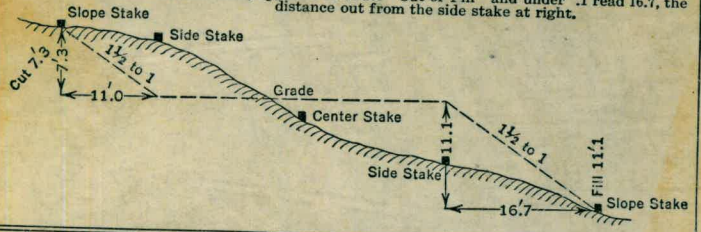
W
581

DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING

Roadway of any Width. Side Slopes 1½ to 1.

In the figure below: opposite 7 under "Cut or Fill" and under .3 read 11.0, the distance out from the side stake at left. Also, opposite 11 under "Cut or Fill" and under .1 read 16.7, the distance out from the side stake at right.



Cut or Fill	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	Cut or Fill
	Distance out from Side or Shoulder Stake										
0	0.0	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	0
1	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.7	2.9	1
2	3.0	3.2	3.3	3.5	3.6	3.8	3.9	4.1	4.2	4.4	2
3	4.5	4.7	4.8	5.0	5.1	5.3	5.4	5.6	5.7	5.9	3
4	6.0	6.2	6.3	6.5	6.6	6.8	6.9	7.1	7.2	7.4	4
5	7.5	7.7	7.8	8.0	8.1	8.3	8.4	8.6	8.7	8.9	5
6	9.0	9.2	9.3	9.5	9.6	9.8	9.9	10.1	10.2	10.4	6
7	10.5	10.7	10.8	11.0	11.1	11.3	11.4	11.6	11.7	11.9	7
8	12.0	12.2	12.3	12.5	12.6	12.8	12.9	13.1	13.2	13.4	8
9	13.5	13.7	13.8	14.0	14.1	14.3	14.4	14.6	14.7	14.9	9
10	15.0	15.2	15.3	15.5	15.6	15.8	15.9	16.1	16.2	16.4	10
11	16.5	16.7	16.8	17.0	17.1	17.3	17.4	17.6	17.7	17.9	11
12	18.0	18.2	18.3	18.5	18.6	18.8	18.9	19.1	19.2	19.4	12
13	19.5	19.7	19.8	20.0	20.1	20.3	20.4	20.6	20.7	20.9	13
14	21.0	21.2	21.3	21.5	21.6	21.8	21.9	22.1	22.2	22.4	14
15	22.5	22.7	22.8	23.0	23.1	23.3	23.4	23.6	23.7	23.9	15
16	24.0	24.2	24.3	24.5	24.6	24.8	24.9	25.1	25.2	25.4	16
17	25.5	25.7	25.8	26.0	26.1	26.3	26.4	26.6	26.7	26.9	17
18	27.0	27.2	27.3	27.5	27.6	27.8	27.9	28.1	28.2	28.4	18
19	28.5	28.7	28.8	29.0	29.1	29.3	29.4	29.6	29.7	29.9	19
20	30.0	30.2	30.3	30.5	30.6	30.8	30.9	31.1	31.2	31.4	20
21	31.5	31.7	31.8	32.0	32.1	32.3	32.4	32.6	32.7	32.9	21
22	33.0	33.2	33.3	33.5	33.6	33.8	33.9	34.1	34.2	34.4	22
23	34.5	34.7	34.8	35.0	35.1	35.3	35.4	35.6	35.7	35.9	23
24	36.0	36.2	36.3	36.5	36.6	36.8	36.9	37.1	37.2	37.4	24
25	37.5	37.7	37.8	38.0	38.1	38.3	38.4	38.6	38.7	38.9	25
26	39.0	39.2	39.3	39.5	39.6	39.8	39.9	40.1	40.2	40.4	26
27	40.5	40.7	40.8	41.0	41.1	41.3	41.4	41.6	41.7	41.9	27
28	42.0	42.2	42.3	42.5	42.6	42.8	42.9	43.1	43.2	43.4	28
29	43.5	43.7	43.8	44.0	44.1	44.3	44.4	44.6	44.7	44.9	29
30	45.0	45.2	45.3	45.5	45.6	45.8	45.9	46.1	46.2	46.4	30
31	46.5	46.7	46.8	47.0	47.1	47.3	47.4	47.6	47.7	47.9	31
32	48.0	48.2	48.3	48.5	48.6	48.8	48.9	49.1	49.2	49.4	32
33	49.5	49.7	49.8	50.0	50.1	50.3	50.4	50.6	50.7	50.9	33
34	51.0	51.2	51.3	51.5	51.6	51.8	51.9	52.1	52.2	52.4	34
35	52.5	52.7	52.8	53.0	53.1	53.3	53.4	53.6	53.7	53.9	35
36	54.0	54.2	54.3	54.5	54.6	54.8	54.9	55.1	55.2	55.4	36
37	55.5	55.7	55.8	56.0	56.1	56.3	56.4	56.6	56.7	56.9	37
38	57.0	57.2	57.3	57.5	57.6	57.8	57.9	58.1	58.2	58.4	38
39	58.5	58.7	58.8	59.0	59.1	59.3	59.4	59.6	59.7	59.9	39
40	60.0	60.2	60.3	60.5	60.6	60.8	60.9	61.1	61.2	61.4	40

KEUFFEL & ESSER CO., N. Y.

For Curve Tables see end of book.

581

MICROFILMED

JAN 13 1965

The paper in this book No. F363A is made of 50% high grade rag stock with a WATER RESISTING surface sizing.

10,360. k, a, ai. oM.

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MICROFILMED
JAN 13 1995

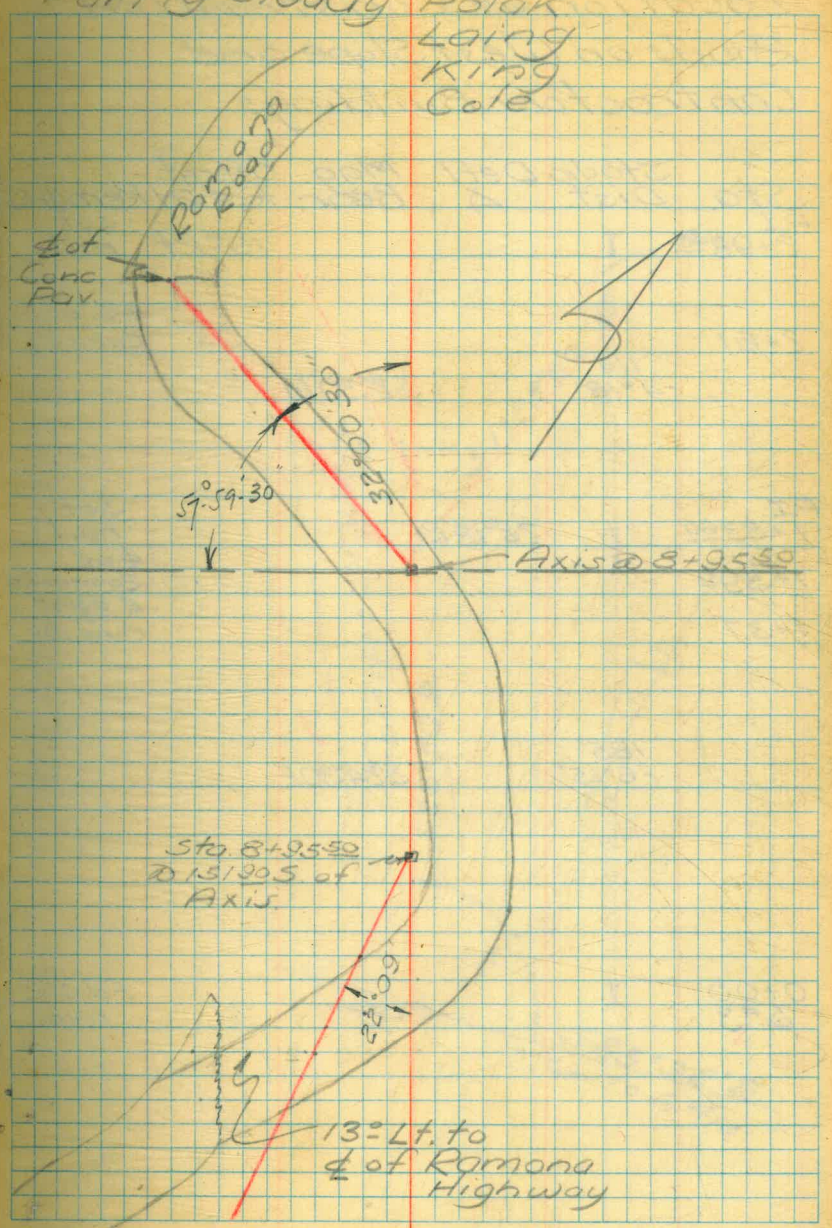
Location and ℄ of Detour Road at San Vicente Damsite

Sta	+	H.I.	Offset to ℄ of Rd.	−	Elev
T.B.M.					475.23
	6.18	481.41			
1+42	3 N of Axis		14 Rt.	2.0	479.5
1+25			5° Lt.	2.7	478.7
1+00			7° Lt.	3.6	477.8
0+75			3° Lt.	3.8	477.6
0+50			5¼ Lt.	4.3	477.1
0+25			2° Lt.	4.5	476.9
0+00	- Axis		2° Lt.	4.7	476.7
0+25			3° Rt.	4.5	476.9
0+50			7° Rt.	4.8	476.6
0+75			7° Rt.	5.4	476.0
1+00			9 Rt.	5.8	475.6
1+25			10° Rt.	4.9	476.5
1+51.90			10¼ Rt.	5.6	475.8
1+75			15° Rt.	5.5	475.9
2+00			12° Rt.	5.8	475.6
2+25			6 Rt.	6.1	475.3
2+50	S. of Axis		0° Lt.	6.7	474.7
T.B.M.				6.18	475.23

2/2/42
Partly Cloudy

Dickinson
Jackson
Polak
Laing
King
Cole

3



Chain Traverse

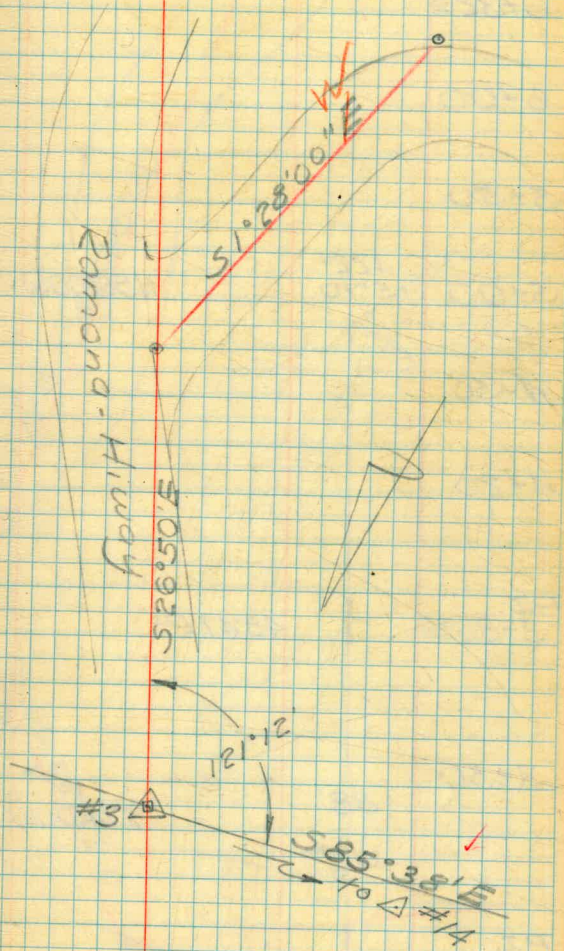
Location of Construction Roads on West Slope and Contractor's Buildings

Sta.	Stadia Dist.	Defl. Δ	Mag. Bear.	Offset to ℄ Rd.	Remarks
P.I. 2+98.5				10' Rt.	set nail
2+61				0'	B.C. of Curve
	114' -4°18'		S2°30'W		
P.I. 1+83.60		28°18' Rt.			set nail ℄ of Ramona Rd.
1+59.6					E Edge of Conc. Pav.
1+37					
	185' -6°15'		S24°30'E		
0+00 △ #3					Fd. 2"x2" nub.

1/31/42
Fair - Warm

Jackson
Dolak
Cole

4



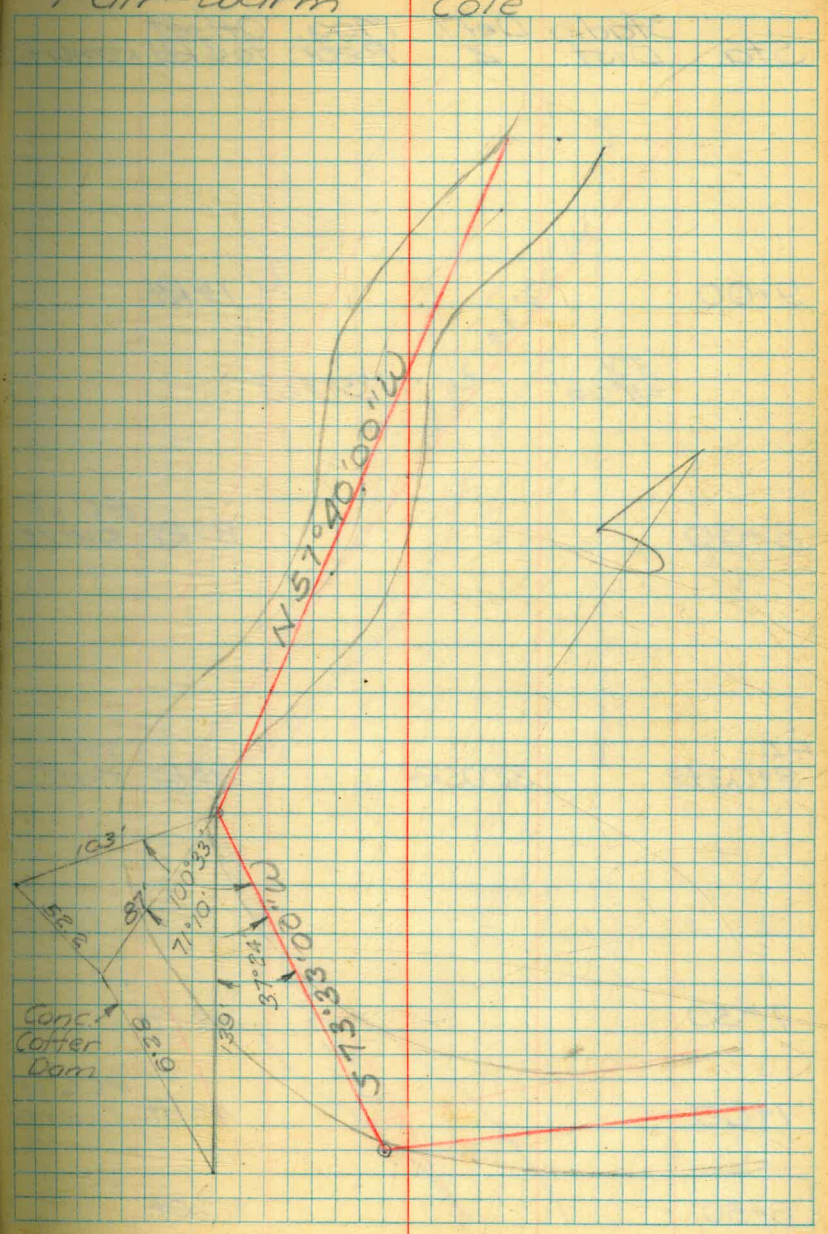
Chain Traverse

1/31/41
Fair-Warm

Jackson
Polak
Cole

5

Sta.	Stadia Dist	Defl. Δ	Mag. Bear.	Offset to ℄ Rd.	Remarks
6+50				11° Rt.	
6+32.5				6.5° Rt.	P.C.C. of Curve
6+00				4° Lt.	
5+50				7° Lt.	B.C. of curve
5+00	422' +5°10'		N59°00W	2.5° Rt.	E.C. of Curve
4+50				3° Rt.	
4+20				5° Lt.	P.C.C. of Curve
P.I. 3+86.45		48°47' Rt.			
3+50				14.5 Lt.	
	88'		S74°00W		
P.I. 2+98.05		72°05' Rt.			

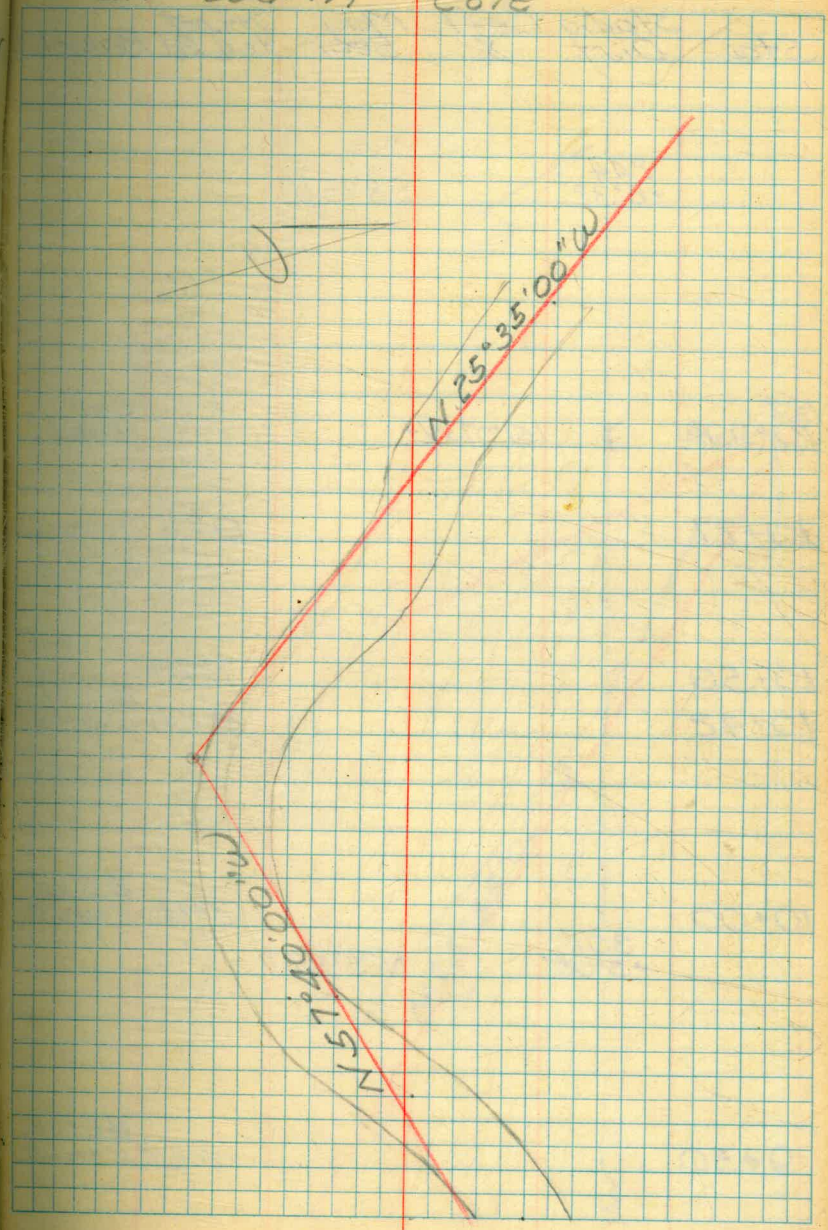


1/31/41
Fair-Worm

Jackson
Polak
Cole

6

Sta.	Stadia Dist.	Defl. Δ	Mag. Bear.	Offset to ℄ Rd.	Remarks
9+00				15 Rt.	
	301' +5°08'		N 25°00' W		
8+50				8° Rt.	E.C. of Curve
P.I. 8+03.50		32°05' Rt.		9.5 Rt.	set nail
7+50				9.5 Lt.	
7+00				4° Rt.	P.C.C. of Curve
6+50				11° Rt.	

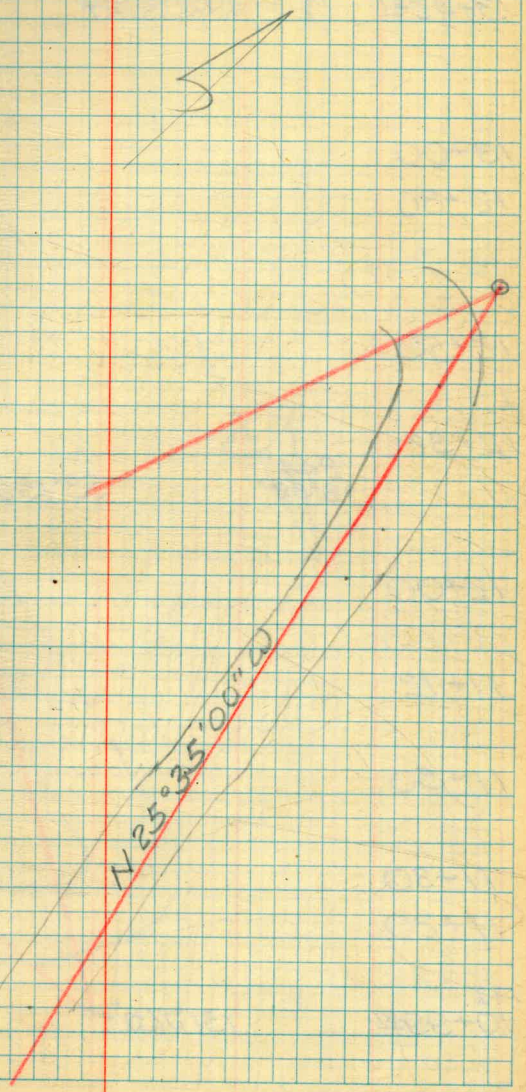


1/31/41
Fair-Warm

Jackson
Polak
Cole

7

Sta	Stadia Dist.	Defl. ∠	Mag. Bear.	Offset to ℄ Rd.	Remarks
	244 +6°32'		S3°15'W		
P.I. 10+99.2		151°07'30" Lt.			set nail
10+77				0°	
10+50				7° Rt.	
10+42				6° Rt.	B.C. of Curve
10+00				2° Lt.	E.C. of Curve
	301' +5°08'		N25°00'W		
9+50				6° Lt.	B.C. of Curve

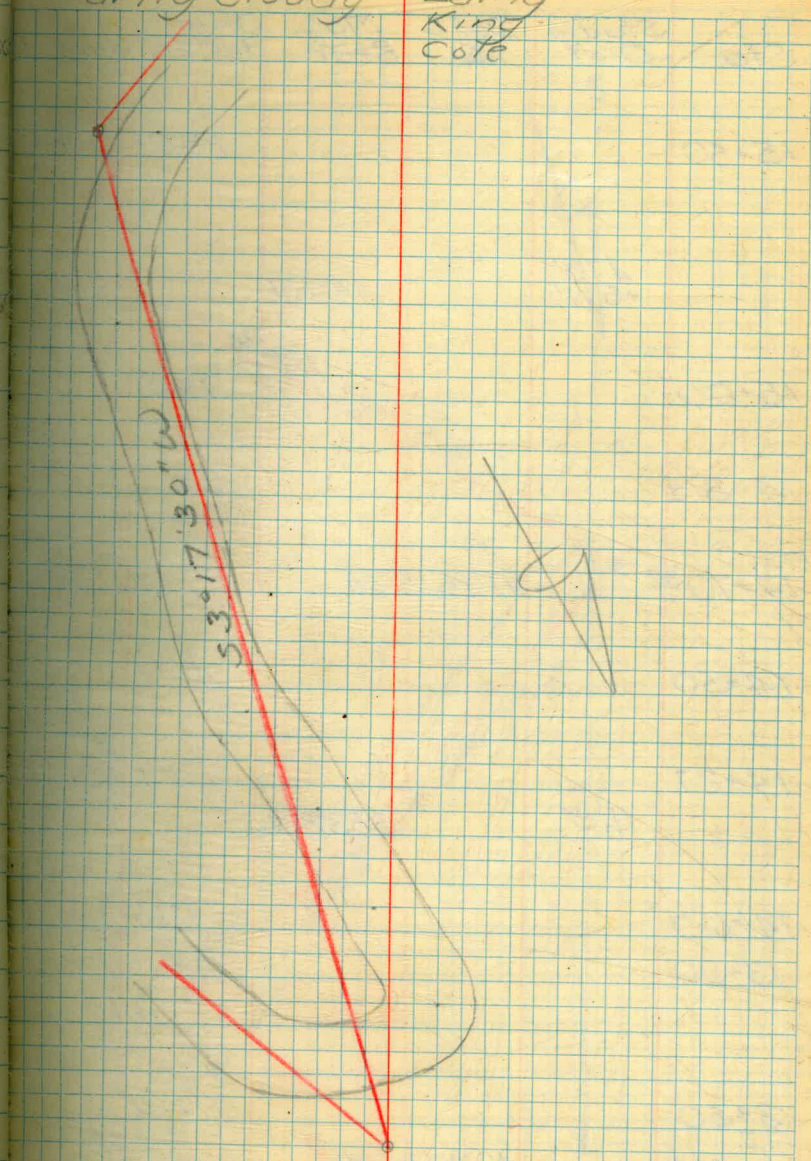


2/2/42
Partly Cloudy

Jackson
Polak
Laing
King
Cote

8

Sta.	Stadia Dist.	Defl. Δ	Mag. Bear.	Offset to ℄ Rd.	Remarks
P.I. 13+42.4'	I	49°40'30" Rt		13± Rt.	set nail
13+00				4° Lt.	
12+80				7° Lt.	B.C. of Curve
12+50				7° Lt.	
12+32	244' +6°32'		S3°15'W	7° Lt.	E.C. of Curve
12+00				4° Lt.	
11+72				4° Rt.	P.C.C. of Curve
11+50				11± Rt.	
11+30				18° Rt.	
11+20				℄	
P.I. 10+99.8'	I	151°07'30" Rt.			set nail

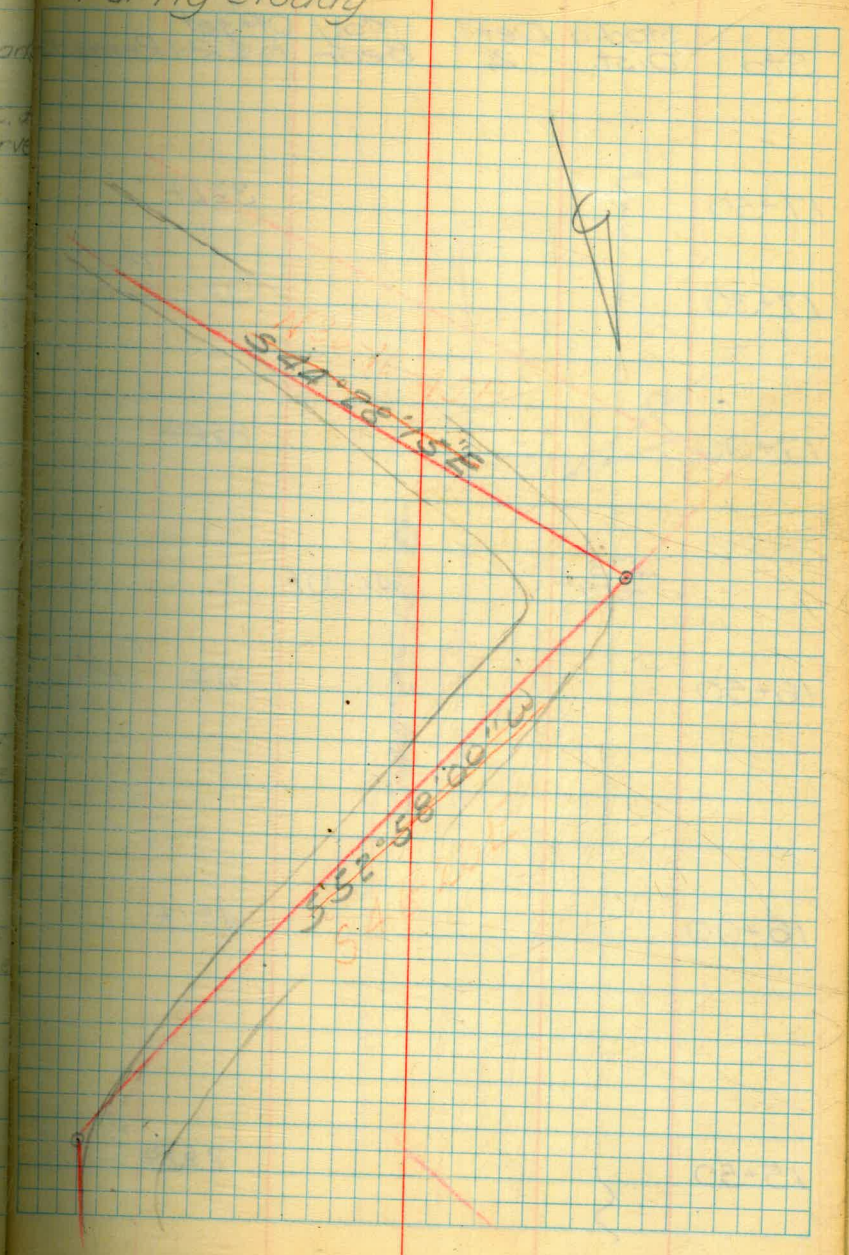


2/2/42

Partly Cloudy

9

Sta.	Stadia Dist.	Defl. Δ	Mag. Bear.	Offset to ℄ Rd.	Remarks
15+50				25 Rt.	P.C.C. of Curve
	473' +6°11'		S44°00E		
15+00				7.8 Rt.	
14+87.4				0°	
P.I. 14+70.38		97°26'15" Lt.		12° Lt.	
14+50				4° Lt.	
14+27				1° Rt.	B.C. of Curve
	128'		S53°30'W		
14+00				4° Rt.	
13+90				4° Rt.	E.C. of Curve
13+50				11° Rt.	
P.I. 13+42.41		49°40'30" Lt. ?			



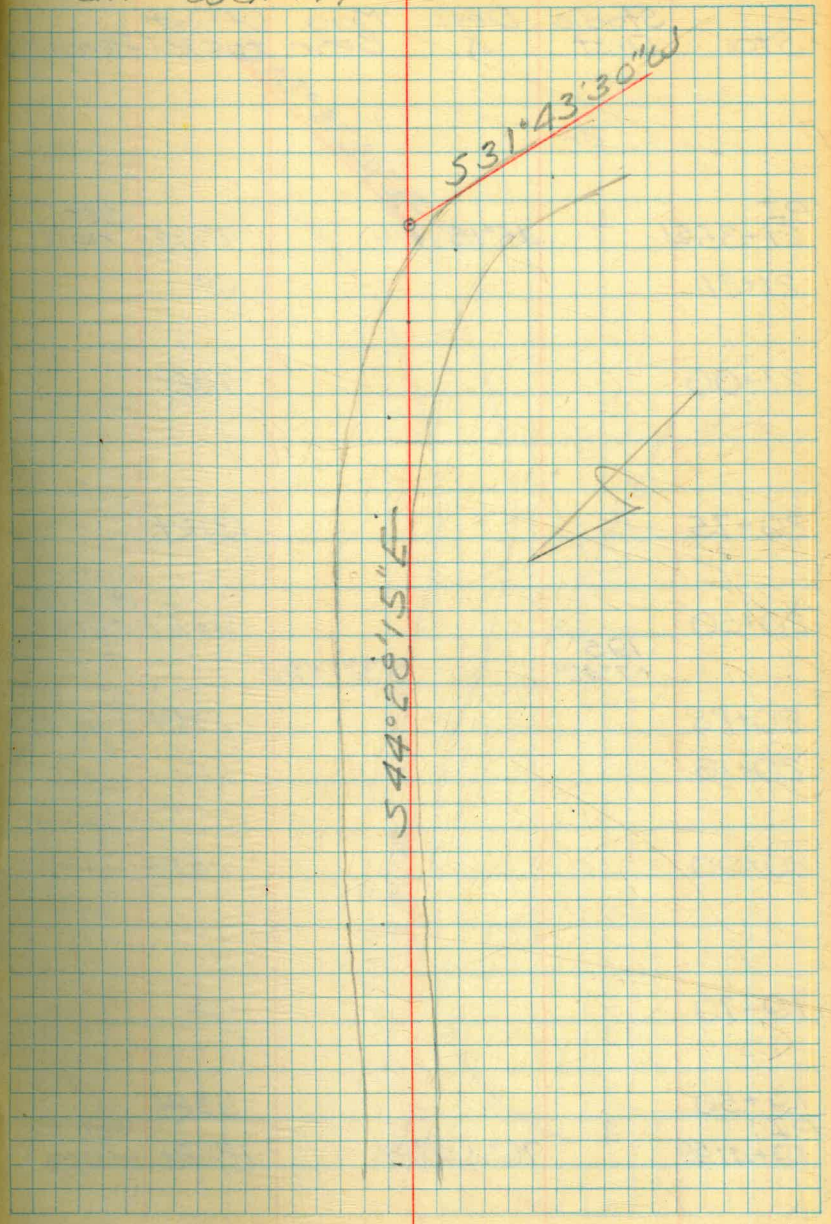
2/3/42
Fair - Warm

Sta.	Stadia Dist.	Defl. Δ	Mag Bear.	Offset to ℄ Rd.	Remar
17+50				3° Lt.	
17+30				0°	P.C.C. of Curve
17+00				2½ Rt.	
	473 +6°11'		S44°00'E		
16+50				0°	P.C.C. of Cur
16+00				4° Lt.	
15+50				2½ Rt.	P.C.C. of Curve

S44°00'E

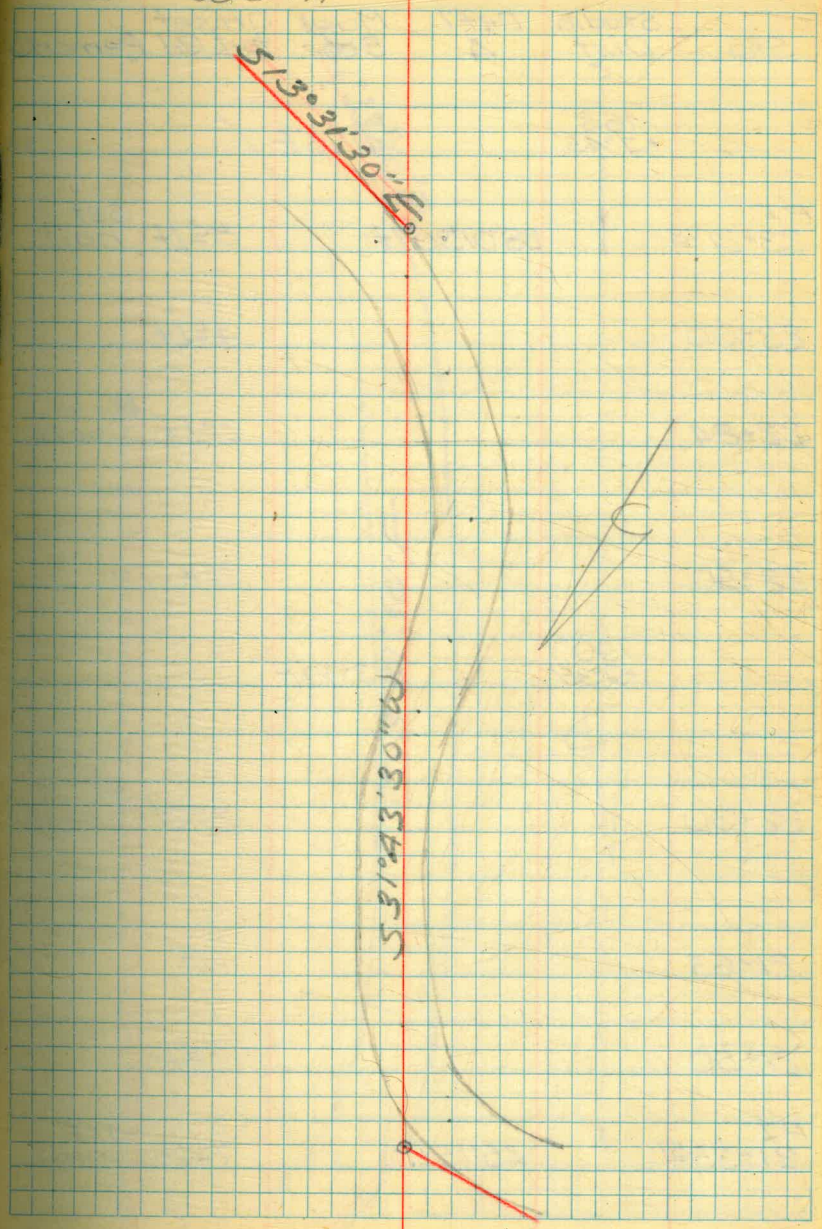
2/3/42
Fair - Warm

Sta.	Stadia Dist. ℄	Defl. Δ	Mag. Bear.	Offset to ℄ Rd.	Remarks
	195' +7°42'		S32°00'W		
P.I. 19+41.50		76°11'45" Rt.		12° Rt.	set nail
19+14				0°	
19+00				4° Lt.	
18+85				6° Lt.	B.C. of Curve
18+50	473 +6°11'		S44°00'E	7° Lt.	
18+00				6° Lt.	
17+50				3° Lt.	



2/3/42
Fair-Worm

Sta.	Stadia Dist.	Defl. Δ	Mag. Bear.	Offset to Rd.	Remarks
	7				
P.I. 21+35.5	1	45°15'Lt.		7°-Lt.	set nail
21+21				0°	
21+00				7°-Rt.	
20+75				13°-Rt.	
20+50				9°-Rt.	B.C. of Curve
	195' +7°42'		S32°00'W		
20+28				2.5°-Rt.	E.C. of Curve
20+16				0°	
20+00				2.5°-Lt.	
19+70				0°	
19+50				9.5°-Rt.	
P.I. 19+41.59	1	76°11'45"Rt.		12°-Rt.	set nail

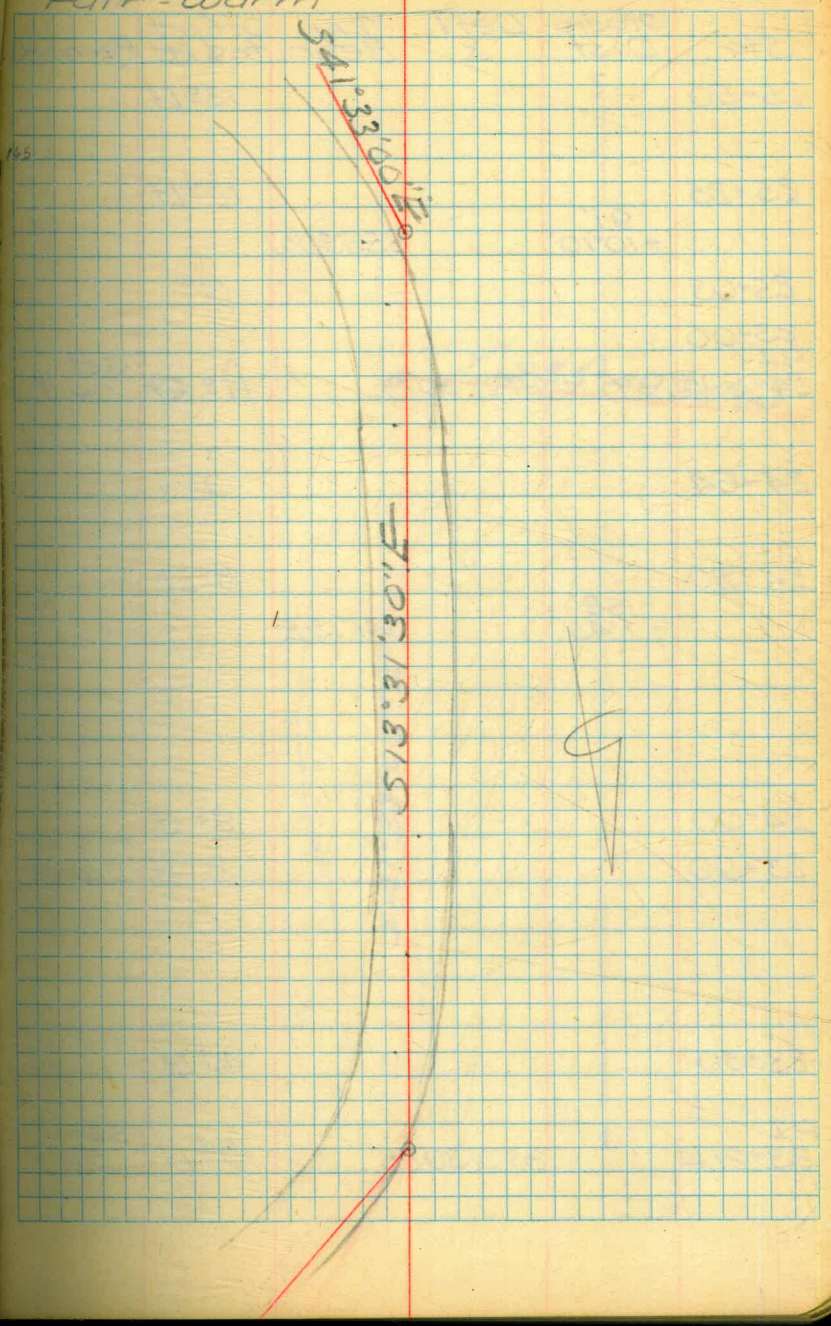


Sta.	Stadia Dist.	Defl. Δ	Mag. Bear.	Offset to ℄ Rd.	Remarks
	168' +7°45'		S41°15'E		
P.I. 23+21.78		28°01'30" Lt		8± Lt.	set nail
23+00				4° Lt.	
22+84				2° Lt.	BC. of Curve
22+50				0°	
	190' +9°35'		S13°00'E		
22+00				2° Rt.	EC of Curve
21+65				0°	
21+50				2± Lt.	
P.I. 21+35.51		45°15' Lt.		7° Lt.	set nail

2/3/42

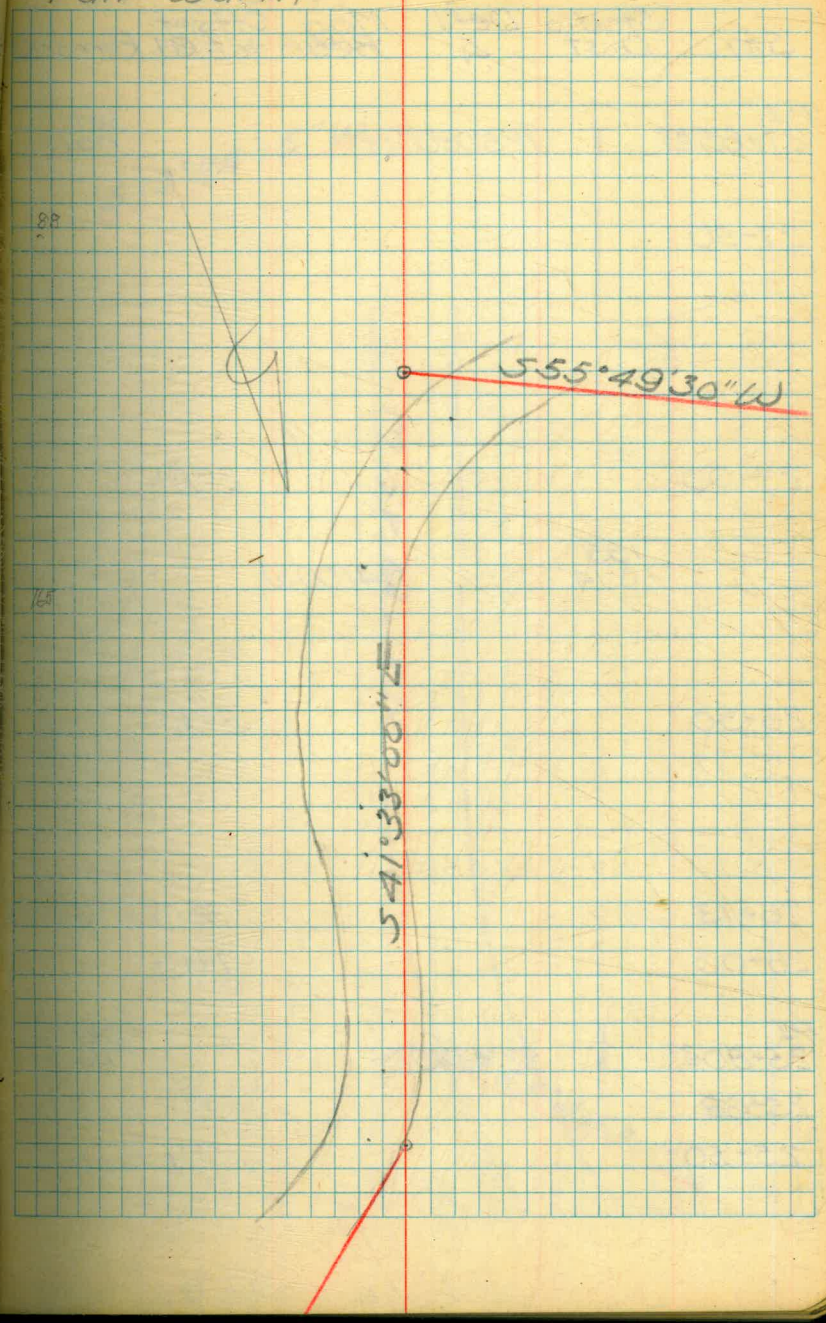
Fair - Warm

13



2/3/42
Fair-Warm

Sta	Stadia Dist.	Defl. ∠	Mag. Bear	Offset to ℄ Rd.	Remarks
25+50	?			15° Lt.	
25+25	91' +10°10'		S56°30'W	12° Lt.	
25+03				0°	
25+00 P.I.					
24+80		97°22'30" Rt.		11° Rt	set nail
24+64				0°	
24+50	168' +7°45'		S41°15'E	8° Lt.	
24+00				9° Lt.	
23+90				8° Lt.	PCC of Curve
23+50				4° Lt	
P.I. 23+21		28°01'30" Lt.		8° Lt.	set nail

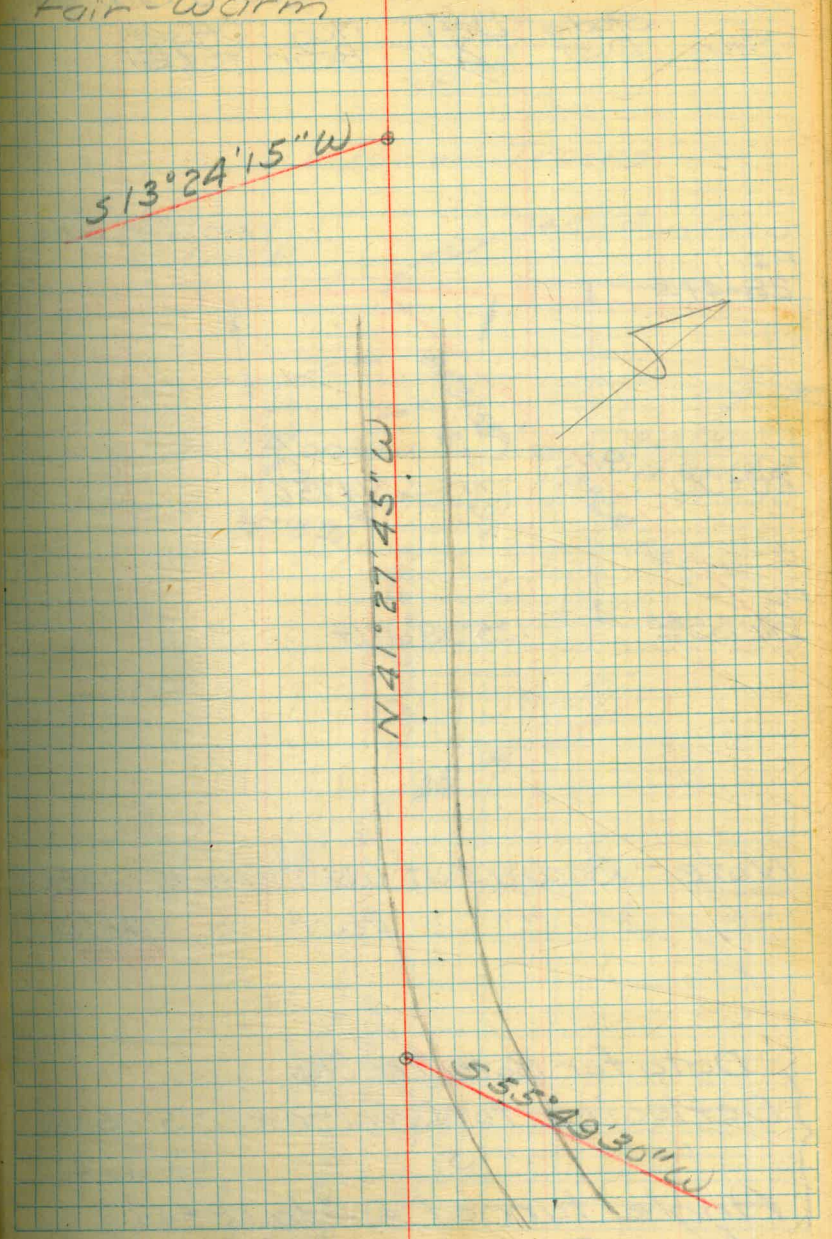


2/3/42

Fair - Warm

15

Sta	Stadia Dist.	Defl. Δ	Mag. Bear.	Offset to ℄ Rd	Remarks
P.I. 27+65.82	T	12°08'00" Lt			set nail
27+50					
27+00				2° Rt.	
	185' +6°14'		N41°00'W		
26+50				5° Rt.	
26+13				5.8 Rt.	E.C. of curve
26+00				7± Rt.	
P.I. 25+80.37	T	82°42'45" Rt			set nail
25+68				0°	
25+50				15° Lt	



Location of Construction Roads and Contractor's Building

2/3/42
Fair - Warm

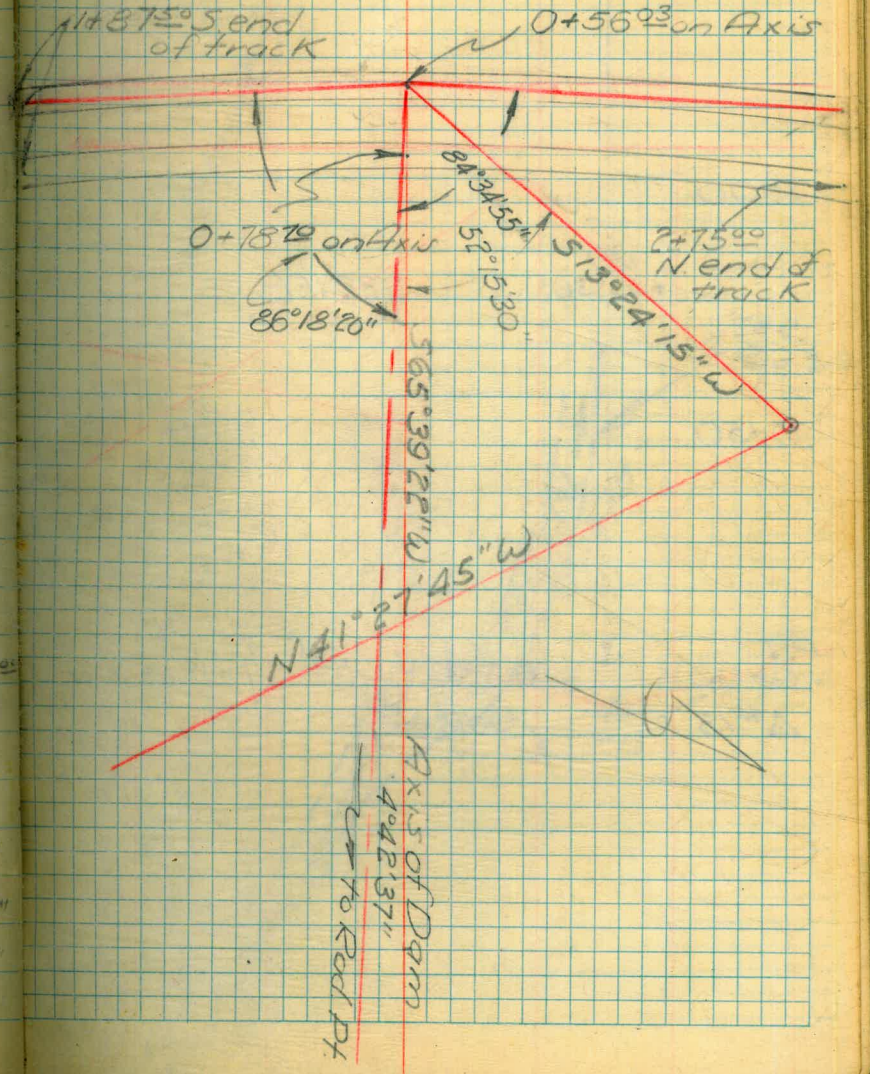
Jackson
Polak
Laing
King
Cole

Sta	Stadia Dist	Defl ∡	Mag Bear	Offset to ℄ Rd
P.I. 28+47.16				
28+00	81'		S14°15'W	
P.I. 27+65.82		125°08'00" Lt.		

Note - Radius of West Track = 1454.00
" " East " 1431.33

Data for Both Tracks
Deflection to N. end track = 5°25'05"
" " S. " " = 3°41'40"
Angles turned @ Sta. 28+47.16 = 0+56.03 on Axis
from Radius Pt.

Tail-Tower-Tracks



Location of Construction Roads and Buildings

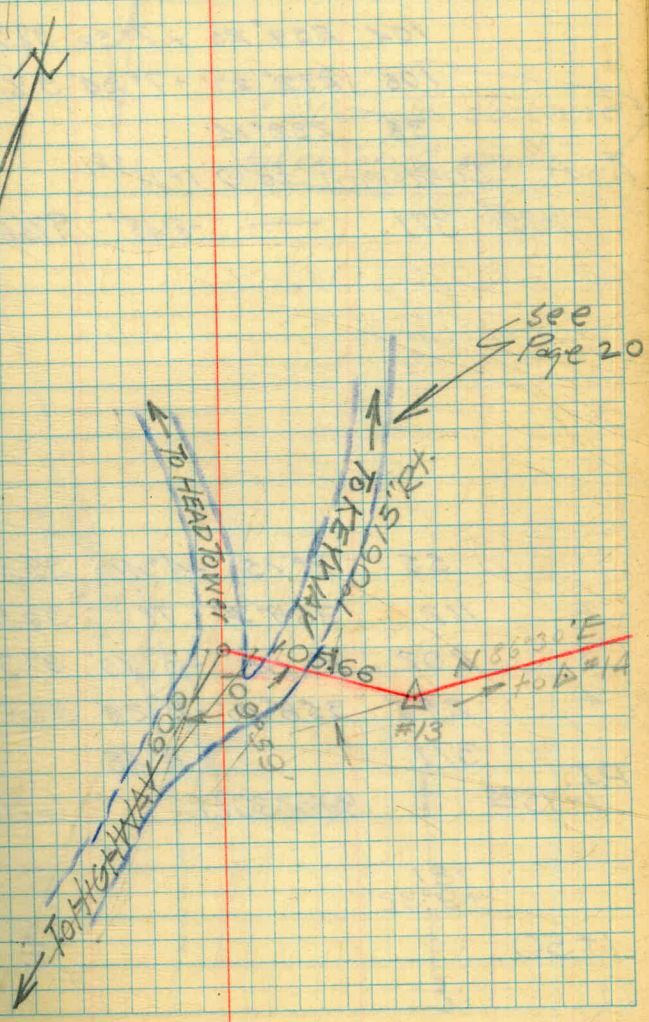
FROM △ #13 TO JUNCTION OF HEAD TOWER Rd

Sta.	Stadia Dist.	Defl. Δ	Mag. Bear.	Offset to ℄ Rd.	Remarks
1+50	℄			℄	
1+00				2' Rt	
	181'	+10°36'	S32°15E		
0+50				5' Rt	
P.I. 0+00		61°32'30" Rt.	N37°45'E	13 Rt	set nail
△ #13		1°06'15" Rt		10° Lt.	

2/6/42
Cool - Cloudy

Jackson
Polak
King
Cole

17

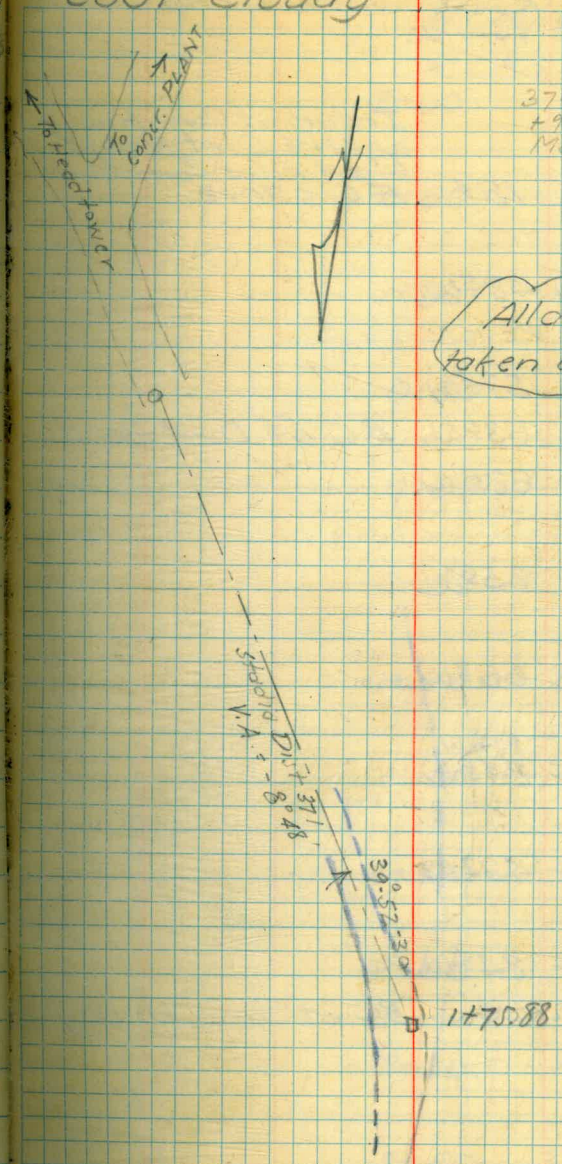


Sta.	Stadia Dist.	Azimuth ~~Defl~~ ~~∡~~	Vert. ∡ ~~Mag.~~ Bear.	Hor. Corr. ~~Offset to ℄ Rd.~~	Corr'd Hor. D ~~Remarks~~
					102
	104	239° 25'	+ 7° 32'	98.28	CHECK SHOT OLD P.I. AT ROAD JUNCT.
	106	232° 27'	+ 7° 24'	98.34	ROAD JUNCT. 104
	38'	232° 15'			
⊼ "A"	Backsight to ⊙		1+75.88		℄ ROAD 4' WEST
1+75.88	371	—	-8° 48'	97.66	362
1	55'	7° 15'	-4° 40	99.34	55
2	112'	359° 34'	- 7°	98.51	110
3	202'	2° 12'	-8° 10'	97.98	198
4	295'	358° 40'	-8° 28'	97.83	288
	371'		-8° 48		
P.I. 1+75.88		39° 52' 30" Lt.		6' Lft.	set nail
	181 +9° 32'				
1+50				℄	
	℄				

2/6/42
Cool - Cloudy

Dickinson
Polak
King
Cole

18



37
+9° 32
Mag 572° 00 E

All angles clockwise taken on ℄ road

LOCATION OF FIRST HIGHWAY DETOUR

Date:- 10/27/41 Notes - Jackson
Weather:- Fair Warm R. - Ecker
H. Chain - Polak
R. Chain - Laing

Sta.	Hiway 18' Wide	Road 23' Wide	Remarks
2+00N.	4^{3}W.		
1+74N.	7^{3}W.		Inter. of Conc. Hiway with ℄ Dirt Road
1+50N.	9^{3}W.	18^{4}	West Edge Conc. Pav. E.C. curve
1+00N.	10^{8}W.	42^{5}W.	
0+50N.	8^{0}W	57^{4}W.	
0+06N		63^{0}W.	B.C. of Dirt Road
0+00	1^{7}W.	62^{8}W.	
0+04S.	1^{7}W.		
0+50S.	7^{2}E.	65^{6}W.	
1+00S.	17^{4}E.	66^{2}W.	
1+10^{5}S.	18^{5}E.		
1+50S.	24^{4}E.	~~24^{6}W.~~ 636 W	
2+00S.	23^{0}E.	49^{7}W.	
2+50S.	13^{2}E.	24^{6}W	
2+88^{3}S.	℄	℄	B.C. of Conc. Hiway
3+00S.	5^{4}W.		
3+50S.	28^{7}W.		

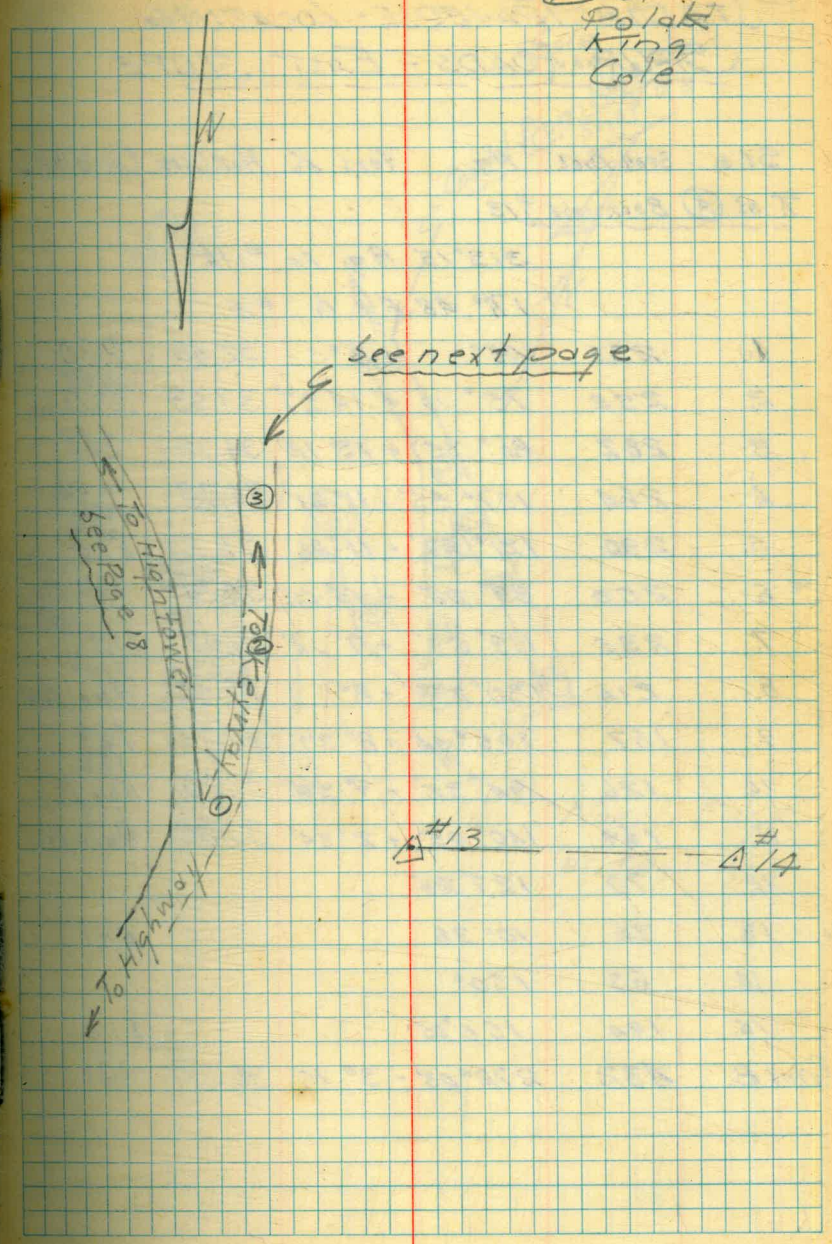
	2+00
	1+50
	1+00
	0+50
℄ of Axis	0+00
	0+50
	1+00
	1+50
	2+00
	2+50
	3+00
	3+50

STADIA SURVEY - LOCATING "SPUR" ROADS ON EAST SLOPE

STATION	Stad. Dist	Azim.	V. A.		
π △ #13	Backsight on #14 △				
①	94'	181° 38'	-1° 58'	99.25	93
②	124	213° 30'			
③	240	230° 25'			
(A)	482	254° 33'	- 6° 52'	98.57	475

FEB 9th
Dickinson
Polak
King
Cole

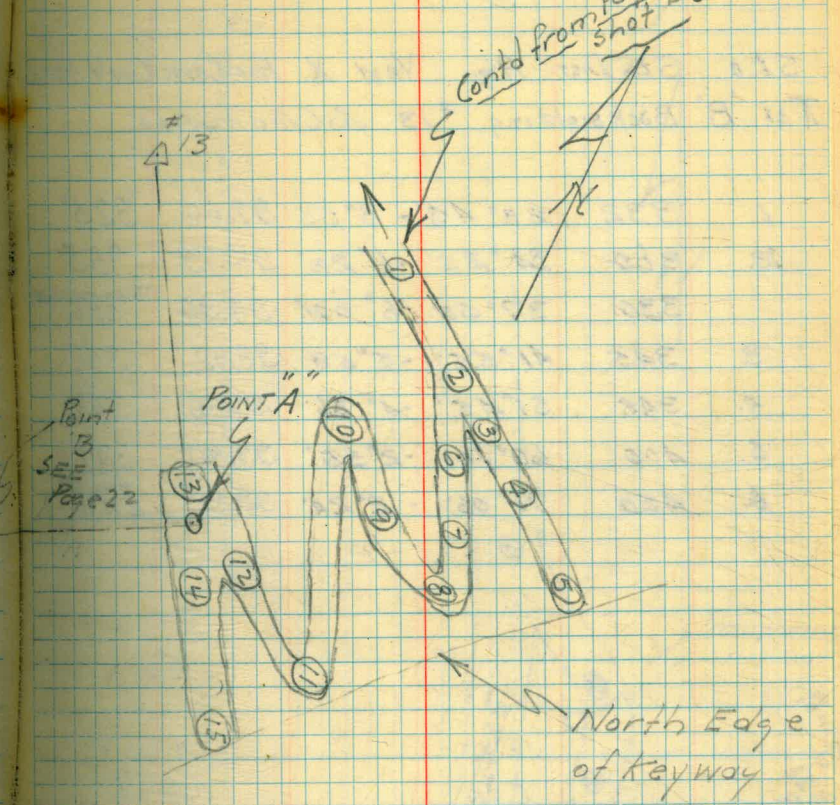
20



STADIA TRAVERSE - LOCATING SPUR ROADS - EAST SLOPE

Sta.	Stad. Dist	Az.	Vert ∡	Hor. Corr.	Corr'd Hor. D
π at (A)	Backsight #13				
		313°13'	Az. to #14		
		171° 46'	Az to #6		
1.	238	48°	+16°	92.40	220
2.	255	75° 10	+ 14°37'	93.63	238 Junction
3.	282	86° 35'	+ 13° 12'	94.79	268
4.	264	107° 55'	+ 11° 21'	96.13	254
5.	290	121° 27'	+ 11° 06'	96.29	280 End
6.	250	89° 04'	+ 13° 02'	94.91	237
7.	235	119° 53'	+ 9° 14'	97.43	229
8.	214	130° 27'	+8°	98.06	210 Hair Pin
9.	167	105° 04'	+8° 37'	97.76	163
10.	126	94° 35'	+ 9° 38'	97.20	122 Hair Pin
11.	169	140° 05'	+ 2° 34'	99.80	169 Hair Pin
12.	70	127° 28'			
Bank 13.	36	10° 38			End
14.	63	150°			
15.	190	156° 05'			End
Point B.	432	272° 03'	- 3° 15'	99.68	431

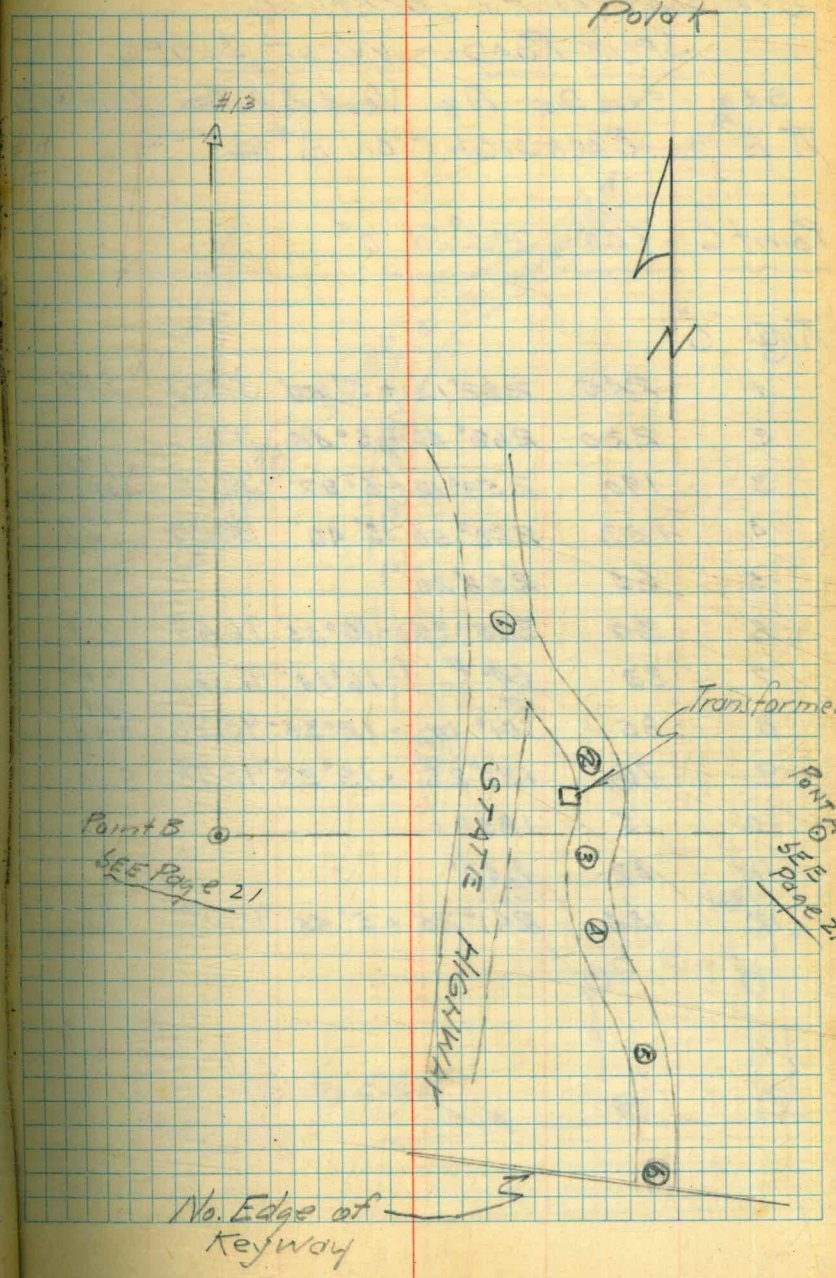
FEB 9th
Dickmon
Polak
Cole
King



STADIA TRAVERSE LOCATING
SPUR ROAD - EAST SLOPE

Sta	Sta Dist.	Az.	Vert ∠	Hor. Corr.	Corr'd. Hor. Δ
T at "B"	Backsighting #13 Δs Clockwise				
1.	332	23° 45'	- 8° 55'	97.60	325
2.	360	34° 25'	-6° 28'	98.73	355
	330	37° 50'	-6° 02'	98.90	TRANSFORMER 326
3.	345	41° 55'	-5° 58'	98.92	342
4.	345	51° 45'	-4° 36'	99.36	343
5.	400	60° 10'	-2° 35'	99.80	399
6.	450	71° 06'	- 2° 24'	99.82	449 END

FEB 9th
DICKINSON
POLOK



STADIA TRAVERSE LOCATING

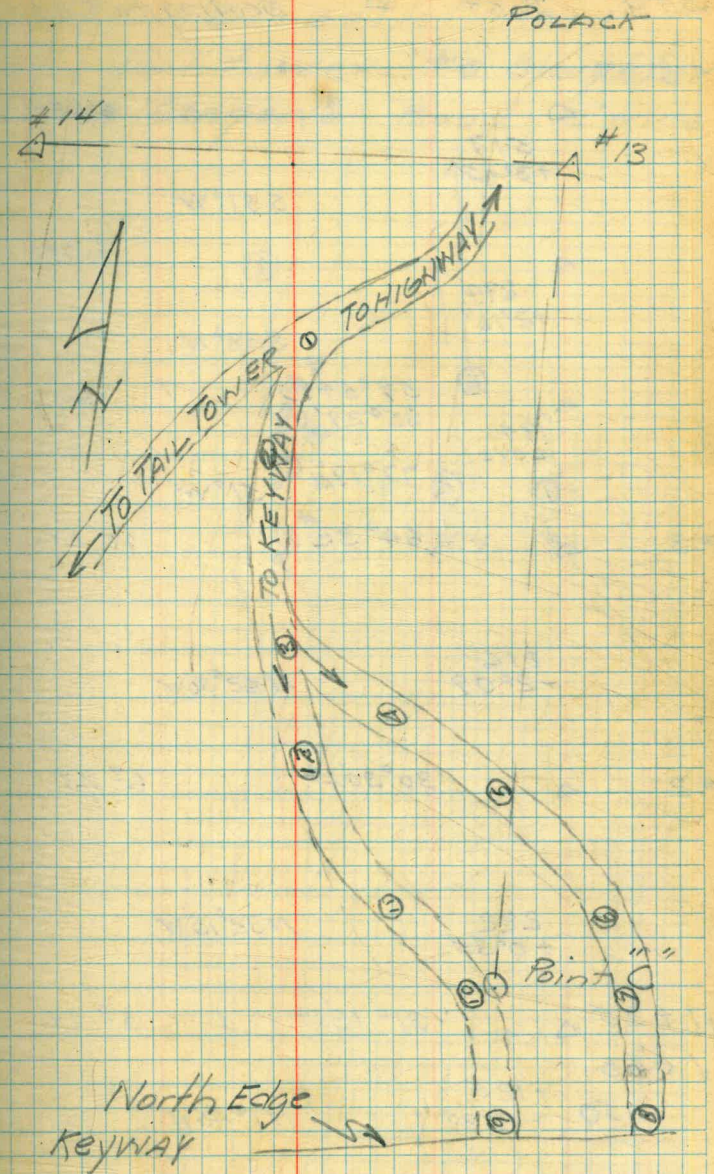
SPUR ROADS - WEST SLOPE

Sta.	Stad Dist	Az.	Vert ∠	Hor. Corr.	Corr'd Hor. D
℄ △ #13	BACKSIGHT ON △ #14				
Point C	840'	294° 50'	0°		
℄ @ "C"					
1	245	282° 12'	+ 5° 50'	98.97	242
2.	220	268° 40'	+ 5° 45'	99.00	217
3.	190	259° 12'	+ 5° 37'	99.05	188 JUNCTION
4.	123	250° 50'	5° 40'	99.59	122
5.	64	258° 20'			
6.	30	325° 30'	- 10° 55'	96.43	29
7.	33	64°	- 16° 18'	92.12	30
8.	85	101° 10'	- 12° 35'	95.26	81 End
9.	70	121° 35'	- 15° 55'	92.78	65 End
10.	5	185°			
11.	42	240°			
12.	134	241° 20'	+ 5° 45'	99.00	131

FEB 9th (23)

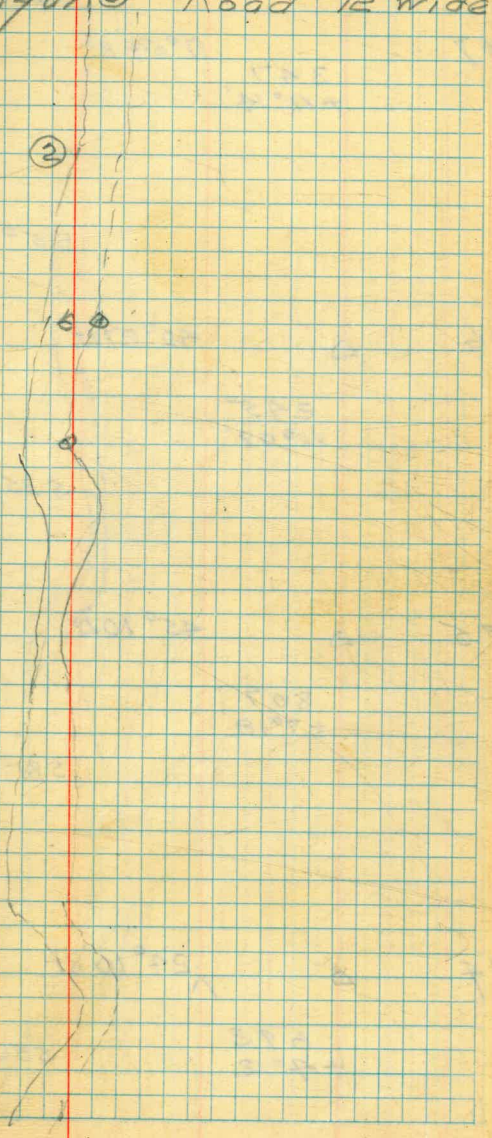
DICKINSON

POLACK



Location of outlet Road from Tail tower to Slaughter house Canyon ③ Road 12' wide

Sta.	Stadia Dist	Def. △	Mag Bearing	offset to ℄ Rd
				6.0 Rt
	517 +3°45'		S 51° W	
				6.0 Rt
	294 +2°16'		S 38° W	
	③	59°54' ④		℄
	194. Level	65°29'½ ③		
	①	② 77°19½'	② S 51° W	
#3		64° 32' ①		10 Lt
	216 +2°09'		N 62°30' W	
#2		30°30' Lt		6° Lt
	222 +0°35'		N 32°15' W	
#1	1+25	31° 13' Lt		5° Lt
	1+00			
	+50	125 -4°05'	N 1°45' W	
	0+00 = 13+42 41	53° 51' Lt		11° Lt
	14+70 38	Points on old road to		tail tower (See this Book - page 9)



April 1, 1943
Weather clear

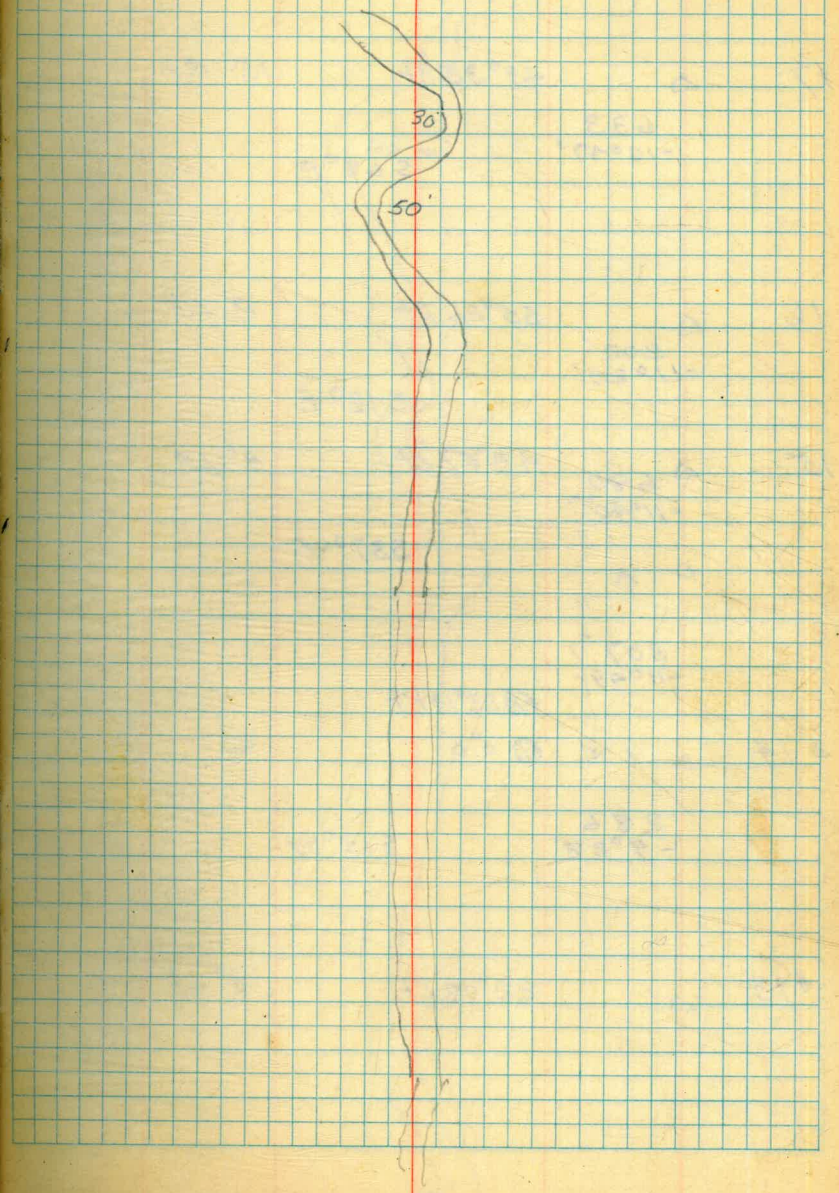
Bock 24
Polak

stq	Stadia Dist	Def ∠	Mag. Bearing	offset to E Road
	198 +11°13'		S12°W	
#7	347 +11°14'	17°54' Rt	S5° E	7± Rt
#6	245 11°09'	40°27' Lt	S35°30'W	6± Lt
#5	807 +7°18'	45°10' Lt	S81°00'W	7± Lt
#4	693 +4°12	24°10' Rt	S56°30'W	7± Rt

April 1, 1943 — Bock Polak — 26

Weather: Clear

Sta	Stadia Dist	Def ∠	Mag Bearing	offset to ℄ Road
	1040 −8°22′			
			S 36°30′W	
#12		92°43′Lt		20′ Lt
	558 Level		N51°30′W	
#11	209 +4°23′	50°47′Rt		10′ Rt
			S 78°30′W	
#10		3°25′Lt		℄
	485 +10°14′		S81°W	
#9		20°36′Rt		5′ Rt
	81 +90°51′		S61°W	
#8		48°07′Rt		7′ Rt



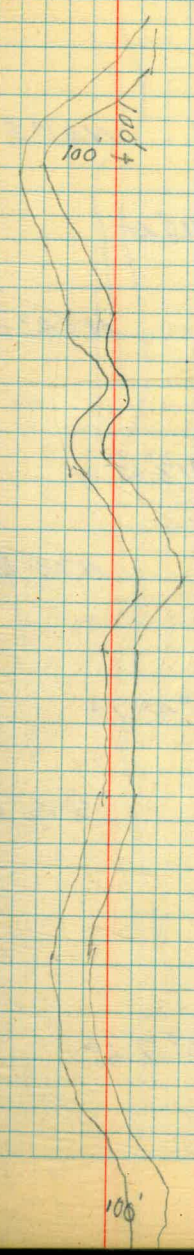
Sta	Stadia Dist	Def △	Mag Bearing	offset to ℄ Road
	548 -6°06'		S18° E	
17	△	49°35' Rt.		15' Rt
	633 -10°47'		S 68° E	
16	△	55°26' Lt		8' Lt
	202' -11°20'		S 12° E	
15	△ 680 -11°40' ↑	48°57' Lt.		8' Lt
	△ ↑		S37° W	
	307' -11°49'			
		② 22°14' Rt		
#14	△ ↓	① 0°0'		℄
	286 -9°38'		S15° W	
#13	△	22°08' Lt		8° Lt

April 1, 1943

Weather Clear

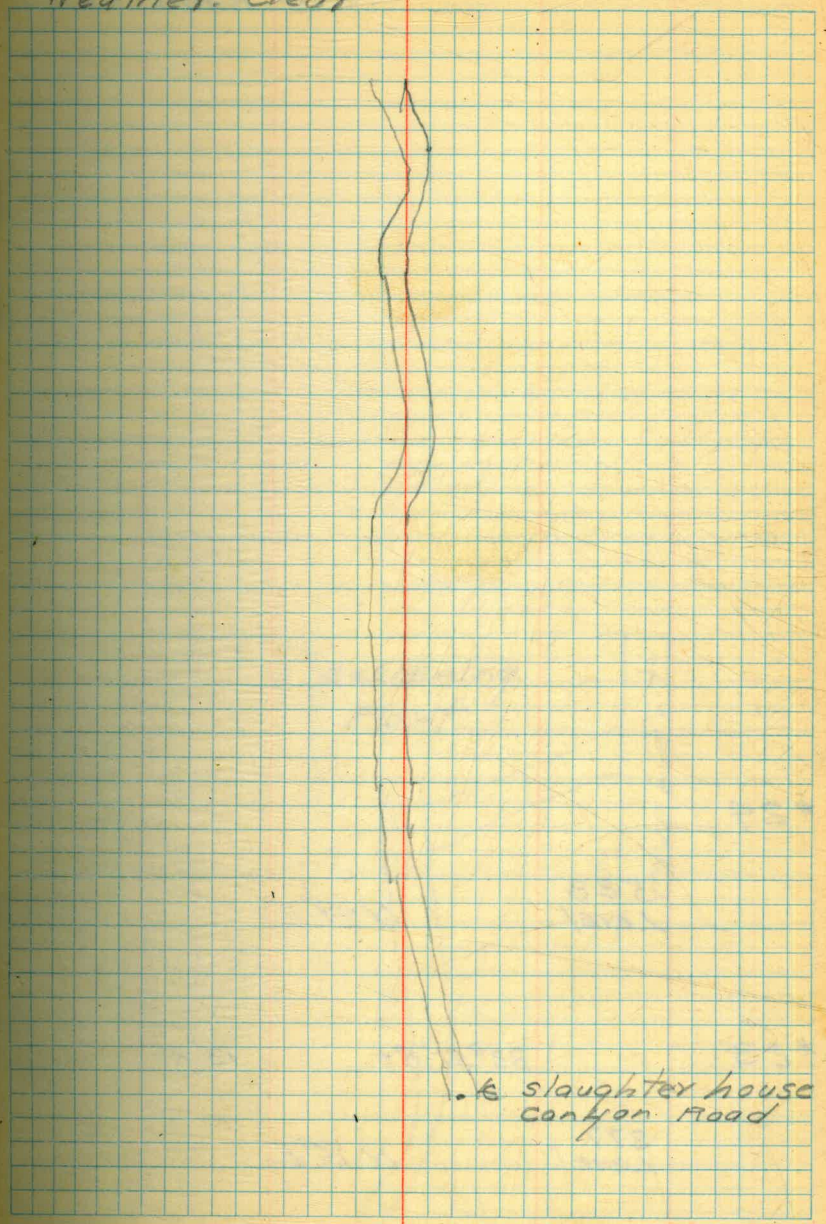
Bock
Polak

27



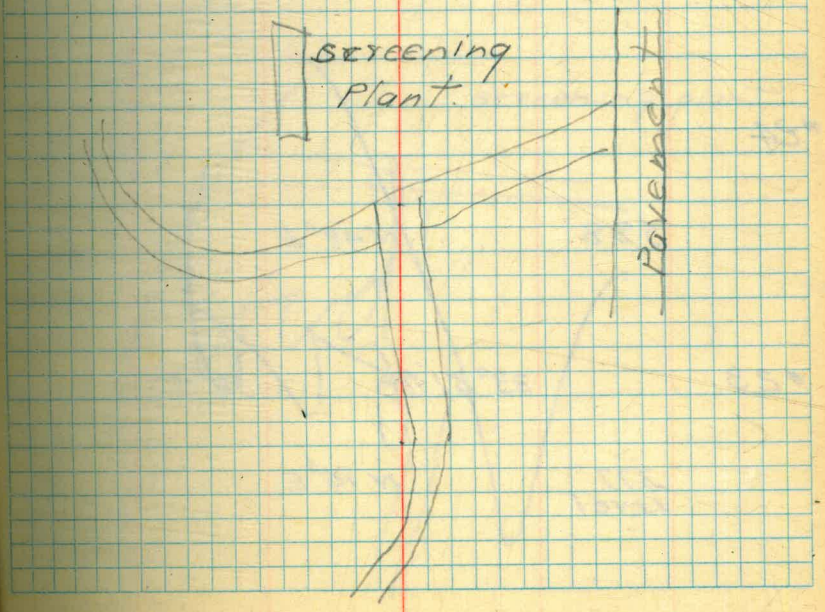
April 1, 1943
Weather: Clear

Stg	Stadia Dist.	Def ∠	Mag Bearing	offset to ℄ of road
#22		25°44'Lt		12' Lt
	582 Level			℄
			N41°E	
#21	604' Level	13°10'Lt		12' Lt
			N54°E	
#20	875' Level	18°18'Lt		12' Lt
			N73°E	
#19	1300' Level	38°49'Lt		12' Lt.
			S68°E	
#18	△	50°17'Lt		30' Rt

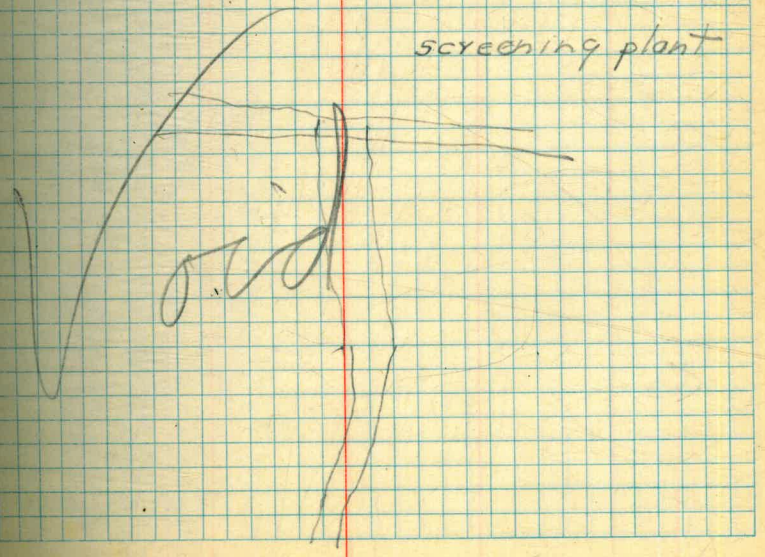


April 1, 1943
Weather Clear

Sta	Stadia Dist	Def ∠	Mag Bear	offset to ℄ Road
#24				
	3.88 Level		N 49° E	
#23		33°51' Rt		12' Rt
	3.77 Level		N 15° E	



Sta	Stadia Dist	Def ∠	Mag Bearing	offset to ℄ of road
#24				
	588		N 49° E	
#23		33° 51' Rt		10' Rt
	377' Level		N 15° E	

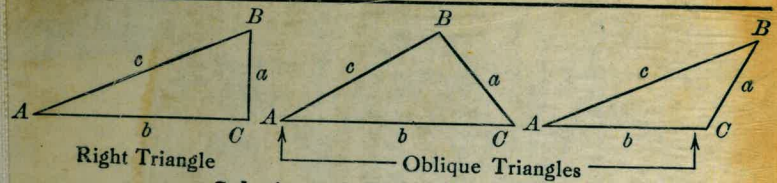


Natural Trigonometrical Functions

Angle.	Sin.	Tan.	Sec.	Cosec.	Cotg.	Cosin.	
° ′							° ′
32	.5299	.6249	1.1792	1.887	1.600	.84805	58
10	.5324	.6289	1.1813	1.878	1.590	.84650	50
20	.5348	.6330	1.1835	1.870	1.580	.84495	40
30	.5373	.6371	1.1857	1.861	1.570	.84339	30
40	.5398	.6412	1.1879	1.853	1.560	.84182	20
50	.5422	.6453	1.1901	1.844	1.550	.84025	10
33	.5446	.6494	1.1924	1.836	1.540	.83867	57
10	.5471	.6536	1.1946	1.828	1.530	.83708	50
20	.5495	.6577	1.1969	1.820	1.520	.83549	40
30	.5519	.6619	1.1992	1.812	1.511	.83389	30
40	.5544	.6661	1.2015	1.804	1.501	.83228	20
50	.5568	.6703	1.2039	1.796	1.492	.83066	10
34	.5592	.6745	1.2062	1.788	1.483	.82904	56
10	.5616	.6787	1.2086	1.781	1.473	.82741	50
20	.5640	.6830	1.2110	1.773	1.464	.82577	40
30	.5664	.6873	1.2134	1.766	1.455	.82413	30
40	.5688	.6916	1.2158	1.758	1.446	.82248	20
50	.5712	.6959	1.2183	1.751	1.437	.82082	10
35	.5736	.7002	1.2208	1.743	1.428	.81915	55
10	.5760	.7046	1.2233	1.736	1.419	.81748	50
20	.5783	.7089	1.2258	1.729	1.411	.81580	40
30	.5807	.7133	1.2283	1.722	1.402	.81412	30
40	.5831	.7177	1.2309	1.715	1.393	.81242	20
50	.5854	.7221	1.2335	1.708	1.385	.81072	10
36	.5878	.7265	1.2361	1.701	1.376	.80902	54
10	.5901	.7310	1.2387	1.695	1.368	.80730	50
20	.5925	.7355	1.2413	1.688	1.360	.80558	40
30	.5948	.7400	1.2440	1.681	1.351	.80386	30
40	.5972	.7445	1.2466	1.675	1.343	.80212	20
50	.5995	.7490	1.2494	1.668	1.335	.80038	10
37	.6018	.7536	1.2521	1.662	1.327	.79864	53
10	.6041	.7581	1.2549	1.655	1.319	.79688	50
20	.6065	.7627	1.2577	1.649	1.311	.79512	40
30	.6088	.7673	1.2605	1.643	1.303	.79335	30
40	.6111	.7720	1.2633	1.636	1.295	.79158	20
50	.6134	.7766	1.2661	1.630	1.288	.78980	10
38	.6157	.7813	1.2690	1.624	1.280	.78801	52
10	.6180	.7860	1.2719	1.618	1.272	.78622	50
20	.6202	.7907	1.2748	1.612	1.265	.78442	40
30	.6225	.7954	1.2778	1.606	1.257	.78261	30
40	.6248	.8002	1.2808	1.601	1.250	.78079	20
50	.6271	.8050	1.2838	1.595	1.242	.77897	10
	Cosin.	Cotg.	Cosec.	Sec.	Tan.	Sin.	Angle

Angle.	Sin.	Tan.	Sec.	Cosec.	Cotg.	Cosin.	
° ′							°
39	.6293	.8098	1.2868	1.589	1.235	.77715	51
10	.6316	.8146	1.2898	1.583	1.228	.77531	50
20	.6338	.8195	1.2929	1.578	1.220	.77347	40
30	.6361	.8243	1.2959	1.572	1.213	.77162	30
40	.6383	.8292	1.2991	1.567	1.206	.76977	20
50	.6406	.8342	1.3022	1.561	1.199	.76791	10
40	.6428	.8391	1.3054	1.556	1.192	.76604	50
10	.6450	.8441	1.3086	1.550	1.185	.76417	50
20	.6472	.8491	1.3118	1.545	1.178	.76229	40
30	.6494	.8541	1.3151	1.540	1.171	.76041	30
40	.6517	.8591	1.3184	1.535	1.164	.75851	20
50	.6539	.8642	1.3217	1.529	1.157	.75661	10
41	.6561	.8693	1.3251	1.524	1.150	.75471	49
10	.6583	.8744	1.3284	1.519	1.144	.75280	50
20	.6604	.8796	1.3318	1.514	1.137	.75088	40
30	.6626	.8847	1.3352	1.509	1.130	.74896	30
40	.6648	.8899	1.3386	1.504	1.124	.74703	20
50	.6670	.8952	1.3421	1.499	1.117	.74509	10
42	.6691	.9004	1.3456	1.494	1.111	.74314	48
10	.6713	.9057	1.3492	1.490	1.104	.74120	50
20	.6734	.9110	1.3527	1.485	1.098	.73924	40
30	.6756	.9163	1.3563	1.480	1.091	.73728	30
40	.6777	.9217	1.3600	1.476	1.085	.73531	20
50	.6799	.9271	1.3636	1.471	1.079	.73333	10
43	.6820	.9325	1.3673	1.466	1.072	.73135	47
10	.6841	.9380	1.3711	1.462	1.066	.72937	50
20	.6862	.9435	1.3748	1.457	1.060	.72737	40
30	.6884	.9490	1.3786	1.453	1.054	.72537	30
40	.6905	.9545	1.3824	1.448	1.048	.72337	20
50	.6926	.9601	1.3863	1.444	1.042	.72136	10
44	.6947	.9657	1.3902	1.440	1.036	.71934	46
10	.6967	.9713	1.3941	1.435	1.030	.71732	50
20	.6988	.9770	1.3980	1.431	1.024	.71529	40
30	.7009	.9827	1.4020	1.427	1.018	.71325	30
40	.7030	.9884	1.4061	1.422	1.012	.71121	20
50	.7050	.9942	1.4101	1.418	1.006	.70916	10
	.7071	1.	1.414	1.414	1.	.70711	45
	Cosin.	Cotg.	Cosec.	Sec.	Tan.	Sin.	Angle

TRIGONOMETRIC FORMULÆ



Right Triangle — Oblique Triangles

Solution of Right Triangles

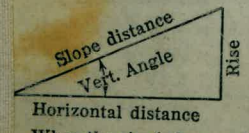
For Angle A. $\sin = \frac{a}{c}$, $\cos = \frac{b}{c}$, $\tan = \frac{a}{b}$, $\cot = \frac{b}{a}$, $\sec = \frac{c}{b}$, $\operatorname{cosec} = \frac{c}{a}$

Given	Required	
a, b	A, B, c	$\tan A = \frac{a}{b} = \cot B, c = \sqrt{a^2 + b^2} = a\sqrt{1 + \frac{b^2}{a^2}}$
a, c	A, B, b	$\sin A = \frac{a}{c} = \cos B, b = \sqrt{(c+a)(c-a)} = c\sqrt{1 - \frac{a^2}{c^2}}$
A, a	B, b, c	$B = 90° - A, b = a \cot A, c = \frac{a}{\sin A}$
A, b	B, a, c	$B = 90° - A, a = b \tan A, c = \frac{b}{\cos A}$
A, c	B, a, b	$B = 90° - A, a = c \sin A, b = c \cos A,$

Solution of Oblique Triangles

Given	Required	
A, B, a	b, c, C	$b = \frac{a \sin B}{\sin A}, C = 180° - (A + B), c = \frac{a \sin C}{\sin A}$
A, a, b	B, c, C	$\sin B = \frac{b \sin A}{a}, C = 180° - (A + B), c = \frac{a \sin C}{\sin A}$
a, b, C	A, B, c	$A + B = 180° - C, \tan \frac{1}{2}(A - B) = \frac{(a-b)\tan \frac{1}{2}(A+B)}{a+b}, c = \frac{a \sin C}{\sin A}$
a, b, c	A, B, C	$s = \frac{a+b+c}{2}, \sin \frac{1}{2}A = \sqrt{\frac{(s-b)(s-c)}{bc}}, \sin \frac{1}{2}B = \sqrt{\frac{(s-a)(s-c)}{ac}}, C = 180° - (A+B)$
a, b, c	Area	$s = \frac{a+b+c}{2}$, area $= \sqrt{s(s-a)(s-b)(s-c)}$
A, b, c	Area	area $= \frac{bc \sin A}{2}$
A, B, C, a	Area	area $= \frac{a^2 \sin B \sin C}{2 \sin A}$

REDUCTION TO HORIZONTAL



Horizontal distance = Slope distance multiplied by the cosine of the vertical angle. Thus: slope distance = 319.4 ft. Vert. angle = 5° 10′. From Table, Page IX. cos 5° 10′ = .9959. Horizontal distance = 319.4 × .9959 = 318.09 ft. Horizontal distance also = Slope distance minus slope distance times (1 — cosine of vertical angle). With the same figures as in the preceding example, the following result is obtained. Cosine 5° 10′ = .9959. 1 — .9959 = .0041. 319.4 × .0041 = 1.31. 319.4 — 1.31 = 318.09 ft.

When the rise is known, the horizontal distance is approximately: — the slope distance less the square of the rise divided by twice the slope distance. Thus: rise = 14 ft., slope distance = 302.6 ft. Horizontal distance $= 302.6 - \frac{14 \times 14}{2 \times 302.6} = 302.6 - 0.32 = 302.28$ ft.

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