

COUNTY DITCH No 10
Alignment and
Levels.

Book No 28

FIELD BOOK

361

KEIFFER & ESSER CO.

COUNTY DITCH No 10

NOTICE

Notice is hereby given that a petition, of which the following is a copy, has been filed in the office of the County Auditor of Cass County, State of Minnesota, and that a hearing will be had upon said petition before the County Board, at the office of the County Auditor of said County, in the Village of Walker on the 31st day of October, A. D. 1916, at 10 o'clock A. M.

Dated at Walker, Minn., this 5th day of Oct. 1916.

C. D. BACON,
County Auditor.

PETITION FOR PUBLIC DITCH

To the County Board of the County of Cass, State of Minnesota:

The undersigned land owners, whose lands will be liable to be affected by, or assessed for, the expense of the construction of the Ditch hereinafter described, would respectfully represent that the public health, convenience and welfare and the reclamation of wet and overflowed lands require the establishment and construction of a county ditch along the following described route in the Town of Tre-ripe, in said County of Cass and that the construction of the same would be of public benefit and utility. This ditch will drain twenty five fortys of good agricultural land that is worthless without a ditch.

A general description of the proposed starting point, route and terminus of said ditch is as follows: Commencing at Sixty rods east of 1/4 Post South boundary line Sec. 23, running thence east to Lake in bog and thence commencing on South side of Lake and running in a south westerly direction to NW cor. of SW 1/4 of SE 1/4 Section 26; running thence south on 1/4 line 1/4 mile more or less to Daggitt Brook.

Lateral commencing on North side of Lake, running thence north Eighty five rods more or less to intersect with Creek running into bog from Island Lake, all in Twp. 140-27 and terminated at Daggitt Brook, as its outlet Daggitt Brook.

And your petitioners pray that you will proceed to establish such county ditch and cause the same to be constructed as provided by Chapter Two Hundred Thirty (230), of the General Laws of Minnesota for 1905.

Dated 9-25, 1916.

H. W. SNELL
GEORGE SNELL
PETER ZUMBRUNNEN
Petitioners.

Calculated by *John A. Hall*, *Per Hall Book Co.*

For Keith's Railroad Curve Tables see end of book.

22
11
7
770

| | | | | | |
|----|----|----|----|----|----|
| 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 |

3 770.00
 737
 10
 7370
 1572.00
 835
 118
 737

3 200.00
 4 0.68
 118.5

165
 85
 825
 1320
 1482.5

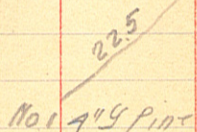
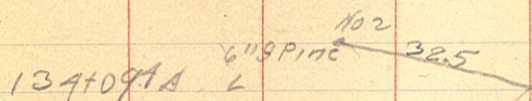
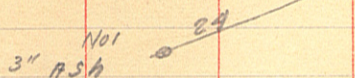
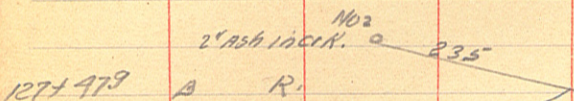
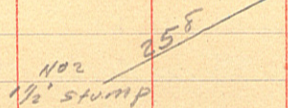
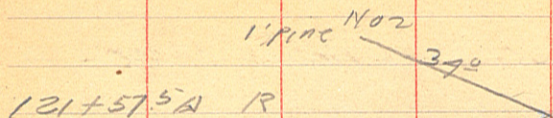
COUNTY Ditch No 10

IN Dex.

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| | |
|----------------------------------|---------|
| Reference pts Co Ditch No 10 | 00 - 4 |
| Alignment of " " " 10 | 5 - 30 |
| Lateral alignment No 1 | 45 - 48 |
| Levels of Main Ditch # 10 | 31 - 44 |
| and continued on page 49 - 60 | |
| Levels of lateral 4 No 1 | 67 - 68 |
| Fly Levels to swamp East of 5-3 | 69 - 69 |
| soundings on Mud Lake | 70 |
| For travers c. chained distances | 71 |
| For Notes North to Island | |
| Lake beginning at top of dit | |
| No 1 Co Ditch see page | 76 |

J. POMASEL ASST ENGR.



76+688 A R

65+772 A R

52+076 A R

38+70'

25+00 Hub

50+00 Hub

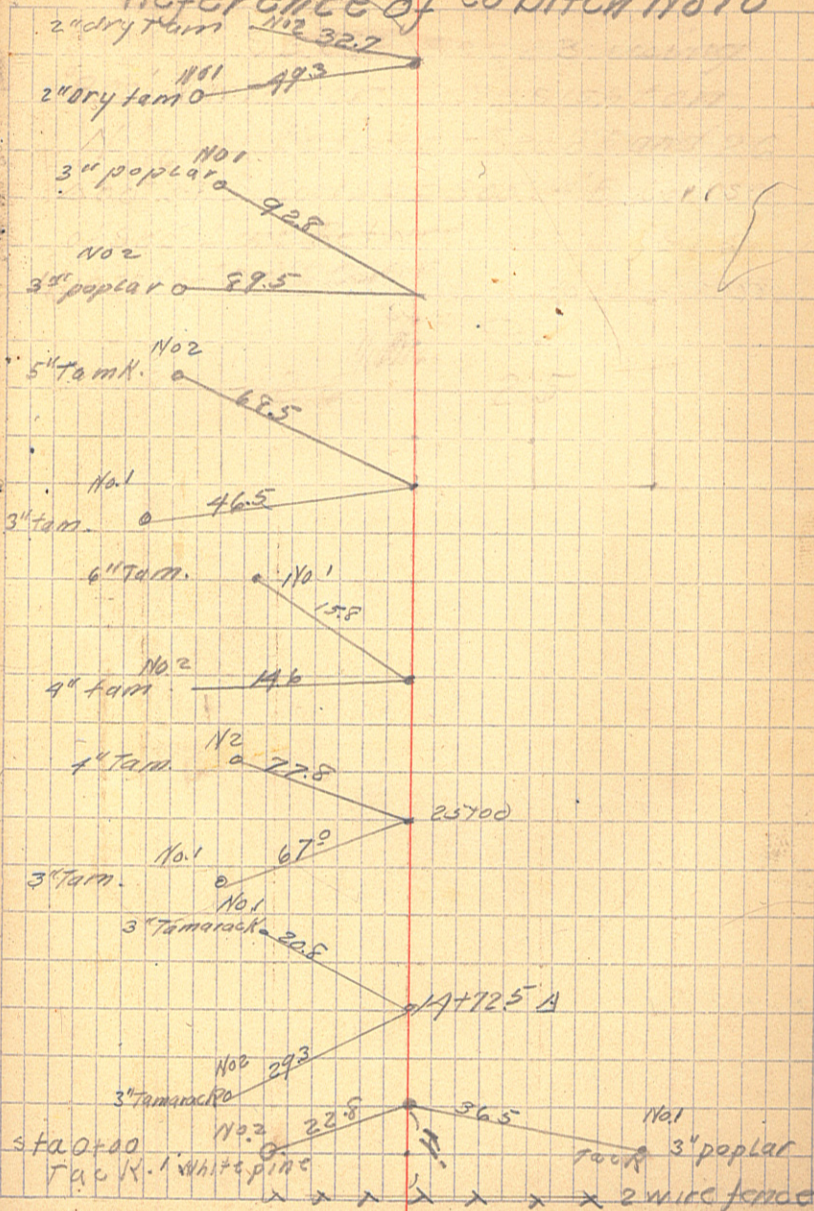
14+725 A R

00

Twp 140 R 27 W. Q

Jan 29 1917

Reference of Co Ditch No 10



3

cont on page 00

119+65° A L

116+66° A R

112+36° A

109+49° A R

101+120° A L

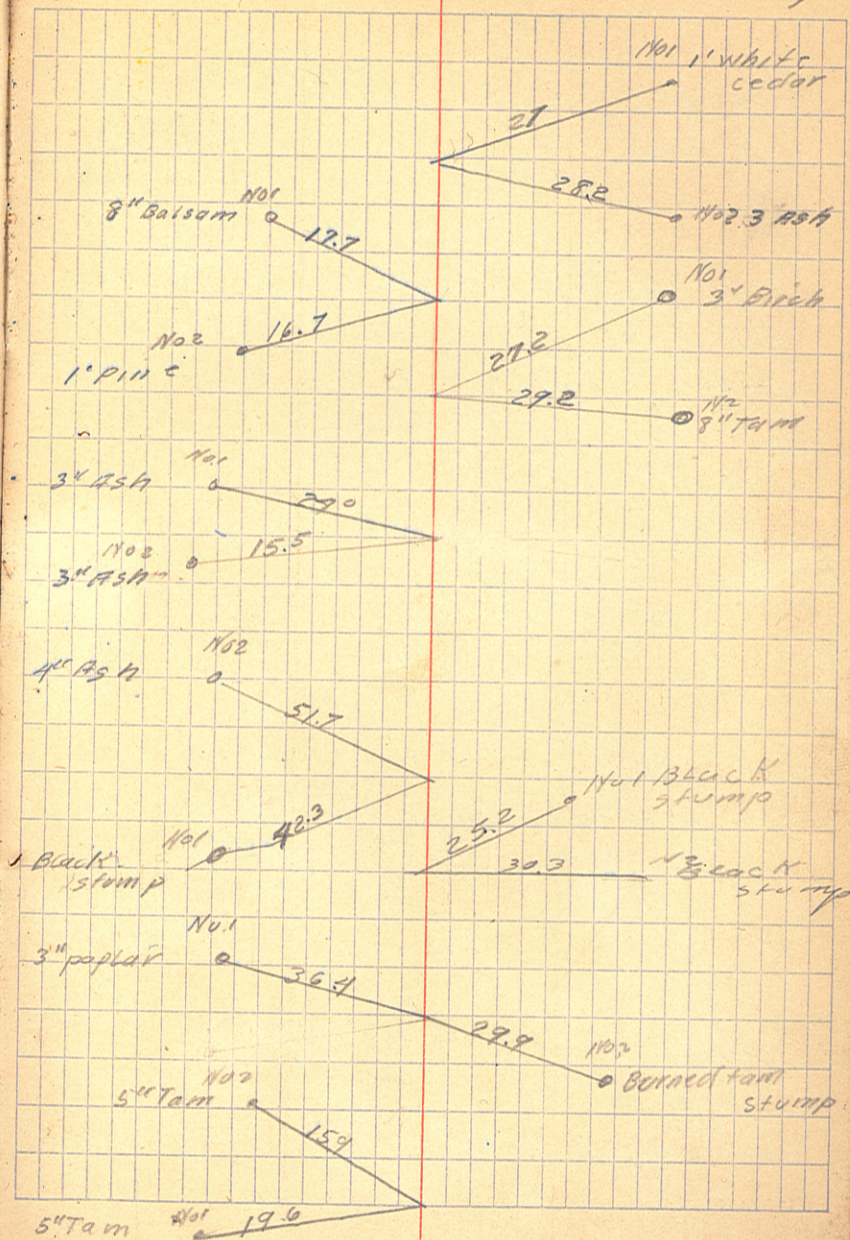
95+85° A L

91+16.5° A L

86+00.9° Pot

Reference

4



Using 8°00' variation
Reading to 1/4 degree
course

39

38+70' A 71°24' R S35°W End of Mud Lake

38+30

27+52' B 41°17' R S36°15' E = P.I. of Lat 114°54' L
Sta of Lat = 13+822

25+44'

25+00

24+00

17+75

14+70

14+72.5 A 90°19' R S0039' E course to N 1/4 B of sec 25-26

14+72.5 A 13°12' R S77°45' E. wooden stake.

6+00

Leave "

5+00

Enter brush

Highland

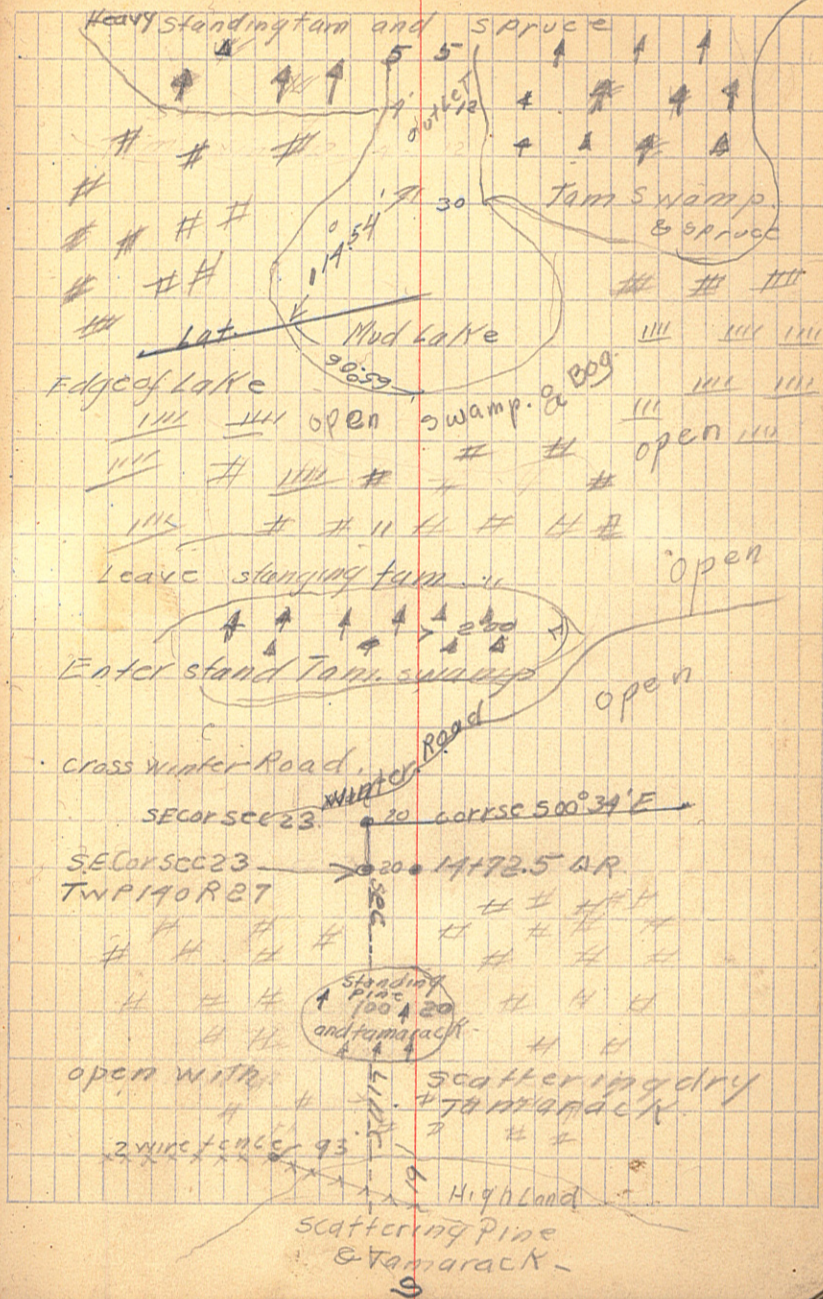
0+00 @ spike N 89°07' E = Sta. 1+00 on account
of missing one sta. i.e. sta. 8.

gPomasec
C WHITE
Geo SNELL

E
2

Jan 29 1917

6



7

59

Leave Br

54

59+30

Enter Br

+82

53

52+76 A 912 R 349°15' W JAN. 30 1917

52

50+25

End of tam swamp

45

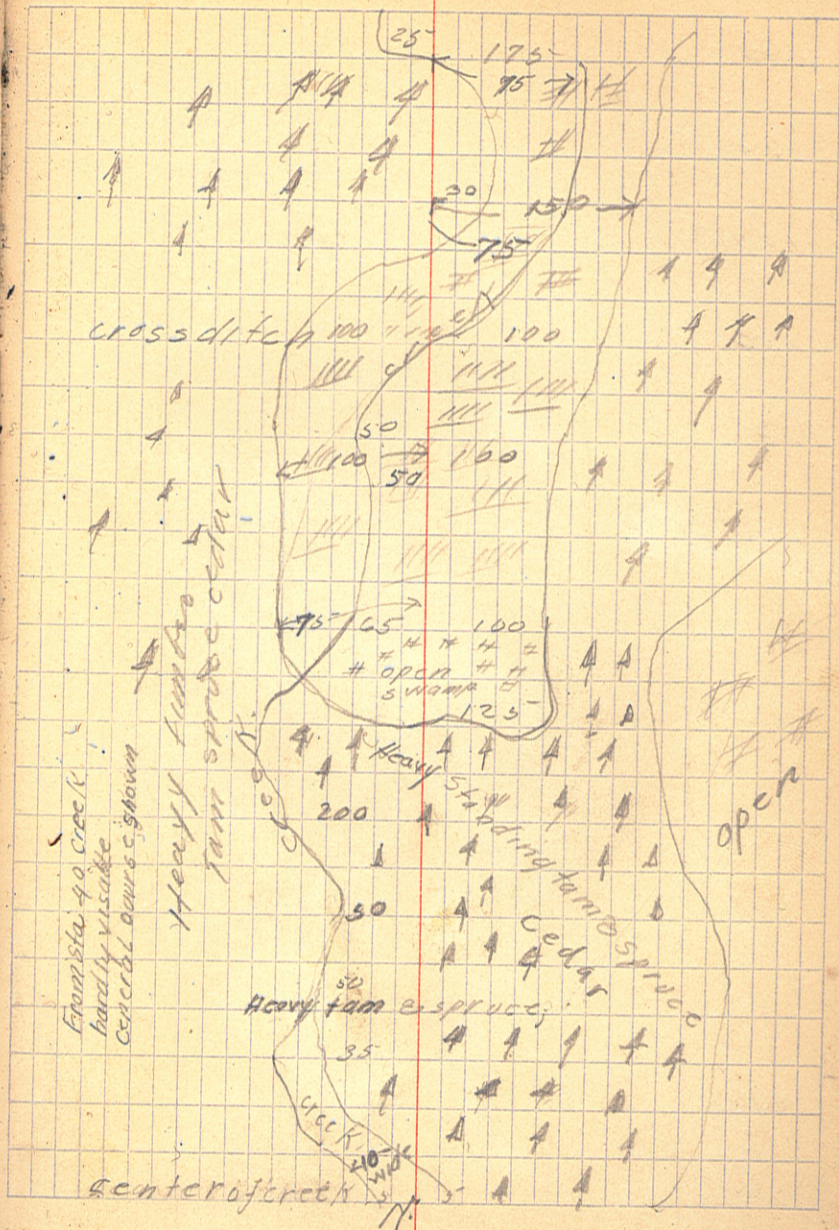
44

43

40

39+60

S Jan 29 1917 8



9

67+50

66+95°

65+77° Δ 29° 28' R 568° 45' W

124

65

650

64

62

+85

+54

+25

61+05

60

Cross Ditch

Cross Ditch

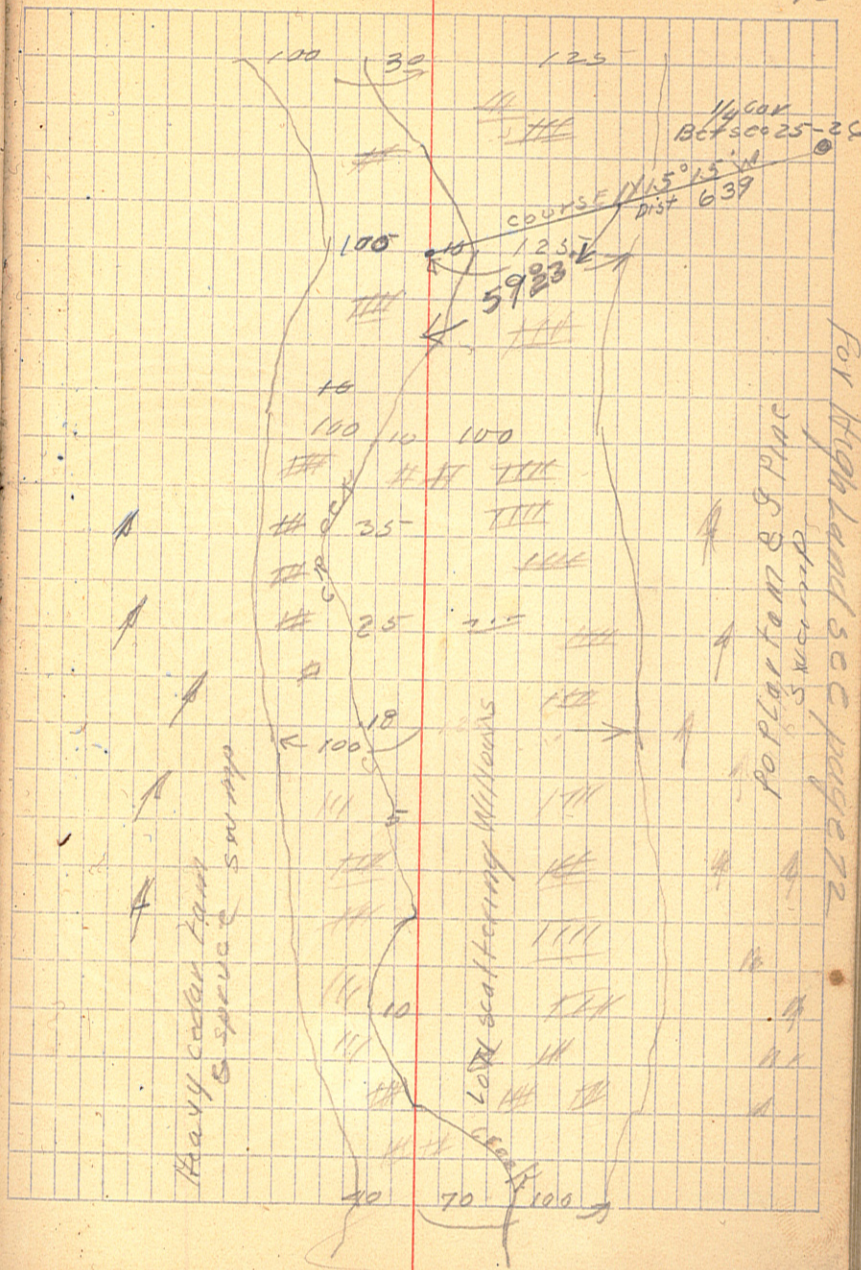
Edge of Ditch

cross ditch

same party

Jan 30 1917

10



11
74+30

cross R

75

74

+50

73

in Ditch

+54

cross

+23

Leave Ditch

72+20

69+61

Edge of Ditch

69

~~69~~

+69

in Ditch

68

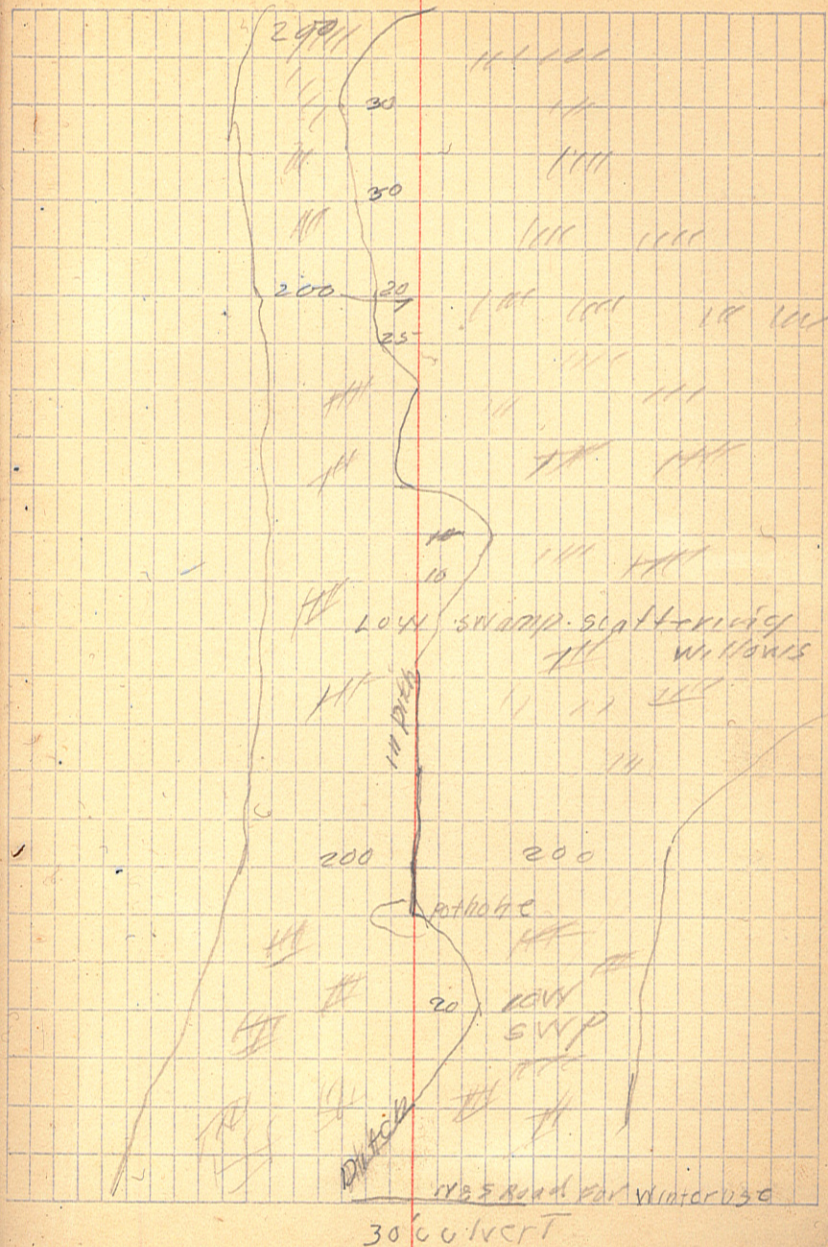
+72

cross ditch

67+60

very cold

Jan 30 1917 12



16

+30

Cross D

100

+65

Cross D

+60

99

Leave

+60

in Ditch

98

97+25

Leave Crk

96+40

in Crk

95+85 $\frac{2}{3}$ $A81^{\circ}25' L S 23^{\circ}10' W$ Polar, $8^{\circ}36' R$
(50 EX) Center of sec 26

94

+50

93

+75

Cross D

92

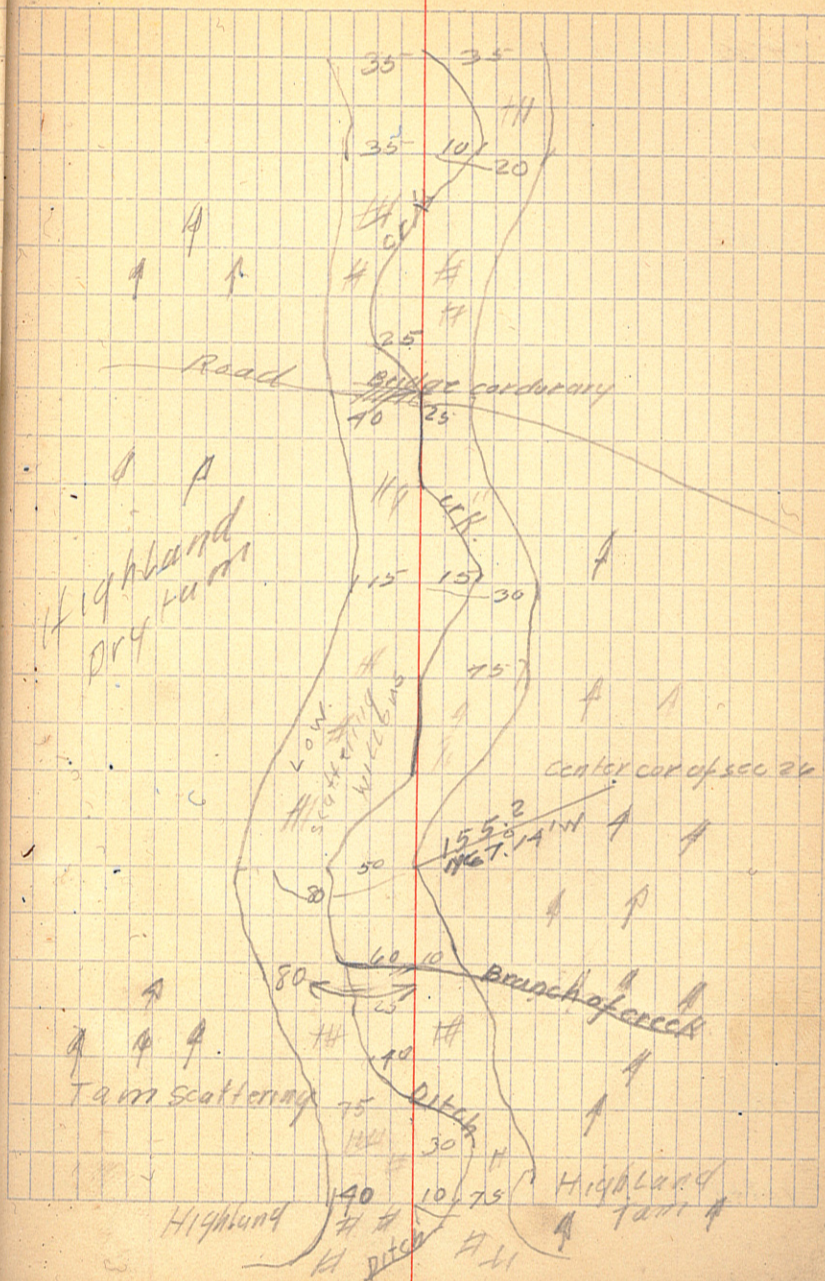
91+50

91+20

Cross D

Jan 30 1917

14



17

109+995 A 22° 50' R. S 27° 30' W

109

+ 60

CROSS D

107

+ 30

CROSS D

115

106

IN DITCH
CROSS D

+ 85

Enter Heavy timber

105

104

+ 60

CROSS D

102

+ 70

Enter Brook

CROSS D

101+120 D 18° 31' L S 4° 45' W

Jan 30 1917.

COLD

18



19

113 + 45

+75

CROSS D.

112 + 36° A 26° 12' L 51° 15' W 15' EXT

+20

CROSS

112

111

+65

CROSS

+60

+20

CROSS D

+15

+06

CROSS D

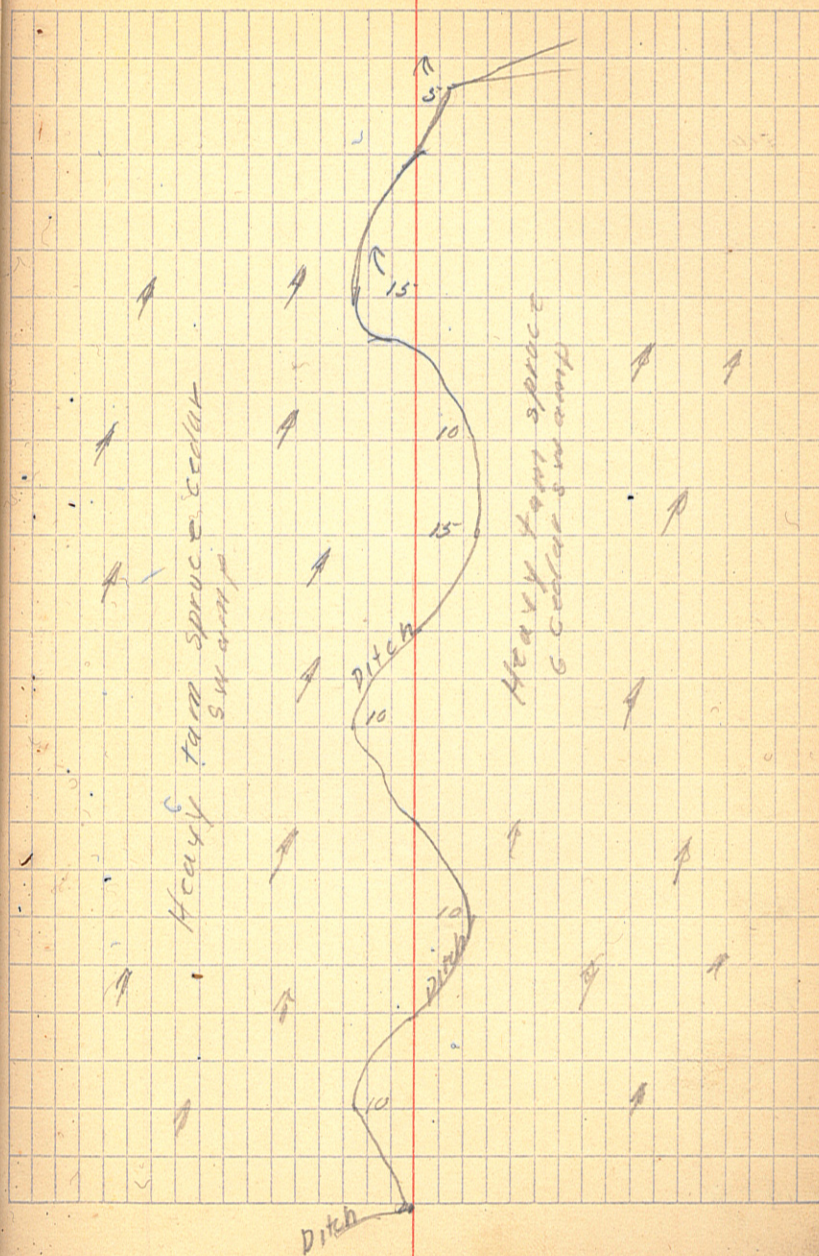
110

109 + 60

110 D.

Jan 30 1917

20



21

+05

in D.

119

+90

Leave

+10

in D.

18

+55

Cross

117

116+669 461°33R 942.15W 35'E XT

+50

116

in P. D.

Cross D.

+75

+50

115

114+50

Jan 30 1917

22



23

+25

CROSS

122

+85

CROSS D.

121+57.5 A 10° 45' R S 7° 10' E 15' EXT

+10

IN DITCH

121

+80

CROSS

+70

+60

CROSS

+25

120

CROSS D

119+65° A 80° 15' L S 17° 50' E 35' EXT.

119+20

CROSS D

Jan 30 1917

24



23

775

750

745

128

765

127+979 $A29^{\circ}07'R$ $S21^{\circ}30'N$

Leave Heavy timber
Enter tag alders.

127

126

125

+50

+10

124

123

in ditch

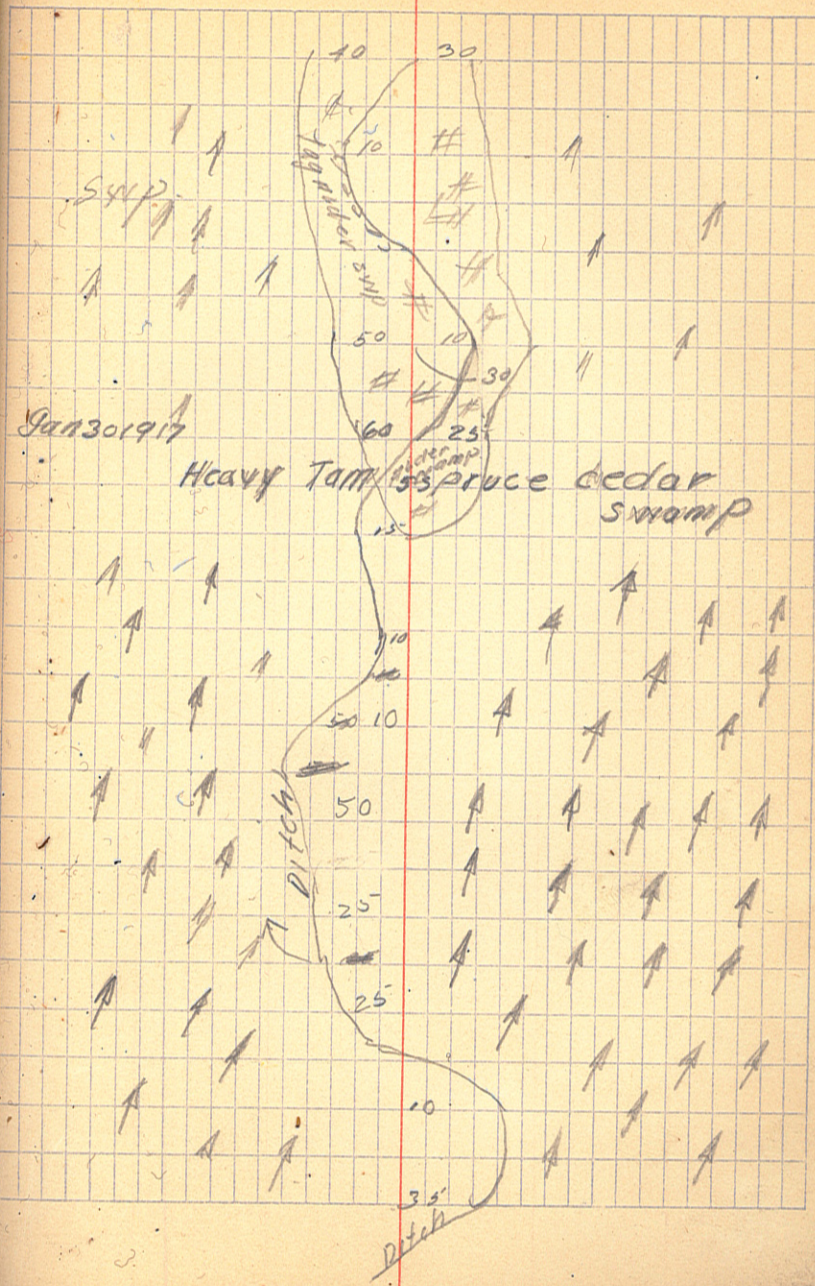
cross D

cross D

cross D

10 Ld

Jan 31 1917 28



27
137

136

in ditch

135

in ditch

134

130

E B W Rodd

134109.9 N 48° 00' L 326° 10' E

134

Leave timber
Enter tag alder
swamp

133

140

Cross D

132

Leave timber
Enter tag alder

131

Leave alder
Ent Heavy tim

130

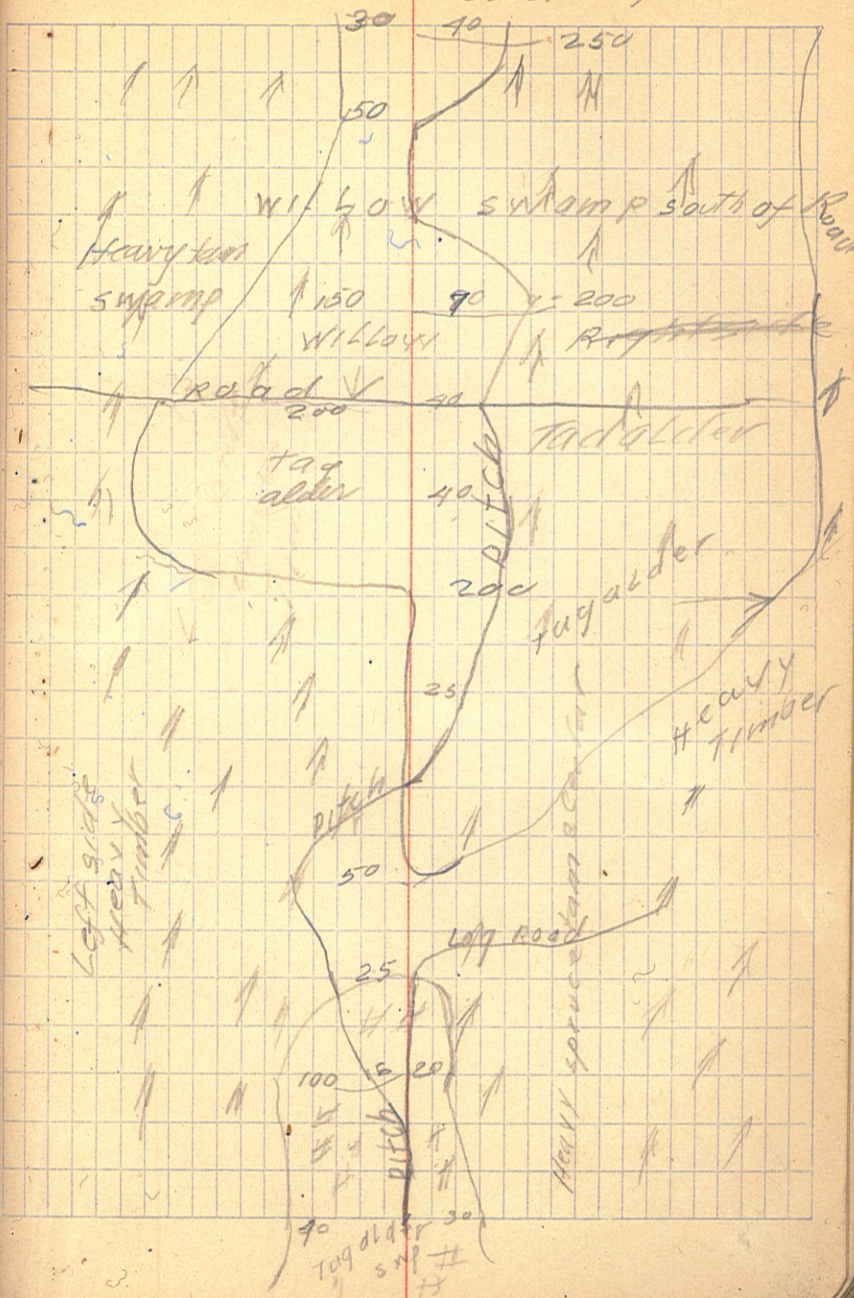
129

Edge of D

same party Jan 31 1917

cold day

28



139+213 End of Ditch in old channel

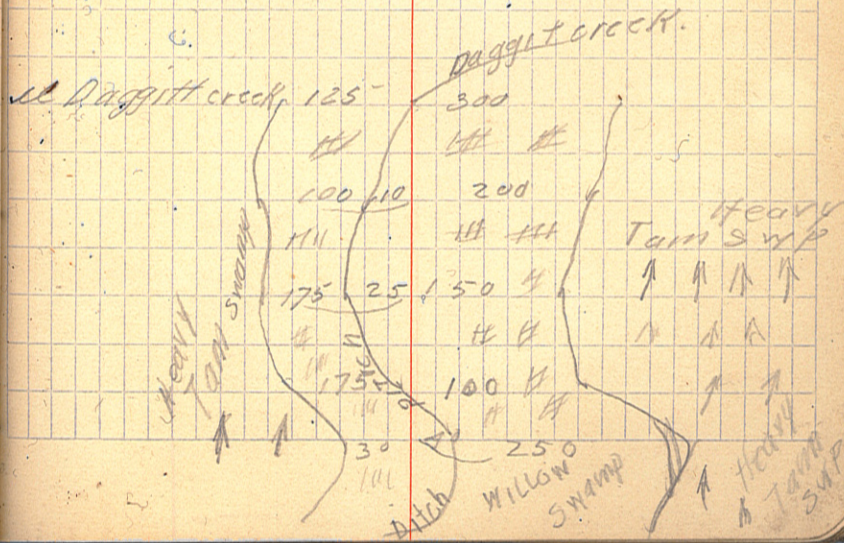
139

138

137+80

CROSS

Finished Transit Line 11 AM.



| Sta | BS | HI | FS | Elev |
|---------|------|----------------------|------|--------|
| B.M. | | | | |
| | 2.52 | 202.52 | | 200.00 |
| T.P. | 5.03 | 201.54 ⁹⁵ | 6.01 | 196.51 |
| | | | 6.1 | 195.4 |
| 2 | | | 6.3 | 95.2 |
| 3 | | | 8.1 | 198.4 |
| T.P. | 6.55 | 203.06 | | 196.51 |
| 139+213 | | | 8.1 | 195.0 |
| +06 | | | 5.3 | 197.8 |
| 139 | | | 5.3 | 97.9 |
| 138 | | | 5.3 | 97.8 |
| +90 | | | 5.3 | 97.8 |
| +82 | | | 9.0 | 94.1 |
| +74 | | | 5.1 | 98.0 |
| 137 | | | 4.7 | 98.4 |
| B.M. | 3.01 | 203.01 | 3.01 | 200.00 |
| +40 | | | 5.3 | 97.7 |
| 136 | | | 18.0 | 95.0 |
| +85 | | | 5.3 | 97.7 |
| 133+08 | | | 8.0 | 95.0 |
| 135 | | | 5.9 | 97.6 |
| +42 | | | | |
| 134+094 | | 8.1 | 4.1 | 98.9 |
| T.P. | 4.96 | 203.82 | 4.15 | 198.86 |
| 134 | | | 5.0 | 98.8 |

Pete Zumbrenner Road
S Pomasee Level

Jan 21 1917 32
COLD

Assumed Elev 200.00 25' Sta 137
on 51st Tam.
Levels every 100 FT. in Duggett Cr. south of End
of line. For Data on the natural fall of creek
see Elev.

Bottom of creek
1' water 4" ice
2' ice 3' water in creek

End of line in Ditch Tag alders
Top bank " "
" "
" "
Top of Bank " "
in Ditch " "
Top Bank " "
B.M. Tackins Tam 25-4 137
T.B. " "
in Ditch " "
Top Bank " "
in D. edge
Top Bank
E & W Road
Level

NOTE: Cross Hair in Level
Bore is replaced with
human hair only thing
available, levels possibly
not accurate.

Leave Tam Enter
Tag alders & Willows

| Sta | + | #1 | - | Elev |
|------|-----|-------|------|--------|
| | | 20382 | | |
| 133 | | | 5.3 | 98.5 |
| +14 | | | 5.0 | 98.8 |
| +40 | | | 6.7 | 97.1 |
| +37 | | | 5.0 | 98.8 |
| 132 | | | 5.1 | 98.7 |
| 131 | | | 4.6 | 99.2 |
| T.P. | 505 | 20391 | | 198.8 |
| B.M. | | | 2.44 | 201.27 |
| 130 | | | 3.9 | 200.0 |
| +12 | | | 4.2 | 99.7 |
| +10 | | | 7.3 | 96.6 |
| +08 | | | 4.3 | 99.6 |
| 129 | | | 4.1 | 99.8 |
| +80 | | | 4.0 | 99.9 |
| +75 | | | 7.2 | 96.7 |
| +68 | | | 4.0 | 99.9 |
| +48 | | | 4.0 | 99.9 |
| +45 | | | 7.3 | 96.6 |
| +42 | | | 4.0 | 99.9 |
| 128 | | | 3.7 | 100.2 |
| T.P. | 370 | 20501 | 2.60 | 201.31 |
| +65 | | | 4.8 | 200.2 |
| +60 | | | 8.6 | 96.1 |
| +55 | | | 5.2 | 99.8 |

Jan 31 1917 - 34
 very cold

Top Bank
 in Ditch
 Top Bank
 Enter fum.
 Leave Alders
 B.M. Tack in 4" Spine 25' L 130 + 90
 Ditch 5' L. 2 FT wide
 Top bank
 in Ditch
 Top B.
 in Ditch
 Top B.
 Top B.
 in D
 Top B.
 Ditch 5' R.
 Top B.
 in D
 Top B.

35

| | | 205.01 | | |
|--------|-----|--------|------|--------|
| 127479 | U R | | 48 | 00.8 |
| 127 | | | 47 | 00.3 |
| 124 | | | 4.87 | 00.2 |
| TP | 275 | 206.61 | 115 | 203.86 |
| 125 | | | 47 | 01.9 |
| +15 | | | 47 | 01.9 |
| +12 | | | 8.0 | 99.6 |
| +08 | | | 5.1 | 01.5 |
| 124 | | | 4.9 | 01.7 |
| BM | | | 299 | 203.62 |
| 123 | | | 47 | 01.9 |
| +30 | | | 45 | 02.1 |
| +27 | | | 73 | 99.3 |
| +23 | | | 76 | 02.0 |
| 122 | | | 7.1 | 02.5 |
| +90 | | | 45 | 02.1 |
| +85 | | | 73 | 99.3 |
| +82 | | | 74 | 02.2 |
| TP | 645 | 209.43 | 3.63 | 202.98 |
| +24 | | | 6.5 | 02.9 |
| +23 | | | 4.6 | 99.8 |
| +20 | | | 7.1 | 02.3 |
| +12 | | | 9.0 | 99.8 |
| +08 | | | 7.4 | 02.0 |

Feb 1 1917 36
VERY COLD

Sta 127+45
(Enter Alder leaves Tam. ditch 15' L)
Ditch 8' L 6' wide

Top B.

in Ditch

Top B.

Ditch 10' R.

Tackling washed 20' R. 123+25

Ground gradually rises
about 50' R. of line

Top of B.

in D

Top B.

Ditch 6' L.

Top B.

in D

Top Bank

Top B.

in D.

Top B.

in D

Top Bank

| 37 | BS | H1 | FS | ELCY |
|--------|-----|---------------------|-----|--------|
| | | 20943 | | |
| 121 | | | 4.7 | 2027 |
| +85 | | | 4.9 | 02.8 |
| +82 | | | 9.8 | 99.8 |
| +98 | | | 7.0 | 02.4 |
| +65 | | | 6.3 | 03.1 |
| +82 | | | 9.6 | 99.8 |
| +38 | | | 6.8 | 02.6 |
| +05 | | | 4.4 | 03.0 |
| 120 | | | 8.5 | 00.9 |
| +95 | | | 7.5 | 01.9 |
| +654 A | | | 5.2 | 04.2 |
| +25 | | | 5.6 | 03.8 |
| +20 | | | 8.5 | 00.9 |
| +03 | | | 8.5 | 00.9 |
| 119 | | | 6.3 | 203.1 |
| +85 | | | 6.3 | 203.1 |
| +82 | | | 8.1 | 201.0 |
| 7P. | 529 | 20922 ²¹ | 550 | 203.93 |
| +15 | | | 7.4 | 01.8 |
| +10 | | | 5.5 | 03.7 |
| 118 | | | 5.2 | 204.0 |
| +54 | | | 5.0 | 04.2 |
| +51 | | | 7.4 | 01.8 |
| +48 | | | 5.2 | 04.0 |

Feb 1 1917 38
Vergold

Ditch 12' R. 6' wide
T Bank
in Ditch
Top Bank
Top B
in D.
Top B.
Top B.
in D.
T Bank

Top B.
in D.
in D.
Top B.
Top B.
in D.

in D.
Top B

Top Bank
in D
Top Bank

| 39 | + | HI | FS | Elev |
|--------|------|--------|------|--------|
| | | 209.22 | | |
| 13M | | | 9.37 | 205.85 |
| 117 | | | 9.4 | 04.8 |
| +664 Δ | | | 4.4 | 04.8 |
| T.P. | 6.85 | 211.53 | 4.54 | 204.68 |
| +50 | | | 6.5 | 05.0 |
| +46 | | | 9.5 | 02.0 |
| +43 | | | 6.8 | 04.4 |
| +12 | | | 6.3 | 05.2 |
| 116 | | | 9.5 | 02.0 |
| +90 | | | 7.0 | 04.5 |
| 115 | | | 6.6 | 04.9 |
| 114 | | | 7.3 | 07.2 |
| 113 | | | 5.9 | 05.9 |
| +85 | | | 5.7 | 05.8 |
| +80 | | | 8.3 | 03.2 |
| +75 | | | 4.1 | 05.4 |
| +86 | A | | 5.5 | 06.0 |
| TP | 5.40 | 211.49 | 5.44 | 206.09 |
| +26 | | | 5.7 | 05.8 |
| +23 | | | 8.3 | 03.2 |
| +20 | | | 6.3 | 05.2 |
| 112 | | | 5.6 | 05.9 |
| 111 | | | 5.5 | 06.0 |
| +70 | | | 5.3 | 06.2 |
| +67 | | | 8.3 | 03.2 |

Feb 1, 1917
cold

B.M. Not Marked
B.M. Tack in 1 1/2" spruce 10' 117+40

Top Bank
in Ditch
Top B
Top B
in Ditch
Top Bank

Ditch 5' R.
Top Bank
in Ditch
Top Bank.

Top Bank
in D
Top B.
Ditch 8' R.

Top Bank
in Ditch

| 91 | + | HI | FS | Elev |
|-----|-----|--------|-----|--------|
| +43 | | 21199 | 5.0 | 065 |
| +35 | | | 80 | 03.5 |
| +32 | | | 5.4 | 06.1 |
| +12 | | | 5.1 | 06.4 |
| +10 | | | 80 | 03.5 |
| +04 | | | 5.5 | 06.0 |
| 110 | | | 5.4 | 06.1 |
| +93 | A | | 7.8 | 06.7 |
| 109 | | | 15 | 07.0 |
| 108 | | | 38 | 07.7 |
| +70 | | | 43 | 07.2 |
| +60 | | | 65 | 05.0 |
| +49 | | | 4.8 | 06.7 |
| 107 | | | 4.7 | 06.8 |
| BM | 421 | 213.98 | 192 | 209.57 |
| +20 | | | 6.5 | 07.3 |
| +17 | | | 82 | 05.6 |
| +13 | | | 6.8 | 09.0 |
| +03 | | | 6.9 | 07.4 |
| 106 | | | 83 | 05.5 |
| +84 | | | 6.3 | 07.5 |
| 105 | | | 5.9 | 07.9 |
| 104 | | | 4.9 | 08.9 |
| 103 | | | 4.6 | 09.2 |
| +67 | | | 4.6 | 09.2 |

Feb 1 1917 42
0069

Top Bank
in ditch
Top B.
Top B.
in D.
Top B.

Top B.

in D.

Enter Heavy tam.
Leave scattering dry tam.

Top B.

Pitch 1' R.

Tack in Dry tam. 2' R. 106 + 90

Top B. Feb 3 1917

in D.

T B

T B

in D.

Top B.

Pitch 3' Left

Top B.

43

B.S.

HI

F.S

Elev.

21378

| | | | | |
|-------|------|----------------------|------|--------|
| +60 | | | 7.0 | 068 |
| +55 | | | 4.7 | 09.1 |
| 102 | | | 4.1 | 09.7 |
| +80 | | | 4.8 | 09.0 |
| +75 | | | 7.0 | 06.8 |
| +72 | | | 4.5 | 09.3 |
| TOP A | | | 3.7 | 10.1 |
| 101 | | | 3.7 | 10.1 |
| T.P. | 4.20 | 216.14 ²³ | 3.84 | 209.94 |
| +40 | | | 6.7 | 09.4 |
| +38 | | | 8.3 | 07.8 |
| +35 | | | 6.1 | 10.0 |
| 100 | | | 6.0 | 10.1 |
| +84 | | | 6.0 | 10.1 |
| +67 | | | 8.3 | 07.8 |
| +63 | | | 5.7 | 10.4 |
| +62 | | | 5.4 | 10.7 |
| 99 | | | 7.5 | 08.6 |
| +60 | | | 7.5 | 08.6 |
| +54 | | | 5.2 | 10.9 |
| 98 | | | 4.4 | 11.7 |
| +30 | | | 4.3 | 11.6 |
| +28 | | | 9.0 | 09.1 |
| 97 | | | 7.0 | 09.1 |

Feb 31 1917 74
snowing

in D. Ditch 5' wide

T. Bank

D. 5' wide

Top B.

in D.

T.B. ditch 4' wide

101 + 70 Enter Dry farm Leave

scattering willowts and small
Dry farm

Top B.

in D. Ditch 5' wide

Top B.

Top B.

in D. Ditch 10' wide

Top B.

Top B.

in D.

" "

Top B.

Top B.

in D.

in D.

CONTINUED on page 49

LAT. No 1

45

8

4

5

4

+75

3

+90

+75

+50

2+00

+70

+50

0+00 S12-45 E

Read to near $\pm \frac{1}{4}$ degree

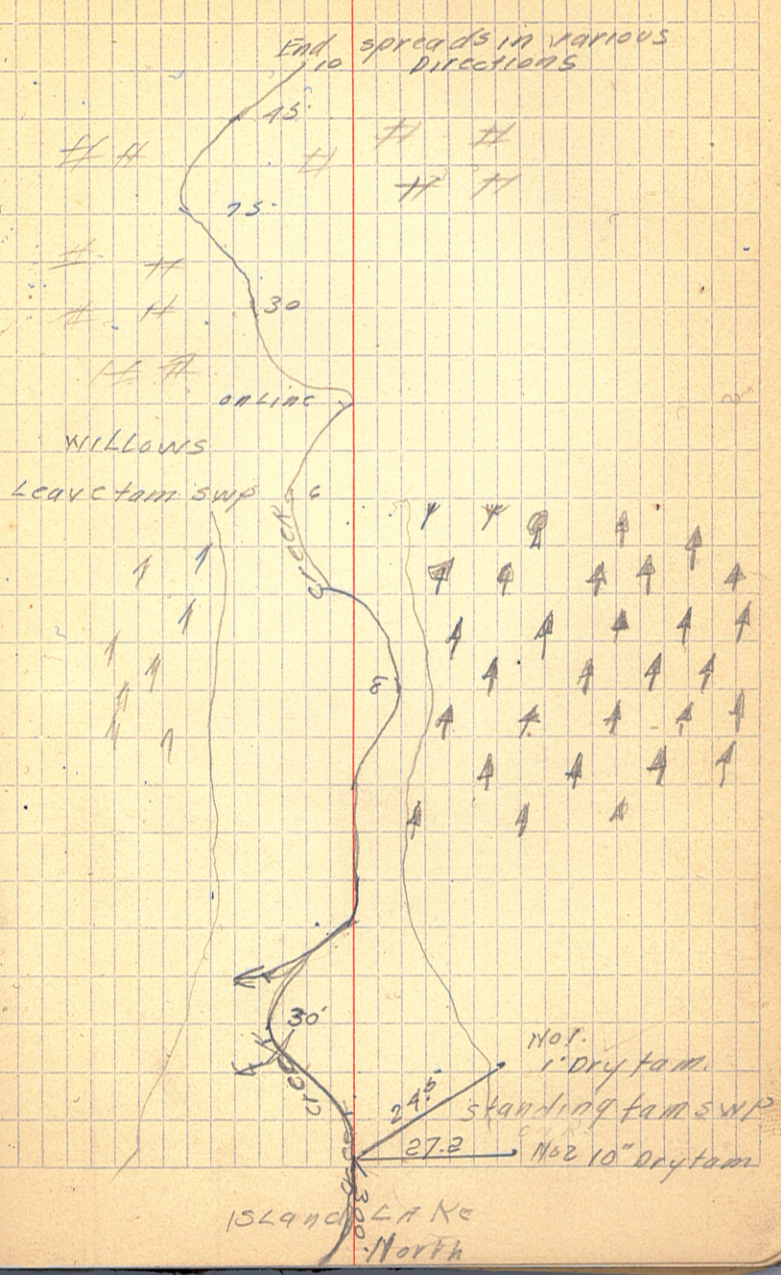
CROSS

LEAVE CRK.

CROSS CRK

CRK

8⁰⁰ Vari S Jan 29 1917. 46



4.7

13782⁹ End of Lat = 27+528 Main Ditch

12147

Mud Lake

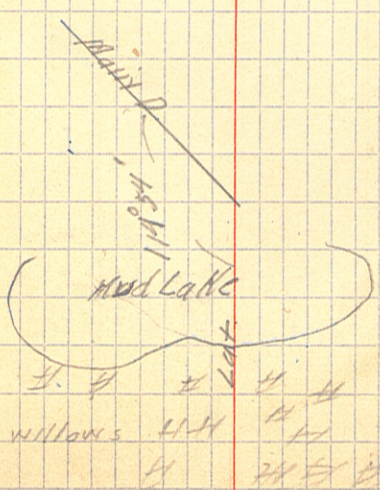
12100

⊙

9100

Windy \$
G. F. Pott - Geo Snell &
C. White P. Zumbrenen

Jan 28 1917 48



| 49 | BS | HI | F.S. | Elev |
|---------|-----|--------|------|--------|
| | | 216.14 | | |
| 96+95 | | | 4.7 | 11.7 |
| +55 | | | 7.7 | 11.7 |
| +90 | | | 7.9 | 09.1 |
| +35 | | | 4.7 | 11.4 |
| 96 | | | 3.1 | 13.0 |
| +85.2 A | | | 2.0 | 14.1 |
| T.P. | 495 | 218.80 | 1.79 | 214.35 |
| 95 | | | 5.1 | 13.7 |
| 94 | | | 6.7 | 12.1 |
| B.M. | | | 3.20 | 215.60 |
| +10 | | | 7.5 | 14.3 |
| 93 | | | 6.0 | 12.8 |
| +80 | | | 5.1 | 13.7 |
| +70 | | | 6.8 | 12.0 |
| +13 | | | 6.9 | 11.9 |
| +10 | | | 7.6 | 11.2 |
| +07 | | | 6.5 | 12.3 |
| 92 | | | 4.0 | 12.8 |
| +90 | | | 5.7 | 13.1 |
| +65 | | | 7.6 | 11.2 |
| 424 | | | 5.7 | 13.1 |
| +165 A | | | 6.0 | 12.8 |
| T.P. | 560 | 218.36 | 6.04 | 212.76 |
| 91 | | | 5.5 | 12.9 |

Continued from page 43 50

FEB 2 1917 SNOVING

Top B

Top B

11.0

Top B

B.M. spike in 1/2 pine stump 25 R. 94

Top B

11.0

Top B

Top B

11.0

Top B

51

| | BS | HI | FS | ELEV |
|-----|-----|--------|------|--------|
| | | 218.36 | | |
| 90 | | | 5.2 | 13.2 |
| 89 | | | 4.6 | 13.8 |
| +90 | | | | |
| +20 | | | | |
| 88 | | | 4.5 | 13.9 |
| 87 | | | 4.4 | 14.0 |
| +60 | | | | |
| 84 | | | 4.1 | 14.3 |
| +20 | | | | |
| 85 | | | 4.1 | 14.3 |
| TP | 523 | 219.20 | 4.39 | 213.97 |
| 87 | | | 5.4 | 13.8 |
| 83 | | | 4.7 | 14.5 |
| 82 | | | 4.5 | 14.7 |
| BM | | | 3.24 | 215.96 |
| 81 | | | 4.7 | 14.5 |
| 80 | | | 5.2 | 14.0 |
| 79 | | | 4.8 | 14.4 |
| FA2 | | | 4.6 | 14.4 |
| +90 | | | 6.7 | 12.5 |
| +88 | 493 | | 4.4 | 14.6 |
| TP | 493 | 219.40 | 4.73 | 214.47 |
| 78 | | | 4.7 | 14.7 |
| +73 | | | 4.5 | 14.9 |

52

Leave Tam enter scattering Tam 2 willow
 Enter tam leave open meadow

Leave tam enter open meadow

Enter tam leave open meadow

Leave Tam enter open swamp

Enter open swamp scattering
 willow 193 Tam 130' 82

TOP B

IND 3' ditch

TOP B

TOP B

53

| | BS. | HI | FS | Elev |
|-----------------------|-----|---------------------|---------------|-------|
| | | 21990 | | |
| +70 | | | 65 | 129 |
| +67 | | | 45 | 149 |
| +28 | | | 43 | 151 |
| +25 ^u | | | 65 | 129 |
| +23 | | | 43 | 151 |
| 77 | | | 48 | 144 |
| 76+68 ^{EW} R | | | 42 | 152 |
| +33 | | | 41 | 153 |
| +30 | | | 64 | 130 |
| +28 | | | 40 | 154 |
| 76 | | | 42 | 152 |
| 75 | | | 34 | 158 |
| 74 | | | 41 | 153 |
| 7P. | 368 | 21850 ⁹⁰ | 458 | 51482 |
| 73 | | | 35 | 150 |
| +97 | | | 49 | 125 |
| +94 | | | 35 | 150 |
| +76 | | | 35 | 150 |
| +75 | | | 60 | 125 |
| +72 | | | 37 | 148 |
| +20 | | | 60 | 125 |
| 72 | | | 60 | 125 |
| +82 | | | 40 | 125 |
| +80 | | | 41 | 144 |

Feb 3 1917 54
Cold

147
Top Bank
Top B
In D. 4' wide
Top B
Ditch 6' R.

Top Bank (D) 4' wide
In D
Top B

Top Bank
In D
Top B
Top B
In D Ditch 5' wide
Top B
In D
" "
" "
Top B

55

| | BS. | HI | FS | ELEV |
|------|-----|-----------------------|------|--------|
| | | 218.50 | | |
| +30 | | | 3.7 | 178 |
| +28 | | | 6.0 | 125 |
| 71 | | | 4.0 | 125 |
| +90 | | | 4.1 | 125 |
| +70 | | | 4.1 | 144 |
| +50 | | | 4.1 | 144 |
| +48 | | | 6.0 | 125 |
| 70 | | | 5.7 | 128 |
| 790 | | | 3.7 | 128 |
| +07 | | | 4.0 | 145 |
| +51 | | | 4.0 | 145 |
| +49 | | | 5.7 | 128 |
| 69 | | | 5.7 | 128 |
| +69 | | | 5.7 | 128 |
| +15 | | | 4.0 | 145 |
| 68 | | | 3.9 | 144 |
| T.P. | 515 | ¹³³ 219.88 | 3.77 | 214.73 |
| +80 | | | 5.3 | 146 |
| +77 | | | 6.0 | 133 |
| +72 | | | 5.5 | 144 |
| +63 | | | | |
| 67 | | | 5.0 | 149 |
| +52 | | | 5.1 | 148 |
| +47 | | | 6.0 | 133 |
| +42 | | | 4.8 | 151 |

Feb 31 91 788

| | |
|----------------------|-------------|
| Top B. | |
| in D. | |
| in D. | |
| Top B. | |
| Top B. | |
| in D. | |
| " " | |
| " " | |
| Top B. | |
| " " | |
| in D. | |
| in D. | pot hole |
| " " | |
| Top B. | |
| Top Bank | |
| in D. | |
| Top B. | |
| center of N & S Road | Winter Road |
| Top Bank | |
| in D. | |
| Top B. | Ditch 4' R |

57

| | BS. | HI | FS. | ELEV |
|--------------------|------|--------|------|--------|
| | | 21988 | | |
| 60 | | | 4.9 | 15.0 |
| +77 ² A | | | 1.7 | 15.2 |
| +35 | | | 4.5 | 15.4 |
| +30 | | | 6.0 | 13.9 |
| +22 | | | 4.4 | 15.5 |
| 63 | | | 7.3 | 15.6 |
| 64 | | | 4.3 | 15.6 |
| B.M. | | | 1.90 | 217.98 |
| 63 | | | 4.0 | 15.9 |
| 62 | | | 4.0 | 15.9 |
| TR. | 5.13 | 221.61 | 3.40 | 216.48 |
| +78 | | | 6.0 | 15.6 |
| +73 | | | 7.5 | 14.1 |
| +36 | | | 7.3 | 14.1 |
| +54 | | | 6.2 | 15.4 |
| +08 | | | 5.7 | 15.9 |
| +04 | | | 7.7 | 14.2 |
| 61 | | | 6.0 | 15.4 |
| 60 | | | 5.0 | 14.6 |
| 59 | | | 4.4 | 17.2 |
| +10 | | | | |
| 68 | | | 4.2 | 17.1 |
| 57 | | | 3.6 | 18.0 |
| 56 | | | 4.5 | 17.1 |
| B.M. | | | | |

Feb 3 1917.
P.M. Cold

58

Ditch 7 R.

Top B

1 in D 3' wide

Top B

Ditch 10' L

B.M. spike in 4" P.Pine 100' R. sta 64+50

Top B

1 in Ditch

1 in D.

Top B

Top B

1 in D.

Top B

Enter scattering willow swp.
Leave tag alderEnter tag alder
Leave scattering small ^{dry} opening

| 59 | B.S. | HI | F.S. | ELEV |
|---------|-----------------|------------------------|------|--------|
| BM. | 3.40 | 221.61 | 2.04 | 218.97 |
| BM | 3.40 | 222.37 | | 218.97 |
| 55 | | | 4.9 | 17.5 |
| 54 | | | 5.1 | 17.3 |
| +83 | | | 5.3 | 17.1 |
| +82 | | | 7.3 | 15.1 |
| +80 | | | 5.7 | 16.7 |
| 53 | | | 4.5 | 17.9 |
| +07.2 A | | | 4.3 | 18.1 |
| 52 | | | 7.2 | 18.1 |
| 51 | | | 4.0 | 18.4 |
| 50 | | | 3.8 | 18.6 |
| T.P. | 4.20 | 223.82 ^{1.43} | 2.75 | 219.62 |
| 49 | | | 5.2 | 18.6 |
| 48 | | | 4.7 | 19.1 |
| 47 | | | 5.1 | 18.7 |
| BM | | | 3.72 | 220.10 |
| 46 | | | 4.8 | 19.0 |
| 45 | | | 4.5 | 19.3 |
| 44 | | | 4.5 | 19.3 |
| T.P. | 3.94 | 224.34 ^{5.2} | 3.42 | 220.40 |
| 43 | | | 5.1 | 19.2 |
| 42 | | | 4.5 | 19.8 |
| 41 | | | 4.0 | 20.3 |
| 40 | | | 4.3 | 20.0 |

Feb 3 1917

cold

60

BM spike in 4" Tam 5' R. 50790

Top B. ditch 3' wide

IND.

Top B.

5

Leave Heavy Tam swing P. day
50+30 Enter small scattering Tam opening

BM spike in 3" Tam 26' R. 46+50

| Main Ditch | | | | |
|------------|------------------|-----------------------|------|--------|
| 43 | BS. | HI | F.S. | Elev |
| | | 224.59 | | |
| TP. | | | 3.40 | 221.19 |
| BM | | | 3.00 | 221.59 |
| TP | 360 | 224.79 | | 221.19 |
| 21 | | | 4.7 | 20.1 |
| 20 | | | 5.0 | 19.8 |
| 19 | | | 4.0 | 20.5 |
| 18 | | | 4.3 | 20.5 |
| +60 | | | | |
| 17 | | | 4.3 | 20.5 |
| +65 | | | | |
| 16 | | | 4.4 | 20.4 |
| TP | 337 | 225.56 ⁷⁷ | 2.60 | 222.19 |
| 15 | | | 5.1 | 20.5 |
| +72.5 A | | | 4.7 | 20.9 |
| 14 | | | 5.0 | 20.6 |
| 13 | | | 4.6 | 21.0 |
| BM | | | 3.64 | 221.92 |
| 12 | | | 4.3 | 21.3 |
| 11 | | | 4.5 | 21.1 |
| 10 | | | 4.7 | 20.9 |
| TP | 560 | 227.98 ²⁴² | 3.18 | 222.38 |
| 09 | | | 4.5 | 21.5 |
| 07 | correct sta 8 | | 4.3 | 21.7 |
| 06 | " 7 | | 4.4 | 21.4 |

same crew.
same instrument FEB 6 1917 64
cloudy

spike in 3" spruce 10 R 21 + 25

inter standing tam leave swamp
with few small
scattering dry tam
North & south winter road

BM spike in 3" spruce 35 L. 13

Note 100' error in chaining sta 8 marked
7 sta 8 left out.

46

| | BS. | HI | FS. | ELCV |
|------|------------------------|---------------------------|------|---------------------------|
| | correct sta 6+50 | 227.98 | | |
| 5+50 | | | 4.6 | 234 |
| 5 | 6 | | 6.8 | 21.2 |
| 4 | 5 | | 6.8 | 21.2 |
| 3 | 4 | | 6.5 | 21.5 |
| T.P. | 320 | ^{2.16} 225.82 | 5.36 | 222.42 |
| 2 | 3 | | 7.5 | 21.3 |
| 1 | 2 | | 7.6 | 21.3 |
| 00 | 1 | | 4.2 | 21.6 |
| B.M. | | | 2.37 | 223.45 |
| | | | | ^{2.37} 225.82 |

Feb 6 1917

66

From sta 5 to 6 Jack pine & cedars
sta not corrected

Note to correct stationing use
End of line sta 00 as sta 1
spike in 1" white pine 30' L of station
Corrected sta 1+00

| 67 | BS. | HI | FS | Elev | |
|------------|-------|---------------------|---------------|----------------|------------|
| Lateral 13 | +82.6 | = | 27+5 | 28 | Main Ditch |
| T.P. | 5.30 | | 22489 | 21959 | |
| 13+82.6 | | | 520 | 197 | ice Elev |
| 13 | | | 52 | 197 | " |
| +60 | | | 50 | 199 | |
| 12 | | | 50 | 199 | |
| 11 | | | 47 | 202 | |
| 10 | | | 51 | 198 | |
| 9 | | | 47 | 202 | |
| 8 | | | 50 | 199 | |
| T.P. | 5.40 | ²¹ 22570 | 519 | 219.70 | |
| 7 | | | 53 | 198 | |
| 6 | | | 49 | 202 | |
| 5 | | | 48 | 203 | |
| 4 | | | 45 | 206 | |
| 3 | | | 45 | 206 | |
| 2 | | ⁷⁷ | 49 | 202 | |
| T.P. | 5.60 | 22587 | 483 | 220.27 | |
| 1 | | | 54 | 205 | |
| 415 | | | 50 | 209 | |
| 00 | | | 59 | 200 | |
| | | | 5.75 | 220.42 | |
| BM | | | 3.40 | 222.47 | |

Lateral No Feb 3 1917 65

350

Mid Lake End of Lat

Edge of Mid Lake Leave open strip

Enter strip scatter in willow
leave willows.

Bottom of Ditch 500' From Island Lake

Ice Elev of Island Lake Feb 3 1917

split in 6" Tam 20' L 0700

Elev of ice on Island Lake 22042

" " " " Mud Lake No 21959

083

69 Fly Levels East to Big Swamp. East of Sta 53
 BS HI FS ELEV

| | | | | |
|------|-----|-------------------------|------|----------------------|
| BM | 343 | 222.40 | | 218.97 |
| T.P. | 321 | 223.26 ⁸⁶ | 2.35 | 220.05 ⁷³ |
| | | | 7.9 | 18.9 |
| T.P. | 527 | 227.97 ¹⁷¹ | 0.56 | 222.70 |
| T.P. | 336 | 226.36 ⁷¹ | 1.77 | 223.20 |
| | | | 3.6 | 23.0 |
| T.P. | 631 | 229.76 ³²⁰ | 3.11 | 223.45 |
| | | ground ELEV | 9.9 | 24.9 |
| T.P. | 910 | 229.99 ²³ | 3.87 | 225.89 |
| | | ELEV of swamp in center | 5.0 | 225.0 |

Snowing very Hard

Feb 5) Soundings on Mud Lake 70
 Feb 6) Located with Transit

see in Traverse Notes

| No | Depth of ICE | Depth of water | Depth of Mud | Total Depth Below ice of Lake EL | Ice ELEV Bottom |
|------|--------------|----------------|--------------|----------------------------------|-----------------|
| No 1 | 2' | 2' | 4 | 8 | 211.6 |
| No 2 | 2 | 2' | 3 | 7 | 212.6 |
| No 3 | 2' | 2' | 9' | 13 | 206.6 |
| No 4 | 2' | 2 | 1 1/2 | 5 1/2 | 217.1 |
| No 5 | 2' | 2 | 4 | 8 | 211.6 |
| No 6 | 2' | 2' | 3 1/2 | 7.5 | 212.1 |
| 38 | 2 | 3 | 10' | 16 | 203.6 |
| 37 | 2 | 2' | 6 | 10 | 209.6 |
| 36 | 2 | 2 | 6 | 10 | 09.6 |
| 35 | 2 | 2 | 6 | 10 | 09.6 |
| 34 | 2 | 2 | 6 | 10 | 09.6 |
| 33 | 2 | 2 | 6.3 | 10.3 | 09.3 |
| 32 | 2' | 2 | 1 | 4.5 | 15.1 |
| 31 | 2' | 2 | 1 1/2 | 4.5 | 15.1 |
| 30 | 2' | 2 | 1.5 | 5.8 | 213.8 |
| 29 | 2 | 2 | 7.7 | 8.7 | 211.2 |
| 28 | 2 | 4 | 5 | 11 | 208.6 |
| 27 | 2 | 4 | 5 | 11 | 208.6 |
| 26 | 2 | 4 | 5 | 14 | 205.6 |

Bottom consists of thick mud & sand in places

71

BS- HI FS- ELCH

65+770

62

60

chanced EAT to Neck of Big Swamp
To High point

52

26

21

20

17

19+723

void

Feb 7 1917 72

USC 14 cor
Bet 25-23

1337+97
5 50
133747

1337+97
50
133747

1337+97
50
133747

Dec. 17, 1917
Fence destroyed by
Beams Logging outfit.
Steel rail fence for
GRH 80 south of Pine River
Material broken 13 posts
2" x 6" planks OK.
4x4s OK.
needed 13 posts

34
2
0708

75

B.S. HI F.S. ELEY

+ 5+50

+ 4

+ 50

+ 3

+ 2

+ 1

0+00

soundings

+ 5+50

ISLAND LAKE

+ 4

+ 3

+ 2

+ 1

0+00 LAT No 1

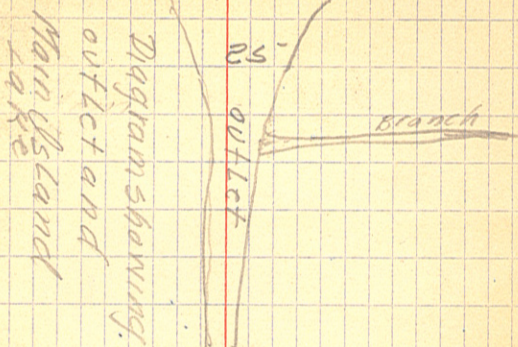
May 28 1917.

CO Ditch No 10 J. Pomasek 76
W. Stark Weather

Island Lake

Main Part Island Lake

E 125'



00 = End of Lat. + 123, 95, 5+50 = stations North to Island Lake

1 FT water. Muck bottom

1/2 water 7' muck to sand bottom

1/2 water 3' muck to sand bottom

1/2 water 2' muck to sand bottom

1/2 water 3' " " " "

1/2 water 5' muck to solid bottom

continued
on next page

77 BS. HI FS. ELEV

2.

4

6

8

10

12

Levels North From
00 of Lat Net to Island Lake

| | | | | |
|------|------|--------|------|--------|
| B.M. | 2.65 | 225.12 | | 222.47 |
| + 1 | | | 4.4 | 220.7 |
| + 2 | | | 6.4 | 187 |
| — | | | 4.72 | 220.90 |
| 3 | | | 4.5 | 220.6 |
| 4 | | | | 194 |
| 5 | | | | 194 |
| 130 | | | | 194 |

May 28 1917

78

soondrags

1/2 water 5' muck to sand bottom

1/2 Frost

10' muck no solid bottom length of
sounding rod 10'

10' muck length of sounding rod no solid
bottom

10' muck no solid bottom

10' muck no solid bottom

10' " " " "

natural ground

creek bottom

Water Elev of Island Lake May 28 1917

original ground

Estimated Elev of bottom
of outlet

"

81

| BS. | HI | FS. | ELEV |
|--------------------|-------|----------------------|--------|
| | 22519 | | |
| 29+05 ⁹ | | 3.9 | 221.3 |
| 30 | | 3.9 | 21.3 |
| TP | 287 | ⁴⁰ 225.59 | 222.72 |
| 32 | | 3.8 | 221.8 |
| 34 | | 4.0 | 21.6 |
| 36 | | 3.2 | 22.9 |
| TP | 292 | ⁷⁹ 226.38 | 223.46 |
| 36+73 | | 4.0 | 22.1 |
| BM | | 294 | 223.14 |

Soundings

From Island Lake to Meander Post
Floating bog 16' of Muck.

struck no solid bottom.

At SE cor sec 14 Twp 140 R 27 W

4' muck sand bottom.

X X second set of levels

| | | | | | |
|----|-----|----------------------|------|--------|-------------------|
| BM | 424 | 224.64 | | 22040 | Water E of Island |
| 00 | | | | 22040 | |
| 2 | | | 4.2 | 20.7 | |
| 4 | | | 4.0 | 20.6 | |
| TP | 197 | ⁶⁴ 225.28 | 1.33 | 223.31 | |
| 6 | | | 4.6 | 20.7 | |
| 8 | | | 4.3 | 21.0 | |

May 29 same party 1917 82

Turn North on sec line between sec 13 & 14

1/4 cor between sec 13 and 14 Twp 140 R 27 W
BM on fence Post 20' N of 1/4 cor.

Elev. at 1/4 corner. 222.40

water Elev of Island Lake. 220.40

2.0 Difference

Initial point about 1000's of N 1/4 cor sec 24

Thence North very close to N & S 1/4

line of sec 13 Twp 140 R 27 W

00+00 2' sand to gravel bottom

06+00 2' muck to sand bottom

Lake sand washed along lake

shore. 1400 4' muck to sand bottom.

Also run North along old

logging road

| Sta | BS | HI | FS | Elev |
|------|-----|-----------------------|-----|--------|
| | | 225.28 | | |
| 10 | | | 4.2 | 221.1 |
| T.P. | 355 | 225.66 ³⁸ | 317 | 222.11 |
| 12 | | | 4.6 | 21.1 |
| 14 | | | 4.6 | 21.1 |
| 16 | | | 4.4 | 21.3 |
| 18 | | | 4.4 | 21.3 |
| T.P. | 362 | 225.38 ²⁸ | 390 | 221.76 |
| 20 | | | 3.9 | 21.5 |
| 22 | | | 3.8 | 21.6 |
| 24 | | | 3.8 | 21.6 |
| T.P. | 378 | 226.19 ¹¹¹ | 267 | 222.71 |
| 26 | | | 4.3 | 22.2 |
| 28 | | | 3.4 | 23.1 |
| +60 | | | 3.0 | 23.5 |
| BM. | | | 256 | 223.93 |

May 29 1917.

same crew PM. sprinkling

84

Tamarack swamp.

+60 High land. Main swamps West
and N.W. and East and S.E. East
BM on 6" cedar 20' R. 26+40
I+sta 28+60 Elev 223.50
Water Elev Island Lake. 220.40
3.10

Natural Tangents

| deg. | 0' | 10' | 20' | 30' | 40' | 50' | sec. | deg. | 0' | 10' | 20' | 30' | 40' | 50' | sec. |
|------|------|------|------|------|------|------|------|------|--------|--------|--------|--------|--------|--------|------|
| 0 | 0000 | 0029 | 0058 | 0087 | 0116 | 0145 | 89 | 40 | 8391 | 8441 | 8491 | 8541 | 8591 | 8642 | 49 |
| 1 | 0175 | 0204 | 0233 | 0262 | 0291 | 0320 | 88 | 41 | 8693 | 8744 | 8796 | 8847 | 8899 | 8952 | 48 |
| 2 | 0349 | 0378 | 0407 | 0437 | 0466 | 0495 | 87 | 42 | 9004 | 9057 | 9110 | 9163 | 9217 | 9271 | 47 |
| 3 | 0524 | 0553 | 0582 | 0612 | 0641 | 0670 | 86 | 43 | 9325 | 9380 | 9435 | 9490 | 9545 | 9601 | 46 |
| 4 | 0699 | 0729 | 0758 | 0787 | 0816 | 0846 | 85 | 44 | 9657 | 9713 | 9770 | 9827 | 9884 | 9942 | 45 |
| 5 | 0875 | 0904 | 0934 | 0963 | 0992 | 1022 | 84 | 45 | 1.0000 | 1.0058 | 1.0117 | 1.0176 | 1.0235 | 1.0295 | 44 |
| 6 | 1051 | 1080 | 1110 | 1139 | 1169 | 1198 | 83 | 46 | 1.0355 | 1.0416 | 1.0477 | 1.0538 | 1.0599 | 1.0661 | 43 |
| 7 | 1228 | 1257 | 1287 | 1317 | 1346 | 1376 | 82 | 47 | 1.0724 | 1.0786 | 1.0850 | 1.0913 | 1.0977 | 1.1041 | 42 |
| 8 | 1405 | 1435 | 1465 | 1495 | 1524 | 1554 | 81 | 48 | 1.1106 | 1.1171 | 1.1237 | 1.1303 | 1.1369 | 1.1436 | 41 |
| 9 | 1584 | 1614 | 1644 | 1673 | 1703 | 1733 | 80 | 49 | 1.1504 | 1.1571 | 1.1640 | 1.1708 | 1.1778 | 1.1847 | 40 |
| 10 | 1763 | 1793 | 1823 | 1853 | 1883 | 1914 | 79 | 50 | 1.1918 | 1.1988 | 1.2059 | 1.2131 | 1.2203 | 1.2276 | 39 |
| 11 | 1944 | 1974 | 2004 | 2035 | 2065 | 2095 | 78 | 51 | 1.2340 | 1.2423 | 1.2497 | 1.2572 | 1.2647 | 1.2723 | 38 |
| 12 | 2126 | 2156 | 2186 | 2217 | 2247 | 2278 | 77 | 52 | 1.2799 | 1.2876 | 1.2954 | 1.3032 | 1.3111 | 1.3190 | 37 |
| 13 | 2309 | 2339 | 2370 | 2401 | 2432 | 2462 | 76 | 53 | 1.3270 | 1.3351 | 1.3432 | 1.3514 | 1.3597 | 1.3680 | 36 |
| 14 | 2493 | 2524 | 2555 | 2586 | 2617 | 2648 | 75 | 54 | 1.3764 | 1.3848 | 1.3934 | 1.4019 | 1.4106 | 1.4193 | 35 |
| 15 | 2679 | 2711 | 2742 | 2773 | 2805 | 2836 | 74 | 55 | 1.4281 | 1.4370 | 1.4460 | 1.4550 | 1.4641 | 1.4733 | 34 |
| 16 | 2867 | 2899 | 2931 | 2962 | 2994 | 3026 | 73 | 56 | 1.4826 | 1.4919 | 1.5013 | 1.5108 | 1.5204 | 1.5301 | 33 |
| 17 | 3057 | 3089 | 3121 | 3153 | 3185 | 3217 | 72 | 57 | 1.5399 | 1.5497 | 1.5597 | 1.5697 | 1.5798 | 1.5900 | 32 |
| 18 | 3249 | 3281 | 3314 | 3346 | 3378 | 3411 | 71 | 58 | 1.6003 | 1.6107 | 1.6212 | 1.6319 | 1.6426 | 1.6534 | 31 |
| 19 | 3443 | 3476 | 3508 | 3541 | 3574 | 3607 | 70 | 59 | 1.6643 | 1.6753 | 1.6864 | 1.6977 | 1.7090 | 1.7205 | 30 |
| 20 | 3640 | 3673 | 3706 | 3739 | 3772 | 3805 | 69 | 60 | 1.7321 | 1.7437 | 1.7556 | 1.7675 | 1.7797 | 1.7917 | 29 |
| 21 | 3839 | 3872 | 3906 | 3939 | 3973 | 4006 | 68 | 61 | 1.8040 | 1.8165 | 1.8291 | 1.8418 | 1.8546 | 1.8676 | 28 |
| 22 | 4040 | 4074 | 4108 | 4142 | 4176 | 4210 | 67 | 62 | 1.8807 | 1.8940 | 1.9074 | 1.9210 | 1.9347 | 1.9486 | 27 |
| 23 | 4245 | 4279 | 4314 | 4348 | 4383 | 4417 | 66 | 63 | 1.9626 | 1.9768 | 1.9912 | 2.0057 | 2.0204 | 2.0353 | 26 |
| 24 | 4452 | 4487 | 4522 | 4557 | 4592 | 4628 | 65 | 64 | 2.0503 | 2.0655 | 2.0809 | 2.0965 | 2.1123 | 2.1283 | 25 |
| 25 | 4663 | 4699 | 4734 | 4770 | 4806 | 4841 | 64 | 65 | 2.1445 | 2.1609 | 2.1775 | 2.1943 | 2.2113 | 2.2286 | 24 |
| 26 | 4877 | 4913 | 4950 | 4986 | 5022 | 5059 | 63 | 66 | 2.2460 | 2.2637 | 2.2817 | 2.2998 | 2.3183 | 2.3369 | 23 |
| 27 | 5095 | 5132 | 5169 | 5206 | 5243 | 5280 | 62 | 67 | 2.3559 | 2.3750 | 2.3945 | 2.4142 | 2.4342 | 2.4545 | 22 |
| 28 | 5317 | 5354 | 5392 | 5430 | 5467 | 5505 | 61 | 68 | 2.4751 | 2.4960 | 2.5172 | 2.5386 | 2.5605 | 2.5826 | 21 |
| 29 | 5543 | 5581 | 5619 | 5658 | 5696 | 5735 | 60 | 69 | 2.6051 | 2.6279 | 2.6511 | 2.6746 | 2.6985 | 2.7228 | 20 |
| 30 | 5774 | 5812 | 5851 | 5890 | 5930 | 5969 | 59 | 70 | 2.7475 | 2.7725 | 2.7980 | 2.8239 | 2.8502 | 2.8770 | 19 |
| 31 | 6009 | 6048 | 6088 | 6128 | 6168 | 6208 | 58 | 71 | 2.9042 | 2.9319 | 2.9600 | 2.9887 | 3.0178 | 3.0475 | 18 |
| 32 | 6249 | 6289 | 6330 | 6371 | 6412 | 6453 | 57 | 72 | 3.0777 | 3.1084 | 3.1397 | 3.1716 | 3.2041 | 3.2371 | 17 |
| 33 | 6494 | 6536 | 6577 | 6619 | 6661 | 6703 | 56 | 73 | 3.2709 | 3.3052 | 3.3402 | 3.3759 | 3.4124 | 3.4495 | 16 |
| 34 | 6745 | 6787 | 6830 | 6873 | 6916 | 6959 | 55 | 74 | 3.4874 | 3.5261 | 3.5656 | 3.6059 | 3.6470 | 3.6891 | 15 |
| 35 | 7002 | 7046 | 7089 | 7133 | 7177 | 7221 | 54 | 75 | 3.7321 | 3.7760 | 3.8208 | 3.8657 | 3.9136 | 3.9617 | 14 |
| 36 | 7265 | 7310 | 7355 | 7400 | 7445 | 7490 | 53 | 76 | 4.0108 | 4.0611 | 4.1126 | 4.1653 | 4.2193 | 4.2747 | 13 |
| 37 | 7536 | 7581 | 7627 | 7673 | 7720 | 7766 | 52 | 77 | 4.3315 | 4.3897 | 4.4494 | 4.5107 | 4.5736 | 4.6382 | 12 |
| 38 | 7813 | 7860 | 7907 | 7954 | 8002 | 8050 | 51 | 78 | 4.7046 | 4.7729 | 4.8430 | 4.9152 | 4.9894 | 5.0658 | 11 |
| 39 | 8098 | 8146 | 8195 | 8243 | 8292 | 8342 | 50 | 79 | 5.1446 | 5.2257 | 5.3093 | 5.3955 | 5.4845 | 5.5764 | 10 |

| deg. | 60' | 50' | 40' | 30' | 20' | 10' | sec. | deg. | 60' | 50' | 40' | 30' | 20' | 10' | sec. |
|------|--------|--------|--------|---------|---------|---------|------|------|--------|--------|--------|---------|---------|---------|------|
| 80 | 5.6713 | 5.7694 | 5.8708 | 5.9758 | 6.0844 | 6.1970 | 9 | 80 | 5.6713 | 5.7694 | 5.8708 | 5.9758 | 6.0844 | 6.1970 | 9 |
| 81 | 6.3138 | 6.4348 | 6.5606 | 6.6912 | 6.8269 | 6.9682 | 8 | 81 | 6.3138 | 6.4348 | 6.5606 | 6.6912 | 6.8269 | 6.9682 | 8 |
| 82 | 7.1154 | 7.2687 | 7.4287 | 7.5958 | 7.7704 | 7.9530 | 7 | 82 | 7.1154 | 7.2687 | 7.4287 | 7.5958 | 7.7704 | 7.9530 | 7 |
| 83 | 8.1443 | 8.3450 | 8.5555 | 8.7769 | 9.0098 | 9.2553 | 6 | 83 | 8.1443 | 8.3450 | 8.5555 | 8.7769 | 9.0098 | 9.2553 | 6 |
| 84 | 9.5144 | 9.7882 | 10.078 | 10.385 | 10.711 | 11.059 | 5 | 84 | 9.5144 | 9.7882 | 10.078 | 10.385 | 10.711 | 11.059 | 5 |
| 85 | 11.430 | 11.826 | 12.250 | 12.706 | 13.197 | 13.727 | 4 | 85 | 11.430 | 11.826 | 12.250 | 12.706 | 13.197 | 13.727 | 4 |
| 86 | 14.300 | 14.924 | 15.605 | 16.350 | 17.169 | 18.075 | 3 | 86 | 14.300 | 14.924 | 15.605 | 16.350 | 17.169 | 18.075 | 3 |
| 87 | 19.081 | 20.206 | 21.470 | 22.903 | 24.542 | 26.432 | 2 | 87 | 19.081 | 20.206 | 21.470 | 22.903 | 24.542 | 26.432 | 2 |
| 88 | 28.636 | 31.242 | 34.368 | 38.189 | 42.964 | 49.104 | 1 | 88 | 28.636 | 31.242 | 34.368 | 38.189 | 42.964 | 49.104 | 1 |
| 89 | 57.290 | 68.750 | 85.940 | 114.588 | 171.885 | 343.770 | 0 | 89 | 57.290 | 68.750 | 85.940 | 114.588 | 171.885 | 343.770 | 0 |

Natural Cotangents

Paul dothby
 3ydr tracing profile
 7 pencils 13H 14H
 Mail to Engadana
 Send Bill town
 board will send
 warrant

R.P. Hub 20 south of Sec 23



$$\begin{array}{r} 35 \overline{) 4.50} \\ \underline{440} \\ .10 \end{array}$$

$$\begin{array}{r} 340 \\ 8 \overline{) 287} \\ \underline{224} \\ .53 \end{array}$$

$$\begin{array}{r} 2 \overline{) 17.5} \\ \underline{2067} \\ 110 \end{array}$$

$$\begin{array}{r} 399 \\ 53 \\ 296 - 399 \\ \underline{287} \\ 209 \end{array}$$

$$\begin{array}{r} 15 \\ 7 \\ \hline 10.5 \end{array}$$

$$\begin{array}{r} 18 \\ A \\ \hline 72 \end{array}$$

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

ROADWAY 14 FEET WIDE. SIDE SLOPES 1½ TO 1.

FOR SINGLE TRACK EMBANKMENT.

| | 0 | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | |
|----|------|------|------|------|------|------|------|------|------|------|----|
| 0 | 7.0 | 7.2 | 7.3 | 7.5 | 7.6 | 7.8 | 7.9 | 8.1 | 8.2 | 8.4 | 0 |
| 1 | 8.5 | 8.7 | 8.8 | 9.0 | 9.1 | 9.3 | 9.4 | 9.6 | 9.7 | 9.9 | 1 |
| 2 | 10.0 | 10.2 | 10.3 | 10.5 | 10.6 | 10.8 | 10.9 | 11.1 | 11.2 | 11.4 | 2 |
| 3 | 11.5 | 11.7 | 11.8 | 12.0 | 12.1 | 12.3 | 12.4 | 12.6 | 12.7 | 12.9 | 3 |
| 4 | 13.0 | 13.2 | 13.3 | 13.5 | 13.6 | 13.8 | 13.9 | 14.1 | 14.2 | 14.4 | 4 |
| 5 | 14.5 | 14.7 | 14.8 | 15.0 | 15.1 | 15.3 | 15.4 | 15.6 | 15.7 | 15.9 | 5 |
| 6 | 16.0 | 16.2 | 16.3 | 16.5 | 16.6 | 16.8 | 16.9 | 17.1 | 17.2 | 17.4 | 6 |
| 7 | 17.5 | 17.7 | 17.8 | 18.0 | 18.1 | 18.3 | 18.4 | 18.6 | 18.7 | 18.9 | 7 |
| 8 | 19.0 | 19.2 | 19.3 | 19.5 | 19.6 | 19.8 | 19.9 | 20.1 | 20.2 | 20.4 | 8 |
| 9 | 20.5 | 20.7 | 20.8 | 21.0 | 21.1 | 21.3 | 21.4 | 21.6 | 21.7 | 21.9 | 9 |
| 10 | 22.0 | 22.2 | 22.3 | 22.5 | 22.6 | 22.8 | 22.9 | 23.1 | 23.2 | 23.4 | 10 |
| 11 | 23.5 | 23.7 | 23.8 | 24.0 | 24.1 | 24.3 | 24.4 | 24.6 | 24.7 | 24.9 | 11 |
| 12 | 25.0 | 25.2 | 25.3 | 25.5 | 25.6 | 25.8 | 25.9 | 26.1 | 26.2 | 26.4 | 12 |
| 13 | 26.5 | 26.7 | 26.8 | 27.0 | 27.1 | 27.3 | 27.4 | 27.6 | 27.7 | 27.9 | 13 |
| 14 | 28.0 | 28.2 | 28.3 | 28.5 | 28.6 | 28.8 | 28.9 | 29.1 | 29.2 | 29.4 | 14 |
| 15 | 29.5 | 29.7 | 29.8 | 30.0 | 30.1 | 30.3 | 30.4 | 30.6 | 30.7 | 30.9 | 15 |
| 16 | 31.0 | 31.2 | 31.3 | 31.5 | 31.6 | 31.8 | 31.9 | 32.1 | 32.2 | 32.4 | 16 |
| 17 | 32.5 | 32.7 | 32.8 | 33.0 | 33.1 | 33.3 | 33.4 | 33.6 | 33.7 | 33.9 | 17 |
| 18 | 34.0 | 34.2 | 34.3 | 34.5 | 34.6 | 34.8 | 34.9 | 35.1 | 35.2 | 35.4 | 18 |
| 19 | 35.5 | 35.7 | 35.8 | 36.0 | 36.1 | 36.3 | 36.4 | 36.6 | 36.7 | 36.9 | 19 |
| 20 | 37.0 | 37.2 | 37.3 | 37.5 | 37.6 | 37.8 | 37.9 | 38.1 | 38.2 | 38.4 | 20 |
| 21 | 38.5 | 38.7 | 38.8 | 39.0 | 39.1 | 39.3 | 39.4 | 39.6 | 39.7 | 39.9 | 21 |
| 22 | 40.0 | 40.2 | 40.3 | 40.5 | 40.6 | 40.8 | 40.9 | 41.1 | 41.2 | 41.4 | 22 |
| 23 | 41.5 | 41.7 | 41.8 | 42.0 | 42.1 | 42.3 | 42.4 | 42.6 | 42.7 | 42.9 | 23 |
| 24 | 43.0 | 43.2 | 43.3 | 43.5 | 43.6 | 43.8 | 43.9 | 44.1 | 44.2 | 44.4 | 24 |
| 25 | 44.5 | 44.7 | 44.8 | 45.0 | 45.1 | 45.3 | 45.4 | 45.6 | 45.7 | 45.9 | 25 |
| 26 | 46.0 | 46.2 | 46.3 | 46.5 | 46.6 | 46.8 | 46.9 | 47.1 | 47.2 | 47.4 | 26 |
| 27 | 47.5 | 47.7 | 47.8 | 48.0 | 48.1 | 48.3 | 48.4 | 48.6 | 48.7 | 48.9 | 27 |
| 28 | 49.0 | 49.2 | 49.3 | 49.5 | 49.6 | 49.8 | 49.9 | 50.1 | 50.2 | 50.4 | 28 |
| 29 | 50.5 | 50.7 | 50.8 | 51.0 | 51.1 | 51.3 | 51.4 | 51.6 | 51.7 | 51.9 | 29 |
| 30 | 52.0 | 52.2 | 52.3 | 52.5 | 52.6 | 52.8 | 52.9 | 53.1 | 53.2 | 53.4 | 30 |
| 31 | 53.5 | 53.7 | 53.8 | 54.0 | 54.1 | 54.3 | 54.4 | 54.6 | 54.7 | 54.9 | 31 |
| 32 | 55.0 | 55.2 | 55.3 | 55.5 | 55.6 | 55.8 | 55.9 | 56.1 | 56.2 | 56.4 | 32 |
| 33 | 56.5 | 56.7 | 56.8 | 57.0 | 57.1 | 57.3 | 57.4 | 57.6 | 57.7 | 57.9 | 33 |
| 34 | 58.0 | 58.2 | 58.3 | 58.5 | 58.6 | 58.8 | 58.9 | 59.1 | 59.2 | 59.4 | 34 |
| 35 | 59.5 | 59.7 | 59.8 | 60.0 | 60.1 | 60.3 | 60.4 | 60.6 | 60.7 | 60.9 | 35 |
| 36 | 61.0 | 61.2 | 61.3 | 61.5 | 61.6 | 61.8 | 61.9 | 62.1 | 62.2 | 62.4 | 36 |

Calculated by Julien A. Hall, M. Am. Soc. C. E.

MADE IN GERMANY.