

Marron Res. Barns

ENGINEERS'
FIELD BOOK

Nº 401

W 67

DIETZGEN
TRADE MARK

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	II
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

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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 33.6 = 32.6. For slopes of 1 on 1½ see inside of back cover.

Copyright, 1914, by Eugene Dietzgen Co.

2678
1983
2664
1409
87.34

3530
1879
168
5597

1784
1901
311
3617
7513

3700
350
1754
5802
1676
1291
8769
7495
6264

656.54
73.49
730.05

\$1330
115

45
3x
50
11
45
12
42
30

157
48
80
49

3223
1268
1453
1349
7495

13.00
12
14
148
33
16.1
12
17.3 HIGH
21
154
6
9.4 HIGH
31
6.3

2335
3064
931
(330)

506.54
150
656.54
546
110.50

104 -
1350 675x2

(375 6-7)

Sta(6) LT 18⁺ 17'

13⁺ 20 MON 25. Built gate

About 1914 A.D. ? BC

SURVEY MARRON RESERVOIR

TRAVERSE OF

CONTOUR 223.46

LYING WITHIN THE U.S.A.

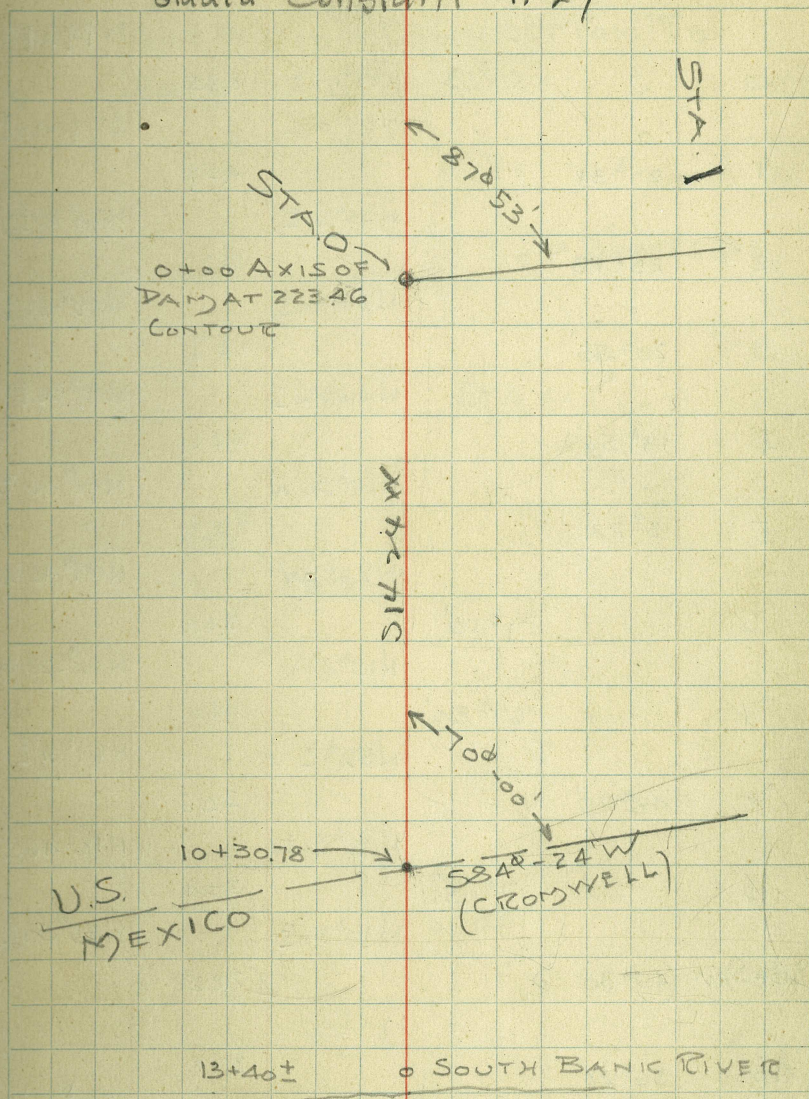
CONTOUR 223.46 MARRON
EQUALS U.S.G.S 730.000

22346

11.63	161.63		150.00
11.82	172.97	0.15	161.15
12.76	185.67	0.06	172.91
12.85	198.26	0.16	185.41
12.32	209.68	0.90	197.36
12.67	221.85	0.50	209.18
9.93	231.69	0.09	221.76
	234.6		

823 223.46

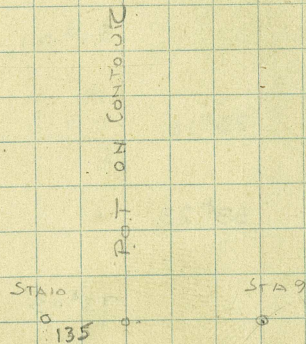
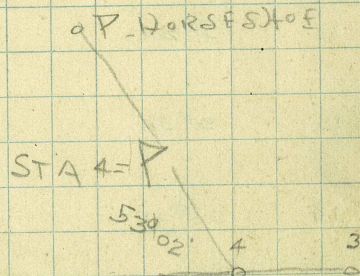
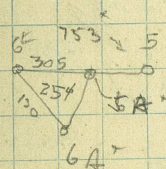
Stadia constant +1.27



STA	L	R	501° E MAG	ROD	CALC
0					N1424E
0		87°53'	N87°00'E	0.85	✓ S77-43E
1	27°38'		N87°00'E	0.97	✓ N74°39'E
2	25°13'	75°	N59°20'E	1.12	N49°20'E
3	29°50'		N34°00'E	1.37	N13°36'E
4	18°50'		N04°30'E	5.21	N00°46'E
5	8°28'		N14°30'W	7.53	N07°42'W
6		7°19'	N23°W	2.98	N00°23'W
7		67°34'	N15°40'W	1.40	N67°11'E
8	48°25'		N52°E	3.60	N18-46E
9		7°05'	N03°30'E	3.94	N25°51'E
SIDE SHOT (45°30')				(2.85)	
10	50°28'			3.78	
SIDE SHOT (15°00')			N40°W	(2.55)	
208°52'		169°51'		6	
39°01'				3278	

SEE PRECEDING PAGE FOR

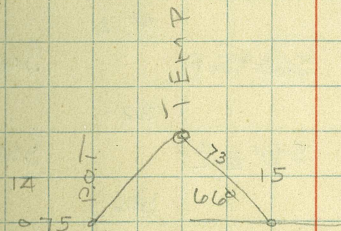
SKETCH OF CONNECTION TO
DAM AXIS



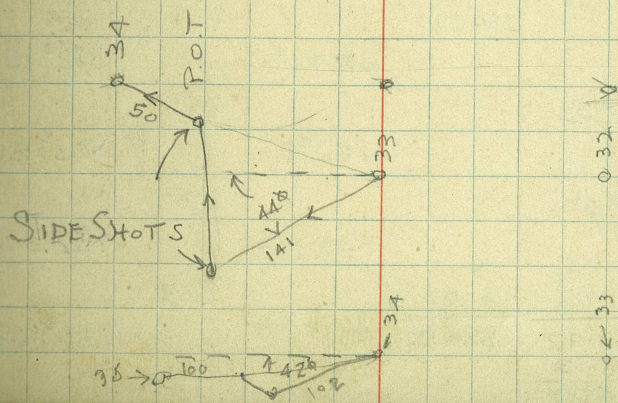
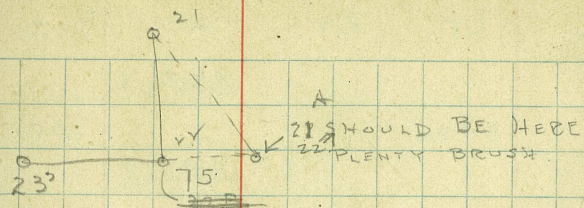
INST AT STA 9

INST AT 11

②	LT	RT	MAG	POD	CALC
			N40°W		N24-37W
SIDESHOT	POT			3.20	← INST AT 11.
11		18°42'		4.87	
			N21°10'W		N05°55'W
12	5°21'			1.78	
			N26°20'W		N11°16'W
13	9°58'			1.23	
			N36°20'W		N21°14'W
14	30°11'			2.14	
			N66°30'W		N51°25'W
15		29°25'		2.38	
			N37°W		N22°00'W
16		31°01'		0.88	9-01 N09°16'E
			N06°W		
17	23°18'			0.55	
			N20°50'W		N14°17'W
18	33°23'			0.76	
			N62°20'W		N47°40'W
19		73°03'		0.53	
			N10°30'E		N25-23E
20	44°46'			2.23	
			N34°W		N19°23'W
21		27°44'		2.29	
x			N06°W		N08°21'E
	146°57'	179°55'			
		146-57			
	RT-32°58'			5.6	
				22.84	

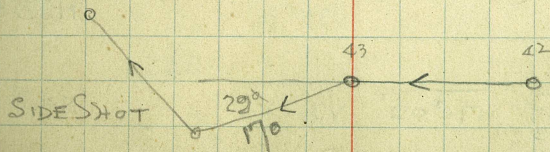


③	LT	RT	MAG	TR.D	CALC
			N06°W		N08°-21'E
22		73°41		0.85	
					N82°-02'E
23		76°36		1.66	
			S36-30E		S21°-22'E
24	27°26'			0.73	
			S63°50E		S48°-48'E
25	10°43			2.21	
			S73°20E		S59°-31'E
26		21°07'		1.86	
			S53°20E		S38°-24'E
27	23°44'			2.96	
			S77°30E		S62°-08'E
28	23°05'			2.77	
			N80°E -		S85°-13'E
29	29°03'			2.84	
			N50-40E		N65°-44'E
30		119°27'		3.95	
			S10-10E		S05°-11'W
31	20°51'			1.77	
			S30-50E		S15°-40'E
32	28°45'			0.84	
			S59-30E		S44°-25'E
33		7°50'		2.90	
			S52 E L		S36°-35'E
34	7°50'			2.08	
	171°-27	298°-41	S59°40E	96	S44°-25'E ✓
	RT-127°-14	171-27		2678	
				2742	



④ STA	LT	RT	MAG	ROD	CALC
			S50°40'E		S44°25'E
35	31°30'		N88°40'E	1.06	S75°55'E
36	39°22'		49-30 N45°30'E (2)	2.06	N64°43'E
37	17°48'		N31°40'E	1.39	N46°55'E
38	28°50'		N30°E	0.97	N18°05'E
SIDE SHOT	30°00'			(1.85)	
SS	06°00'			(1.68)	
SS		10°30'		(3.20)	
SS		40°00'		(1.50)	
39		65°47'		2.69	
			N68°40'E		N83°52'E
40		13°52'		3.01	
			N82°20'E		S82°15'E
41	22°35'			2.65	
			N60°E		N75°10'E
42	12°37'			3.37	
			N47°20'E		N62°33'E
43		8-33'		2.03	
			N55°50'E		N71°12'E
	152-42	88-19			
	88-19				
	LT-64-23				

INST. AT 39
SIGHT 38

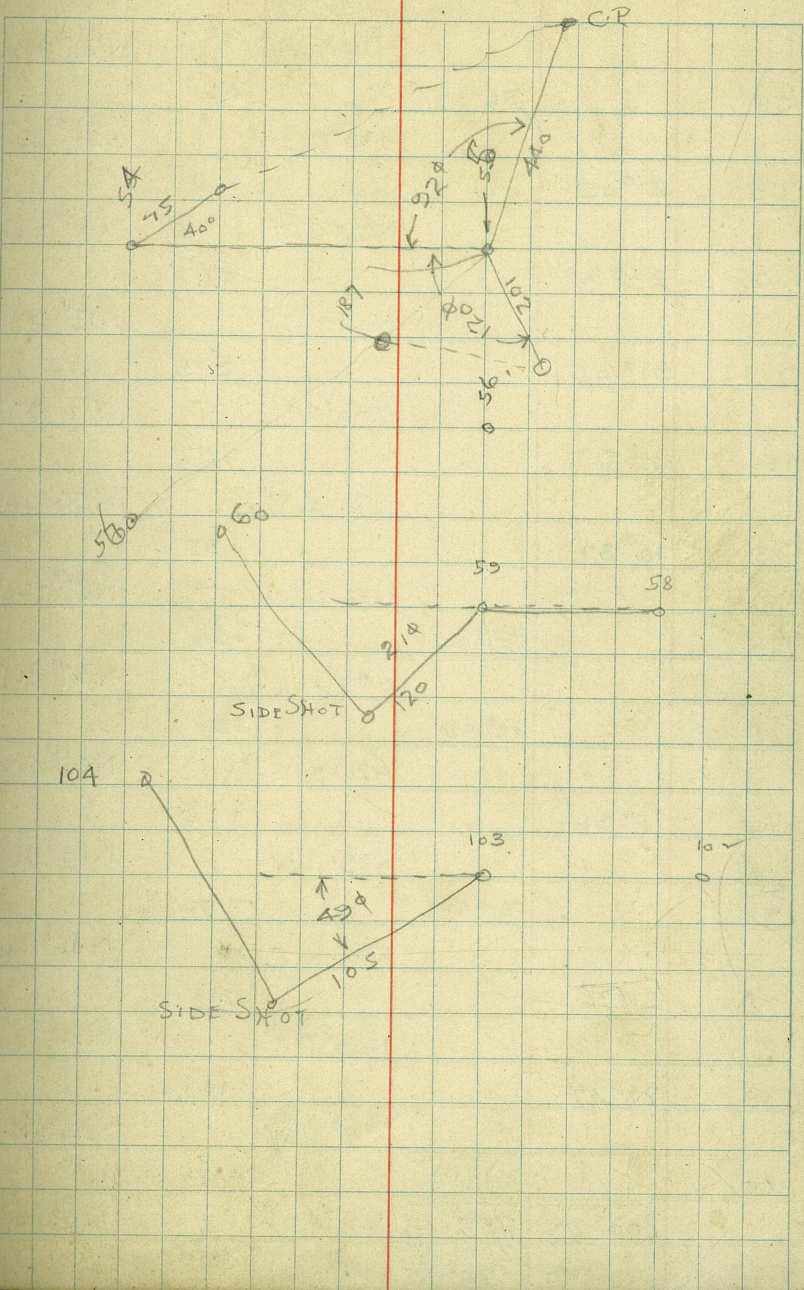


⑤ STA	LT	RT	MAG	TO.D	CALC
			N55-50E		N71°12'E
44		21°35'		2.69	S87°13'E
			N77-20E		
45	24°01'			1.67	N68°46'E
			N53-30E		
46	24°23'			1.01	
			N29° E		N44°-23'E
47	43°33'			0.82	
			N14°W		N00°50'E
SIDE STOT	(22°00')			(1.23)	
v.	(18°00')			(1.55)	
		50°39'		4.27	
48			N36°40E		N51°-29'E
		38°55'		3.85	
49			S45°30E		S29°36'E
	33°47'			2.25	
50			S79° E		S63°-23'E
	14°47'			1.67	
51			N86°30E		S78°-10'E
	39°08'			2.49	
52			N41°30E		N62°42E
	8°43'			2.27	
53			N39° E		N53°-59'E
	8°35'			3.65	
54		171°09'	N30-20E	5.6	N45°-24E
	196°57'			26.64	
	171°09'				
LT	25°48'				

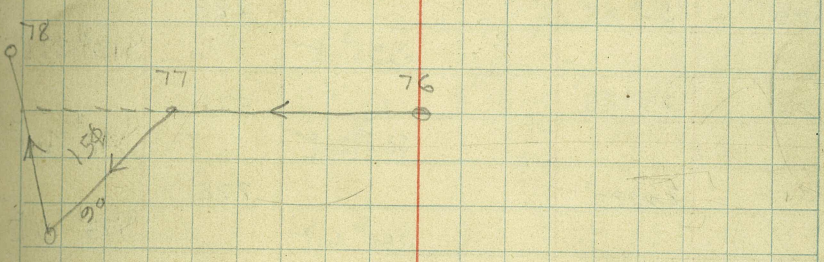
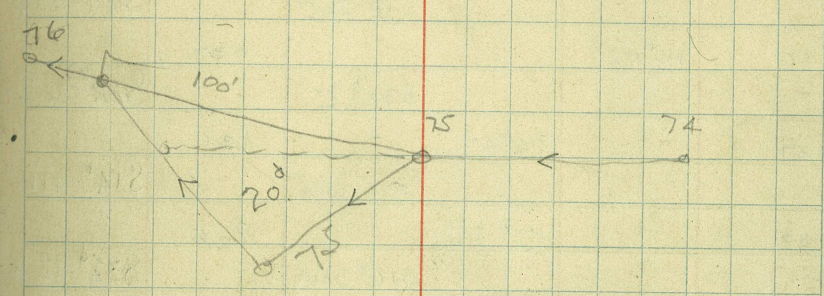
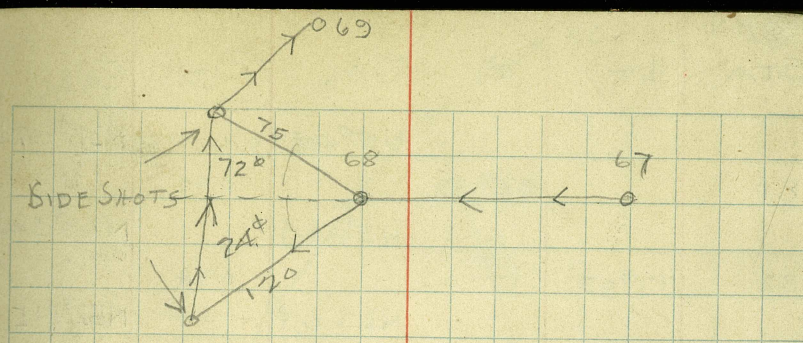
} INST AT STA 48
 } BS v v 47

⑥ STA.	LT	RT	MAG	POD	CALC
			N30°20'E		N45°24'E
55		143°42'	S06°30'E	7.16	S09°06'W
56	13°46'		S20°40'E	3.25	S04°40'E
57	44°11'		S65°E	3.68	S48°51'E
X					
58	32°15'		N83°10'E	3.26	S81°06'E
59		23°55'	S73°25'E	1.88	S57°11'E
60		24°03'	S49°20'E	2.37	S33°08'E
61	19°31'		S68°45'E	4.94	S52°39'E
62	13°56'		S82°30'E	1.27	S66°35'E
63	83°29'		N16°E L	5.53	N29°56'E
64	23°35'		N08°25'W	3.95 ⁹⁵	N06°21'E
65		31°50'	N22°50'W	6.35	N38°51'E
66	15°54'		N07°20'W	2.89	N22°17'E
67	43°50'		N36°W	3.06	N21°33'W
	230-27	223-30		67	
	223-30			56	
LT	66-57			3550	
				4959	

1409

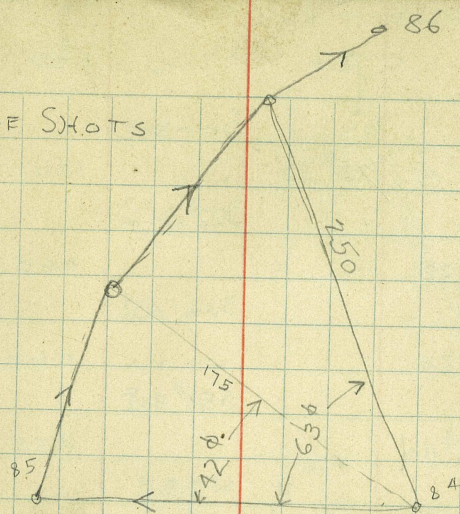


⑦ STA	LT	RT	MAG	TRD	CALC
			N36°W		N21°-33W
68		86°03'		2.61	
			N49°50E		N64°-30E
69	21°05'			1.19	
			N28°20E		N43°-25E
70	29°38'			0.57	
			N01-20W		N13°-47'E
71	31°25'			0.75	
			N32°40W		N17°-38W
72	38°59'			0.52	
			N71-50W		N56-37W
73	10°37'			1.35	
			N82-20W		N67°-14W
74		33°04'		1.69	
			N49°20W		N34°-10W
75		28°49'		1.85	
			N20-30W		N05°-21W
76	18°36'			1.66	
			N39-10W		N23°-57W
77		70°03'		1.52	
			N30°40E		N46°-06E
78	21°36'			2.38	
			N09°E		N24°30E
79	28°42'			1.23 1.22	
			N19°30W		N04°-12W
80		37°14'		0.87	✓
	200°-38'	255°-13'	N18°40E		N33°-02E
		200°-38'		6	
	RT	54°-35'		1879	



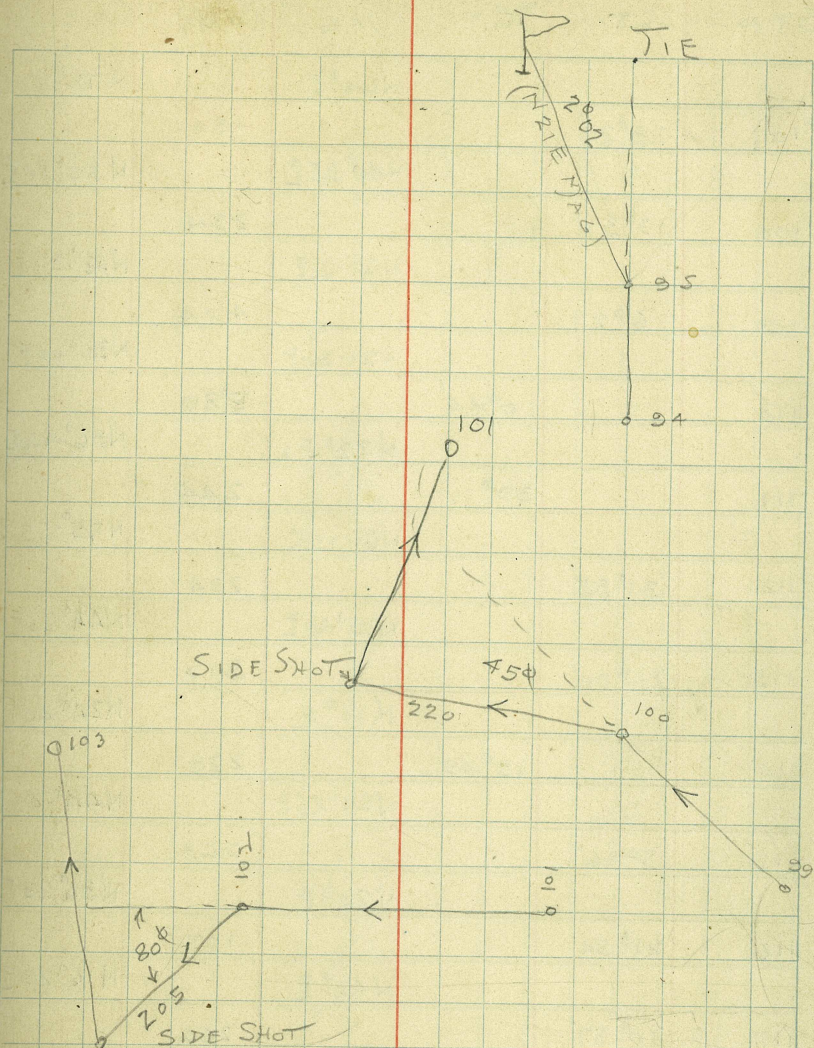
STA	LT	RT	MAC	R _{OD}	CALC
			N18°40'E		N33°-02'E
81		36°52'		0.94	
			N54-40E		N69°-54'E ✓
82	17°03'			0.74	
			N37-10E		N52°51'E ✓
83		54°48'		0.70	
			S88°E		S72°-21'E
84		111°25'		1.83	
			S22-20W		S39°04'W ✓
85	43°08'			0.84	
			S19-50E		S04-04'E
86	18°02'			0.97	
			S38°E		S22°06'E
87		36°47'		1.31	
			S01-50E		S14°-41'W
88		17°31'		2.06	
			S16°30'W		S32°-12'W
89	51°35'			2.20	
			S35°E		S19°-23'E
90	29°25'			0.71	
			S64°20'E		S48°-48'E
91	24°25'			2.28	
			S88°40'E		S73°-13'E
92		38°18'		4.06	
					S34°-55'E
93		48°56'		1.88	
	183°38'	344°37'	S01°-30'E		S14°01'W ✓
	RT	183-38			
		160-54			

SIDE SHOTS



STA	LT	RT	MAG	ROD	CALC
			S01-30E		S14°-01W
94		23°52'		1.50	
			S22°30W		S37°-53W
95	29°22'			0.69	
			S06-45E		S08°-31W
96	51°24			0.60	
			S58°30E		S42°-53E
97	50°40'			4.56	
			N7°E		N86°-27E
98	(2)	37°44		2.34	
			S68-20E		S55°-49E
99	28°37'			0.70	
			N80°E		S84°-26E
100	12°29'			3.40	
			S87-20E		S71°-57E
101	03°02'			0.71	
			N89-30E		S74°-59E
102	46°43'			1.99	
			N42-40E		N58°-18E
103	see page 6	24°14'		1.61	
			N67°E		N82°-32E
104	21°20'			0.91	
			N88°20E		S76°-08E
105	6°25'			1.21	
			N82°E		S82°-33E
106	18°05'			0.90	✓
	234-18	119°-39	N64°E		N79°-22E
LT.	114-39				

AT HORSESHOE



⑩

STA	LT.	TCT	MAG	ROD	CALC.
			N64°E		N79°22'E
P107	23°24'		N40°35'E	254 154	N55°58'E
108	13°31'		N27°20'E	234	N42°27'E
109	6°27'		N21°30'E	4.04	N36°00'E
110		0°44'	N22°E	5.80	N36°44'E
111		39°11'	N61°15'E	244	N75°55'E
112	31°35'		N29°40'E	234	N44°20'E
113	20°00'		N10°E	312	N24°20'E
114		19°49'	N29°45'E	220	N44°09'E
115	5°46'		N24°E	2.68	N38°23'E
116	21°54'		N02°E	107	N16°29'E
117	11°57'		N10°W	266	N04°32'E
118	38°10'		N48°40'W	5.94	N33°38'W
119		01°40'	N47°20'W	3.55	N31°58'W
LT.	$\frac{172^{\circ}44}{61-24}$ 111°20'	69°24'		3.72	

P Hoesshoe)

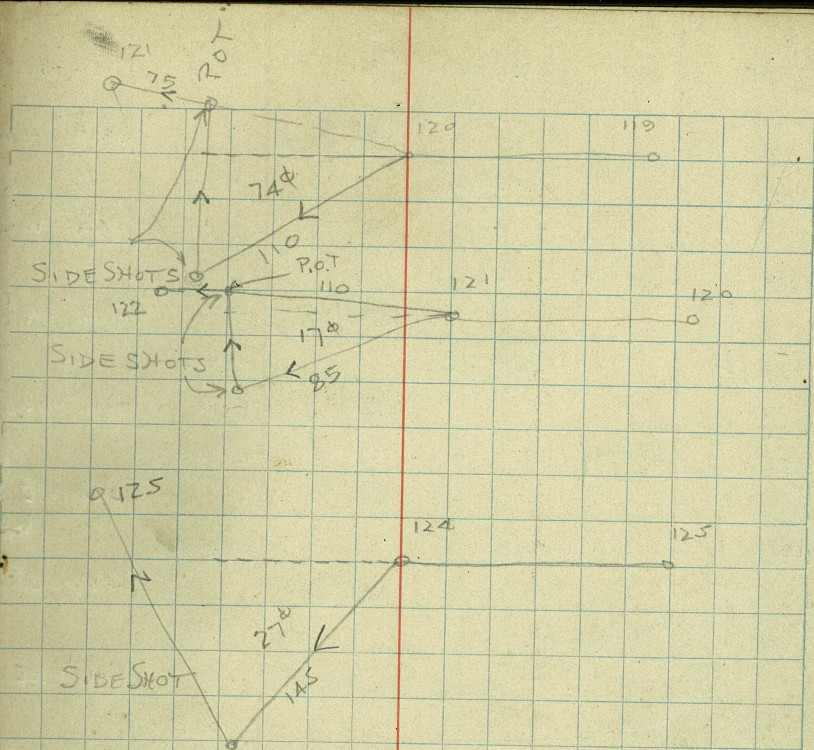
o 106

16°31'

o 107

1 Bluff

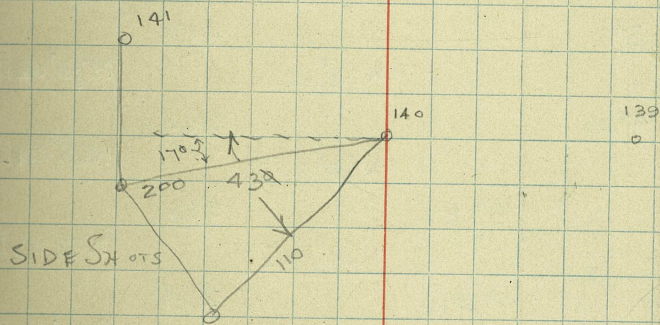
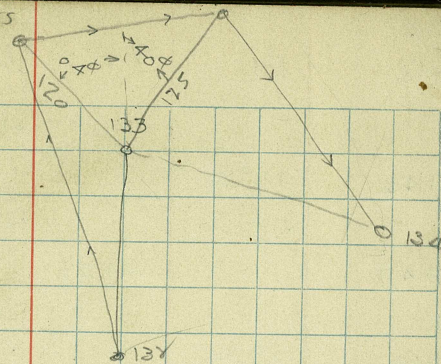
11 STA	LT	TCT	MAG	POD	CALC
			N47°20'W		N31°58'W
120	4°05'		N51-10W	2.17	N36°03'W
121		13°57'	N37°20'W	2.62	N22°06'W
122	6°27'		N43°45'W	5.14	N28°33'W
123	9°06'		N52°45'W	17.5	N37°39'W
124		77°40'	N25°30'E	2.05	N40°01'E
125	32°15'		N06-45W	1.53	N07°46'E
126	29°32'		N36-35W	6.82	N21°46'W
127	(2)	34°20'	N02°W	1.44	N12°34'E
128	18°41'		N20°50'W	2.94	N06°07'W
129	8°16'		N29°W	1.84	N14°23'W
130		9°38'	N19°30'W	3.57	N04°45'W
131		31°25'	N12°E	1.51	N26°40'E
132	41°00'			3.62	
	149-22	167°00'	N28°50'W	7.5	N14°20'W
	TCT	149-22		3700	
		17-38			



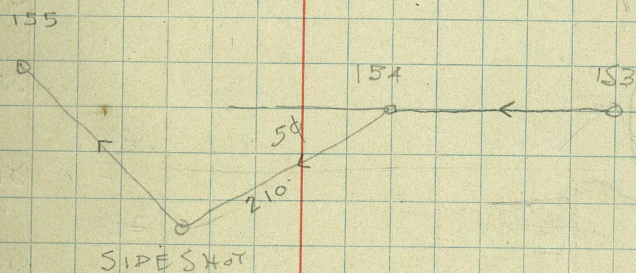
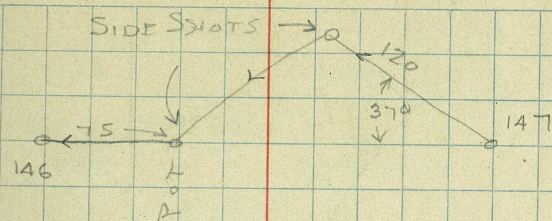
STA	LT	RT	MAG	POD	CAIC
			N28°50'W		N14°20'W
133		149°40'		181	
			S53°E	259 159	S44°-40'E
134	20°24'				
			S79-40'E		S65°04'E
135		53°04'		322	
			S27°E		S12°-00'E
136	20°11'		S27-20'E	2.68	
			S47°E		S32-11'E
137		18°06'		6.04	
			S25°20'E		S14-05'E
138	26°06'			0.36	
			S56°30'E		S40°-11'E
139	17°45'			1.22	
			S73°E		S57°56'E
140	10°05'			3.66	
			S82°30'E		S68°01'E
141	45°57'			3.09	
			N51-20'E		N66°02'E
142		120°10'		2.85	
			S54°W		S06°-12'W
143	38°02'			0.89	
			S46°45'E		S31°-50'E
144	30°03'			2.71	
			S76°40'E		S61°-53'E
145	15°16'			3.56	
	223-49	341°-00'			
		223-49	N88 10'E		S77°00'E
	RT	117-11			

80
121
120-50

SIDE SHOTS



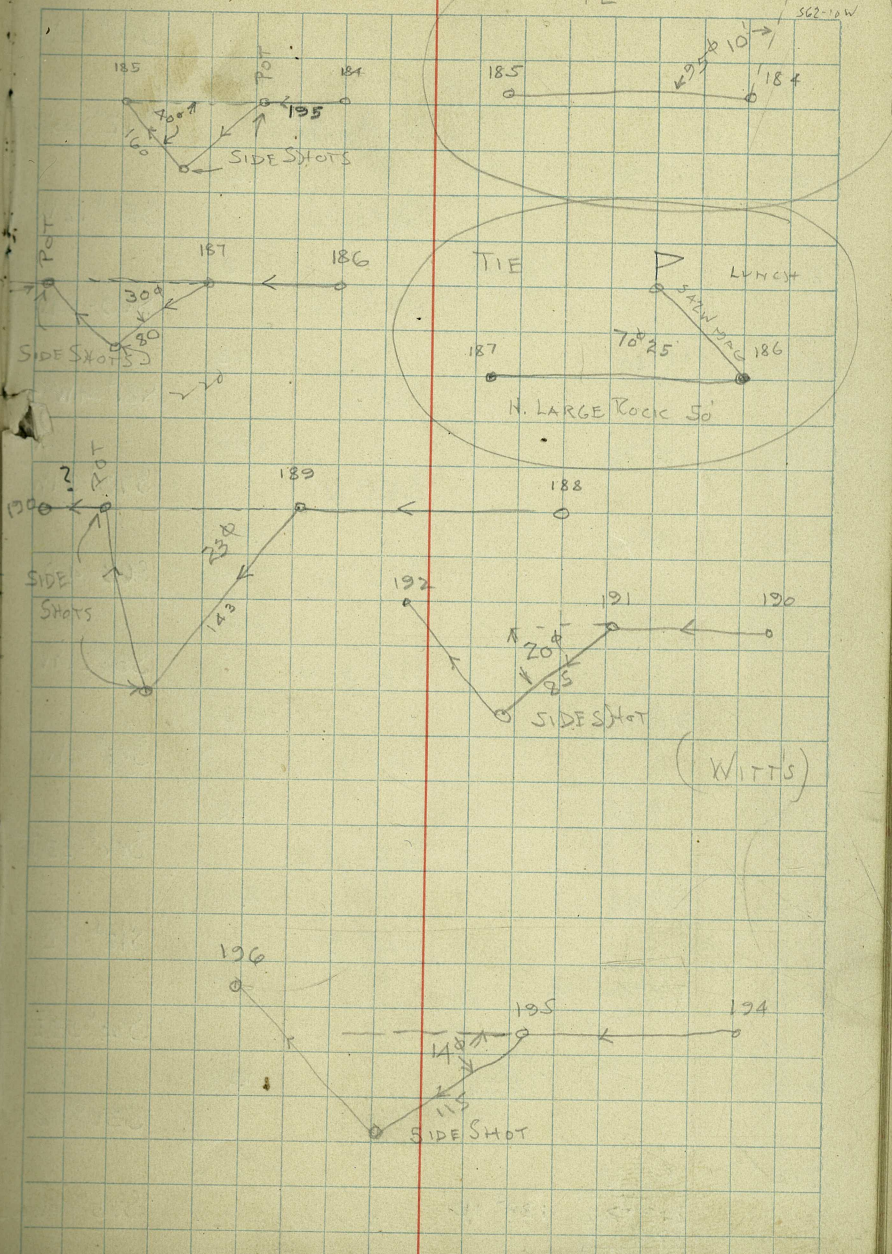
STA	LT	RT	MAG	POD	CALC
			N88°10'E		S77°09'E
146	16°35'			296	
			N71°20'E		N86°16'E
147		14°57'		198	
			N86°20'E		S78°47'E
148	11°34'			275	
			N75°15'E		N89°39'E
149		3°25'		324	
			N78°30'E		S86°56'E
150	6°32'			198	
			N71°50'E		N86°32'E
151	8°19'			479	
x			N63°40'E		N78°13'E
152	5°11'			2.13	
			N58°20'E		N73°02'E
153	4°08'			6.64	
			N54°20'E		N68°54'E
154		3°31'		535	
2.			N57°40'E		N72°25'E
155		11°57'		274	
			N69°30'E		N84°22'E
156	6°02'			266	
			N69°30'E		N78°20'E
157	2°11'			441	
			N61°20'E		N76°09'E
158	8°40'			351	
	69°12'	33°50'	N52°40'E		N67°29'E
	33°50'				
	35-22				



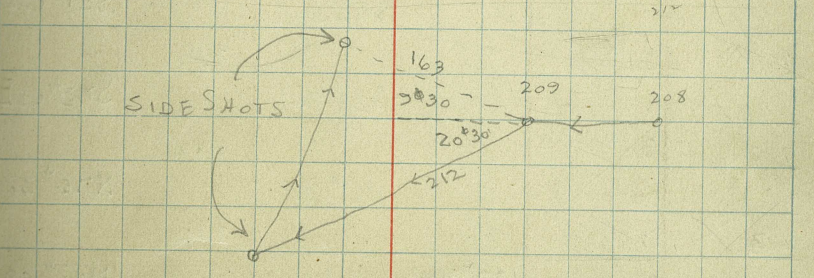
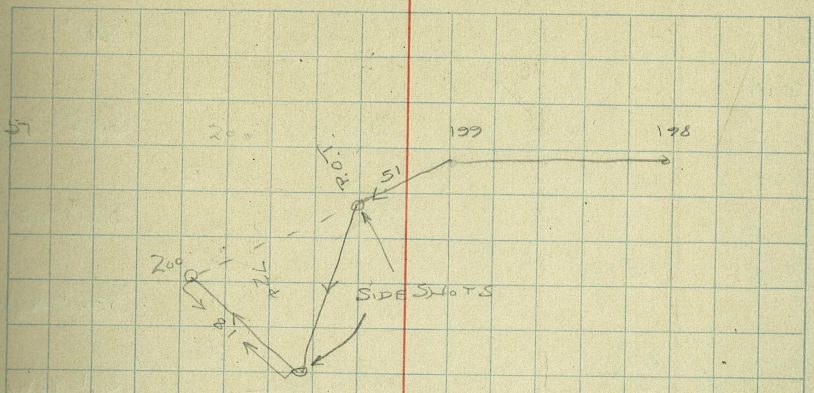
STA	LT	RT	MAG	ROD	CALC
			N52°40E		N67°29E
159		92°10'		0.66	
			S35°30E		S20°-21E
160		59°55'		2.58	
			S24-30W		S39°-34W
161		21°49'		3.03	
			S46-30W		S61°23W
162		0°25"		2.25	
			S47°W		S61°48W
163		16°07'		0.81	
			S63°10'W		S77-55W
164		04°16'		1.44	
			S67°20W		S82°-11W
165		07°53'		0.70	
			S75°W		N89°56W
165	5°21'			1.21	
			S70°W		S84°-43W
167		1°38'		1.01	
			S71°40W		S86°-21W
168	8°26'			1.26	
			S63°W		S77°-55W
169	12°36'			4.93 3.83	
			S50-30W		S65°19W
170	5°36'			4.41	
			S45°W		S59°-43W
171		0°15'		4.04	
	31°59'	$\frac{204^{\circ}28'}{31^{\circ}59'}$	S45-15W		S59°-58W
		172°-29'			

COTTONWOOD RIVER

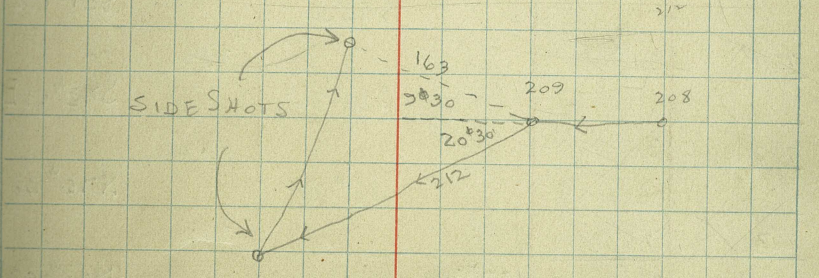
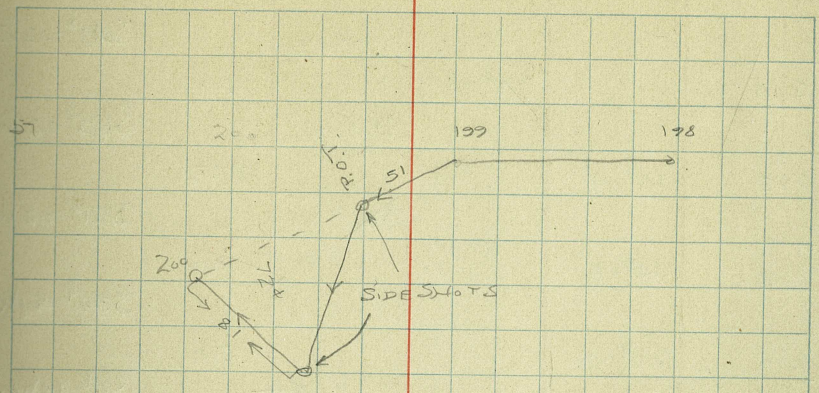
STA	LT	TCT	MAG	POD	CALC
185		$26^{\circ}43'$	S33°E	1.80	S18°20'E
186	21°32'		S06°20'E	2.22	S08°23'W
187		49°25'	S28°E	1.75	S13°09'E
188	37°09'		S21°10'W	1.27	S36°16'W
189		17°09'	S16°20'E	3.83	S00°53'E
190	6°35'		S01°W	4.76	S16°16'W
191	8°26'		S05°40'E	1.77	S09°41'W
(X) 192	25°12' (?)		S14°30'E	1.14	S01°15'W
193	30°08'		S39°30'E	1.98	S23°57'E
194	37°43'		S69°E	1.36	S54°05'E
195	18°40'		N73°E	3.29	N88°12'E
196	155°25'		S87°E	1.85	S73°08'E
197	2°12'		S69°30'W	3.62	S82°17'W
	168°57'	267°22'	S65°30'W		S80°05'W
		168°57'			
		98°25'			



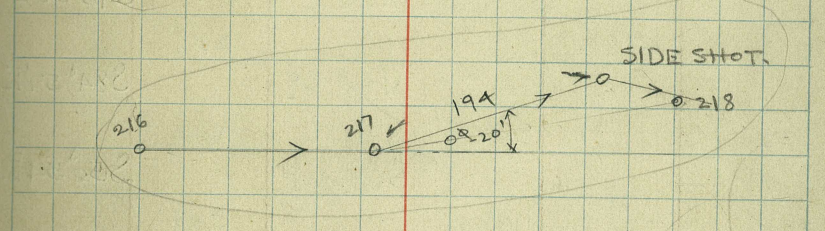
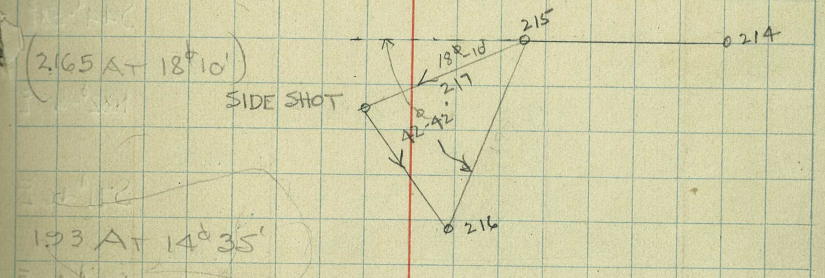
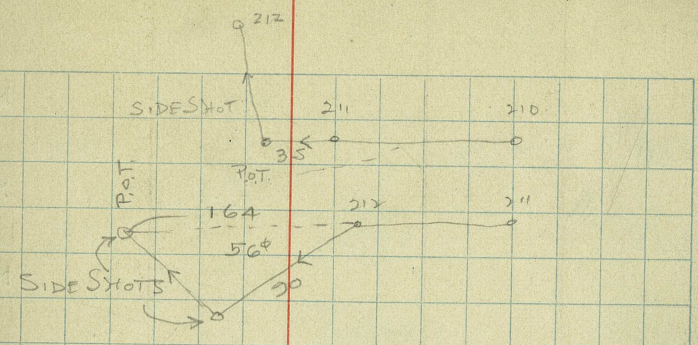
STA	LT	TC	MAG	POD.	CALC
			S65°30'W		S80°05'W
198	7°15'	↑		1.44	
		↓	S57°30'W		S72°50'W
199	16°38'			1.60	
			S41°50'W		S56°12'W
200		53°54'		<u>4.16</u> 1.16	
			N84°20'W		N69°54'W
201	11°10'			1.93	
			S84°20'W		N81°04'W
202	25°22'			1.20	
			S59°W		S73°34'W
203	9°45'			1.98	
			S49°W		S63°49'W
204	25°28'			2.65	
			S23°30'W		S38°21'W
205	21°13'			1.93	
			S01°30'W		S17°08'W
206	17°31'			1.25	
			S16°10'E		S00°23'E
207	11°48'			2.01	
			S28°E		S12°11'E
208	22°44' 17"			1.97	
			S50°20'E		S34°55'E
209		74°25'		1.97	S39°30'W S39°50'W
			S25°W		
210	44°32'			<u>2.05</u> 6.05	
	213°26' 128°19' 85°07'	128°19'	S19°40'E		S05°02'E



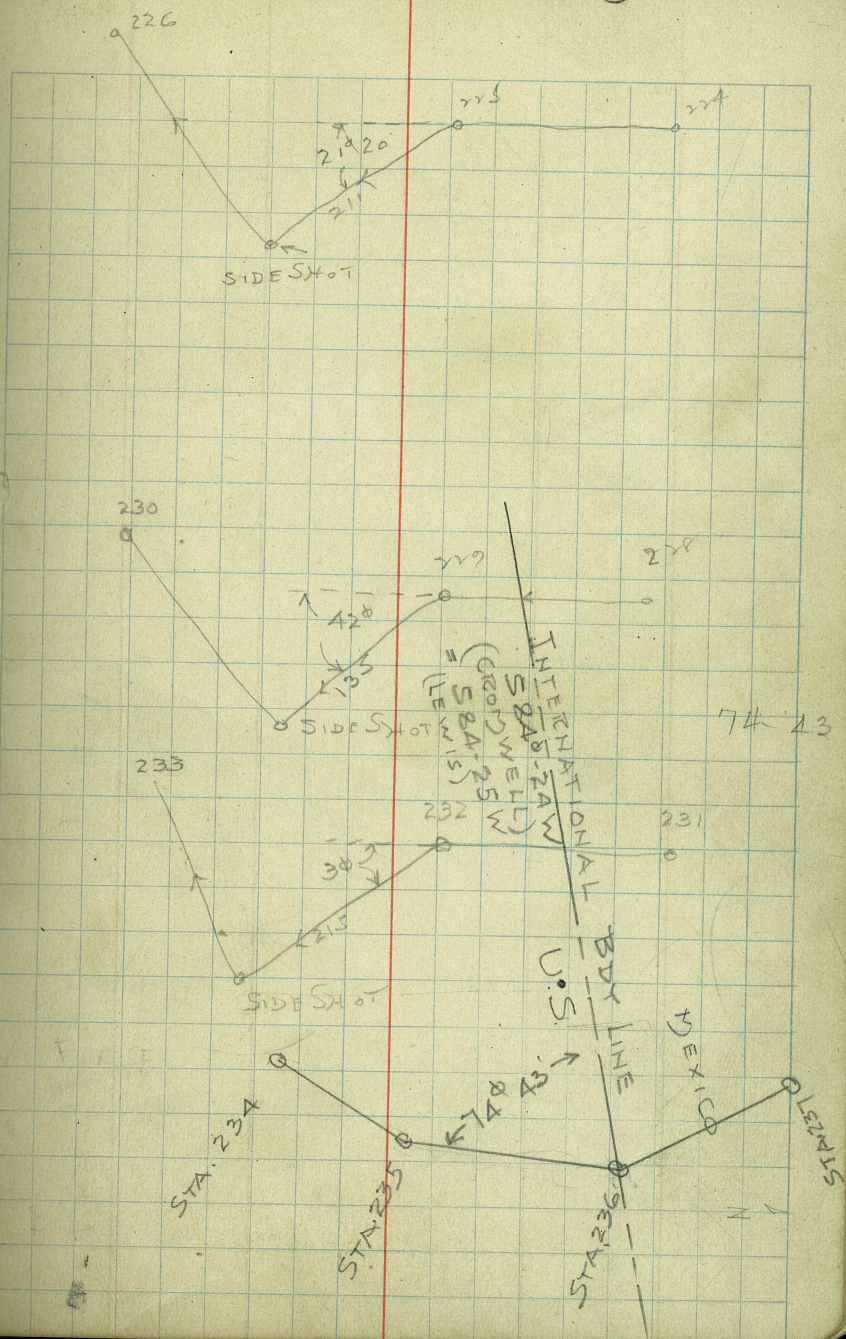
STA	LT	RET	MAG	POD.	CALC
			S65°30'W		S80°05'W
198	7°15'	↑		1.44	
		↓	S57°30'W		S72°50'W
199	16°38'			1.60	
			S41°50'W		S56°12'W
200		53°54'		4.16 1.16	
			N84°20'W		N69°54'W
201	11°10'			1.93	
			S84°20'W		N81°04'W
202	25°22'			1.20	
			S59°W		S73°34'W
203	9°45'			1.98	
			S49°W		S63°49'W
204	25°28'			2.65	
			S23°30'W		S38°21'W
205	21°13'			1.93	
			S01°30'W		S17°08'W
206	17°31'			1.25	
			S16°10'E		S00°23'E
207	11°48'			2.01	
			S28°E		S12°11'E
208	22°44' 17			1.97	
			S50°20'E		S34°55'E
209		74°25'		1.97	S39°30'W S39°50'W
			S25°W		
210	44°32'			2.05 6.05	
	213°26' 128°19'	128°19'	S19°40'E		S05°02'E
	85°07'				

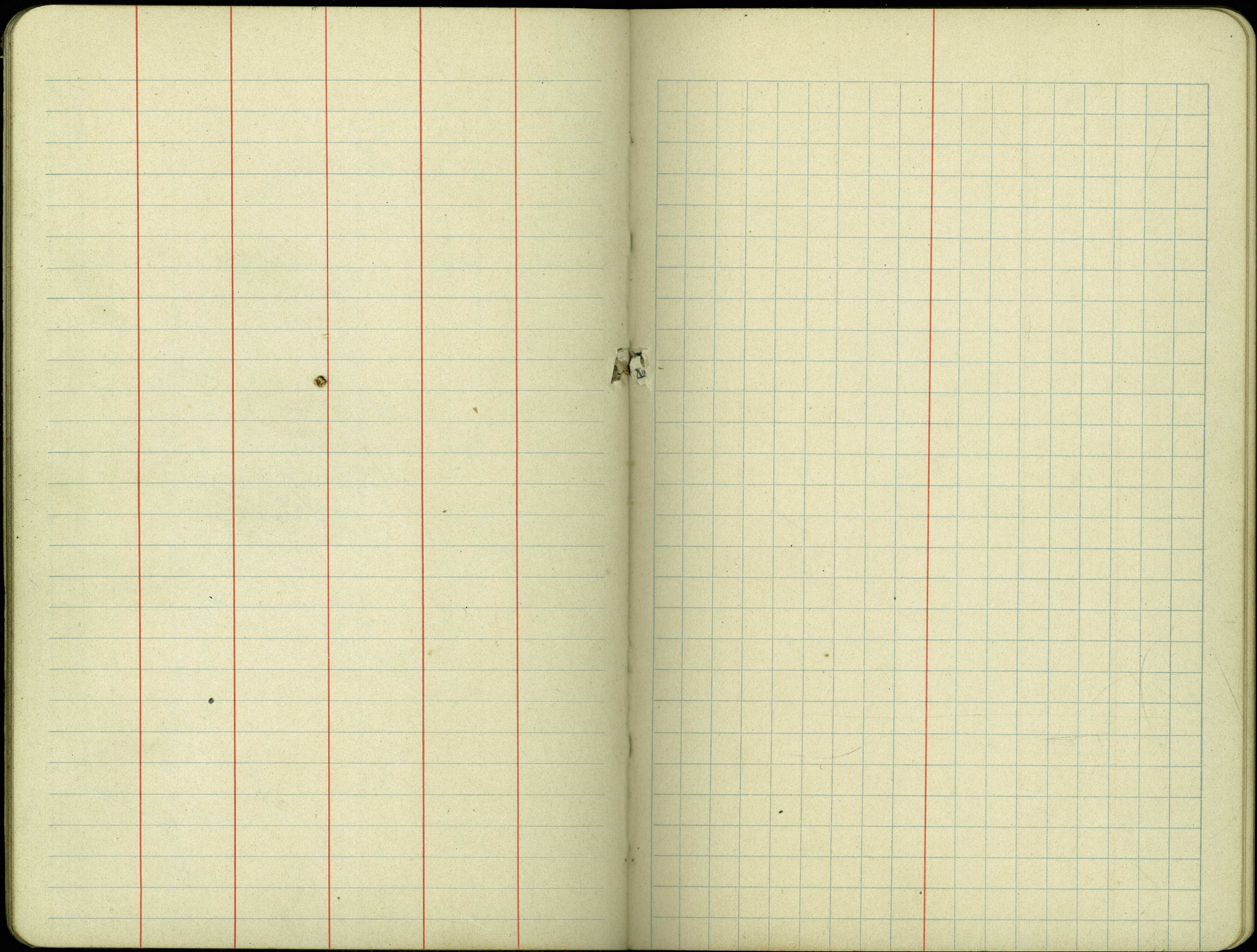


STA	LT	TR	MAG	POD	CALC
			S19°40E		S05°-02E
211		74°05'		1.91	
			S54°W		S69°03W
212	18°01'			3.37	
			S36°W		S51°-02W
213	14°15'			1.80	
			S21-45W		S36°-47W
214	25°03'			1.73	
			S03°15E		S11°-44W
X 215	42°42'			1.96	
			S46°E		S30°-58E
216	3°41'			0.85	
			S49-30E		S34°-39E
217	14°15'			1.81	
			S63°50E		S48°-54E
218	21°36'			1.47	
+ 219		53°42'		1.87	
			S32°E		S16°-48E
220	34°31'			0.76	
			S66°30E		S51-19E
221	21°42'			2.60	
			S88°30E		S73°01E
222	30°27'			2.84 0.84	
			N61°30E		N76°-32E
223	34°09'			2.16	
	260-22	127°47'	N27°30E		N42°-23E
	127-47				
	132-35				



STA	LT.	RT	MAG	ROD	CALC
			N27°30'E		N42°-23'E
224	14°38'			0.85	
			N12°50'E		N27°-45'E
225		39°24'		1.35	
			N52°15'E		N67°-09'E
226		94°04'		2.87	
			S34°E		S18°-47'E
227	26°11'			0.52	
			S60-20E		S44°-58'E
228	52°15'			0.57	
			N67°45'E		N82°-47'E
229		25°27'		2.27	
			S87°15'E		S71°46'E
230	6°50'			0.64	
231			N86°E		S78°-36'E
231	6°21'			2.92	
			N79°50'E		S84°-57'E
232		34°23'		1.00	
			S65°40'E		S50°-34'E
233		113°-31'		5.08	
			S48°W		S62°-57'W
234	22°35'			0.56	
			S25W		S40°-22'W
235	30°-40'			.64 0.16	S71-14E S09°-42'W
236	17°17'			1.21	
			S23°E		S07°-35'E
237					





CONTOURS AT DAM AXIS

STADIA
DIST. ANGLE

INST AT 525 (E.S.G.S ELEV.) = (7+99.12)

1.15 129°00' L

2.53 116°45' L

3.20 104°20' L

6.67 59°12'

190 31°12'

350 43°30' R

550 (5+299) ← PLUS ON DAM AXIS

1.60 102°50' L

3.40 103°20' L

6.70 68°20' R

1.20 63°50' R

2.45 71°45' R

3.00 73°30' R

575 (3+87.45)

0.70 83°30' R

2.40 86°30' R

3.15 83°12'

1.77 94°30' L

3.25 95°12' L

600 (2+96.65)

2.44 89°30' L

3.82 88°30' L

2.35 88°20' R

54600 OUTLET ELEV = (5+52.25)

(8+65) = 512.87 = NORTH BANK RIVER

1028.48 } N. OF BDY. LINE

230
1030.78

13+40 = SOUTH BANK RIVER

THESE CONTOURS ARE REFERRED

TO U.S.G.S. DATUM

NOTE —

FROM 7+99.12 TO 13+40

TRANSVERSE SECTIONS MAY BE

TAKEN AS LEVEL

CONTOUR	STADIA DIST	ANGLE
	(2+3635)	
625	1.80	90° 10' R
	2.10	87° 15' R
	2.00	85° 30' L
	3.10	81° 20' L
650	(1+758)	
	1.87	78° 50' L
	2.70	78° L
	.70	94° 30' R
	1.75	93° 30' R
675	(1+17.9)	
	0.90	91° R
	1.55	85° R
	1.52	74° L
	2.34	71° 20' L
700	(0+59.25)	
	0.70	92° R
	1.45	84° 50' R
	1.47	73° L
725	(0+11.45)	
	0.90	88° 30' R
	0.70	75° L

LEVELS FOR OUTLET ELEV

				656.54	
	12.99	558.99		546.00	
236	12.54	571.07	0.46	558.53	
275	12.99	583.67	0.39	570.68	
300	12.54	595.74	0.47	583.20	
375	12.87	608.41	0.20	595.54	
650	12.91	621.19	0.13	608.28	
675	12.36	633.58	0.03	621.22	
700	13.08	646.48	0.18	633.40	
	12.80	659.17	0.11	646.37	
	13.07	672.14	0.10	659.07	
	12.82	684.09	0.87	671.27	
	13.06	696.99	0.16	683.93	
	12.40	709.20	0.19	696.80	
	12.55	721.72	0.03	709.17	
	12.78	733.96	0.54	721.18	
	1.93	547.93		546.00	
	0.38	535.48	12.83	535.10	
	0.11	522.97	12.62	522.86	
	7.73	520.60	10.10	512.87	TOE
			5.00	515.6	AT
			13.80	506.87	SB RIVER

= 150 CONTOUR MARRON RESERVOIR

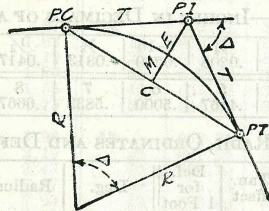
730.03

AT NLY CHANNEL BANK
 BDY LINE
 AT STREAM BED ELEV

	11.92	234.92		223.00
T.P.	12.05		0.14	234.78
		246.83		
T.P.	11.61		0.19	246.64
		258.25		
T.P.	12.85		0.30	257.95
		270.80		
T.P.	11.78		0.40	270.40
		282.18		
T.P.	3.81		1.42	280.76
		284.57		
T.P.	0.31		12.34	272.23
		272.54		
T.P.	0.96		12.54	260.00
		260.96		
T.P.	0.04		12.63	248.33
		248.37		
T.P.	1.44		12.63	235.74
		237.18		

DIETZGEN'S RAILROAD CURVE AND REDUCTION TABLES

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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) $= R \cos \frac{\Delta}{2} (1 - \cos \frac{\Delta}{2})$ (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 $+8\frac{1}{3} = 414.49$ 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 $= 158 - \text{Sta. P. C.} = 54.50$, 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. $= (\text{in minutes}) .3 \times C \times D^\circ$ or $= \text{defl. for 1 ft. from Table III} \times C$. 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 91.37. For from Table IV for 1° curve $E = 960.6$ for $8^\circ 20' = 960.6 \div 8\frac{1}{3} = 91.27$ and from Table V correction $= .10$ or $E = 91.37$ ft. Or suppose $\Delta = 32^\circ$ and E is measured and found to be 42 ft. What is D ? From Table IV $E = 230.9$ and $\div 42 = 5.5$ or $D = 5^\circ 30'$.

TABLE VIII.—NATURAL TRIGONOMETRICAL FUNCTIONS.

Angle	Sine.	Tan.	Cotg.	Cosin.	Angle	Sine.	Tan.	Cotg.	Cosin.	
32	.5299	.6249	1.600	.84805	58	.8525	1.257	.78261	.30	
10	.5324	.6289	1.590	.84650	50	.8248	.8002	1.250	.78079	
20	.5348	.6330	1.580	.84495	40	.6271	.8050	1.242	.77897	
30	.5373	.6371	1.570	.84339	30	.6293	.8098	1.235	.77715	
40	.5398	.6412	1.560	.84182	20	.6316	.8146	1.228	.77531	
50	.5422	.6453	1.550	.84025	10	.6338	.8195	1.220	.77347	
33	.5446	.6494	1.540	.83867	57	.8361	.8243	1.213	.77162	
10	.5471	.6536	1.530	.83708	50	.6383	.8292	1.206	.76977	
20	.5495	.6577	1.520	.83549	40	.6406	.8342	1.199	.76791	
30	.5519	.6619	1.511	.83389	30	.6428	.8391	1.192	.76604	
40	.5544	.6661	1.501	.83228	20	.6450	.8441	1.185	.76417	
50	.5568	.6703	1.492	.83066	10	.6472	.8491	1.178	.76229	
34	.5592	.6745	1.483	.82904	56	.6494	.8541	1.171	.76041	
10	.5616	.6787	1.473	.82741	50	.6517	.8591	1.164	.75851	
20	.5640	.6830	1.464	.82577	40	.6539	.8642	1.157	.75661	
30	.5664	.6873	1.455	.82413	30	.6561	.8693	1.150	.75471	
40	.5688	.6916	1.446	.82248	20	.6583	.8744	1.144	.75280	
50	.5712	.6959	1.437	.82082	10	.6604	.8796	1.137	.75088	
35	.5736	.7002	1.428	.81915	55	.6626	.8847	1.130	.74896	
10	.5760	.7046	1.419	.81748	50	.6648	.8899	1.124	.74703	
20	.5783	.7089	1.411	.81580	40	.6670	.8952	1.117	.74509	
30	.5807	.7133	1.402	.81412	30	.6691	.9004	1.111	.74314	
40	.5831	.7177	1.393	.81242	20	.6713	.9057	1.104	.74120	
50	.5854	.7221	1.385	.81072	10	.6734	.9110	1.098	.73924	
36	.5878	.7265	1.376	.80902	54	.6756	.9163	1.091	.73728	
10	.5901	.7310	1.368	.80730	50	.6777	.9217	1.085	.73531	
20	.5925	.7355	1.360	.80558	40	.6799	.9271	1.079	.73333	
30	.5948	.7400	1.351	.80386	30	.6820	.9325	1.072	.73135	
40	.5972	.7445	1.343	.80212	20	.6841	.9380	1.066	.72937	
50	.5995	.7490	1.335	.80038	10	.6862	.9435	1.060	.72737	
37	.6018	.7536	1.327	.79864	53	.6884	.9490	1.054	.72537	
10	.6041	.7581	1.319	.79688	50	.6905	.9545	1.048	.72337	
20	.6065	.7627	1.311	.79512	40	.6926	.9601	1.042	.72136	
30	.6088	.7673	1.303	.79335	30	.6947	.9657	1.036	.71934	
40	.6111	.7720	1.295	.79158	20	.6967	.9713	1.030	.71732	
50	.6134	.7766	1.288	.78980	10	.6988	.9770	1.024	.71529	
38	.6157	.7813	1.280	.78801	52	.7009	.9827	1.018	.71325	
10	.6180	.7860	1.272	.78622	50	.7030	.9884	1.012	.71121	
20	.6202	.7907	1.265	.78442	40	.7050	.9942	1.006	.70916	
					30	.7071	1.	1.	.70711	
	Cosin.	Cotg.	Tan.	Sine.	Angle.	Cosin.	Cotg.	Tan.	Sine.	Angle.

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

Roadway 16 feet wide. Side Slopes 1 on 1½.
For Single Track Embankment.

H	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	H
0	8.0	8.2	8.3	8.5	8.6	8.8	8.9	9.1	9.2	9.4	0
1	9.5	9.7	9.8	10.0	10.1	10.3	10.4	10.6	10.7	10.9	1
2	11.0	11.2	11.3	11.5	11.6	11.8	11.9	12.1	12.2	12.4	2
3	12.5	12.7	12.8	13.0	13.1	13.3	13.4	13.6	13.7	13.9	3
4	14.0	14.2	14.3	14.5	14.6	14.8	14.9	15.1	15.2	15.4	4
5	15.5	15.7	15.8	16.0	16.1	16.3	16.4	16.6	16.7	16.9	5
6	17.0	17.2	17.3	17.5	17.6	17.8	17.9	18.1	18.2	18.4	6
7	18.5	18.7	18.8	19.0	19.1	19.3	19.4	19.6	19.7	19.9	7
8	20.0	20.2	20.3	20.5	20.6	20.8	20.9	21.1	21.2	21.4	8
9	21.5	21.7	21.8	22.0	22.1	22.3	22.4	22.6	22.7	22.9	9
10	23.0	23.2	23.3	23.5	23.6	23.8	23.9	24.1	24.2	24.4	10
11	24.5	24.7	24.8	25.0	25.1	25.3	25.4	25.6	25.7	25.9	11
12	26.0	26.2	26.3	26.5	26.6	26.8	26.9	27.1	27.2	27.4	12
13	27.5	27.7	27.8	28.0	28.1	28.3	28.4	28.6	28.7	28.9	13
14	29.0	29.2	29.3	29.5	29.6	29.8	29.9	30.1	30.2	30.4	14
15	30.5	30.7	30.8	31.0	31.1	31.3	31.4	31.6	31.7	31.9	15
16	32.0	32.2	32.3	32.5	32.6	32.8	32.9	33.1	33.2	33.4	16
17	33.5	33.7	33.8	34.0	34.1	34.3	34.4	34.6	34.7	34.9	17
18	35.0	35.2	35.3	35.5	35.6	35.8	35.9	36.1	36.2	36.4	18
19	36.5	36.7	36.8	37.0	37.1	37.3	37.4	37.6	37.7	37.9	19
20	38.0	38.2	38.3	38.5	38.6	38.8	38.9	39.1	39.2	39.4	20
21	39.5	39.7	39.8	40.0	40.1	40.3	40.4	40.6	40.7	40.9	21
22	41.0	41.2	41.3	41.5	41.6	41.8	41.9	42.1	42.2	42.4	22
23	42.5	42.7	42.8	43.0	43.1	43.3	43.4	43.6	43.7	43.9	23
24	44.0	44.2	44.3	44.5	44.6	44.8	44.9	45.1	45.2	45.4	24
25	45.5	45.7	45.8	46.0	46.1	46.3	46.4	46.6	46.7	46.9	25
26	47.0	47.2	47.3	47.5	47.6	47.8	47.9	48.1	48.2	48.4	26
27	48.5	48.7	48.8	49.0	49.1	49.3	49.4	49.6	49.7	49.9	27
28	50.0	50.2	50.3	50.5	50.6	50.8	50.9	51.1	51.2	51.4	28
29	51.5	51.7	51.8	52.0	52.1	52.3	52.4	52.6	52.7	52.9	29
30	53.0	53.2	53.3	53.5	53.6	53.8	53.9	54.1	54.2	54.4	30
31	54.5	54.7	54.8	55.0	55.1	55.3	55.4	55.6	55.7	55.9	31
32	56.0	56.2	56.3	56.5	56.6	56.8	56.9	57.1	57.2	57.4	32
33	57.5	57.7	57.8	58.0	58.1	58.3	58.4	58.6	58.7	58.9	33
34	59.0	59.2	59.3	59.5	59.6	59.8	59.9	60.1	60.2	60.4	34
35	60.5	60.7	60.8	61.0	61.1	61.3	61.4	61.6	61.7	61.9	35
36	62.0	62.2	62.3	62.5	62.6	62.8	62.9	63.1	63.2	63.4	36
37	63.5	63.7	63.8	64.0	64.1	64.3	64.4	64.6	64.7	64.9	37
38	65.0	65.2	65.3	65.5	65.6	65.8	65.9	66.1	66.2	66.4	38
39	66.5	66.7	66.8	67.0	67.1	67.3	67.4	67.6	67.7	67.9	39
40	68.0	68.2	68.3	68.5	68.6	68.8	68.9	69.1	69.2	69.4	40

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