

Road Surveys
Transit # 2

FIELD BOOK
361 S

W96

KEUFFEL & ESSER CO.

DRAWING MATERIALS
AND
SURVEYING INSTRUMENTS.

NEW YORK.

CHICAGO. ST. LOUIS. SAN FRANCISCO. MONTREAL.

Tables for Excavations and Embankments.

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.
ROADWAY 18 FEET WIDE. SIDE SLOPES 1 TO 1.
FOR SINGLE TRACK EXCAVATION.

"Copyright, 1895, by Keuffel & Esser Co."

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

Calculated by Julien A. Hall, M. Am. Soc. C. E.

FOR KEITH'S RAILROAD CURVE TABLES SEE END OF BOOK.

Otago

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Level Line - Highway Location from
Saddle and X Roads - into Otay Valley -

Willcomb

Aug. 28, 1917

Grade 6%		Grade	
0+00	1.75	501.75	500
1+00	1.64	496.21	7.18 494.57 494
2+00	0.61	488.68	8.14 488.07 488
3+00	0.86	487.87	6.67 482.01 482
+50		3.79	479.09 479
4+	2.59	478.57	6.87 475.98 476
+50		5.52	473.05 473
5	2.51	472.60	8.48 470.09 470
+50		5.61	66.99 467.0
6	3.03	67.04	8.59 464.01 464.0
+50		6.04	461.0
	12.99	45.95	

0+00 4.7' S. of big sign in rd. at X

Nail

Assumed Elevation

45.95
12.99 500.
32.96 467.0

67.04 ✓

7+00 2.00 460.11 8.93 458.11 458

+50 (5.12) 455

8 3.48 455.52 8.07 452.04 452

+40 (5.88) 449.64 449.6

9 3.77 449.87 7.32 446.20 446

+50

+50 (7.07) 443

~~10+00~~ 2.01 442.00 7.98 439.99 440

+30 (3.74) 438.26 438.2

11 0.62 434.69 7.93 434.07 434.0

+50 (3.64) 31.05 431

6.69

12 ✓ 0.80 428.80 ✓ 6.69 428.0 428

+50 (3.80) 425.0 425

12.68

50.92

467.04 5092
3824 1268
428.80 3824

428.80 ✓

13+00 (6.84) 421.96 422

+50 0.93 419.86 9.87 418.93 419

14 (3.79) 416.07 416

+50 (6.82) 413.04 413

15 1.56 411.50 9.92 409.94 410

+50 (4.52) 406.98 407

16 0.43 404.26 7.67 403.83 404

17 0.69 398.76 6.19 398.07 398

18 1.03 393.12 6.67 392.09 392

+50 (4.16) 388.96 389

~~7.12~~ 38

19 1.28 387.28 7.12 386.00 386

20 2.10 383.08 ✓ 7.30 379.98 380

8.02

54.74

54.74
8.02
428.80
46.72
382.08

		387.08 ✓			
21	0.95	375.08	7.95	374.13	374
22	1.65	369.64	7.09	367.99	368
23	3.19	366.57	6.26	363.38	362
24	1.90	359.36	9.11	357.46	356
+60			(6.44)	352.92	352.4
25+20			10.03	349.33	348.9
25+20	2.47	351.80			
+50			(4.82)	346.98	347
26	1.53	345.40	7.93	343.87	344
+50			(4.56)	340.84	341
27	3.23	341.23 ✓	7.40	338.00	338
	14.92		55.77		

Near Fence

358
488

Aug. 29, 1917

$$\begin{array}{r}
 82.08 \\
 46.83 \\
 \hline
 341.23 \quad 7085
 \end{array}$$

✓
341.23

27 +50 (6.02) 335.21 335

28 3.85 335.63 9.45 331.78 332 ✓

+50 (6.78) 28.85 329

29 3.30 329.37 9.56 326.07 326

30 2.28 322.39 9.26 320.11 320

31 1.75 315.90 8.24 314.15 314

+50 (4.94) 310.96 311

32 2.00 309.91 7.99 307.91 308

33 2.24 304.10 8.05 301.86 302

+50 (5.13) 298.97 299

34 2.50 298.53 ✓ 8.07 296.03 296

+50 (5.58) 292.95 293

17.92
60.62

60.62
17.92
341.23
42.70
298.53

		298.53 [✓]			
35	1.92	291.90	8.55	289.98	290
+50			(4.93)	286.97	287
36	3.60	287.85	7.65	284.25	284
+50			(6.56)	281.29	281
37	3.63	381.57	9.91	277.94	278
+50			(6.63)	274.94	275
38	2.51	274.58	9.50	272.07	272
+50	1.76	271.00	5.34	269.24	269
39	1.93	263.86	9.07	^{261.93} 261.93	266
+50			(3.19)	260.67	263
40			(4.88)	258.98	260
+50	2.21	259.68 [✓]	6.39	257.49	257
	17.56		56.41		

5641
1756
 9851
3885
 25968

✓
259.68

41 3.46 57.22

42+00 4.50 256.39 7.79 251.89

43 3.6

44 4.1

45 5.0

46 6.3

47 4.01 253.57 6.83 247.56

48 4.9

49 4.2

5 4.9

51 6.25

52 2.61 250.05 6.13 247.44

11.12 20.75

Hub

+40 Fence

Hub

2075
1112
259.68 963
9.63
250.05

250.05 ✓

53			4.15	245.90
+20			6.3	
54			8.0	
55			8.3	
56			8.9	
57	7.11	248.64	8.52	241.53
+45	7.11 8.81	252.99	4.46	244.88
58+45			1.09	51.90
59+50			0+85	252.14 ✓

15.94
 19.83
 2.09
 250.86
 252.14

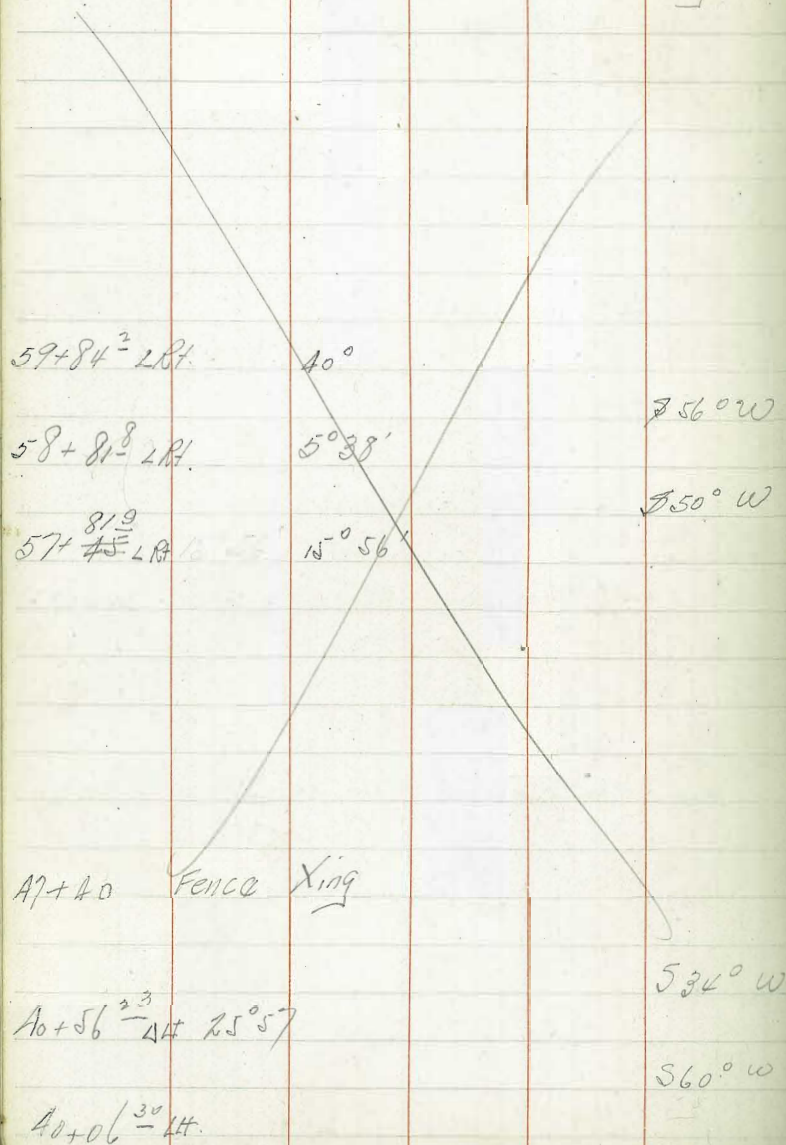
13.83

Edge of River Channel

Road on gravel Bar Mouth of Canyon

Road Survey

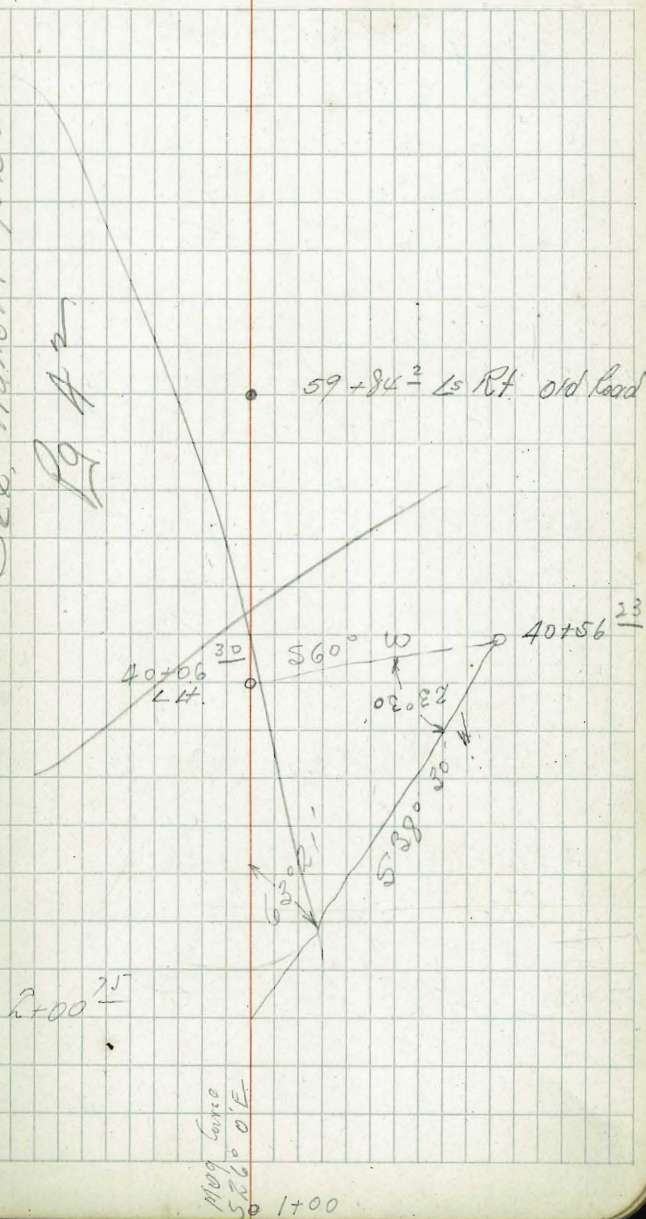
Sta Ls Lt Ls Rt Mag. C.



8/30/17

9

See Transit Book #1
Pg 42



Lt. "A" L₁₀₀.
 X sections Road

3/4	Grade	123	9880	9457
1+00	494.0	$\frac{1.0}{150}$	$\frac{0.7}{75}$	$\frac{0.7}{75} + 0.6$
1+27	492.58	$\frac{1.9}{15}$	$\frac{1.7}{75}$	$+1.4$
1+40	491.6	$\frac{1.9}{150}$	$\frac{+3.0}{75}$	$\frac{0.6}{1.0}$
1+00	488.0	2.87	90.94	48807
2+00	488.0	$\frac{+1.3}{150}$	$\frac{+0.9}{75}$	0.0
+40	485.6	$\frac{+1.8}{150}$	$\frac{+0.7}{75}$	$\frac{-0.9}{7.5}$
3+00	482.0	$\frac{+3.1}{150}$	$\frac{+1.8}{75}$	$\frac{-1.6}{7.5}$

Rt

9/11/17 10

Cuts Fills Willcomb - Level
 Bob - Notes
 Root Fisher - Ditley

$\frac{+0.7}{52}$	$\frac{1.0}{75}$	$\frac{-1.0}{150}$	9.1	0.0
$\frac{-1.5}{150}$			18.9	0.0
$\frac{-0.8}{150}$			8.3	6.1
$\frac{-1.1}{150}$	$\frac{1.2}{16.8}$	$\frac{0}{3.0}$	3.0	18.0
$\frac{-2.0}{150}$			4.3	3.3
$\frac{-2.6}{150}$			8.5	6.5

(7.5' RT+)

	Lt.		£	
3+50	479.0	574	84.82	479.08
			$\frac{+20}{15.0} \frac{1.1}{7.5}$	$+0.1 \frac{1.1}{7.5} \frac{3.2}{7.5}$
4+00	476.0		$\frac{+42}{15.0} \frac{2.5}{8.8} \frac{2.2}{7.5}$	00
T.P.		265	78.63	75.9P
4+00	476.0			$\frac{-3.9}{100}$
4+50	473.0		$\frac{+50}{15.0} \frac{3.2}{9.1} \frac{2.6}{7.5}$	00 $\frac{-4.2}{100}$
5+00	470.0		$\frac{+54}{15.0} \frac{2.8}{8.9} \frac{2.2}{7.5}$	$+0.1 \frac{1.0}{7.5} \frac{-2.3}{100}$
		5.9	75.99	70.09
5+50	467.0		$\frac{+40}{15.0} \frac{2.4}{8.1} \frac{2.1}{7.5}$	00 $\frac{-3.3}{100}$
6+00	464.0		$\frac{+41.76}{15.0} \frac{2.8}{8.8} \frac{2.3}{7.5}$	+00
		7.61	716.2	64.01

	Cuts	Fills	11 Rod
	$\frac{-5.5}{15.0} \frac{6.0}{16.5} \frac{-7.2}{20.0}$	8.1	8.1
	4.8	21.0	(2.5' left) 5.8
	13.7		4.6 left 8.8
	9.4		
	$\frac{5.4}{15.0} \frac{-6.7}{20.0}$	14.2	2.6
		20.3	1.6 left
	$\frac{4.8}{14.7} \frac{-5.6}{20.0}$	15.3	15.2
		18.0	1' left 5.6
	$\frac{2.6}{11.4} \frac{-4.8}{20.0}$	11.2	9.1
			6.0 - 8.6
	$\frac{4.6}{14.7} \frac{-6.6}{20.0}$	12.5	11.9
		9.0	18.0
			(1.4 left) 9.0
	$\frac{-2.7}{10.0} \frac{3.2}{12.3} \frac{-5.1}{20.0}$	10.5	11.1
		9.8	12.0
			(0.3 left)
			7.6 - 12.0

4. E
 6+50 461.0 $\frac{+3.7}{15.0} \frac{2.2}{8.6} \frac{+2.0}{7.5} 0.0$

7+00 458.0 $\frac{+2.6}{15.0} \frac{1.2}{8.1} \frac{+1.1}{7.5} +0.1 \frac{0.0}{0.6}$

1.91 60.02 58.11

7+50 455.0 $\frac{+1.9}{15.0} \frac{1.0}{8.0} \frac{+1.0}{7.5} -0.1 \frac{0.0}{1}$

8+00 452.0 $\frac{+2.4}{15.0} \frac{1.3}{8.1} \frac{+1.2}{7.5} +0.4 \frac{0.0}{1}$

8+40 449.6 $\frac{+4.3}{15.0} \frac{2.4}{8.7} \frac{+2.1}{7.5} 0.0$

5.6 55.34 449.64

9+00 446.0 $\frac{+5.8}{15.0} \frac{3.8}{9.4} \frac{+3.1}{7.5} +0.2 \frac{0.0}{0.6}$

1+50 443.0 $\frac{+6.2}{15.0} \frac{3.8}{7.4} \frac{+3.0}{7.5} 0.0$

10+00 440.0 $\frac{+3.2}{15.0} \frac{2.2}{8.5} \frac{+2.1}{7.5} 0.0$

12
 Rt. Cuts. Fills Red.
 $\frac{-2.7}{10.0} \frac{3.0}{12.3} \frac{5.0}{20.0}$ $\frac{10.0}{83} \frac{10.1}{17.0}$ (0.8 left) 0.6

$\frac{-1.6}{10.0} \frac{-2.2}{20.0}$ 4.9 5.5 2.0 13.6

$\frac{-1.1}{10.0} \frac{-2.5}{20.0}$ 4.3 3.3 5.0

$\frac{-1.6}{10.0} \frac{-3.3}{20.0}$ 6.2 4.4 8.0

$\frac{-3.5}{10.0} \frac{4.6}{14.4} \frac{-6.1}{20.0}$ 12.6 13.2 9.0 17.3 (1.2 left) 10.4

$\frac{-3.3}{10.0} \frac{4.4}{14.1} \frac{-6.4}{20.0}$ 15.4 15.2 9.2

$\frac{-5.1}{10.0} \frac{-9.2}{20.0} \frac{10.4}{23.1} 44.7$ 20.0 39.0 (2.5 left) 12.2

$\frac{-2.2}{10.0} \frac{2.4}{11.1} \frac{-4.3}{20.0}$ 8.3 9.0 0.5 3.5

$\frac{0.0}{20} - \frac{1.0}{15.0} \quad \frac{1.9}{10.3} - \frac{2.4}{7.5} \quad -3.3$
 10+15 439.1
 $\frac{4}{19.5} + \frac{3.3}{15.0} \quad \frac{2.2}{8.6} + \frac{2.0}{7.5} \quad +0.1 \quad \frac{0.0}{3}$
 10+30 438.2
 $\frac{4.1}{15.0} \quad \frac{2.8}{7.8} + \frac{2.2}{7.5} \quad \frac{0.0}{2.4} - 1.0$
 10+40 437.6
 $\frac{6.6}{18.3} - \frac{5.0}{15.0} \quad + \frac{2.0}{7.5} \quad +0.6 \quad \frac{0.0}{3}$
 10+70 435.8
 $\frac{+6.0}{15.0} \quad \frac{3.8}{9.4} + \frac{3.1}{7.5} \quad +0.1 \quad \frac{0.0}{3}$
 11+00 434.0
 $\frac{+5.5}{10.0} \quad \frac{4.0}{9.5} + \frac{3.4}{7.5} \quad +0.1 \quad \frac{0.0}{0.4}$
 +50 431.0
 $\frac{+5.0}{15.0} \quad \frac{3.8}{9.4} + \frac{2.8}{7.5} \quad 0.0$
 17+00 428.0
 $2.2 \quad 3.3 \quad 2.6 \quad 3.1 \quad 0.5$
 12+50 425.0
 $\frac{4.0}{15.0} \quad \frac{2.2}{8.6} + \frac{1.9}{7.5} \quad 0.0$
 13+00 422.0
 $\frac{+3.1}{11.0} \quad \frac{1.6}{8.3} + \frac{1.4}{7.5} \quad 0.0$

0.0 110.4 13
 Cuts Fills Draw 4.4
 $\frac{-5.4}{10.0} \quad \frac{6.8}{17.7} - \frac{7.2}{20.0} \quad 36.5 \quad 16.1 \quad 5.3$
 $\frac{-3.9}{10.0} \quad \frac{4.0}{14.2} - \frac{5.4}{20.0} \quad 28.9 \quad 18.8 \quad 5.9$
 Draw (More 1.9 to left 2.0)
 $\frac{-4.4}{10.0} \quad \frac{4.7}{12.6} - \frac{5.7}{20.0} \quad 41.2 \quad 0.0$
 $\frac{-2.4}{10.0} \quad \frac{-3.5}{15.0} \quad \frac{-6.3}{20.0} \quad 0.0 \quad 7.7$
 (Move 7.5 to left)
 $\frac{-4.1}{10.0} \quad \frac{8.0}{19.5} - \frac{8.2}{20.0} \quad 20.2 \quad 19.2 \quad 9.5$
 $\frac{14.8}{19.1} \quad 20.5 \quad 19.2 \quad 7.5$
 (1' left)
 $\frac{-4.5}{10.0} \quad \frac{7.0}{16.0} - \frac{7.6}{20.0} \quad 19.1 \quad 20.5 \quad 2.3 \quad 12.5$
 $\frac{15.4}{16.7} \quad 15.9 \quad 15.9 \quad 12.5$
 (1' left)
 $\frac{-3.9}{10.0} \quad \frac{5.2}{15.3} - \frac{6.4}{20.0} \quad 16.7 \quad 15.9 \quad 5.3 \quad 15.5$
 $\frac{14.8}{14.8} \quad 14.8 \quad 14.8$
 11+50 -0.7
 $\frac{-3.3}{10.0} \quad \frac{4.1}{13.7} - \frac{5.5}{20.0} \quad 10.6 \quad 12.3 \quad 8.3$
 $\frac{8.3}{8.3} \quad 8.3 \quad 8.3$
 (1' left) 8.3
 $\frac{-2.6}{10.0} \quad \frac{3.2}{12.3} - \frac{5.3}{20.0} \quad 8.5 \quad 8.3 \quad 1.9 \quad 11.3$
 $\frac{6.0}{6.0} \quad 6.0 \quad 6.0$
 (1.2' left)

	Lt.		⊖	
		19	23.86	421.96
13+50	A19	$\frac{+4.0}{15.0}$	$\frac{2.2}{8.6}$	$\frac{+1.9}{7.5}$
				-0.1
14+00	A16	$\frac{+4.2}{15.0}$	$\frac{2.5}{8.8}$	$\frac{2.2}{7.5}$
				+0.1
+50	A13	$\frac{+3.8}{15.0}$	$\frac{2.0}{8.5}$	$\frac{+1.7}{7.5}$
				+0.0
		18	414.84	413.04
15+00	A10.0	$\frac{+2.4}{15.0}$	$\frac{1.2}{8.1}$	$\frac{1.1}{7.5}$
				0.0
15 +50	A07.0	$\frac{+0.7}{15.0}$	$\frac{0.1}{7.6}$	$\frac{+0.3}{7.5}$
				0.0
16+00	A04.0	$\frac{+2.1}{15.0}$	$\frac{1.00}{7.5}$	
				-0.3
12+00	398.0	A.1	0217	9807
		$\frac{+2.7}{15.0}$	$\frac{1.5}{8.1}$	$\frac{1.4}{7.5}$
				+0.1

	Rt	Cuts	Fills	
13+50		8.9	8.8	(0.2' left) 4.9
	$\frac{-2.2}{10.0}$	$\frac{2.5}{11.2}$	$\frac{-4.8}{20.0}$	$\frac{7.8}{9.9}$
14+00		12.9	13.1	(1.4' left) 7.9
	$\frac{-3.4}{10.0}$	$\frac{5.6}{11.9}$	$\frac{-7.0}{20.0}$	$\frac{9.8}{21.2}$
+50		7.5	7.5	(1.0' left) 10.9
	$\frac{-1.9}{10.0}$	$\frac{2.0}{10.0}$	$\frac{4.3}{20.0}$	
14+50		6.0	6.2	(1.0' left) 4.8
	$\frac{-2.0}{10.0}$	$\frac{2.0}{10.0}$	$\frac{-4.6}{20.0}$	$\frac{4.0}{7.6}$
15 +50		4.9	0.0	7.5' left 7.8
	$\frac{-0.8}{10.0}$	$\frac{7}{8.5}$	$\frac{-4.6}{20.0}$	$\frac{4.1}{7.6}$
16+00		0.0	9.5	10.8
	$\frac{-1.5}{10.0}$	$\frac{-2.7}{20.0}$		
12+00		6.7	4.1	4.2
	$\frac{1.2}{9.3}$	$\frac{1.3}{10.0}$	$\frac{-3.3}{20.0}$	7.2

	Lt.			E	
18+00	392.0	$\frac{-3.1}{15.0}$	$\frac{18+1.6}{87.7.5}$	+0.1	$\frac{0.0}{4}$
18+50	389.00	2.13 $\frac{+3.0}{15.0}$	$\frac{91.09}{8.8+1.2}{7.5}$	+0.0	88.96
19+00	386.0	$\frac{+2.5}{15.0}$	$\frac{1.1+1.0}{8.1+7.5}$	+0.0	
20+00	380.	$\frac{+2.0}{15.0}$	$\frac{1.1+1.0}{8.0+7.5}$	0.0	
21+00	374	2.37 $\frac{+2.1}{15.0}$	$\frac{76.50}{+1.3}{7.5}$	+0.1	374.13
21+04	A = 21+04 B				
22+00	368	$\frac{+0.8}{15.0}$	$\frac{20.6}{7.5}$	0.0	
23+00	362	2.6 $\frac{-1.8}{15.0}$	$\frac{65.98}{+1.8}{7.5}$	+1.4	63.38
24+00	356	$\frac{+2.6}{15.0}$	$\frac{+2.7}{7.5}$	+1.5	

	Rt	Cuts	Fills	
	$\frac{-2.3}{10.0}$	8.0	7.9	(25 left) 10.2
	$\frac{2.4}{11.1}$	7.1	8.5	
	$\frac{18+5.0}{15.0}$	4.9	5.4	2.1 13.2
	$\frac{-3.7}{20.0}$	4.9	5.1	
	$\frac{-1.6}{10.0}$	3.6	6.0	(26 left) 5.1
	$\frac{-3.0}{20.0}$	3.6	3.4	11.1
	$\frac{0.9}{9.0}$			
	$\frac{-2.6}{20.0}$			2.5
	$\frac{-1.7}{10.0}$			5.5
	$\frac{-1.9}{20.0}$			4.0
	$\frac{+1.5}{10.0}$			10.0
	$\frac{+1.5}{20.0}$			
	$\frac{+2.2}{7.5}$			
	$\frac{+2.6}{15.0}$			

	Lt.		E		Rt.		
24+65	352.1	$\frac{2.35}{-1.5}$	$\frac{55.27}{0.9}$	$\frac{57.92}{2.06}$	$\frac{7.4}{+1.4}$	$\frac{15.0}{+1.7}$	3.2
		$\frac{20.0}{14.0}$	$\frac{7.5}{7.5}$	+0.8			

24+78		$\frac{-5.4}{20.0}$	$\frac{-4.6}{10.0}$	-3.0	$\frac{-2.0}{10.0}$	$\frac{-0.6}{20.0}$	4.0
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25+00	350.	$\frac{-7.6}{20.0}$	$\frac{-6.1}{10.0}$	-4.6	$\frac{-3.1}{10.0}$	$\frac{-1.7}{20.0}$	5.3
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25+16	349.0	$\frac{-3.7}{20.0}$	$\frac{-1.9}{10.0}$	+0.1	$\frac{7.0}{7.5}$	$\frac{+1.8}{15.0}$	6.3
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25+50	347.0	$\frac{-6.5}{20.0}$	$\frac{-3.7}{10.0}$	0.0	$\frac{+2.8}{7.5}$	$\frac{+6.1}{15.0}$	8.3
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26+50	341.0	30.7	43.91	340.34	$\frac{+2.5}{7.5}$	$\frac{+5.1}{15.0}$	2.9 4.3
		$\frac{-8.1}{20.0}$	$\frac{-3.7}{10.0}$	-0.2			

27+00	338.0	$\frac{-7.5}{20.0}$	$\frac{-3.9}{10.0}$	0.0	$\frac{+2.9}{7.5}$	$\frac{+6.3}{15.0}$	5.7
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27+50	335.0	5.9	37.70	31.78	$\frac{+3.5}{7.5}$	$\frac{+7.1}{15.0}$	2.7 8.9
		$\frac{-7.0}{20.0}$	$\frac{-5.0}{10.0}$	+0.2			

27+80	333.8	$\frac{-6.9}{10.0}$	$\frac{-3.1}{10.0}$	+1.6	$\frac{+4.3}{7.5}$	$\frac{+8.8}{15.0}$	4.5 11.9
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	Lt.			£					
28+00	33.2	$\frac{-9.0}{20.0}$	$\frac{-4.9}{10.0}$	-0.2					

		$\frac{+3.8}{7.5}$	$\frac{+7.2}{15.0}$					8.7	11.9

28+50	329.0	$\frac{-9.0}{20.0}$	$\frac{-4.6}{10.0}$	-0.1					
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		$\frac{+3.0}{7.5}$	$\frac{+7.0}{15.0}$					8.7	
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		3.33	19.40		2607				
29+00	326.0	$\frac{+2.5}{20.0}$	$\frac{-4.5}{10.0}$	+0.1					

		$\frac{+3.1}{7.5}$	$\frac{+6.4}{15.0}$					8.4	11.7
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30+00	320.0	$\frac{-7.4}{20.0}$	$\frac{-3.5}{10.0}$	-0.1					
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		$\frac{+3.4}{7.5}$	$\frac{+6.2}{15.0}$					9.4	
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		5.72	19.87		1415				
31+00	314.0	$\frac{-6.8}{20.0}$	$\frac{-3.7}{10.0}$	-0.2					

		$\frac{+2.7}{7.5}$	$\frac{+5.2}{15.0}$					5.9	15.4
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		3.9	311.81		307.91				
32+00	308.0	$\frac{-7.4}{20.0}$	$\frac{-3.7}{10.0}$	-0.1					

		$\frac{+2.6}{7.5}$	$\frac{+5.5}{15.0}$					3.8	11.9
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33+00	302.0	$\frac{-6.9}{20.0}$	$\frac{-3.1}{10.0}$	-0.1					
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		$\frac{+2.2}{7.5}$	$\frac{+4.5}{15.0}$					7.8	
--	--	--------------------	---------------------	--	--	--	--	-----	--

34+00	296.00	$\frac{-5.9}{20.0}$	$\frac{-3.0}{10.0}$	00					
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		$\frac{+3.1}{7.5}$	$\frac{+4.6}{15.0}$					2.0	15.8
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8/1/17

18

	Lt.		E	
35+00	290.0	20	9803 $\frac{-6.4}{200}$	96.03 $\frac{-3.2}{100}$ 00

	Rt.	
	$\frac{+2.5}{7.5}$	$\frac{+4.9}{15.0}$ 8.0

35+50	287.0	624	9049 $\frac{-6.4}{200}$	8425 $\frac{-7.9}{100}$ 00
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	$\frac{+2.3}{7.5}$	$\frac{+4.7}{15.0}$ 11.0
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36+00	284.0		$\frac{-7.3}{200}$	$\frac{-6.7}{100}$	+0.3
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	$\frac{+2.6}{7.5}$	$\frac{+4.8}{15.0}$ 6.5	14.0
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37+00	278.0	352	81.46 $\frac{-10.0}{200}$	7794 $\frac{-4.7}{100}$	0.0
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	$\frac{+4.0}{7.5}$	$\frac{+7.1}{15.0}$ 3.5	12.5
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37+40	275.6		$\frac{-9.9}{200}$	$\frac{-6.6}{100}$	-1.5
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	$\frac{+4.0}{7.5}$	$\frac{5.9}{15.0}$ 5.9
--	--------------------	------------------------

37+50	275.0		$\frac{-9.8}{200}$	$\frac{-5.7}{100}$	-0.1
-------	-------	--	--------------------	--------------------	------

	$\frac{+3.7}{7.5}$	$\frac{+6.3}{15.0}$ 6.5
--	--------------------	-------------------------

38+00	272.0	32	72.40 $\frac{-8.4}{200}$	69.24 $\frac{-4.4}{100}$	+0.1
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	$\frac{+3.1}{7.5}$	$\frac{+6.3}{15.0}$ 3.4	9.5
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38+50	269.0		$\frac{-7.0}{200}$	$\frac{-4.4}{100}$	+0.2
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	$\frac{+3.8}{7.5}$	$\frac{+6.9}{15.0}$ 12.5
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	Lt.	E	
39+00	266.0	$\frac{-6.3}{20.0}$	$\frac{-2.7}{10.0} - 5.0$

	Lt.	
	$\frac{-4.1}{10.0}$	$\frac{-3.8}{20.0}$
		6.4

	Lt.	E	
39+30	264.7	288	6355
	$\frac{-0.2}{20.0}$	$\frac{-6.0}{10.0}$	60.67
			-8.4

	Lt.		
	$\frac{-5.7}{10.0}$	$\frac{-4.0}{20.0}$	Wash
			-0.6

	Lt.	E	
39+50	263.0	$\frac{-3.1}{20.0}$	$\frac{-2.7}{10.0} - 2.2$

	Lt.		
	$\frac{-2.7}{10.0}$	$\frac{-1.5}{20.0}$	+0.6

	Lt.	E	
40+00	260.0	$\frac{-1.2}{20.0}$	$\frac{-1.1}{10.0} - 1.0$

	Lt.		
	$\frac{-0.7}{10.0}$	$\frac{-0.5}{20.0}$	3.6

	Lt.	E	
40+50	257	$\frac{+0.6}{15.0}$	$\frac{+0.4}{7.5} + 0.6$

	Lt.		
	$\frac{+0.4}{7.5}$	$\frac{+0.5}{15.0}$	6.6

	Lt.	E	
	101	H.I.	256.22
		57.23	

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|       | Lt.                | E                  |  |
|-------|--------------------|--------------------|--|
| 41+00 | $\frac{1.2}{15.0}$ | $\frac{1.01}{0.0}$ |  |

|  | Lt.                |  |
|--|--------------------|--|
|  | $\frac{0.5}{15.0}$ |  |

|       | Lt.                | E                 |  |
|-------|--------------------|-------------------|--|
| 42+00 | $\frac{4.5}{15.0}$ | $\frac{5.4}{0.0}$ |  |

|  | Lt.                |  |
|--|--------------------|--|
|  | $\frac{5.7}{15.0}$ |  |

|     | Lt.                | E                 |  |
|-----|--------------------|-------------------|--|
| +50 | $\frac{7.0}{15.0}$ | $\frac{7.0}{0.0}$ |  |

|  | Lt.                |  |
|--|--------------------|--|
|  | $\frac{6.9}{15.0}$ |  |

Wash

Red Reading

|        |                    |                  |
|--------|--------------------|------------------|
|        | Lt.                | E                |
|        | 57.23              |                  |
| 43+00. | $\frac{4.3}{15.0}$ | $\frac{4.5}{00}$ |

|        |                    |                  |
|--------|--------------------|------------------|
| 44+00. | $\frac{4.9}{15.0}$ | $\frac{5.0}{00}$ |
|--------|--------------------|------------------|

|       |                    |                  |
|-------|--------------------|------------------|
| 45+00 | $\frac{5.9}{15.0}$ | $\frac{5.9}{00}$ |
|-------|--------------------|------------------|

|       |                    |        |
|-------|--------------------|--------|
| T.P.  |                    |        |
| 46+00 | 423                | 249.56 |
|       | $\frac{3.9}{15.0}$ |        |
|       | 53.79              |        |

|       |                    |  |
|-------|--------------------|--|
| 47+00 | $\frac{4.3}{15.0}$ |  |
|-------|--------------------|--|

|       |                    |  |
|-------|--------------------|--|
| 48+00 | $\frac{4.9}{15.0}$ |  |
|-------|--------------------|--|

|       |                    |  |
|-------|--------------------|--|
| 49+00 | $\frac{4.4}{15.0}$ |  |
|-------|--------------------|--|

|       |                    |  |
|-------|--------------------|--|
| 50+00 | $\frac{5.7}{15.0}$ |  |
|-------|--------------------|--|

|         |                    |
|---------|--------------------|
|         | Rt.                |
|         | $\frac{4.6}{15.0}$ |
|         | $\frac{4.8}{15.0}$ |
|         | $\frac{6.1}{15.0}$ |
| (47+00) | $\frac{3.5}{15.0}$ |
|         | $\frac{4.2}{15.0}$ |
|         | $\frac{5.1}{15.0}$ |
|         | $\frac{4.5}{15.0}$ |
|         | $\frac{5.0}{15.0}$ |

|      | Lt. | H.I.  | E      |
|------|-----|-------|--------|
| T.P. | 339 | 50,83 | 247,44 |

| Rt.   |
|-------|
| 52+00 |

|       |
|-------|
| 51+00 |
|-------|

|                    |
|--------------------|
| $\frac{3.6}{15.0}$ |
|--------------------|

|                    |
|--------------------|
| $\frac{3.5}{15.0}$ |
|--------------------|

|        |
|--------|
| 52+00. |
|--------|

|                    |
|--------------------|
| $\frac{3.1}{15.0}$ |
|--------------------|

|                    |
|--------------------|
| $\frac{4.1}{15.0}$ |
|--------------------|

|       |
|-------|
| 53+00 |
|-------|

|                    |
|--------------------|
| $\frac{6.0}{15.0}$ |
|--------------------|

|                    |
|--------------------|
| $\frac{4.5}{15.0}$ |
|--------------------|

|     |
|-----|
| +60 |
|-----|

|                    |
|--------------------|
| $\frac{8.9}{15.0}$ |
|--------------------|

|                   |
|-------------------|
| $\frac{7.9}{0.0}$ |
|-------------------|

|                    |
|--------------------|
| $\frac{8.7}{15.0}$ |
|--------------------|

|        |
|--------|
| 54+00. |
|--------|

|                    |
|--------------------|
| $\frac{9.0}{15.0}$ |
|--------------------|

|                    |
|--------------------|
| $\frac{8.6}{15.0}$ |
|--------------------|

|        |
|--------|
| 55+00. |
|--------|

|                    |
|--------------------|
| $\frac{7.9}{15.0}$ |
|--------------------|

|                   |
|-------------------|
| $\frac{8.2}{0.0}$ |
|-------------------|

|                    |
|--------------------|
| $\frac{8.5}{15.0}$ |
|--------------------|

|     |
|-----|
| +25 |
|-----|

|                    |
|--------------------|
| $\frac{9.8}{15.0}$ |
|--------------------|

|                   |
|-------------------|
| $\frac{9.5}{0.0}$ |
|-------------------|

|                    |
|--------------------|
| $\frac{9.8}{15.0}$ |
|--------------------|

|     |
|-----|
| +50 |
|-----|

|                    |
|--------------------|
| $\frac{7.5}{15.0}$ |
|--------------------|

|                   |
|-------------------|
| $\frac{7.3}{0.0}$ |
|-------------------|

|                    |
|--------------------|
| $\frac{7.3}{15.0}$ |
|--------------------|

|     |
|-----|
| +75 |
|-----|

|                    |
|--------------------|
| $\frac{9.6}{15.0}$ |
|--------------------|

|                    |
|--------------------|
| $\frac{10.0}{0.0}$ |
|--------------------|

|                     |
|---------------------|
| $\frac{10.4}{15.0}$ |
|---------------------|



|                                 | Lt                  |                  | Rt.                |
|---------------------------------|---------------------|------------------|--------------------|
| 56+00                           | $\frac{9.9}{15.0}$  | $\frac{90}{97}$  | $\frac{9.9}{15.0}$ |
| AP.                             | 862                 | ✓50.15           | 241.53             |
| 57+00                           | $\frac{86}{15.0}$   | $\frac{79}{00}$  | $\frac{8.7}{15.0}$ |
| 57+30                           | $\frac{9.0}{15.0}$  | $\frac{9.3}{00}$ | $\frac{8.7}{15.0}$ |
| 57+80 = (57+45)                 | $\frac{5.3}{15.0}$  |                  | $\frac{7.9}{15.0}$ |
| 58+00                           | $\frac{0.9}{15.0}$  | $\frac{35}{00}$  | $\frac{5.5}{15.0}$ |
| AP.                             | 489                 | 56.79            | ✓51.90             |
| 59+00                           | $\frac{3.75}{15.0}$ | $\frac{4.3}{00}$ | $\frac{4.5}{15.0}$ |
| 59+84 <sup>3</sup> EAD Old Road | $\frac{3.9}{15.0}$  | $\frac{4.2}{00}$ | $\frac{4.2}{15.0}$ |

|                   | Rt.                |
|-------------------|--------------------|
|                   | $\frac{9.9}{15.0}$ |
| 57+00             | $\frac{8.7}{15.0}$ |
|                   | $\frac{8.7}{15.0}$ |
|                   | $\frac{7.9}{15.0}$ |
|                   | $\frac{5.5}{15.0}$ |
| 58+81.2 = (58+45) |                    |
|                   | $\frac{4.5}{15.0}$ |
|                   | $\frac{4.2}{15.0}$ |

9/3/17

"B" Line  
Lower Otay Valley Highway

|       |       |        |             |                     |
|-------|-------|--------|-------------|---------------------|
| 39+50 | 2.32  | 262.99 |             | 260.67              |
| 0+00  |       |        | 7.9         | 255.09 255-         |
| +50   |       |        | 10.1        | 51.9 58.25<br>58.79 |
| +58   |       |        | 12.9        | 50.1 58.77          |
| 1     |       |        | 12.7        | 50.3 261.5          |
| +50   |       |        | 10.6        | 52.4 264.75         |
| 2     |       |        | 5.6         | 57.4 268.0          |
| +25   |       |        | 0.4         | 62.6 269.63         |
| Δ     | 13.01 | 275.68 | 0.32        | 267.67              |
| +50   |       |        | 7.4         | 268.3 271.25        |
| Δ     | 12.79 | 288.09 | 0.38<br>.20 | 275.30              |
| 3     | 28.17 |        | 9.5         | 278.6 274.5         |

Running along Fence Line from  
50' S.W. of N.E. edge Tobacco Weed  
on 6 1/2% Grade

23

"A" Line

6 1/2% Grade -

100 6.5  
50 3.25  
25 1.625  
10 .65

28.17  
70  
21.47

260.67  
274.5  
288.09

|              |       |                     |              |                  |        |
|--------------|-------|---------------------|--------------|------------------|--------|
|              |       | 288.09              |              |                  |        |
| 3+50         |       |                     | 10.0         | 278.1            | 277.75 |
| 4            |       |                     | 7.4          | 280.7            | 281.00 |
| +50          |       |                     | 3.5          | 284.6            | 284.25 |
| <del>5</del> |       |                     | <del>5</del> | <del>287.5</del> |        |
| Δ            | 12.29 | 299.71              | 0.67         | 287.42           |        |
| 5+50         |       |                     | 9.1          | 290.6            | 290.75 |
| 6+50         |       |                     | 2.5          | 297.2            | 297.25 |
| Δ            | 12.65 | 311.67              | 0.69         | 299.02           |        |
| 7+50         |       |                     | 8.1          | 303.6            | 303.75 |
| 8+50         |       |                     | 1.7          |                  | 310.25 |
|              | 11.38 | 323.02 <sup>v</sup> | 0.03         | 311.64           |        |
|              | 36.32 |                     | 1.39         |                  |        |
| 9+00         |       |                     | 9.8          | 313.2            | 313.5  |
| +50          |       |                     | 5.6          | 317.4            | 316.75 |
| 10           |       |                     | 3.00         |                  | 320.0  |

36.32  
1.39  
34.93  
288.09  
323.02

Edge Cutbank

323.02

|       |       |        |      |        |
|-------|-------|--------|------|--------|
| Δ     | 12.08 | 333.89 | 1.21 | 331.81 |
| 10+50 |       |        | 10.7 | 323.25 |
| 11+50 |       |        | 3.0  | 329.75 |
| Δ     | 12.75 | 346.11 | 0.53 | 333.36 |
| 12+50 |       |        | 9.6  | 336.25 |
| 13    |       |        | 6.1  | 339.5  |
| +50   |       |        | 3.2  | 342.75 |
| Δ     | 12.42 | 356.98 | 1.55 | 344.56 |
|       |       |        |      | 346.00 |
| 14    |       |        | 10.9 |        |
| +50   |       |        | 7.8  | 349.25 |
| 15    |       |        | 4.4  | 353.5  |
|       | 12.95 | 369.05 | 0.88 | 356.10 |

12+75 Road Xing  
opposite Cut Old Rd.

|         |          | 369.05 |      |                        |
|---------|----------|--------|------|------------------------|
| 15+50   |          |        | 13.0 | 355.75                 |
| 16      | 24       |        | 10.1 | 258.95 359.0           |
| +50     |          |        | 3.5  | 365.5 362.25           |
|         | 3.94     | 279.88 | 0.11 | 368.94                 |
| 17 = 22 | 99.79    |        | 2.9  | 370.0 365.5            |
| 18 = 22 |          |        | 3.6  | <del>369.3</del> 372.0 |
| +95.3   |          |        |      | 378.13                 |
| 22+00   | "A" Line |        | 4.71 | 288.19                 |

| B.S. | F.S. |       |
|------|------|-------|
|      |      |       |
| 4.4  | 1    |       |
|      | 8.5  | 354.0 |

Sta. 21+04.48 6 To Grade -  
 Old Grade 374.2 = 378.13 which gives  
 4' to spare -  
 267.99' a/c.

## Profile Old Road -

|       |       |        |                  |        |
|-------|-------|--------|------------------|--------|
| 2+50. | 11.39 | 279.68 | <del>11.78</del> | 268.3  |
| 3+50  |       |        | 6.2              | 273.5  |
| 4+50  |       |        | 0.4              | 279.3  |
| Δ     | 13.04 | 292.45 | 0.27             | 279.41 |
| 5+50  |       |        | 5.0              | 87.5   |
| 6     |       |        | 1.9              | 90.6   |
| Δ     | 11.83 | 303.50 | 0.78             | 291.67 |
| 7     |       |        | 8.3              | 95.2   |
| +50   |       |        | 6.1              | 97.4   |
| 8     |       |        | 3.6              | 299.9  |
| +50   |       |        | 0.7              | 302.8  |
| Δ     | 12.81 | 315.73 | 0.58             | 302.97 |
| 9     |       |        | 10.1             | 05.6   |
| +50   |       |        | 7.7              | 08.0   |

6½% or B Line

Center Old Road.

|     |       |        |      |        |
|-----|-------|--------|------|--------|
|     |       | 315.73 |      |        |
| 10  |       |        | 4.8  | 10.9   |
| +50 |       |        | 1.1  |        |
| Δ   | 13.25 | 328.31 | 0.67 | 315.06 |
| 11  |       |        | 9.5  | 318.8  |
| +50 |       |        | 5.5  | 322.8  |
| 12  |       |        | 1.3  | 327.0  |
| Δ   | 12.48 | 340.78 | 0.01 | 328.30 |
| +50 |       |        | 7.0  | 33.8   |
| 13  |       |        | 0.1  | 340.7  |
| Δ   | 12.98 | 353.33 | 0.43 | 340.35 |
| +50 |       |        | 4.6  | 348.7  |
| +70 |       |        | 0.7  | 352.6  |
| Δ   | 9.36  | 361.93 | 0.76 | 352.57 |
| 14  |       |        | 5.5  | 356.4  |
| +30 |       |        | 2.3  | 359.6  |
| +50 |       |        | 1.1  | 60.8   |

opposite Sta 23+75 6% Line ✓

9/4/17

Adjusting "B" -

|                     |      |        |       |        |        |
|---------------------|------|--------|-------|--------|--------|
| 21+04 <sup>95</sup> |      |        |       | 374.02 |        |
| 21+00.              |      |        |       | 74.32  |        |
| 22+00               |      |        |       | 67.82  |        |
| 23+00               |      |        |       | 61.32  |        |
| 24+00               |      |        |       | 54.82  |        |
| 16 "B"              | 4.4  | 363.35 |       | 358.95 |        |
| 24+18.19            |      |        | 8.5   | 354.85 | 53.62  |
|                     | 5.35 | 360.20 |       |        |        |
| +50                 |      |        | 8.7   | 351.5  | 351.57 |
| 25                  |      |        | 11.9  | 348.9  | 348.32 |
| Δ                   | 4.81 | 352.61 | 12.4  | 347.8  |        |
| +50                 |      |        | 7.55  | 345.06 | 345.07 |
| 26                  |      |        | 10.7  | 341.9  | 341.82 |
| Δ                   | 2.92 | 342.59 | 12.76 | 339.65 |        |
| +50                 |      |        | 4.0   | 338.6  | 338.57 |
| 27                  |      |        | 7.2   | 335.4  | 335.32 |
| +50                 |      |        | 10.35 | 332.2  | 332.07 |
|                     | 0.62 | 330.22 | 12.97 | 329.60 |        |
| 28                  |      |        | 1.25  | 28.87  | 328.82 |

6.5  
5.25

29

"A" Line -

6 1/2 % Grade

Corresponds to Sta. 16 "B"



|       |      |        |       |        |        |
|-------|------|--------|-------|--------|--------|
|       |      | 330.72 |       | 3      |        |
| 28+50 |      |        | 5.4   | 324.8  | 325.57 |
| 29    |      |        | 9.5   | 320.7  | 322.32 |
| +50   | 0.70 | 317.46 | 12.96 | 317.26 | 319.07 |
| 30    |      |        | 1.45  | 316.0  | 315.82 |
| +50   |      |        | 4.85  | 312.6  | 312.57 |
| 31    |      |        | 8.05  | 319.4  | 309.32 |
| +50   |      |        | 11.2  | 306.3  | 306.07 |
| Δ     | 0.48 | 305.30 | 12.64 | 304.82 |        |
| 32    |      |        | 3.0   | 302.3  | 302.82 |
| +50   |      |        | 7.8   | 297.5  | 299.57 |
| 33    |      |        | 9.6   | 295.7  | 296.32 |
|       | 1.33 | 294.62 | 12.01 | 293.29 |        |
| +50   |      |        | 0.9   | 293.7  | 293.07 |
| 34    |      |        | 3.6   | 290    | 289.82 |

Center Old Rd.

Inside Rd - Same Elev

Rd - 4.0

Rd - 4.0

Rd - 3.5

Side Cut Bank Rd - 3.0

Side Cut Bank Rd - 1.5

Inside Old Rd Same Elev

51.57  
65.0  
116.57

294.62

286.57

34+50

6.7

287.9

35

11.1

283.5

283.32

1.53

283.77

12.38

282.24

+50

3.8

280.0

280.07

36

6.8

277.0

276.82

+50

9.6

274.2

273.57

37

12.9

270.9

270.32

Δ

0.78

271.76

12.79

270.98

+50

8.3

263.5

267.07

Δ

1.67

260.98

12.45

259.31

38

5.0

256.0

263.52

+50

9.25

251.7

260.57

39

10.7

250.3

257.32

+50

Δ

6.64

254.34

254.07

1+00

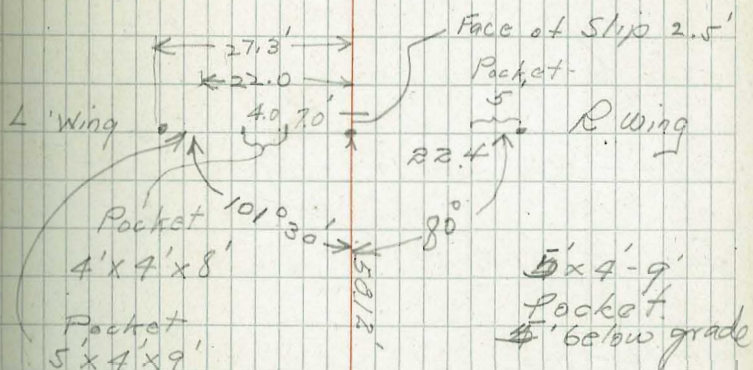
10.48

250.50

Leave Old Rd-

(34+57)<sup>13</sup> "A" Line)

"B" Line



Cross-section on Line of Drift

|     |  |  |      |      |
|-----|--|--|------|------|
| 9'  |  |  | 13.2 | 0    |
| 12' |  |  | 13.2 |      |
| 6'  |  |  |      | 0.3  |
| 6'  |  |  |      | 12.7 |
| 7'  |  |  | 12.7 |      |
| 18' |  |  |      | 0.8  |
| 8'  |  |  | 12.8 |      |
| 66' |  |  |      | 37.6 |
|     |  |  |      | 0.0  |
|     |  |  | 12.3 |      |
|     |  |  |      | 49.9 |
|     |  |  | T    | 1.0  |
|     |  |  | 12.4 |      |
|     |  |  |      | 61.3 |
|     |  |  |      | 9.2  |
|     |  |  | 12.9 |      |
|     |  |  |      | 52.1 |
|     |  |  |      | 65.0 |

|      |      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|------|
| 0.0  | 0    | 10.2 | 16.0 | 16.3 | 19.3 | 24.2 | 24.6 | 34.7 |
| 0    | 7.5  | 7.5  | 13.5 | 19   | 21.5 | 23   | 25   | 29   |
| 53.1 | 52.6 | 48.6 | 46.7 | 44.7 | 45.0 | 42.7 | 37.6 | 34.1 |
| 58   | 55   | 51   | 45   | 43   | 41   | 38   | 34   | 32   |
| 60.9 | 59.6 | 66.6 | 74.0 |      |      |      |      |      |
| 62   | 66   | 66   | 70   |      |      |      |      |      |

Sub  
Mittler

12/9/18

33

# 2 Coyote Hole in Quarrie

0+00 Hub in Sand Bank

0+74<sup>45</sup> Nail

0+80 Tunnel Portal

1+30<sup>85</sup> Nail Drift E

1+32<sup>85</sup> End Tunnel

1+30<sup>85</sup> 91°45' West 38' 361.05

1+30<sup>85</sup> 83°47' 96°13' East 50

1+50<sup>85</sup> Lt Drift 2.95 364.95 362.00

1+80<sup>85</sup> Lt Drift 5.5 3.0 364.95

1+40<sup>85</sup> Rt Drift 4.5 3.0 364.95

1+70<sup>85</sup> Rt Drift 6.0 3.0 361.95

Continued on Page 35

Approx.

10-15-18

For Cement House

Building 64' Long x 41' wide

$$\begin{array}{r} 64 \\ \times 41 \\ \hline 64 \\ 256 \\ \hline 2624 \end{array} \times 12 = \frac{31488}{4} = 7872 \text{ bbls-}$$

311

|      | Rod     |      |      |      |      |      |       |      |      |       | Readings |      |      |      |       |
|------|---------|------|------|------|------|------|-------|------|------|-------|----------|------|------|------|-------|
|      | Ground- |      |      |      |      |      |       |      |      |       | Springer |      |      |      |       |
|      | 0.0     | 0.6  | 1.65 | 2.6  | 3.5  | 4.5  | 5.5   | 6.5  | 7.5  | 8.5   | 9.5      | 10.5 | 11.5 | 12.5 |       |
|      | 21      | 15   | 9    | 3    | 3    | 3    | 3     | 3    | 3    | 3     | 3        | 3    | 3    | 3    |       |
| 0    |         |      |      |      |      |      |       |      |      |       |          |      |      |      |       |
| 1    | 0.6     | 1.4  | 1.8  | 2.4  | 3.2  | 3.7  | 4.5   | 5.4  | 6.2  | 7.0   | 7.8      | 8.6  | 9.4  | 10.2 |       |
|      | 33      | 27   | 21   | 15   | 9    | 3    | 3     | 3    | 3    | 3     | 3        | 3    | 3    | 3    |       |
| 2    | 1.9     | 4.1  | 4.8  | 4.9  | 5.4  | 5.7  | 6.4   | 6.9  | 7.2  | 7.8   | 8.1      | 8.7  | 9.2  | 9.7  |       |
|      | 33      | 27   | 21   | 15   | 9    | 3    | 3     | 3    | 3    | 3     | 3        | 3    | 3    | 3    |       |
| 3    | 6.5     | 6.7  | 6.8  | 7.2  | 7.2  | 7.0  | 7.3   | 7.6  | 7.7  | 7.9   | 8.1      | 8.3  | 8.5  | 8.7  |       |
|      | 33      | 27   | 21   | 15   | 9    | 3    | 3     | 3    | 3    | 3     | 3        | 3    | 3    | 3    |       |
| 4    | 7.4     | 7.6  | 7.9  | 8.0  | 8.1  | 8.5  | 8.8   | 9.1  | 9.3  | 9.6   | 9.8      | 10.1 | 10.3 | 10.5 | 6.3   |
|      | 33      | 27   | 21   | 15   | 9    | 3    | 3     | 3    | 3    | 3     | 3        | 3    | 3    | 3    |       |
| 5    | 9.0     | 10.9 | 10.6 | 12.1 | 12.6 | 13.6 | 14.05 | 12.5 | 11.7 | 11.5  |          |      |      |      | 7.2   |
|      | 33      | 27   | 21   | 15   | 9    | 3    | 3     | 3    | 3    | 3     |          |      |      |      |       |
| 6    |         |      |      |      |      |      | 6.9   |      |      |       |          |      |      |      |       |
| 7    |         |      |      |      |      |      | 7.75  |      |      |       |          |      |      |      |       |
| 8    |         |      |      |      |      |      | 8.6   |      |      |       |          |      |      |      |       |
| B.S. |         |      |      |      |      |      |       |      |      | F.S.  |          |      |      |      |       |
|      |         |      |      |      |      |      |       |      |      | 12.87 |          |      |      |      |       |
| 3.47 |         |      |      |      |      |      |       |      |      |       |          |      |      |      |       |
| 6    | 2.4     | 3.6  | 3.9  | 5.2  | 5.5  | 6.7  | 6.6   | 4.9  | 3.9  |       |          |      |      |      | +1.33 |
|      | 33      | 21   | 21   | 15   | 9    | 3    | 3     | 9    | 14   |       |          |      |      |      |       |
| 7    | 5.4     | 5.8  | 6.8  | 7.6  | 7.7  | 7.8  | 7.5   | 4.9  | 3.7  |       |          |      |      |      | +0.46 |
|      | 33      | 27   | 21   | 15   | 9    | 3    | 3     | 9    | 14   |       |          |      |      |      |       |
| 8    | 8.5     | 8.9  | 8.8  | 10.3 | 10.4 | 11.5 | 7.4   |      |      |       |          |      |      |      | -0.37 |
|      | 33      | 27   | 21   | 15   | 9    | 3    | 3     |      |      |       |          |      |      |      |       |

1 foot pipe

Continued from page 33

35

Cross-section thru 1st Pocket south

|                            |      |       |      |        |
|----------------------------|------|-------|------|--------|
| Bottom of Coyote at Portal | 12.7 | 374.7 |      | 362.00 |
| 0+59                       |      |       | 12.7 | 362.00 |
| +71                        |      |       | 5.9  | 368.8  |
| +75                        |      |       | 6.4  | 366.3  |
| Δ                          | 11.9 | 386.2 | 0.4  | 374.3  |
| +75                        |      |       | 8.7  | 377.5  |
| +77                        |      |       | 8.6  | 377.6  |
| +77                        |      |       | 7.1  | 379.1  |
| +86                        |      |       | 5.4  | 380.8  |
| +88                        |      |       | 2.5  | 383.7  |
| 90                         |      |       | 2.7  | 383.5  |
| 90                         |      |       | 1.1  | 385.1  |
| 91                         |      |       | 1.1  | 385.1  |
| Δ                          | 17.9 | 403.6 | 0.5  | 385.7  |
| 92                         |      |       | 8.0  | 395.6  |
| 95                         |      |       | 6.6  | 397.0  |
| 96                         |      |       | 10.1 | 403.7  |
| Δ                          | 12.0 | 415.6 | 0.0  | 403.6  |
| 1+02                       |      |       | 8.4  | 407.2  |
| 1+03                       |      |       | 6.6  | 409.0  |
| 1+09                       |      |       | 5.6  | 410.0  |
| 1+10                       |      |       | 3.6  | 412.0  |
| 1+15                       |      |       | 3.1  | 412.5  |
| 1+15                       |      |       | 1.2  | 414.4  |

Continued on Page 44

did not  
17/10/18  
2/18

B. Ligo

Lt.

E

Rt

END Area  
Cut Fill

36  
Cu Yds  
Cut Fill

21+00

21+00<sup>8</sup> A  
21+04<sup>8</sup> B 376.0

$\frac{+1.4}{8.7} -0.0$

$\frac{-1.2}{9.3}$

53 45

21+50 71.07

$\frac{+1.7}{8.4} -0.7$

$\frac{0.0}{7.5}$

11.9 00

22+00 678.2

$\frac{+2.5}{8.8} +1.5$

$\frac{+1.0}{8.0}$

25.7

23+00 613.2

$\frac{8.5}{11.8} +8.7$

$\frac{+8.9}{12.0}$

169.8

23+50 580.7

$\frac{7.0}{11.0} +7.4$

$\frac{8.2}{11.6}$

140.6

B.

Lt

E

24+00 5482  
325

24+12 5404

 $\frac{44}{9.7} + 44$ 

24+18.2 5364

 $\frac{0.0}{7.5} + 1.2$ 24+50 51.57  
325 $\frac{-3.4}{12.6} 00$ 

25+00 4832

 $\frac{-23.0}{12.0} - \frac{13.5}{200} 00$ 

25+25 46.69

 $\frac{0.0}{7.5} 1.0$ 

25+42 45.59

 $\frac{-1.8}{11.7} \frac{0.0}{3.0} 0.5$ 

25+50 45.07

 $\frac{-6.8}{17.7} 00$ 

26+50 38.57

 $\frac{-6.0}{16.5} 00$ 

Rt

END Areas

Guts Fills

Co Yds 37

Guts Fills

 $\frac{+9.4}{9.7}$ 

75.7

 $\frac{-3.8}{6.6} + \frac{4.5}{9.8}$ 

29.1 00

 $\frac{+3.1}{9.0}$ 

116 12.8

 $\frac{+3.0}{9.0}$ 

117.2 139.7

 $\frac{-3.0}{9.0}$ 

19.5 00

 $\frac{-2.7}{8.9}$ 

130 66.8

 $\frac{-1.8}{8.4}$ 

68 25.5

 $\frac{+3.0}{9.0}$ 

113 22.5



18

|       | H     |                     | E                      |                        |
|-------|-------|---------------------|------------------------|------------------------|
| 27+00 | 35.32 | $\frac{-2.6}{11.4}$ | $\frac{00}{0.5} + 0.1$ |                        |
| 27+40 | 34.67 | $\frac{-4.2}{13.8}$ | -2.0                   |                        |
| 27+80 | 34.02 | $\frac{-2.0}{18.0}$ | -2.4                   |                        |
| 27+50 | 32.07 | $\frac{-3.8}{12.2}$ | 0.0                    |                        |
| 28+00 | 28.82 | $\frac{-2.0}{10.5}$ | 0.0                    |                        |
| 28+50 | 25.57 | $\frac{-1.0}{9.0}$  | -0.8                   |                        |
| 29+00 | 27.32 | $\frac{-3.8}{13.2}$ | $\frac{-1.6}{8.0}$     | -1.6                   |
| 29+50 | 31.97 | $\frac{-1.8}{10.2}$ | $\frac{-2.4}{2.5}$     | -1.8 $\frac{00}{3.3}$  |
| 30+00 | 31.52 | $\frac{-3.6}{12.9}$ | $\frac{-4.1}{6.2}$     | $\frac{00}{0.3} + 0.2$ |

|  | Rt                                     | END Areas |       | Cu. Vol. 38 |       |
|--|----------------------------------------|-----------|-------|-------------|-------|
|  |                                        | Cuts      | Fills | Cuts        | Fills |
|  | $\frac{+2.8}{8.9}$                     | 11.0      | 9.1   |             |       |
|  | $\frac{00}{7.5}$                       | 00        | 37.0  |             |       |
|  | $\frac{00}{7.5}$                       | 00        | 56.9  |             |       |
|  | $\frac{+3.2}{9.1}$                     | 12.0      | 14.3  |             |       |
|  | $\frac{+1.6}{4.4}$ $\frac{+1.6}{8.3}$  | 9.1       | 7.5   |             |       |
|  | $\frac{00}{6.0}$ $\frac{+1.6}{8.3}$    | 12        | 9.7   |             |       |
|  | $\frac{00}{7.5}$                       | 00        | 22.0  |             |       |
|  | $\frac{+2.4}{6.0}$ $\frac{+3.8}{9.0}$  | 10.2      | 22.0  |             |       |
|  | $\frac{+2.7}{2.7}$ $\frac{+6.6}{10.8}$ | 38.5      | 27.2  |             |       |

B

Lt.

E

|       |        |                     |                    |     |
|-------|--------|---------------------|--------------------|-----|
| 30+50 | 312.57 | $\frac{-3.7}{13.1}$ | $\frac{-2.7}{4.5}$ | 0.0 |
|-------|--------|---------------------|--------------------|-----|

|       |        |                     |                    |       |
|-------|--------|---------------------|--------------------|-------|
| 31+00 | 309.32 | $\frac{-3.4}{12.3}$ | $\frac{-2.5}{5.0}$ | +0.00 |
|-------|--------|---------------------|--------------------|-------|

|       |        |                     |                    |      |
|-------|--------|---------------------|--------------------|------|
| 31+50 | 306.07 | $\frac{-3.0}{12.0}$ | $\frac{-2.6}{0.5}$ | +0.2 |
|-------|--------|---------------------|--------------------|------|

|       |        |                     |                    |      |
|-------|--------|---------------------|--------------------|------|
| 32+00 | 302.82 | $\frac{-3.5}{11.2}$ | $\frac{-2.3}{3.5}$ | -0.5 |
|-------|--------|---------------------|--------------------|------|

|       |       |                     |                    |      |
|-------|-------|---------------------|--------------------|------|
| 32+50 | 99.57 | $\frac{-5.1}{15.1}$ | $\frac{-1.5}{7.8}$ | -2.0 |
|-------|-------|---------------------|--------------------|------|

|       |       |                     |                    |      |
|-------|-------|---------------------|--------------------|------|
| 33+00 | 96.32 | $\frac{-6.2}{16.8}$ | $\frac{-6.6}{3.8}$ | -0.6 |
|-------|-------|---------------------|--------------------|------|

|       |       |                     |                   |      |
|-------|-------|---------------------|-------------------|------|
| 33+50 | 93.07 | $\frac{-5.1}{15.1}$ | $\frac{0.0}{4.0}$ | +0.6 |
|-------|-------|---------------------|-------------------|------|

|       |       |                     |                   |      |
|-------|-------|---------------------|-------------------|------|
| 34+00 | 89.82 | $\frac{-4.8}{14.7}$ | $\frac{0.0}{4.5}$ | +1.2 |
|-------|-------|---------------------|-------------------|------|

Cuts  $\frac{1}{2}$  to 1 - 15' Roadway

Fills  $\frac{1}{2}$  to 1 - 15' "

39

Rt.

Cuts Fills

|                    |                     |      |      |
|--------------------|---------------------|------|------|
| $\frac{+5.1}{5.3}$ | $\frac{+7.6}{11.3}$ | 37.2 | 13.3 |
|--------------------|---------------------|------|------|

|                    |                     |      |       |
|--------------------|---------------------|------|-------|
| $\frac{+4.0}{3.7}$ | $\frac{+7.0}{11.0}$ | 38.8 | 19.35 |
|--------------------|---------------------|------|-------|

|                    |                     |      |      |
|--------------------|---------------------|------|------|
| $\frac{+2.0}{1.2}$ | $\frac{+5.2}{10.1}$ | 26.7 | 10.5 |
|--------------------|---------------------|------|------|

|                   |                    |                    |              |
|-------------------|--------------------|--------------------|--------------|
| $\frac{0.0}{1.0}$ | $\frac{+1.9}{2.0}$ | $\frac{+2.3}{9.7}$ | 18.8<br>19.0 |
|-------------------|--------------------|--------------------|--------------|

|                   |                    |     |      |
|-------------------|--------------------|-----|------|
| $\frac{0.0}{5.5}$ | $\frac{-2.4}{8.7}$ | 7.4 | 23.9 |
|-------------------|--------------------|-----|------|

|                   |  |     |      |
|-------------------|--|-----|------|
| $\frac{0.0}{9.5}$ |  | 0.0 | 19.0 |
|-------------------|--|-----|------|

|                    |                    |     |     |
|--------------------|--------------------|-----|-----|
| $\frac{+0.4}{7.0}$ | $\frac{+2.5}{8.8}$ | 8.5 | 9.9 |
|--------------------|--------------------|-----|-----|

|                    |                    |      |     |
|--------------------|--------------------|------|-----|
| $\frac{+0.8}{4.0}$ | $\frac{+2.3}{8.7}$ | 11.5 | 7.2 |
|--------------------|--------------------|------|-----|

|       | B     | A                | E    |
|-------|-------|------------------|------|
| 34+50 | 86.57 | $\frac{00}{7.5}$ | +1.3 |

|       |       |                     |                       |
|-------|-------|---------------------|-----------------------|
| 35+00 | 83.32 | $\frac{-3.0}{12.0}$ | $\frac{00}{5.7}$ +0.2 |
|-------|-------|---------------------|-----------------------|

|       |       |                     |                      |
|-------|-------|---------------------|----------------------|
| 35+50 | 80.07 | $\frac{-3.0}{12.0}$ | $\frac{00}{3.5}$ 0.0 |
|-------|-------|---------------------|----------------------|

|       |       |                     |                       |
|-------|-------|---------------------|-----------------------|
| 36+00 | 76.82 | $\frac{-3.0}{12.0}$ | $\frac{00}{3.7}$ +0.2 |
|-------|-------|---------------------|-----------------------|

|       |       |                     |                                          |
|-------|-------|---------------------|------------------------------------------|
| 36+50 | 73.57 | $\frac{-2.3}{11.0}$ | $\frac{00}{5.0}$ $\frac{+0.6}{3.0}$ +0.6 |
|-------|-------|---------------------|------------------------------------------|

|       |       |                  |      |
|-------|-------|------------------|------|
| 37+00 | 70.35 | $\frac{00}{7.5}$ | +0.6 |
|-------|-------|------------------|------|

|       |       |                     |      |
|-------|-------|---------------------|------|
| 37+18 | 69.15 | $\frac{-2.0}{10.5}$ | +0.0 |
|-------|-------|---------------------|------|

|       |       |                     |      |
|-------|-------|---------------------|------|
| 37+35 | 68.05 | $\frac{-2.0}{10.5}$ | -1.0 |
|-------|-------|---------------------|------|

|       |       |                     |      |
|-------|-------|---------------------|------|
| 37+50 | 67.07 | $\frac{-4.1}{13.6}$ | -3.6 |
|-------|-------|---------------------|------|

| Rt.                |                    | END Areas |       | Cu. Yds |       |
|--------------------|--------------------|-----------|-------|---------|-------|
|                    |                    | Guts      | Fills | Guts    | Fills |
| $\frac{+2.0}{5.0}$ | $\frac{+3.3}{9.2}$ |           |       |         |       |

|                    |                    |     |     |  |  |
|--------------------|--------------------|-----|-----|--|--|
| $\frac{+0.3}{4.0}$ | $\frac{+3.0}{9.0}$ | 6.0 | 4.9 |  |  |
|--------------------|--------------------|-----|-----|--|--|

|                   |  |     |     |  |  |
|-------------------|--|-----|-----|--|--|
| $\frac{0.0}{7.5}$ |  | 0.0 | 6.0 |  |  |
|-------------------|--|-----|-----|--|--|

|                    |  |     |     |  |  |
|--------------------|--|-----|-----|--|--|
| $\frac{+0.4}{7.7}$ |  | 2.7 | 5.7 |  |  |
|--------------------|--|-----|-----|--|--|

|                    |  |     |     |  |  |
|--------------------|--|-----|-----|--|--|
| $\frac{+0.7}{7.9}$ |  | 7.3 | 2.9 |  |  |
|--------------------|--|-----|-----|--|--|

|                    |  |     |     |  |  |
|--------------------|--|-----|-----|--|--|
| $\frac{+0.9}{8.0}$ |  | 8.0 | 0.0 |  |  |
|--------------------|--|-----|-----|--|--|

|                    |  |     |     |  |  |
|--------------------|--|-----|-----|--|--|
| $\frac{+0.4}{7.7}$ |  | 1.5 | 7.5 |  |  |
|--------------------|--|-----|-----|--|--|

|                   |  |     |      |  |  |
|-------------------|--|-----|------|--|--|
| $\frac{0.0}{7.5}$ |  | 0.0 | 16.5 |  |  |
|-------------------|--|-----|------|--|--|

|                     |  |  |     |  |  |
|---------------------|--|--|-----|--|--|
| $\frac{-2.8}{11.7}$ |  |  | 7.4 |  |  |
|---------------------|--|--|-----|--|--|

|       | B          | Lt                  | E    | Rt                  | 9/5/17   | Al      |
|-------|------------|---------------------|------|---------------------|----------|---------|
|       | X sections | "B"                 | Line |                     | End Area | Cu. yds |
|       |            |                     |      |                     | Cuts     | Cuts    |
|       |            |                     |      |                     | Fills    | Co yds  |
|       |            |                     |      |                     |          | Fills   |
| 37+66 | 66.03      | $\frac{-4.5}{14.3}$ | -4.0 | $\frac{-3.7}{13.0}$ |          | 85.4    |
| 37+74 | 65.51      | $\frac{-6.9}{17.9}$ | -6.7 | $\frac{-6.3}{17.0}$ |          | 166.4   |
| 38+00 | 63.82      | $\frac{-8.0}{19.5}$ | -7.8 | $\frac{-7.7}{18.3}$ |          | 201.4   |
| 38+50 | 60.57      | $\frac{-8.5}{20.1}$ | -8.9 | $\frac{-9.0}{20.5}$ |          | 146.7   |
| 39+00 | 57.32      | $\frac{-6.7}{17.5}$ | -7.0 | $\frac{-7.3}{18.5}$ |          | 178.5   |
| 39+16 | 56.28      | $\frac{-3.4}{12.6}$ | -6.0 | $\frac{-6.4}{17.4}$ |          | 125.9   |
| 39+28 | 55.50      | $\frac{-2.0}{10.5}$ | -2.7 | $\frac{-2.7}{10.8}$ |          | 44.5    |
| 39+45 | 54.40      | $\frac{0.0}{7.5}$   | 0.0  | $\frac{0.0}{7.5}$   |          | 00 00   |
| 39+50 | 254.07     | $\frac{+0.9}{8.0}$  | +0.3 | $\frac{0.0}{7.5}$   |          | 5.7     |

|                    |      |        |      |        |         |
|--------------------|------|--------|------|--------|---------|
| 27+50 <sup>0</sup> | 9.13 | 341.35 |      | 387.22 | 6 1/2 % |
| +25 <sup>0</sup>   | 9.12 | 349.67 | 0.80 | 340.55 | 333.8   |
| 27+00              |      |        | 6.41 | 343.3  | 335.47  |
| 26+50              | 9.67 | 359.16 | 0.18 | 349.49 | 338.72  |
| 26                 |      |        | 4.70 | 354.5  | 341.97  |
| 25+50              | 7.07 | 365.43 | 0.80 | 358.36 | 345.2   |
| 24+50              |      |        | 5.0  | 360.4  |         |
| 24                 |      |        | 3.35 | 367.1  |         |
| 23                 |      |        | 0.90 | 364.5  |         |

22+37 = 29+04 ?? "A" Line —

"B" Line - Back up thru old Highway Cut -

7-18-18

Laying out Center Divide Wall  
Spillway Section Main Dam-

Overflow Section = 250' on 310' R.

There are 18 bays.

Total Central Angle  $\Delta = 46^{\circ} 12' 22.7''$

$\Delta_1 = 2^{\circ} 34' 1.3''$

7 Bays =  $17^{\circ} 58' - 9.1''$

= 62.15' on 198.22 R. Curve.

$\frac{45}{17.15}$

43

|          |                       |
|----------|-----------------------|
| 8 - 40.4 |                       |
| 2.11     |                       |
| 17.20    | 202.0                 |
|          | 00.4                  |
|          | 00.0                  |
|          | 198.22                |
|          | 11.4                  |
|          | 11.4                  |
| 15' =    | 20.10' 06.3           |
|          | <del>18</del> 28 38.9 |
| 17.15    | 20 28 45.2            |

12/9/18

Quarrie cont. from Page 35

AA

## Sections over Coyote Hole #2

|     |      | 415.6 |           |       |
|-----|------|-------|-----------|-------|
| Δ   | 12.6 | 428.2 | 0.0       | 415.6 |
| +21 |      |       | 10.2      | 418.0 |
| +23 |      |       | 9.8       | 418.4 |
| +23 |      |       | 6.8       | 421.4 |
| +27 |      |       | 5.4       | 422.8 |
| +30 |      |       | 1.9       | 426.3 |
| +34 |      |       | 1.8       | 426.4 |
| Δ   | 12.5 | 440.7 | 0.0       | 428.2 |
| +36 |      |       | 11.6      | 429.1 |
| +40 |      |       | 9.3       | 331.4 |
| +40 |      |       | 8.3       | 332.4 |
| +48 |      |       | 4.7       | 336.0 |
| +49 |      |       | 5' higher | 341.0 |

Cross-section thru 2<sup>nd</sup> Pocket South

|              |      |       |                 |       |
|--------------|------|-------|-----------------|-------|
| Δ #1 1st sec | 11.6 | 385.9 |                 | 374.3 |
| 0+67         |      |       | <del>17.0</del> | 362.0 |
| +74          |      |       | 17.0            | 368.9 |
| +74          |      |       | 7.0             | 378.9 |
| +77          |      |       | 6.3             | 379.6 |
| +77          |      |       | 5.1             | 380.8 |
| +81          |      |       | 5.0             | 380.9 |
| +82          |      |       | 3.2             | 382.7 |
| +84          |      |       | 2.8             | 383.1 |

Plotted  
12/10/18  
9288

Quarria Sections  
for Shot # 2

385.9

|      |      |       |      |       |
|------|------|-------|------|-------|
| +85  |      |       | 1.3  | 384.6 |
| +86  |      |       | 0.7  | 385.2 |
| Δ    | 12.6 | 398.5 | 0.0  | 385.9 |
| 90   |      |       | 7.8  | 390.7 |
| 92   |      |       | 7.1  | 391.4 |
| 93   |      |       | 0.6  | 397.9 |
| Δ    | 12.4 | 410.9 | 0.0  | 398.5 |
| 96   |      |       | 12.4 | 398.5 |
| 96   |      |       | 10.5 | 400.4 |
| 98   |      |       | 10.9 | 400.0 |
| 99   |      |       | 7.6  | 403.3 |
| 1+03 |      |       | 6.6  | 404.3 |
| 1+09 |      |       | 7.2  | 403.7 |
| Δ    |      |       | 0.7  | 410.2 |
|      | 12.9 | 423.8 | 0.0  | 410.9 |
| +14  |      |       | 12.2 | 411.6 |
| +14  |      |       | 9.1  | 414.7 |
| +19  |      |       | 7.1  | 416.7 |
| +19  |      |       | 4.5  | 419.3 |
| Δ    | 12.3 | 436.1 | 0.0  | 423.8 |
| 1+25 |      |       | 5.5  | 430.6 |
| +34  |      |       | 4.8  | 431.3 |
| +41  |      |       | 0.9  | 435.2 |

Plated  
w/ oil  
#208



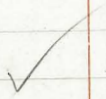


Quarrie sections  
for Shot # 2  
1st Pocket North.

46

|      |      |       |      |        |
|------|------|-------|------|--------|
|      | 12.9 | 374.9 |      | 362.00 |
| 0+66 |      |       | 12.9 | 362.00 |
| 0+68 |      |       | 10.7 | 364.2  |
| +69  |      |       | 7.1  | 367.8  |
| +79  |      |       | 4.2  | 370.7  |
| +80  |      |       | 3.1  | 371.8  |
| +82  |      |       | 2.6  | 372.3  |
| A    | 12.7 | 387.4 | 0.2  | 374.7  |
| +84  |      |       | 10.5 | 376.9  |
| +87  |      |       | 10.0 | 377.4  |
| +88  |      |       | 7.1  | 380.3  |
| 92   |      |       | 5.4  | 382.0  |
| A    | 12.5 | 399.9 | 0.0  | 387.4  |
| 96   |      |       | 5.6  | 394.3  |
| 98   |      |       | 5.4  | 394.5  |
| A    | 12.4 | 412.3 | 0.0  | 399.9  |
| 1+00 |      |       | 9.7  | 402.6  |
| 1+03 |      |       | 8.7  | 403.6  |
| 1+04 |      |       | 6.1  | 406.2  |
| 1+05 |      |       | 5.8  | 406.5  |
| 1+06 |      |       | 4.0  | 408.3  |
| 1+10 |      |       | 1.2  | 411.1  |
| 1+17 |      |       | 0.5  | 411.8  |
| A    | 12.8 | 424.9 | 0.2  | 412.1  |

Plotted  
12/10/18  
JPH



Quarrie Sections  
for Spot # 2

A7

|      |      |       |      |       |
|------|------|-------|------|-------|
|      |      | 424.9 |      |       |
| 1+20 |      |       | 6.0  | 418.9 |
| 1+25 |      |       | 4.3  | 420.6 |
| A    | 12.9 | 437.8 | 0.0  | 424.9 |
| 1+27 |      |       | 12.4 | 425.4 |
| + 30 |      |       | 12.2 | 425.6 |
| + 30 |      |       | 9.7  | 428.1 |
| + 38 |      |       | 7.1  | 430.7 |
| + 44 |      |       | 3.7  | 434.1 |
| + 49 |      |       | 0.3  | 437.5 |

2<sup>nd</sup> Pocket North

|      |      |       |      |        |
|------|------|-------|------|--------|
|      |      | 375.3 |      | 362.00 |
|      | 13.3 |       |      | 362.00 |
| 0+67 |      |       |      |        |
| +69  |      |       | 10.0 | 365.3  |
| +71  |      |       | 6.5  | 368.8  |
| +77  |      |       | 5.7  | 369.6  |
| A    | 12.7 | 388.0 | 0.0  | 375.3  |
| +80  |      |       | 12.1 | 375.9  |
| +83  |      |       | 11.7 | 376.3  |
| +85  |      |       | 7.0  | 381.0  |
| +89  |      |       | 7.8  | 380.2  |
| +91  |      |       | 0.8  | 387.2  |
| A    | 13.0 | 401.0 | 0.0  | 388.0  |

Plotted  
m/10/15  
MGA

# Coyote hole # 2

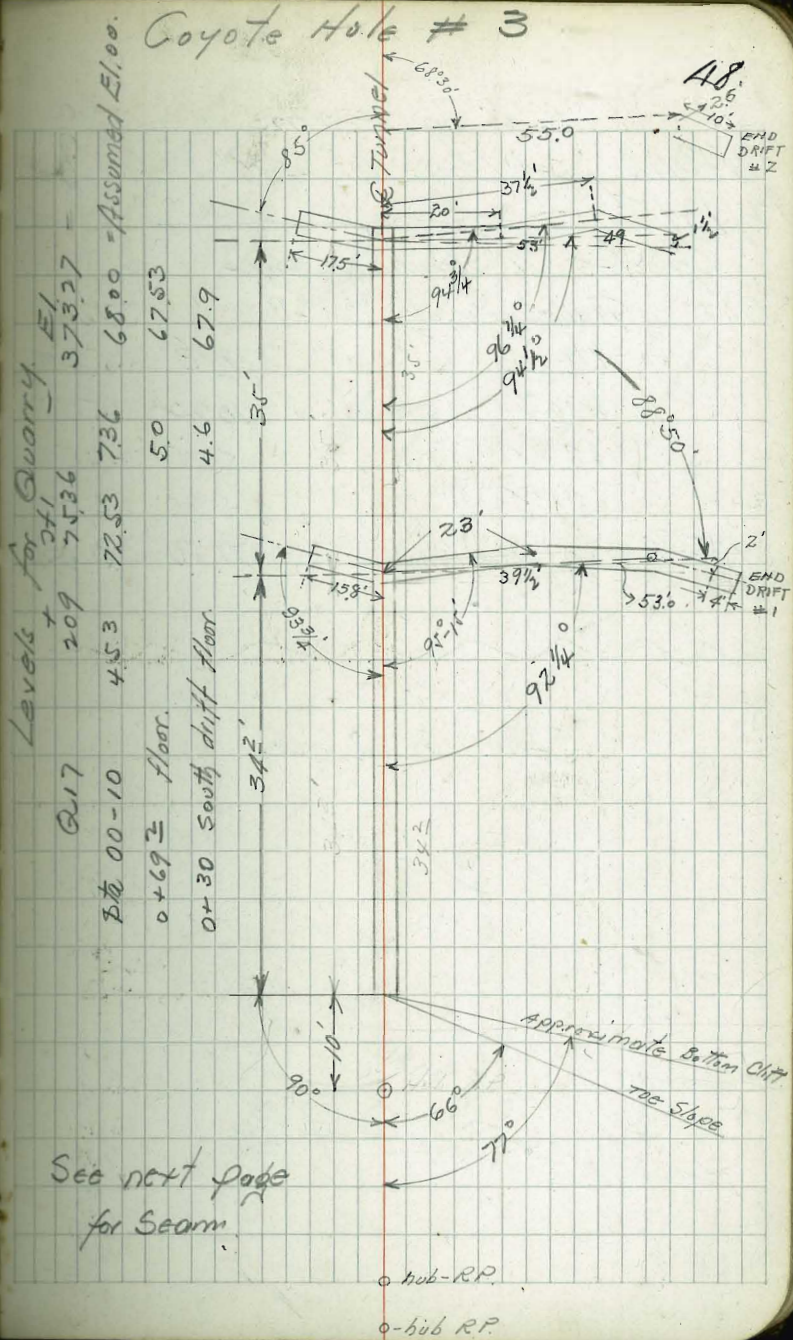
## Quarry Sections

|        |      | 401.0 |      |       |
|--------|------|-------|------|-------|
| 95     |      |       | 13.0 | 388.0 |
| 96     |      |       | 10.6 | 390.4 |
| 98     |      |       | 9.9  | 391.1 |
| 99     |      |       | 2.9  | 398.1 |
| Δ      | 13.0 | 414.0 | 0.0  | 401.0 |
| 1+09   |      |       | 12.7 | 401.3 |
| 1+10   |      |       | 10.7 | 403.3 |
| 1+19   |      |       | 6.3  | 407.7 |
| 1+19   |      |       | 4.4  | 409.6 |
| 1+21   |      |       | 4.4  | 409.6 |
| Δ      | 12.4 | 426.3 | 0.1  | 413.9 |
| 1+22   |      |       | 11.2 | 414.9 |
| 1+26   |      |       | 11.0 | 415.3 |
| 1+31   |      |       | 4.3  | 422.0 |
| 1+31   |      |       | 2.1  | 424.2 |
| 1+33   |      |       | 1.9  | 424.4 |
| Δ 1+33 | 13.3 | 439.5 | 0.1  | 426.2 |
| 1+38   |      |       | 12.4 | 427.1 |
| 1+41   |      |       | 7.2  | 432.1 |
| 1+45   |      |       | 5.4  | 434.1 |
| 1+50   |      |       | 0.0  | 439.5 |

Dated 12/10/15  
KRP

41' North to face of former shot ✓

# Coyote Hole # 3



See next page for Seam

o-hub-R.P.

o-hub R.P.

Check on Forms

12/13/18 Set Nails out 4.96"

12/13/18

Grades 16" drainage pipe

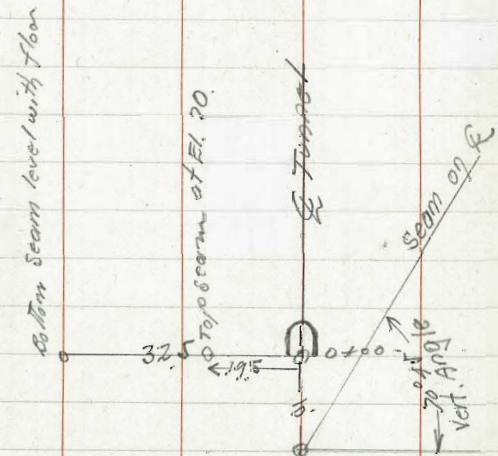
|                    |          |       |       |        |
|--------------------|----------|-------|-------|--------|
| B.M.               | Grades   | 2.61  | 75.27 | 372.66 |
|                    |          | 69.10 | 9.93  | 65.34  |
|                    |          | 69.03 | 10.22 | 65.07  |
|                    |          | 68.92 | 8.75  | 66.52  |
| 3.                 |          | 68.82 | 8.40  | 66.87  |
| 3+85 <sup>12</sup> | Top Nail |       | 11.60 | 63.67  |

Copied Book 7  
Pg 44

|     |          |
|-----|----------|
| 376 | Top Nail |
| 395 | " "      |
| 240 | " "      |
| 195 | " "      |

Computed Ele = 63.64 End Flat Section

Seam in Quarry



Willcomb  
Bubb  
Mixer.

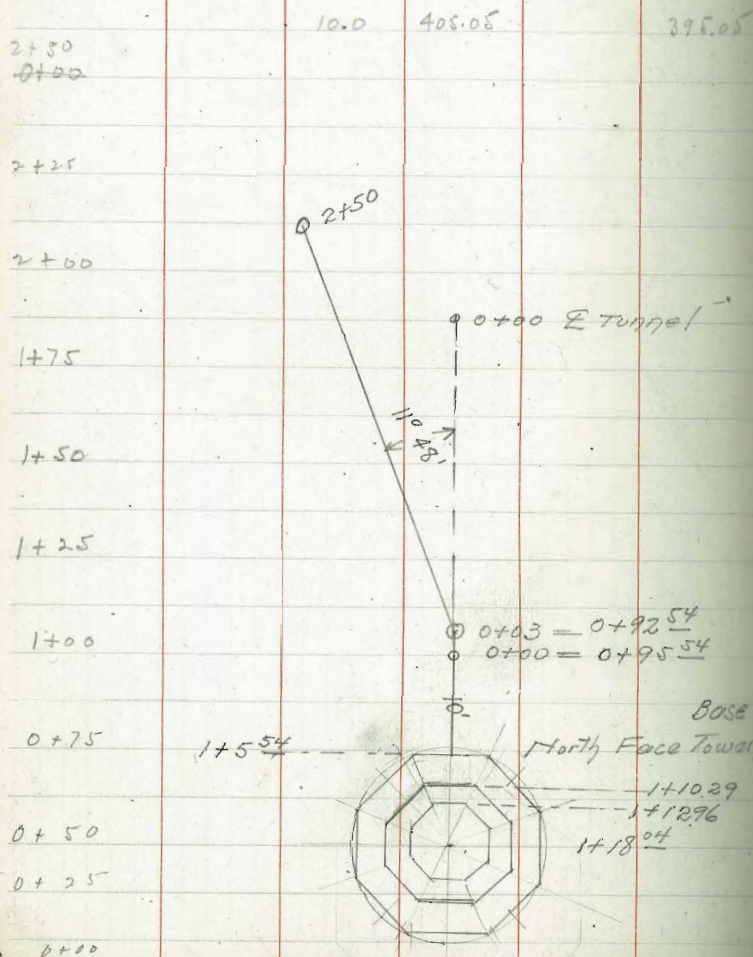
Approach to Outlet Tower

12-14-18

Cross-sections and Cut Stakes

Set on hub 3' from end of concrete forebay. Set stakes every 25' calling Inst. Sta. 0+03'

Defl. from  $\frac{1}{2}$  of tower  $11^{\circ}48' L.$



Rod Reading and Cuts shown

|      | W                        | E                 | E               |                   |                          |                   |
|------|--------------------------|-------------------|-----------------|-------------------|--------------------------|-------------------|
| cuts | 1.1<br>5.5<br>8.9<br>4.1 | 1.1<br>8.9<br>3   | 0.4<br>2.6<br>0 | 1.1<br>8.9<br>3   | 1.1<br>5.5<br>9.9<br>4.1 | 571               |
|      | 4.6<br>5.4<br>7.6        | 3.9<br>6.1<br>5   | 0.9<br>2.1<br>3 | 0.7<br>2.3<br>0   | 4.5<br>3.5<br>1          | 5.6<br>4.4<br>8.6 |
|      | 3.5<br>6.5<br>6.5        | 3.3<br>6.7<br>5   | 0.9<br>2.1<br>2 | 0.7<br>2.3<br>0   | 0.9<br>2.5<br>4          | 3.1<br>6.9<br>6.1 |
|      | 3.5<br>6.3<br>6.7        | 3.7<br>9.2<br>1   | 0.8<br>2.4<br>0 | 0.6<br>2.4<br>1   | 1.9<br>2.6<br>5          | 3.8<br>6.2<br>6.8 |
|      | 4.6<br>5.4<br>7.6        | 1.4<br>8.6<br>3   | 0.9<br>2.1<br>0 | 1.9<br>2.1<br>1   | 2.7<br>7.3<br>4          | 4.2<br>5.8<br>7.2 |
|      | 5.4<br>4.6<br>8.4        | 1.0<br>9.0<br>2   | 1.1<br>2.1<br>0 | 4.3<br>5.7<br>5   | 4.2<br>5.8<br>7.2        | 1385              |
|      | 5.0<br>5.0<br>8          | 1.2<br>2.8<br>2   | 1.3<br>2.7<br>1 | 2.6<br>7.5<br>0   | 3.9<br>6.1<br>6.9        | 1547              |
|      | 5.0<br>5.0<br>8          | 1.5<br>2.5<br>2   | 1.5<br>2.5<br>1 | 2.3<br>6.7<br>0   | 4.0<br>6.0<br>7.0        | 1719              |
|      | 4.1<br>5.9<br>7.1        | 5.7<br>4.3<br>4   | 5.5<br>4.5<br>0 | 5.4<br>4.6<br>8.4 | 5.4<br>4.6<br>8.4        | 2203              |
|      | 5.5<br>6.0<br>9.4        | 4.0<br>5.1<br>9.4 | 5.1<br>4.3<br>0 | 5.1<br>4.3<br>0   | 6.2<br>5.8<br>9.2        | 2373              |
|      | 5.0<br>5.0<br>8          | 1.5<br>2.5<br>2   | 1.5<br>2.5<br>1 | 2.3<br>6.7<br>0   | 4.0<br>6.0<br>7.0        | 2845              |
|      | 4.1<br>5.9<br>7.1        | 5.7<br>4.3<br>4   | 5.5<br>4.5<br>0 | 5.4<br>4.6<br>8.4 | 5.4<br>4.6<br>8.4        | 6039              |
|      | 5.5<br>6.0<br>9.4        | 4.0<br>5.1<br>9.4 | 5.1<br>4.3<br>0 | 5.1<br>4.3<br>0   | 6.2<br>5.8<br>9.2        | 6147              |
|      | 5.0<br>5.0<br>8          | 1.5<br>2.5<br>2   | 1.5<br>2.5<br>1 | 2.3<br>6.7<br>0   | 4.0<br>6.0<br>7.0        | 62.60             |

278.4 cy not completed in Dec  
245.4

Good Area  
Cuts shown  
571  
12.4  
2107  
16.1  
1385  
13.5  
1547  
15.1  
1719  
18.1  
2203  
21.2  
2373  
24.1  
2845  
41.1  
6039  
56.4  
6147  
57.4  
62.60

Bub  
mixer

At Dam

Elev. Water Level in Reservoir

E 10

039

390.46

39007

Water Level

10-30-2/11/19

1470

376.26

4/24/19 H/L sections for  
Estimate of Rock in Quarry  
Grade

|      |     | +   | N1                       | -   | E1                |                                                              |
|------|-----|-----|--------------------------|-----|-------------------|--------------------------------------------------------------|
|      |     | Lt. |                          |     | E                 | Rt.                                                          |
| 0+00 | 366 | 6   | 372 <sup>00</sup>        |     | 366 <sup>00</sup> |                                                              |
|      |     |     | 6.0 4.4 5.4 5.6          |     |                   |                                                              |
| 0+00 |     |     | 66.0 67.6 66.6 66.4      |     |                   | 3.8 6.0<br>368.2 366.0<br>6.0 1.0                            |
|      |     |     | 30.0 28.0 12.0 00        |     |                   |                                                              |
| t.P. |     | 5.6 | 375.3                    | 2.3 | 369.7             |                                                              |
|      |     |     | 9.0 8.0 9.0 8.0          |     |                   |                                                              |
| 0+25 | 366 |     | 66.3 67.3 66.3 67.3      |     |                   | 5.0 9.3<br>76.3 66.0<br>8.0 2.0                              |
|      |     |     | 34.0 26.0 19.0 7.0       |     |                   |                                                              |
| t.P. |     | 5.6 | 377.1                    | 3.8 | 371.5             |                                                              |
|      |     |     | 4.1 3.0 4.1              |     |                   |                                                              |
| 0+50 | 373 |     | 73.0 74.1 73.6           |     |                   | 2.0 4.1<br>75.1 73.0<br>1.0 3.0                              |
|      |     |     | 20.0 9.0 8.0             |     |                   |                                                              |
| t.P. |     | 5.6 | 378.8                    | 3.9 | 373.2             |                                                              |
|      |     |     | 4.8 0.0 3.3 2.7 4.8      |     |                   |                                                              |
| 0+75 | 374 |     | 74.0 78.8 75.5 76.1 74.0 |     |                   | 3.2 0.0 0.0 4.8<br>76.6 78.8 78.8 74.0<br>10.0 16.0 22.0 5.0 |
|      |     |     | 5.7 4.0 3.2 1.7 0.0      |     |                   |                                                              |
| t.P. |     | 5.6 | 382.1                    | 2.3 | 376.3             |                                                              |
|      |     |     | 8.1 2.5 1.7 3.0 5.6      |     |                   |                                                              |
| 1    | 374 |     | 74.0 79.6 80.4 79.5 76.5 |     |                   | 4.0 7.0 8.1<br>76.1 75.1 74.0<br>16.0 36.0 5.0               |
|      |     |     | 8.0 4.3 3.2 7.0 0.0      |     |                   |                                                              |

Platted  
4/24/19  
P

R.P.T.

|      | Lt. | +    | HI    | -   | R     |
|------|-----|------|-------|-----|-------|
| t.P. |     | 12.2 | 393.9 | 0.4 | 381.7 |

|      |            |  |      |      |      |
|------|------------|--|------|------|------|
| 1+25 | 374 Right. |  | 130  | 8.0  | 6.0  |
|      | 367 Left.  |  | 80.9 | 85.9 | 87.7 |
|      |            |  | 512  | 340  | 0.0  |

|      |  |     |       |     |       |
|------|--|-----|-------|-----|-------|
| t.P. |  | 0.0 | 388.3 | 5.6 | 388.3 |
|------|--|-----|-------|-----|-------|

|      |     |  |  |  |  |
|------|-----|--|--|--|--|
| 1+25 | 374 |  |  |  |  |
|------|-----|--|--|--|--|

|      |  |     |       |      |       |
|------|--|-----|-------|------|-------|
| t.P. |  | 5.6 | 386.5 | 13.0 | 380.9 |
|------|--|-----|-------|------|-------|

|                   |  |  |      |      |  |
|-------------------|--|--|------|------|--|
| 1+25 <sup>e</sup> |  |  | 12.5 | 5.0  |  |
|                   |  |  | 74.0 | 81.5 |  |
|                   |  |  | 82.0 | 89.0 |  |

|      |  |     |       |      |       |
|------|--|-----|-------|------|-------|
| t.P. |  | 5.6 | 379.6 | 12.5 | 374.0 |
|------|--|-----|-------|------|-------|

|                   |       |      |       |  |  |
|-------------------|-------|------|-------|--|--|
| 1+25 <sup>e</sup> | 367.1 | 12.5 | 67.1  |  |  |
|                   |       |      | 103.0 |  |  |

|      |  |  |              |  |        |
|------|--|--|--------------|--|--------|
| t.P. |  |  | 393.90 + 0.6 |  | 394.50 |
|      |  |  | 5.60         |  | 400.10 |

|      |  |  |      |  |  |
|------|--|--|------|--|--|
| 1+50 |  |  | 56.5 |  |  |
|      |  |  | 94.5 |  |  |
|      |  |  | 1.0  |  |  |

|      |  |     |       |      |       |
|------|--|-----|-------|------|-------|
| t.P. |  | 3.2 | 391.3 | 12.0 | 388.1 |
|------|--|-----|-------|------|-------|

|      |  |  |  |  |  |
|------|--|--|--|--|--|
| 1+50 |  |  |  |  |  |
|------|--|--|--|--|--|

|  |      |      |
|--|------|------|
|  | 7.0  | 11.2 |
|  | 85.9 | 82.7 |
|  | 12.2 | 4.0  |

|  |      |
|--|------|
|  | 14.3 |
|  | 74.0 |
|  | 83.0 |

Platted

4/24/19  
P

|  |      |      |
|--|------|------|
|  | 5.4  | 12.0 |
|  | 94.7 | 88.1 |
|  | 28.0 | 31.0 |

|  |      |      |      |       |
|--|------|------|------|-------|
|  | 5.6  | 9.0  | 7.0  | 17.3  |
|  | 85.7 | 82.3 | 84.3 | 74.0  |
|  | 78.2 | 81.0 | 94.0 | 104.0 |



|      | LT   |        | ♀      |
|------|------|--------|--------|
| 1450 | 11.0 | 405.50 | 394.50 |

|      |       |       |       |
|------|-------|-------|-------|
| 1475 | 12.0  | 5.6   | 05    |
|      | 393.5 | 399.9 | 405.0 |
|      | 64.0  | 34.0  | 32.0  |

|      |  |      |       |
|------|--|------|-------|
| L.P. |  | 12.0 | 393.5 |
|------|--|------|-------|

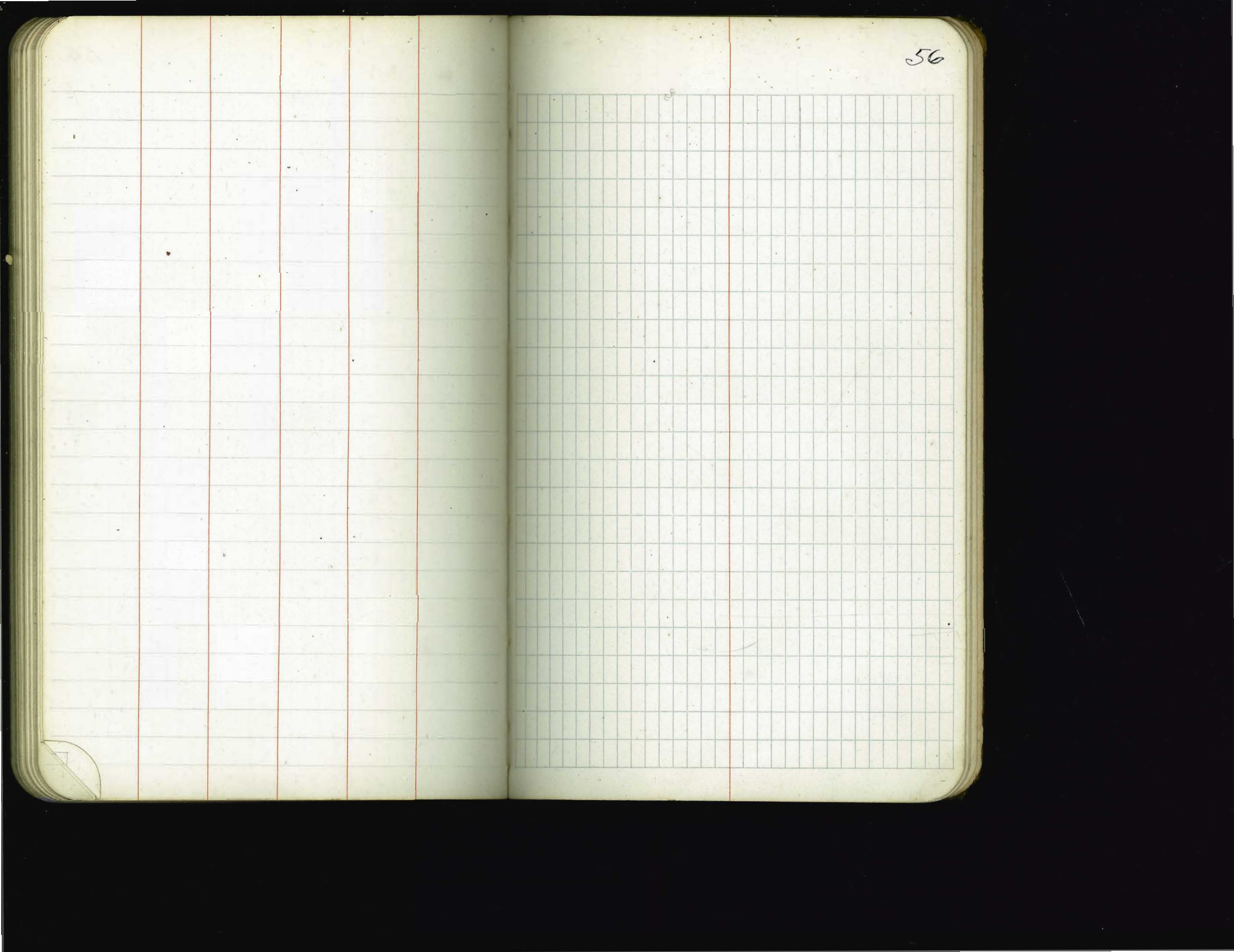
|  |     |       |  |
|--|-----|-------|--|
|  | 0.0 | 393.5 |  |
|--|-----|-------|--|

|      |       |       |      |
|------|-------|-------|------|
| 1475 | 15.0  | 13.0  | 5.6  |
|      | 88.5  | 81.5  | 87.9 |
|      | 125.0 | 104.0 | 88.0 |

RT

55

Plotted  
4/19/19 P



Sand 1<sup>st</sup> to 10<sup>th</sup> am = 3861 cy  
3381 cy to Stock Pile

Tunnel 160 lin ft. to 10<sup>th</sup>

1<sup>st</sup> to 10 1305 cy Cyl. masonry to 1<sup>st</sup> to 10<sup>th</sup>

547 Wds to 1<sup>st</sup> 10<sup>th</sup> Cement banded

(11.0 truck loads to storage)

1 to 15<sup>we</sup> - 117 loads to storage  $4\frac{1}{2}$  to load

" " - 109 " " Dam " " "

1 to 15<sup>we</sup> Wagon to storage - 2788<sup>loads</sup>  $1\frac{1}{2}$  cy " "

1 to 15<sup>we</sup> " to Dam 168<sup>loads</sup>  $1\frac{1}{2}$  cy to "

1 to 15<sup>we</sup> wick - 43548 say  
13215

11/23/18 Sta 24 minus 15 ft to end of  
tunnel forms.

# 3.20



# KEITH'S RAILROAD CURVE TABLES.

Published by KEUFFEL & ESSER CO., New York.

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## HOW TO USE KEITH'S TABLES.

### EXAMPLE.

Wanted a Curve with an Ext. of about 12 ft. Angle  
of Intersection or I. P. =  $23^{\circ} 20'$  to the R. at Station  
 $542+72$ .

Ext. in Tab. IV opposite  $23^{\circ} 20' = 120.87$   
 $120.87 \div 12 = 10.07$ . Say a  $10^{\circ}$  Curve.

Tan. in Tab. IV opp.  $23^{\circ} 20' = 1183.1$   
 $1183.1 \div 10 = 118.31$ .

Tab. V correction for A.  $23^{\circ} 20'$  for a  $10^{\circ}$  Cur. = 0.16  
 $118.31 + 0.16 = 118.47 =$  corrected Tangent.

(If corrected Ext. is required find in same way)  
Ang.  $23^{\circ} 20' = 23.33^{\circ} \div 10 = 2.3333 =$  L. C.

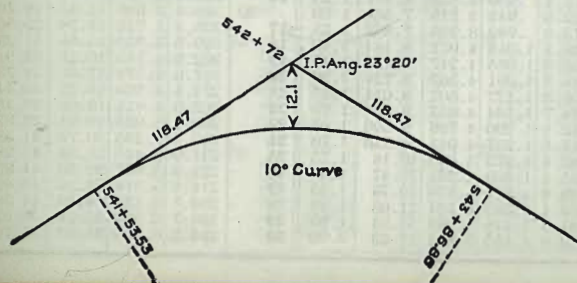
|                                            |       |              |             |
|--------------------------------------------|-------|--------------|-------------|
| $2^{\circ} 19\frac{1}{2}' =$ def. for sta. | 542   | I. P. = sta. | $542+72$    |
| $4^{\circ} 49\frac{1}{2}' =$ " " "         | +50   | Tan. =       | 1.18.47     |
| $7^{\circ} 19\frac{1}{2}' =$ " " "         | 543   | B. C. = sta. | $541+53.53$ |
| $9^{\circ} 49\frac{1}{2}' =$ " " "         | +50   | L. C. =      | 2.33.33     |
| $11^{\circ} 40' =$ " " "                   | 543+  | E. C. = Sta. | $543+86.86$ |
|                                            | 86.86 |              |             |

$100 - 53.53 = 46.47 \times 3' (\text{def. for 1 ft. of } 10^{\circ} \text{ Cur.}) = 139.41' =$   
 $2^{\circ} 19\frac{1}{2}'' =$  def. for sta. 542.

Def. for 50 ft. =  $2^{\circ} 30'$  for a  $10^{\circ}$  Curve.

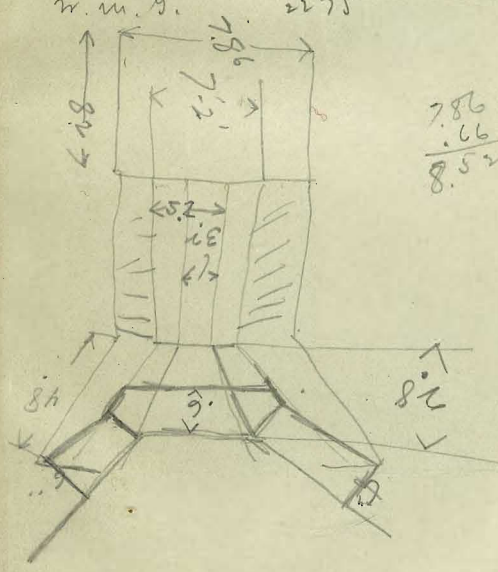
Def. for 86.86 ft. =  $1^{\circ} 50\frac{1}{2}'$  for a  $10^{\circ}$  Curve.

(These tables are published in Field Books of  
KEUFFEL & ESSER Co., New York, N. Y.)



|         |   |             |
|---------|---|-------------|
| Sch. r  | # | 700         |
| 3       |   | 100         |
| 4       |   | 1300        |
| Sabrage |   | <u>2200</u> |
| Total   |   | 4300        |
| Fund    |   | 1100        |
| Radio   |   | 3200        |
| fund r. |   | <u>500</u>  |
| Total   |   | 9100.       |

|           |   |                    |
|-----------|---|--------------------|
| H. A. J.  | # | 4550               |
| Gr. A. S. |   | 2275 + 100 per mo. |
| w. m. G.  |   | 2275               |



|             |    |
|-------------|----|
| 7.86        | wt |
| .66         |    |
| <u>8.52</u> | N  |

|            |
|------------|
| 17         |
| <u>217</u> |
| 52         |
| <u>281</u> |
| 81         |
| <u>362</u> |

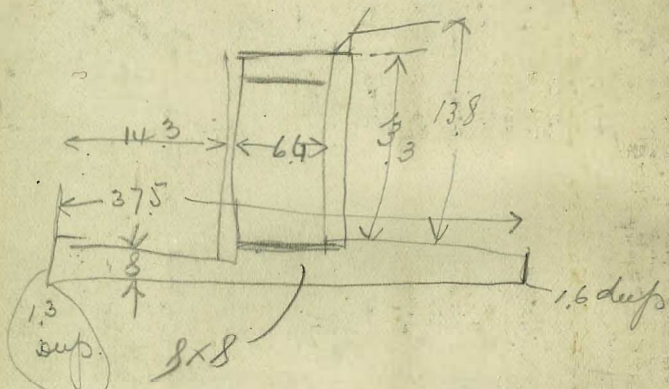
Apr 27

438.5 to 1st January

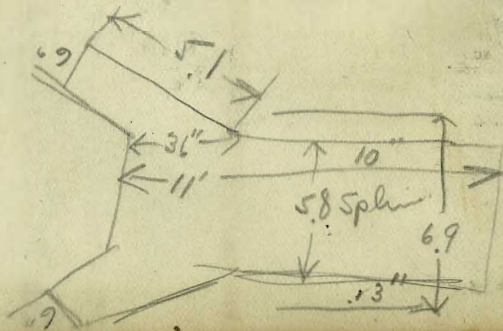
Top Outside 3' above +4 line  
8 steps & gauge

Outside 23 gauge

50" + 3' spring line



12" below old



84.5  
51  
39.5  
564  
074.40  
1430.85  
180 60  
85.8  
951.845  
180  
9613  
73 47

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

ROADWAY 14 FEET WIDE. SIDE SLOPES 1½ TO 1.

FOR SINGLE TRACK EMBANKMENT.

|    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    |    |
|----|------|------|------|------|------|------|------|------|------|------|----|
| 0  | 7.0  | 7.2  | 7.3  | 7.5  | 7.6  | 7.8  | 7.9  | 8.1  | 8.2  | 8.4  | 0  |
| 1  | 8.5  | 8.7  | 8.8  | 9.0  | 9.1  | 9.3  | 9.4  | 9.6  | 9.7  | 9.9  | 1  |
| 2  | 10.0 | 10.2 | 10.3 | 10.5 | 10.6 | 10.8 | 10.9 | 11.1 | 11.2 | 11.4 | 2  |
| 3  | 11.5 | 11.7 | 11.8 | 12.0 | 12.1 | 12.3 | 12.4 | 12.6 | 12.7 | 12.9 | 3  |
| 4  | 13.0 | 13.2 | 13.3 | 13.5 | 13.6 | 13.8 | 13.9 | 14.1 | 14.2 | 14.4 | 4  |
| 5  | 14.5 | 14.7 | 14.8 | 15.0 | 15.1 | 15.3 | 15.4 | 15.6 | 15.7 | 15.9 | 5  |
| 6  | 16.0 | 16.2 | 16.3 | 16.5 | 16.6 | 16.8 | 16.9 | 17.1 | 17.2 | 17.4 | 6  |
| 7  | 17.5 | 17.7 | 17.8 | 18.0 | 18.1 | 18.3 | 18.4 | 18.6 | 18.7 | 18.9 | 7  |
| 8  | 19.0 | 19.2 | 19.3 | 19.5 | 19.6 | 19.8 | 19.9 | 20.1 | 20.2 | 20.4 | 8  |
| 9  | 20.5 | 20.7 | 20.8 | 21.0 | 21.1 | 21.3 | 21.4 | 21.6 | 21.7 | 21.9 | 9  |
| 10 | 22.0 | 22.2 | 22.3 | 22.5 | 22.6 | 22.8 | 22.9 | 23.1 | 23.2 | 23.4 | 10 |
| 11 | 23.5 | 23.7 | 23.8 | 24.0 | 24.1 | 24.3 | 24.4 | 24.6 | 24.7 | 24.9 | 11 |
| 12 | 25.0 | 25.2 | 25.3 | 25.5 | 25.6 | 25.8 | 25.9 | 26.1 | 26.2 | 26.4 | 12 |
| 13 | 26.5 | 26.7 | 26.8 | 27.0 | 27.1 | 27.3 | 27.4 | 27.6 | 27.7 | 27.9 | 13 |
| 14 | 28.0 | 28.2 | 28.3 | 28.5 | 28.6 | 28.8 | 28.9 | 29.1 | 29.2 | 29.4 | 14 |
| 15 | 29.5 | 29.7 | 29.8 | 30.0 | 30.1 | 30.3 | 30.4 | 30.6 | 30.7 | 30.9 | 15 |
| 16 | 31.0 | 31.2 | 31.3 | 31.5 | 31.6 | 31.8 | 31.9 | 32.1 | 32.2 | 32.4 | 16 |
| 17 | 32.5 | 32.7 | 32.8 | 33.0 | 33.1 | 33.3 | 33.4 | 33.6 | 33.7 | 33.9 | 17 |
| 18 | 34.0 | 34.2 | 34.3 | 34.5 | 34.6 | 34.8 | 34.9 | 35.1 | 35.2 | 35.4 | 18 |
| 19 | 35.5 | 35.7 | 35.8 | 36.0 | 36.1 | 36.3 | 36.4 | 36.6 | 36.7 | 36.9 | 19 |
| 20 | 37.0 | 37.2 | 37.3 | 37.5 | 37.6 | 37.8 | 37.9 | 38.1 | 38.2 | 38.4 | 20 |
| 21 | 38.5 | 38.7 | 38.8 | 39.0 | 39.1 | 39.3 | 39.4 | 39.6 | 39.7 | 39.9 | 21 |
| 22 | 40.0 | 40.2 | 40.3 | 40.5 | 40.6 | 40.8 | 40.9 | 41.1 | 41.2 | 41.4 | 22 |
| 23 | 41.5 | 41.7 | 41.8 | 42.0 | 42.1 | 42.3 | 42.4 | 42.6 | 42.7 | 42.9 | 23 |
| 24 | 43.0 | 43.2 | 43.3 | 43.5 | 43.6 | 43.8 | 43.9 | 44.1 | 44.2 | 44.4 | 24 |
| 25 | 44.5 | 44.7 | 44.8 | 45.0 | 45.1 | 45.3 | 45.4 | 45.6 | 45.7 | 45.9 | 25 |
| 26 | 46.0 | 46.2 | 46.3 | 46.5 | 46.6 | 46.8 | 46.9 | 47.1 | 47.2 | 47.4 | 26 |
| 27 | 47.5 | 47.7 | 47.8 | 48.0 | 48.1 | 48.3 | 48.4 | 48.6 | 48.7 | 48.9 | 27 |
| 28 | 49.0 | 49.2 | 49.3 | 49.5 | 49.6 | 49.8 | 49.9 | 50.1 | 50.2 | 50.4 | 28 |
| 29 | 50.5 | 50.7 | 50.8 | 51.0 | 51.1 | 51.3 | 51.4 | 51.6 | 51.7 | 51.9 | 29 |
| 30 | 52.0 | 52.2 | 52.3 | 52.5 | 52.6 | 52.8 | 52.9 | 53.1 | 53.2 | 53.4 | 30 |
| 31 | 53.5 | 53.7 | 53.8 | 54.0 | 54.1 | 54.3 | 54.4 | 54.6 | 54.7 | 54.9 | 31 |
| 32 | 55.0 | 55.2 | 55.3 | 55.5 | 55.6 | 55.8 | 55.9 | 56.1 | 56.2 | 56.4 | 32 |
| 33 | 56.5 | 56.7 | 56.8 | 57.0 | 57.1 | 57.3 | 57.4 | 57.6 | 57.7 | 57.9 | 33 |
| 34 | 58.0 | 58.2 | 58.3 | 58.5 | 58.6 | 58.8 | 58.9 | 59.1 | 59.2 | 59.4 | 34 |
| 35 | 59.5 | 59.7 | 59.8 | 60.0 | 60.1 | 60.3 | 60.4 | 60.6 | 60.7 | 60.9 | 35 |
| 36 | 61.0 | 61.2 | 61.3 | 61.5 | 61.6 | 61.8 | 61.9 | 62.1 | 62.2 | 62.4 | 36 |

Calculated by Julien A. Hall, M. Am. Soc. C. E.