2

County Line

2

EUGENE DIETZGEN CO.

DRAWING MATERIALS, MATHEMATICAL and SURVEYING INSTRUMENTS

Chicago New York San Francisco New Orleans Pittsburg Toronto

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

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

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

Signs | Instruc- | 139-27 | 139-27 | 139-27 | 139-27 | 140-25

Chicag

H	
0	
1	
2	1
3	1
4	1
5	1
6	1
7	1
8	1
9	1
10	1
11	1
12	2
13	2
14	2
15	2
16	2
17	2
18	2
19	2
20	2
21	2
22	2
23	2
24	2
25	2
26	2
27	2
28	2
29	2
30	2
31	2
32	2
33	2
34	2
35	2
36	2
37	2
38	2
39	2
40	2

Ex
to be
of road
examp
30.6 =

Index in back

Soft Control Stakes at

330 ~~E.C.F. $\frac{1}{4}$ + S. $\frac{1}{3}$~~

660

990

1320 W.O.F. W-W H-C.B.

1650

1980

2310

2640 APP. $\frac{1}{4}$ Post

2970

3300

3630

3960 ~ App. $\frac{1}{4}$

4290

4620

4950

5280

East on random between S25 & 36 Var. 7° E

2.50	Left marsh - enter mixed brush.
8.50	Enter alder N & S
12.00	Leave alder N & S - enter Hb-III
14.00	Creek 40 links wide runs S.W.
20.00	Enter Ha-II
40.00	Set approximate 1/4. post.
43.00	Wagon road - N & S. End 2/5/37 Start 2/6/37
47.52	Fence N & S.
56.20	Enter Ss - 6-8
75.78	Enter Pn - 6-8
79.75	N & S line - 49 links south of corner to Secs. 25/36 End 2/6/37

B.T.s bear from corner.

White birch - 8 N 78 E - 33 lks.

Nor. pine - 20 N 70 W - 78 "

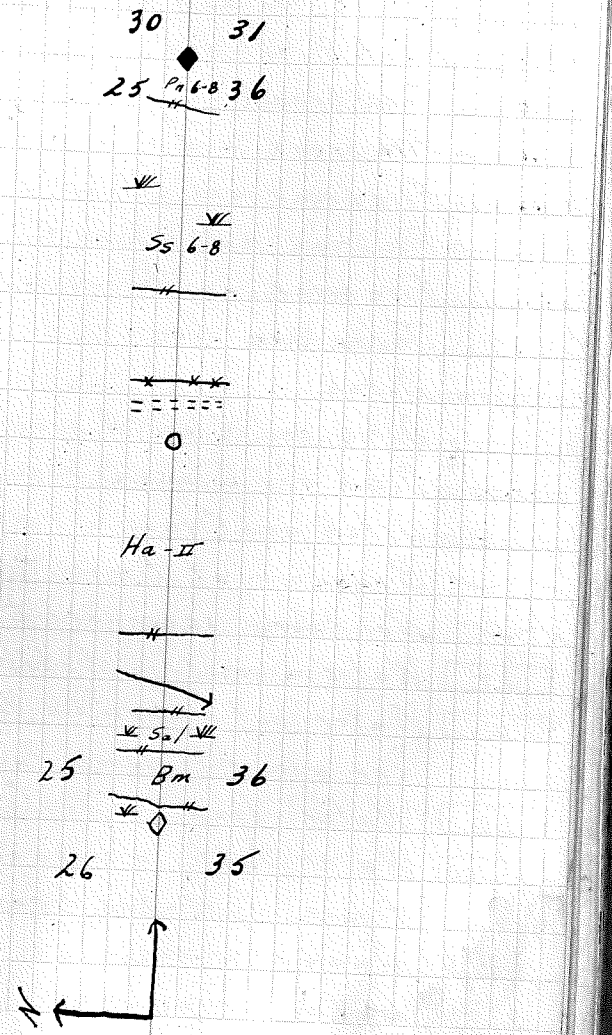
Corner post 2" I.P. in place.

Set 4" squared post with tag.

Date: 2/5/37, 2/6/37.

Party: Entire entire crew.

Weather: Clear & cold.



Conventional Signs

- Class A.-All weather road for auto or truck.
- Class B.-Dry weather road for auto or truck.
- Class C.- Wagon road-Usually not passable for auto or truck.
- Foot trail and portage.
- Fire break
- Fire break and Class A road.
- Fire break and Class B road.
- Fire break and Class C. road.
- Fire break and telephone line.
- Telephone line.
- Ditch
- Ditch and Class A road
- Ditch and Class B road
- Ditch and Class C road
- Boundary of timber type
- Boundary secondary timber type
- WT — Water accessible to truck for fire fighting
- W — Water not accessible to truck - can use for pump tanks.
- LD — Water loading dock.
- 16-100 — Water table designation - first figure, depth - 2nd figure, gal. per hour.
- Swamp or bog
- Lakes or ponds
- Spring
- Stream
- Intermittent stream or dry gully.
- Bridge on stream.
- Dam
- Well
- 1937 — Burn - give year of fire
- 2006 — High Hill.
- Ridge
- Lookout tower
- Rangers Headquarters (Includes Pat. & Lookouts)
- House
- House with telephone
- Cabin (Shack)
- Summer resort
- Camp ground.
- Original corner or B.T. found.
- Doubtful corner found.
- School
- Store or postoffice
- Saw mill
- Tool cache
- Logging Camp
- Fire Warden
- Fire foreman.
- Fence

Reconnaissance Symbols.

P- Upland Coniters

Pw - White pine
Pn - Norway pine
Pj - Jack pine
Ps - White spruce
Pba - Balsam
Pc - Cedar
Psb - Black spruce

H - Upland Hardwoods

Ha - Aspen
Hb - White birch
Hm - Mixed elm, basswood, maple, oak, etc.

B - Brush type

Bh - Hazel brush predominating
Bm - Mixed brush, willow, dogwood, fire cherry, highland alder, etc.

O - Open Wild Land Type

Ogr - Upland grass predominating
Ost - Sweet fern
Obh - Lake beach, dry mud flats
Obn - Newly burned areas.
Osl - Slash

S - Swamp Type

St - Tamarack
Ss - Black spruce
Sc - Cedar
Shm - Mixed swamp hardwoods

S - Swamp brush type

Sw - Willow
Sal - Tag alder
Sb - Bog or dwarf birch.

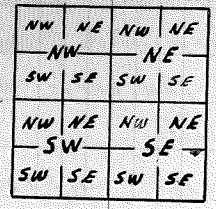
M - Marsh Types

Mgr - Wild hay meadow
Msc - Sedges predominating
Mbl - Blue joint.
Mlt - Labrador tea.
Mre - Reeds
Mct - Cat Tails.

Subdivision of a Township

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

Subdivision of a Section.



Instructions for Determining True Declination

Error, falling, alinement, tangential offset are synonomous terms, and are equivalent to a right angle measurement from actual or doubtful corner to point of intersection on random line.

Distance is the chained measurement from the starting point to the point of intersection.

Course is the line of run considering the declination used.

True declination is computed as follows:

1. To find error in degrees.

A.D. - $\frac{\text{Alinement distance}}{\text{Departure for 1° at distance}}$ = error plus or minus in declination

2. To find true declination.

A random line falling to the LEFT of the true or doubtful corner indicates too great a declination and the error is subtracted from the random declination while a random line falling to the right requires that the error be added to the declination used.

Left error - Subtract
Right error - Add

Example:

A.D. = $\frac{2.66}{1.33}$ left. $1.33\overline{)2.66}$ 2 / 2.66

D = 1.33

∴ 2° error to the left.

Random declination = 7°

True " = 7° minus 2° = 5°

∴ T.D. = 5°

Tables.

Departure for 1° at 80 chains = 1.4 ch. or 140 links.

" " 1° at 1 chain = $\frac{1.4}{80}$ = .0175 ch.

Distance x .0175 = Departure for 1° at that distance.

If the distance chained is more than one mile, the error is found by (1) dividing the total distance by two and (2) dividing the alinement error by two to get the proportions for a distance of one mile (more or less). The results are divided as in example.

The table following gives the offsets for 1° most likely to be used for the determination of the error when tying into a corner:

1/4 corner		Section Corner	
Chains	Offset	Chains	Offset
35	.6125 ch	70	1.225
36	.6300	71	1.2425
37	.6475	72	1.2600
38	.6650	73	1.2775
39	.6825	74	1.2950
40	.7000	75	1.3125
41	.7175	76	1.3300
42	.7350	77	1.3475
43	.7525	78	1.3650
44	.7700	79	1.3825
45	.7875	80	1.4000
		81	1.4175
		82	1.4350
		83	1.4525
		84	1.4700
		85	1.4875
		86	1.5050

139-27 139-27 139-27 139-25 26 140-25

West bedrock 29/3

Poplar II-IV

6. Left poplar. Enter marsh
15. " marsh " Poplar III-VI
19. " poplar " marsh
35 Left marsh Entered poplar III-IV Hazel Brush
40. set approximate ¼ post.
62. Poplar II-IV · Bm - Birch II-IV
80. Set Approximate

S 83° W

1.

Date: 3/6/37

Party: Modahl, Dunbar
Olander, Johnson, Miller
Damerow.

Weather, Clear, Cold

S 93° W

Birch grove

31 30
32 29

Ha-II-IV-Bm-Birch IV

Brush

Ha-IV-Bh

Mst
Ha-IV-II

32 Mst
Ha-I-IV

33 26

N

T30 R27 Line Runs West
West Boundary Sec. 30 & 31 - 139 - 27W

7. Entered marsh
7. Left marsh entered Hazel Brush
15. " Brush " " marsh
22. " marsh " " sal - Ha# - Hl#
25. White Pine 8-10 - Ha# - Hl# - Sal
40 Set approximate 1/4 post
47 Swamp
53 Shm
60 Swamp - St # - #
75 End of Swamp start of oak
76 Road - old R.R. grade.
77 N & S. line - 8.37 chs. So. of Sec. Cor. 25/30 & 36/31

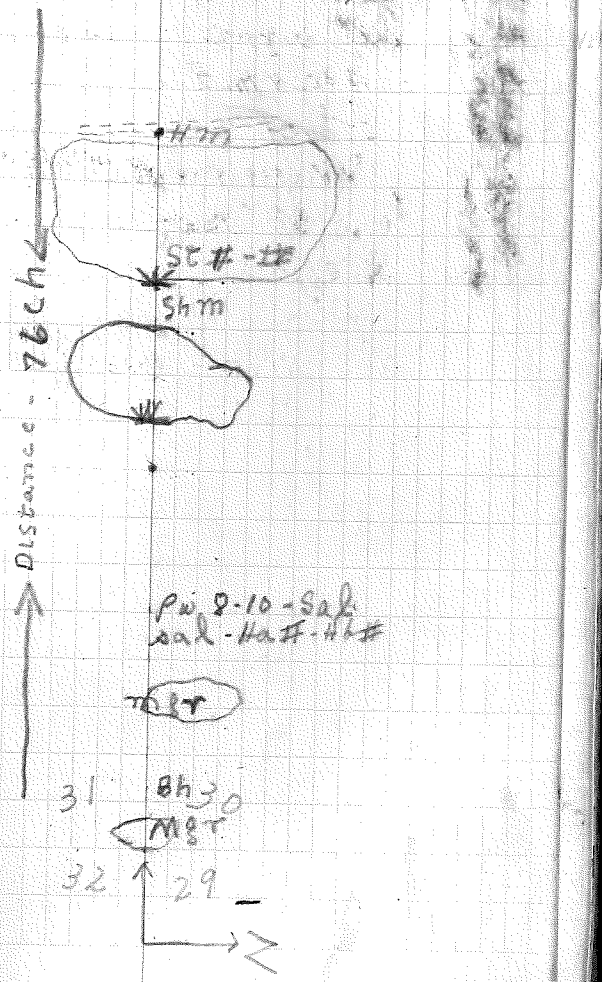
Tie made by Wilson & Engebretson 3/1/37

2.

S 83° W

Date 3/5/37

party Broadbent, Johnson
Langlee Hazzard
Ramsden
Weather, Clear, cool



L 7.27 Between Sec. 7-18
East Between Sec. 7/18-139-27
7 | 18
12 | 13
STARTED FROM I.P. MARKED
CHAINAGE on 3" Sq. CEDAR ST. WITH TAG.

10.00 ENTERED "HA" 2" 4'-6
" SET APP. 1/4 ST.

7.31 N&S. LINE - 10.33 CHS. No. OF
APP. 7/18 / 12/17 3" SQ ST. WITH TAG

15.00 SET REC. ST. - END.

3

T. 139 N - R 27 W.

MAR. 1937 - 9:45 A.M.
WEATHER
PARTLY = LIGHT RAIN
MODAUL & COMPASS
FREEDMAN-MAPPER
DANIELSON
(NAMS (-HATCHERS
JOHNSON-POD
SCUDDY
KOSKINEN-TRIED

N & E

8 ◇ 17
7 18 APP.

HA = 2' - 4"
APP. 1/4

HA = 0' - 2"
#2.0

HA = 0' - 2"
7 | 18
12 | 13

N

EAST BETWEEN S-31-6

CHAINAGE	
.00	STARTED FROM 2½" I.P. MARKED 36/31 1/6
21.00	ENTER P.W.° 12"- 24"
22.27	P.W. 22" ON LINE
37.50	ENTER HA°-HO°-0"-2"
40.00	SET APP 1/4 ST.
57.00	SMALL RIDGE
80.00	No + FOUND — SET 3" TEM. ST WITH TAG

T. 139-138 N.-R 27 W.

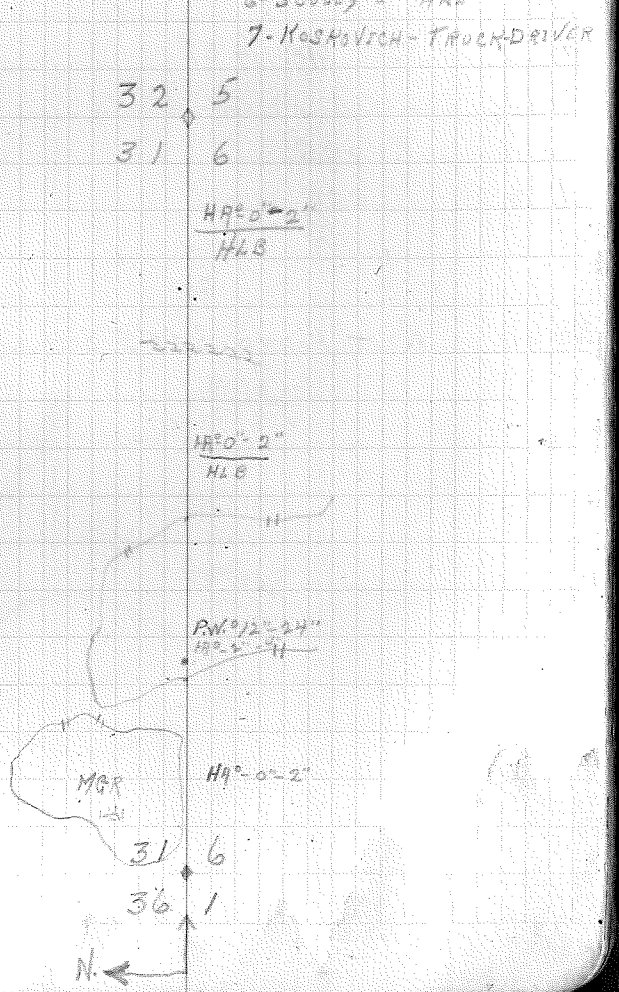
MAR. 4, 1937 — TIME 9:30 A.M. TO 10:55 A.M.

WEATHER-CLEAR-WIND S/W

PARTY

1- MCCANN - COMPASS
2- ENGEBRETSON-MAPPER
3- DANIELSON } -CHAINERS
4- HAMS }
5- JOHNSON, B. - POLE
6- SCULLY - AXE
7- KOSHOVICH - TRUCK-DRIVER

N 84° E



EAST BETWEEN SECS 32-5

CHAIN AGE	
.00	STARTED FROM 3" TRM. ST. APP. 31/6 32/5
16.00	TO LAKE SHORE
23.15	LEAVE LAKE
40.00	SET APP. 1/4 ST ?
46.00	ENTER HA'-2'-W HB
60.00	RIDGE
65.40	RIDGE
80.00	NO + FOUND - SET 3" SQ OAK ST.

T139-138N. R27W.

APR 4, 1937

TIME 10:45 A.M. T
PARTY 2:00 P.M.
1-MCDAHL - COMPASS
2- ENGEBRETSON - MAPPER
3- DAN ELSON
4-HOMS
5-JOHNSON - ROD
6-SCULLY - AXE
7- KOSKOVICH - T.D.

N 84° E

33 4
32 5

HB'-0-2"
HB-0-2"

HA'-2-W
HB 2-W

HA'-0-2"

LAKE

HB'-0-2"
HA'-0-2"

32 5
31 6

N.

East between Secs 33-4

Chaining

.00 Enter Ha-0-2 Ha-0-2 -Bm

20ch " Ha-IX-XI-Bm

40ch SET APP. Stake.

70ch Enter Ha-0-2

72.26ch N&S. Line - 1.64 Ch. No of App 3" Sq. Ha With Tag

T. 139 R. 27 W.

1138

N 84° E

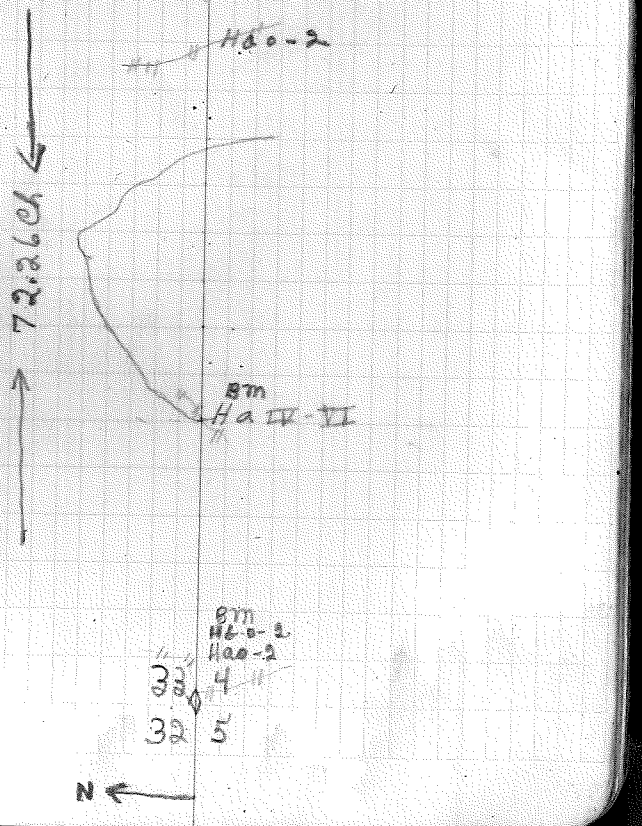
MAR. 5. 1937

Time - 9.20 - 1.0 pm

party.

1. Modahl - Compass
2. Danielson - Chain
3. Rolf - Axe
4. Johnson - Rod
5. Scully - Axe.
6. Cerkowniak - Chain

Weather - Clear - Warm



2

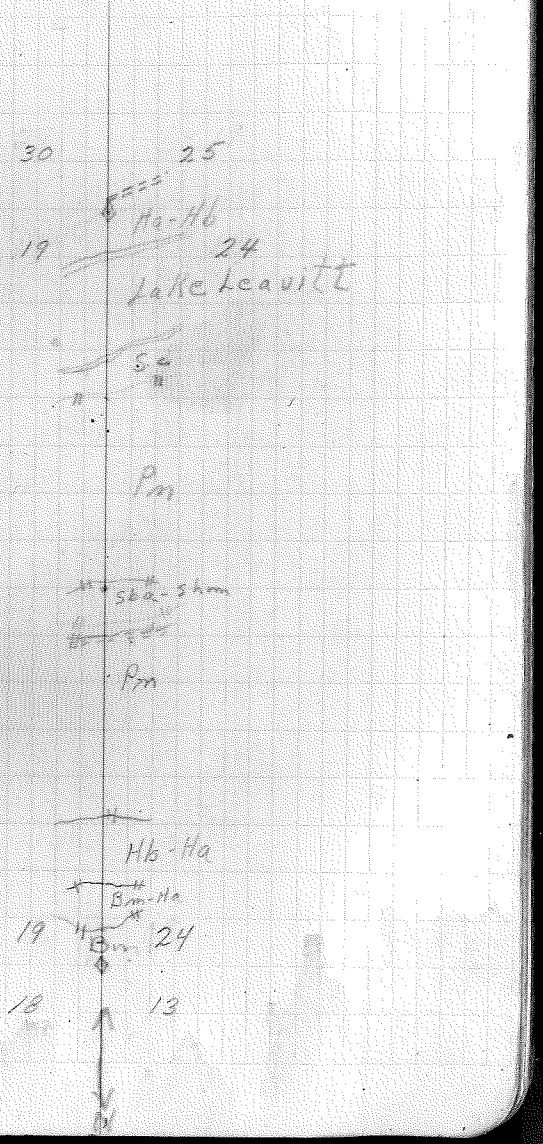
South on random line bet.
Secs 24/19 Twp. 139 N. R. 25-26 W.
Start South from Sec. cor. 13/18 24/19

3.00 Enter M sc
8.00 " Bm-Ha
16.00 Enter Hb-Ha
35.00 Road - Enter Pn
36.35 Enter Sba-Shm
40.30 Set App. ¼ Cor.
41.00 " Pn
61.00 Sc
63.61 Lake
M.C. 69 Lks. E. of Line at 63.21
4" Concrete post B.T. 14" Cedar
15 Lks. W. of M.C.
71.57 Enter Ha-Hb
79.37 Set App Sec Cor 22 Lks
East of Ran. Line

X

T. 139 R 25-24 Mar. 8, 1937

S 6° 30' E



South on Ran. Line bet. Sec's
25/30 Twp. 139 N. R. 25-26 W.

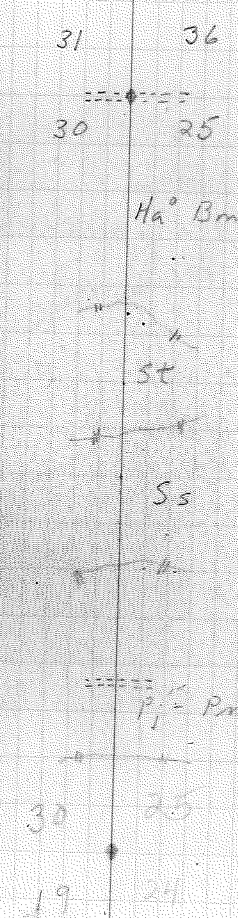
Start South from Sec. Cor. 26/19 over 25/30

11.00	Enter Pj 4-8" Pa
19.80	Out Pa - Swale Road
20.02	4" Cement Post 8 Lks. West of Ran. Line
31.00	Enter Ss
36.00	Enter Pj
39.96	Set App. ¼ Cor. Yellow tag on 7" Pj
44.00	Enter St
57.00	" Ha° Bm
80.00	Set App. Sec. Cor. in road 20 lks W. of Ran. line

T-139 R-25 R 26

Mar. 8, 1937

S 6° 30 E



EAST BETWEEN SEC. 29-32

80.00 SET 3" TAM ST WITH TAG. EDGE OF DEAD TAM No + FOUND

69.15 LEAVE LAKE - ENTER TAM SWP.

63.10 LOON LAKE

59.00 ENTER 2" DEAD TAM SWP.

48.50 ENTER HDC - II

40.00 SET APP 1/4 ST - 29 SECS - 32 - 3" - OAK

38.67 RW. POINT TO N. SOUTH.

22.65 BACK. No. TO RANDOM LINE 4 CHS.

13.83 FENCE - EDGE OF FIELD - ENTER DEAD TAM SWP

4.75 EAST - 1.80 CH. No OF OFFSET LINE TO HOUSE

.31 TO BARN FROM 1" IRON ROD - 1 FT. HIGH

.00 OFFSET 80 4 CHAINS TO CLEAR BUILDINGS

T-140 N. - R. 25 W.

MAR. 9, 1937 - TIME 9.

1:00 P.M. to 2:30 P.M.

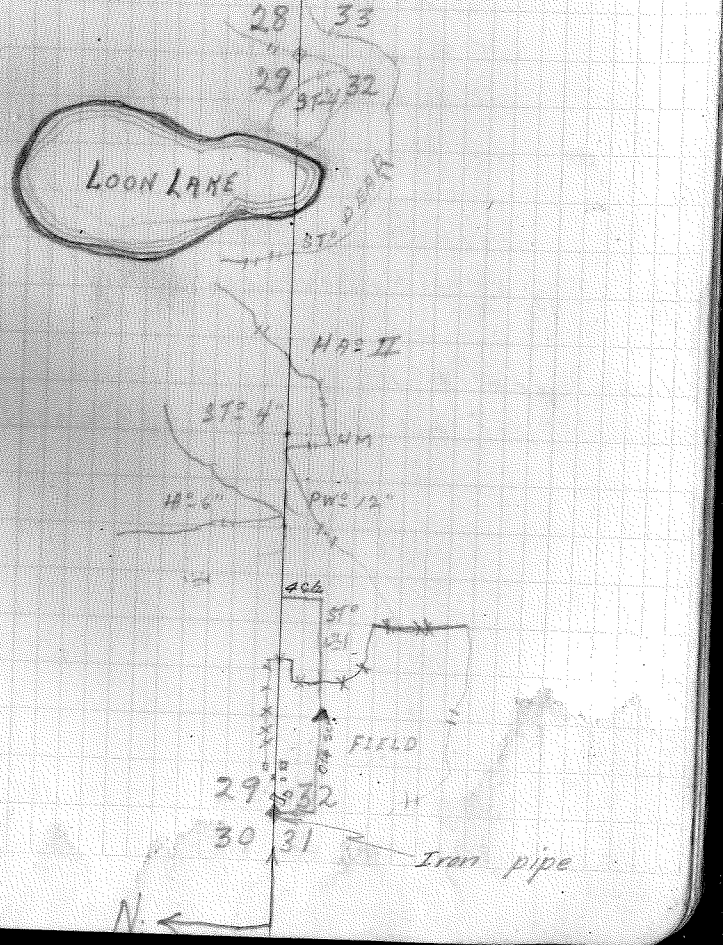
WEATHER CLOUDY - COLD

PARTY

1 - MODAHL - COMPASS
2 - ENGEBRETSON - MOP
3 - CLARKSON) CHS.
4 - SCULLY)
5 - DANIELSON - ROD
6 - JOHNSON - B - AXE
7 - KOSKOVICH - T.D.

N 84° 30' E

Random mag. bearing



T. 140 - 139N - R 25 W - MARIO 1937
WEATHER - CLEAR & COOL

PARTY
1 - MOORE - COMPASS
2 - ENGEBRETSON - NARROW
3 - CERNOHORSKY - CHAIN
4 - SCULLY
5 - BENNIE JOHNSON - NE
6 - DANIELSON
7 - MORONEY - T.D.

EAST BETWEEN SECS 33-4 -

5280 FT.

COULD NOT LOCATE I.P. TOO MUCH SNOW.

80.00 SET 4" - OAK ST WITH TAG.

74.20 OLD LOGGING ROAD No/So.

58.68 LEAVE GULLY - ENTER HA= II - HA°-6"

55.10 ENTER GRASSY GULLY NW/SE

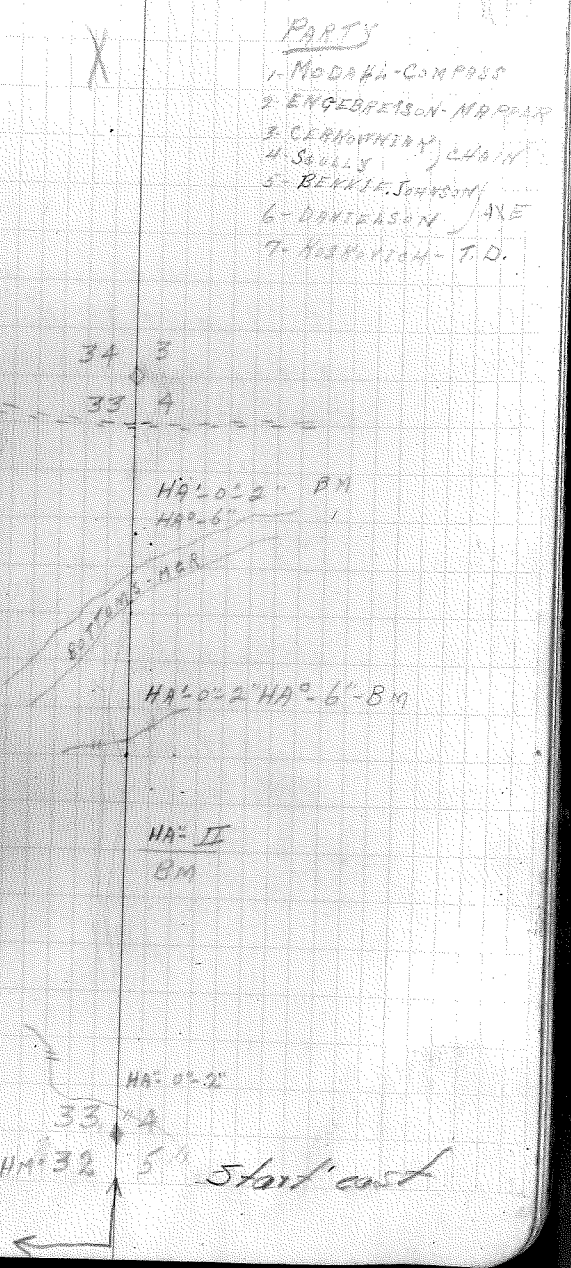
41.60 ENTER HA= II SCATTERED HA-6"

40.00 SET APP 1/4 † SEC 33-4 - 3½" OAK-ST.

2.00 ENTER HA= II

.00 HARDWOOD 6-14 SET 3" OAK ST WITH TAG.

.00 2" I.P. WITH CAP NOT MARKED
8" BASSWOOD N 27° EAST 27 LKS FACED



EAST BETWEEN SEC 34-3

T. 140-139 N. ~~R 27 W.~~ R. 25 W.

MAR 10, 14, 1937 11.

WEATHER CLEAR COOL

PARTY
1 MCDRAL
2 ANDERSON
3 DERKOWITAK
4 DANIELSON
5 SCULLY
6 JOHNSON, B
7 KOSKOVECH, TED

N 83° 30' E

insertion ?

5384.9 FT.

81.59	2" I.P.	in place (cor. found later)
80.00	SET	ELM ST 3" No + FOUND
78.75	LEAVE	ASH. ENTER-ASPEN 6"
75.00	ENTER	ASH SWP. ASH 6" - 12"
58.00	ENTER	HA"-4"-6"
45.15	LEAVE	SWP. ENTER HM° 4"-8 HA° II
40.55	ENTER	SAME SPRUCE SWP.
40.00	SET	3" TAM. ST. APP. ¼ SEC'S 34-3
36.25	ENTER	SPRUCE SWP. 1.75 CHS. ACROSS
.00	STARTED	FROM 4 OAK - APP. CORNER

N 83° 30' E
Bearing tree

35 2
34 3

HA"-4-6" - BM
HM°-4

HM°-4"-8
HA°-II - BM

55°-4
55°-4

HA°-II-HA°-6"
BM

HA°-II HA°-4"-6"
34 3
33 4

NORTH BETWEEN SECS 32-33

78.26 TIE-78.26 N.-.95 LKS-EAST-TO APP.
CORNER SECS 29-28-32-33-3" TAM. ST. WITH TAG.

72.00 ENTER DEAD TAM. SWP.

40.00 SET 3" ORN-ST. APP 1/4 SECS 32-33
38.00 ENTER-OPEN WITH SMALL BRUSH

128.0 LEAVE SWP.
11.59 ENTER OPEN SWP.
5.60 LEAVE HARDWOOD
.00 STARTED FROM IP-IN HM'6-12"

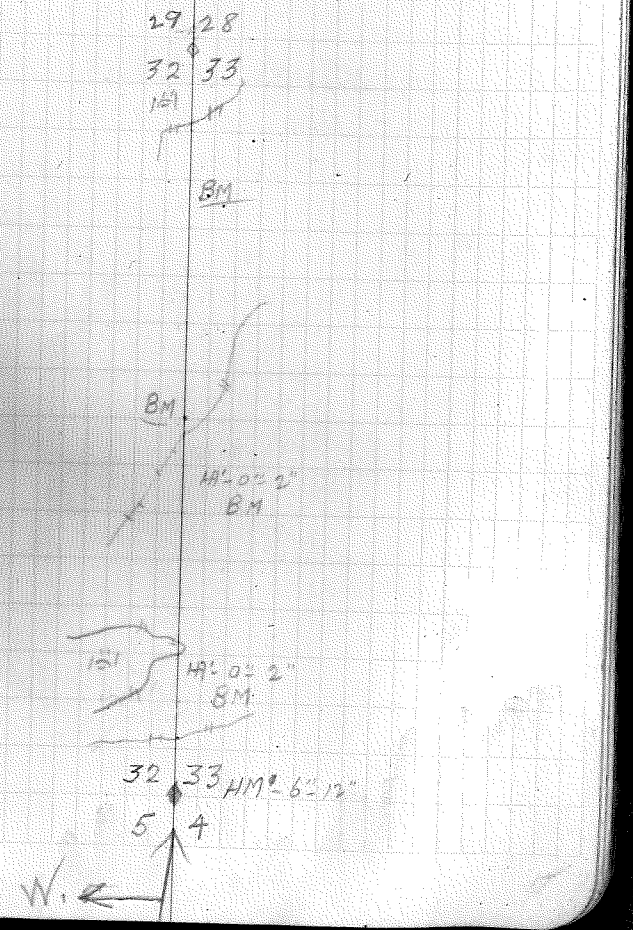
T.140 N.-R.25 W.

MAR 1, 1937 12.

WEATHER
CLEAR & COOL
1:30 P.M. - 2:50 P.M.

PARTY
1-MCDAHL
2-ENGEBRETSON
3-DANIELSON
4-SCHULZ
5-GERMOWNIAK
6-JOHNSON, B
7-ANDERSEN-TD.

N. 5°30' W



0+00 Start cost bet. 28/33 - 140-25

~~EAST BETWEEN SEC 28+33~~

0 -	STARTED FROM APP. +
2.	St-4'
7.20	End of St - Entered Ha-2
37.35	Entered SS-4-6
40.	Set App ¼ STAKE. St
53.91	End of SS - Entered Hb-0-2 Ha-0-2
75	Entered BM-Ha-4-6
80	SET App - St-4" + Post Not Found

T140 R25

X

Mar 12 1937

Weather

Clear - Cool

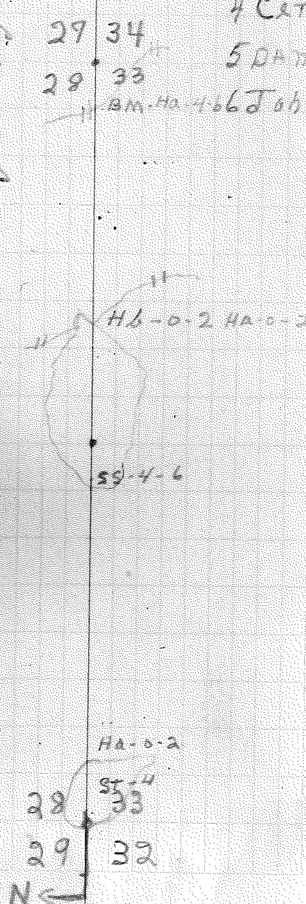
9.15 AM - 12.30 PM

1. Modahl - Compass
2. Morken - AXE
3. Scully - Chain
4. Catkowniak - Chain
5. Danielson - AXE
6. Johnson - Rod

N 84° E

Total → 5280 ft. distance

N 88° E Random Mag. bearing



EAST BETEEN SEC 27 + 34

Cor. 27|28 / 34|33 Started from.

0+00 STARTED FROM APP. SE 4" + POST

Entered Ha. 2-4

40 Set APP 1/4 Hb 3" STAKE

61 Entered SS-4-6-Bm

68 Left SS Entered Hb-0-2-Bm

78 SS-4-6-Bm-HM-4-6

80 Set APP. ASh + Stake. Not found.

5280 Ft.

T. 140 R 25

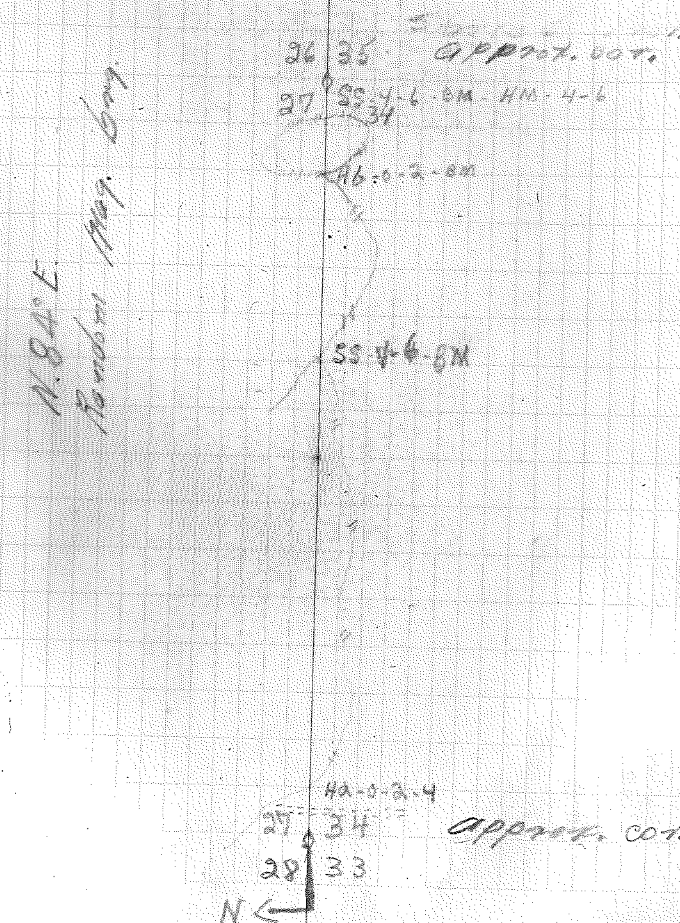
N 84° E

MARCH 12, 1937

WEATHER - CLEAR Cool

CREW - SAME

1 PM - 2.30 PM



South BETEEN S 36-31

0. Started F. APP S. + 25/30 / 36/31 - 139-25,26
2. Entered Aspen - 0-2
15.10 " " 2-4 & Birch 2-4

40. SET APP + STAKE - POPLAR - 3 inch.

45.90 POPLAR - 2-4 & Birch-2-4-BM

80. SET APP + STAKE
" 4" Birch "
no + Found
for cor to 36/31 / 1/6 139-25,26

5280 ft distance

15

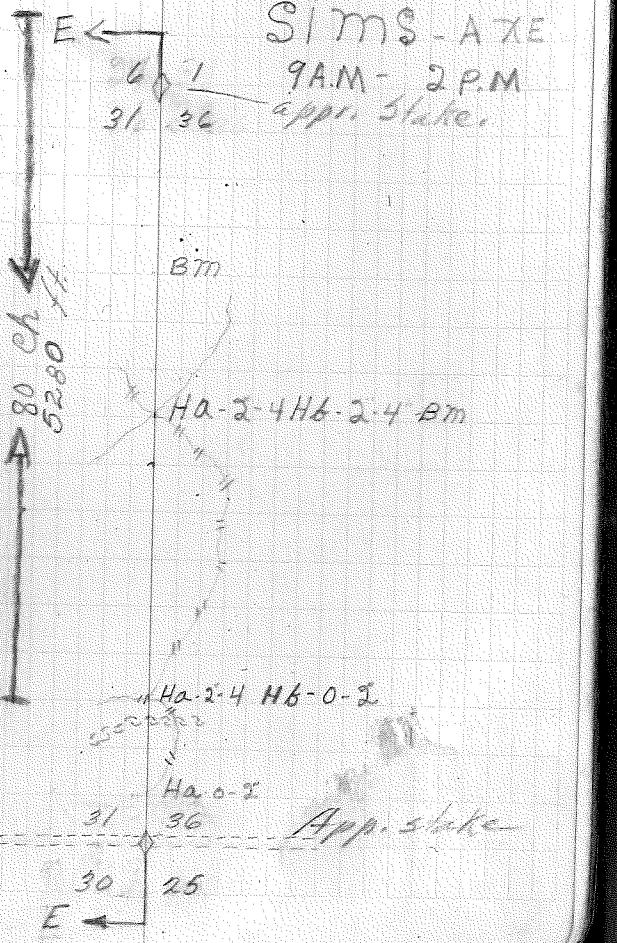
T.139.R.25-26

MARCH. 15. 1937

WEATHER. Cloudy. Cool

CREW COMPASS-Modahl
DANIELSON - CHAIN
BENSTON - CHAIN
HAMS - Rod
Johnson - AXE
SIMS - AXE
9A.M - 2P.M

S 6°30' E



11

South, BETWEEN S 13 & 18

NO + FOUND
80. SET 3" + STAKE IN LAKE
5280 ft.

61.25 ENTERED LAKE
50.90 LEFT LAKE ENTERED Ha-4-6, Pw-4-8 Pn-4-6
46.75 Lake
40 ch SET Ha-3" APP'd STAKE
28.25 ENTERED ASPEN-2-4-Hb2-4
34. ENTERED - St-4-6
29.10 Road

22.45 LEFT ASPEN & Birch Entered SS-2-6

12. ENTERED ASPEN 0-2 - Birch-0-2
8. St-4-6
2. SAL
0 - STARTED FROM AT POST

T. 139 R. 25-24

MARCH 16, 1937

16

WEATHER.
CREW IN MODAHL - COMPAS.
1 SILVA STAKE
3 HATTS AXE
4 JOHNSON - ROD
1 DANIELSON - CHAIN
1 BEDFORD

8.45 AM — 11.30 AM

S 4° E

S. SHORE Broken mnt. bm

19 24
18 13
18.75
LAKE
Ha-4-6 Pw-4-8 Pn-4-6
LAKE
Ha-2-4 Hb-2-4
St-4-6
SS-2-4-6
Ha-0-2 Hb-0-2
St-4-6
18 13
Sal
7 12
E

1

South BELEED S. 24-19

Distance Chained. 5280 Ft.

No CORNER Found

80 ch SET APP + POSS. ASH 4" STAKE

52 ch ENTERED ASPEN-4-6, HL-4-8 HM-4-8

41.00 ENTERED PW-4-8 - Ha-2-4

40 SET ASPEN STAKE 3" APP & STAKE

21. End of LAKE START OF HM-4-6

SIDE OF LAKE

0 START FROM APP & IN LAKE

17

T. 139, R 25-24

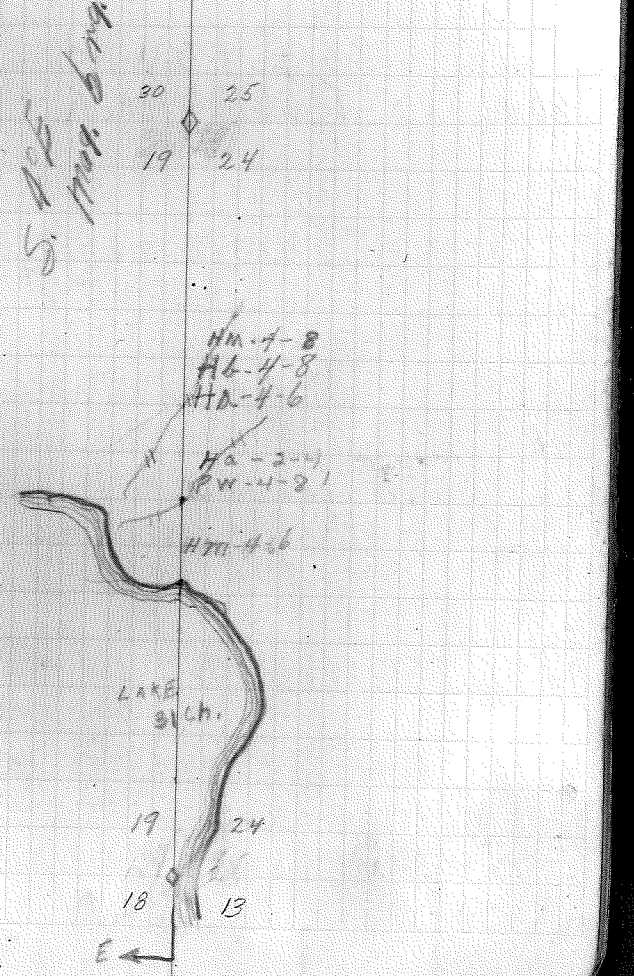
March, 16, 1937

WEATHER - CLEAR - COOL

CREW - SAME.

12. 10 2.15 PM

S 4° E



South BEHEN S 25 & 30

d/s trace, 5280 ft.
line runs South bet. Sc. 25/30

TIO + Found.
80 ch SET TAMARACK + Post.

67.23 End of Hm + BM ENTERED St-4-BM

~~40~~
40 SET APP Ha 1/4 +
39.15 LEFT SS 2-6 ENTERED Hm-2-4-BTM

24.75 ENTERED SS 2-6

12. End of St ENTERED Ha-2-4-BTM
6.75 LEFT Hm ENTERED St-4-6
0 - STARTED FROM APP + PROTENTERED Hm-2-4
0 +00 Start South

18

T. 139 R. 25-24

MARCH, 17, 1937

WEATHER-Cloudy-Cool

CREW-Madahl-Compass
2 Danielson - Chain
3 Scully - Chain
4 Hanna - Axe
5 Benesson - Axe
6 Johnson - Rod

S 6° E

31 36
30 25

St-4-8-BTM

Hm-2-4-BTM

SS-2-6

Ha-2-4-BTM

St-4-6

30 25
Hm-2-4
19 24

Start

E

138
139-25

139-27

140-24

139-25

South Between S. 31+31

Total distance
5370 FT.

ALIGNMENT 3.45
Found-3" Corner Post
of + TO SECTION 36.
81.26 E & W LINE - 3.45 ch. WEST
75. ENTERED - SS - ST - J-6
74.60 Road

67.40 LEFT SWAMP ENTERED Ha-J-6

48.96 CREEK Running WEST
47.40 " "
43.30 Road
40 SET APP. ¼ POST SS-3" 41.50 - Road

31.56 E.SS.-2-8-

32.15 LEFT Ha-2-4 & Hm-2-4 ENTERED Ha-H.S.-HL-V.S

8.55 High LINE
1 ENTERED Ha-2-4 & Hm-2-4
0. STARTED FROM APP T

19

T139 R25-24

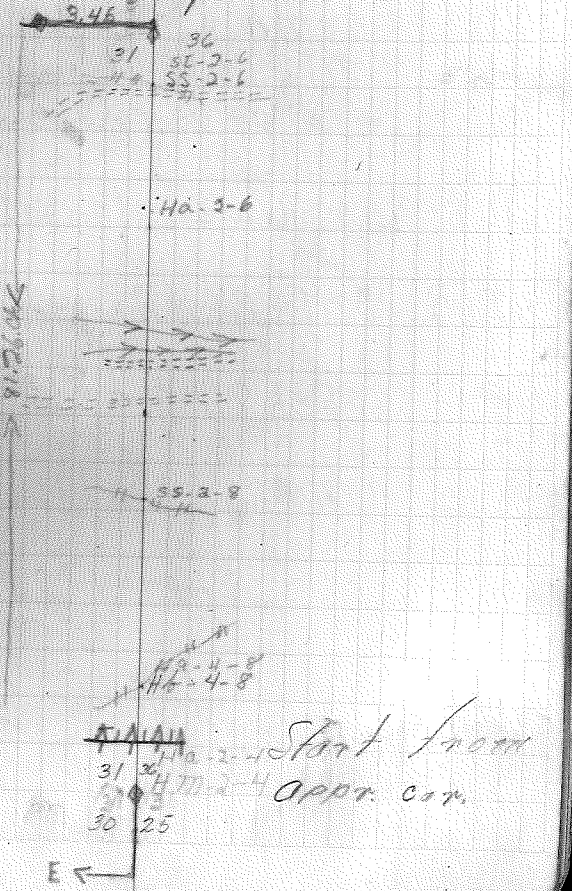
March 12, 1923

V. S 6° E

True V = S 8° 30 E

WEATHER Cloudy-Cool

CREW Modafa-compass
2-John Sarr - Rod
3-Daniel Sarr - AXE
4-Ben Stom-AXE
5-Schuyler-CHAIN
6-HAMS-CHAIN



139-27 140-26 139-25

WEST BETWEEN S.36 + 1.
Twp 139 N R. 25 W.

total distance
5280 Ft.

Found BT - M39 F - 22
ALIGNMENT - 2 Ch. So.

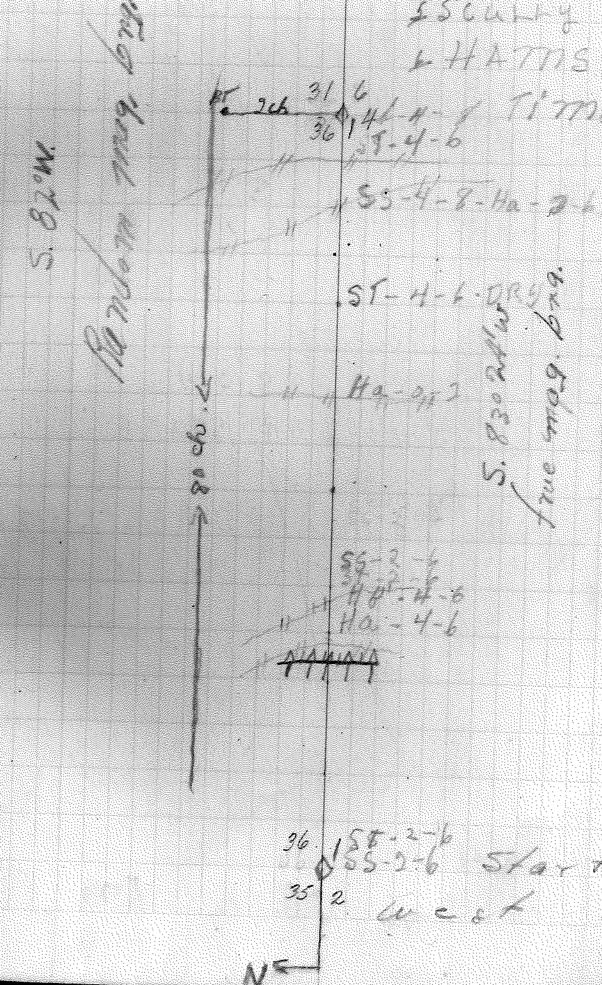
80. FOUND CORNER STAKE. SS 4"
76 ENTERED - Hb - 4-8 + ST - 4-6
70.10 ENTERED SS-4-8 - Ha. 2-6 - Hb. 4-8
61-81 LEFT Ha-0-2 ENTERED ST-4-6-DRY
49.52 - ENTERED Ha-0-2
40 SET APP 1/4 + SS 2" STAKE
30.52 ENTERED Hb + Ha - 4-6 - SS - 2-6 ST 2-6
24.40 - HIGH LINE

1 ENTERED ST + SS - 2-6
0. STARTED FROM SQUARED STAKE.

T 139/138 R 25

MARCH 19, 1937
WEATHER CLEAR COOL
CREW - [illegible] COMPA
1 Johnson - Rod
3 DANIELSON - AXE
4 BERNSTEIN - AXE
5 SCULLY - CHAIN
6 HANNS - CHAIN
TIME - 10.30 AM - 1.30

S. 82° W



West between 35/2 - T139-138 - R25W.

Tie to l.R. - from random line
Distance = 52+83
Alignment 21 lk. north to l.R.

80	Found BT 12" ST 100 lkf.
78.53	CROSSED LINE - RUNNING N & S
78-	ENTERED ST-2-4-
75	ENTERED Ha-24
64.50	Bottom - N & S
63.41	Road
50	LEAVE SWAMP
46.50	ENTERED SS-2-4
40.	SET 3" POPLAR STAKE
30.90	Creek Running SE ENTERED Ha24
15	ENTERED HM-4-8
0	ENTERED Ha-4-6-ST-4-6-Ha-4-8-BTM
0-	STARTED FROM TAM. STAKE

21

MARCh, 22, 1937

WEATHER CLEAR-WAR[illegible]

CREW-Modahl-Compass

2- Johnson-Rod

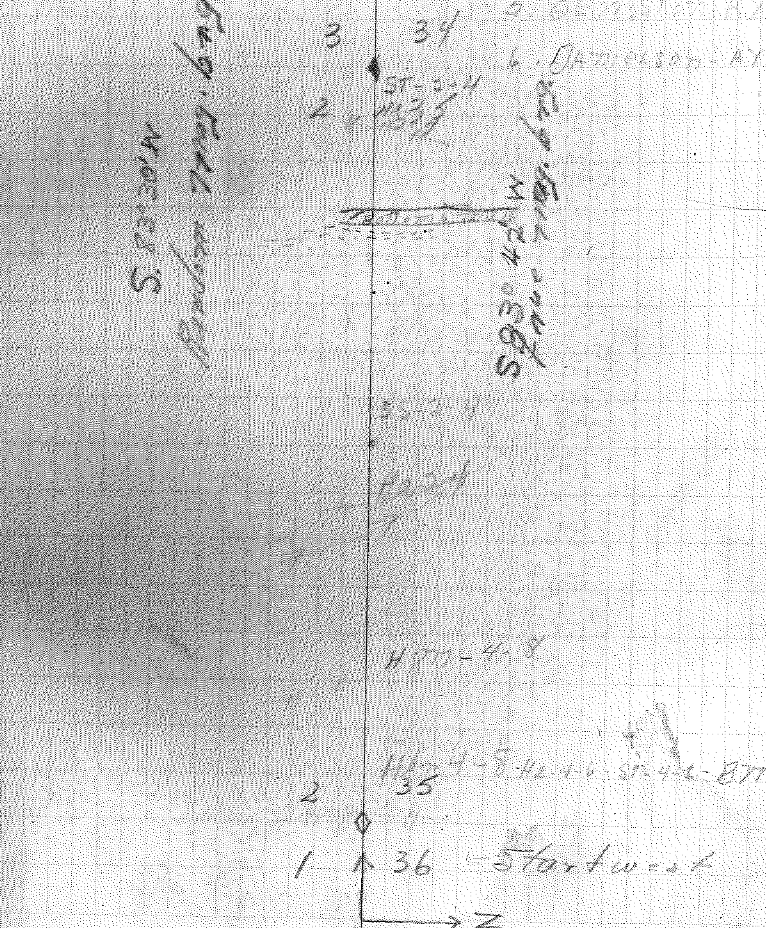
3- HAMMS-CHAIN

4. Scully-CHAIN

5. [illegible]-AXE

6. Danielson-AXE

S 83°30' W



West between 34/3-T139-138 R25W.

total distance 5280 FT.

	not Found
80.00	SET APP OAK STAKE in S. $\frac{4 \mid 3}{33 \mid 34}$
76.15	ENTERED Ha-4-8 - HM-4-10
61.58	ENTERED ST-4-6
40.	SET POPLAR 1/4 + STAKE
34.15	ENTERED Ha-0-2-BM
22.	ENTERED HM-8-10-BM
19.90	CROSSED CREEK
7 ch	ENTERED SS-4-6
0	ST-2-4+HA-4-R
0.	STARTED LOOK FOR STAKE

22 X

N... 23, 1937

WEATHER - CLEAR - COOL

CREW - MODAHL - COMP.

2 DANIELSON - AT

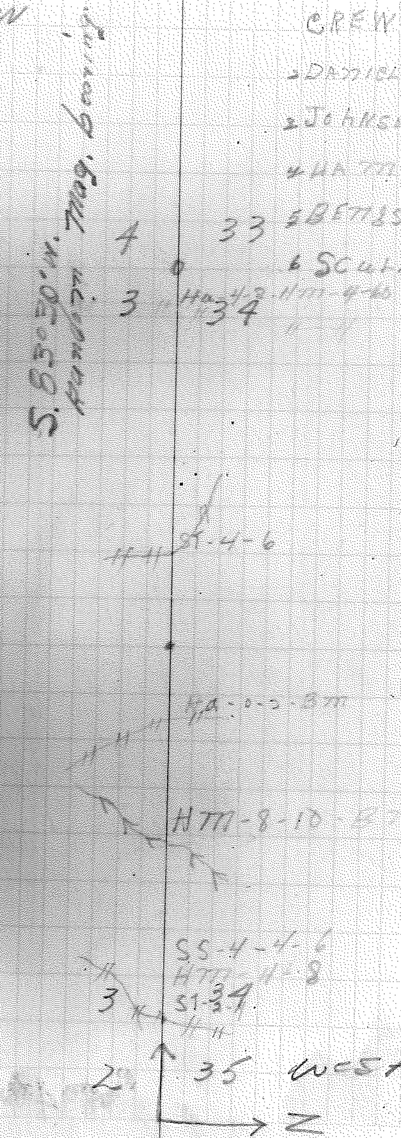
3 JOHNSON - ROD

4 HAMMS - CHAIN

5 BENNSTON - CHAIN

6 SCULLY - CHAIN

S 83°30' W



140-26 139-25

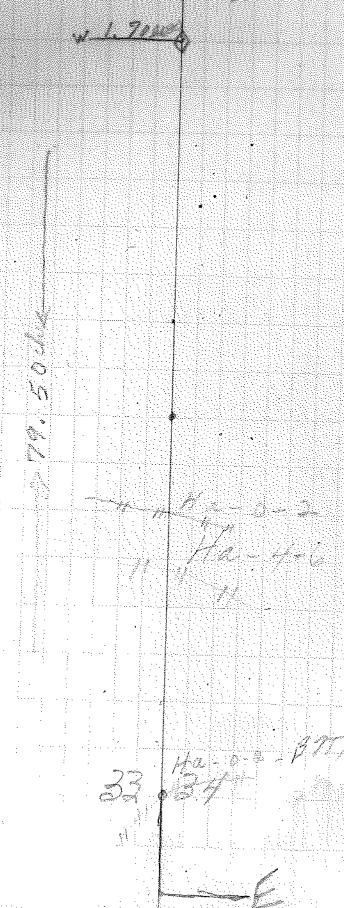
North Between S.34 & 33. T139 R.25

80 ch.	ALIGNMENT 1.70 lks Found APP + Post.
40	SET APP 1/4 + STAKE
35	ENTERED Ha-0-2.
24	ENTERED Ha-4-6
0	STARTED IN ASPEN Ha-0-2-BM
0	STARTED FROM APP +

23 X

MARCH 24, 1937
WEATHER-CLEAR-COLD
CREW-Mattson
2 DANIELSON-AXE
3 BENGSTON-AXE
4 HARRIS-CHAIN
5 SCULLY-CHAIN
6 JOHNSON-Rod

N 6° 30' W



NORTH BETWEEN S. 27 & 28 T. 139. R 27

ALIGNMENT. 1 ROD EAST

78.44 FOUND APP + STAKE

70 ENTERED Ha-2-4-BTM

68.70 CROSSED ROAD

59.44 ENTERED Ha-2-4

40 SET APP ½ + STAKE

27. ENTERED BTM

26.45 CREEK

20.23 ENTERED HTM-4-64 Ha-H-8-BTM

0 STARTED TO Ha-0-2

0 STARTED FROM APP + STAKE

24

MARCH 25, 1937

WEATHER-CLEAR, WARM

CREW-[illegible]

1-HARRIS-CHAIN

2-SCULLY-CHAIN

3-JOHNSON-ROD

4-[illegible]-AXE

5-DANIELSON-AXE

N 6° 30' W
Variation

1.40 W

Ha-2-4 1-BTM

Ha-2-4

1 BTM

Ha-H-8-BTM

HTM-4-64

28 27 Ha-0-2

→E

NORTH BETWEEN S. 21+22 T139 R.27

ALIGNMENT 11.50 ch. WEST

85.20 TO LINE

74.70 ENTERED Ha-2-4. Hb-2-4-Hl

72 ENTERED SAL

55.90 ENTERED Hb 2-4 Hm 0-2

40 SET APP 1/4 + STAKE.

35 ENTERED SAL

25.10 ENTER SWAMP.

0 STARTED in Hb 2-4 Hl

0 STARTED FROM APP +

MARCH. 26 1937

WEATHER-CLEAR COOL

CREW-1 McDAHL COMPASS

2 DANIELSON Rod

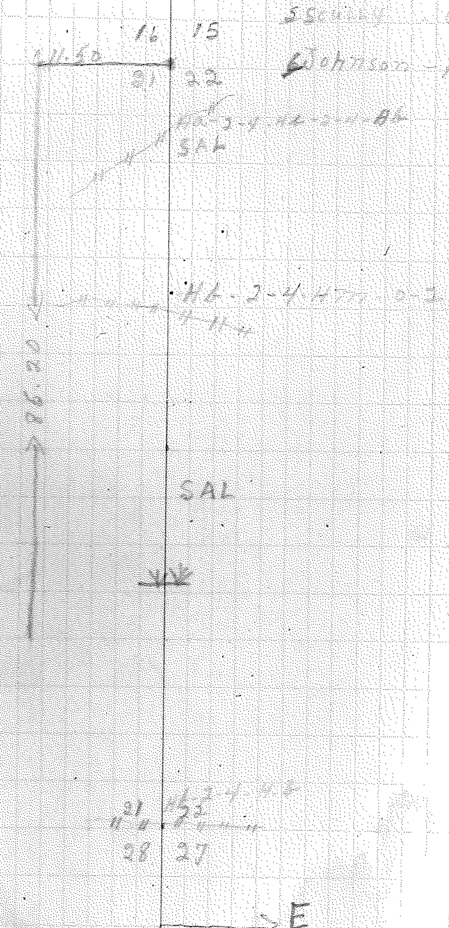
3 BENGSTON - AXE

4 [illegible] - CHAIN

5 SCULLY - CHAIN

6 Johnson AXE

N 6°30'W



139-25

140-26

NORTH BETWEEN S.16+15 T.139. R.97

W. OF LINE.

74.20 FOUND APP. + STAK 3.20 ch.

72. ENTERED BM-4-8 SS-4-6

59.50 ENTERED SS-4-6 ST 4-10

51. ENTERED Ha 4-6-BM

40 SET APP. 1/4 + STAKE

15 CROSSED CREEK

13.50 ENTERED Hb 2-4-BM

7 ENTERED Ha-2-6-BM

6 STARTED IN Hb-2-4-SaL

0 STARTED FROM APP + STAKE

N 6°30'W

MARCH. 29. 1937

WEATHER-CLEAR-WARM

CREW 1 MOSDAHL-COMPASS

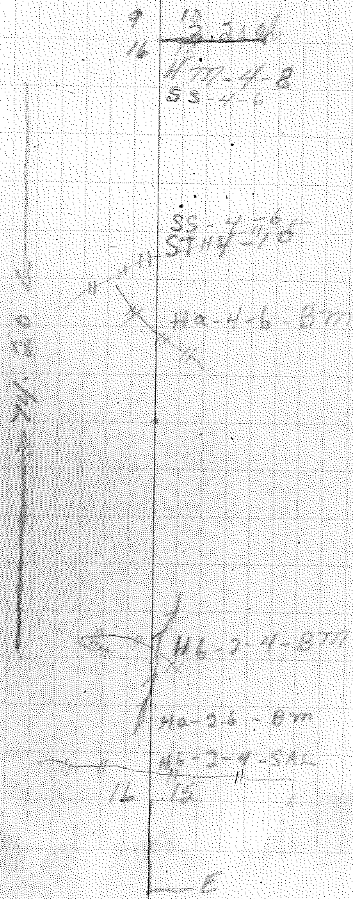
2 SCULLY-CHAIN

3 HAMS-CHAIN

4 JOHNSON-ROD

5 DANIELSON-AXE

6 BERGSTAN-AXE



139-25

140-26

5°9

5/26/37

PARTY- ROLF A
CARYEAU
SIMS
NYSTROM
THOMPSON

26+40 SET POST APP COR. TO SEC 25-26-35-36

24+02 LEAVE MARSH

23+39 ENTER MARSH

STARTED FROM ¼ COR. TO SEC. 26-35

W

26	25
~~34~~	~~29~~
~~35~~	~~26~~
35	36

2462
2337

MA-2-4

BM

N

T 140 R 26

Random line west from App. S.C. $\frac{26|25}{35|36}$

Course - S 84°30' W

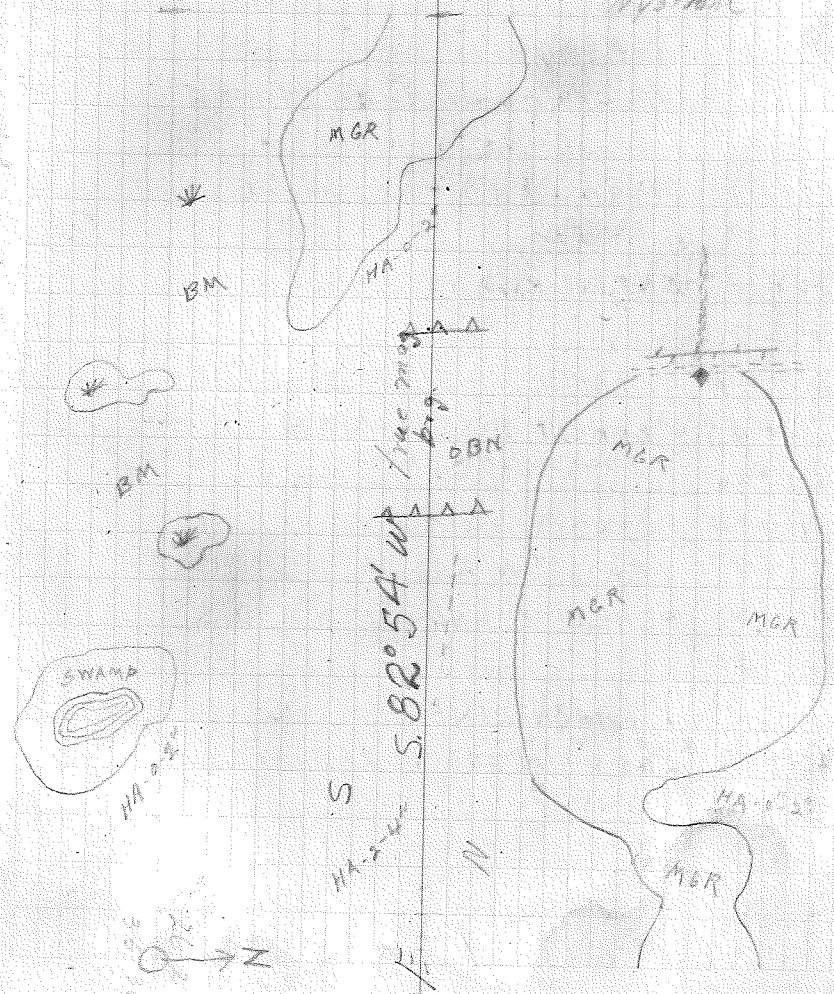
52+91	NO. AND SO. LINE ~~57+75~~ 01+59.5 No of S.C. $\frac{27|26}{34|35}$ - 1/8" iron rod located two inches below surface SE Hgwy. 6 at intersection of road west to Dragon.
37+00	ENTER MGR
36+30	
29+70	
29+45	FIRE BREAK NO. AND SO.
26+40	SET APP 1/4 POST.
16+50	
13+00	LEAVE MARSH
12+25	MARSH NO. AND SO.
9+90	
9+25	LEAVE MARSH ENTER BM - HA - 2'-4"
8+50	MARSH N AND SO.
6+50	LEAVE SWAMP
5+00	ENTER SWAMP
3+30	
0+00	App. S.C. $\frac{26|25}{35|36}$ WCS/c

Weather:
Partly Cloudy
Fair + Warm.

Chaining Record: IIIII

Date - May 25 [illegible]

Party: Ralf - T
Sims
Carriveau
Thompson
Hyatt



25-P61

T 139 N R 25 W 2

24/19
RANDOM LINE RUNNING EAST FROM S.C. 25/30
COURSE N. 83° E Dist 16/30
Twp. 139 N. R 25 W.

Chained distance 5246 FT.

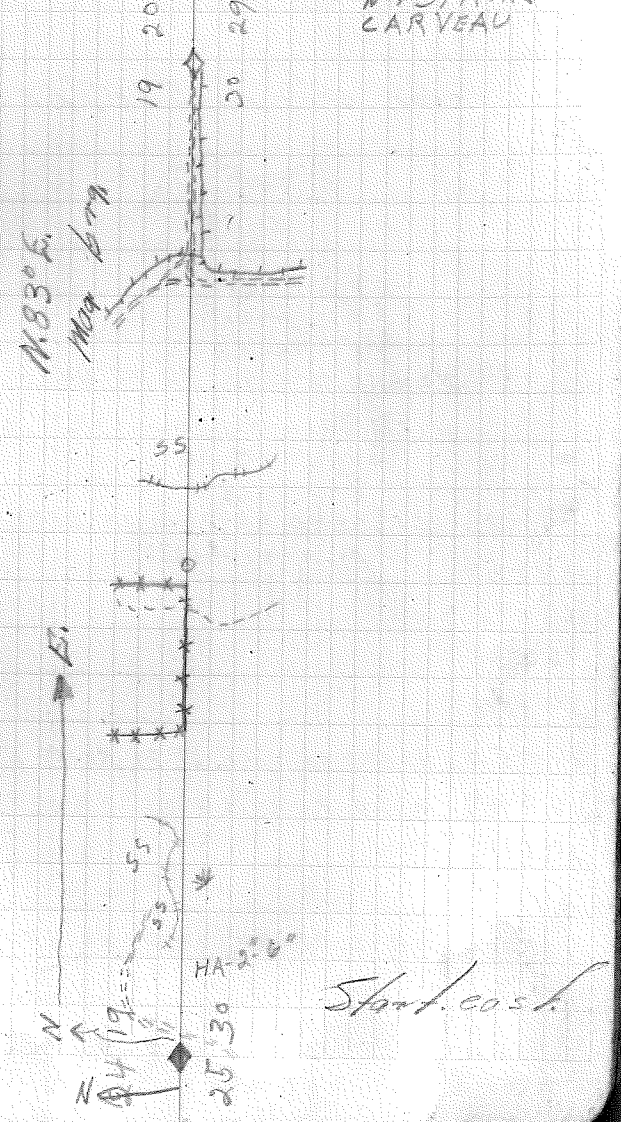
52+46 Set appox See Corner at Intersection of roads

39+59 ROAD AND TELEPHONE LINE
36+30
30+00 ENTER SWAMP SPRUCE
29+70
26+47 No. AND So. LINE 2 FT SO. OF 1/4 COR S. 30
4" CEMENT POST SCRIBED S 1/4 S/9 N 1/4 S30
23+10 FROM WHICH A P.N. STUMP BEARS N 30° E 7 FT. SCRIBED X
19+84 FENCE RUNNING No. AND So.
18+97 TRAIL No. AND So.
17+33 FENCE E. AND W. N. AND S.
16+50
14+44 1" I.R ON LINE
10+62 1" IRON PIPE ON LINE IN PLACE
9+90
3+30
0+44 CLASS C. ROAD
0+00 4" SQ. CEMENT POST SCRIBED 24/19 2530
YELLOW TAG ON 8" P.N. N 18° E 15 FT

X 29

WEATHER- CLOUDY
WARM
CHAINING RECORD-III

DATE - MAY 22 193[illegible]
PARTY- ROLF 1
SIMS
THOMPSON
NYSTROM
CARVEAU



25-PE1

T 139-R 25

RANDOM LINE RUNNING EAST BET SEC 20-29

COURSE NO. 84° E

Line runs east bet. Sec. 20/29 Twp. 139 N

R. 25 W.

Total dist. 5287 FT.

52+89 NO. AND SO. LINE 34 FT. NO. OF TELEPHONE POLES WITH YELLOW TAG. COR TO SEC. 20|21 / 29|28

49+83 CROSSED BRIDGE ON STREAM

49+50

42+90

36+30

29+70

26+54 NO AND SO. LINE 27 FT. NO. OF 4" SQ POST 1/4 TO S 20-29

26+47 ROAD RUNNING NO. FENCE RUNNING SO.

23+10

16+50

11+50 CROSSED BRIDGE ON STREAM

9+70

3+30

0+00 STARTED FROM CENTER OF ROAD AT INTERSECTION

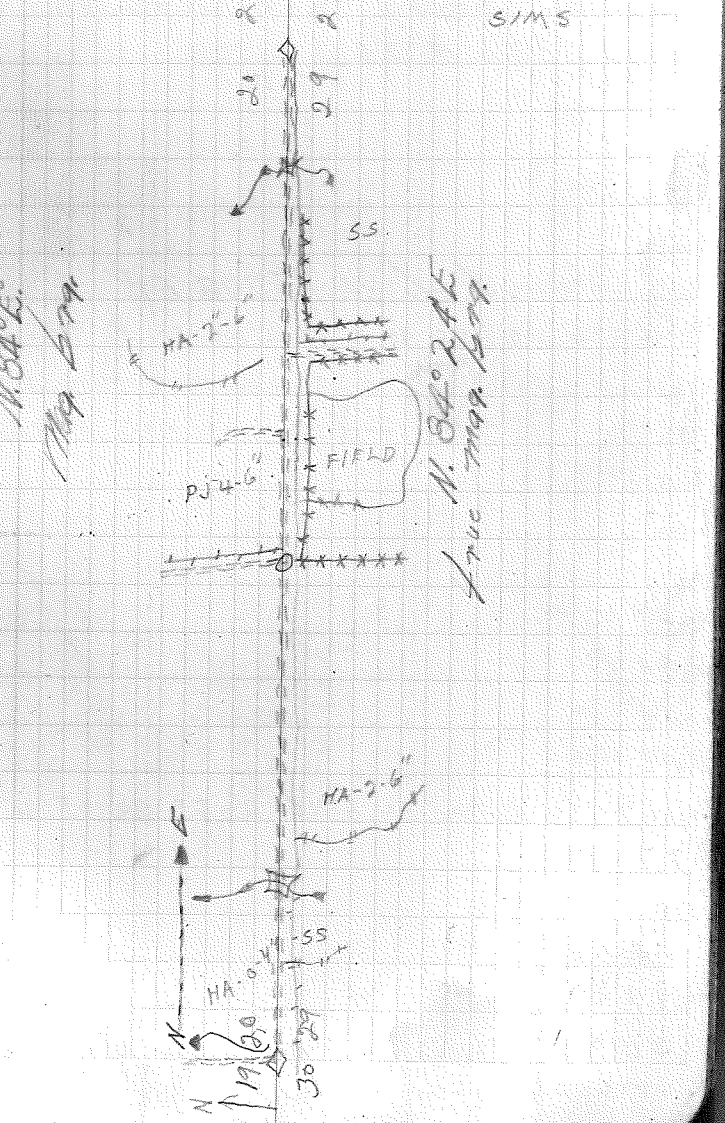
X 30

DATE MAY 28 1937

WEATHER
PARTLY CLOUDY
FAIR WARM

CHAINING RECORD ITT

PARTY- ROLF A
NYSTROM
THOMPSON
VOEGLI
SIMS



25-PSI

T 139 R 25

RANDOM LINE RUNNING EAST BET. SEC. 21-28

COURSE N 83° 30' E.

Line running east between Sec. 21 / 28
T. 139 N. R. 25 W.

Chained dist. 5306 FT.

53+06 No. AND So. LINE 5 FT. So. TO TELEPHONE POLE WITH YELLOW TAG TO MARK COR. TO SEC. 21 | 22 / 28 | 27 NO COR. FOUND

49+50

42+96

36+30

29+70

25+97 No. AND So. LINE 22 FT. So. OF 4" So POST

23+16 1/4 COR TO SEC 21-28.

16+50

9+90

3+30

0+00 STARTED FROM CENTER OF ROAD

~~APP COR. TO SEC 20 | 21 / 28 | 27~~ APP. COR. TO SEC. 20 | 21 / 29 | 28

140-26

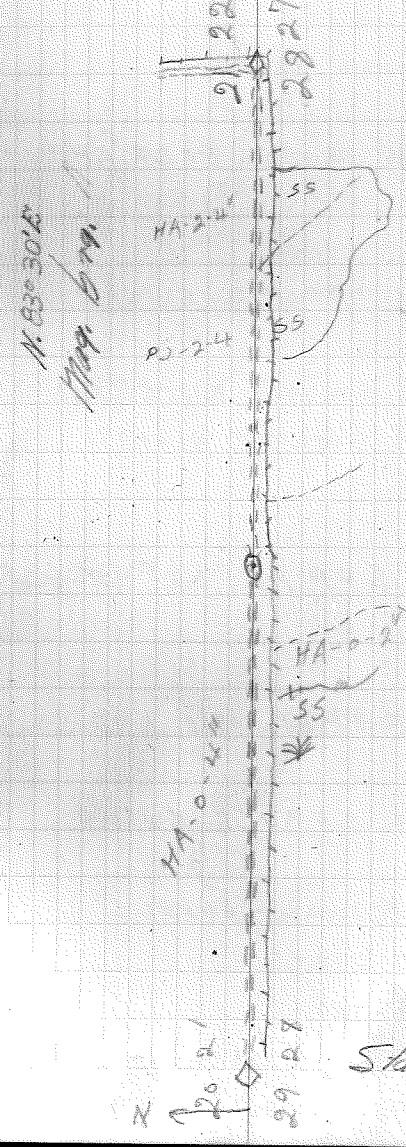
Y 31

WEATHER PARTLY CLOUDY FAIR AND WARM

DATE MAY 28 '73

PARTY- ROLF T
THIMPSON
NYSTROM
SIMS

CHAINING RECORD III



T 139 R 25

RANDOM LINE RUNNING EAST BET SEC 22-27

COURSE N 83° 30' E

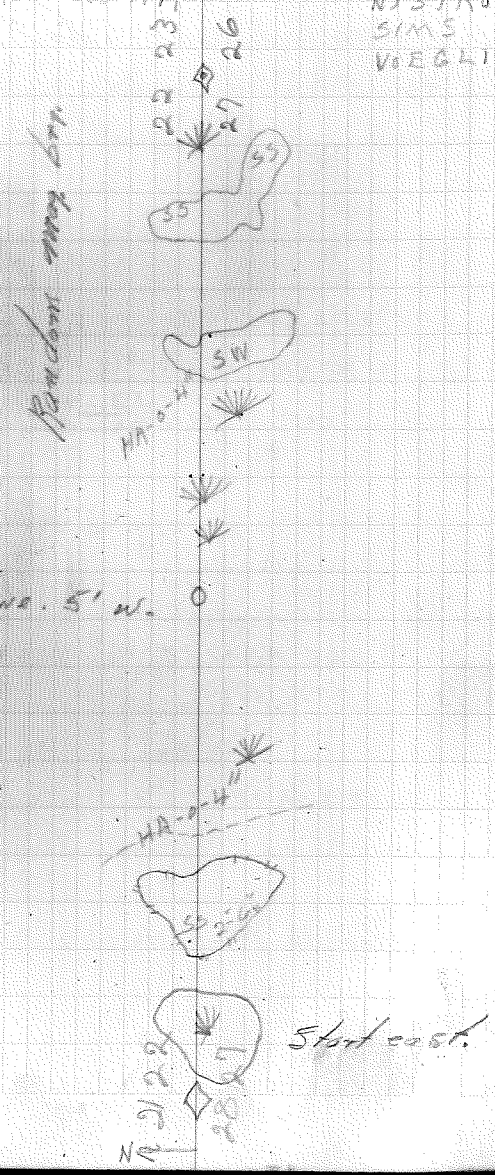
total distance 5280 FT.

52+80	SET 4" BALSOM POST APP COR TO SEC 22/23 27/26
49+50	
49+00	LEAVE SWAMP
46+00	ENTER SPRUCE SWAMP
42+90	
41+50	LEAVE SWAMP ENTER HA-O-H
39+00	ENTER SWAMP WILLOW
36+30	
29+90	
26+40	SET APP 1/4 POST Bt. old. burnt NP stump. on Line. 5' W.
23+10	
16+50	
13+84	FIRE TRAIL NO. AND SO.
~~13+80~~	
11+50	LEAVE SPRUCE SWAMP
9+90	
7+25	ENTER SWAMP SPRUCE
5+00	LEAVE SWAMP
1+26	ENTER SWAMP
0+00	STARTED FROM [illegible] SECTION APP COR TO SEC 21/22 28/27

32

WEATHER- PARTLY CLOUDS
FAIR AND WARM
CHAINING RECORD III

DATE MAY 28 1937
JUNE 1 1937
PARTY- ROLF R
THOMPSON
NYSTROM
SIMS
VIEGLI



25-P61

T 139 R 26

RANDOM LINE RUNNING EAST BET SEC. 23-26

COURSE N 83° 30' E.

line Runing east bet. 23/26

T. 139 R. 25W.

52+80 SET 4" ASPEN POST FROM WHICH 12" ELM BEARS So. 31° 30' W. 86 FT SCRIBED COR. TO SEC. 23/24/26/25 W-B T

49+50

42+90

36+30

29+70

26+73 OFFSET AROUND 12" BASWOOD

26+40 SET APP¼ POST

23+10

18+00 LEAVE SWAMP

16+50

9+90

6+22 LOGGING ROAD No. AND So.

3+30

2+00 ENTER SS.

0+00 STARTED FROM ¼ POST APP COR. TO SEC 23/26/27/26

748-26

PARTLY CLOUDY

WEATHER-FAIR-WARM

RUNNING RECORD ////

33

JUNE 2 1937

DATE JUNE 1 1937

PARTY ROLF

COMSTOCK

NYSTROM

THOMPSON

SIMS

total distance 5280 FT.

23 24 25 26

N 83° 30' E

Running Line

BK

HM

PBA

PBA

SHM

SC

SHM

M. SS

T 139 R 25

RANDOM LINE RUNNING EAST BET. SEC. 24-25

COURSE N 83° 30' E.

line runs east bet. 24/25 T.139 R.25

BLAZED ON TWO SIDES

52+80	NO CORNER FOUND - SET 4" ASPIN POST
48+47	NO. AND SO. LINE 4 FT. NO. OF 4" POST WITH YELLOW TAG APP COR TO SEC 19-24-25-30
39+10	SQUARED BASSWOOD 8" 15 FT. SO OF LINE
26+40	SET APP 1/4 POST
20+33	OFFSET AROUND 12" BIRCH TREE
17+50	ENTER HM. 8"-12"
17+34	OFFSET AROUND 12" OAK TREE
8+15	LEAVE MEADOW
7+50	MEADOW NO. AND SO.
6+00	LOGGING ROAD NO. AND SO.
0+00	STARTED FROM 4" ASPIN POST APR COR TO SEC 23/24 - 26/25

X JUNE 4 1931

DATE JUNE 3. 1931

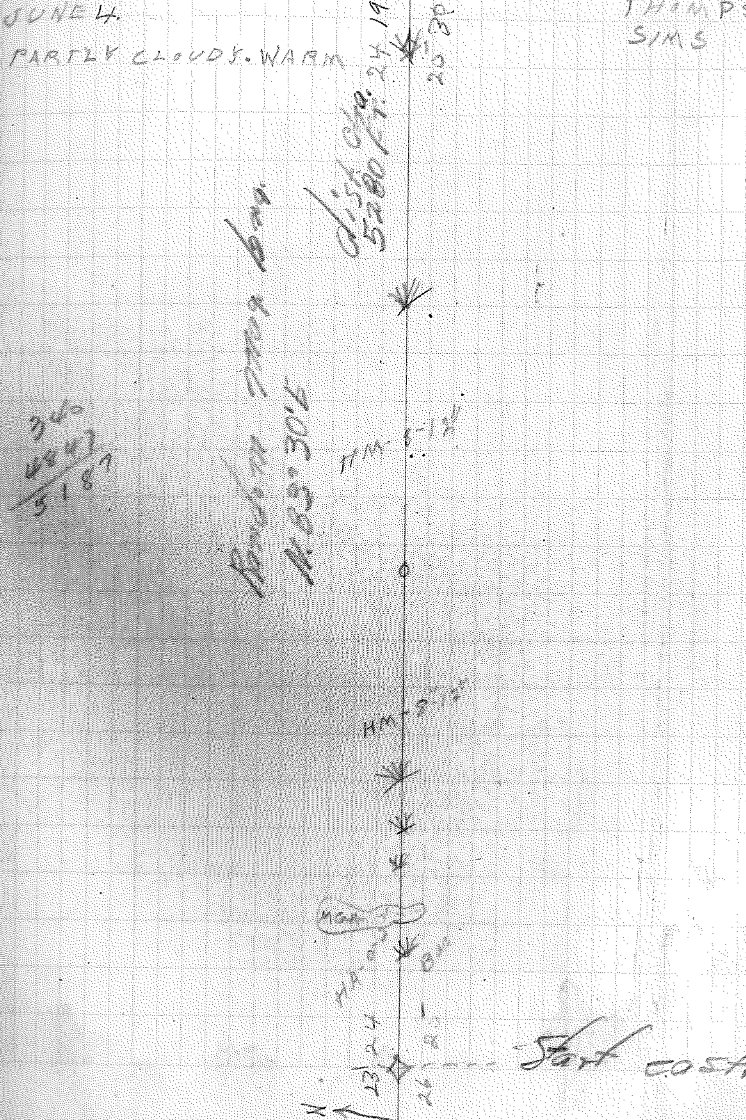
WEATHER
FAIR - WARM

PARTY ROLF
COMSTOCK
JONES
THOMPSON
SIMS

CHAINING RECORD IIII

JUNE 4

PARTLY CLOUDY. WARM



T 139 R 25 W.

RANDOM LINE RUNNING EAST BET. SEC. 13-24
COURSE No. 83° E.

line Runs east bet. 13/24

ON 2 SIDES APP. MEANDER COR. TO SEC. 13-18-19-24

45+22	TO EDGE OF LAKE. SET 4" TAM. POST BLAZED
44+00	ENTER SWAMP TAMRACK
32+00	LEAVE MARSH
31+00	MARSH, No. AND SO.
26+46	SET 3" SQ. RED OAK POST APP 1/4 TO SEC. 13-24
16+00	LEAVE SWAMP ENTER HA-0-2"
13+10	FENCE RUNNING No. AND SO.
9+00	ENTER SWAMP
0+00	STARTED FROM APP. COR. TO SEC. 13-14-23-24

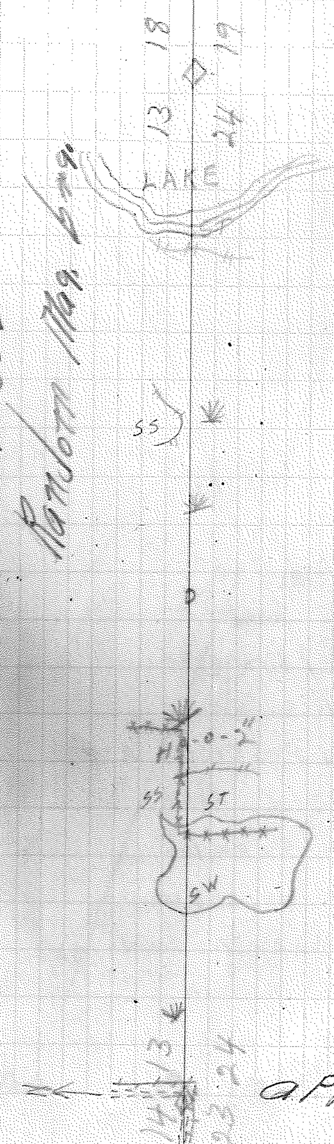
140-26

WEATHER - CLOUDY - COLD
LIGHT RAIN

DATE JUNE 7 193[illegible]

CHAINING RECORD - 111

PARTY - ROLE 1
COMSTOCK
THOMPSON
SIMS
JONES



25-PE1

140-26

T 139 R 26

TRUE LINE RUNNING EAST BET. SEC. 26-35

COURSE No 84° 15'

53+94	COR. TO SEC. 25-30-31-36 2" I.P. SCRIBED ON CAP
4 +00	ENTER WILD HAY MEADOW
34+25	LEAVE SWAMP
33 +00	ENTER SWAMP
31 +00	LEAVE SWAMP
20+70	ENTER SWAMP
26+40	SET ¼ POST 4" ASPEN
26 +00	LEAVE SWAMP
23+00	ENTER SWEMP
21+70	MARSH No. AND SO.
12+00	SECONDARY ROAD NE AND SO.
4+02	LEAVE MARSH
1+80	ENTER MARSH NO. AND SO.
0+00	STARTED FROM 4" OAK POST WITH METAL TAG COR. TO SEC. 25-26-35-36

36

WEATHER FAIR-WARM

CHAINING RECORD. IIII

DATE JUNE 9 1932

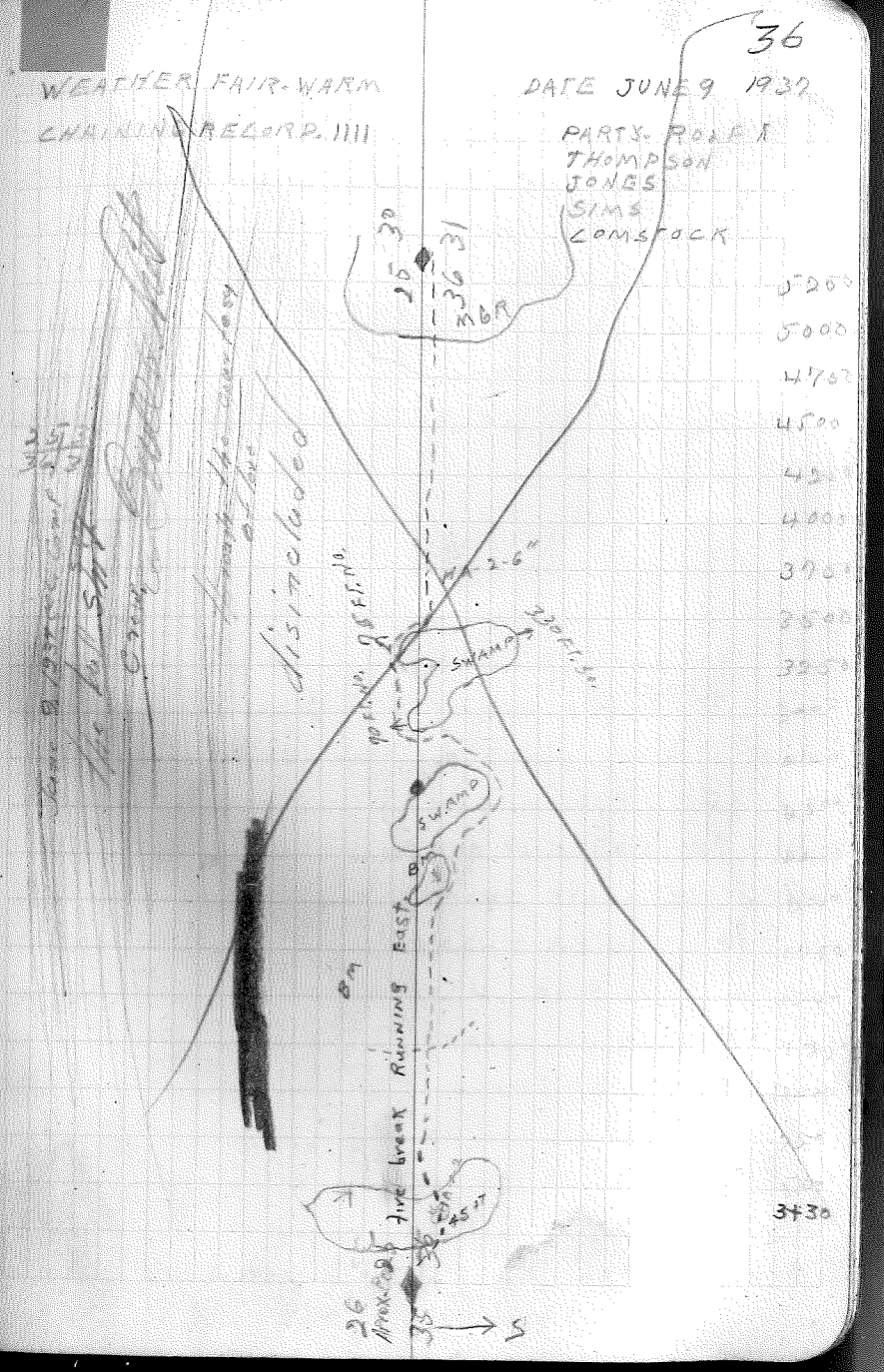
PARTY. ROLFE

THOMPSON

JONES

SIMS

COMSTOCK



T 140N-R26W

TRUE LINE RUNNING WEST BET SEC 25-36.
COURSE S. 84° 30' W

52+75 COR TO SEC. 25-26-35-36 4" OAK POST

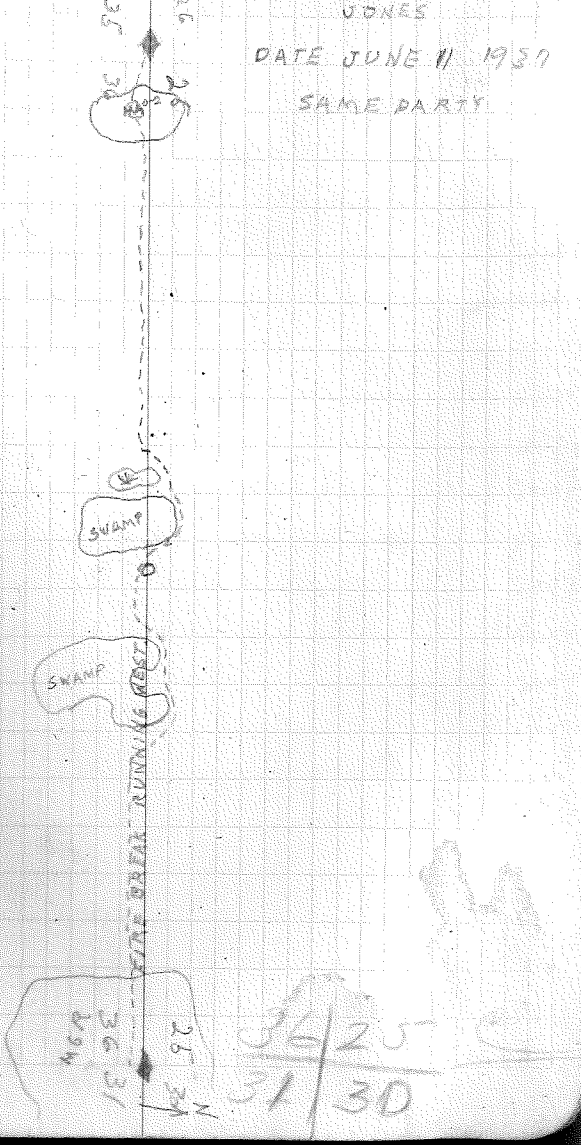
51+00 LEAVE MARSH
49+80 ENTER MARSH
40+93 SECONDARY ROAD No. AND So
31+25 LEAVE MARSH
30+56 MARSH No. AND So.
29+81 LEAVE SWAMP
27+00 ENTER SWAMP
26+40 1/4 POST 4" SD. ASPEN
22+65 LEAVE SWAMP
21+00 ENTER SWAMP
19+80 LEAVE SWAMD
18+00 ENTER SWEMP
4+00 LEAVE MEADOW
0+00 2" I.P. SEC. 25/36 SCRIBED ON CAP

37

WEATHER- PARTLY CLOUDY WARM
CHAINING RECORD HH
WEATHER - CLOUDY - WARM

DATE JUNE 10 1937
PARTY ROLF A.
COMSTOCK
THOMPSON
SIMS
JONES

DATE JUNE 11 1937
SAME PARTY



T 140 N R 26 W

TRAVERSE RUNNING SOUTH BET. SEC 35-36

COURSE S 5° 46' E

52+88 COR. TO SEC. 1-2-35-36

2" I.P. FROM WHICH A BURNED PINE STUMP BEARS S 85° 30' W 84 FT. SCRIBED B.T.

PINE STUMP S 59° 30' E 48 FT. SCRIBED B.T.

44+19 LEAVE SWAMP

42+58 ENTER SWAMP

39+00 LEAVE SWAMP

34+44 ENTER SPRUCE SWAMP

31+00 LEAVE SWAMP

30+00 SWAMP EAST AND WEST

26+40 SET 1/4 POST 3" SP. OAK.

16+50 LEAVE MEADOW

13+20 ENTER MEADOW

12+22 TRAIL RUNNING N-E AND S-W

6+41 LEAVE MARSH

6+00 MARSH EAST AND WEST

5+48 LEAVE MARSH

4+29 MARSH EAST AND WEST

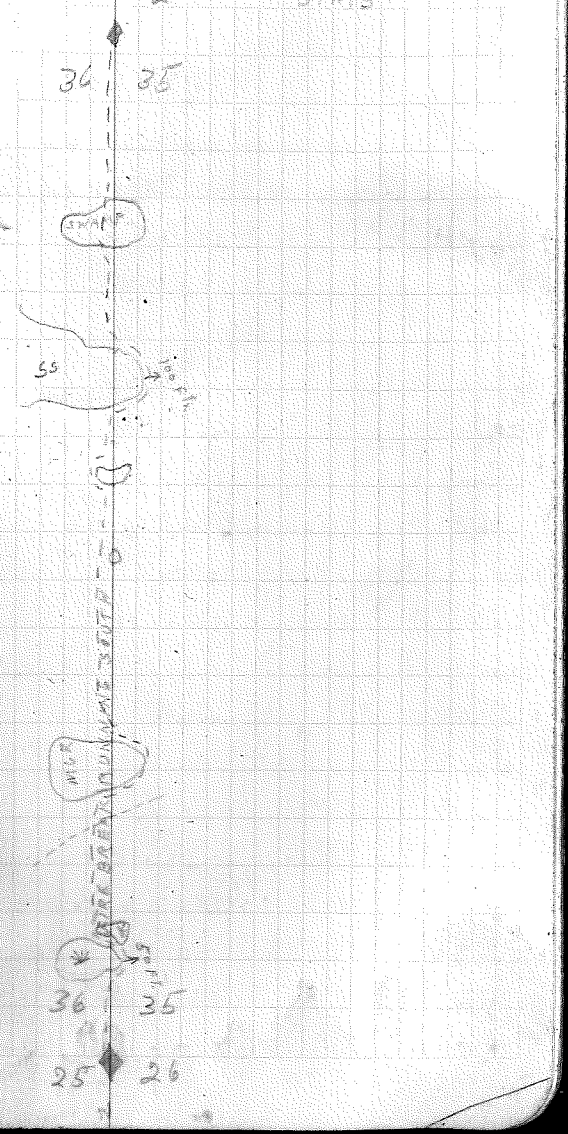
0+00 STARTED FROM BRASS CAP POST COR. TO SEC. 25-30-31-36

X 38

WEATHER-FAIR-WARM DATE JUNE 14 1937

TRAVERSE RECORD TTT

PARTY. ROLF
COMSTOCK
THOMPSON
JONES
SIMS



T 140 - R 26 W.

LINE RUNNING EAST BET. SEC. 1-36

COURSE N 87° 30' E

ONE WITH METAL TAG.

52+74 COR. TO SEC. 1-30-31-36 2" I.P. 2-4" POSTS

39+50 SWAMP 50 FT. WIDE No. AND So.

33+40 LEAVE SWAMP

27+30 ENTER SWAMP

26+48 1/4 POST 2" I.P. 4" TAM. POST WITH METAL TAG

23+35 LEAVE SWAMP

22+00 ENTER SWAMP

14+00 LEAVE SWAMP

8+59 TRAIL No. AND So.

7+59 ENTER TAM. SWAMP

5+10 LEAVE SWAMP

4+00 ENTER SWAMP

0+00 STARTED FR 2 I.P. COR. TO SEC. 1-2-35-36

39

WEATHER FAIR - WARM. DATE JUNE 15 1937

CHAINING RECORD TTTT

PARTY - ROLF
CONSTANS
DUFRAUT
THOMPSON
SIMS

T 140 N R 26 W — 25

LINE RUNNING SO. BET SEC. 31-36

COURSE S. 6° E

52+72 COR. TO SEC. 1-6-31-36

2" I.P. 2 4" POSTS ONE WITH METAL TAG

39+60 1/16 POST

26+40 1/4 POST 4" ASPEN WITH METAL TAG

25+20 LEAVE MARSH

23+00 ENTER MARSH 13+20 1/16

9+55 LEAVE MEADOW

0+00 STARTED FROM 2" I.P. COR. TO SEC. 25-30-31-36

40X

WEATHER.

FAIR. WARM

DATE JUNE 16 1932

PARTY - ROAD

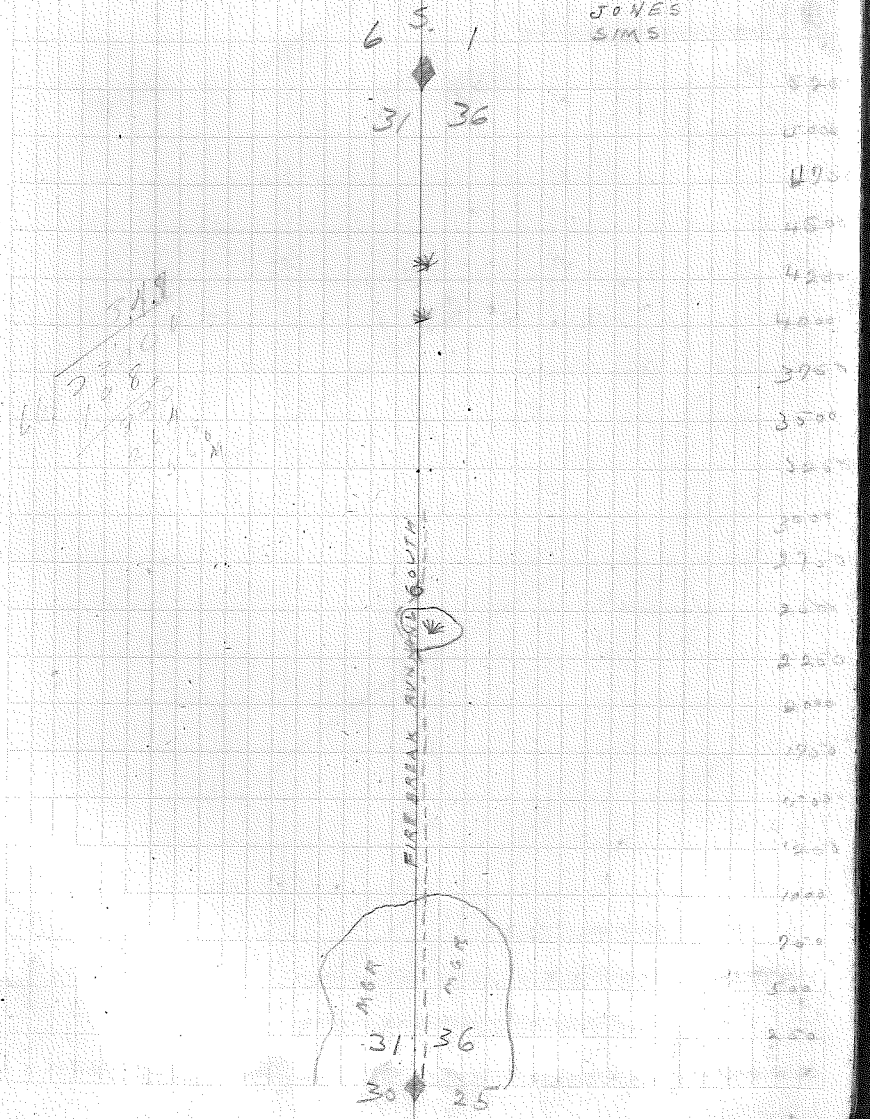
COMSTOCK

THOMPSON

JONES

SIMS

CHAINING RECORD TTT



LINE RUNNING WEST FROM 1/16 POST 13 ROD N. OF SOUTH EAST COR. OF SEC. 36.

COURSE S 85° W

6 LINKS EDGE SW

4.00 ENTER SWAMP WINDOW

6.00 COR. TO SEC. 36

0.00 STAKE FROM 1/16 SEC. LINE 13 x 20 AZ. N. OF

WEATHER.

FAIR - WARM

CHAINING RECORD

DATE JUNE 16, 1937

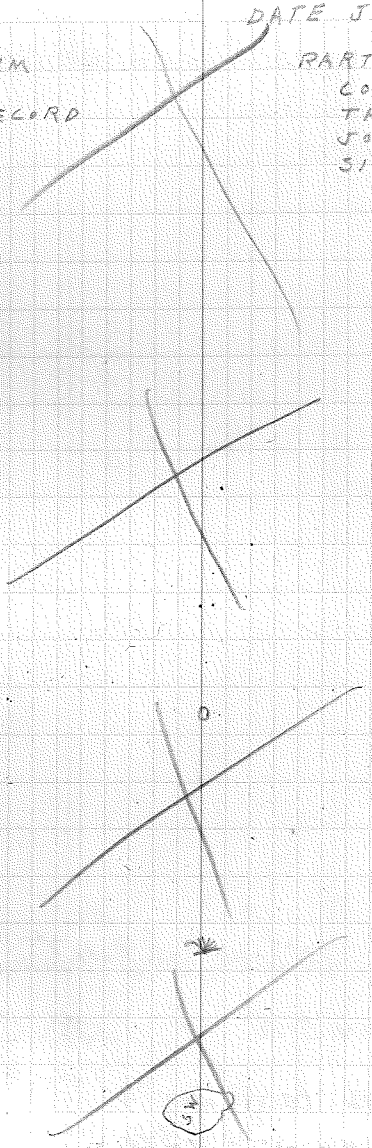
PARTY ROLE

COMSTOCK

THOMPSON

JONES

SIMS



SEC. 36 1/16 LINE

41

WEATHER
FAIR-WARM

T 140 N
R 26 W

DATE-June 21

PARTY-
STONESTREET
JONES
COMSTOCK
SIMS
CLEMAN

Planting Notes

to C. N 1/16. where I quit for day.

Run. West. on N. 5-30 1320 ft to C. 1/4 Cor. Thence
Thence S. deviated back South to C. E 1/16. and
Thence Run. North. 5-30. 1320 ft. to NE 1/16.
Set up at E 1/4 stake of Sec. 36. Run. West. 1320 ft. to C. E 1/16.

ALL plowed and planted.

Run. North. 1320 ft
set up and
ALL plowed & planted.

SEC. 36

Weather Bright. Clear warm. DATE June 22. 1937.

PARTY
Stronstead - Compass
Sims - Rodman
Comstock
Jones
Coghlan.

Planting Co.

at 450 ft. West of C.W.1/16 I come to a swamp and left it at 600 ft.
at 200 ft. Come to Wet marsh apro. 20 ft. Swamp apro. 200 ft. Long and 150 ft. Wide
I set up at C.W.1/16 of Sec. 36. Run. West on 5.30 1317 Ft. West to center 1/4 of Sec. 36.
Come to N.W.1/16 Cor. at 1329 Ft. of Sec. 36 Lake West of N.W.1/16 about 200 ft.
Wet Marsh ends at 1100 ft. N.
Plowing stopd at 750 ft. N. of C. West 1/16 Sec 36 I come to Wet marsh at 700 ft. N. of C West 1/16
Come to Wet marsh at 450 ft. N. of C.W.1/16 Marsh just West of Lins. Size about 100 ft by 300 ft.
I Come to Plowing Running East and West, bet AT 350 FT N- of C.W.1/16
Then I set up at C. West 1/16 and Run. N. on 5.30 1320 ft. to N-W 1/16 Sec. 36
Plowing Run. N-S. Stopd at 900 Ft. West of C.1/4 Sec. 36
Run into Wet Marsh at 700 FT West of C 1/4 Sec Plowed ends at 830 Ft. West of C 1/4 of Sec. 36
I set up at C. 1/4 of Sec. 36. Run. West on. 5.30 1320 ft to C.W 1/16. all plowed.

Weather. Clear-Warm Date. June. 23. 1939

T.14 N
R. 26 W

Party
Stronstad, Compass
S. M. S. Redman
Fallon
Jones
Comstock

Tam. Swamp and wet marsh Crosses line at 760 Ft. N. of C.¼. Left Marsh at 700 Ft. S. M.S. Redman
Running North to C.S.½. 572 Ft. N. to plowing. Run. N.S. Fallon
on Ld. 1320 Ft. North to C.S.½. Sec. 36. Wet Marsh East of ¼ Line. Jones
I.P. at Center ¼ cor. Between Sec. 36-31. Set up at S. Center ¼ Run N. Comstock
At 1185 I left plowing and entered Tam. swamp. S. of S.W.¼ Wet Marsh at 1250 Ft.
At 875 Ft. S. of S.W.¼. I left Marsh At 1920 Ft. S. of S.W.¼ I come to Plowing Run. E-W
An old graded logging road at 575 Ft. South of S.W.¼ at 750 Ft. S. of S.W.¼ came to wet Marsh
I set up at S.W.¼. run South on Ld. 13 Ft. to W.¼ Sec. 36
Run North on Ld 1320 Ft to C.¼.
at 550 Ft. North I come to wet marsh and Left at 650 Ft. Sec. 36
and at 1250 I come to plowing Running N-S. Sec. 36
and 1160 Ft. East. I come to Tam. Swamp.
an old graded Logging Road at 875 Ft. East of S.W.¼.
Swamp on North of Line 50 Ft. Wide 100 Ft. Long. Run East 300 Ft. from S.W.¼ sec. 36
Set up at S.W.¼ of Sec. 36 Run east on Ld. 1320 Ft. to C.S.¼.
at 1100 Ft. Left Tam. Swamp of Sec. 06
at 900 Ft. I entered Tamarack Swamp.
at 600 Ft I left. Marsh.
at 500 ft I entered wet Marsh. Tamarack Swamp to North
I set up at S.W.¼ of Sec. 36. and run West to South ¼. on Ld. 1296 Ft. to S.¼ Sec. 36
I come to a Swamp at 1069 Ft. South of C.W.¼ Sec. 36. Swamp ends at 1200 Ft. South of C.W.¼
Run South 130 Ft. I came to wet marsh ends at 250 Ft. Sec. 36
I set up at C.W.¼ cor. of Sec. 36. Run South on Ld. 1320 Ft. to S.W.¼ Sec. 36

Weather. Cloudy. Warm

Date June 24 1937

Party

Stronstad
Sims
Fallon
Jones
Comstock

T 140 N
R 26 W

Planting Area

I set up at S.E. 1/16 of Sec 36 Run North on 6d 15m. 1320 Ft. to C.E. 1/16
Wet Marsh West of Line at 1200 Ft. North of S-E 1/16 Sec 36.
Wet Marsh West of Line Apro. 200 ft. by 150 Ft. South of S.E 1/16 Sec. 36 at 700 Ft.
P/Mine stopped at 330 FT. East of C.S. 1/16, and Started at 700 Ft. Sec. 36. I set up at C.E 1/16 Runs 6d 15 min. Runs S. 1320 Ft. to E. 1/16
I come to Ta m. Swamp at 330 Ft. East of C.S 1/16 I left Ta m. Swamp at 530 FT.
I set up at C.S 1/16 Cor. of Sec 36 Run East on 6d 15m. 1320 ft. to S.E 1/16.

Located 3" Aspen Sq. stake scribed
T 512, 2 ft. high rotted at ground level.
from which wh. pine burned stump
24" diam bears S 31° W - 22.2 ft.
Scribed B.T. original pine but
not original scribe.
Placed 4" stake 5' high with W.T.
at corner.
Dist. approx. 5 lake at Ralph Tecumseh
33 ft. South.

TAM. STUMP S 6H° W 64 FT. SC. 5 11
4" TAM POST SCRIBED S 1-2-MOR
FR. WHICH A 12" TAM. BEARS E 53° E. 42 FT. SC. 5 12 BT.
A 12" TAM. STUMP S 55° E 6 FT. LK. OF

53+07 N. AND S. LINE 5 FT. SO. OF COR TO SEC 1-2-11-12

50+00 ENTER SPRUCE SWAMP

34+50 Birch and aspens

3300 Ft. W. of Sec. Cor. Bet. Sec. 1-12 in Pine and Small aspens.
at 3100 Ft. W. of Sec. Cor. Between 1/2 & come to SWP N. of the Line about 50 Ft.
& set 1/4 Cor. in a bunch of Pines and aspens. No old Cor. found. 2970 Ft. W. in aspens near Birch
~~SA~~ Wet marsh to the south of the line at 2310 Ft. West. at 2640 Ft. W. of Sec. Cor. 1-12
at 1980 Ft. W. of Sec. Cor. 1-12 Oak and Birch at 2310 Ft. W. of Sec. Cor. 1-12 mixed aspen and oak
& set 1320 Ft. W. of Sec. 1-12, 1/16 Cor. in aspens and Willows. 1650 Ft. W. of Sec. Cor. 1/2 aspens
At 1050 Ft. W. of Sec. Cor. 1-12 & come to Alder SWP, & left Alder SWP, at 1200 Ft. SWP. APPROX. 100 Ft. BY 25 Ft.
Tam. Swamp Run. N. S. 330 aspens and 12 in. 660 Small aspens. 990 Ft. W. of Sec. Cor. 1-12 Small aspens
S 84° W on random line bet S 1/2 T 139 R 25 at 300 Ft. West of Sec. Cor. Between 1-12 & come to

Weather Cloudy, Warm Date. June. 25. 1937

Party
Stronstad
Sims
Comstock
Jones.

West on random
line bet. 1-12. Twp
139 R. 25 W.

S. 84° W. Random line
Corr. Mon. Cor.
S. 83° 30' W.
Corr. Dist. - 53.07

T 13 S R 25 W.

RANDOM LINE RUNNING WEST BET. SEC. 2-11

COURSE S 83° 45' W.

COR. TO SEC. 2-3-10-11

52+31 NO. AND SO. LINE 22 FT. S. OF 4" SQ. POST

51+84 SECONDARY ROAD NO. AND SO.

40+00 LEAVE SW

37+91 Stream NO. AND SO. 40 FT. WIDE

33+00 ENTER SWAMP WILLOW

26+40 SET APP 1/4 POST 4" ASPEN

1+00 LEAVE SWAMP

0+00 4" TAM. POST COR. TO SEC. 2-3-10-11

Start west from J. C. 2/11 1/2 13S-25

WEATHER - FAIR - WARM DATE JUNE 28 1937

CHAINING RECORD - 1111

PARTY - ROLF
COMSTOCK
SIMS
JONES
FALTON

JUNE 29

SAME PARTY

S 83° 45' W 6.19 chains

stream

SW

Scribed Tam post.

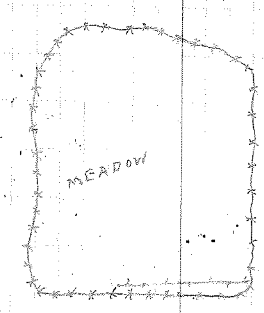
26+40	SET APP 1/4 POST 4" ASPIN
25	
24	
23	
22	
21	
20	
19	
18	
17+56	
17	LEAVE MEADOW FENCE N-S S-W.
16	
15	
14	
13+20	SET 1/16 POST SEC. 3-10
13	ENTER HAY MEADOW
12+93	FENCE AND TELEPHONE LINE NO AND SO.
11	
10+00	ENTER MARSH
9	
8	
7	
6	
5	
4	
3	
2	
1	
0+00	STARTED WEST FR. 3/2 10/11 T.139-25W

JUNE 30 1937

ROLF - CH. OF PARTY
SIMS - ROD MAN
COMSTOCK } AXE
FALLON }
JONES - CHAIN

T.139 N
R.25 W

1/4 SEC. 3-10



S 89° 46' W
RANDOM LINE

4" ASPIN POST

10 3
11 2

53+72 SET 4" ASPIN POST AND COR. TO SEC 3 0 0 0

52

51

50

49

48

47

46

45

44

43 1/2

43 TRAIL NO. AND SO.

42

41

40

39+60 SET TEMP. 1/16

39

38+00 LEAVE SPRUCE SWAMP

37

36

35

34

33 ENTER HM - 55

32

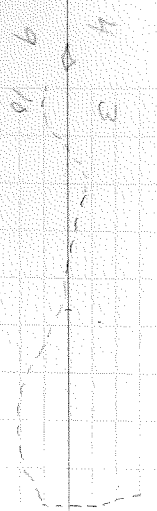
31

30

29

28

27



24+00 SET TEMP 1/4 POST SEC 4-9 3" ASPIN
23
22
23
22
21
20
19
18
17
16
15
14 LEAVE SWAMP
13+20 SET TEMP 1/16
13
12
11
10
9
8+80 STREAM NO. AND SO. 10 FT. WIDE
8
7+00 ENTER MARSH
6
5
4
3
2
1
0+00 STARTED WEST FR. 4|3 / 9|10 T 139 R 26 W.

1/4 SEC. 4|9

JULY 1, 1937

50

RILEY CH. OF PARTY
SIMS - REC
FALLON, COMSTOCK — AXE
JONES — CHAIN

4|3 BROWN
RANDOM LINE
9|10

53+51 TOTAL DISTANCE

137 FT NO OF EAST LINE

44+41 TIED TO LINE RUNNING FROM EAST

43

42

41

40

37+60 SEC. TOWN. 1/6

35

27

26

25

34

33

32

31

30

29

28

27

26+40 SET 4" AS[illegible] POST [illegible] COR. TO SEC
25-30-31-36

13+20 SET TEMP. 1/16 POST

1+81 FENCE E AND W
1+39 SECONDARY ROAD N AND S

0+00 STARTED EAST FR. 1/4 COR. S 25/36

APP. COR. TO SEC.
25|30
36|31

JULY 2, 1937
ROLK - CH OF PAR
SMS - ROD
FALLON
COMSTOCK - AXE
GRAA - CHAIN

T 140 N
R 25 W

Line was Run East-West
from 1/4 Cor. to Sec. Cor.

N 83° 45' E
Random Mag bearing

2640 ft.
26[illegible] ft.

1/4 COR 25/36
0 4" SQ. POST
SCRIBING [illegible]

26+40 SET 4" POST APP. COR. TO SEC. 26|25 / 35|36

26.

25.

24.

23.

22.

21.

20+00 STREAM NO. AND 60. 20 FT. WIDE

19

18.

17.

16.

15.

14.

13.

12.

11.

10.

9

8

7

6

5

4

3

2+00 LEAVE SPRUCE - ENTER SW

1+76 ENTER SPRUCE SWAMP SW

0+00 STARTED WEST FR. 1/4 COR. SEC. 25/36

T 140 R 25

JULY 6 1937

[illegible]

POSTED

[illegible]

JULY 8 1937

SAME PARTY

[illegible]

APP. COR. TO SEC. 26|25 / 35|36

Line Run west bet 25/36 - 140-75W

From 1/4 Cor. to the Section Cor.

S. 83°45' W

Random mag bearing

2640 ft.

total distance

SW

RANDOM LINE

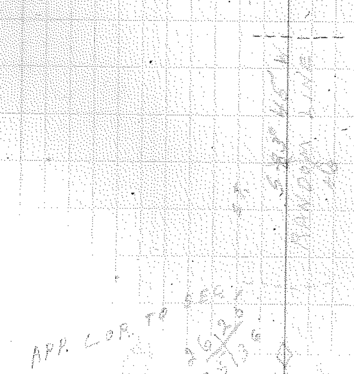
0

26+40	SET TEMP. 1/4 POST SEC. 26/35				
26					
25					
24					
23					
22					
21					
20					
19					
18					
17					
16					
15					
14					
13+20	SET TEMP 1/16 POST				
13					
12					
11+75	CLASS C ROAD N AND SO.				
11					
10+10	OFFSET AROUND 12" ASPIN				
10					
9					
8					
7+68	CLASS C ROAD NO. AND SO.				
7					
6					
5+00	LEAVE SWAMP				
4					
3					
2	ENTER SCATTERED [illegible]			H.B.	
1+49	OLD HAY ROAD N AND SO.				
1					
0+00	STARTED WEST FR. APP. COR. TO SEC.				26/25 35/36

1/4 SEC. 26/35

JULY 8 1937
ROLF - CH. OF PARTY
SIMS - RODMAN
SMKR [illegible]
FALLON - AXE
GOBA - CHAIN

54



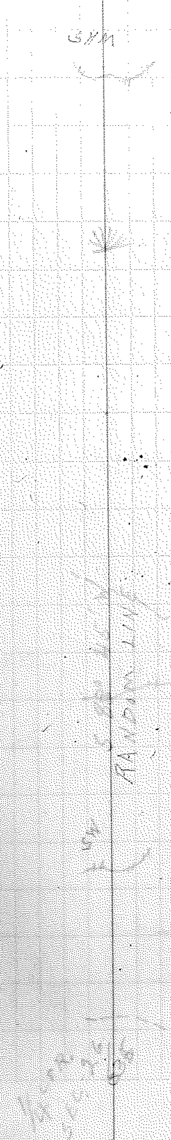
T 140 R 25

55+20	NO. AND SO. LINE LOCAT. NO. OF APP. COR.
52	TO SEC. 27|26 / 34|35
51	
50	
49	
48+10	ENTER SWAMP HARDWOOD
47	
46	
45	
44	
43	
42	
41	
40	
39+60	SET TEMP. 1/16 POST
39	
38	
37+57	CLASS 4 ROAD S.W. - N.E.
37	
36	
35+10	LEAVE SWAMP WILLOW
34	
33	
32	
31+50	
31	ENTER SWAMP WILLOW
30	
29	
28+32	CLASS 4 ROAD NO. AND SO.
28	
27	

APP. COR. TO SEC.
27|26
34|35

JULY 9 19[illegible]

READ ... CHAINMAN? PARTY
... MAN
... (COMPLETE?)
RALLON ... AXE
GOGA ... CHAIN



Index

July 12, 1937
Rolf - Chief of Party
Sims - 56
Fallon -
Engstrom -
Gogan -

1/4 Sec. 30/31

1/4 Cor -

20+28 set Temp. 1/16 Cor

5+57 - Class - B Road

3+15 Leave Mon - N-S

0+00 Started East on True Line between Sec. 30-31 T. 24 N R. 25 W.

True Line

N 85° E

Mon

30 31
25 36

52+45 To 1 inch iron Pipe

51+51

46+50 Leave Mar

43+00 Enter Mar

39+60 Set 1/16 Cor

July 12, 1937
Rolf-Chief Party
Comstock-
Sims- 57
Good-
Fallon-

SAME PARTY

Mar

Mar

Set 1/16 cor

30 31

T. 140 R 25

July 14, 1937 X

Party
COMSTOCK
SIMS
Goga
Fallow
Galvan

58

86+40 Set App. ¼ Post 4" Poplar

25

24

23

22

21+00 Leave swamp. Entered Hazel Brush

20

19

18+00 Entered Wet Swamp

17

16

15

14+00 Ft. Leave wet swamp. Enter poplars

13

12

11 11+00 Ft entered wet swamp.

10 10+55 Fence 10+71 Ft. Creek Wagon Road

9+00 Ft Leave Wild Hay Meadow

9

8

7

6

5

4

3

2

1 Sta. Entered Wild Hay Meadow

Area Granted West Bet Sec 12/13

Cor to Sec 12/13

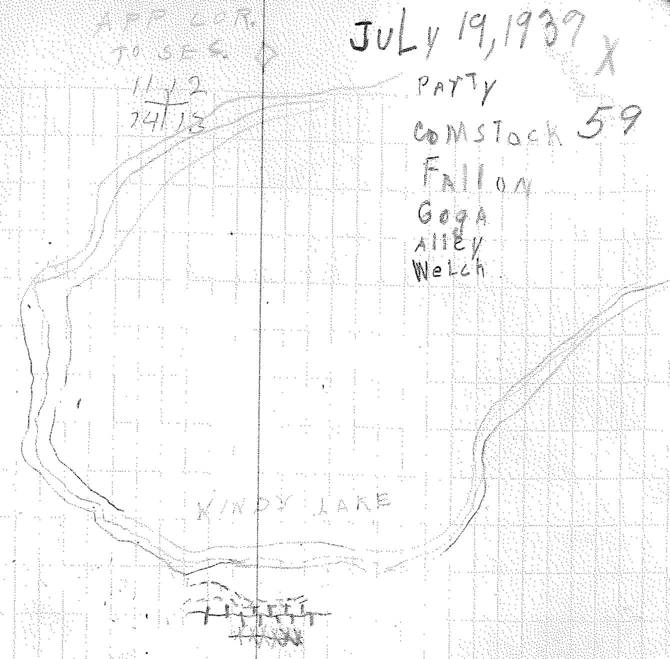
M61

T 140 R 25

52+80
51
50
49
48
47
4+20
45
44
43+00 EDGE OF LAKE OFFSET 810 [illegible]
42+47 FOUND M.C. 134 FT. S. OF LINE
41+
40+00 Leave mixed TAM + Spruce - enter Hazel Brusch
39
38
37+00 entered mixed TAM + Spruce SWAMP
36+30
35
34
33+00
32
31
30
29+70
28
27

JULY 19, 1939 X

PARTY
COMSTOCK 59
FALLON
GOGA
ALLEY
WELCH



T-142 R-25

26 ENTER SWAMP.

25 OFFSET 140 FT. TO NO. AND SET APP. [illegible]

25 FT. to center of road FR. WHICH I RUN W. ON 90

24+11 Barbed wire fence

23+10

22+00 FT to center of old logging road

21

20

19+80

18

17

16+58

16 LEAVE MIXED HARDWOODS

15

14+00 FT entered Mixed sh M.

13

12+00 FT Center of cabin offset 10 FT. to So. around cabin

11

10

9

8

7

6 BOARD FENCE S.E.–N.W.

5

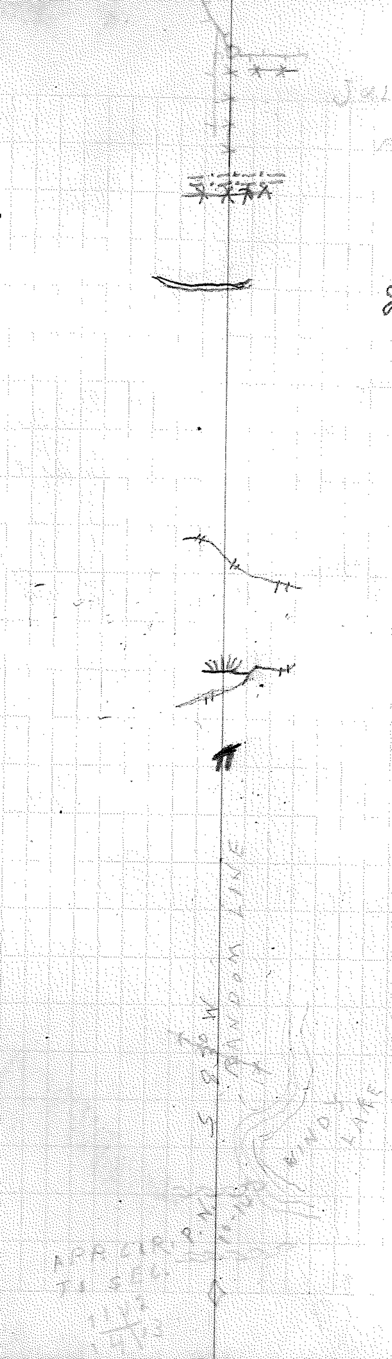
4

3 RIDGE N. AND SO.

2

1 RIDGE N. AND S.

Running west. bet.



JULY 22 1937

PARTY – ALL

FALLON

GOGA

ALLEY

WELCH

July 21, 1937

PARTY – Comstock

Fallon

Goga

Alley

Welch

52+80 SET 4" ASPIN POST - APPROX. COR. TO SEC. ~~11 12 14 13~~ 10|11 / 15|14
51
50
49+50
48
47
46+20
45
44+44 FT to CENTER of old logging road
44
43
42-90
41
40
39+60
38
37+27 LEAVE FIELD
36+27 OFFSET 35 FT AROUND POTATO PATCH
36
35
34
33
32
31
30
29
28+40
28 LEAVE SWAMP
27 ... APP. 1/4 SEC. 11/14

JULY 22 1927

PARTY

Comstock
Fallon
Welch
Alley
Goga

total distance 5280 ft.

S 83° W.
Random mag bearing

INDEX

T140 R25

96+?	Sec APP ¼ Cor.
95	
94	
93+10	
92	
91	
90+00	LEAVE Bog or dwarF Birch SWAMP
?+60	
18	
17	
16+50	
15	
14	
13+20	
12	
11	
10	
9+90	ENTER Bog or dwarF Birch SWAMP
8	
7	
6+60	
5	
4	
3+30	
2	
1	
0+00	? Sec Corner

15 | 16
14 | 11

Variation ?

X62

July 23, 1937
Party Consists of
Fallow
Goga
Welch
Alley

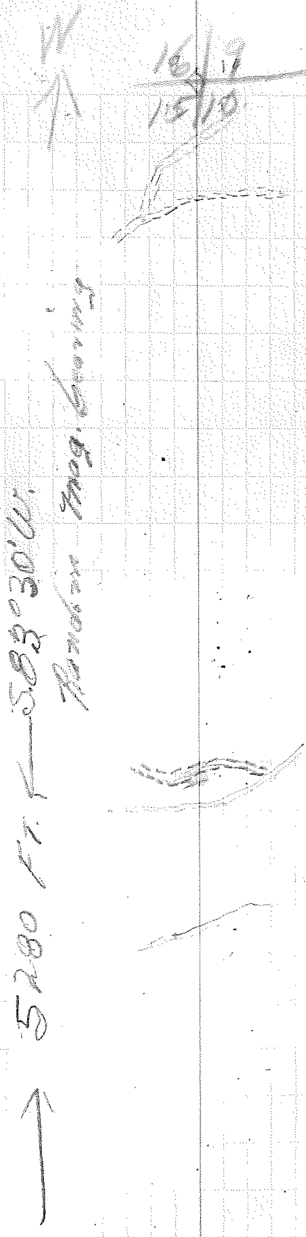
July 26, 1937

S 6° 30 W

T 14 R 25

52+90	SET 4" SPRUCE POST APP. COR TO SEC 10-9-15-16
51+12	CROSSED OLD WINTER ROAD
4 +95/+50	CROSSED OLD WINTER ROAD
8	
47	
46+20	
+60	SET APP 1/4 COR.
+92/+00	ENTER SPRUCE SWAMP - OLD FIRE TRAIL
+30	
35	
36 +25	CROSSED FIRE TRAIL
+00	
30	
29+70	
36	
37	

July 27, 1937
PARTY Comstock
Goga
Alley
Welch
Graf



T 140 R 25

26+40 SET APP. 1/4 POST
25
24
23+10
22
21
20
19+80
18
17
16+50
15
14
13+30
12
11
10
9+90
8
7
6+60
5+00
4
3+30
2
1
0+00

west bet.
Sec 15 / 10

X64

July 28, 1937
PARTY - Comstock
Good
Alley
Welch
Graf

S 83° 30' W

Random [illegible] bearing → W

App. Cor.

T. 140 R. 25

52+80 SET 4" popular post APP. cor to sec. 8-9-16-17

51

49+50

+92 Old Fire trail

46+57 crossed old logging road

45

44

+90

+60

+30

LEAVE mixed Tree & brush swamp

+00 ENTER mixed Tree & brush swamp

32

31

30

29+70

28

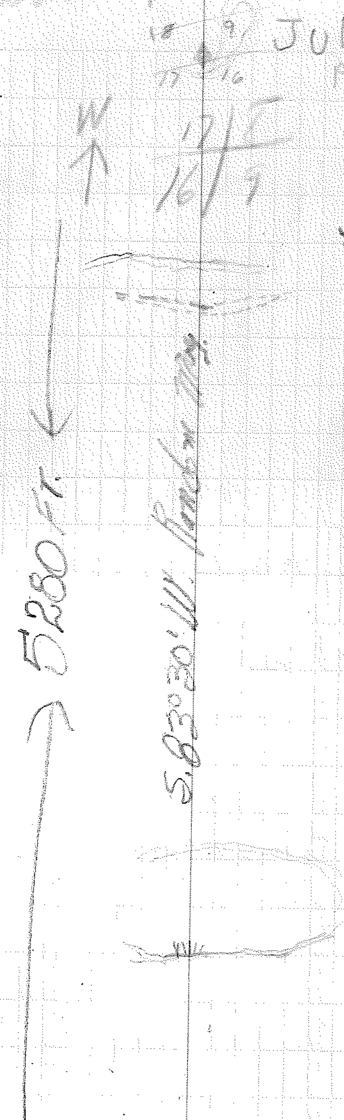
27

Variation P

X 65

July 29 1937
Party Comstock
Welch
Alley
Goga
Graf

July 30 1937
Comstock
Welch
Alley
Goga
Graf



T 140 R 25 W

26+40	SET Appr. 1/4 Cor
25	
24+00	
23+10	ENTER dwarf Birch SWAMP
22	
21	
20	
19+60	
18	
17	
16+50	
15+00	LEAVE TAM. SWAMP
14	
13 30 +00	ENTER d TAM. SWAMP
12	
11	
10	
9+90 00	LEAVE TAM. SWAMP - ENTER SMALL POINT
8	
7	
6+60	
5+60	ENTER TAM. SWAMP
4	
3+30	
2	
1	
0+00	Approx Sec 17 E 16

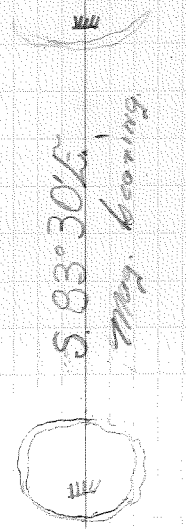
Variation?

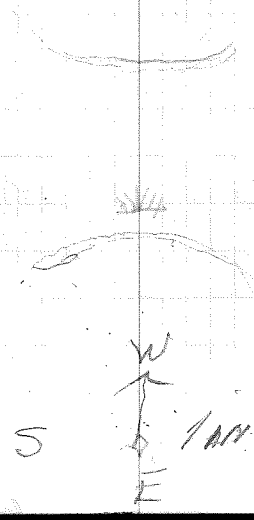
66

July 31 1937

Party Comstock
Welch
Alley
Gog A
Graf

603





[illegible]	SET 5" [illegible] POST - APP COR to SEC 7-8-15-16
51+90	LEAVE MGY SWAMP
50	
49+50	
48	
47+93	ENTERED M.G.Y SWAMP
46+20	
45	
44	
43	
42+90	
41	
40	
39+60	SET APP 3/4 POST
38	
37	
36+30	
35	
34	
33+06	
32+00	LEAVE dWARF or BIRCH SWAMP.
31	
30	
29+70	
28	
27+00	

Aug 2, 1939

V. 6½° W

18 | 7
17 | 8

M.G.Y.

PARTY CONSIST
Stronstad
Alley
Graf
Chupka
Milelich

T. 140 R. 25	
26+40	
25	
24	
23+10	
22	
21	
20	
19+80	
18	
17	
16+50	
15	
14	
13+35 / 13+20	To creek running N & S. 10 ft wide
12	
11	
10	
9+90	
8	
7	
6+60	
5	
4	
3+30	
2	
1	
0+00	App sec. cor.

start west

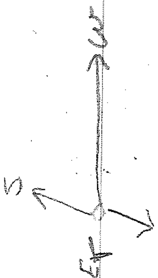
Aug. 3, 1939 68

V. 6½° W

Party Comstock
Stromstad
Alley
Gyaf
Chupka
Mihelich

S. 83° 30' W.
Random Mag bearing

92) 562 (6



Appro. sec. cor.

T140 R25

69

Aug. 4 1937

Weather-fair-warm

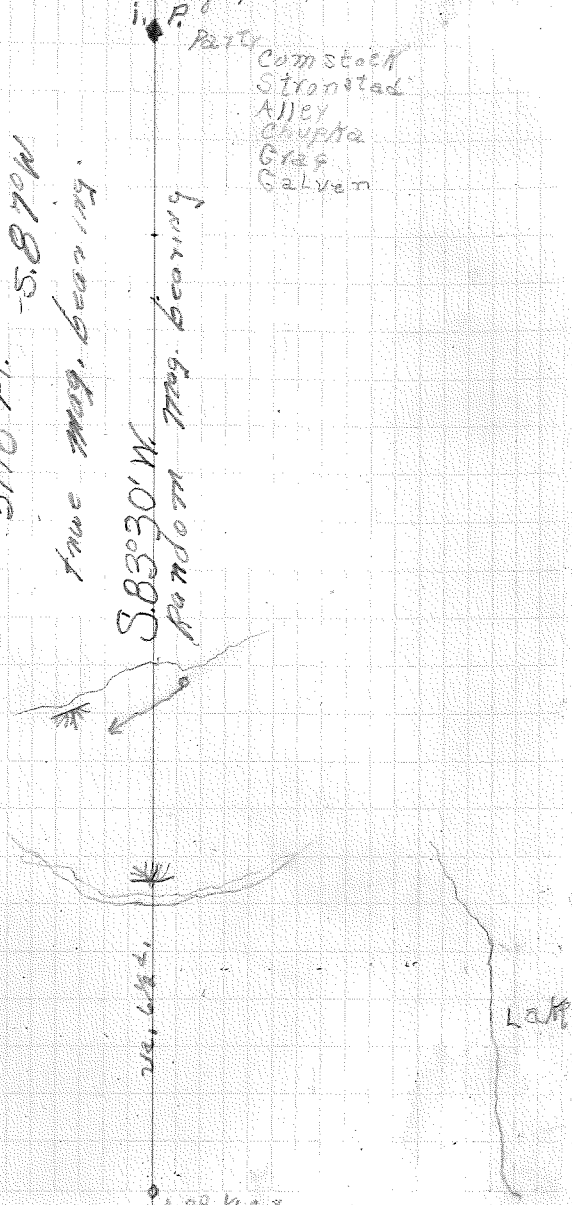
I. P.

Party
Comstock
Stromstad
Alley
Chapin
Graf
Galvan

9 set Yellow Tag on aspen tree 70 Ft. No. 70 E
51+18 Ft. Came to i.p. on Range Line

Off set Line 3+35 No. to old Line
47+54 Ft. 2 of set and run No. to old line
46
45
44
43
42
41 +00 Came to old cedar swp
40
39
38 +00 Ft. Left Low Land Swp.
37 +10 Ft Crossed Spring run N-W and S-E
36
35
34
33 +00 Ft. Came to Low Land swp
32
31
30
29
28
27

Set up at A.P. 1/4 Cor. run W. 4, 6 1/2



BK 2

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N	Bet	16-15	139-25	Page 26
			?	27
W	"	26-35	140-26	28
E	"	19-30	139-25	29
E	"	20-29	" "	30
"	"	21-28	" "	31
"	"	22-27	" "	32
"	"	23-26	" "	33
"	"	24-25	" "	34
E	"	13-24	" "	35
			Void.	36
W	"	25-36	140 26	37
S	"	35-36	" "	38
E	"		?	39
S	"	31-36	(140-26 & 25)	40
			Void	41

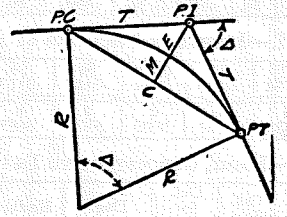
Sub-division of Planting Area 42-45

T140 N R 26 W Sec 36

W	"	1-12	139-25	46
W	"	2-11	" "	47
W	"	3-10	" "	48-49
W	"	4-9	" "	50-51
E from 1/4		25-36	140-25	52

W	from 1/4	25-36	(140-25)	P. 53
W	Bet.	26-35	" "	54-55
E	Bet	30-31	" "	56-57
W	"	12-13	" "	58-59
W	"	11-14	" "	60-61
W	"	10-15	" "	62-63
W	"	9-16	" "	64-65
W	"	8-17	" "	66-67
W	"	7-18	" "	68-

DIETZGEN'S RAILROAD CURVE AND REDUCTION TABLES



CURVE FORMULAS

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

Tangent=T=R tan $\frac{\Delta}{2}$ (3) Length of Curve=L=$100\frac{\Delta}{D}$ (4)

Middle ordinate=M= R(1—cos. $\frac{\Delta}{2}$) (5) =R vers $\frac{\Delta}{2}$ (6)

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

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

EXPLANATION AND USE OF TABLES

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

Offsets.—Tangent offsets vary (approximately) directly with D and with square of the distance. Thus tangent offset for Sta. 158 on above curve is 2.16 ft. found as follows. From Table III tangent-offset for 100 ft.=7.27 ft. Distance=158—Sta. P. C.=54.50, hence offset=7.27 (54.50÷100)²=2.16 ft. Also square of any distance divided by twice the radius equals (approximately) the distance from tangent to curve. Thus (54.50)²÷(2 x 688.26)=2.16 ft.

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

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

Table I.—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 II.—Inches in Decimals of a Foot.

1–16	3–32	1/8	3–16	1/4	5–16	3/8	1/2	5/8	3/4	7/8
.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 III.—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°				
20	17188.8	.073	.291	0.10	20′	819.02	1.528	6.105	2.10′
30	11459.2	.109	.436	0.15	30	781.84	1.600	6.395	2.20
40	8594.42	.145	.582	0.20	40	764.49	1.637	6.540	2.25
50	6875.55	.182	.727	0.25		747.89	1.673	6.685	2.30
1					8				
10	5729.65	.218	.873	0.30	20	716.78	1.746	6.976	2.40
20	4911.15	.255	1.018	0.35	30	688.16	1.819	7.266	2.50
30	4297.28	.291	1.164	0.40	40	674.69	1.855	7.411	2.55
40	3819.83	.327	1.309	0.45		661.74	1.892	7.556	2.60
50	3437.87	.364	1.454	0.50	9				
	3125.36	.400	1.600	0.55	20	637.28	1.965	7.846	2.70
2					30	614.56	2.037	8.136	2.80
10	2864.93	.436	1.745	0.60	40	603.80	2.074	8.281	2.85
20	2644.58	.473	1.891	0.65		593.42	2.110	8.426	2.90
30	2455.70	.509	2.036	0.70	10				
40	2292.01	.545	2.181	0.75	30	573.69	2.183	8.716	3.00
50	2148.79	.582	2.327	0.80	11	546.44	2.292	9.150	3.15
	2022.41	.618	2.472	0.85	30	521.67	2.402	9.585	3.30
3					12	499.06	2.511	10.02	3.45
10	1910.08	.655	2.618	0.90	30	478.34	2.620	10.45	3.60
20	1809.57	.691	2.763	0.95	13	459.28	2.730	10.89	3.75
30	1719.12	.727	2.908	1.00	30	441.68	2.839	11.32	3.90
40	1637.28	.764	3.054	1.05	14	425.40	2.949	11.75	4.05
50	1562.88	.800	3.199	1.10	30	410.28	3.058	12.18	4.20
	1494.95	.836	3.345	1.15		396.20	3.168	12.62	4.35
4					15				
10	1432.69	.873	3.490	1.20	30	383.07	3.277	13.05	4.50
20	1375.40	.909	3.635	1.25	16	370.78	3.387	13.49	4.65
30	1322.53	.945	3.781	1.30	30	359.27	3.496	13.92	4.80
40	1273.57	.982	3.926	1.35	17	348.45	3.606	14.35	4.95
50	1228.11	1.018	4.071	1.40	18	338.27	3.716	14.78	5.10
	1185.78	1.055	4.217	1.45	19	319.62	3.935	15.64	5.40
5					20	302.94	4.155	16.51	5.70
10	1146.28	1.091	4.362	1.50	21	287.94	4.374	17.37	6.00
20	1109.33	1.127	4.507	1.55	22	274.37	4.594	18.22	6.30
30	1074.68	1.164	4.653	1.60	23	262.04	4.814	19.08	6.60
40	1042.14	1.200	4.798	1.65	24	250.79	5.035	19.94	6.90
50	1011.51	1.237	4.943	1.70		240.49	5.255	20.79	7.20
	982.64	1.273	5.088	1.75	25	231.01	5.476	21.64	7.50
6					26	222.27	5.697	22.50	7.80
10	955.37	1.309	5.234	1.80	27	214.18	5.918	23.35	8.10
20	929.57	1.346	5.379	1.85	28	206.68	6.139	24.19	8.40
30	905.13	1.382	5.524	1.90	29	199.70	6.360	25.04	8.70
40	881.95	1.418	5.669	1.95	30	193.18	6.583	25.88	9.00
50	859.92	1.455	5.814	2.00					

Note. Chord Deflection=2 times tangent deflection.

Table IV.—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	7.01	40	788.26	53.97	40	1305.3	146.79
50	291.92	7.43	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 IV.—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	387.4	51°	2732.9	618.4
10′	1598.0	218.7	10′	2151.7	390.7	10′	2743.1	622.8
20	1606.9	221.1	20	2161.2	394 1	20	2753.4	627.2
30	1615.9	223.5	30	2170.8	397.4	30	2763.7	631.7
40	1624.9	226.0	40	2180.3	400.8	40	2773.9	636.2
50	1633.9	228.4	50	2189.9	404.2	50	2784.2	640.7
32	1643.0	230.9	42	2199.4	407.6	52	2794.5	645.2
10	1652.0	233.4	10	2209.0	411.1	10	2804.9	649.7
20	1661.0	235.9	20	2218.6	414.5	20	2815.2	654.3
30	1670.0	238.4	30	2228.1	418.0	30	2825.6	658.8
40	1679.1	241.0	40	2237.7	421.4	40	2835.9	663.4
50	1688.1	243.5	50	2247.3	425.0	50	2846.3	668.0
33	1697.2	246.1	43	2257.0	428.5	53	2856.7	672.7
10	1706.3	248.7	10	2266.6	432.0	10	2867.1	677.3
20	1715.3	251.3	20	2276.2	435.6	20	2877.5	682.0
30	1724.4	253.9	30	2285.9	439 2	30	2888.0	686.7
40	1733.5	256.5	40	2295.6	442.8	40	2898.4	691.4
50	1742.6	259.1	50	2305.2	446.4	50	2908.9	696.1
34	1751.7	261.8	44	2314.9	450.0	54	2919.4	700.9
10	1760.8	264.5	10	2324.6	453.6	10	2929.9	705.7
20	1770.0	267.2	20	2334.3	457.3	20	2940.4	710.5
30	1779.1	269.9	30	2344.1	461.0	30	2951.0	715.3
40	1788.2	272.6	40	2353.8	464.6	40	2961.5	720.1
50	1797.4	275.3	50	2363.5	468.4	50	2972.1	725.0
35	1806.6	278.1	45	2373.3	472.1	55	2982.7	729.9
10	1815.7	280.8	10	2383.1	475.8	10	2993.3	734.8
20	1824.9	283.6	20	2392.8	479.6	20	3003.9	739.7
30	1834.1	286.4	30	2402.6	483.8	30	3014.5	744.6
40	1843.3	289.2	40	2412.4	487.2	40	3025.2	749.6
50	1852.5	292.0	50	2422.3	491.0	50	3035.8	754.6
36	1861.7	294.9	46	2432.1	494.8	56	3046.5	759.6
10	1870.9	297.7	10	2441.9	498.7	10	3057.2	764.6
20	1880.1	300.6	20	2451.8	502.5	20	3067.9	769.7
30	1889.4	303.5	30	2461.7	506.4	30	3078.7	774.7
40	1898.6	306.4	40	2471.5	510.3	40	3089.4	779.8
50	1907.9	309.3	50	2481.4	514.3	50	3100.2	784.9
37	1917.1	312.2	47	2491.3	518.2	57	3110.9	790.1
10	1926.4	315.2	10	2501.2	522.2	10	3121.7	795.2
20	1935.7	318.1	20	2511.2	526.1	20	3132.6	800.4
30	1945.0	321.1	30	2521.1	530.1	30	3143.4	805.6
40	1954.3	324.1	40	2531.1	534.2	40	3154.2	810.9
50	1963.6	327.1	50	2541.0	538.2	50	3165.1	816.1
38	1972.9	330.2	48	2551.0	542.2	58	3176.0	821.4
10	1982.2	333.2	10	2561.0	546.3	10	3186.9	826.7
20	1991.5	336.3	20	2571.0	550.4	20	3197.8	832.0
30	2000.9	339.3	30	2581.0	554.5	30	3208.8	837.3
40	2010.2	342.4	40	2591.0	558.6	40	3219.7	842.7
50	2019.6	345.5	50	2601.1	562.8	50	3230.7	848.1
39	2029.0	348.6	49	2611.2	566.9	59	3241.7	853.5
10	2038.4	351.8	10	2621.2	571.1	10	3252.7	858.9
20	2047.8	354.9	20	2631.3	575.3	20	3263.7	864.3
30	2057.2	358.1	30	2641.4	579.5	30	3274.8	869.8
40	2066.6	361.3	40	2651.5	583.8	40	3285.8	875.3
50	2076.0	364.5	50	2661.6	588.0	50	3296.9	880.8
40	2085.4	367.7	50	2671.8	592.3	60	3308.0	886.4
10	2094.9	371.0	10	2681.9	596.6	10	3319.1	892.0
20	2104.3	374.2	20	2692.1	600.9	20	3330.3	897.5
30	2113.8	377.5	30	2702.3	605.3	30	3341.4	903.2
40	2123.3	380.8	40	2712.5	609.6	40	3352.6	908.8
50	2132.7	384.1	50	2722.7	614.0	50	3363.8	914.5

TABLE IV.—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	1208.9	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 IV.—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	2711.2	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	6438.4	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	20	9991.0	5787.7
30	6889.2	3230.8	30	8259.3	4322.4	30	10025.0	5817.0
40	6909.6	3246.5	40	8285.0	4343.6	40	10059.0	5846.5
50	6930.1	3262.3	50	8310.8	4364.8	50	10093.0	5876.1

Table V.—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 IV) 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	.53	.58	.63	.68
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	.70	.81	.92	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	1.94
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	3.44	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	4.98	5.38	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	.029	.032	.035	.039	.043	.047	.051
20°	.006	.011	.017	.022	.028	.034	.038	.045	.051	.057	.063	.070	.076	.083
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	.179	.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	.711	.845	.922	1.01
70°	.080	.159	.240	.321	.403	.485	.568	.652	.735	.819	.906	.994	1.08	1.17
75°	.095	.182	.286	.383	.480	.578	.678	.777	.877	.977	1.07	1.18	1.29	1.39
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	.985	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 VI.—CORRECTIONS FOR SUB-CHORDS AND LONG CHORDS.

FOR SUB-CHORDS ADD										Excess of arc per 100 ft.	LONG CHORDS				
D	10	20	30	40	50	60	70	80	90		D	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	.04	.02		.13	4	199.88	299.51	398.78	497.57
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	492.57
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	196.90	287.94	370.17	441.15
34	.15	.28	.40	.50	.55	.57	.53	.43	.25	1.48	22	196.32	285.44	364.06	429.30
36	.17	.32	.45	.56	.62	.64	.59	.48	.28	1.66	24	195.63	282.71	357.43	416.53
38	.18	.36	.51	.62	.70	.71	.66	.53	.31	1.86	26	194.87	279.76	350.30	402.89
40	.21	.40	.56	.69	.77	.79	.73	.59	.35	2.06	28	194.06	276.59	342.69	388.42
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	326.06	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	190.21	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 VII.—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°	.366	.313	.273	.236	.200	.170	.139
2	.045	.038	.034	.029	.025	.021	.017	17	.378	.333	.290	.252	.213	.180	.148
3	.067	.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	.105	27	.594	.524	.457	.396	.335	.284	.233
13	.290	.254	.222	.192	.163	.138	.113	28	.618	.545	.475	.411	.348	.294	.242
14	.312	.275	.239	.207	.175	.148	.122	29	.638	.564	.491	.424	.361	.303	.250
15	.334	.295	.257	.223	.188	.159	.131	30	.660	.583	.508	.438	.374	.313	.259

SLOPE REDUCTIONS.

When distances are measured on a slope they may be reduced to the equivalent horizontal distance by the following approximate rule:—subtract from the slope distance the square of the rise divided by twice the slope distance. Thus for a slope distance of 250.3 ft. and a rise of 15 ft. correction=$15^2 \div 2 \times 250.3$=.45 (by slide rule) or horizontal distance=250.3—.45=249.85. When vertical angle=V. A. is measured horizontal distance=slope distance—slope distance (1—Cos. V. A.). Thus for slope distance of 248.7 ft. and V. A. of 4° 20′ from Table VIII Cos=.99714 and correction=1—.99714=.00286 per foot or total of .286×2½ (near enough)=.57 and horizontal distance=248.7—.57=248.13 ft.

TRIGONOMETRICAL FORMULAS.

See fig. (a).

sin. $A=\frac{a}{c}$

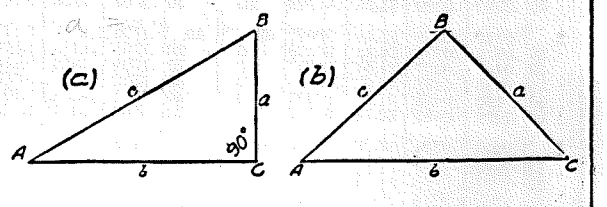
cos. $A=\frac{b}{c}$

tan. $A=\frac{a}{b}$

cot. $A=\frac{b}{a}$

sec. $A=\frac{c}{b}$

cosec. $A=\frac{c}{a}$



FORMULA FOR SOLVING TRIANGLES.

Given	Sought.	Right triangles. See fig. (a).
a, c	A, B, b	$\sin. A=\frac{a}{c}$, $\cos. B=\frac{a}{c}$, $b=\sqrt{(c+a)(c-a)}$
a, b	A, B, c	$\tan. A=\frac{a}{b}$, $\cot. B=\frac{a}{b}$, $c=\sqrt{a^2+b^2}$.
A, a	B, b, c	$B=90°-A$, $b=a \cot. A$, $c=\frac{a}{\sin. A}$.
A, b	B, a, c	$B=90°-A$, $a=b \tan. A$, $c=\frac{b}{\cos. A}$.
A, c	B, a, b	$B=90°-A$, $a=c \sin. A$, $b=c \cos. A$
Given	Sought.	Oblique triangles. See fig. (b).
A, B, a	b	$b=\frac{a \sin. B}{\sin. A}$
A, a, b	B	$\sin. B=\frac{b \sin. A}{a}$
a, b, C	$A-B$	$\tan. \frac{1}{2}(A-B)=\frac{(a-b) \tan. \frac{1}{2}(A+B)}{a+b}$
c, b, c	A	If $s=\frac{1}{2}(a+b+c)$, $\sin. \frac{1}{2}A=\sqrt{\frac{(s-b)(s-c)}{b\,c}}$, $\cos. \frac{1}{2}A=\sqrt{\frac{s(s-a)}{b\,c}}$, $\tan. \frac{1}{2}A=\sqrt{\frac{(s-b)(s-c)}{s(s-a)}}$, $\sin. A=\frac{2\sqrt{(s-a)(s-b)(s-c)\,s}}{b\,c}$
A, B, C, a	area	$\text{area}=\frac{a^2 \sin. B \sin. C}{2 \sin. A}$
A, b, c	area	$\text{area}=\frac{1}{2} b\,c \sin. A$
a, b, c	area	$s=\frac{1}{2}(a+b+c)$, $\text{area}=\sqrt{s(s-a)(s-b)(s-c)}$

Table VIII.—Natural Trigonometrical Functions.

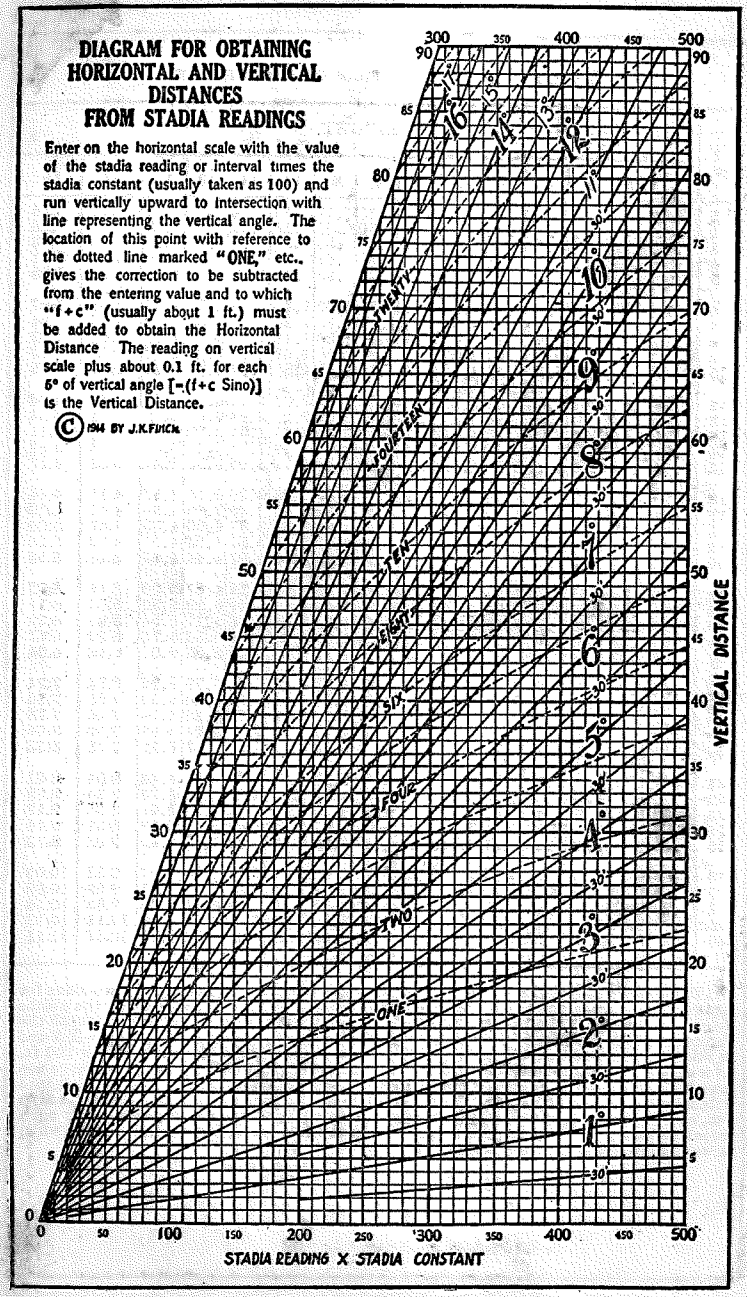
Angle	Sine.	Tan.	Cotg.	Cosin.		Angle	Sine.	Tan.	Cotg.	Cosin.	
0′						8′					
0	0	0	00	1	90	8	.1392	.1405	7.115	.99027	82
10	.0029	.0029	343.8	1	50	10	.1421	.1435	6.968	.98986	50
20	.0058	.0058	171.9	.99998	40	20	.1449	.1465	6.827	.98944	40
30	.0087	.0087	114.6	.99996	30	30	.1478	.1495	6.691	.98902	30
40	.0116	.0116	85.94	.99993	20	40	.1507	.1524	6.561	.98858	20
50	.0145	.0145	68.75	.99989	10	50	.1536	.1554	6.435	.98814	10
1	.0175	.0175	57.29	.99985	89	9	.1564	.1584	6.314	.98769	81
10	.0204	.0204	49.10	.99979	50	10	.1593	.1614	6.197	.98723	50
20	.0233	.0233	42.96	.99973	40	20	.1622	.1644	6.084	.98676	40
30	.0262	.0262	38.19	.99966	30	30	.1650	.1673	5.976	.98629	30
40	.0291	.0291	34.37	.99958	20	40	.1679	.1703	5.871	.98580	20
50	.0320	.0320	31.24	.99949	10	50	.1708	.1733	5.769	.98531	10
2	.0349	.0349	28.64	.99939	88	10	.1736	.1763	5.671	.98481	80
10	.0378	.0378	26.43	.99929	50	10	.1765	.1793	5.576	.98430	50
20	.0407	.0407	24.54	.99917	40	20	.1794	.1823	5.485	.98378	40
30	.0436	.0437	22.90	.99905	30	30	.1822	.1853	5.396	.98325	30
40	.0465	.0466	21.47	.99892	20	40	.1851	.1883	5.309	.98272	20
50	.0494	.0495	20.21	.99878	10	50	.1880	.1914	5.226	.98218	10
3	.0523	.0524	19.08	.99863	87	11	.1908	.1944	5.145	.98163	79
10	.0552	.0553	18.07	.99847	50	10	.1937	.1974	5.066	.98107	50
20	.0581	.0582	17.17	.99831	40	20	.1965	.2004	4.989	.98050	40
30	.0610	.0612	16.35	.99813	30	30	.1994	.2035	4.915	.97992	30
40	.0640	.0641	15.60	.99795	20	40	.2022	.2065	4.843	.97934	20
50	.0669	.0670	14.92	.99776	10	50	.2051	.2095	4.773	.97875	10
4	.0698	.0699	14.30	.99756	86	12	.2079	.2126	4.705	.97815	78
10	.0727	.0729	13.73	.99736	50	10	.2108	.2156	4.638	.97754	50
20	.0756	.0758	13.20	.99714	40	20	.2136	.2186	4.574	.97692	40
30	.0785	.0787	12.71	.99692	30	30	.2164	.2217	4.511	.97630	30
40	.0814	.0816	12.25	.99668	20	40	.2193	.2247	4.449	.97566	20
50	.0843	.0846	11.83	.99644	10	50	.2221	.2278	4.390	.97502	10
5	.0872	.0875	11.43	.99619	85	13	.2250	.2309	4.331	.97437	77
10	.0901	.0904	11.06	.99594	50	10	.2278	.2339	4.275	.97371	50
20	.0929	.0934	10.71	.99567	40	20	.2306	.2370	4.219	.97304	40
30	.0958	.0963	10.39	.99540	30	30	.2334	.2401	4.165	.97237	30
40	.0987	.0992	10.08	.99511	20	40	.2363	.2432	4.113	.97169	20
50	.1016	.1022	9.788	.99482	10	50	.2391	.2462	4.061	.97100	10
6	.1045	.1051	9.514	.99452	84	14	.2419	.2493	4.011	.97030	76
10	.1074	.1080	9.255	.99421	50	10	.2447	.2524	3.962	.96959	50
20	.1103	.1110	9.010	.99390	40	20	.2476	.2555	3.914	.96887	40
30	.1132	.1139	8.777	.99357	30	30	.2504	.2586	3.867	.96815	30
40	.1161	.1169	8.556	.99324	20	40	.2532	.2617	3.821	.96742	20
50	.1190	.1198	8.345	.99290	10	50	.2560	.2648	3.776	.96667	10
7	.1219	.1228	8.144	.99255	83	15	.2588	.2679	3.732	.96593	75
10	.1248	.1257	7.953	.99219	50	10	.2616	.2711	3.689	.96517	50
20	.1276	.1287	7.770	.99182	40	20	.2644	.2742	3.647	.96440	40
30	.1305	.1317	7.596	.99144	30	30	.2672	.2773	3.606	.96363	30
40	.1334	.1346	7.429	.99106	20	40	.2700	.2805	3.566	.96285	20
50	.1363	.1376	7.269	.99067	10	50	.2728	.2836	3.526	.96206	10
					82						74
	Cosin.	Cotg.	Tan.	Sine.	Angle.		Cosin.	Cotg.	Tan.	Sine.	Angle.

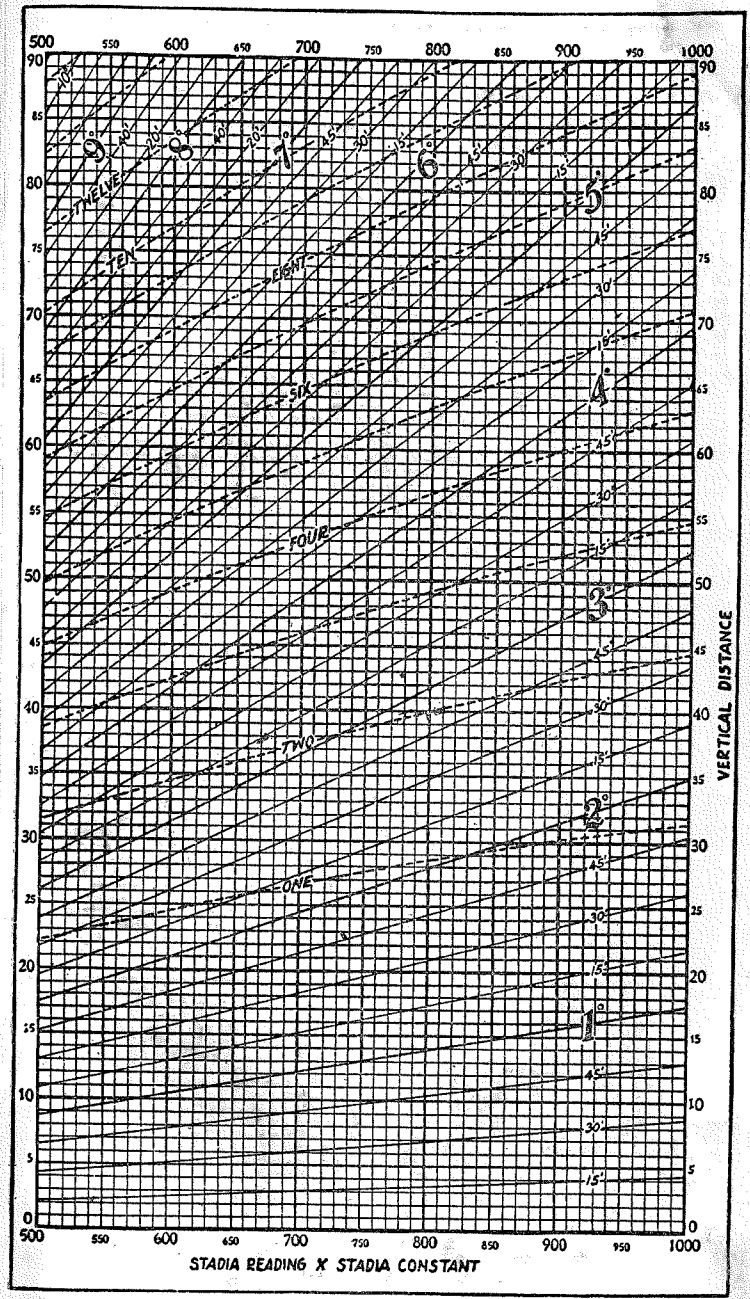
Table VIII.—Natural Trigonometrical Functions.

Angle	Sine.	Tan.	Cotg.	Cosin.		Angle	Sine.	Tan.	Cotg.	Cosin.	
16′						24′					
16	.2756	.2867	3.487	.96126	74	24	.4067	.4452	2.246	.91355	66
10	.2784	.2899	3.450	.96046	50	10	.4094	.4487	2.229	.91236	50
20	.2812	.2931	3.412	.95964	40	20	.4120	.4522	2.211	.91116	40
30	.2840	.2962	3.376	.95882	30	30	.4147	.4557	2.194	.90996	30
40	.2868	.2994	3.340	.95799	20	40	.4173	.4592	2.177	.90875	20
50	.2896	.3026	3.305	.95715	10	50	.4200	.4628	2.161	.90753	10
17	.2924	.3057	3.271	.95615	73	25	.4226	.4663	2.145	.90631	65
10	.2952	.3089	3.237	.95545	50	10	.4253	.4699	2.128	.90507	50
20	.2979	.3121	3.204	.95459	40	20	.4279	.4734	2.112	.90383	40
30	.3007	.3153	3.172	.95372	30	30	.4305	.4770	2.097	.90259	30
40	.3035	.3185	3.140	.95284	20	40	.4331	.4806	2.081	.90133	20
50	.3062	.3217	3.108	.95195	10	50	.4358	.4841	2.066	.90007	10
18	.3090	.3249	3.078	.95106	72	26	.4384	.4877	2.050	.89879	64
10	.3118	.3281	3.048	.95015	50	10	.4410	.4913	2.035	.89752	50
20	.3145	.3314	3.018	.94924	40	20	.4436	.4950	2.020	.89623	40
30	.3173	.3346	2.989	.94832	30	30	.4462	.4986	2.006	.89493	30
40	.3201	.3378	2.960	.94740	20	40	.4488	.5022	1.991	.89363	20
50	.3228	.3411	2.932	.94646	10	50	.4514	.5059	1.977	.89232	10
19	.3256	.3443	2.904	.94552	71	27	.4540	.5095	1.963	.89101	63
10	.3283	.3476	2.877	.94457	50	10	.4566	.5132	1.949	.88968	50
20	.3311	.3508	2.850	.94361	40	20	.4592	.5169	1.935	.88835	40
30	.3338	.3541	2.824	.94264	30	30	.4617	.5206	1.921	.88701	30
40	.3365	.3574	2.798	.94167	20	40	.4643	.5243	1.907	.88566	20
50	.3393	.3607	2.773	.94068	10	50	.4669	.5280	1.894	.88431	10
20	.3420	.3640	2.747	.93969	70	28	.4695	.5317	1.881	.88295	62
10	.3448	.3673	2.723	.93869	50	10	.4720	.5354	1.868	.88158	50
20	.3475	.3706	2.699	.93769	40	20	.4746	.5392	1.855	.88020	40
30	.3502	.3739	2.675	.93667	30	30	.4772	.5430	1.842	.87882	30
40	.3529	.3772	2.651	.93565	20	40	.4797	.5467	1.829	.87743	20
50	.3557	.3805	2.628	.93462	10	50	.4823	.5505	1.816	.87603	10
21	.3584	.3839	2.605	.93358	69	29	.4848	.5543	1.804	.87462	61
10	.3611	.3872	2.583	.93253	50	10	.4874	.5581	1.792	.87321	50
20	.3638	.3906	2.560	.93148	40	20	.4899	.5619	1.780	.87178	40
30	.3665	.3939	2.539	.93042	30	30	.4924	.5658	1.767	.87036	30
40	.3692	.3973	2.517	.92935	20	40	.4950	.5696	1.756	.86892	20
50	.3719	.4006	2.496	.92827	10	50	.4975	.5735	1.744	.86748	10
22	.3746	.4040	2.475	.92718	68	30	.5000	.5774	1.732	.86603	60
10	.3773	.4074	2.455	.92609	50	10	.5025	.5812	1.720	.86457	50
20	.3800	.4108	2.434	.92499	40	20	.5050	.5851	1.709	.86310	40
30	.3827	.4142	2.414	.92388	30	30	.5075	.5890	1.698	.86163	30
40	.3854	.4176	2.394	.92276	20	40	.5100	.5930	1.686	.86015	20
50	.3881	.4210	2.375	.92164	10	50	.5125	.5969	1.675	.85866	10
23	.3907	.4245	2.356	.92050	67	31	.5150	.6009	1.664	.85717	59
10	.3934	.4279	2.337	.91936	50	10	.5175	.6048	1.653	.85567	50
20	.3961	.4314	2.318	.91822	40	20	.5200	.6088	1.643	.85416	40
30	.3987	.4348	2.300	.91706	30	30	.5225	.6128	1.632	.85264	30
40	.4014	.4383	2.282	.91590	20	40	.5250	.6168	1.621	.85112	20
50	.4041	.4417	2.264	.91472	10	50	.5275	.6208	1.611	.84959	10
					66						58
	Cosin.	Cotg.	Tan.	Sine.	Angle.		Cosin.	Cotg.	Tan.	Sine.	Angle.

DIAGRAM FOR OBTAINING HORIZONTAL AND VERTICAL DISTANCES FROM STADIA READINGS

Enter on the horizontal scale with the value of the stadia reading or interval times the stadia constant (usually taken as 100) and run vertically upward to intersection with line representing the vertical angle. The location of this point with reference to the dotted line marked "ONE," etc., gives the correction to be subtracted from the entering value and to which "f + c" (usually about 1 ft.) must be added to obtain the Horizontal Distance The reading on vertical scale plus about 0.1 ft. for each 5° of vertical angle [=(f+c Sino)] is the Vertical Distance.





1.11 lbs

12 3/4
R10B26
6.125
18.75

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

Roadway 16 feet wide. Side Slopes 1 on 1½

For Single Track Embankment.

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

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

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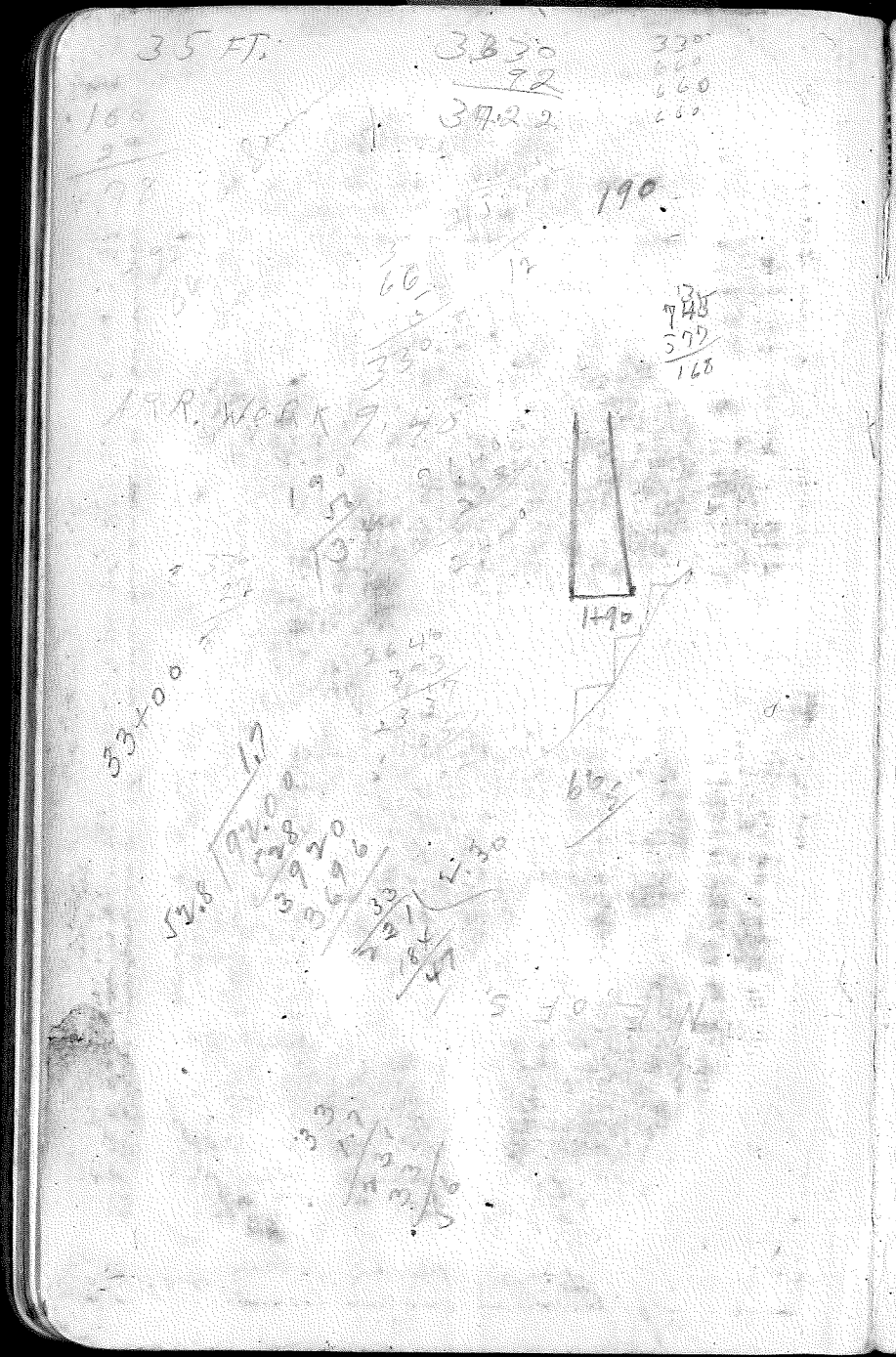

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

Roadway 16 feet wide. Side Slopes 1 on 1½

For Single Track Embankment.

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

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

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