Rodin Dam Topographic
Conduit survey - Syphons

W 176

DIETZGEN
TRADE MARK

ENGINEERS'
FIELD BOOK
No. 404

EUGENE DIETZGEN CO.

DRAWING MATERIALS, MATHEMATICAL and SURVEYING INSTRUMENTS

Chicago New York San Francisco New Orleans Pittsburg Toronto

Distances from Center of Roadway for Cross-Sectioning
Roadway 16 feet wide. Side Slopes 1 on 1.
For Single Track Embankment.

H	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	H
0	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9	0
1	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	1
2	10.0	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8	10.9	2
3	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9	3
4	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9	4
5	13.0	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.8	13.9	5
6	14.0	14.1	14.2	14.3	14.4	14.5	14.6	14.7	14.8	14.9	6
7	15.0	15.1	15.2	15.3	15.4	15.5	15.6	15.7	15.8	15.9	7
8	16.0	16.1	16.2	16.3	16.4	16.5	16.6	16.7	16.8	16.9	8
9	17.0	17.1	17.2	17.3	17.4	17.5	17.6	17.7	17.8	17.9	9
10	18.0	18.1	18.2	18.3	18.4	18.5	18.6	18.7	18.8	18.9	10
11	19.0	19.1	19.2	19.3	19.4	19.5	19.6	19.7	19.8	19.9	11
12	20.0	20.1	20.2	20.3	20.4	20.5	20.6	20.7	20.8	20.9	12
13	21.0	21.1	21.2	21.3	21.4	21.5	21.6	21.7	21.8	21.9	13
14	22.0	22.1	22.2	22.3	22.4	22.5	22.6	22.7	22.8	22.9	14
15	23.0	23.1	23.2	23.3	23.4	23.5	23.6	23.7	23.8	23.9	15
16	24.0	24.1	24.2	24.3	24.4	24.5	24.6	24.7	24.8	24.9	16
17	25.0	25.1	25.2	25.3	25.4	25.5	25.6	25.7	25.8	25.9	17
18	26.0	26.1	26.2	26.3	26.4	26.5	26.6	26.7	26.8	26.9	18
19	27.0	27.1	27.2	27.3	27.4	27.5	27.6	27.7	27.8	27.9	19
20	28.0	28.1	28.2	28.3	28.4	28.5	28.6	28.7	28.8	28.9	20
21	29.0	29.1	29.2	29.3	29.4	29.5	29.6	29.7	29.8	29.9	21
22	30.0	30.1	30.2	30.3	30.4	30.5	30.6	30.7	30.8	30.9	22
23	31.0	31.1	31.2	31.3	31.4	31.5	31.6	31.7	31.8	31.9	23
24	32.0	32.1	32.2	32.3	32.4	32.5	32.6	32.7	32.8	32.9	24
25	33.0	33.1	33.2	33.3	33.4	33.5	33.6	33.7	33.8	33.9	25
26	34.0	34.1	34.2	34.3	34.4	34.5	34.6	34.7	34.8	34.9	26
27	35.0	35.1	35.2	35.3	35.4	35.5	35.6	35.7	35.8	35.9	27
28	36.0	36.1	36.2	36.3	36.4	36.5	36.6	36.7	36.8	36.9	28
29	37.0	37.1	37.2	37.3	37.4	37.5	37.6	37.7	37.8	37.9	29
30	38.0	38.1	38.2	38.3	38.4	38.5	38.6	38.7	38.8	38.9	30
31	39.0	39.1	39.2	39.3	39.4	39.5	39.6	39.7	39.8	39.9	31
32	40.0	40.1	40.2	40.3	40.4	40.5	40.6	40.7	40.8	40.9	32
33	41.0	41.1	41.2	41.3	41.4	41.5	41.6	41.7	41.8	41.9	33
34	42.0	42.1	42.2	42.3	42.4	42.5	42.6	42.7	42.8	42.9	34
35	43.0	43.1	43.2	43.3	43.4	43.5	43.6	43.7	43.8	43.9	35
36	44.0	44.1	44.2	44.3	44.4	44.5	44.6	44.7	44.8	44.9	36
37	45.0	45.1	45.2	45.3	45.4	45.5	45.6	45.7	45.8	45.9	37
38	46.0	46.1	46.2	46.3	46.4	46.5	46.6	46.7	46.8	46.9	38
39	47.0	47.1	47.2	47.3	47.4	47.5	47.6	47.7	47.8	47.9	39
40	48.0	48.1	48.2	48.3	48.4	48.5	48.6	48.7	48.8	48.9	40

Example—If point is 22.6 ft. above grade, how far should it be from center line to be a slope stake point? Ans. from Table 30.6. For same slopes but other widths of roadbed, correct above figures by one-half difference in width of roadbed; thus in example above, for 20 ft. roadbed distance will be 30.6+(20—16)÷2 or 2 ft. added to 30.6 =32.6. For slopes of 1 on 1½ see inside of back cover.

J.W. Williams. Consulting Eng.
City Hall

Book #1 Roden Dam

Rodin Dam Topography

Williams

Dam Topography	1-5
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Rodan Dam Site

Williams
Van Hoen
Thompson
Dransfield

Stout

Jan 9-1924

	Azm.	Rod	Vert	To	Elev.
⊼ at South axis point	2°00	4.68	0 0	N axis	825.0
	5°15	5.8	+3°10	A1.	857.0
	1°45	5.75	+2°40		851.7
	7°45	5.70	+2°45		852.3
	16°08	6.00	-0°10'		823.3
	359°43	6.63	+1°43		844.9
	24°57'	6.05	-3°30'		798.1 ~~861.9~~
	349°25	6.55	+0°47'		834.0
	27°44	6.03	-4°40		776.0
	343°27	6.29	0°0		825.0
	30°36	6.05	-6°10'		760.4
	340°00	5.90	-1°22'		810.9
	34°05'	6.10	-8°15		738.4
	334°35	6.77	-3°23		785.1
	44°00	4.60	-15°26		706.8
	329°35	5.75	-15°53		673.4
	45°17	3.88	-18°56		705.6
	323°40'	5.65	-9°22		734.2
	35°05	3.30	-23°45		703.0
	12°15	3.03	-27°20'		701.0
	305°48	4.93	-15°50'		695.0
	340°58'	3.87	-9°45		760.3
	353°00	4.85	-1°55		808.8
	356°03	5.05	+0°30		870.6

Azmith of Axis N 2°E or Mag N 14°W

	Vert Dist	Horiz Dist
H.I. 830.1 S axis point El. 825		464.0
Reading 5.1 center X Hair Top of Hill A#1	+32.0	579.2
	+26.7	574.8
825 / 36.9 / 788.1	+27.3	568.8
	-1.7	601.0
	+19.9	663.4
	-36.9	603.7
	+9.0	655.9
	-49.0	600.0
	—	630.0
	-64.6	599.0
	-14.1	590.7
	-86.6	598.7
	-39.9	675.7
to toe of slope at river edge	-118.2	428.8
" " " "	-151.6	532.2
toe slope river edge	-119.4	347.6
	-90.8	551.1
toe slope river edge	-122.0	277.9
	-124.0	240.0
edge of river	-130.0	457.3
	-64.7	377.1
	-16.7	485.5
	-4.4	506.0

Roden Dam

1/9-24

Inst	Azm.	Rod	Vert	To	Elev.	Vert Dist	Horz Dist.
T at S Axis Point H.I = 830.1 Axis = 875.°	22°16	4.11	-5°39		784.7	- 40.3	408.7
	2°20	4.17	-3°12		801.7	- 23.3	416.7
	17°57	4.40	-3°03		801.0	- 24.0	439.8
	2°24	3.60	-7°10		780.4	- 44.6	355.4
	17°57	4.42	-3°05		801.3	- 23.7	441.8
	2°24	3.61	-7°14		779.9	- 45.1	356.4
	2°05	3.33	-13°50		747.6	- 77.4	314.8
	13°55	4.57	-1°13		815.3	- 9.7	457.8
	2°33	3.17	-19°50		723.5	- 101.5	281.5
	11°25	5.05	+0°25		828.7	+ 3.7	506.0
	9°21	5.43	+1°45		841.6	+ 16.6	543.5
on Axis T at N Axis Point		2.33	-29°24		703.5	- 121.5	716.1
	182°00	4.68	0.0		825.0	H.I. 5.00 (830.00) Elev N. Point 825.00	00	469.0
	146°41	4.73	-15°02		706.3	Edge Cr.	- 118.7	447.3
	233°02	4.50	-17°47		693.9	Edge Cr.	- 131.1	409.6
	182°30	7.25	+10°22		953.4	on Axis	+ 128.4	702.7
	224°22	5.67	-2°45		797.8	Edge Road	- 27.2	566.8
	149°58	5.59	-4°17		783.4	Edge Road @ Bend	- 41.6	557.0
	182°43	5.74	+8°15		906.6	on Axis	+ 81.6	564.0
	219°30	6.50	+2°57		858.4		+ 33.4	649.4
	163°45	6.10	+4°45		875.3		+ 50.3	607.0
	182°29	5.22	+4°10		862.9	on Axis	+ 37.9	570.2
	216°50	7.15	+5°51		897.5		+ 72.5	708.6

Roden Dam

	Azm	Intercept	Vert Ang.	To.	Elev.
T of N Axis Point El. 875.0 H.I. 830.	167°37	6.50	+7°30		909.1
	182°30	4.33	-4°05		793.9
	171°23	6.90	+10°20		946.1
	212°34	7.70	+7°52		929.4
	179°50	3.95	-10°40		753.3
	178°40	2.70	-27°40		713.5
	183°55	3.50	-23°00		699.1
T of A1. Elev. 857.0 H.I. 863.0	Back Az	5°15			
	325°32	.85	-7°40		845.8
	311°35	1.98	-5°00		840.0
	338°17	3.03	-0°38	A A2	853.6
	281°37	2.13	-7°04		831.0
	338°20	4.50	+2°05		873.3
	268°40	2.63	-9°35		813.8
	347°15	4.01	+1°26		867.0
	354°41	4.20	+1°54		870.9
	358°36	3.70	-0°37		853.0
	347°37	5.24	+6°50	Δ A.3	919.°
	5°36	3.40	-4°30		830.4
	12°50	3.10	-9°12		798.1
	344°47	5.27	+6°30		916.3
	355 52	2.43	-9°05		819.1
	337°08	5.20	+3°30		888.7
	347°10	3.20	-2°05		845.4
	342°40	3.88	+0°47		862.3

1/9-24

		Vert. Dist	Hor. Dist
	+		
Edge Road	+	84.1	639.9
	-	31.1	431.7
	+	121.1	668.8
	+	104.1	776.7
1/10-24 Party Same Clear	-	71.7	381.5
Toe of Slope	-	111.7	212.6
Edge of C.C.	+	125.9	297.6
Top of Knoll (North of Axis) A.1 6.° (North Side Dams)	-	11.2	84.5
	-	47.0	197.5
on Knoll in Saddle N. Side Dam Site	-	3.4	304.0
	-	26.0	210.9
on Side Hill N. of Saddle	+	16.3	450.5
on Point Back of Dam Site	-	43.2	256.8
	+	10.0	401.8
	+	13.9	420.6
	-	4.0	371.0
near top of large Knoll 500' N. of Dam Site	+	62.0	517.6
	-	26.6	358.9
at edge of Small Canyon	-	58.9	303.1
Near top large Knoll (Heavy Granite Boulders)	+	59.3	521.2
Bottom Small Canyon	-	37.9	238.0
	+	31.7	519.1
Small branch of Draw	-	11.6	320.6
	+	5.3	389.0

Roden Dam

Inst at	Azm	Intercept	Vert. Ang.	To	Elev.				
⊼ A1 Elev 857.0	333°28	5.05	+1°28		870.1		+	13.1	505.7
	341°00	4.70	+3°40		887.0		+	30.0	469.1
	356°32	6.53	+5°07	△A4	915.0	on ridge of Large Knoll N. of Dam	+	58.0	649.0
	326°25	4.73	-1°52		841.6		-	15.4	473.5
	319°50	4.73	-4°08		823.0	Bottom Small Draw	-	34.0	471.7
	327°50	6.13	-1°00		846.3	Bottom of Draw in Back of Large Knoll	-	10.7	613.8
	0°50	5.70	+3°40		893.4	on Ridge of Large Knoll	+	36.4	568.7
	322°33	5.70	-2°34		831.5	Bottom of Draw Back of L. Knoll	-	25.5	569.9
	7°22	5.45	-0°56		848.1		-	8.9	546.0
	315°10	5.50	-5°10		807.7	Bottom of Draw Back of L. Knoll	-	49.3	546.5
	13°03	6.70	-2°10		831.7		-	25.3	670.0
	302°00	6.70	-6°28		782.0	on Ridge in back of Draw	-	75.0	662.8
	18°02	6.50	-4°13		809.3		-	47.1	647.6
	~~317°00~~ 307°00	6.70	-4°15		807.5	on Ridge in back of Draw	-	49.5	667.5
	25°33	6.70	-7°22		771.8	on side of Large Knoll	-	85.2	660.1
	311°02	6.63	-2°34		827.3	on Knoll in back of Draw	-	29.7	662.7
	30°45	6.50	-10°00		745.9	Toe of Slope	-	111.1	630.4
	317°00	6.50	-1°00		845.7	on Knoll in back of Draw	-	11.3	650.8
	323°55	6.95	-0°00		857.0	Break in Slope on Knoll	-	0.0	696.0
	327°55	7.30	+1°30		876.1	" " " " "	+	19.1	739.5
	332°20	7.90	+4°05		913.1		+	56.1	787.2
	330°10	2.21	-5°37		835.5	Low Point of Saddle	-	21.5	219.0

Roden Dam

1/10-24

⊼ on A 2
El. 853.6

Azm.	Intercept	Vert Angle	To	Elev.		Vert Dist	Horiz Dist
					H.I. 5.00		
162°50	.90	-12°10		834.9	in saddle	- 18.7	87.0
110°50	1.22	-18°15		817.0	Bot Draw North of Dam	- 36.6	111.1
216°20	1.10	-14°00		827.5		- 26.1	104.4
101°50	1.57	-17°50		807.5		- 46.1	143.1
235°20	1.53	-14°20		816.7	Bot W. Draw	- 36.9	144.6
99°05	1.80	-18°20		799.6	Bot E. Draw	- 54.0	163.1
237°40	2.12	-14°30		802.0	Bot W. Draw	- 51.6	199.7
143.05	3.18	- 3°00		836.9		- 16.7	318.1
95°45	2.50	- 17°30		781.6	Bot E. Draw	- 72.0	228.3
128°25	3.15	- 7°27		813.0		- 40.6	310.9
93°10	3.04	- 17°20		766.9	Bot E. Draw	- 86.7	278.0
244°45	4.78	- 13°35		744.2	Bot W. Draw	- 109.4	452.8
93°15	3.00	- 17°20		768.0	Bot E. Draw	- 85.6	274.3
119°10	3.70	- 10°10		789.1		- 64.5	359.5
244°36	5.80	-13°40		720.2	Bot W. Draw	- 133.4	548.5
91°35	3.80	- 16°00		752.6	Bot E. Draw & toe of Sl.	- 101.0	352.0
109°40	4.23	-13°00		760.7		- 92.9	402.6
235°30	4.65	-11°00		766.3		- 87.3	449.0
229°40	4.25	- 11°25		770.9	Break in Slope	- 82.7	409.6
219°40	3.00	- 8°20		810.4	on Sl.	- 43.2	294.7
201°00	2.45	- 5°00		832.2		- 21.4	244.1
183.0	1.73	- 4°05		841.2		- 12.4	173.2

Stadia across Syphon #1

T on Sta			Horiz	Elev.
13+27½	4.80			794.96
9+86.1	4.40	-0.45	440.9	799.96 769.83
9+48.5	3.80	-4°40	378.5	774.83 742.31
10+06.6	3.30	-10°20	320.37	747.31 709.78
10+79.3	2.80	-20°10	247.7	714.78 694.8
Ca Bot 11+04			223.0	717.63 736.60
11+80.7	1.68	-21°35	146.3	747.9 766.27
12+34.5	1.04	-20°30	92.25	771.27 785.71
12+83.26	.48	-19°20	43.74	790.41

Mag. N. 84° W.

7/11-24
Party same
Clear

H.I. 5.00 Elev 806.73 Elev ground 800.73

Edge Bank

Bottom Ca 15' lower 25' ahead

Rod at 4.3

	Azm	Rod	El
0+00			
2+40	266°56'	2.4	799.05
5+00			800.8
	Siphon #1 see page 6		
8+47.2			
12+84			
14+70			800.73
15+73			97.2
18+33			98.76
20+00			95.09
22+00			92.59
23+87			88.87
24+73			92.12
26+00 = 24+56	Siphon #2 See Page 54 Dist across Siphon 940 (Stadia)		98.18
	Siphon #x see page 54		
33+96			

Abandoned see page 53

783.10
11.32
799.32

Es

300.00	Axis of Dam
799.76	F.2
99.5	C 1.3
99.15	Siphon Point "A"
	Note .15% Grade used on Siphons.
98.50	Grade Siphon Point "B"
98.30	C 2.4
98.20	C 1.0
97.96	C 0.3
97.79	F 2.7
97.59	F 5.2
97.37	F 8.5
97.38	F 5.2
97.18	C 1.2 Siphon Point "A"
	Note 0.15% Grade used on Siphons
96.77	Siphon Point "B"

setup #33 from MAxis
" " 35 " SAxis

Abandoned see P. 53

8

Station				Elev	Gr. Rod	
35+00				set to Gr	8.63	95.67
36+00				"	8.73	95.57
37+50				"	8.87	95.42
39+00				"	6.06	95.27
41+00				93.37		95.07 (F 1.7)
43+00				94.17		94.87 (F 0.7)
44+00				set to Gr	6.56	94.77
45+35				"		94.64 set to Gr.
46+75				"	11.03	94.50
48+75				"	11.23	94.30 transit no point set
50+75				"	15.95	94.10
52+75				"	16.15	93.90
53+75				"	6.06	93.80

1/11-23
Party Same
Clear

1/12-23
Party Same
Clear

1/12-23
Party Same
Clear

	Elev	Gn Rd
54+25	set to Gn	6.11
56+00	"	6.29
57+00	"	
58+75	"	7.51
60+50	"	7.69
62+00	"	7.84
63+00	"	7.94
64+00	"	13.11
66+00	"	13.31
68+00	"	13.51
70+00	"	13.71
71+00	"	
72+00	"	

93.75
.17
93.57
.10
93.47 set to grade
.17
93.30
.18
93.12
.15
92.97
.10
92.87
.10
92.77
.20
92.57
.20
92.37
.20
92.17
.10
92.07 in canyon set with hand level to grade
.10
91.97

	Elev Set to Gr.	Gr. Rod
73+00		
74+00	"	
75+00	"	14.21
76+00	"	14.31
77+50	92.90	14.41
78+90	Set to Gr.	10.98
79+50	"	11.04
80+25	"	
82+25	"	10.97
84+25	"	11.19
86+25	"	11.39
87+00	"	11.47

91.87	
91.77	
91.67	
91.57	
91.43	Cut 1.46
91.29	
91.23	
91.16	
90.96	
90.76	
90.56	
90.48	

1/14-73
Ponty-Same
Clear

"					
88+50			Set tog.	11.62	90.33
89+50			"	11.72	90.23
90+50			"	11.82	90.13
91+00			"	11.87	90.08
93+00			"	11.77	89.88
95+00			796.05	11.97	89.68 C 6.3
97+00			Set tog.	12.17	89.48
97+50			"	12.22	89.43
99+50			"	12.42	89.23
100+50			"	12.52	89.13
102+50			"	12.72	88.93
103+50			"	12.82	88.83
105+50			"	13.02	88.63

12

107+50		set to gr.	12.46
			17
109+50		"	12.66
111+00		"	12.81
112+50		"	9.89
113+00		"	9.92
113+50		"	9.97
115+50		"	12.56
			15
117+00		"	12.71
118+00		"	12.81
120+00		"	13.01
120+50		"	13.06
121+00		"	13.11
122+00		"	13.21

88.43	
	20
88.23	
	15
88.08	
	15
87.93	
	.05
87.88	
	.05
87.83	
	.20
87.63	
	.15
87.48	
	.10
87.38	
	.20
87.18	
	.05
87.13	
	.05
87.08	
	.10
86.98	

		Gr. Rod	Grade
124+00	Set to Gr.	13.41	86.78
			.18
125+75	"	13.59	86.60
			.05
126+25	"	13.64	86.55
			.10
127+25	"	11.04	86.45
			.12
128+50	"	11.16	86.33
			.08
129+25	"	11.24	86.25
			.07
130+00	"	11.31	86.18
			.15
131+50	"	11.46	86.03
			.20
133+50	"	11.66	85.83
			.10
134+50	"	12.13	85.73
			.10
135+50	"	12.23	85.63
			.20
137+50	"	12.43	85.43
			.20
139+50	"	12.63	85.23

141+50	Set to Gr.	12.83	
143+00	"	12.98	
145+00	"	12.12	
147+00	"	12.32	
149+00	"	12.52	
150+00	"	12.62	
152+00	"	12.82	
153+00	"	7.41	
155+00	"	7.61	
157+00	"	7.81	
159+00	"	8.01	
160+00	"	8.11	
161+00	"	8.21	

1/15-23
Party Same
Clear.

85.03	.20
84.88	.15
84.68	.20
84.48	.20
84.28	.20
84.18	.10
83.98	.20
83.88	.10
83.68	.20
83.48	.20
83.28	.20 set to Grade with hand level
83.18	.10
83.08	.10

163+00				Sett to Gr.	8.41
165+00				"	11.30
167+00				"	11.50
168+00				"	11.60
169+00				"	11.70
170+00				"	11.54
171+00				"	11.64
173+00				"	11.14
175+00				"	11.34
176+00				"	11.44
176+50				"	9.91
177+00				"	9.96
179+00				"	10.16

1/15-23

82.88
82.68
82.48
82.38
82.23
82.18
82.08
81.88
81.68
81.58
81.53
81.48
81.38

180+00	Set to Gr.	9.82	81.18
181+00	"	9.92	81.08
183+00	"	10.12	80.88
185+00	"	10.61	80.68
187+00	"	10.81	80.48
189+00	"	11.01	80.28
191+00	"	11.21	80.08
191+90	"	9.66	79.99
193+50	"	9.84	79.83
195+00	77.98 ~~78.38~~	9.99	79.69 E 1.7
196+00	Set to Gr.	10.19	79.58
198+00	"	13.06	79.38
198+40	"	13.11	79.33

17

	Elev	
198+90	78.40 ~~79.20~~	
199+48	Set to Gr	8.03
201+50	83.93	
203+43		8.42
205+43		8.62
207+43		8.82
208+18		8.89
209+50		10.56
211+50		10.75
213+50		10.95
215+00		11.10
217+00		11.30
219+00	78.29	10.50

1/15-23

79.23 FOS
79.23
79.03 CA 9
78.83
78.64
78.44
78.37
78.24
78.04
77.84
77.69
77.49
77.29 CIP

	Elev.	
221+00	78.09	10.70
222+75	77.92	10.87
224+75	77.72	11.07
226+00	77.52	11.27
227+00	set to Gr.	9.80
227+75	"	9.87
229+75	"	10.07
230+50	"	10.15
232+50	"	10.35
234+50	"	10.55
236+00	779.33	
238+00	Set to Gr.	9.95
240+50	"	10.20

16+24
Party same.

77.09	C 1.0
76.92	C 1.0
76.72	C 1.0
76.58	Cut 0.94
76.48	
76.41	
76.21	
76.13	
75.93	
75.73	
75.58	C. 3.75
75.38	
75.13	

2A1+50		Set to Gn	10.30	75.03
2A2+25		"	10.37	74.96
2A3+75		"	5.92	74.81
2A5+75		"	6.12	74.61
2A7+75		"	6.32	74.41
2A9+25		"	6.47	74.26
250+00		"	6.54	74.18
252+00		"	6.75	73.98
254+00		"	6.95	73.78
255+00		"	7.05	73.68
256+00		"	7.15	73.58
257+00		"	6.08	73.48
258+00		"	6.18	73.38

16-24

259+00	Sett to Gr.	10.67	73.28
261+00	"	10.87	73.08
262+00	"	10.97	72.98
263+00	"	11.07	72.88
264+50	"	11.22	72.73
266+50	"	11.42	72.53
267+50	"	11.52	72.43
268+00	"	11.57	72.38
269+00	"	8.32	72.25
269+50	"	8.37	72.23
271+50	"	8.57	72.03
273+00	"	8.72	71.88
274+00	"	8.82	71.78

276+00	Sett. Gr.	9.02	71.53
277+00	"	9.12	71.43
278+00	"	9.22	71.33
279+00	"	9.32	71.23
281+00	"	6.94	71.08
281+50	"	6.99	71.03
283+50	"	7.19	70.83
284+25	"	7.26	70.76
285+00	"	7.34	70.68
286+00	"	7.44	70.58
288+00	"	7.64	70.38
289+00	"	7.74	70.28
290+00	"	7.84	70.18

291+00		Set to Gr.	9.76
292+00		"	9.86
292+50		"	9.91
293+00		"	10.00
294+00		"	10.30
295+00		"	10.40
296+00		"	10.50
297+00		"	10.60
298+00		"	10.70
299+00		"	10.80
300+00		"	10.89
301+00		"	10.69
302+50		"	10.84

70.08
69.98
69.93
69.88
69.78
69.68
69.58
69.48
69.38
69.28
69.18
69.08
68.93

303+50	Set to Gr.	10.94	68.83
305+50	"	11.14	68.63
306+50	"	11.24	68.53
307+50	"	9.48	68.43
309+25	"	9.65	68.26
310+25	"	9.75	68.16
312+25	"	9.95	67.96
313+25	"	10.05	67.86
314+00	"	11.52	67.79
315+00	"	11.62	67.69
315+75	"	11.70	67.61
317+75	"	7.97	67.41
318+52	"	8.05	67.33

1/17-24
Party same
clear

320+50		Bottom Gr.	7.79	67.13
322+50		"	7.99	66.93
324+50		"	8.19	66.73
326+00		"	8.34	66.58
327+00		"	8.44	66.48
328+00		"	11.87	66.38
330+00		"	12.07	66.18
331+50		"	12.22	66.03
332+50		"	12.32	65.93
333+60		"	12.27	65.82
334+50		"	12.37	65.73
336+35		"	10.27	65.55
	Siphon #3			
340+32		765.09		64.95

1/17-23 Siphon Point "A"

0.15% Grade on Siphons

1/17-23 at 014 Siphon Point "B"

341+50	Set to Gr	9.90	64.83
343+50	"	10.10	64.63
345+50	"	10.30	64.43
347+50	"	10.50	64.23
349+00	"	9.15	64.08
350+60	"	9.31	63.92
352+60	"	9.51	63.72
353+60	"	11.58	63.67
354+50	"	11.92	63.53
355+50	"	12.24	63.43
356+50	"	8.67	63.33
357+00	"	8.94	63.28
357+50	"	8.79	63.23

17-24
Party gone clear.

1/17-24

		Elev.		
359+50			11.50	63.03
360+00			11.55	62.98
361+50			11.70	62.83
363+00			11.85	62.68
365+00			12.05	62.48
367+00			12.25	62.28
369+00			12.45	62.08
370+50	Siphon #4		12.60	61.93 1/17-23
				0.15% fall on Siphon
398+51		759.25		57.73 Cut 1.52 1/18-23
400+50			13.32	57.53 Party same Clear.
402+50			13.52	57.33
404+50			13.72	57.13
405+00			11.30	57.08

18-23

		Elev		
A06+50		Sctto Gr.	11.46	56.93
407+50		Sctto Gr.	11.56	56.83
408+00		"	10.65	56.78
410+00		"	10.85	56.58
411+85		"	11.03	56.40
413+50		"	11.20	56.23
414+06	V	"	11.25	56.18
415+00		"	12.26	56.08
416+50		"	12.41	55.93
417+50		"	12.51	55.83
419+25		"	12.69	55.65
419+50	V	"	12.71	55.63
420+00		756.08	12.22	55.58

3.0 E

	Elev.	
420+50	Set to Gr.	12.27
421+50	756.43	12.58
423+50	Set to Gr.	12.78
424+50	"	10.70
426+00	"	10.88
427+50	"	10.99
428+00	"	11.04
429+00	"	5.87
430+00	"	5.97
431+00		6.07
433+00		6.27
434+00		6.37
434+50		11.41

55.53	
55.43	Set 13
55.23	
55.13	
54.98	
54.83	
54.73	
54.63	
54.53	
54.43	
54.23	
54.13	
54.13	

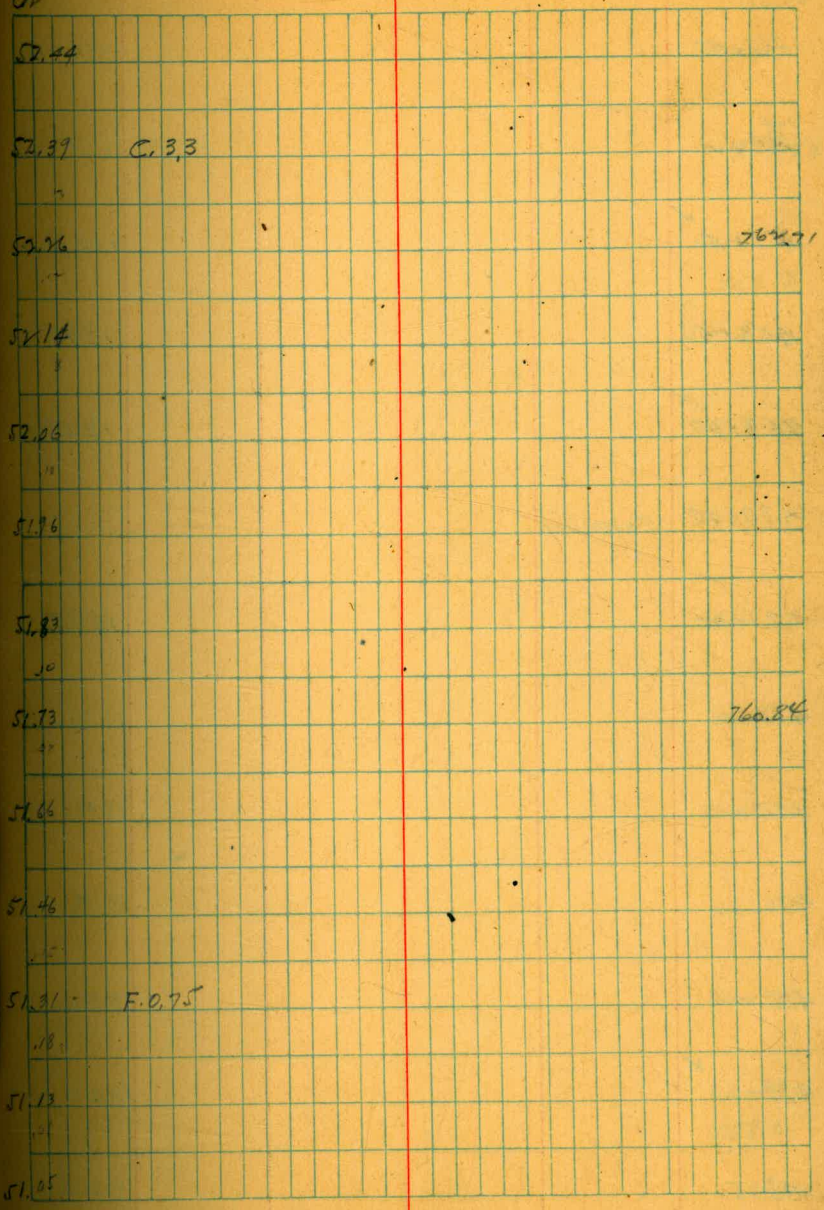
436+50	11.61	53.93
438+50	11.81	53.73
440+00	11.96	53.58
441+00 V	12.06	53.48
441+75	12.13	53.41
442+25	9.92	53.36
443+25	10.02	53.26
444+25	10.12	53.16
445+75	10.27	53.01
446+75 V	10.37	52.91 V 7/18-24
448+75	9.88	52.71
449+50	9.95	52.64
450+50	10.51	52.54

7/18-24

30

	El.	
451+50		10.61
452+00	755.69	7.36
453+25		10.45
454+50		10.57
455+25		10.65
456+25		10.75
457+50		10.88
458+50		9.11
459+20		9.18
461+20		9.38
462+70		9.53
464+50		9.71
465+25		9.79

Gr



31

465+95		9.86	
467+00		6.65	
467+40		6.69	
468+40		12.44	
469+00		12.50	
470+00	No point		
471+00		12.70	
473+00		12.90	
474+00		13.0	
476+00		13.4	
477+00		13.3	
478+00		13.4	
478+50		9.21	

Gr

760.84

750.98

750.84 F 2.0

757.53

763.18

750.74

750.68

750.48

750.28

750.18

749.98

749.88

749.78

758.94

749.73

37

480+50	9.41
481+50	9.51
482+50	9.61
483+50	9.71
484+50	4.82
485+50	4.92
486+75	5.05
487+50	5.12
489+00	9.97
490+50	10.12
491+70	10.24
492+15	9.29
493+00	9.38

Grade

749.53 — 758.92

749.43

749.33

749.23

749.13 — C 1.3 — 753.95

749.03

748.90

748.83

748.68 — 758.65

748.53

748.41

748.37 — 757.66

748.28

494+00	9.48
496+00	9.68
497+00	9.78
498+00	3.22
498+50	3.27
499+50	11.17
500+70	11.29
501+50	11.37
502+25	11.44
502+75	11.49
504+75	11.69
506+75	11.89
507+00	11.94

493 - 938

748.18 .24 747.98 747.88 .10 747.78 .05 747.73 .10 747.63 .14 747.51 .03 747.43 .07 747.36 .05 747.31 .20 747.11 .20 746.91 .23 746.88

751.75

757.66

751.00

758.80

46.88
.20
46.68

						Gr		
509+00					8.39	46.68		755.07
						.07		
509+75					8.46	46.61		
						.10		
510+75					8.56	746.51		
						.20		
512+75					8.76	746.31		
						.20		
514+75					8.96	746.11		
						.10		
515+75					9.06	746.01		
						.10		
516+75 ✓					9.16	745.91	C 6.36	
		⊼ 765.35				.03		
517+00			11.3	754.0		745.88	C 8.1 Beg Tunnel	765.35
						.05		
+50			8.5	756.8		745.83		
						.05		
518+00			5.2	760.1		745.78		
						.05		
+50			2.8	762.5		745.73		
						.05		
519+00	High Point		1.4	763.9		745.68		
						.05		
+50			2.8	762.5		745.63		

35

Sta	+	℄	−	Elev.
		765.35		
520+00			5.6	759.7
+50			7.7	757.6
521+00			9.7	755.6
on Hub ✓				
+50	+0.42	TP. 753.01	12.76	752.59
521 –			3.0	750.00
+50			4.7	748.3
523			6.3	746.7
+30			7.76	745.25
+50 ✓	1.80	746.46	8.35	744.66
524			3.5	747.19
526			9.8	~~756.7~~ 736.7
T.P. (+60±)	0.96	734.90	12.52	733.94
528			4.3	730.6
530			5.8	729.1

745.63
.05
745.58
.05
745.53
.05
745.48
.05
745.43
.05
745.38
.05
745.33
.05
745.28
745.25 Grade point
745.23
.05
745.18 Begin Subdiv. #5

Sta	+	H.I.	−	Elev
T.P.		734.90		
532			2.96	731.94
	+1.07	733.01		
534			11.0	722.0
+75			11.6	721.4
536			3.9	729.1
+40 ✓		T.P.	0.82	732.19
	+11.10	743.29		
537			4.0	739.3
+30			2.7	740.6
538			10.1	733.2
+60			12.8	730.5
539+30 ✓			1.2	742.1
540		T.P.	1.11	742.18
	+6.18	748.36		
+50			2.4	746.0
541+35			4.2	744.2
+80			1.8	746.6
542			3.2	745.0
+60			15.2	733.2
544			16.3	732.1
545+20			19.5	728.9
546			7.2	741.2
+50			3.0	745.4
+80 ✓			3.60	744.76
	+1.88	746.64		
547			4.9	741.7
+50			11.1	735.5
		T.P.	10.30	736.34

on top 547+50

Sta	+	H	−	Elev.	
				736.34	
	0.96	737.30			
548			11.3		
		T.P.	12.78	724.52	
	0.79	725.31			
+50			7.1	718.2	
549			13.1	712.2	
		T.P.	12.20	713.11	
	0.57	713.68			
+50			7.4	706.5	
550			12.0	701.7	
+50			11.4	702.3	
		T.P.	1.09	714.59	
	12.36	726.95			
552			2.6	724.3	
		T.P.	0.35	724.60	
	12.36	736.96			
		T.P.	0.61	736.35	
	+11.91	748.26			
+50			10.7	737.6	
552+64.3			5.94	742.32	5.94
553+00			5.98		5.98
+50					6.03
554+45					6.13
		T.P.	5.32	742.94	
	10.84	753.78			
555+20					11.72
556+20		T.P.	11.82	741.96	11.82
	+9.02	750.98			
557+20					9.02
558+20					9.22

150.0
35.7
114.3

10.7
75.0
64.3

520 − 745.18 Gr
552+64.3 2.86
28.64.3 742.32

Grade

Top rock 3' Lt. of Sta 548+05 — 748.26 / 742.31 / 5.95

on top of 549

Highest about 551+50

about 8' Rt

748.26

742.32 — End Syphon #5

742.28

742.23

742.13 — on rock at Sta 552+28 — 753.78

742.06

741.96

741.86 — F.L. 9 — 750.98

741.76

	+	⊼	−	Elev	Rod	Grade		⊼
559+00	+9.39	750.98 751.07	9.30	741.68	9.30	741.68 .10		750.98 751.07
560+00					9.44	741.58 .10		
561+00					9.50	741.48 .10		
562+00	+11.97	T.P. 753.35	9.69	741.38	9.69	741.38	End of Jan 22. 1924	753.35
562+50					12.02	741.33	Jan. 23-1924.	
563+80	12.09	T.P. 753.29	12.15	741.20	12.15	741.20		753.29
564+60					12.17	741.12		
566+60					12.37	740.92		
568+40	12.22	75296	12.55	740.74	12.55	740.74		
569+70					12.35	740.61	(Stake 740.00 F=0.6)	
570+70	12.78	757.02	8.72 8.72	~~744.24~~ 744.24		740.51	(CUT 3.7) Begin Jan 26. 1924	748.65 ~~746.65~~

See page 58 for Tunnel #2

	+	⊼	−	Elev	Rod	Grade	
626+92.0					11.76	736.89 ~~734.89~~	Grade at adjusted south portal of Tunnel which is 374.4' East of Prelim. Location
628+00					11.87	736.78 ~~734.78~~	

Note:- 2° Emmons Level notes made in pegging over tunnel.

		Elev.
630+00		12.07
631+00	TP.	12.17
632+25		10.41
633+50		10.54
634+50		10.64
636+50		10.84
637-	T.P.	10.89
638-		11.24
640-		11.44
+60		
642-		11.64
643-		11.74
644+50		11.89
646+50		12.09

736.58
736.48
736.36
736.23
736.13
735.93
735.88
735.78
735.68
735.38
735.28
735.13
737.93

746.65

+10.39

744.77

+11.14

745.02

6.8°

648+50		12.29
650+50		12.49
652+50		12.61
654+00	T.P.	12.84
656+00		8.04
657+00		8.14
1770' × 1.5 = 2.58 Siphon #6		
674+70	← Possible Intake of Tunnel portal to be run later.	8.14
675		11.88
676+25		12.00
677+75		12.15
679+25		12.30
680+00		12.37
682+00		12.57

734.77
732.73

745.02

784.53
737.53

784.33
737.33

784.18
737.18

+7.84

740.02

733.98
731.98

733.88
731.88

End of Sat Jan 27, 23.

733.89' = Ground
731.88

C. 2.58

731.30
729.30 Grade +9.22

741.10

Begin Tues. Jan 30, 23

731.22
729.22

731.1
728.10

730.95
728.95

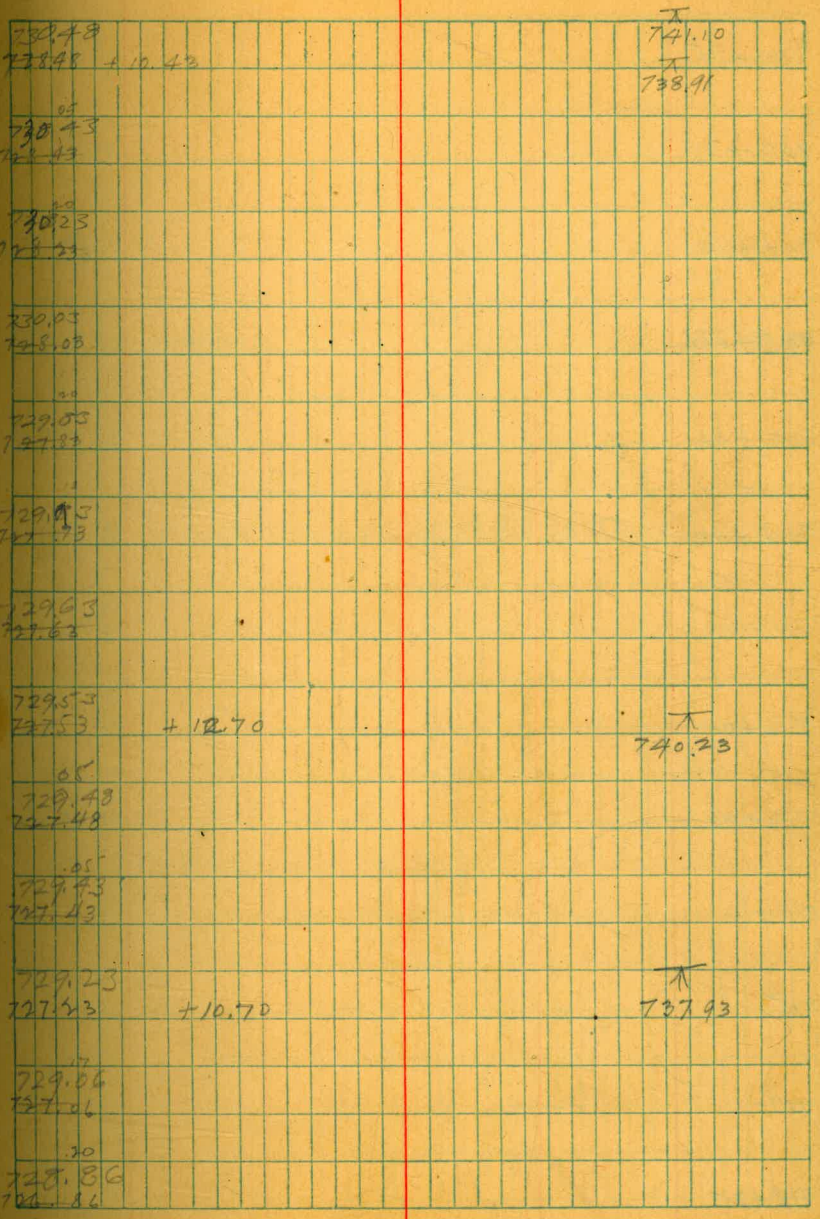
730.80
728.80

730.73
728.73

730.53
728.53

41

		Gr Rod.
682+50	T.P.	12.67
683+00		10.48
685+00		10.68
687+00		10.88
689+00		11.08
690+00		11.18
691+00		11.28
692+00	T.P.	11.38
692+50		12.75
693+00		12.80
695+00		13.00
696+75		10.87
698+75		11.07



47

700+95		11.27
702+75		11.47
704+40		11.64
705+00	T.P.	11.70
707+00		10.35
709+00		10.55
711+00		10.75
712+00		10.85
713+00		10.95
714+10		11.06
715		11.15
717		11.35
718+25		11.47

736.86

T 737.93

728.66
736.66

728.46
736.46

728.29
736.29

728.23
736.23 +10.15 T 736.38

728.03
736.03

727.83
735.83 Possible outlet Portal of Tunnel

727.63
735.63

727.53
735.53

727.43
735.43

727.32
735.32

727.23
735.23

727.03
735.03

726.91
734.91

43

					Gr. Rod
720+00					11.65
721+00					11.75
722+15	Beginning Syphon. #7				11.14
	Rod Interval		Hor.	Diff Elev	To Point
Setup at 722+15 Elev. 726.42	0.44	-21°29	38.3	-15.0	#1
Setup at #1 Elev 711.51	1.65	-26°41'	132.8	-66.5	#2
	3.06	-22°54'	259.9 bottom of Creek	-109.7	#3
	3.52	-12°49'	336.1	76.3	#4
	4.71	-0°0'	471	00	#5
Hub at End of Syphon 727+67.9					9.83
729-					9.96
730-					10.06
732-					10.26
732+75					10.33

Grade

⊼ 736.38

724.73			
724.63			737.65 ⊼ 735.65
Gr. 726.51 (724.51)	+11.02 Fill 0.09	730.51 ⊼ 733.51 on Rock	-11.23 724.42 ⊼ 733.51
-9.09			
Rod 5.1	Elev 711.51	Sta 722+53.3	
	645.0	723+86.1	
	601.8	725+13.2	
	635.0	725+89.4	
	645.0	727+25.3	
725.68 Gr 723.68	730.31 Hub 728.31	C 4.63	
725.55 723.55			
725.45 723.45			
725.35 723.35			
725.10 723.18			

Station		Rod	Elevation			
			723.18			⊼ 733.51
733+75		11.78	725.08 ~~722.08~~		T.P. −10.20	723.31 + 734.86
			.10			
734+75		11.88	724.98 ~~722.98~~			
1 75		.18	.18			
736+50		12.06	724.80 722.80			
✓		.15	.15			
738+00	T.P.	12.21	724.65 ~~722.65~~		+10.14	732.79
			.05			
738+50		10.19	724.60 722.60			
740+00		10.34	724.45 ~~722.45~~			
			.20			
742+00		10.54	724.25 ~~722.25~~	723.19 ~~721.19~~ on Rock C. 1.06		
		.20				
744+00		10.74	724.05 ~~722.05~~			
		.10	.10			
745+00		10.84	723.95 721.95			
✓						
745+50	T.P.	10.89	723.90 ~~721.90~~		+8.25	⊼ 730.15
			.15			
747+00		8.40	723.75 721.75			
			.08			
747+75		8.48	723.67 721.67			
1 50						
749+25		8.63	723.52 721.52			

45

		Gr. Rod
750+00		8.70
751+75		11.37
753+25		11.49
755+75		11.67
756+00	T.P.	11.74
757+25		8.08
758+25		8.18
760+00		11.07
762+00		11.27
764+00		11.47
765+50		11.64
767+00	T.P.	11.77
769+00		10.77

Grade

723.45 T.P. 8.77 721.43 730.15

723.28 732.60

721.13

722.93

722.86 +7.95 728.81

722.73

720.63 T.P. 4.20 727.61 +3.91 731.52

722.45

722.25 720.25 5.20

722.06

721.80

721.75 730.32

721.55

Station		Elev		Gr		
769+50			10.32	721.51 / 719.50	Siphon Point "A"	
	Siphon #8	721.34 / 719.34		719.92 / 719.92		
780+00				720.34	Cut 1.42	728.06
	Siphon #9					726.04 / 726.88
787+13		717.92		718.78 / 716.78	Cut 1.14 + 8.96	726.88
789+00	void		9.40	718.64 / 716.64		
791+00			9.60	718.44 / 716.44		
793+00			9.80	718.24 / 716.24		
795+00		TP	10.00	718.04 / 716.04		
789+63			10.30	718.58 / 716.58		
791+63			10.50	718.38 / 716.38		
793+00			10.64	718.24 / 716.24		
795+00			10.84	718.04 / 716.04		
797+00			11.04	717.84 / 715.84		
799+00			11.24	717.64 / 715.64		

47

Sta				Gr. Rod Elev.	Elev.
801+00				11.44	
803+00				11.64	
805+00				10.80	
807+00				11.00	
809+00				11.20	
811+00				11.40	
813+00				10.38	
815+00				10.58	
817+00				10.78	
819+00				9.87	715.63
~~821+00~~				~~10.07~~	
T.P.	4.08	~~717.65~~	1299	~~710.57~~	
Set B.M.			384	710.81	

Williams
Brackett Trans
Van Horn Level
Thompson H.C.
Mansfield R.C.
Start Rod.

Grade El.			
717.94 715.44			726.88
717.24 715.24	+ 10.60		725.84
717.04 715.04			
716.84 714.84			
716.64 714.64			
716.44 714.44	+ 10.18		724.62
716.24 714.24			
716.04 714.04			
715.84 713.84	+ 9.67		723.51
715.64 713.64	717.63 716.63	C 2.°	Begin Jan 31, 1924
~~713.44~~			

10 poplar partly Euc. tree 14' W. of Dwelling in streambed.

48

T.P.	10.66	722.23	710.57
823+00	.385	717.29	709
825+00			715
870+50			11.90
822+50			12.10
		T.P.	0.39
824+40			

#3 Tunnel Portal drop 0.50 per 1000'

824+70

825 –

827 –

829 –

831 –

833 –

835

713.64
.15
713.49

Gr. Elev.

725.39

718.24

718.04

715.49 719.05
713.49 717.05 C 3.56

715.29 722.54
713.29 720.34 C 7.0
717.40
725.00 + 12.10 737.10

715.10 714.62
713.10 712.62 F 0.5

715.07 727.22
713.07 -11.88 725.22 C 12.15

715.06 1.5 731.91
713.06 -7.69 729.41

on 826+50 T.P. 0.39 736.81 + 12.64 749.45
7900
-11.45 738.00

747.71
-3.76 745.71

-0.48 748.97 +10.26 759.23 830+25 30' Lt of line
75213
-9.10 750.13

757.58
-3.65 755.58

T.P. 0.33 758.90 +12.17 771.07 834+15 on line
763.27
-9.80 761.27

49

836

837

839

841

843

845

847

849

851

853

855

858+50

857

773.07

		762.17			771.07
	10.90	760.17			
		764.47			
	8.60	767.47			
		773.05			
T.P.	− 0.02	771.05	+11.05		782.10
		775.00			
	9.1	773.00			
		777.4			
	6.7	775.4			
		779.6			
	4.5	777.6			
		781.2			
	2.9	779.2			
		782.88			
T.P.	− 1.22	780.88	+13.11		793.99
		785.89			
	10.10	783.89			
		790.19			
	5.80	788.19			
		794.19			
	1.80	792.19			
		795.85			
TP	− 0.14	793.85	+11.68		805.53
		799.13			
	− 8.40	797.13			

859

859+60

Tunnel No. 3.

Inst. at	Stadia Intercept	V.A.	Hor. Dist	Vert. Dist	To
On Original Line 859+60 Elev. 803.93	1.74	Defl. Left 90°00 Defl. Right 87°09		-1.0 Level Reading 16.87	Point #1
Point #1 Elev. 802.93	4.92	+1°58	491.4	+16.91	" #2
Point #2 Elev 819.84	6.06	-5°34'	601.43	-58.48	" #3
	6.70	-6°02'	663.7	70.1	" #4
	9.00	-5°36'	892.7	87.5	" #5
	12.24	-4°04'	1219.0	86.7	" #6
	14.25	-3°47'	1419.90	-93.90	" #7.
Point #7 Elev 725.94	.98	-9°25	96.4	-15.82	879+78

See Roden Canyon Transit Book #2 Page 14.

Syphon #10

Inst. at	Stadia Intercept	V.A.	Hor. Dist	Vert. Dist	To
962+50	1.21	-12°35'	116.3	25.9	Point #1.
	4.03	-9°28'	393.4	65.5	" #2.
	5.95	-8°46'			" #3.
	7.70	-6°00'			" #5.
	8.70	-2°02'			" #6
	9.30	Level.			

See Transit Book #2 Page 15

-4.80 802.73 ~~800.73~~ 807.53 ~~805.53~~

-3.60 803.93 ~~801.93~~

Rod H.I.	Elev.	Sta.	
5.1	802.93 ~~800.93~~	859+68	
5.0	819.84	864+61.5	High Point
5.0	761.4	870+60.1	
	749.74	871+24.2	Bed of Gulley.
	732.34	873+53.3	Bed of Gulley.
	733.14	876+79.5	
	725.94	878+70.4	
	709.94 / ~~710.32~~ 712.32 = ∠	879+66.0 / 879+78.0 =	Sou. Portal
	704.05	962+50	Beginning Syphon #10
	678.15	963+66.3	
	638.5	966+43.4	
	614.25	968+32.5	
	623.95	970+12.6	
	673.05	971+20	
		971+80	End Syphon #10

5'

Tunnel beginning at 986+50 To 1003+43. (Length 1693.0) Febr. 1924

	Stadia Int.	Vert Δ	Horiz. Dist	Vert Dist	To.
Setup #½	0.395	-24°45	33.4	-15.42	986+50
"	3.08	+9°20' (9°22)	298.4	+49.22	#1
#1	3.03	-9°23			#½
"	1.62	+4°22	161.81	+12.35	#2
#2	1.615	-4°23			#1
"	3.08	-1°32	309.8	-8.32	#3
#3	3.10 (3.09)	+1°30 (1°31)			#2
"	2.43	-2°06	243.9	-8.78	#4
#4	2.43	+2°02 (2°04)			#3
"	4.50	-3°48	448.8	-29.7	#5
#5	4.50	+3°46			#4
"	2.00	-8°02	197.1	-27.8	#6
			1693.0		

#3 offset 24.0

El. ~~699.18~~ 701.18

5.0 El. ~~714.6~~ 716.6 #½	Sta 986+83.4	Y. Levels	~~714.67~~ 716.67	
5.0 El ~~763.8~~ 765.8 #1	Sta 989+81.8	" "	~~763.30~~ 765.30	
5.0				
5.0 El. ~~776.10~~ 778.1 #2	Sta 991+43.6			
5.0 El. ~~767.8~~ 769.8 #3	Sta 994+53.4	Y. Levels	~~767.35~~ 769.35	
5.0 El. ~~759.0~~ 761.0 #4	Sta. 996+97.1	" "	~~758.64~~ 760.64	
5.0 El. ~~729.3~~ 731.3 #5	Sta. 1001+45.9	" "	~~729.50~~ 731.50	
El. ~~701.5~~ 703.5 #6	Sta 1003+43.0	" "	~~701.96~~ 703.96	C. 3.63
				Gr. ~~698.33~~ 700.33

5?

#8

Siphon 8 Sta 769+50 to 780+00

⊼ 769+50
Elev ~~719.50~~ 721.5

780+00		10.50	0°0		
771+47 7		200 St. chained & 50' Horiz.	-8°45		
	Inst on	771+97 7	H.I. Elev.	Horiz	Diff Elev.
⊼ 771+97 7 Elev ~~687.37~~	689.38	2.82	-18°35	254.7	-85.5
# 3		3.60	-17°28	329.1	-103.3
# 4		5.08	-6°47	502.2	-59.6
# 5		6.60	-0°41	661.0	-7.9
# 6		6.78	+2°21	677.9	+27.8

#9

Siphon Sta 780+00 to 787+63

721.34 ~~719.34~~	Inst on Sta	780+00	Elev 721.34		
#1		1.41	-7°41	138.5	-18.8
#2		3.35	-5°07	333.5	29.8
#4		5.72	-2°00	572.3	20.0
#5		6.84	-0°44	684.9	8.8

1/30-24
Party Same
Clear
Van Horn notes

H.I. 4.70 ~~Elev 724.20~~

End of Siphon #8

		~~691.08~~ 689.08
Siphon Point #1	on Point note Elev 771+97 7	1.7 Lower than 771+47 7
H.I. 5.3		689.4
Toe of Slope	774+52 4	603.9
Bot of Creek	775+26 8	586.1
	776+99 9	629.8
	778+58 7	681.5
	778+75 6	717.2

H.I. 5.00

780+00	721.34
781+38 5	702.5
783+33 5	691.5
785+72 3	701.3
786+84 9	712.5

~~Siphon~~ Line Change @ Siphon #1

1/12-24
Party same
clear.

Stadia Dist across Siphon P_1 437.00
Gr. " " " " P_2 480.00

Station		Elev	Gr.	
8+47		799.15	99.15	Siphon Point "A"
	SIPHON See page 6.			
1A+70P1 = 13+27P2		800.73	98.3 / 97.43 =	℄ Siphon Point "B" C.24 note: change of Siphon makes a grade equation of .13 which was disregarded
14+30		799.2	98.2	C 1^{0}
16+90		798.76	97.96	C 0^{8}
18+57		795.09	97.79	F 2^{7}
20+57		792.57	97.59	F 5^{0}
22+44		788.87	97.37	F 8^{5}
23+30		792.12	97.32	F 5^{2}
24+56		798.18	97.18	C 1^{0} Siphon Point "A" Siphon #2

See page 7

805.00
799.9
5.10

803.4
791.86
11.54

Stadia across Syphon #2

				Hor.	Elev
⊼ at 24+56					778.51
		.93	-12°30	89.65	~~783.51~~
25+45^{6}		1.75	-13°35	166.0	756.7
26+22		2.30 ~~1.15~~	-13°20	109.8	738.6
27+45^{4}		3.05	-13°30	289.4	729.9 ~~734.9~~
28+19^{8}		3.70	-8°00	363.8	747.4 ~~752.4~~
28+69^{5}		4.17	-6°10	413.5	753.7 ~~758.7~~
29+12^{2}		4.60	-5°50	456.2	751.9 ~~756.9~~
29+43^{6}		4.92	-6°15	487.6	745.2 ~~750.2~~
33+11^{8}		8.55	-0°30	855.8	790.9 ~~795.9~~
30+49^{4}		6.00	-6°00	593.4	736.0 ~~741.0~~
32+66^{8}		8.10	-1°08	810.8	782.4 ~~787.4~~
31+13^{8}		6.60	-4°00	657.8	752.5 ~~757.5~~
32+21^{2}		7.65	-1°55	765.2	772.8 ~~777.8~~
33+96					795.77

1/11-24
Party same
Clear

H.I. 5.2 (Elev 803.38) Elev Ground 798.18

→ Rod 8.0

Rod of 13.0 Bot of Draw

Top Ridge Between draws

In Draw

Stadia across Siphon # 3

⊼ at 336+35 Sta Dist 397.0

Elev. 765.55

Station	Horiz D.	Ob. Dist	V.A.	Diff in Elev	Elev
					765.55
340+32		3.97	0°00		
g 340+05[3]	370.3	3.70	-2°30	-16.12	749.43
f 339+77[2]	342.2	3.45	-6°00	-35.97	729.58
e 339+43	308.0	3.15	-9°15	-50.14	715.41
a 337+18[8]	83.8	.93	-19°20	-29.3	736.25
d 339+00	264.9	2.94	-18°45	-89.8	673.3
b 337+70[7]	135.7	1.50	-18°45	-45.95	719.6
c 338+08[7]	173.7	1.93	-18°45	-59.1	705.0
					665.0

65.55
4.60
70.15

Mag S 28°15' W.

H.I. 4.60 (Elev 70.15) Siphon Point "A"

Siphon Point "B"

Rod of 7.0

Rod of 6.0 Bot Cr. 40' Lower with H_2O 1/17-24

Siphon # 4

Stadia across Siphon Sta 370+50 to 398+51

⊼ 370+50
Elev 761.93

	Hor Dist	ob. Dist.		Diff Elev.	761.93
stake #1	151.5	1.63	-16°15	- 44.0	710.93
" 2	266.0	2.85	-15°20	- 72.8	689.13
" 3	352.0	3.77	-15°05	- 95.0	666.93
" 4	375.0	4.00	-14°50	- 99.0	657.93
" 5	602.0	6.40	-14°20	- 154.0	601.93
" 6	638.0	6.80	-14°50°	- 168.0	590.93
" 7	1373.	14.70	-14°55	-365.6	395.7
" 8	1821.6	18.90	-11°05	-356.6	406.8
⊼ at Sta 8		~~2.54~~	~~+2°35~~		
" 9	2.54	2.54	+2°35	+ 11.5	418.3
" 10	409	4.20	+9°30	+ 68.4	475.2
" 11	458.	4.80	+12°40	+ 103.0	509.8
" 12	661.0	7.40	+19°05	+ 230.0	636.8
" 13	980.0	11.10	+20°04	+ 358.0	764.8

Dist to N Bank main channel ~~1410~~ from Sta #7 = 60
" " Toe of S. " " " ~~334~~ 334
Dist to S. Bank Main channel 32
crest of Point 90' S. of stake 20' higher than channel
Main channel 5' lower than valley bed.

1/17-23
Party same

Mag. S 67°40' W.

H.I. 5.0 (766.93)

Rod of 12.0	Sta	372+01.5
	"	373+16
	"	374+02
Rod of 10.0	"	374+25
Rod of 11.0	"	376+52
Rod of 8.0	"	376+88
Rod of 5.65	"	384+23
Rod of 3.55	El. 406.83 Dist. ~~1844.0~~ 1820.07	388+71.6
H.I. 5.0 ~~Rod 5.0~~	404.16 connected elev	
Rod 5.0	Sta	391+25.6
Rod 5.0	"	392+80.6
" 5.0	"	393+29.6
" 5.0	"	395+32.6
" 5.0	"	398+51.6 Dist. 979.24

Total " ~~2801.0~~ 2799.31
+1.0 stadia Corr = 2800.00

Sta.	Rod	Horiz	vert	Elev.	
		Inst on	Sta	H.I	5.00
Sta.	Az	Ob. Dist	V.A.	Diff in Elev	Elev
#17.					
		Inst on #17		Elev	
#17 "A"					
		Inst on "17 A"		Elev	
572+68.3				770.35	
	5.1	198.3	7° 30		26.11
570+70				744.24	

Elev.

H.I 5.00

Tunnel #2.

Set up	Rod	Vert ∠	Horiz	Diff Elev Vert Dist	to	Rod Ht.	Elev.		
(#5 Top of Ridge)	11.6	-12°00	1109.9	235.94	El 770.30 577+68.3	5.0	1006.24	583+78.2 = Sta. of #5	
Sta #1.	6.26	-12°32'	596.7	132.59		5.0	873.6	577+81.5	
" #2	4.40	-20°32'	386.1	144.54		5.0	861.7	579+92.1	
# 3	2.44	-24°46'	242.4	111.84		5.0	890.4	581+35.8	
# 4	0.56	-21°00	48.8	18.74		5.0	937.5	583+29.4	
High point # 6	0.26	+5°40'	25.75	2.56		5.0	1008.8	584+04.0	
Set up on #6	3.52	-12°44	336.0	-76.0	#7	5.0	~~922.8~~ 932.8	587+40.2	
	4.56	-10°36'	442.0	-82.8	#8	5.0	926.0	588+46	
	5.10	-10°38'	494.0	-92.8	#9	5.0	916.0	588+98	Mag Brg S 1°50' W
	7.76	-8°30'	760.0	-113.7	#10	5.0	895.3	591+63.1	
Set up on Sta 10	5.08	-6°18'	503.1	-55.5	#11	5.0	839.8	596+66.2	
	11.76	-3°58	1171.7	-81.2	#12	5.0	814.1	603+34.8	
	15.90	-1°02	1590.6	-28.6	#13	5.0	866.7	607+52.6	
Set on Sta 13	6.84	-6°46'	675.7	-80.2	#14	5.0	786.5	614+28.3	
	8.4	-3°20'	837.1	48.7	#15	5.0	818.0	615+89.7	
Set on Sta 15	3.08	-8°58'	301.7	-47.5	#16	5.0	770.5	618+91.4	Starting Friday
	6.00	-5°37'	595.5	-58.5	#17	5.0	759.5	621+85.2	
	8.08	-0°43'	809.0	-10.6	#18	5.0	808.2	~~623+89.7~~ 623+98.7	Elev -9.50 below #15 Direct rod.
Set on Sta 18	~~4.82~~	~~-11°57'~~	~~461.2~~	~~97.8~~	~~#19~~ (Grade 734.72)	~~5.1~~	~~713.4~~	~~628+50.9~~	
	3.20	-13°36	302.1	73.12	#19	5.1	735.68	~~626+91.8~~ 627+00.8	Gr ~~734.89~~ 736.89 Swing east 374.40

59

#6 Siphon 657+00 to 674+20 Jan 26. 1934

	Rod	Vert ∠	Horiz	Vert Dist	To Sta
Setup 657+00 Elev 733.88	3.0	-3°53'	298.7	-20.34	#1
Setup 659+98.7 Elev 713.54	3.5	-15°24'	326.5	-89.9	#2
	14.08	+0°10'	1409.0	+4.12	#8
	5.1	-11°10'	494.0	-99.4	#3
	12.54	-7°04'	1253.4	-45.2	#7
	6.3	-11°16'	609.3	-121.3	#4
	11.56	-3°14'	1153.0	-65.3	#6
	8.06	-10°40'	779.4	-146.8	#4½
	9.00	-8°06'	883.6	-125.6	#5½
	8.4	-10°44'	814.3	-153.3	#5

#11 694.78

Syphon at 1058+90 El. = 692.78 to 1094+62

Inst at	Intercept	V.A.	Horiz Dist	Vert Dist	To
1058+90 El. 694.78	1.28	-19°45'	114.5	40.7	#1
	2.90	-17°35'	264.8	83.8	#2
	4.22	-16°10'	390.3	113.1	#3
	9.28	-8°32'	908.7	136.3	#4
	15.60	-5°37'	1546.5	152.0	#5
	17.80	-4°56'	1768.4	152.6	#6
	21.60	-3°13'	2154.0	121.1	#7
	26.10	-1°30	2609.20	-68.4	#8
#8	1.92	+3°38'	192.3	412.20	#9
#9	1.50	-2°22'	150.8	6.2	#10
	3.28	-3°04'	328.1	17.52	#11
	6.25	+0°55'	626	10.0	
	7.80	+3°58	777.5	54.0	

4.50 4.03 4.88 5.78 11.56 1.21 7.21 11.27 6.27 2.86 5.12 12.54

713.54

50	713.54	659+98.7	
50	623.64		663+25.2
50	717.66		674+07.7
50	616.14		664+92.7
	668.34		672+52.1
	592.34		666+08
	648.14		671+57.7
	566.74		667+78.1
	587.94		668+82.3
	560.24	668+13.0	Bottom of Creek

Rod	Elev	Sta
50	694.78	
	654.1	1060+04.5
	611.0	1061+54.8
	581.7	1062+80.3
	558.5	1067+98.7
	542.8	1074+36.5
	542.3	1076+58.4
	573.7	1080+44.0
	626.4	1084+99.20
50	638.6	1086+91.5
51	632.4	1088+42.3
	621.1	1090+19.6
	648.6	1093+17.5
	692.6	1094+69

1098 +61.5

magCourse S59°30E -12°07 S47°23 E for Tunl

60

1106+10 = Tunnel Portal

701.7~~699.72~~ Cut 13.48   697.39

Tunnel starting at 1105+80 Elev. = ~~695.39~~

Inst at	Intercept	V.A.	Hor. Dist	Vert. Dist		
1105+80	2.09	+22°48	178.6	+ 75.03	772.43	#1 ✓ 1107+57.6
⊼ #1	0.67	+17°28	61.50	+ 19.34	791.77	#2 ✓ 1108+20.1
#2	0.66	-17°28				#1
⊼ "	1.80	+13°50	170.70	+ 42.08	833.79	#3 ✓ 1109+90.8
#3	1.79	-13°56 ?				#2
⊼ "	1.34	+6°57	133.0	+ 16.20	849.99	#4 ✓ 1111+23.8
#4	1.34	-7°06	133.94	16.54		#3
⊼ "	0.87	+1°18	87.96	+ 2.00	851.99	#5 ✓ 1112+11.86
#5	0.88	-1°39	88.93	2.60		#4
⊼ "	1.65	-9°42	161.30	- 27.5	824.49	#6 ✓ 1113+73.06
"	4.25	-5°58'	421.6	- 44.0	814.02	#7 ✓
"	8.74	-2°29	873.3	- 37.97	~~807.99~~	#8 ✓ 1116+33.36
#8	874	+2°23'	873.4	36.30	851.02	#5
⊼ "	11.54	+1°50'	1154.0	+ 37.0	~~844.99~~	#9 ✓ 1127+87.36
"	18.30	+2°36'	1827.5	+ 83.0	887.02 ~~890.99~~	#10 ✓ 1134+60.86
"	20.72	+3°50	2063.7	+138.76	952.28 ~~946.21~~	#11 ✓ 1136+97.06
#11	20.72	-3°51	2063.7		1029.85	#8
⊼ "	2.94	+15°52	273.06	+ 77.57	~~1023.82~~	#12 ✓ 1139+70.12
#12	2.94	-15°59	272.64	78.07	1126.07	#11
⊼ "	4.70	+12°02	450.00	+ 96.22	~~1120.04~~	#13 ✓ 1144+20.12
#13	4.72	-12°11	452.00	97.60	911.32	#12
⊼ "	22.36	-5°33	2216.00	- 214.75	905.29	#18 ✓ 1166+36.12
⊼ #18	22.36	+5°32	2216.00	214.75	1051.72	#13
"	19.60	+4°07	1952.00	+ 140.40	~~1045.69~~	#14 ✓ 1146+84.12
"	10.56	-1°00	1057.00	- 18.4	~~892.92~~	#15 1155+79.12
"	4.05	-5°02	403.00	- 35.5	~~879.87~~	#16 ✓ 1162+33.2
"	1.72	-10°04	167.8	- 29.8	~~881.81~~	#17 1164+68.3
"	1.00	+0°47	101.00	+ 1.37	915.69 ~~906.66~~	#19 1167+37.1
#19	1.00	-0°47	101.	1.37	872.94	#18
⊼ "	3.67	-6°15	363.7	- 39.75	~~866.91~~	#20 ✓ 1171+00.82
#20	3.67	+6°13	363.7	39.75	789.94	#19
⊼ "	3.74	-13°09	355.6	- 83.0	~~783.91~~	#21 ✓ 1174+56.4
"	10.00	-8°11	980.8	- 141.00	731.94 ~~725.91~~	#22 1180+81.6
"	10.00	-8°09			778.5	#22
Ridge "	5.62	-9°48	547.0	- 94.4	~~772.51~~	#21½ ✓ 1176+47
"	8.24	-8°50	805.7	- 125.15	747.79 ~~741.76~~	#21¾ ✓ 1179+06.5
"	20.50	-3°02	2049.4 Mean	- 108.5	~~[illegible]~~	#23B 1196+04.1
#23B	20.60	+3°01	2050.5	+107.95	699.1	#20
⊼ " B	17.80	-2°06	1779.0	- 65.3	~~693.1~~	#24B 1213+83.1
#24B	17.80	-2°05				#23B

Swing Tunnel at 1198+54.9

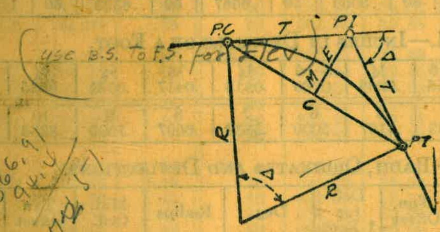
1984.9 ft. to Rt 90° or 12°07' Rt.

= 1200+65.7 Tunnel end

55 27 5 138 725 133 590

Rod

DIETZGEN'S RAILROAD CURVE AND REDUCTION TABLES



CURVE FORMULAS

Radius=R=$\frac{50}{\sin. D/2}$ (1) Degree of Curve=D and sin. $\frac{D}{2}=\frac{50}{R}$ (2)

Tangent=T=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 vers $\frac{\Delta}{2}$ (6)

External=E=T tan$\frac{\Delta}{4}$ (7) =R÷cos.$\frac{\Delta}{2}$—R (8)=R exsec $\frac{\Delta}{2}$ (9)

Long Chord=C=2 R sin.$\frac{\Delta}{2}$ (10) Δ=Central Angle

EXPLANATION AND USE OF TABLES

Stations.—Given P. I.=Sta. 161 +60.35 to find Sta. of P. C. and P. T. Δ=62° 10′ D=8° 20′. From Table IV for 1° curve T=3454.1 and ÷8⅓=414.49 ft. From Table V correction=.36 or T=414.85 ft. P. C.=Sta. P.I.—T=157 +45.50. Also from (4) L=746.00 and P. T.=Sta. P. C. +L=164 +91.50.

Offsets.—Tangent offsets vary (approximately) directly with D and with square of the distance. Thus tangent offset for Sta. 158 on above curve is 2.16 ft. found as follows. From Table III tangent offset for 100 ft.=7.27 ft. Distance=158—Sta. P. C.=54.50, hence offset=7.27 $(54.50\div100)^2$=2.16 ft. Also square of any distance divided by twice the radius equals (approximately) the distance from tangent to curve. Thus $(54.50)^2\div(2\times688.26)$=2.16 ft.

Deflections.—Deflection angle=½ D for 100 ft., ¼ D for 50 ft., etc. For c ft.=(in minutes) .3 x C x D° or=defl. for 1 ft. from Table III x C. For Sta. 158 of above curve=.3 x 54.5 x 8⅓=136.2′ or 2° 16.2′, or=2.50 x 54.5=136.2′ from Table III. For Sta. 159 deflection angle=2° 16.2′ +8° 20′ ÷2=6° 26.2′, etc.

Externals.—May be found in similar manner to tangents. Thus E for curve above is 91.37. For from Table IV for 1° curve E=960.6 for 8° 20′=960.6÷8⅓=91.27 and from Table V correction=.10 or E=91.37 ft. Or suppose Δ=32° and E is measured and found to be 42 ft. What is D? From Table IV E=230.9 and ÷42=5.5 or D=5° 30′.

789.62
+2.45
792.07
-0.31
791.76
+1.77
793.53
-1.67
791.86
12.00
803.86
-3.96
799.90
805.52
-1.59
803.93
815.30
2.81
812.49

.86
.97

5.091
4.364
.727

4.795
.727
4.068

-13.81

862+98. 35
1479.4 1.35
877+27.4
153
878+80.4 −
97.3
879+78.0

118.00
151.40
269.40

805.53
−13 01
792.52 T
+0.84
793.36 T
−12.89 5410.4
780.47 T
+0.56
781.03 T
−13.00
768.03 −
+0.28
768.31
−13.00
755.31
+0.24
755.55
−12.96
742.59
+0.30
742.89
12.90
729.99
+0.47
730.46
−13.00
717.46
+2.87
720.33
710.37
10.01

878+80.4
824+70.0
5410.4

.04979 2051
269.400
216416
529840
486936
429040
378728
503120

15

824+70 = 713.07
879+78 .275
55.08 710.37
275

.0175
1400
250

10.51
14.3
3153
4204
1051
150.293

97.

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

Roadway 16 feet wide. Side Slopes 1 on 1½.

For Single Track Embankment.

H	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	H
0	8.0	8.2	8.3	8.5	8.6	8.8	8.9	9.1	9.2	9.4	0
1	9.5	9.7	9.8	10.0	10.1	10.3	10.4	10.6	10.7	10.9	1
2	11.0	11.2	11.3	11.5	11.6	11.8	11.9	12.1	12.2	12.4	2
3	12.5	12.7	12.8	13.0	13.1	13.3	13.4	13.6	13.7	13.9	3
4	14.0	14.2	14.3	14.5	14.6	14.8	14.9	15.1	15.2	15.4	4
5	15.5	15.7	15.8	16.0	16.1	16.3	16.4	16.6	16.7	16.9	5
6	17.0	17.2	17.3	17.5	17.6	17.8	17.9	18.1	18.2	18.4	6
7	18.5	18.7	18.8	19.0	19.1	19.3	19.4	19.6	19.7	19.9	7
8	20.0	20.2	20.3	20.5	20.6	20.8	20.9	21.1	21.2	21.4	8
9	21.5	21.7	21.8	22.0	22.1	22.3	22.4	22.6	22.7	22.9	9
10	23.0	23.2	23.3	23.5	23.6	23.8	23.9	24.1	24.2	24.4	10
11	24.5	24.7	24.8	25.0	25.1	25.3	25.4	25.6	25.7	25.9	11
12	26.0	25.2	26.3	26.5	26.6	26.8	26.9	27.1	27.2	27.4	12
13	27.5	27.7	27.8	28.0	28.1	28.3	28.4	28.6	28.7	28.9	13
14	29.0	29.2	29.3	29.5	29.6	29.8	29.9	30.1	30.2	30.4	14
15	30.5	30.7	30.8	31.0	31.1	31.3	31.4	31.6	31.7	31.9	15
16	32.0	32.2	32.3	32.5	32.6	32.8	32.9	33.1	33.2	33.4	16
17	33.5	33.7	33.8	34.0	34.1	34.3	34.4	34.6	34.7	34.9	17
18	35.0	35.2	35.3	35.5	35.6	35.8	35.9	36.1	36.2	36.4	18
19	36.5	36.7	36.8	37.0	37.1	37.3	37.4	37.6	37.7	37.9	19
20	38.0	38.2	38.3	38.5	38.6	38.8	38.9	39.1	39.2	39.4	20
21	39.5	39.7	39.8	40.0	40.1	40.3	40.4	40.6	40.7	40.9	21
22	41.0	41.2	41.3	41.5	41.6	41.8	41.9	42.1	42.2	42.4	22
23	42.5	42.7	42.8	43.0	43.1	43.3	43.4	43.6	43.7	43.9	23
24	44.0	44.2	44.3	44.5	44.6	44.8	44.9	45.1	45.2	45.4	24
25	45.5	45.7	45.8	46.0	46.1	46.3	46.4	46.6	46.7	46.9	25
26	47.0	47.2	47.3	47.5	47.6	47.8	47.9	48.1	48.2	48.4	26
27	48.5	48.7	48.8	49.0	49.1	49.3	49.4	49.6	49.7	49.9	27
28	50.0	50.2	50.3	50.5	50.6	50.8	50.9	51.1	51.2	51.4	28
29	51.5	51.7	51.8	52.0	52.1	52.3	52.4	52.6	52.7	52.9	29
30	53.0	53.2	53.3	53.5	53.6	53.8	53.9	54.1	54.2	54.4	30
31	54.5	54.7	54.8	55.0	55.1	55.3	55.4	55.6	55.7	55.9	31
32	56.0	56.2	56.3	56.5	56.6	56.8	56.9	57.1	57.2	57.4	32
33	57.5	57.7	57.8	58.0	58.1	58.3	58.4	58.6	58.7	58.9	33
34	59.0	59.2	59.3	59.5	59.6	59.8	59.9	60.1	60.2	60.4	34
35	60.5	60.7	60.8	61.0	61.1	61.3	61.4	61.6	61.7	61.9	35
36	62.0	62.2	62.3	62.5	62.6	62.8	62.9	63.1	63.2	63.4	36
37	63.5	63.7	63.8	64.0	64.1	64.3	64.4	64.6	64.7	64.9	37
38	65.0	65.2	65.3	65.5	65.6	65.8	65.9	66.1	66.2	66.4	38
39	66.5	66.7	66.8	67.0	67.1	67.3	67.4	67.6	67.7	67.9	39
40	68.0	68.2	68.3	68.5	68.6	68.8	68.9	69.1	69.2	69.4	40

Example—If point is 22.6 ft. above grade, how far should it be from center line to be a slope stake point? Ans. from Table 41.9. For same slopes but other widths of roadbed correct above figures by one-half difference in width of roadbed; thus in example above for 20 ft. roadbed distance will be 41.9 + (20—16) ÷ 2 or 2 ft. added to 41.9 = 43.9. For slopes of 1 on 1 see inside of front cover.

Made in Germany.