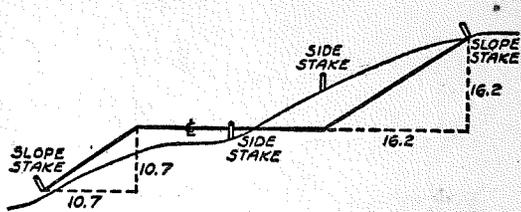


13

13

HARGO
FIELD BOOK



DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING
SLOPE 1 TO 1. ROADWAY OF ANY WIDTH

	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
0	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	0
1	1.00	1.10	1.20	1.30	1.40	1.50	1.60	1.70	1.80	1.90	1
2	2.00	2.10	2.20	2.30	2.40	2.50	2.60	2.70	2.80	2.90	2
3	3.00	3.10	3.20	3.30	3.40	3.50	3.60	3.70	3.80	3.90	3
4	4.00	4.10	4.20	4.30	4.40	4.50	4.60	4.70	4.80	4.90	4
5	5.00	5.10	5.20	5.30	5.40	5.50	5.60	5.70	5.80	5.90	5
6	6.00	6.10	6.20	6.30	6.40	6.50	6.60	6.70	6.80	6.90	6
7	7.00	7.10	7.20	7.30	7.40	7.50	7.60	7.70	7.80	7.90	7
8	8.00	8.10	8.20	8.30	8.40	8.50	8.60	8.70	8.80	8.90	8
9	9.00	9.10	9.20	9.30	9.40	9.50	9.60	9.70	9.80	9.90	9
10	10.00	10.10	10.20	10.30	10.40	10.50	10.60	10.70	10.80	10.90	10
11	11.00	11.10	11.20	11.30	11.40	11.50	11.60	11.70	11.80	11.90	11
12	12.00	12.10	12.20	12.30	12.40	12.50	12.60	12.70	12.80	12.90	12
13	13.00	13.10	13.20	13.30	13.40	13.50	13.60	13.70	13.80	13.90	13
14	14.00	14.10	14.20	14.30	14.40	14.50	14.60	14.70	14.80	14.90	14
15	15.00	15.10	15.20	15.30	15.40	15.50	15.60	15.70	15.80	15.90	15
16	16.00	16.10	16.20	16.30	16.40	16.50	16.60	16.70	16.80	16.90	16
17	17.00	17.10	17.20	17.30	17.40	17.50	17.60	17.70	17.80	17.90	17
18	18.00	18.10	18.20	18.30	18.40	18.50	18.60	18.70	18.80	18.90	18
19	19.00	19.10	19.20	19.30	19.40	19.50	19.60	19.70	19.80	19.90	19
20	20.00	20.10	20.20	20.30	20.40	20.50	20.60	20.70	20.80	20.90	20
21	21.00	21.10	21.20	21.30	21.40	21.50	21.60	21.70	21.80	21.90	21
22	22.00	22.10	22.20	22.30	22.40	22.50	22.60	22.70	22.80	22.90	22
23	23.00	23.10	23.20	23.30	23.40	23.50	23.60	23.70	23.80	23.90	23
24	24.00	24.10	24.20	24.30	24.40	24.50	24.60	24.70	24.80	24.90	24
25	25.00	25.10	25.20	25.30	25.40	25.50	25.60	25.70	25.80	25.90	25
26	26.00	26.10	26.20	26.30	26.40	26.50	26.60	26.70	26.80	26.90	26
27	27.00	27.10	27.20	27.30	27.40	27.50	27.60	27.70	27.80	27.90	27
28	28.00	28.10	28.20	28.30	28.40	28.50	28.60	28.70	28.80	28.90	28
29	29.00	29.10	29.20	29.30	29.40	29.50	29.60	29.70	29.80	29.90	29
30	30.00	30.10	30.20	30.30	30.40	30.50	30.60	30.70	30.80	30.90	30
31	31.00	31.10	31.20	31.30	31.40	31.50	31.60	31.70	31.80	31.90	31
32	32.00	32.10	32.20	32.30	32.40	32.50	32.60	32.70	32.80	32.90	32
33	33.00	33.10	33.20	33.30	33.40	33.50	33.60	33.70	33.80	33.90	33
34	34.00	34.10	34.20	34.30	34.40	34.50	34.60	34.70	34.80	34.90	34
35	35.00	35.10	35.20	35.30	35.40	35.50	35.60	35.70	35.80	35.90	35
36	36.00	36.10	36.20	36.30	36.40	36.50	36.60	36.70	36.80	36.90	36
37	37.00	37.10	37.20	37.30	37.40	37.50	37.60	37.70	37.80	37.90	37
38	38.00	38.10	38.20	38.30	38.40	38.50	38.60	38.70	38.80	38.90	38
39	39.00	39.10	39.20	39.30	39.40	39.50	39.60	39.70	39.80	39.90	39
40	40.00	40.10	40.20	40.30	40.40	40.50	40.60	40.70	40.80	40.90	40
41	41.00	41.10	41.20	41.30	41.40	41.50	41.60	41.70	41.80	41.90	41
42	42.00	42.10	42.20	42.30	42.40	42.50	42.60	42.70	42.80	42.90	42
43	43.00	43.10	43.20	43.30	43.40	43.50	43.60	43.70	43.80	43.90	43
44	44.00	44.10	44.20	44.30	44.40	44.50	44.60	44.70	44.80	44.90	44
45	45.00	45.10	45.20	45.30	45.40	45.50	45.60	45.70	45.80	45.90	45
46	46.00	46.10	46.20	46.30	46.40	46.50	46.60	46.70	46.80	46.90	46
47	47.00	47.10	47.20	47.30	47.40	47.50	47.60	47.70	47.80	47.90	47
48	48.00	48.10	48.20	48.30	48.40	48.50	48.60	48.70	48.80	48.90	48
49	49.00	49.10	49.20	49.30	49.40	49.50	49.60	49.70	49.80	49.90	49
50	50.00	50.10	50.20	50.30	50.40	50.50	50.60	50.70	50.80	50.90	50

Distance of slope stake from side or shoulder stake for any width roadway, slope 1 to 1. If ground is nearly level, the cut or fill at side stake is located by the double entry method in left column and top row. The number in body of table in same row and column gives distance from side stake to slope stake. If ground is not level estimate the difference in elevation between the side stake and slope stake, lower target by this amount if cut, elevate if fill. Add this amount to cut or fill and find distance in table. Set up rod at this point, and line of sight should cut target. If it does not make the slight adjustment necessary.

Book 1.
Blind Lake Twp.
Wapedo Twp.



INDEX

T 139-140 N. R. 28.

West bet.	36 - 1	Page 1-2
" "	35 - 2	" 3-4
" "	34 - 3	" 5-6
" "	33 - 4	" 7-8

T 139 N. R 28 W.

" "	12 - 13	" 13-14
" "	11 - 14	" 15-16
East "	10 - 15	" 17-18
West "	9 - 16	" 19-20
" "	8 - 17	" 21-22
" "	7 - 18	" 23 24
" "	24 - 25	" 25-26

26-40. Set approx. $\frac{1}{4}$ stake. 4' look. 8/16

140-28
5/16

13+20 Found 3" Aspen squared. No evidence of original.
Set Approx. $\frac{1}{16}$ stake.

2+35 Intersection of road.

0+00 started west from $\frac{116}{121} \frac{36}{191}$ 139-28
 $\frac{116}{121}$

Oct. 26-1935

Woods - M
Schwarz -
Chupka -
Estensen -

Look for:

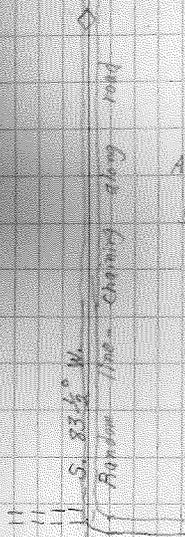
Found:

No evidence of original.

Aspen

Aspen

Saplings



S. 83 1/2° W.

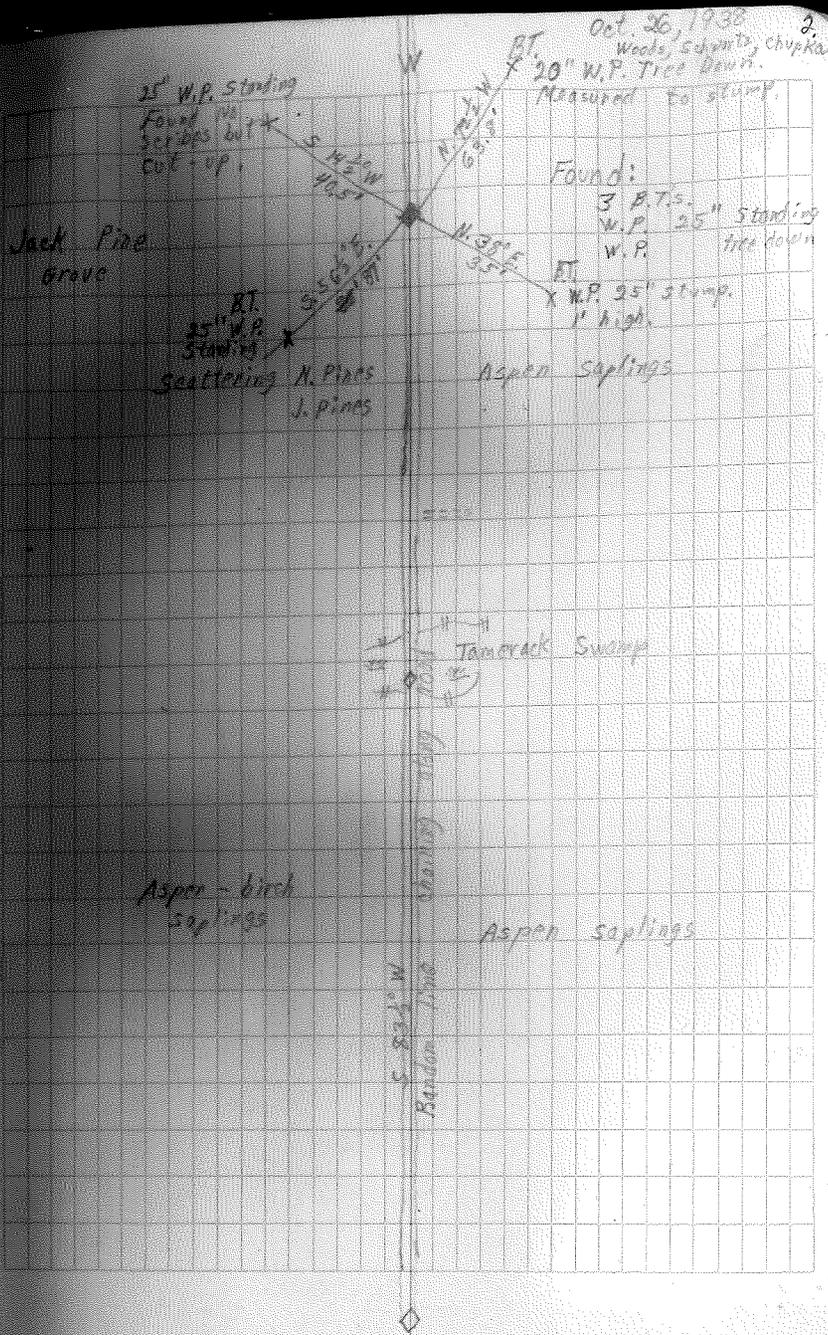
Random line - crossing along road

⊗ Iron pipe in center of road

49+50 Found ori. Sec. corner
 3 B.T.s.
 1 B.T. W.P. Standing - 25"
 1 B.T. W.P. Stump - 25"
 1 B.T. W.P. Log - 20"
 1 Tree - W.P. 25" standing - appears to be a B.T. but too rotten to locate scribbing. Is cut and staked like a B.T.
 Set compass up on compass line and at 49+50 & sighted on B.T.

39+60 Set approx. W-16

26+40 Continued west from Approx. 1/4 Sec. 28-28
 139



26+40 Set approx. $\frac{1}{4}$ offset compass line 35' N.

17+50 Entered spr. + tan swamp

13+20 Set approx. E. $\frac{1}{16}$

10+75 Side road to B. Mayer's place.

7+15 Hit creek

0+00 started west from $\frac{35}{2} \frac{36}{1}$ 139-28

Oct. 26, 1938

Howe

Pahl

Stegleak

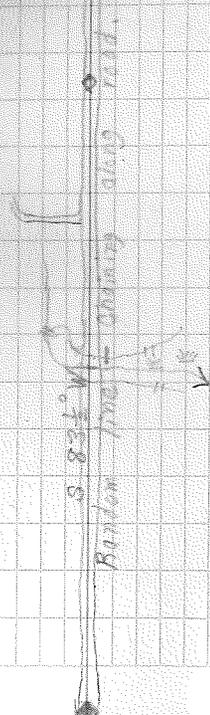
Holbert

3.

Look For:

Found:

No Evidence of Orig. U.S.



53+00 Found 2 B.T.s, & a round pest 7" in pile of
rocks but this didn't check with B.T.s.
Was too far east.

49+00 Entered Spr- Tan Swamp

46+50 Foot
Trail going South

44+45 Side road

39+00 Set spray. W. 36
37+00 Left Swamp

36+00
35+50 Swamp

27+00 Left Swamp

26+40 Continued West

Oct. 26, 1933 4

Left for:

BT. $S 16^{\circ} E$ 39.1'
N 32° E Pike rods
202'
Found: 2 B.T.s.
Tam. 6" $S 16^{\circ} E$ 39.1'
Tam. 6" $S 16^{\circ} E$ 39.1'
Pile rocks, N 32° E 39.2'

Jack Pine
Pole Timber

Jack Pine
Pole Timber

S. 83° W.

Random line

Chain along road

road

41+30 Road Junction Set Approx sec Corner
6" Tama Squared on 3 Sides

42+30 Road Junction

42+30 Drive in for Graveyard.

4290 Side road to Diamond Crest Lodge. Wabed Lake
4285 Truck Trail

40+30 ~~the~~ left Tamarack Swamp
38+60 set Approx with Stake 3" Tam

36+25 Tam Swamp Creek running North Flashed
35+45 Foot Path or to south of road

26+40 cont west from approx $\frac{34}{3}$ 139-28

Oct 27-38
Dah
Stegelyk
Newbert

6

~~Jack Pine~~
Poles

Jack Pine Poles

Jack Pine
saplings

Aspen
saplings

Aspen saplings

Aspen

26+40 set Approx $\frac{1}{4}$ Cor 3' Birch
BT. N84 $\frac{1}{2}$ °W - 87' scribed $\frac{1}{4}$ S33 BT

20+00 Type change

16+20 Type change

14+26 Road to house

13+24 Fence runs North set Approx $\frac{1}{4}$ Co
Found 1 BT

12+00 Type Change

9+90 Trails to houses N+S.

5+62 Trail running SW

3+00 ~~800~~ Type Change

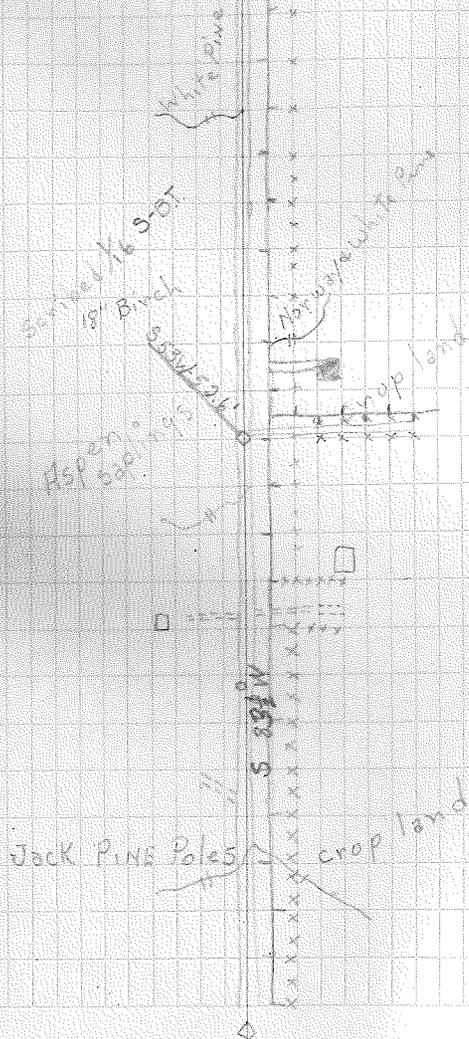
0+00 started West from \diamond $\frac{33}{4}$ $\frac{33}{3}$ 139-20

Oct. 27-38

Dah
Stegelvik
Herbert

Found

20' Norway Pine
scribed 4533 BT



53+41 Found I.P. SW B.T.S.
 52+30 Hit Meadow
 47+30 Hit Sparrow and Tam.

32/33
 5/9 139-28

42+90 Hit Swamp Willow

40+00 Tamarack
 38+60 Set App. to Corn
 38+60 Hit Mixed Hardwoods

36+60 Hit Swamp Alder

35+50 Hit Tail
 cont. W. from 3400
 34+00 Road to WS North quit for day

29+42 Road to hay field Change in type

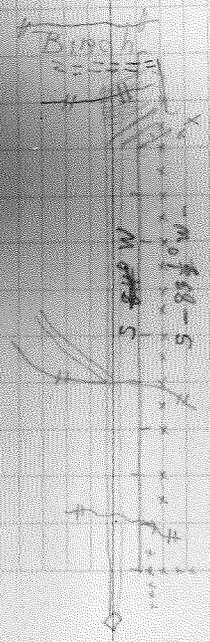
27+65 Entered Tamarack Swamp

26+79 Fence runs North

26+40 Cont West from 33 139-28

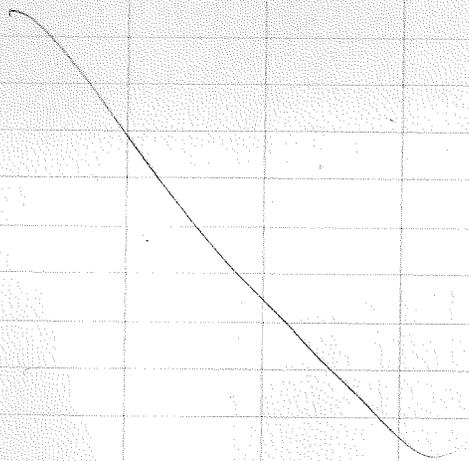
Oct. 27-38 Dec 19-38
 Meadow → mod Dahl Estensen
 Tam and Sparrow → Herbent Michaelson
 Found Gravel

wilow	↓	wilow	↓
Swamp Willow	↓	Swamp Willow	↓
↓ Tam	↓	↓ Tam	↓
↓ Mixed Hardwoods	↓	↓	↓
Swamp Alder	↓	Swamp Alder	↓



4 5 139 28

See Book
#2



3 4 138 26

9

Look for:

Tom. 20" N 26 $\frac{1}{2}$ W 45115

Spr. 8" S 31 $\frac{1}{2}$ W 10115

$\frac{1}{2}$ Mile is 40 chs.

WLP

Var. 6.3°

6/5 1972

6/5

See book
#2.

10

Look for:
Tam. 6", N15°E, 621K5
Tam 6', N43°W, 661K5.

6/5

63°

26+40 Set APP. # cor $\frac{1}{6}$ Wagon Trail

13+20 Set APP. #1 - Wagon Trail

11+50

9+00 - Change to Marsh grass

See Book #2

0+00 Started E From

$\frac{1}{6}$
 $\frac{5}{5}$

131-26

NS S.

Look for.

Linn. 7" S37E 191K.

W. Maple 5" N35W 121K.

FOUND:

Epidendrum

Seliger

RUNS NE

Aspen

Bm

Change along road

Aspen

Mixed brush

scattered
Pipe in
small clump

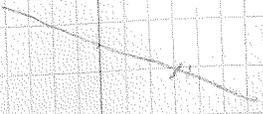
6.3°

Topo line

To 139-28

49+50 Type change to Lake Shore

look for:



40+80 Road turns NE
40+67 Settlers Road S



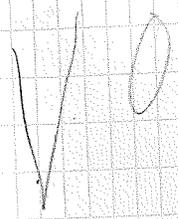
3
36+50 Settlers Road S
35+50 Type change to Basswood

see book #2

26+40 CONTINUED

mile is short - 77 chs.

77
66
462
462
5082



6.8°

26+40 Set App $\frac{1}{4}$ Corner, 2" Birch $\frac{12}{13}$ 137-25

22+80 Stream running NW-SE.

13+20 Set App $\frac{1}{16}$ Cor. 2" Aspen

1+12 Hit center of road

0+00 started west from $\frac{12}{13}$ 137-23

December 10, 1938

13

Howe
Estenson
Michaelson
Faurre

Look for:

W. Pine 7" S. 20 E 81Ks.

W. Pine 5" N. 30 W. 91Ks.

Found:

No evidence orig.

Magnetic Bearing S. 33 E 9 W
Random Line

Mixed Brush

Mixed Brush

Var. 6.2°

December 14, 1938 14

50+63 Offset 40ft. S. to I.P. Marked $\frac{1112}{1413}$ 39+60 Set App. $\frac{1}{16}$ Cor. 2" Aspen

29+67 Hit trail running W x S.

26+40 Continued West from $\frac{1}{4}$ Cor. 139-25

Look for:

W. Birch 10" N50E 51Ks.

Elm 12" N50W 81Ks.

B. Oak 6" S45E 37Ks.

B. Oak 9" S70W 28Ks.

Found:

2" Iron pipe

Howe
Estenson
Michaelson
FaurreMagnetic Bearing S. 53.8° W.
Random line

Mixed Brush

26+40 Set App. K4 Cor. $\frac{11}{14}$ 139-28

24+85 Hit Stream N.W. and S.E.

13+20 Set App. $\frac{16}{19}$ Cor. $\frac{11}{14}$
12+48 Hit mixed brush

5+25 Type change - Leather leaf

3+00 Hit Swamp Willow

0+00 Started West from $\frac{11}{12}$ $\frac{14}{13}$ 139-28

Dec. 12, 1938

15.

Look for:

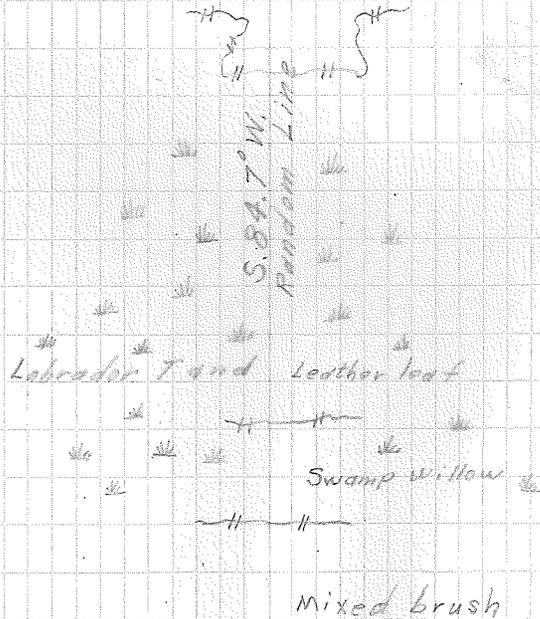
Tom. 5" S48E 90 Yds.

Spr. 7" N60E. 90 Yds.

Howe
Kouke
Estensen
Greylich
MicholisonFound: No evidence
of orig.

Mixed brush

mixed brush



Var. 53° 5'

Dec. 20-38

10/11
15/14

Found 2E 63' No. 2 in. D
offset 63' No. 139-28

~~41472~~ ~~Hit~~ ~~mixed brush~~ Void-RE

46430 Hit mixed brush

~~44100~~ ~~Hit~~ ~~to S 216 F7 to other~~ ~~Re. L.~~
~~Void RE.~~

33+90 Hit Aspen type

26+40 Continued West from $\frac{11}{14}$ 139-28

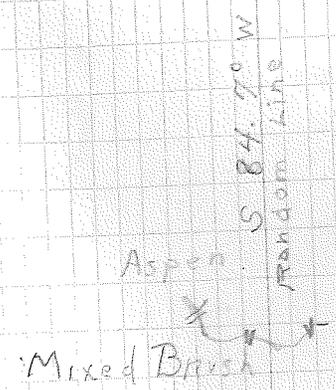
Look for:

- Aspen 10" N58°E 691ks.
- Tam. 6" N9°W 58 1ks.
- W. Pine 10" S70°E 751ks
- Tam. 9" S40°W 24 1ks.

Found: IP

Mixed Brush

White Pine
windfall
burnt & rotten
likely BT, C. as BI



Mixed Brush

26 + 40

Set APP. $\frac{10}{15}$ 139-28

22 + 28 Hit Swamp Willow and Mixed Brush

16 + 25 Hit Marsh

15 + 45 Hit old Road

10 + 20 Set App to Cor.

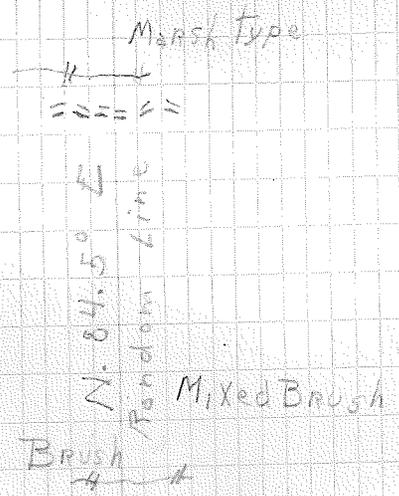
7 + 90 Hit Mixed BRUSH

1 + 85

0700 started East from $\frac{9}{10}$ 137-28
 $\frac{16}{15}$

Dec. 16, 1937
Estensen
Michaelson

Look for: ~~W~~ Found: Gravelish
T.M. 5" ~~W~~ Mixed Brush ~~W~~ ~~Nothing~~
J.K. 8" ~~W~~ 123/145 ~~W~~ No evidence of
Cedar 8" N50W 3145. cor.
Cedar 8" S45E 6145.



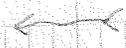
BIRCH
Mixed BRUSH

~~52+00~~ Found Sp. Copper Asp. No. 10/11 139-28
52+00 HIT STREAM 15/14

40+11 Hit Mixed Brush
09+60 set APP 46 CORN
38+80 Hit Aspen Type

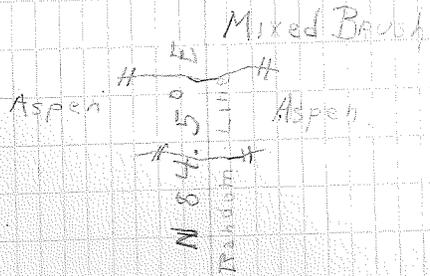
26+40 Continued East from $\frac{1}{4}$ cor. $\frac{10}{15}$ 139-28

Dec. 16 1938 18



Look for:
see page 16.

Found:
2" Iron Pipe
Also BT. see page 16.



Mixed Brush

Mixed Brush

26+40

EST. APPR. $\frac{1}{4}$ COR. AT 26+40

$\frac{9}{16}$

139-29

24+68 Road

23+00 - open marsh to mixed brush

13+20 SET APPR. $\frac{1}{16}$

0+00

Started West from

$\frac{7}{16}$
 $\frac{15}{15}$

139-28

140 R. 28

Dec. 21 1938

19

Estensen

Michadson

Foure

Gretlich

Brush mixed

Look for:

Birch 6" NW. 14K.

Aspen 6" SW. 41K.

Found:

No evidence of
COR.

OPEN
Meadow

Aspen

Random Line

Magnetic Bearing S. 88° W.

Bm

Aspen

140-67

FOUND concrete cor. 52+78
52+78

$\frac{8}{17} \frac{9}{16}$ 139-21

49+60 ~~9+50~~ - set $\frac{1}{16}$ Post

46+60 ~~11+11~~ Change of type

45+60 ~~11+11~~ Trail N. 40° E.

27+00 Marsh Type

26+40 Continued West from $\frac{9}{16}$ 139-21

140 R. 28

Date: Dec. 21, 1938 20

Estensen
Michaelson
Fourey
Grevitch

Mixed brush

Look for:

Found:

W. Birch 7" N 55 W 29 1/2 Re-estab. cor. - a

W. Birch 7" N 55 W 29 1/2 concrete post.

W. Birch 7" S 45 E 27 1/2 - Mixed brush

Aspen 8" S 60 W 33 1/2

Aspen

Marsh

Magnetic declination S 85.5° W

Aspen

Mixed brush

26+40 set App. 1/4 corner $\frac{3}{17}$ 139-28

13+20 set App. E. 1/4 corner

0+00 started west from $\frac{8}{17/16}$ 139-28

Jan 19, 1939

Olsen - ch.

Chupka - Ch.

Look for:

Aspen 9" N15W. 2016s.

" 10" S5E. 3016s.

Found:

No evidence of original corner

Aspen

Aspen poles

Aspen

Aspen Poles

S 83 1/2° W
Random line

at 6.30

54+22 0.55 set 268' N. to J.R. ^{7/8} 117 139-28
scribed M.C. with cap

41+10 entered swamp Alder

39+60 set app W 1/4 corner

Continued West from $\frac{8}{17}$ 139-28

Leak for:

Tam. 6" N50E 101K

" 4" N60W 121K

" 7" S 30 E 16 1K

" 5" S 45 W 20 1K

Dist. 5247'

Found:

B.T. - Tam. 7" SE-36'

BT. - Tam. 5" SW-16'

2" I.P. scribed

M.C.

sat. sat
H H

Aspen Poles

83 1/2° W
Random Line

H

26+40 - set app. 1/4 cor.

7
18 139-25

14+95 Entered ASPEN

12+20 set app. 1/4 cor
13+10 - 13000

11+46 Entered swampy valley

9+00 Entered aspen

0+00 Start West from

7 8
18 19 139-28

JAN - 1919 39

23

Olsen Ch.
Chuyata Ch.

Look for:

Birch 7" NW 15115,
" 6" SW 30115

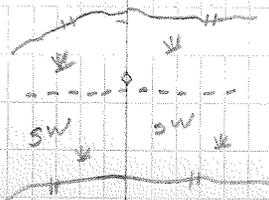
37.10 chains

2448.6 feet to 1/4

Found: No Evidence

of orig. Cor.

ASPEN ASPEN-Seedlings



W W

TAMARACK TAMARACK

58+30 - CORNER IN LAKE

$\frac{7}{18}$ 139-28

44+20 - Entered Hay LAKE

39+60 - Set App. W $\frac{1}{2}$ cor.

34+55 - Logging Road

27+50 Entered Mixed Brush

Continued West from $\frac{7}{18}$ 139-28

Look for:

Aspen 12" N 32 E, 27 lbs

Tom. 10" S 69 E, 44 lbs

Willow 6" S 35 W, 39 lbs

Tom. 11" N 50 W, 32 lbs.

24
Found: corner to
Ba IN LAKE.

HAY LAKE

77.10 chs.

4897.2'

Mixed
Brush

Mixed
Brush

40 B. 28
46.16.4⁹

Ha

26+40 Set APP $\frac{1}{4}$ Cor 3" ASP $\frac{24}{25}$ 139-28

13+26 Set APP $\frac{1}{16}$ Cor 3" ASP

8+57 OLD RR. Grade running N. & Road W.
8+15 Type change

5+91 Type change

4+62 Type change

0+00 started West from $\frac{24}{25}$ 139-28

NO B. 28

JAN. 10, 1939 25
Stegelyk K
ESTERSON AYE
ANDERSON CTR.

Look for:
Aspen 8" N 38W 1916
" 6" S 20E 1815

No EVIDENCE
DRUGS

B.M.

Ogr.

B.M.

Mgr.

X

X

Random Line

Var 6°

52+80 Set APP sec cor 3" Birch $\frac{23}{24}$
52+50 B.T. 38' N 6" ~~ASP~~ $\frac{26}{25}$ 139-28

49+40 Road to abandoned farm S.W.

39+60 Set APP W $\frac{1}{2}$ cor 8" ASP

37+50 Type change

33+30 Type change

Continued West from $\frac{24}{25}$ 139-28

28

32' 0

Jan. 10, 1939.

Steglovik T
Estensen AKC
Anderson ch.

Look for:

W. Pine 20" N68E 66/115

R. Oak 7" N51W 26/115

Aspen 8" S48E 18/115

W. Maple 4" S12W 20/115

Found:

6" Aspen in sec 10

7139 N R 28 W 526

377

Magr

S 80° W
Abandoned
Line

26+46
25+72
25+60

Fence E. in field RUN N
Type change

23
26
139-28

21+00 Type change
20+30 Fence N
19+45 Fence N

17+10 Road N into farm fence N

14+60
13+20
13+00

Fence N
58' APPLE & COR 3" BIRCH
Type change

12+45 Fence N & W along Road

9+00 Type change

8+60 Road S. to abandoned farm

6+00 Type change

3+44 Type change

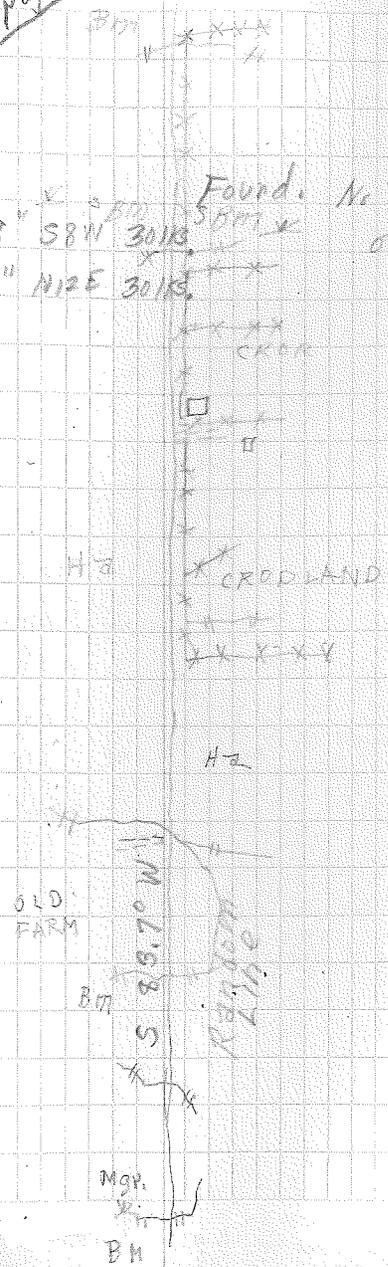
0+40
0+00

Type change
Started West from 23/24
26/25 139-28

Notice
Pages stock
field - continue
line on page 30
in this

look for:
Aspen 8" S8W 3013
" 10" N12E 3013

Found. No EVID of
ORIG. COR



at 6.30

52+80 Found No EVID. 21/22
OF ORIGIN CO. 28/27 139-28
Set APP.

48420 Type change

39460 Set APP W/L COR J' Birch

26+95 FENCE ENDS Started West from 22/23 21/22 28/27 139-28
26+40

Look for: Bm Dsr
W. Birch 7° S20W 101K. No evidence
Y. Pine 9° N15E 391K.

Bm Bm

S 83.7° W 1 F
Random line

Bm

Vol. 6.30

52+84 Found 2" I.P. with cap

~~11/22/25~~
~~20/27/26~~ 139-28
 Vol. JAN. 10, 1939
 H.M.S.

48+70 Road Curves N.

47+30 Hit Hay Field

46+00 Fence N

45+60 Road To farm

45+10 Fence N

44+60 Type change

43+60 Type change

41+90 Fence N & W

39+60 set APP W $\frac{1}{2}$ COR. 3" Birch

35+10 Type change
 35+00 Wood Road SE

34+60 Wood Road

32+95 Type change
 32+60 Wood Road S.

Continued West from $\frac{28}{79}$ 139-28

Hay Field

Look for:

B. Oak 6" N31E 40/115

" 12" N52W 37/115

Aspen 20" S12E 16/115

" 8" S45W 10/115

Mse

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

Found: 2" I.P. with cap

Scribed 22/23

24/27

H6
 H2
 S 83.5° W
 Random
 Line

Vol 6.3

26+48 Fence MSE
26+45 Set App to COR 2 ASP.
26+31 Creeks.
21
28 139-28

22+27 Road SE 50 ft bet 10's to Keegan road
22+25

13+20 Fence S. Set App to COR 2 ASP
12+27 Type

0+00 Started East from 20/21
29/28 139-28

Jan. 11, 1939 31

Stogelvik X
Anderson of
ESTABLISH APP

Look for:
W. Birch 8" N 63E 50' 1/2"
Aspen 10" S 30W 9' 1/2"
Scattered P.S. poles
No EVID. of ORIG. COR.
Scattered P.S. poles

Hand Bm Bm
Scattered P.S. poles

51237147
Random line

Bm

NEWLAND

6.30

53+05 Hit Temporary
HPICOR21/22
22/27

139-26

39+00 Set APP to cut 2' Hsp.
39+40 Fence N Type change Fence East side
38+20 Road to tarro

36+98 Fence N

34+56 Fence N

29+15 Road N to field
27+11 Type change

26+48 continued west 21/27 139N23W

32

Look for:

P. Oak 6" N31E 40 KG

B. Oak 12" N52W 37 KG

Aspen 20" S12E 16 KG

" 8" S45W 10 KG

Bm

Bm

No Evidence
of ORG. COE

Bm

P. Oak
Crown
Lohd

Bm

S. 83.70W

Bm

P. Oak

Crown
LAND

Bm

Bm

Var. 6.3"

26+40 Set APP. 1/4 Cor 3" ASP. 25
26+28 Fence N. Y. Road to Farm 29 139-28

21+70 Road SW
21+00 Fence N. Type change.

18+00 Type change

16+00 Type change

13+70 Fence N.
13+00 Set APP. with Cor 3" Bl. rod

12+37 Road to Farm

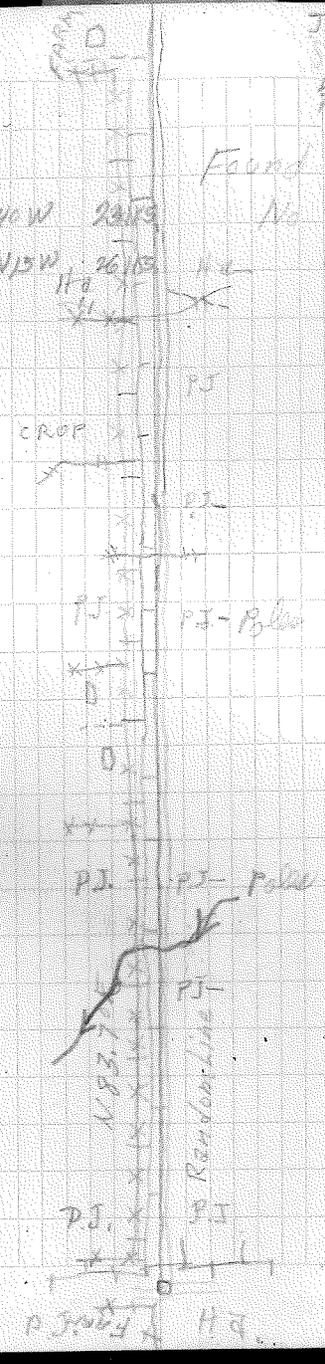
10+60 Fence N. Farm

7+85 Creek.

0+00 Started East from 17/20 139-28
30/29

JAN. 11, 1939 33
Mogelvik to
ESTENSON AXE
ANDERSON Ch.

Look for: Found:
Aspen 6" S40W 23173 No evidence of
W. Birch 4" N15W 26109 ORIG. COR.



52+63 Road N

20	21
29	28

139-28

51+74 ENTRANCE to School house

50+00 Fence N4E

49+10 Road S. To farm

48+15 Road to Farm

47+10 Fence E

46+48 Fence N

41+46 TRAIL SW

39+60 20' APP E 1/4 COR 3" ASP.

31+04 Fence ends runs N.

Continued East from

20	
20	

139-28

Look for:

Y. Pine 20" N45 E 30' 1/3

W. Birch 5" S24 E 25' 1/3

V. Pine 5" S68 W 17' 1/3

W. Pine 7" N21 W 20' 1/3



~~24780~~ FENCE 1 1/2" dia. 1 1/2' tall

12+65 FENCE N. & S. OFF SET SOUTH 56'
To E 1/4 corner, continued West
along fence line

3+00 Open field

3+00 Fence north of line

1+00 House approx. 50' of line

0+00 started West from P.R. SEC. COR. $\frac{19}{30}$

Jan. 13, 1939 35

Woods
Barn
East
Greenland

~~Woods~~

~~Woods~~

~~Woods~~

Found:

1/2" Brass pipe

6" post squared
on 4 sides

Jack pine

aspens

5000' W of
Random line

Found later 30' from house

Jack pine

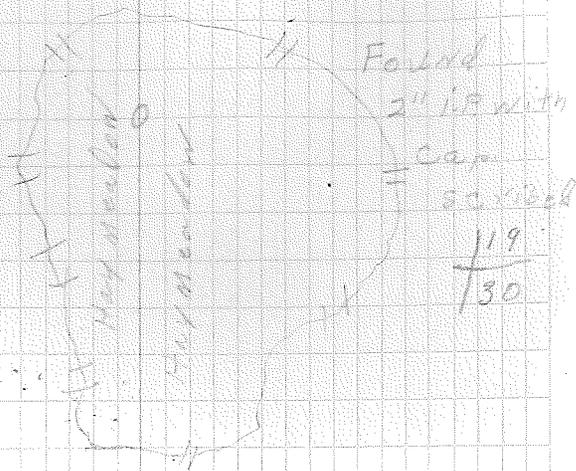
49430 Found 2" I.P. 1 1/2' tall

42421 Entered Hay meadow

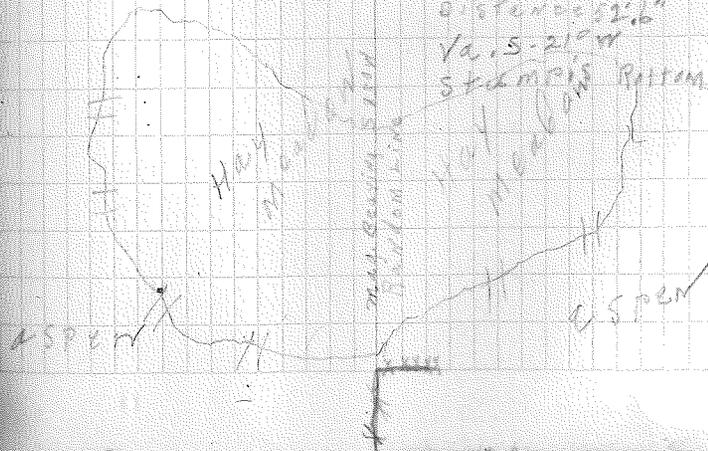
39413 Found west 1/4 corner

32430 Entered aspen

27448 Falco North.



Found
 3 1/2" I.P. 3' tall
 12" pine stump
 scribed 1/5-30 P.
 distance 2.6"
 Va. S. 21" W
 STAMPS RATTIN



26+70 Found 2" i.p. 3' tall ³⁶ 139-28
25+61 Left M.C.T. ~~40~~ 1/4 N OF Line

22+34 Centered Macat.

15+13 Left M.G.S.

12+45 center of old RR grade
~~11+45 center of old RR grade~~

9+22 edge of M.G.S.
~~8+22 edge of M.G.S.~~

0+00 started West from ³⁶ 139-28

Lost for: M.C.T. M.G.S. Found
W. Birch 6" N 9W 3113 16' N.P.
" 6" S 18W 3113 scribed 1/4-S-36
Distance 34'
Va. N 47 1/2 E
The i.p. scribed
on one side 1/4-S.
The other 1/4
B.M.

M.C.T. ~~11+45~~ M.G.S.

S 83.7° W 2' 30"
M.G.S.
B.M.

Var. 6.3°

Jan. 5, 1938
Woods T
Oison ch.
Herbert ch.
Schwartz axe

53+50 ~~From~~ OFF SET 87' ^{35/36} 137-28
52+00 Left pond

49+30 edge of pond

44+90 LEFT M.R.E.

44+37 entered M.R.E.

26+70 Continued West from ³⁶ 137-28

To 2" I.P. with Cap. &

Jan 5 1939
Woods X
Olson Ch
Herbert Ch
Stewart eye

Look for: Found:

The point for
sec. cor. is in
pond. Therefore
cor. was established

2" I.P. ~~35/36~~ ^{35/36}
Offset 87' No.
to I.P.

145 lvs. West or
about 90.6 feet W. M.R.E.
B.T. M.R.E.

Y. Pine 16", N63W 40' X 5'
No other tree
convenient

5 29.7° W. 11.1' N
Random Line

0

26+97

Found 2" Iron Pipe ³⁵
5 FT South of line 139-2613+20
13+00Set Apple
Type change

14+25

Type change

8+65

Type change

7+00

Type change

2+00

Type change

0+70

~~0+70~~ Started West witness ³⁵/₃₆ 139-28
05 pp. 35

Jan. 5 1939

BM

Woods. X

Look for:

Aspen 6" NYSE 71K

W. Birch 5" SSW 21K.

Found:

2" Iron Pipe

5' S. of line

0.150N ch.

Herberton.

Somewhat 13-20

BM

B.M.

BM



52+30 Found 2" IRON PIPE ^{37/35} ~~8/34~~ ~~2/38~~ 139-28
No other evidence

39+60 Set Approx w/1/2 cor ³⁵ ~~34~~ 139-28

35+00 quit for day Jan 5, 1939

26+17 Continued West from ³⁵ ~~34~~ ~~31~~ 139-28

Look for:

Soft Maple, 5" N57E 26 IKs.

Oak 5" S40W, 39 IKs.

W. Birch 6" S7W, 14 IKs.

Blk Oak, 15" N23W, 5 IKs.

Bm

Found:

2" Iron pipe

Capped ~~34/35~~

No other evidence

Jan 5, 1939

Woods T

Olson-Cr.

Herbert-Cr.

Schwartz-Cr.

Bm

585.7° W
Barber Line

Bm

$\frac{1}{4}$ $\frac{34}{35}$ 139-28

See pages
49 & 50

13+20

E $\frac{1}{16}$ corner in Lake Quit for Dac
Jan. 6, 1939

9+70

Lake

0+00

Started West from

$\frac{34}{35}$
 $\frac{3}{2}$

139-28

January 6, 1939

X Stegelvik

Olson Ch

Herbert Ch

Look for:

W. Birch 8° N 67 E, 51 Ks.

Aspen 6° S 35 E, 21 Ks.

Found: Schwartz Base

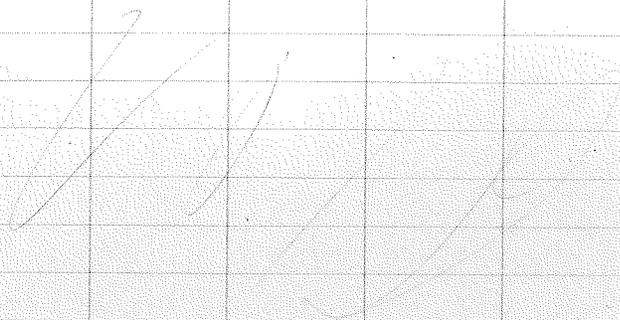
Lake

5 83.7° W
Borden Line

000
3

33/34

139-28



Continued West from 34 139-28

42

Look for: Found:

Aspen 12" N33E 531Ks.

" 10" S72E 111Ks.

" 10" S13W 81Ks.

" 11" N50W 101Ks.

S 83.7° W
Random Line

26 Feb Wed 21/18

1/4 33

139-28

13+20 set App. W 1/16 corner

11+20 entered M.G.S.

0+00

started East from

32/32

139-28

Look for:

Y. Pine - 7" NW, 24 IKs.

W. Pine - 10" SW, 11 IKs.

M.G.S.

Aspen

Var. 6.30

Random Line

Jan 17 1937

1/3

Michelson X-axe

Harland axe

Goulich pickets

1/500

Weggs

CH

Sketch notes

Found:

2" i.P. 1/2 South of F

Line

12" Pine scarred pine

STAMP. scribed

533 ft. Distances 47'

M.G.R. in N 52° E

Aspen

53421 Reached Sect. Cor
off Sect. 765 to Sect. Cor

33/34

139-28

Jan 17 1939

Same party

Look for:

Aspen, 12" N33E, 53 IKs

" 10" S72E, 11 IKs

" 10" S13W, 8 IKs

" 11" N50W, 10 IKs.

FOUND!

16" White Pine

bearing - 530° E

Distance - 46 ft.

34760 Set app E 1/4 corner

9 am Friday Jan 17, 1939

27700 ← Mixed Brush
Continued East from

33

139-28

Mixed brush

Mixed brush

26+01 Found 2" ip

25+08 ASPex

32

139-28

~~34~~

20+16 M.G.Y.

14+75 alder

12+43 M.G.Y.

11+00 alder

9+00 M.G.Y.

5+00 Entered alder

3+00 Entered M.G.Y.

0+00 started East from sec. box

4/32

~~31~~

Jan 17, 1939 45

Michelson - alder

Hayland - alder

Gynerch - alders

Gynerch - alders

Woods - ch. Notes

Look for:

W. Birch 6" N 9E 10 Ks.

Maple 5" SSE 2 Ks

Found

2" ip

M.G.Y.

9" W.B. scribbled

~~11~~

1/4 S-S-B.T.

~~12~~

Distance 75'

1/2 S 56° W

~~13~~

Alder

~~14~~~~15~~

M.G.Y.

1/2 Alder

~~16~~

M.G.Y.

1/2 Alder

~~17~~~~18~~~~19~~

M.G.Y.

~~20~~~~21~~

0

52+80

32 | 33

139-28

Jan 17, 1939

46

Same party

Look for:

Aspen 10" N72E, 17 lbs.

Blk. Oak 7" S20E, 19 lbs.

Aspen 7" S63W, 24 lbs.

Aspen 24" N8W, 8 lbs.

NO EVIDENCE

ASPEN

Aspen

Continued East from 32 139-28

25+00 TYPE change
 24+23.4 S $\frac{1}{4}$ CORNER Sect. 31 I.P.
 23+10 TYPE change

19+97 Change of type

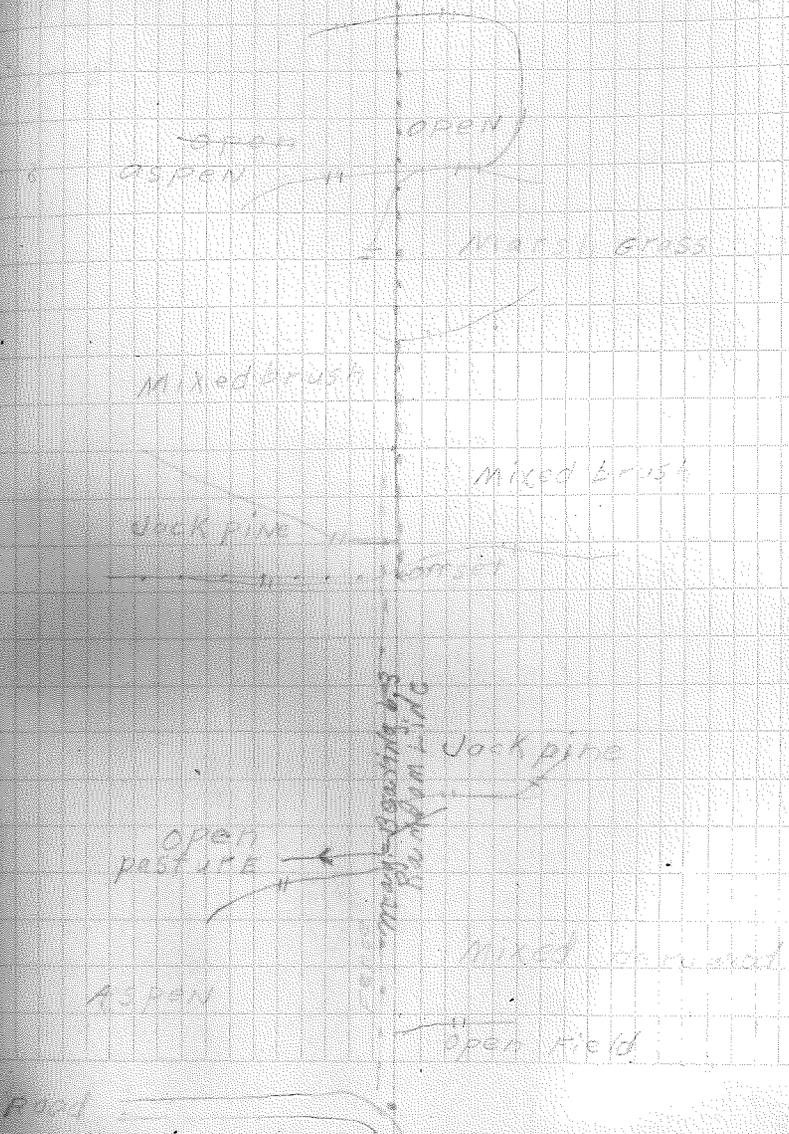
16+50 TYPE change

12+00 TYPE change
 Fence runs North
 11+29 Offset T'S to avoid fence

6+54 type change
 5+20 Stream N50°W

1+79 Type change
 0+00 STARTED FOS FROM APP 300' ~~31~~ 31

Jan 16 1939
 ASPEN BRUSH Mixed
 Woods
 michelson
 mason
 Schwartz
 Kistner
 Brounlich
 offset 5.4ft N to top Marsh brush



50+16 Offset 11.7' N to sec. cor. ~~3132~~

47+20 Wagon trail 35' N

38+00 Type change

33+23 Type change

29+00 Type change

24+23.4 CONTINUED FROM PAGE 47

Jan 12 1939 Y8

Woods X
MICHOLSON
MATSON
SCHWARTZ
ESTRICK
GROULICH

Look for:

Fir N. 40° E, 21 IKs

Y. Pine S 60° E, 21 IKs

Y. Pine S 57° W, 19 IKs

Y. Pine N 53° W, 16 IKs

FOUND:

Bearing tree - PINE

stump fire-scarred

8.0' D start from I.P.

Bearing - Ya. N 71/2° E

2" I.P. with cap

scrubbed $\frac{3132}{615}$

upland brush

marsh brush

aspens

marsh brush

N. 83.7° E

M.P. bearing 6.34

Random line

Var. 6.3°

3106

26+40 SET FOR $\frac{1}{4}$ COR. 3913+20 SET APP. $\frac{1}{8}$ OF SET 82 FT.3+30 SET APP. $\frac{1}{8}$

1100 STARTED EAST FROM 33 39 130 28

Jan. 18 1939 49

Party
Michaelson
Plyson
Jost
Greulich
HarlandMixed
Brush

N 83.5° E

S to Random Line.

Mixed
Brush

Magnetic Bearing

RANDOM LINE

52+52 FOUND SECTION 600

32 31
3 2

44+00 High water mark of Lake

42+00 Water level of Lake

39+60 set APPR E $\frac{1}{16}$ ~~36+30~~

35+00 water level of Lake

31+70 High water mark of Lake

29+70 set APPR

25+40 CONTINUE EAST FROM $\frac{1}{16}$

Jan. 8 1950 5.0

Same party

FOUND -
See page 40
BRUSH

mixed

RUSHES

Lake

Magnetic Bear

Random Line

RUSHES

Mixed
BRUSH

34

T. 140 R. 28

The image shows an open notebook with two blank, grid-lined pages. The pages are white with a light gray grid pattern. The notebook has a dark cover visible around the edges. The grid consists of small squares, typical of a ledger or account book. The pages are otherwise empty of any text or markings.

T. 140 R. 28

~~Wabigoon~~ Trip.

T. 140-28

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Look for:

Ash 4" N27E 181Ks } next page
 Aspen 12" S43W 381Ks } copy this

~~7 cks 991Ks edge of lake~~

~~9 cks sp. strip~~

~~11 cks aspen strip~~

~~25 cks. Set App. Sec. cor.~~

page 16 FROM 32+30

To 52+70 apply to above

distance in chains.

1
26+00 Set Appr. 1/4 corner. \$360 140-28

23+40 Left S.H.M. entered ~~S Balsum Swp.~~ Aspen
Jan 26 1939
M. R. W.

18+50 crossed stream NW-SE.

12+16 Left Balsum swamp.

10+92 entered Balsum

0+00 started North from sec 401 24 1/4 140-R-28.

Jan 26 1939

Woods. Kates

Estrem ch.

Harland ch.

Aspen

Aspen

HHH

No Evidence
of 1/4 corner.



S.H.M.

S.H.M.

Balsum
swamp

11350

Random wire

Mag. Bearing N 63° 50' W

S.H.M.

S.H.M.

54700 entered tam, swp.
found I.P.

49480 center of old R.R. grade
48470 crossed fence entered Alder

38486 center of old Road passable by
car in summertime

35465 entered Jack pine

29400 entered swp. Alder

27432 entered Spruce center swp.

look for:

Tam. 6" N17E 221Ks

J. Pine 6" S27E 221Ks ~~221Ks~~

Tam 5" S79W 81Ks

J. Pine 6" N23W 221Ks.

Jack
pine

FOUND.

1 1/2" I.P. 3" sq. Stake

12" Tam. App. 70' tall

Distance 25' Var. S 35° E

Nail in bottom of tree

12" Tam. App. 60' tall

N 70° E Distance 18.6'

it is impossible to

read scribbles on trees

RANDOM LINE

Mag. Bearing N 60.35° W

Jan 26 1939

Woods Notes

Estrem ch.

Hayland ch.

2

³
2 6140 1/4 corner in Lake.

21400 edge of Lake

18456 entered Sp. swp.

12440 entered Mixed BRUSH.

11428 entered Alder SWP.

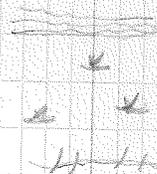
5465 Left fam. SWP.

0400 started North from sec. cor $\frac{25}{36}$ T140R28

Jan 26 1939
Woods, N. of
Estrem City
Harland City

Look for:
1/4 cor. in pond
Lake

Lake



Mixed BRUSH



N 6.75° W

Mixed BRUSH

Random line



N 6.75° W

0

53+41 FOUND 4" ASPEN Squared 3' tall
6.7' West OF LINE.

34+89 off set 16' East to 2" i.p. Laying on ground
34+63 entered ASPEN.
33+50 ~~found ASPEN~~ FOUND 4" Sq. Stake
32+90 entered spr. SW pr.

Jan. 26 1939
Woods Notes
Estym ch.
Hayland ch.

Look for:

W. Birch 8" N56E 23/1Ks
BIX. OAK 7" S35E 22/1Ks
Y. Pine 20" S65W 26/1Ks
Aspen 10" N27W 25/1Ks.

ASPEN

Look for: at 33833'

W. C. Aspen 7" N60W 29/1Ks
Twp. 5" N12E 28/1Ks

8' East OF LINE.

Random line

lake

Mag. Bearing N 65.5° W

lake

$$\begin{array}{r} 13 \ 18 \\ 24 \ 19 \end{array}$$

42790 entered cedar spruce Swamp.
quit for day Jan 20, 1939.

30400 entered Aspen
27400 started North from 1/4 corner.

6

Jan 28 1939

Woods Notes
Esty on Ch.
Busick Ch.

Look for:

Cedar 10" N32E 61Ks

Tom 10" S48E 131Ks

Cedar 12" S37W 171Ks

Cedar 8" N37W 81Ks

~~11 11~~

MAG. BEARING N. 61° W
RANDOM LINES

~~11 11~~

jack pine jack pine

T. 140 R. 28

78

T. 140 R. 28

90

T. 140 R. 28

940.

The image shows an open notebook with two pages. Both pages are ruled with a grid pattern. The left page has a small label at the top center that reads "T. 140 R. 28". The right page has a handwritten number "940." in the top right corner. The pages are otherwise blank.

T. 140 R. 28

16

2640 Set App. 1/4 corner,

14700 entered ASPEN

7451 entered spruce Swamp.

1726 edge of Lake

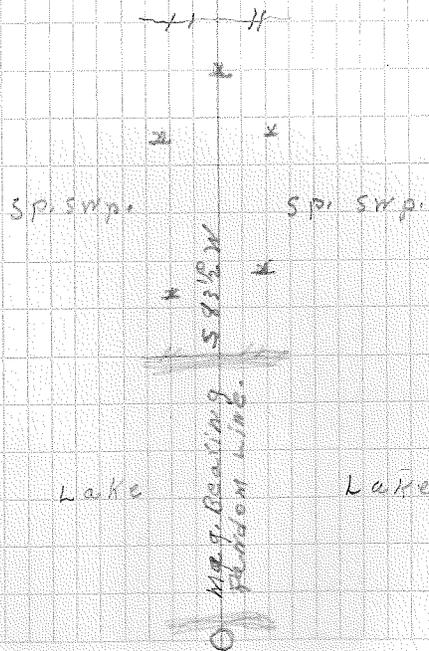
0700 started West from sec. cor. $\frac{24}{35} / \frac{25}{36}$ T140-28

Jan 28, 1939

Woods Notes

EStYan ch.

BUSION ch.



47118 off set 20' north to 2" i.p.

45433 entered Aspen.

34400 entered Mg. r.

32400 entered aspen

30451 center of Road N-S.

29439 entered Mg. r.

27400 continued west from NW corner.

0

H H

Mag. Bearing S 83° W.
 H H
 aspen
 H H
 Random Line
 H H

12
 JAN 28, 1939
 Woods Notes
 ESTHER CH
 BUSICK CH

26+40 Set Approx. 1/4 mile - 33/34 140-28
 26+10 Bottom of hill

25+10 Top of hill.

22+00 Slight rise - hill

21+00 Leave Swamp - Enter Jack Pine & Bar.

15+00 Enter spr. swamp

13+43 Formed fence
 13+27 Found 1/6 cor post 18' west of line.

All Highland

7+90 Type change to Jack Pine & HB

8+91 stream

Swamp

0+00 Started North from 33/34 140-28

Pal. Swamp

13

Feb. 7, 1939

Woods Proving
 Herland " " "
 Busch Chain
 Estrem-Notes

Look for:

W. Pine 7" N 80W 37.1Ks.

" 10" N 60E 22.1Ks. ...

2640' dist.

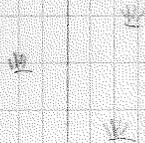
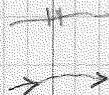
Found

No evidence of 1/4



Found:

1/6 Wood Post - scribed
 4" pine post



Var. 6.35°

52+80

34+39 Bottom of Hill started lake-wake
 33+00 top of Hill

30+80 Leave swamp - hit highland Hdw.

26+40 Continued North from 33/34 140-28

14

Feb. 7, 1939

Cor. is in Lake

Harland-Brook
 Wards-Brook
 Busick-Ck
 Estren-Notes

Wakarusa

Lake

At 34+45.2 feet
 Look for M.C. post
 W. Birch 5" SWN, 18 lbs. Found
 Elm 12" N 60 E 36 lbs. No evidence

26+27 top of Hill Birch 28 | 27 140-28

26+30 leave Alder swamp

21+40 enter Alder swamp
leave lake - Wabedo

17+20 Enter lake - Wabedo

7+00 enter Aspen
leave swamp

5+00 Enter swamp

4+00
3+00 leave lake - Wabedo

0+00 Continued North from 25 | 27 140-28
33 | 34

11/11/11 Feb. 7, 1939
Harland Crossing
Woods, Brushing
Busick Ca.
Extreme notes
Found no
Evidence

Look for:
Dry Pine 18" S88E, 120 lks.
No other tree.

11/11/11

Wabedo lake

11/11/11

11/11/11

Orig. Notes.

AE 422 ft. left

Lake & look for

M.C. post

Elm 10" N55E 43 lks.

Oak 7" N30 W 40 lks.

Var. G.35°

Found no
Evidence

52+80 set app. sec cor,
on edge of Lake.

21 22
28 27 140-28

45+52 entered espen
44+20 entered spruce swamp

39+60 set approx. N^{1/2} corner.
39+26 edge of Lake.

36+36 ^{date for day Feb. 7, 1939}
center of road running E-W

35+00 enter birch
34+25 leave lake - Wabedo

28+00

26+00 ^{Edge of Lake Wabedo}
Cent. North from ^{28 27}
Bottom of Hill 140-28

Lake Lake

16

Feb. 7, 1939

Look for:

Tom. 16" N60E, 48 lks.

Tom. 8" S25E, 43 lks.

Tom. 19" S10W, 22 lks.

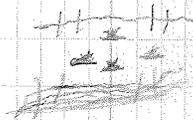
W. Pine 20" N39W, 43 lks.

SHM. Harland Brushing
Woods Brushing
Busick ch
Extrem Notes

Feb. 7, 1939

Woods Notes - ch.

Busick - ch.



lake lake

Ori. Notes -

Left lake at 3564'

Look for: M.C. post

Oak 6" S83W, 55 lks.

Oak 17" N70E, 39 lks.

Ori. Notes.

At 2812.2' intersect

lake Wabedo

same lake -

Look for: M.C. post

Cedar 7" N50E, 24 lks.

Elm 4" S48W, 30 lks.

21/22 140-28

Look for:

W. Pine 6" S70W, 31 lbs.

Dry Birch 5" N40E, 2 lbs.

17

9:00

Started North from

21/22
25/21

140-28

Vel. 6.35⁰

16	15
21	22

140-28

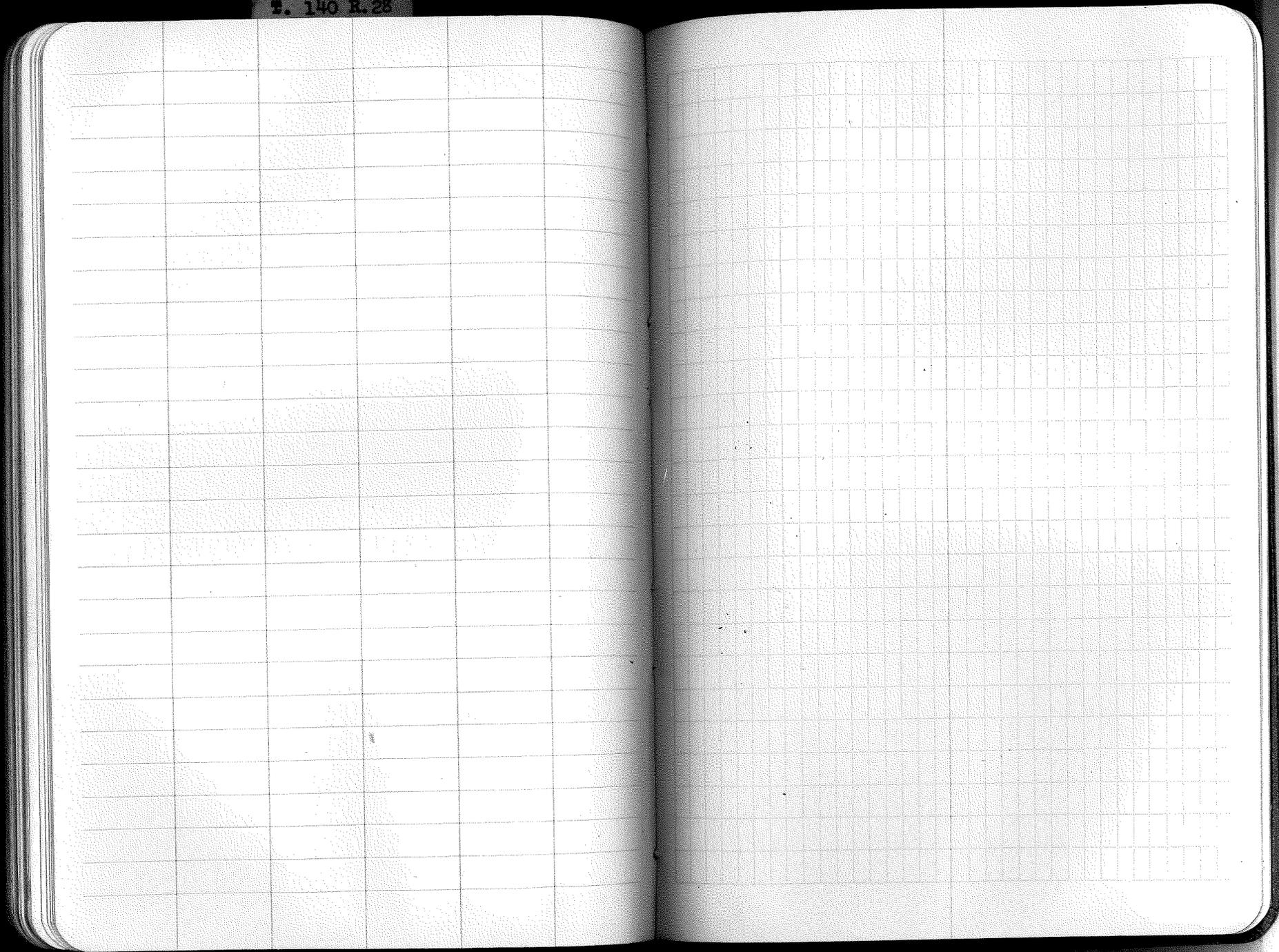
Look for:

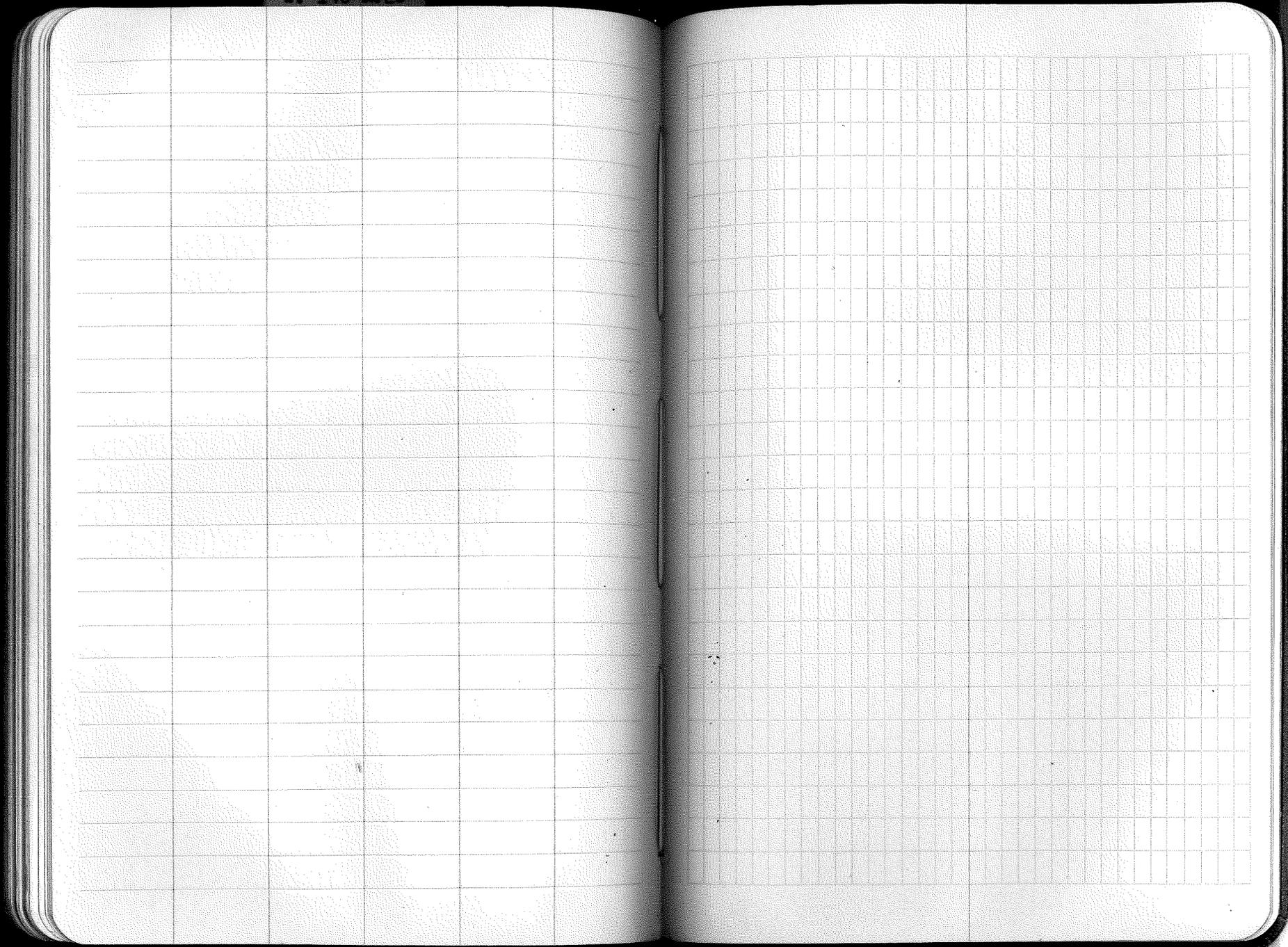
W. Birch 6" S57W, 80 lbs.

" 7" N55E, 40 lbs.

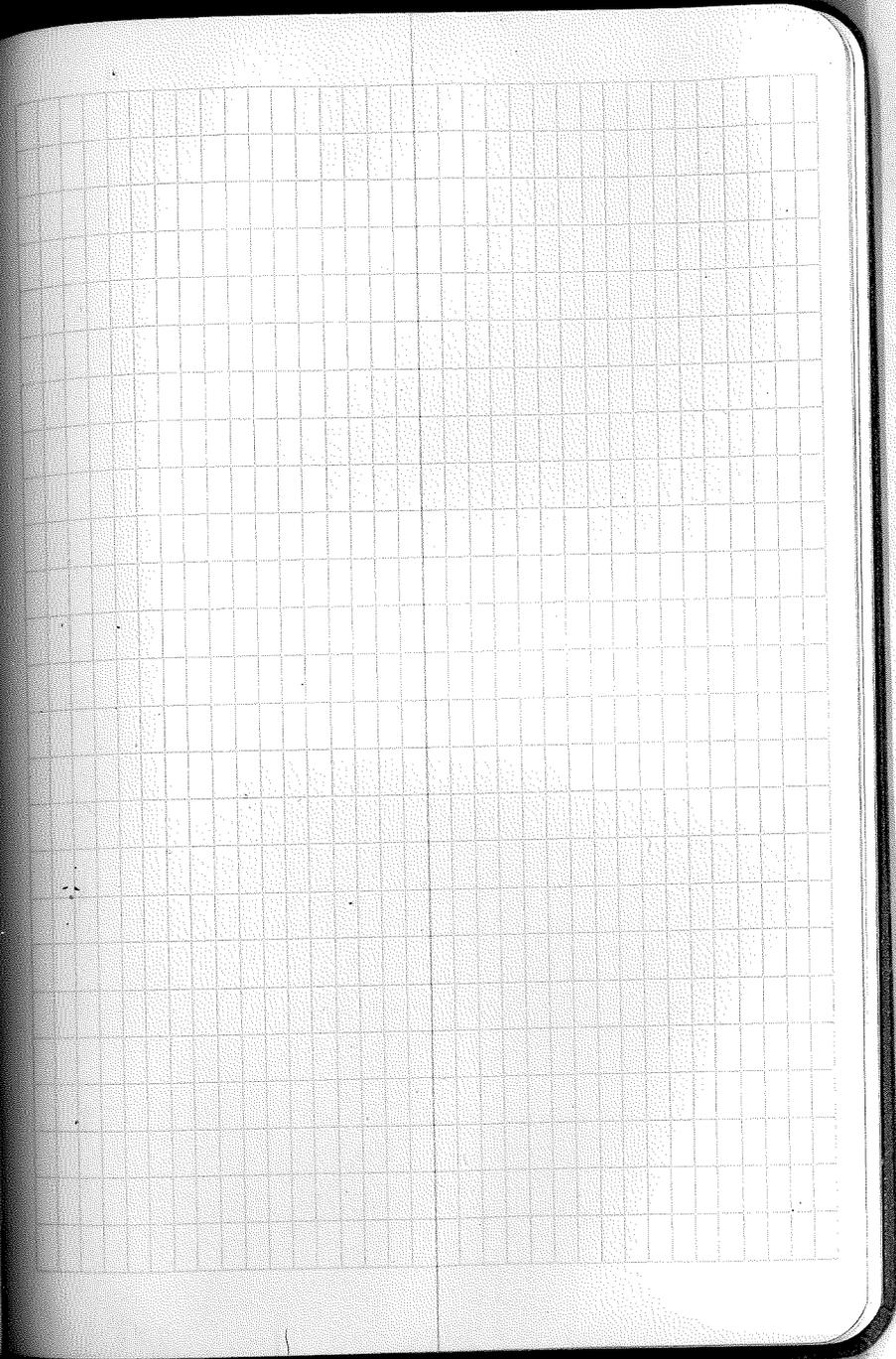
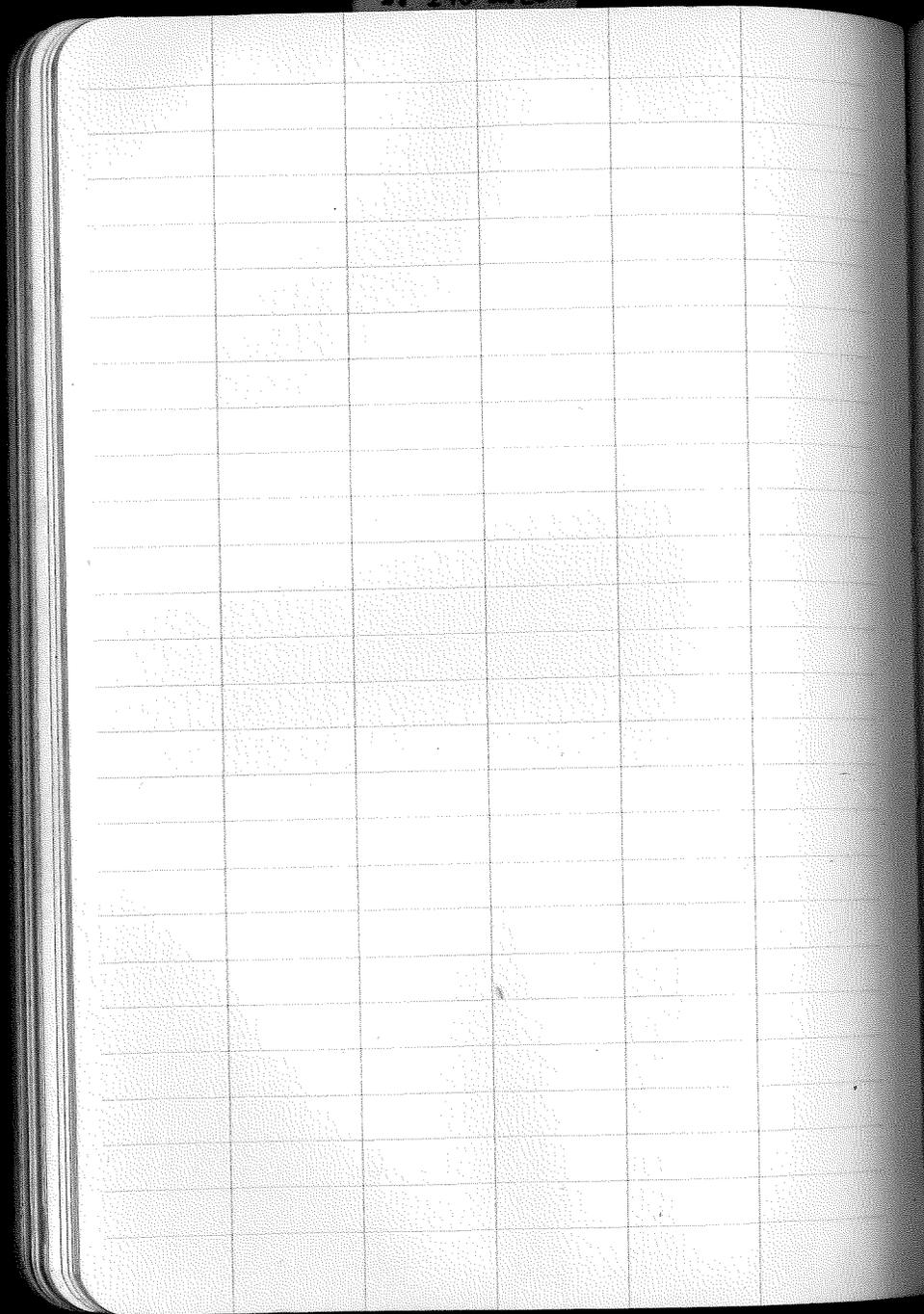
W. Pine 9" N42W, 50 lbs.

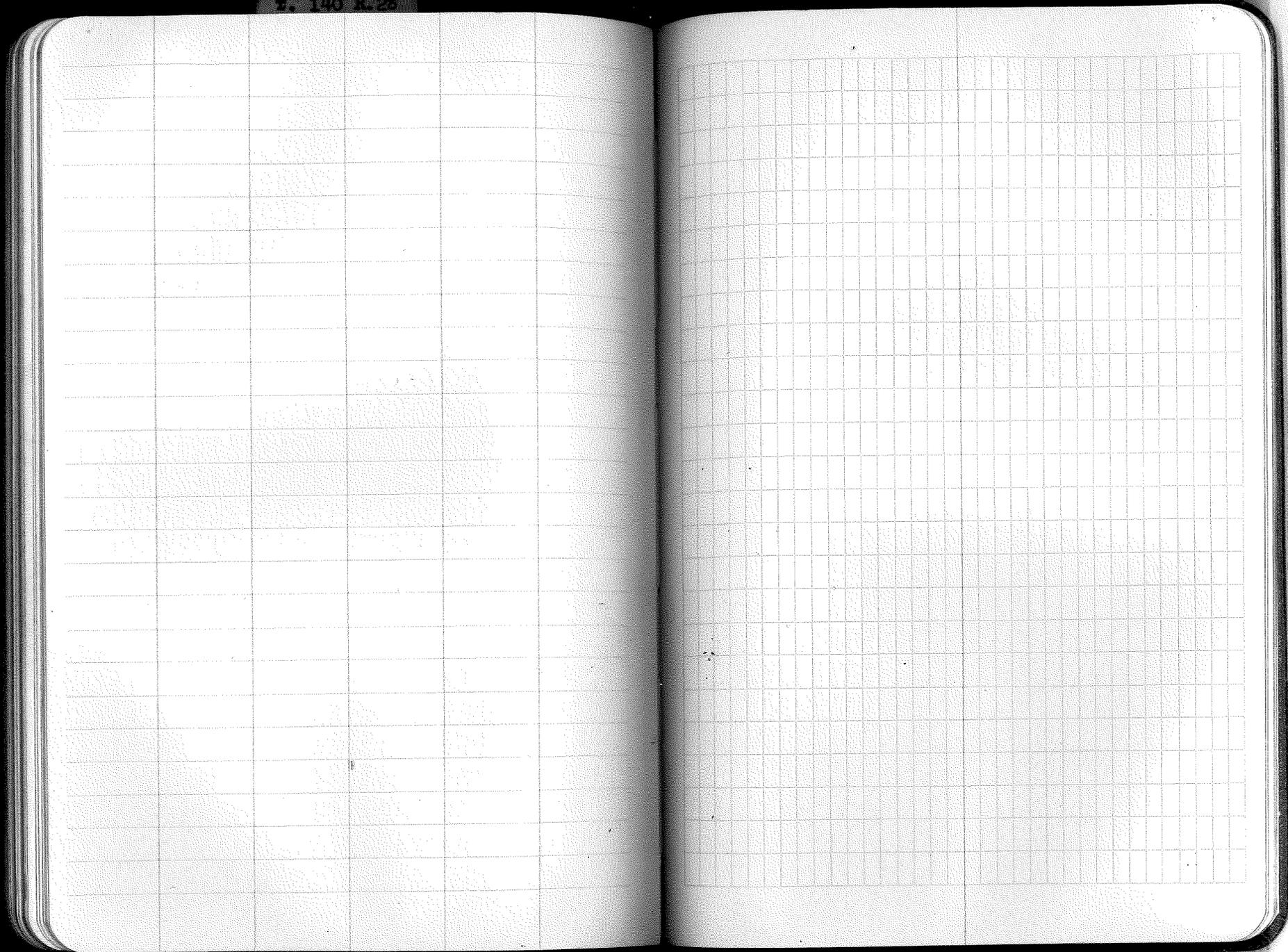
Maple 4" S43E, 30 lbs.



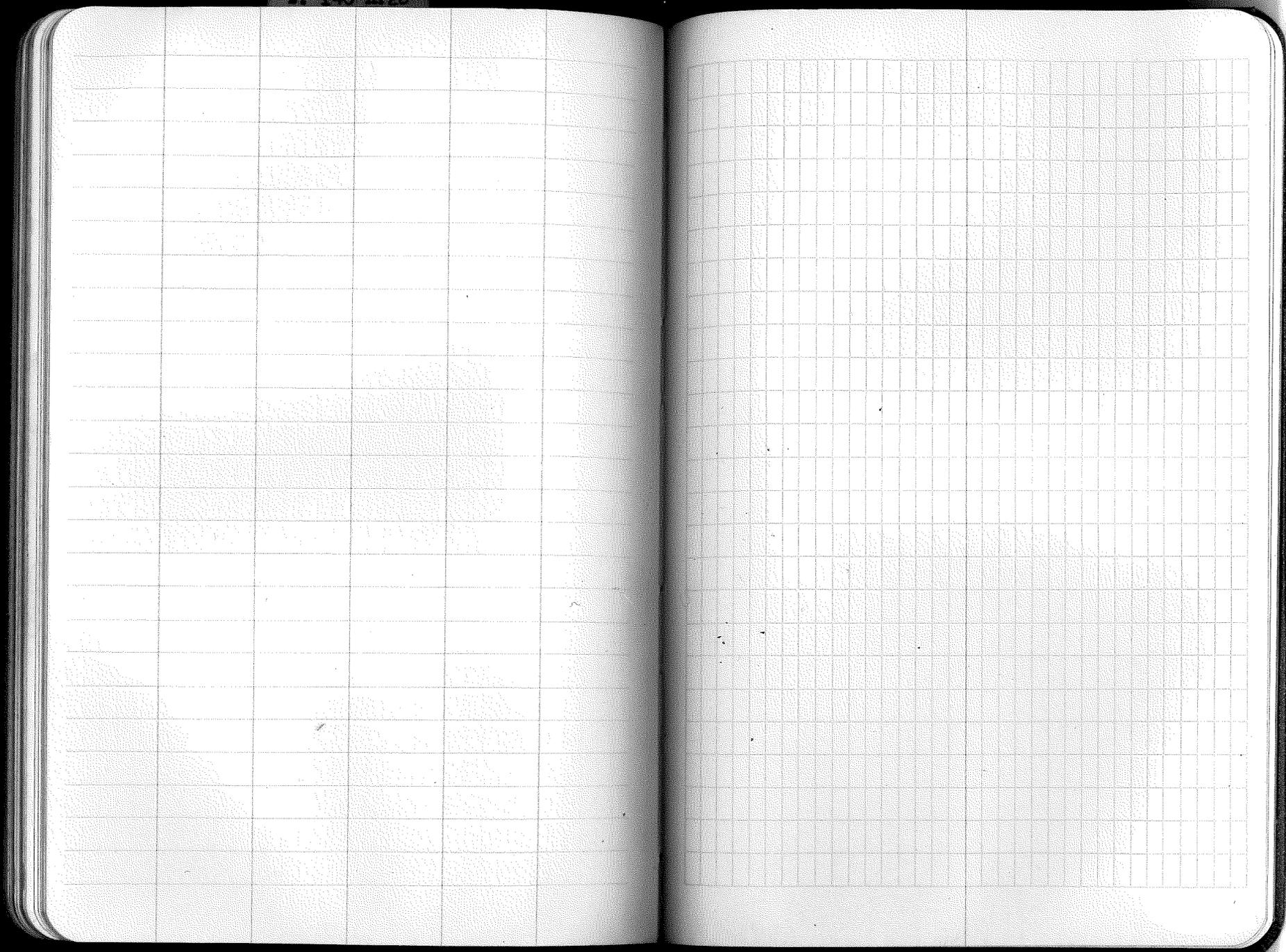


F. 140 B. 28

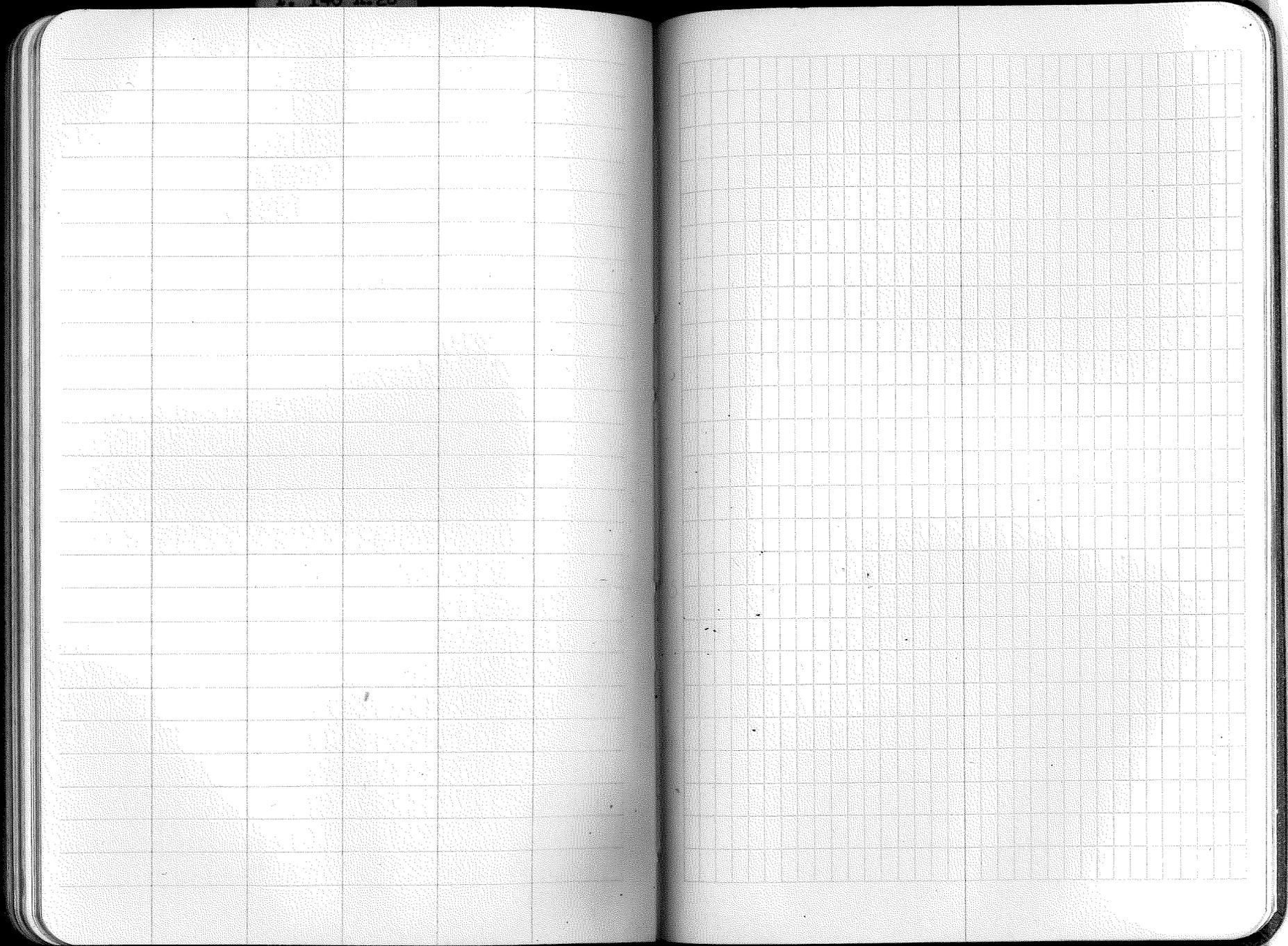




F. 140 R. 28



3. 140 B. 26



F. 140 R. 28

A grid of 20 columns and 25 rows on the left page of a notebook. The grid is composed of thin, light-colored lines forming a uniform pattern of small squares. The page is otherwise blank.

A grid of 20 columns and 25 rows on the right page of a notebook. The grid is composed of thin, light-colored lines forming a uniform pattern of small squares. The page is otherwise blank.

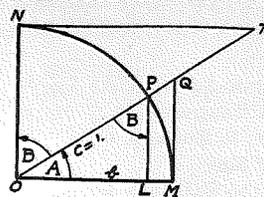


TABLE II

TRIGONOMETRIC FORMULAE

$$\angle A = \angle MOP \quad \angle B = \angle PON = \angle OPL$$

$$R = OB = c = 1$$

$$\sin A = \frac{a}{c} = \frac{a}{1} = a = \cos B = LP$$

$$\cos A = \frac{b}{c} = \frac{b}{1} = b = \sin B = OL$$

$$\tan A = \frac{a}{b} = \frac{MQ}{OM} = \frac{MQ}{1} = MQ = \cot B = MQ$$

$$\cot A = \frac{NT}{ON} = \frac{NT}{1} = NT = \tan B = NT$$

$$\sec A = \frac{OQ}{OM} = \frac{OQ}{1} = OQ = \csc B = OQ$$

$$\csc A = \frac{OT}{ON} = \frac{OT}{1} = OT = \sec B = OT$$

$$\text{vers } A = \frac{LM}{OP} = LM = \text{covers } B \#$$

$$\text{covers } A = \frac{OP - LP}{OP} = OP - LP = \text{vers } B$$

$$\text{exsec } A = PQ = \text{coexsec } B$$

$$\text{coexsec } A = PT = \text{exsec } B$$

$$\sin \frac{1}{2}A = \sqrt{\frac{1 - \cos A}{2}} \quad \cos \frac{1}{2}A = \sqrt{\frac{1 + \cos A}{2}}$$

$$\sin 2A = 2 \sin A \cos A \quad \cos 2A = \cos^2 A - \sin^2 A$$

$$\text{Law of Sines} \quad \frac{\sin A}{a} = \frac{\sin B}{B} = \frac{\sin C}{C}$$

$$\text{Law of Cosines} \quad c^2 = a^2 + b^2 - 2ab \cos C$$

$$\text{Law of Tangents} \quad \frac{a+b}{a-b} = \frac{\tan \frac{1}{2}(A+B)}{\tan \frac{1}{2}(A-B)}$$

TABLE II—Continued
TRIGONOMETRIC FORMULAE (continued)

In any triangle:

Given a, b, C; to find c, B, A.

Use Law of Tangents.

Given A, B, c; to find a, b, C.

Use Law of Sines.

Given a, b, c; to find A, B, C.

$$\text{Let } \frac{a+b+c}{2} = s, \sqrt{\frac{(s-a)(s-b)(s-c)}{s}} = r$$

$$\cos \frac{1}{2}A = \sqrt{\frac{s(s-a)}{bc}}$$

$$\tan \frac{1}{2}A = \frac{r}{s-a}$$

$$\tan \frac{1}{2}B = \frac{r}{s-b}$$

$$\tan \frac{1}{2}C = \frac{r}{s-c}$$

Area of a triangle:

$$\text{Area} = \frac{1}{2} ab \sin C$$

$$\text{Area} = \sqrt{s(s-a)(s-b)(s-c)}$$

PRISMOIDAL FORMULA

$$\text{Vol.} = \frac{h}{6}(B+b+4M)$$

h = altitude; b B = bases; M = midsection

TABLE III
MINUTES IN DECIMALS OF A DEGREE

1'	.0167	11'	.1833	21'	.3500	31'	.5167	41'	.6833	51'	.8500
2	.0333	12	.2000	22	.3667	32	.5333	42	.7000	52	.8667
3	.0500	13	.2167	23	.3833	33	.5500	43	.7167	53	.8833
4	.0667	14	.2333	24	.4000	34	.5667	44	.7333	54	.9000
5	.0833	15	.2500	25	.4167	35	.5833	45	.7500	55	.9167
6	.1000	16	.2667	26	.4333	36	.6000	46	.7667	56	.9333
7	.1167	17	.2833	27	.4500	37	.6167	47	.7833	57	.9500
8	.1333	18	.3000	28	.4667	38	.6333	48	.8000	58	.9667
9	.1500	19	.3167	29	.4833	39	.6500	49	.8167	59	.9833
10	.1667	20	.3333	30	.5000	40	.6667	50	.8333	60	1.0000

TABLE IV
INCHES IN DECIMALS OF A FOOT

$\frac{1}{16}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{9}{16}$	$\frac{5}{8}$	$\frac{11}{16}$
.0052	.0078	.0104	.0156	.0208	.0260	.0313	.0417	.0521	.0625	.0729
1	2	3	4	5	6	7	8	9	10	11
.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167

TABLE V.—RADII, ORDINATES AND DEFLECTIONS

Deg.	Radius	Mid. Ord.	Tan. Offset	Def. for 1 Foot	Deg.	Radius	Mid. Ord.	Tan. Offset	Def. for 1 Foot
0° 10'	34377.5	.036	.145	0.05'	7°	819.02	1.528	6.105	2.10'
20	17188.8	.073	.291	0.10	20'	781.84	1.600	6.395	2.20
30	11459.2	.109	.436	0.15	30	764.49	1.637	6.540	2.25
40	8594.42	.145	.582	0.20	40	747.89	1.673	6.685	2.30
50	6875.55	.182	.727	0.25	8	716.78	1.746	6.976	2.40
1	5729.65	.218	.873	0.30	20	688.16	1.819	7.266	2.50
10'	4911.15	.255	1.018	0.35	30	674.69	1.855	7.411	2.55
20	4297.28	.291	1.164	0.40	40	661.74	1.892	7.556	2.60
30	3819.83	.327	1.309	0.45	9	637.28	1.965	7.846	2.70
40	3437.87	.364	1.454	0.50	20	614.56	2.037	8.136	2.80
50	3125.36	.400	1.600	0.55	30	603.80	2.074	8.281	2.85
2	2864.93	.436	1.745	0.60	40	593.42	2.110	8.426	2.90
10	2644.58	.473	1.891	0.65	10	573.69	2.183	8.716	3.00
20	2455.70	.509	2.036	0.70	30	546.44	2.292	9.150	3.15
30	2292.01	.545	2.181	0.75	40	521.67	2.402	9.585	3.30
40	2148.79	.582	2.327	0.80	30	499.06	2.511	10.02	3.45
50	2022.41	.618	2.472	0.85	12	478.34	2.620	10.45	3.60
3	1910.08	.655	2.618	0.90	30	459.28	2.730	10.89	3.75
10	1809.57	.691	2.763	0.95	13	441.68	2.839	11.32	3.90
20	1719.12	.727	2.908	1.00	30	425.40	2.949	11.75	4.05
30	1637.28	.764	3.054	1.05	14	410.28	3.058	12.18	4.20
40	1562.88	.800	3.199	1.10	30	396.20	3.168	12.62	4.35
50	1494.95	.836	3.345	1.15	15	383.07	3.277	13.05	4.50
4	1432.69	.873	3.490	1.20	30	370.78	3.387	13.49	4.65
10	1375.40	.909	3.635	1.25	16	359.27	3.496	13.92	4.80
20	1322.53	.945	3.718	1.30	30	348.45	3.606	14.35	4.95
30	1273.57	.982	3.926	1.35	17	338.27	3.716	14.78	5.10
40	1228.11	1.018	4.071	1.40	18	319.62	3.935	15.64	5.40
50	1185.78	1.055	4.217	1.45	19	302.94	4.155	16.51	5.70
5	1146.28	1.091	4.362	1.50	20	287.94	4.374	17.37	6.00
10	1109.33	1.127	4.507	1.55	21	274.37	4.594	18.22	6.30
20	1074.68	1.164	4.653	1.60	22	262.04	4.814	19.08	6.60
30	1042.14	1.200	4.798	1.65	23	250.79	5.035	19.94	6.90
40	1011.51	1.237	4.943	1.70	24	240.49	5.255	20.79	7.20
50	982.64	1.273	5.088	1.75	25	231.01	5.476	21.64	7.50
6	955.37	1.309	5.234	1.80	26	222.27	5.697	22.50	7.80
10	929.57	1.346	5.379	1.85	27	214.18	5.918	23.35	8.10
20	905.13	1.382	5.524	1.90	28	206.68	6.139	24.19	8.40
30	881.95	1.418	5.669	1.95	29	199.70	6.360	25.04	8.70
40	859.92	1.455	5.814	2.00	30	193.18	6.583	25.88	9.00

Note. Chord Deflection = 2 times tangent deflection.

TABLE VI.—TANGENTS AND EXTERNALS TO A 1° CURVE

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
1°	50.00	.22	11°	551.70	26.50	21°	1061.9	97.57
10'	58.34	.30	10'	560.11	27.31	10'	1070.6	99.16
20'	66.67	.39	20'	568.53	28.14	20'	1079.2	100.75
30'	75.01	.49	30'	576.95	28.97	30'	1087.8	102.35
40'	83.34	.61	40'	585.36	29.82	40'	1096.4	103.97
50'	91.68	.73	50'	593.79	30.68	50'	1105.1	105.60
2	100.01	.87	12	602.21	31.56	22	1113.7	107.24
10	108.35	1.02	10	610.64	32.45	10	1122.4	108.90
20	116.68	1.19	20	619.07	33.35	20	1131.0	110.57
30	125.02	1.36	30	627.50	34.26	30	1139.7	112.25
40	133.36	1.55	40	635.93	35.18	40	1148.4	113.95
50	141.70	1.75	50	644.37	36.12	50	1157.0	115.66
3	150.04	1.96	13	652.81	37.07	23	1165.7	117.38
10	158.38	2.19	10	661.25	38.03	10	1174.4	119.12
20	166.72	2.43	20	669.70	39.01	20	1183.1	120.87
30	175.06	2.67	30	678.15	39.99	30	1191.8	122.63
40	183.40	2.93	40	686.60	40.99	40	1200.5	124.41
50	191.74	3.21	50	695.06	42.00	50	1209.2	126.20
4	200.08	3.49	14	703.51	43.03	24	1217.9	128.00
10	208.43	3.79	10	711.97	44.07	10	1226.6	129.82
20	216.77	4.10	20	720.44	45.12	20	1235.3	131.65
30	225.12	4.42	30	728.90	46.18	30	1244.0	133.50
40	233.47	4.76	40	737.37	47.25	40	1252.8	135.35
50	241.81	5.10	50	745.85	48.34	50	1261.5	137.23
5	250.16	5.46	15	754.32	49.44	25	1270.2	139.11
10	258.51	5.83	10	762.80	50.55	10	1279.0	141.01
20	266.86	6.21	20	771.29	51.68	20	1287.7	142.93
30	275.21	6.61	30	779.77	52.89	30	1296.5	144.85
40	283.57	7.03	40	788.26	53.97	40	1305.3	146.79
50	291.92	7.48	50	796.75	55.13	50	1314.0	148.75
6	300.28	7.86	16	805.25	56.31	26	1322.8	150.71
10	308.64	8.31	10	813.75	57.50	10	1331.6	152.69
20	316.99	8.76	20	822.25	58.70	20	1340.4	154.69
30	325.35	9.23	30	830.76	59.91	30	1349.2	156.70
40	333.71	9.71	40	839.27	61.14	40	1358.0	158.72
50	342.08	10.20	50	847.78	62.38	50	1366.8	160.76
7	350.44	10.71	17	856.30	63.63	27	1375.6	162.81
10	358.81	11.22	10	864.82	64.90	10	1384.4	164.86
20	367.17	11.75	20	873.35	66.18	20	1393.2	166.95
30	375.54	12.29	30	881.88	67.47	30	1402.0	169.04
40	383.91	12.85	40	890.41	68.77	40	1410.9	171.15
50	392.28	13.41	50	898.95	70.09	50	1419.7	173.27
8	400.66	13.99	18	907.49	71.42	28	1428.6	175.41
10	409.03	14.58	10	916.03	72.76	10	1437.4	177.55
20	417.41	15.18	20	924.58	74.12	20	1446.3	179.72
30	425.79	15.80	30	933.13	75.49	30	1455.1	181.89
40	434.17	16.43	40	941.69	76.86	40	1464.0	184.08
50	442.55	17.07	50	950.25	78.26	50	1472.9	186.29
9	450.93	17.72	19	958.81	79.67	29	1481.8	188.51
10	459.32	18.38	10	967.38	81.09	10	1490.7	190.74
20	467.71	19.06	20	975.96	82.53	20	1499.6	192.99
30	476.10	19.75	30	984.53	83.97	30	1508.5	195.25
40	484.49	20.45	40	993.12	85.43	40	1517.4	197.53
50	492.88	21.16	50	1001.7	86.90	50	1526.3	199.82
10	501.28	21.89	20	1010.3	88.39	30	1535.3	202.12
10	509.68	22.62	10	1018.9	89.89	10	1544.2	204.44
20	518.08	23.38	20	1027.5	91.40	20	1553.1	206.77
30	526.48	24.14	30	1036.1	92.92	30	1562.1	209.12
40	534.89	24.91	40	1044.7	94.46	40	1571.0	211.48
50	543.29	25.70	50	1053.3	96.01	50	1580.0	213.86

TABLE VI.—TANGENTS AND EXTERNALS TO A 1° CURVE

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
31°	1589.0	216.3	41°	2142.2	337.4	51°	2732.9	618.4
10'	1592.0	218.7	10'	2151.7	340.7	10'	2743.1	622.8
20'	1606.9	221.1	20'	2161.2	344.1	20'	2753.4	627.2
30'	1615.9	223.5	30'	2170.8	347.4	30'	2763.7	631.7
40'	1624.9	226.0	40'	2180.3	350.8	40'	2773.9	636.2
50'	1633.9	228.4	50'	2189.9	354.2	50'	2784.2	640.7
32	1643.0	230.9	42	2199.4	357.6	52	2794.5	645.2
10	1652.0	233.4	10	2209.0	361.0	10	2804.9	649.7
20	1661.0	235.9	20	2218.6	364.5	20	2815.2	654.3
30	1670.0	238.4	30	2228.1	368.0	30	2825.6	658.8
40	1679.0	241.0	40	2237.7	371.4	40	2835.9	663.4
50	1688.1	243.5	50	2247.3	374.9	50	2846.3	668.0
33	1697.2	246.1	43	2257.0	378.4	53	2856.7	672.7
10	1706.3	248.7	10	2266.6	381.9	10	2867.1	677.3
20	1715.3	251.3	20	2276.2	385.4	20	2877.5	682.0
30	1724.4	253.9	30	2285.9	388.9	30	2888.0	686.7
40	1733.5	256.5	40	2295.6	392.4	40	2898.4	691.4
50	1742.6	259.1	50	2305.2	395.9	50	2908.9	696.1
34	1751.7	261.8	44	2314.9	400.0	54	2919.4	700.9
10	1760.8	264.5	10	2324.6	404.1	10	2929.9	705.7
20	1770.0	267.2	20	2334.3	408.2	20	2940.4	710.5
30	1779.1	269.9	30	2344.1	412.3	30	2951.0	715.3
40	1788.2	272.6	40	2353.8	416.4	40	2961.5	720.1
50	1797.4	275.3	50	2363.5	420.5	50	2972.1	725.0
35	1806.6	278.1	45	2373.3	424.6	55	2982.7	729.9
10	1815.7	280.8	10	2383.1	428.7	10	2993.3	734.8
20	1824.9	283.6	20	2392.8	432.8	20	3003.9	739.7
30	1834.1	286.4	30	2402.6	436.9	30	3014.5	744.6
40	1843.3	289.2	40	2412.4	441.0	40	3025.2	749.6
50	1852.5	292.0	50	2422.3	445.1	50	3035.8	754.6
36	1861.7	294.9	46	2432.1	449.2	56	3046.5	759.6
10	1870.9	297.7	10	2441.9	453.3	10	3057.2	764.6
20	1880.1	300.6	20	2451.8	457.4	20	3067.9	769.7
30	1889.4	303.5	30	2461.7	461.5	30	3078.7	774.7
40	1898.6	306.4	40	2471.5	465.6	40	3089.4	779.8
50	1907.9	309.3	50	2481.4	469.7	50	3100.2	784.9
37	1917.1	312.2	47	2491.3	473.8	57	3110.9	790.1
10	1926.4	315.2	10	2501.2	477.9	10	3121.7	795.2
20	1935.7	318.1	20	2511.2	482.0	20	3132.6	800.4
30	1945.0	321.1	30	2521.1	486.1	30	3143.4	805.6
40	1954.3	324.1	40	2531.1	490.2	40	3154.2	810.9
50	1963.6	327.1	50	2541.0	494.3	50	3165.1	816.1
38	1972.9	330.2	48	2551.0	498.4	58	3176.0	821.4
10	1982.2	333.2	10	2561.0	502.5	10	3186.9	826.7
20	1991.5	336.3	20	2571.0	506.6	20	3197.8	832.0
30	2000.9	339.3	30	2581.0	510.7	30	3208.8	837.3
40	2010.2	342.4	40	2591.0	514.8	40	3219.7	842.7
50	2019.6	345.5	50	2601.1	518.9	50	3230.7	848.1
39	2029.0	348.6	49	2611.2	523.0	59	3241.7	853.5
10	2038.4	351.8	10	2621.2	527.1	10	3252.7	858.9
20	2047.8	354.9	20	2631.3	531.2	20	3263.7	864.3
30	2057.2	358.1	30	2641.4	535.3	30	3274.8	869.8
40	2066.6	361.3	40	2651.5	539.4	40	3285.8	875.3
50	2076.0	364.5	50	2661.6	543.5	50	3296.9	880.8
40	2085.4	367.7	50	2671.8	547.6	60	3308.0	886.4
10	2094.9	371.0	10	2681.9	551.7	10	3319.1	892.0
20	2104.3	374.2	20	2692.1	555.8	20	3330.3	897.5
30	2113.8	377.5	30	2702.3	560.0	30	3341.4	903.2
40	2123.3	380.8	40	2712.5	564.1	40	3352.6	908.8
50	2132.7	384.1	50	2722.7	568.2	50	3363.8	914.5

TABLE VI.—TANGENTS AND EXTERNALS TO A 1° CURVE

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
61°	3375.0	920.2	71°	4086.9	1308.2	81°	4893.6	1805.3
10'	3386.3	925.9	10'	4099.5	1315.6	10'	4908.0	1814.7
20	3397.5	931.6	20	4112.1	1322.9	20	4922.5	1824.1
30	3408.8	937.3	30	4124.8	1330.3	30	4937.0	1833.6
40	3420.1	943.1	40	4137.4	1337.7	40	4951.5	1843.1
50	3431.4	948.9	50	4150.1	1345.1	50	4966.1	1852.6
62	3442.7	954.8	72	4162.8	1352.6	82	4980.7	1862.2
10	3454.1	960.6	10	4175.6	1360.1	10	4995.4	1871.8
20	3465.4	966.5	20	4188.5	1367.6	20	5010.0	1881.5
30	3476.8	972.4	30	4201.2	1375.2	30	5024.8	1891.2
40	3488.3	978.3	40	4214.0	1382.8	40	5039.5	1900.9
50	3499.7	984.3	50	4226.8	1390.4	50	5054.3	1910.7
63	3511.1	990.2	73	4239.7	1398.0	83	5069.2	1920.5
10	3522.6	996.2	10	4252.6	1405.7	10	5084.0	1930.4
20	3534.1	1002.3	20	4265.6	1413.5	20	5099.0	1940.3
30	3545.6	1008.3	30	4278.5	1421.2	30	5113.9	1950.3
40	3557.2	1014.4	40	4291.5	1429.0	40	5128.9	1960.2
50	3568.7	1020.5	50	4304.6	1436.8	50	5143.9	1970.3
64	3580.3	1026.6	74	4317.6	1444.6	84	5159.0	1980.4
10	3591.9	1032.8	10	4330.7	1452.5	10	5174.1	1990.5
20	3603.5	1039.0	20	4343.8	1460.4	20	5189.3	2000.6
30	3615.1	1045.2	30	4356.9	1468.4	30	5204.4	2010.8
40	3626.8	1051.4	40	4370.1	1476.4	40	5219.7	2021.1
50	3638.5	1057.7	50	4383.3	1484.4	50	5234.9	2031.4
65	3650.2	1063.9	75	4396.5	1492.4	85	5250.3	2041.7
10	3661.9	1070.2	10	4409.8	1500.5	10	5265.6	2052.1
20	3673.7	1076.6	20	4423.1	1508.6	20	5281.0	2062.5
30	3685.4	1082.9	30	4436.4	1516.7	30	5296.4	2073.0
40	3697.2	1089.3	40	4449.7	1524.9	40	5311.9	2083.5
50	3709.0	1095.7	50	4463.1	1533.1	50	5327.4	2094.1
66	3720.9	1102.2	76	4476.5	1541.4	86	5343.0	2104.7
10	3732.7	1108.6	10	4489.9	1549.7	10	5358.6	2115.3
20	3744.6	1115.1	20	4503.4	1558.0	20	5374.2	2126.0
30	3756.5	1121.7	30	4516.9	1566.3	30	5389.9	2136.7
40	3768.5	1128.2	40	4530.4	1574.7	40	5405.6	2147.5
50	3780.4	1134.8	50	4544.0	1583.1	50	5421.4	2158.4
67	3792.4	1141.4	77	4557.6	1591.6	87	5437.2	2169.2
10	3804.4	1148.0	10	4571.2	1600.1	10	5453.1	2180.2
20	3816.4	1154.7	20	4584.8	1608.6	20	5469.0	2191.1
30	3828.4	1161.3	30	4598.5	1617.1	30	5484.9	2202.2
40	3840.5	1168.1	40	4612.2	1625.7	40	5500.9	2213.2
50	3852.6	1174.8	50	4626.0	1634.4	50	5517.0	2224.3
68	3864.7	1181.6	78	4639.8	1643.0	88	5533.1	2235.5
10	3876.8	1188.4	10	4653.6	1651.7	10	5549.2	2246.7
20	3889.0	1195.2	20	4667.4	1660.5	20	5565.4	2258.0
30	3901.2	1202.0	30	4681.3	1669.2	30	5581.6	2269.3
40	3913.4	1208.8	40	4695.2	1678.1	40	5597.8	2280.6
50	3925.6	1215.8	50	4709.2	1686.9	50	5614.2	2292.0
69	3937.9	1222.7	79	4723.2	1695.8	89	5630.5	2303.5
10	3950.2	1229.7	10	4737.2	1704.7	10	5646.9	2315.0
20	3962.5	1236.7	20	4751.2	1713.7	20	5663.4	2326.6
30	3974.8	1243.7	30	4765.3	1722.7	30	5679.9	2338.2
40	3987.2	1250.8	40	4779.4	1731.7	40	5696.4	2349.8
50	3999.5	1257.9	50	4793.6	1740.8	50	5713.0	2361.5
70	4011.9	1265.0	80	4807.7	1749.9	90	5729.7	2373.3
10	4024.4	1272.1	10	4822.0	1759.0	10	5746.3	2385.1
20	4036.8	1279.3	20	4836.2	1768.2	20	5763.1	2397.0
30	4049.3	1286.5	30	4850.5	1777.4	30	5779.9	2408.9
40	4061.8	1293.6	40	4864.8	1786.7	40	5796.7	2420.9
50	4074.4	1300.9	50	4879.2	1796.0	50	5813.6	2432.9

TABLE VI.—TANGENTS AND EXTERNALS TO A 1° CURVE

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
91°	5830.5	2444.9	101°	6950.6	3278.1	111°	8336.7	4386.1
10'	5847.5	2457.1	10'	6971.3	3294.1	10'	8362.7	4407.6
20	5864.6	2469.3	20	6992.0	3310.1	20	8388.9	4429.2
30	5881.7	2481.5	30	7012.7	3326.1	30	8415.1	4450.9
40	5898.8	2493.8	40	7033.6	3342.3	40	8441.5	4472.7
50	5916.0	2506.1	50	7054.5	3358.5	50	8468.0	4494.6
92	5933.2	2518.5	102	7075.5	3374.9	112	8494.6	4516.6
10	5950.5	2531.0	10	7096.6	3391.2	10	8521.3	4538.8
20	5967.9	2543.5	20	7117.8	3407.7	20	8548.1	4561.1
30	5985.3	2556.0	30	7139.0	3424.3	30	8575.0	4583.4
40	6002.7	2568.6	40	7160.3	3440.9	40	8602.1	4606.0
50	6020.2	2581.3	50	7181.7	3457.6	50	8629.3	4628.6
93	6037.8	2594.0	103	7203.2	3474.4	113	8656.6	4651.3
10	6055.4	2606.8	10	7224.7	3491.3	10	8684.0	4674.2
20	6073.1	2619.7	20	7246.3	3508.2	20	8711.5	4697.2
30	6090.8	2632.6	30	7268.0	3525.2	30	8739.2	4720.3
40	6108.6	2645.5	40	7289.8	3542.4	40	8767.0	4743.6
50	6126.4	2658.5	50	7311.7	3559.6	50	8794.9	4766.9
94	6144.3	2671.6	104	7333.6	3576.8	114	8822.9	4790.4
10	6162.6	2684.7	10	7355.6	3594.2	10	8851.0	4814.1
20	6180.2	2697.9	20	7377.8	3611.7	20	8879.3	4837.8
30	6198.3	2711.3	30	7399.9	3629.2	30	8907.7	4861.7
40	6216.4	2724.5	40	7422.2	3646.8	40	8936.3	4885.7
50	6234.6	2737.9	50	7444.6	3664.5	50	8965.0	4909.9
95	6252.8	2751.3	105	7467.0	3682.3	115	8993.8	4934.1
10	6271.1	2764.8	10	7489.6	3700.2	10	9022.7	4958.6
20	6289.4	2778.3	20	7512.2	3718.2	20	9051.7	4983.1
30	6307.9	2792.0	30	7534.9	3736.2	30	9080.9	5007.8
40	6326.3	2805.6	40	7557.7	3754.4	40	9110.3	5032.6
50	6344.8	2819.4	50	7580.5	3772.6	50	9139.8	5057.6
96	6363.4	2833.2	106	7603.5	3791.0	116	9169.4	5082.7
10	6382.1	2847.0	10	7626.6	3809.4	10	9199.1	5107.9
20	6400.8	2861.0	20	7649.7	3827.9	20	9229.0	5133.3
30	6419.5	2875.0	30	7672.9	3846.5	30	9259.0	5158.8
40	6438.3	2889.0	40	7696.3	3865.2	40	9289.2	5184.5
50	6457.3	2903.1	50	7719.7	3884.0	50	9319.5	5210.3
97	6476.2	2917.3	107	7743.2	3902.9	117	9349.9	5236.2
10	6495.2	2931.6	10	7766.8	3921.9	10	9380.5	5262.3
20	6514.3	2945.9	20	7790.5	3940.9	20	9411.3	5288.6
30	6533.4	2960.3	30	7814.3	3960.1	30	9442.2	5315.0
40	6552.6	2974.7	40	7838.1	3979.4	40	9473.2	5341.5
50	6571.9	2989.2	50	7862.1	3998.7	50	9504.4	5368.2
98	6591.2	3003.8	108	7886.2	4018.2	118	9535.7	5395.1
10	6610.6	3018.4	10	7910.4	4037.8	10	9567.2	5422.1
20	6630.1	3033.1	20	7934.6	4057.4	20	9598.9	5449.2
30	6649.6	3047.9	30	7959.0	4077.2	30	9630.7	5476.5
40	6669.2	3062.8	40	7983.5	4097.1	40	9662.6	5504.0
50	6688.8	3077.7	50	8008.0	4117.0	50	9694.7	5531.7
99	6708.6	3092.7	109	8032.7	4137.1	119	9727.0	5559.4
10	6728.4	3107.7	10	8057.4	4157.3	10	9759.4	5587.4
20	6748.2	3122.9	20	8082.3	4177.5	20	9792.0	5615.5
30	6768.1	3138.1	30	8107.3	4197.9	30	9824.8	5643.8
40	6788.1	3153.3	40	8132.3	4218.4	40	9857.7	5672.3
50	6808.2	3168.7	50	8157.5	4239.0	50	9890.8	5700.9
100	6828.3	3184.1	110	8182.8	4259.7	120	9924.0	5729.7
10	6848.5	3199.6	10	8208.2	4280.5	10	9957.5	5758.6
20	6868.8	3215.1	20	8233.7	4301.4			

TABLE VII.—CORRECTIONS FOR TANGENTS AND EXTERNALS

These corrections are to be added to the approximate values, found by dividing the tangent, or external, for a 1° curve (Table VI) by the degree of curve, in order to obtain the true tangents, or externals. Intermediate values may be obtained by interpolation.

FOR TANGENTS ADD

Central Angle	DEGREE OF CURVE													
	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
10°	.03	.06	.09	.13	.16	.19	.22	.25	.28	.31	.34	.38	.42	.46
15°	.04	.10	.14	.19	.24	.29	.34	.39	.45	.51	.58	.65	.72	.79
20°	.06	.13	.19	.26	.32	.39	.45	.51	.58	.65	.72	.79	.84	.90
25°	.08	.16	.24	.33	.40	.49	.58	.67	.75	.83	.90	.99	1.06	1.14
30°	.10	.19	.29	.39	.49	.59	.69	.79	.89	.99	1.09	1.20	1.29	1.39
35°	.11	.22	.34	.47	.58	.69	.79	.89	1.04	1.29	1.42	1.54	1.66	
40°	.13	.26	.40	.53	.67	.80	.93	1.06	1.20	1.34	1.49	1.64	1.79	1.91
45°	.15	.30	.44	.60	.76	.91	1.06	1.21	1.37	1.52	1.70	1.87	2.04	2.21
50°	.17	.34	.51	.68	.85	1.02	1.19	1.36	1.54	1.72	1.91	2.10	2.29	2.48
55°	.19	.38	.57	.76	.95	1.14	1.32	1.52	1.72	1.92	2.14	2.35	2.56	2.77
60°	.21	.42	.63	.84	1.05	1.27	1.49	1.71	1.94	2.17	2.38	2.60	2.83	3.07
65°	.23	.46	.69	.93	1.16	1.40	1.64	1.88	2.13	2.38	2.63	2.88	3.13	3.39
70°	.25	.51	.76	1.02	1.28	1.54	1.80	2.06	2.33	2.60	2.88	3.16	3.44	3.72
75°	.27	.56	.83	1.12	1.40	1.69	1.98	2.27	2.57	2.87	3.16	3.47	3.78	4.09
80°	.30	.61	.91	1.22	1.53	1.84	2.15	2.46	2.78	3.10	3.43	3.78	4.12	4.46
85°	.33	.66	1.00	1.33	1.68	2.02	2.36	2.70	3.05	3.40	3.77	4.14	4.55	4.89
90°	.36	.72	1.09	1.45	1.83	2.20	2.57	2.94	3.32	3.70	4.10	4.50	4.91	5.32
95°	.39	.79	1.19	1.55	2.00	2.40	2.80	3.20	3.61	4.02	4.40	4.83	5.33	5.83
100°	.43	.86	1.30	1.74	2.18	2.62	3.06	3.50	3.95	4.40	4.88	5.37	5.85	6.34
110°	.51	1.03	1.56	2.08	2.61	3.14	3.67	4.21	4.76	5.31	5.86	6.43	7.01	7.60
120°	.62	1.25	1.93	2.52	3.16	3.81	4.45	5.11	5.77	6.44	7.12	7.80	8.50	9.22

FOR EXTERNALS ADD

Central Angle	DEGREE OF CURVE													
	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
10°	.001	.003	.004	.006	.007	.008	.009	.011	.012	.014	.015	.017	.018	.020
15°	.003	.007	.010	.014	.018	.023	.027	.032	.037	.043	.049	.055	.061	.067
20°	.006	.011	.017	.022	.028	.034	.038	.045	.051	.057	.063	.070	.076	.082
25°	.009	.018	.027	.036	.046	.056	.065	.074	.083	.093	.106	.120	.127	.135
30°	.013	.025	.038	.051	.065	.078	.090	.103	.116	.129	.149	.170	.188	
35°	.018	.035	.054	.072	.086	.109	.131	.153	.175	.197	.213	.230	.247	.264
40°	.023	.046	.070	.093	.117	.141	.172	.203	.234	.265	.277	.290	.315	.341
45°	.030	.060	.093	.119	.153	.184	.216	.254	.289	.325	.351	.378	.411	.445
50°	.037	.075	.116	.151	.189	.227	.266	.305	.345	.384	.425	.467	.508	.550
55°	.046	.093	.142	.188	.236	.283	.332	.381	.420	.479	.530	.582	.641	.700
60°	.056	.112	.168	.225	.283	.340	.398	.457	.516	.575	.636	.697	.774	.851
65°	.067	.135	.204	.273	.343	.412	.483	.554	.625	.697	.771	.845	.922	1.01
70°	.080	.159	.240	.321	.403	.485	.568	.652	.735	.819	.906	.994	1.08	1.17
75°	.095	.182	.266	.353	.439	.528	.617	.707	.797	.877	.971	1.07	1.18	1.29
80°	.110	.220	.332	.445	.558	.671	.787	.903	1.02	1.13	1.25	1.38	1.50	1.62
85°	.128	.259	.391	.524	.657	.790	.926	1.06	1.20	1.34	1.47	1.62	1.76	1.91
90°	.149	.299	.450	.603	.756	.910	1.07	1.22	1.38	1.54	1.70	1.87	2.03	2.20
95°	.174	.350	.522	.706	.895	1.06	1.25	1.43	1.62	1.80	1.99	2.18	2.38	2.58
100°	.200	.401	.604	.809	1.01	1.22	1.43	1.64	1.85	2.06	2.28	2.50	2.73	2.96
110°	.268	.536	.806	1.08	1.35	1.63	1.91	2.20	2.48	2.76	3.05	3.35	3.66	3.96
120°	.360	.721	1.08	1.45	1.82	2.19	2.57	2.95	3.33	3.72	4.11	4.50	4.91	5.32

TABLE VIII.—CORRECTIONS FOR SUB-CHORDS AND LONG CHORDS

D	FOR SUB-CHORDS ADD									Excess of Arc per 100 ft.	LONG CHORDS				
	10	20	30	40	50	60	70	80	90		200	300	400	500	
4°	.00	.00	.01	.01	.01	.01	.01	.01	.00	.02	1	199.99	299.97	399.92	499.85
6	.00	.01	.01	.02	.02	.02	.02	.01	.01	.05	2	199.97	299.88	399.70	499.39
8	.01	.02	.02	.03	.03	.03	.03	.02	.01	.08	3	199.93	299.73	399.32	498.63
10	.01	.02	.03	.04	.05	.05	.05	.04	.02	.13	4	199.88	299.51	398.78	497.87
12	.02	.04	.05	.06	.07	.07	.07	.05	.03	.18	5	199.81	299.24	398.10	496.20
14	.02	.05	.07	.08	.09	.10	.09	.07	.04	.25	6	199.73	298.90	397.26	494.53
16	.03	.06	.09	.11	.12	.12	.12	.09	.05	.33	7	199.63	298.51	396.28	492.87
18	.04	.08	.11	.14	.15	.16	.15	.12	.07	.41	8	199.51	298.05	395.14	490.31
20	.05	.10	.14	.17	.19	.20	.18	.15	.09	.51	9	199.38	297.54	393.86	487.75
22	.06	.12	.17	.21	.23	.24	.22	.18	.10	.62	10	199.24	296.96	392.42	484.90
24	.07	.14	.20	.25	.28	.28	.26	.21	.12	.74	12	198.90	295.63	389.12	478.34
26	.09	.17	.24	.29	.32	.33	.31	.25	.15	.86	14	198.51	294.06	385.22	470.65
28	.10	.19	.27	.34	.37	.38	.36	.29	.17	1.00	16	198.05	292.25	380.76	461.86
30	.11	.22	.31	.39	.43	.44	.41	.33	.19	1.15	18	197.54	290.21	375.74	452.02
32	.13	.25	.36	.44	.49	.50	.47	.38	.22	1.31	20	196.96	287.94	370.17	441.15
34	.15	.28	.40	.50	.55	.57	.55	.43	.25	1.48	22	196.32	285.44	364.06	429.30
36	.17	.32	.45	.56	.62	.64	.64	.49	.28	1.66	24	195.63	282.71	357.43	416.53
38	.18	.36	.51	.62	.70	.71	.69	.53	.31	1.86	26	194.87	279.76	350.30	402.89
40	.21	.40	.56	.69	.77	.79	.78	.59	.35	2.06	28	194.06	276.59	342.69	388.43
42	.23	.44	.62	.76	.85	.87	.81	.65	.38	2.28	30	193.18	273.20	334.61	373.20
44	.25	.48	.68	.84	.94	.96	.89	.72	.42	2.50	32	192.25	269.61	326.08	357.28
46	.27	.52	.75	.92	1.02	1.05	.98	.78	.46	2.74	34	191.26	265.81	317.12	340.73
48	.30	.57	.81	1.00	1.12	1.14	1.06	.86	.50	2.99	36	190.19	261.80	307.77	323.61
50	.32	.62	.89	1.09	1.21	1.24	1.15	.93	.55	3.24	38	189.10	257.60	298.03	305.99
52	.35	.67	.96	1.18	1.31	1.35	1.25	1.01	.59	3.52	40	187.94	253.21	287.94	287.94
54	.38	.73	1.04	1.28	1.42	1.46	1.35	1.09	.64	3.80	42	186.72	248.63	277.51	269.54
56	.41	.78	1.12	1.38	1.53	1.57	1.46	1.17	.69	4.09	44	185.44	243.87	266.78	250.85
58	.44	.84	1.20	1.48	1.65	1.69	1.57	1.26	.74	4.40	46	184.10	239.93	255.78	231.95
60	.47	.91	1.29	1.59	1.76	1.81	1.68	1.35	.80	4.72	48	182.71	233.83	244.51	212.92

NOTE.—When a chord of less than 100 ft. is used the corrections given in the above table should be added to the nominal length of chord to get the length which should be used in order that the 100 ft. points will check with those obtained by using the standard 100 ft. chord. Thus in locating a 14° curve by 25 ft. chords measure 25'.06 for each chord. Long chords are useful in passing obstacles.

TABLE IX.—MIDDLE ORDINATES FOR RAILS IN FEET

Deg. of Curve	LENGTH OF RAILS							Deg. of Curve	LENGTH OF RAILS						
	32	30	28	26	24	22	20		32	30	28	26	24	22	20
1°	.022	.020	.016	.013	.011	.009	.008	16°	.356	.313	.273	.236	.200	.170	.139
2	.045	.038	.034	.029	.025	.021	.017	17	.378	.333	.290	.252	.213	.180	.148
3	.037	.058	.051	.044	.037	.031	.026	18	.400	.351	.306	.265	.225	.190	.156
4	.089	.079	.069	.060	.050	.042	.035	19	.423	.371	.324	.280	.238	.201	.165
5	.112	.099	.086	.074	.063	.053	.044	20	.445	.392	.341	.296	.250	.212	.174
6	.134	.117	.102	.088	.076	.064	.052	21	.466	.410	.357	.309	.262	.222	.182
7	.156	.137	.120	.104	.088	.074	.061	22	.487	.430	.375	.325	.275	.233	.191
8	.179	.158	.137	.119	.100	.085	.070	23	.509	.450	.390	.338	.287	.243	.199
9	.201	.175	.153	.133	.112	.095	.078	24	.531	.469	.408	.354	.299	.253	.208
10	.223	.196	.171	.148	.125	.106	.087	25	.552	.486	.424	.367	.311	.263	.216
11	.245	.216	.188	.163	.139	.117	.096	26	.573	.506	.441	.382	.323	.274	.225
12	.268	.236	.206	.179	.151	.128	.108	27	.594	.524	.457	.396	.335	.284	.233
13	.290	.254	.222	.192	.163	.138	.118	28	.618	.545	.475	.411	.348	.294	.242
14	.312	.275	.239	.20											

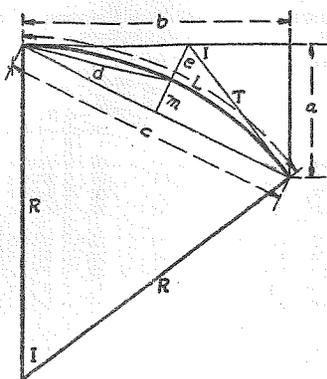


TABLE X
CURVE FORMULAE FOR SIMPLE CURVES
COMPILED BY J. CALVIN LOCKE, C.E.

- (1) $c = \sqrt{2Ra}$ (2) $c = \sqrt{a^2 + b^2}$
 (3) $c = \sqrt{2R(R - \sqrt{(R+b)(R-b)})} = \sqrt{2R(R - \sqrt{R^2 - b^2})}$
 (4) $c = 2\sqrt{m(2R - m)}$
 (5) $c = 2R \sin \frac{1}{2} I$ (6) $c = 2T \cos \frac{1}{2} I$
 (7) $e = R \operatorname{exsec} \frac{1}{2} I$
 (8) $e = R \tan \frac{1}{2} I \tan \frac{1}{4} I$ (9) $e = T \tan \frac{1}{4} I$
 (10) $b = \sqrt{a(2R - a)}$
 (11) $b = \sqrt{\left(c + \frac{c^2}{2R}\right)\left(c - \frac{c^2}{2R}\right)} = \sqrt{c^2 - \frac{c^4}{4R^2}}$
 (12) $b = R \sin I$ (13) $b = a \cot \frac{1}{2} I$
 (14) $R = \frac{a^2 + b^2}{2a} = \frac{c^2}{2a}$ (15) $R = \frac{d^2}{2m} = \frac{c^2 + 4m^2}{8m}$
 (16) $d = \sqrt{R(2R - \sqrt{(2R+c)(2R-c)})} = \sqrt{R(2R - \sqrt{4R^2 - c^2})}$
 (17) $d = \sqrt{2Rm}$ (18) $d = 2R \sin \frac{1}{4} I$ (19) $m = \frac{d^2}{2R}$
 (20) $m = R = \sqrt{\left(R + \frac{c}{2}\right)\left(R - \frac{c}{2}\right)} = R = \sqrt{R^2 - \frac{c^2}{4}}$
 (21) $m = R \operatorname{vers} \frac{1}{2} I$ (22) $m = R \sin \frac{1}{2} I \tan \frac{1}{4} I$ (23) $m = \frac{1}{2} c \tan \frac{1}{4} I$
 (24) $a = \frac{c^2}{2R}$ (25) $a = R - \sqrt{(R+b)(R-b)} = R - \sqrt{R^2 - b^2}$
 (26) $a = 2R(\sin^2 \frac{1}{2} I)^2$ (27) $a = R \operatorname{vers} I$ (28) $a = R \sin I \tan \frac{1}{2} I$
 (29) $a = b \tan \frac{1}{2} I$ (30) $a = T \sin I$ (31) $T = R \tan \frac{1}{2} I$
 (32) $I = \frac{L}{R} \times 57.295780$ (33) $R = \frac{L}{I} \times 57.295780$
 (34) $L = IR \times 0.01745329$ (35) $L = \frac{8d - c}{3}$
 (36) $\text{Area Seg.} = \frac{LR - R^2 \sin I}{2} = \frac{LR - Rb}{2}$

TABLE XI.—CALCULATION OF EARTHWORK

Width	HEIGHT														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	.02	.04	.06	.07	.09	.11	.13	.15	.17	.18	.20	.22	.24	.26	.28
2	.04	.07	.11	.15	.18	.22	.26	.30	.33	.37	.41	.44	.48	.52	.56
3	.06	.11	.17	.22	.28	.33	.39	.44	.50	.56	.61	.67	.72	.78	.83
4	.07	.15	.22	.30	.37	.44	.52	.59	.67	.74	.81	.89	.96	1.04	1.11
5	.09	.19	.28	.37	.46	.56	.65	.74	.83	.93	1.02	1.11	1.20	1.30	1.39
6	.11	.22	.33	.44	.56	.67	.78	.89	1.00	1.11	1.22	1.33	1.44	1.55	1.67
7	.13	.26	.39	.52	.65	.78	.91	1.04	1.16	1.30	1.42	1.55	1.68	1.81	1.94
8	.15	.30	.44	.59	.74	.89	1.04	1.19	1.33	1.48	1.63	1.78	1.92	2.08	2.22
9	.17	.33	.50	.67	.83	1.00	1.17	1.33	1.50	1.67	1.83	2.00	2.17	2.33	2.50
10	.18	.37	.56	.74	.93	1.11	1.30	1.48	1.67	1.85	2.04	2.22	2.41	2.59	2.78
11	.20	.41	.61	.82	1.02	1.22	1.43	1.63	1.83	2.04	2.24	2.44	2.65	2.85	3.06
12	.22	.44	.67	.89	1.11	1.33	1.56	1.78	2.00	2.22	2.44	2.67	2.89	3.11	3.33
13	.24	.48	.72	.96	1.20	1.44	1.68	1.92	2.16	2.41	2.65	2.89	3.13	3.37	3.61
14	.26	.52	.78	1.04	1.30	1.55	1.81	2.08	2.33	2.59	2.85	3.11	3.37	3.63	3.89
15	.28	.56	.83	1.11	1.39	1.67	1.94	2.22	2.50	2.78	3.06	3.33	3.61	3.89	4.17
16	.30	.59	.89	1.18	1.48	1.78	2.07	2.37	2.67	2.96	3.26	3.56	3.85	4.15	4.44
17	.31	.63	.94	1.26	1.57	1.89	2.20	2.52	2.83	3.13	3.46	3.78	4.09	4.41	4.72
18	.33	.67	1.00	1.33	1.67	2.00	2.33	2.67	3.00	3.33	3.67	4.00	4.33	4.67	5.00
19	.35	.70	1.06	1.41	1.76	2.11	2.46	2.82	3.17	3.52	3.87	4.22	4.57	4.92	5.28
20	.37	.74	1.11	1.48	1.85	2.22	2.59	2.96	3.33	3.70	4.07	4.44	4.81	5.18	5.56
21	.39	.78	1.17	1.55	1.94	2.33	2.72	3.11	3.50	3.89	4.28	4.67	5.06	5.44	5.83
22	.41	.81	1.22	1.63	2.04	2.44	2.85	3.26	3.67	4.07	4.48	4.89	5.30	5.70	6.11
23	.43	.85	1.28	1.70	2.13	2.56	2.98	3.41	3.83	4.26	4.68	5.11	5.54	5.96	6.39
24	.44	.89	1.33	1.78	2.22	2.67	3.11	3.56	4.00	4.44	4.89	5.33	5.78	6.22	6.67
25	.46	.92	1.39	1.85	2.31	2.78	3.24	3.70	4.17	4.63	5.09	5.56	6.02	6.48	6.94
26	.48	.96	1.44	1.92	2.41	2.89	3.37	3.85	4.33	4.82	5.30	5.78	6.26	6.74	7.24
27	.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
28	.52	1.04	1.55	2.07	2.59	3.11	3.63	4.15	4.67	5.18	5.70	6.22	6.74	7.26	7.78
29	.54	1.07	1.61	2.15	2.68	3.22	3.76	4.30	4.83	5.37	5.91	6.44	6.98	7.52	8.06
30	.56	1.11	1.67	2.22	2.78	3.33	3.89	4.44	5.00	5.55	6.11	6.67	7.22	7.78	8.33
31	.57	1.15	1.72	2.30	2.87	3.44	4.02	4.59	5.17	5.74	6.32	6.89	7.46	8.04	8.61
32	.59	1.18	1.78	2.37	2.96	3.56	4.15	4.74	5.33	5.92	6.52	7.11	7.70	8.30	8.89
33	.61	1.22	1.83	2.44	3.05	3.67	4.28	4.89	5.50	6.11	6.72	7.33	7.94	8.55	9.17
34	.63	1.26	1.89	2.52	3.15	3.78	4.40	5.04	5.67	6.29	6.93	7.56	8.18	8.81	9.44
35	.65	1.30	1.94	2.59	3.24	3.89	4.53	5.18	5.83	6.48	7.13	7.78	8.42	9.08	9.72
36	.67	1.33	2.00	2.67	3.33	4.00	4.66	5.33	6.00	6.67	7.33	8.00	8.67	9.33	10.00
37	.68	1.37	2.06	2.74	3.42	4.11	4.79	5.48	6.17	6.85	7.54	8.22	8.91	9.59	10.28
38	.70	1.41	2.12	2.82	3.52	4.22	4.92	5.63	6.33	7.03	7.74	8.44	9.15	9.85	10.56
39	.72	1.44	2.17	2.89	3.61	4.33	5.05	5.78	6.50	7.22	7.95	8.67	9.39	10.11	10.83
40	.74	1.48	2.22	2.96	3.70	4.44	5.18	5.92	6.67	7.41	8.16	8.89	9.63	10.37	11.11

Table gives cu. yds. in 1 ft. of a triangle of given width and height. Corrections for tenths of width are one tenth the values found under each height considering the widths from 1 to 9 as tenths and similarly the corrections for tenths of height are one tenth the figures opposite width considering the heights from 1 to 9 as tenths. Thus if $w = 16.2$ and $h = 5.3$, cu. yds. = $1.48 + .028 + .089 = 1.597$ cu. yds. or practically 160 cu. yds. per 100 ft. If w exceeds 40 ft., use one-half and multiply result by 2, if both w and h are large use one-half of each and multiply result by 4. Any cross-section may be divided into triangles by the following rule. To the triangle of the sum of the outside outs (or fills) = h , and $\frac{1}{2}$ the roadbed = w , add the triangles formed by taking the distance out to each break in turn (= w 's) by the difference between the cuts (or fills) on each side of it (= h 's) always subtracting the outer from the inner.

TABLE XII. STADIA REDUCTIONS
VERTICAL HEIGHTS

Minutes	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°
0	0.00	1.74	3.49	5.23	6.96	8.68	10.40	12.10	13.78	15.45	17.10
2	0.06	1.80	3.55	5.28	7.02	8.74	10.45	12.15	13.84	15.51	17.16
4	0.12	1.86	3.60	5.34	7.07	8.80	10.51	12.21	13.89	15.56	17.21
6	0.17	1.92	3.66	5.40	7.13	8.85	10.57	12.26	13.95	15.62	17.26
8	0.23	1.98	3.72	5.46	7.19	8.91	10.62	12.32	14.01	15.67	17.32
10	0.29	2.04	3.78	5.52	7.25	8.97	10.68	12.38	14.06	15.73	17.37
12	0.35	2.09	3.84	5.57	7.30	9.03	10.74	12.43	14.12	15.78	17.43
14	0.41	2.15	3.90	5.63	7.36	9.08	10.79	12.49	14.17	15.84	17.48
16	0.47	2.21	3.95	5.69	7.42	9.14	10.85	12.55	14.23	15.89	17.54
18	0.52	2.27	4.01	5.75	7.48	9.20	10.91	12.60	14.28	15.95	17.59
20	0.58	2.33	4.07	5.80	7.53	9.25	10.96	12.66	14.34	16.00	17.65
22	0.64	2.38	4.13	5.86	7.59	9.31	11.02	12.72	14.40	16.06	17.70
24	0.70	2.44	4.18	5.92	7.65	9.37	11.08	12.77	14.45	16.11	17.76
26	0.76	2.50	4.24	5.98	7.71	9.43	11.13	12.83	14.51	16.17	17.81
28	0.81	2.56	4.30	6.04	7.76	9.48	11.19	12.88	14.56	16.22	17.86
30	0.87	2.62	4.36	6.09	7.82	9.54	11.25	12.94	14.62	16.28	17.92
32	0.93	2.67	4.42	6.15	7.88	9.60	11.30	13.00	14.67	16.33	17.97
34	0.99	2.73	4.48	6.21	7.94	9.65	11.36	13.05	14.73	16.39	18.03
36	1.05	2.79	4.53	6.27	7.99	9.71	11.42	13.11	14.79	16.44	18.08
38	1.11	2.85	4.59	6.33	8.05	9.77	11.47	13.17	14.84	16.50	18.14
40	1.16	2.91	4.65	6.38	8.11	9.83	11.53	13.22	14.90	16.55	18.19
42	1.22	2.97	4.71	6.44	8.17	9.88	11.59	13.28	14.95	16.61	18.24
44	1.28	3.02	4.76	6.50	8.22	9.94	11.64	13.33	15.01	16.66	18.30
46	1.34	3.08	4.82	6.56	8.28	10.00	11.70	13.39	15.06	16.72	18.35
48	1.40	3.14	4.88	6.61	8.34	10.05	11.76	13.45	15.12	16.77	18.41
50	1.45	3.20	4.94	6.67	8.40	10.11	11.81	13.50	15.17	16.83	18.46
52	1.51	3.26	4.99	6.73	8.45	10.17	11.87	13.56	15.23	16.88	18.51
54	1.57	3.31	5.05	6.79	8.51	10.22	11.93	13.61	15.28	16.94	18.57
56	1.63	3.37	5.11	6.84	8.57	10.28	11.98	13.67	15.34	16.99	18.62
58	1.69	3.43	5.17	6.90	8.63	10.34	12.04	13.73	15.40	17.05	18.68
60	1.74	3.49	5.23	6.96	8.68	10.40	12.10	13.78	15.45	17.10	18.73

HORIZONTAL CORRECTIONS

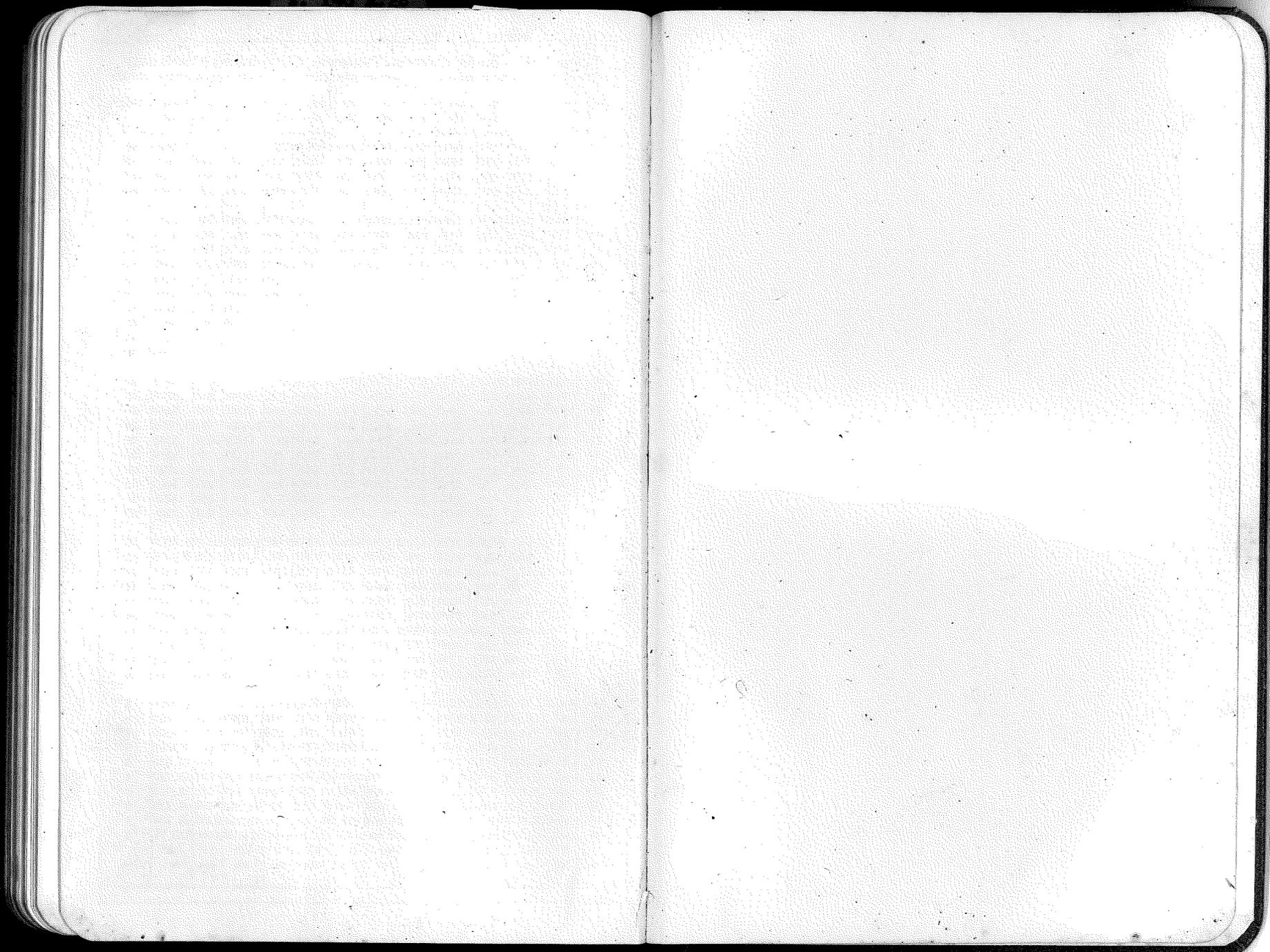
Dist.	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°
100	0.0	0.0	0.1	0.3	0.5	0.8	1.1	1.5	1.9	2.5	3.0
200	0.0	0.1	0.2	0.5	1.0	1.5	2.2	3.0	3.9	4.9	6.0
300	0.0	0.1	0.4	0.8	1.5	2.3	3.3	4.5	5.8	7.4	9.1
400	0.0	0.1	0.5	1.1	2.0	3.0	4.4	6.0	7.8	9.8	12.1
500	0.0	0.2	0.6	1.4	2.5	3.8	5.5	7.5	9.7	12.3	15.1
600	0.0	0.2	0.7	1.6	2.9	4.6	6.5	8.9	11.6	14.7	18.1
700	0.0	0.2	0.8	1.9	3.4	5.3	7.6	10.4	13.6	17.2	21.1
800	0.0	0.2	1.0	2.2	3.9	6.1	8.7	11.9	15.5	19.6	24.2
900	0.0	0.3	1.1	2.4	4.4	6.8	9.8	13.4	17.5	22.1	27.2
1000	0.0	0.3	1.2	2.7	4.9	7.6	10.9	14.9	19.4	24.5	30.2

TABLE XII. STADIA REDUCTIONS
VERTICAL HEIGHTS

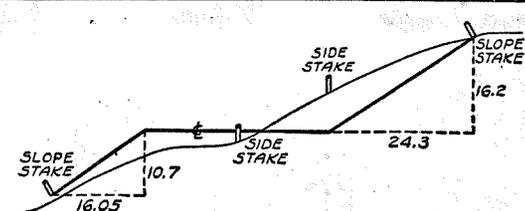
Minutes	11°	12°	13°	14°	15°	16°	17°	18°	19°	20°
0	18.73	20.34	21.92	23.47	25.00	26.50	27.96	29.39	30.78	32.14
2	18.78	20.39	21.97	23.52	25.05	26.55	28.01	29.44	30.83	32.18
4	18.84	20.44	22.02	23.58	25.10	26.59	28.06	29.48	30.87	32.23
6	18.89	20.50	22.08	23.63	25.15	26.64	28.10	29.53	30.92	32.27
8	18.95	20.55	22.13	23.68	25.20	26.69	28.15	29.58	30.97	32.32
10	19.00	20.60	22.18	23.73	25.25	26.74	28.20	29.62	31.01	32.36
12	19.05	20.66	22.23	23.78	25.30	26.79	28.25	29.67	31.06	32.41
14	19.11	20.71	22.28	23.83	25.35	26.84	28.30	29.72	31.10	32.45
16	19.16	20.76	22.34	23.88	25.40	26.89	28.34	29.76	31.15	32.49
18	19.21	20.81	22.39	23.93	25.45	26.94	28.39	29.81	31.19	32.54
20	19.27	20.87	22.44	23.99	25.50	26.99	28.44	29.86	31.24	32.58
22	19.32	20.92	22.49	24.04	25.55	27.04	28.49	29.90	31.28	32.63
24	19.38	20.97	22.54	24.09	25.60	27.09	28.54	29.95	31.33	32.67
26	19.43	21.03	22.60	24.14	25.65	27.13	28.58	30.00	31.38	32.72
28	19.48	21.08	22.65	24.19	25.70	27.18	28.63	30.04	31.42	32.76
30	19.54	21.13	22.70	24.24	25.75	27.23	28.68	30.09	31.47	32.80
32	19.59	21.18	22.75	24.29	25.80	27.28	28.73	30.14	31.51	32.85
34	19.64	21.24	22.80	24.34	25.85	27.33	28.77	30.19	31.56	32.89
36	19.70	21.29	22.85	24.39	25.90	27.38	28.82	30.23	31.60	32.93
38	19.75	21.34	22.91	24.44	25.95	27.43	28.87	30.28	31.65	32.98
40	19.80	21.39	22.96	24.49	26.00	27.48	28.92	30.32	31.69	33.02
42	19.86	21.45	23.01	24.55	26.05	27.52	28.96	30.37	31.74	33.07
44	19.91	21.50	23.06	24.60	26.10	27.57	29.01	30.41	31.78	33.11
46	19.96	21.55	23.11	24.65	26.15	27.62	29.06	30.46	31.83	33.15
48	20.02	21.60	23.16	24.70	26.20	27.67	29.11	30.51	31.87	33.20
50	20.07	21.66	23.22	24.75	26.25	27.72	29.15	30.55	31.92	33.24
52	20.12	21.71	23.27	24.80	26.30	27.77	29.20	30.60	31.96	33.28
54	20.18	21.76	23.32	24.85	26.35	27.81	29.25	30.65	32.01	33.33
56	20.23	21.81	23.37	24.90	26.40	27.86	29.30	30.69	32.05	33.37
58	20.28	21.87	23.42	24.95	26.45	27.91	29.34	30.74	32.09	33.41
60	20.34	21.92	23.47	25.00	26.50	27.96	29.39	30.78	32.14	33.46

HORIZONTAL CORRECTIONS

District	11°	12°	13°	14°	15°	16°	17°	18°	19°	20°
100	3.6	4.3	5.1	5.9	6.7	7.6	8.5	9.5	10.6	11.7
200	7.3	8.6	10.1	11.7	13.4	15.2	17.1	19.1	21.2	23.4
300	10.9	13.0	15.2	17.6	20.1	22.8	25.6	28.6	31.8	35.1
400	14.6	17.3	20.2	23.4	26.8	30.4	34.2	38.2	42.4	46.8
500	18.2	21.6	25.3	29.3	33.5	38.0	42.7	47.7	53.0	58.5
600	21.8	25.9	30.4	35.1	40.2	45.6	51.3	57.3	63.6	70.2
700	25.5	30.2	35.4	41.0	46.9	53.2	59.8	66.8	74.2	81.9
800	29.1	34.6	40.5	46.8	53.6	60.8	68.4	76.4	84.8	93.6
900	32.8	38.9	45.5	52.7	60.3	68.4	76.9	85.9	95.4	105.3
1000	36.4	43.2	50.6	58.5	67.0	76.0	85.5	95.5	106.0	117.0



5280
 142
 5422



DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING
 SLOPE 1 1/2 TO 1. ROADWAY OF ANY WIDTH

	0	1	2	3	4	5	6	7	8	9	
0	0.00	0.15	0.30	0.45	0.60	0.75	0.90	1.05	1.20	1.35	0
1	1.50	1.65	1.80	1.95	2.10	2.25	2.40	2.55	2.70	2.85	1
2	3.00	3.15	3.30	3.45	3.60	3.75	3.90	4.05	4.20	4.35	2
3	4.50	4.65	4.80	4.95	5.10	5.25	5.40	5.55	5.70	5.85	3
4	6.00	6.15	6.30	6.45	6.60	6.75	6.90	7.05	7.20	7.35	4
5	7.50	7.65	7.80	7.95	8.10	8.25	8.40	8.55	8.70	8.85	5
6	9.00	9.15	9.30	9.45	9.60	9.75	9.90	10.05	10.20	10.35	6
7	10.50	10.65	10.80	10.95	11.10	11.25	11.40	11.55	11.70	11.85	7
8	12.00	12.15	12.30	12.45	12.60	12.75	12.90	13.05	13.20	13.35	8
9	13.50	13.65	13.80	13.95	14.10	14.25	14.40	14.55	14.70	14.85	9
10	15.00	15.15	15.30	15.45	15.60	15.75	15.90	16.05	16.20	16.35	10
11	16.50	16.65	16.80	16.95	17.10	17.25	17.40	17.55	17.70	17.85	11
12	18.00	18.15	18.30	18.45	18.60	18.75	18.90	19.05	19.20	19.35	12
13	19.50	19.65	19.80	19.95	20.10	20.25	20.40	20.55	20.70	20.85	13
14	21.00	21.15	21.30	21.45	21.60	21.75	21.90	22.05	22.20	22.35	14
15	22.50	22.65	22.80	22.95	23.10	23.25	23.40	23.55	23.70	23.85	15
16	24.00	24.15	24.30	24.45	24.60	24.75	24.90	25.05	25.20	25.35	16
17	25.50	25.65	25.80	25.95	26.10	26.25	26.40	26.55	26.70	26.85	17
18	27.00	27.15	27.30	27.45	27.60	27.75	27.90	28.05	28.20	28.35	18
19	28.50	28.65	28.80	28.95	29.10	29.25	29.40	29.55	29.70	29.85	19
20	30.00	30.15	30.30	30.45	30.60	30.75	30.90	31.05	31.20	31.35	20
21	31.50	31.65	31.80	31.95	32.10	32.25	32.40	32.55	32.70	32.85	21
22	33.00	33.15	33.30	33.45	33.60	33.75	33.90	34.05	34.20	34.35	22
23	34.50	34.65	34.80	34.95	35.10	35.25	35.40	35.55	35.70	35.85	23
24	36.00	36.15	36.30	36.45	36.60	36.75	36.90	37.05	37.20	37.35	24
25	37.50	37.65	37.80	37.95	38.10	38.25	38.40	38.55	38.70	38.85	25
26	39.00	39.15	39.30	39.45	39.60	39.75	39.90	40.05	40.20	40.35	26
27	40.50	40.65	40.80	40.95	41.10	41.25	41.40	41.55	41.70	41.85	27
28	42.00	42.15	42.30	42.45	42.60	42.75	42.90	43.05	43.20	43.35	28
29	43.50	43.65	43.80	43.95	44.10	44.25	44.40	44.55	44.70	44.85	29
30	45.00	45.15	45.30	45.45	45.60	45.75	45.90	46.05	46.20	46.35	30
31	46.50	46.65	46.80	46.95	47.10	47.25	47.40	47.55	47.70	47.85	31
32	48.00	48.15	48.30	48.45	48.60	48.75	48.90	49.05	49.20	49.35	32
33	49.50	49.65	49.80	49.95	50.10	50.25	50.40	50.55	50.70	50.85	33
34	51.00	51.15	51.30	51.45	51.60	51.75	51.90	52.05	52.20	52.35	34
35	52.50	52.65	52.80	52.95	53.10	53.25	53.40	53.55	53.70	53.85	35
36	54.00	54.15	54.30	54.45	54.60	54.75	54.90	55.05	55.20	55.35	36
37	55.50	55.65	55.80	55.95	56.10	56.25	56.40	56.55	56.70	56.85	37
38	57.00	57.15	57.30	57.45	57.60	57.75	57.90	58.05	58.20	58.35	38
39	58.50	58.65	58.80	58.95	59.10	59.25	59.40	59.55	59.70	59.85	39
40	60.00	60.15	60.30	60.45	60.60	60.75	60.90	61.05	61.20	61.35	40
41	61.50	61.65	61.80	61.95	62.10	62.25	62.40	62.55	62.70	62.85	41
42	63.00	63.15	63.30	63.45	63.60	63.75	63.90	64.05	64.20	64.35	42
43	64.50	64.65	64.80	64.95	65.10	65.25	65.40	65.55	65.70	65.85	43
44	66.00	66.15	66.30	66.45	66.60	66.75	66.90	67.05	67.20	67.35	44
45	67.50	67.65	67.80	67.95	68.10	68.25	68.40	68.55	68.70	68.85	45
46	69.00	69.15	69.30	69.45	69.60	69.75	69.90	70.05	70.20	70.35	46
47	70.50	70.65	70.80	70.95	71.10	71.25	71.40	71.55	71.70	71.85	47
48	72.00	72.15	72.30	72.45	72.60	72.75	72.90	73.05	73.20	73.35	48
49	73.50	73.65	73.80	73.95	74.10	74.25	74.40	74.55	74.70	74.85	49
50	75.00	75.15	75.30	75.45	75.60	75.75	75.90	76.05	76.20	76.35	50

Distance of slope stake from side or shoulder stake for any width roadway, slope 1 1/2 to 1. If ground is nearly level, the cut or fill at side stake is located by the double entry method in left column and top row. The number in body of table in same row and column gives distance from side stake to slope stake. If ground is not level estimate the difference in elevation between the side stake and slope stake, lower target by this amount if cut, elevate if fill. Add this amount to cut or fill and find distance in table. Set up rod at this point, and line of sight should cut target. If it does not make the slight adjustment necessary.

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HARGO
FIELD BOOK