

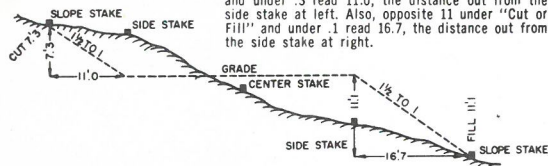
K-2
LEVEL BOOK

82-0640

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	Distance out from Side or Shoulder Stake										Cut or Fill
	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
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



The paper in this book is made of 50% high grade rag stock with a WATER RESISTING surface sizing.

KEUFFEL & ESSER CO.

Fla. Dept Nat. Res.

R153 ESCM 1973

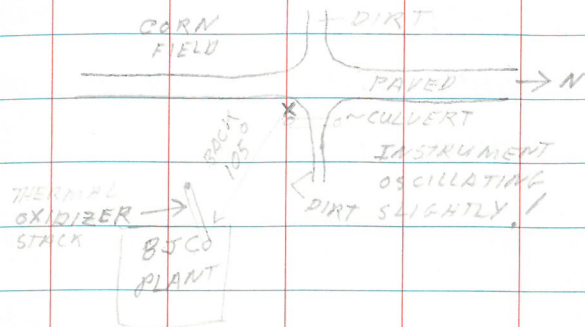
PONTIGO/NEEL

7/9/81

BM	Read	time	I. H.	elev.	data
23-2	11434	07:46	17.5 ¹¹	165	
	11434	07:47		$\frac{-1'}{164}$	✓
	11435	07:49			
	11445	08:53	17.5 ¹¹		
	11441	08:56	OSCILLATING		
	11440	08:57			
	11440	08:58			✓
	11457	10:02			
	11455	10:04			
	11455	10:05			✓

DESC. / COMMENTS

23-2 T4 N R29W



BM	read	TIME	IN	ELEV	DATA
TF-21C	11573	08:00	—	181	
	11571	08:01			
	11571	08:03			↓
10-2	11858	08:11	—	133	
	11858	08:12			↓
	11857	08:13			
10-4	11427	08:22	17"	175	
	11423	08:23			
	11422	08:24			
	11422	08:25			↓
11-3	11850	08:33	18"	124	
	11848	08:34			↓
	11847	08:35			
P-583	11960	08:44	18"		
	11963	08:45			11962✓
	11961	08:46			

DESCRIPTION/COMMENTS

7-9-81

2-3 T4N R29W

TF-21C 1948 RESET 1963 ELEV. 181

10-2 T4N R29W

→ N

READING TAKEN ON
ROAD W/O TRI-POD

DIRT Rd To WELL

10-4 T4N R29W

LOCKED GATE
→ E

11-3 T4N R29W

N ←

DIRT
LAKE

14-2 T4N R

→ N

~25' - 310° of X-TREE

OSCILLATING!

BM	READ	TIME	IN	ELEV	DATA
P-678	11049	09:18	19"		
	11046	09:19			
	11048	09:20			↓
24-3	11056	09:26	15'	207	
	11054	09:27		-0.5	
	11054	09:28		206.5	↓

7-9-81

DESCRIPTION/COMMENTS

23-E THNR 28W OSCILLATING

23-4 ~20' - 300°

24-3 THNR 28W

E ← PAVED

BM	READ	TIME	IN	ELEV	DATA
P-636	12116	09:47	17.1		
	12114	09:48			
	12112	09:49			
	12111	09:50			
	12112	09:52			✓
	12129	11:08			
	12126	11:09			
	12128	11:10			✓
	12150	12:19			
	12150	12:20			
	12150	12:21			

7-9-81

19-2 T4N R28W



~20' ^{80CM} 270° OY-TREE

BM	READ	TIME	IH	ELEV	DATE		
TT22C	11854	10:15	—	164			7-9-81
	11849	10:16				DESCRIPTION/COMMENTS	
	11848	10:17				11565 TT 22C 1940	ELEV
	11849	10:18			✓	T N R W	
P 581	11530	10:28	18"	10		sec. 123 T4N R29W	
	11529	10:30				W1W	BACK 220' - 300' OF X-TREE
	11530	10:32			✓		
18-2	11426	10:41	18"	197		sec 18-2 T4N R28W	
	11425	10:42				Rd INTERSECTION	down HILL → N
	11425	10:43			✓		DIRT
P-523	11823	10:54	18"	7		sec 13-3 T4N R29W	
	11823	10:55					BACK 25-30' - 225' OF X-TREE
	11823	10:56			✓		
30-2	11822	11:18	19"	122'		T4N R29W	
	11821	11:19		-10"	✓		
	11820	11:21					

BM	READ	TIME	IN	ELEV	DATA
P-578	12109	11:31	17 ¹ / ₂ "		
	12108	11:32			
	12109	11:33			✓
SRD	12219	11:42	—	81	
				-3	
UNMARKED	12216	11:43			
	12218	11:44			✓
J84	11846	12:00	12 ¹ / ₂ "	118	
	11843	12:01			
	11844	12:03			✓

7-9-81

DESCRIPTION/COMMENTS

19-4 T 4 N R 28 W



BACK
~15' - 255° of X-TREE

20-3 T 4 N R 28 W

ON EAST END-NORTH SIDE OF COLDWATER CK.

BRIDGE - ON RD OF RAIL.

33-1 T 4 N R 28 W

USCG J84

NOTE NEW BASE →

BM	READ	TIME	TH	ELEV	DATE
J-84	11846	12:00	12 $\frac{1}{2}$ "	118	
	11843	12:01			
	11844	12:03			✓
	11877	12:58			
	11874	12:59			
	11873	13:00			
	11870	13:01			✓
	11869	13:02			
	11871	13:03			
	11897	14:20			
	11893	14:22			
	11889	14:23			
	11889	14:24			✓
	11889	14:25			
	11912	15:36			
	11910	15:37			
	11911	15:38			✓

cancel hour
begin
at 87

7-9-81

DESCRIPTION / COMMENTS

33-1 TAN R28W

USCG J84

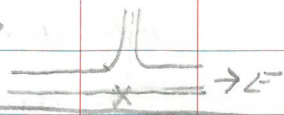
B.M.	READ	TIME	IN	LEV	DATE
29-1	11916	12:34	18"	125	
	11916	12:37			✓
	11915	12:39			
28-2	11551	12:47	19"	176	
	11550	12:48		-1'	
	11550	12:49		175'	✓
26-1	12206	13:23	17"	208	
	12205	13:24			
	12205	13:25			✓
35-2	11794	13:35	17"	245	
	11795	13:36			
	11794	13:37			✓
10-2	11924	13:50	17"	173	
	11921	13:51		+1'	
	11921	13:52		174	✓
9-3	11550	14:06	17"	212	
	11550	14:07		+0.5'	
	11552	14:08		212.5'	✓

7-9-81

DESCRIPTION/COMMENTS

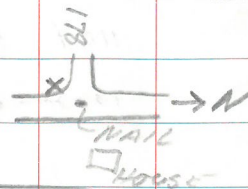
29-1 T4N R28W

SWITCH IS BAD!



28-2 T4N R28W

HIWAY 87



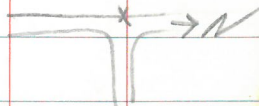
26-1 T5N R28W

N ←

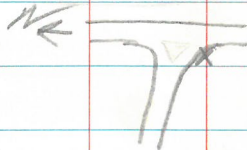


IS MAY BE 1' LOWER

35-2 T5N R28W

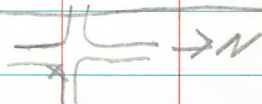


10-2 T4N R28W



10-3?

9-2 T4N R28W

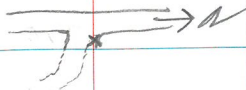


BM	READ	TIME	IN	ELEV	DATA
34-4	1191X	14:38	17 1/2"	119	
	11910	14:40		+10"	
	11906	14:41		718'	
	11904	14:42			
	<u>11904</u>	<u>14:44</u>			↓

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DESCRIPTION / COMMENTS

34-4 T4NR28W



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BM	READ	TIME	IN	ELEV	DATA
TT30C	10762	15:12	1	157	

DESCRIPTION/COMMENTS

17-3 T3N R28W

TT 30C 1940

ALLENTOWN ELEM SCHOOL

10760 15:16

10759 15:18

10773 16:11

10770 16:12

10769 16:13

10768 16:14

10768 17:15

10764 17:16

10763 17:17

10761 17:18

10761 17:19

BM READ TIME IN ELEV DATA

9-2 11094 15:48 19" 178

11092 15:49 ✓

11091 15:51

7-4 10928 15:59 17" 185

10933 16:00 +1.5

10932 16:01

10929 16:02

10929 16:03 ✓

30-3 11171 16:34 17 1/2" 198

11170 16:35 +4"

11167 16:36

11166 16:37 ✓

11165 16:38

11-4 10535 17:00 18" 215

10535 17:02 ✓

10536 17:03

7-9-81

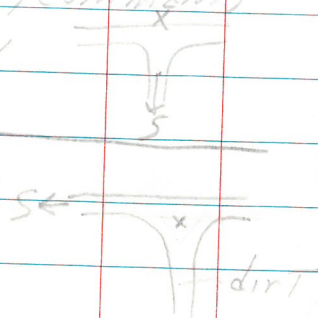
DESCRIPTION/COMMENTS

9-2 T3N R28W

7-4 T3N R28W

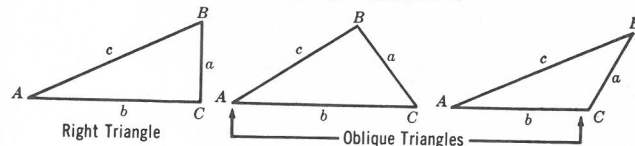
30-3 T4N R28W

11-4 T3N R29W



4

SOLUTION OF TRIANGLES



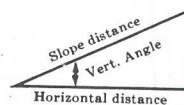
Solution of Right Triangles

For Angle A, $\sin = \frac{a}{c}$, $\cos = \frac{b}{c}$, $\tan = \frac{a}{b}$, $\cot = \frac{b}{a}$, $\sec = \frac{c}{b}$, $\csc = \frac{c}{a}$	
Given a, b	Required 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 $B = 90^\circ - A$, $b = a \cot A$, $c = \frac{a}{\sin A}$
A, b	B, a, c $B = 90^\circ - A$, $a = b \tan A$, $c = \frac{b}{\cos A}$
A, c	B, a, b $B = 90^\circ - A$, $a = c \sin A$, $b = c \cos A$

Solution of Oblique Triangles

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

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 X, $\cos 5^\circ 10'=.9959$. Horizontal distance=319.4 $\times$.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 $5^\circ 10'=.9959$, $1-.9959=.0041$, $319.4 \times .0041=1.31$, $319.4-1.31=318.09$ 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.

