LETTER

169

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.

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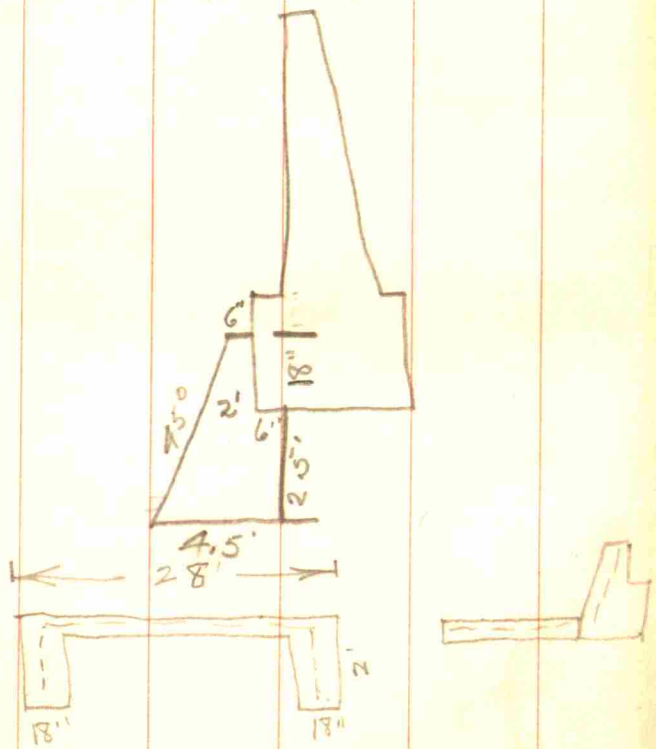
	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
0	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	0
1	10.0	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8	10.9	1
2	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9	2
3	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9	3
4	13.0	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.8	13.9	4
5	14.0	14.1	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.

2.

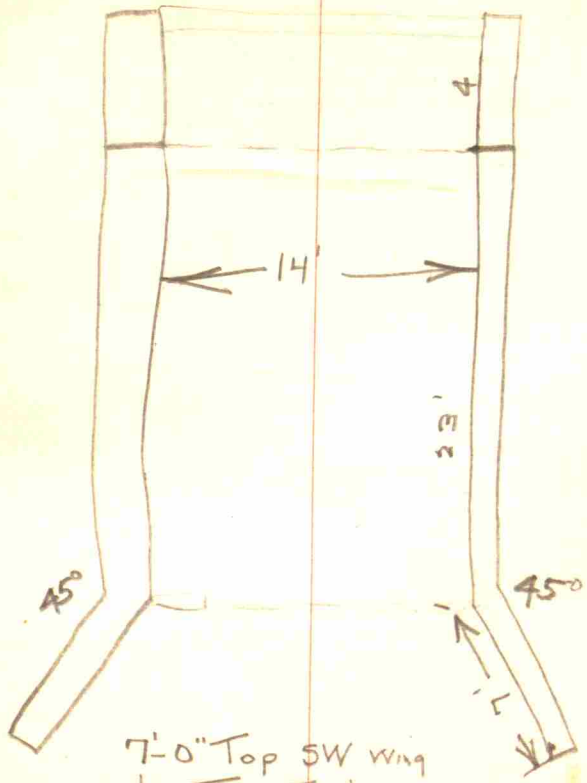
BM – Top SW wing next to Hand Rail – 2.5 + 9.9
80.78
69.64 H.Gd.
11.14' Top Wing to Bed



Total Conc 27.0 Cu Yds
6 Bars 1½"□ – 30' long
48 Bars ½"□ – 10' long
Total Steel – 404 lbs

Panten Br.

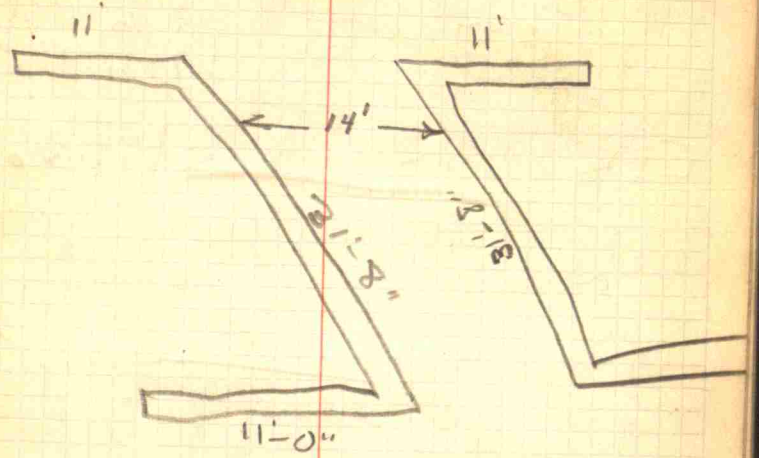
3



7'-0" Top SW wing to Top Footing
9'-6" Top Rail to Top Footings

Johnson Br No 1

BM - Sand E. Rail, 131+65
91.03 — Bed 78.90

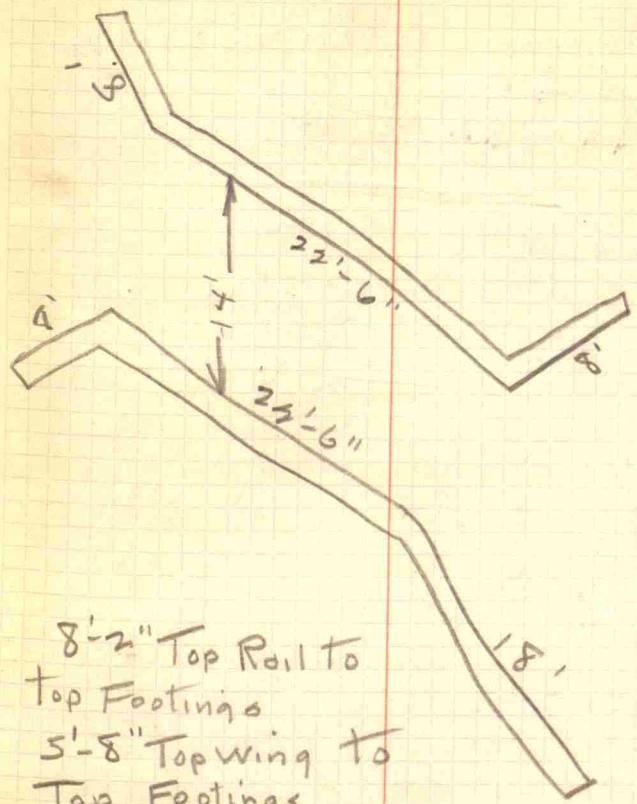


Top Rail to Top Footing 9'-3"
" " To Bed 11'-0"
Top Rail to To Top Wing 2'-2"

6. Johnson No 2

BM – Top SE wing Next to Hand Rail — Sta 127+43

El – 88.75 – Nov 4 79.36



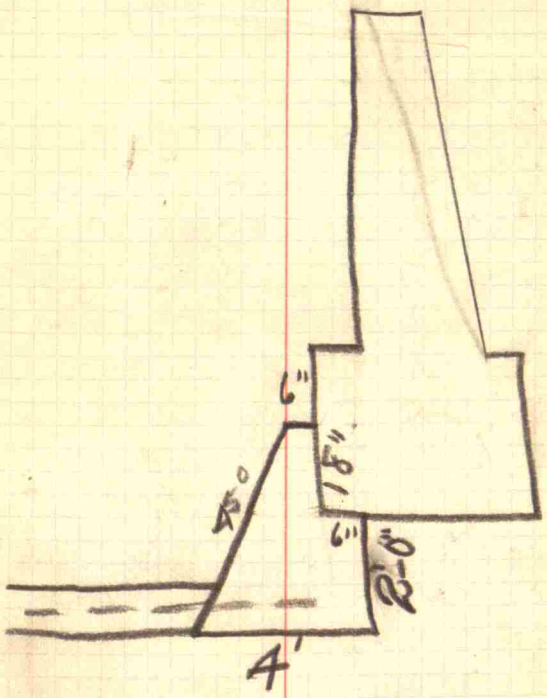
8'-2" Top Rail to Top Footings

5'-8" Top Wing to Top Footings

Rosebourn Bl.

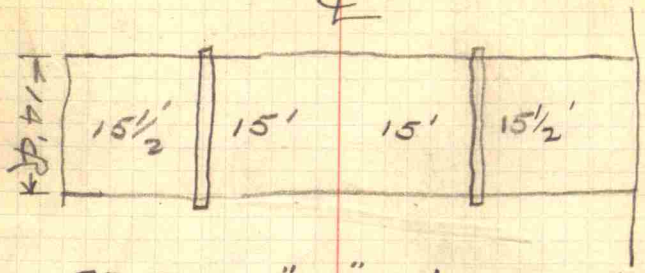
BM.
Top SW wing next to Hand Rail
108+68 — 91.67
New Gd — 81.22

6 Bars ½□ — 26' long in floor
bent into Toe
48 Bars ½□ 6' long in floor
bent into Coping



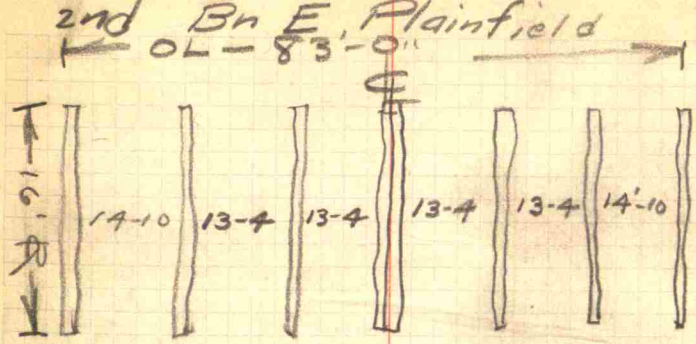
1st Br E. Plainfield

℄



F.P. 92 Pc's – 3"x8" – 14' = 2576'-BM
Sh – 180 Pc's – 1"x6" – 10' = 900'-BM
Curb 10 Pc's – 2"x8" – 16' = 214'-BM
Blocks 2"x4"x(8-12) = 80-Sq yds
Paving Pitch = 1000#
Nails – 60# = 1 Keg
" – 8# = 1 Keg
Roofing Paper =
Sand =

2nd Bn E. Plainfield



6 Is = 6X3 –
2 Cs = 6X2 – } in good condition

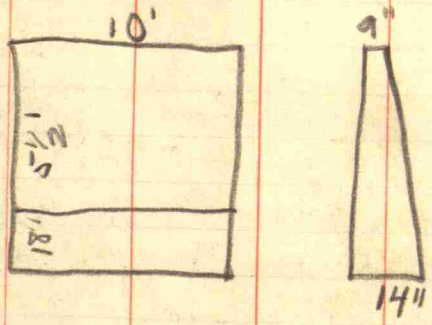
Lumber for Hand Rails Reqd
12 Pc = 3X8-14 = 336' BM

FP = 125 Pc – 3X8-16 = 4000' BM
Sh = 270 Pc – 1X6-10 = 1350' BM
Curb = 12 pc – 2X8-16 = 256' BM
Blocks 2X4 (6-12) = 140 Sq Yds
Paving Pitch = 1700#
Roofing Paper =
Nails =
Sand –

16.

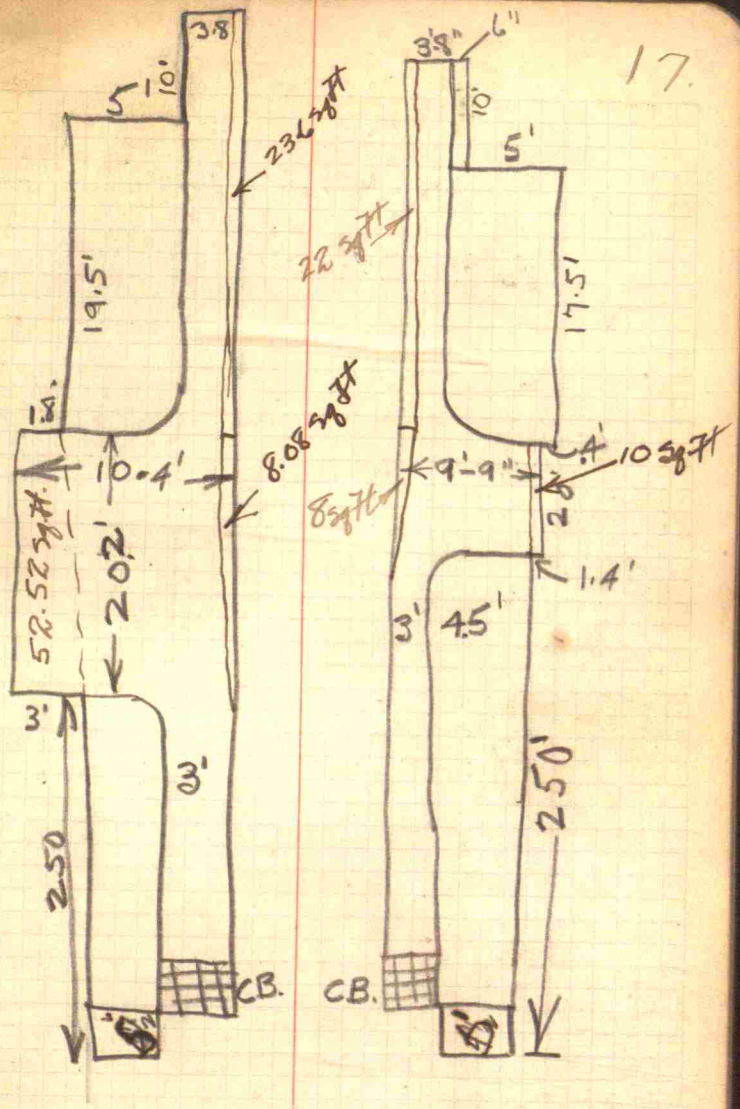
N Ind St W. Side

144' 18" Tile @ 1.50
1' 18"x12" Y @ 3.00
30' x12" Plain @ Hdwf

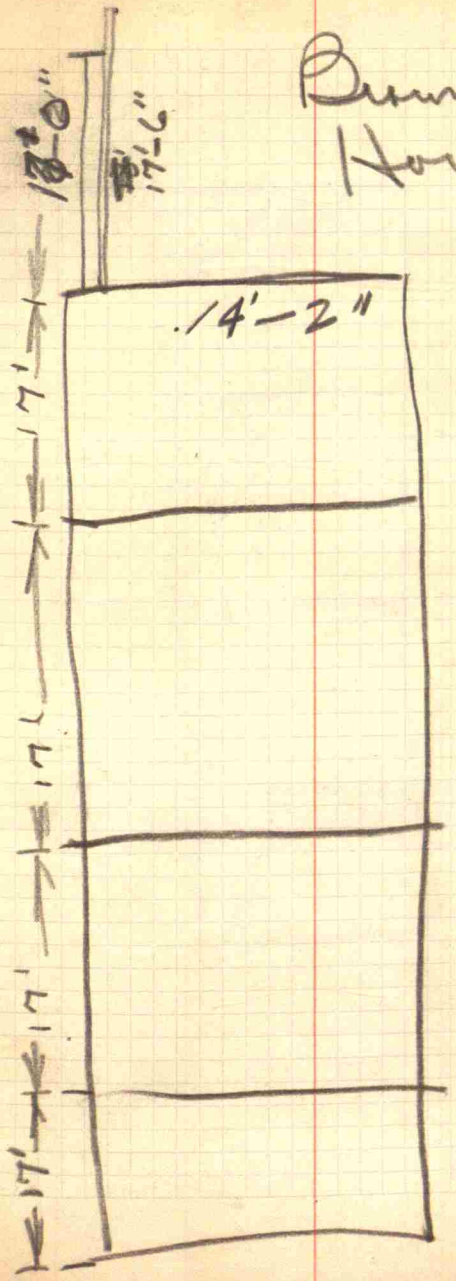


28' of 12" Relaid across Street
8'- of 12" Relaid N of E-CB

17.

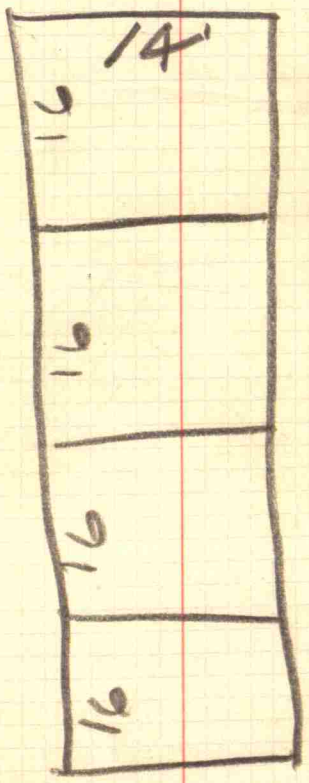


Brumsbury
Hornsby



SW Brooklyn

64 X 14 =

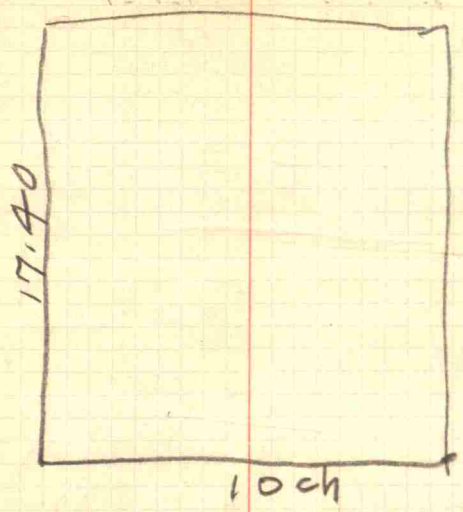


No New Steel Road

Levels on Subgrade Fisher Road 8-29-31

	BS	HI	FS	℄ Road	Elev
BM #3	2.55	93.49			90.94
79+52				4.10	89.39
79+00				4.50	88.99
78+0				5.00	88.49
77+0				5.30	88.19
76+0				5.00	88.49
75+0				3.90	89.59
74+0				1.90	91.59
⊙			1.72		91.77
⊼	4.72	96.49			
73+0				4.25	92.24
72+0				4.95	91.54
71+0				5.20	91.29
70+0				5.10	91.39
69+0				4.30	91.69
68+0				3.20	93.29
67+0				2.00	94.49
⊙			1.10		95.39
⊼	8.15	103.54			
66+0				6.30	97.24
65+0				5.15	98.39
64+0				5.70	97.84
63+0				7.00	96.54
62+0				7.50	96.04
61+0				7.40	96.10
60+0				7.30	96.24

Gulley Corn



LEVELS ON FISHER ROAD -

BM	BS	HI	FS	North stake	100
⊼	5.33	106.33			
1+00				4.17	101.16
2+00				3.78	101.55
3+00				3.04	102.29
4+00				1.35	103.98
⊙			2.45	102.88	
⊼	7.91	110.79			
5+00				4.90	105.89
6+00				2.70	108.09
7+00				3.85	106.94
8+00				5.80	104.99
9+00				7.45	103.34
10+00				8.95	101.84
11+00				4.00	106.79
⊙			8.98	101.81	
⊼	3.68	105.49			
12+00				4.05	101.44
13+00				4.60	100.89
14+00				3.08	102.41
15+00				2.55	102.94
⊙			3.12	102.37	
⊼	5.80	108.17			
16+00				3.65	104.52
17+00				4.77	103.40

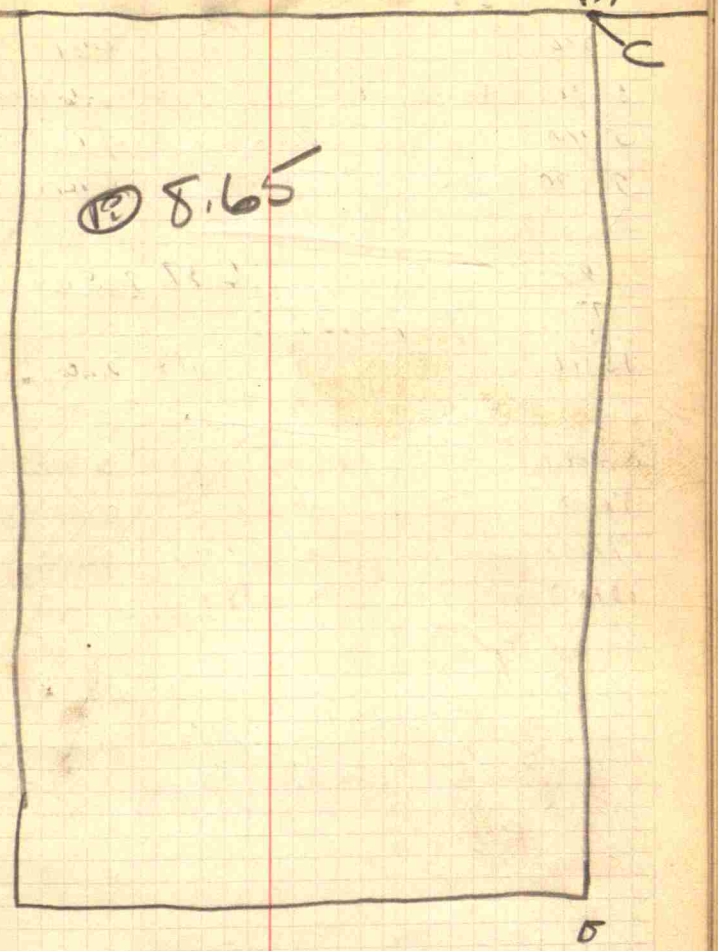
NE Cor. Step - Maplewood Church

	BS	HI	FS	North stake	
		106.17			
Top/SRail				4.42	103.75
" NRail				4.35	103.82
18+00				5.12	103.05
19+00				5.30	102.87
⊙			5.30	102.87	
⊼	4.67	107.54			
20+00				5.60	101.94
21+00				4.35	103.19
22+00				5.18	102.36
23+00				6.04	101.50
24+00				4.76	102.78
25+00				5.25	102.29
⊙			4.78	102.76	
⊼	5.39	108.15			
26+00				4.83	103.32
BM#2				2.80	105.35
27+00				4.45	103.70
28+00				4.88	103.27
29+00				6.10	102.05
30+00				7.38	100.77
⊙			6.70	101.45	
⊼	6.20	107.65			
31+00				6.00	101.65
32+00				4.99	102.66
33+00				5.74	101.91

105.42

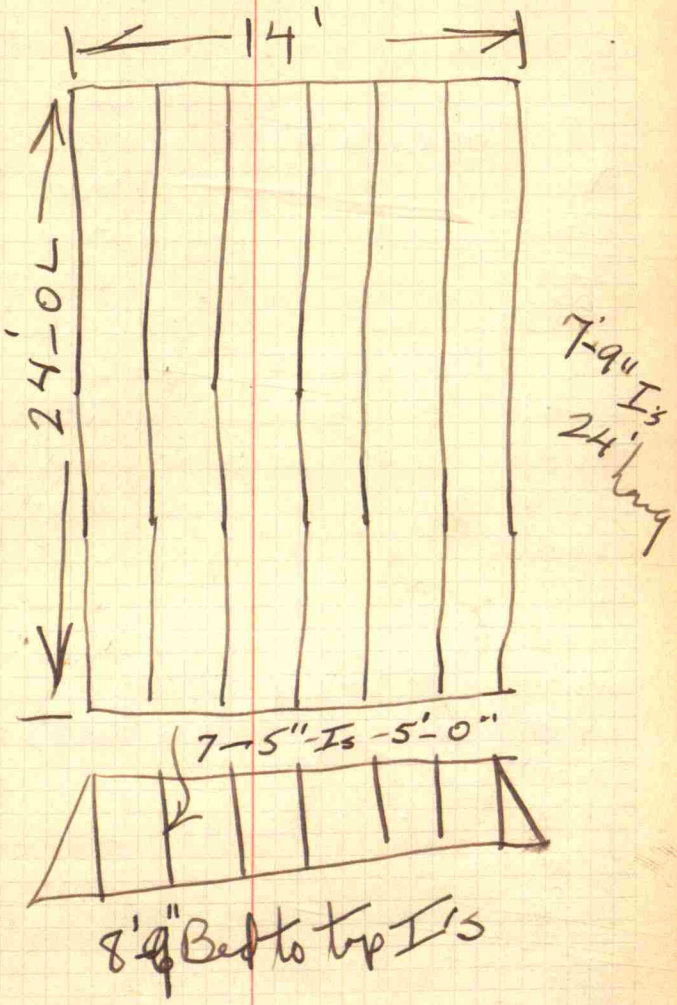
	BS	HI (107.64)	FS	North stake		South stake	
34+00				4.55	103.10		
35+00				3.37	104.28		
36+00				.80	106.85		
⊙			1.54	106.11			
⊼	4.42	110.53					
37+00				5.20	105.33		
38+00				4.82	105.71		
39+00				4.95	105.58	3.95	106.58
40+00				4.70	105.83	4.09	106.44
41+00				4.98	105.55	4.90	105.63
42+00				6.05	104.48	7.25	103.28
⊙			6.58	103.95			
⊼	5.16	109.11					
43+00				4.53	104.58	5.45	103.66
44+00				4.41	104.70	4.95	104.16
⊙			5.00	104.11			
⊼	3.95	108.06					
45+00				3.40	104.66	3.50	104.56
46+00				4.63	103.43	4.83	103.23
47+00				6.08	101.98	5.72	102.34
⊙			7.90	100.16			
⊼	4.69	104.85					
48+00				3.96	100.89	4.67	100.18
49+00				4.32	100.53	6.61	98.24
⊙			5.20	99.65			
⊼	5.30	104.95					

	E1		
20'W 11.32	10.51	Con R Line AB	
11.19	10.40	Shoulder line AB 6' SA	
10.20	9.54	Side Ditch " " 11' SA	
12.62	11.91	Gd at Co Port Co Lot — 16' E1	
40'W 15.98	20' 15.61	15.10	C+60 on line AB
20'W 13.88	40'W 13.89	13.98	C+115 on AB
Con Rd	10.51	10.50	0.00
16' S	11.91	10.00	2.00
60' S	15.10	11.00	4.10
120' S	13.98	8.00	6.00



	BS	104.95 HI	FS	N stake	
50+00				4.61	100.34
51+00				4.69	100.26
52+00				5.18	99.77
53+00				6.40	98.55
54+00				6.47	98.48
⊙			6.37	98.58	
T	3.79	102.37			
55+00				3.20	99.17
56+00				2.54	99.83
57+00				3.38	98.99
58+00				4.25	98.12
59+00				5.32	97.05
60+00				5.60	96.77
61+00				5.85	96.52
62+00				6.34	96.03
⊙			6.16	96.21	
T	7.80	104.01			
63+00				6.94	97.07
64+00				5.68	98.33
65+00				4.80	99.21
66+00				7.22	96.79
67+00				9.25	94.76
⊙			9.25	94.76	
T	3.43	98.19			
67+00					

S stake	
6.30	98.65
4.54	100.41
4.85	100.10
2.80	95.39


14'
24'-0L
7'-9" I's
24' long
7-5" I's -5'-0"
8'-9" Bed to top I's

	BS	98.19 HI	FS	N Stake out		S Stake	
68+00						4.60	93.59
69+00				5.50	92.69	6.54	91.65
⊙			6.80	91.39			
Π	5.04	96.43					
70+00				4.60	91.83	5.41	91.02
71+00				4.60	91.83	5.74	90.69
72+00				4.01	92.42	4.93	91.50
⊙			4.11	92.32			
Π	3.73	96.05					
73+00				1.49	94.56	3.30	92.75
74+00				4.11	91.94	4.29	91.76
75+00				5.75	90.30	6.30	89.75
76+00				6.38	89.67	7.48	88.57
77+00				6.85	89.20	7.90	88.15
⊙			7.50	88.55			
Π	5.80	94.35					
78+00				4.99	89.36	5.38	88.97
79+00				4.78	89.57	4.00	90.35
BM #3			3.36	90.99			

Coatsville Amo Rd

Beg 198' N of W¼ Mi stone
Sec 5-14-2W at Station

0+00	
0+20	Set Stakes N+S 17.5'
1+0	" " " "
3+0	" " N
4+0	" " N+S
6+85	Wooden Br – 6' Span 5' Bed to Channel
7+00	Set St. N+S
9+00	" " N+S
11+0	" " N+S
12+21	PC 90° Pt – Sts N+S.
13+20	Corner Def R 90° "
14+19	PT – and PC "
15+18	Corner Def L 90° "
16+17	PT "
18+0	Stks N+S
20+0	" "
22+0	" "
24+0	" "
25+24	Wooden Br – 12' Span 5½' Bed to Channel
26+0	Stks N+S
28+33	Con Stone Cen Sec 5 – Stks N+S
	NW Cor House S45°W 73.8'
	28" Beech N60°W 49'

30+0 Stks N+S
33+0 " "
36+0 " "
39+0 " "
39+52.5 – 12' Span + 6' Bents cross weaver
42+0 Stks N+S
45+0 " "
48+0 " "
51+0 " "
54+75 " " Construct Sec 5
57+0 " "
60+0 " "
63+0 " "
66+0 " "
69+0 " "
72+0 " "
75+0 " "
78+0 " "
80+87 " North
81+03 " South Stone Cen Sec 4
84+0 " N+S
87+0 " "
90+0 " "
93+0 " "
96+0 " "
99+0 " "

102+0 Stk N+S
104+41 W end steel Br — 18" off ℄ to N
105+23 E end " "
107+31 Stk N+S — E² Sec 4 stone
110+0 Stk N+S
113+0 " N+S
116+0 " N+S
119+0 " "
122+0 " "
125+0 " "
128+0 " "
131+0 " "
134+0 " "
137+0 " "
140+0 " "
143+0 " "
146+0 " "
146+78 Cen E Cen Sec 3

2625
2632
2628
2628

52.

FISHER ROAD

Stone & Mile Stone
SW. Cor of Porch 85'
SE Cor of House 95'

Stone & Mile Stone
NW Corner of Brick Porch 79'
Soft Maple tree N 2° W 82'

Stone Mile Stone
Stk 50' North } in fence
Stk 50' South } Row.

Stone & Mile from East End
apple tree North 1° West 46'

apple tree North 45° W. 54'

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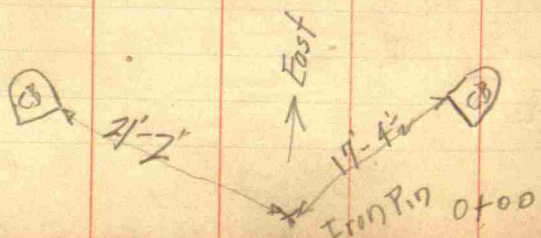
in J.H. Dugan Road.
Center Section Stone
NW Corner of from house 28.2
First tree at NW Cor of lot
18.9



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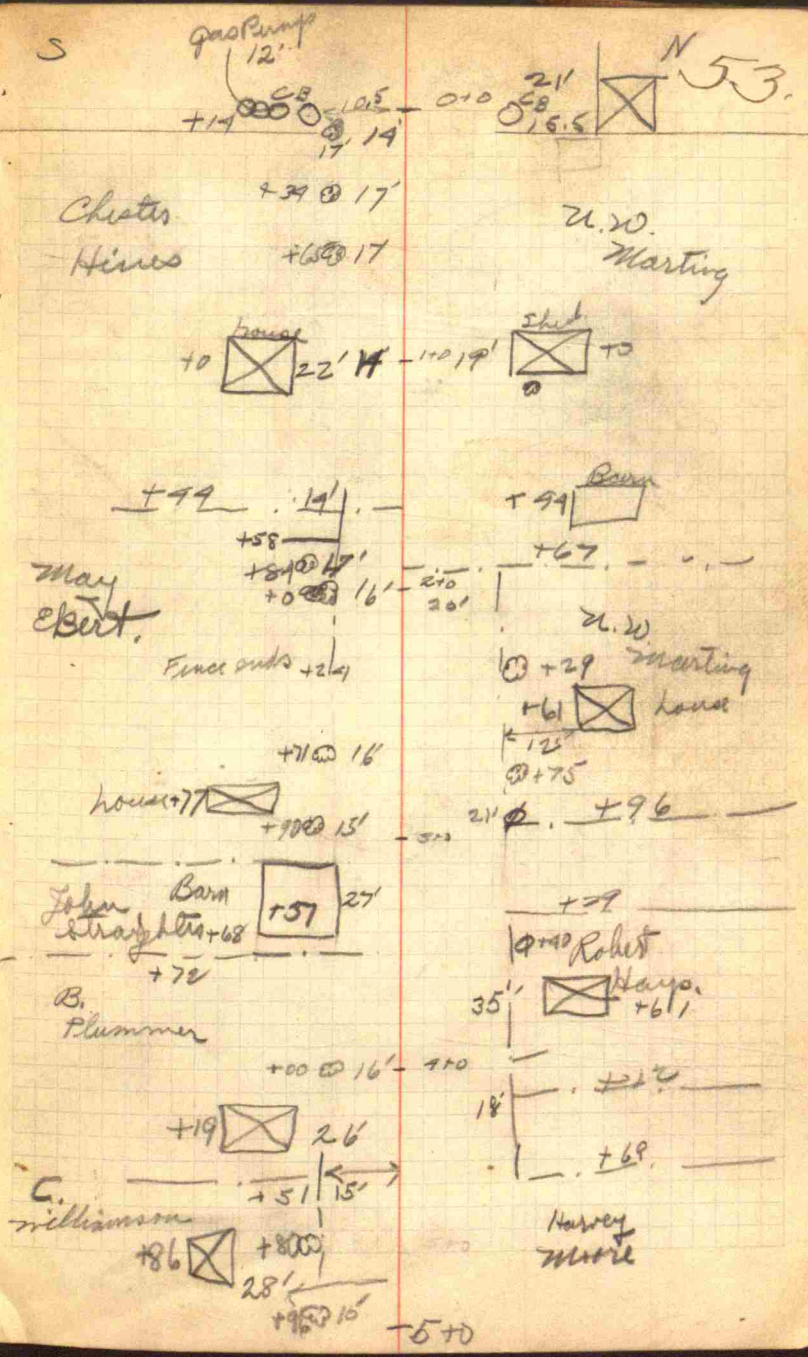
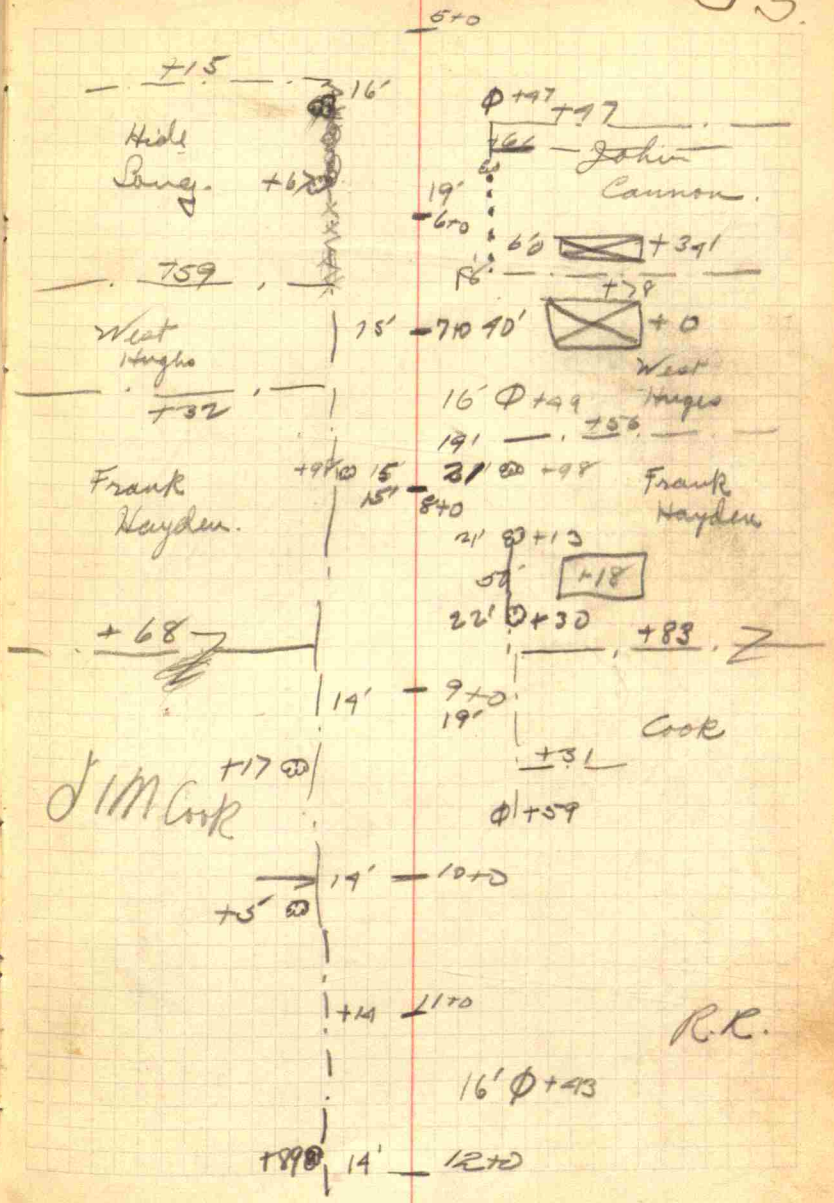
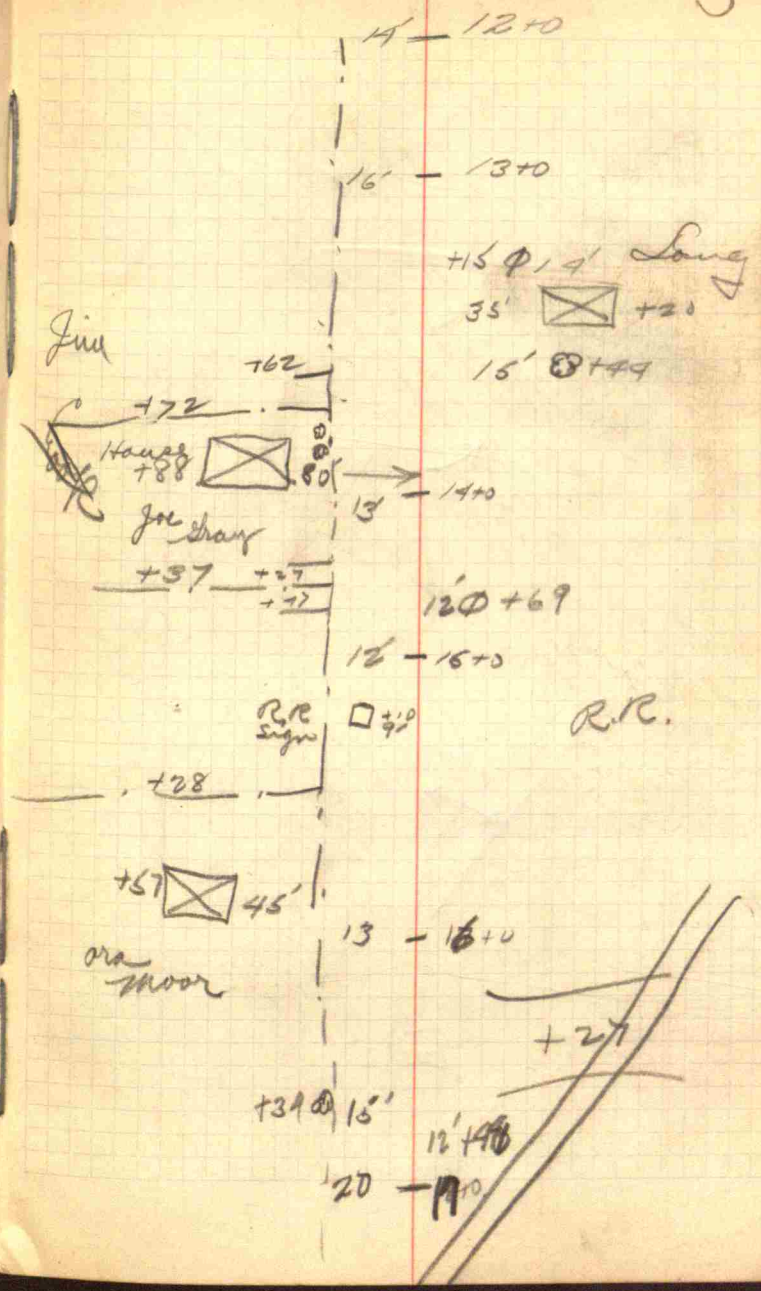
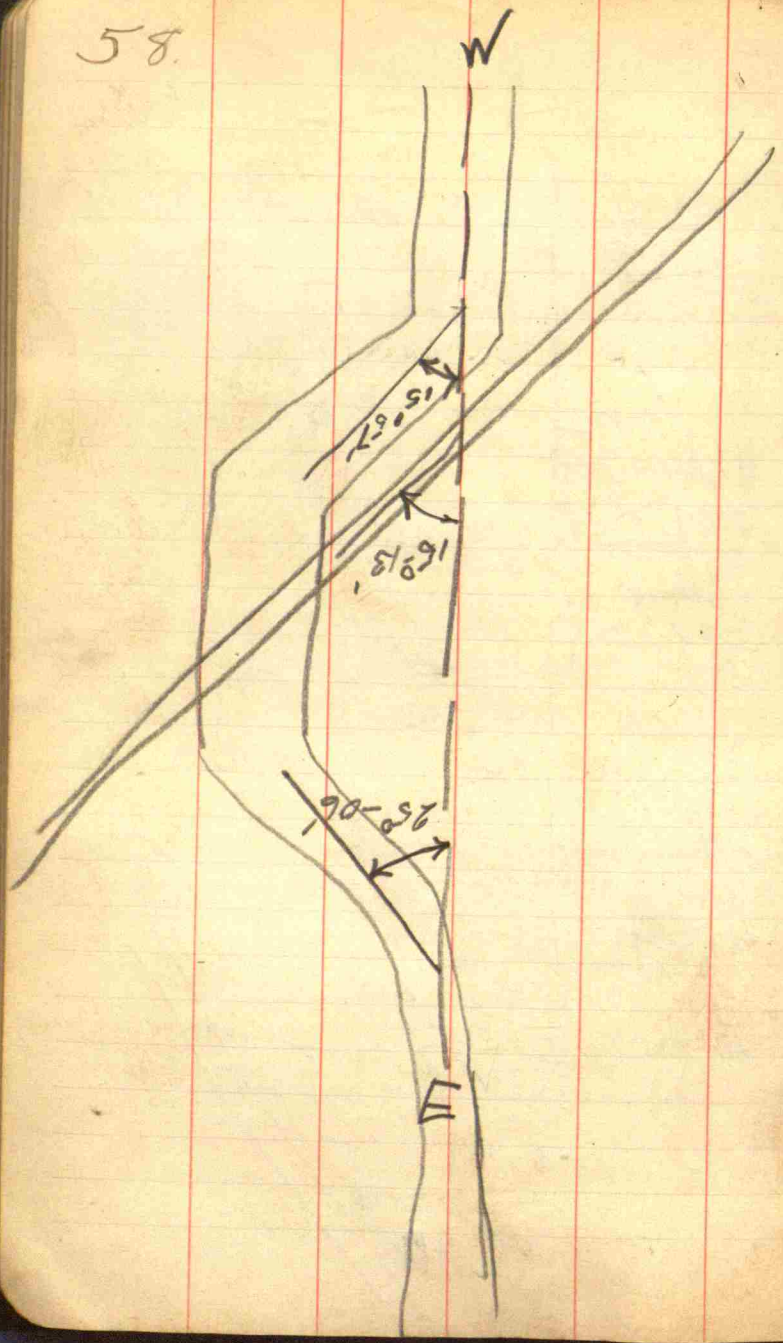
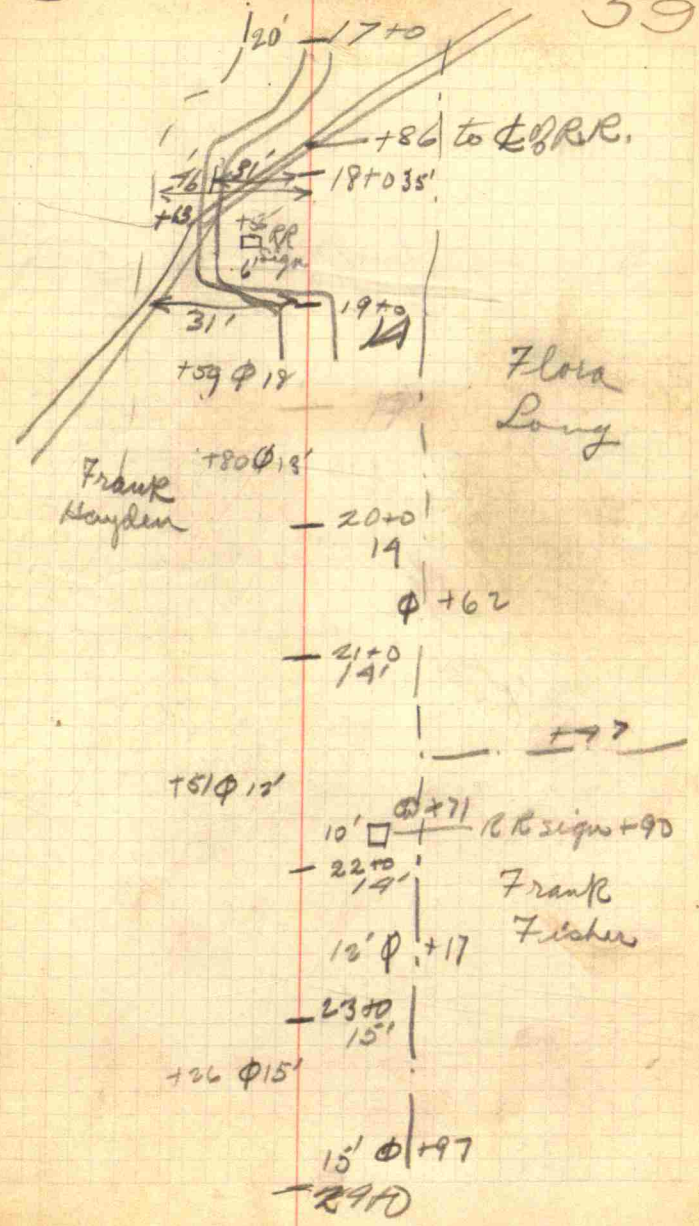


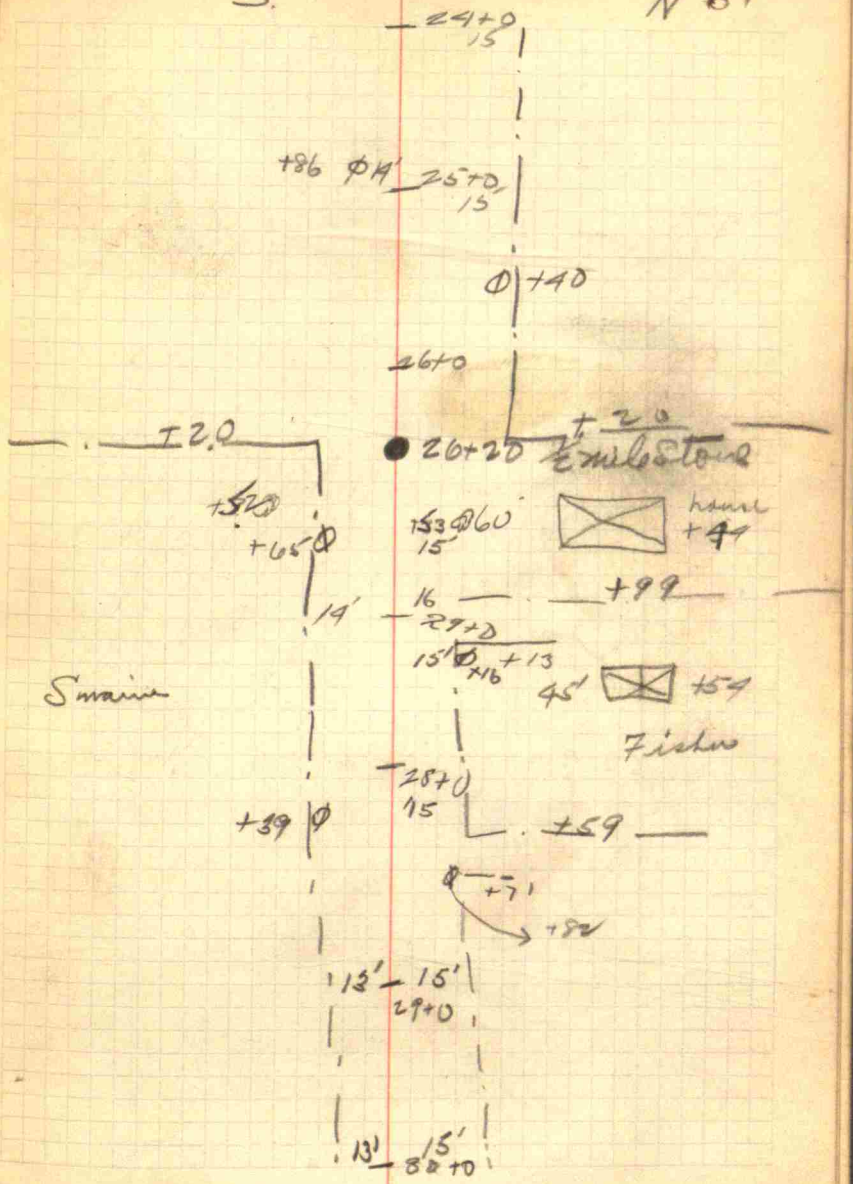

5+0
+15
16'
Φ +47
+97
+66
John
Cannon.
Hide
Bourg.
+6
19'
6+0
60
+34
759
+78
West
Hughes
15'
7+0
40'
+0
West
Hughes
+32
16' Φ +49
+56
19'
Frank
Hayden.
+98
15
15'
8+0
21'
Frank
Hayden
21' +13
50'
+18
22' +30
+68
+83
14'
9+0
19'
Cook
+31
+17
J M Cook
Φ +59
14'
10+0
+5'
+14
11+0
R.R.
16' Φ +43
+8
14'
12+0


14 — 12+0
16' — 13+0
+15 Φ 14' Long
35' +20
16' +44
Jim
+62
+72
Hauer
+88
80
13' — 14+0
Joe Gray
+37
+27
+27
12 Φ +69
12 — 15+0
R.R. Sign
+40
R.R.
+28
+57
45'
13 — 16+0
ora Moor
+27
+39 Φ 15'
12' +46
20 — 17+0


W
E
15°51'
51°51'
90-25°


20'
17+0
+86 to ℄ of R.R.
18+035'
+13
RR
31'
19+0
+59 Φ 18
Flora Long
+80 Φ 18'
Frank Hayden
20+0
14
Φ +62
21+0
14'
+51 Φ 13'
Φ +71
10'
R.R. sign +90
22+0
14'
Frank Fischer
12' Φ +17
23+0
15'
+26 Φ 15'
15' Φ +97
24+0

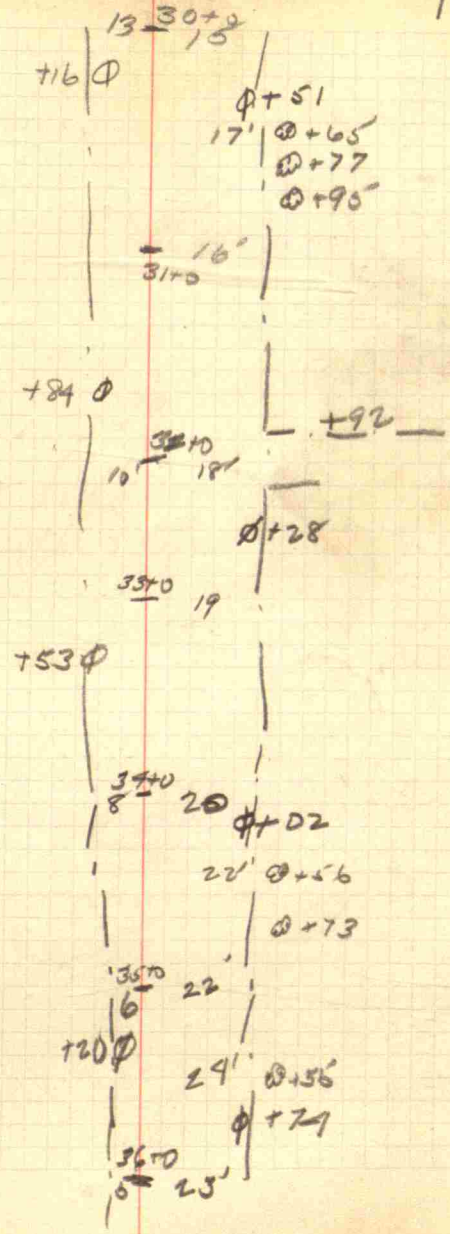
at Stone Def. R. 56'
to ¾ Mile Stone.



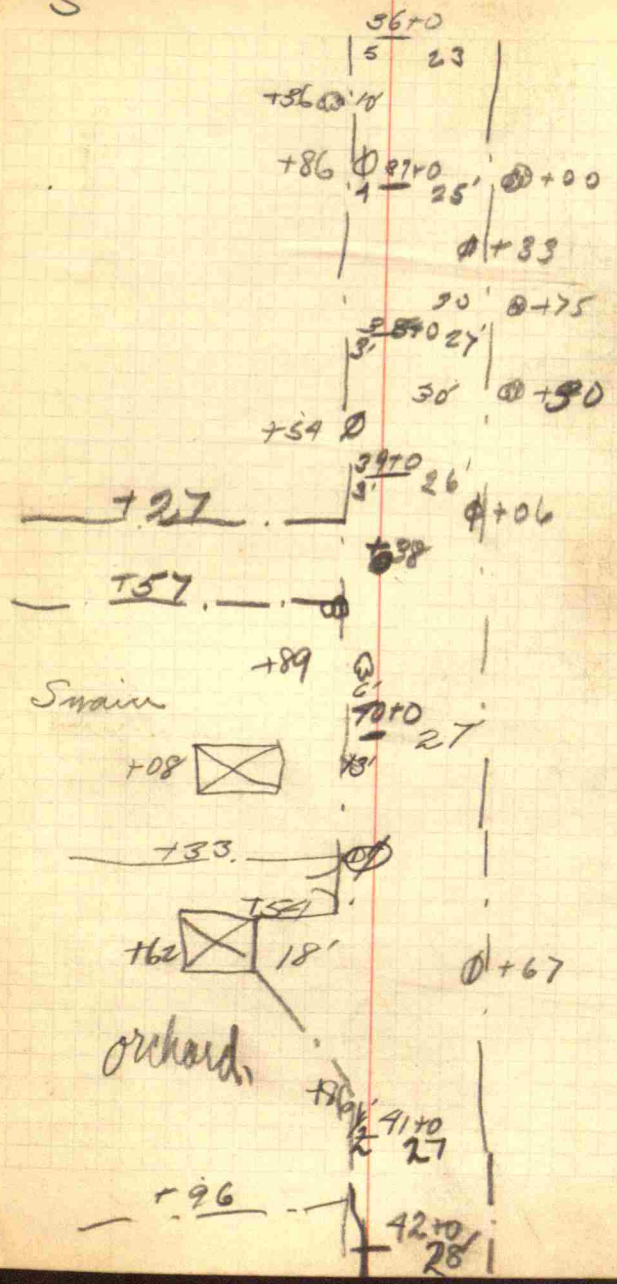
62

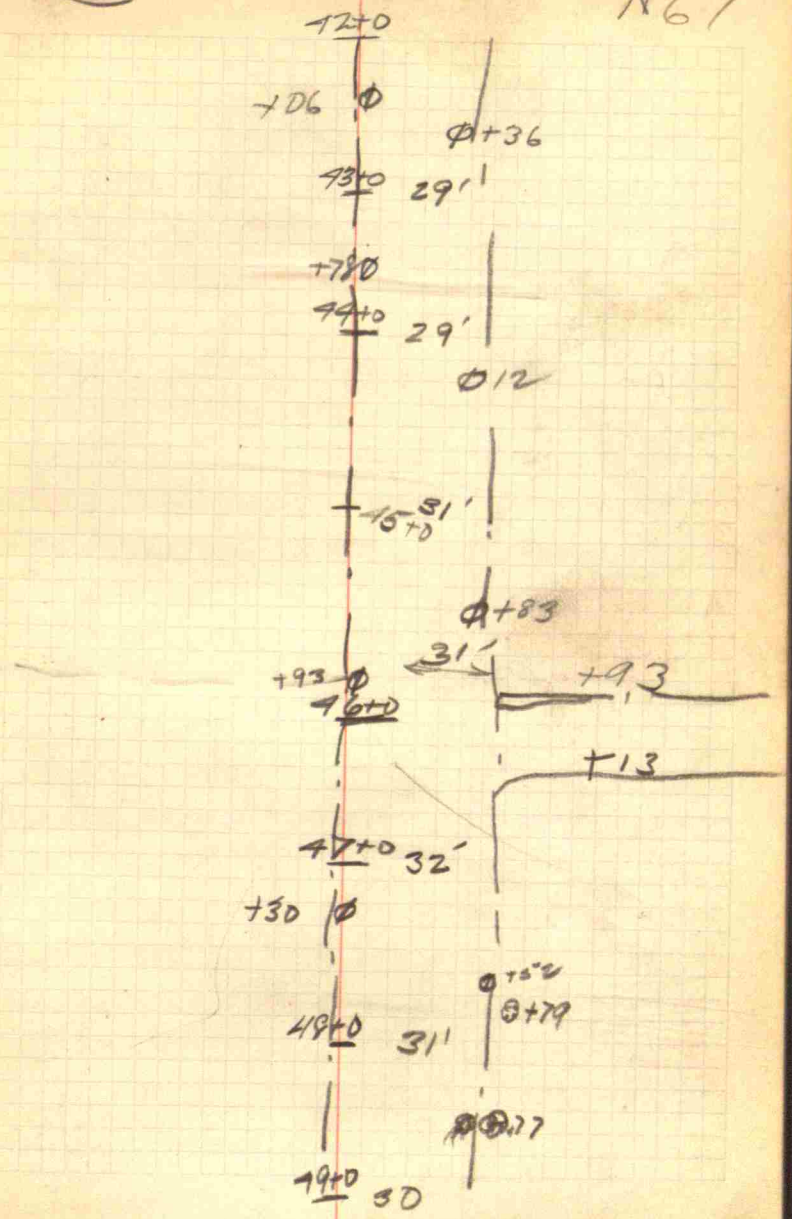
5

N63

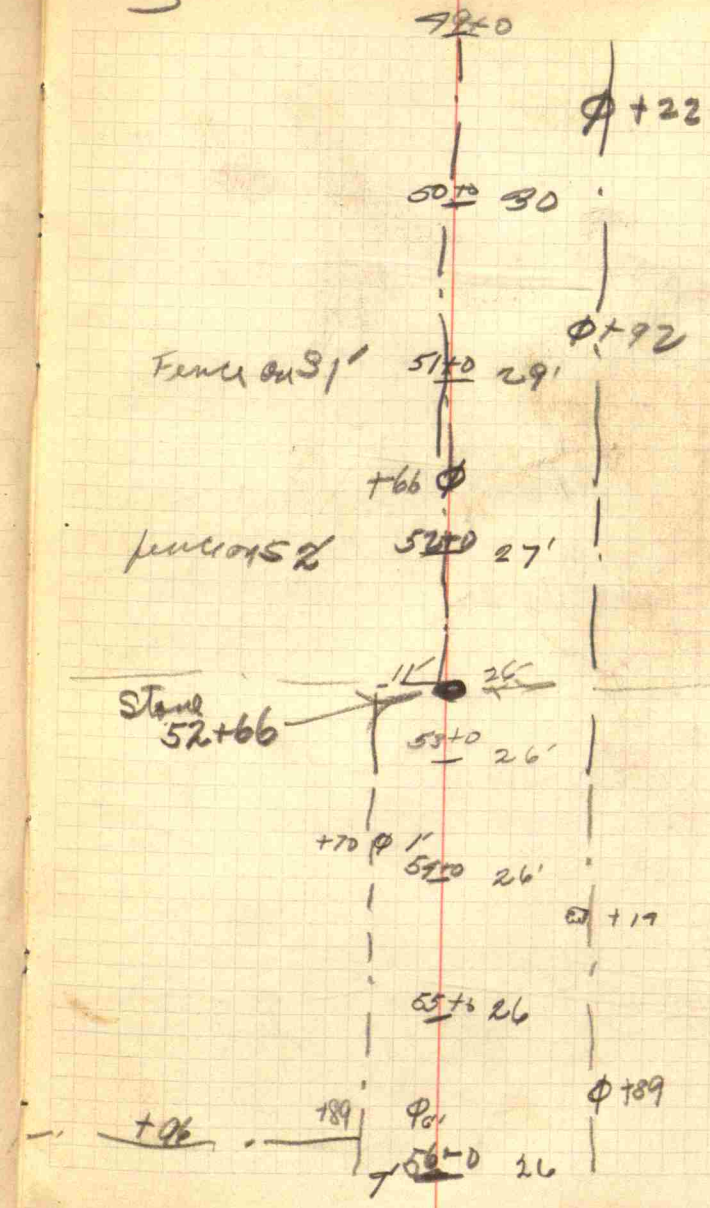

13 30+8 15
+16
+51
17'
+65
+77
+90
16'
31+0
+84
+92
10'
18'
+28
35+0
19
+53
37+0
8
20
+02
22'
+56
+73
35+0
6
22
+20
24'
+56
+74
36+0
0
23'

Def at Stone
Def. R. 5 minutes.




42+0
+06
0+36
43+0
29'
+78
44+0
29'
012
45+0
31'
0+83
31'
+93
46+0
+93
+13
47+0
32'
+30
+52
0+79
48+0
31'
0+77
49+0
30

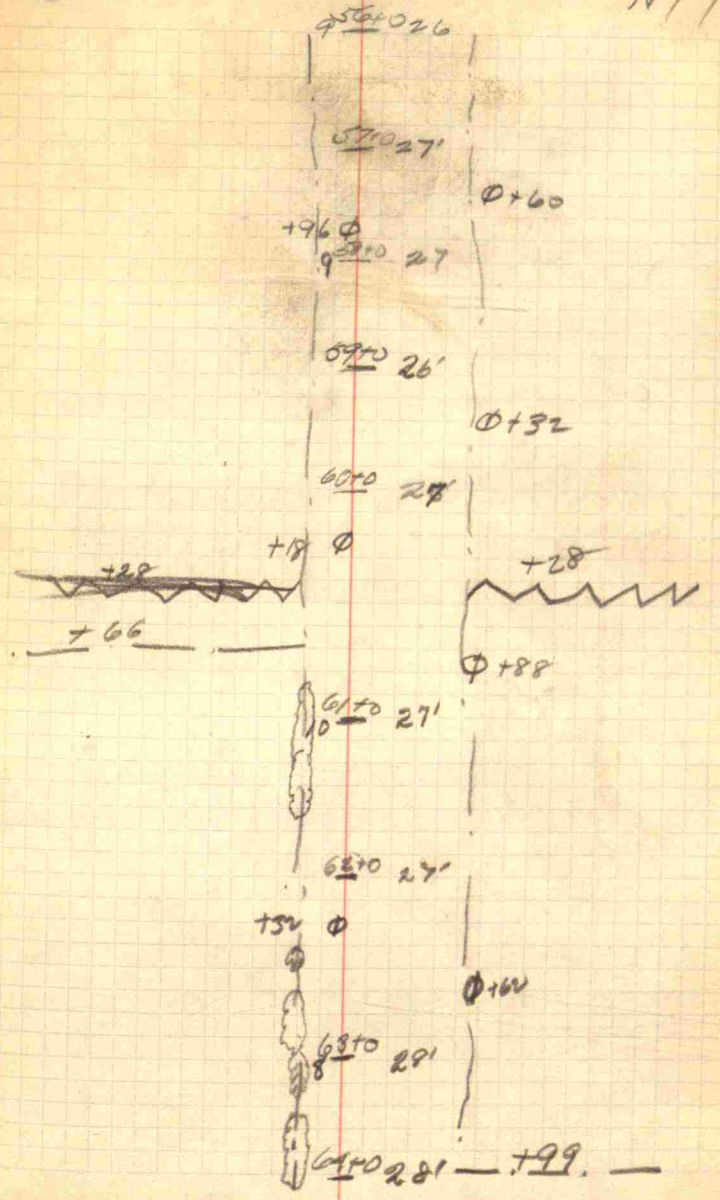
Det R 2° 26''

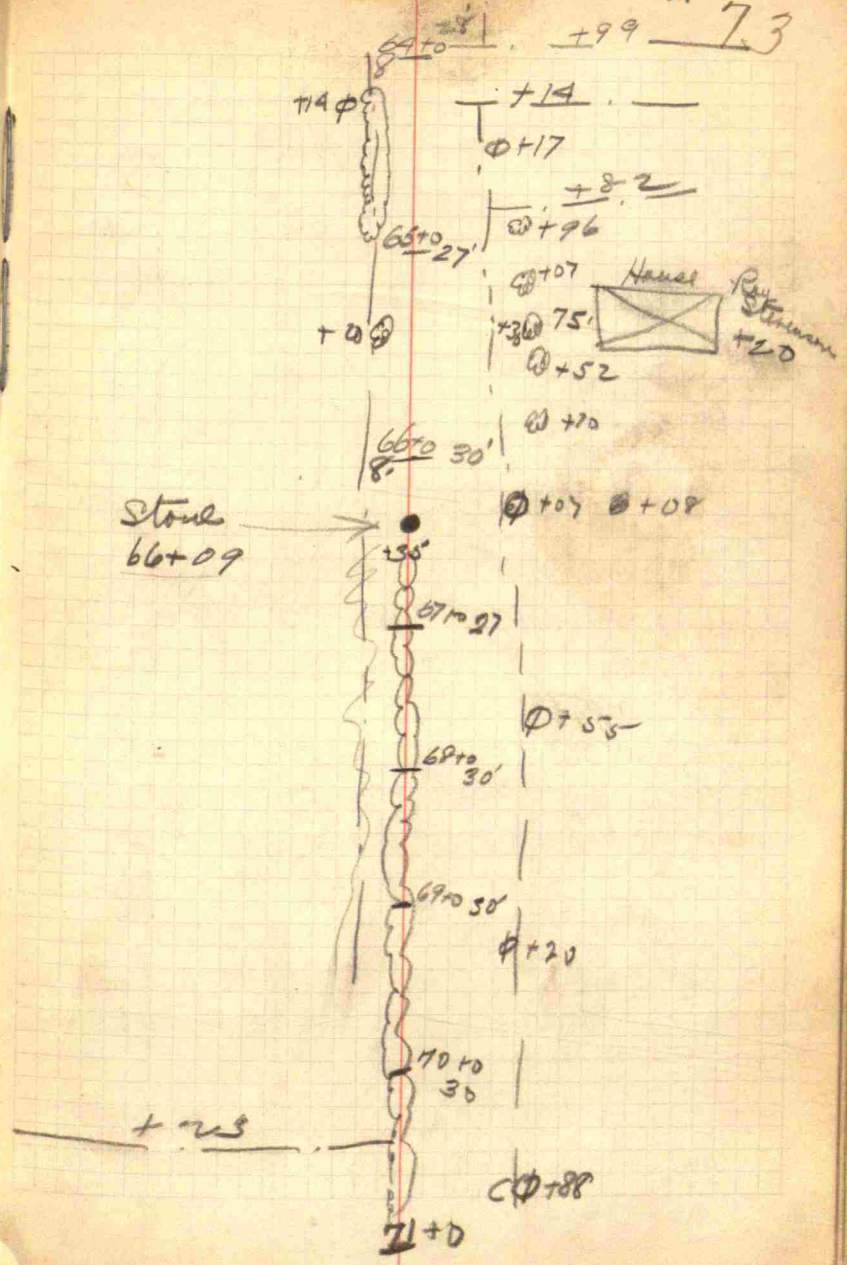

49+0
Φ +22
50+0 30
Φ +92
Fence on 31'
51+0 29'
+66 Φ
fence on 52
52+0 27'
11'
26'
Stone
52+66
53+0 26'
+70 Φ 1'
54+0 26'
+17
55+0 26
Φ +89
+96
189
Φ 6'
56+0 26

70

5

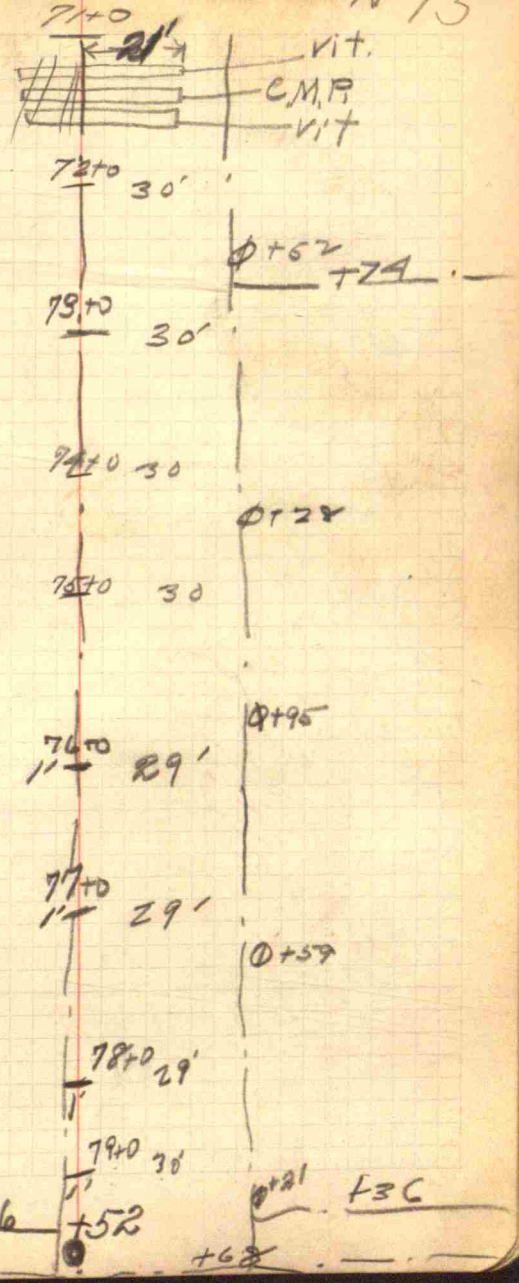
N71


56+026
57+0 27'
Φ+60
+96 Φ
59+0 27
59+0 26'
Φ+32
60+0 27
+18 Φ
+28
+28
+66
Φ+88
61+0 27'
62+0 27'
+32 Φ
Φ+60
63+0 28'
64+0 28' +99.


64+0
+99
+14
+17
+82
+96
65+0
27'
+07
Hamel
Rt Stream
75'
+20
+52
+70
66+0
30'
+07
+08
Stone
66+09
+36'
67+0 27
+55
68+0
30'
69+0 30'
+20
70+0
30
+23
C+88
71+0

3 5

Sewers
Sta 71+08
1-24" cor. met pipe
Two Vit Tile 18"
21' long
Two south end of
each is 4' N of ℄



Sta 8	N 5' out	Stk	Ditch	Berm	℄	Berm	Ditch	Stk	S 5' out.	B.M. on N.E. cor of step of Church in Maplewood EL. = 100.00
West of 0+0		100'9905		50'9941						
South at 0+0		100'9972		50'9984	℄	10112				
N at 0+0		100'10050		50'10015						
Flow line of C.B. on N of Road. 9994										
Flow line of C.B. on S of Road. 9940										
on S. Flow line in Bot. of C.B. 9596.										
on N. Flow line in Bott. of C.B. 9660.										
1+0	100.92	10039	10024		10048	10006	10027	10049		100'N 102.98
2+0	10083	10081	10073		10124	10048	10045	10046		50'N 102.67
3+0	10164	101.50	10131		10195	10139	10129	10122		℄ 101.81
4+0	10359	103.15	10236		10257	10223	10230			⊙ 102.68
5+0	10556	10524	10390		10409	10390	10400	10393		⊙ 104.23
6+0		107.35	107.60	106.84	106.91	106.64		106.45		⊙ 101.22
7+0	106.90	106.53	104.94		10509	104.93	104.95	105.26	103.85	⊙ 102.91
8+0	104.62	104.45	103.21		103.85	103.57	103.18	103.96		
9+0	102.54	102.54	101.93	102.41	102.64	102.03	102.19	101.94		
10+0	~~101.17~~	101.09	101.32	101.59	101.92	101.64	101.39	101.08	100.75	
11+0	100.47	100.68	100.70	101.20	101.51	101.02	100.41	100.76	100.12	
12+0	100.71	100.76	100.39	100.82	101.15	100.76	100.49	100.58	100.27	
13+0	100.13	100.27	100.47		100.59	100.51	99.67			
14+0	99.80	99.94	100.05	100.40	100.71	100.22	99.80	99.60	99.65	
15+0	102.99	102.92	101.06		101.34	101.03	101.44	101.48	101.52	
16+0	101.46	104.71	103.78	102.49		102.75	102.61	102.23		
			Stk			℄				

17+0		STK 10304	10176	10307	10236
17+80			℄ of S. Rail		
17+90			℄ of N Rail		
18+0	10232	10243	10429	10166	10326
19+0	10247	10246	10186	10240	10245
20+0	10145	10150	10107	10216	10230
21+0	10258	10275	10263	10144	10235
22+0	10134	10186	10218	10226	10245
23+0	10086	10089	10110	10215	10223
24+0	10224	10236	10162	10231	10242
25+0	10159	10175	10179	10281	10277
26+0	10309	10300	10257	10296	10306
27+0	10327	10316	10301	10298	
28+0		10275	10261	10197	10242
29+0	10162	10155	10111	10180	10186
30+0	9997	9990	9979	10117	10160
31+0	10048	10085	10052	10166	10171
32+0	10210	10207	10248	10230	10136
33+0	10150	10157	10125	10249	10246
34+0	10230	10262	10198	10311	10302
35+0	10452	10370	10338	10413	10439
36+0	10671	10614	10540	10609	10620
37+0	10580	10516	10451	10540	10524
38+0	10559	10446	STK 10525	10560	10530
39+0	10424	10413	10502	10510	10488

10389					
10388					
℄					
10271	10302	10237			
10389					
10388					
10344	10204	10344	10276	10265	
10224	10281	10257	10256		
10218	10098	10203	10170		
10220	10157	10154	10186		
10238	10170	10221	10185		
10192	10078	10150	10094		
10247	10196	10360	10345	10347	
10292	10212	10261	10233	10238	
10303	10250	10306	10285		
10217	10291	10298			
10299	10230	10169	10260	10230	
10187	10104	10170	10178		
10079	10054	9941			
10054	10120	10115			
10202	10266				
10174	10187	10175			
10200	10270	10286			
10420	10560	10560	10614		
10546	10647	10610	10624		
10420	10510	10495	10499		
10455	10424	10575	10605		
10408	10455	10490	10576		

0

10238

BM. in S.W. Corner of Pier - Step of house
Sta. 27+0 El. 105.42

0101.68

0 10628

		Stk.			
40+0	10471 5	10480 25	10422 1	10496 7	10547 13
41+0	10499 5	10440	10476 5	10517 17	10431 21
42+0	10340 3	10308	10374 5	10397 17	10260 22
43+0	10335 2	10296	10373 5	10375 17	10269 21
44+0	10362 5	10332	10404 6	10391 17	10256 22
45+0	10486 7	10374	10420 18	10339 21	10452 29
46+0	10287 7	10266	10282 16	10218 20	10312 24
47+0	10175 5	10057 3	Stk 10121	10147 5	10126 17
48+0	10000 4	9950 2	10019	10034 5	10001 17
49+0	9940 5	9890 3	9969	10000 5	9923 17
50+0	9929 9	9835 3	9926	9979 4	9951 15
51+0	9970 4	9883 20	9941	10000 4	9990 17
52+0	9880 4	9862 2	9825	9930 5	9920 18
53+0	9768 5	Stk 9835	9760 5	9879 7	9837 22
54+0	9683 3	9758	9732 7	9830 13	9828 26
55+0	9935 5	9977	9792 7	9870 14	9876 25
56+0	9982 3	10001	9833 8	9919 14	9939 25
57+0	9829 5	9847	9716	9798 14	9803 25
58+0	9716 4	9761	9630 9	9686 14	9693 25
59+0	9630 4	9642	9530 10	9655 15	9659 25
60+0	9609 4	9626	9499 10	9620 15	9626 25
61+0	9567 4	9609	9482 11	9592 14	9624 25
62+0	9560 4	9560	9494 8	9595 13	9603 25
63+0	9640 4	9648	9590 6	9655 13	9678 25
64+0	9839 3	9841		9775 12	9790

	19	24	25	38	42
	10519	10465	10496	10584	10567
	25	30		40	
	10566	10563		10648	
	25			40	
	10318			10324	
	26			40	
	10334			10326	
	25			40	
	10347			10349	
	25	27		40	
	10464	10430		10439	
	25	28		40	
	10330	10300		10309	
	23	29		40	
	10077	10027		10036	
	21	25		40	
	9929	10018		10000	
	21	25		40	
	9832	9867		9798	
	20	25		40	
	9847	9890		9795	
	21	25	30	40	
	9930	10042	10009	10008	
	23	25	39	40	
	9895	9984	9932	9943	
	24	25	39		
	9743	9770	9771		
	29	39			
	9713	9708			
	28	40			
	9805	9886			
	30	39			
	9892	9975			
	30	40			
	9725	9742			
	30	31		40	
	9625	9700		9675	
	31	35		40	
	9646	9600		9560	
	30	39		39	
	9536	9570		9522	
	29	32		39	
	9495	9556		9542	
	31	32		40	
	9518	9584		9574	
	30	31		40	
	9579	9693		9680	
	28	33		40	
	9725	9871		9847	

⊙10429

09933

⊙9618

65+0	9914	9935	9827	9838	9930
66+0	9772	9756	9635	9644	9690
67+0	9412	9457	9449	9417	9405
68+0	9260	9216	9319	9262	9230
69+0	9089	9040	9165	9214	9150
70+0	8994	9009	9060	9140	9160
71+0	8952	8960	9126	9121	8945
71+	Ditch 8823	FL 8832	Berm 9104	9145	9043
72+0	9116	9063	9165	9189	9162
73+0	9238	9187	9335	9379	9343
74+0	9130	9037	9100	9136	9120
75+0	8971	8870	8930	8940	8935
76+0	8877	8814	8854	8905	8873
77+0	8830	8767	8845	8857	8838
78+0	8867	8786	8850	8874	8844
79+0	8950	8861	8891	8895	8886
+52		100 N 90.04			E 8924

BM. on Window
Road on gully window
West end E.L. 90.94

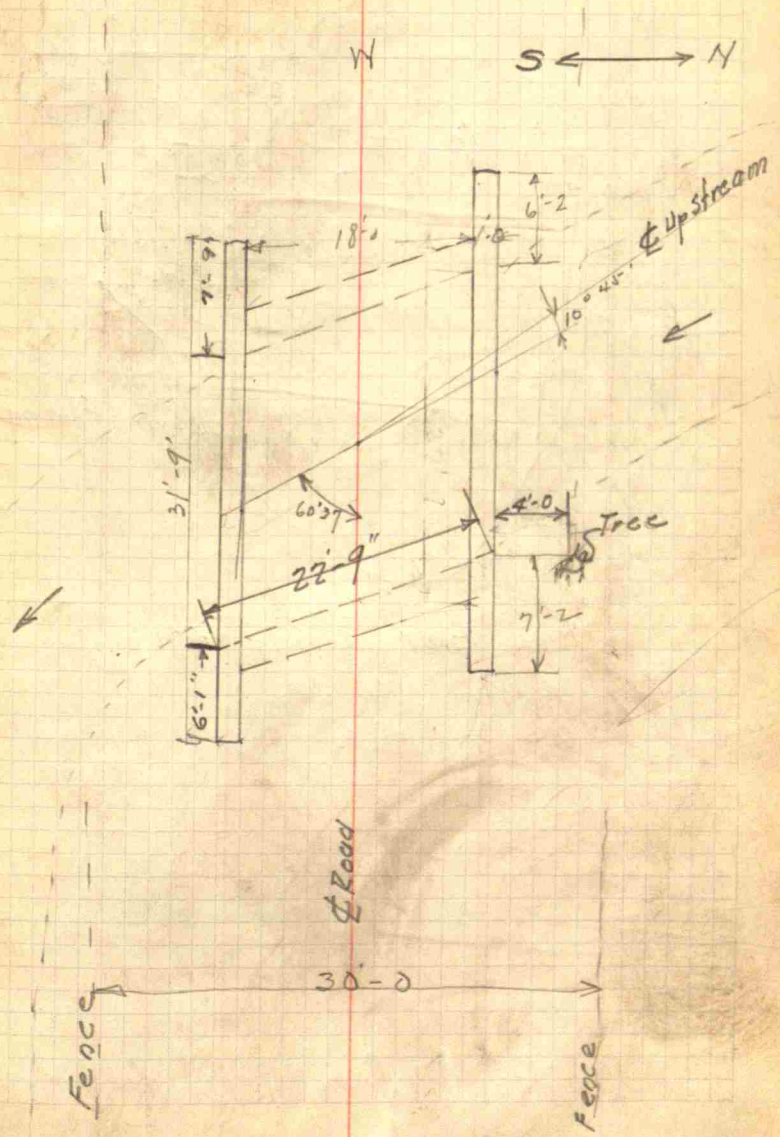
9801	10002	9982		⊙9622
9605	9583	9740	9930 9910	⊙9154
9434	9450	9456		
9340	9349	9352		⊙8890
9130	9188			
9091	9053	9040		
8945	8995	8999		
8802	8779			
9087	9156	9107 - 9110		
9194	9299	9287 9290		
9074	9165	9151		
8886	8961	8967		
8782	8823	8840		
8738	8795	8754		
8779	8840	8812		
8838	8944	8957		
	100 S 8875			

Sill of house at end of
on North Side of house on

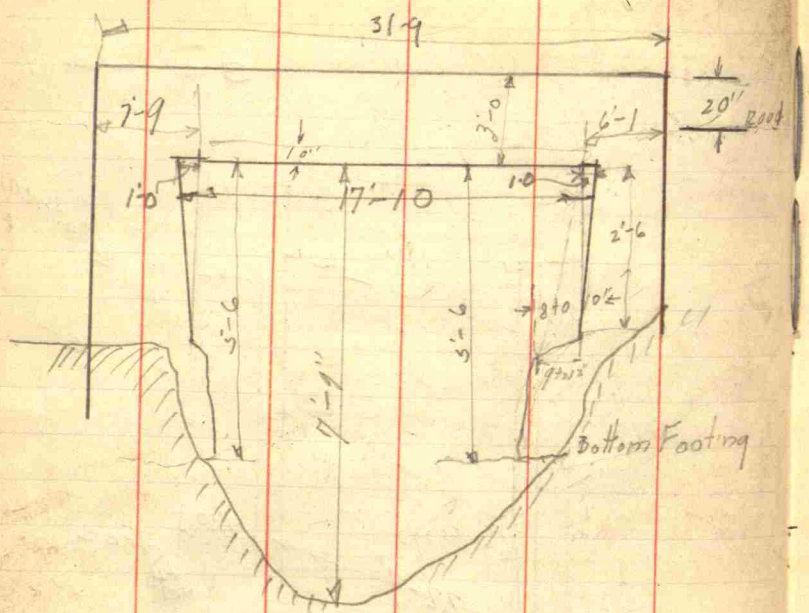
KENNEDY BRIDGE

CE Logan
Major Franklin
1-6-31
Cloudy + Cold

UNION TOWNSHIP



KENNEDY BRIDGE

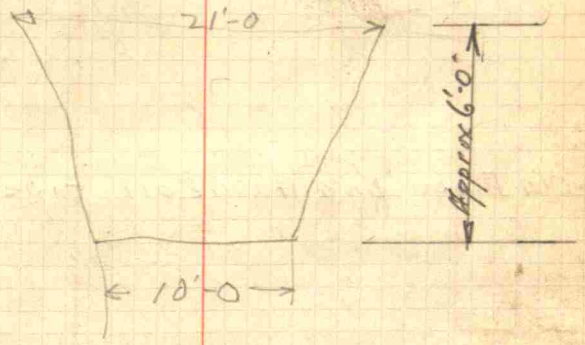


Elev Looking North

UNION TOWNSHIP

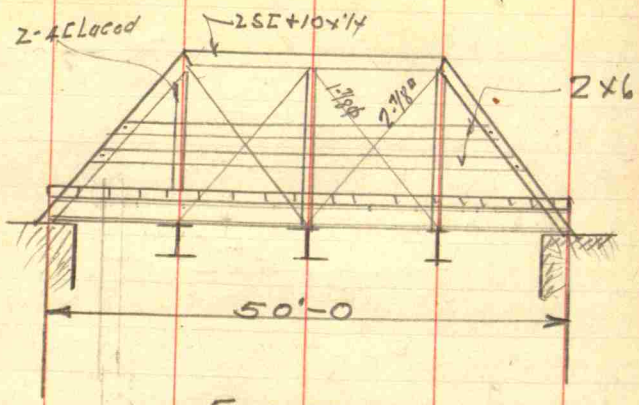
11'-9
3-6
27-3

Section 75'-0 Downstream



Section - upstream

BOONE BRIDGE

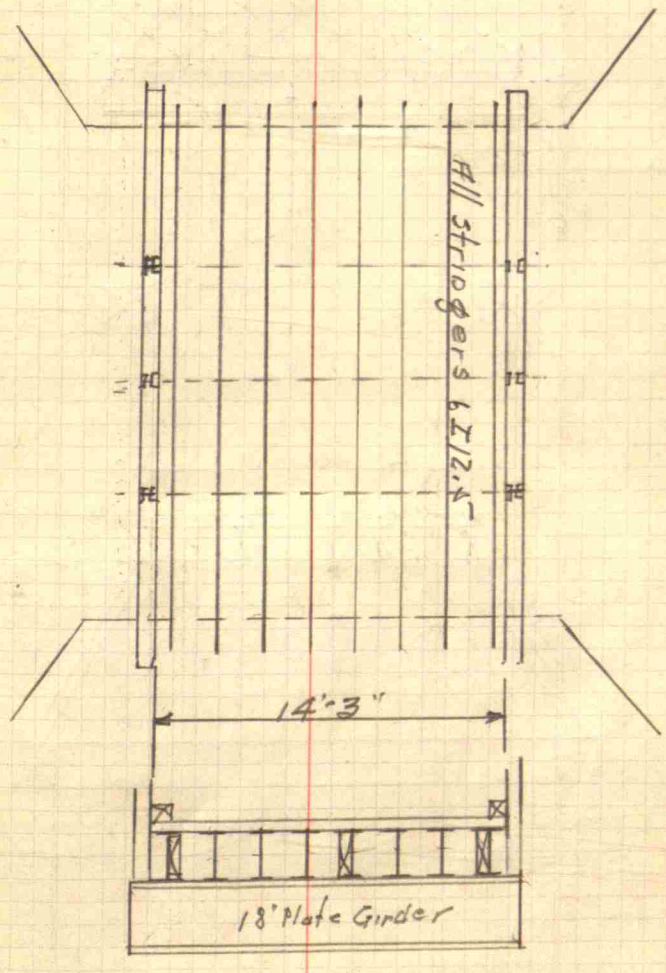


ELEVATION

old Floor and Hand Rail to be Replaced

EEL RIVER TOWNSHIP

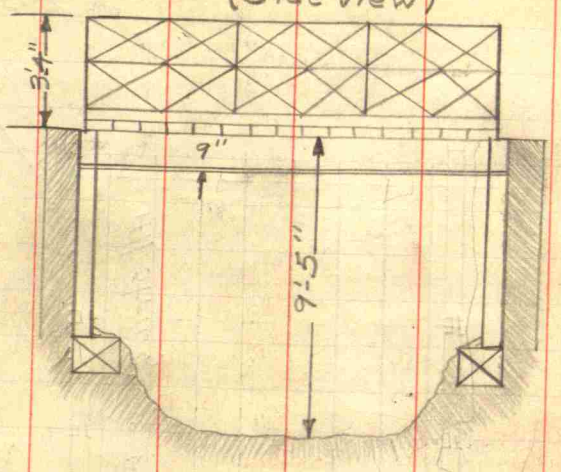
C E Logan
Major Franklin
1-6-31
Cloudy + Cold

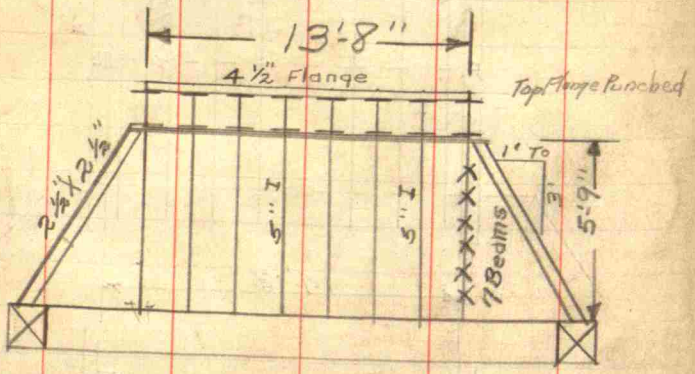


QUINN BRIDGE

S. HAND RAIL BROKEN & BENT.

(Side View)

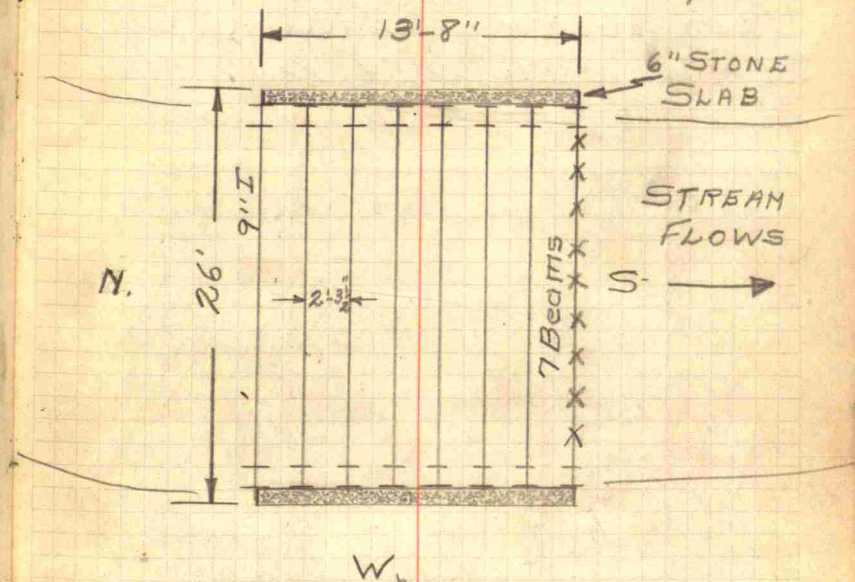




END WALL

BROWN TWP.

C.E. LOGAN
MAJOR FRANKLIN
1-6-31
CLOUDY + COLD



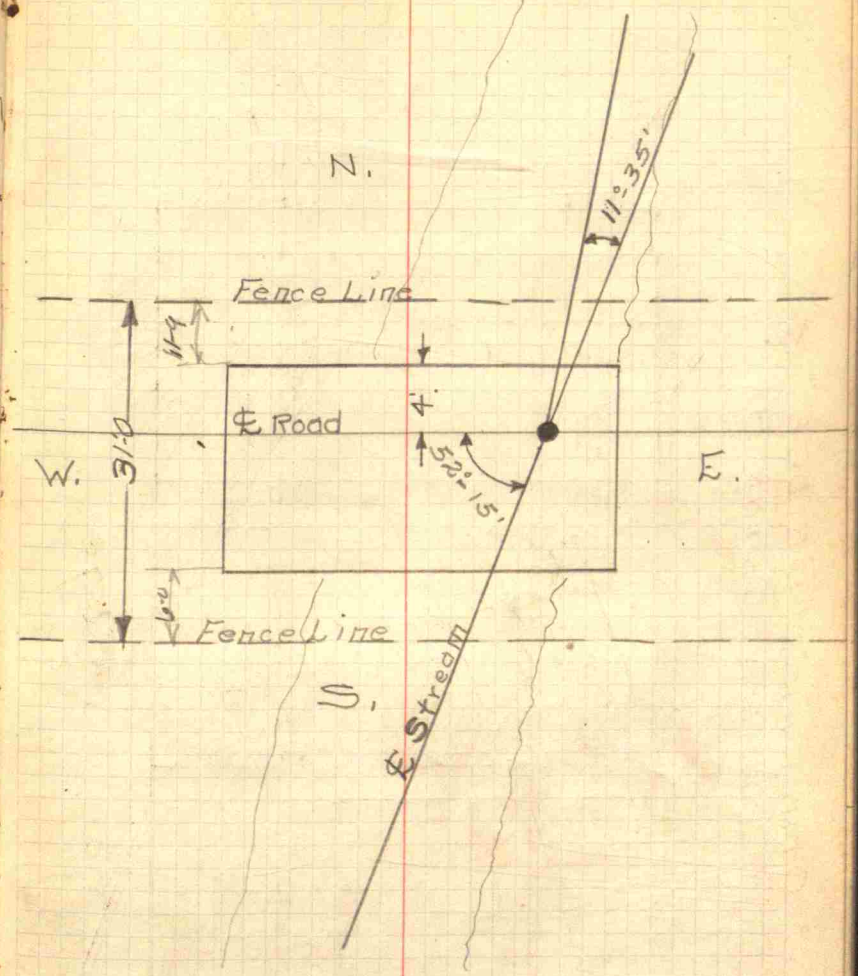
Bench Mark:
2 Nails in Sycamore 50' N. of Bridge on East Bank.
EL. 100.00
92.91 EL. Stream at Bridge
102.06 " Bridge Floor
100.47 " 50' W of Bridge
100.69 " 100' " " "
101.55 " 200' " " "
103.00 " 300' " " "

(over)

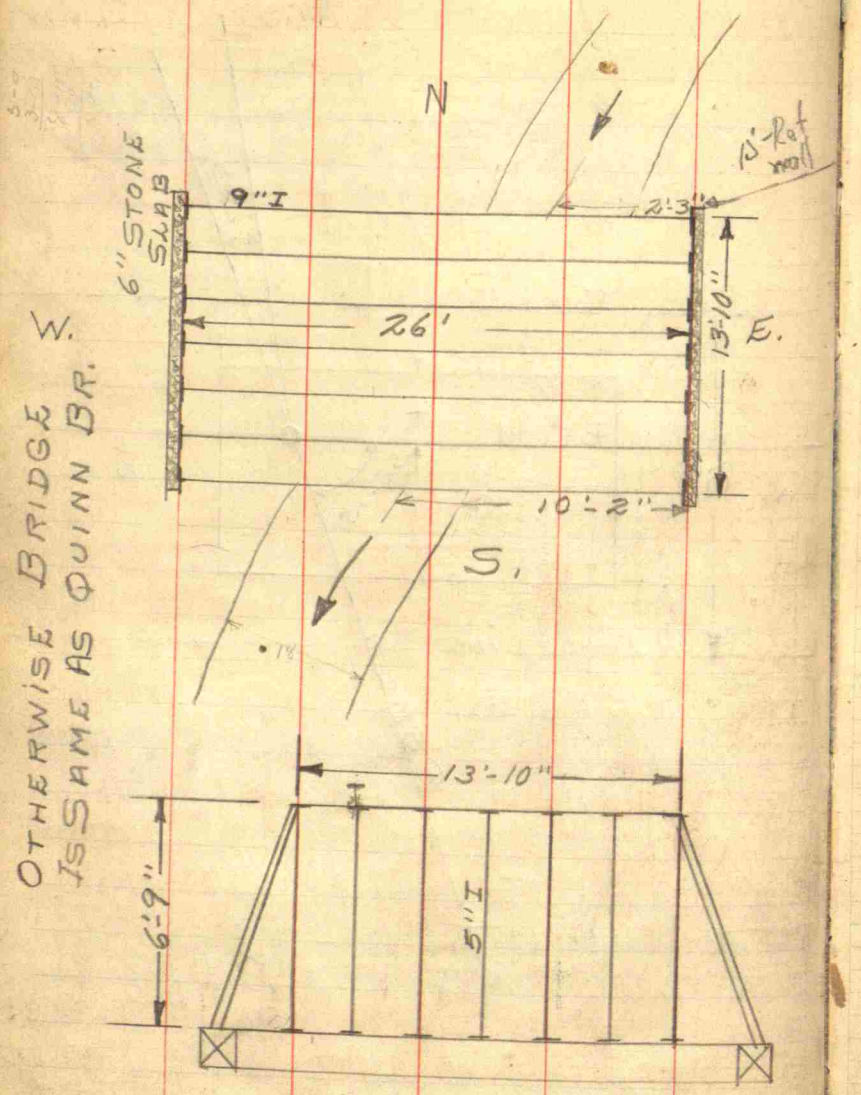
101.56 - 100' East of Bridge
101.76 - 200' " " "
99.00 Average El. Bank of Stream
31' - Width of Road.

11'-7
6-0
17-0
31-7

COLLINS BRIDGE



COLLINS BRIDGE



OTHERWISE BRIDGE IS SAME AS QUINN BR.

Top of I Beam to flow line 10'-6

4.79 104.79 / 100.79 / 4.0 4.79

BROWN TWP.

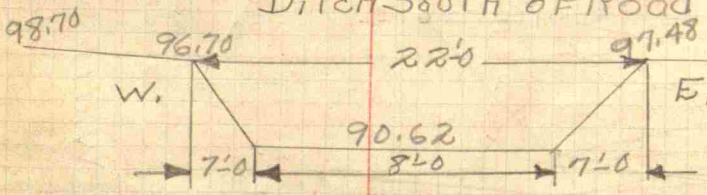
C. E. LOGAN
MAJOR FRANKLIN
1-6-31
CLOUDY + COLD

Bench Mark:
Nail in ash Tree ~~East~~ Side. 20' W of Bridge on S. Side of Road. El. 100.00

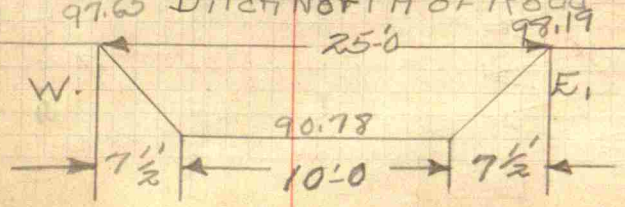
100.79 El. of Floor of Bridge
99.53 " " Road West 130'
99.27 " " " " 130'
98.70 " " " East 100'
99.15 " " " " 200'
100.20 " " " " 300'
El. of Ground 200' East and West - Level with Road.
Country Level
94.70 El. of 6" Road Tile From East.

90.54 El. of Ditch at Bridge

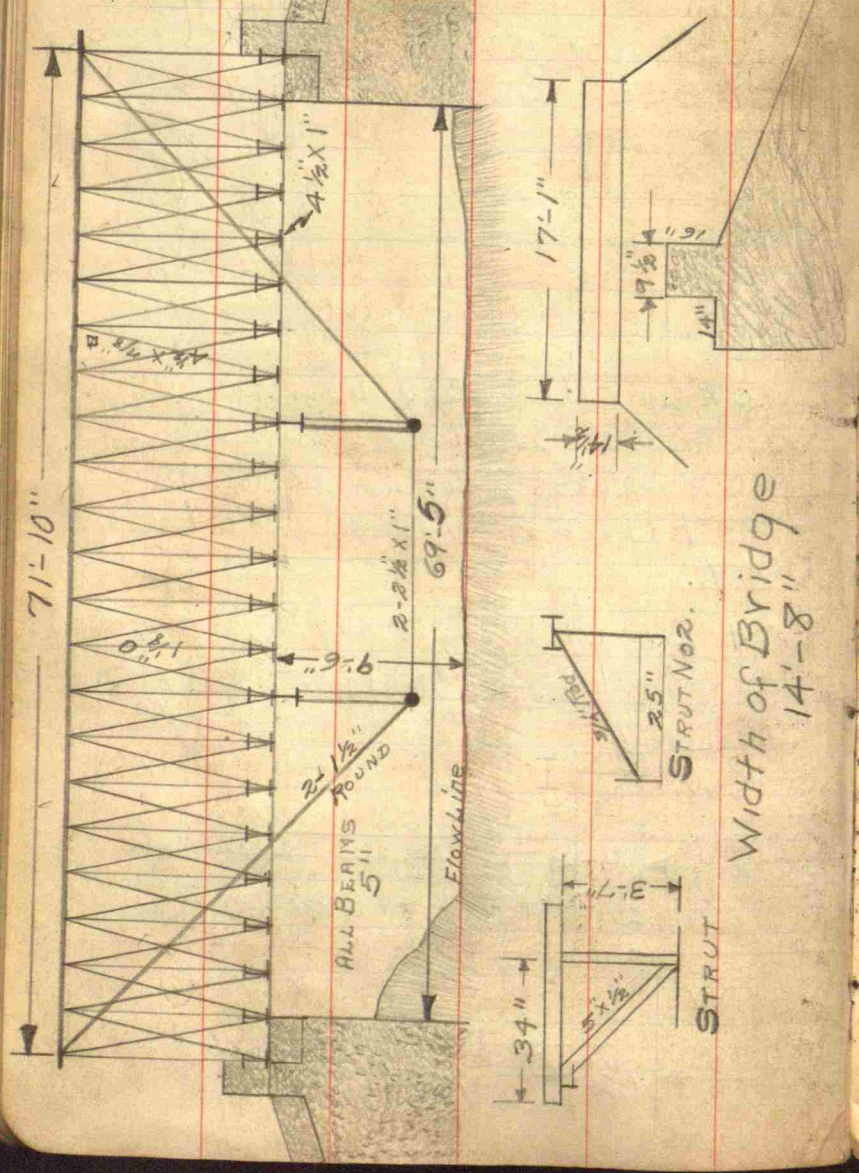
Ditch South of Road



97.65 Ditch North of Road



KENDALL BRIDGE



LIBERTY TWP.

Connections Bolted

12- 6 I 12.5# 18#
11- do 19#

Top Chord 9 I 35#

B.M. El. 100 N.W. Cor. Bridge Seat - West Abut.

B.S. - H.I. - F.S.
6.05 - 106.05 -

℄ Rd + Cen Br. Floor -	4.33
" " " E. End "	4.50
100' East	4.70
200' "	4.05
Flow Line	13.80
℄ Rd W. End Bridge	4.64
100' West	5.45
Bridge Seat East Abut	6.02

100.9 95.47 4.43 TH 100.9 96.26 4.64

102 A. SUGAR GROVE BRIDGE

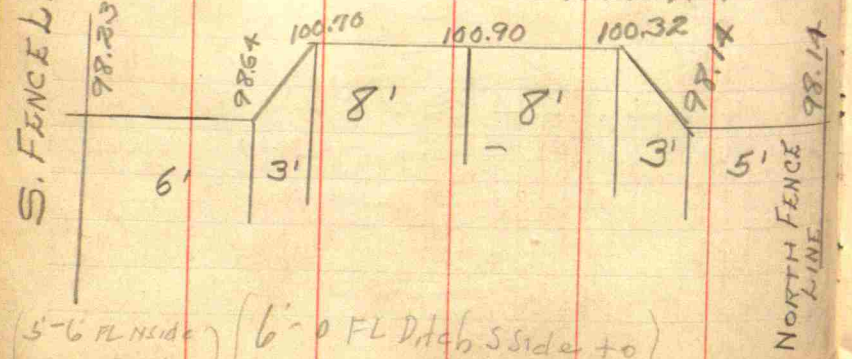
BENCH MARK.

ON STONE 15' S.W OF BRIDGE

EL. 100.00

EL. FLOWLINE N. END BRIDGE	95.47
" " " S. " "	95.26
EL. FLOWLINE 150 FT. N.	96.77
EL. 4" TILE	96.42
EL. FLOWLINE 50' S.	93.95
" " " 150 S.	92.84
EL OF ℄ OF ROAD 100' W	100.89
" " " " " 200' W	101.95
" " " " " 100' E	101.44
" " " " " 200' E	102.20
EL. ON STONE UNDER BRACE ROD OF CORNER POST	98.27

CROSS SECTION ROAD E. END OF CULVERT

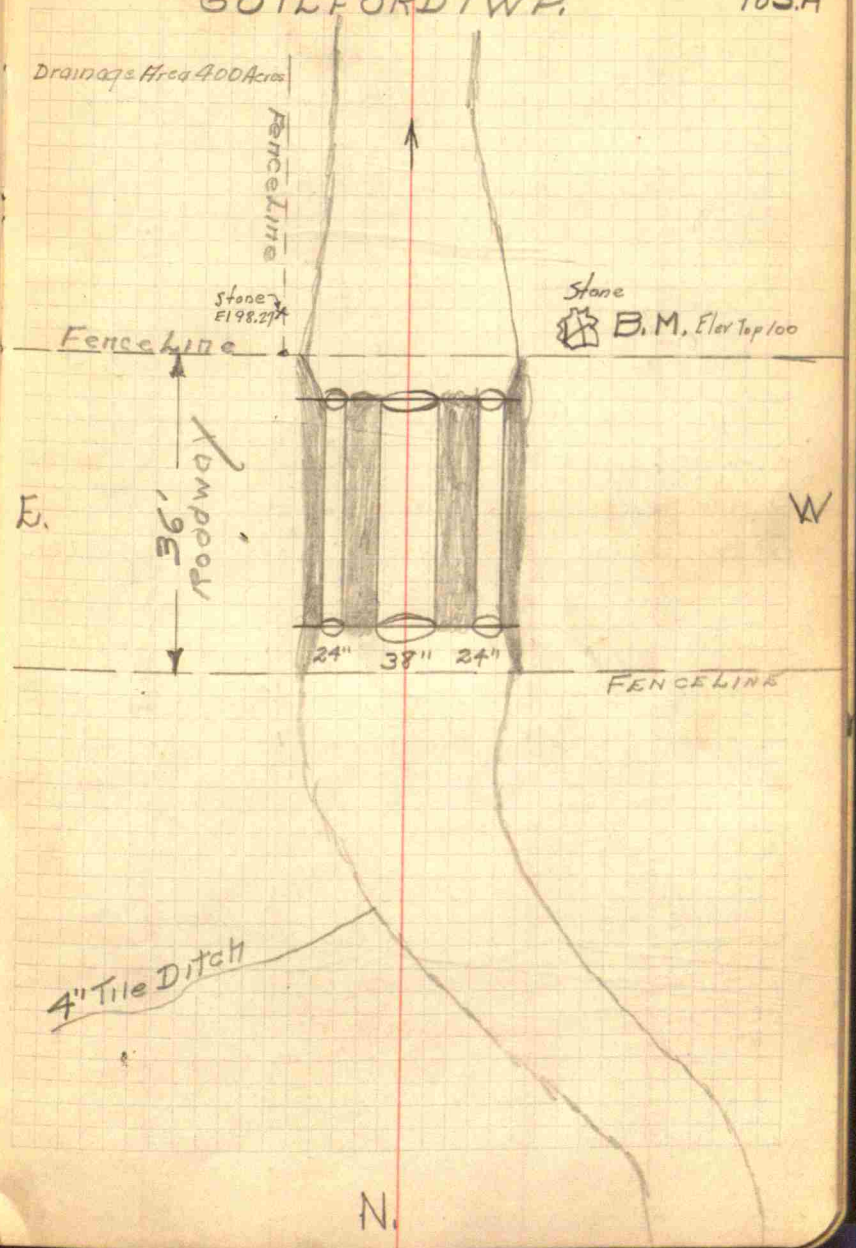


(5'-6" FL N Side to Road Grade) {6'-0" FL Ditch S Side to Road Grade}

S.

GUILFORD TWP.

103.A



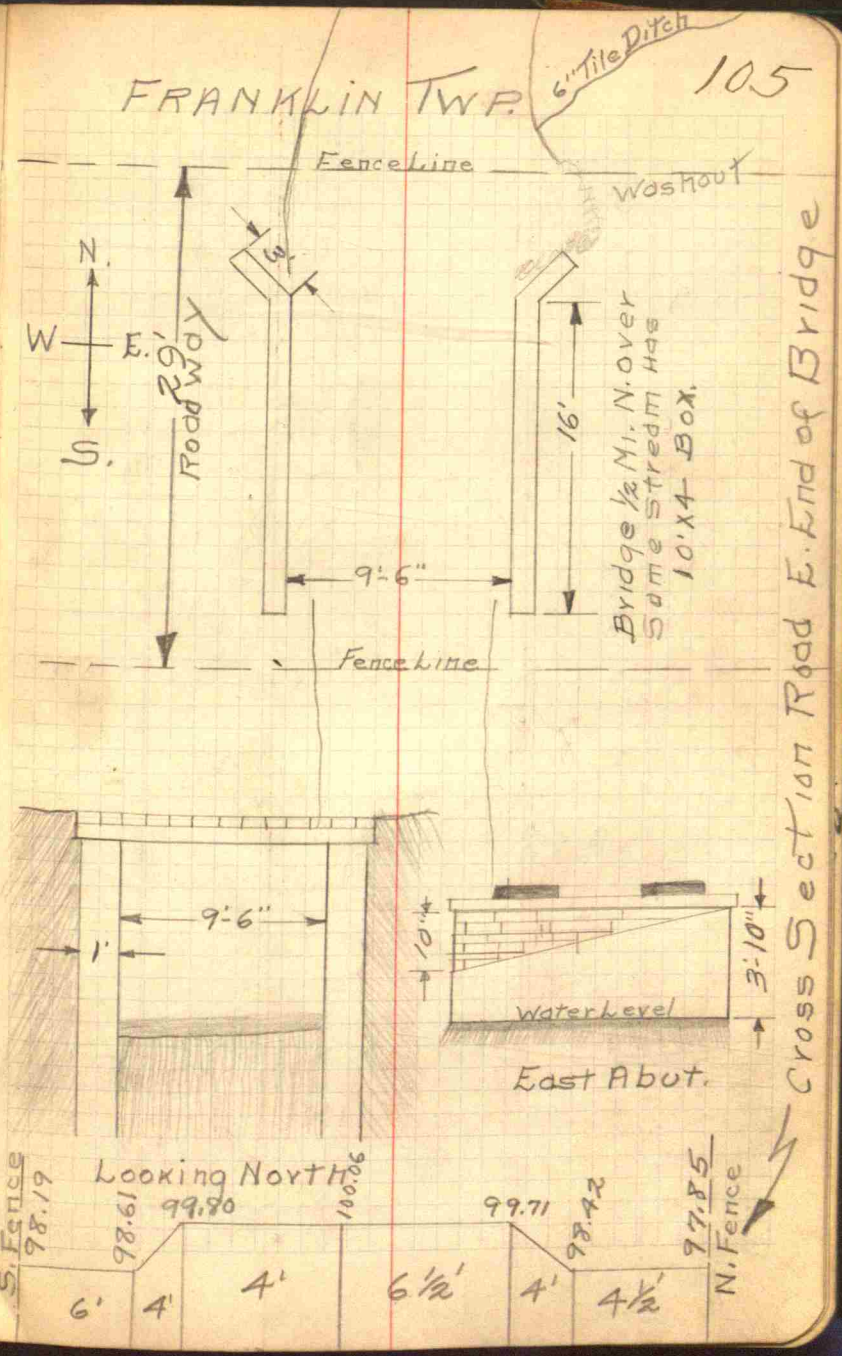
MASTEN BRIDGE

BENCH MARK. On pole No. 685-81' E. of bridge on N. side of Rd.
EL. EL. 100.00

99.84	℄ of Rd. on Bridge
100.20	℄ 100' W. on Rd.
100.65	℄ 200' " " "
101.30	℄ 300' " " "
100.36	℄ 100' E. on Rd.
101.09	℄ 200' E. " "
102.25	℄ 300' E " "
103.62	℄ 400' E " "
104.20	" " ON BOLT AT BOTTOM OF CONCRETE POST. (ON WEST SIDE)
93.10	Flow Line at N. Fence
95.30	EL. 6" TILE NOF Bridge
95.85	100' N. IN DITCH.
96.90	200' " " "
97.57	300' " " "
95.19	S. SIDE OF BRIDGE (at Fence)
98.65	Top OF W-HDWLL. N. SIDE
95.10	FLOW LINE S-FENCE
95.05	" " " 100'
94.60	" " " 200'
94.40	" " " 300'

	B.S.	H.I.	F.S.	
B.M	4.13	104.13		100.00
Stk.			3.93	100.20 Top Stake
			4.39	

FRANKLIN TWP.

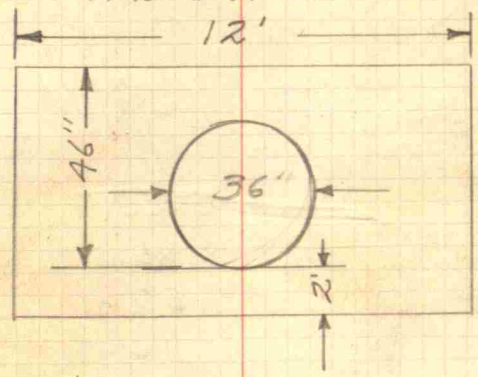


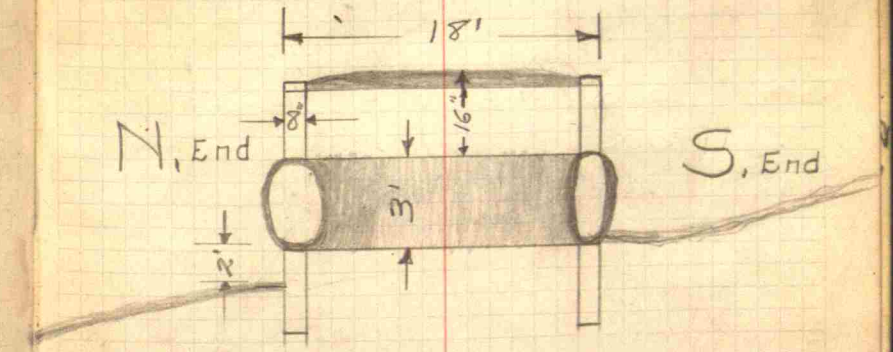
WEST BRIDGE

BM	BS	HI	FS	100
X	4.47	104.47		
℄ Bridge			5.24	99.23
100 E			4.70	99.77
200 E			3.70	100.77
100 W			4.30	100.17
200 W			2.95	101.52
FL S			9.58	94.89
25'-S			8.20	96.27
FL N			9.85	94.62
Fence N			12.10	92.37
FL 25 N			11.10	93.37
Top S+K. N. Side			10.12	94.35

CLAY TWP.

N. End View





Buis-Bridge.-Franklin-Twp.

B.M Nail-24" Oak 200'
S.E. of Bridge.-El-100.00

	BS	HI	FS	
	11.15	111.15		
0+00			5.25	105.90
E.1+0			3.65	107.50
E.2+0			.50	110.65
W-1+0			4.80	106.35
W-2+0			2.70	108.45
W-2+50			.90	110.25
Flow Line			22.0	89.15

B.M	B.S.	H.I.	F.S.	EL.100	
	10.03	110.03			
STK.			3.67	106.36	Top Stake
			7.95	106.08	Grade Roadway

℄ Road at Bridge

Fence on S.

Fence on N 19'

35' 14

Cross Section W. End
Ten Ft. W. of Abut.

50' 16.6' 9' 10' 6' 7' 11' N. 16' 21' 28'
12 - 12 - 7.8 - 5.5 - 5.3 - 5.5 - 8 - 11 - 13 - 15'

Fence Section Ten
Ft. E. of E Abut

29' 17' 10' 7' 6' 11' 16' 21' 27
14.5 13 - 8.7 - 5.4 - 5.1 - 5.3 - 8 - 12 - 13 - 13.6

96.61 - 98.15 - 102.45 - 105.75 - 106.05 - 106.30 - 105.15 - 98.15 - 93.95

Fence

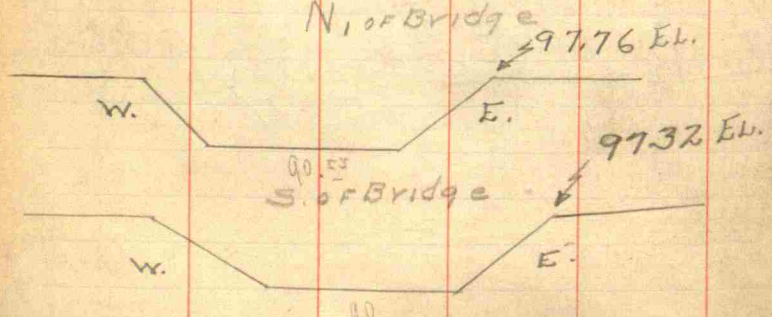
© 93.17

CAMP BRANCH

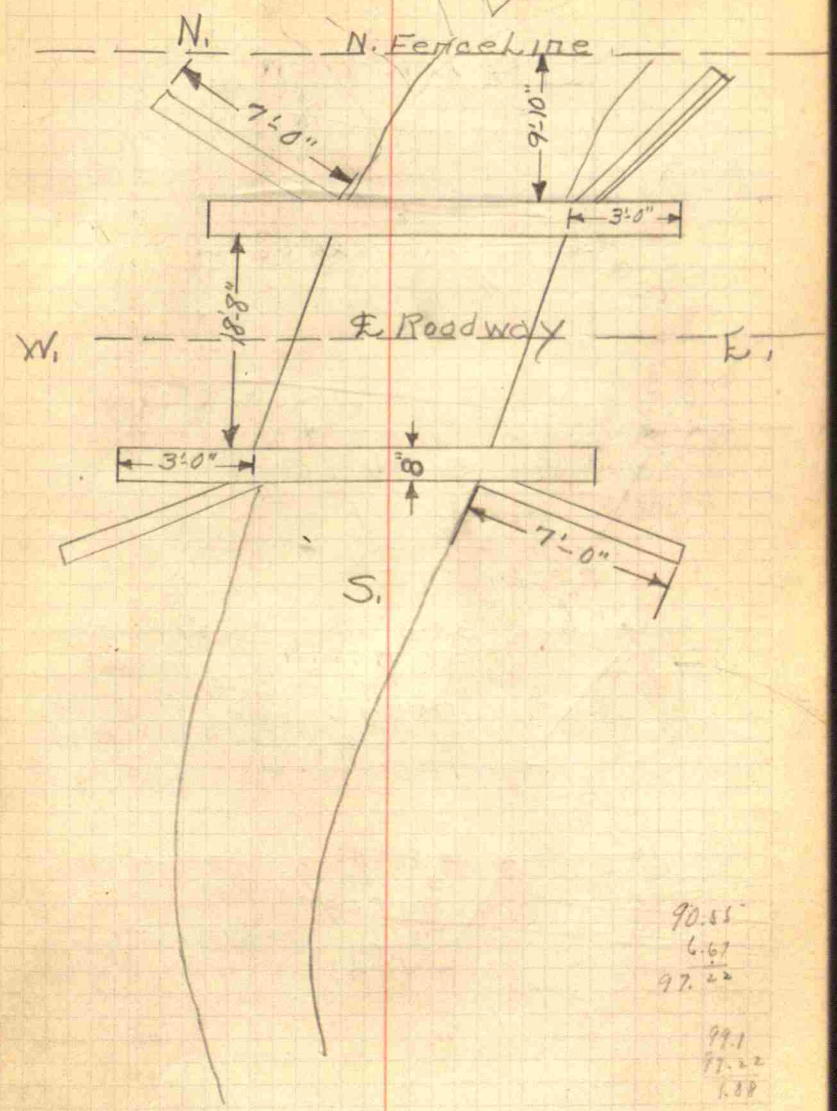
BENCH MARK.

TWO NAILS IN TOP OF OAK STUMP 75' W. OF BRIDGE ON NORTH SIDE OF ROAD. EL. 100.00

99.10	℄ OF ROAD + BRIDGE
97.69	" " " 100' W.
97.30	" " " 200' W
97.85	" " " 300' W
97.60	" " " 400' W
97.81	" " " 100' E
97.95	" " " 200' E
97.57	" " " 300' E
97.38	" " " 400' E
98.81	EL. TOP OF S.E. Wing
90.55	EL. 100 S. in Ditch
90.55	EL. OF Ditch at S. End of Bridge
90.13	EL. 100' W. in Sub. Arm.
90.40	EL. 100' N in Ditch

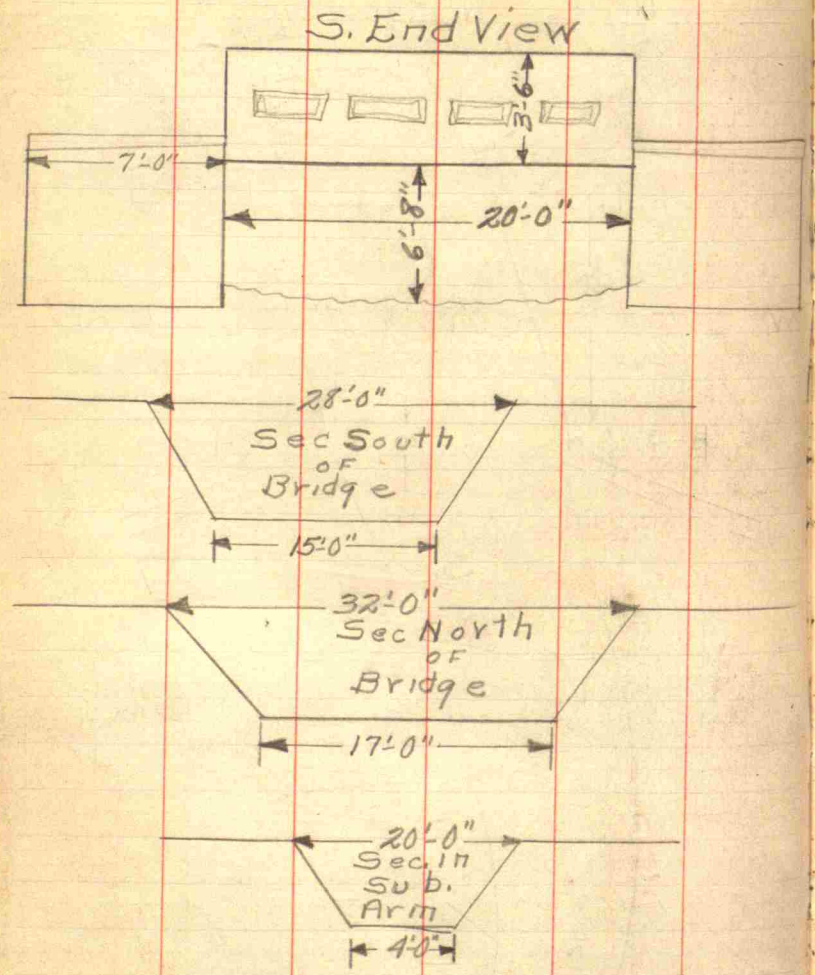


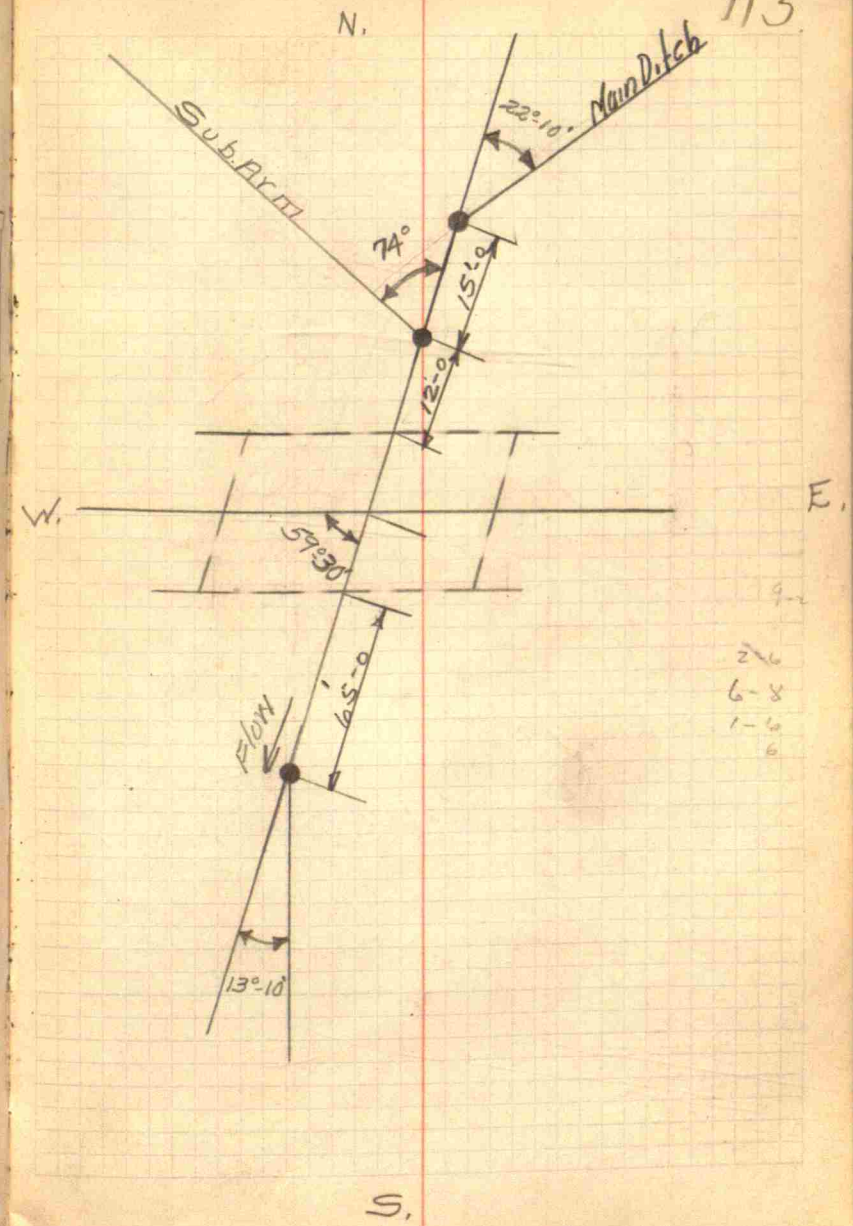
BRIDGE-FRANKLIN TWP.



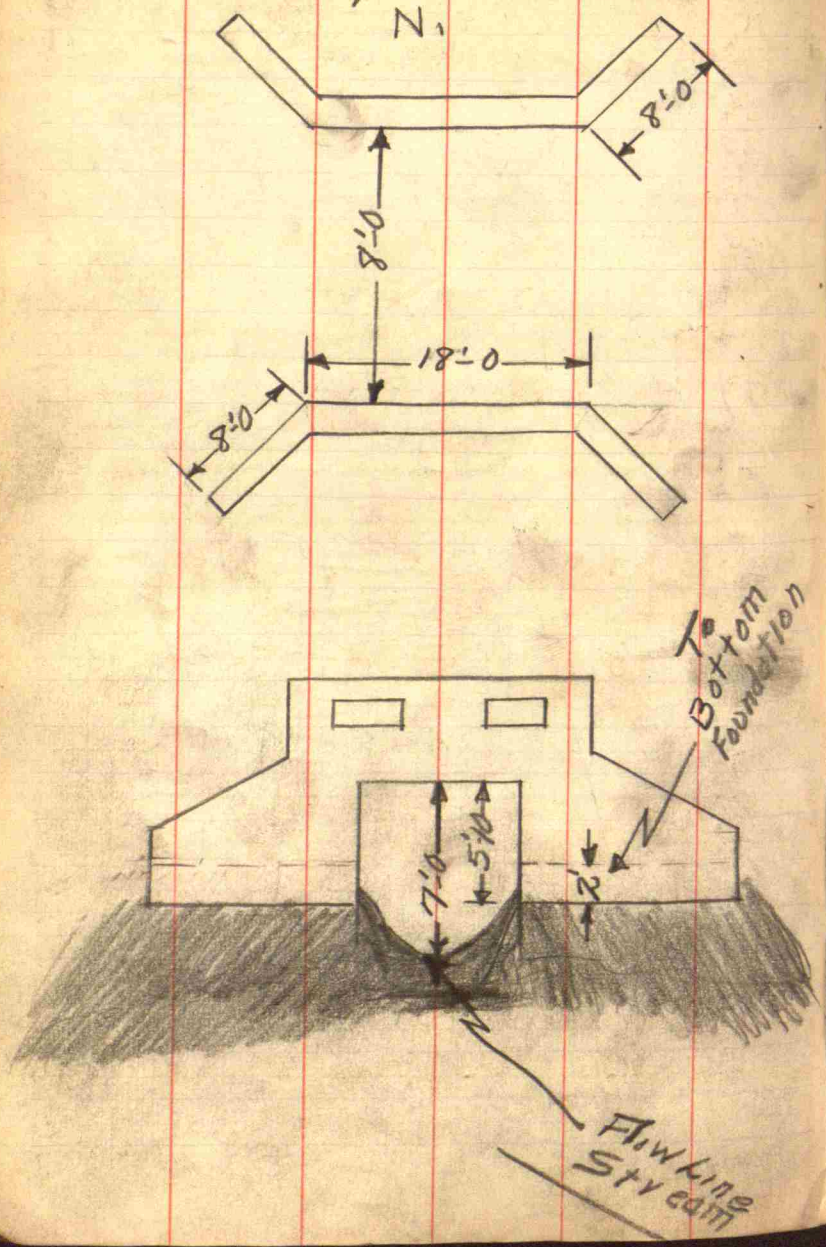
90.55
6.67
97.22

99.1
97.22
1.88


S. End View
3'-6"
7'-0"
6'-8"
20'-0"
28'-0"
Sec South of Bridge
15'-0"
32'-0"
Sec North of Bridge
17'-0"
20'-0"
Sec. in Sub. Arm
4'-0"


N.
Sub. Arm
22°-10'
Main Ditch
74°
15'-0
12'-0
W.
E.
57°30'
65'-0
Flow
13°-10'
S.

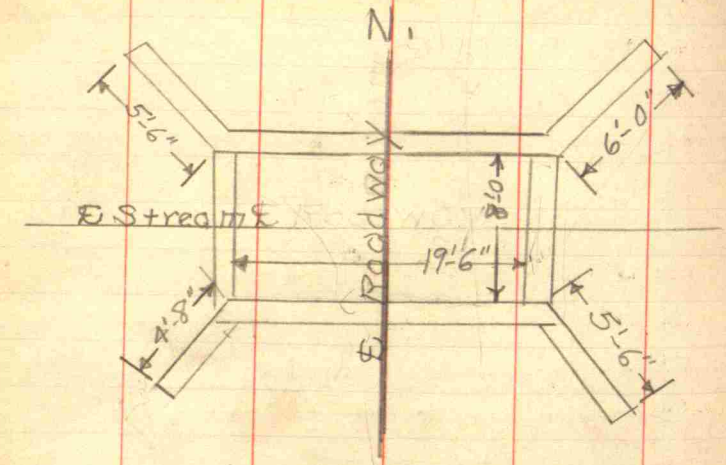
118. Robbins Bridge over McDaniel Drain In 1/8 Mi. N. Cen. Sec 28 19
T 17 N - R 1 W

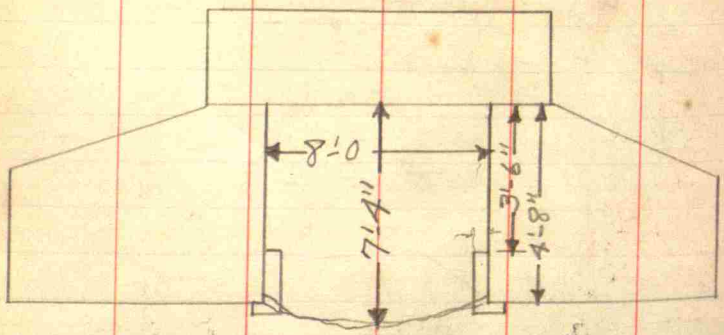


FAULKNER

BRIDGE ON ARM OF McDANIAL DRAIN

AT N.E. Cor. Sec. 26 Tp 17N-R1W

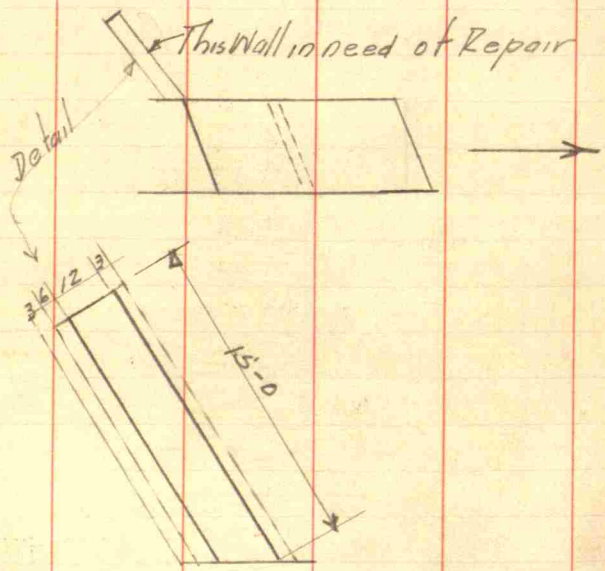


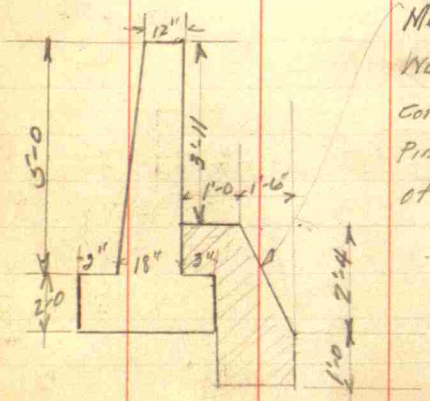


CELogan

2-17-31

McVey Bridge one half Mile South of New Winchester

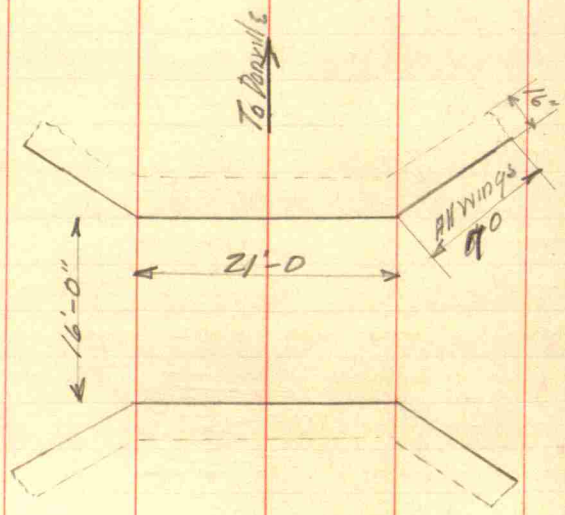


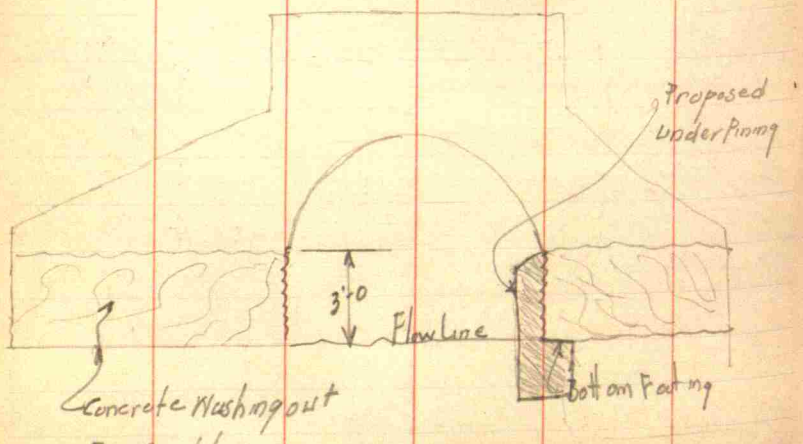


Method of Supporting Wall. This arrangement corresponds with under Pinning of south wall of Bridge

2-20-31

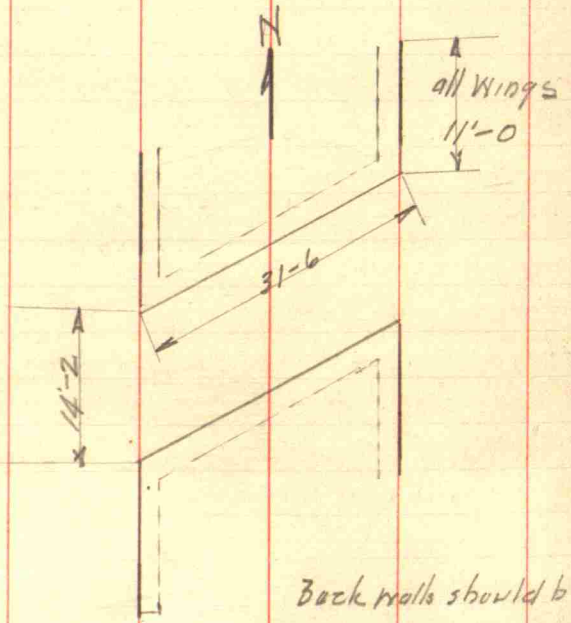
BRIDGE ON NORTH SALEM ROAD AT C.A. DISNEY FARM



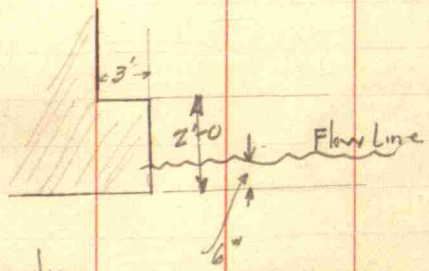


Elevation

SOUTH BRIDGE ALONG ROSEBLOOM FARM OVER ROSEBLOOM DITCH

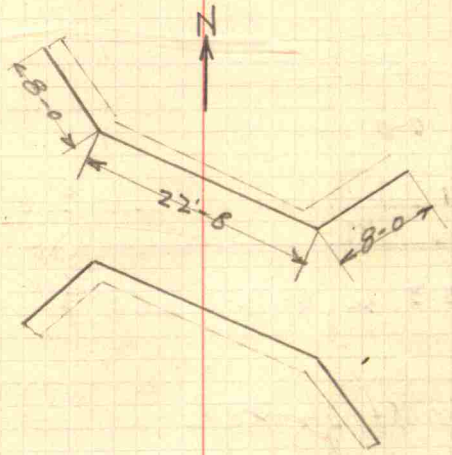


Back walls should be underpinned and back 6' on each Wing

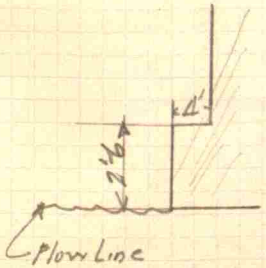


Section

NORTH BRIDGE ALONG ROSEBLOOM FARM OVER ROSEBLOOM DITCH



North wall is washed out and needs Under pinning. South wall ok

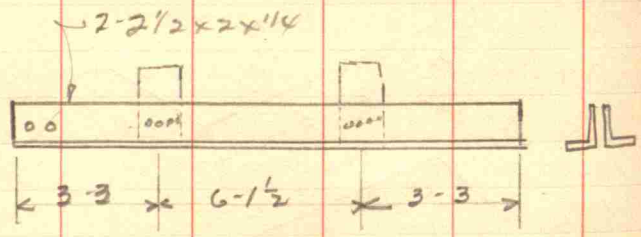


Section thru N. Backwall

Earle Logan
Major Franklin

2-20-31

BRIDGE IN SEC 8 T16 1W
Middle Township near Henderson Farm



Two Struts Required to replace those in bottom chord of Bridge

CHATHAM BRIDGE LEVELS

	BS	HI	FS		
BM X	2.22	102.22			100
℄ Road			4.30	97.92	
100' West			3.50	98.72	
200' "			0.50	101.72	
100' East			4.50	97.72	
1+50			3.45	98.77	
200' "			3.85	98.37	
S. Flow Line			8.50	93.72	
25'-South			8.00	94.00	
N Flow Line			8.23	93.99	
25'-North			7.83	94.39	

Nail in Brace Post west of Gate to Barnyard
S. Side Road East of Bridge

Sadler Gravel Pit

BM	BS	HI	FS		100
T	7.77	107.77			
0+00					
0+27					
0+45					
0+61					
0+78					
1+05					
End Section					
①			.07	107.7	
T	10.89	118.59			
0+27					
0+45					
0+61					

Top Post E

S 6.5 101.27

20 6.05 101.72

N. 5.9 101.87

S 7.74 100.03 | 2 7.65 100.12 | 3 6.95 100.82 | 6 6.42 101.35 | 13 1.42 106.35

S 8.43 99.34 | 6 6.52 101.27 | 12.5 2.45 105.32

-6 10.3 97.47 | S 8.04 99.73 | 2 7.96 99.81 | 11 1.53 106.24

S 10.6 97.17 | 11 3.5 104.27

S 11.12 | 16 10.15

center 6.03 101.74 | 9.5 E 3.12 104.65 | 13.0 E .62 107.15

24 E true End 0+00 3.8

22.9 4.42 114.17 | 25.9 4.42 114.17

25 4.65 113.94

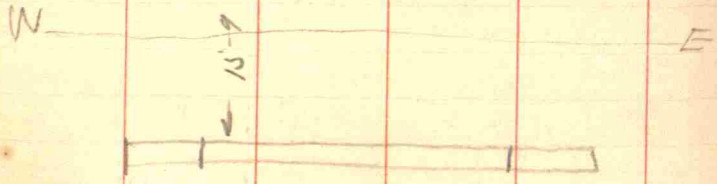
21 5.8 112.79

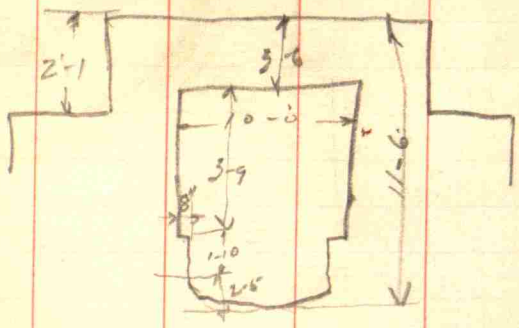
0+78		118.59			
0+90					37 / 11.4
					107.19
0+45					
0+61					
0+78					
⊙				11.43	107.16
π	1.08	108.24			
0+00				6.36	
0+27				7.00	101.24
0+45				7.44	100.80
0+61				7.82	100.42
0+78				7.90	100.34
0+90				8.55	99.69
1+05				9.24	99
⊙			8.01	100.23	
π	.49	100.72			
1+07			.65	100.07	
0+90			3.86	~~3.8~~	96.86
End			2.71		98.01

23-6	28-6	31-6
5.55	5.92	4.35
113.04	112.67	114.24
28	22	
8.15	11.41	
110.44	107.18	
28-6	34-7	
5.36	8.83	
113.23	109.76	
24-0	27-9	
6.12	5.22	
112.47	113.37	
31-6		
4.38		
114.21		

138

EGGERS BRIDGE



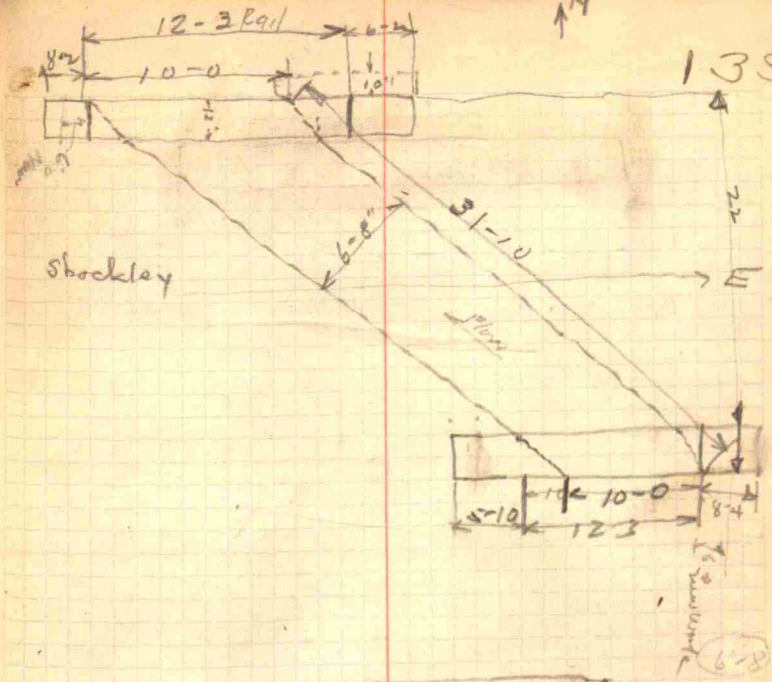


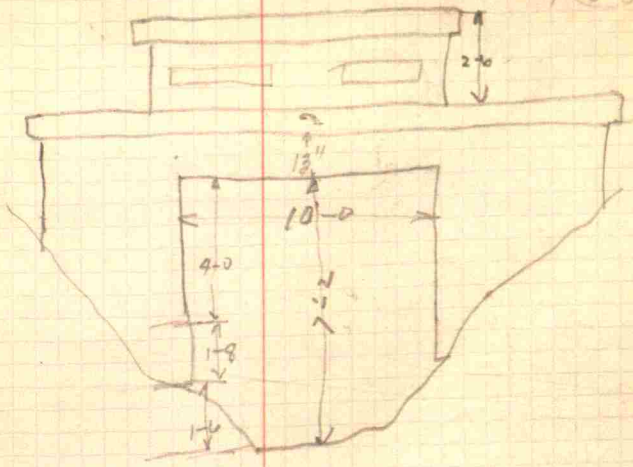
3-6
3-9
1-10
9 1

11-6
9-
2 5

SE

139

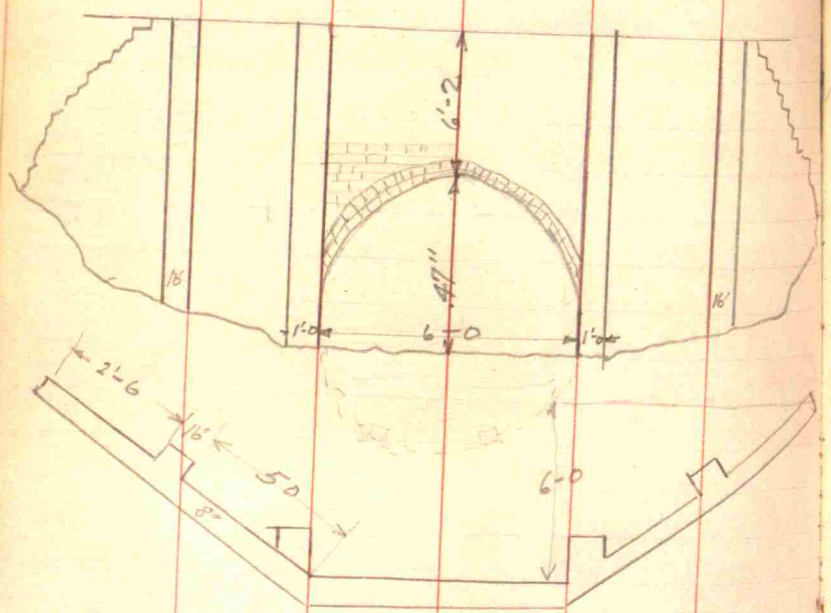




N Elev

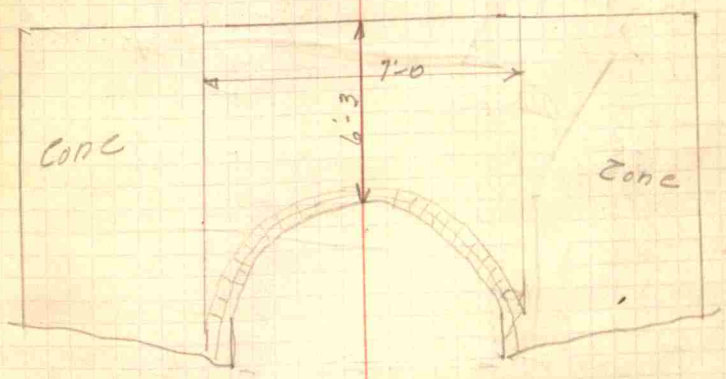
Roadway 14'-4
Span 28'-0
5-10I + 2 10E
Height Floor to Plate 11'-10 - 4" Floor on I
Hand Rails etc

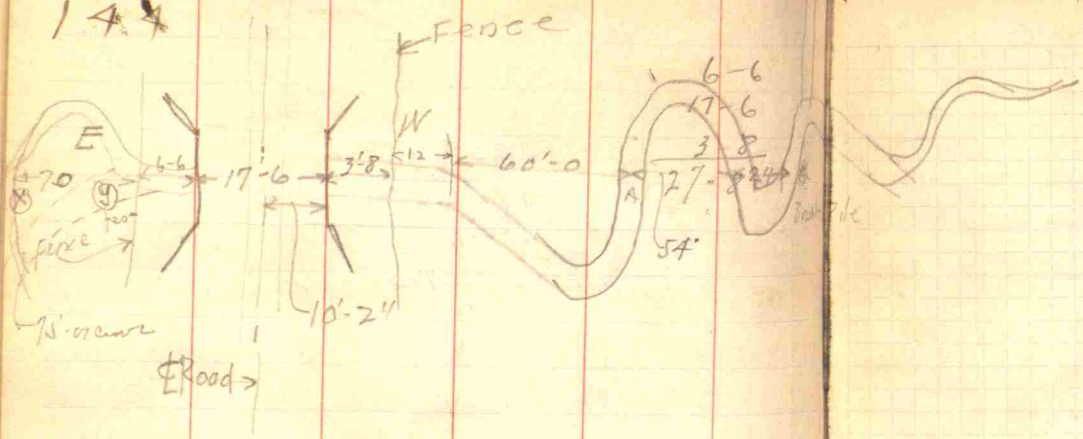
EAST wall



Plan

West wall





Center	← 6-1½ →	Rise 34"
West End	← 6-0½ →	" 34"
East End	← 6-0½ →	" 32"

LEVELS

BM	BS	HI	FS	Elev	Elev/100
π	8.37	108.37			
℄ Bridge			3.7	104.67	✓
100'-North			1.65	106.72	✓
125 North			-.10	108.17	✓
100'-South			.95	107.42	✓
Top Wall			4.93	103.44	
F.L. E Side			15.27	93.10	✓
" W side			15.68	92.69	
Brush Pile West			8.45	99.92	
Point A			10.35	98.02	

Nail in Tree on East Fence Line 30'- South of Bridge

	BS	HI	FS	Elev
		108.37		
Cross-section 16'S. ℄ Bridge				
Point X			18	90.37
" Y			12.7	96.30

80' Rod

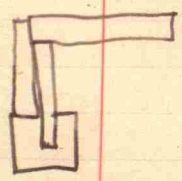
80' Rod

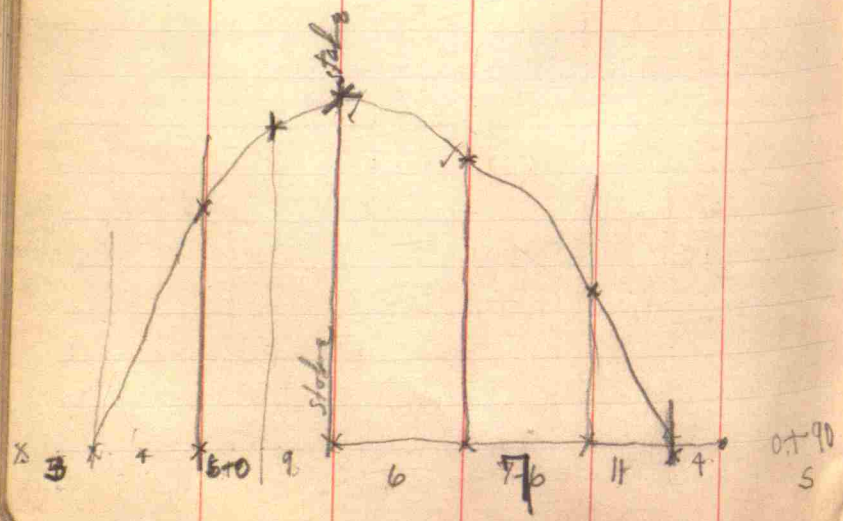
80-100 steep slope

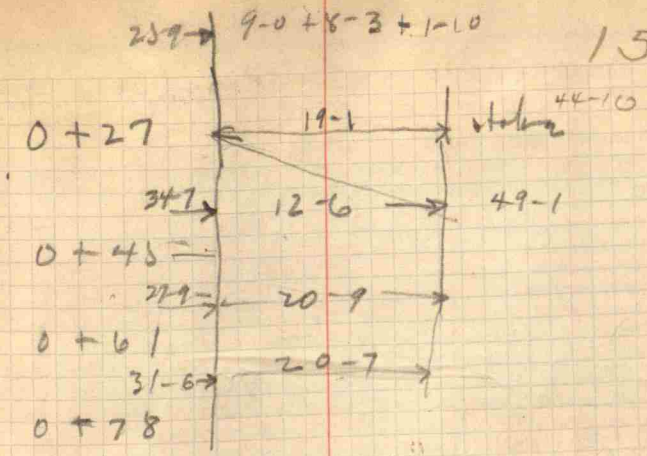
E							W
25/13	10.64/15	13/8.87	5/4.10	Ebank 3.97	6/4.10	Fence 13/8.38	25/10.1

LEVELS—SHORT BRIDGE

BM	8.11	108.11			100	Nail in Sycamore Tree 75' East
0+00			5.71	102.4		South Bank
1+00			.65	107.46		Going South
			14.00	94.11		in stream Going North
			15.00	93.11		" " " "
			16.5	91.61		" " " "
0+00			6.45	101.66		N. Bank
1+00			3.25	104.86		Going North
2+00			1.00	107.11		" "
			11.45	96.66		HIGH WATER MARK




x
3
4
6+0
9
6
7
6
11
4
0+90
5


25-9
9-0 + 8-3 + 1-10
0+27
19-1
44-10
34-7
12-6
49-1
0+45
27-9
20-9
0+61
31-6
20-7
0+78

158

$\frac{\cancel{270}^{10} \times \cancel{18}^{9} \times 1/2}{\cancel{27}}$ 90

Natural Trigonometrical Ratios.

Angle.	Sine.	Tan.	Sec.	Cosec.	Cotg.	Cosin.	
° ′							
0	0	0	1.	∞	∞	1.	90
10	.0029	.0029		343.8	343.8	I.	50
20	.0058	.0058		171.9	171.9	.99998	40
30	.0087	.0087		114.6	114.6	.99996	30
40	.0116	.0116	1.0001	85.94	85.94	.99993	20
50	.0145	.0145	1.0001	68.76	68.75	.99989	10
1	.0175	.0175	1.0002	57.30	57.29	.99985	89
10	.0204	.0204	1.0002	49.11	49.10	.99979	50
20	.0233	.0233	1.0003	42.98	42.96	.99973	40
30	.0262	.0262	1.0003	38.20	38.19	.99966	30
40	.0291	.0291	1.0004	34.38	34.37	.99958	20
50	.0320	.0320	1.0005	31.26	31.24	.99949	10
2	.0349	.0349	1.0006	28.65	28.64	.99939	88
10	.0378	.0378	1.0007	26.45	26.43	.99929	50
20	.0407	.0407	1.0008	24.56	24.54	.99917	40
30	.0436	.0437	1.0010	22.93	22.90	.99905	30
40	.0465	.0466	1.0011	21.49	21.47	.99892	20
50	.0494	.0495	1.0012	20.23	20.21	.99878	10
3	.0523	.0524	1.0014	19.11	19.08	.99863	87
10	.0552	.0553	1.0015	18.10	18.07	.99847	50
20	.0581	.0582	1.0017	17.20	17.17	.99831	40
30	.0610	.0612	1.0019	16.38	16.35	.99813	30
40	.0640	.0641	1.0020	15.64	15.60	.99795	20
50	.0669	.0670	1.0022	14.96	14.92	.99776	10
4	.0698	.0699	1.0024	14.34	14.30	.99756	86
10	.0727	.0729	1.0027	13.76	13.73	.99736	50
20	.0756	.0758	1.0029	13.23	13.20	.99714	40
30	.0785	.0787	1.0031	12.75	12.71	.99692	30
40	.0814	.0816	1.0033	12.29	12.25	.99668	20
50	.0843	.0846	1.0036	11.87	11.83	.99644	10
5	.0872	.0875	1.0038	11.47	11.43	.99619	85
10	.0901	.0904	1.0041	11.10	11.06	.99594	50
20	.0929	.0934	1.0043	10.76	10.71	.99567	40
30	.0958	.0963	1.0046	10.43	10.39	.99540	30
40	.0987	.0992	1.0049	10.13	10.08	.99511	20
50	.1016	.1022	1.0052	9.839	9.788	.99482	10
6	.1045	.1051	1.0055	9.567	9.514	.99452	84
10	.1074	.1080	1.0058	9.309	9.255	.99421	50
20	.1103	.1110	1.0061	9.065	9.010	.99390	40
30	.1132	.1139	1.0065	8.834	8.777	.99357	30
40	.1161	.1169	1.0068	8.614	8.556	.99324	20
50	.1190	.1198	1.0072	8.405	8.345	.99290	10
7	.1219	.1228	1.0075	8.206	8.144	.99255	83
10	.1248	.1257	1.0079	8.016	7.953	.99219	50
20	.1276	.1287	1.0082	7.834	7.770	.99182	40
30	.1305	.1317	1.0086	7.661	7.596	.99144	30
40	.1334	.1346	1.0090	7.496	7.429	.99106	20
50	.1363	.1376	1.0094	7.337	7.269	.99067	10
	Cosin.	Cotg.	Cosec.	Sec.	Tan.	Sine.	Angle. 82

Angle.	Sine.	Tan.	Sec.	Cosec.	Cotg.	Cosin.	
° ′							
8	.1392	.1405	1.0098	7.185	7.115	.99027	82
10	.1421	.1435	1.0102	7.040	6.968	.98986	50
20	.1449	.1465	1.0107	6.900	6.827	.98944	40
30	.1478	.1495	1.0111	6.766	6.691	.98902	30
40	.1507	.1524	1.0115	6.636	6.561	.98858	20
50	.1536	.1554	1.0120	6.512	6.435	.98814	10
9	.1564	.1584	1.0125	6.394	6.314	.98769	81
10	.1593	.1614	1.0129	6.277	6.197	.98723	50
20	.1622	.1644	1.0134	6.166	6.084	.98676	40
30	.1650	.1673	1.0139	6.059	5.976	.98629	30
40	.1679	.1703	1.0144	5.955	5.871	.98580	20
50	.1708	.1733	1.0149	5.855	5.769	.98531	10
10	.1736	.1763	1.0154	5.759	5.671	.98481	80
10	.1765	.1793	1.0160	5.665	5.576	.98430	50
20	.1794	.1823	1.0165	5.575	5.485	.98378	40
30	.1822	.1853	1.0170	5.488	5.396	.98325	30
40	.1851	.1883	1.0176	5.403	5.309	.98272	20
50	.1880	.1914	1.0181	5.320	5.226	.98218	10
11	.1908	.1944	1.0187	5.241	5.145	.98163	79
10	.1937	.1974	1.0193	5.164	5.066	.98107	50
20	.1965	.2004	1.0199	5.089	4.989	.98050	40
30	.1994	.2035	1.0205	5.016	4.915	.97992	30
40	.2022	.2065	1.0211	4.945	4.843	.97934	20
50	.2051	.2095	1.0217	4.877	4.773	.97875	10
12	.2079	.2126	1.0223	4.810	4.705	.97815	78
10	.2108	.2156	1.0230	4.745	4.638	.97754	50
20	.2136	.2186	1.0236	4.682	4.574	.97692	40
30	.2164	.2217	1.0243	4.620	4.511	.97630	30
40	.2193	.2247	1.0249	4.560	4.449	.97566	20
50	.2221	.2278	1.0256	4.502	4.390	.97502	10
13	.2250	.2309	1.0263	4.445	4.331	.97437	77
10	.2278	.2339	1.0270	4.390	4.275	.97371	50
20	.2306	.2370	1.0277	4.336	4.219	.97304	40
30	.2334	.2401	1.0284	4.284	4.165	.97237	30
40	.2363	.2432	1.0291	4.232	4.113	.97169	20
50	.2391	.2462	1.0299	4.182	4.061	.97100	10
14	.2419	.2493	1.0306	4.133	4.011	.97030	76
10	.2447	.2524	1.0314	4.086	3.962	.96959	50
20	.2476	.2555	1.0321	4.039	3.914	.96887	40
30	.2504	.2586	1.0329	3.994	3.867	.96815	30
40	.2532	.2617	1.0337	3.949	3.821	.96742	20
50	.2560	.2648	1.0345	3.906	3.776	.96667	10
15	.2588	.2679	1.0353	3.864	3.732	.96593	75
10	.2616	.2711	1.0361	3.822	3.689	.96517	50
20	.2644	.2742	1.0369	3.782	3.647	.96440	40
30	.2672	.2773	1.0377	3.742	3.606	.96363	30
40	.2700	.2805	1.0386	3.703	3.566	.96285	20
50	.2728	.2836	1.0394	3.665	3.526	.96206	10
	Cosin.	Cotg.	Cosec.	Sec.	Tan.	Sine.	Angle. 74

Angle.	Sine.	Tan.	Sec.	Cosec.	Cotg.	Cosin.	
° ′							
16	.2756	.2867	1.0403	3.628	3.487	.96126	74
10	.2784	.2899	1.0412	3.592	3.450	.96046	50
20	.2812	.2931	1.0423	3.556	3.412	.95964	40
30	.2840	.2962	1.0429	3.521	3.376	.95882	30
40	.2868	.2994	1.0438	3.487	3.340	.95799	20
50	.2896	.3026	1.0448	3.453	3.305	.95715	10
17	.2924	.3057	1.0457	3.420	3.271	.95630	73
10	.2952	.3089	1.0466	3.388	3.237	.95545	50
20	.2979	.3121	1.0476	3.357	3.204	.95459	40
30	.3007	.3153	1.0485	3.326	3.172	.95372	30
40	.3035	.3185	1.0495	3.295	3.140	.95284	20
50	.3062	.3217	1.0505	3.265	3.108	.95195	10
18	.3090	.3249	1.0515	3.236	3.078	.95106	72
10	.3118	.3281	1.0525	3.207	3.048	.95015	50
20	.3145	.3314	1.0535	3.179	3.018	.94924	40
30	.3173	.3346	1.0545	3.152	2.989	.94832	30
40	.3201	.3378	1.0555	3.124	2.960	.94740	20
50	.3228	.3411	1.0566	3.098	2.932	.94646	10
19	.3256	.3443	1.0576	3.072	2.904	.94552	71
10	.3283	.3476	1.0587	3.046	2.877	.94457	50
20	.3311	.3508	1.0598	3.020	2.850	.94361	40
30	.3338	.3541	1.0608	2.996	2.824	.94264	30
40	.3365	.3574	1.0619	2.971	2.798	.94167	20
50	.3393	.3607	1.0631	2.947	2.773	.94068	10
20	.3420	.3640	1.0642	2.924	2.747	.93969	70
10	.3448	.3673	1.0653	2.900	2.723	.93869	50
20	.3475	.3706	1.0665	2.878	2.699	.93769	40
30	.3502	.3739	1.0676	2.856	2.675	.93667	30
40	.3529	.3772	1.0688	2.833	2.651	.93565	20
50	.3557	.3805	1.0700	2.811	2.628	.93462	10
21	.3584	.3839	1.0711	2.790	2.605	.93358	69
10	.3611	.3872	1.0723	2.769	2.583	.93253	50
20	.3638	.3906	1.0736	2.749	2.560	.93148	40
30	.3665	.3939	1.0748	2.729	2.539	.93042	30
40	.3692	.3973	1.0760	2.709	2.517	.92935	20
50	.3719	.4006	1.0773	2.689	2.496	.92827	10
22	.3746	.4040	1.0785	2.670	2.475	.92718	68
10	.3773	.4074	1.0798	2.650	2.455	.92609	50
20	.3800	.4108	1.0811	2.632	2.434	.92499	40
30	.3827	.4142	1.0824	2.613	2.414	.92388	30
40	.3854	.4176	1.0837	2.595	2.394	.92276	20
50	.3881	.4210	1.0850	2.577	2.375	.92164	10
23	.3907	.4245	1.0864	2.559	2.356	.92050	67
10	.3934	.4279	1.0877	2.542	2.337	.91936	50
20	.3961	.4314	1.0891	2.525	2.318	.91822	40
30	.3987	.4348	1.0904	2.508	2.300	.91706	30
40	.4014	.4383	1.0918	2.491	2.282	.91590	20
50	.4041	.4417	1.0932	2.475	2.264	.91472	10
							66
	Cosin.	Cotg.	Cosec.	Sec.	Tan.	Sine.	Angle.

Angle.	Sine.	Tan.	Sec.	Cosec.	Cotg.	Cosin.	
° ′							
24	.4067	.4452	1.0946	2.459	2.246	.91355	66
10	.4094	.4487	1.0961	2.443	2.229	.91236	50
20	.4120	.4522	1.0975	2.427	2.211	.91116	40
30	.4147	.4557	1.0989	2.411	2.194	.90996	30
40	.4173	.4592	1.1004	2.396	2.177	.90875	20
50	.4200	.4628	1.1019	2.381	2.161	.90753	10
25	.4226	.4663	1.1034	2.366	2.145	.90631	65
10	.4253	.4699	1.1049	2.351	2.128	.90507	50
20	.4279	.4734	1.1064	2.337	2.112	.90383	40
30	.4305	.4770	1.1079	2.323	2.097	.90259	30
40	.4331	.4806	1.1095	2.309	2.081	.90133	20
50	.4358	.4841	1.1110	2.295	2.066	.90007	10
26	.4384	.4877	1.1126	2.281	2.050	.89879	64
10	.4410	.4913	1.1142	2.268	2.035	.89752	50
20	.4436	.4950	1.1158	2.254	2.020	.89623	40
30	.4462	.4986	1.1174	2.241	2.006	.89493	30
40	.4488	.5022	1.1190	2.228	1.991	.89363	20
50	.4514	.5059	1.1207	2.215	1.977	.89232	10
27	.4540	.5095	1.1223	2.203	1.963	.89101	63
10	.4566	.5132	1.1240	2.190	1.949	.88968	50
20	.4592	.5169	1.1257	2.178	1.935	.88835	40
30	.4617	.5206	1.1274	2.166	1.921	.88701	30
40	.4643	.5243	1.1291	2.154	1.907	.88566	20
50	.4669	.5280	1.1308	2.142	1.894	.88431	10
28	.4695	.5317	1.1326	2.130	1.881	.88295	62
10	.4720	.5354	1.1343	2.119	1.868	.88158	50
20	.4746	.5392	1.1361	2.107	1.855	.88020	40
30	.4772	.5430	1.1379	2.096	1.842	.87882	30
40	.4797	.5467	1.1397	2.085	1.829	.87743	20
50	.4823	.5505	1.1415	2.073	1.816	.87603	10
29	.4848	.5543	1.1434	2.063	1.804	.87462	61
10	.4874	.5581	1.1452	2.052	1.792	.87321	50
20	.4899	.5619	1.1471	2.041	1.780	.87178	40
30	.4924	.5658	1.1490	2.031	1.767	.87036	30
40	.4950	.5696	1.1509	2.020	1.756	.86892	20
50	.4975	.5735	1.1528	2.010	1.744	.86748	10
30	.5000	.5774	1.1547	2.	1.732	.86603	60
10	.5025	.5812	1.1566	1.990	1.720	.86457	50
20	.5050	.5851	1.1586	1.980	1.709	.86310	40
30	.5075	.5890	1.1606	1.970	1.698	.86163	30
40	.5100	.5930	1.1626	1.961	1.686	.86015	20
50	.5125	.5969	1.1646	1.951	1.675	.85866	10
31	.5150	.6009	1.1666	1.942	1.664	.85717	59
10	.5175	.6048	1.1687	1.932	1.653	.85567	50
20	.5200	.6088	1.1707	1.923	1.643	.85416	40
30	.5225	.6128	1.1728	1.914	1.632	.85264	30
40	.5250	.6168	1.1749	1.905	1.621	.85112	20
50	.5275	.6208	1.1770	1.896	1.611	.84959	10
							58
	Cosin.	Cotg.	Cosec.	Sec.	Tan.	Sine.	Angle.

Angle.	Sine.	Tan.	Sec.	Cosec.	Cotg.	Cosin.	
° ′							
32	.5299	.6249	1.1792	1.887	1.600	.84805	58
10	.5324	.6289	1.1813	1.878	1.590	.84650	50
20	.5348	.6330	1.1835	1.870	1.580	.84495	40
30	.5373	.6371	1.1857	1.861	1.570	.84339	30
40	.5398	.6412	1.1879	1.853	1.560	.84182	20
50	.5422	.6453	1.1901	1.844	1.550	.84025	10
33	.5446	.6494	1.1924	1.836	1.540	.83867	57
10	.5471	.6536	1.1946	1.828	1.530	.83708	50
20	.5495	.6577	1.1969	1.820	1.520	.83549	40
30	.5519	.6619	1.1992	1.812	1.511	.83389	30
40	.5544	.6661	1.2015	1.804	1.501	.83228	20
50	.5568	.6703	1.2039	1.796	1.492	.83066	10
34	.5592	.6745	1.2062	1.788	1.483	.82904	56
10	.5616	.6787	1.2086	1.781	1.473	.82741	50
20	.5640	.6830	1.2110	1.773	1.464	.82577	40
30	.5664	.6873	1.2134	1.766	1.455	.82413	30
40	.5688	.6916	1.2158	1.758	1.446	.82248	20
50	.5712	.6959	1.2183	1.751	1.437	.82082	10
35	.5736	.7002	1.2208	1.743	1.428	.81915	55
10	.5760	.7046	1.2233	1.736	1.419	.81748	50
20	.5783	.7089	1.2258	1.729	1.411	.81580	40
30	.5807	.7133	1.2283	1.722	1.402	.81412	30
40	.5831	.7177	1.2309	1.715	1.393	.81242	20
50	.5854	.7221	1.2335	1.708	1.385	.81072	10
36	.5878	.7265	1.2361	1.701	1.376	.80902	54
10	.5901	.7310	1.2387	1.695	1.368	.80730	50
20	.5925	.7355	1.2413	1.688	1.360	.80558	40
30	.5948	.7400	1.2440	1.681	1.351	.80386	30
40	.5972	.7445	1.2466	1.675	1.343	.80212	20
50	.5995	.7490	1.2494	1.668	1.335	.80038	10
37	.6018	.7536	1.2521	1.662	1.327	.79864	53
10	.6041	.7581	1.2549	1.655	1.319	.79688	50
20	.6065	.7627	1.2577	1.649	1.311	.79512	40
30	.6088	.7673	1.2605	1.643	1.303	.79335	30
40	.6111	.7720	1.2633	1.636	1.295	.79158	20
50	.6134	.7766	1.2661	1.630	1.288	.78980	10
38	.6157	.7813	1.2690	1.624	1.280	.78801	52
10	.6180	.7860	1.2719	1.618	1.272	.78622	50
20	.6202	.7907	1.2748	1.612	1.265	.78442	40
	Cosin.	Cotg.	Cosec.	Sec.	Tan.	Sine.	Angle.

Angle.	Sine.	Tan.	Sec.	Cosec.	Cotg.	Cosin.	
° ′							
30	.6225	.7954	1.2778	1.606	1.257	.78261	30
40	.6248	.8002	1.2808	1.601	1.250	.78079	20
50	.6271	.8050	1.2838	1.595	1.242	.77897	10
39	.6293	.8098	1.2868	1.589	1.235	.77715	51
10	.6316	.8146	1.2898	1.583	1.228	.77531	50
20	.6338	.8195	1.2929	1.578	1.220	.77347	40
30	.6361	.8243	1.2959	1.572	1.213	.77162	30
40	.6383	.8292	1.2991	1.567	1.206	.76977	20
50	.6406	.8342	1.3022	1.561	1.199	.76791	10
40	.6428	.8391	1.3054	1.556	1.192	.76604	50
10	.6450	.8441	1.3086	1.550	1.185	.76417	50
20	.6472	.8491	1.3118	1.545	1.178	.76229	40
30	.6494	.8541	1.3151	1.540	1.171	.76041	30
40	.6517	.8591	1.3184	1.535	1.164	.75851	20
50	.6539	.8642	1.3217	1.529	1.157	.75661	10
41	.6561	.8693	1.3251	1.524	1.150	.75471	49
10	.6583	.8744	1.3284	1.519	1.144	.75280	50
20	.6604	.8796	1.3318	1.514	1.137	.75088	40
30	.6626	.8847	1.3352	1.509	1.130	.74896	30
40	.6648	.8899	1.3386	1.504	1.124	.74703	20
50	.6670	.8952	1.3421	1.499	1.117	.74509	10
42	.6691	.9004	1.3456	1.494	1.111	.74314	48
10	.6713	.9057	1.3492	1.490	1.104	.74120	50
20	.6734	.9110	1.3527	1.485	1.098	.73924	40
30	.6756	.9163	1.3563	1.480	1.091	.73728	30
40	.6777	.9217	1.3600	1.476	1.085	.73531	20
50	.6799	.9271	1.3636	1.471	1.079	.73333	10
43	.6820	.9325	1.3673	1.466	1.072	.73135	47
10	.6841	.9380	1.3711	1.462	1.066	.72937	50
20	.6862	.9435	1.3748	1.457	1.060	.72737	40
30	.6884	.9490	1.3786	1.453	1.054	.72537	30
40	.6905	.9545	1.3824	1.448	1.048	.72337	20
50	.6926	.9601	1.3863	1.444	1.042	.72136	10
44	.6947	.9657	1.3902	1.440	1.036	.71934	46
10	.6967	.9713	1.3941	1.435	1.030	.71732	50
20	.6988	.9770	1.3980	1.431	1.024	.71529	40
30	.7009	.9827	1.4020	1.427	1.018	.71325	30
40	.7030	.9884	1.4061	1.422	1.012	.71121	20
50	.7050	.9942	1.4101	1.418	1.006	.70916	10
	.7071	1.	1.414	1.414	1.	.70711	45
	Cosin.	Cotg.	Cosec.	Sec.	Tan.	Sine.	Angle.

BS HI

B 3.46 103.46 100

3.45 100.1

13.42

1073
81 03
2628

100.1

3.45

103.46
.72
102.74
100.1
2.64

100.1
886
11.5

℄ Rd & Track Rail 4.85

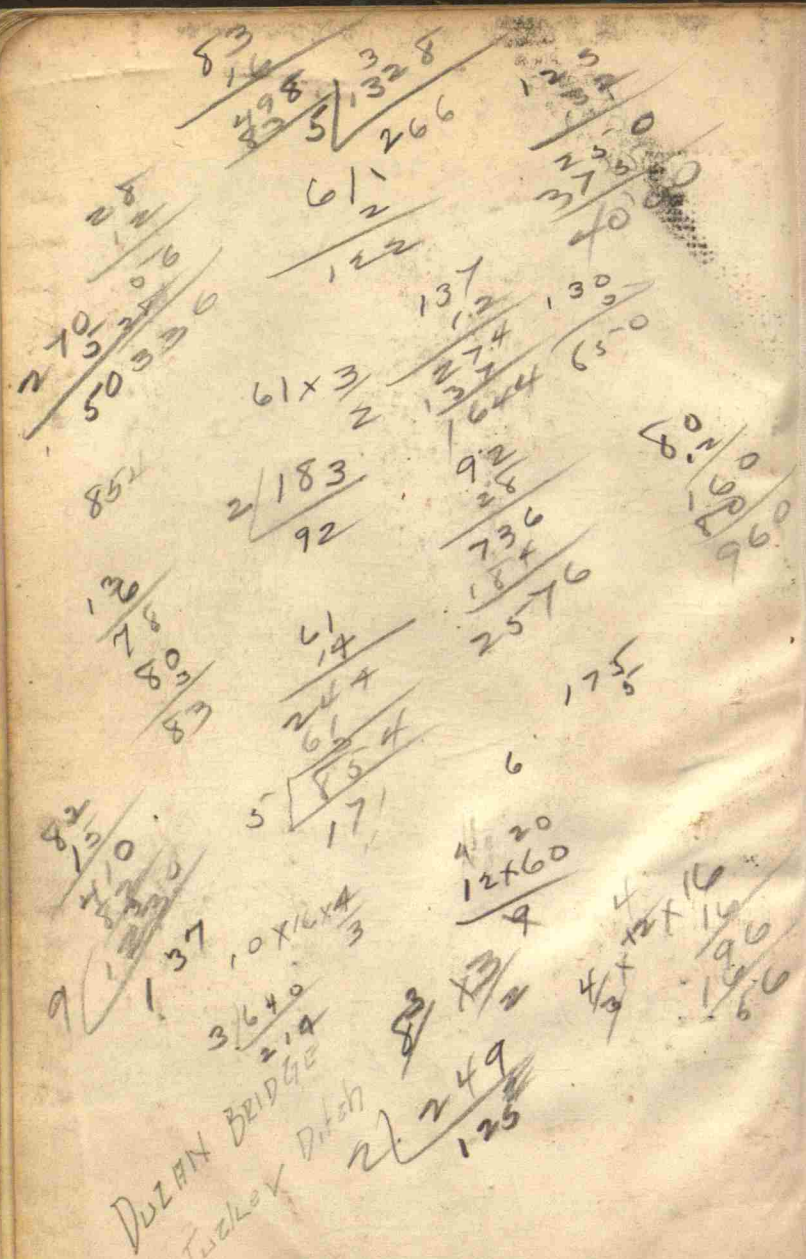
100' W.	"	5.10
200' "	"	5.40
300' "	"	5.70
400' "	"	5.95
500' "	"	6.10
600' "	"	6.40
100' E	"	4.70
200' E	"	4.70
300' "	"	4.65
400' "	"	4.55
500' "	"	4.35
600' "	"	4.25

12.5
15
13.25

103.46
13.25
90.21

886
1.61

12
61
12
72



102,76
539
10815
780
10335

DISTANCE FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

ROADWAY 14 FEET WIDE. SIDE SLOPES $1^1/_2$ 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.