DIETZGEN

TRADE MARK

ENGINEERS'

FIELD BOOK

No. 400

EUGENE DIETZGEN CO.

DRAWING MATERIALS, MATHEMATICAL and SURVEYING INSTRUMENTS

Chicago New York San Francisco New Orleans Pittsb… Toronto

Distances from Center of Roadway for Cross-Se… doning

Roadway 16 Feet Wide … Slope Stake No…

… Single Track … Embankment …

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

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

Newbury Twp.

N. & S. Center Rd. from Auburn line to Smiths Crossings Pg 2-5

Smiths Crossing South

Stakes. Auto Center 300

from Auburn Corners

Apr. 16 — 70 Stakes

" 12 — 105 "

Roads, 26' & Ditch to 2 Ditch

6 " — Not less than 18' Roadway

Frosts Cor. to Fullerton Pg 22

STERRY Rd at SR. 87 CH. #12

Greens Crossing Eastly Pg 35

CH. #10 & CH. #4

Perkin Road Pg 48

Smiths Crossing Eastly Pg 63

Penn Rd & CH. #4

Potters Corners Pg 64

Boss Lake Rd.

Music Street #1146 Sec. F Pg 66

Mansfield Road CH. #16 North Woodland Pg 70

FAIRMOUNT

Smiths Crossing North Pg 74

Music St West of Munn Rd Pg 67

(OVER)

Levels Joe Teichmans 33
" Wolf 34

Mar. 25. Marks, Straw. Thompson, 1 day @ .40
Stakes at Auburn Center.
Mr. Geo. Munn, Trustee.

B.M. Elev. 1245.61
On S. Root 3" Maple in front of House on N.W. Cor. Newbury Center, about 200' W. of C. N.T.S. Road.

Apr. 7, 1924, Marks, Straw, 1 day, @.40, Fare .70
8 " " " 1 " @.40, " 1.40
9 " " " 1/2 — 1.00
9 Marks, Straw. Fullerton 1/2 day.
10 Marks + Straw. 1 day, @.40 1.40
" Gas + Oil 1.35
" Otto Schultz 1 day
11, Marks, Straw, Schultz, 1 day @.40 Fare 1.40
12, Marks + Straw. 1 day @.40 Fare .70
15, Marks + Straw. 1 " @.40
16, " + " Fullerton 1 day @.40
17, Marks + Straw, Fullerton 1 day @.40

N. + S. Center Rd.

from S. Line Newbury Twp. to Smith's Crossing

33+50 $\Delta = 1°02'R$

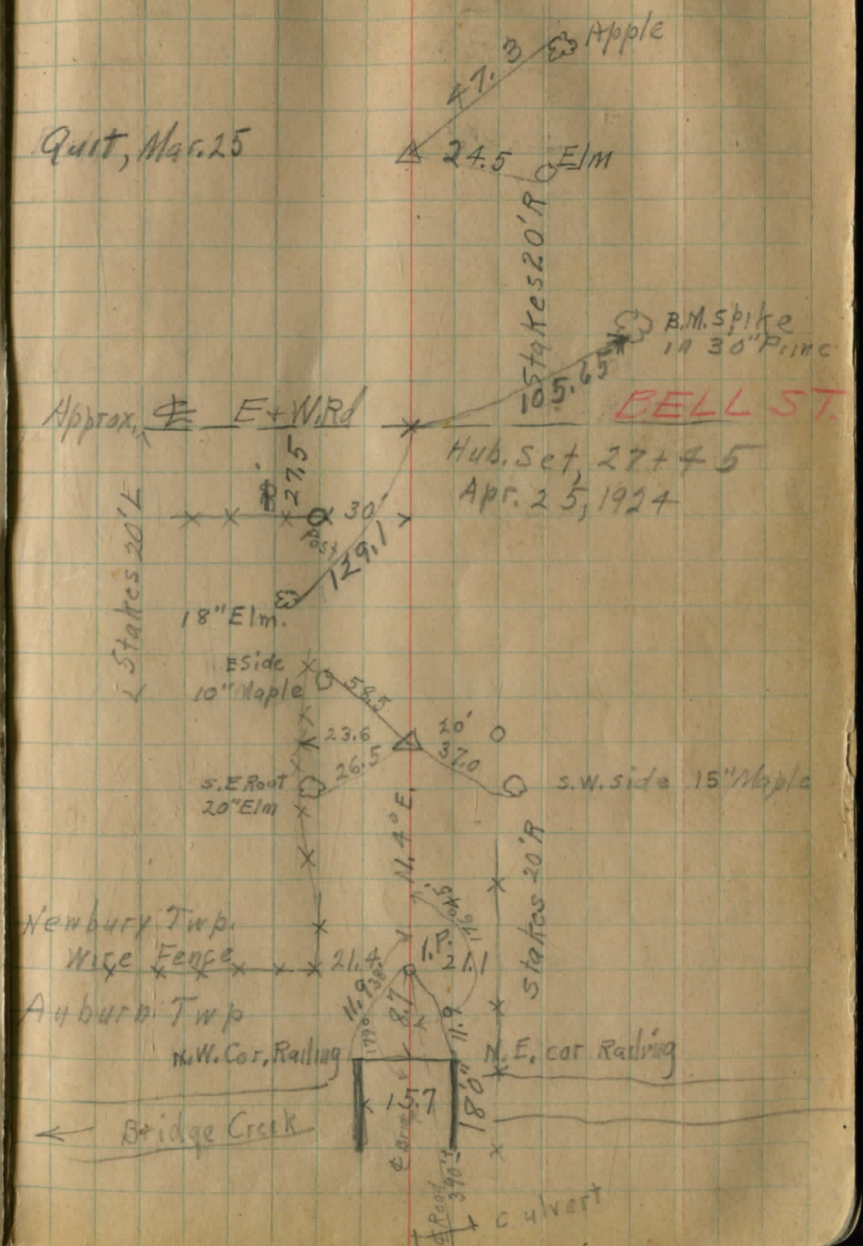
27+ ~~45.0~~ ~~1.15~~ $\Delta = 00$

13+00 $\Delta = 0°22'R$

0+00

Mar. 25, 1924
36°, Cloudy.
Marks
Gray
Thompson

Quit, Mar. 25



133+00 0°00'

131+42.5 S. Fence, Cemetery

119+99.3 Δ 0°00'

113+47 Δ = 1°12 R

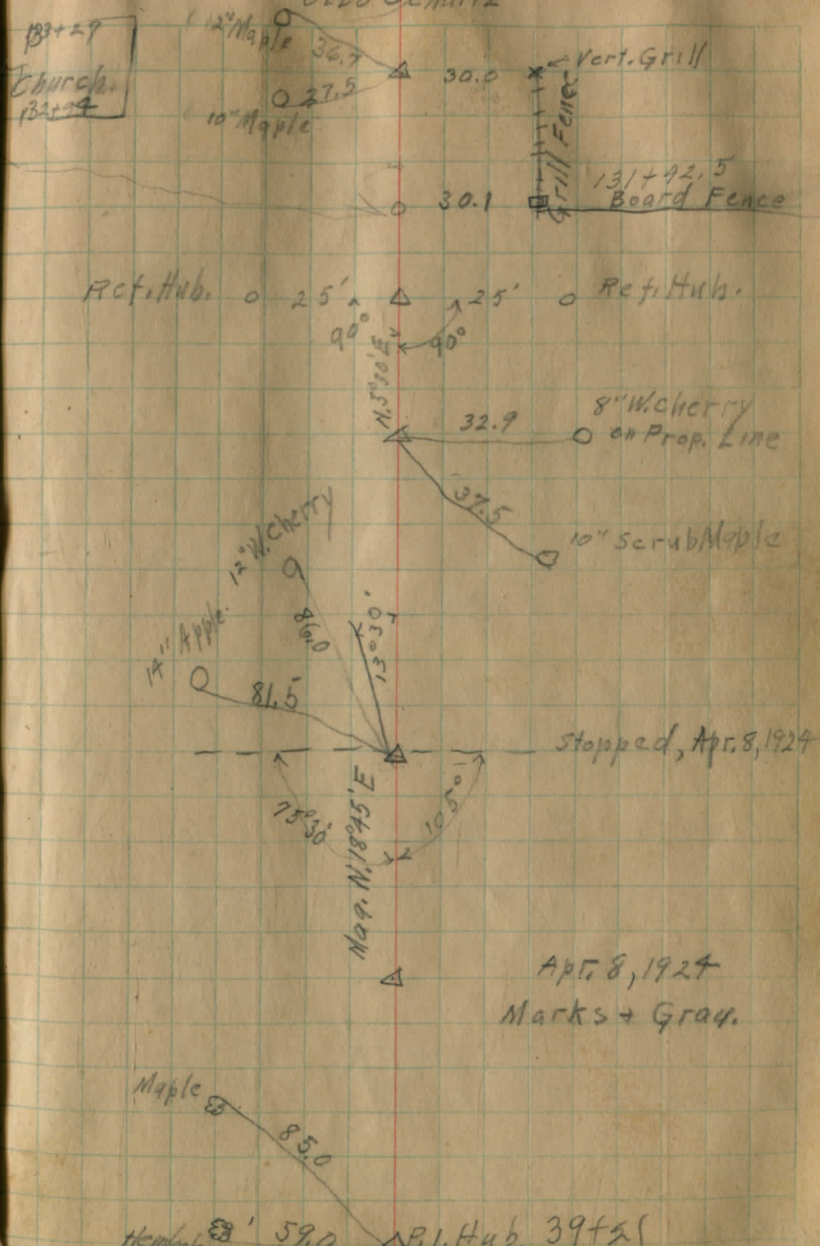
93+79 0°00'

81+54.0 Δ = 13°30' ℄ E. & W. Rd.

52+55.8 Δ = 0°33' L.

P.T. = 40+39.6
P.C. 37+81 D = 5° T = 140' L = 278.6
P.T. 39+21 Δ = 13°56' R.

Apr. 10, 1924, Marks Gray
Fair Otto Schultz



Wood Beam Bridge 25.5 span

181+12. Forms Not stripped, Poor Concrete
Conc. Culvert 2.5'X1.7'

165+00 Δ = 1°16'L

156+64 0°00'

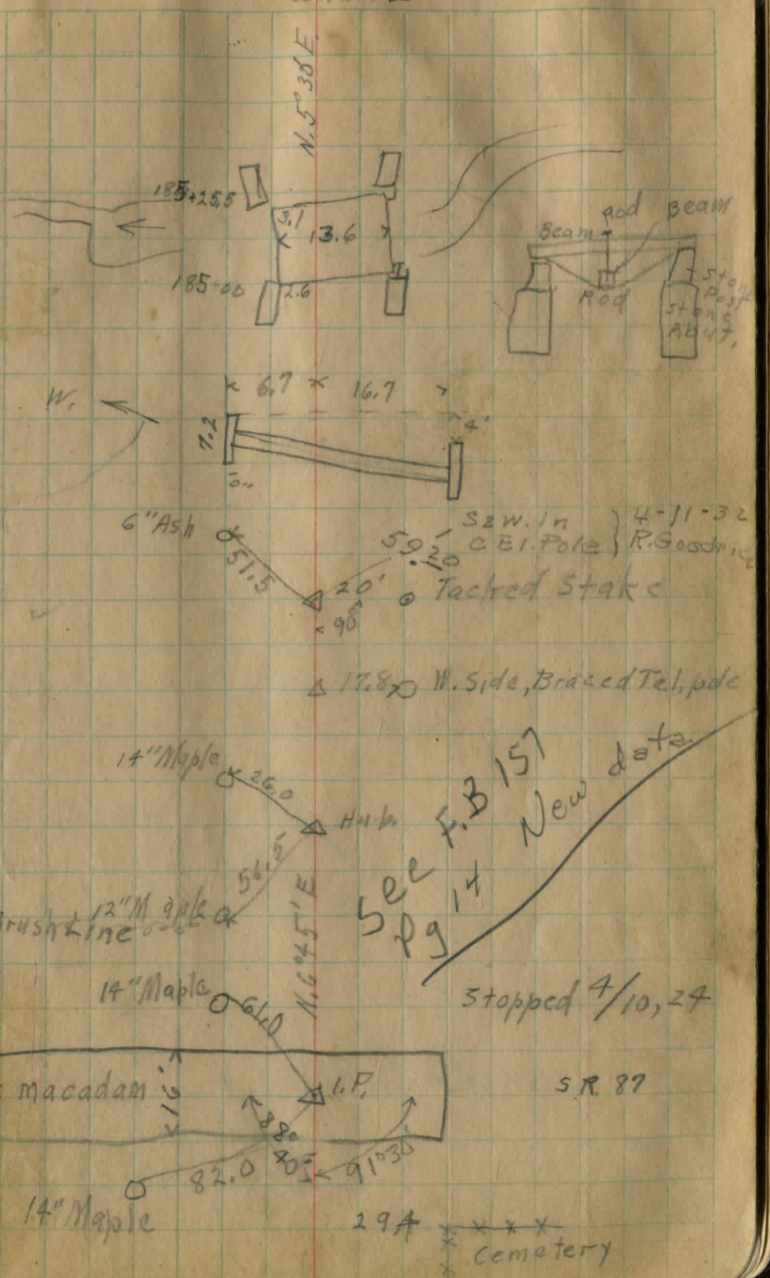
147+51.6 0°00'

Δ = 0°31'R.

139 +17.9 E.+W. Center Rd (Newbury Center)

134+43.7

Apr. 11, 1924 Marks, Grau, Otto Schultz
Fair.

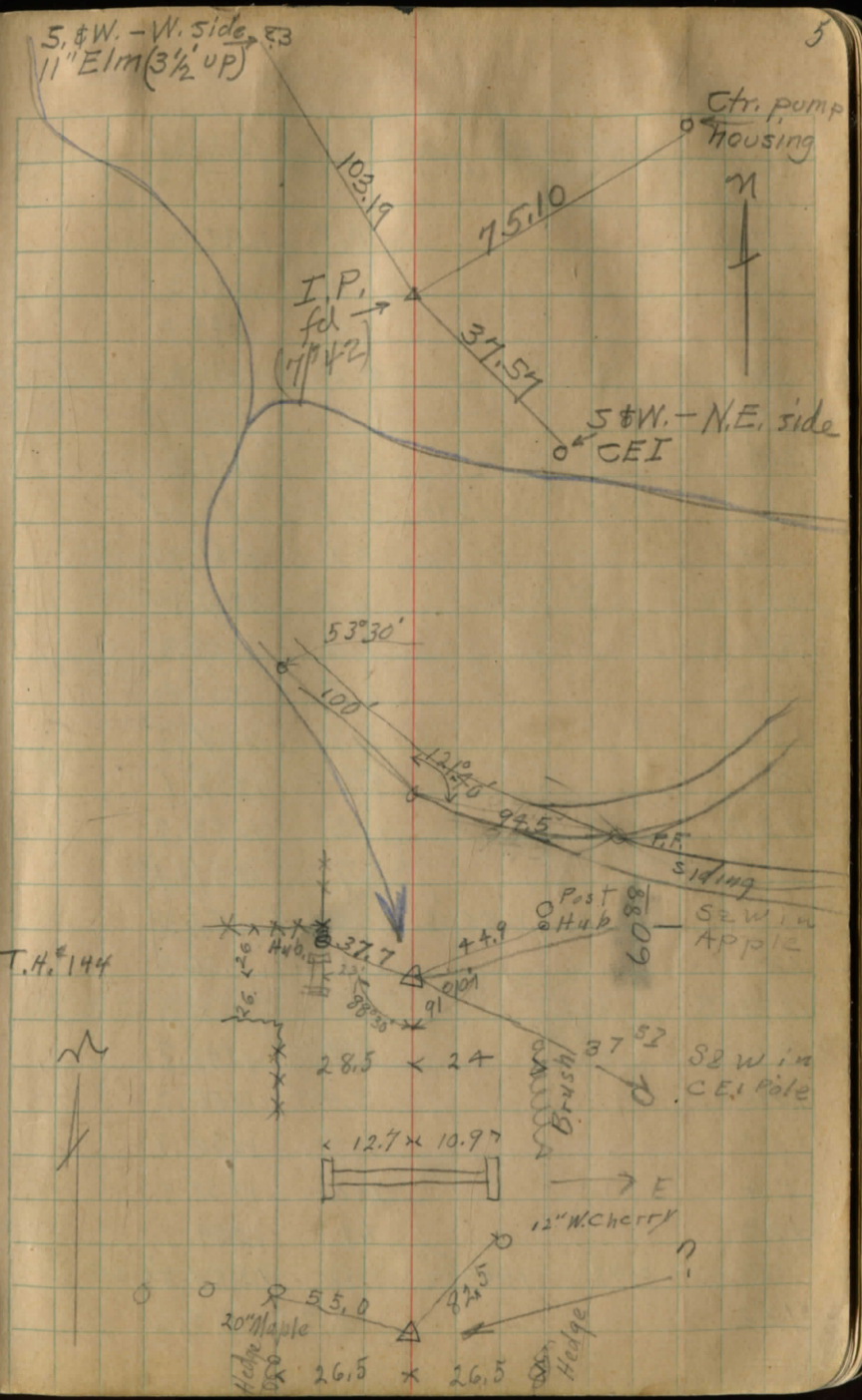


204+15.8 South Rail, C.+E. Ry.

201+75.0 PEKIN & E.+W. Rd. $\Delta = 0°30'$ L.

197+71 2.5 x (3) Stone Culvert

193+00 $\Delta = 0°00'$



	12.73	1258.34		1245.61
139+18			10.9	1247.4
139			11.0	1247.3
138			8.4	1249.9
137			6.5	1251.8
136			3.9	1254.4
135			1.2	1257.1
	7.09	1265.14	0.29	1258.05
134			5.2	1259.9
133+30			3.0	1262.1
133+10			1.8	1263.3
133			1.7	1263.4
132			3.8	1261.3
131			8.0	1257.1
130			11.3	1253.8
129			13.7	1251.4
	2.12	1255.65	11.61	1253.53
128			5.1	1250.5
127+05				
127 05			5.9	1249.7
126			5.4	1250.2
125			4.9	1250.7
124			2.8	1252.8
123			1.1	1254.5
	4.98	1259.52	1.11	1254.54
122			5.9	1255.6

Mark St Gray.
Cloudy. Apr. 12 1924

S.R. 17

B.M., S. Root, 3" Maple, N. Side E+W. Rd, 300' W. of Newbury Center

1246.9 − 1.49 = 100 West

E + W. Rd.

1246.0 + 12.3 = 100' East

Top Stake 129

Solid C.I. Pipe 10"

7' × 11.5' → E

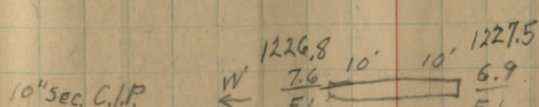
1248.0 − 7.6 = 7. F.L.

1246.8 + 8.8 = 11.5 F.L.

Top St. 123

		1239.52		
121			2.6	1256.9
120+40			1.1	1258.4
120			1.2	1258.3
119			3.2	1256.3
118			6.9	1252.6
117			9.9	1249.6
116			11.3	1248.2
115			12.0	1247.5
114			13.4	1246.1
	0.18	1246.75	12.95	1246.57
113			6.3	1240.4
112+50			7.3	1237.4
112			11.4	1235.0
111			13.8	1232.9
	0.71	1234.44	13.02	1233.73
110			2.4	1232.0
109			3.1	1231.3
108			4.0	1230.4
107+02			4.0	1230.4
106			4.2	1230.2
105			3.8	1230.6
104			2.3	1232.1
103			0.9	1233.5
102			1.6	1232.8
	4.63	1236.87	2.20	1232.24
101			4.4	1232.5
100			4.5	1232.4

Top St. 111



		1236.87		
99			4.6	1232.3
98			4.5	1232.4
97			4.5	1232.4
96			4.0	1232.9
95			3.6	1233.3
94			4.4	1232.5
93			5.3	1231.6
92			6.0	1230.9
	0.30	1231.99	5.18	1231.69
91			2.1	1229.9
90			4.0	1228.0
89			6.8	1225.2
88			8.8	1223.2
87			10.2	1221.8
86			12.1	1219.9
85			14.3	1217.7
	0.58	1219.88	12.69	1219.30
			1.68	1218.20
84			3.7	1216.2
83			5.5	1214.4
82			7.0	1212.9
81+54	E.E.+W.Rd,		7.9	1212.0
81			9.4	1210.5
80			12.4	1207.5
	1.90	1209.72	12.06	1207.82
79			3.0	1206.7
78			3.3	1206.4

Top. Stake. 92

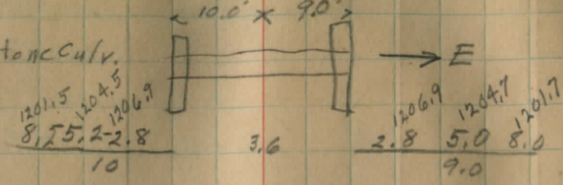
Top. Stake 85
B.M. Set. E. Root 24" W. Cherry E. of Sta 84+00

1212.7
7.2
100' W

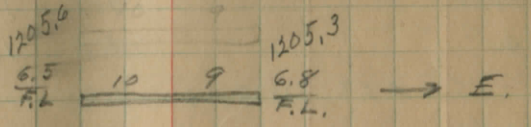
1211.2
8.7
100' E

		1209.72		
77			4.2	1205.5
76+40			3.6	1206.1
76			4.6	1205.1
75			3.5	1206.2
74			2.2	1207.5
73			0.8	1208.9
	3.48	1212.09	1.11	1208.61
72			4.5	1207.6
71+80			4.5	1207.6
71			4.3	1207.8
70			2.2	1209.9
69+25			0.2	1211.9
69			0.6	1211.5
68			1.3	1210.8
67			1.9	1210.2
66			3.1	1209.0
	0.21	1210.50	1.80	1210.29
65			3.8	1206.7
64			5.5	1205.0
63+60			5.6	1204.9
				1204.9
63			5.6	1204.9
62			5.8	1204.7
~~61~~			~~5.7~~	

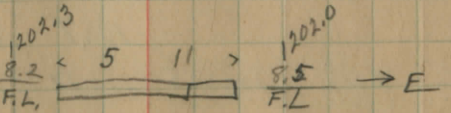
3'x3' Stone Culv.
Good



8" Solid C.I.P.



10" Sec. C.I.P.



		1210.50		
61+15			6.1	1204.4
61			5.7	1204.8
60			4.7	1205.8
59			2.6	1207.9
	4.81	12 11.43	3.88	1206.62
58			1.2	1210.2
57			6.8	1204.6
56+00			8.8	1202.6
55			7.3	1204.1
54+60			5.7	1205.7
54			1.0	1210.4
	4.23	1215.26	0.40	1211.03
53+50			2.2	1213.1
53			1.4	1213.9
52+50			1.2	1214.1
52			2.4	1212.9
51			5.5	1209.8
50			8.4	1206.9
49			10.1	1205.2
48			11.2	1204.1
47+40			11.5	1203.8
47			12.7	1202.6
	0.28	1203.25	12.29	1202.97
46			3.9	1199.3
45			4.7	1198.5
44+60			4.6	1198.6

8" C.I.P. 1202.6 7.9 F.L. < 12' × 8' > 1202.1 8.4 F.L. → E

10" Sec. C.I.P. 1200.7 11.2 F.L. < 11.5 < 8.3 > 1199.7 11.7 F.L. → E

12" Solid C.I.P. 4 sec. 1196.2 7.0 F.L. < 7.5 12 > 1195.2 8.0 F.L. → E

		1203.25		
44			4.5	1198.7
43			3.2	1200.0
42			2.9	1200.3
41			2.3	1200.9
40+60			1.6	1201.6
40			1.2	1202.0
39			2.7	1200.5
	3.83	1204.63	2.45	1200.80
38			4.3	1200.3
37			5.0	1199.6
36			4.9	1199.7
35+95			4.9	1199.7
35			4.3	1200.3
34			3.5	1201.1
33			1.5	1203.1
32+50			0.0	1204.6
	6.69	1209.87	1.45	1203.18
32			4.6	1205.3
31			4.3	1205.6
30			4.7	1205.2
29			4.8	1205.1
28			4.5	1205.4
27+45	℄ E+W. Rd		4.1	1205.8
27			3.0	1206.9
	5.42	1213.37	1.92	1207.95
			3.00	1210.37
26			5.2	1208.2

P.I. Hub, 39+

10" C.I.P

1197.3 / 7.3 / F.L. ← 8' 10' → 1196.9 / 7.7 / F.L. 1196.5 / 8.1 / 100 → E

1202.7 / 7.2 / 100' W

1208.1 / 1.8 / 100' E

Top. Stake 27

B.M. Set by D.G. Dick, 1923 1209.14
S.W. Root, 30" Pine, N. Side E.+W. Rd., 100± E of Corn

		1213.37		
25			4.1	1209.3
24+40			3.0	1210.4
24			3.4	1210.0
23			4.9	1208.5
22			5.4	1208.0
21			5.4	1208.0
20+17			5.1	1208.3
20			5.0	1208.4
19			4.9	1208.5
	8.40	1216.18	5.59	1207.78
18			7.1	1209.1
17			6.1	1210.1
16			5.0	1211.2
15			4.1	1212.1
14			3.3	1212.9
13			3.1	1213.1
12			6.4	1209.8
11			9.1	1207.1
10			10.3	1205.8
	0.61	1206.42	10.37	1205.81
9			2.0	1204.4
8			2.3	1204.1
7+40			2.5	1203.9
7			1.7	1204.7
6+50			2.8	1203.6
6			5.6	1200.8
5+50			10.6	1195.8

8" Solid C.I.P. W←

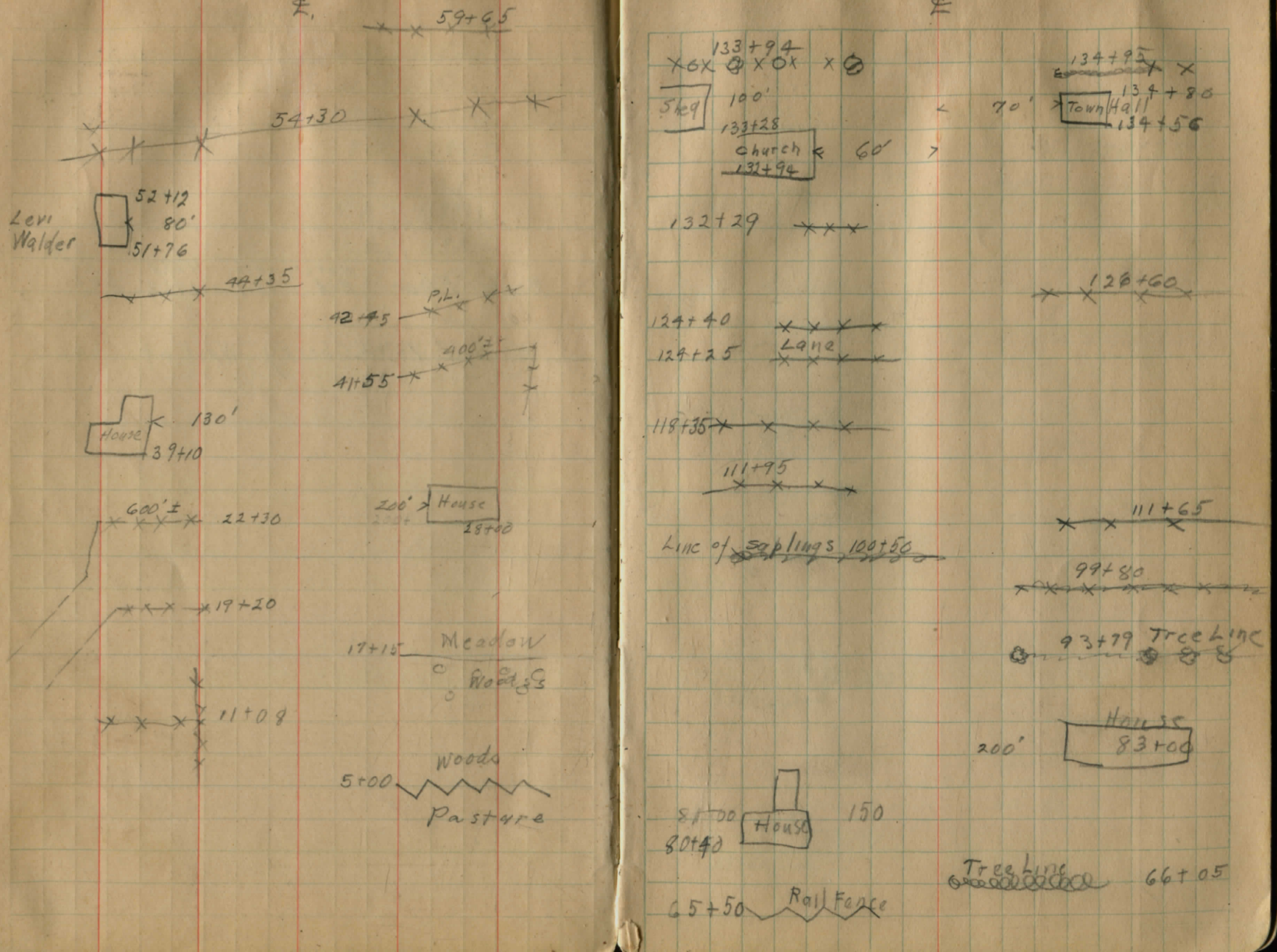
1206.1 F.L. 7.3 | 10.5 | 7.5 | 7.0 F.L. 1206.4

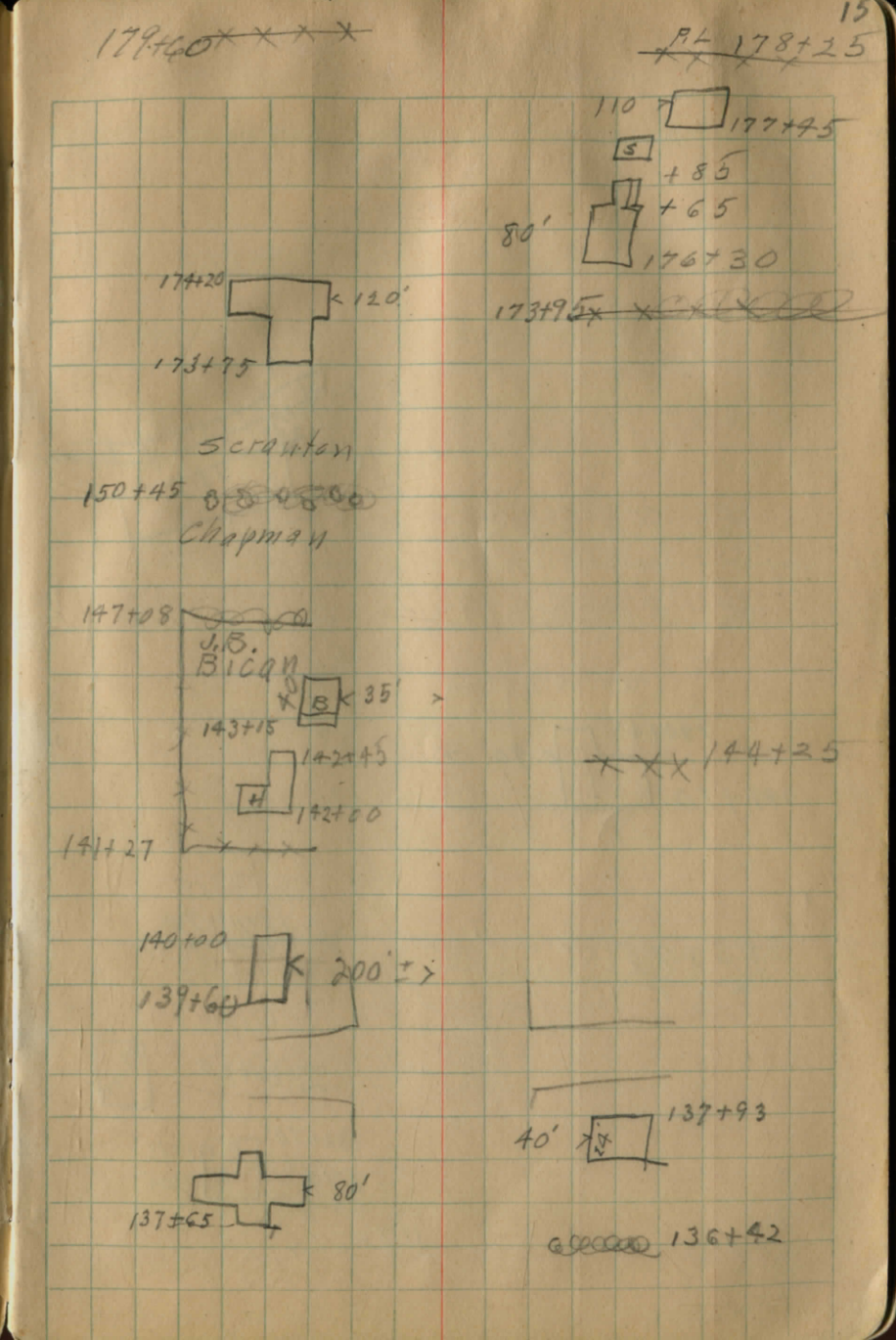
Top. Stake 19

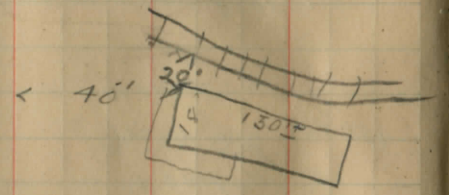
		1206.42		
5			13.9	1192.5
	0.20	1194.43	12.19	1194.23
4			5.6	1188.8
3			7.7	1186.7
2			9.4	1185.0
1			11.2	1183.2
0			11.2	1183.2
			11.1	1183.3
0-100			10.8	1183.6
			6.24	1188.19

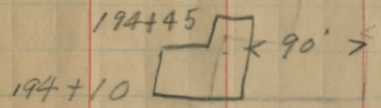
Bridge Floor	Water	14.6	1179.8
	Bed	18.1	1176.3

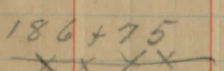
E. Root, 18" W. Cherry, West of 4700

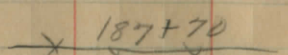

℄
59+65
54+30
52+12
80'
Levi Walder
51+76
44+35
P.L.
42+75
400'±
41+55
House
130'
39+10
600'±
22+30
200'
House
28+00
19+20
17+15
Meadow
Woods
11+08
5+00
Woods
Pasture
℄
133+94
100'
Sky
133+28
Church
132+94
60'
70'
134+95
Town Hall
134+80
134+56
132+29
126+60
124+40
124+25
Lane
118+35
111+95
Line of Saplings 100+50
111+65
99+80
93+79
Tree Line
House
83+00
200'
80+40
House
150
65+50
Rail Fence
Tree Line
66+05

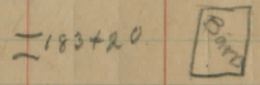

179+60
PL 178+25
110
177+45
S
+85
+65
80'
176+30
173+95
174+20
120'
173+75
Scranton
150+45
Chapman
147+08
J.B.
Bican
S
B
35'
143+15
142+45
H
142+00
141+27
144+25
140+00
139+60
200'±
40'
137+93
80'
137+65
136+42

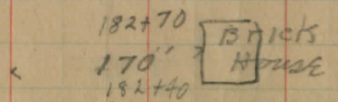

40'
20'
14
130±


194+45
90'
194+10


186+75


187+70


183+20
Barn

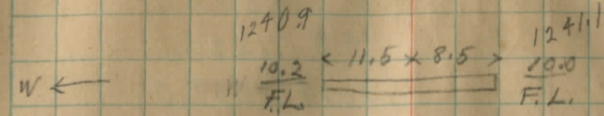

182+70
170'
182+40
Brick
House

187+[illegible]

	5.47	1251.08		1245.61
140			5.5	1245.6
141			6.8	1244.3
142			7.9	1243.2
142+75	10" C.I.P., sectional		8.1	1243.0
143			8.2	1242.9
144			8.1	1243.0
145			6.9	1244.2
	1.90	1245.98	7.00	1244.08
146			1.8	1244.2
147			1.0	1245.0
148			0.1	1245.9
148+10			0.0	1246.0
149			1.4	1244.6
150			3.4	1242.6
151			5.0	1241.0
152			5.7	1240.3
153			6.3	1239.7
154			7.1	1238.9
155			7.6	1238.4
	1.19	1239.38	7.79	1238.19
156			1.2	1238.2
157			1.4	1238.0
157+65			1.6	1237.8
158			2.2	1237.2
159			3.6	1235.8
160			5.4	1234.0
161			6.6	1232.8

Apr. 15, 1924 — Marks
Cool - Cloudy — Gray

B.M., S. Root 3' Maple, N. side E. & W. Rd. 200' W. of Newbury Center



		1239.38		
162			7.9	1231.5
163			8.6	1230.8
164			9.3	1230.1
165			10.4	1229.0
165+50			11.5	1227.9
166			13.1	1226.3
	0.42	1227.30	12.50	1226.88
167			4.1	1223.2
168			7.6	1219.7
+50			9.6	1217.7
169			12.5	1214.8
	0.09	1214.70	12.69	1214.61
170			5.9	1208.8
171			11.9	1202.8
	0.31	1201.99	13.02	1201.68
172			4.1	1197.9
173			7.4	1194.6
174			9.3	1192.7
175			10.7	1191.3
+60			11.8	1190.2
	0.62	1189.59	13.02	1188.97
176			1.6	1188.0
177			8.3	1181.3
178			12.8	1176.8
	0.63	1177.30	12.92	1176.67
178 +70			2.1	1175.2
179			4.5	1172.8

		1177.30		
179+50			8.0	1169.3
180			9.4	1167.9
181			11.1	1166.2
181+12			10.9	1166.4
181+45			11.1	1166.2
182			9.4	1167.9
182+60			8.6	1168.7
183			9.6	1167.7
183+25			10.8	1166.5
	2.11	1166.41	13.00	1164.30
184			6.1	1160.3
+20			8.0	1158.4
185			9.5	1156.9
+13			17.0	1149.4
+26			9.1	1157.3
+50			10.4	1156.0
186			9.7	1156.7
+45			8.6	1157.8
187			5.7	1160.7
	12.10	1177.91	0.60	1165.81
188			11.2	1166.7
+50			8.1	1169.8
189			6.4	1171.5
190			2.5	1175.4
	8.50	1186.08	0.33	1177.58
191			8.0	1178.1
192			5.6	1180.5

1163.75		1165.55		1167.40		1166.4		1166.4		1167.7		1165.65		1163.95
13.55	11.85	9.7		10.9				10.9		9.6	11.65		13.35	
5.2	6.7			5.8				15.8		16.7			F.L.	

Bridge Floor
Stream Bed
Bridge Floor

		1186.08		
193			3.5	1182.6
+75			5.7	1180.4
			0.15	1185.93
194			7.9	1178.2
	1.45	1174.52	13.01	1173.07
195			4.3	1170.2
+50			7.9	1166.6
196			11.4	1163.1
	1.02	1163.20	12.34	1162.18
196+50			2.5	1160.7
197			3.9	1159.3
197+71	Culvert		6.2	1157.0
198			6.9	1156.3
+50			7.4	1155.8
199			7.2	1156.0
200			5.1	1158.1
201			4.7	1158.5
201+75	℄ E+W. Rd,		3.1	1160.1
202			2.5	1160.7
203			0.6	1162.6
	11.73	1174.15	0.78	1162.42
203+50			9.9	1164.2
204			7.8	1166.3
+16	S. Rail		6.4	1167.7
+21			6.65	1167.5
205			1.8	1172.3
B.M. Set.			9.12	1165.03

B.M. Beat Spike, E. Root 18" Maple W. of 193+40

1153.8

9.4 / F.L.

8.4 4.3 / 12.7

6.2 / 11

6.2 / 9

5° 4.2 8.3 9.4 / 10.9 F.L.

1161.3

1.9 / 100' W.

1157.7

5.5 / 23 F.L. side Rd. Culvert.

1159.7

4.0 / 100' E.

5.9 / 100' W.

7.0 / 100' E

W. Root, Double Elm, W. of 203+15

	3.88			
58	.58	1280.88		1277.00
0+00			2.3	1278.6
+08			2.5	1278.4
+13			3.1	1277.8
0+50			7.6	1273.3
0+70			9.0	1271.9
1			10.2	1270.7
2			12.0	1268.9
	1.81	1270.97	11.72	1269.16
3			3.9	1267.1
4			4.9	1266.1
5			5.3	1265.7
+14	12" Corr. Pipe, Stone H.Ws.		5.1	1265.9
6			5.6	1265.4
7			4.5	1266.5
8			1.7	1269.3
+40			0.9	1270.1
+60			1.0	1270.0
9			1.6	1269.4
10			4.4	1266.6
11			7.8	1263.2
12			12.0	1259.0
	1.01	1259.61	12.37	1258.60

Fullertown Road, Newbury Tp.

From E. & W. Centre Rd. North & N. W. to W. Tp. line,

May 1, 1924 Cloudy, Windy Marks & Grau

B.M. 1277.00, N. root, 30" Maple, on S. side of E. & W. Rd, 400' E. of Fullertown Rd.

1278.6 − 2.3 = 100' N

1278.6 − 2.3 = 0

1277.6 − 3.3 = 100' E.

12634 − 26.48 = 10.

12667 − 1265.9 = 5.1

1266.3 − 4.7 = 10

1263.5 − 7.5 = FL

FROST'S CORNER'S to FULLERTOWN

43+00 0°00'

35+61.5 Stone Culvert

L = 216.67
T = 108.45
D = 3°

P.T. = 28+40.12
27+31.9 P.I. Δ = 6°30' Right.
P.C. = 26+23.45

L = 225.0'
T = 112.63
D = 3°

P.T. 23+12.37
22+00 P.I. Δ = 6°45' Left.
P.C. 20+87.37

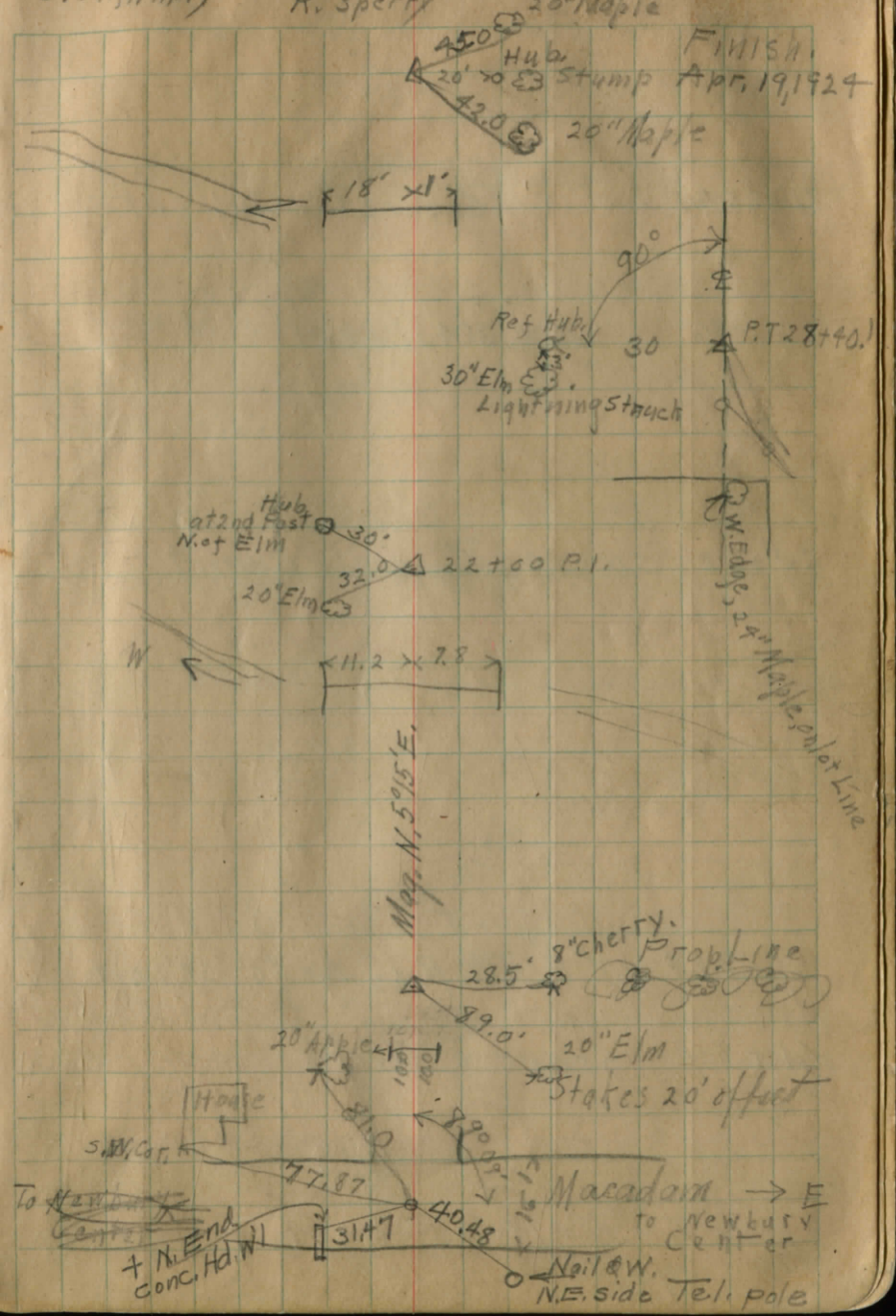
18+20 1'x1' Stone Box

9+13.1 Hub. 0°00'

5+14 12" Corr. Pipe ~~Stone~~ Culvert. Stone H.W.S

0+00 Pipe flush with Ft. Slope
C.H. #12

Apr. 19, 1924 Marks
Clear, Windy F. Gray.
R. Sperry



67+48.6
61+74.8
5 73.8

71+35.4 Concrete Culvert

67+48.6 Δ = 3°42' Left.

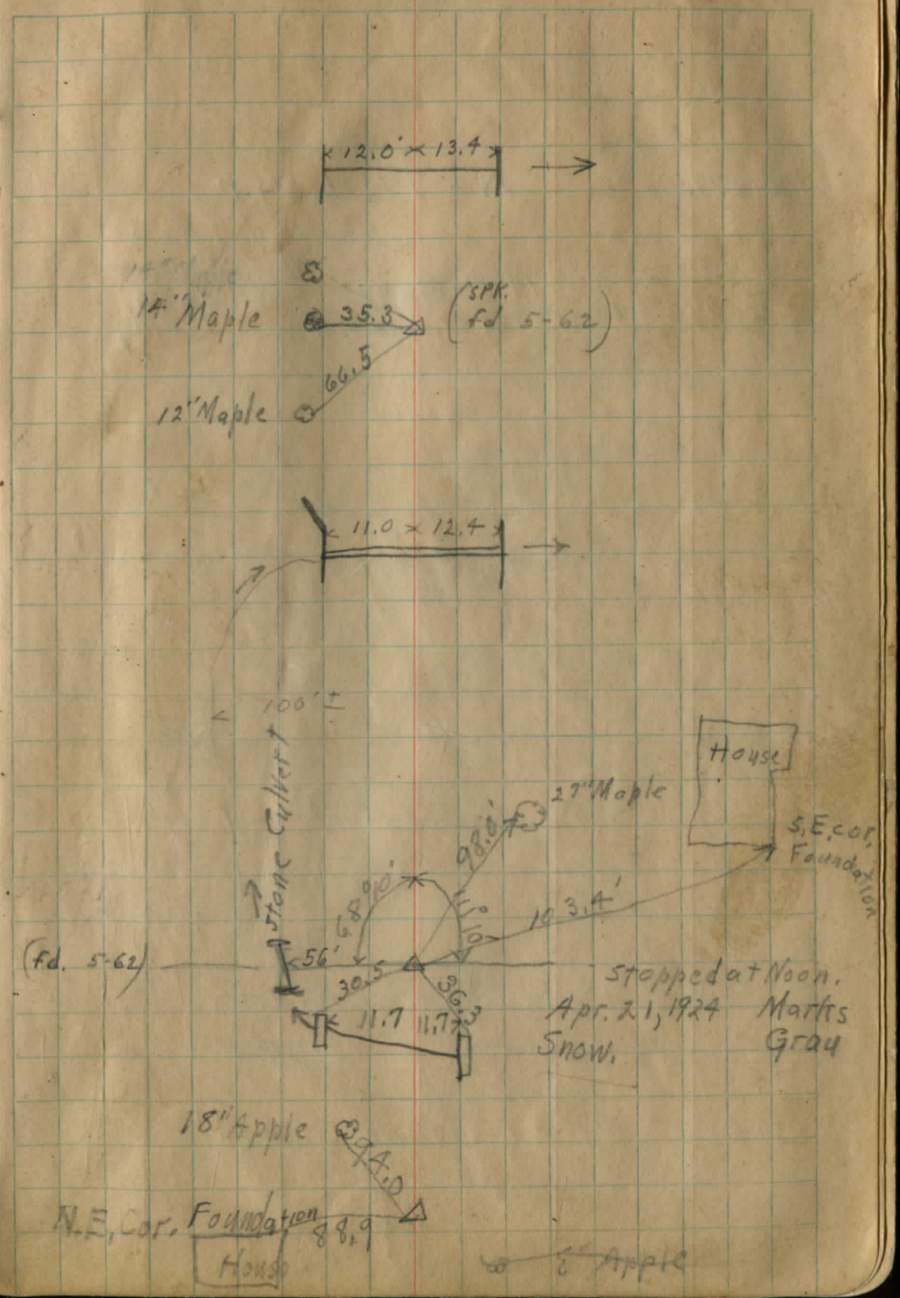
64+92 20"x26" Concrete Culvert

61+74.8 E.E.+W. Rd. Δ = 20° 38' Left.

61+39 Stone Culvert

57+00 Δ = 1°+3' Left

Apr. 24, 1924 Marks, Gray, Marshall Andrews 23
Fair.



106+77.2 Δ = 9°12' Left

106+26 Abandoned Mill Race

104+68.7 14' Roadway 56.9' span Center Steel Truss. Bridge

Δ = 9°36' Left

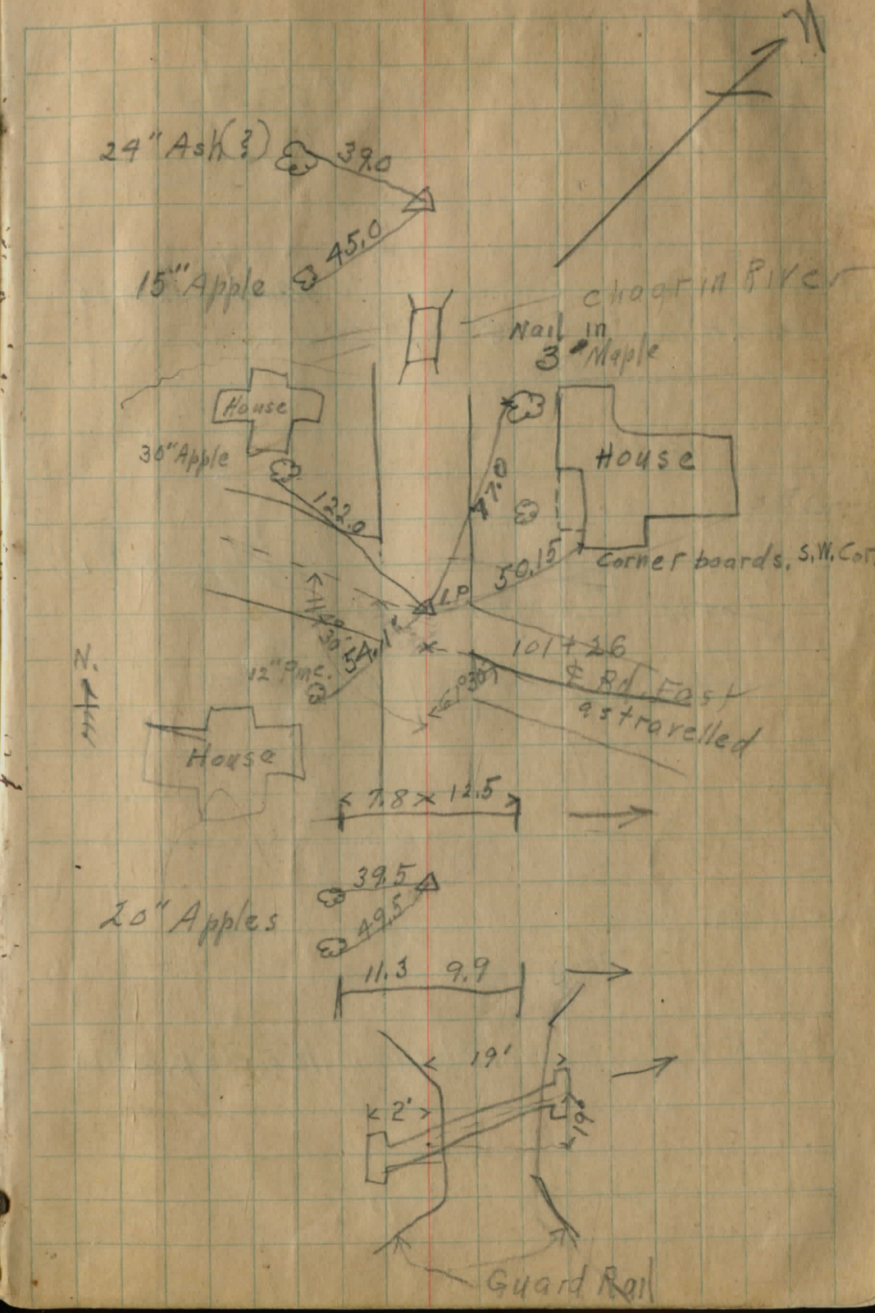
101+49.2 Found Iron Stake of E. + W. Rd.

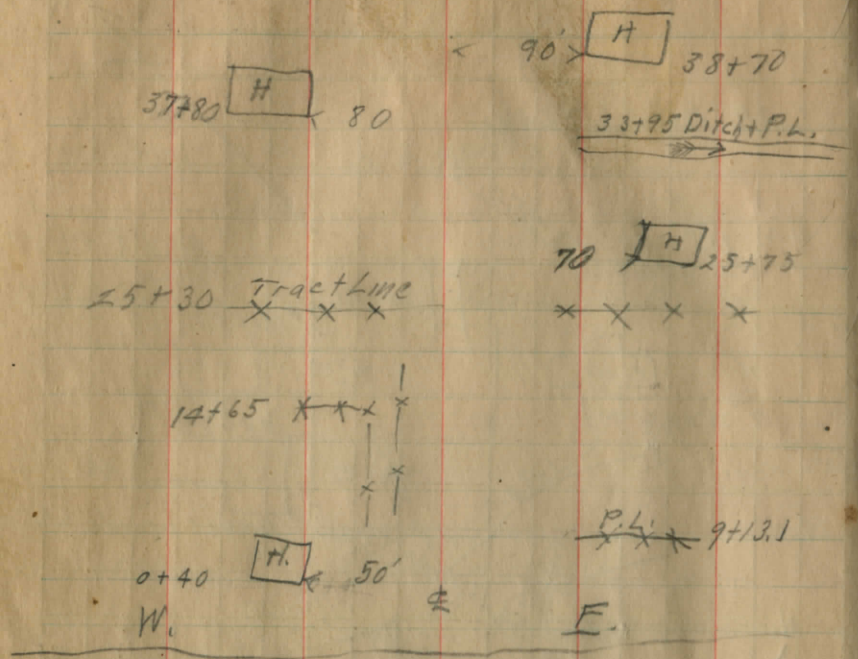
99+97 Stone Culvert

89+00 Hub 0°00'

86+44 1'x1' Stone Culvert

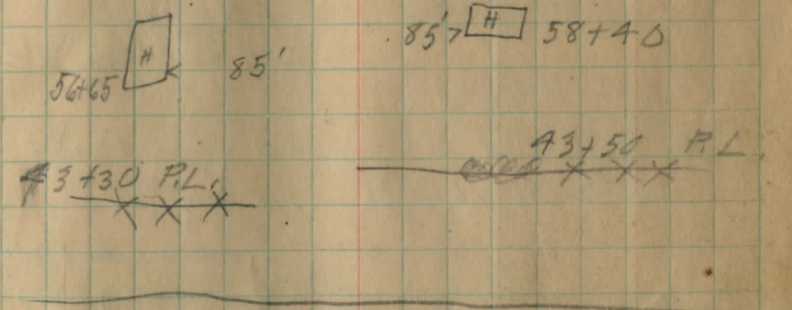
83+29 2'9"x2' Stone Culvert

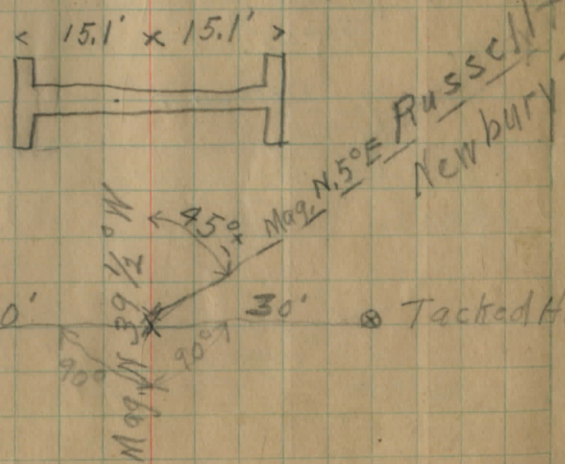


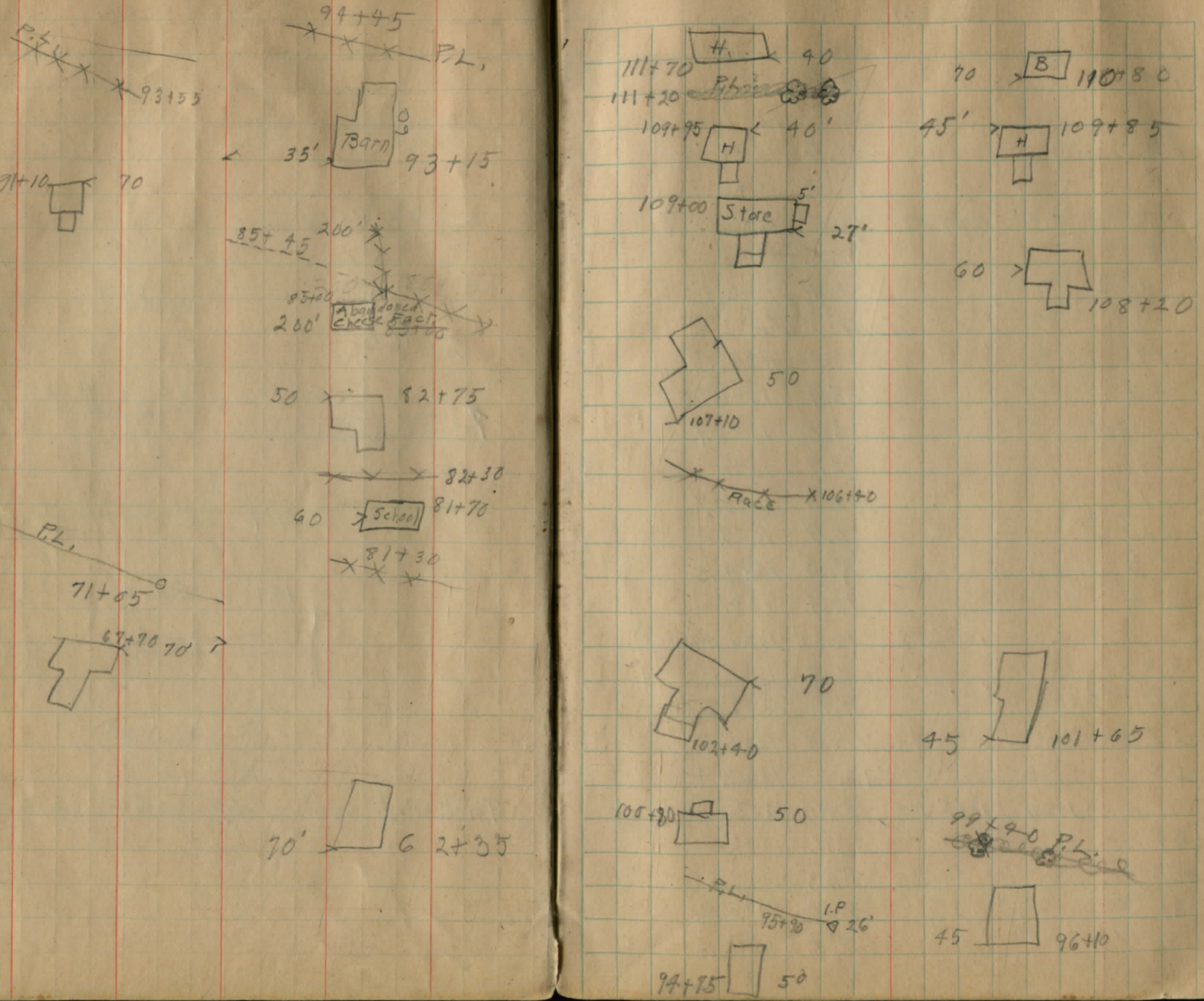


112+95

112+45 Approx ℄ Rd. running N. on Twp. Line






P.L.
93+35
94+45
P.L.
Barn
35'
93+15
91+10
70
85+45
200'
85+00
200'
Abandoned Creek Bed
85+00
50
82+75
82+30
60
School
81+70
81+30
P.L.
71+65
67+70
70
70'
62+35
H.
40
111+70
111+20
Pond
109+95
H
40'
109+00
Store
5'
27'
50
107+10
Race
106+40
70
102+40
105+80
50
P.L.
95+20
I.P
26'
94+75
50
70
B
110+80
45'
H
109+85
60
108+20
45
101+65
99+40
P.L.
45
96+10

		1259.61		
13			4.0	1255.6
14			7.5	1252.1
15			9.8	1249.8
16			11.6	1248.0
17			12.7	1246.9
	2.41	1249.09	12.93	1246.68
18			2.5	1246.6
+20	→	1'x1' Stone Culv.	2.4	1246.7
19			3.6	1245.5
20			3.1	1246.0
+40			3.0	1246.1
+70			2.9	1246.2
21			3.4	1245.7
22			6.7	1242.4
23			9.3	1239.8
24			12.1	1237.0
	0.12	1236.59	12.62	1236.47
25			2.8	1233.8
26			7.0	1229.6
27			10.5	1226.1
28			13.2	1223.4
	1.26	1225.06	12.79	1223.80
29			3.6	1221.5
30			5.3	1219.8
31			6.9	1218.2
32			8.8	1216.3

1243.7 1244.9 1246.6
5.4 4.2 2.5
F.L. 11.2

1247.0 1245.3 1244.1
2.1 - 3.8 - 5.0
7.8 F.L.

		1225.06		
33			10.6	1214.5
34			11.8	1213.3
35			12.4	1212.7
3576.5	15" Stone Culv.		12.1	1213.0
	9.35	1222.66	11.75	1213.31
36			9.3	1213.4
37			7.8	1214.9
+50			6.1	1216.6
38			1.8	1220.8
	12.97	1234.44	0.29	1222.37
39			5.0	1229.4
	10.96	1245.40	0.00	1234.44
40			10.3	1235.1
41			6.4	1239.0
42			3.6	1241.8
+70			2.0	1243.4
43			2.6	1243.4
+30			3.0	1242.4
44			6.3	1239.1
45			11.7	1233.7
	0.26	1233.44	12.22	1233.18
46			4.9	1228.5
47			8.9	1224.5
48			11.1	1222.3
49			12.6	1220.8
	2.01	1222.63	12.82	1220.62
50			2.7	1219.9

1209.7 1211.5 1213.3
15.4 - 13.6 - 11.8
18

1213.5 1211.4 1209.9
11.6 - 13.7 - 15.2

T.P. on High Point, West Headwall

Extra levels fg 33

		1222.63 ✓		
51			3.7	1218.9
52			5.4	1217.2
53			8.0	1214.6
54			9.7	1212.9
55			12.6	1210.0 ✓
	0.18	1210.59 ✓	12.22	1210.41 ✓
56			3.2	1207.4
57			4.9	1205.7
+50			6.9	1203.7
58			11.1	1199.5
+20			13.0	1197.6
	0.21	1197.91 ✓	12.89	1197.70 ✓
58+80			3.2	1194.7
59			4.5	1193.4
+20			5.1	1192.8
60			6.7	1191.2
61			8.0	1189.9
+39	2' Stone Culvert		8.3	1189.6
61+75	℄ E. 4 W. Rd.		9.3	1188.6
62			9.5	1188.4
+70			10.5	1187.4
63			12.3	1185.6
	0.29	1185.49 ✓	12.71	1185.20 ✓
+75			7.1	1178.4
64			8.8	1176.7
+92	Spoon 20" X 26" Height of culv. Conc.		10.8	1174.7
			10.65	1174.84

Top of Station 56

1188.8 — 9.1 / 100' W

11186.9 11188.3 11190.5
11.0 − 9.6 − 7.4
11.7

11190.6 11185.4 11186.8
7.3 − 9.5 − 11.1
11.7

11191.3 — 6.6 / 100' E

11170.9 11173.1 11175.5
14.6 12.4 − 10.0
11.0

11174.9 11172.9 11170.7
10.6 − 12.6 − 14.8
12.4

B.M. — N.E. Cor. E.H.W.

		1185.49		
65			11.0	1174.0
+60			11.3	1174.2
66			10.5	1175.0
+45			8.1	1177.4
67			4.3	1181.2
+25			3.3	1182.2
+50			4.6	1180.9
68			9.1	1176.4
68+70	0.21	1173.90	11.80	1173.69
69			4.1 6.4	1169.8 1167.5
+58			9.3	1164.6
70			11.6	1162.3
+50			13.3	1160.6
71			13.4	1160.5
+35.4	span 18" x 26"	stone + conc. Culv.	13.6	1160.3
72			14.2	1159.7
+60			14.6	1159.3
73			13.5	1160.4
+60			10.7	1163.2
+80			10.5	1163.4
74			11.1	1162.8
	0.48	1162.16	12.22	1161.68
75			3.2	1159.0
76			8.0	1154.2
77			11.7	1150.5
	0.12	1150.64	11.64	1150.52
78			3.6	1147.0

1156.1 1158.7 1160.3
17.8 15.7 13.6
12.0

1160.2 1158.0 1155.8
13.7 - 15.9 - 18.1
13.4

		1150.64		
79			7.3	1143.3
88			11.2	1139.4
	0.37	1138.33	12.68	1137.96
81			1.7	1136.6
82			4.0	1134.3
+30			4.3	1134.0
83			7.1	1131.2
+29	2'9"x2' Stone Culv.		7.7	1130.6
+75			7.5	1130.8
84			7.0	1131.3
+25			5.8	1132.5
+80			2.4	1135.9
85			1.6	1136.7
+60			0.5	1137.8
	6.02	1143.60	0.75	1137.58
86			5.7	1137.9
+44	1'x1' Stone Culv.		5.0	1138.6
87			4.9	1138.7
	2.56	1141.22	4.94	1138.66
88			1.7	1139.5
+50			1.2	1140.0
+75			1.1	1140.1
89			2.1	1139.1
+50			3.8	1137.4
90			4.6	1136.6
91			7.3	1133.9
92			9.8	1131.4

1129.8 1124.9 1127.9
15.5 - 13.4 - 10.4
2

1128.6 1124.8 1122.4
9.7 - 13.5 - 15.9
19

1136.6 1137.4 1138.8
7.0 6.27.8
11.3

1138.0 1137.0 1136.4
5.6 - 6.6 - 7.2
8.9

		1141.22		
93			13.0	1128.2
	0.65	1129.10	12.77	1128.45
94			3.9	1125.2
+40			4.8	1124.3
95			9.6	1119.5
	0.33	1116.75	12.68	1116.42
96			4.2	1112.6
97			9.5	1107.3
+30			11.3	1105.5
	1.65	1105.69	12.71	1104.04
98			2.4	1103.3
99			4.0	1101.7
+97	1'x(?)	Foot Stone Culv.	5.3	1100.4
100			5.6	1100.1
101			9.3	1096.4
101+26		Road East	10.3	1095.4
+47.2		" West	11.3	1094.4
	1.07	1095.51	11.25	1094.44
102			3.3	1092.2
+20			3.9	1091.6
103			10.1	1085.4
	0.68	1083.11	13.08	1082.43
103+75			3.4	1079.7
104			4.7	1078.4
+40		Bridge Floor	5.5	1077.6
+68		Stream Bed	23.0±	1060.
+96		Bridge Floor	6.2	1076.9
105+50			7.1	1076.0

1099.4 1099.5 1101.2
6.3 62 4.5
7.8

1100.8 1099.9 1099.3
4.9 - 5.8 - 6.4
12.5

1092.6
13.1
100' E

1094.2
11.5
100' W.

L.P. ℄ Road, 101+47.2

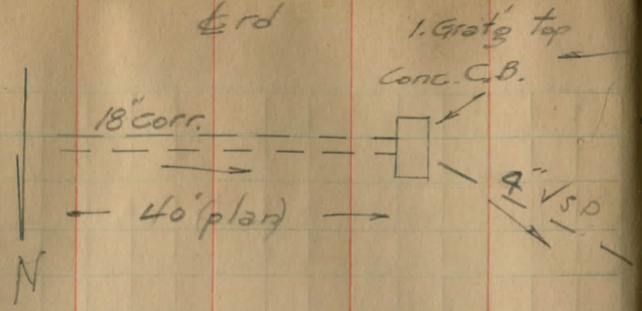
		1083.11		
106			6.9	1076.2
+50			6.0	1077.1
+75			4.6	1078.5
107			2.8	1080.3
	11.73	1093.55	1.29	1081.82
+60			6.3	1087.3
108			5.2	1088.4
109			3.1	1090.5
+25			3.2	1090.4
			1.40	1092.15
110			6.4	1087.2
111			9.0	1084.6
112			10.1	1083.5
+45	Twp. Line E. N.F.S. Rd.		10.3	1083.3
113+45			11.4	1082.2

→ B.M. Set. spike E. Root 30" Evergreen, W. of 109+60
= 335 ft So. Estly on Rd ℄ from Culvert
or Sta 112+95

1084.7
8.9
100' N.

5-23-52

Teichman DRAINAGE



BM	4.76	104.76		100.	
			6.75	98.01	INLET FL 18" CULV.
			7.14	97.62	O.L. FL. CUL 18"
			8.51	96.25	F.L. INLET 4" TILE
100' from C.B.			6.55	98.21	
200' " " "			7.66	97.10	
300			8.70	96.06	
T.P.	3.52	100.66	7.62	97.14	
400			5.96	94.70	
500			7.88	92.78	
600			9.30	91.36	
+97			13.4	87.3	

Ground 6' W of C.B 100.70

apertures for ditch H_2O into C.B.

bottom 98.7

4.76
3.25
8.51

NEEDS Clean BAD

Elev NW ⌀ Catch Basin 200' S of Old Teichman Drive
West side road

Normal ground E side road
= ± Same as top 18"
pipe

8" clay tile

± 4-50 Prob Jct 6" field drain from S

FL 8" field tile O.L.

5-22-57

Levels Sperry Rd W side
± L 8+00 N/y

BM 5.05 105.05 100.00
0+0 = P/L between Meredyk & Sprinkle

0

+20 Sprinkle drive 12" CP OUTLET Pt.

+60 Edge W ditch

1+0

+50

2+0

+50

+60 Wolf Pt 17'

3+0

4+0

+30 12" drive pipe

5+0

+25 12" drive

6+0

B.M. SET STA 5+10 6.90

Pin (P/L) between Wolf & Sprinkle
West

			103.0		℄ 104.6	E
			2.0		0.45	
			ditch 15			
			101.8			
			3.25			
		101.2	01.3		102.5	
		3.9	3.7		2.5	
		25	15			
		99.7	100.5		101.6	
	OPENING	5.4	4.5		3.4	
		23	15			
	98.3	98.4	99.0		100.6	
	6.8	6.66	6.0		4.45	
	50	25	15			
96.9	97.6	97.9	98.2		99.9	97.7
8.2	7.5	7.2	6.8		5.2	7.4
100	50	20	15			20 ditch
	97.5	98.0	97.1		99.1	
	7.6	7.1	7.9		5.9	
	30	21	18			
			8.27	94.78		
		97.8	96.7		98.6	96.9
	LCV OUT	7.3	8.3		6.4	8.2 ditch
		20	17			20 to C.P.
		97.3	95.5		97.6	96.0
		7.8	9.5		7.4	9.1
		20	17	95.1		20
			10.0			
		96.3	94.2		96.3	94.3
		8.6	10.8		8.7	10.8
		21	17			20
			11.5	93.55		
		95.2	91.6		93.8	92.1
		9.9	13.4		11.2	13.0
		23	17			20

SLANT Spr E. Road 18" High West Side.

Good Fall To North

Cf. #10 at CA. #4

GREENS CROSSING

EASTERLY =

(to South Newbury)

37+00 0°00'

32+58 8" V.T. Pipe.

27+82 8" V.T. Pipe

24+00 Hub. Δ = 0°29' Left

14+36 Roadway 17'; Span 17.5
Center Bridge

See Fd bk
#124 pg 74+
for 1950 Ref.

2+00

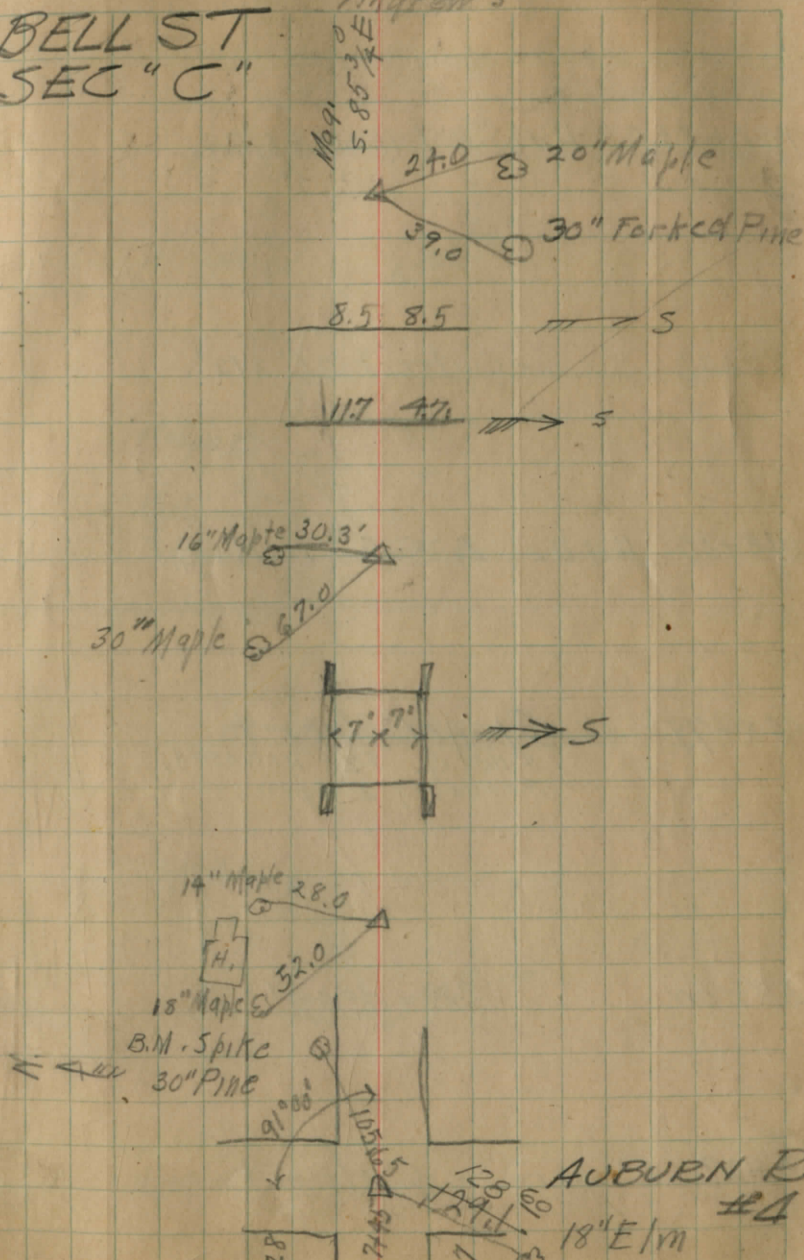
0+00

Apr. 25, 1924
Fair.

Marks
Gray
Andrews

35

BELL ST
SEC "C"



107+83.0 Hub. W. Line N. & S. Rd.

97+53 Stone Culvert 21" x 12"

78+00 Hub. Δ = 0°09' Right

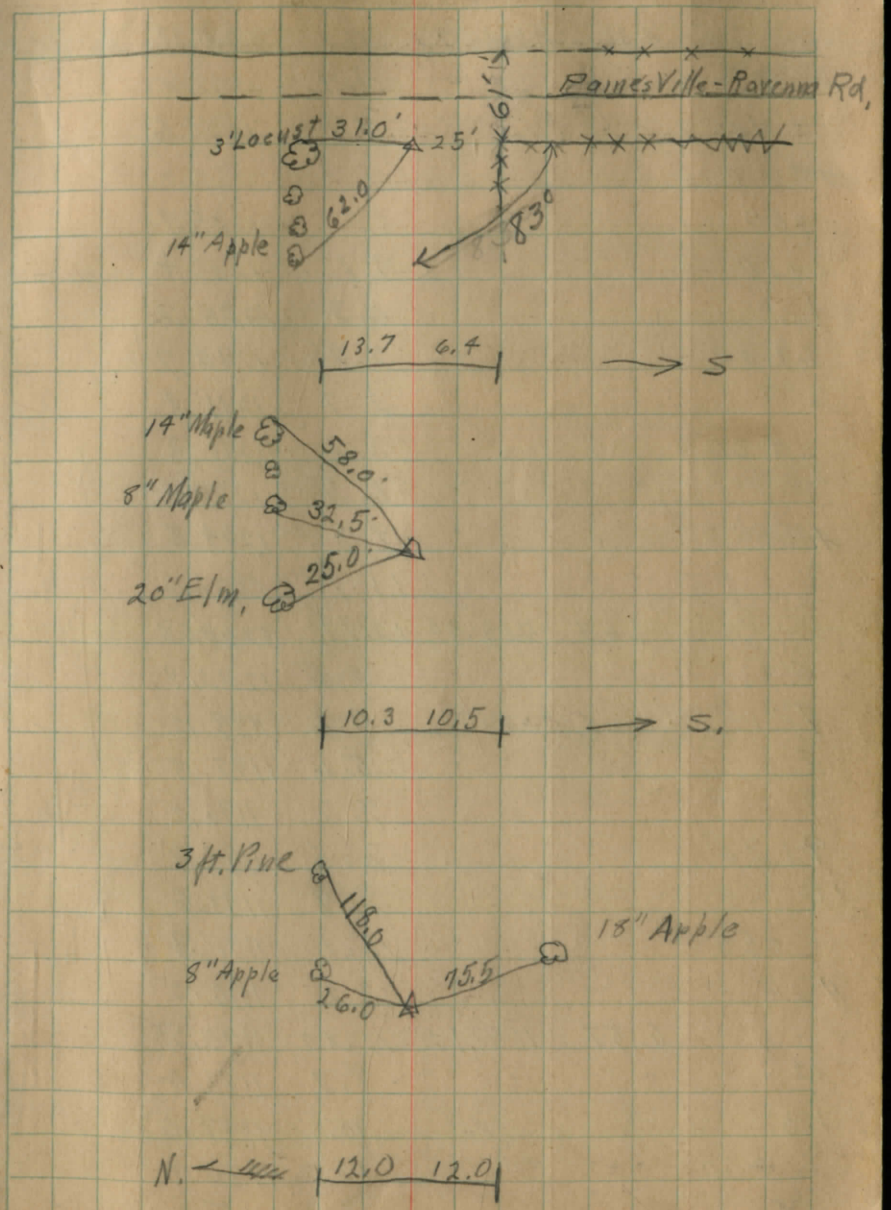
68+79 Stone Culvert
Filled up, Size unknown,
Probably 2' span

38+00 Δ = 0°00'

44+27 Concrete Culvert

Apr. 26, 1924
Fair.

Martin
Gray
Andrews



May 2, 1924
Cool, Windy, Cloudy

Mark 5, Grad.

	4.10	1214.47		1210.37
0-100			11.9	1202.6
0-16			9.9	1204.6
~~0~~				
0+00			8.6	1205.9
0+10			9.1	1205.4
1			6.3	1208.2
+60			3.8	1210.7
2			2.7	1211.8
+30			3.2	1211.3
3			6.5	1208.0
4			9.8	1204.8
5			11.9	1202.6
	1.67	1203.35	12.79	1204.68
6			2.5	1200.9
7			4.2	1199.2
8			5.6	1197.8
9			7.2	1196.2
9+70			8.5	1194.9
10			9.8	1193.6
+55			12.1	1191.3
11			13.2	1190.2
	6.57	1197.12	12.80	1190.55
12			8.7	1188.4
13			10.1	1187.0
+60			10.2	1186.9
14			9.9	1187.2

B.M., Spike, S.W. Root 30" Pine N.E. Cor. at Greens Crossing

		1197.12		
14+27	Br. Flr.		7.9	1189.2
+36	Stream Bed		14.2	1182.9
+45	Br. Fl.		7.9	1189.2
+60			8.8	1188.3
15			8.4	1188.7
+50			8.9	1188.2
16			8.5	1188.6
17			7.1	1190.0
18			5.0	1192.1
19			2.2	1194.9
	11.20	1208.09	0.23	1196.87
20			9.0	1199.1
21			4.5	1203.6
+65			1.9	1206.2
22			1.2	1206.9
	9.57	1217.53	0.13	1207.96
23			7.7	1209.8
+65			5.2	1212.3
24			3.1	1214.4
+45			1.1	1216.4
25			1.2	1216.3
26			2.0	1215.5
27			3.5	1214.0
+82	8" V.T. Pipe	Half Filled with mud	3.8	1213.7
28			3.9	1213.6
29			3.1	1214.4
+60			1.4	1216.1

1212.1
5.4
11.7

1213.7
3.8

1211.9
5.6
4.7

		1217.53		
	5.43	1221.23	1.73	1215.80
30			5.3	1215.9
31			6.5	1214.7
+50			7.1	1214.1
32			7.0	1214.2
+58	Full of Mud of 8" Vit. Pipe		7.0	1214.2
33			6.8	1214.4
34			6.1	1215.1
35			5.0	1216.2
36			3.7	1217.5
37			0.6	1220.6
	2.11	1222.70	0.64	1220.59
+30			1.3	1221.4
+60			1.2	1221.5
38			1.5	1221.2
39			3.5	1219.2
40			5.6	1217.1
41			6.9	1215.8
42			7.7	1215.0
43			8.3	1214.4
44			9.0	1213.7
+27	Concrete-Culvert.		8.2	1214.5
			7.07	1215.63
+75			8.7	1214.0
45			8.2	1214.5
46			6.0	1216.7
+50			3.8	1218.9

1212.5

8.7
8.5

1212.3

8.9
8.5

12.3/300 12.1/200 11.7/100 11.4 9.6 7.1 / 12.0

12.11.3 12.13.1 12.15.6 11.7

Drainage to North

12.15.7 12.13.3 12.11.4

7.0 9.4 11.3 / 12.0

12.0/100 12.1/200 12.6/300

B.M. set, N.E. Cor. N. Head Wall

		1222.70		
	5.19	1224.79	3.40	1219.30
46+75			5.2	1219.3
47			5.1	1219.4
48			5.5	1219.0
49			4.8	1219.7
50			3.3	1221.2
51			0.9	1223.6
	12.24	1236.57	0.16	1224.33
+75			10.5	1226.1
52			9.3	1227.3
+50			5.9	1230.7
53			1.9	1234.7
	12.72	1248.72	0.57	1236.00
54			3.5	1245.2
	12.91	1261.13	0.50	1248.22
+50			10.8	1250.3
55			7.3	1253.8
	11.29	1271.82	0.60	1260.53
56			9.6	1262.2
+30			6.8	1265.0
57			3.7	1268.1
+50			2.1	1269.7
+70			1.9	1269.9
58			3.0	1268.8
59			5.6	1266.2
60			7.9	1263.9
61			11.5	1260.3

		1271.82		
	0.33	1261.61	10.54	1261.28
62			4.0	1257.6
63			7.6	1254.0
+50			9.2	1252.4
64			11.6	1250.0
	1.29	1250.59	12.31	1249.30
65			4.9	1245.7
66			9.2	1241.4
+50			10.6	1240.0
67			12.0	1238.6
	3.09	1242.59	11.09	1239.50
68			5.8	1236.8
+79	Stone Cairn		6.5	1236.1
69			6.8	1235.8
+50			7.2	1235.4
70			6.9	1235.7
71			5.7	1236.9
+50			4.9	1237.7
72			3.7	1238.9
	12.51	1254.28	0.82	1241.77
73			11.4	1242.9
+40			10.0	1244.3
+70			8.0	1246.3
74			6.9	1247.4
75			4.7	1249.6
76			2.5	2511.8
77			0.7	1253.6

Top of Stake 61

Top of Stake 67

1231.0 1231.6 1234.5
11.6 11.0 8.1
10.3

1236.0 1231.8 1231.3
6.6 - 10.8 - 11.3
10.5

Flow to South

		1254.28		
77+75			0.2	1254.1
78			0.4	1253.9
78 +30			1.0	1253.3
+50			2.2	1252.1
79			5.8	1248.5
	0.40	1243.92	10.76	1243.52
+60			1.5	1242.4
80			6.3	1237.6
	0.23	1231.78	12.37	1231.55
81			2.5	1229.3
82			9.5	1222.3
	0.66	1219.43	13.01	1218.77
83			2.7	1216.7
84			7.9	1211.5
85			12.4	1207.0
	0.20	1206.92	12.71	1206.72
86			4.4	1202.5
87			8.4	1198.5
88			11.4	1195.5
	0.64	1194.73	12.83	1194.09
89			2.1	1192.6
90			4.8	1189.9
91			7.6	1187.1
92			10.0	1184.7
93			12.4	1182.3
	0.08	1184.33	10.48	1184.25
94			4.6	1179.7

108 13
7775
3038

		1184.33		
95			6.0	1178.3
96			7.0	1177.3
97			8.0	1176.3
+53	Stone Culvert		8.1	1176.2
+80			8.5	1175.8
98			8.5	1175.8
+60			7.9	1176.4
99			7.2	1177.1
100			3.4	1180.9
+50			1.6	1182.7
101			0.4	1183.9
	4.82	1187.77	1.38	1182.95
102			2.8	1185.0
+50			2.8	1185.0
103			3.2	1184.6
104			4.2	1183.6
105			4.9	1182.9
106			4.1	1183.7
	6.96	1189.99	4.74	1183.03
107			5.8	1184.2
107+83			5.61	1184.38
108+13	℄ I.C.H. 324		9.4	1180.6
			1.77	1188.22

1173.8 1174.8 1176.6

10.5 − 9.5 − 7.7

13.7

1176.5 1174.6 1173.9

7.8 − 9.7 + 10.6

6.4

10800

4027

6373

5280

1093

Top of Stake, 106

Top of Stake

3.7 / 100 1186.3 North

1174.7

5.3 / 100 South

B.M. set, Spike in S. Root 3½' Locust, N. of 107+75

Bent

May 3, 1924 Marks & Grau.
Rain

31+90
31+50 100'
26+65, P.L.

23+50
22+90 90'

20+50

19+45
creek

11+50

1+95
1+45 45

23+10 P.L.
55' +50
22+15
160'
21+80

19+65 C.E. Walker
90 H. H.M. Simpson
19+10

80 Barn. 15+20
17+50

9+70 P.L.

165' 73+20
73+80 72+80
R. Williams 80'
72+20
70+50
68+70 P.L.?

60+05
E. A. Clark 80'
59+35

50+35

48+25
John H. George H 80
47+60

34+60 P.L.

75+50

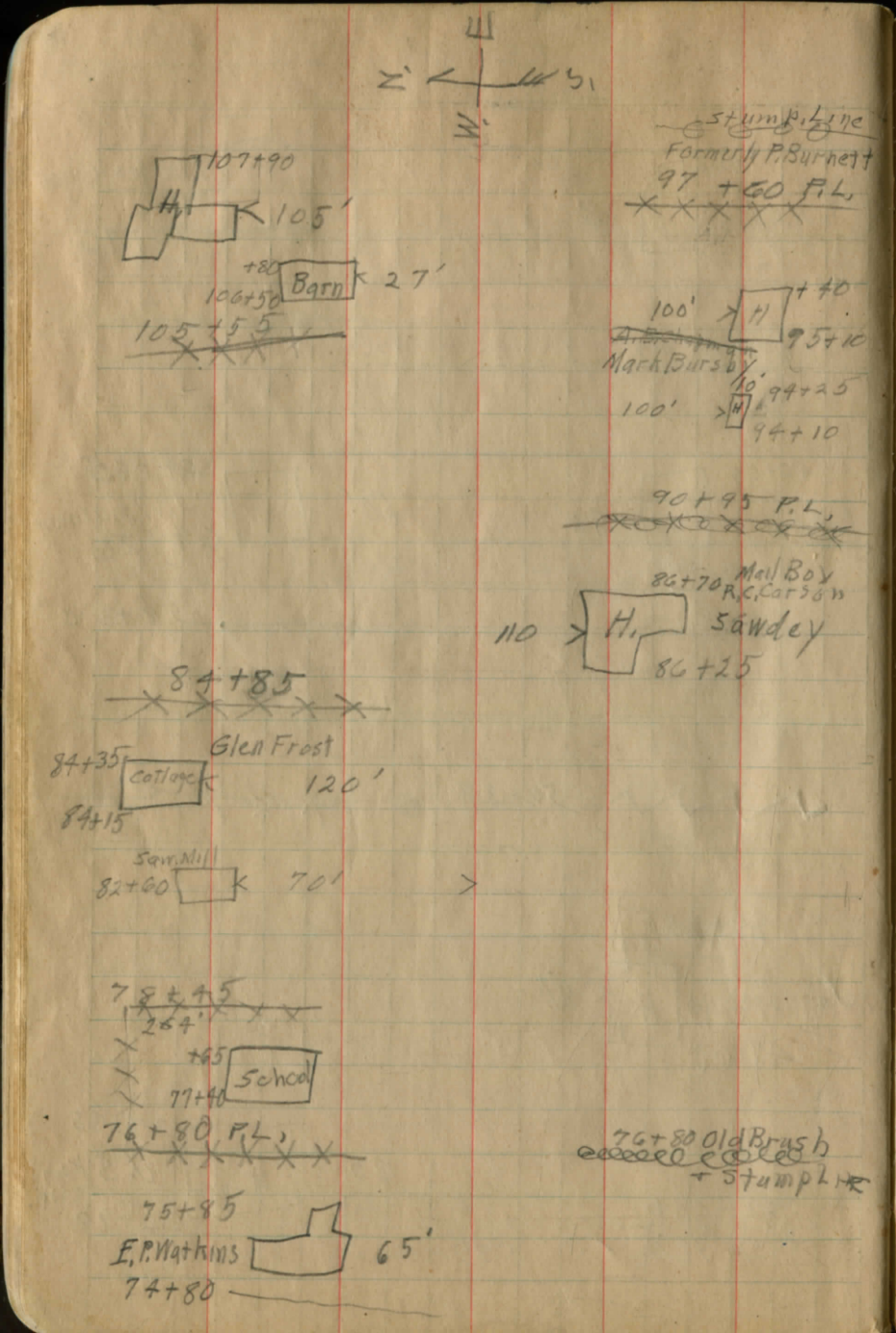
73+80
L. E. Messenger
73+40

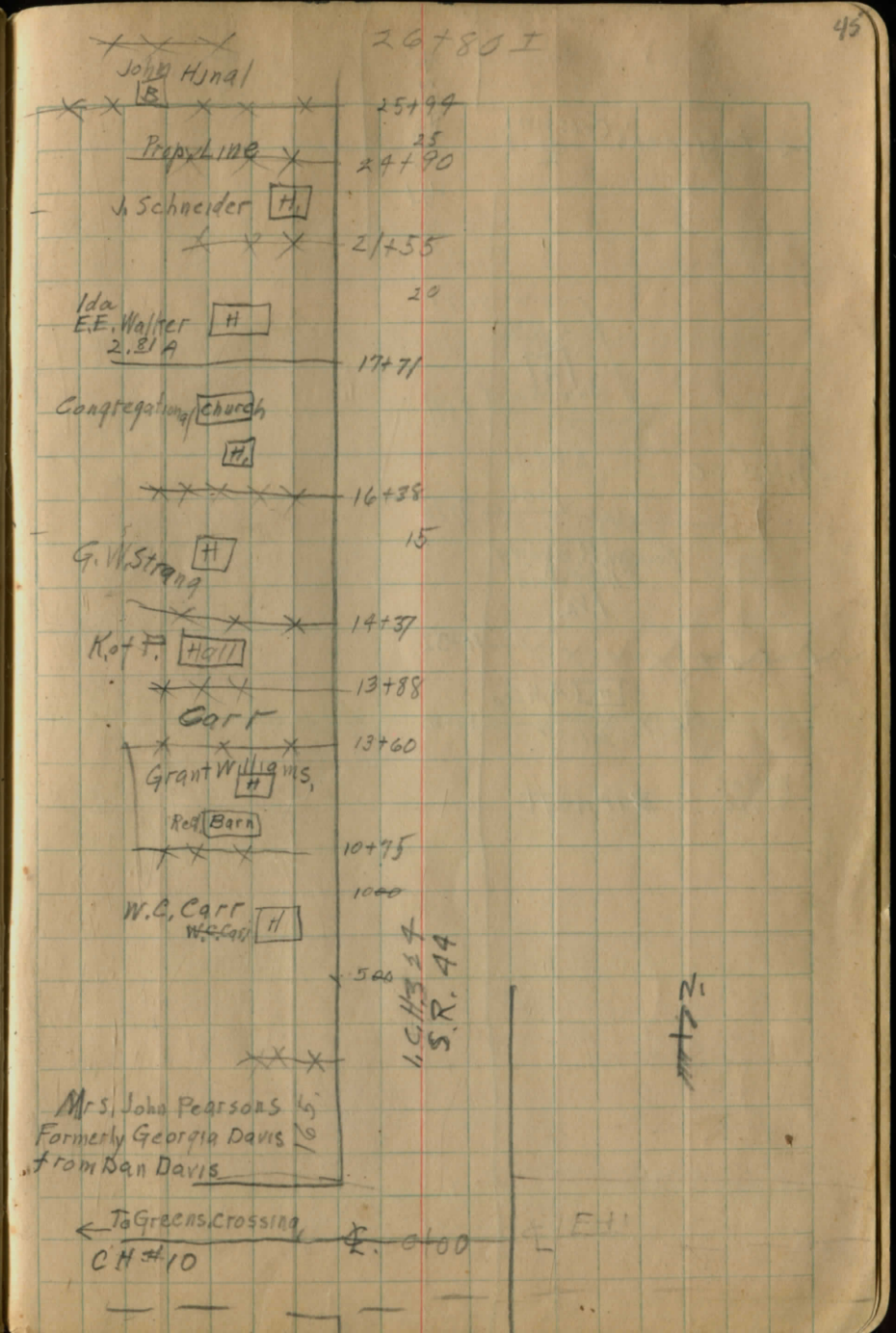
68+90 P.L.

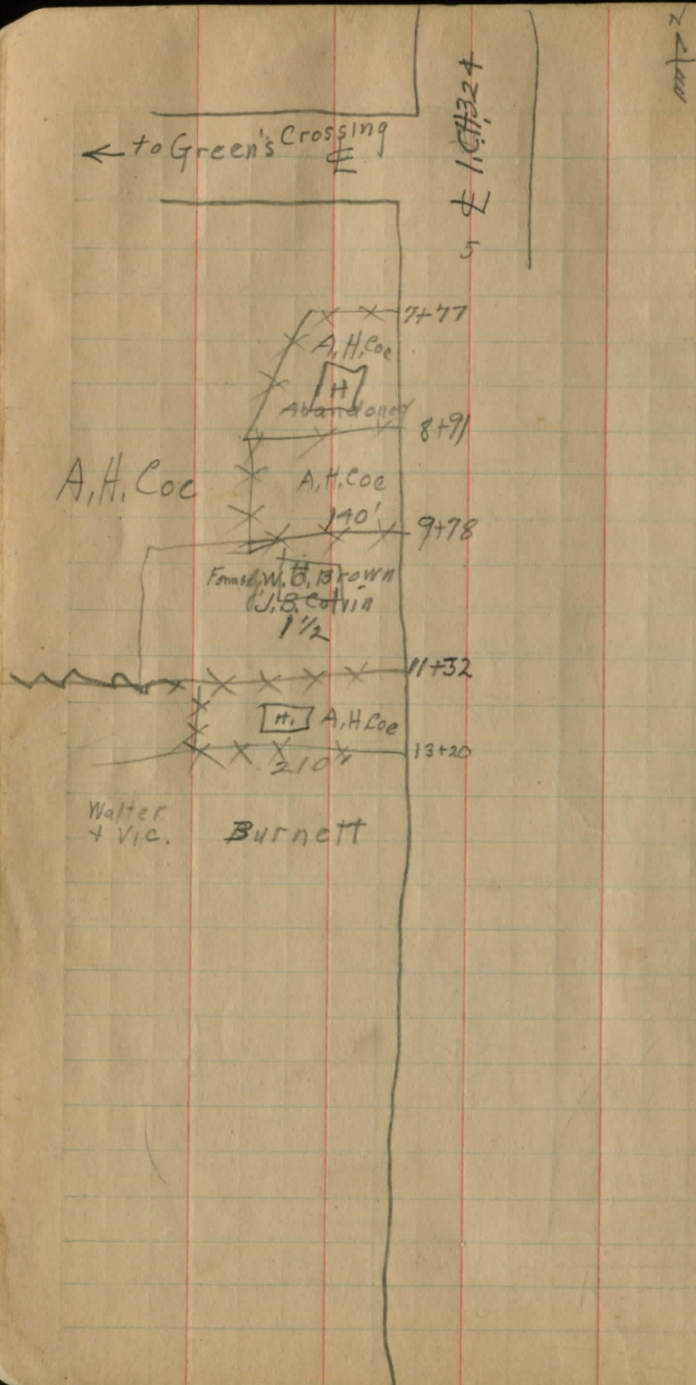
64+65
60' W. W. Harmon
64+20

58+30

65 H 37+35
S. S from rock
36+90


107+90
H.
105'
+80
Barn
100+50
27'
105+55
Stump Line
Formerly P. Burnett
97 + 60 P.L.
100'
H
+40
95+10
Mark Bursby
100'
94+25
94+10
90+95 P.L.
86+70
Mail Box
R.C. Carson
110
H.
Sawdey
86+25
84+85
Glen Frost
84+35
Cottage
120'
84+15
Saw Mill
82+60
70'
78+45
264'
+65
School
77+40
76+80 P.L.
76+80 Old Brush
+ Stumps
75+85
E.P. Watkins
65'
74+80


John Hunal
B
25+94
Prop. Line
25
24+90
J. Schneider
H.
21+55
20
Ida
E.E. Walker
2.81 A
H
17+71
Congregational Church
H.
16+38
15
G.W. Strong
H
14+37
K. of P. Hall
13+88
Carr
13+60
Grant Williams
H
Red Barn
10+75
1000
W.C. Carr
H
500
I.C.H.S. 14
S.R. 44
Mrs. John Pearsons
Formerly Georgia Davis
from Dan Davis
To Greens Crossing
C.H. #10
0+00
N.
47+


to Green's Crossing
℄ I.C.R.R.
7+77
A.H.Coe
H
Abandoned
8+91
A.H.Coe
A.H.Coe
140'
9+78
Formerly W.B. Brown
U.S. Cotton
1½
11+32
H
A.H.Coe
13+20
210'
Walter
& Vic.
Burnett

0+00

May 26, 1925
Fair - Cool

Marks
Grau
Reynolds

T.P. in ℄ of Frost's Corners to Fullertown Road at Sta. 61+74.8 of 1924 Survey of that Road.

PEKIN ROAD from CH.^Y 12 EASTERLY

24
23
22
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0 + 0.0

New Data
See Field Book 175
Pg. 30

Stakes on 25' Offset Right
unless otherwise noted.

14+36 × × × × 27.3 × 27.3 × × × 24+36

~~16+70 P.T.~~ 3

2½' X 3' Stone Box
Needs Outlet
Isaac Johns,
~~P.I. 14+60~~
13+60

11.3 11.8

17+35
16+90
15+99
16+00
15+38
W.J. Redver
14+97

14' 12+19

21.5
11'
8+34
7+92 2½' X 3' Stone Culv. Good
16'
7+15

Mag. S. 85° 15' E

1+05
0+60

(A)

111.28'

→ to Frost's Corners

To Fullerton

See Pg 23

New & Data
Field Book 175
Pg 30

Sta 38+00 to 46+01 inclusive
Stakes on 20' offset Right,

26+40
26
25

$\Delta = 0°03'$ Right for corrected line

47+90
H
47+55
47+25

47+55
H
J. Gould.
47+4

9.0 8.5
46+61 15" Stone Box
Corrected 7.7 10.8 Inadequate

40+95
Coville
H
40+50

Hedge
J. Gould.
25½ 24½
27' 23
37+90 P.L.
Clara Davis
37+40
H
37+25

corrected 10.4 6.6
11.5 5.5
35+74 12" V.I.P. No. H.W.S

31+55 P.L.
30+85
H
30+35

Coville
28+75
P.L. 18+15
27+75
27+00
Isaac Johns
H
26+70
B

P.L. 27+07
V. in Maple
27.0'
26+50
H
Frank Boehm Sr.
26+30
18.0'
V. in Maple

64+37 5 small Stone Sluice Outlet needs opening

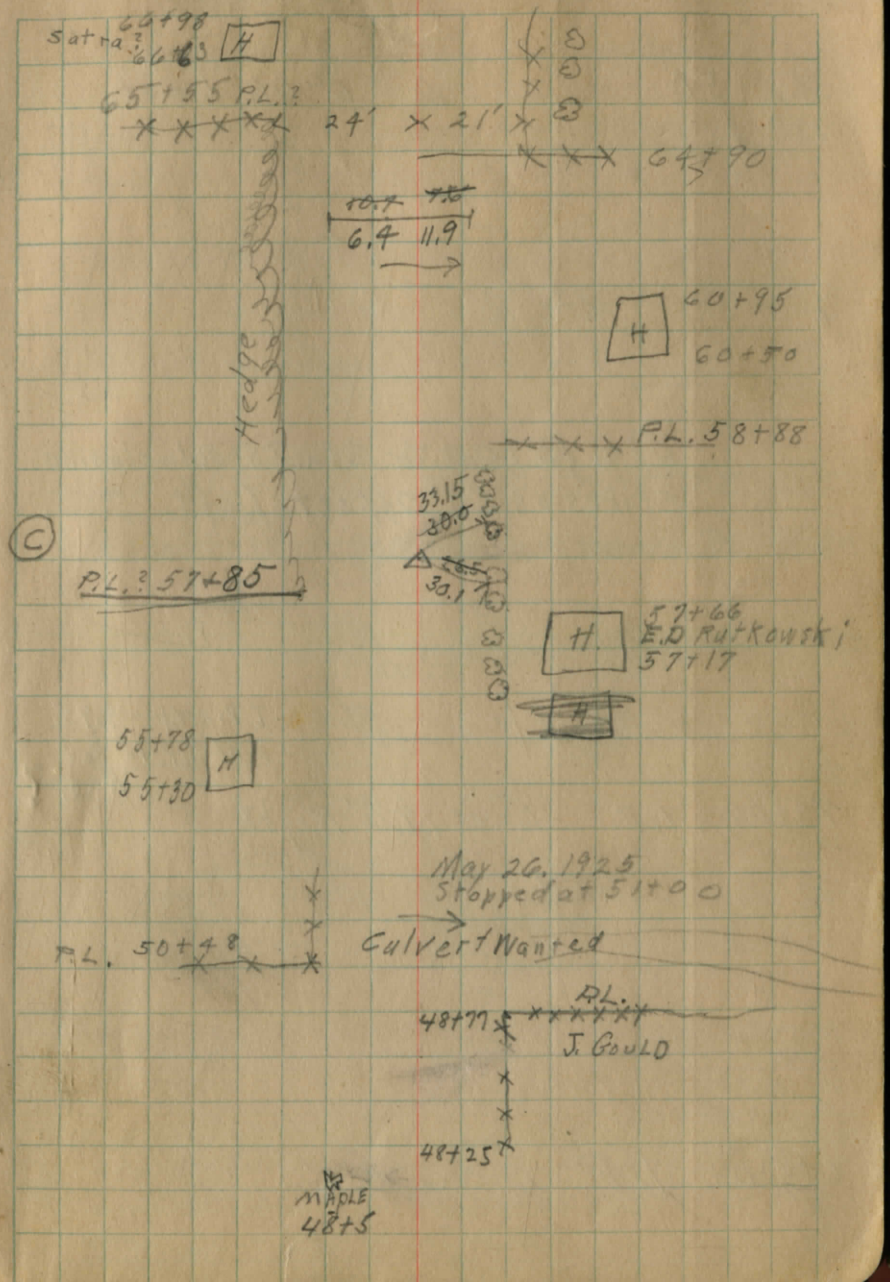
3160

58+00 L.P. 0°00'

1000

May 27, 1925
Fair

L Marks, Graw, Reynolds



82+50 $\Delta = 0°06'$ Left.

73.

95°

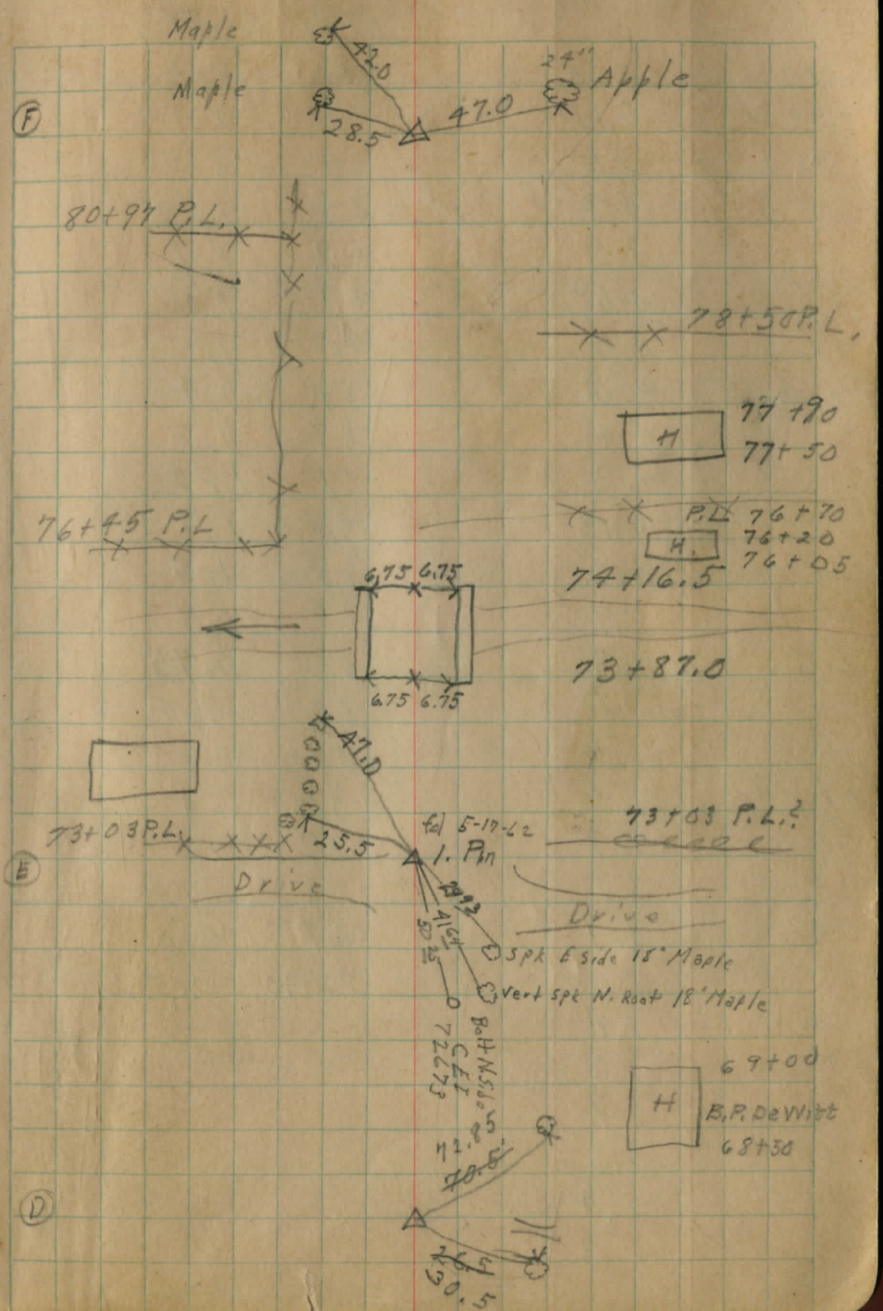
Sta. 73+00 to Sta. 98+00 inclusive
Stakes on 25' Offset Left.

I Pin fd 2.90'
E. of I.P. fd Par.
Ref. ?

73+00 I.P. $\Delta = 0°17\frac{1}{2}'$ Right

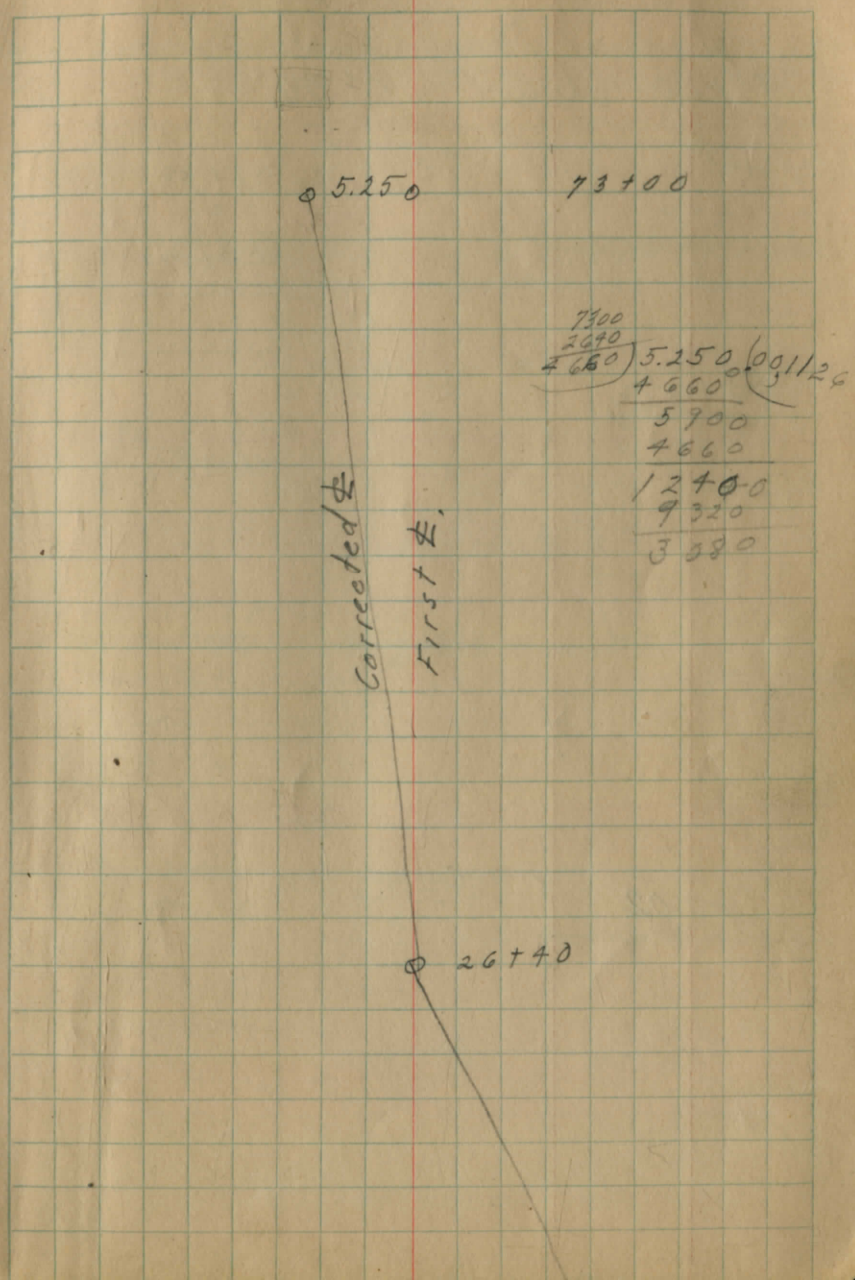
500

68+00 I.P. $\Delta = 0°00'$



Sta.	Correction
73	5.25
72	5.1
71	5.0
70	4.9
69	4.8
68	4.69
67	4.6
66	4.5
65	4.4
64	4.3
63	4.13
62	4.0
61	3.9
60	3.8
59	3.7
58	3.56
57	3.4
56	3.3
55	3.2
54	3.1
53	3.00
52	2.9
51	2.8
50	2.7
49	2.6
48	2.4
47	2.3

Sta.	Correction
46	2.2
45	2.1
44	2.0
43	1.88
42	1.7
41	1.6
40	1.5
39	1.4
38	1.3
37	1.2
36	1.1
35	1.0
34	0.9
33	0.75
32	0.64
31	0.5
30	0.4
29	0.3
28	0.18
27	0.07
26+40	0.00



7300
2640
4660) 5.250 (0,1126
4660
5900
4660
12400
9320
3380

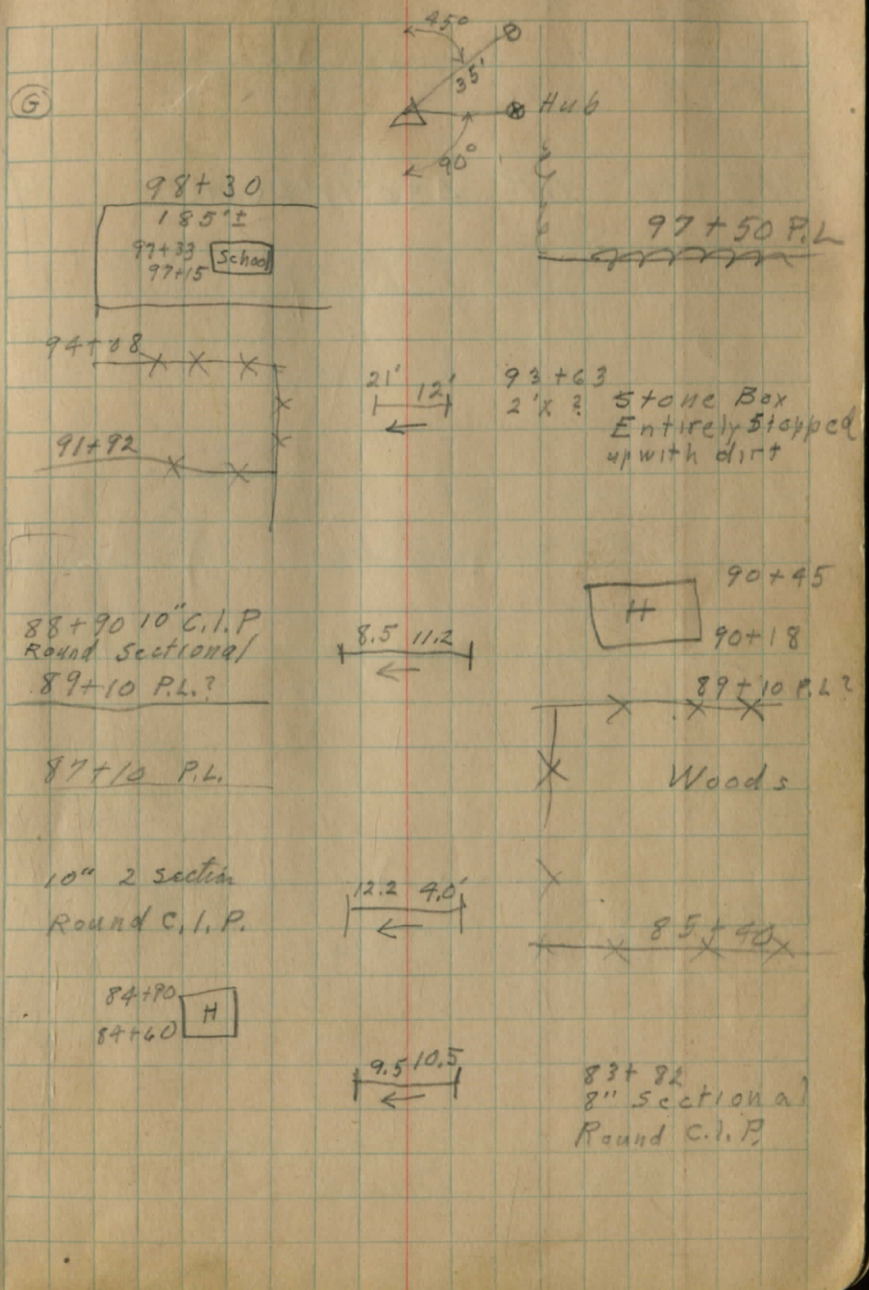
99+00 I.P. 0°00'

1650

93+63

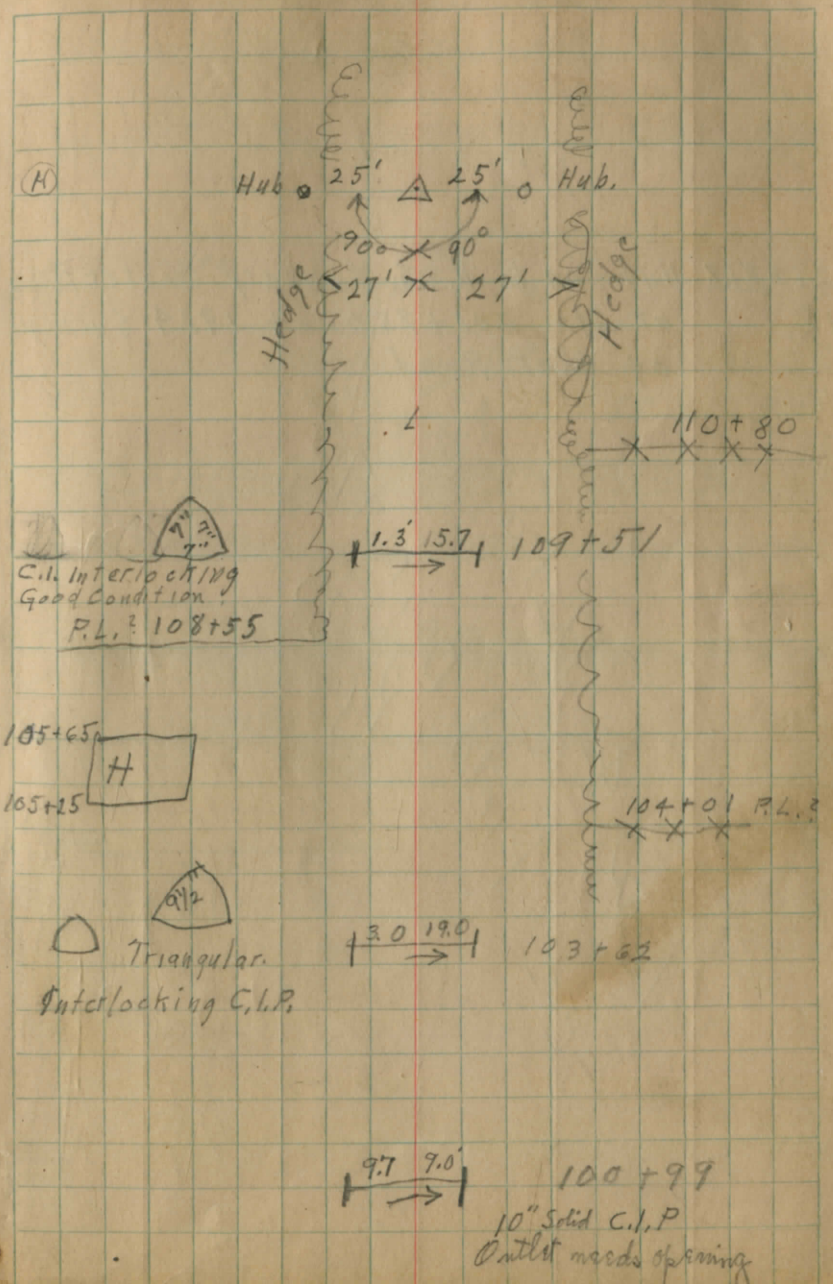
86+02

Stopped at 99+00 53
Mar 27, 1925



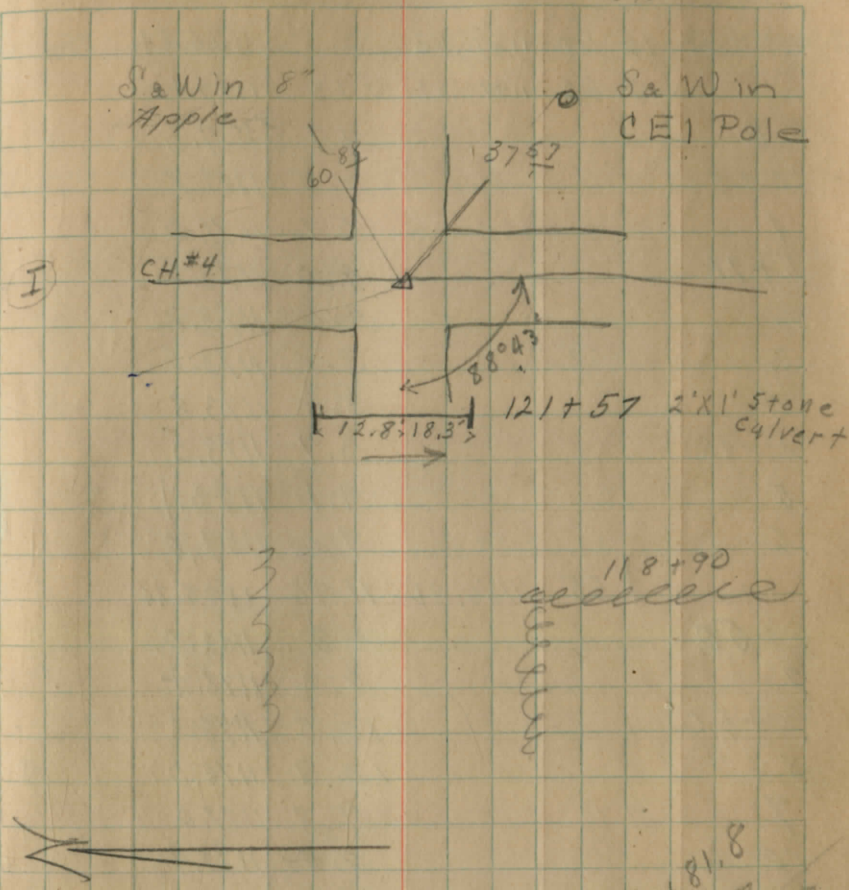
115+00 . I.P Δ = 0°19' Left.

1600.00



121+81.8 Hub. on ℄ N. & S. Newbury Center Rd.
115 at Sta. 201+75.0 of 1924 Survey
GSIS of that Road.

New & Data
See Field Book 175
Pg. 30



PEKIN ROAD.

	12.69	1187.53		1174.84	
	9.82	1197.22	0.13	1187.40	
0			7.7	1189.5	
0+50			7.5	1189.7	
1			5.7	1191.5	
1+70			4.6	1193.2	
2			4.0	1193.2	
3			3.6	1193.6	
4			3.4	1193.8	*
4+85			3.7	1193.5	
5			4.1	1193.1	
6			9.6	1187.6	
	1.55	1186.81	11.96	1185.26	
6+50			4.8	1182.0	
7			8.4	1178.4	
+50			10.5	1176.3	
8			10.8	1176.0	*
9			9.8	1177.0	
10			7.4	1179.4	
11			3.6	1183.2	
+50			0.2	1186.6	
	12.01	1198.42	0.40	1186.41	
12			10.4	1188.0	
13			8.6	1189.8	
14			6.5	1191.9	
+65			5.3	1193.1	*
15			5.8	1192.6	

B.M. - N.E. Cor. E. Headwall sta 64+92 Frost's Cor. - Fullerton Rd

		1198.92			
15+20			6.3	1192.1	*
16			5.5	1192.9	
17			3.8	1194.6	
+50			2.4	1196.0	
18	12.95	1211.33	0.04	1198.38	
19			5.6	1205.7	
+50			1.5	1209.8	
	12.91	1223.68	0.56	1210.77	
20			11.4	1212.3	
21			6.8	1216.9	
22			2.2	1221.5	
	12.88	1235.77	0.77	1222.91	
23			8.7	1227.1	
24			1.8	1234.0	
	13.00	1248.06	0.73	1235.06	
25			7.5	1240.6	
26			2.0	1246.1	
	4.10	1252.10	0.06	1248.00	
+80			0.8	1251.3	*
27			1.6	1250.5	
28			7.4	1244.7	
29			11.5	1240.6	
	1.41	1240.51	13.00	1239.10	
30			3.1	1237.4	
31			6.2	1234.3	
32			9.3	1231.2	
33			12.3	1228.2	

		1240.51			
	2.85	1230.49	12.87	1227.64	
34			4.1	1226.4	
35			5.7	1224.8	
36			6.8	1223.7	
37			7.1	1223.4	
38			7.7	1222.8	
39			8.6	1221.9	
	1.92	1223.21	9.20	1221.29	
40			3.0	1220.2	
41			4.9	1218.3	
42			6.9	1216.3	
43			8.5	1214.7	
44			9.5	1213.7	
45			10.0	1213.2	
46			10.6	1212.6	
47			10.8	1212.4	*
	8.71	1220.65	11.27	1211.94	
48			7.9	1212.7	
49			7.4	1213.2	
50			7.2	1213.4	
51			6.2	1214.4	
52			5.0	1215.6	
53			3.2	1217.4	
54			1.9	1218.7	
55			1.6	1219.0	*
56			1.0	1219.6	
+50			1.3	1219.3	flat

		1220.65			
57			2.0	1218.6	
	1.95	1220.39	2.21	1218.44	*
58			3.8	1216.6	
59			5.8	1214.6	
+85			7.4	1213.0	
60			8.1	1212.3	
61			12.3	1208.1	
	0.90	1209.06	12.23	1208.16	
61+70			4.3	1204.8	
62			6.3	1202.8	
+50			10.6	1198.5	
	1.31	1197.71	12.66	1196.40	
63			2.6	1195.1	
64			5.8	1191.9	
65			7.8	1189.9	
66			9.7	1188.0	
67			11.1	1186.6	
+75			12.1	1185.6	
	0.51	1185.21	13.01	1184.70	
68			0.9	1184.3	
+75			5.1	1180.1	
69			6.6	1178.6	
	0.15	1172.60	12.76	1172.45	
70			1.3	1171.3	
71			9.6	1163.0	
	0.38	1159.87	13.11	1159.49	
72			8.3	1151.6	

		1159.87			
72+50			12.6	1147.3	
	2.12	1149.09	12.90	1146.97	
			1.18	1147.91	
73			5.1	1144.0	
+80			7.9	1141.2	
+87			8.6	1140.5	
74			24.0	1125.1	*
74+16.5			8.8	1140.3	
74+45			11.8	1137.3	
75			12.7	1136.4	Flat
76			11.6	1137.5	
	10.23	1158.14		1147.91	
77			18.1	1140.0	*
78			13.2	1144.9	
+75			10.1	1148.0	
79			7.0	1151.1	
	13.13	1171.27	0.00	1158.14	
80			9.6	1161.7	
	11.34	1182.50	0.11	1171.16	
81			10.3	1172.2	
82			1.8	1180.7	
+30			0.6	1181.9	*
+80			1.8	1180.7	
83			2.1	1180.4	Flat
+50			2.5	1180.0	

B.M. Set, Bent Spike, N. Root 18" Maple Right of 72+70

W. End, Bridge Floor Rock Bottom
Stream Bed on Downstream (North) Side.
E. End Bridge Floor

May. 29, 1925 Marks, Gray, Reynolds
Fair,
B.M. Right of 72+70

		1182.50			
84			2.6	1179.9	X
85			0.3	1182.2	
	10.25	1192.00	0.75	1181.75	
+30			8.8	1183.2	
86			9.0	1183.0	
87			6.9	1185.1	
88			3.9	1188.1	
89			3.5	1188.5	
+55			2.4	1189.6	X
90			3.8	1188.2	
91			9.1	1182.9	
	0.95	1181.02	11.93	1180.07	
+45			1.0	1180.0	
92			6.7	1174.3	
+50			10.4	1170.6	
93			12.0	1169.0	
+63			12.4	1168.6	X
94			11.6	1169.4	
95			6.5	1174.5	
	11.88	1192.90	0.00	1181.02	
96			9.2	1183.7	
97			0.4	1192.5	
	9.82	1202.72	0.00	1192.90	
98			2.7	1200.0	
+75			0.0	1202.7	
99			0.0	1202.7	X
100			3.0	1199.7	

		1202.72			
101			5.2	1197.5	
102			4.3	1198.4	
+20			3.9	1198.8	
103			5.1	1197.6	
104			5.0	1197.7	
105			3.6	1199.1	
	2.16	1201.21	3.67	1199.05	
106			2.2	1199.0	
+55			2.5	1198.7	
107			3.7	1197.5	
+85			11.2	1190.0	
108			11.5	1189.7	
109			14.4	1186.8	
+50			14.8	1186.4	
110			14.7	1186.5	
111			13.4	1187.8	*
112			10.0	1191.2	
113			6.0	1195.2	
	2.56	1197.82	5.95	1195.26	
114			0.5	1197.2	
+64			0.0	1197.8	*
115			1.3	1196.5	
116			4.3	1193.5	
117			10.3	1187.5	
	0.96	1185.82	12.96	1184.86	
+50			3.0	1182.8	
118			8.0	1177.8	

		1185.82		
	0.01	1172.81	13.02	1172.80
118+50			1.0	1171.8
119			5.4	1167.4
+50			8.6	1164.2
120			10.1	1162.7
121			12.2	1160.6
+81.8			12.7	1160.1
	6.00	1166.47	12.34	1160.47
			1.78	1164.69

℄ N. & S. Center Rd.

(1165.03)

B.M. Left of Sta. 203+15 of 1924 Survey of N. & S. Center Rd.

Smiths Crossing Easterly
PERIN RD (CH.# 144) at CH.# 4
Mar 11, 1926 Marks-Gray Fair 32°

ROAD RECORDS, Book C-P. 456
E.+W. Road in Newbury. beginning at the S.E. corner of Lot 17 in the first Tract thence along the line of lots N 89°E 175 chains (at one mile post, Witness a large beech standing S. 50 links marked with three hacks at two miles a small beech tree marked, Witness a large White Oak tree standing S.E. 2½ feet through 40 links distant, marked with three hacks, at 110 75/100 chains (N.+S. E.+W. Road.) N 74°E, 5 chains 88 links thence N 89°E following the S. line of A. Knop's farm 26 chains 80 links to the E. State road in Newbury.
Dec. 17, 1838 Geo. Smith, Surveyor
(Statute Width at this time 60 feet)

110.75
66
66+50
60+50
T 309.50

0 T 00

63

Ret Good in "73"
Stk. S. side 20" Maple
Set
BK 122 Pg 27
Stk W. side 18" Maple
53.0
79.5
I.P. Fd "73"
72+99.05 - 1.38 mi
To Bos. & Lake
C.H.# 23
90°
45'
Mar. 31, 1926, Windy
Marks, Gray, Hassel & Goodrich

Sta 53+00 stopped Mar. 30

6" Maple from tot line
25+27.0 Iron Pipe
24+31
23.0
26.0
Δ = 0° 2' 30" Right
Lot Line
Stakes on 20' offset Right.
Mar. 30, 1926, Cloudy
Marks, Hassel, Goodrich
S. 15° E
91° 06½'
N.+S. Center Rd. C.H.# 4
201.42
194+00

T.H. 144 at CH. 23

Potters Corners Northerly to South Line of Munson Twp.

Apr. 30, 1927 - Marks-Gray-Snyder

Stakes on 20' Offset.

N.W. Corner of Chicken House Foundation

8" cherry

59.65'

34.5'

77.0

15" Maple

51+50

~~56+50~~ 0°00'

See FB 125 Pg 9 Rec. & Pt.

51+95, as located by Zetmayr

51+97 Approximate E. of Road.

Butternut Rd CH. 21

Spk. W. Side CEI #846650

93.31

Spk. 7/75

117.34

Spk. W. Side CEI #846651

Spk. NE. side 12" Maple

41+54.15 0°00'

54.21'

Spk. 7/75

31+25.74 0°00'

47.29'

Spk. NW. Side CEI

70.96

Spk. SE. side 12" Maple

20+03.24 0°00'

Spk. 7/75

47.35'

Spk. E. Side 24" Ash

7/75 Spk.

31.75

Spk N. Side CEI #

#14120

45.61'

CEI #543833

8+60.71 0°00'

Tekin Rd.

0+00

At 72+99.05 of preceding page

64

Error of 100' discovered June 1, 1928, and notes revised accordingly

Iron Pipe

29°37'

800'

36.0

30.0

Iron Pipe

93.0

Big Twin Basswood

Munson Twp. 72+32.2

~~71~~+32.2

Newbury Twp.

1.3508 miles

Spike in Triple Ash

67

~~66~~+25.8

P.T. Spike

Hub.

40.0

50.21

Hub.

P.I.

66

~~65~~+31.4

1975 Δ = 28°56' Right

D = 15°

T = 98.5'

L = 192.9'

65

~~64~~+32.9

Spike o P.C.

90° (assumed)

292.6

529.4

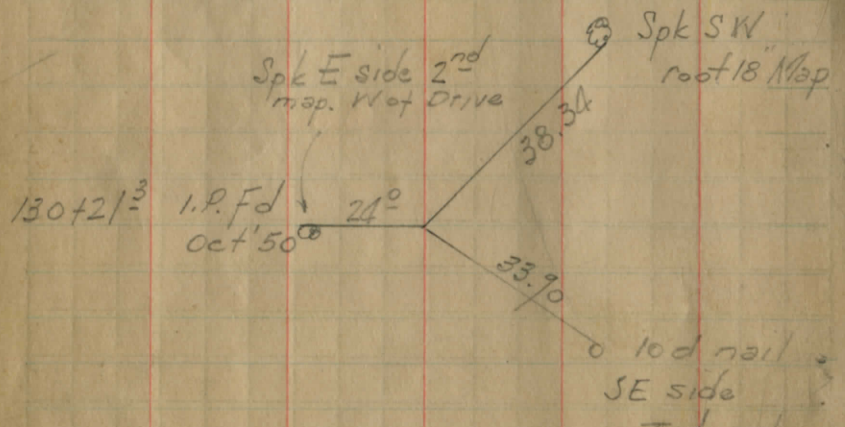
604.9

2-8-56

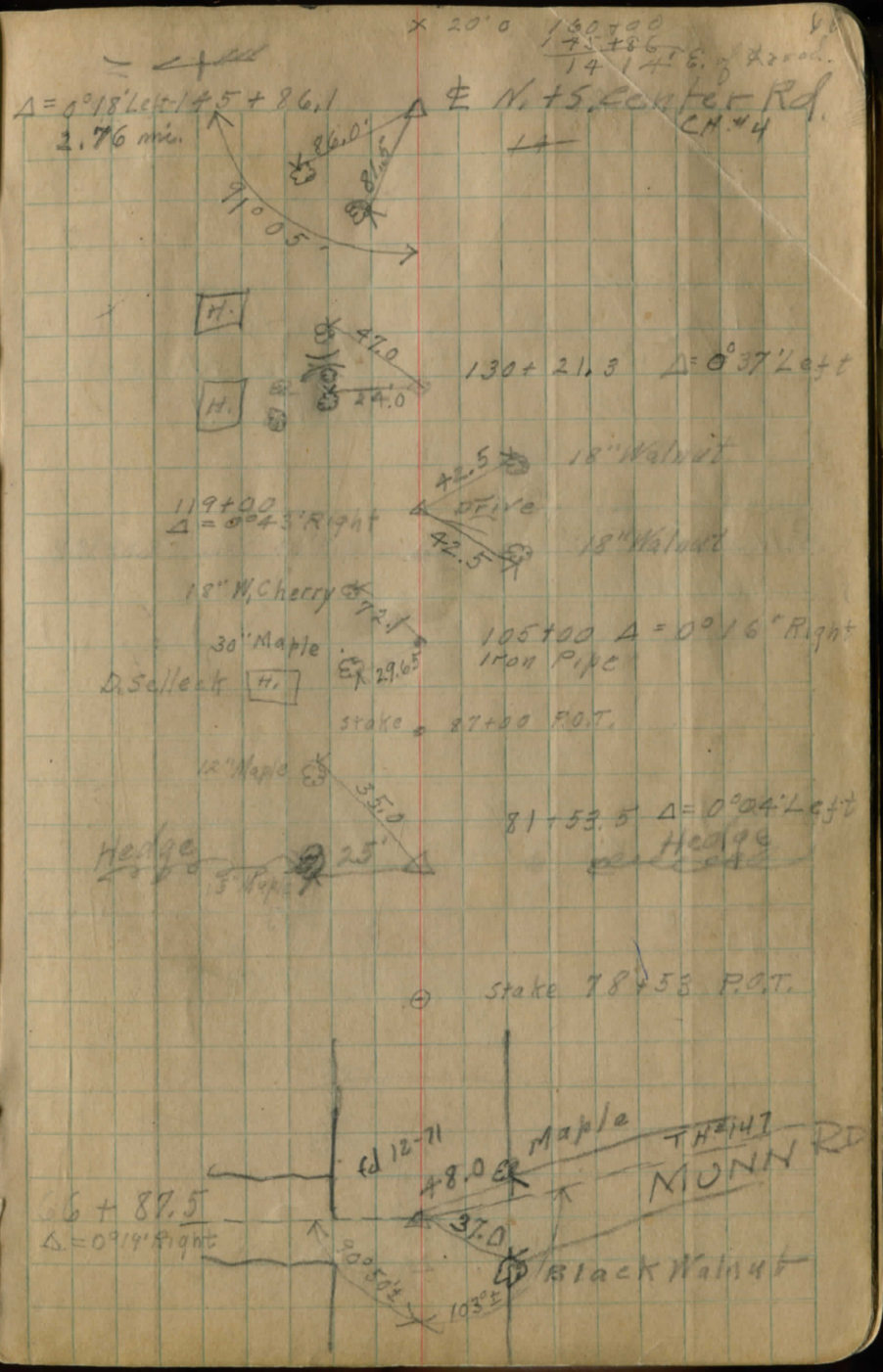
(A-227 66') Marks-Gray

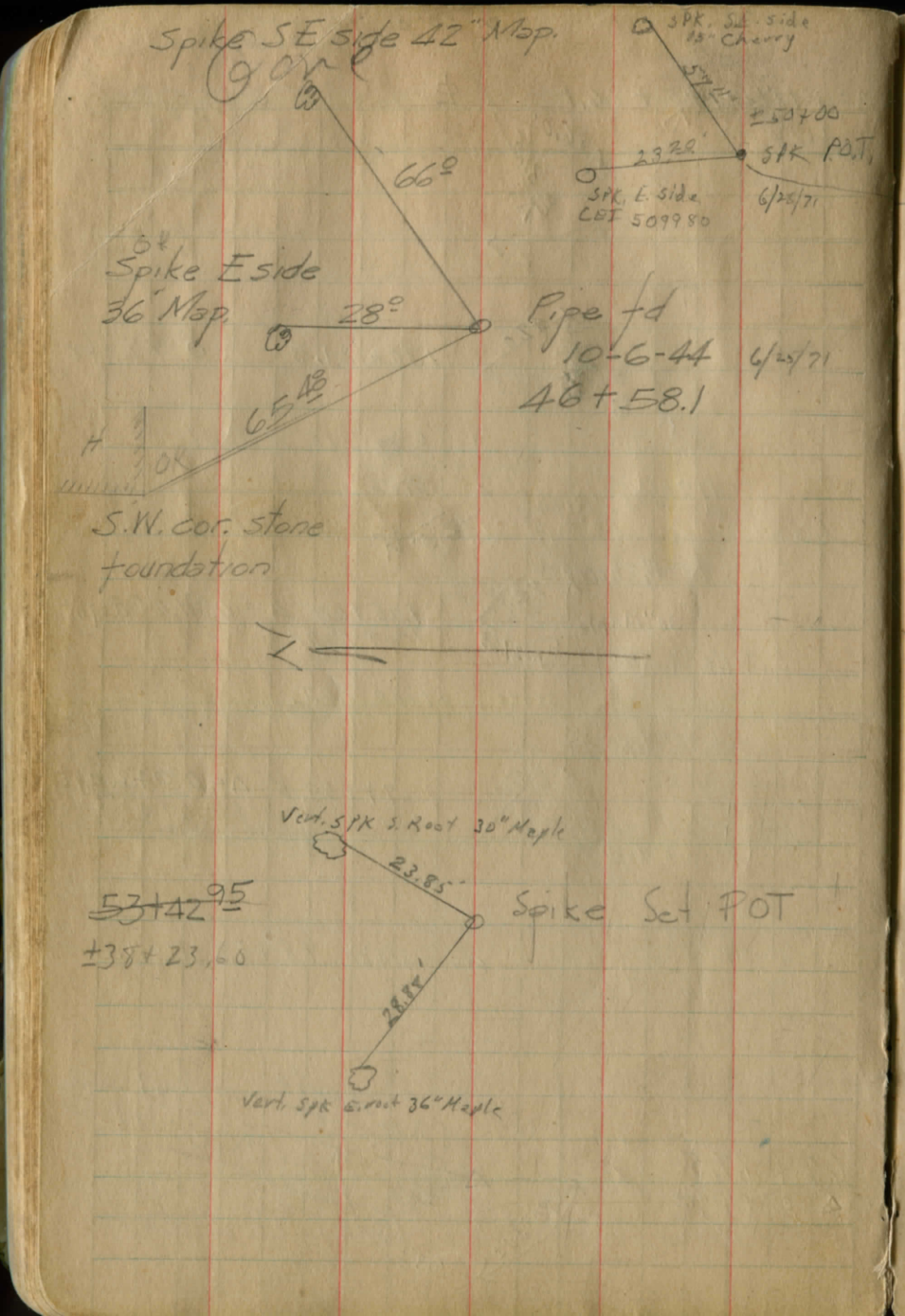
Music. St, Mar. 13, 1926 Clear, Cold,

Apr. 12, 1926. Fair, Cool-Windy.
Marks-Gray-Timms.
Side stakes, 105+00 to 160+00

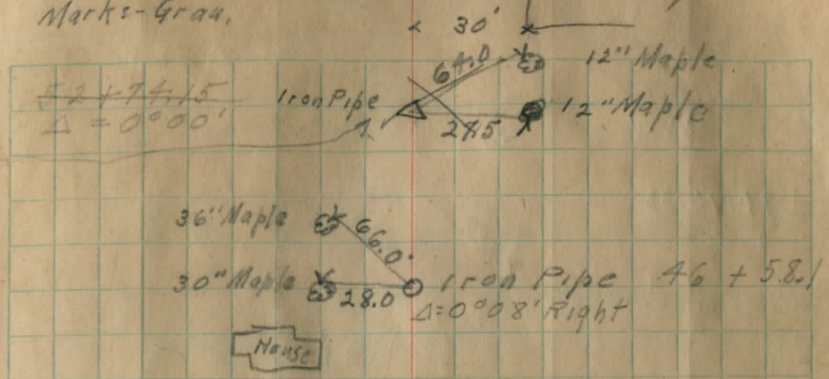


Apr. 10-1926 Fair-Marks, Gray, Timms.
Side Stakes 68+00 to 105+00



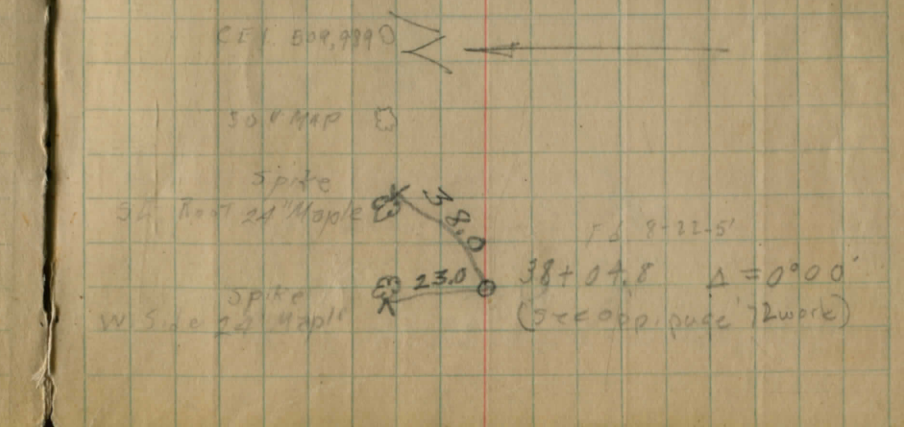


Transit Points, Apr. 5-1926
Marks - Grau.

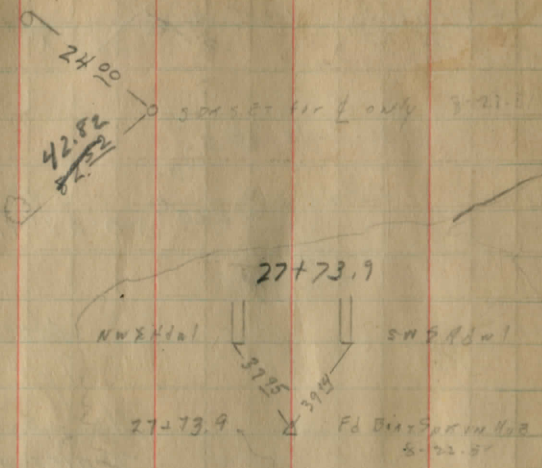


~~Mar.~~
Apr. 9, 1926, Fair.
Marks, Grau, Timms.
Traverse, 0+00 to 68+00

MUSIC STREET
WEST OF MUNN RD.



±19+80.33
63.90



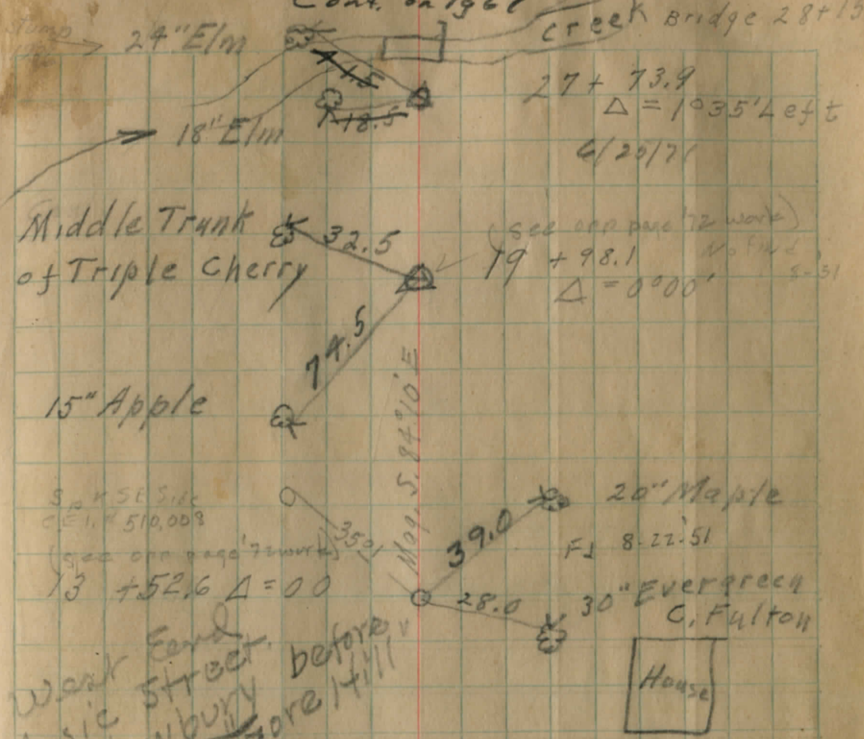
7+44 Beg. Proj (1971) at end Pavement

3+86.1
3+86.1 = Ely end Gore Hill relocation per Pg 45 F.B. # 106

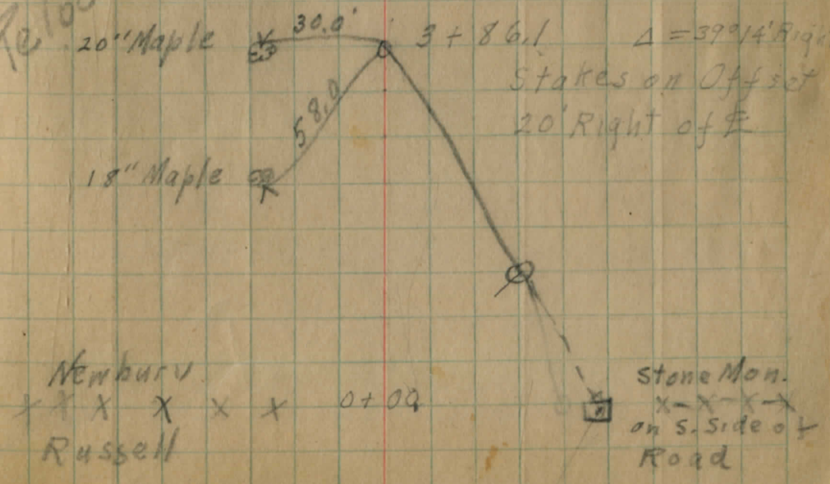
See F.B. 125 pg 64 - '72 topo
" " 324 " 1 - '72 x secs

Transit Points, Apr. 6, 1926 Marks - Gray

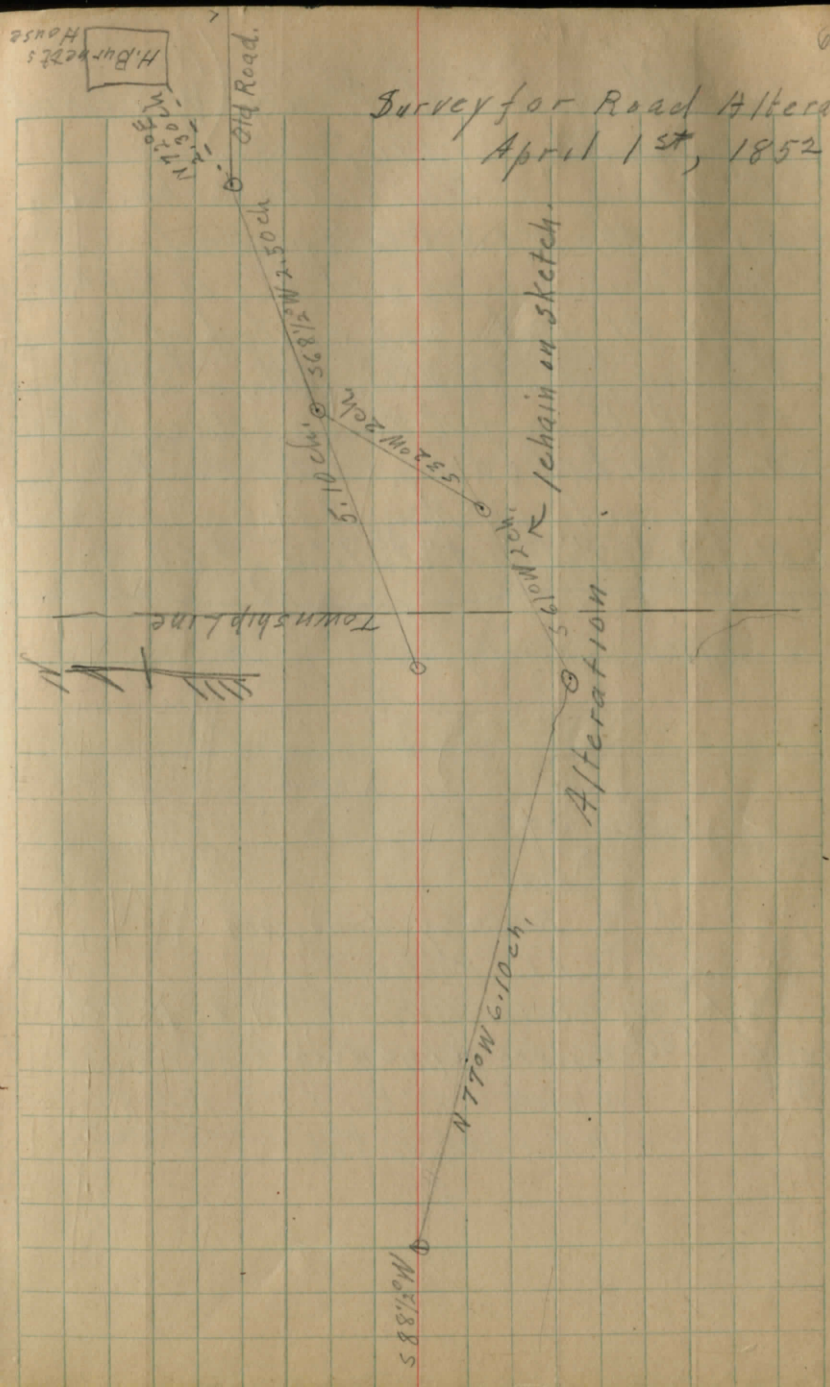
Cont. on Pg 67



Work Ended
Music Street.
in Newbury before
Relocation Gore Hill



Survey for Road Alteration
April 1st, 1852



C.H. #16

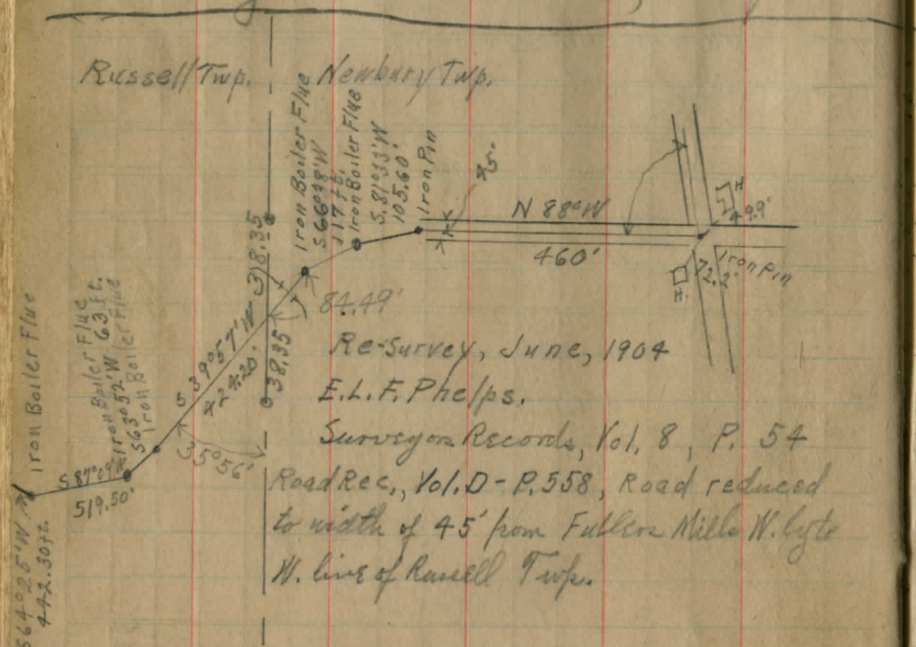
Mansfield Road. (North Woodland)

Road Records, C.-176.

Road from Fuller's Mills in Newbury Co. to the N. & S. Center road.

Beginning on the S. line of lot #3, Tract #1, and on the center of the road leading from Fuller's Mills a S.E. direction, thence E. on lot lines 2 Miles 59 Chains 50 links to the N. & S. Center Road. Surveyed Surveyed 23d May, 1834, By George Smith

(Statutory Width at this Time), 60 ft.



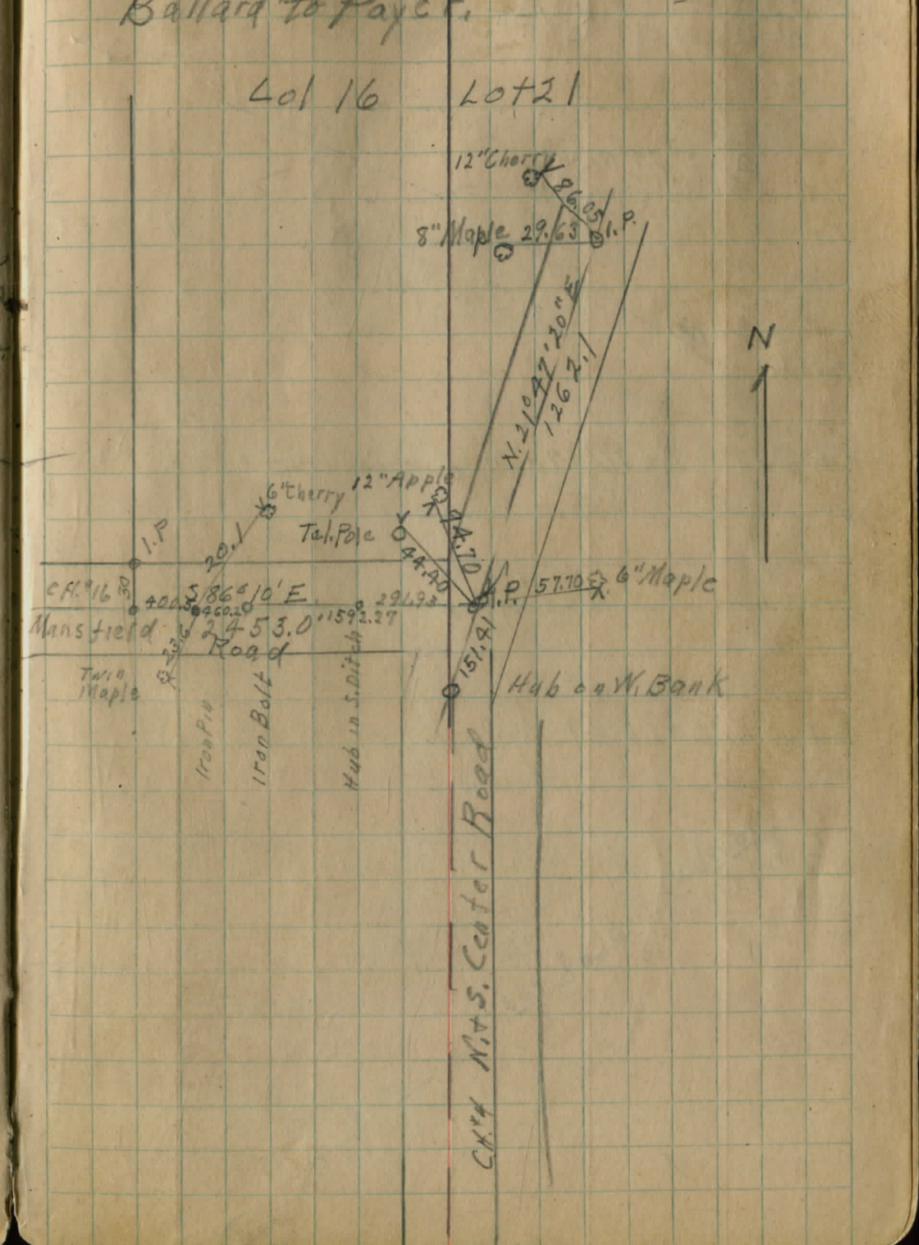
Re-Survey, June, 1904

E.L.F. Phelps.

Surveyor Records, Vol. 8, P. 54

Road Rec., Vol. D - P. 558, Road reduced to width of 45' from Fullers Mills W. Lyte W. line of Russell Twp.

Zethmayr's Survey of Land Sold by Ballard to Payer.

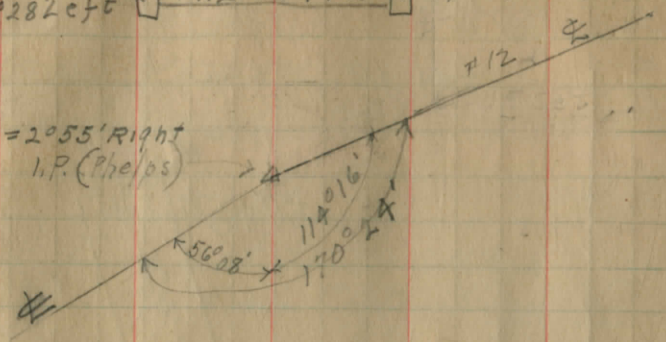


Stakes Set on 20' Offset, Apr. 25, 1927
Marks, Gray-Snyder
C.H. #16 Fairmount Rd

12+03.0 Δ = 2°28' Left — 14.2 — 14.2 — Spike, center of Culvert

Δ 3°56

Δ = 2°55' Right
7+67.4 I.P. (Phelps)

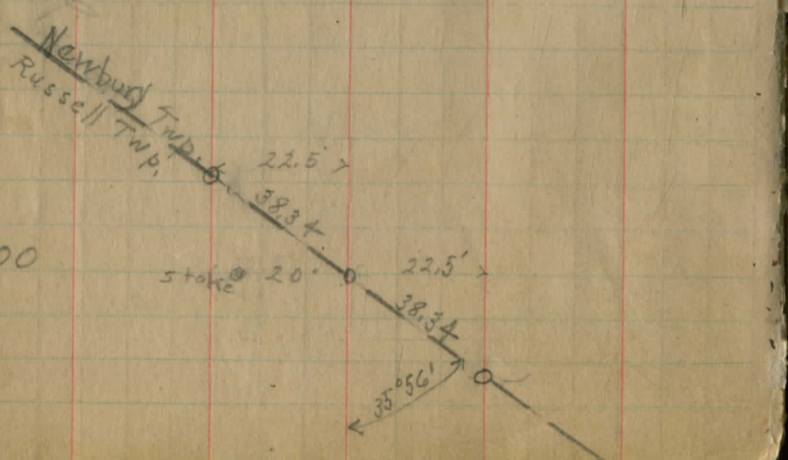


C.H. #12

3+07.1 Δ = 10°27' Right, ○ Iron Pipe (Phelps)

2+01.5 Δ = 14°55' Right ⊗ Iron Bar (Phelps)

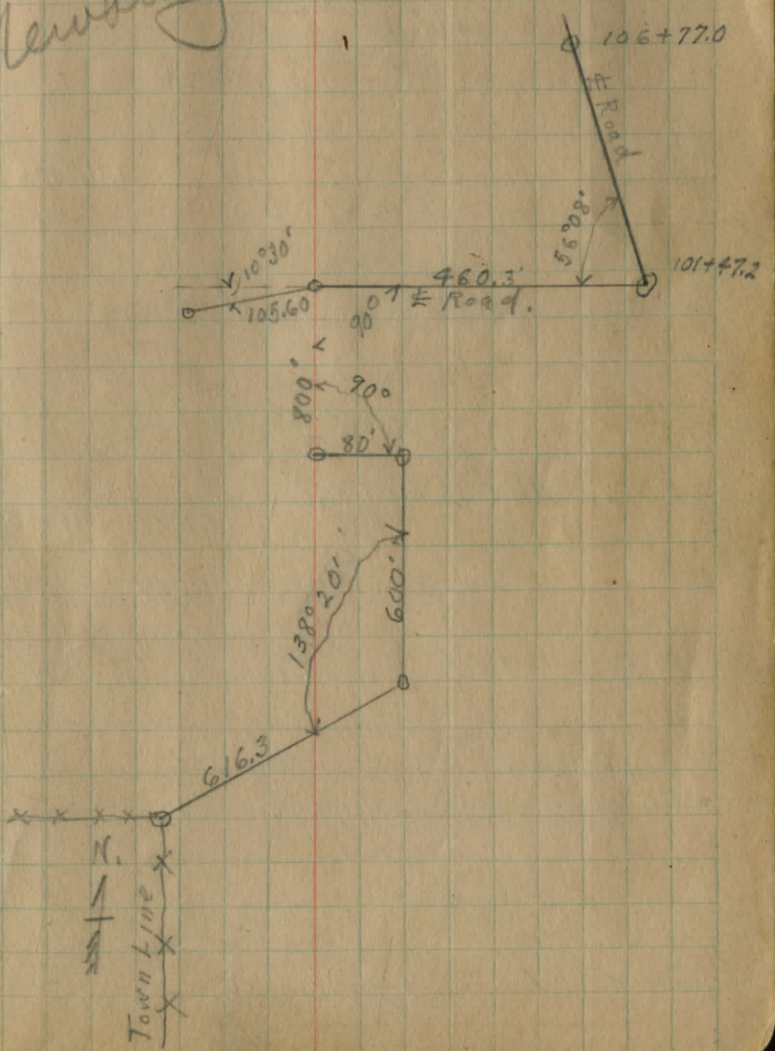
0+84.5 Δ = 26°41' Right ⊗ Iron Pipe (Phelps)



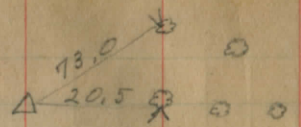
71

? See Fd Bk #165 pg 71

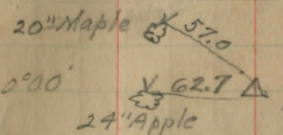
N. Woodland Twp
Newburg Twp



81+00 0°00'



64+00 Δ=0°00'



o stake

61+52 Approx ℄ of Road
Rockhaven

T.H. #106

56+90 Δ=0°06' Right. o spike

45+50 Δ=0°14' Right. Hub.

stopped, Apr. 25, 1927

35+00 0°00'

spike
20' o stake

30+00 0°00'

21+00 Δ=0°27' Right Δ Hub.
20'

o stake

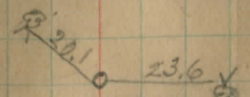
North Woodland #16 Newbury

130+91.15

Iron Bolt (Zetmayr)

460.00

126+31.1 Δ=0°00'



Twin Maple o.k

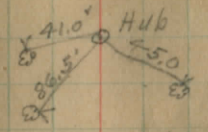
I.P. (Zetmayr)

1260.55

113+70.55 Δ=0°22' Left

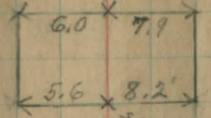
470.56

109+00



104+98.2

spike in edge of End Plank



Steel Truss Bridge
Abutments, Frame, Floor, Good Condition

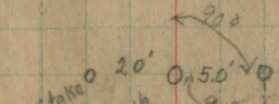
104+57.8

spike in edge of End Plank

103+85

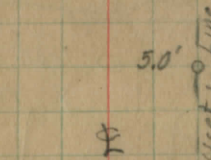
℄ C.V.E.R.R.

99+00



stopped, Apr. 28, 1927
Marks, Grau, Snyder.

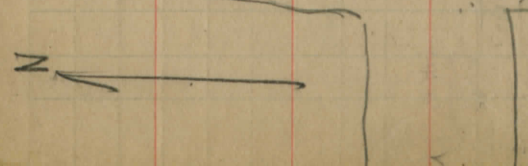
95+40



90+00

Stopped, Apr. 29, 1927,
Marks, Grau, Snyder

C.H. #4
146 +83.0 — — ⊙ Iron Pipe, (Zethmayr)
N+S. Center Road,



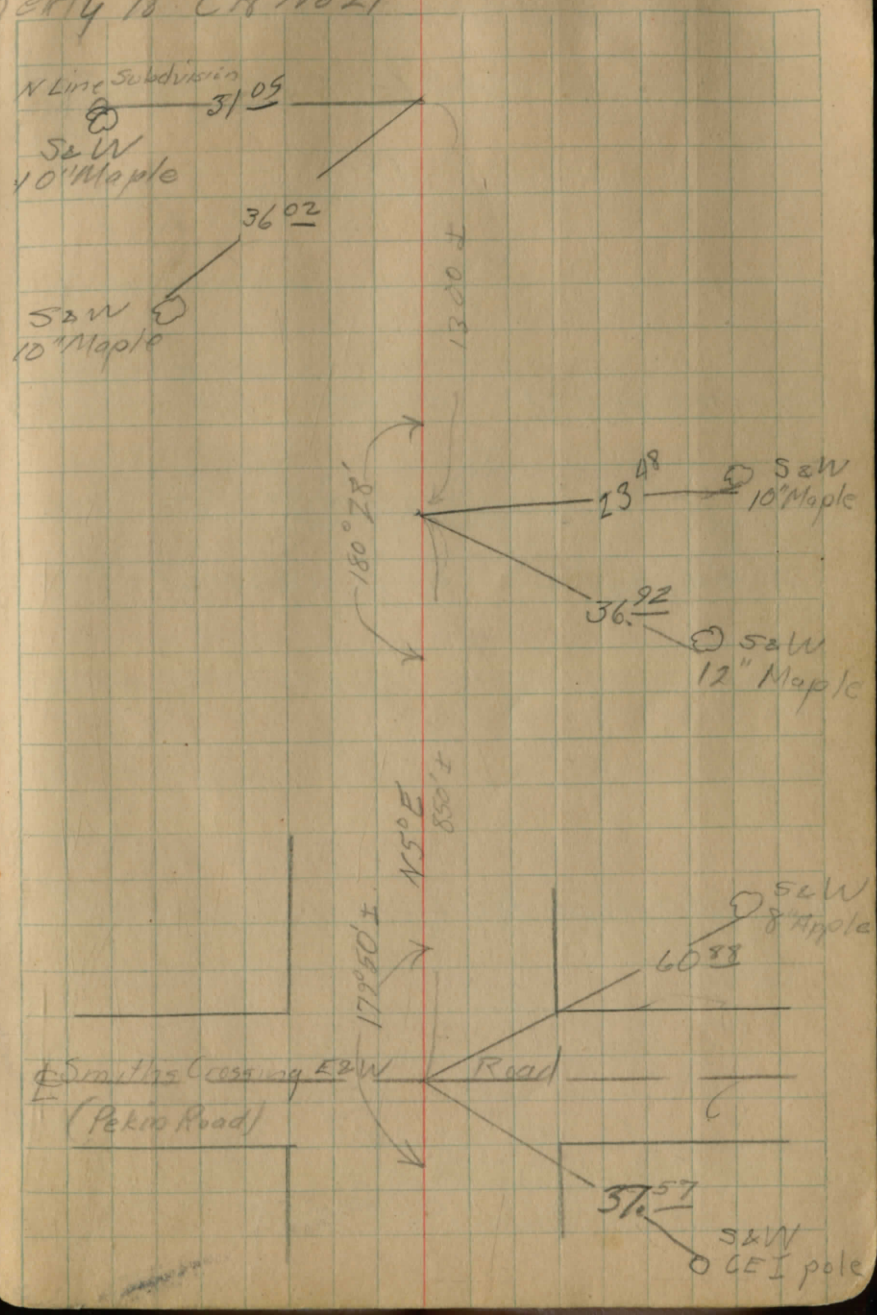
℄ Location Smiths Crossing Northerly to CH No 21

Sta 20+88 Def Lt 0°18' Spike Set

Sta 8+50 PI Def Rt 0°28' Spike Set

See F.B # 165 pgs 11 to 24 for resurvey July 1942

Sta 0+00 Beginning of Imp Iron Found



Sta 35+94.87 POT

Iron Found

Sta 35+21.62 PI Def Rt 17°00'

P.I.P. Set

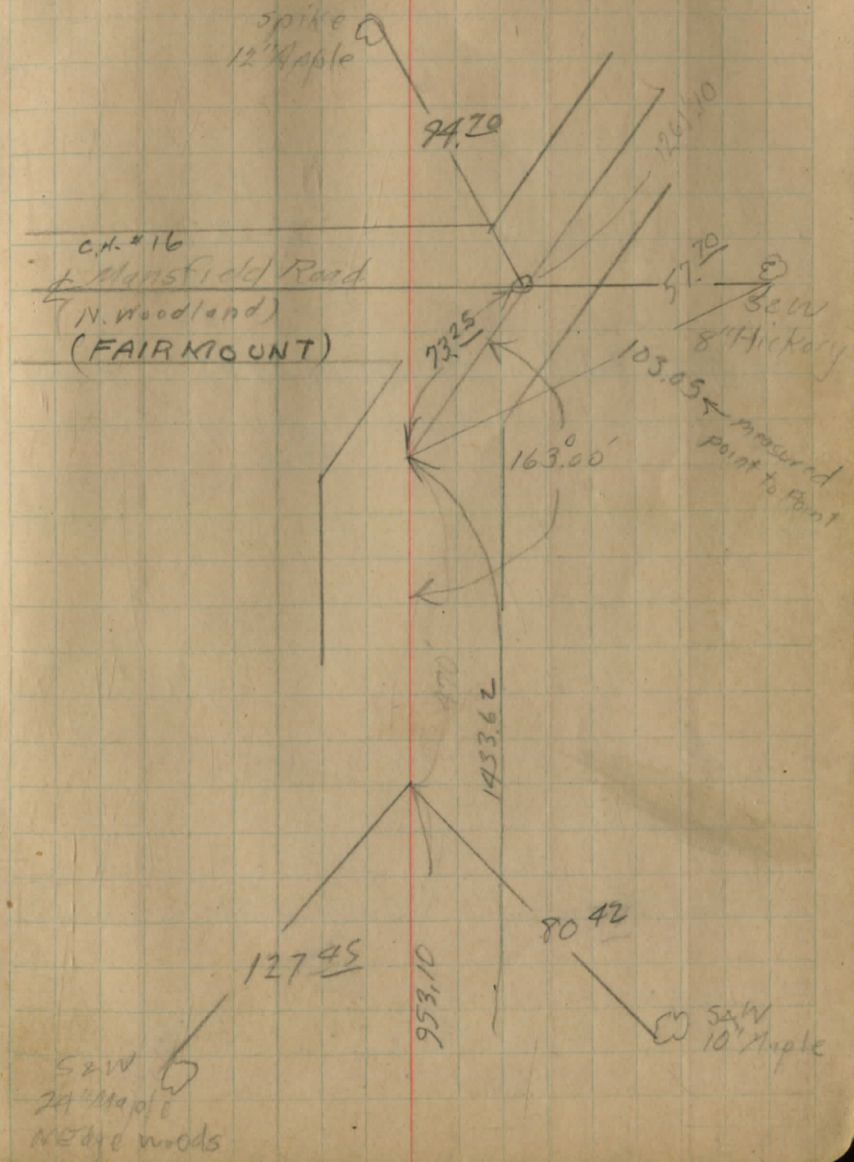
Sta 30+41.10 POT

P.I.P. Set

953
2019
3071

2068
1434
3522
33

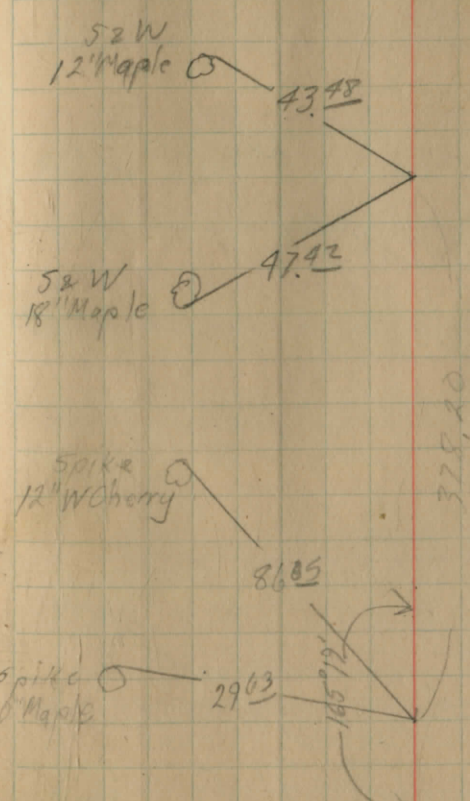
Note: Distances and angles not at Mansfield Road corner from Payer deed



FEZ
Z1-33-10

Sta 52+34.17 PI Def Lt 28°33' Iron Found
'51-27

Sta 48+55.97 PI Def Lt 14°41' Pipe Found



Sta 69+51.40 POT

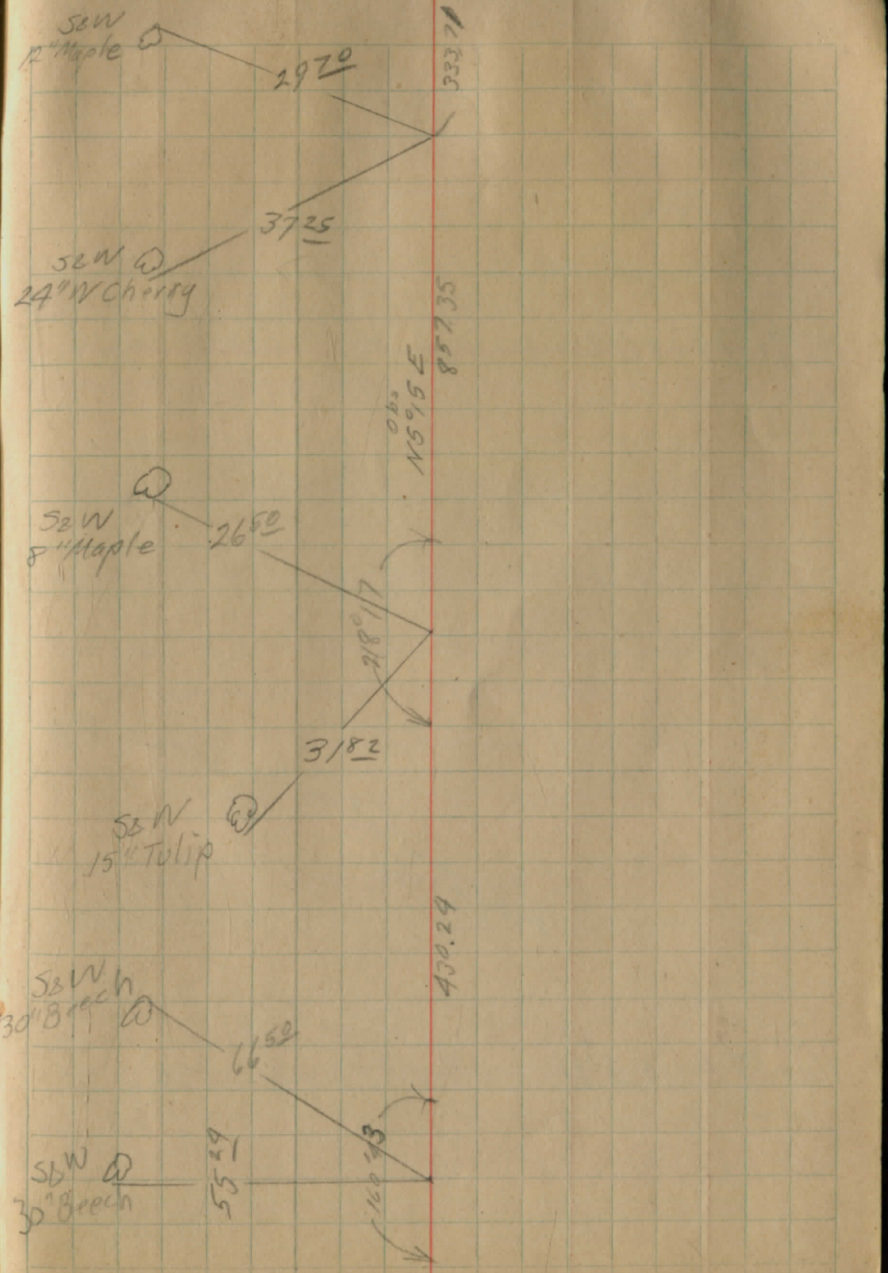
Spike Set

Sta 60+94.05 Def Rt 38°17'

Spike Set

Sta 56+63.81 Def Lt 19°17'

Spike Set

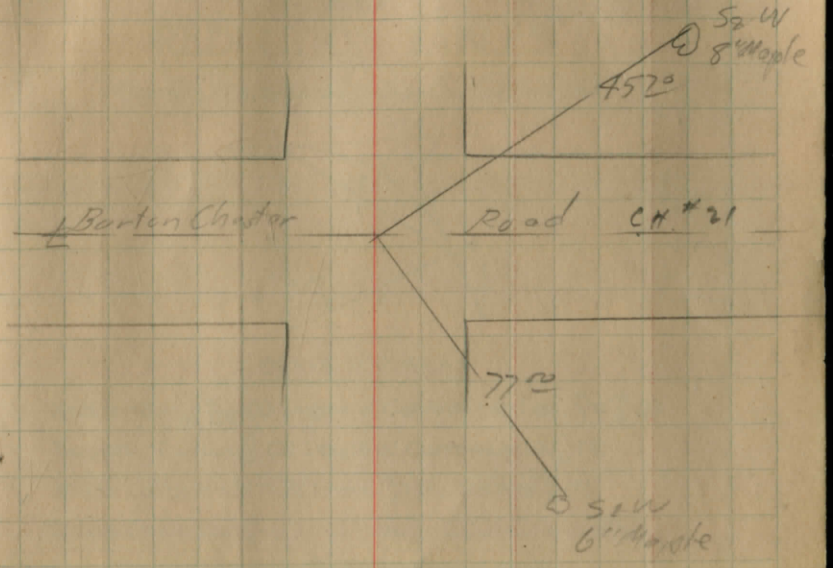


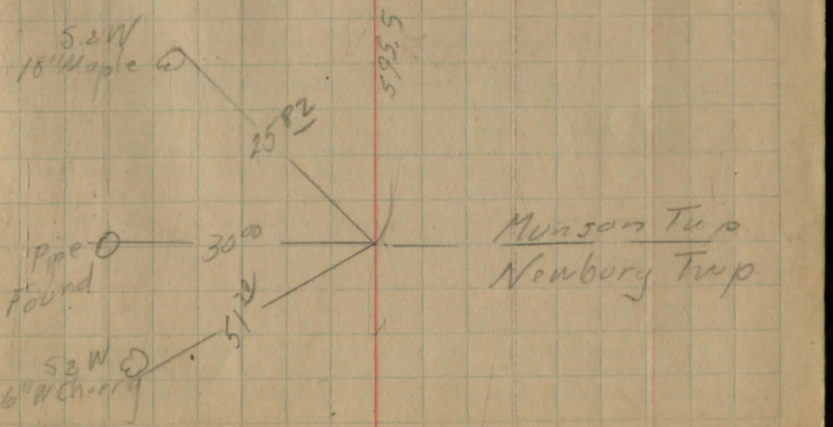
Sta 78+80 ℄ End of Imp. Rod Found

1.379 miles Newbury Twp.

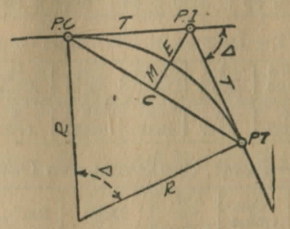
5280 / 7285.11

Sta 72+85 ℄ Def Rt 20' 28° Set





DIETZGEN'S RAILROAD CURVE AND REDUCTION TABLES



CURVE FORMULAS

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

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

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

External=E=Ttan$\frac{\Delta}{4}$- (7) =R÷cos.$\frac{\Delta}{2}$–R (8)=Rexsec$\frac{\Delta}{2}$ (9)

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

EXPLANATION AND USE OF TABLES

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

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

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

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

Table I.—Minutes in Decimals of a Degree.

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

Table II.—Inches in Decimals of a Foot.

1–16	3–32	1/8	3–16	1/4	5–16	3/8	1/2	5/8	3/4	7/8
.0052	.0078	.0104	.0156	.0208	.0260	.0313	.0417	.0521	.0625	.0729

1	2	3	4	5	6	7	8	9	10	11
.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167

Table III.—Radii, Ordinates and Deflections.

Deg.	Radius	Mid. Ord.	Tan. Offset	Def. for 1 Foot	Deg.	Radius	Mid. Ord.	Tan Offset	Def. for 1 Foot
0° 10′	34377.5	.036	.145	0.05′	7°	819.02	1.528	6.105	2.10′
20	17188.8	.073	.291	0.10	20′	781.84	1.600	6.395	2.20
30	11459.2	.109	.436	0.15	30	764.49	1.637	6.540	2.25
40	8594.42	.145	.582	0.20	40	747.89	1.673	6.685	2.30
50	6875.55	.182	.727	0.25					
					8	716.78	1.746	6.976	2.40
1	5729.65	.218	.873	0.30	20	688.16	1.819	7.266	2.50
10	4911.15	.255	1.018	0.35	30	674.69	1.855	7.411	2.55
20	4297.28	.291	1.164	0.40	40	661.74	1.892	7.556	2.60
30	3819.83	.327	1.309	0.45					
40	3437.87	.364	1.454	0.50	9	637.28	1.965	7.846	2.70
50	3125.36	.400	1.600	0.55	20	614.56	2.037	8.136	2.80
					30	603.80	2.074	8.281	2.85
2	2864.93	.436	1.745	0.60	40	593.42	2.110	8.426	2.90
10	2644.58	.473	1.891	0.65					
20	2455.70	.509	2.036	0.70	10	573.69	2.183	8.716	3.00
30	2292.01	.545	2.181	0.75	30	546.44	2.292	9.150	3.15
40	2148.79	.582	2.327	0.80	11	521.67	2.402	9.585	3.30
50	2022.41	.618	2.472	0.85	30	499.06	2.511	10.02	3.45
					12	478.34	2.620	10.45	3.60
3	1910.08	.655	2.618	0.90	30	459.28	2.730	10.89	3.75
10	1809.57	.691	2.763	0.95	13	441.68	2.839	11.32	3.90
20	1719.12	.727	2.908	1.00	30	425.40	2.949	11.75	4.05
30	1637.28	.764	3.054	1.05	14	410.28	3.058	12.18	4.20
40	1562.88	.800	3.199	1.10	30	396.20	3.168	12.62	4.35
50	1494.95	.836	3.345	1.15					
					15	383.07	3.277	13.05	4.50
4	1432.69	.873	3.490	1.20	30	370.78	3.387	13.49	4.65
10	1375.40	.909	3.635	1.25	16	359.27	3.496	13.92	4.80
20	1322.53	.945	3.718	1.30	30	348.45	3.606	14.35	4.95
30	1273.57	.982	3.926	1.35	17	338.27	3.716	14.78	5.10
40	1228.11	1.018	4.071	1.40	18	319.62	3.935	15.64	5.40
50	1185.78	1.055	4.217	1.45	19	302.94	4.155	16.51	5.70
5	1146.28	1.091	4.362	1.50	20	287.94	4.374	17.37	6.00
10	1109.33	1.127	4.507	1.55	21	274.37	4.594	18.22	6.30
20	1074.68	1.164	4.653	1.60	22	262.04	4.814	19.08	6.60
30	1042.14	1.200	4.798	1.65	23	250.79	5.035	19.94	6.90
40	1011.51	1.237	4.943	1.70	24	240.49	5.255	20.79	7.20
50	982.64	1.273	5.088	1.75					
					25	231.01	5.476	21.64	7.50
6	955.37	1.309	5.234	1.80	26	222.27	5.697	22.50	7.80
10	929.57	1.346	5.379	1.85	27	214.18	5.918	23.35	8.10
20	905.13	1.382	5.524	1.90	28	206.68	6.139	24.19	8.40
30	881.95	1.418	5.669	1.95	29	199.70	6.360	25.04	8.70
40	859.92	1.455	5.814	2.00	30	193.18	6.583	25.88	9.00

Note. Chord Deflection=2 times tangent deflection.

Table IV.—Tangents and Externals to a 1° Curve.

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
1°	50.00	.22	11°	551.70	26.50	21°	1061.9	97.57
10′	58.34	.30	10′	560.11	27.31	10′	1070.6	99.16
20	66.67	.39	20	568.53	28.14	20	1079.2	100.75
30	75.01	.49	30	576.95	28.97	30	1087.8	102.35
40	83.34	.61	40	585.36	29.82	40	1096.4	103.97
50	91.68	.73	50	593.79	30.68	50	1105.1	105.60
2	100.01	.87	12	602.21	31.56	22	1113.7	107.24
10	108.35	1.02	10	610.64	32.45	10	1122.4	108.90
20	116.68	1.19	20	619.07	33.35	20	1131.0	110.57
30	125.02	1.36	30	627.50	34.26	30	1139.7	112.25
40	133.36	1.55	40	635.93	35.18	40	1148.4	113.95
50	141.70	1.75	50	644.37	36.12	50	1157.0	115.66
3	150.04	1.96	13	652.81	37.07	23	1165.7	117.38
10	158.38	2.19	10	661.25	38.03	10	1174.4	119.12
20	166.72	2.43	20	669.70	39.01	20	1183.1	120.87
30	175.06	2.67	30	678.15	39.99	30	1191.8	122.63
40	183.40	2.93	40	686.60	40.99	40	1200.5	124.41
50	191.74	3.21	50	695.06	42.00	50	1209.2	126.20
4	200.08	3.49	14	703.51	43.03	24	1217.9	128.00
10	208.43	3.79	10	711.97	44.07	10	1226.6	129.82
20	216.77	4.10	20	720.44	45.12	20	1235.3	131.65
30	225.12	4.42	30	728.90	46.18	30	1244.0	133.50
40	233.47	4.76	40	737.37	47.25	40	1252.8	135.35
50	241.81	5.10	50	745.85	48.34	50	1261.5	137.23
5	250.16	5.46	15	754.32	49.44	25	1270.2	139.11
10	258.51	5.83	10	762.80	50.55	10	1279.0	141.01
20	266.86	6.21	20	771.29	51.68	20	1287.7	142.93
30	275.21	6.61	30	779.77	52.89	30	1296.5	144.85
40	283.57	7.01	40	788.26	53.97	40	1305.3	146.79
50	291.92	7.43	50	796.75	55.13	50	1314.0	148.75
6	300.28	7.86	16	805.25	56.31	26	1322.8	150.71
10	308.64	8.31	10	813.75	57.50	10	1331.6	152.69
20	316.99	8.76	20	822.25	58.70	20	1340.4	154.69
30	325.35	9.23	30	830.76	59.91	30	1349.2	156.70
40	333.71	9.71	40	839.27	61.14	40	1358.0	158.72
50	342.08	10.20	50	847.78	62.38	50	1366.8	160.76
7	350.44	10.71	17	856.30	63.63	27	1375.6	162.81
10	358.81	11.22	10	864.82	64.90	10	1384.4	164.86
20	367.17	11.75	20	873.35	66.18	20	1393.2	166.95
30	375.54	12.29	30	881.88	67.47	30	1402.0	169.04
40	383.91	12.85	40	890.41	68.77	40	1410.9	171.15
50	392.28	13.41	50	898.95	70.09	50	1419.7	173.27
8	400.66	13.99	18	907.49	71.42	28	1428.6	175.41
10	409.03	14.58	10	916.03	72.76	10	1437.4	177.55
20	417.41	15.18	20	924.58	74.12	20	1446.3	179.72
30	425.79	15.80	30	933.13	75.49	30	1455.1	181.89
40	434.17	16.43	40	941.69	76.86	40	1464.0	184.08
50	442.55	17.07	50	950.25	78.26	50	1472.9	186.29
9	450.93	17.72	19	958.81	79.67	29	1481.8	188.51
10	459.32	18.38	10	967.38	81.09	10	1490.7	190.74
20	467.71	19.06	20	975.96	82.53	20	1499.6	192.99
30	476.10	19.75	30	984.53	83.97	30	1508.5	195.25
40	484.49	20.45	40	993.12	85.43	40	1517.4	197.53
50	492.88	21.16	50	1001.7	86.90	50	1526.3	199.82
10	501.28	21.89	20	1010.3	88.39	30	1535.3	202.12
10	509.68	22.62	10	1018.9	89.89	10	1544.2	204.44
20	518.08	23.38	20	1027.5	91.40	20	1553.1	206.77
30	526.48	24.14	30	1036.1	92.92	30	1562.1	209.12
40	534.89	24.91	40	1044.7	94.46	40	1571.0	211.48
50	543.29	25.70	50	1053.3	96.01	50	1580.0	213.86

Table IV.—Tangents and Externals to a 1° Curve.

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
31°	1589.0	216.3	41°	2142.2	387.4	51°	2732.9	618.4
10′	1598.0	218.7	10′	2151.7	390.7	10′	2743.1	622.8
20	1606.9	221.1	20	2161.2	394.1	20	2753.4	627.2
30	1615.9	223.5	30	2170.8	397.4	30	2763.7	631.7
40	1624.9	226.0	40	2180.3	400.8	40	2773.9	636.2
50	1633.9	228.4	50	2189.9	404.2	50	2784.2	640.7
32	1643.0	230.9	42	2199.4	407.6	52	2794.5	645.2
10	1652.0	233.4	10	2209.0	411.1	10	2804.9	649.7
20	1661.0	235.9	20	2218.6	414.5	20	2815.2	654.3
30	1670.0	238.4	30	2228.1	418.0	30	2825.6	658.8
40	1679.1	241.0	40	2237.7	421.4	40	2835.9	663.4
50	1688.1	243.5	50	2247.3	425.0	50	2846.3	668.0
33	1697.2	246.1	43	2257.0	428.5	53	2856.7	672.7
10	1706.3	248.7	10	2266.6	432.0	10	2867.1	677.3
20	1715.3	251.3	20	2276.2	435.6	20	2877.5	682.0
30	1724.4	253.9	30	2285.9	439.2	30	2888.0	686.7
40	1733.5	256.5	40	2295.6	442.8	40	2898.4	691.4
50	1742.6	259.1	50	2305.2	446.4	50	2908.9	696.1
34	1751.7	261.8	44	2314.9	450.0	54	2919.4	700.9
10	1760.8	264.5	10	2324.6	453.6	10	2929.9	705.7
20	1770.0	267.2	20	2334.3	457.3	20	2940.4	710.5
30	1779.1	269.9	30	2344.1	461.0	30	2951.0	715.3
40	1788.2	272.6	40	2353.8	464.6	40	2961.5	720.1
50	1797.4	275.3	50	2363.5	468.4	50	2972.1	725.0
35	1806.6	278.1	45	2373.3	472.1	55	2982.7	729.9
10	1815.7	280.8	10	2383.1	475.8	10	2993.3	734.8
20	1824.9	283.6	20	2392.8	479.6	20	3003.9	739.7
30	1834.1	286.4	30	2402.6	483.8	30	3014.5	744.6
40	1843.3	289.2	40	2412.4	487.2	40	3025.2	749.6
50	1852.5	292.0	50	2422.3	491.0	50	3035.8	754.6
36	1861.7	294.9	46	2432.1	494.8	56	3046.5	759.6
10	1870.9	297.7	10	2441.9	498.7	10	3057.2	764.6
20	1880.1	300.6	20	2451.8	502.5	20	3067.9	769.7
30	1889.4	303.5	30	2461.7	506.4	30	3078.7	774.7
40	1898.6	306.4	40	2471.5	510.3	40	3089.4	779.8
50	1907.9	309.3	50	2481.4	514.3	50	3100.2	784.9
37	1917.1	312.2	47	2491.3	518.2	57	3110.9	790.1
10	1926.4	315.2	10	2501.2	522.2	10	3121.7	795.2
20	1935.7	318.1	20	2511.2	526.1	20	3132.6	800.4
30	1945.0	321.1	30	2521.1	530.1	30	3143.4	805.6
40	1954.3	324.1	40	2531.1	534.2	40	3154.2	810.9
50	1963.6	327.1	50	2541.0	538.2	50	3165.1	816.1
38	1972.9	330.2	48	2551.0	542.2	58	3176.0	821.4
10	1982.2	333.2	10	2561.0	546.3	10	3186.9	826.7
20	1991.5	336.3	20	2571.0	550.4	20	3197.8	832.0
30	2000.9	339.3	30	2581.0	554.5	30	3208.8	837.3
40	2010.2	342.4	40	2591.0	558.6	40	3219.7	842.7
50	2019.6	345.5	50	2601.1	562.8	50	3230.7	848.1
39	2029.0	348.6	49	2611.2	566.9	59	3241.7	853.5
10	2038.4	351.8	10	2621.2	571.1	10	3252.7	858.9
20	2047.8	354.9	20	2631.3	575.3	20	3263.7	864.3
30	2057.2	358.1	30	2641.4	579.5	30	3274.8	869.8
40	2066.6	361.3	40	2651.5	583.8	40	3285.8	875.3
50	2076.0	364.5	50	2661.6	588.0	50	3296.9	880.8
40	2085.4	367.7	50	2671.8	592.3	60	3308.0	886.4
10	2094.9	371.0	10	2681.9	596.6	10	3319.1	892.0
20	2104.3	374.2	20	2692.1	600.9	20	3330.3	897.5
30	2113.8	377.5	30	2702.3	605.3	30	3341.4	903.2
40	2123.3	380.8	40	2712.5	609.6	40	3352.6	908.8
50	2132.7	384.1	50	2722.7	614.0	50	3363.8	914.5

Table IV.—Tangents and Externals to a 1° Curve.

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
61°	3375.0	920.2	71°	4086.9	1308.2	81°	4893.6	1805.3
10′	3386.3	925.9	10′	4099.5	1315.6	10′	4908.0	1814.7
20	3397.5	931.6	20	4112.1	1322.9	20	4922.5	1824.1
30	3408.8	937.3	30	4124.8	1330.3	30	4937.0	1833.6
40	3420.1	943.1	40	4137.4	1337.7	40	4951.5	1843.1
50	3431.4	948.9	50	4150.1	1345.1	50	4966.1	1852.6
62	3442.7	954.8	72	4162.8	1352.6	82	4980.7	1862.2
10	3454.1	960.6	10	4175.6	1360.1	10	4995.4	1871.8
20	3465.4	966.5	20	4188.5	1367.6	20	5010.0	1881.5
30	3476.8	972.4	30	4201.2	1375.2	30	5024.8	1891.2
40	3488.3	978.3	40	4214.0	1382.8	40	5039.5	1900.9
50	3499.7	984.3	50	4226.8	1390.4	50	5054.3	1910.7
63	3511.1	990.2	73	4239.7	1398.0	83	5069.2	1920.5
10	3522.6	996.2	10	4252.6	1405.7	10	5084.0	1930.4
20	3534.1	1002.3	20	4265.6	1413.5	20	5099.0	1940.3
30	3545.6	1008.3	30	4278.5	1421.2	30	5113.9	1950.3
40	3557.2	1014.4	40	4291.5	1429.0	40	5128.9	1960.2
50	3568.7	1020.5	50	4304.6	1436.8	50	5143.9	1970.3
64	3580.3	1026.6	74	4317.6	1444.6	84	5159.0	1980.4
10	3591.9	1032.8	10	4330.7	1452.5	10	5174.1	1990.5
20	3603.5	1039.0	20	4343.8	1460.4	20	5189.3	2000.6
30	3615.1	1045.2	30	4356.9	1468.4	30	5204.4	2010.8
40	3626.8	1051.4	40	4370.1	1476.4	40	5219.7	2021.1
50	3638.5	1057.7	50	4383.3	1484.4	50	5234.9	2031.4
65	3650.2	1063.9	75	4396.5	1492.4	85	5250.3	2041.7
10	3661.9	1070.2	10	4409.8	1500.5	10	5265.6	2052.1
20	3673.7	1076.6	20	4423.1	1508.6	20	5281.0	2062.5
30	3685.4	1082.9	30	4436.4	1516.7	30	5296.4	2073.0
40	3697.2	1089.3	40	4449.7	1524.9	40	5311.9	2083.5
50	3709.0	1095.7	50	4463.1	1533.1	50	5327.4	2094.1
66	3720.9	1102.2	76	4476.5	1541.4	86	5343.0	2104.7
10	3732.7	1108.6	10	4489.9	1549.7	10	5358.6	2115.3
20	3744.6	1115.1	20	4503.4	1558.0	20	5374.2	2126.0
30	3756.5	1121.7	30	4516.9	1566.3	30	5389.9	2136.7
40	3768.5	1128.2	40	4530.4	1574.7	40	5405.6	2147.5
50	3780.4	1134.8	50	4544.0	1583.1	50	5421.4	2158.4
67	3792.4	1141.4	77	4557.6	1591.6	87	5437.2	2169.2
10	3804.4	1148.0	10	4571.2	1600.1	10	5453.1	2180.2
20	3816.4	1154.7	20	4584.8	1608.6	20	5469.0	2191.1
30	3828.4	1161.3	30	4598.5	1617.1	30	5484.9	2202.2
40	3840.5	1168.1	40	4612.2	1625.7	40	5500.9	2213.2
50	3852.6	1174.8	50	4626.0	1634.4	50	5517.0	2224.3
68	3864.7	1181.6	78	4639.8	1643.0	88	5533.1	2235.5
10	3876.8	1188.4	10	4653.6	1651.7	10	5549.2	2246.7
20	3889.0	1195.2	20	4667.4	1660.5	20	5565.4	2258.0
30	3901.2	1202.0	30	4681.3	1669.2	30	5581.6	2269.3
40	3913.4	1208.9	40	4695.2	1678.1	40	5597.8	2280.6
50	3925.6	1215.8	50	4709.2	1686.9	50	5614.2	2292.0
69	3937.9	1222.7	79	4723.2	1695.8	89	5630.5	2303.5
10	3950.2	1229.7	10	4737.2	1704.7	10	5646.9	2315.0
20	3962.5	1236.7	20	4751.2	1713.7	20	5663.4	2326.6
30	3974.8	1243.7	30	4765.3	1722.7	30	5679.9	2338.2
40	3987.2	1250.8	40	4779.4	1731.7	40	5696.4	2349.8
50	3999.5	1257.9	50	4793.6	1740.8	50	5713.0	2361.5
70	4011.9	1265.0	80	4807.7	1749.9	90	5729.7	2373.3
10	4024.4	1272.1	10	4822.0	1759.0	10	5746.3	2385.1
20	4036.8	1279.3	20	4836.2	1768.2	20	5763.1	2397.0
30	4049.3	1286.5	30	4850.5	1777.4	30	5779.9	2408.9
40	4061.8	1293.6	40	4864.8	1786.7	40	5796.7	2420.9
50	4074.4	1300.9	50	4879.2	1796.0	50	5813.6	2432.9

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

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
91°	5830 5	2444 9	101°	6950.6	3278.1	111°	8336.7	4386.1
10′	5847 5	2457 1	10′	6971.3	3294.1	10′	8362 7	4407.6
20	5864 6	2469 3	20	6992.0	3310 1	20	8388 9	4429.2
30	5881 7	2481 5	30	7012.7	3326 1	30	8415 1	4450.9
40	5898 8	2493 8	40	7033 6	3342.3	40	8441.5	4472.7
50	5916.0	2506.1	50	7054.5	3358.5	50	8468.0	4494.6
92	5933.2	2518 5	102	7075.5	3374.9	112	8494.6	4516.6
10	5950.5	2531.0	10	7096 6	3391.2	10	8521 3	4538.8
20	5967 9	2543.5	20	7117.8	3407.7	20	8548.1	4561.1
30	5985.3	2556.0	30	7139.0	3424.3	30	8575.0	4583.4
40	6002.7	2568.6	40	7160.3	3440 9	40	8602.1	4606.0
50	6020.2	2581.3	50	7181.7	3457.6	50	8629.3	4628.6
93	6037 8	2594.0	103	7203.2	3474 4	113	8656.6	4651.3
10	6055 4	2606.8	10	7224.7	3491.3	10	8684.0	4674.2
20	6073 1	2619.7	20	7246.3	3508.2	20	8711.5	4697.2
30	6090 8	2632.6	30	7268.0	3525.2	30	8739.2	4720.3
40	6108.6	2645.5	40	7289.8	3542.4	40	8767.0	4743.6
50	6126.4	2658.5	50	7311.7	3559.6	50	8794.9	4766.9
94	6144.3	2671.6	104	7333.6	3576.8	114	8822.9	4790.4
10	6162.6	2684 7	10	7355.6	3594.2	10	8851 0	4814.1
20	6180 2	2697 9	20	7377 8	3611.7	20	8879.3	4837.8
30	6198 3	2711.2	30	7399 9	3629.2	30	8907 7	4861.7
40	6216 4	2724.5	40	7422 2	3646.8	40	8936.3	4885.7
50	6234.6	2737.9	50	7444.6	3664.5	50	8965.0	4909.9
95	6252.8	2751.3	105	7467.0	3682.3	115	8993.8	4934.1
10	6271 1	2764.8	10	7489.6	3700.2	10	9022.7	4958.6
20	6289 4	2778.3	20	7512 2	3718 2	20	9051 7	4983.1
30	6307 9	2792.0	30	7534 9	3736.2	30	9080 9	5007.8
40	6326 3	2805 6	40	7557.7	3754 4	40	9110.3	5032.6
50	6344.8	2819.4	50	7580.5	3772.6	50	9139.8	5057.6
96	6363 4	2833.2	106	7603.5	3791.0	116	9169.4	5082.7
10	6382 1	2847.0	10	7626 6	3809 4	10	9199.1	5107.9
20	6400 8	2861.0	20	7649 7	3827.9	20	9229.0	5133.3
30	6419 5	2875.0	30	7672 9	3846.5	30	9259.0	5158.8
40	6438.4	2889.0	40	7696.3	3865.2	40	9289.2	5184.5
50	6457.3	2903.1	50	7719.7	3884.0	50	9319.5	5210.3
97	6476.2	2917.3	107	7743.2	3902.9	117	9349.9	5236.2
10	6495 2	2931 6	10	7766 8	3921.9	10	9380 5	5262.3
20	6514 3	2945.9	20	7790.5	3940 9	20	9411.3	5288.6
30	6533 4	2960.3	30	7814.3	3960.1	30	9442.2	5315.0
40	6552 6	2974 7	40	7838 1	3979 4	40	9473.2	5341.5
50	6571 9	2989.2	50	7862.1	3998.7	50	9504.4	5368.2
98	6591 2	3003.8	108	7886.2	4018.2	118	9535.7	5395.1
10	6610 6	3018.4	10	7910.4	4037.8	10	9567.2	5422.1
20	6630 1	3033.1	20	7934.6	4057.4	20	9598.9	5449.2
30	6649 6	3047.9	30	7959.0	4077.2	30	9630.7	5476.5
40	6669 2	3062.8	40	7983.5	4097.1	40	9662.6	5504.0
50	6688.8	3077.7	50	8008.0	4117.0	50	9694.7	5531.7
99	6708.6	3092.7	109	8032.7	4137.1	119	9727 0	5559.4
10	6728 4	3107.7	10	8057.4	4157.3	10	9759.4	5587.4
20	6748 2	3122 9	20	8082.3	4177.5	20	9792 0	5615.5
30	6768 1	3138 1	30	8107.3	4197.9	30	9824 8	5643 8
40	6788 1	3153 3	40	8132.3	4218.4	40	9857 7	5672.3
50	5808.2	3168.7	50	8157.5	4239.0	50	9890.8	5700.9
100	6828 3	3184 1	110	8182 8	4259.7	120	9924 0	5729 7
10	6848.5	3199 6	10	8208 2	4280.5	10	9957.5	5758.6
20	6868 8	3215.1	20	8233.7	4301.4	20	9991.0	5787.7
30	6889 2	3230.8	30	8259.3	4322 4	30	10025.0	5817.0
40	6909.6	3246.5	40	8285.0	4343.6	40	10059.0	5846.5
50	6930.1	3262.3	50	8310.8	4364.8	50	10093.0	5876.1

TABLE V.—CORRECTIONS FOR TANGENTS AND EXTERNALS.

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

FOR TANGENTS ADD

Central Angle	Degree of Curve													
	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
10°	.03	.06	.09	.13	.16	.19	.22	.25	.28	.31	.34	.38	.42	.46
15°	.04	.10	.14	.19	.24	.29	.34	.39	.45	.51	.53	.58	.63	.68
20°	.06	.13	.19	.26	.32	.39	.45	.51	.58	.65	.72	.79	.84	.90
25°	.08	.16	.24	.33	.40	.49	.58	.67	.75	.83	.90	.99	1.06	1.14
30°	.10	.19	.29	.39	.49	.59	.69	.79	.89	.99	1.09	1.20	1.29	1.39
35°	.11	.22	.34	.47	.58	.69	.70	.81	.92	1.04	1.29	1.42	1.54	1.66
40°	.13	.26	.40	.53	.67	.80	.93	1.06	1.20	1.34	1.49	1.64	1.79	1.94
45°	.15	.30	.44	.60	.76	.91	1.06	1.21	1.37	1.52	1.70	1.87	2.04	2.21
50°	.17	.34	.51	.68	.85	1.02	1.19	1.36	1.54	1.72	1.91	2.10	2.29	2.48
55°	.19	.38	.57	.76	.95	1.14	1.32	1.52	1.72	1.92	2.14	2.35	2.56	2.77
60°	.21	.42	.63	.84	1.05	1.27	1.49	1.71	1.94	2.17	2.38	2.60	2.83	3.07
65°	.23	.46	.69	.93	1.16	1.40	1.64	1.88	2.13	2.38	2.63	2.88	3.13	3.39
70°	.25	.51	.76	1.02	1.28	1.54	1.80	2.06	2.33	2.60	2.88	3.16	3.44	3.72
75°	.27	.56	.83	1.12	1.40	1.69	1.98	2.27	2.57	2.87	3.16	3.47	3.78	4.09
80°	.30	.61	.91	1.22	1.53	1.84	2.15	2.46	2.78	3.10	3.44	3.78	4.12	4.46
85°	.33	.66	1.00	1.33	1.68	2.02	2.36	2.70	3.05	3.40	3.77	4.14	4.55	4.89
90°	.36	.72	1.09	1.45	1.83	2.20	2.57	2.94	3.32	3.70	4.10	4.50	4.91	5.32
95°	.39	.79	1.19	1.55	2.00	2.40	2.80	3.20	3.61	4.02	4.40	4.98	5.38	5.83
100°	.43	.86	1.30	1.74	2.18	2.62	3.06	3.50	3.95	4.40	4.88	5.37	5.85	6.34
110°	.51	1.03	1.56	2.08	2.61	3.14	3.67	4.21	4.76	5.31	5.86	6.43	7.01	7.60
120°	.62	1.25	1.93	2.52	3.16	3.81	4.45	5.11	5.77	6.44	7.12	7.80	8.50	9.22

FOR EXTERNALS ADD

Central Angle.	Degree of Curve													
	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
10°	.001	.003	.004	.006	.007	.008	.009	.011	.012	.014	.015	.017	.018	.020
15°	.003	.007	.010	.014	.018	.023	.027	.029	.032	.035	.039	.043	.047	.051
20°	.006	.011	.017	.022	.028	.034	.038	.045	.051	.057	.063	.070	.076	.083
25°	.009	.018	.027	.036	.046	.056	.065	.074	.083	.093	.106	.120	.127	.135
30°	.013	.025	.038	.051	.065	.078	.090	.103	.116	.129	.149	.170	.179	.188
35°	.018	.035	.054	.072	.086	.109	.131	.153	.175	.197	.213	.230	.247	.264
40°	.023	.046	.070	.093	.117	.141	.172	.203	.234	.265	.277	.290	.315	.341
45°	.030	.060	.093	.119	.153	.184	.216	.254	.289	.325	.351	.378	.411	.445
50°	.037	.075	.116	.151	.189	.227	.266	.305	.345	.384	.425	.467	.508	.550
55°	.046	.093	.142	.188	.236	.283	.332	.381	.420	.479	.530	.582	.641	.700
60°	.056	.112	.168	.225	.283	.340	.398	.457	.516	.575	.636	.697	.774	.851
65°	.067	.135	.204	.273	.343	.412	.483	.554	.625	.697	.711	.845	.922	1.01
70°	.080	.159	.240	.321	.403	.485	.568	.652	.735	.819	.906	.994	1.08	1.17
75°	.095	.182	.286	.383	.480	.578	.678	.777	.877	.977	1.07	1.18	1.29	1.39
80°	.110	.220	.332	.445	.558	.671	.787	.903	1.02	1.13	1.25	1.38	1.50	1.62
85°	.128	.259	.391	.524	.657	.790	.926	1.06	1.20	1.34	1.47	1.62	1.76	1.91
90°	.149	.299	.450	.603	.756	.910	1.07	1.22	1.38	1.54	1.70	1.87	2.03	2.20
95°	.174	.350	.522	.706	.985	1.06	1.25	1.43	1.62	1.80	1.99	2.18	2.38	2.58
100°	.200	.401	.604	.809	1.01	1.22	1.43	1.64	1.85	2.06	2.28	2.50	2.73	2.96
110°	.268	.536	.806	1.08	1.35	1.63	1.91	2.20	2.48	2.76	3.05	3.35	3.66	3.96
120°	.360	.721	1.08	1.45	1.82	2.19	2.57	2.95	3.33	3.72	4.11	4.50	4.91	5.32

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

FOR SUB-CHORDS ADD										Excess of arc per 100 ft.	LONG CHORDS				
D	10	20	30	40	50	60	70	80	90		D	200	300	400	500
4°	.00	.00	.01	.01	.01	.01	.01	.01	.00	.02	1	199.99	299.97	399.92	499.85
6	.00	.01	.01	.02	.02	.02	.02	.01	.01	.05	2	199.97	299.88	399.70	499.39
8	.01	.02	.02	.03	.03	.03	.03	.02	.01	.08	3	199.93	299.73	399.32	498.63
10	.01	.02	.03	.04	.05	.05	.05	.04	.02	.13	4	199.88	299.51	398.78	497.57
12	.02	.04	.05	.06	.07	.07	.07	.05	.03	.18	5	199.81	299.24	398.10	496.20
14	.02	.05	.07	.08	.09	.10	.09	.07	.04	.25	6	199.73	298.90	397.26	494.53
16	.03	.06	.09	.11	.12	.12	.12	.09	.05	.33	7	199.63	298.51	396.28	492.57
18	.04	.08	.11	.14	.15	.16	.15	.12	.07	.41	8	199.51	298.05	395.14	490.31
20	.05	.10	.14	.17	.19	.20	.18	.15	.09	.51	9	199.38	297.54	393.86	487.75
22	.06	.12	.17	.21	.23	.24	.22	.18	.10	.62	10	199.24	296.96	392.42	484.90
24	.07	.14	.20	.25	.28	.28	.26	.21	.12	.74	12	198.90	295.63	389.12	478.34
26	.09	.17	.24	.29	.32	.33	.31	.25	.15	.86	14	198.51	294.06	385.22	470.65
28	.10	.19	.27	.34	.37	.38	.36	.29	.17	1.00	16	198.05	292.25	380.76	461.86
30	.11	.22	.31	.39	.43	.44	.41	.33	.19	1.15	18	197.54	290.21	375.74	452.02
32	.13	.25	.36	.44	.49	.50	.47	.38	.22	1.31	20	196.96	287.94	370.17	441.15
34	.15	.28	.40	.50	.55	.57	.53	.43	.25	1.48	22	196.32	285.44	364.06	429.30
36	.17	.32	.45	.56	.62	.64	.59	.48	.28	1.66	24	195.63	282.71	357.43	416.53
38	.18	.36	.51	.62	.70	.71	.66	.53	.31	1.86	26	194.87	279.76	350.30	402.89
40	.21	.40	.56	.69	.77	.79	.73	.59	.35	2.06	28	194.06	276.59	342.69	388.43
42	.23	.44	.62	.76	.85	.87	.81	.65	.38	2.28	30	193.18	273.20	334.61	373.20
44	.25	.48	.68	.84	.94	.96	.89	.72	.42	2.50	32	192.25	269.61	326.08	357.28
46	.27	.52	.75	.92	1.02	1.05	.98	.78	.46	2.74	34	191.26	265.81	317.12	340.73
48	.30	.57	.81	1.00	1.12	1.14	1.06	.86	.50	2.99	36	190.21	261.80	307.77	323.61
50	.32	.62	.89	1.09	1.21	1.24	1.15	.93	.55	3.24	38	189.10	257.60	298.03	305.99
52	.35	.67	.96	1.18	1.31	1.35	1.25	1.01	.59	3.52	40	187.94	253.21	287.94	287.94
54	.38	.73	1.04	1.28	1.42	1.46	1.35	1.09	.64	3.80	42	186.72	248.63	277.51	269.54
56	.41	.78	1.12	1.38	1.53	1.57	1.46	1.17	.69	4.09	44	185.44	243.87	266.78	250.85
58	.44	.84	1.20	1.48	1.65	1.69	1.57	1.26	.74	4.40	46	184.10	239.93	255.78	231.95
60	.47	.91	1.29	1.59	1.76	1.81	1.68	1.35	.80	4.72	48	182.71	233.83	244.51	212.92

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

TABLE VII.—MIDDLE ORDINATES FOR RAILS IN FEET.

Deg. of Curve	LENGTH OF RAILS							Deg. of Curve	LENGTH OF RAILS.						
	32	30	28	26	24	22	20		32	30	28	26	24	22	20
1°	.022	.020	.016	.013	.011	.009	.008	16°	.356	.313	.273	.236	.200	.170	.139
2	.045	.038	.034	.029	.025	.021	.017	17	.378	.333	.290	.252	.213	.180	.148
3	.037	.058	.051	.044	.037	.031	.026	18	.400	.351	.306	.265	.225	.190	.156
4	.089	.079	.069	.060	.050	.042	.035	19	.423	.371	.324	.280	.238	.201	.165
5	.112	.099	.086	.074	.063	.053	.044	20	.445	.392	.341	.296	.250	.212	.174
6	.134	.117	.102	.088	.076	.064	.052	21	.466	.410	.357	.309	.262	.222	.182
7	.156	.137	.120	.104	.088	.074	.061	22	.487	.430	.375	.325	.275	.233	.191
8	.179	.158	.137	.119	.100	.085	.070	23	.509	.450	.390	.338	.287	.243	.199
9	.201	.175	.153	.133	.112	.095	.078	24	.531	.469	.408	.354	.299	.253	.208
10	.223	.196	.171	.148	.125	.106	.087	25	.552	.486	.424	.367	.311	.263	.216
11	.245	.216	.188	.163	.139	.117	.096	26	.573	.506	.441	.382	.323	.274	.225
12	.268	.236	.206	.179	.151	.128	.105	27	.594	.524	.457	.396	.335	.284	.233
13	.290	.254	.222	.192	.163	.138	.113	28	.618	.545	.475	.411	.348	.294	.242
14	.312	.275	.239	.207	.175	.148	.122	29	.638	.564	.491	.424	.361	.303	.250
15	.334	.295	.257	.223	.188	.159	.131	30	.660	.583	.508	.438	.374	.313	.259

SLOPE REDUCTIONS.

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

TRIGONOMETRICAL FORMULAS.

See fig. (a).

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

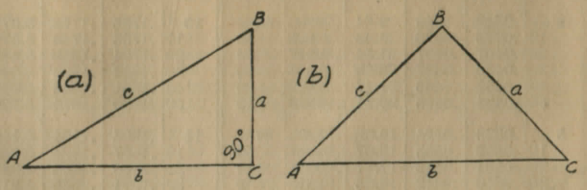
cos. $A=\frac{b}{c}$

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

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

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

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



FORMULA FOR SOLVING TRIANGLES.

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

Table VIII.—Natural Trigonometrical Functions.

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

Table VIII.—Natural Trigonometrical Functions.

Angle	Sine.	Tan.	Cotg.	Cosin.		Angle	Sine.	Tan.	Cotg.	Cosin.	
16°	.2756	.2867	3.487	.96126	74	24°	.4067	.4452	2.246	.91355	66
10	.2784	.2899	3.450	.96046	50	10	.4094	.4487	2.229	.91236	50
20	.2812	.2931	3.412	.95964	40	20	.4120	.4522	2.211	.91116	40
30	.2840	.2962	3.376	.95882	30	30	.4147	.4557	2.194	.90996	30
40	.2868	.2994	3.340	.95799	20	40	.4173	.4592	2.177	.90875	20
50	.2896	.3026	3.305	.95715	10	50	.4200	.4628	2.161	.90753	10
17°	.2924	.3057	3.271	.95615	73	25°	.4226	.4663	2.145	.90631	65
10	.2952	.3089	3.237	.95545	50	10	.4253	.4699	2.128	.90507	50
20	.2979	.3121	3.204	.95459	40	20	.4279	.4734	2.112	.90383	40
30	.3007	.3153	3.172	.95372	30	30	.4305	.4770	2.097	.90259	30
40	.3035	.3185	3.140	.95284	20	40	.4331	.4806	2.081	.90133	20
50	.3062	.3217	3.108	.95195	10	50	.4358	.4841	2.066	.90007	10
18°	.3090	.3249	3.078	.95106	72	26°	.4384	.4877	2.050	.89879	64
10	.3118	.3281	3.048	.95015	50	10	.4410	.4913	2.035	.89752	50
20	.3145	.3314	3.018	.94924	40	20	.4436	.4950	2.020	.89623	40
30	.3173	.3346	2.989	.94832	30	30	.4462	.4986	2.006	.89493	30
40	.3201	.3378	2.960	.94740	20	40	.4488	.5022	1.991	.89363	20
50	.3228	.3411	2.932	.94646	10	50	.4514	.5059	1.977	.89232	10
19°	.3256	.3443	2.904	.94552	71	27°	.4540	.5095	1.963	.89101	63
10	.3283	.3476	2.877	.94457	50	10	.4566	.5132	1.949	.88968	50
20	.3311	.3508	2.850	.94361	40	20	.4592	.5169	1.935	.88835	40
30	.3338	.3541	2.824	.94264	30	30	.4617	.5206	1.921	.88701	30
40	.3365	.3574	2.798	.94167	20	40	.4643	.5243	1.907	.88566	20
50	.3393	.3607	2.773	.94068	10	50	.4669	.5280	1.894	.88431	10
20°	.3420	.3640	2.747	.93969	70	28°	.4695	.5317	1.881	.88295	62
10	.3448	.3673	2.723	.93869	50	10	.4720	.5354	1.868	.88158	50
20	.3475	.3706	2.669	.93769	40	20	.4746	.5392	1.855	.88020	40
30	.3502	.3739	2.675	.93667	30	30	.4772	.5430	1.842	.87882	30
40	.3529	.3772	2.651	.93565	20	40	.4797	.5467	1.829	.87743	20
50	.3557	.3805	2.628	.93462	10	50	.4823	.5505	1.816	.87603	10
21°	.3584	.3839	2.605	.93358	69	29°	.4848	.5543	1.804	.87462	61
10	.3611	.3872	2.583	.93253	50	10	.4874	.5581	1.792	.87321	50
20	.3638	.3906	2.560	.93148	40	20	.4899	.5619	1.780	.87178	40
30	.3665	.3939	2.539	.93042	30	30	.4924	.5658	1.767	.87036	30
40	.3692	.3973	2.517	.92935	20	40	.4950	.5696	1.756	.86892	20
50	.3719	.4006	2.496	.92827	10	50	.4975	.5735	1.744	.86748	10
22°	.3746	.4040	2.475	.92718	68	30°	.5000	.5774	1.732	.86603	60
10	.3773	.4074	2.455	.92609	50	10	.5025	.5812	1.720	.86457	50
20	.3800	.4108	2.434	.92499	40	20	.5050	.5851	1.709	.86310	40
30	.3827	.4142	2.414	.92388	30	30	.5075	.5890	1.698	.86163	30
40	.3854	.4176	2.394	.92276	20	40	.5100	.5930	1.686	.86015	20
50	.3881	.4210	2.375	.92164	10	50	.5125	.5969	1.675	.85866	10
23°	.3907	.4245	2.356	.92050	67	31°	.5150	.6009	1.664	.85717	59
10	.3934	.4279	2.337	.91936	50	10	.5175	.6048	1.653	.85567	50
20	.3961	.4314	2.318	.91822	40	20	.5200	.6088	1.643	.85416	40
30	.3987	.4348	2.300	.91706	30	30	.5225	.6128	1.632	.85264	30
40	.4014	.4383	2.282	.91590	20	40	.5250	.6168	1.621	.85112	20
50	.4041	.4417	2.264	.91472	10	50	.5275	.6208	1.611	.84959	10
					66						58
	Cosin.	Cotg.	Tan.	Sine.	Angle.		Cosin.	Cotg.	Tan.	Sine.	Angle.

Table VIII.—Natural Trigonometrical Functions.

Angle	Sine.	Tan.	Cotg.	Cosin.		Angle	Sine.	Tan.	Cotg.	Cosin.	
or						or					
32	.5299	.6249	1.600	.84805	58	30	.6225	.7954	1.257	.78261	30
10	.5324	.6289	1.590	.84650	50	40	.6248	.8002	1.250	.78079	20
20	.5348	.6330	1.580	.84495	40	50	.6271	.8050	1.242	.77897	10
30	.5373	.6371	1.570	.84339	30						
40	.5398	.6412	1.560	.84182	20	39	.6293	.8098	1.235	.77715	51
50	.5422	.6453	1.550	.84025	10	10	.6316	.8146	1.228	.77531	50
						20	.6338	.8195	1.220	.77347	40
33	.5446	.6494	1.540	.83867	57	30	.6361	.8243	1.213	.77162	30
10	.5471	.6536	1.530	.83708	50	40	.6383	.8292	1.206	.76977	20
20	.5495	.6577	1.520	.83549	40	50	.6406	.8342	1.199	.76791	10
30	.5519	.6619	1.511	.83389	30						
40	.5544	.6661	1.501	.83228	20	40	.6428	.8391	1.192	.76604	50
50	.5568	.6703	1.492	.83066	10	10	.6450	.8441	1.185	.76417	50
						20	.6472	.8491	1.178	.76229	40
34	.5592	.6745	1.483	.82904	56	30	.6494	.8541	1.171	.76041	30
10	.5616	.6787	1.473	.82741	50	40	.6517	.8591	1.164	.75851	20
20	.5640	.6830	1.464	.82577	40	50	.6539	.8642	1.157	.75661	10
30	.5664	.6873	1.455	.82413	30						
40	.5688	.6916	1.446	.82248	20	41	.6561	.8693	1.150	.75471	49
50	.5712	.6959	1.437	.82082	10	10	.6583	.8744	1.144	.75280	50
						20	.6604	.8796	1.137	.75088	40
35	.5736	.7002	1.428	.81915	55	30	.6626	.8847	1.130	.74896	30
10	.5760	.7046	1.419	.81748	50	40	.6648	.8899	1.124	.74703	20
20	.5783	.7089	1.411	.81580	40	50	.6670	.8952	1.117	.74509	10
30	.5807	.7133	1.402	.81412	30						
40	.5831	.7177	1.393	.81242	20	42	.6691	.9004	1.111	.74314	48
50	.5854	.7221	1.385	.81072	10	10	.6713	.9057	1.104	.74120	50
						20	.6734	.9110	1.098	.73924	40
36	.5878	.7265	1.376	.80902	54	30	.6756	.9163	1.091	.73728	30
10	.5901	.7310	1.368	.80730	50	40	.6777	.9217	1.085	.73531	20
20	.5925	.7355	1.360	.80558	40	50	.6799	.9271	1.079	.73333	10
30	.5948	.7400	1.351	.80386	30						
40	.5972	.7445	1.343	.80212	20	43	.6820	.9325	1.072	.73135	47
50	.5995	.7490	1.335	.80038	10	10	.6841	.9380	1.066	.72937	50
						20	.6862	.9435	1.060	.72737	40
37	.6018	.7536	1.327	.79864	53	30	.6884	.9490	1.054	.72537	30
10	.6041	.7581	1.319	.79688	50	40	.6905	.9545	1.048	.72337	20
20	.6065	.7627	1.311	.79512	40	50	.6926	.9601	1.042	.72136	10
30	.6088	.7673	1.303	.79335	30						
40	.6111	.7720	1.295	.79158	20	44	.6947	.9657	1.036	.71934	46
50	.6134	.7766	1.288	.78980	10	10	.6967	.6713	1.030	.71732	50
						20	.6988	.9770	1.024	.71529	40
38	.6157	.7813	1.280	.78801	52	30	.7009	.9827	1.018	.71325	30
10	.6180	.7860	1.272	.78622	50	40	.7030	.9884	1.012	.71121	20
20	.6202	.7907	1.265	.78442	40	50	.7050	.9942	1.006	.70916	10
							.7071	1.	1.	.70711	45
											or
	Cosin.	Cotg.	Tan.	Sine.	Angle.		Cosin.	Cotg.	Tan.	Sine.	Angle.

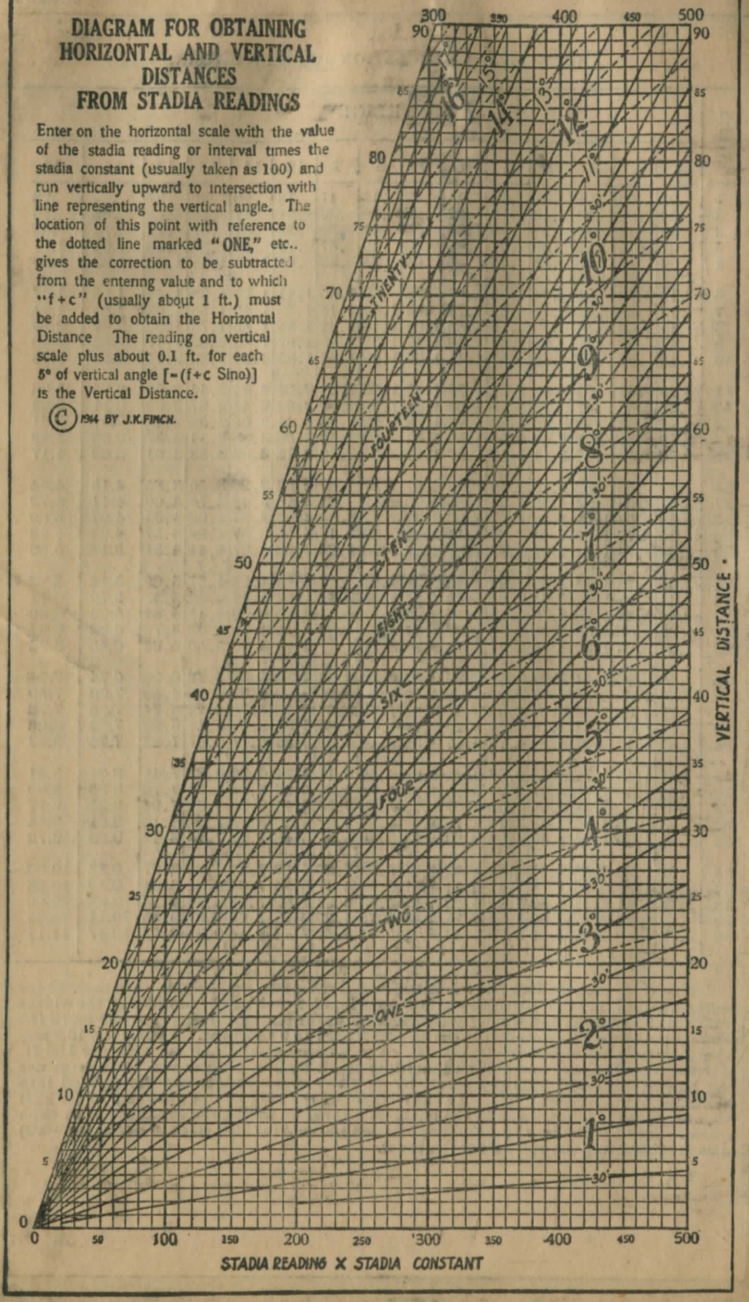
Table IX.—Calculation of Earthwork.

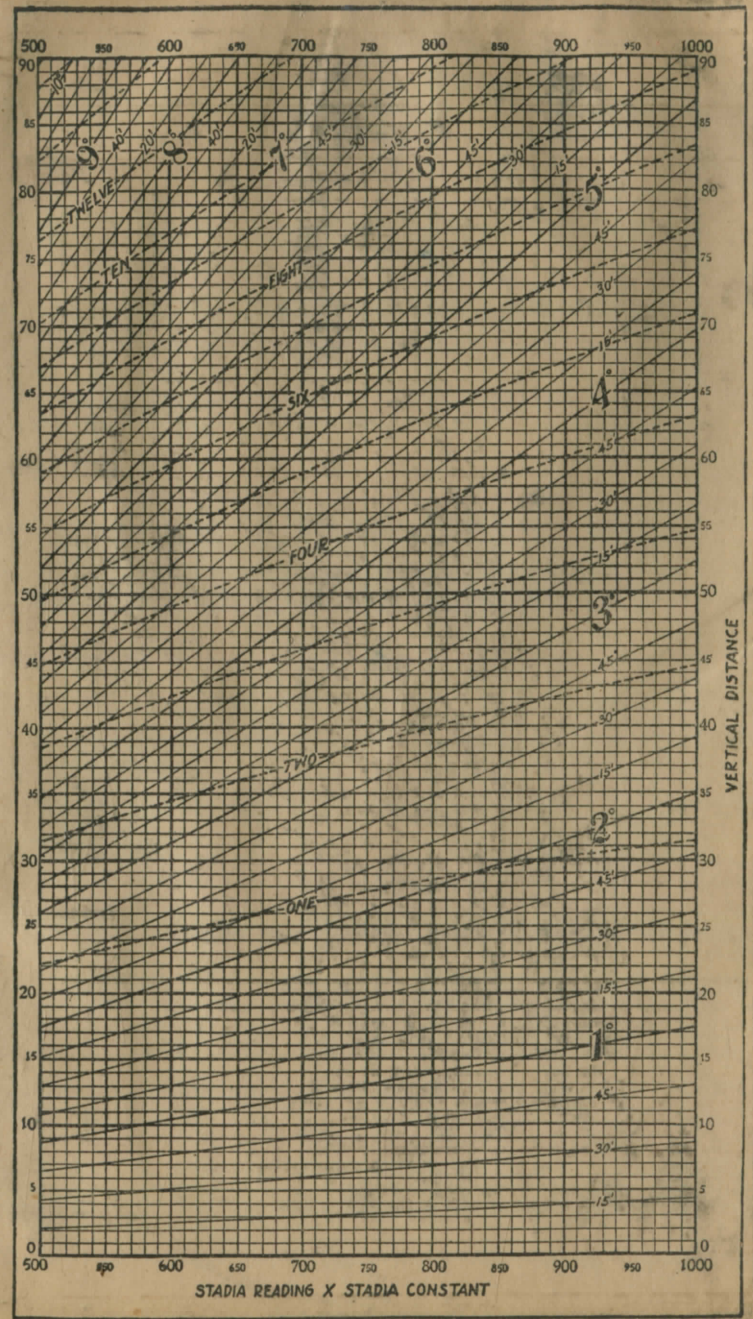
Width	HEIGHT														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	.02	.04	.06	.07	.09	.11	.13	.15	.17	.18	.20	.22	.24	.26	.28
2	.04	.07	.11	.15	.18	.22	.26	.30	.33	.37	.41	.44	.48	.52	.56
3	.06	.11	.17	.22	.28	.33	.39	.44	.50	.56	.61	.67	.72	.78	.83
4	.07	.15	.22	.30	.37	.44	.52	.59	.67	.74	.81	.89	.96	1.04	1.11
5	.09	.19	.28	.37	.46	.56	.65	.74	.83	.93	1.02	1.11	1.20	1.30	1.39
6	.11	.22	.33	.44	.56	.67	.78	.89	1.00	1.11	1.22	1.33	1.44	1.55	1.67
7	.13	.26	.39	.52	.65	.78	.91	1.04	1.16	1.30	1.42	1.55	1.68	1.81	1.94
8	.15	.30	.44	.59	.74	.89	1.04	1.19	1.33	1.48	1.63	1.78	1.92	2.08	2.22
9	.17	.33	.50	.67	.83	1.00	1.17	1.33	1.50	1.67	1.83	2.00	2.17	2.33	2.50
10	.18	.37	.56	.74	.93	1.11	1.30	1.48	1.67	1.85	2.04	2.22	2.41	2.59	2.78
11	.20	.41	.61	.82	1.02	1.22	1.43	1.63	1.83	2.04	2.24	2.44	2.65	2.85	3.06
12	.22	.44	.67	.89	1.11	1.33	1.56	1.78	2.00	2.22	2.44	2.67	2.89	3.11	3.33
13	.24	.48	.72	.96	1.20	1.44	1.68	1.92	2.16	2.41	2.65	2.89	3.13	3.37	3.61
14	.26	.52	.78	1.04	1.30	1.55	1.81	2.08	2.33	2.59	2.85	3.11	3.37	3.63	3.89
15	.28	.56	.83	1.11	1.39	1.67	1.94	2.22	2.50	2.78	3.06	3.33	3.61	3.89	4.17
16	.30	.59	.89	1.18	1.48	1.78	2.07	2.37	2.67	2.96	3.26	3.56	3.85	4.15	4.44
17	.31	.63	.94	1.26	1.57	1.89	2.20	2.52	2.83	3.15	3.46	3.78	4.09	4.41	4.72
18	.33	.67	1.00	1.33	1.67	2.00	2.33	2.67	3.00	3.33	3.67	4.00	4.33	4.67	5.00
19	.35	.70	1.06	1.41	1.76	2.11	2.46	2.82	3.17	3.52	3.87	4.22	4.57	4.92	5.28
20	.37	.74	1.11	1.48	1.85	2.22	2.59	2.96	3.33	3.70	4.07	4.44	4.81	5.18	5.56
21	.39	.78	1.17	1.55	1.94	2.33	2.72	3.11	3.50	3.89	4.28	4.67	5.06	5.44	5.83
22	.41	.81	1.22	1.63	2.04	2.44	2.85	3.26	3.67	4.07	4.48	4.89	5.30	5.70	6.11
23	.43	.85	1.28	1.70	2.13	2.56	2.98	3.41	3.83	4.26	4.68	5.11	5.54	5.96	6.39
24	.44	.89	1.33	1.78	2.22	2.67	3.11	3.56	4.00	4.44	4.89	5.33	5.78	6.22	6.67
25	.46	.92	1.39	1.85	2.31	2.78	3.24	3.70	4.17	4.63	5.09	5.56	6.02	6.48	6.94
26	.48	.96	1.44	1.92	2.41	2.89	3.37	3.85	4.33	4.82	5.30	5.78	6.26	6.74	7.24
27	.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
28	.52	1.04	1.55	2.07	2.59	3.11	3.63	4.15	4.67	5.18	5.70	6.22	6.74	7.26	7.78
29	.54	1.07	1.61	2.15	2.68	3.22	3.76	4.30	4.83	5.37	5.91	6.44	6.98	7.52	8.06
30	.56	1.11	1.67	2.22	2.78	3.33	3.89	4.44	5.00	5.55	6.11	6.67	7.22	7.78	8.33
31	.57	1.15	1.72	2.30	2.87	3.44	4.02	4.59	5.17	5.74	6.32	6.89	7.46	8.04	8.61
32	.59	1.18	1.78	2.37	2.96	3.56	4.15	4.74	5.33	5.92	6.52	7.11	7.70	8.30	8.89
33	.61	1.22	1.83	2.44	3.05	3.67	4.28	4.89	5.50	6.11	6.72	7.33	7.94	8.55	9.17
34	.63	1.26	1.89	2.52	3.15	3.78	4.40	5.04	5.67	6.29	6.93	7.56	8.18	8.81	9.44
35	.65	1.30	1.94	2.59	3.24	3.89	4.53	5.18	5.83	6.48	7.13	7.78	8.42	9.08	9.72
36	.67	1.33	2.00	2.67	3.33	4.00	4.66	5.33	6.00	6.67	7.33	8.00	8.67	9.33	10.00
37	.68	1.37	2.06	2.74	3.42	4.11	4.79	5.48	6.17	6.85	7.54	8.22	8.91	9.59	10.28
38	.70	1.41	2.11	2.82	3.52	4.22	4.92	5.63	6.33	7.03	7.74	8.44	9.15	9.85	10.56
39	.72	1.44	2.17	2.89	3.61	4.33	5.05	5.78	6.50	7.22	7.95	8.67	9.39	10.11	10.83
40	.74	1.48	2.22	2.96	3.70	4.44	5.18	5.92	6.67	7.41	8.15	8.89	9.63	10.37	11.11

Table gives cu. yds. in 1 ft. of a triangle of given width and height. Corrections for tenths of width are one tenth the values found under each height considering the widths from 1 to 9 as tenths and similarly the corrections for tenths of height are one tenth the figures opposite width considering the heights from 1 to 9 as tenths. Thus if w =16.2 and h =5.3, cu. yds. =1.48+.028+.089 =1.597 cu. yds. or practically 160 cu. yds. per 100 ft. If w exceeds 40 ft., use one half and multiply result by 2, if both w and h are large use one half of each and multiply result by 4. Any cross-section may be divided into triangles by the following rule. To the triangle of the sum of the outside cuts (or fills) =h, and ½ the roadbed =w, add the triangles formed by taking the distance out to each break in turn (=w's) by the difference between the cuts (or fills) on each side of it (=h's) always subtracting the outer from the inner.

DIAGRAM FOR OBTAINING HORIZONTAL AND VERTICAL DISTANCES FROM STADIA READINGS

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

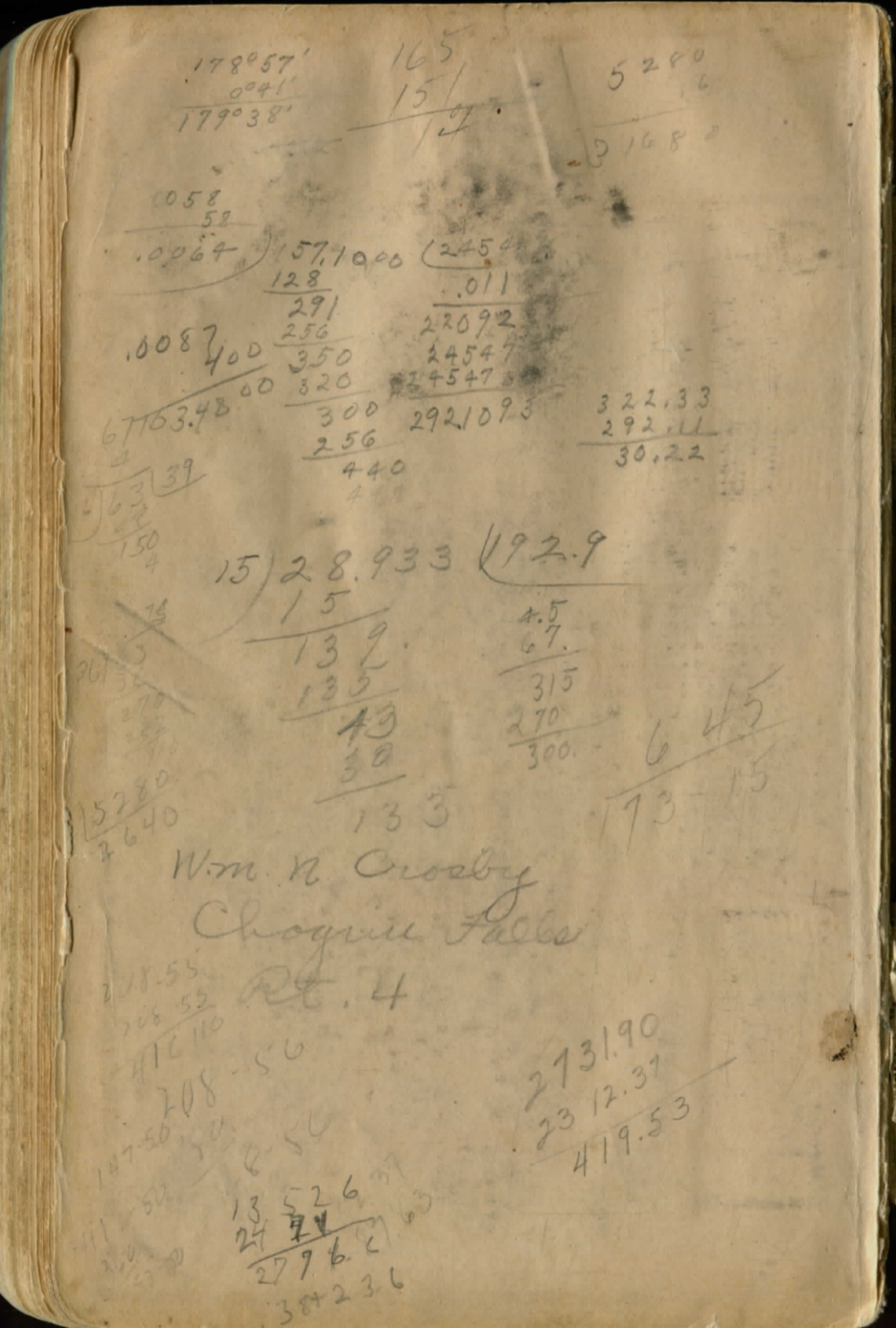




29.2
.992 | 29.00
1984
9160
8928
2320

34.8
.810 | 30.0400.
25 830
4 1740
3 4440
7 3200

5445
45.55



DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

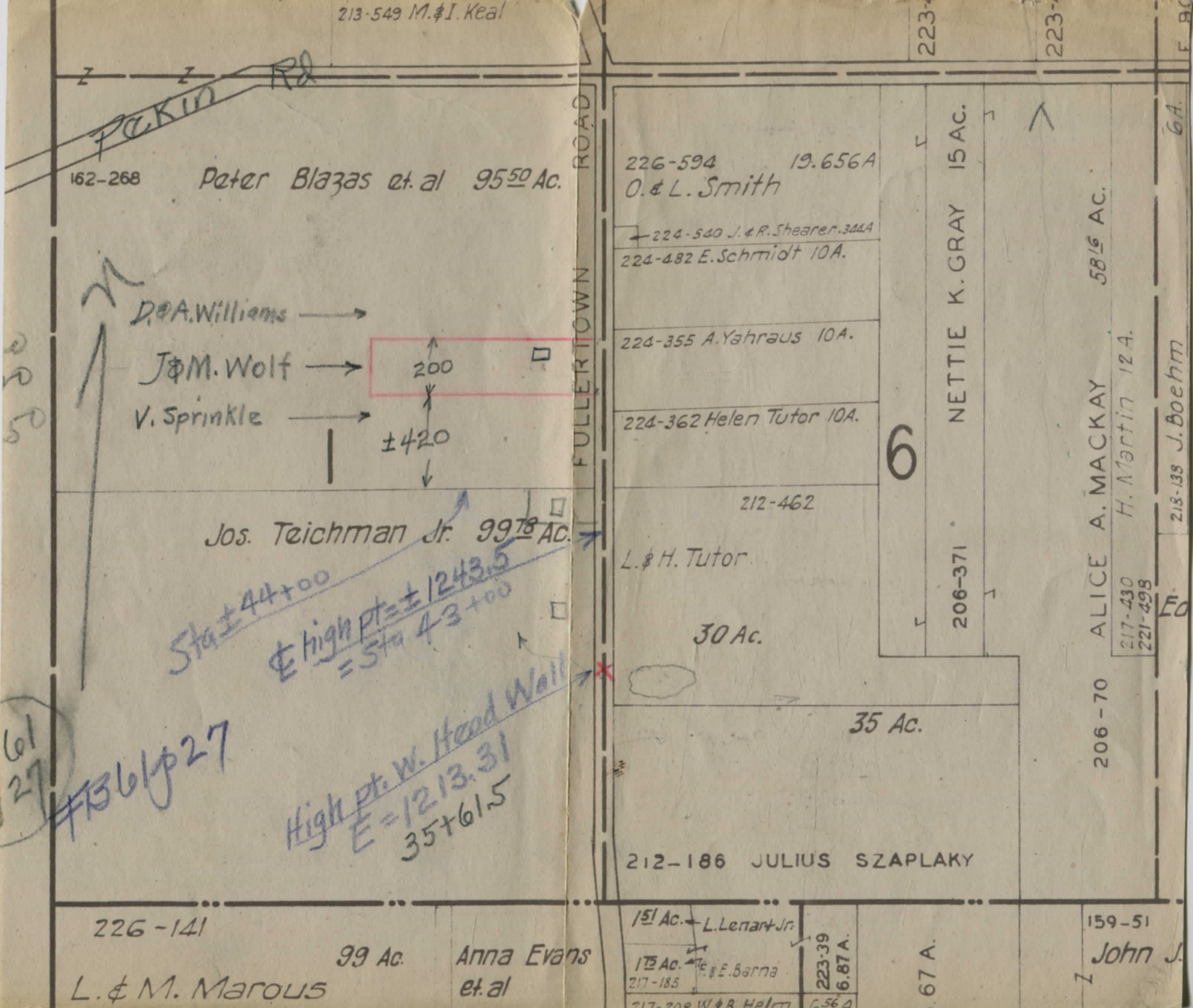
Roadway 16 feet wide. Side Slopes 1 on 1½.

Top Angle 1[illegible] Limber [illegible]

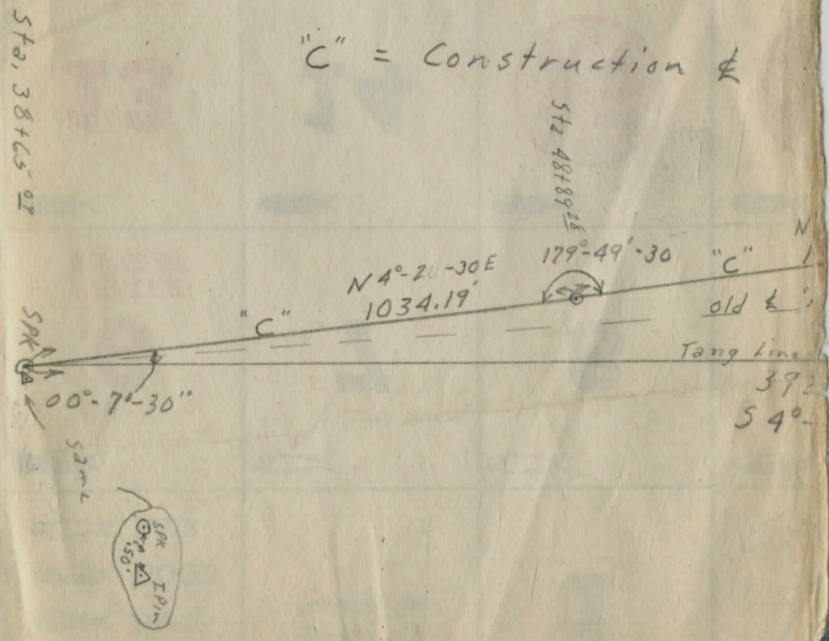
0	8.0	8.2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	9.2	9.4	0
1	9.5	9.7	9.8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10.7	10.9	1
2	11.0	11.2	11.3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	12.2	12.4	2
3	12.5	12.7	12.8	[illegible]	[illegible]	13.2	13.4	13.6	13.7	13.9	3
4	14.0	14.2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	15.2	15.4	4
5	15.5	15.7	15.8	16.0	16.1	16.3	16.4	16.6	16.7	16.9	5
6	17.0	17.2	17.3	17.5	17.6	17.8	17.9	18.1	18.2	18.4	6
7	18.5	18.7	18.8	19.0	19.1	19.3	19.4	19.6	19.7	19.9	7
8	20.0	20.2	20.3	20.5	20.6	20.8	20.9	21.1	21.2	21.4	8
9	21.5	21.7	21.8	22.0	22.1	22.3	22.4	22.6	22.7	22.9	9
10	23.0	23.2	23.3	23.5	23.6	23.8	23.9	24.1	24.2	24.4	10
11	24.5	24.7	24.8	25.0	25.1	25.3	25.4	25.6	25.7	25.9	11
12	26.0	25.2	26.3	26.5	26.6	26.8	26.9	27.1	27.2	27.4	12
13	27.5	27.7	27.8	28.0	28.1	28.3	28.4	28.6	28.7	28.9	13
14	29.0	29.2	29.3	29.5	29.6	29.8	29.9	30.1	30.2	30.4	14
15	30.5	30.7	30.8	31.0	31.1	31.3	31.4	31.6	31.7	31.9	15
16	32.0	32.2	32.3	32.5	32.6	32.8	32.9	33.1	33.2	33.4	16
17	33.5	33.7	33.8	34.0	34.1	34.3	34.4	34.6	34.7	34.9	17
18	35.0	35.2	35.3	35.5	35.6	35.8	35.9	36.1	36.2	36.4	18
19	36.5	36.7	36.8	37.0	37.1	37.3	37.4	37.6	37.7	37.9	19
20	38.0	38.2	38.3	38.5	38.6	38.8	38.9	39.1	39.2	39.4	20
21	39.5	39.7	39.8	40.0	40.1	40.3	40.4	40.6	40.7	40.9	21
22	41.0	41.2	41.3	41.5	41.6	41.8	41.9	42.1	42.2	42.4	22
23	42.5	42.7	42.8	43.0	43.1	43.3	43.4	43.6	43.7	43.9	23
24	44.0	44.2	44.3	44.5	44.6	44.8	44.9	45.1	45.2	45.4	24
25	45.5	45.7	45.8	46.0	46.1	46.3	46.4	46.6	46.7	46.9	25
26	47.0	47.2	47.3	47.5	47.6	47.8	47.9	48.1	48.2	48.4	26
27	48.5	48.7	48.8	49.0	49.1	49.3	49.4	49.6	49.7	49.9	27
28	50.0	50.2	50.3	50.5	50.6	50.8	50.9	51.1	51.2	51.4	28
29	51.5	51.7	51.8	52.0	52.1	52.3	52.4	52.6	52.7	52.9	29
30	53.0	53.2	53.3	53.5	53.6	53.8	53.9	54.1	54.2	54.4	30
31	54.5	54.7	54.8	55.0	55.1	55.3	55.4	55.6	55.7	55.9	31
32	56.0	56.2	56.3	56.5	56.6	56.8	56.9	57.1	57.2	57.4	32
33	57.5	57.7	57.8	58.0	58.1	58.3	58.4	58.6	58.7	58.9	33
34	59.0	59.2	59.3	59.5	59.6	59.8	59.9	60.1	60.2	60.4	34
35	60.5	60.7	60.8	61.0	61.1	61.3	61.4	61.6	61.7	61.9	35
36	62.0	62.2	62.3	62.5	62.6	62.8	62.9	63.1	63.2	63.4	36
37	63.5	63.7	63.8	64.0	64.1	64.3	64.4	64.6	64.7	64.9	37
38	65.0	65.2	65.3	65.5	65.6	65.8	65.9	66.1	66.2	66.4	38
39	66.5	66.7	66.8	67.0	67.1	67.3	67.4	67.6	67.7	67.9	39
40	68.0	68.2	68.3	68.5	68.6	68.8	68.9	69.1	69.2	69.4	40

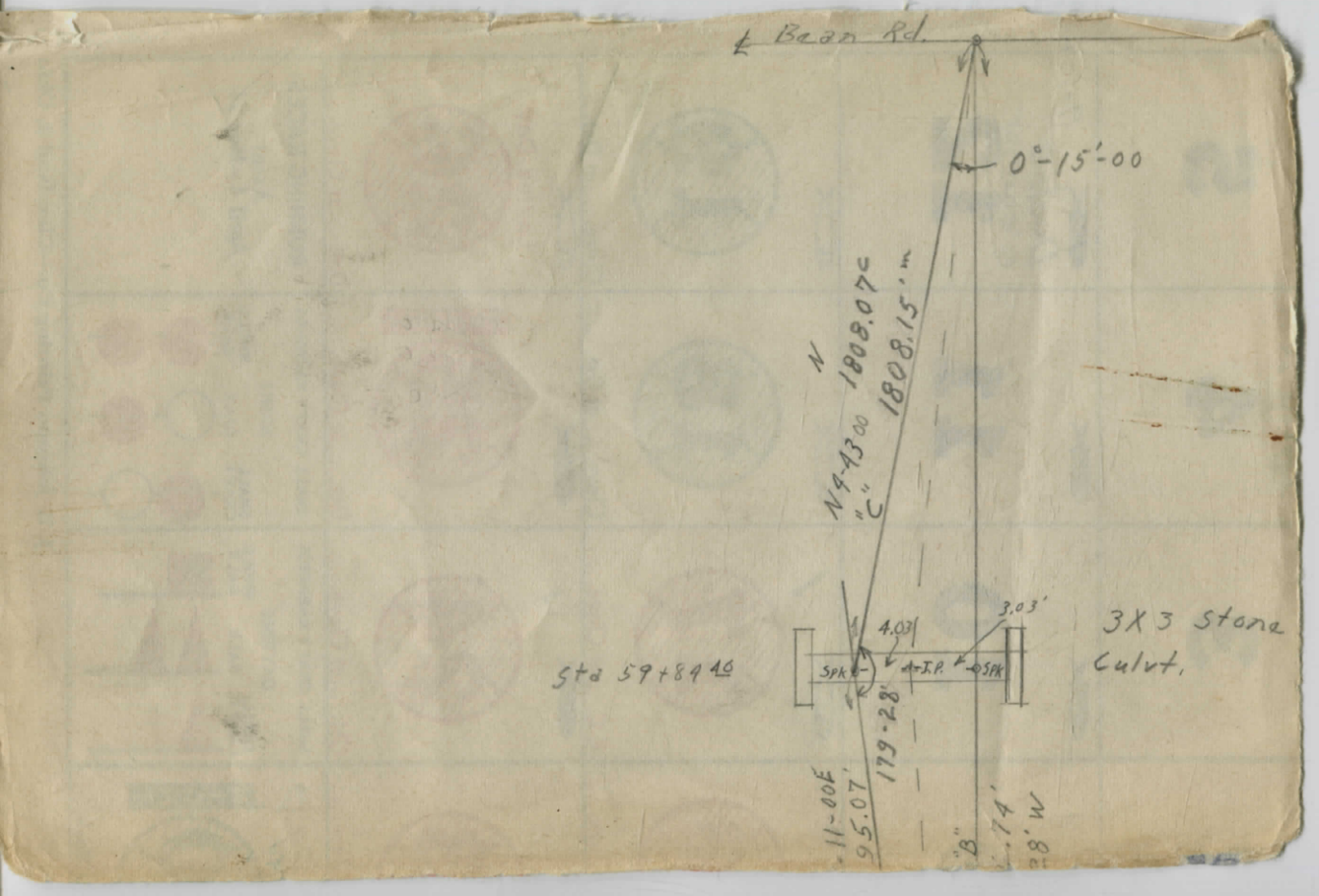
Example—If point is 22.6 ft. above grade, how far should it be from center line to be a slope stake point? Ans. from Table 41.9. For same slopes but other widths of roadbed correct above figures by one-half difference in width of roadbed; thus in example above for 20 ft. roadbed distance will be 41.9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

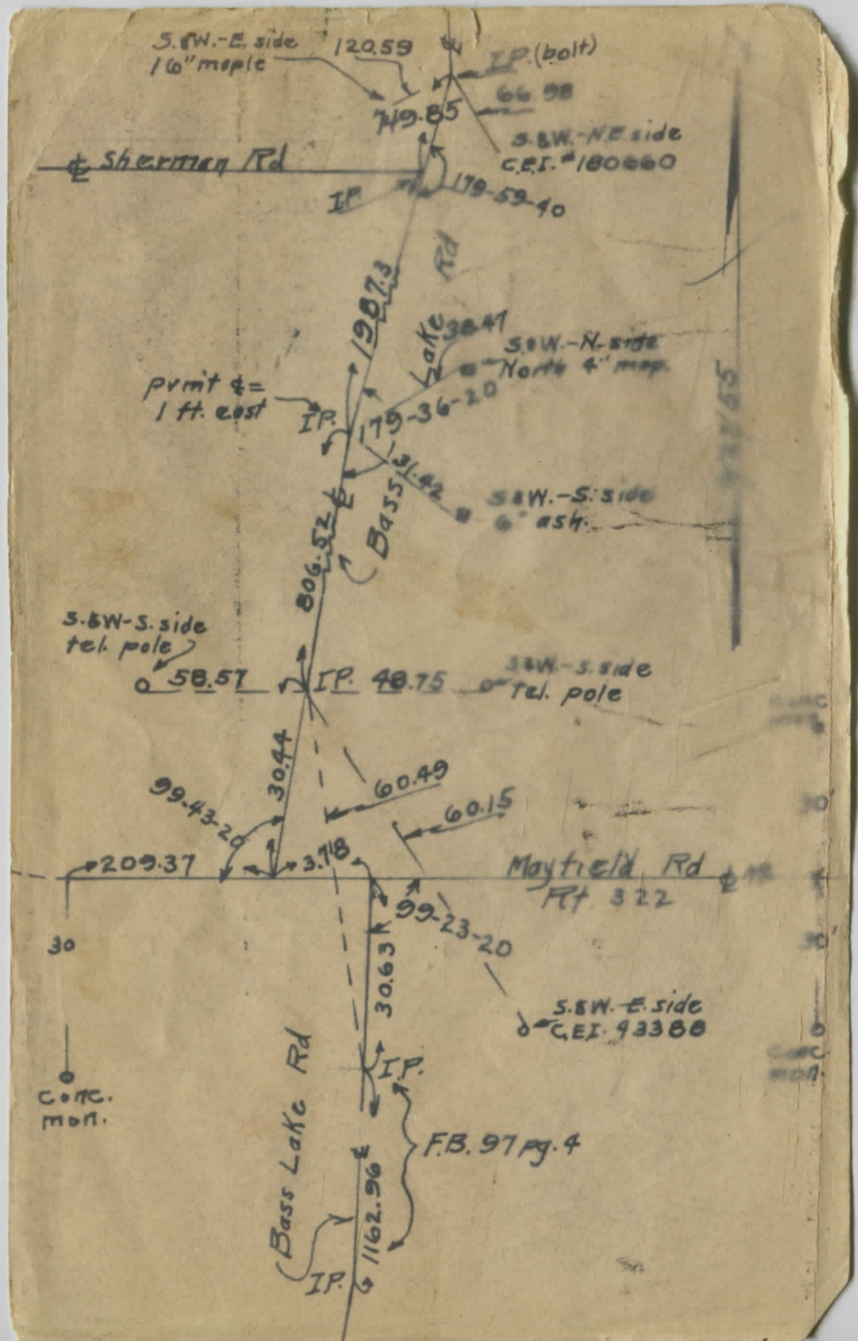
Made in Germany.


213-549 M.&I. Keal
223-
223-
Pekin Rd
162-268 Peter Blazas et.al 95 50 Ac.
FULLERTOWN ROAD
226-594 19.656A
O.&L. Smith
224-540 J.&R. Shearer .344A
224-482 E. Schmidt 10A.
224-355 A. Yahraus 10A.
224-362 Helen Tutor 10A.
212-462
L.&H. Tutor
30 Ac.
35 Ac.
6
NETTIE K. GRAY 15 Ac.
206-371
ALICE A. MACKAY 58 16 Ac.
206-70
H. Martin 12A.
217-430
221-498
213-138 J. Boehm
6A.
D.&A. Williams
J&M. Wolf
V. Sprinkle
200
±420
Jos. Teichman Jr. 99 78 Ac.
Sta ±44+00
℄ high pt = ±1243.5
= Sta 43+00
High pt. W. Head Wall
E = 1213.31
35+61.5
FB 61 p 27
61
27
212-186 JULIUS SZAPLAKY
226-141
99 Ac.
L.& M. Marous
Anna Evans
et.al
1 51 Ac. L. Lenart Jr.
1 75 Ac. F.&E. Barna
217-185
223-39
6.87 A.
67 A.
159-51
John J.

"C" = Construction ℄




Bean Rd.
0°-15'-00
N
N4-43 00 E
1809.07
1808.15'
4.03'
3.03'
3X3 Stone
Culvt.
Sta 59+84.10
Spk
A.I.P.
Spk
11-00E
95.07'
179-28'
8"
14'
28' W


S.&W.-E. side
16" maple
120.59
IP (bolt)
66.98
119.85
S.&W.-NE side
C.E.I. #180660
℄ Sherman Rd
IP
179-59-40
Bass Lake Rd
198.73
Lake
38.47
S.&W.-N. side
4" maple
permit ℄=
1 ft. east
IP
179-36-20
Bass
S.&W.-S. side
6" ash
806.52
S.&W.-S. side
tel. pole
58.57
IP
48.75
S.&W.-S. side
tel. pole
30.44
99-43-20
60.49
60.15
209.37
3.78
Mayfield Rd
Rt 322
99-23-20
30
30.63
S.&W.-E. side
C.E.I. 93388
IP
Conc.
mon.
Bass Lake Rd
F.B. 97 Pg. 4
1162.96
IP