

W184

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

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87-18

~~1330~~
115

50000477

546
+94

5665
4095

57

13 + 12 = 40
50 57

5 34153
77 x 9112

13 + 63 = 57

47876
1159

MICROFILMED

JAN 18 1965

8718
6207
1-4925

174356
87178
610246
6 x .07 .07 3 6

2 x 339903
3 x 20000
15 97

40 -
8 9/16
8 5/16

134 A+ 15 30

W.F.

200 - 16⁰⁰ INCH N.V.L.

205 - 13-25

AT 9 B58 RT To Pass Portal
36⁰⁰ 730 FET

5.10 5402.5
284 226

226 52271

- 13⁰⁰ 22 To JACK 1285 v v

+ 10⁰⁰ 1.61 Moy.

West Sq - 0⁰⁰

173 - A+ 12⁰⁰ 10'

1300 - 17⁰⁰ 55'

7.05 - 13⁰⁰ 35'

(Mmm 3.40)

(99 AT - 22⁰⁰ 30'
Creek EAST)

{ 306 To POT AT 15⁰⁰
45 LEVEL
74 - 18⁰⁰

Please Return to

City of San Diego
Office of City Eng -
Mann Res Site & Conduit

Index

Marron Res. Site + Conduit	---	1
Road Survey Route 7		
along N & W shore Otay Res.	---	38
Summit in Road - South of		
Harvey Ranch	-----	48
Tunnel Survey Start of Sta. 372		
Dulzura Conduit	-----	49

	1.60	658.20		656.54
T.P.	1.59		12.73	645.47
		647.06		
T.P.	0.14		12.69	634.37
		634.51		
T.P.	0.08		12.90	621.61
		621.67		
T.P.	- 0.02		12.70	608.97
		608.95		
T.P.	0.23		12.57	596.38
		596.61		
T.P.	0.10		12.58	584.03
		584.13		
T.P.	0.22		12.79	571.40
		571.62		
T.P.	0.55		12.44	559.18
		559.73		
T.P.	2.55		12.40	547.33
		549.88		
				546.00

15000 CONTOUR MARRON RESERVOIR

CHECK THIS

	ANGLE	MAG	ROD	FLEV	CALC.
0	03° 09' L	S84° 30' W	13.66	546.00	N14° 24' E
1	05° 18' R	S80° 45' W	6.55	540.45	
2	35° 05' L	S45° 45' W	1.94	542.71	
3	10° 51' R	S65° 45' W	3.77	542.72	
4	0° 34' LT	S65° W	3.40	545.02	
5	27° 20' LT	S37° 50' W	6.60	547.00	
6	18° 17' LT		3.75	546.00	
7			32.11		
			71.78		S84° 24' W
8	38° 23' L	S30° 50' W	5.39		S46° 01' W
9	20° 59' R	S51° 40' W			S67° 00' W
	To P.O.T.		3.98		

657.09
ELEV. TOP SADDLE
OVERTUNNEL #2
U.S.G.S

ELEV	506
547.65	540.45
540.45	547.70
	4.98
	542.72
	505
	547.77
	275
	545.02
	542.72
	845
	551.17
	4.7
	547.00
	545.02
	565
	550.67
	31.77
	346.90

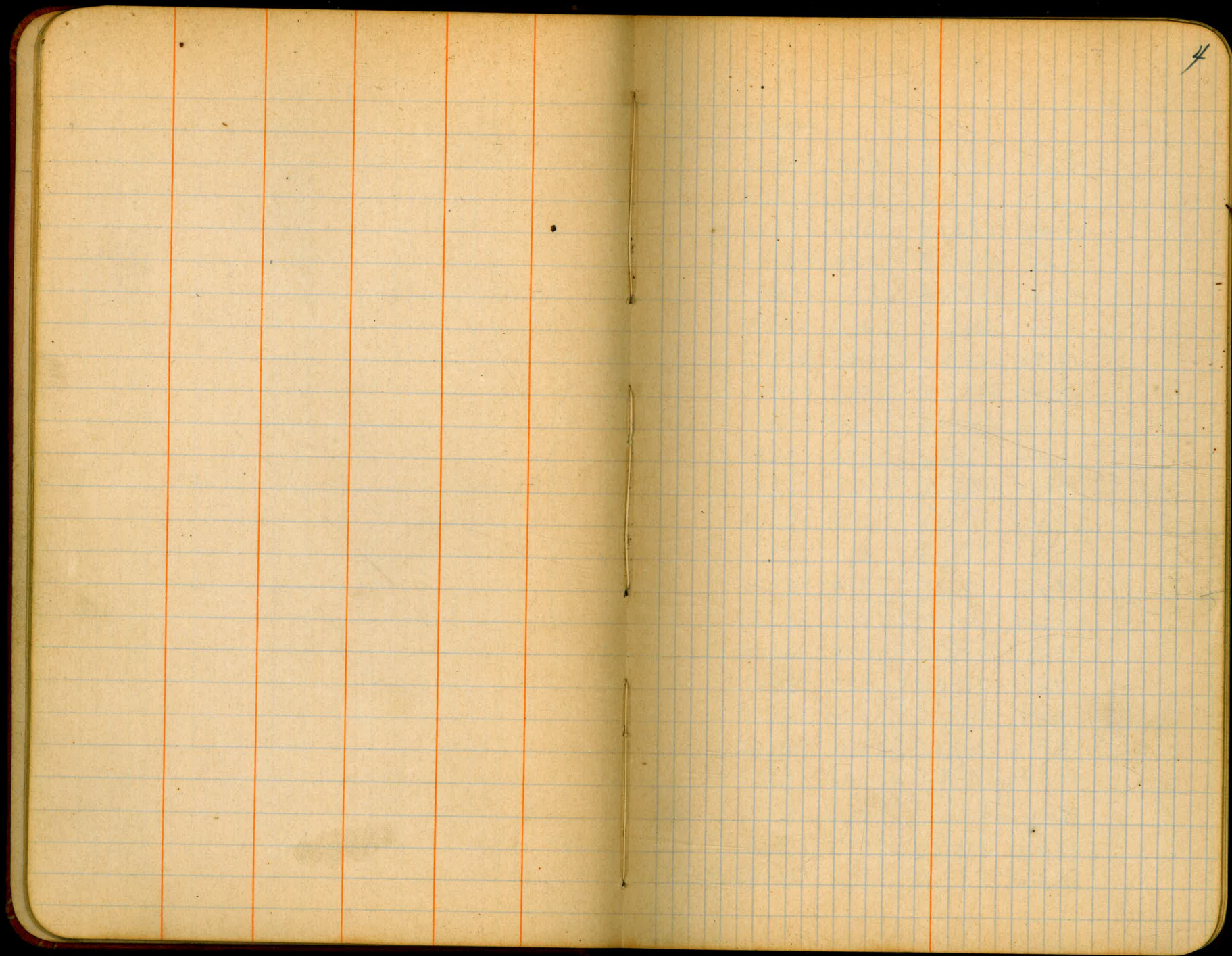
76-42
103-09
179-51
179-60
76-42
103-18

84 3
76-30
8

71.78
71.78

ADD 6X CONSTANT.

546
539



LEVELS OVER TUNNEL #1

①	HT		FLYV
			546.90
12.22	559.12	0.70	558.42
12.69	571.11	0.82	570.79
12.94	583.73	0.09	583.64
12.65	596.29	0.39	595.90
12.76	608.66	0.22	608.44
13.01	621.45	0.10	621.35
12.92	634.27	0.35	633.92
12.90	646.82	0.25	646.57
12.08	658.65	0.07	658.58
11.96	670.54	0.26	670.28
12.80	683.08	0.47	682.61
12.95	695.56	0.34	695.22
12.94	708.16	0.46	707.70
13.05	720.75	0.59	720.16
10.61	731.77	0.14	731.63
12.91	744.54	0.39	744.15
12.89	757.04	0.37	756.67
12.98	769.65	0.30	769.35
12.70	782.05	0.30	781.75
11.80	793.55	0.34	793.21
12.96	806.17	0.46	805.71
13.02	818.73	0.71	818.02
12.46	830.68	0.12	830.56

=829.56

2

LEVELS OVERTUNNEL #

			829.56	
			830.56	
	12.64	843.20	0.29	842.91
	12.55	855.46	0.13	855.33
	12.89	868.22	0.56	867.66
12.18	12.17	879.84	0.07	879.77
	13.10	892.87	0.50	892.37
	12.83	905.20	0.14	905.06
	12.01	917.07	0.18	916.89
	12.86	929.75	0.36	929.39
	13.01	942.40	0.91	941.49
	12.51	954.00	0.15	953.85
	12.89	966.74	0.85	965.89
	12.88	978.77	0.07	978.70
	13.00	991.70	0.69	991.01
	13.02	1004.03	0.84	1003.99
	12.95	1016.94	0.23	1016.71
	12.91	1029.62	0.31	1029.31
	12.52	1041.83	0.08	1041.91
	12.88	1054.79	0.51	1054.28
	12.78	1067.06	0.37	1066.69
	12.64	1079.33	3.84	1075.49
	9.63	1085.12	8.95	1076.17
	3.19	1079.36	12.58	1076.78
			√ =	1065.31

1003.69

1041.75

1066.78

6

BM on North Bolt vs Moun

= 1066.31

(A)

LEVELS OVER TUNNEL #1

7

	2.04		805.34	(794.23)	804.92
		807.38			
T.P.	0.10		12.60	794.78	
		794.88			
TP	0.41		13.11	783.77	
		784.18			
TP	0.30		12.96	771.22	
		771.52			
TP	0.40		12.72	758.80	
		759.20			
TP	0.23		12.78	746.42	
		746.65			
TP	0.26		12.72	733.93	
		734.19			
TP	0.88		12.80	721.29	0.39
		722.17			
TP	0.04		12.74	709.43	
		709.39			
TP	0.24		12.67	696.72	
		696.96			
TP	0.12		12.94	682.02	
		681.90			
TP #		670.89		657.09	
		13	(13.80)	668.10	
TP	0.47		12.90	669.00	
		669.47		657.99	
		658.46			

ELEV. SADDLE OVER TUNNEL #2

LEVELS OVER TUNNEL #1

		658.46		
		667.47		
TP	0.53		12.90	656.57
		657.10		
TP	1.70		12.41	644.69
		646.39		
TP	0.91		12.57	633.82
		634.73		
TP	0.77		12.53	622.20
		622.97		
TP	0.30		12.76	610.21
		610.51		
TP	0.59		12.72	597.79
		598.38		
TP	0.31		12.65	585.73
		586.04		
TP	0.74		12.69	573.35
		574.09		
TP	1.53		12.01	562.08
		563.61		
TP	4.87		12.39	550.62
		555.49		
		544.48		
			3.49	



Mar 16/25

Levels from Lewis Sta	0 to 8	Hoopes	
Around Nose in Mex	0 = P.O.	Kang	
Sta	+	-	Damaks
0			ElcV
			546.00
	+0.30	546.30	
tp			-7.08 539.22
	+0.05	539.27	
#			-12.20 527.07
	+0.26	527.33	
#			-12.23 515.10
	+1.45	516.55	
Bed of creek			-12.86 503.69
tp			+6.00 509.69
	+3.99	507.78	
tp			-5.90 503.79
	+4.13	504.73	
#			-7.18 500.60
	+7.13	504.73	
#			-3.55 501.18
	+9.05	510.23	
tp			-1.00 509.23
	+11.20	520.43	
tp			-0.74 519.69
	+8.1.5	527.84	
tp			-10.52 517.32
	+1.09	518.41	
tp			-12.24 506.17
	+1.24	507.41	
tp			-12.88 494.53

Lewis oto 8 contd

Sta	+	⊖	-	Elev
tp Ford				494.53
	+1.64	496.17		
tp			-11.82	484.31
	+2.13	486.44		
tp			-2.35	484.09
in road	+8.45	493.54		
tp			-1.45	492.09
	+10.65	502.74		
tp			-0.64	502.10
	+9.44	511.54		
tp			-10.42	501.12
	+1.37	502.49		
tp			-3.62	498.87
	+1.94	500.81		
tp			-12.46	488.35
	+0.45	488.80		
tp			-11.77	477.03
	+2.65	479.68		
tp			-7.20	472.48
	+2.80	475.28		
tp			-10.61	464.67
	+3.83	468.50		
tp			-7.00	461.50
			-6.67	461.83
tp	+4.10	465.93		

10

Bed of Str (Cotton wood) at End of Nose = 478 approx

End of nose

High Point in Road End of Nose

Bed of Str at Via Redondo Rd (via Rancho San Ysidro)

Levels	Lewis 0-8 cont'd			
sta	+	0	-	Elev
⊖ Ford		465.93		
tp			-7.80	458.13
	+2.86	460.99		
tp			-8.18	452.81
	+2.22	455.03		
tp			-6.00	449.03
	+3.50	452.33		
tp			-6.88	445.45
	+7.70	553.15		
tp			-0.48	452.67 BM
	+10.45	563.12		
tp			-0.59	462.53
	+12.92	575.75		
tp			-0.77	474.98
	+12.42	587.40		
tp			-3.00	484.40
	+10.31	594.71		
tp			-4.86	489.85
	+12.91	602.76		
tp			-0.00	502.76
	+12.65	615.41		
tp			-1.03	514.38
	+11.79	626.17		
tp			-0.50	525.67
	+11.74	637.41		

Top Large Gran bldr 900' S of Lewis 8 100' E of Creek

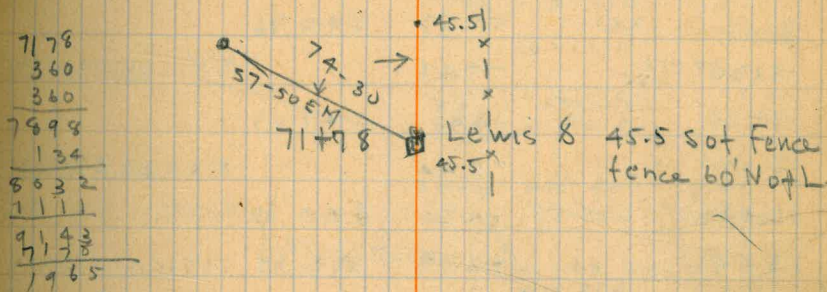
Levels Lewis sta 8 Condit

Sta	+	⊖	-	Elev
⊖ Ford		637.41		
⊕			-2.16	535.25
	+7.22	642.47		
			-3.31	539.16

Condit Marrow Rods

Mar 17/25

Sta	Age	VA Rod	⊖	Elev	Gr.
71+78		+4.20	543.36	539.16	539.16
78+98	(537-E)	+4.64	543.80	539.16	539.00
80+32	(229-12)	-6.15	542.21	537.65	539.00
91+43	(314-E) R23-00	-4.56		537.65	537

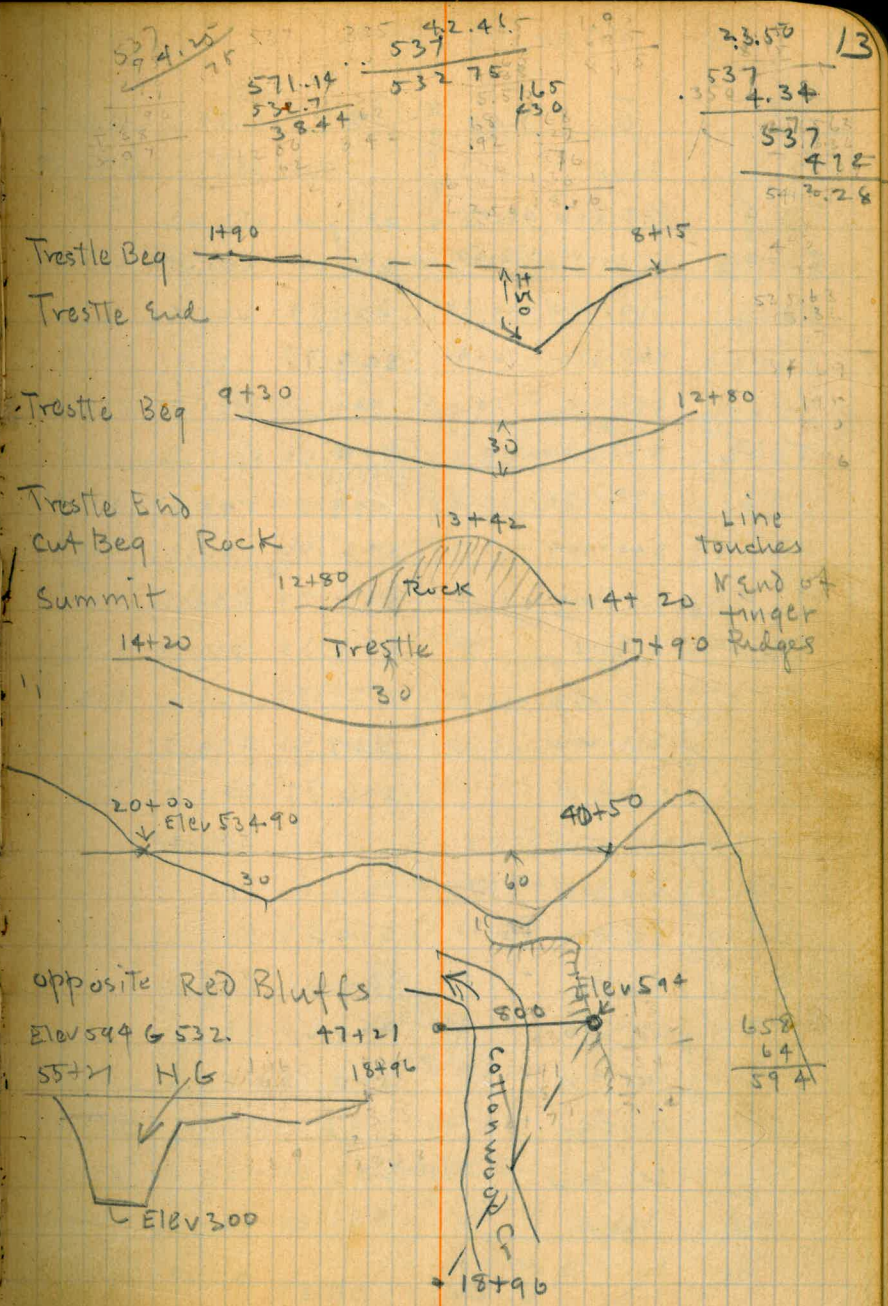
Elev Lewis Sta 8. (Note: Lewis has two sta No 1) = .1%
7178 ft

Sine changed to S side of creek
Recent mile hand level shows N bank very
steep many slides and cliffs. Tunnels also.
Difficult and expensive line to construct
and maintain. Line cuts oil slides
and cliffs. Paper location shows point
91+43 equidistant from Dam as Lewis
Sta 8.

Commenced at Lewis 8. jumped canon
along gale as shown.
Condit from dam to 91+43 two
siphons touching nose of hill and
reaching 91+43 at 6' elev 537. -

See next p

Sta	VA Rod	o	Elev	Gr
91+43=0+00	N85W R109 D35W	+4.88	541.88	537.00
1+90		-5.07	536.81	536.81
1+90	N77-15W R7-35	+4.88	541.69	536.16
8+15		-5.50	536.19	536.19
8+15	N72-15W R4-07	+4.57	540.76	
9+30		-4.68	536.08	536.08
9+30	N71-45W L2-07	+4.99	541.07	
12+80		-5.44	535.63	535.63
12+80	S83-30W L25-55	+4.70	540.33	
13+42		+5.00	559.69	535.56
13+42	N76-15W R20-05	-11.80	537.89	537.89
14+07		+4.60	552.49	535.49
14+07	N44-40E L3-40	-6.00	546.49	
17+97		+4.90	552.39	541.84
17+97	S66-30W L34-25	+13.45	555.39	
18+96		+23.38	578.77	535.00
18+96	S78-45W R12-32	+4.87	583.64	535.00
42+46		-5.00	678.64	532.75
42+46	S89-10W R10-45	+4.80	583.44	
43+04		-3.80	579.64	532.70
43+04		+78.40	658.04	532.28
47+21	S67-40W L16-50		658.04	532.28
47+21	R96-20	-64.00		
55+21			594.00	
1+90		-5.07	536.81	536.81
91+43=0+00		+4.88	541.88	537.00



sta	⚡	VA Rod	⊖	ELEV	537 Gr
98+21		534-30W			527.18
98+81		535-W		531.92	527.12
99+88		536-35W		531.98	527.10
101+48		546-45W		531.75	527.10
102+98		561-15W			
104+48		563-30W		531.73	527.10
107+08		575-10W		532.00	527.10
113+78		580-W		530.00	525.68
123+73		563-45W			525.68

Mar 19-25

123+73			-0.50	525.18	525.68
124+48		554W			
159+88		544W			525.68
160+88		529W	+4.25	529.93	521
174+62		535-45W		524.95	520
174+52		537W			
187+72		533W		524.82	520
191+82		533-30W		522.95	518
196+92		538-15W		522.20	517.30
200+22		549-50W			517.00
207+82		576-45W		522.55	517.00
209+47		560-10W			517+00
216+47		552-15W			517
218+47		550-30W			517

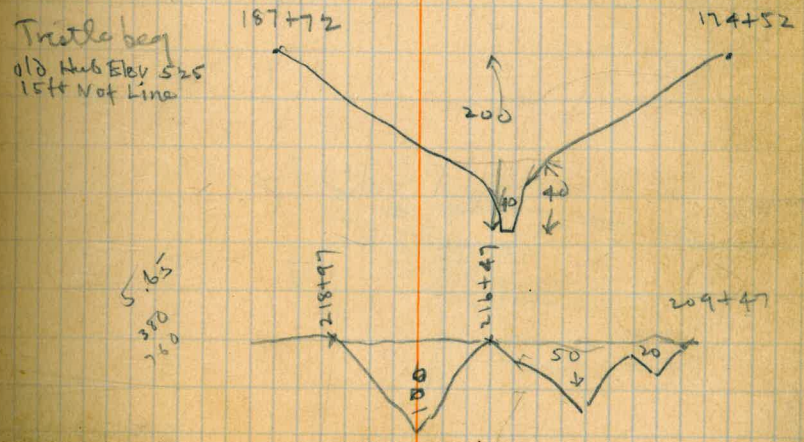
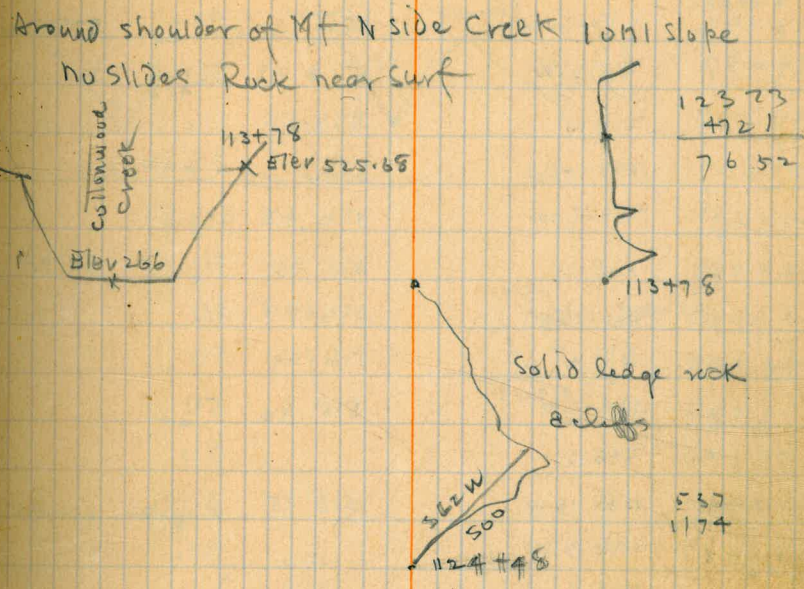
165
250

537
521
537
520

532.00
525.68
6.32
537
19.7
537
517-3.18

537
11.38
525.68
58
1.12
57
66

537
264
226
9.88
527.12
382
266
116



Sta	End	VA	Rod	Elev	Gr
218+97 3+6	550-30W			521.75 517.75	515.11
222+37 5+50	577-15W			522.85 517.55	
230+87	573-30W			521.35 517.35	513.
234+87 4	565-05W			518.27 513.5 4.77	513.5
239+07	573W			516.50 512.50	
247+07 12	N82-45W			513.50	
259+07 8	567-30W			518.45 513.50 4.95	511.00
260+87 60	568-W			515.95 511.00 4.95	
262+47 2	N61-45W			516+00 511	
264+67 8	N51W			516.09 511	
272+67 4	N39-15W			515.90 511 49	
277+47 3	545W			511	
280+47 6	N25-15W			515.75 511 475	
286+97 14	M11-15W			511	
300+97	N19-30E +109			620 620	

around rise old stakes on line ± NBS Av Gr =

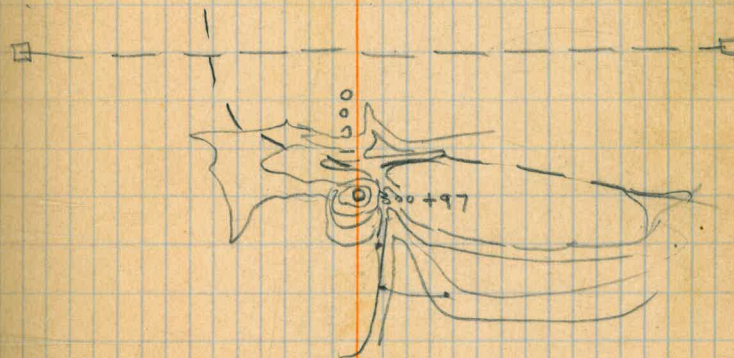


old stks on line

$$\begin{array}{r} .078 \\ 1400 + 430 \\ \hline 317 \\ 78 \\ \hline 109.200 \end{array}$$

across canon

$$\begin{array}{r} 521.35 \\ 138 \\ \hline 7.85 \end{array}$$



170
440

532
2

$$\begin{array}{r} 537 \\ 219 \\ \hline 515.1 \end{array}$$

$$\begin{array}{r} 537 \\ 235 \\ \hline 13.5 \end{array}$$

$$\begin{array}{r} 537 \\ 26 \\ \hline 511 \end{array}$$

135

16

Staff gauge Otay Tower
G.S. Elev. 494.2 = 147.0 on tower

21

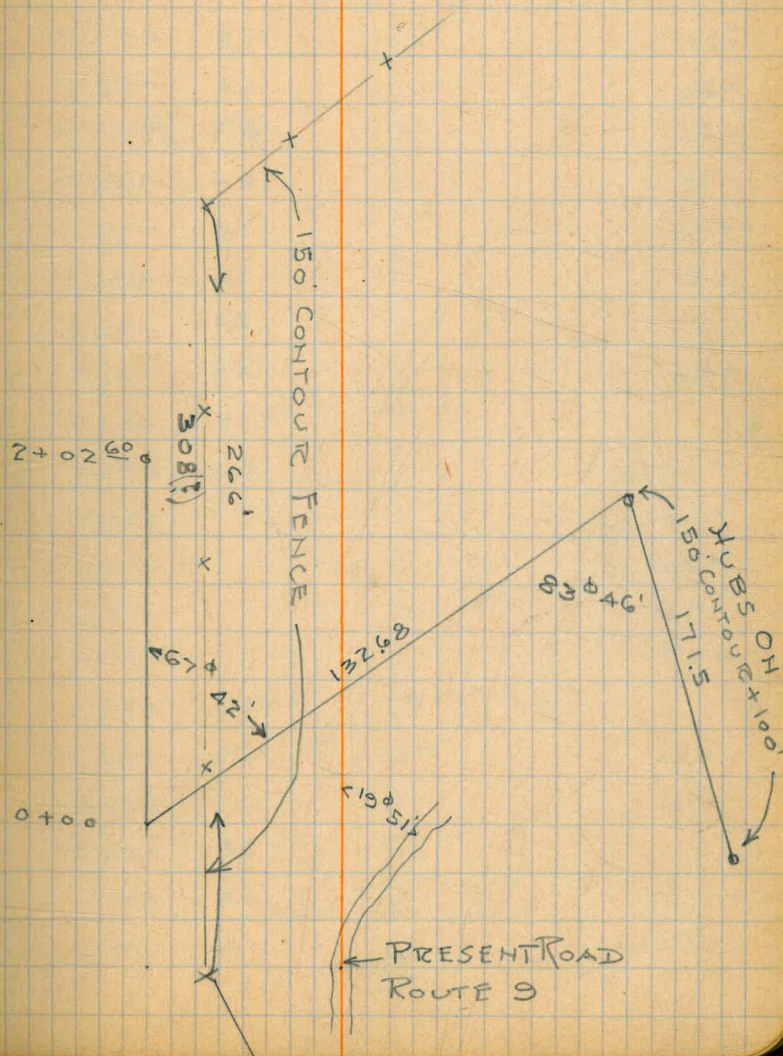
ROAD SURVEY ROUTE 9
FIRST SECTION ALIGNMENT

STA LT RT MAG CALC

21+13 ⁸⁰	59°±	= TAN.	PRESENT ROAD
18+46 ¹⁵		28°46'	
16+00	P.O.T.		S 21°10' W
11+05 ⁰⁵	53°15'		
10+78 ⁵⁰	P.O.T.		S 74°30' W
9+50 ⁰⁰		51°05'	
8+09 ⁰⁰	33°00'		S 56°10' W
7+13 ¹⁰	87°30'		
5+50 ⁰⁰		16°05'	N 52° W
2+02 ⁶⁰	42°35'	42	N 09°40' W
0+00		19°51'	

38
ALONG N AND W SHORE OTAY TCS.
THIS LOCATION IMMED. BELOW UPPER
OTAY DAM.

END



ROAD SURVEY ROUTE 9

SECTION FIRST

LEVELS

	11.59	49035	478.76	
	11.98		224 488.11	
		500.09		
0+00			75 492.6	
+20			72 492.9	
+30			64 493.7	
+50			37 496.4	
+75			04 499.7	
1+00			10 499.1	
+50			32 496.9	
+57			94 490.7	
+90			93 490.8	
2			118 488.2	
+02.60			12.1 488.0	
+20			485.9	
+50			478.6	WL
+75			478.6	WL
- +85			485.4	
3			127 487.4	
+50			56 494.5	
+75			37 496.4	
4			28 497.3	
+50			04 499.7	
+54.60			04 499.7	

39

LT

RT

= WATER LEVEL NOV. 22, 1924

$$-5^{\circ} - \frac{35^{\circ}}{10} \frac{00}{100} \quad \frac{00}{6.} \frac{+35^{\circ}}{10} + 15^{\circ}$$

$$00 - \frac{1^{\circ}}{3} \frac{00}{120} \quad + 12^{\circ}$$

$$- 10^{\circ} \quad + 10^{\circ}$$

$$- 5^{\circ} \quad 00$$

$$00 \quad 00$$

$$00$$

$$- 5^{\circ} \quad 00$$

$$- 10^{\circ} \quad + 5^{\circ}$$

$$- 5^{\circ} \quad + 5^{\circ}$$

$$- 5^{\circ} - \frac{10^{\circ}}{20} \quad + \frac{100}{20} + \frac{25^{\circ}}{10} + 5^{\circ}$$

ROAD SURVEY ROUTE 9
FIRST SECTION
50000

5	43	4958
+25	6.0	4941
+50	60	4941
+70	6.0	4941
6	9.5	491.6
+15	100	490.1
+50	7.0	493.1
+65	82	499.9
7	83	4918
+1310	5.1	4950
+50	52	4949
8	52	4949
+09.0	51	4950
+18	62	4989
+25	90	4910
+40	5.1	4950
+50	4.6	4955
+90	1.2	4989
9	1.2	4989
+50.0	3.2	496.9
10 + 00	1.0	499.1
+50	18	498.3
+65	0.0	500.1
+80		500.1

LT

RT

40

-50	$\frac{+300}{25}$
00	$\frac{+50}{10} + \frac{200}{20} + 0.50$
00	$\frac{+200}{10} + 0.50$
00	$\frac{-50}{10} + 0.50$
00	-1.00
-150	+150
-150	+150
-120	+150
-150	+100
-150	+150
-130	+130
-150	+150

ROAD SURVEY ROUTE 9

FIRST SECTION

500.00

11+00		46	4955
+05 ⁰⁰		66	4935
+12	(48906)	11.0	4891
+50		14.0	475.1 ±
+60		10.0	479.1
+75		4.6	483.5
12		4.3	484.8
+50		4.4	484.7
13		4.3	484.8
+50		4.0	485.1
14		11.8	488.3
+50		7.0	493.1
15		3.5	496.6
+50		1.0	499.1
	335	503.34	0.10
16		5.4	497.9
+35		7.8	495.5
+50		5.8	497.5
17		3.1	500.2
+50		3.7	499.6
18		4.7	498.6
+10		5.6	497.7
+46.15 = 50		4.6	498.7
+85		5.1	498.2
+90		4.1	499.2

41

LT RT

- +25.4

+35.4 00

147 12.50 487.59
489.06-35.4 $\frac{00}{10.0}$ $\frac{00}{10.0}$ -25.4-35.4 $\frac{00}{10.0}$ $\frac{00}{10.0}$ -25.4-35.4 $\frac{00}{10.0}$ $\frac{00}{10.0}$ -35.4-35.4 $\frac{00}{10.0}$ $\frac{00}{10.0}$ -25.4

-5.4 +50

-5.4 +50

-5.4 +50

-5.4 +50

-5.4 +50

-8.4 +80

-8.4 +80

-20.4 $\frac{00}{10.0}$ - $\frac{4}{1}$ +80-25.4 - $\frac{10.4}{1}$ $\frac{00+4}{10.0}$ +10.4

ROAD SURVEY ROUTED
FIRST SECTION
S0334

10	37	4996
+10	33	5000
+20	53	4980
+25	33	5000
+50	33	5000
20	4.2	4991
+50		4950
21		4920
END +138		4918

Lt

Rt

42

$$00 - \frac{y}{1} \frac{00}{2}$$

+8x

-5.8

+100

$$-20 \frac{00}{12}$$

$\frac{y}{1} + 10x$

$$\frac{-5}{20} \frac{00}{4}$$

$\frac{00+y}{60} \frac{y}{1} + 10x$

00

+100

11.30

478.76

490.06

7.10

0.45

489.61

496.71

489 61

12 52

502 13

42

ROAD SURVEY SEC. 2 ROUTE 9
 SECOND SECTION (ALIGNMENT.)

ALONG N AND W SHORE OTAY RES.

43

STA LT RT MAG CALC

26+81 ⁴⁰			S46°20'E
25+44 ¹⁰	22°54'		S23°E
22+00 ⁰⁰	7°13'		S15°50'E
16+90 ⁰⁰		82°37'	N81-20E
15+50 ⁰⁰		90°00'	N08°30'W
11+00 ⁰⁰	05°05'		N03°20'W
8+86 ⁰⁰	09°32'		N06°05'E
5+21 ³⁰	26°26'		N32-30E
3+00	18°34'		N51-05E
0+00			

STAB ± ON JANAL T.C. NO. LINE ±.

<12°>

← PRESENT ROAD
 ROUTE 9

ROAD SURVEY SEC 2 ROUTE 9
SECOND SECTION

	1226		48961
		501.87	
0		55	496.4
+40		73	494.6
+50		63	495.6
1		50	496.9
+50		46	497.3
2		42	497.7
+50		45	497.4
3	Δ	58	496.1
+50		53	496.6
4		45	497.4
+50		50	496.9
5		63	495.6
+21.30		54	496.5
P	976	537	496.50
		506.26	
+50		90	497.3
+70		72	499.1
6		86	497.7
+50		95	496.8
7		98	496.5
+50		100	496.3
8		85	497.8

1/2 Road

+10°	-1/4	00
+11°	-5/6	-1/2 00
+12°	-10/12	-1/2 00
+13°	-13/20	
+7°	-7/20	
+7°	-7/20	
+12°	-10/30	
+10°	-10/30	-60/4 00
+12°	-10/20	-40/4 00
+12°	-10/30	-40/4 00

+11°	-11°
+12°	-12°
+15°	-15°
+17°	-17°
+17°	-17°
+18°	-18°

		50626		
8+50			6.1	500.1
+86°			50	501.3
9			4.7	501.6
+50			50	501.3
10			5.7	500.6
+50			5.3	501.0
11	Δ		3.8	502.5
TP	504		3.67	502.59

		50763		
+50			8.9	498.7
12			7.8	499.8
+50			8.4	499.2
13			8.0	499.6
+50			8.4	499.2
14			9.0	498.6
+50			8.4	499.2
15			5.7	501.9
+50	Δ		1.4	506.2
16			7.0	500.6
+40			8.8	498.8
+50			5.8	501.8
	12.12	513.75	4.00	503.63
+65			8.6	505.2
17			2.5	511.3

	L	R	45
	+10°	-15°	
	+10°	-12°	
	+10°	-12°	
	+7°	-10°	WW
	+10°	-18°	
	+10° + $\frac{30°}{12}$	- $\frac{35°}{30}$	00
	+15° + $\frac{25°}{15}$	- $\frac{25°}{25}$	00
	+10°	-12°	-20°
	+10°	-10°	
	+5°	-5°	
	+5°	-5°	
	00	-5°	WW 13490
	+7°	00	
	+10°	- $\frac{5°}{10}$	00
	+5°	-5°	
	+5°	-5°	
	00	+5°	
	+5° + $\frac{10°}{20}$	-12°	

51375

17	+50	32	5106
18		20	5118
	+50	36	5102
19		42	5096
	+50	38	5100
20		34	5104
	+50	36	5102
21		48	5090
	+50	63	5075
22	4	71	5067
	+50	70	5068
23		97	5041
	+50	96	5042
24		91	5047
	+50	106	5032
25		117	5021
	+4410	132	5006
	+50	132	5006
26		130	5008
	+50	132	5006
	+8140	136	5002

L+

R+

46

+20°	+50	-5°
	15	
	+10°	-10°
+10°	00	00 - 15°
	10	12
	+12°	-12°
	+12°	-12°
	+12°	-12°
	+12°	-12°
	+10°	-10°
	+12°	-12°
	+10°	-10°
	+10°	-10°
	+10°	-5°
	+10°	-5°
	+7°	00
	+6°	-6°
	+10°	-5°
	+10°	-5°
-10°	+20°	-35° - 5°
	00	14
-10°	00	00
	6	1/2 + 10°

47

0+00 IS SUMMIT ROAD S.D.CO. HIGHWAY COMM.
N.E. LY FROM WASHED OUT CULVERT.

	625	60000
	60625	
0	8.5	5978
+50	80	5983
1	7.1	5992
+50	7.5	598.8
2	7.4	5989
+50	5.3	601.0
+75	67	5996
3	59	6004
+50	55	6008
4	68	5995.
+50	8.1	5982
5	79	5984
+50	7.4	598.3
6	64	5999
+50	5.5	6008
7 65	50	6013
+80	77	599.6
7	7.5	5988
+50	73	5990

THIS CONNECTION A SINGLE
TANGENT.
PHONE POLE
S.D.CO. HIGHWAY COMM.
COUNTY SURVEYOR

ASSUME SPIKE IN PHONE POLE 42' LT

0+00

	00	00	
	00	00	
	00	00	
	00	00	⊙ Road
+50 +20°	$\frac{00}{5}$	$\frac{00}{10}$	$\frac{00}{5} - 20°$
	00	$\frac{00}{2}$	$\frac{00}{2} - 40° - 10°$
	00	-12°	
00	$\frac{+12°}{2}$	-12°	
00	$\frac{+15°}{10}$	-10°	
00	$\frac{+10°}{12}$	-7°	
	-7°	$\frac{+10°}{15}$	00
00	$\frac{+15°}{15}$	-5°	
	+10°	-10°	
	+15°	$\frac{-15°}{4} - \frac{35°}{3}$	00
+15° +360°	$\frac{00}{10}$	00	
			⊙ Road

7+50 IS ± AT SUMMIT IN ROAD
SOUTH OF HARVEY RANCH.
COUNTY SURVEYORS ROAD

TUNNEL SURVEY START W
OF STA 372. DULZURA CONDUIT
LT RT

13+63.20 POT END
13+06.20 BANK SIDE CONDUIT
12+12⁴⁰ POT

S06°W

11+40 Δ 28°48'

10+90⁰⁰ (POT PT. ON BOULDER)

6+19⁰⁰ POT

5+25 ±

S32°45'W

4+13³⁰ 14°52'

S47°40'W

2+35⁰⁰ 69°00'

N63°50'W

1+26⁰⁰ 45°00'

0+18 BANK SIDE CONDUIT

N18°25'W

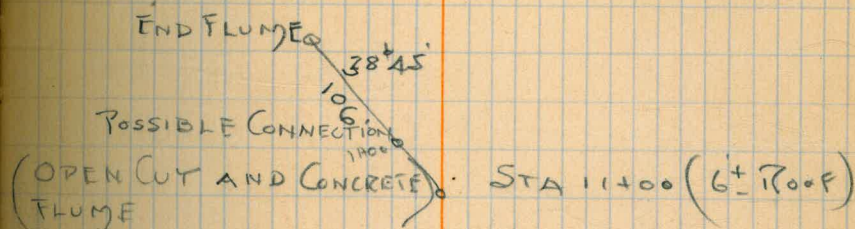
0+00

-372+58

MAGNETIC COURSES ONLY.

49

STA 383+67 =
OPPOSITE 13+63.20



APPROXIMATE LOCATION OF WINDOW

HUB

POINT ON LEDGE

POINT ON BOULDER

HUB OUTSIDE CONDUIT

TUNNEL S40 FLY AROUND
TRESTLES NOS. DULZURA CONDUIT

MAGNETIC COURSES

5+87.40 END P.O.T

5+00 P.O.T

1+49.20 92°04

0+00 = 336+47±

S40-45W

50

= 341+37 (5+61± BANK SIDE CONDUIT)

0+10± BANK SIDE CONDUIT

52

52

~~21'-29~~

~~21.2~~

4 2.3
4
9.2

1430 Front St.

4.7 2nd
3 ✓
14.1

~~21.2~~
~~1.8~~
16.96
~~21.2~~
38.16
~~9.2~~
47.36

21.2

18.2
1.8
14.56
18.2
32.76
14.1
46.9

9-17-26

32.76
9.2
41.96 1st
14.1 - 2nd
56.06

$$\begin{array}{r} 6.6' \\ 3.1 \\ \hline 66 \\ 198 \\ \hline 2046' \end{array}$$

E.S. St 1764 Front St

9-17-26

$$\begin{array}{r} 21.3 \\ 1.6 \\ \hline 1278 \\ 213 \\ \hline 34.08' \end{array}$$

W.S. St 1764 Front St

9-17-26

$$\begin{array}{r} 2.7 \\ 1.9 \\ \hline 293 \\ 27 \\ \hline 5.13 \end{array}$$

1739 Front St E Side

3817 Pringle St
9-17-26

$$\begin{array}{r} 3.2 \\ 3.9 \\ \hline 288 \\ 96 \\ \hline 1248 \\ 448 \\ \hline 16.96 \end{array}$$
$$\begin{array}{r} 2.8 \\ 1.6 \\ \hline 168 \\ 28 \\ \hline 4.48 \end{array}$$
$$\begin{array}{r} 16.7 \\ 2 \\ \hline 33.40 \end{array}$$
$$\begin{array}{r} 4.5 \\ 2.7 \\ \hline 315 \\ 90 \\ \hline 12.15 \end{array}$$
$$\begin{array}{r} 3.4 \\ 2 \\ \hline 6.8 \end{array}$$
$$\begin{array}{r} 6.5 \\ 2 \\ \hline 13.0 \end{array}$$
$$\begin{array}{r} 16.96 \\ 9.48 \\ \hline 12.15 \\ 33.4 \\ \hline 66.99 \\ 6.8 \\ \hline 73.79 \\ 13. \\ \hline 86.79 \end{array}$$

Georgia St Bridge 9-17-26

$$\begin{array}{r} 30.5 \\ 3 \\ \hline 91.5 \\ \hline 68.4 \\ 14 \\ \hline 2736 \\ 684 \\ \hline 95.76 \end{array}$$
$$\begin{array}{r} 8.5 \\ 4 \\ \hline 34.0 \end{array}$$
$$\begin{array}{r} 22.9 \\ 3 \\ \hline 68.7 \end{array}$$
$$\begin{array}{r} 91.5 \\ 95.76 \\ 34.00 \\ 68.7 \\ \hline 289.96 \end{array}$$

690
 276.0
 3.28) 546.00 (U6)
 328
 2180
 1968
 2120

9-17-26
 30th of Muade

10.8
 2.5
 540
 216
 27.0
 23.1
 57.1

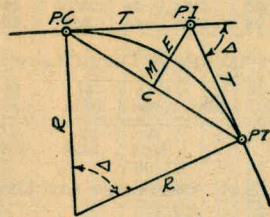
3.3
 23.1

3.5
 9.2
 70
 140
 14.7
 27.5
 42.2

11.0
 2.5
 5.5
 27.5

DIETZGEN'S RAILROAD CURVE AND REDUCTION TABLES

Copyright, 1914, by Eugene Dietzgen Co., New York City



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) $\Delta =$ 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 $E = 115.37$. 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 $D = 5^\circ 30'$.

4°-40

800

99
800
792

108
800
64.

545
26

15-20

3270
1090
1+1.78

150

150

6-30

111
150
150
150

3.28
80
262.40

1650

100

12) 39.37 (3.28
36
33
24
97

328 = 100 M

656 = 200 M

3.28 | 520.00 (160
328
1920

7178
11378
18,556

546
28
328) 52600 (160
328
1980
1968

328
150
1640
328
49200