

BRIDGE BOOK

Aug. 12-1918

Relocation North Approach

(5)

Jan Be #2 = BR 3349

ISLAND NOTES

(5)

FIELD BOOK

361

70

# KEUFFEL & ESSER CO.

## DRAWING MATERIALS

AND

## SURVEYING INSTRUMENTS.

NEW YORK.

CHICAGO. ST. LOUIS. SAN FRANCISCO. MONTREAL.

### Tables for Excavations and Embankments.

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.  
ROADWAY 18 FEET WIDE. SIDE SLOPES 1 TO 1.  
FOR SINGLE TRACK EXCAVATION.

*"Copyright, 1895, by Keuffel & Esser Co."*

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

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

FOR KEITH'S RAILROAD CURVE TABLES SEE END OF BOOK.

*W.D. SANFORD - Hockensack*

Engr. News 10 Ton Formula -

$$\frac{2WH}{S+1}$$

W = weight hammer in tons  
H = fall " " feet  
S = penetration in inches - average  
last 3 blows

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BRIDGE SURVEY - BOY RIVER

3 Hub

2

+33

+05

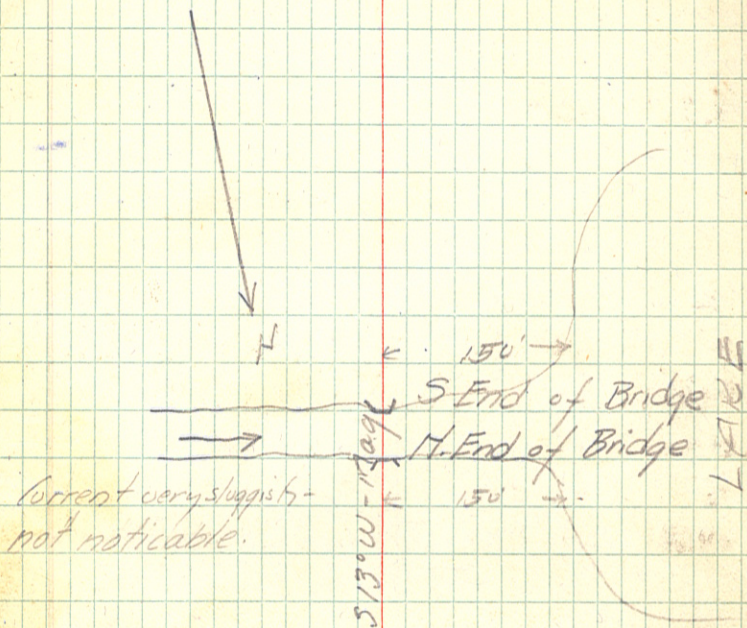
1

+80

0 Hub S13°W Mag

J.R.R. Aug. 14-18  
A.W.M.

SE COR SEC 16 - T.140-29 - WOODROW



Bridge in unsafe condition  
old bent in center  
Length about 28'  
" required - 2-15' Spans  
Temporary road on left can be  
built for approx. \$50-

Levels

Sta	BS	HI	Rod	FS	Elev
BM	6.28	106.28			100.00
00			5.0		01.3
+80			6.4		99.9
1400			5.5		00.8
+05			7.9		01.7
			10.73		95.85
+33			6.0		00.3
+10			6.1		00.2
2			5.8		00.5
+10			5.2		01.1
3			3.7		02.6

Soundings

R

	Water	Mud	Total
1405	2'	25'	27'
+19	4'	20'	24'
+33	3'	20'	23'

Feb 20 1919

BM	6.83	106.83	100.00
Elev of Spite on N End of Br.		5.81	101.02
" " " " " "		5.89	100.94

J.F.P. Aug 14 1918  
AN. 14

2

L & R

BM Spite 128" AS 6 100' NE. of Sta 0+00

96.1	99.9	99.7	96.1
12	7	7	15

Water elev

96.7	00.2	00.3	95.9
12	6	7	12
98.1	00.5	00.5	98.2
10	6	6	10
00			00

L

	Water	Mud	Total
2 1/2'	25'		27 1/2'
4'	20'		24'
3'	20'		23'

Floor Elev.  
101.00

101.02 = .02 High

100.94 = .06 Low

Bridge survey Boy RIVER

AY.M.  
J.P.

AUG 14, 1918 3

old bridge in poor condition

consists of 3 bents

Length = 395 ft.

" recommended for new - 2-15' Spans  
or 2-17' "

Current very sluggish

+70<sup>2</sup> Hub

4

3

+87<sup>5</sup>

S End of Br

+48

N End of Br

2

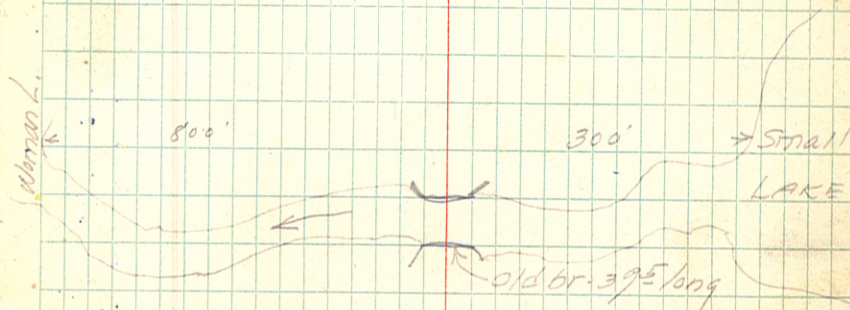
+60

+20

1

0 Hub 521°W Mag

SEC 15 - Twp 140 - R 29 Woodrow  
(Approx. center of sec.)



low land from +50 to 3+20

S 21°W

## Levels

Sta	B.S.	H.I.	rod	F.S.	Elev
B.M.	030	100.30			100.00
+70.9			1.0		99.3
+25			1.4		98.9
4			2.2		98.1
3			7.7		92.6
+87.5			8.7		91.6
				19.16	86.14
+18			9.0		91.3
2			10.3		90.0
+60			9.2		91.1
+20			5.6		94.7
1			5.0		95.3
00			2.0		98.3

### Soundings

on R

Sta	Water	Mud	day	Totals
1+98	2'		10' to hard clay 12'	
1+68	4'		8' " " " 12'	
1+87.5	0'		10' " " " 10'	

Feb. 20 1919

B.M.	1.54	101.54		100.00
Elev of spike S end of br.			8.10	93.14
" " " N " " "			10.90	91.14

Aug 14, 1918.

A.M.  
S.P.

L & R

A

spike in 6" Oak 15' L of Sta 3+85.2

91.6

Water level 86.1

Water elev

### Soundings

on L

Water	Mud	sand	Totals
2'	9' to hard clay		11
4.5		10' to hard clay	14 1/2'
3'	7' clay to hard pan		10'

Elev of floor.

91.50

93.14 = 2.94 High

91.14 = .37 Low

## LUMBER & PILING

FOR BRIDGE IN SEC 15-140-29

2-17' Spans L=35' W=16'

11 Piling 30' long	}	Not less than 6" tops
15 " 26 "		
26 " total 720 lin. ft.		

### LUMBER

2 pcs	12x12x20	Caps
1 "	12x12x18	"
2 "	3x10x20	Sway B
26 "	4x12x18	Joists
8 "	2x4x12	Bridging
1680 BF	3"x16'	6" min flooring
1 pc	3x12x16	Block
4 "	4x6x18	W.G.
1 "	2x6x12	" Block
5 "	4x4x12	Rail Posts
8 "	2x6x18	Rail
4 "	2x4x18	"
750 BF	3"x16'	}
720 "	3"x12'	

Total 6,358 BF

## LUMBER & PILING

BRIDGE IN SEC 16-140-29

2-15' Spans L=31' W=16'

PILING-	11 pcs 30' long	}	Not less than 6" tops
	15 " 26 "		
	26 " Total 965 lin. ft.		

### LUMBER-

2 pcs	12x12-20
1 "	12x12-18
2 "	3x10-20
22 "	4x12-16
6 "	2x4-12
1488 BF	3"x16' (6" min)
1 pc	3x12-16
4 "	4x6-16
1 "	2x6-12
5 "	4x4-12
8 "	2x6-16
4 "	2x4-16
750 BF	3"x16'
720 "	3"x12'

TOTAL 5,777 BF

6,358

12,135





IRON - WOODROW BRIDGES

SECS 15-16-140-54

- 30 -  $\frac{3}{4}$ " x 2'-0" drift bolts round counter sunk  
hd + painted
- 56 -  $\frac{3}{4}$ " x 18" do- do-
- 15 -  $\frac{5}{8}$ " x 12 machine bolts sq. hd + sq nut
- 10 -  $\frac{5}{8}$ " x 10 do. 60-
- 75 - 60 washers  $\frac{3}{4}$ " hole.
- 100 - Ogee washers  $\frac{3}{4}$ " hole x  $\frac{1}{2}$ " thick
- 60 - packing rings  $\frac{3}{4}$ " hole x  $\frac{1}{2}$ " thick
- 25 -  $\frac{5}{8}$ " x 12" carriage bolts + nuts
- 100#  $\frac{3}{8}$ " x 10" wire spikes
- 100#  $\frac{3}{8}$ " x 8 " "
- 400# 60° spikes
- 100# 40 "
- 100# 20 "

PILING AT WOODROW BRIDGES

11-14-18

WEST BRIDGE

(6-36 N.G.)

17 - 36' long

9 - 40' "

Rejected -

EAST BR-

11 - 30' long

(10 N.G.)

15 - 26' "

REJ -

BR. 2850

BM 2.22 91.02

88.80

5.15 85.87

Nick Ritchie  
AUM

1-4-19

8

On Oak - R sta 3

= Ice - 1-4-19

CAMP #3 BR.

BRIDGE SURVEY ACROSS BOY RIVER

5 END Survey  
 +431 0 Spike in stump  
 4  
 +30  
 3  
 2  
 1  
 0 0 H11°30'E mag spike

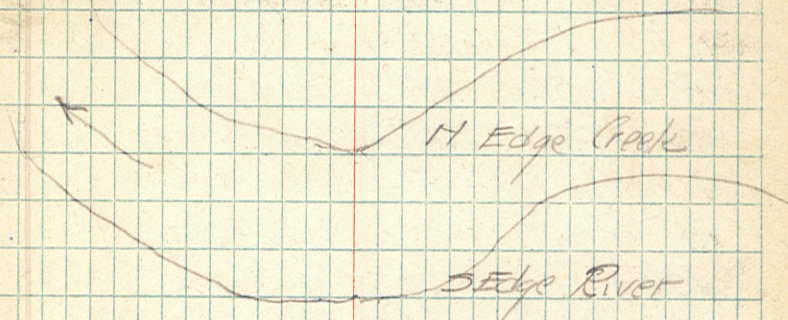
BM	0.77	100.77		100.00
00			2.1	98.7
1			7.10	93.67
2			7.17	93.60
3			7.17	93.60
4			5.5	95.3
BM			0.63	100.14
5			A.1	96.7

FM  
 AWM

1-9-19

11

located in SE 1/4 of NE 1/4 SEC 36-143-28



On bldg. post

25' R Sta 00

Ice

"

"

on Stp A+43?

on Spike on top of Stp

CAMP #3 BR.

SOUNDINGS

	Water	Mud	Sand	Hard
1.	5	12'		
+50	4.5	15'	- Blue Clay	
2	5.0	11'	" "	
+50	4.8	11"	" "	
3	2.7	12'	Mud+Clay	
+50	0	10'	Clay	
4	0.0	10'	Clay	
5	0	10'	"	

H.W. is 4.7 higher according to  
marks on piling. = 98.3.  
Mean H.W. - about 3' higher = 96.6.

P.M.

1-9-19

12

44128

# SANATORIUM BRIDGE SURVEY

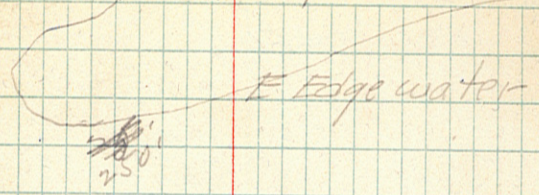
8  
 +70  
 7  
 6  
 5  
 4  
 3  
 2  
 +15  
 1  
 +85  
 +60  
 +30  
 0+00

↑  
 LEECH LAKE  
 ↓

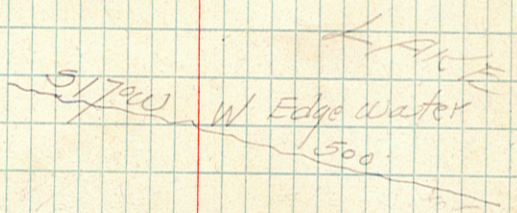
5700  
 SPIKE  
 N88°45 E MAG

AW.M.  
 EBH  
 JFP  
 2-19-19  
 13

# SEC. 2 - T. 141-31



LEECH



5' SOAK TAP - BT.

# SAN. BRIDGE

Sta	B.S.	I.I.	Red	Es	Elev
	0.51	100.51			100.00
00			+10		101.5
+30			2.0		98.5
+60			9.4		91.1
T.P.	-0.6	89.03		11.42	89.09
+85			6.9		82.6
1			12.7		76.3
T.P.	2.20	79.33		11.90	77.13
+15			5.1		74.2
2			5.0		74.3
3			5.0		74.3
4			5.0		74.3
5			5.0		74.3
6			5.2		74.1
7			5.0		74.3
+70			5.2		74.1
T.P.	12.83	89.07		3.09	76.24
B.M.				5.15	83.32
8			11.7		77.7
+10			2.9		86.2
T.P.	11.45	100.21		0.31	87.76
+70			8.0		92.2
+83			1.2		96.5
Top Rail			2.4		98.07
+12.8	0				
9	0				
+85	0	SPIKE			

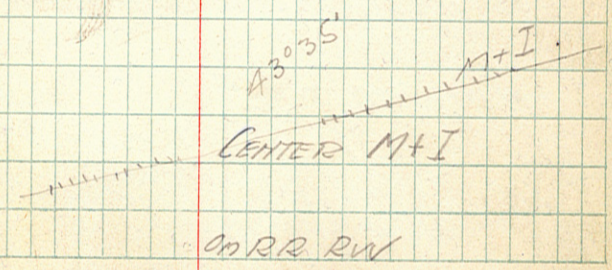
AW Maulster Feb. 19, 1919  
 J. F. Parnisell  
 E. B. Horst

19

B.M. Elev. 100.00 on 10" Oak. 4' 2.0 of 0730  
 approx.

107  
 "  
 "  
 "  
 "  
 "  
 "  
 "

On 14" Oak. BT. 25' 6" 8400







BRIDGE SURVEY - BUNGO CREEK - SRM 02  
HW 1/4 SEC. 6 - 137 30

OLD BRIDGE - HW + SE  
21' long - extreme  
16' W  
4 1/2' above ice

3' on W side Br  
1' W - 14' mud + sand + gravel  
5' on E side  
11' Mud + Sand

22 - 26' piling required

4-5-19 22' - 26' H.P. Piling delivered

J.B. Crossman  
W. Cromett  
A.W.M

16

BRIDGE SURVEY - SDH 2 - AUSTIN CREEK  
1/4 NW 1/4 SEC 1 - 137-31

19' long E & W Near Sec. Line  
16' wide  
5 1/2' above water  
5' Side - 3' Mud & Gravel  
to Gravel  
14 " 8' do -

22 - 22' Piling Required

A-5-19 22 - 22' piling delivered  
1 - REJ

B Crossman  
W Crossman  
Aron

17

Sta	BS.	H.W.	I.S.	Rod	Elev
B.M.	0.21	100.21			100.00
T.P.	4.75	96.66	830		91.91
00				8.2	88.5
+03				7.9	88.8
+04				5.7	91.0
+07				4.8	91.9
+23				1.9	91.8
+30				5.3	91.4
+36				5.5	91.2
+41				5.7	91.0
+56				5.7	91.0
+69				5.9	90.8
+70				8.5	88.2

J.F. Arnold.  
F. Marsh

April 22, 1919 18

Channel change levels at Bridge approx.  
150' E of W 1/4 Cor M line Sec 1 T137R31  
B.M. on dead pine stump 12' south of W 1/4 Cor  
M line Sec 1 T137R31 Elev 100.00  
NOTE  
B.M. transferred to Rock 25' R.  
of 6+20 on large Rock Elev 103.34

in Creek.

Sta	Elev	Area	Cu yds
00	88.50	00	
+			2
+03	88.49	3.0	
+07			4
+04	88.49	18.0	
			2.3
+07	88.47	288	
			13.8
+23	88.41	22.8	
			5.6
+30	88.37	20.5	
			4.3
+36	88.35	18.1	
			5.2
+44	88.31	17.2	
			8.2
+56	88.26	19.7	
			8.1
+69	88.20	14.1	
			3
+70	88.20	00	
			48.9

slowing ditch near old br. 1.6  
 total 50.9

April 23, 1919

A' Base

19

1:1 slope

L	R
$\frac{00}{2}$	$\frac{00}{2}$
$\frac{+36}{5.1}$	$\frac{00}{2}$
$\frac{+21}{5.1}$	$\frac{+21}{7.9}$
$\frac{+35}{5.1}$	$\frac{+31}{5.7}$
$\frac{+31}{5.1}$	$\frac{+33}{6}$
$\frac{+31}{5.1}$	$\frac{+29}{7.9}$
$\frac{+27}{7.1}$	$\frac{+27}{6}$
$\frac{+26}{7.6}$	$\frac{+26}{7.6}$
$\frac{+34}{5.9}$	$\frac{+27}{6}$
$\frac{+38}{7.8}$	$\frac{+24}{6}$
$\frac{00}{2}$	$\frac{00}{2}$

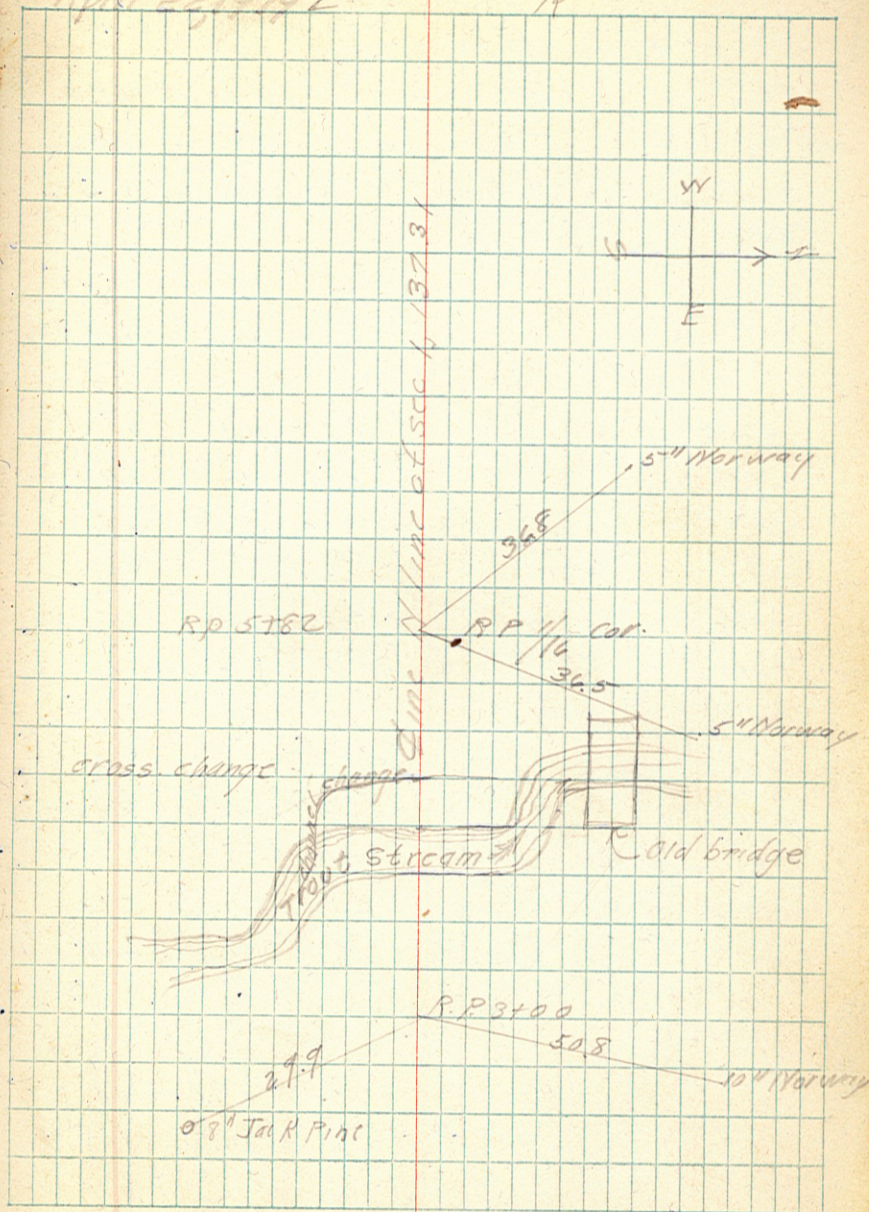
8 End  
 7  
 6  
 +820 0  
 +95  
 5  
 +81  
 +42  
 +31  
 +19  
 4  
 3 0  
 +74  
 2  
 1  
 00 0

W/4 COR N. line sec 1, 137.31  
 Reest 1/16 cor. June 2/19  
 WITH F. Caswell & N. Ritchie

20

April 22, 1919 L

R



Stn	BS.	HI	FS	Rod	Elev
BM	707	107.07			100.00
8			3	0.1	107.0
7				1.9	05.2
6	~			6.5	00.6
BM.	0.50	100.50			100.00
+45				7.7	92.8
-				5.6	94.94
-				6.18	94.32
5				9.3	91.2
+49				8.6	91.9
+12				12.2	88.3
+31				11.1	89.1
-				11.00	89.50
+19				9.4	91.1
1				8.6	91.9
+55				8.0	92.5
+25				15	99.0
TP.	620	<sup>5.93</sup> 106.43	0.27		100.23
3				4.2	02.21
+79				6.9	99.5
2				4.7	01.7
1				4.4	01.8
00				7.0	99.4

Apr 23, 1919.

21

Levels on Line of Road N line Sec 11, 137-31  
Spike in Pine Stump 12' Sta 5+82 Elev 100.00  
in old road L level R

level ~~99~~ <sup>1000</sup>/<sub>15</sub> old road

Level L

West end of Br.

East " " "

Top Bank of creek.

Edge " "

" " "

Water elev

Top bank

level <sup>29</sup> 98.1 <sup>980</sup> old road

level 022 104 <sup>15</sup> 99.1 <sup>15</sup> 99.4 <sup>20</sup> 99.4  
6 3 13 17

level Road 7' R.

level " 5' R.

" " 45 B.