165

K & E

FIELD BOOK

F 360

DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING

Roadway of any Width. Side Slopes 1½ to 1.

In the figure below: opposite 7 under "Cut or Fill" and under .3 read 11.0, the distance out from the side stake at left. Also, opposite 11 under "Cut or Fill" and under .1 read 16.7, the distance out from the side stake at right.

PLEASE RETURN TO
GEAUGA COUNTY ENGINEER
COURT HOUSE
CHARDON, O.
PHONE 250-X

Cut or Fill	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	Cut or Fill
	Distance out from Side or Shoulder Stake										
0	0.0	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	0
1	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.7	2.9	1
2	3.0	3.2	3.3	3.5	3.6	3.8	3.9	4.1	4.2	4.4	2
3	4.5	4.7	4.8	5.0	5.1	5.3	5.4	5.6	5.7	5.9	3
4	6.0	6.2	6.3	6.5	6.6	6.8	6.9	7.1	7.2	7.4	4
5	7.5	7.7	7.8	8.0	8.1	8.3	8.4	8.6	8.7	8.9	5
6	9.0	9.2	9.3	9.5	9.6	9.8	9.9	10.1	10.2	10.4	6
7	10.5	10.7	10.8	11.0	11.1	11.3	11.4	11.6	11.7	11.9	7
8	12.0	12.2	12.3	12.5	12.6	12.8	12.9	13.1	13.2	13.4	8
9	13.5	13.7	13.8	14.0	14.1	14.3	14.4	14.6	14.7	14.9	9
10	15.0	15.2	15.3	15.5	15.6	15.8	15.9	16.1	16.2	16.4	10
11	16.5	16.7	16.8	17.0	17.1	17.3	17.4	17.6	17.7	17.9	11
12	18.0	18.2	18.3	18.5	18.6	18.8	18.9	19.1	19.2	19.4	12
13	19.5	19.7	19.8	20.0	20.1	20.3	20.4	20.6	20.7	20.9	13
14	21.0	21.2	21.3	21.5	21.6	21.8	21.9	22.1	22.2	22.4	14
15	22.5	22.7	22.8	23.0	23.1	23.3	23.4	23.6	23.7	23.9	15
16	24.0	24.2	24.3	24.5	24.6	24.8	24.9	25.1	25.2	25.4	16
17	25.5	25.7	25.8	26.0	26.1	26.3	26.4	26.6	26.7	26.9	17
18	27.0	27.2	27.3	27.5	27.6	27.8	27.9	28.1	28.2	28.4	18
19	28.5	28.7	28.8	29.0	29.1	29.3	29.4	29.6	29.7	29.9	19
20	30.0	30.2	30.3	30.5	30.6	30.8	30.9	31.1	31.2	31.4	20
21	31.5	31.7	31.8	32.0	32.1	32.3	32.4	32.6	32.7	32.9	21
22	33.0	33.2	33.3	33.5	33.6	33.8	33.9	34.1	34.2	34.4	22
23	34.5	34.7	34.8	35.0	35.1	35.3	35.4	35.6	35.7	35.9	23
24	36.0	36.2	36.3	36.5	36.6	36.8	36.9	37.1	37.2	37.4	24
25	37.5	37.7	37.8	38.0	38.1	38.3	38.4	38.6	38.7	38.9	25
26	39.0	39.2	39.3	39.5	39.6	39.8	39.9	40.1	40.2	40.4	26
27	40.5	40.7	40.8	41.0	41.1	41.3	41.4	41.6	41.7	41.9	27
28	42.0	42.2	42.3	42.5	42.6	42.8	42.9	43.1	43.2	43.4	28
29	43.5	43.7	43.8	44.0	44.1	44.3	44.4	44.6	44.7	44.9	29
30	45.0	45.2	45.3	45.5	45.6	45.8	45.9	46.1	46.2	46.4	30
31	46.5	46.7	46.8	47.0	47.1	47.3	47.4	47.6	47.7	47.9	31
32	48.0	48.2	48.3	48.5	48.6	48.8	48.9	49.1	49.2	49.4	32
33	49.5	49.7	49.8	50.0	50.1	50.3	50.4	50.6	50.7	50.9	33
34	51.0	51.2	51.3	51.5	51.6	51.8	51.9	52.1	52.2	52.4	34
35	52.5	52.7	52.8	53.0	53.1	53.3	53.4	53.6	53.7	53.9	35
36	54.0	54.2	54.3	54.5	54.6	54.8	54.9	55.1	55.2	55.4	36
37	55.5	55.7	55.8	56.0	56.1	56.3	56.4	56.6	56.7	56.9	37
38	57.0	57.2	57.3	57.5	57.6	57.8	57.9	58.1	58.2	58.4	38
39	58.5	58.7	58.8	59.0	59.1	59.3	59.4	59.6	59.7	59.9	39
40	60.0	60.2	60.3	60.5	60.6	60.8	60.9	61.1	61.2	61.4	40

KEUFFEL & ESSER CO., N. Y.

For Curve Tables see end of book.

PLEASE RETURN TO
COUNTY ENGINEERS OFFICE
CHARDON, OHIO

4 NV 59

The paper in this book No. F360
is made of 100% high grade rag stock
with a WATER RESISTING surface sizing.

Book 165

CH. #4

Chardon - Auburn Road (Music Street northerly to Cleve. Burton road)

Pages 1 - 10

Chardon - Auburn Road 32

(Pekin to H. Wood. Pgs 11 - [redacted]

56-57

Rd. #46 Music ST. From Munn Rd westerly to cem. 33-36

CHARDON - AUBURN RD SEC "K"

37-55

#1 J DATA FOR SURFACE

56-57

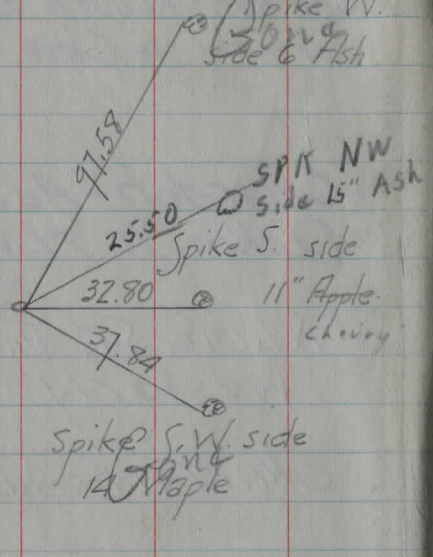
Newbury Center Twp Hall Lot Pg 58

Profile on CH #16 for adistance of 600' W of CH #4 Pg 73

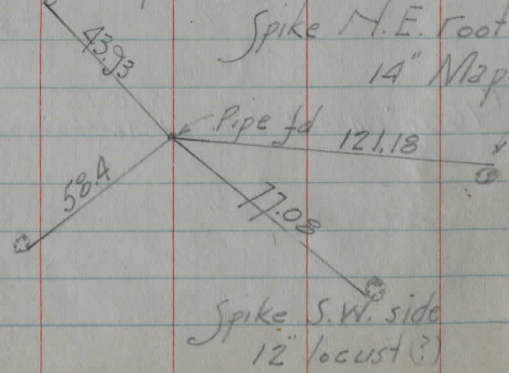
#16 Fairmount (Sperry - Peckhoven) Sec "F" pg. 74

FAIRMOUNT SEC G Pg 77

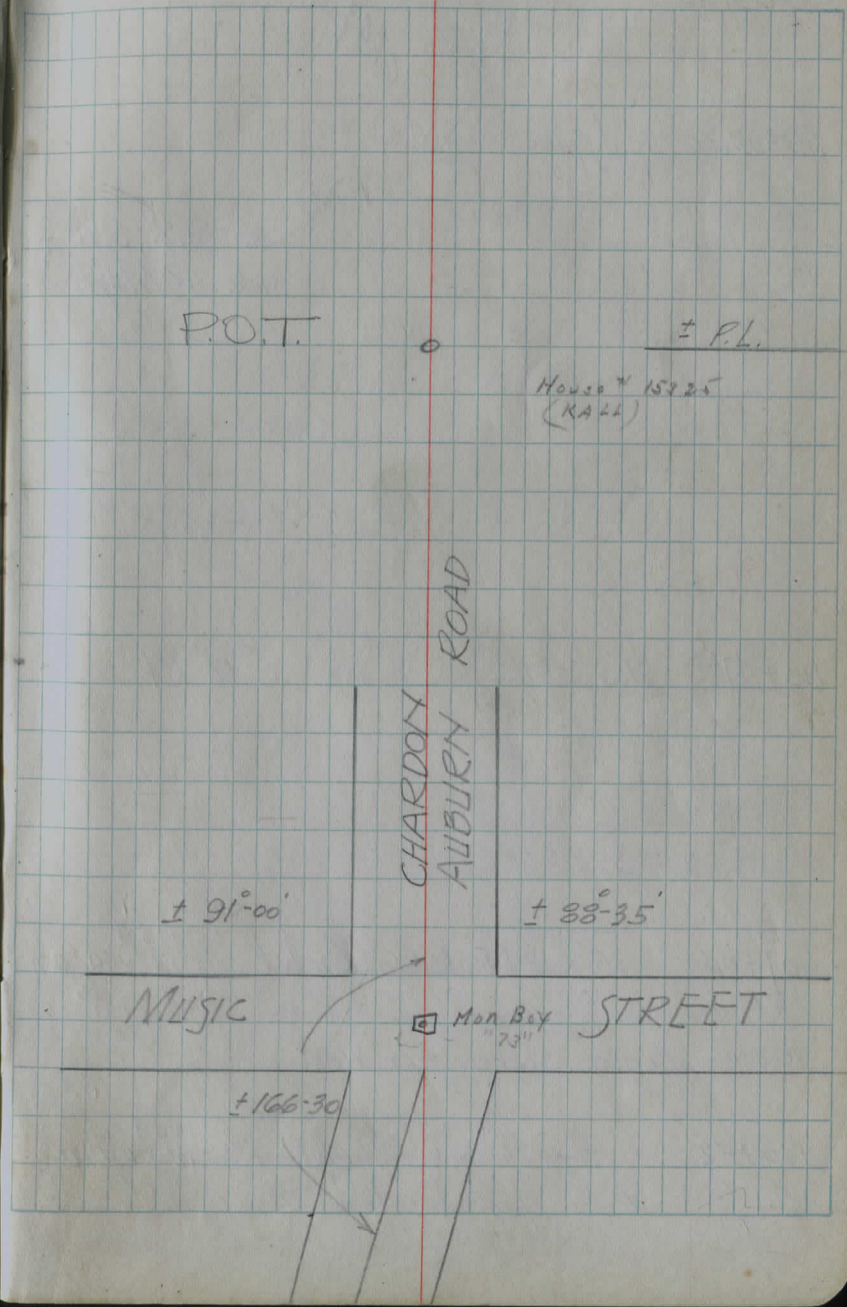
6-24-41 Pomeroy
Richards
Gundersen

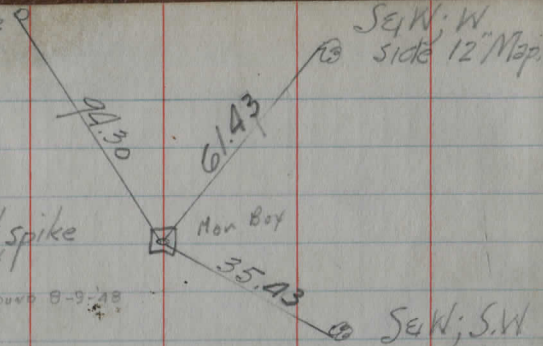


21.30
93 + 78.70 Pipe fd.
"20"



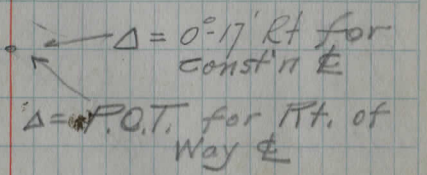
81 + 54
4" Catalpa

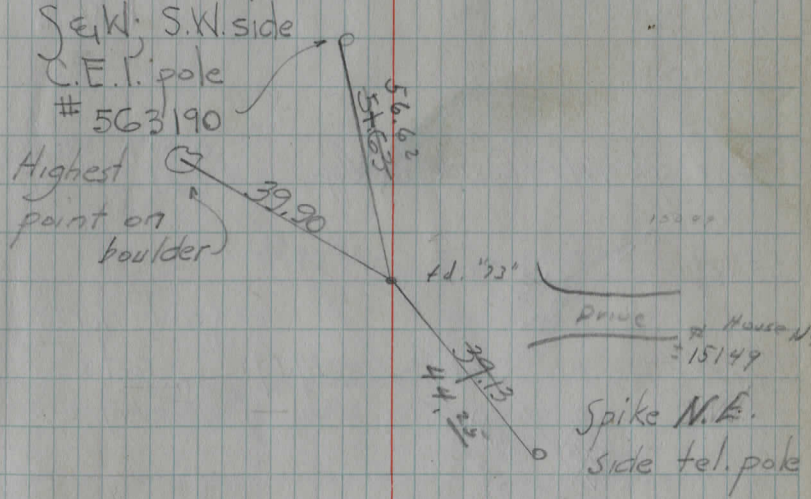




119+99.30 Boat spike set

TIPE SET OVER PIN FOUND 8-9-48

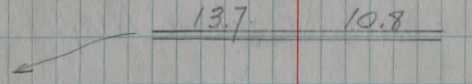




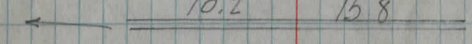
113+47.00 Boat spike (set) Δ = 1°12' Rt

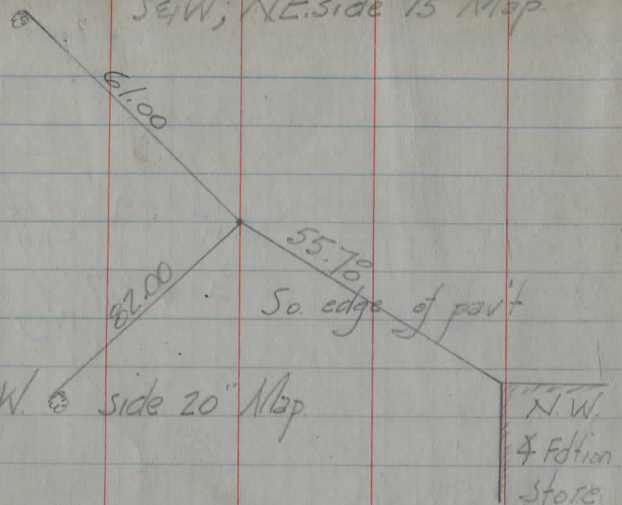
107+00 15" x 24.5' R.C.P. Culvt 1959 15" YUU RCP ok

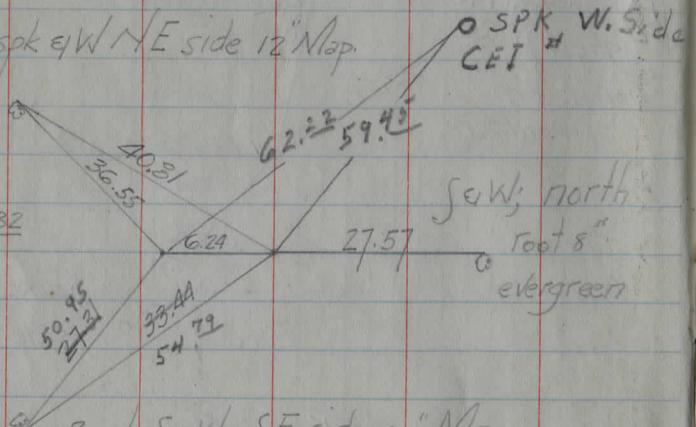
102+0 Begin stakes on West



100+52 12" x 26' R.C.P. Culvt 1959 12" YUU RCP ok
O.K. if extended

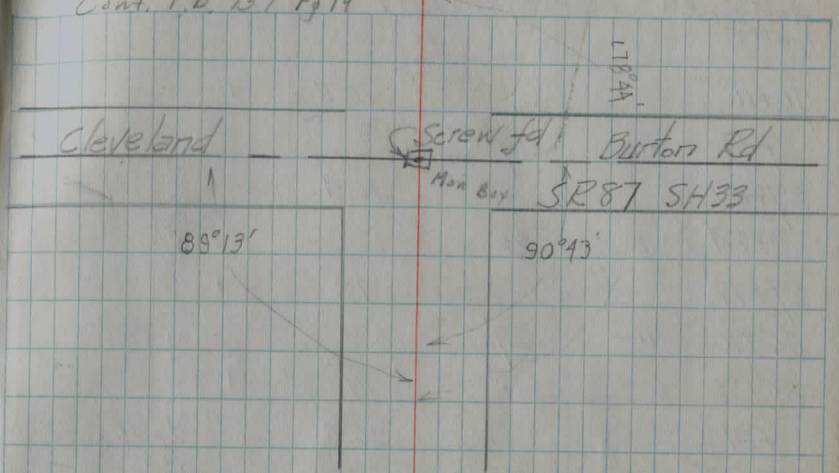


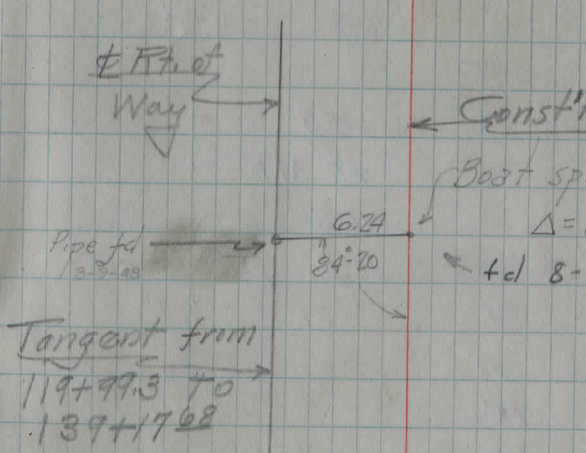




127+02 12"X28.6' R.C.P. culv't
O.K. with ext
1959 32'X12" RCP with 8'X12" corr
on E. OK.

Cont. F.B. 157 Pg 14





12.1 16.5

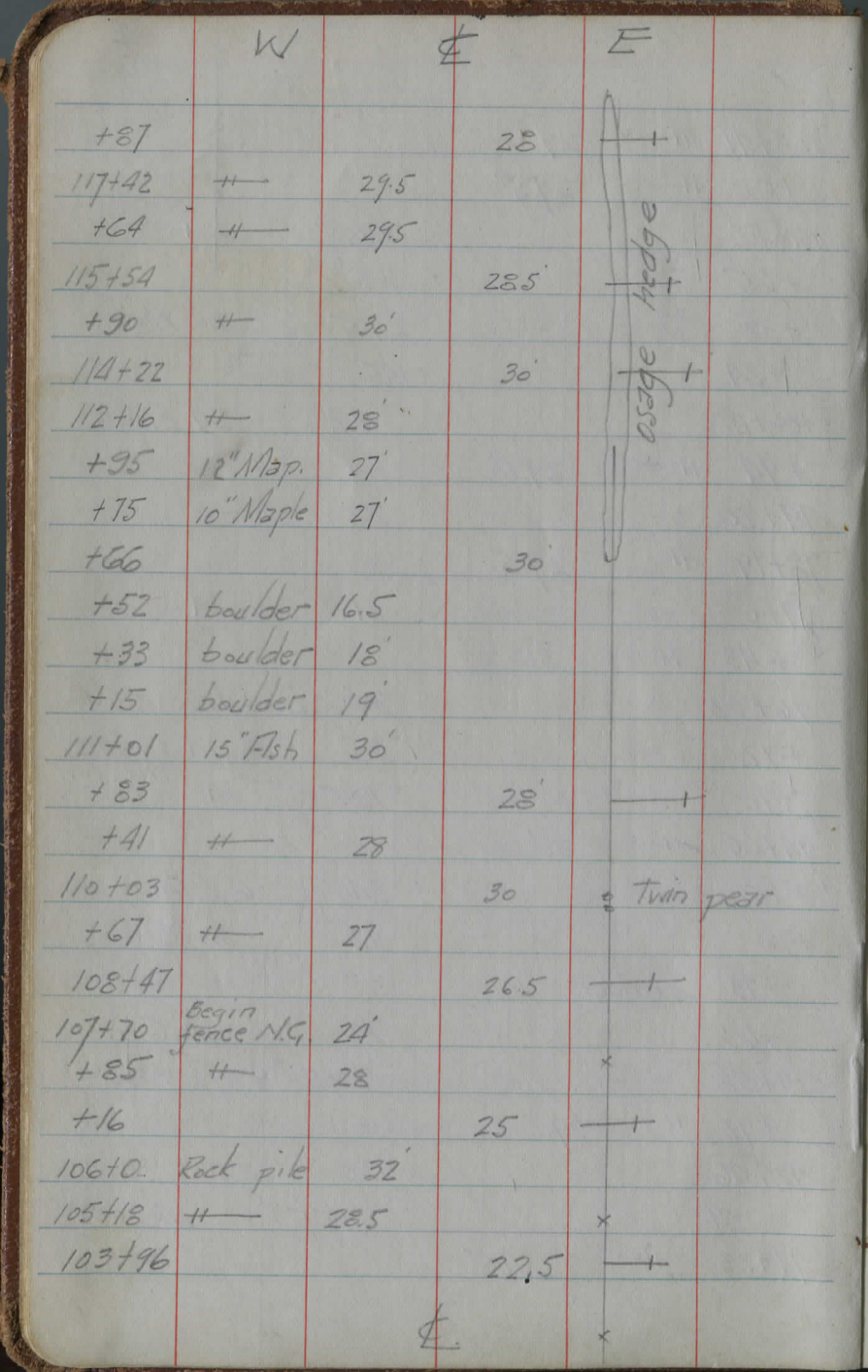
6-26-41
Richards
Hosford
Gaddersen

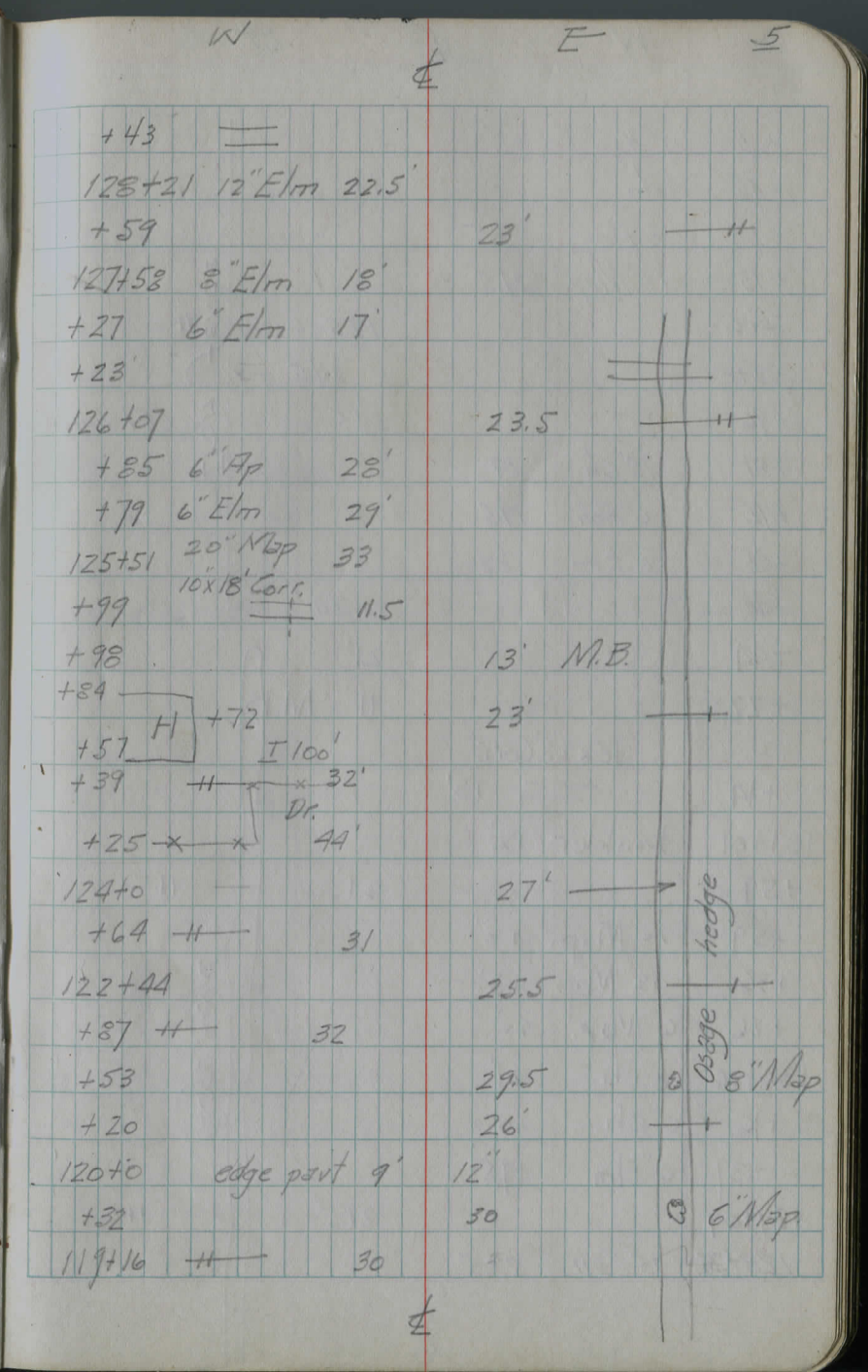
TOPOGRAPHY

Station	W		℄	E		
90+11				18.5	—+	
+58	++—	29'				
89+0				16.5	→	
+84	++—	28				
87+77				18'	—+	
86+10	++—	29'				
85+38				17'	—+	
+81				26.5		15" Ch
+53	++—	29.5				
84+02				22.5		24" Ch
+39				16.5	—+	
+13	++—	29.5				
83+0				15.5	→	
+62				9.5 M.B.		
+23				16.5	→	
82+15				16.5	pole brace	
+95				29		
+83	++—	32'				
+75	Sign	28'				
+63	N edge music St.					
81+51	Begin project					

ELECTRIC FENCE
1 WIRE

Station	W		℄	E	
103+41	++—	29			
+68	++—	29.5			
101+52				22.5	—+
+65				23'	
+32				29.5	20" Hick.
+24				14.5	[symbol]
100+11				32	24" Elm
+94	++—	29.5			
99+20				22	—+
98+19	++—	29.5			
97+0				21	—+
+43	++—	30			
96+33				30'	End tree row
+72				30'	Begin small tree row
+70				18.5	—+
94+66	++—	30'			
+86				24	6" Elm
+78				32	8" Ch
+73	boulder	10			
+63				22	24" Ch.
93+58				22.5	12" Map.
+92	++—	29.5			
92+46				20	—+
+24				25.5	24" Elm
91+23	++—	29.5			


W
℄
E
+87
28
117+42
29.5
+64
29.5
115+54
28.5
+90
30'
114+22
30'
112+16
28'
+95
12" Map.
27'
+75
10" Maple
27'
+66
30'
+52
boulder
16.5
+33
boulder
18'
+15
boulder
19'
111+01
15" Fish
30'
+83
28'
+41
28
110+03
30
+67
27
108+47
26.5
107+70
Begin fence N.G.
24'
+85
28
+16
25
106+0.
Rock pile
32'
105+18
28.5
103+96
22.5
℄
osage hedge
Twin pear


W
℄
E
5
+43
128+21
12" Elm
22.5'
+59
127+58
8" Elm
18'
+27
6" Elm
17'
+23'
126+07
+85
6" Ap
28'
+79
6" Elm
29'
125+51
20" Map
33
10'x18' Corr.
+99
11.5
+98
+84
H
+72
+57
I 100'
+39
32'
Dr.
+25
44'
124+0
+64
31
122+44
+87
32
+53
+20
120+10
edge pavt
9'
+32
119+16
30
℄
23'
23.5
13'
M.B.
23'
27'
hedge
25.5
osage
29.5
8" Map
26'
12"
30
6" Map

	W	℄	E
+56	12" Map.	32'	
+46	Gate		24.5
+29	8" Elm	19.5	
+13	18" Map.	21.5	
+06			19.5
132+0			24.5
+96			19.5
+81	15" Ch	19	
+72	6" Ash	19.5	
+45	6" Elm	22'	
+44			24'
+44			21'
+22			11 M.B
	10'x28' Corr.		
+14		13'	
131+01	boulder	12'	
+59			21'
+59	20" Map.	22'	
+36	12" Map	23'	
+26	6" Map.	20'	
130+06	8" Ch.	21'	
+76	6" Ch.	20'	
+37	6" Elm	19.5'	
129+09			21.5
128+76	15" Elm	22.5	

Iron fence

Osage hedge

CEI another

℄

	W	℄	E
+24			27'
137+10	12" Map.	26'	
+73	12" Map.	26.5'	
+55			24'
136+30	12" Map.	27.5'	
+95			26'
+89	15" Map.	28'	
+49	12" Map.	28.5'	
+8	15" Map.	30'	
135+2			22'
+68	4' wide Conc. walk		24'
+45			24'
134+18	15" Map.	31'	
+93	15" Map.	31.5'	
+83	driva		
+72			24'
+56			20'
+39	10" Map.	31.5	
+28		100'±	
+24	12" Map.	32'	
+9	driva		
133+8			
+94		100'±	
+93	10" Map.	32'	

15" Map.

10" Elm

walk

driva

End Fence

gate

Iron fence

CHURCH

driva

℄

	℄		℄	E
		End		
+87		50.5'		
+75				
+74			14'	large rock
+74			14.5'	Catch basin
+65			13'	Stop Sign
+54			27.5'	10" Map.
433			27.5'	10" Map.
+25			37.5'	
+23				drive
+23	15" Map.	30'		
+11			27.5'	15" Map
138			25'	
+92				
+88			24'	15" Map.
+83			9'	3 Mail Boxes
+71			25'	15" Map.
+68			43'	
+63			11'	1' pipe
+53			24'	12" Map.
1+46	15" Map.	25.5		
	12" x 18' Hot water tank			
137+30		14.5'		
	℄			

Catch Basin?

House

6-27-41
Richards
Hosford
Gunderson
Hot as H-

Cross Sections

Over

	+	H.I.	−	E	
B.M.#5	2.89	1254.21	5.64	1251.32	
129					51.8
130					53.9
T.P.	0.51	1256.96	8.99	1256.45	
131					57.0
132					61.0
133					62.8
134					59.9
135					57.1
T.P.	7.56	1265.44	1.25	1257.88	
136					54.3
137					51.8
T.P.	7.38	1259.13	1.69	1251.75	
138					49.5
139					1247.8
					1247.6
	7.83	1253.44		1245.61	

E ℄ W

B.M. Spk. W root 12" Elm 22 Lt. Sta 128+21

30/3.8 17.5/7.1 13/4.6 13.5/5.7 5.2 9.5/5.9 12.5/6.5 15.5/5.3 30/4.2

30/3.0 12.5/2.7 13/2.8 11/3.5 3.1 10/3.8 12/4.0 15/3.3 21.5/1.5 30/0.0

30/5.7 15.5/6.7 12/7.6 9.5/9.0 8.4 10.5/8.5 13.5/8.9 17.5/6.8 2.3/6.0 30/4.9

30/4.2 24/4.0 18.5/4.2 10.5/5.0 4.4 10/4.9 13.5/5.5 18/3.8 21/2.5 30/1.7

30/3.3 23.5/3.2 11/3.0 2.6 10.5/2.7 18/2.4 30/2.0 Crest of hill

30/4.0 24.5/4.8 17.5/5.3 11/6.2 5.5 10/6.1 13.5/6.4 16/5.4 30/3.7

30/7.4 15.5/7.5 11.5/8.6 10.5/9.0 8.3 12/9.0 13.5/9.8 16.5/8.6 21.5/6.4 30/6.0

30/2.6 18.5/3.2 13/3.7 10/5.5 4.8 12/5.7 14/6.2 17/4.6 20.5/2.7 30/2.4

30/5.6 13.5/6.9 11.5/7.4 9/7.8 7.3 11.5/8.0 13.5/8.3 16/7.3 30/5.3

30/1.9 14/3.4 10/3.7 8/4.0 3.9 10.5/4.6 13/5.6 15/4.3 30/3.2

Fl. of tile
3.5

30/5.4 5.6 30/5.8

catch basin
5.6

℄ 87 E 300'/6.2 — 4 Pvt. 5.8 S. Edg. 5.8 — ℄ 87 300' W 7.9

B.M.#6 S. root 3' Map. N. side #87 300' W. of Ctr.

	+	H.I.	-	E.	
		Over			
110					31.8
111					38.2
B.M. #4			2.36	1236.71	
112					35.4
T.P.	0.17	1239.07	13.22	1238.90	
113					40.2
114					45.7
115					47.6
116					48.2
117					49.6
T.P.	1.15	1252.12	11.41	1250.97	
118					52.4
119					55.8
120					57.9
121					56.9
122					55.4
123					54.0
T.P.	8.79	1262.38	0.62	1253.59	
124					52.4
125					50.8
126					50.3
Culv't.					50.2
127					50.1
128					50.6
		1254.21			

E ℄ W

30/7.9 13/8.1 10.5/8.7 8.5/7.9 7.3 14/7.9 17/7.7 30/8.4
30/6.2 15/6.1 10/6.9 9/6.4 5.9 13/6.6 15/6.9 19/6.6 30/7.1
Spk. E root 12" Map. 27' Lt. Sta 111+95
30/1.0 26/1.1 16/2.1 11/4.4 9.5/4.2 3.7 12/4.5 14/5.1 20/3.4 30/3.2

30/7.0 20/8.1 12.5/13 11/12.4 11.9 11.5/12.3 13/13. 19.5/9.6 30/9.4
30/4.5 18/5.2 13/8.0 11/6.8 6.4 11/7.1 14/8.5 20/4.8 30/4.9
30/4.9 14.5/5.2 12/6.1 9.5/5.0 4.5 12/5.0 14/5.6 17/5.2 30/5.8
30/5.0 14/9.5 13/5.0 11/4.6 3.9 12/4.3 14/4.7 16/4.4 (6.0/30)
30/0.0 16/1.3 14/2.4 11/3.4 8.5/3.0 2.5 11/3.2 15/3.2 21/2.3 30/2.1

30/5.8 18/6.8 15/7.9 11/11.0 9.5/10.4 10.0 10/10.4 14/11.7 22/7.7 30/8.1
30/4.8 17/5.1 12.5/7.7 10.5/7.0 6.6 9/7.1 12/8.0 17.5/6.0 30/6.0
30/4.6 19/4.6 15/5.6 14/5.1 4.5 8.5/5.1 10.5/5.4 14/4.7 30/4.1
30/5.3 19/5.3 15.5/6.6 14/6.1 5.5 8/6.2 9/6.6 13/5.5 30/5.1
30/7.0 23/7.1 15.5/7.7 7.0 6.5/7.5 9/8.0 14/7.4 30/7.0
30/9.0 19/8.9 15.5/9.1 8.4 6.5/8.9 8.5/9.4 12/8.7 30/7.9

30/1.8 25/1.8 17/1.8 15.5/2.6 1.8 7/2.4 9/3.1 15/1.9 30/1.0
30/2.0 21/2.3 15.5/3.2 14/4.0 3.4 15/3.4 9.5/9.3 18.5/3.0 30/2.2
30/5.0 30/4.8 13.5/4.6 3.9 8/4.6 9.5/5.1 12.5/4.8 30/5.3
← 30/7.7 F.L. 7.3 4.0 F.L. 6.4 30/6.2
30/5.0 20/5.2 15/6.3 11/4.5 4.1 10/5.0 12.5/6.0 20/6.2 30/5.5
30/5.0 17.5/4.8 12/4.5 3.6 9.5/4.3 12/4.7 17.5/4.4 30/4.0

℄

	+	H.I.	-	E	
92					30.7
93					31.5
94					32.3
95					33.1
96					32.8
97					32.3
T.P.	4.62	1236.76	4.69	1232.14	
98					32.1
99					32.3
100					32.5
B.M. #3			2.81	1234.22	
Colvt.					32.7
101					32.3
102					32.7
103					33.4
104					32.0
turn on stake (104)	3.08	1237.03	1.16	1233.95	
105					30.8
106					30.9
Colvt.					30.3
107					30.3
108					30.9
T.P.	4.34	1235.11	8.30	1230.77	
109					31.0
		1239.07			

E & L.

30/4.0 19/5.8 13.5/7.1 16.5/6.7 6.1 9/6.9 10.5/7.3 17/6.3 30/5.9

30/4.9 18/4.6 15/5.9 12/5.6 5.2 9/5.8 10.5/4.1 19/4.4 30/4.4

30/4.5 18/4.2 13.5/5.2 12.5/5.0 4.5 16/4.9 9/5.1 13/4.1 30/4.4

30/3.4 18/3.9 14/4.5 13/4.1 3.7 8/4.3 10/5.0 13/3.2 30/4.0

30/3.3 17/3.8 14/4.7 12/4.4 4.0 8/4.6 9.5/5.0 14/4.0 30/4.3

30/4.5 19/4.8 15/5.5 13.5/5.0 4.5 9/5.4 10/5.7 12/5.1 30/5.4

30/3.8 19/5.3 15/6.0 13/5.2 4.9 8/5.1 10/6.0 13/5.3 30/6.0

30/3.8 18/5.3 16/6.0 14/5.3 4.7 8/5.2 10/5.7 12/5.9 30/6.1

30/4.0 20/5.4 15.5/6.2 12/4.9 4.5 10/5.6 13/5.5 16/5.8 30/6.1

Sph. S.L.L. root 2'E/m 32' rt. Sta. 100+11

F.L. 6.6 — 4.3 — 7.1 — 30/7.5

30/4.2 16/5.5 13.5/5.9 11.5/4.9 4.7 10/4.9 11.5/6.1 14/5.5 30/6.0

30/4.2 18/4.5 13/5.1 11.5/4.9 4.3 10/4.8 11/5.6 14.5/4.9 30/5.1

30/2.6 20/5.8 12.5/4.5 10.5/4.1 3.6 9/4.2 12.5/4.6 16/5.8 30/3.9

30/3.7 17/4.4 11/5.9 10/5.1 5.0 18/5.5 13/5.9 15/4.5 30/4.6

30/3.6 16.5/4.8 17/5.6 11/4.8 4.3 10/4.9 13/5.4 18/5.4 30/5.7

30/5.6 15/5.6 12/6.8 10.5/5.5 4.9 14/6.1 20/6.1 30/4.3

30/5.3 F.L. 1.9 — 4.8 — F.L. 8.2 — F.L. 9.3 →

40/5.0 18/5.6 13.5/7.8 9/5.2 4.8 17/5.5 15.5/8.5 19/6.1 30/6.6

30/4.1 18/6.0 12/5.2 4.7 15/5.7 18/5.4 30/5.8

40/7.4 25/8.0 18/8.0 9/9.0 8.1 17.5/6.7 18/8.7 30/8.9

	+	H.I.	-	E	
					1212.2
82					1213.1
83					14.2
84					15.9
B.M.			4.23	1218.19	1218.20
85					17.8
86					19.7
87					21.5
T.P.	0.10	1222.42	10.64	1222.32	
88					25.2
89					25.1
90					27.8
91					29.7
B.M.	0.54	1232.96 1236.76	4.34	1232.42	

E. Lt

100' S
13.2

81+40 10.4

100'
10.7

4 x rds
10.2

100'
9.1

30 19 11.5 3.8 12.5 16 21 30
11.0 11.5 10.2 10.3 10.5 9.6 9.5

30 10.5
10. 9.3 8.7 8.2 8.9 12.5 9.2 16 7.8 30 7.2

30 19 13.5 12 8 10 13 30
5.5 6.2 8.0 7.2 6.5 7.2 7.3 5.6 5.1

Spk. E root 2' Cherry 23' rt. 5+2 84+02

30 17 14 10 9 11 13 30
4.3 4.5 4.2 5.0 4.6 5.3 5.2 4.3 4.0

30 18 14 12 10 11 16 30
3.4 2.9 3.4 3.3 2.7 3.7 3.1 2.8 3.0

30 17 13 2 30
1.1 0.6 2.0 1.2 0.2 1.5 1.5 0.6 0.5

30 11 13 10 9.8 8 11 14 30
8.6 8.3 10.6 10.1 10.4 10.1 8.1 8.1

30 17 11 9 8 10 14 30
7.2 6.0 8.3 8.2 7.9 8.4 8.6 6.1 5.3

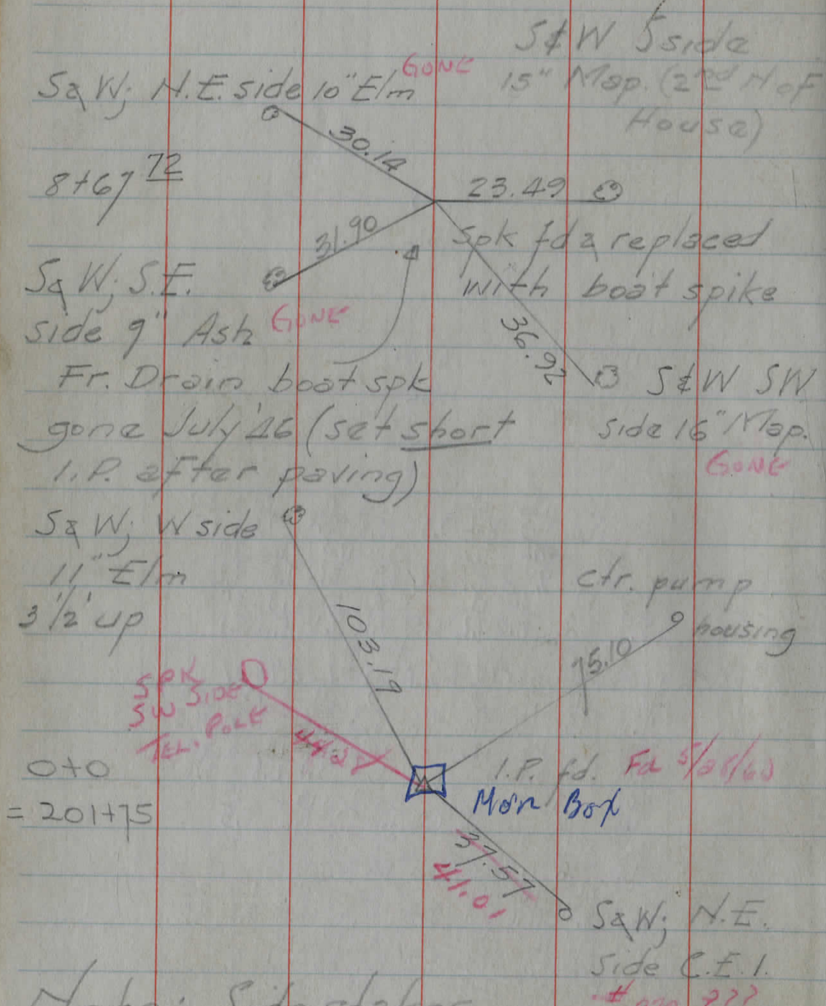
30 18 13 13.5 8.5 10 13.5 30
4.4 4.2 6.1 5.8 5.2 5.8 7.3 4.3 4.1

30 17 13 10 9.5 11.5 13 30
3.2 3.2 4.0 3.7 3.3 4.0 4.6 3.2 3.6

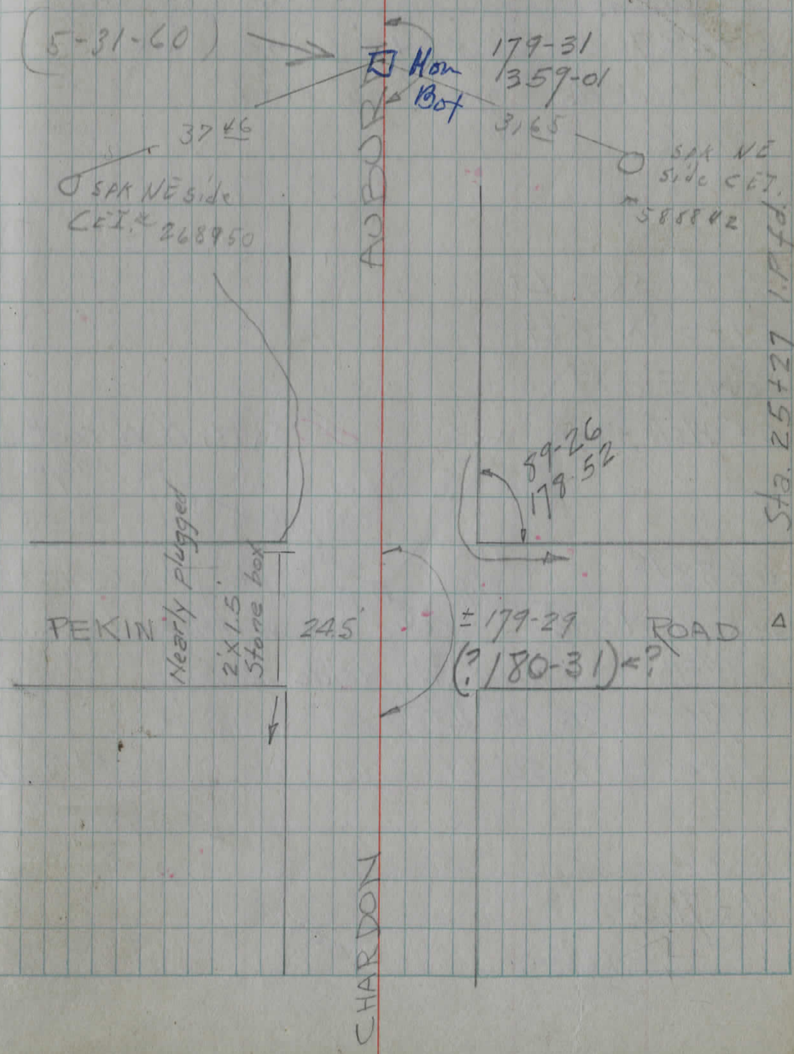
Spk. W root 24" Elm 35' sk. St. 91+24

CHARDON-AUBURN ROAD SEC. "J"

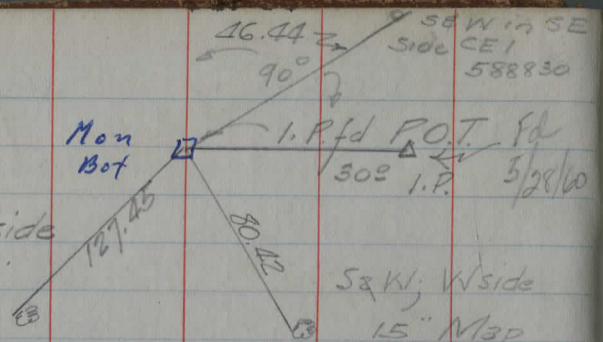
7-14-42
Pomeroy - Woodhall - Clark



Note: Side stakes set 30' Rt. unless otherwise noted

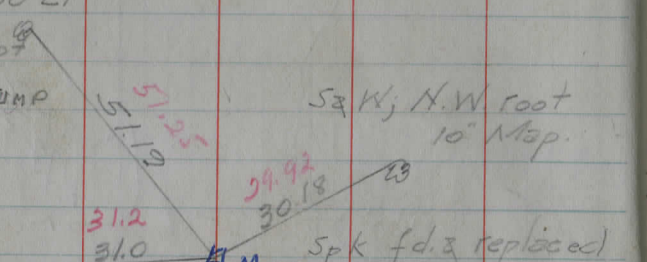


57.75



30+42.25

27+28.7 2' x 2' x 24.3' Conc. Box
Needs grouting both ends

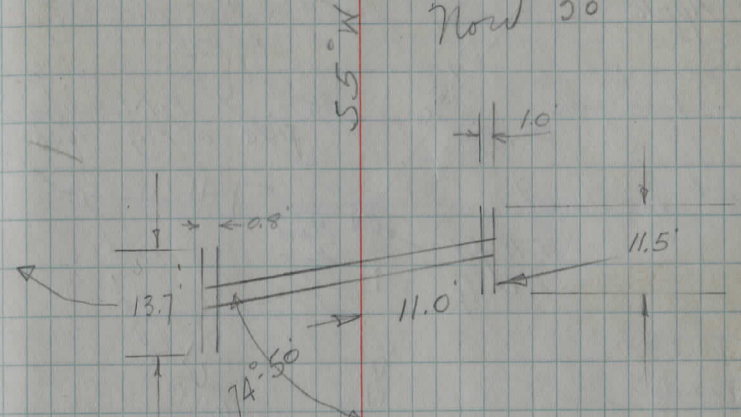


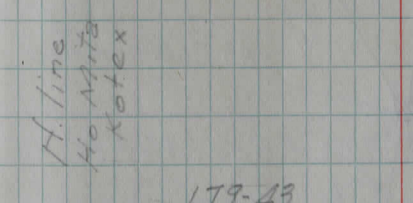
20+88.90

11+71.5

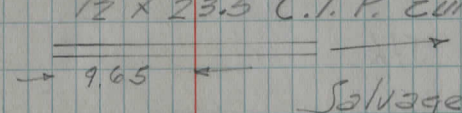
12

Now 30' Corr

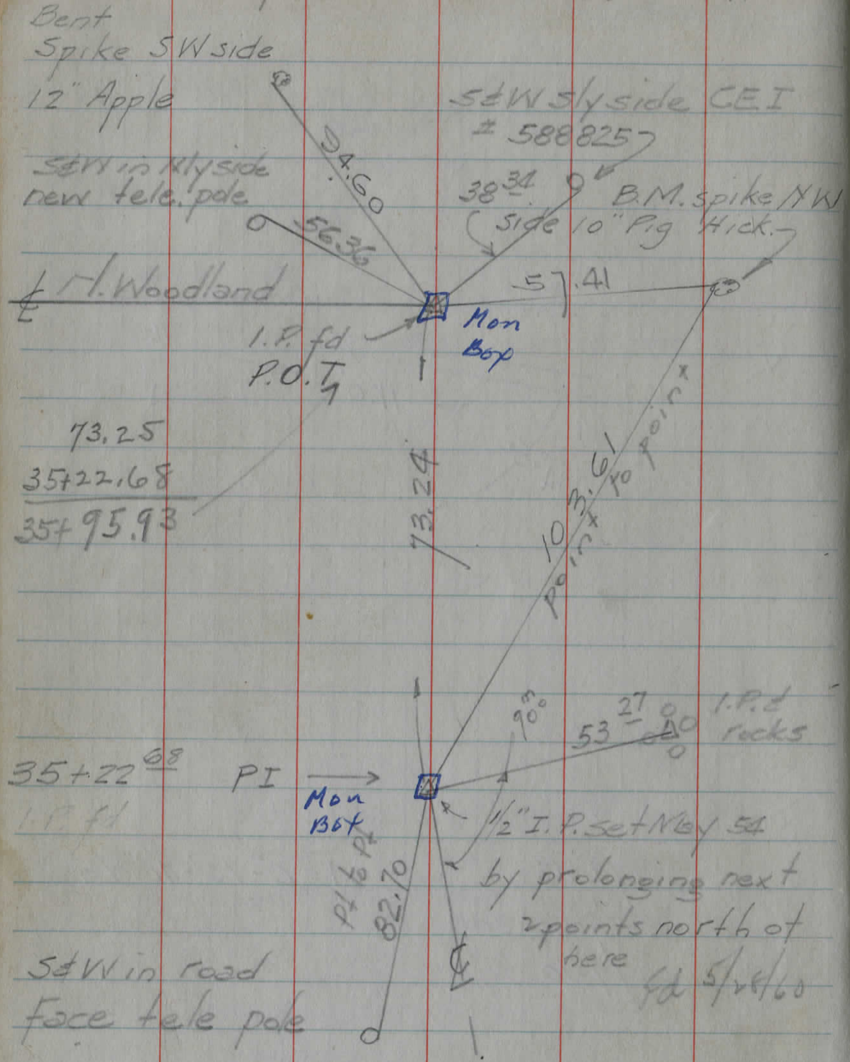




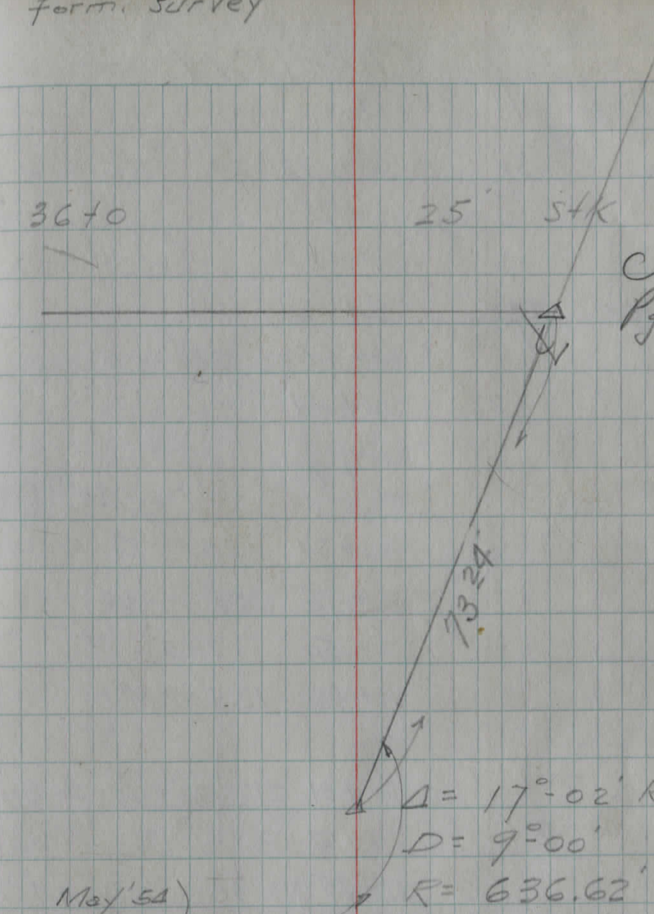
Δ = 0°-16'-40" Lt



I.P. fd   Δ Sta. 48+55.97 of form. survey



34	Stk	30'
33	"	30'
32	Stk	30
31	"	"
30	"	"



May '54
162-57
325-55-
128-52-
162-57-20 use
Δ = 17-02-40

Δ = 17°-02' Rt
D = 9°-00'
R = 636.62'
T = 95.33'
L = 189.26
E = 7.097
P.I = 35+22.68
95.33
P.C. 34+27.35
1 89.26
PT 36+16.61

7-15-42 Pom & Co.

West | East

Topo. CHARDON

℄

℄ drive (not used)

	+82	24'	26' 8" Ash ✓
	+72	28'	12" Elm
	+23		Wet bank
3 rail fence 29.5'	3+06		
	+60	22'	5" Ap.
F 22'	2+44		
	+95	27'	
	+84	25.5	20" Elm Conc. porch
	+75	23'	
	+50	28.5'	F
	+45	12.5'	2 M.B.
	+31	21'	12" x 20' Boilers
F 23	1+14		
	+75	30'	Twin 4" Ch.
	+33	31.5	6" Ap.
F 28.5'	+31		

0+0

18' Bit Mac.

℄

W | E

AUBURN

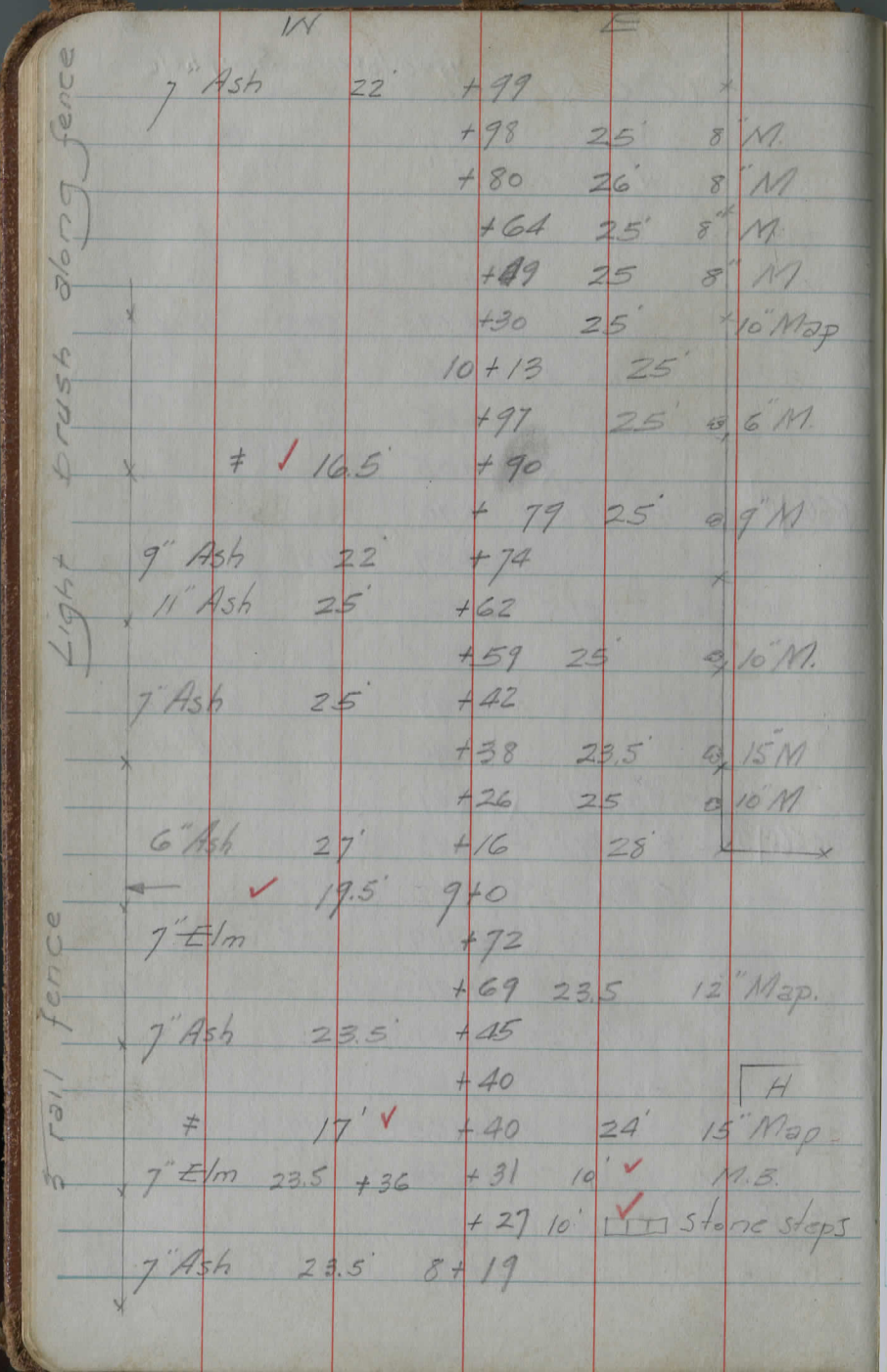
7+80 to 8+45 Soup hole

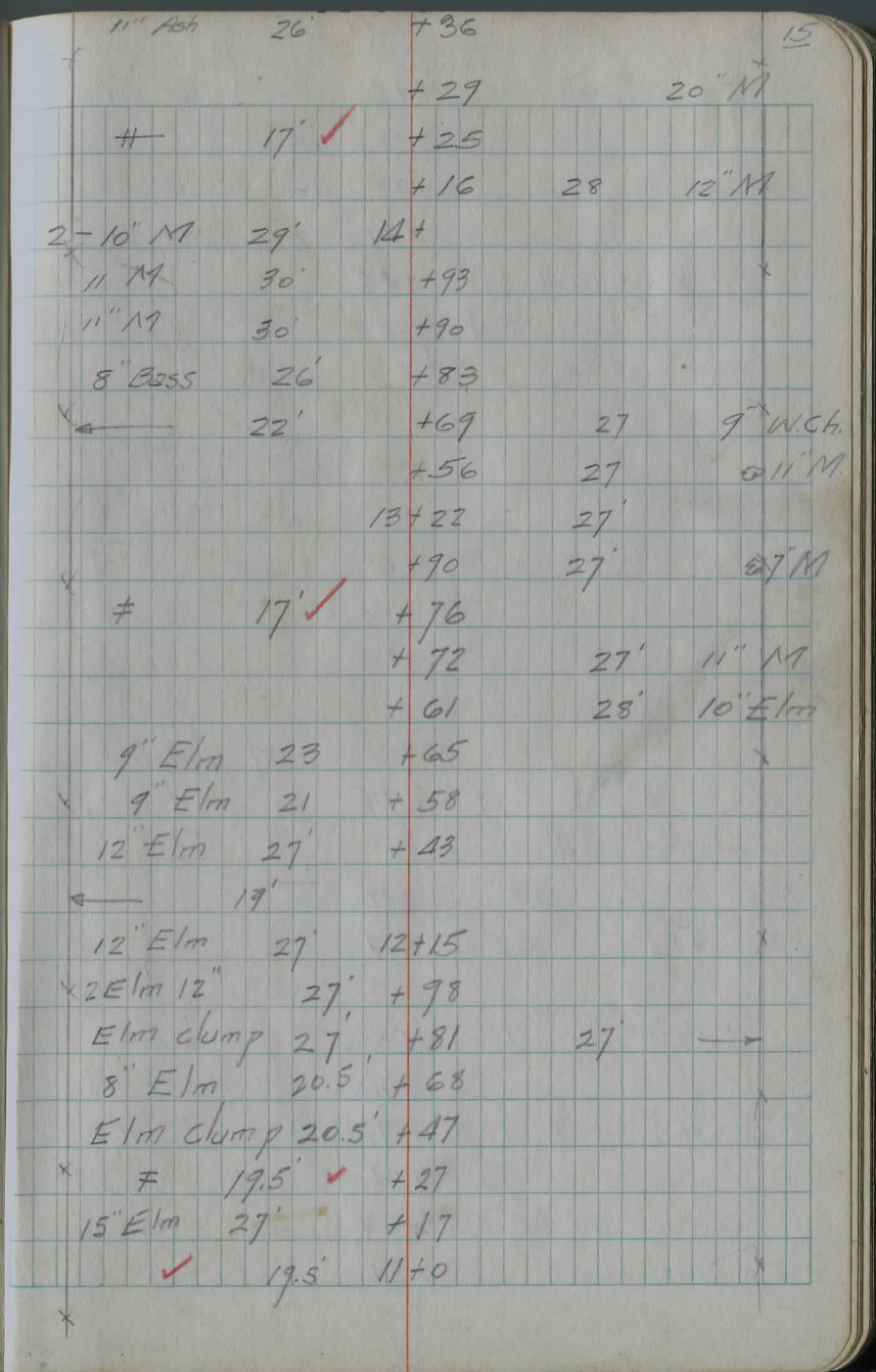
14

H

		+15	24'	shrubs
12" Ap. ✓	18.5'	8+0		
		+90	± 75'	
		+83	? 24.5'	16" Map.
		+59	? 24.5'	12" Map.
2-15" Ch. ?	22'	+14		
18" W. Ch	27'	+05		8" C.I.P.
	✗	7+05	13'	82'
556734 F	17.5' ✓	+90		10" Corr.
		+59	28'	18" Map.
←	21.5'	+55		
		6+25	25' ?	10" Map.
		+99	29'	10" Elm
		+90	29'	11" Elm
8" Map.	27' ✗	+67		
#556733 F	19.51' ✓	+43		
15" Ash	27'	+32		
		5+19	25' ✓	11" Wal.
		+81	25' ✓	11" Map
10" W. Ch.	25'	+67		
6" Ash	22.5'	+65		
		4+05	17' ✓	12" Ap.
	23.5'	+93		
3 rail fence F ✗✓	20'	+92		
		3+93	24.5	4" Ash

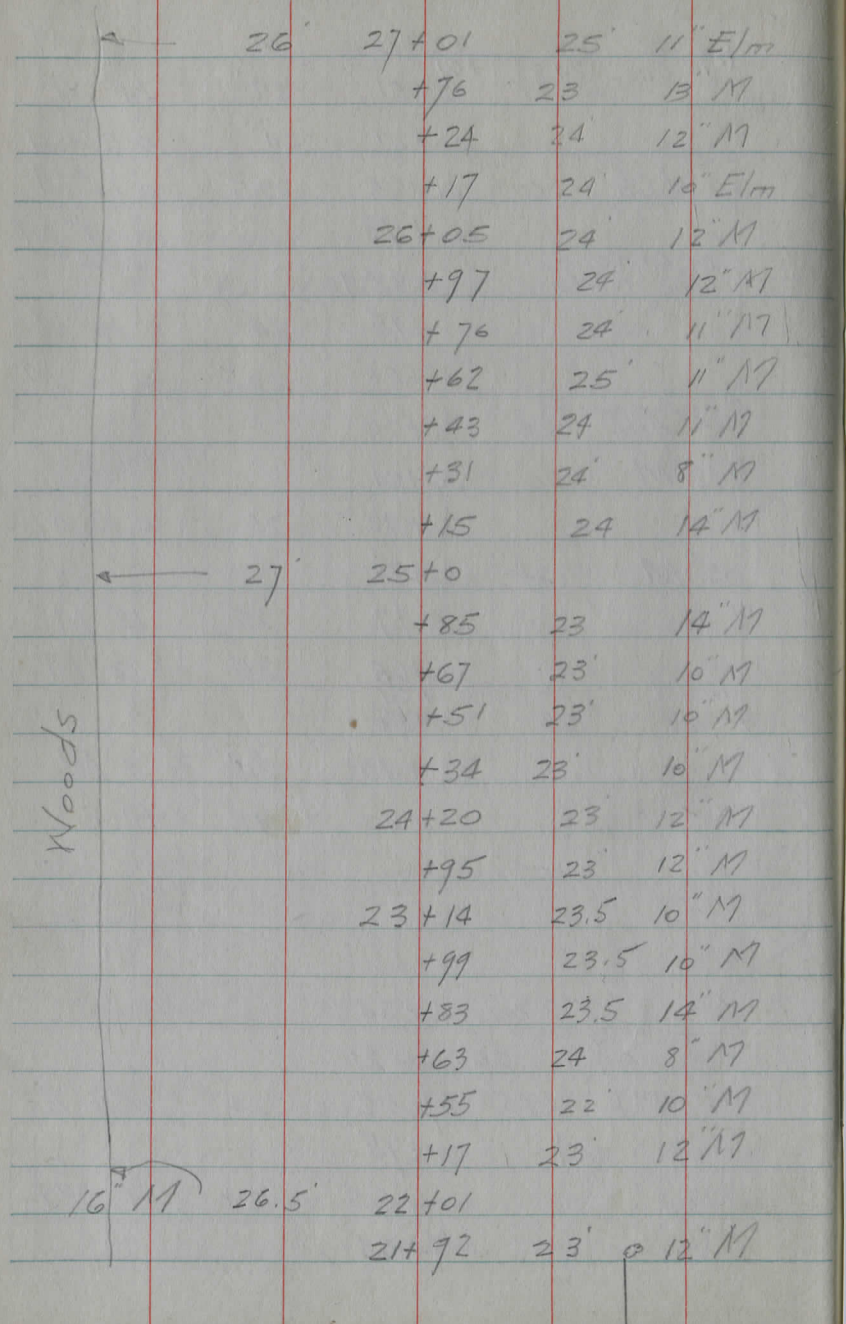
Small trees

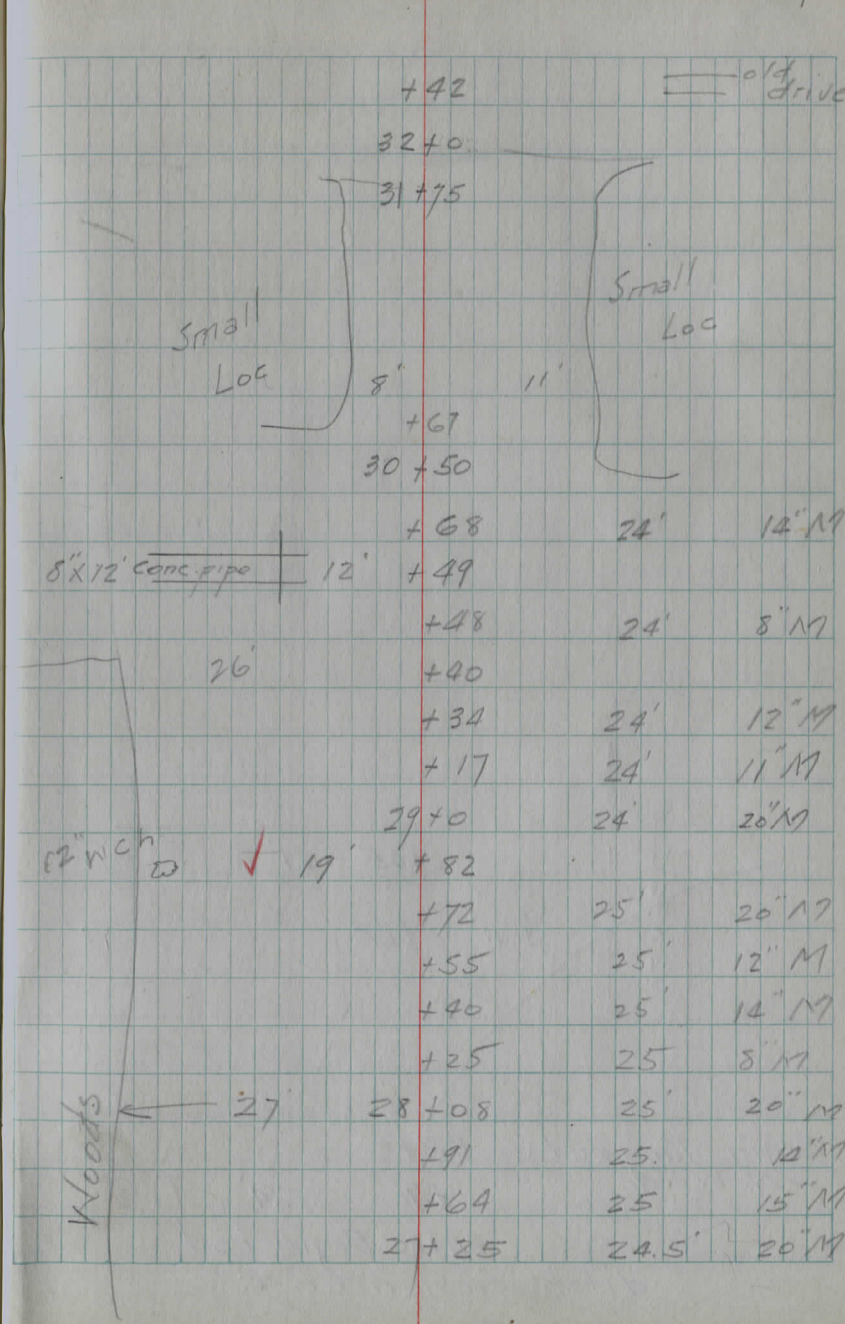

W
E
brush along fence
Light
3 rail fence
7" Ash 22' +99
+98 25' 8" M.
+80 26' 8" M
+64 25' 8" M.
+49 25 8" M
+30 25' 10" Map
10+13 25'
+97 25' 6" M.
≠ ✓ 16.5' +90
+79 25' 9" M
9" Ash 22' +74
11" Ash 25' +62
+59 25' 10" M.
7" Ash 25' +42
+38 23.5' 15" M
+26 25 10" M
6" Ash 27' +16 28'
✓ 19.5' 9+0
7" Elm +72
+69 23.5 12" Map.
7" Ash 23.5' +45
+40
≠ 17' ✓ +40 24' 15" Map
7" Elm 23.5 +36 +31 10' ✓ M.S.
+27 10' ✓ stone steps
7" Ash 23.5' 8+19
H

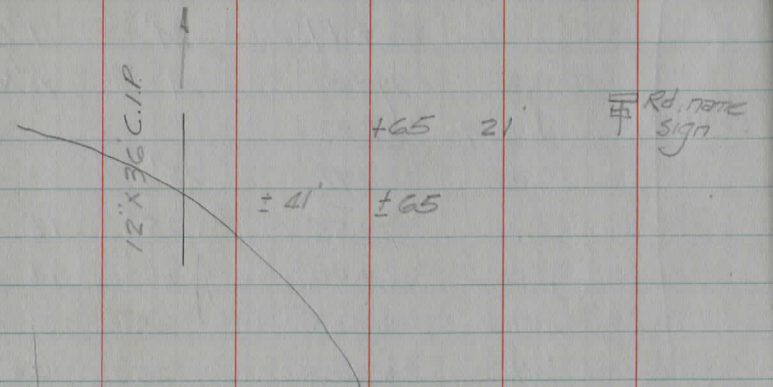

15
11" Ash 26' +36
+29 20" M
+ 17' ✓ +25
+16 28 12" M
2-10" M 29' 14+
11" M 30' +93
11" M 30' +90
8" Bass 26' +83
22' +69 27 9" W.Ch.
+56 27 11" M.
13+22 27'
+90 27' 27" M
≠ 17' ✓ +76
+72 27' 11" M
+61 28' 10" Elm
9" Elm 23 +65
9" Elm 21 +58
12" Elm 27' +43
19'
12" Elm 27' 12+15
2 Elm 12" 27' +98
Elm clump 27' +81 27'
8" Elm 20.5' +68
Elm clump 20.5' +47
≠ 19.5' ✓ +27
15" Elm 27' +17
✓ 19.5' 11+0

+44 15' End hedge
18+26 24" M
+78 15' →
+78 26' 24" M
+53 27' 14" M
hedge
11" Whitewood 28' +48
3' Conc Walk
25' ≠ 19' ✓ 17+25
16' →
+87 17' ✓
+73 12'
Building block 28
+61 25'
+50 12" M
+35 12" M ⊙
+15 9" M
16+01 27' 12" Ash ⊙
≠ ✓ 17 +75
24'
Map clump 29' +17
3x3 Stone post 22' +17
10" Boiler 23 13' 15+06
+96 8" M
3x3 Stone post 22.5' +93
+84 28' 10" M
23.5' +64 28' 12" M
14+50 28' 10" M ⊙

+70 24' 9" M
Woods 11" Cuc. 24.5 +61
+51 24' 14" M
+27 24' ⊙ 12" dead
14" W Ch 26' 21+05 23.5 ⊙ 10" M
+93 ⊙ 9" M
N Line Ho Mita +88.90
+75 24 13" M
+58 23.5' ⊙ 10" M
15" Ash 23' 28' +20
12" M 30' 20+01
+98 25' ⊙ 13" M
12" M 26' +78
+77 25' 13" M
+66 25' 12" M
12" M 26. +61
23' +50
+43 24' 8" M
+42 ✓ 12' M. B
+36
23' +24
Ho Mita Kotex sign 20' +21
Met guy 19.5 19+02 24 ⊙ 10" E
≠ 21 +75
+65 24' ≠ guy
18+54


26'
27+01 25' 11" Elm
+76 23 13" M
+24 24 12" M
+17 24 10" Elm
26+05 24 12" M
+97 24 12" M
+76 24 11" M
+62 25' 11" M
+43 24 11" M
+31 24' 8" M
+15 24 14" M
27'
25+0
+85 23 14" M
+67 23' 10" M
+51 23' 10" M
+34 23' 10" M
24+20 23 12" M
+95 23' 12" M
23+14 23.5 10" M
+99 23.5 10" M
+83 23.5 14" M
+63 24 8" M
+55 22 10" M
+17 23' 12" M
Woods
16" M
26.5'
22+01
21+92 23' 12" M


+42
old drive
32+0
31+75
Small Loc
Small Loc
8'
11'
+67
30+50
+68 24' 14" M
8"x12' Conc pipe
12'
+49
+48 24' 8" M
26'
+40
+34 24' 12" M
+17 24' 11" M
29+0 24' 20" M
12" x 4" ch
19'
+82
+72 25' 20" M
+55 25' 12" M
+40 25' 14" M
+25 25' 8" M
27'
28+08 25' 20" M
+91 25. 12" M
+64 25' 15" M
Woods
27+25 24.5' 20" M



Begin turnout 35+0
H. Wood.
+71 24' T
34+30 Begin bad
ditch erosion on E

Pomeroy
Woodhall
Clark

7-16-42

CHARDON - AUBURN

	+	H.I.	-	E	
± 200' W			0.7	1189.8	
± 100 W			2.3	1188.2	
± 37+0			19.8	1170.7	
36+0			9.3	1181.2	
Intersection			8.8		
B.M. 5			6.19	1184.35	1184.40
T.P.	1.04	1190.54	11.66	1189.50	
T.P.	0.27	1201.16	11.48	1200.89	
B.M. 4			5.82	1206.55	1206.58
T.P.	0.49	1212.37	7.84	1211.88	
B.M. 3	1.77	1219.72	1.85	1217.95	1217.75
T.P.	9.46	1219.80	0.25	1210.34	
B.M. 2			7.53	1203.06	1203.05
T.P.	4.75	1210.59	3.45	1205.84	
T.P.	12.27	1209.29	0.26	1197.02	
T.P.	12.11	1197.28	0.26	1185.17	
T.P.	12.89	1185.43	0.25	1172.54	
B.M. 1	7.93	1172.79	1.15	1164.86	1164.86
B.M.	11.00	1166.01		1155.01	

Bench Marks

Spk NW root 10" Pig Hick at end of tree row runing E from intersection

Hub W side at end of Locusts

Bench over + Spk; W root 20" Maple 25' Rt Sta 28+08

Spike E root 12" Maple 26' Lt 19+78

Spike SW root 11" Elm 30' E Sta 11+55

Spk E root twin Elm ± 40' W of Sta. 1 ± 25

Spike W side Elm stub ± 75 N of culvt (± 300' S. of intersection)
E side Chardon - Aub. road

7-17-42
Pom 2 Co

CHARDON-AUBURN J

29				05.8
Drive Lt				1206.2
30				05.8
31				04.4 ✓
T.P	7.43	1210.84 ✓	0.89	1203.41
T.P			3.45	1200.85 ✓ (1100.89)
32+0				99.4
33+0				96.1
T.P.	9.09	1204.30 ✓	0.14	1195.21 ✓
34+0				93.4
F.L.	12"x36"C.I.P.		11.1	
35+0				89.4
BM 5	11.00	1195.35 ✓		1184.35

E

X Sect.

West — East

4.7 4.8 3.8 6.5 5.7 5.0 5.8 4.8 2.9 3.2 2.2
30 22 19 11 10 11 12 16 19 30

4.5 4.2 4.6
60 30

5.4 5.8 6.2 5.9 5.0 6.0 6.6 6.7
30 13 11 10 10 12 21
30

5.5 5.7 7.8 7.4 6.4 6.8 7.8 4.6 4.9
21 17 11 10 11 12 22 30
30

3.8 3.2 5.8 4.9 5.2 5.9 4.1 3.8 3.3
30 19 11 4 9 15 22 30

7.3 7.2 7.6 9.1 8.4 8.1 8.2 8.3 8.9 5.5 4.8
30 22 16 12 6 1 4 8 16 30
11

0.8 0.2 1.0 3.4 1.95 3.6 +1.3
30 21 17 13 14 22-30

2.0 2.1 7.1 6.9 6.0 6.0 7.5 8.0 10.5 8.5 5.1
30 26 16 14 2 15 21.5 24 27 32

E

	+	HI	−	E	
T.P.	5.21	1221.81	1.54	1216.60	
22				14.2	
23				12.9	
24				12.5	
T.P.	7.83	1218.14	0.37	1210.31	
25				09.2	
26				04.4	
T.P.	9.18	1210.68		1201.50	
27				02.5	
Culvt	27+28.9			02.1	
T.P.	5.60	1207.10	9.34	1201.50	
28				02.5	
BM 4			4.33	1206.51	(1206.55)
		1210.84			

West ℄ East 21

5.4 5.1 5.0 5.4 5.0 3.9 4.7 5.2 4.4 3.3 2.8 2.7
30 24 15 14 12 9 11 14 24 26 30

6.3
7.7 7.0 6.6 12 5.2 6.0 6.5 4.8
30 23 13 10 11 30

6.3 6.1 6.2 6.7 5.6 6.6 7.3 6.5 5.6 5.2
30 20 14 12 9 11 12 19 30

0.4 +0.1 0.4 2.5 1.5 2.4 +0.8 +0.2 +0.9
30 22 20 14 9 15 24 30
21

4.2 4.7 4.1 7.7 6.3 7.6 7.4 5.0 4.5 5.6
30 23 20 12 11 12 16 24 30

4.7 8.8 6.9 5.4 4.6 5.4 6.4 6.6 4.0 3.4
30 17 11 9 10 11.5 19 24 30

Good tall Ch. 14.4 10.4 5.75 5.0 5.6 9.9 8.4
14 FL 13 13 11 FL 30 Ch.
HJ 11

8.0 7.4 9.5 9.1 8.3 9.1 5.8 6.1
25 18 12 11 11 17 22
30
30

Station	+	HI	−	E	
15				10.8	
drive	15+06			10.8	X
16				11.5	X
T.P.	2.96	1215.23	9.54	1212.27	
Drive	16+73			13.1	
17				13.8	
18				17.0	
Drive	18+54			17.3	
19				17.1	
Drive	19+36			17.3	
BM 3			3.95	1217.86	(1217.95)
20				17.7	
21				16.6	
		1221.81			

5.6 5.2 5.5 6.2 5.5 4.4 5.1 6.1 5.5 5.7
30 17 15 13 10 10 15 16 25 30

7.1 5.3 4.4
±110 24

3.6 4.1 4.4 5.1 4.7 3.7 5.1 4.8
30 26 16 14 11 14 16 30

8.75 9.1 8.8 8.3
8 11 28

6.0 7.2 9.2 8.0 8.8 7.9 6.7
30 20 15 13 15 2.5 – 0.7 Side Walk 30

5.2 5.9 6.4 5.8 4.8 5.9 4.5 4.2
30 14 12 10 10 15 30

4.5 4.5
25
50

5.4 5.7 5.9 5.5 4.7 5.8 5.3 5.2 5.6
30 14 13 12 11 13 23 30

4.3 4.6 4.5
100 30

4.4 4.7 5.3 4.1 5.1 5.7 4.7
30 14 13 11 12 15 30

5.2 4.9 5.7 6.2 5.9 5.2 6.1 6.4 6.2 4.7 4.1 3.8
30 21 14 13 12 9 10 12 15 25 27 30

Station	+	HI	−	E	
7	taken in drive cut add yardage			98.6	
T.P.	5.38	1205.45	11.69	1200.07	
8				04.9	
9				08.3	
T.P.	3.89	1211.76	1.77	1207.87	
10				07.2	
11				05.1	
B.M. 2			6.68	1202.96	1203.06
Culv't				05.0	
12				05.2	
T.P.	4.20	1209.64	9.79	1205.44	
13				06.2	
14				08.3	
		1215.23			

West . East

Drive Same as 1

6.0 5.4 8.2 7.5 6.9 6.5 4.2 2.4
30 19 13 12 7 30 50

5.3 5.1 7.8 7.6 6.9 7.5 4.1 3.4 3.3
30 16 12 11 12 20 25 30

1.8 1.7 1.5 4.5 3.5 3.8 4.2 1.9 2.7 ✓
30 20 17 12 5 10 15 30
18

Hub 9+61 W. ditch Quit 4:30

0.6 1.1 1.7 3.8 3.7 3.2 2.4 3.4 2.3 1.7 1.9
30 22 15 11 10 9 12 17 25 30

3.6 4.2 4.7 6.2 6.0 5.4 4.5 5.5 5.8 6.0 6.6
30 19 16 13 12 10 12 13 25 30

6.7 4.6 7.3 7.6 8.2
FL FL 30 100

6.3 6.1 6.7 5.6 4.4 4.7 5.4 6.5 7.2
24 17 14 11 5 10 12 30
30

10.8 10.6 9.7 11.1 10.2 9.0 10.0 10.8 10.2 9.7 9.5
30 26 21 13 11 10 11 15 24 30

6.4 6.0 6.8 8.5 7.8 6.7 7.8 8.4 6.0 5.4
30 20 16 13 11 10 12 16 30

				Elev.	
F.L			8.7		
0+0				1161.3	
1				62.9	
BM1			2.41	1164.79	(1164.87)
T.P.	1.13	1167.20	9.82	1166.07	
2				66.1	
3				71.4	
T.P.	1.25	1175.89	12.89	1174.64	
4				77.4	
T.P.	0.20	1187.53		1187.33	
5				83.3	
T.P.	3.99	1191.32	13.19	1187.33	
6				90.5	
T.P	0.45	1200.52		1200.07	

200 — 7.8 59.4

100 — 7.3 59.9

4.9 5.9 6.8
100 100

6.4 6.1 5.0 6.3 6.1 5.2 4.3 4.9 4.6 5.5 5.9 5.5 5.2
30 26 24 20 18 13 11 11.5 20 24 25 30
23

9.4 8.7
22 30

13.6 11.9 11.6 11.0 10.4 9.7 8.8 9.9 10.8 10.2 10.1 10.3 10.0
32 26 21 18 13 3 9 11.5 15 16 17
11

5.6 5.2 4.5 5.0 4.9 4.0 3.0 1.8 1.6
30 13 11 17 20 20.5 27 30

10.5 9.3 8.7 11.2 10.1 10.5 10.8 10.7 7.0 5.5
30 24 19 14 8 10 13 19 30

7.1 6.2 9.5 9.3 8.9 8.0 8.5 8.8 3.2 1.4
30 21 15 13 11 10 11 21 30

10.1 8.4 11.1 10.9 10.0 10.1 10.7 5.6 4.3 4.0
28 20 14 13 4 11 18 28 30

B.M.	0.28	1184.68		1184.40
0			2.9	1181.8
T.P.	0.00	1171.61	13.07	1171.61
1			0.8	1170.8
2			8.9	1162.7
T.P.	3.85	1164.73	10.73	1160.88
3			4.7	1160.0
4			4.8	1159.9
5			3.5	1161.2
5+50			1.15	1163.58
6			+ ±2.0	1166.7
			3.97	1160.76

5-3-44
For Randles

PROFILE on #4 Nly fm N. Woodland

Pig Hick

Less fill reqd on W

E side culvt easier to doctor

Gd. rail both sides

Note: Sta. 0 = P.I. Chardon-Aub. & N. Wood. Rds.

See Next pg

= ± end of fill

Fill = 16'-17' wide

3+74 = Ctr culvert

NE & E Hdwl

Begin Fill 1+50

Ctr culvt 3+72.5

5+50 End Fill on W

5+75 " " on E

opening outlet 23"x25"

	0.30	1161.06	H.I. #1	1160.76
2				
	0.56	1161.32	H.I. #2	1160.76
3				
4				
5				

E End of culvt to ℄ = 34'

inlet op. 24"x27"

W use H.I. #2 — 1161.32

E use H.I. #1 — 1161.06

Level 25 +0.3 − 4.0 4.4 8.1 4.0

52 14 9 9 21 26 31 39

ditch

16.0 11.4 10.6 12.0 Level →

43 31.5 26.5 6.5 9 27

15.2

FL end sluice

± 14.7

F.L.

16.0 13.5 13.1 − − 14.5

38 34 27 7 9 31.5

H_2O

7.0 7.1 .8 lower 2 − 13.1 14.5

36 26.5 16 11 9 32 38

H_2O

W end both sluice to ℄ = 16.4

8' more to end spillway

SLOPE STAKES
CHARDON - AUBURN

8+0		
7+0		
6+0		
5+0		
4+0		
3+0		
2+0		
1+0		

7-5-44
Pom - Meyers

W	E
22.5	25
22	23.5
22	28.5
22.5	30
22	26.5
18.5	22.5
18.5	20.5
19	18.5

17

16

15

14

13

12

11

10

9

21.5	21
19	18.5
18.5	16
21.5	22
19.5	20
19	21
20.5	17.5
22	20.5
22.5	22

26

25

24

23

22

21

20

19

18

22.5 22.5

22 21

19.5 20

18 19.5

18.5 20.5

20.5 21.5

19.5 19.5

19 19.5

18.5 20.5

BM.	8.76	1193.16		1184.40	Grade
35					1185.9
	9.35	1201.86	0.65	1192.51	
34					1190.4
33					1194.9
T.P.	6.32	1204.17	4.01	1197.85	
32					1199.4
31					
30					
29					
28					
27					

Spk HW root 10" Pg Hick E of inter. 30

15.96 − 7.46 = 8.50

1201.86 − 85.90 = 15.96

30 — 32

93.16 − 85.9 = 7.26

7.26 − 1.71 = C5.55

11.46 − 5.96 = C5.50

26.5 — 25.5

01.86 − 90.40 = 11.46

11.46 − 3.71 = C7.75

6.96 − 3.71 = 3.25

23.5 — 27

01.86 − 94.90 = 6.96

6.96 − 0.96 = C6.00

4.77 − 1.77 = C3.00

22 — 21.5

04.17 − 99.40 = 4.77

4.77 − 2.27 = C2.5

21.5 — 27.5

19.5 — 18.5

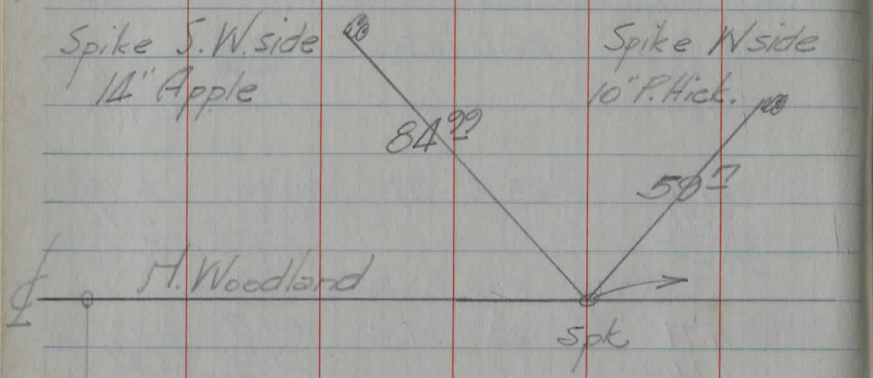
21 — 23

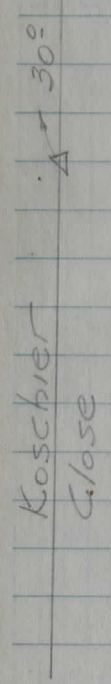
20.5 — 23.5

22 — 19

Sept. 44
Pom. Hall
Maynard

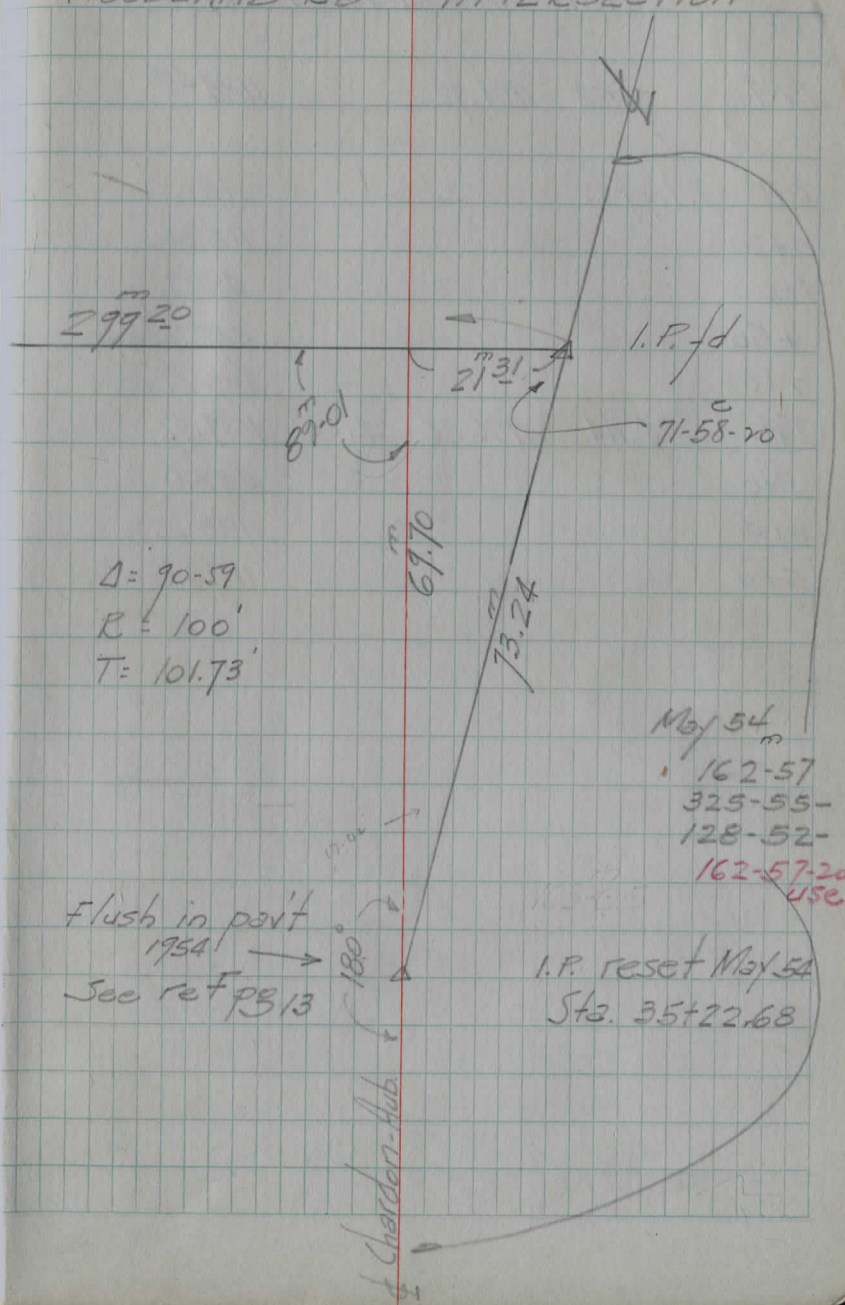
CHARDON-AUBURN RD - NORTH





See pg 56 & 57
for
Trial borings & X Sec.

WOODLAND RD INTERSECTION



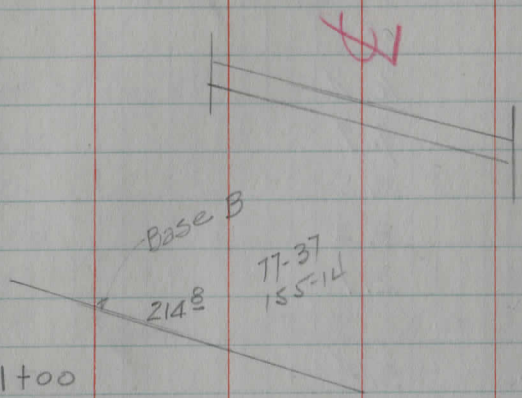
Levels on N. Woodland

BM.	7.52	1191.92		1184.40
0+0 = P.I. of Es				1181.5
0+20				1182.0
1+0				1188.1
1+50				1188.7
2+0				1189.8
T.P.	6.44	1196.36	2.00	1189.92
3+0				1193.0
4+0				1188.2
5+0				1179.6

(Westerly from N°1)

±	10.4
So. bank	9.9
1.5 Lights	3.8
level	3.2
1.0 Lights	2.1
1.5 Lights	3.4
2.5 "	8.2
	16.8

Music St. Westerly from
66+87.5 Intersection Munn Rd.



61+00

60 ± 64 — James E line

59+95 — 25'

57+ — 26'

90°

57+00

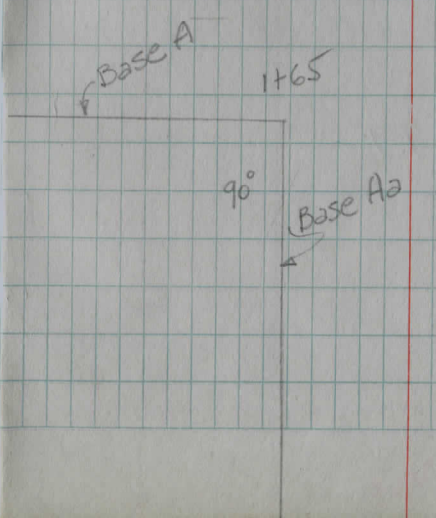
56± 30 — 29' — @ 7" Elm

56 ± 30 — 27'

56 ± 30 — ± E line Cem.

Munn Rd.

Brush row = E line Trustees



10-7-44 Pom-Steele Levels Music St. West of Munn Rd.

B.M.	5.75	1179.38		1173.63 ✓
T.P.	6.22	1185.20	0.40	1178.98 ✓
T.P.	7.92	1192.09	1.03	1184.17 ✓
			3.80	1188.29 ✓
T.P.	0.25	1180.55	11.79	1180.30 ✓
T.P.	0.29	1170.34	10.50	1170.05 ✓
℄ 62 to			4.4	1165.7
61 ± 85, 30' South			8.3	1162.0
61 ± 27			8.1	1162.2
61 ± 23			8.3	1162.0
61 ± 25			5.4	1164.9
℄ 61 to			6.8	1163.5
BM set			5.79	1164.55 ✓
T.P.			7.00	1163.34 ✓

Cont'd next pg.

S.W.K stepping stone front Munns house

Intersection Munn & Music St ℄s
Can't see thru either culvert at inter.
Lots of H_2O from N & E

Outlet 4" Field drain
inlet rd culvert
outlet " "
℄ " " South

6.8 9.5 ditch 8.8 25

Spk N root 18" Map. James E. Prop. Line
Stake in field

T.P.	4.18	1167.52		1163.34	
					62.5
					63.2
					63.2
					64.5
	top 8" pipe N Wly				58.7
	ground				60.5
	± ℄ line James				61.0
					61.5
					61.7
	± 7Ac W of Munn & N of Music				64.6
					65.1
B.M.	0.60	1165.15		1164.55	Sta 60
					Sta 57
T.P.	3.09	1161.75	6.49	1158.66	
58+0					
57+0					
56+0					

L	Dist	Rod	
38-46 Lt	129	5.0	ditch
26-52 Lt	142	4.3	
86-44 Lt	60'	4.3	"
152-38 Lt	96'	3.0	"
110-03 Rt	211	8.8	
" " "	211	7.0	
110-38 "	78'	6.5	
92-58 "	89'	6.0	
4-10 Lt	79	5.8	
3-48 "	130	2.9	
12-20 Rt	140	2.4	

Base B

	S ditch		℄	North ditch
	6.3	58.8	4.6	
6.4 25	7.9	57.2	6.2	
4.8 25	5.5	56.2	3.6	5.2
5.9 25	6.2	55.5	4.4	6.3
			4.5	6.8
			up	13.4

Swale N of road

		1161.75		
0+50				
1+10				
+50				
T.P.	4.82	1161.30	5.27	1156.48
1+0				
+50				
2+0				
+50				
± 95-P.L.				
3+50				

E

W

54.7

6.2 50 | 6.4 | 6 30 | 6.1 65 | 7.0 71 | 3.9 80

54.5

6.3 50 | 6.8 | 7.0 30 | 6.7 67 | 7.2 72.5 | 3.9 8.2

4.7 50 | 5.9 | 6.3 30 | 6.9 +10

54.7

7.1

South

53.3

8.0 / 10

52.6

8.7 / 17

51.6

9.7 / 20

10.2 51.10

12.9 48.4

Plenty fall

Southwesterly

CHARDON - AUBURN RD Sec K

June 17 46

Pom Canfield Thrasher Bell

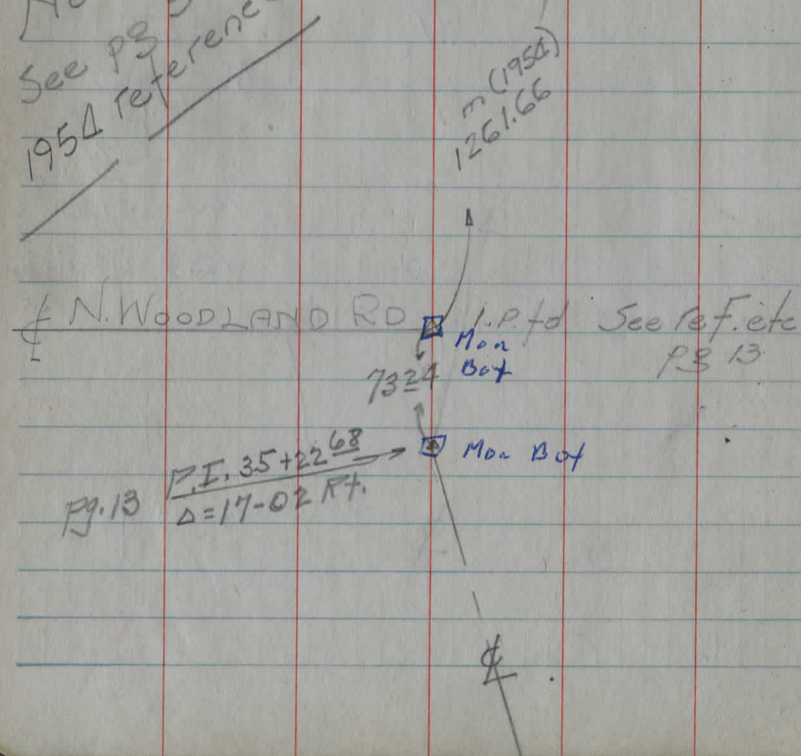
39+67.5 2' X 2.35' X conc. box culvt

Conc. Floor

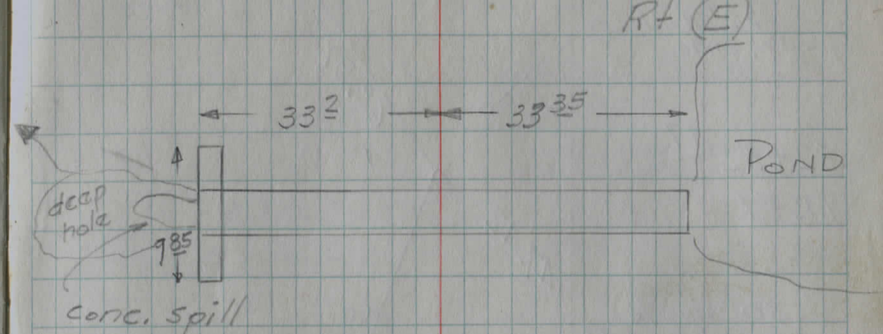
exc. cond. except ± 5' of

E end : sidewalls cracked

NOTE: See pg 59 for 1954 references



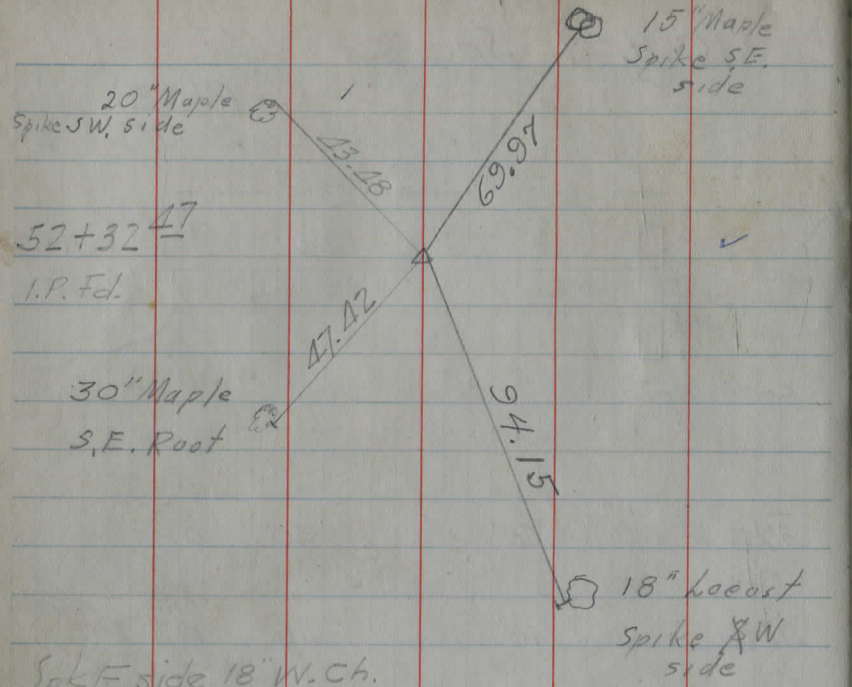
C.H. #4 SEC. K



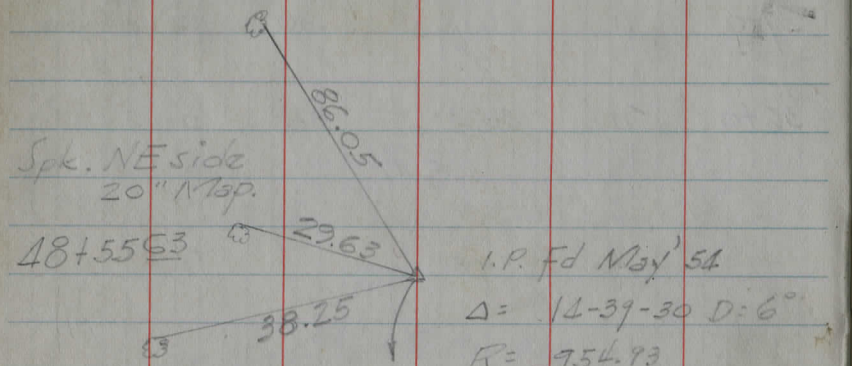
39+0	□	50	⊕	40	□
38+0	□	40	⊕	40	□
37+0	□	30	⊕	30	□
36+0	□	30	⊕	30	□

5.47

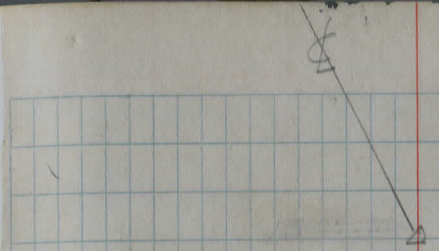
All stks not marked on back set at ℄ + 30'



Spk E side 18" W. Ch.



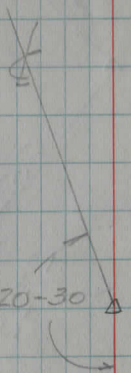
I.P. Fd May '54
Δ = 14-39-30 D: 6°
R = 954.93
P.I. = 48+55.63
T = 1 22.81
P.C. = 47+32.82
L = 244.31
P.T. = 49+77.13



Δ = 21-33-10 Lt
D = 8°
R = 716.197
P.I. = 52+32.47
T = 1 36.30
P.C. = 50+96.17
L = 2 69.41
P.T. = 53+65.58

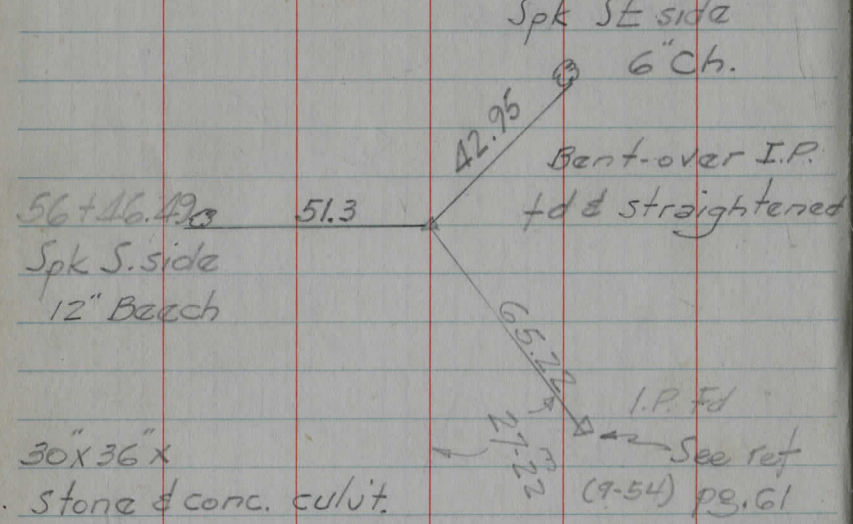
51+0 = 3.83 : 0-09-12
+50 = 2-09-12
52+0 4-09-12
+50 6-09-12
53+0 8-09-12
P.T. +65.58 10-16-15

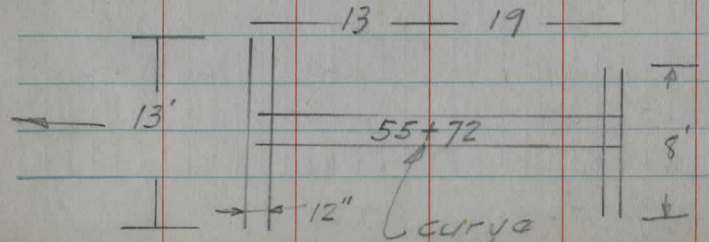
SEE P3 59

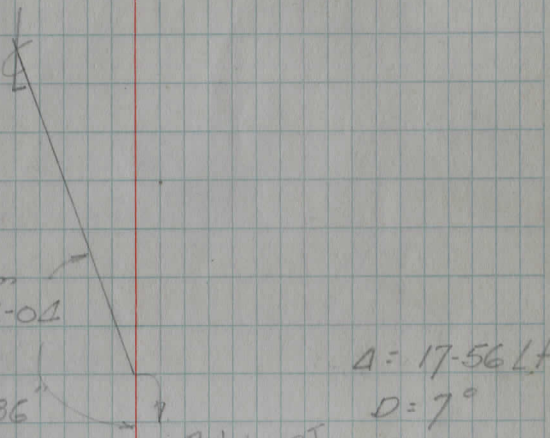


41 □ 40 30 □

40 □ 50 30 □







55+50 = 32.66
" = 1°08'36"
56+0 = 2-53-36
+50 = 1-38-36
57+0 = 6-23-36
+73.53 = 8-58

Δ = 17-56 Lt
D = 7°
R = 818.511
P.I = 56+46.49
T = 1 29.15
P.C. = 55+17.34
L = 2 56.19
P.T. = 57+73.53

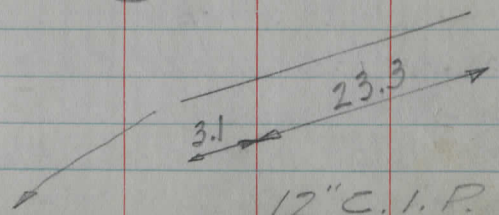
Lt hdwl cracked & started to Fall out
West 12'± all conc incl. Floor.
Stone part M.G.

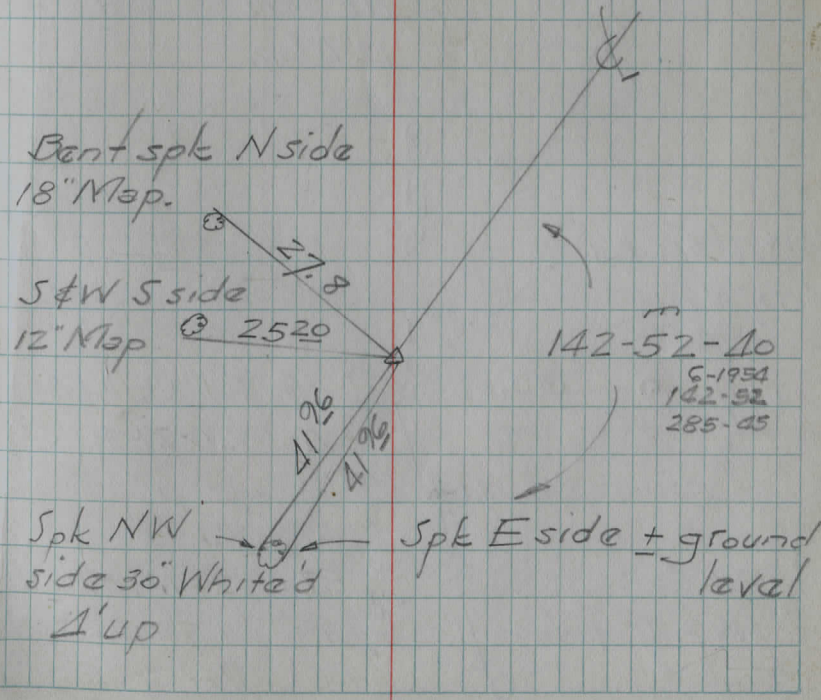
68+0 Spk

60+94.20 △ I.P. Fd

Note: All stks this curve set From tang. ℄.

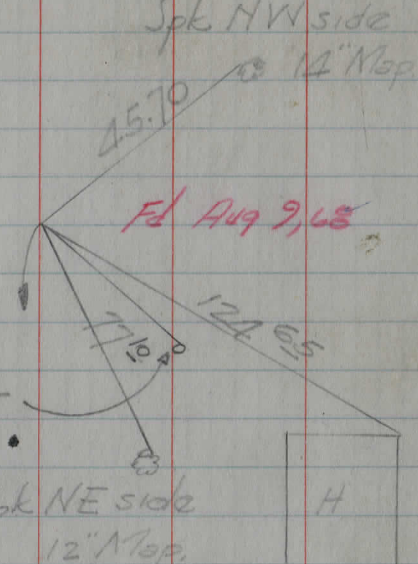
59+87.7

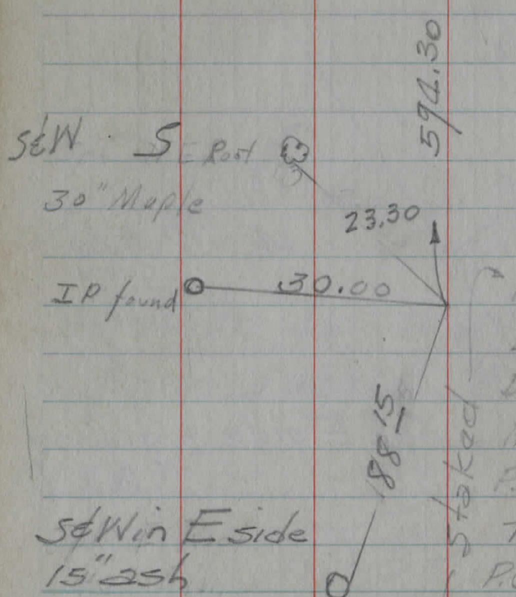




Oct 53

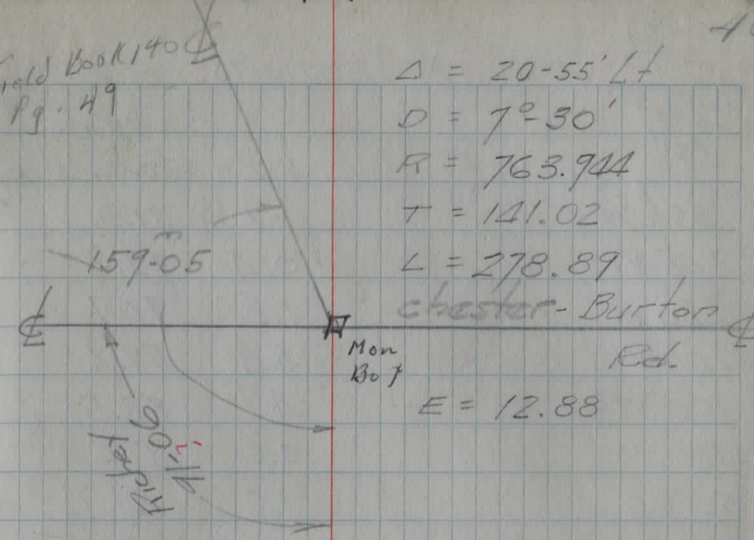
78+67.00 I. Pin Fd
8" under
±13' Ext. existing
45.21 to 7
S&W in NE side CEI
277634





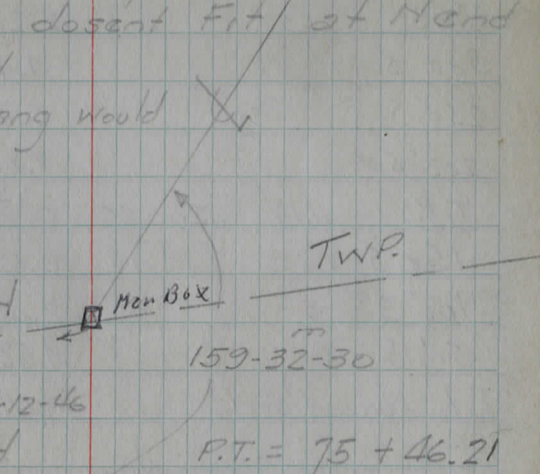
I.P. Fd Oct 53
Δ = 20-27-30 R
D = 6°
R = 954.93
P.I = 72+76.37
T = 172.32
P.C = 71+04.05
L = 340.97
PT = 74+45.02

Field Book 140
Pg. 49



Δ = 20-55' Lt
D = 7°-30'
R = 763.944
T = 141.02
L = 278.89
E = 12.88

Note: Curve dosent Fit at Hand
P.T = to far W
±100' more tang would
help



New Curve 9-12-46
Δ = 20-27-30 Rt
D = 3°45'
R = 1527.89
P.I = 72+76.37
T = 275.71
P.C = 70+00.66
L = 545.55

P.T. = 75+46.21
E = 24.68

6-21-46
Canfield
Post
Thrasher
Bell

X Sections

				88.0
	400'W		5.2	& down steep
350'W			1.9	91.3
300'W			0.4	92.8
250'W			1.3	91.9
200'W			3.4	89.8
150'W			4.7	88.5
100'W			5.6	87.6
50'W			8.5	84.7
BM1	8.78	1193.18		1184.40
350'S			2.2	98.1
300'S			4.4	95.9
250'S			6.6	93.7
200'S			8.8	91.5
T.P.	11.13	1200.25 ✓	0.26	1189.12 ✓
150S			0.2	89.2
100'S			2.45	86.9
50'S			4.62	84.8
P.I. N woodland			7.69	81.7
BM.	1.98	1189.38 ✓		1184.40

CH #1 Sec K

Spk NW root 10" Pig Hick

	+	HI	−	E	
41+0				61.5	
40+0				60.4	
			60.5	19.8 20' W of hdwl	21.6 deep hole
39+0				61.9	
T.P	1.13	1164.45	10.82	1163.32	
38+0				Quit Mon 65.5	
37				71.8	
TP	0.36	1174.14	10.72	1173.78	
~~37~~					
36+		outlet FL			
36+0				81.3	
BM	0.10	1184.50		1184.40	

West ℄ East

42

9.4 9.2 5.3 3.8 3.2 3.0 3.3 5.7 16.2 ~~17.8~~ 18
38 30 24 18 10.5 10 19 31.5 40

19.5 19 9.7 6.6 5.2 4.1 4.8 5.8 7.3 17 ~~14.8~~ 19
50 41 26 18.5 13 10 14 18 35 40

19.8 18.7 13.9 5.3 4.0 4.8 17.7 15.4 18.1
End spill FL hdwl top 13.5 11.5 10' East of End top of barrel flow line

19.6 19.0 9.2 5.3 3.3 2.6 3.6 5.6 14.0 15.3 15.0
50 41 26.5 19 10 12 18 31 40 50

17.6 5ft W side 38 ± 20

17.5 13.3 10.1 9.1 8.6 9.4 13.7 15.1 18.8 18.0
39 24.5 19 12 12.5 22 26.5 32 40

6.0 5.8 5.7 3.6 2.9 2.3 2.9 4.1 5.7 7.5 5.9 6.5
39.5 30 19.5 16 11.5 11 16.5 22 26.5 31.0 40.5

5.2

2.7 3.2 4.3 5.2 6.1 8.6
30 14.5 19.5 25 30

℄

	+	HI	−	E	
T.P.	4.58	1228.31	0.44	1223.73	
48					
47				13.3	
T.P	13.00	1224.17	0.25	1211.17	
45+54				1200.7	
45+70				02.1	
46				1204.5	
T.P	12.87	1211.42	0.22	1198.55	
45				95.6	
44				86.2	
T.P.	12.88	1198.77	0.36	1185.89	
43+0				76.9	
TP	11.58	1186.25	0.83	174.67	
42+0				68.6	8.5
TP	11.78	1175.50	0.73	1163.72	37
		1164.25			

West ℄ East 43

22.5

2.8 2.5 1.7 2.2 2.2
7 6 4 15 14.5

5.0 5.1 12.0 11.7 10.9 10.9 11.6 12.4 6.7 7.2
30 19 4.5 7.5 6 4 12.5 18 15 30 33 40
10.7 11.67 7.6 13.5 12.1
1.5 12.5 16.5 30

9.3 10.2 7.8 6.8 6.0
2 12.5 17 19 24.5 30

0.0 7.5 8.5 6.9 7.1 7.9 9.1 6.6 3.2 3.6
30 24 18.5 2 7 16.5 19.5 25.5 30.5 36

+1.5 +1.3 3.7 4.6 4.0 3.2 3.0 4.6 4.5
30 27 20.5 14.5 15 10 9 13 30

12.6 12.0 12.9 13.8 13.3 12.9 12.6 12.8 13.3 13.6 86.9 85.0
30 22.5 19 14.5 10.5 5.5 6 12 13 19 30

11.2 10.5 10.1 9.8 9.4 9.4 9.7 10.2 10 8.9 8.6 8.6
18.5 16.5 13 10.5 3 6.5 11.5 12 15 20.5 30
30
9.6 10.3 8.3 7.3 6.8 6.9 7.3 8.3 12.5
30 26.5 21.5 12.5 3.5 8 16 30

	+	HI	−	E	
T.P.	0.11	1226.31 ✓	11.74	1226.20 ✓	
54+0			4.5E		
53+0			1.5W		
52+50			2.7W		
T.P.	2.79	1237.94 ✓	2.79	1235.15 ✓	
52		2.7W			
TP	6.58	1241.73 ✓	7.97	1235.15 ✓	
51+50			1.3W		
BM	5.52	1243.12	5.52	1237.60 ✓	
TP	8.84	1243.12 ✓		1234.28	
51			1.4E	38.4	T
50			8.1E		
T.P	4.32	1238.60	0.52	1234.28 ✓	Level
49+0			5.2E		
48+50			6.3E		
T.P.	11.07	1234.80 ✓		1223.73 ✓	Level
48		1228.31			Trans.

West ℄ East

27.5
7.0 6.4 7.6 7.6 11.0 11.3 8 10.4 | 10.1 11.1 9.4 9.6
35 28 19 15.5 9.5 7.5 5.5 1.0 | 4.5 14.5 / 10.5 19.5 30

34.4
2.5 3.3 3.5 | 3.9 4.3 3.5 3.5
35 9.5 | 11.5 17.5 22 30

35.0
0.6 1.9 2.4 3.5 | 2.9 2.5 2.6 3.0 4.0 3.3 3.3
35 15 5.5 3 | 2.5 8 13 17 19.5 21.5 30

2.9 3.0 4.8 4.8 6.0 5.8 | 5.2 5.6 6.4 6.2 6.8
37 30 11.5 7.5 5.5 3.5 – 35.9 | 6.0 11.5 17.5 19 30

37.8
2.4 2.3 5.5 6.0 5.7 | 5.8 6.2 6.7 6.6 7.2
40 30 11.5 8.0 6.0 | 3.5 11.5 14.5 16 30

24" Walnut at 51+40 Ref Spk. W. side

1.6 2.8 3.8 5.4 5.2 4.7 | 4.6 5.3 4.8 5.8
35 26 12.5 9.5 7.5 ℄ | 4 13.5 16 30

34.4
2.3 2.5 2.7 5.1 | 4.2 4.9 3.3 3.8
40 16.5 12 7.5 | 3 13 / 10.5 15.6 35

29.1
8.1 7.4 6.8 6.1 5.9 6.7 ℄ | 5.7 5.9 6.4 4.3 3.8 3.4 3.9
40 30 21 16 9.5 6.5 | 3 9 14.5 19.5 27 29 35

10.7 8.8 8.2 9.4 | 26.4 8.4 8.9 9.2 9.2 7.9 8.1
40 13 10.5 6.5 | 4.5 14.5 16.5 / 17.5 20 24 35

4.3 3.5 3.2 | 3.0 2.6
35 20 15 / 16 | 33 24 / 26

24.0 24.8 25.1 25.3 25.7

	+	HI	−	E	
T.P	12.19	1272.09 ✓		1259.90	✓
61+0			16.1 E		
T.P	(8.28)	1268.18	0.41	1259.90	✓
60+0			21.6 E		
		✓			
T.P.	11.59	1260.31	0.42	1248.72	✓
B.M.			0.90	1248.24	✓
59+0			5.0 E		
T.P	11.99	1249.14 ✓	0.05	1237.15	✓
T.P.	11.19	1237.20 ✓		1226.01	✓
58+0					
Trans	(11.18)	1237.19	0.27	1226.01	✓
57+0				1.5 W	
TP	6.92	1226.28 ✓		1219.36	✓
56+50			1.5 W		
T.P.	(6.05)	1225.41		1219.36	✓
66+0			0.5 W		
		C.L. Culvert			
55+50			1.6 E		
T.P.	(4.21)	1223.57	6.95	1219.36	✓
55+0			4.3 E		
		1126.31 ✓			

West

East 45

61.8

6.5 6.4 5.7 5.6 5.5 6.2 4.1 3.4 3.8 3.0 1.7

15 20 6.5 12 21.5 22.5 29.5 26 29 34.5 50 70

10.4 7.5 7.1 7.1 53.2 7.2 8.0 4.9 4.1 2.2 0.8

30 12 6.5 1 6 8 9 13 19 40 50

Bent over spk E root 30" beech Lt 59+55

9.8 6.9 6.0 43.1 6.4 7.5 4.2 2.8 1.1 0.0

30 12.5 2.5 9 10 11 14.5 20.5 40 48

32.1

9.8 8.8 5.1 5.7 5.1 4.9 5.8 2.0 1.0 x2.3

35 30 8 6 4 13 15 17 20 30 38

10.2 6.0 4.9 4.4 21.9 3.8 4.2 4.9 3.8 2.5 2.3 1.4

37 10 4.0 9 17 18.5 19.5 21 26 30 35

down 10 6.8 6.2 5.6 19.8 5.1 5.7 6.2 5.9 4.3 4.0

steep 38 7.5 4.0 9.5 19.5 21 22 24 30 37

19.0

13.3 12.9 12 5.9 4.6 4.7 5.4 7.7 6.1 2.6 1.9

09.1 37 30 19 8 18.6 3.0 9.5 15.5 18.5 20 30 37

14.5 8.0 14.8 5.6 6.6 9.3 12.6

F.L. Head wall 3.7 6.5 5.0 13.5 Headwall F.L. 11.0

12.5 11.9 10.8 6.7 5.5 4.8 19.3 4.3 4.5 5.2 6.4 8.0 9.7 9.9

40 32 24 16 14 5.5 3.5 2.0 7.5 12.5 17.5 24 29 35

3.3 4.4 6.0 5.9 21.3 5.0 5.2 5.6 6.3 0.4 0.0

27 15.5 11.5 8.5 7 6.5 11 15 15.5 26 32

33

	+	H.I	−	E	
T.P.	9.32	1343.46		1334.14	✓
71				35.4	
T.P.	5.92	1340.06	0.31	1334.14	✓
70					
T P	12.54	1334.45		1321.91	✓
69					
		13			
T.P.	(8.67)	1330.58	0.32	1321.91	✓
68					
				16.4	✓
T.P.	11.26	1322.23		1310.97	✓
67				09.3	✓
T.P.	(3.98)	1314.90	1.06	1310.97	✓
T.P.	12.31	1312.03		1299.72	✓
66					
T.P	(7.71)	1307.43	+.01	1299.72	✓
65+0					
T.P	8.21	1299.71	0.43	1291.50	✓
64+0				86.5	
T.P	8.89	1291.93	0.30	1283.04	✓
63+0		3.8 E		77.8	
T.P	11.43	1283.34	0	1271.91	✓
62+0		19.1 E			
T.P	(5.92)	1277.83	0.18	1271.91	✓
		1272.09			✓

West ℄ East 46

4.9 4.3 5.6 4.7 5.0 5.5 5.3 4.0 4.0
35 12.5 10.5 7.5 8.5 11 14.5 35

4.1 3.3 4.7 4.3 4.0 30.5 4.2 4.5 4.6 2.2 1.5
35 15 10 8 2 6 1 6 9 12 35
12 7

5.6 4.7 4.1 6.4 6.0 5.6 25.0 6.2 7.1 6.0 4.1 3.1
35 24 17.5 17 8 2 6 8 11.5 15 35
17.3 7

4.8 ? 17.4

2.9 2.7 5.5 5.1 5.8 16.4 5.2 4.1 5.2 1.7 1.9 1.1
30 15 9 6.0 1.0 6.5 7.5 11.5 23 15.5 35
12.5 8.5

5.1 4.1 4.3 6.6 5.6 6.0 6.7 8.1 2.6
8.5
35 19.5 13 10 8.0 11 17 35

1300.9

6.5 4.7 4.8 7.4 7.0 6.5 7.1 7.8 4.0 3.8
35 20.5 15 9 7.0 7.5 9.5 13.5 35
11 8.0

5.6 4.7 5.2 6.5 5.9 5.5 94.2 6.1 6.6 6.2 4.4 3.9
35 26.5 13.5 11 6.5 7.5 8 10 12 35

5.0 4.0 4.4 6.0 4.1 5.9 5.4 86.5 5 6.0 4.7 3.5 2.9 3.5 3.9
8.5
30 24 12 10.5 9.5 7.5 1 6.0 2.5 12 15.5 35 40

5.8 4.4 5.1 6.5 6.1 5.5 77.8 6.1 7.3 3.7 2.6 1.9 0.9 0 0
10 7.5
30 17 12.5 11.5 8 1 7 8.5 13.5 16.5 33.5 40 50
69.3
8.0 7.5 7.7 9.7 8.5 8.9 9.8 6.8 5.8 4.8 4.9 4.2
25 14.5 12.5 9 1.0 10 11.5 16 20 45 50 60
13

	+	HI	−	E
200'E			1.2	55.9
150'E			2.3	54.8
100'E			3.25	53.9
BM.			2.35	1350.78
78				
77				
76				49.1
T.P.	7.90	1357.13 ✓	3.65	1349.23 ✓
75				
74				46.4
73				
T.P.	9.79	1352.88 ✓	0.37	1343.09
72				
IBM.			4.41	1339.05 ✓
		1343.46 ✓		

W ℄ E 47

Ref. spk W side 14" Map. 45.7 NE of P.I

51.0

6.3 6.2 7.5 7.1 6.1 7.0 5.6 4.8
3.5 27 16.5 14.5 5 ℄ 6.5 13 30
22

8.6 8.4 8.0 7.3 49.8 7.5 7.9 7.4 6.7
30 14 11 2 3 8 11 15

11.1 9.7 8.8 8.4 8.0 8.1 8.5 8.7 7.7 7.1
40 20.5 9 5 7 10.5 12.5 19 40

5.5 4.9 4.8 4.9 4.5 5.0 5.4 4.2 3.7
40 20.5 6.5 5.5 48.4 13 11.5 15 18.5 40
13

5.5 5.1 6.0 6.9 6.5 6.3 6.9 7.3 5.5 5.1 5.7
40 32 5.5 4 ℄ 5 14 19.5 20 25 40
18.5

43.7
7.3 8.7 9.6 9.2 10.0 10.5 10.1 8.5 8.0 8.5 8.6
30 16.5 13 2 ℄ 5.5 7.5 10 12.5 20 27 40
11

5.3 5.1 5.8 5.5 5.0 4.7 38.8 5.4 5.7 5.5 4.8 5.4
30 22 18.5 15 9.5 4 4 6 9 11 40

Spk SE roof 40' E/m ± 2.5 Ht 71 ± 76

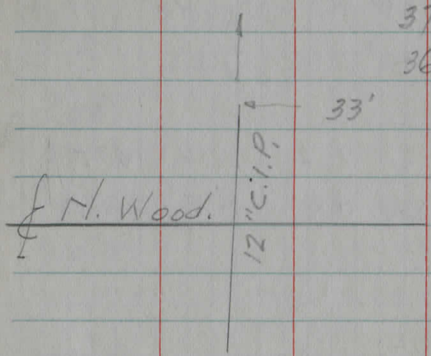
BM.			7.10	1331.39 ✓	(1330.26)
T.P.	1.42 ✓	1338.49 ✓	8.85	1337.07 ✓	
300			7.7	38.2	
200' W			2.7	43.2	
T.P.	0.12	1345.92 ✓	11.33	1345.80 ✓	
100' W			9.5	47.6	
300' N			7.2	49.9	
200' N			7.3	49.8	
100' N			6.0	51.1	
		1357.13 ✓			

12" Wal ± 460' W X S side

6.27.46
Con
Por
Thras
Ball

Topo No 4 K

W	℄	E	
	44+02	30'	12" Ap
	+50	begin light brush	
	+18	30'	+
	43		
	42		
	+86	28.5'	+
	+75	29'	15" Ap
	41		
	40		
	+63	28'	+
	39		
	+95	30'	15" Stump
	38		
	37+70	29.5	+
	36+32	27.5'	+
33'	36+10		



Bad erosion in ditch 5.5 36-200 to

℄

			℄			
15" Map	24.5'	+85	+89 +58 +55	28 / 30.5	24" Elm 18" Ch	
brush at edge rd						
27" Elm	25'		32			
O hedge	27'		50+0	+05 49+90 49+75	29	+
20" Ch	24.5'		+54			
14" Ch	21'		+36			
14" Ash	20.5'		+20			
12" Wal	17.5'		49+11			
Os hedge	21		+67			
12" Map	18'		+67			
			+54	36'	+	
Os Hedge	21'		48+0			
24" Ch	26'		+44			
			+27	28.5	+	
Os hedge	30'		47+0			
brush top of bk.			46+0	Beg. lt. brush		
			+92	28.5	+	
8" Elm	26.5'		45+47			

45+0 northerly
E bank = gravel + prob. ok for berms

Os. hedge	42.5	+68		
12" Elm		+68		
		+58	End brush	
		44+58	29'	+

		+11	30'	16" M
		55+10	30'	14" M
	✓	+90	29'	20" M
16" Map NG 19.5 —	+83	+76 —	28.5	18" Map
16" Map NG	20.5 ✓	+49		
		+46	35	+
28" Map	20' ✓	54+13		
14" Map	21' ✓	+79		
		+65	26	20" Map
		+52	28'	18" Map
36" Map	20.5 ✓	+43		
		+37	27'	12" Map ✓
		+15	27'	12" ch NG ✓

No bldgs
±2% up
9" × 22' C.I.P. OK
0 — 6.5
+02
— 4'

		53+02	43	+
		+95	34.5	12" Map
15" Map ✓	15'	+64		
30" Map NG ✓	12.5	+29		
hedge	21	52+0		
30" Map ✓	17	+93		
27" Map ✓	21	+58		
		+51	31	+
		51+41	30.5	24" Wal

all meas. on tang

28" Whtwd ✗ 18.5 +				
		60+03	24	+
8" ch	18.5	+77		
30" beech	21 ✗	+56		
10" ch	18 ✗	+16		
8" ch	19 ✗	59+03		
24" beech	27 ✗	+69		
8" ch	✗ 21	+60		
		+57	28	+
20" beech	33.5	+49		
		58+02	Solid rock × rd	
27" beech	✗ 30'	+75		
		57+30		start
				Solid (Sandstone) rock E ditch
30" beech	✗ 30'	57+05		

Very heavy brush here on

		+74	✗ 28.5	15" Wal
14" Elm ✗	31'	+65		
8" " ✗	27'	+63		
		+57	✗ 28.5'	14" Elm
14" Ash ✗	23.5	+55		
		+42	27' ✗	30" Ash
		+40	25' ✗	15" Map
✗ 24" Map NG	18'	55+18		

9" M		16.5 ✓	63+0	17.5	24" M ✓
12" M		16 ✓	+93		
			+83	18'	18" M ✓
9" M	19		+78		
18" M		21.5	+77		
14" M		18.5	+74		
			+60	17.5 8" M ✓	
24" ch		22.5	+47		
24" tulip		22.5	+40	20	20" M ✓
14" M		19	+36		
18" M		20	+20	20	18" M ✓
		62	+05	20	18" M ✓
stone fence 26' (100 boulders)			+87		
24" M		23	+87		
20" M		23.5'	+82		
			+88	49.5 ✓	10" tulip
			+80	35.5 ✓	9" Hick
			+69	29.5	†
12" Wal NG		14	+50		
18" M		21	+45		
			+32	51	18" ch ✓
12" M		13	+28		
		61	+25	54 ✓	14" M
12" Map NG		12'	+92		
		60	+85	56' ✓	15' tulip

		+99	18 ✓	20' ch
10' ch	21 ✓	+68		
		+63	30	†
		+57	18 ✓	15' ch
20" E ✓	23	+49		
8' E ✓	23.5	+23		
		+17	18' ✓	14" M
rock fence	27'	+02		
10" Wht wd ✓	15'	+02		
	64	+01	17 ✓	18" M
		+75	19.5 ✓	24" M
18" M	X7 ✓	+73		
10" M	18.5 ✓	+69		
20" M	22 ✓	+64		
15" M	16 ✓	+57		
12 M	22.5 ✓	+54		
		+53	20 ✓	12" M
		End rock		
		+45 ✓	18.5	16" M
		+36		
		+35 ✓	19	† 10" M
27' M ✓	23	+30		
24" Elm ✓	21	63+24		
		+21	30'	†

		+31	20	15"ch ✓
		+19	20.5	15"ch ✓
18"M	22.5 ✓	+14		
24"M	20 ✓ 67	+11		
		+ 85	20.5	24"M ✓
12"E	20.5 ✓	+59		
10"E	25	+47		
		+49	19	10"Wal ✓
22"Wal	25	+ 41		
		+ 31	18.5	12"M ✓
12"E	23.5 ✓	+ 28		
10"E	20.5 ✓	+ 22		
10"M	21 ✓	+15	17	18"M ✓
10"M	21 ✓	+ 13		
20"E	22.5 ✓	+ 12		
	66	+09	30	+
		+98	19.5 ✓	16"M
		+ 87	19 ✓	20"M
		+ 83	18' ✓	24"M
16"E ✓	24	+77		
15"E ✓	24	+67		
14"E ✓	23	+53		
10"E ✓	21.5	+39		
		+ 31	18 ✓	18"Aldo
16"E ✓	22.5	+26		
	65	+16	19' ✓	14"ch

10"E	20.5 ✓	+ 29		
12"ch NG	16.5 ✓	+ 25		
15"ch	21' ✓	71	+04	
		+ 91 ✓	20.5	9"Wal
28"M	19.5 ✓	+ 71		
12"Ash	19 ✓	+ 59		
		+ 50	28	+
		+ 30 ✓	23	12"Wal
14"ch ✓	19.5	+ 25		
14"M ✓	24.5'	+ 16		
30"Ash ✓	24	70	+02	
stone fence	27'	or	+88	
15"M ✓	24	+ 58		
		+ 13	18.5 ✓	2-8"Wal
36"ch ✓	23.5	+ 13		
		+ 08	29.5	+
14"M ✓	24	69	+02	
14"M ✓	23	+ 84		
14"M ✓	25	+ 73		
20"M ✓NG	22	68	+56	
15"M ✓	23	+ 96		
18"M ✓	24.5	+ 72		
		+ 65	18.5 ✓	15"M
	or	+62		
		+ 51	18' ✓	15"Bass
18"M ✓	23.5	+ 46		
8"E ✓	20	+ 38		

12" M D 20.5 +91

Level +87

4 Board Fence

C.E.M.

	←	25	+76	
18" M		20.5	+71	
15" M		20	+17	
12" M	⊕	21	74+12	
24" M	⊗	23	+79	
			+62	24.5	+

up 12' at 35 then grad. down —36'→

Corr. ok

14.5

1'x20' CMP

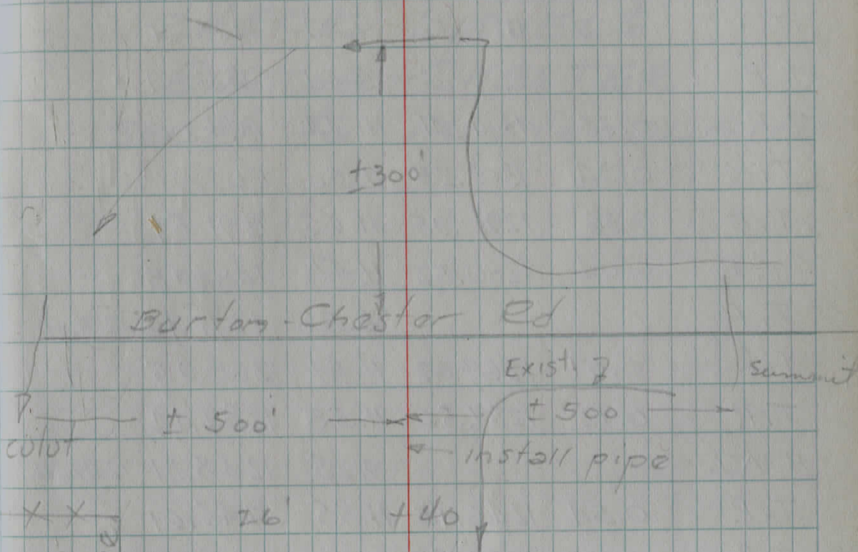
Cem Dr 73+05

Endbrush et&Lt

Carry H_2O down Twp line

Cedar Rd +65

8" E	32.5	+41		
8" ch	33	+36		
8" ch	31.5	+31		
11" ch	31.5	+26		
8" Wal	30.5	+15		
3-8" Ch	27	+07		
		72+11	23	+
10" Ash	27.5	+90		
30" E	24.5	+75		
		71+65	17	12" Wal



X X 26' +40

78+22	8.5	10" Ap
77+92	26'	12" M
76+47	28'	+

Barb Wire

Pasture +75

X X X

← CEM

15" M ⊕	19.5	+71	
18" M	19.5	+43	
15" M ⊕	20	+19	
		75+03	28'	+

4 board

	+	HI	−	E	
BM	0.34	1355.12		1354.78	
T.P.	0.25	1348.79	6.58	1348.54	
B.M.			9.78	1339.01	1339.05
T.P.	0.19	1337.05	11.93	1336.86	
T.P.	0.29	1325.50	11.84	1325.21	1321.91
T.P.			3.61	1321.89	
T.P.	0.35	1314.41	11.44	1314.06	
T.P.	0.34	1303.25	11.50	1302.91	
T.P.	0.36	1291.95	11.66	1291.59	
T.P.	0.04	1280.52	11.47	1280.48	
T.P.			8.56	1271.96	1271.91
T.P.	0.07	1269.02	11.57	1268.95	
T.P.	0.12	1257.56	11.58	1257.44	
B.M.			9.25	1248.31	1248.24
T.P.	0.54	1246.15	11.95	1245.61	
T.P.	0.13	1234.58	11.70	1234.45	
T.P.	0.59	1226.70	8.47	1226.11	1226.01
T.P.	11.74	1236.87	1.57	1225.13	
T.P.	6.56	1242.57	0.86	1236.01	
BM			4.87	1237.70	1237.60
T.P.	0.10	1230.81	11.86	1230.71	
T.P.	0.16	1219.25	11.72	1219.09	
T.P.			8.00	1211.25	1211.17
T.P.	0.71	1208.63	11.33	1207.92	
T.P.	0.20	1297.06	11.77	1296.86	
T.P.	0.16	1285.35	11.87	1285.19	
T.P	1.07	1274.60	11.82	1273.53	

Ref. spk Maple 45.7 HE 78167

CHECK LEVELS
BURTON - CHESTER
South to H. WOODLAND

Rock by stk E ditch 57 ± 60

	+	12760	−		
T.D.	1.77	1165.01	11.36	1163.24	
T.P.	10.38	1075.16	0.23	1164.78	
T.P.	10.46	1085.52	0.10	1175.06	
B.M.			1.01	1181.51	1181.40
	Profile Westerly along Twp. Line				
B.M.	9.69	1348.74		1339.05	
F.I.			7.1		
T.P.	2.73		9.39		
100' W			4.45		
200' W			8.20		
T.P.	3.31		9.58		
300' W			5.9		
400' W			12.0		
			7.76		

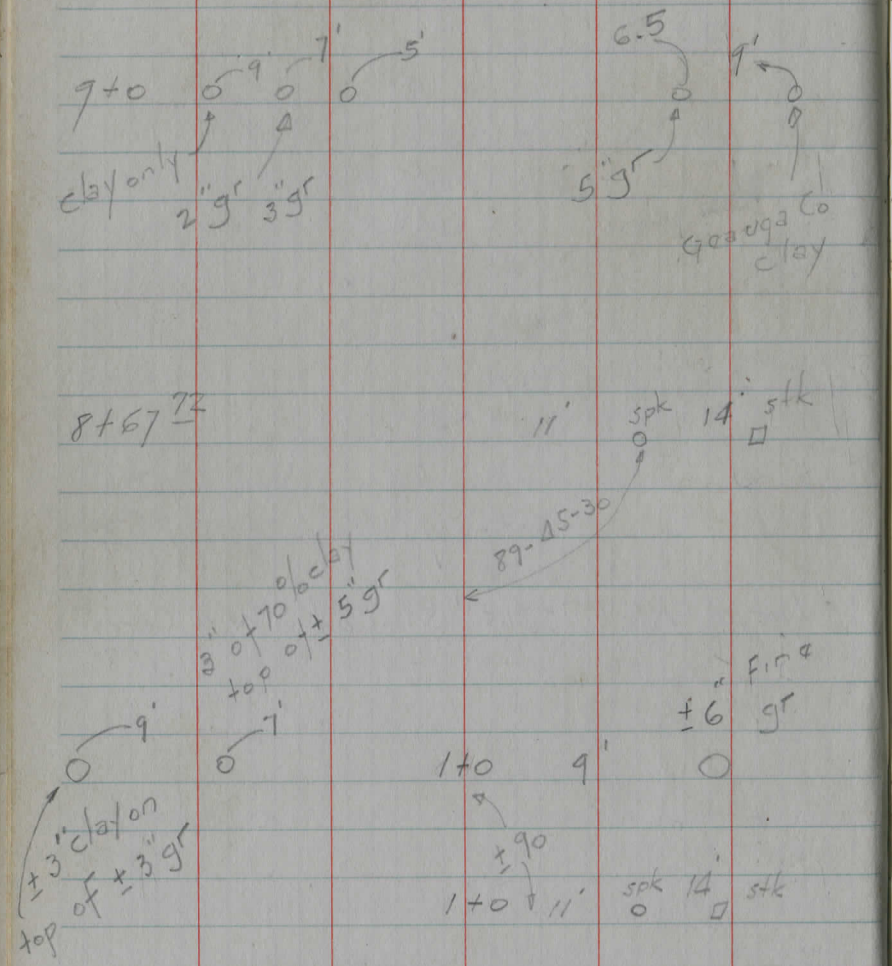
Large rock ± 15' S W of S W ¼ Corn

July 16

No 4 "J"

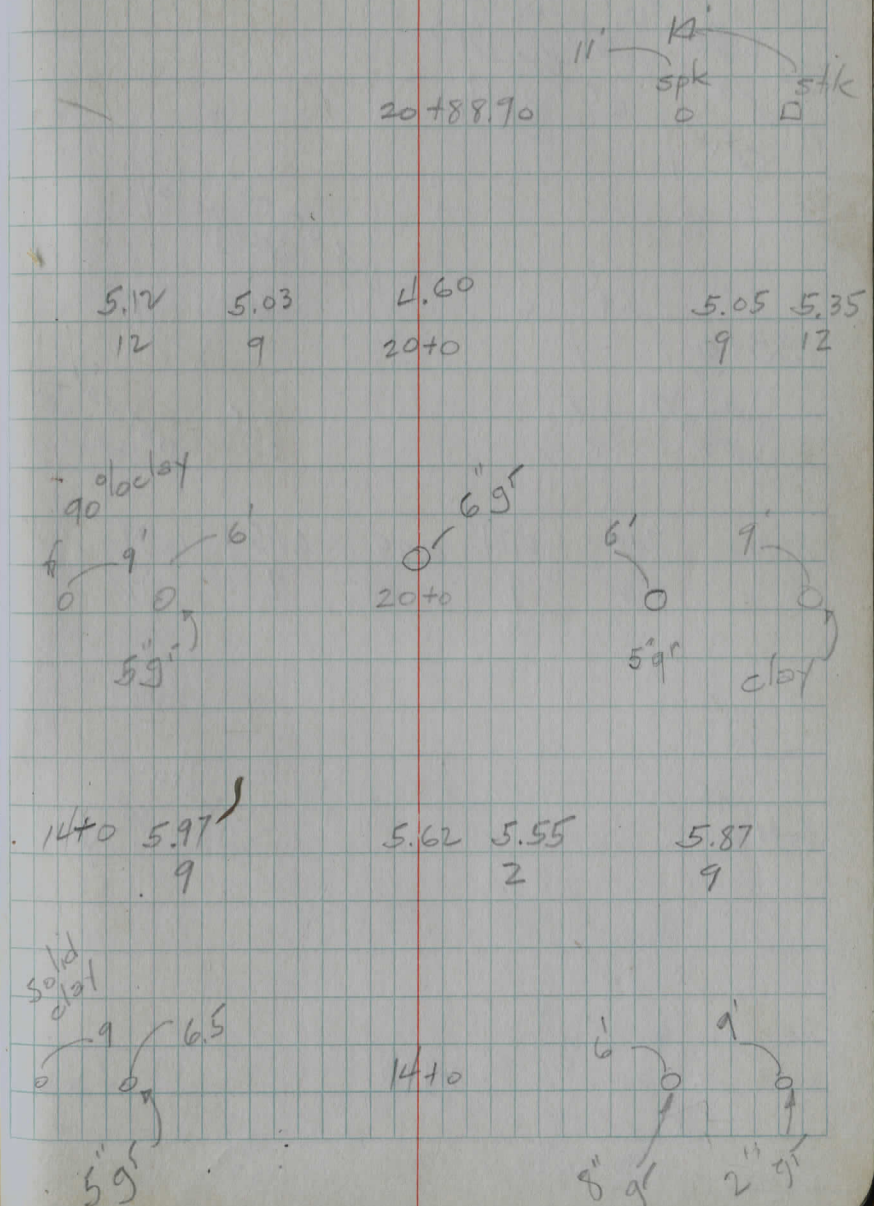
West

East



0 to ± 4" of gravel should be taken out 0-05 to ± 0+50 or build up pave. ± 75' South. Exist. gr. about right E & W

West ℄ East



32+50 to Rt. Wood
more mat. whole
rdwy or Fr. Drs or
both

4" gr on nat
stony clay

33+0	9	6		6	9'
	nat. stony clay	3" gr		3" gr	natural stony clay

31+0	7.10	6.79	6.25	6.75	6.97
	12	9		9	12

30+42 25 11 spk Lt in 30° I.P.

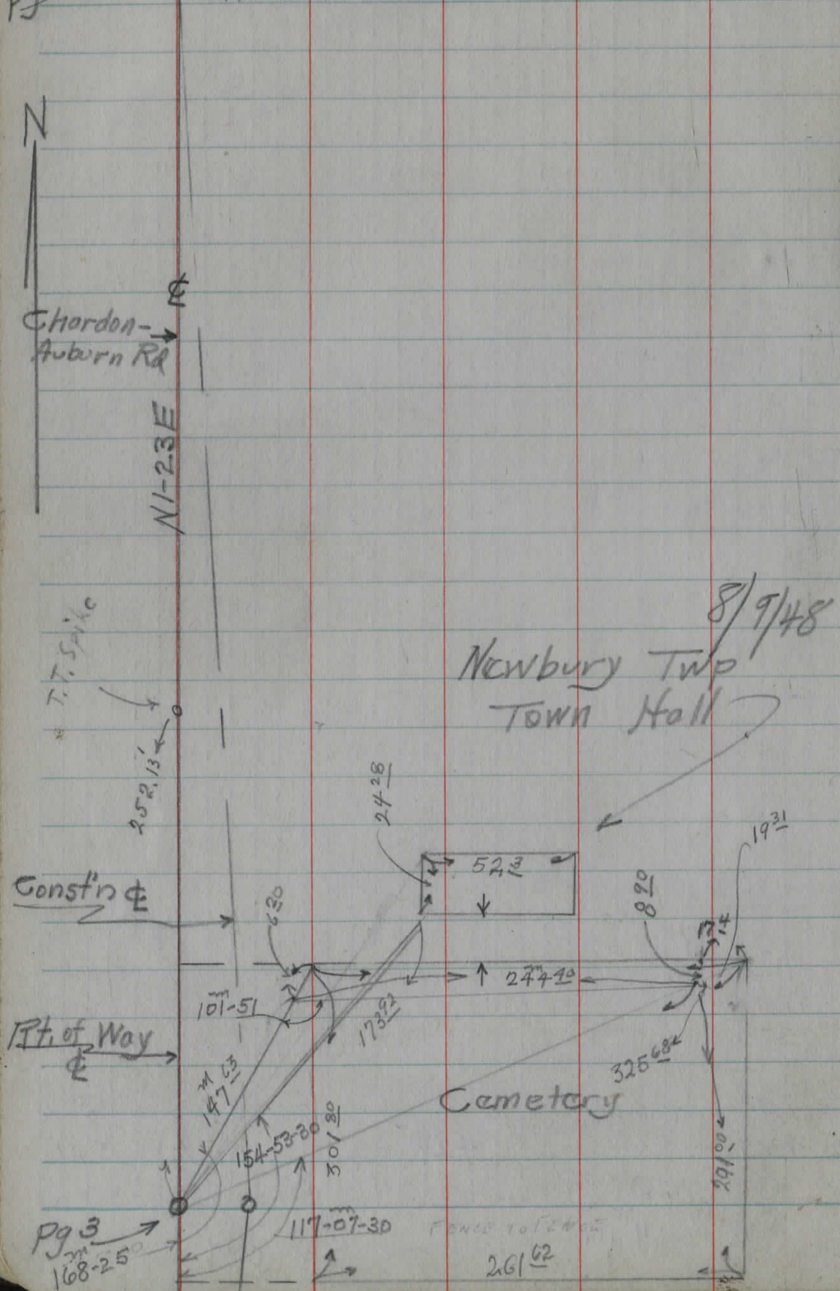
29+0

13	9	6		6	9	13
5.21	4.93		4.29		4.79	5.01
	clay	4" gr.	℄	6" gr	clay	

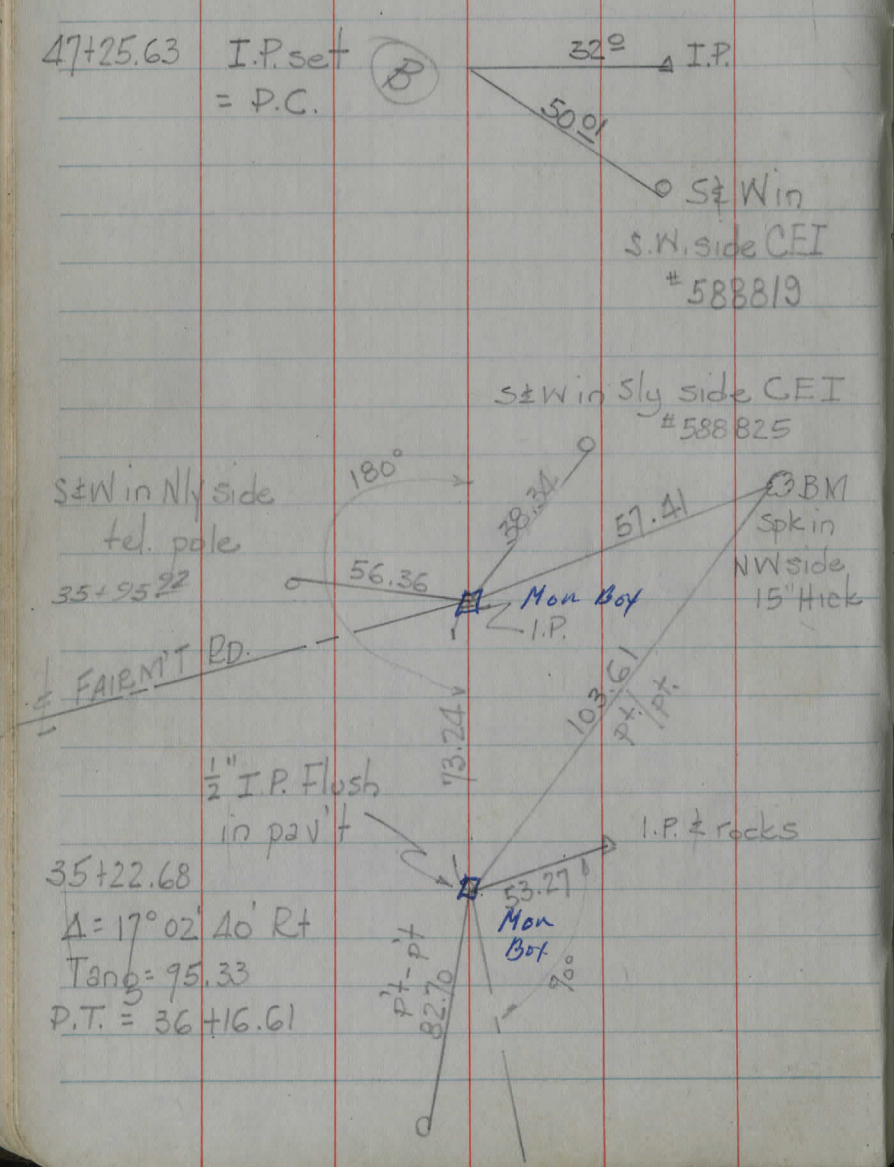
Route 87 (Clere-Burton Rd)

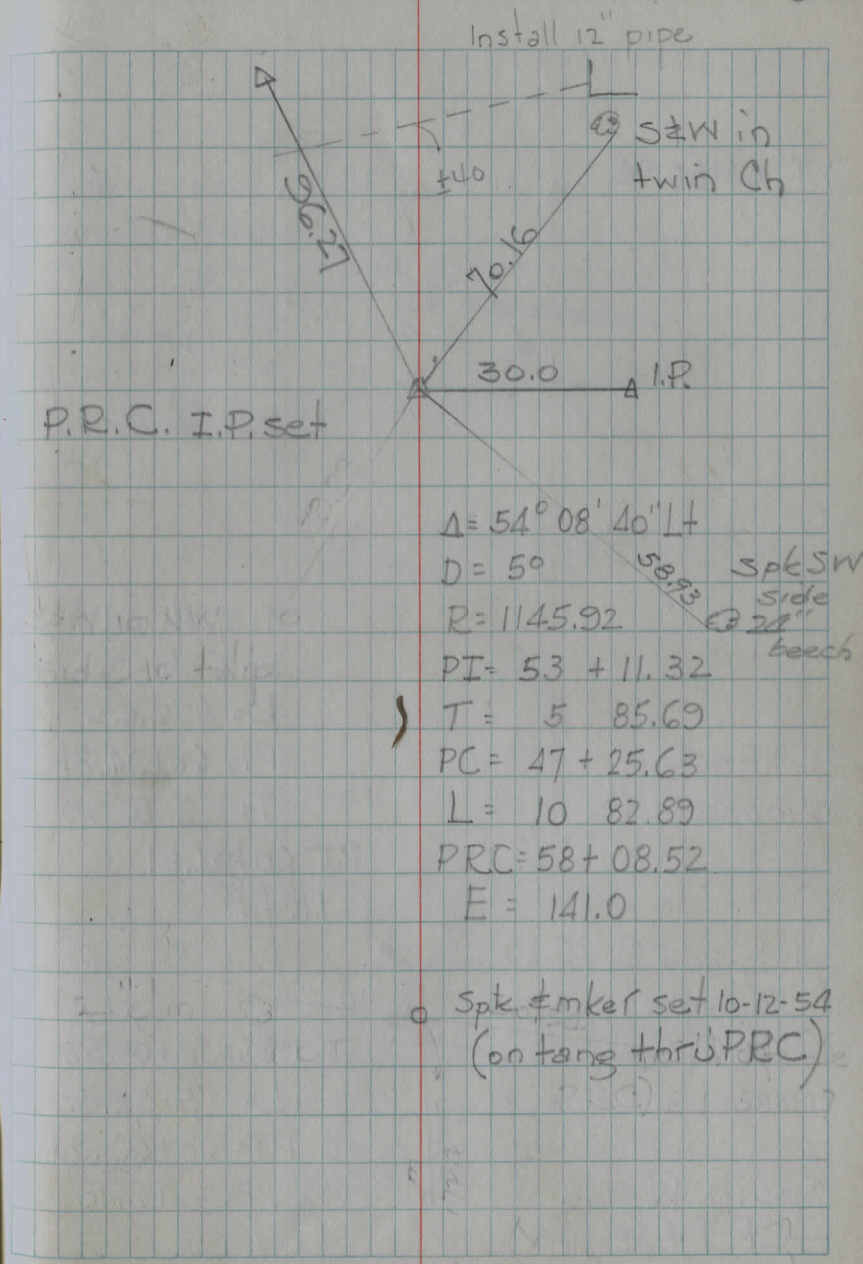
CANFIELD
MAYNARD

8-9-48

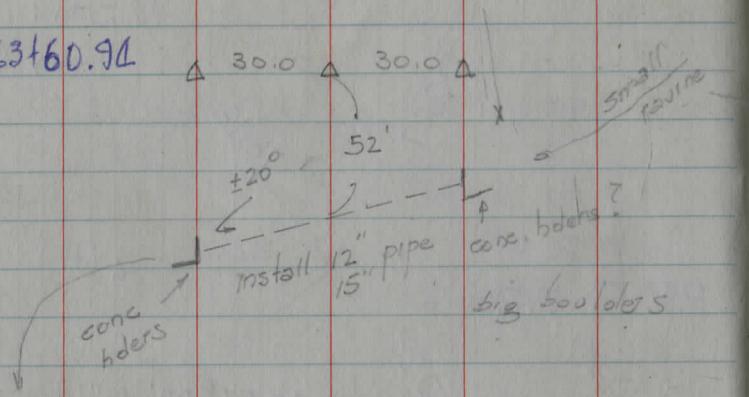


AUBURN RD #4 K June '54

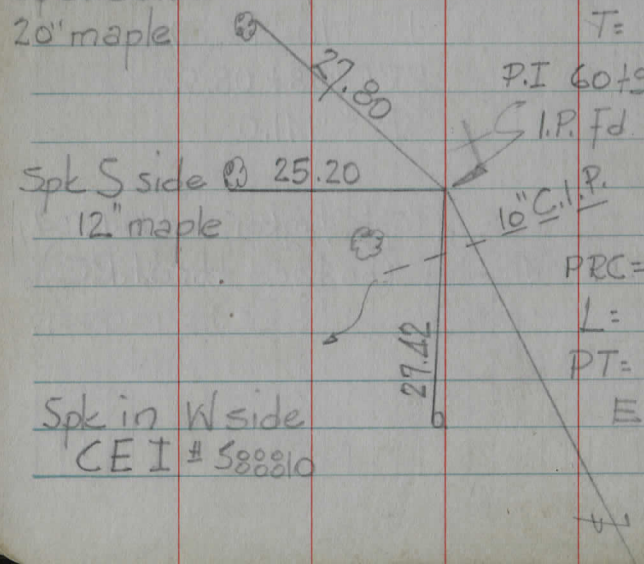




P.T. 63+60.94

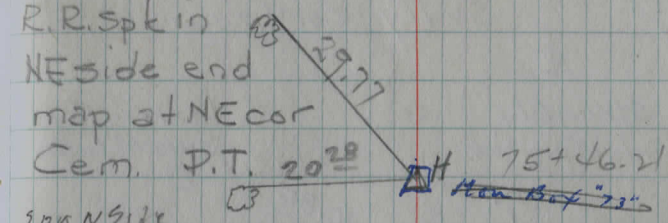


Δ=37-07-20 Rt
D= 6-43-12
R= 852.62
PI= 60+94.81
T= 2 86.29

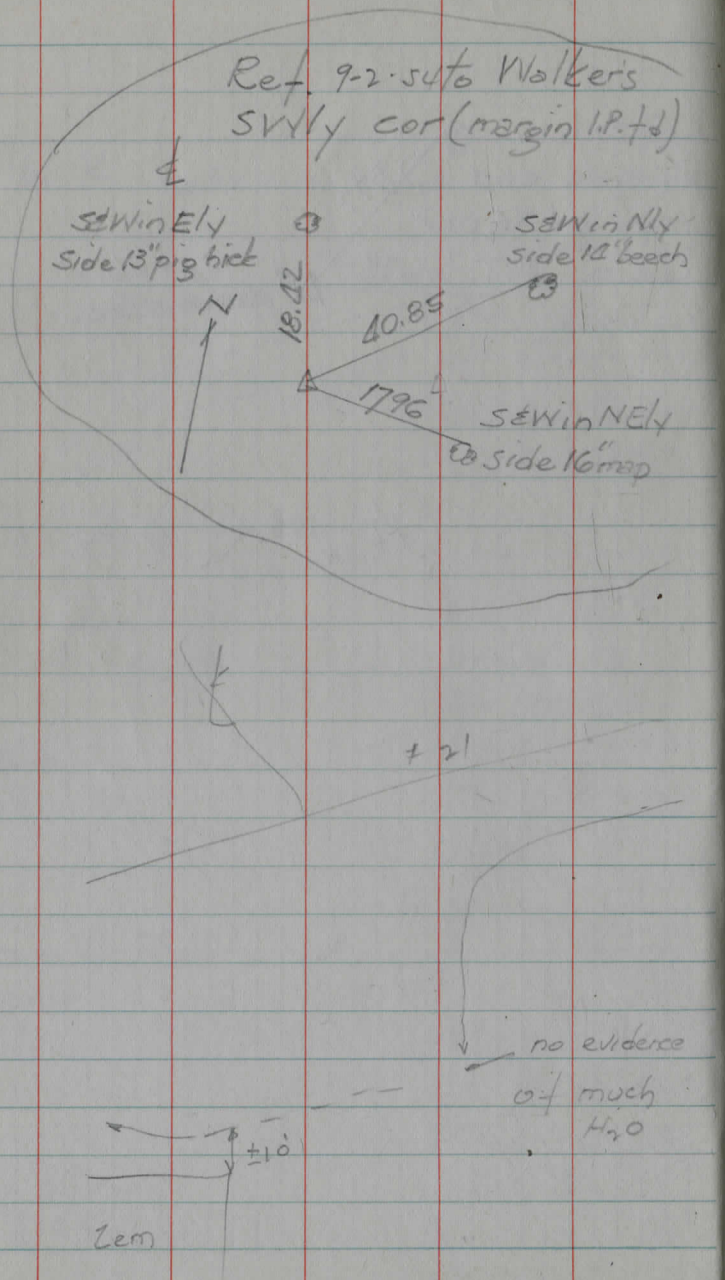


PRC=58+08.52
L= 5 52.42
PT=63+60.94
E= 46.78

CEI # 588810



PI ☐ See Pg. 40 This Book
Mon Box


Ref. 9-2 · suto Walker's
SWly cor (margin I.P. Td)
℄
SEWinEly
side 13" pig hick
SEWinNly
side 12" beech
N
18.12
40.85
17.96
SEWinNEly
side 16" map
+21
no evidence
of much
H2O
±10
Zem

guy 588812 25'

60.39

236

56+46.5

136

307

52+32.47

I.P.+0

179

162'

48+55.63 I.P.+0

5.5

31.5 # 588811 ✓

25.3 # 588813 ✓

28.5 # 588814 ✓

29.5 # 588815 ✓

21.4 # 588816 ✓

29' # 588817 ✓

± 30' tel

21.5 CGZ # 588818 ✓

176

38.5'

72+76.37 = P.I

29' # 588796

46' # 588798

71+22.5

69+50.5

67+76

66+02

64+30

62+54

60+94.2

31.5 # 5888.00

29.5 # 588802

28.5 # 588803

28.5 # 588804

29.5 # 588805

38' # 588807

guy pole on W side = OK

guy E

60+94.2

34.5

65' 588809

Hod K slopes & grades | W | E
9-22,25-1954 Art-John-Pom | Ditches (Grade)

B.M.	4.60	1242.20		1237.60	
51+0				30.56	32.26
50+50				29.66	31.36
50+0				28.2	29.9
49+50				26.45	28.15
TP	5.37	1235.70	11.87	1230.33	
49+0				24.1	25.8
48+50				21.3	23.0
48+0				18.0	19.7
T.P.	6.25	1229.50	12.45	1223.25	
47+50				14.5	15.6

Note: Stks set 2' back (outside) of slope lines

West | Ground at slope line | ℄ | Ground at slope | East

top stk | top stk

Ref. Spk. W side 24" Walnut 51+40 Rt.

9.79 -.21 C 10.0	42.20 32.41 9.79	1.25 40	4.2	4.9 28	42.20 33.41 8.79	8.79 4.29 C 4.5
C 10'	42 20 31.51 10.49 0.49	1.7 38		6.43 25.5	42 20 32.51 9.69 4.69	C 5.0
C 8'	42 20 30.05 12.15 9.15 8.0	6.1 33.5	8.15	7.5 27.5	42.20 31.05 11.15 4.65	C 6.50
C	42.20 28.30 13.90 7.90 6.00	10.20 29		8.4 29.5	42.20 29.30 12.90 5.90	C 7.00
C 3.5	1235.70 25.95 9.75 6.25	8.1 25	6.9	4.3 28.5	35.70 26.95 8.75 2.25	C 6.50
C 4.0	35 70 23.15 12.55 8.55	10.7 26.5		8.6 25.5	35.70 24.15 11.55 6.05	C 5.50
C 7.00	35.70 19.85 15.85 8.85	11.7 30.5	13.7	10.3 29.5	35 70 20.85 14.85 7.85	C 7.00
C 9.50	29.50 16.70 13.30 3.80	5.6 37.		6.7 32.5	29.50 16.85 12.65 4.15	C 8.50

12.10

		1229.50		W	
47+0				10.5	
46+50					
B.M.			8.65	1220.85	
BM	5.67	1243.27		1237.60	
51+50				31.0	32.7
52				30.9	32.6
52+50				30.4	32.1
53+0				29.4	31.1
53+50				27.9	29.6
TP	2.58	1234.34	11.51	1231.76	
54+0				25.9	29.07 Fill

WEST EAST

	West					East	
	1229.50 / 12.10 / 1217.40 / 9.40	10.9 / 35	16.7			29.50 / 12.43 / 17.07 / 15.07	
C 8.00							C 2.00
	29.50 / 08.30 / 21.20 / 8.70	11.1 / 41.5					
C 12.50							

I.P. (P.C.) 32' Rt. 47+25.63

Walnut 51+40 rt. (E)

	West					East	
	43.27 / 32.83 / 10.44 / 5.06	4.45 / 35.50			6.78 / 21.50	43.27 / 33.83 / 9.44 / 4.44	
C 10.5							C 5.0
	43.27 / 32.76 / 10.51 / 1.51	4.72 / 32.0	7.55		7.64 / 22.0	43.27 / 33.76 / 9.51 / 5.51	
C 9.0							C 4.00
	43.27 / 32.24 / 11.03 / 3.53	5.94 / 32.0			8.57 / 23.0	43.27 / 33.24 / 10.03 / 7.03	
C 7.50							C 3.0
	43.27 / 31.21 / 12.06 / 5.06	1.75 / 29.5	9.00		8.85 / 24.50	43.27 / 32.21 / 11.06 / 6.56	
C 7.0							C 4.50
	43.27 / 29.73 / 13.54 / 6.54	8.08 / 32.50			11.55 / 22.0	43.27 / 30.73 / 12.54 / 9.54	
C 7.0							C 3.00
	34.34 / 27.74 / 6.60 / 1.10	3.6 / 30.0	6.9		5.86 / 17	34.34 / 28.74 / 5.60 / 4.10	
C 5.5							C 1.5

		1234.34 ✓			
54+50				24.4	27.61 Fill
55+0				24.75 Fill	26.37 Fill
TP	1.34	1223.41 ✓	12.27	1222.07 ✓	
B.M.			8.09	1215.32 ✓	
				W	E

10-12-54 Temple Maynard Pomeroy

BM	8.27	1223.59		1215.32	

NOTE 55+50 TO 58 INC. REVISED PAGE 67

55+50	Fills (1.55')			24.5	26.15 41'
56+0				25.2	26.85
56+50				26.94	28.60
	12.05	1227.37		1215.32	
57+0				29.72	30.82
TP FOR ELEV 37.50	10.36	1237.05	0.68	1226.69	
+50				33.58	34.20

WEST stks		ground at slope Line	℄	ground at slope Line		EAST stks
C 3.50 ✓	34.34 26.28 8.06 4.56	7.34 25.0		7.7 17.5	34.34 27.28 7.06 5.06	C 2.00 ✓
F 1.5 ✓	34.34 25.08 9.26 10.76	12.76 22.0	13.2	9.7 19.0	34.34 26.04 ✓ 8.30 5.80	C 2.58 ✓

SPT E. ROOT 10" MAPLE 56+25±45' LEFT (WEST OF CENTER LINE)

F	23.59 24.82 -1.23			9.9 41'	23.59 25.82 -2.23 7.77	10.0 F
F 13.5	23.59 25.52 -1.93 11.57 F	13.0 47.5'		3.33 30'	23.59 26.52 2.93 1.57	F 4.5'
F 10.5	23.59 27.27 3.68 6.82	8.6 42'		2.7 31'	23.59 28.27 -4.68 4.32	F 5.0
F 18.5	27.37 29.92 -2.55 15.45 F	16.5 52.5'	5.73	4.0 32.5'	27.37 30.62 3.26 1.5	F 4.5
F 12.5	27.37 33.70 -6.33 6.17	9.5 46.5'		6.94 25'	37.05 34.08 2.97 5.41	F 2.5

	+	HI	−	W ELV	E
		1237.05			
58+0				37.95	38.02
T.P. FOR STNS EAST	13.00	1249.24	0.81	1236.24	
+50				42.57	42.02
59+0				47.03	44.36 CUT
+05 BM			0.99	1248.25	(1248.24)
	11.80	1260.04			
+50				51.72	48.40
TP FOR 60+0 E	8.48	1266.78	1.74	1258.30	
60+0				55.88	52.56
+50				60.05	56.73
TP FOR 61 EAST	11.27	1276.27	1.78	1265.00	
61+0				64.21	60.90
+50				68.38	65.06
62+0				72.52	69.22
TP	10.85	1285.99	1.13	1275.14	

JUMP TO PAGE 68

WEST — GROUND AT SLOPE — ℄ — EAST

STKS (WEST)	WEST	GROUND AT SLOPE	℄	GROUND AT SLOPE	EAST	STKS (EAST)
	3705 37.96 − 0.91 8.09r	10.0 / 39.5	5.3	1.3 / 21'	3705 38.01 − .96 .04	F1.0
F9.0						
	3705 42.46 − 5.41 59	2.30 / 35.5'		8.3 / 19'	4922 42.13 7.11 5.81	C 1.50
F6.0						
	4914 46.80 + 2.44 7.44	9.26 / 33		2.7 / 22.5	4924 46.09 + 3.15 8.65	C 2.50
F5.0						
	6004 51.36 + 8.68 10.18	12.2 / 26.		7.4 / 27.	6004 50.26 9.78 5.28	C 4.50
F 1.5						
Stk 34'	6004 55.52 4.52 4.52	7.1 / 23. — Stk at 34'	6004 3.9	6.7 / 33.	6678 54.42 12.36 4.36	C 8.0
G						
	6678 59.69 7.09 7.09	9.34 / 22. STK 50'		3.24 / 31.5	6678 58.59 8.19 0.69	C 7.50
G			4427 1.1			
	6678 63.85 − 2.93 93	3.6 / 21. STK 51'		7.45 / 34.	7627 62.75 13.52 5.52	C 8.0
C 2.0						
	7627 68.02 8.25 8.25	9.68 / 20. STK 36'		5.23 / 30.	7627 66.92 9.35 2.85	C 6.50
G						
C1.5	7627 72.18 4.09 2.59	6.1 / 21 STAK 28	3.9	1.53 / 29.5	7627 71.08 5.19 .19	C 5.0

				W	E
BM	10.50	25.82		1215.32	
55+50				24.5	26.15
56+0				25.20	26.85
+50				26.94	28.60
57				29.72	30.82
+50				33.58	34.20
TP FOR 57+50 EAST	12.30	1237.10	1.02	1224.80	
58				37.95	38.02

	W			E	
	25.82 24.82G 1.0		12.3 46'	25.82 25.82G 0.0 10.0	F 10.0
13.87 F 14.5	25.82 25.52 + .30 14.20	15.9 53.5	5.6 32.	25.82 26.52 − .70 3.30	F 4.0
F 13.5	25.82 27.27 − 1.45 12.05	13.2 47.	4.8 34.6	25.82 28.27 − 2.45 2.55	F 5.0
F 21.0	25.82 29.92 − 4.10 16.90	18.8 45.5	2.33 32.5	25.82 30.62 − 4.80 0.30	F 5.0
F 15.5	25.82 33.70 − 7.88 7.62	9.05 54.5	7.2 25	37.10 34.08 + 3.02 5.52	F 2.50
F 10.0	37.10 37.96 − .86 9.14	10.8 45.5	1.3 22	37.10 38.01 − .91 .09	F 1.0

	+	1285.99 H1	−	W ELV	E
62+50				76.71	73.40
63				80.87	77.55
T.P.	11.80	1296.69	1.10	1284.89	
+50				84.79	81.82
64				86.73	86.08 Cut
+50				90.61	90.25 Cut
T.P.	12.65	1309.30	0.04	1296.65	
T.P.	12.72	1321.58	0.44	1308.86	
T.P.	10.38	1331.49	0.47	1321.11	
69+0					
+50					
T.P.	10.60	1340.37	1.72	1329.77	
70+0					

W

E

68

85.99
76.35
9.64
8.14
C 1.5

85.99
80.51
5.48
4.98
C 0.5
4.5
3.2/29

85.99
79.41
6.58
.58
C 6.0

96.69
84.43
12.26
10.72
C 1.5
13.3/19
11.1/28

96.69
83.68
13.01
9.51
C 3.5

96.69
88.31
8.38
3.58
C 4.5
7.0/24
8.7
6.6/26

96.69
87.94
8.75
4.25
C 4.5

96.69
92.11
4.58
2.08
C 2.5
4.2/22
4.84
3.0/25

96.69
92.11
4.58
2.08
C 3.5

31.49
23.76
7.73
4.73
C 3.0
5.7/25.6
6.8
9.3/28.5

31.49
23.56
7.93
1.93
C 6.0

31.49
26.86
4.63
0.13
C 4.5
2.93/24
1.8/17.5

31.49
26.46
5.03
.03
C 5.0

40.37
29.86
10.51
7.91
C 3.5
9.1/23.5
10.2
7.3/29

40.37
29.20
11.17
6.17
C 6.0

		1340.37		W	E
70+50					
71+0					
+50					
BM 170			1.27	1339.10	1339.05
	10.79	1349.84		1339.05	
72+0					
+50					
73					
+50					
74					
TP 0	8.39	1355.03	3.20	1340.64	

10-26-54
Pom Maynard Temple

W E 69

	40.37 32.57 7.80 3.8	5.9 24.5	5.1 25.5	40.37 31.77 5.60 3.10	
C 4.0					C 5.5
	40.37 34.97 5.40 3.20	4.75 22. 5.3	4.5 25	40.37 34.17 6.20 2.70	
C 2.0					C 3.5
	40.37 37.20 3.17 1.67	4.0 20.	3.8 22.	40.37 36.40 3.97 1.97	
C 1.5					C 2.0
	49.84 39.27 10.57 10.57	11.5 : 11.9 19 C 5744E AT 25'	11.4 21.5	49.84 38.47 11.37 8.87 2.50	
G					C 2.5 ✓
	49.84 41.17 8.67 6.67	→ 5744E 30'	8.30 24	49.84 40.37 9.47 5.97	
C 2.0					C 3.50
	49.84 42.90 6.94		5.98 26	49.84 42.10 7.74 3.24	
					C 4.50
	49.84 44.46 5.38 2.38	3.78 24	3.9 26	49.84 43.66 6.18 2.15	
C 3.0					C 4.0
	49.84 45.85 3.99 .44	2.2 22.5 3.6	4.3 27	49.84 45.05 4.79 0.29	
C 3.50					C 4.50

		1355.03		
74+50				
75+0				
+50				
76+0				
+50				
75+83	proposed 12" culvt			
T.P.	7.71	1357.00	5.74	1349.29
B.M. RR Spk			7.36	1349.64 (1348.53)
B.M. Spk			2.27	1354.73

W — E

	W				E	
C 3.50	55.03 / 47.08 / 7.95 / 4.45	6.0 / 22		6.1 / 26'	55.03 / 46.28 / 8.75 / 4.25	C 4.5
C 2.0	55.03 / 47.94 / 7.09 / 5.09	6.95 / 15'	6.8	6.0 / 25'	55.03 / 47.34 / 7.69 / 3.69	C 4.0
C 1.5	55.03 / 48.63 / 6.40 / 4.90	6.9 / 15'		6.2 / 21.5	55.03 / 48.23 / 6.80 / 4.30	C 2.50
C 1.0	55.03 / 49.15 / 5.88 / 4.88	7.5 / 18.5	6.04	5.55 / 22	55.03 / 48.95 / 6.08 / 3.08	C 3.0
C 1.5	55.03 / 49.30 / 5.73 / 4.23	6.25 / 16.5	5.85	5.1 / 22.5	55.03 / 49.30 / 5.73 / 3.23	C 2.5

9.6 / 50   8.7 / 32   7.6 / 15   7.0 / 12

USGS UE 123B Cor map (NE¼) cemetery

Spk Maple NE ¼ E ... 9 x 21 (1354.73)

CK. GRADES 11-19-54 #4 Fill

	+	#1	-	Elv	-
BM	0.78	1249.02		1248.24	
58					
TP.	0.99	1236.96	13.05	1235.97	
+50					
57					
+50					
56					
+50					
55					

No 1 Ck grades
11-19-54

W Ground 9'℄ Ground 9'℄ E

E Root 30" beech 57+55

49.02			49.02
37.96	11.42	11.10	38.01
11.06			11.01
36.96			36.96
33.70	3.90	3.06	34.08
3.26			2.88
36.96			36.96
29.92	7.56	6.27	30.62
7.04			6.34
			4.34
36.96			36.96
27.27	9.87	8.46	28.27
9.69			8.69
			7.19
			1.50
36.96			36.96
25.52	11.26	10.33	26.52
11.44			10.44
			8.94
			2.00
36.96			36.96
24.82	12.45	11.53	25.82
12.14			11.14
			9.64
			1.50
36.96			36.96
25.08	12.72	11.75	26.08
11.92			10.88
			10.88

Profile on C.H. #16 for a distance of 600' W of C.H. #9

	+	HI	-	elev	
B.M.	3.55	103.55		100.0	
int.			7.65	95.9	
int +100 W			1.58	102.0	
T.P.	4.28	107.53 (107.48)	0.35	103.25 (103.20)	
int +200' W			3.44	104.1	
int + 300' W			2.60	104.9	
int + 400 W			6.60	100.9	
T.P.	0.61	96.27 12.43	11.82	95.71 (95.66)	
int + 500' W			2.85	93.4	
int + 600 W			11.15	85.1	

Typical section

width gravel	15'
" berm	19'
" ditches	23'

U.S.G.S. BM in Hickory at int. of C.H. # 16 & 9

H. Patterson
D. Canfield
D. Parks

Aug. 8, 1957

Showers - warm

Sperry to Rockhaven

CH #16 Falkmount Rd

12+03.0

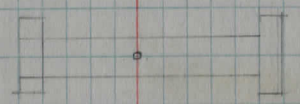
Δ = 2°-28' Left

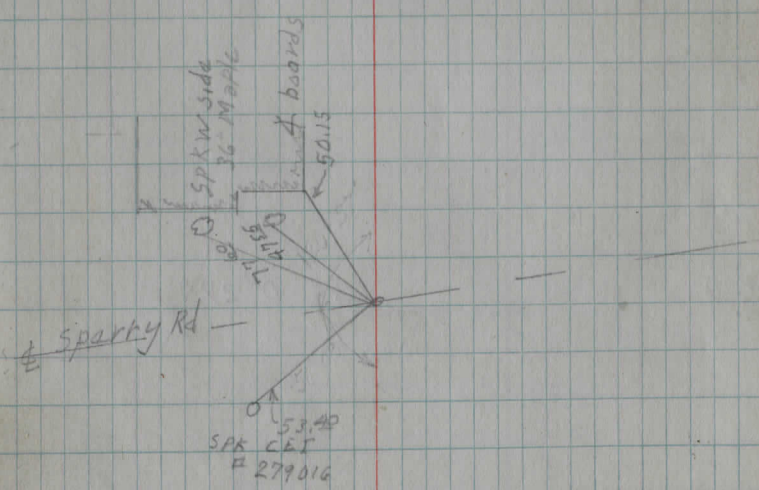
35.6'

7+67.4

Δ = 2°55' Right

Stakes Set 30' off ℄

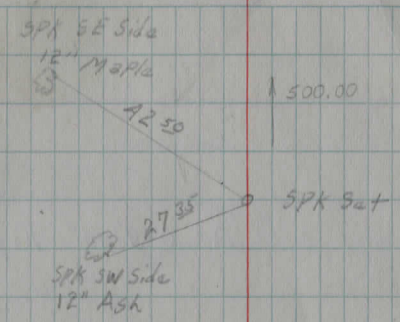


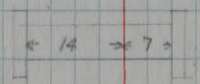


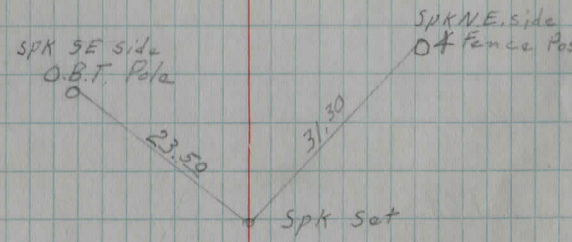
30+00 P.O.T.

25+30

21+00 Δ = 0°27'

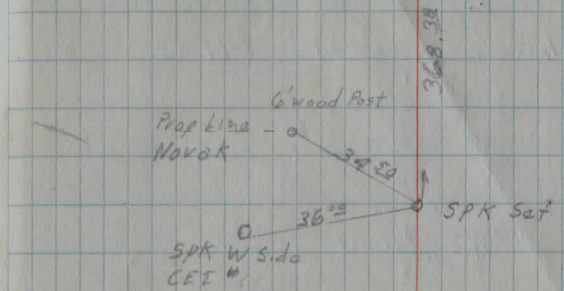


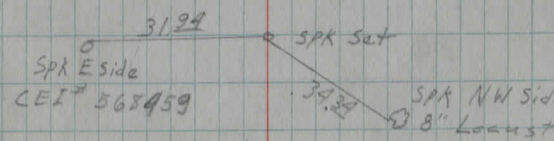


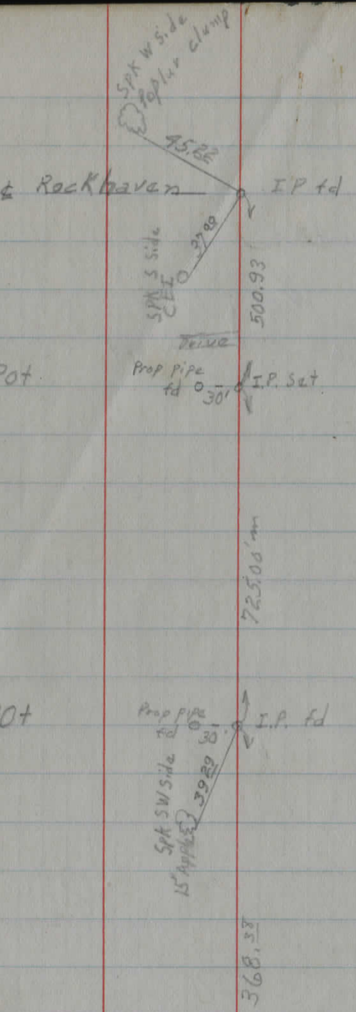


45+50 Δ = 0°9'30" Right

35+00 P.O.T.







8-14-57

56+43 Pot

49+18 Pot

Stopped Acc. Rain

136.6

1873.2

72.6
72.6
4356
1452
5082
5270.76
12.83

18732) 5270.76
37464
152336
149756
25800

172.6
172.6
10356
3452
12082
1726
29790.76

16
1873) 29791
1873
11031
38

1353.77 Spk S side 10" Map
20' N ℄ Sta. 0-60

1330.26 Spk in E side 12" Wal.
35' Lt (S) Sta 4+40

Brass on Chester-Burton
Rd 0+0 = Chardon-Aub.
Rd
Sta. E to W

4.13
53.77
3.36

CURVE TABLES.

Published by KEUFFEL & ESSER CO.

HOW TO USE CURVE TABLES.

Table I. contains Tangents and Externals to a 1° curve. Tan. and Ext. to any other radius may be found nearly enough, by dividing the Tan. or Ext. opposite the given Central Angle by the given degree of curve.

To find Deg. of Curve, having the Central Angle and Tangent: Divide Tan. opposite the given Central Angle by the given Tangent.

To find Deg. of Curve, having the Central Angle and Tangent: Divide Ext. opposite the given Central Angle by the given External.

To find Nat. Tan. and Nat. Ex. Sec. for any angle by Table I.: Tan. or Ext. of twice the given angle divided by the radius of a 1° curve will be the Nat. Tan. or Nat. Ex. Sec.

EXAMPLE.

Wanted a Curve with an Ext. of about 12 ft. Angle of Intersection or I. P. = 23° 20′ to the R. at Station 542+72.

Ext. in Tab. I opposite 23° 20′ = 120.87
120.87 ÷ 12 = 10.07. Say a 10° Curve.

Tan. in Tab. I opp. 23° 20′ = 1183.1
1183.1 ÷ 10 = 118.31.

Correction for A. 23° 20′ for a 10° Cur. = 0.16
118.31 + 0.16 = 118.47 = corrected Tangent.

(If corrected Ext. is required find in same way)
Ang. 23° 20′ = 23.33° ÷ 10 = 2.3333 = L. C.

2° 19½′ = def. for sta.	542	I. P. = sta.	542+72
4° 49½′ = " " "	+50	Tan. =	1.18.47
7° 19½′ = " " "	543	B. C. = sta.	541+53.53
9° 49½′ = " " "	+50	L. C. =	2.33.33
11° 40′ = " " "	543+	E. C. = Sta.	543+86 86
	86.86		

100 − 53.53 = 46.47 × 3′ (def. for 1 ft. of 10° Cur.) = 139.41′ =
2° 19½′ = def. for sta. 542.

Def. for 50 ft. = 2° 30′ for a 10° Curve.

Def. for 36.86 ft. = 1° 50½′ for a 10° Curve.

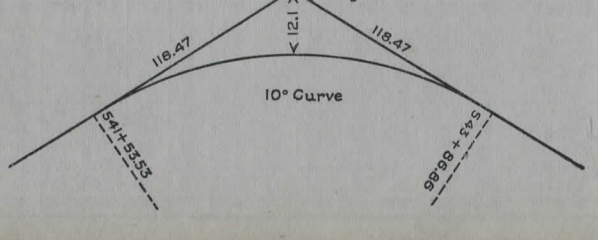


TABLE I. — Tangents and Externals to a 1° Curve.

Chord = 100 ft.

Int. Angle	Tangent	External	Int. Angle	Tangent	External	Int. Angle	Tangent	External
1°	50.00	.22	8°	400.66	13.99	15°	754.32	49.44
10′	58.34	.30	10′	409.03	14.58	10′	762.80	50.55
20	66.67	.39	20	417.41	15.18	20	771.29	51.68
30	75.01	.49	30	425.79	15.80	30	779.77	52.82
40	83.34	.61	40	434.17	16.43	40	788.26	53.97
50	91.68	.73	50	442.55	17.07	50	796.75	55.13
2	100.01	.87	9	450.93	17.72	16	805.25	56.31
10	108.35	1.02	10	459.32	18.38	10	813.75	57.50
20	116.68	1.19	20	467.71	19.06	20	822.25	58.70
30	125.02	1.36	30	476.10	19.75	30	830.76	59.91
40	133.36	1.55	40	484.49	20.45	40	839.27	61.14
50	141.70	1.75	50	492.88	21.16	50	847.78	62.38
3	150.04	1.96	10	501.28	21.89	17	856.30	63.63
10	158.38	2.19	10	509.68	22.62	10	864.82	64.90
20	166.72	2.43	20	518.08	23.38	20	873.35	66.18
30	175.06	2.67	30	526.48	24.14	30	881.88	67.47
40	183.40	2.93	40	534.89	24.91	40	890.41	68.77
50	191.74	3.21	50	543.29	25.70	50	898.95	70.09
4	200.08	3.49	11	551.70	26.50	18	907.49	71.42
10	208.43	3.79	10	560.11	27.31	10	916.03	72.76
20	216.77	4.10	20	568.53	28.14	20	924.58	74.12
30	225.12	4.42	30	576.95	28.97	30	933.13	75.49
40	233.47	4.76	40	585.36	29.82	40	941.69	76.86
50	241.81	5.10	50	593.79	30.68	50	950.25	78.26
5	250.16	5.46	12	602.21	31.56	19	958.81	79.67
10	258.51	5.83	10	610.64	32.45	10	967.38	81.09
20	266.86	6.21	20	619.07	33.35	20	975.96	82.53
30	275.21	6.61	30	627.50	34.26	30	984.53	83.97
40	283.57	7.01	40	635.93	35.18	40	993.12	85.43
50	291.92	7.43	50	644.37	36.12	50	1001.7	86.90
6	300.28	7.86	13	652.81	37.07	20	1010.3	88.39
10	308.64	8.31	10	661.25	38.03	10	1018.9	89.89
20	316.99	8.76	20	669.70	39.01	20	1027.5	91.40
30	325.35	9.23	30	678.15	39.99	30	1036.1	92.92
40	333.71	9.71	40	686.60	40.99	40	1044.7	94.46
50	342.08	10.20	50	695.06	42.00	50	1053.3	96.01
7	350.44	10.71	14	703.51	43.03	21	1061.9	97.57
10	358.81	11.22	10	711.97	44.07	10	1070.6	99.16
20	367.17	11.75	20	720.44	45.12	20	1079.2	100.75
30	375.54	12.29	30	728.90	46.18	30	1087.8	102.35
40	383.91	12.85	40	737.37	47.25	40	1096.4	103.97
50	392.28	13.41	50	745.85	48.34	50	1105.1	105.60

Corrections to be Added (T = Tangent. E = External.)

Int. Angle	Curve 5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
5°	T=.02	.03	.05	.06	.08	.10	.11	.13	.15	.16	.18	.20	.21	.23
	E=.000	.000	.001	.001	.002	.002	.002	.003	.003	.004	.004	.004	.005	.005
10°	T=.03	.06	.09	.13	.16	.19	.22	.25	.28	.31	.34	.38	.42	.46
	E=.001	.003	.004	.006	.007	.008	.009	.011	.012	.014	.015	.017	.018	.020
15°	T=.04	.10	.14	.19	.24	.29	.34	.39	.45	.51	.53	.58	.63	.68
	E=.003	.007	.010	.014	.018	.023	.027	.029	.032	.035	.039	.043	.047	.051
20°	T=.06	.13	.19	.26	.32	.39	.45	.51	.58	.65	.72	.79	.84	.90
	E=.006	.011	.017	.022	.028	.034	.038	.045	.051	.057	.063	.070	.076	.083
25°	T=.08	.16	.24	.33	.40	.49	.58	.67	.75	.83	.90	.99	1.06	1.14
	E=.009	.018	.027	.036	.046	.056	.065	.074	.083	.093	.106	.120	.127	.135

TABLE I. — Tangents and Externals to a 1° Curve.

Chord = 100 ft.

Int. Angle	Tangent	External	Int. Angle	Tangent	External	Int. Angle	Tangent	External
22°	1113.7	107.24	29°	1481.8	188.51	36°	1861.7	294.9
10′	1122.4	108.90	10′	1490.7	190.74	10′	1870.9	297.7
20	1131.0	110.57	20	1499.6	192.99	20	1880.1	300.6
30	1139.7	112.25	30	1508.5	195.25	30	1889.4	303.5
40	1148.4	113.95	40	1517.4	197.53	40	1898.6	306.4
50	1157.0	115.66	50	1526.3	199.82	50	1907.9	309.3
23	1165.7	117.38	30	1535.3	202.12	37	1917.1	312.2
10	1174.4	119.12	10	1544.2	204.44	10	1926.4	315.2
20	1183.1	120.87	20	1553.1	206.77	20	1935.7	318.1
30	1191.8	122.63	30	1562.1	209.12	30	1945.0	321.1
40	1200.5	124.41	40	1571.0	211.48	40	1954.3	324.1
50	1209.2	126.20	50	1580.0	213.86	50	1963.6	327.1
24	1217.9	128.00	31	1589.0	216.3	38	1972.9	330.2
10	1226.6	129.82	10	1598.0	218.7	10	1982.2	333.2
20	1235.3	131.65	20	1606.9	221.1	20	1991.5	336.3
30	1244.0	133.50	30	1615.9	223.5	30	2000.9	339.3
40	1252.8	135.35	40	1624.9	226.0	40	2010.2	342.4
50	1261.5	137.23	50	1633.9	228.4	50	2019.6	345.5
25	1270.2	139.11	32	1643.0	230.9	39	2029.0	348.6
10	1279.0	141.01	10	1652.0	233.4	10	2038.4	351.8
20	1287.7	142.93	20	1661.0	235.9	20	2047.8	354.9
30	1296.5	144.85	30	1670.0	238.4	30	2057.2	358.1
40	1305.3	146.79	40	1679.1	241.0	40	2066.6	361.3
50	1314.0	148.75	50	1688.1	243.5	50	2076.0	364.5
26	1322.8	150.71	33	1697.2	246.1	40	2085.4	367.7
10	1331.6	152.69	10	1706.3	248.7	10	2094.9	371.0
20	1340.4	154.69	20	1715.3	251.3	20	2104.3	374.2
30	1349.2	156.70	30	1724.4	253.9	30	2113.8	377.5
40	1358.0	158.72	40	1733.5	256.5	40	2123.3	380.8
50	1366.8	160.76	50	1742.6	259.1	50	2132.7	384.1
27	1375.6	162.81	34	1751.7	261.8	41	2142.2	387.4
10	1384.4	164.86	10	1760.8	264.5	10	2151.7	390.7
20	1393.2	166.95	20	1770.0	267.2	20	2161.2	394.1
30	1402.0	169.04	30	1779.1	269.9	30	2170.8	397.4
40	1410.9	171.15	40	1788.2	272.6	40	2180.3	400.8
50	1419.7	173.27	50	1797.4	275.3	50	2189.9	404.2
28	1428.6	175.41	35	1806.6	278.1	42	2199.4	407.6
10	1437.4	177.55	10	1815.7	280.8	10	2209.0	411.1
20	1446.3	179.72	20	1824.9	283.6	20	2218.6	414.5
30	1455.1	181.89	30	1834.1	286.4	30	2228.1	418.0
40	1464.0	184.08	40	1843.3	289.2	40	2237.7	421.4
50	1472.9	186.29	50	1852.5	292.0	50	2247.3	425.0

Corrections to be Added (T = Tangent. E = External.)

Int. Angle	Curve 5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
20°	T=.06	.13	.19	.26	.32	.39	.45	.51	.58	.65	.72	.79	.84	.90
	E=.006	.011	.017	.022	.028	.034	.038	.045	.051	.057	.063	.070	.076	.083
25°	T=.08	.16	.24	.33	.40	.49	.58	.67	.75	.83	.90	.99	1.06	1.14
	E=.009	.018	.027	.036	.046	.056	.065	.074	.083	.093	.106	.120	.127	.135
30°	T=.10	.19	.29	.39	.49	.59	.69	.79	.89	.99	1.09	1.20	1.29	1.39
	E=.013	.025	.038	.051	.065	.078	.090	.103	.116	.129	.149	.170	.179	.188
35°	T=.11	.22	.34	.47	.58	.69	.80	.93	1.05	1.17	1.29	1.42	1.54	1.66
	E=.018	.035	.054	.072	.086	.109	.131	.153	.175	.197	.213	.230	.247	.264
40°	T=.13	.26	.40	.53	.67	.80	.93	1.06	1.20	1.34	1.49	1.64	1.79	1.94
	E=.023	.046	.070	.093	.117	.141	.172	.203	.234	.265	.277	.290	.315	.341
45°	T=.15	.30	.44	.60	.76	.91	1.06	1.21	1.37	1.52	1.70	1.87	2.04	2.21
	E=.030	.060	.093	.119	.153	.184	.216	.254	.289	.325	.351	.378	.411	.445

TABLE I. — Tangents and Externals to a 1° Curve.

Chord = 100 ft.

Int. Angle	Tangent	External	Int. Angle	Tangent	External	Int. Angle	Tangent	External
43°	2257.0	428.5	**50°**	2671.8	592.3	**57°**	3110.9	790.1
10′	2266.6	432.0	10′	2681.9	596.6	10′	3121.7	795.2
20	2276.2	435.6	20	2692.1	600.9	20	3132.6	800.4
30	2285.9	439.2	30	2702.3	605.3	30	3143.4	805.6
40	2295.6	442.8	40	2712.5	609.6	40	3154.2	810.9
50	2305.2	446.4	50	2722.7	614.0	50	3165.1	816.1
44	2314.9	450.0	**51**	2732.9	618.4	**58**	3176.0	821.4
10	2324.6	453.6	10	2743.1	622.8	10	3186.9	826.7
20	2334.3	457.3	20	2753.4	627.2	20	3197.8	832.0
30	2344.1	461.0	30	2763.7	631.7	30	3208.8	837.3
40	2353.8	464.6	40	2773.9	636.2	40	3219.7	842.7
50	2363.5	468.4	50	2784.2	640.7	50	3230.7	848.1
45	2373.3	472.1	**52**	2794.5	645.2	**59**	3241.7	853.5
10	2383.1	475.8	10	2804.9	649.7	10	3252.7	858.9
20	2392.8	479.6	20	2815.2	654.3	20	3263.7	864.3
30	2402.6	483.4	30	2825.6	658.8	30	3274.8	869.8
40	2412.4	487.2	40	2835.9	663.4	40	3285.8	875.3
50	2422.3	491.0	50	2846.3	668.0	50	3296.9	880.8
46	2432.1	494.8	**53**	2856.7	672.7	**60**	3308.0	886.4
10	2441.9	498.7	10	2867.1	677.3	10	3319.1	892.0
20	2451.8	502.5	20	2877.5	682.0	20	3330.3	897.5
30	2461.7	506.4	30	2888.0	686.7	30	3341.4	903.2
40	2471.5	510.3	40	2898.4	691.4	40	3352.6	908.8
50	2481.4	514.3	50	2908.9	696.1	50	3363.8	914.5
47	2491.3	518.2	**54**	2919.4	700.9	**61**	3375.0	920.2
10	2501.2	522.2	10	2929.9	705.7	10	3386.3	925.9
20	2511.2	526.1	20	2940.4	710.5	20	3397.5	931.6
30	2521.1	530.1	30	2951.0	715.3	30	3408.8	937.3
40	2531.1	534.2	40	2961.5	720.1	40	3420.1	943.1
50	2541.0	538.2	50	2972.1	725.0	50	3431.4	948.9
48	2551.0	542.2	**55**	2982.7	729.9	**62**	3442.7	954.8
10	2561.0	546.3	10	2993.3	734.8	10	3454.1	960.6
20	2571.0	550.4	20	3003.9	739.7	20	3465.4	966.5
30	2581.0	554.5	30	3014.5	744.6	30	3476.8	972.4
40	2591.0	558.6	40	3025.2	749.6	40	3488.3	978.3
50	2601.1	562.8	50	3035.8	754.6	50	3499.7	984.3
49	2611.2	566.9	**56**	3046.5	759.6	**63**	3511.1	990.2
10	2621.2	571.1	10	3057.2	764.6	10	3522.6	996.2
20	2631.3	575.3	20	3067.9	769.7	20	3534.1	1002.3
30	2641.4	579.5	30	3078.7	774.7	30	3545.6	1008.3
40	2651.5	583.8	40	3089.4	779.8	40	3557.2	1014.4
50	2661.6	588.0	50	3100.2	784.9	50	3568.7	1020.5

Corrections to be Added (T = Tangent. E = External.)

Int. Angle	Curve 5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
40°	T=.13	.26	.40	.53	.67	.80	.93	.106	1.20	1.34	1.49	1.64	1.79	1.94
	E=.023	.046	.070	.093	.117	.141	.172	.203	.234	.265	.277	.290	.315	.341
45°	T=.15	.30	.44	.60	.76	.91	1.06	1.21	1.37	1.52	1.70	1.87	2.04	2.21
	E=.030	.060	.093	.119	.153	.184	.216	.254	.289	.325	.351	.378	.411	.445
50°	T=.17	.34	.51	.68	.85	1.02	1.19	1.36	1.54	1.72	1.91	2.10	2.29	2.48
	E=.037	.075	.116	.151	.189	.227	.266	.305	.345	.384	.425	.467	.508	.550
55°	T=.19	.38	.57	.76	.95	1.14	1.32	1.52	1.72	1.92	2.14	2.35	2.56	2.77
	E=.046	.093	.142	.188	.236	.283	.332	3.81	.420	.479	.530	.582	.641	.700
60°	T=.21	.42	.63	.84	1.05	1.27	1.49	1.71	1.94	2.17	2.38	2.60	2.83	3.07
	E=.056	.112	.168	.225	.283	.340	.398	.457	.516	.575	.636	.697	.774	.851
65°	T=.23	.46	.69	.93	1.16	1.40	1.64	1.88	2.13	2.38	2.63	2.88	3.13	3.39
	E=.067	.135	.204	.273	.343	.412	.483	.554	.625	.697	.711	.845	.922	1.01

TABLE I. — Tangents and Externals to a 1° Curve.

Chord = 100 ft.

Int. Angle	Tangent	External	Int. Angle	Tangent	External	Int. Angle	Tangent	External
64°	3580.3	1026.6	**71°**	4086.9	1308.2	**78°**	4639.8	1643.0
10′	3591.9	1032.8	10′	4099.5	1315.6	10′	4653.6	1651.7
20	3603.5	1039.0	20	4112.1	1322.9	20	4667.4	1660.5
30	3615.1	1045.2	30	4124.8	1330.3	30	4681.3	1669.2
40	3626.8	1051.4	40	4137.4	1337.7	40	4695.2	1678.1
50	3638.5	1057.7	50	4150.1	1345.1	50	4709.2	1686.9
65	3650.2	1063.9	**72**	4162.8	1352.6	**79**	4723.2	1695.8
10	3661.9	1070.2	10	4175.6	1360.1	10	4737.2	1704.7
20	3673.7	1076.6	20	4188.5	1367.6	20	4751.2	1713.7
30	3685.4	1082.9	30	4201.2	1375.2	30	4765.3	1722.7
40	3697.2	1089.3	40	4214.0	1382.8	40	4779.4	1731.7
50	3709.0	1095.7	50	4226.8	1390.4	50	4793.6	1740.8
66	3720.9	1102.2	**73**	4239.7	1398.0	**80**	4807.7	1749.9
10	3732.7	1108.6	10	4252.6	1405.7	10	4822.0	1759.0
20	3744.6	1115.1	20	4265.6	1413.5	20	4836.2	1768.2
30	3756.5	1121.7	30	4278.5	1421.2	30	4850.5	1777.4
40	3768.5	1128.2	40	4291.5	1429.0	40	4864.8	1786.7
50	3780.4	1134.8	50	4304.6	1436.8	50	4879.2	1796.0
67	3792.4	1141.4	**74**	4317.6	1444.6	**81**	4893.6	1805.3
10	3804.4	1148.0	10	4330.7	1452.5	10	4908.0	1814.7
20	3816.4	1154.7	20	4343.8	1460.4	20	4922.5	1824.1
30	3828.4	1161.3	30	4356.9	1468.4	30	4937.0	1833.6
40	3840.5	1168.1	40	4370.1	1476.4	40	4951.5	1843.1
50	3852.6	1174.8	50	4383.3	1484.4	50	4966.1	1852.6
68	3864.7	1181.6	**75**	4396.5	1492.4	**82**	4980.7	1862.2
10	3876.8	1188.4	10	4409.8	1500.5	10	4995.4	1871.8
20	3889.0	1195.2	20	4423.1	1508.6	20	5010.0	1881.5
30	3901.2	1202.0	30	4436.4	1516.7	30	5024.8	1891.2
40	3913.4	1208.9	40	4449.7	1524.9	40	5039.5	1900.9
50	3925.6	1215.8	50	4463.1	1533.1	50	5054.3	1910.7
69	3937.9	1222.7	**76**	4476.5	1541.4	**83**	5069.2	1920.5
10	3950.2	1229.7	10	4489.9	1549.7	10	5084.0	1930.4
20	3962.5	1236.7	20	4503.4	1558.0	20	5099.0	1940.3
30	3974.8	1243.7	30	4516.9	1566.3	30	5113.9	1950.3
40	3987.2	1250.8	40	4530.4	1574.7	40	5128.9	1960.2
50	3999.5	1257.9	50	4544.0	1583.1	50	5143.9	1970.3
70	4011.9	1265.0	**77**	4557.6	1591.6	**84**	5159.0	1980.4
10	4024.4	1272.1	10	4571.2	1600.1	10	5174.1	1990.5
20	4036.8	1279.3	20	4584.8	1608.6	20	5189.3	2000.6
30	4049.3	1286.5	30	4598.5	1617.1	30	5204.4	2010.8
40	4061.8	1293.6	40	4612.2	1625.7	40	5219.7	2021.1
50	4074.4	1300.9	50	4626.0	1634.4	50	5234.9	2031.4

Corrections to be Added (T = Tangent. E = External.)

Int. Angle	Curve 5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
60°	T=.21	.42	.63	.84	1.05	1.27	1.49	1.71	1.94	2.17	2.38	2.60	2.83	3 07
	E=.056	.112	.168	.225	.283	.340	.398	.457	.516	.575	.636	.697	.774	.851
65°	T=.23	.46	.69	.93	1.16	1.40	1.64	1.88	2.13	2.38	2.63	2.88	3.13	3.39
	E=.067	.135	.204	.273	.343	.412	.483	.554	.625	.697	.711	.845	.922	1.01
70°	T=.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
	E=.080	.159	.240	.321	.403	.485	.568	.652	.735	.819	.906	.994	1.08	1.17
75°	T=.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
	E=.095	.182	.286	.383	.480	.578	.678	.777	.877	.977	1.07	1.18	1.29	1.39
80°	T=.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
	E=.110	.220	.332	.445	.558	.671	.787	.903	1.02	1.13	1.25	1.38	1.50	1.62
85°	T=.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
	E=.128	.259	.391	.524	.657	.790	.926	1.06	1.20	1.34	1.47	1.62	1.76	1.91

TABLE I. — Tangents and Externals to a 1° Curve.

Chord = 100 ft.

Int. Angle	Tangent	External	Int. Angle	Tangent	External	Int. Angle	Tangent	External
85°	5250.3	2041.7	**92°**	5933.2	2518.5	**99°**	6708.6	3092.7
10′	5265.6	2052.1	10′	5950.5	2531.0	10′	6728.4	3107.7
20	5281.0	2062.5	20	5967.9	2543.5	20	6748.2	3122.9
30	5296.4	2073.0	30	5985.3	2556.0	30	6768.1	3138.1
40	5311.9	2083.5	40	6002.7	2568.6	40	6788.1	3153.3
50	5327.4	2094.1	50	6020.2	2581.3	50	6808.2	3168.7
86	5343.0	2104.7	**93**	6037.8	2594.0	**100**	6828.3	3184.1
10	5358.6	2115.3	10	6055.4	2606.8	10	6848.5	3199.6
20	5374.2	2126.0	20	6073.1	2619.7	20	6868.8	3215.1
30	5389.9	2136.7	30	6090.8	2632.6	30	6889.2	3230.8
40	5405.6	2147.5	40	6108.6	2645.5	40	6909.6	3246.5
50	5421.4	2158.4	50	6126.4	2658.5	50	6930.1	3262.3
87	5437.2	2169.2	**94**	6144.3	2671.6	**101**	6950.6	3278.1
10	5453.1	2180.2	10	6162.6	2684.7	10	6971.3	3294.1
20	5469.0	2191.1	20	6180.2	2697.9	20	6992.0	3310.1
30	5484.9	2202.2	30	6198.3	2711.2	30	7012.7	3326.1
40	5500.9	2213.2	40	6216.4	2724.5	40	7033.6	3342.3
50	5517.0	2224.3	50	6234.6	2737.9	50	7054.5	3358.5
88	5533.1	2235.5	**95**	6252.8	2751.3	**102**	7075.5	3374.9
10	5549.2	2246.7	10	6271.1	2764.8	10	7096.6	3391.2
20	5565.4	2258.0	20	6289.4	2778.3	20	7117.8	3407.7
30	5581.6	2269.3	30	6307.9	2792.0	30	7139.0	3424.3
40	5597.8	2280.6	40	6326.3	2805.6	40	7160.3	3440.9
50	5614.2	2292.0	50	6344.8	2819.4	50	7181.7	3457.6
89	5630.5	2303.5	**96**	6363.4	2833.2	**103**	7203.2	3474.4
10	5646.9	2315.0	10	6382.1	2847.0	10	7224.7	3491.3
20	5663.4	2326.6	20	6400.8	2861.0	20	7246.3	3508.2
30	5679.9	2338.2	30	6419.5	2875.0	30	7268.0	3525.2
40	5696.4	2349.8	40	6438.4	2889.0	40	7289.8	3542.4
50	5713.0	2361.5	50	6457.3	2903.1	50	7311.7	3559.6
90	5729.7	2373.3	**97**	6476.2	2917.3	**104**	7333.6	3576.8
10	5746.3	2385.1	10	6495.2	2931.6	10	7355.6	3594.2
20	5763.1	2397.0	20	6514.3	2945.9	20	7377.8	3611.7
30	5779.9	2408.9	30	6533.4	2960.3	30	7399.9	3629.2
40	5796.7	2420.9	40	6552.6	2974.7	40	7422.2	3646.8
50	5813.6	2432.9	50	6571.9	2989.2	50	7444.6	3664.5
91	5830.5	2444.9	**98**	6591.2	3003.8	**105**	7467.0	3682.3
10	5847.5	2457.1	10	6610.6	3018.4	10	7489.6	3700.2
20	5864.6	2469.3	20	6630.1	3033.1	20	7512.2	3718.2
30	5881.7	2481.5	30	6649.6	3047.9	30	7534.9	3736.2
40	5898.8	2493.8	40	6669.2	3062.8	40	7557.7	3754.4
50	5916.0	2506.1	50	6688.8	3077.7	50	7580.5	3772.6

Corrections to be Added (T = Tangent. E. = External.)

Int. Angle	Curve 5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
85°	T=.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
	E=.128	.259	.391	.524	.657	.790	.926	1.06	1.20	1.34	1.47	1.62	1.76	1.91
90°	T=.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
	E=.149	.299	.450	.603	.756	.910	1.07	1.22	1.38	1.54	1.70	1.87	2.03	2.20
95°	T=.39	.79	1.19	1.55	2.00	2.40	2.80	3.20	3.61	4.02	4.49	4.98	5.38	5.83
	E=.174	.350	.522	.706	.985	1.06	1.25	1.43	1.62	1.80	1.99	2.18	2.38	2.58
100°	T=.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
	E=.200	.401	.604	.809	1.01	1.22	1.43	1.64	1.85	2.06	2.28	2.50	2.73	2.96
105°	T=.46	.94	1.42	1.90	2.38	2.87	3.34	3.84	4.35	4.84	5.35	5.87	6.40	6.93
	E=.230	.470	.700	.938	1.17	1.42	1.65	1.90	2.14	2.39	2.64	2.90	3.16	3.41

TABLE I. — Tangents and Externals to a 1° Curve.

Chord = 100 ft.

Int. Angle	Tangent	External	Int. Angle	Tangent	External	Int. Angle	Tangent	External
106°	7603.5	3791.0	**111°**	8336.7	4386.1	**116°**	9169.4	5082.7
10′	7626.6	3809.4	10′	8362.7	4407.6	10′	9199.1	5107.9
20	7649.7	3827.9	20	8388.9	4429.2	20	9229.0	5133.3
30	7672.9	3846.5	20	8415.1	4450.9	30	9259.0	5158.8
40	7696.3	3865.2	40	8441.5	4472.7	40	9289.2	5184.5
50	7719.7	3884.0	50	8468.0	4494.6	50	9319.5	5210.3
107	7743.2	3902.9	**112**	8494.6	4516.6	**117**	9349.9	5236.2
10	7766.8	3921.9	10	8521.3	4538.8	10	9380.5	5262.3
20	7790.5	3940.9	20	8548.1	4561.1	20	9411.3	5288.6
30	7814.3	3960.1	30	8575.0	4583.4	30	9442.2	5315.0
40	7838.1	3979.4	40	8602.1	4606.0	40	9473.2	5341.5
50	7862.1	3998.7	50	8629.3	4628.6	50	9504.4	5368.2
108	7886.2	4018.2	**113**	8656.6	4651.3	**118**	9535.7	5395.1
10	7910.4	4037.8	10	8684.0	4674.2	10	9567.2	5422.1
20	7934.6	4057.4	20	8711.5	4697.2	20	9598.9	5449.2
30	7959.0	4077.2	30	8739.2	4720.3	30	9630.7	5476.5
40	7983.5	4097.1	40	8767.0	4743.6	40	9662.6	5504.0
50	8008.0	4117.0	50	8794.9	4766.9	50	9694.7	5531.7
109	8032.7	4137.1	**114**	8822.9	4790.4	**119**	9727.0	5559.4
10	8057.4	4157.3	10	8851.0	4814.1	10	9759.4	5587.4
20	8082.3	4177.5	20	8879.3	4837.8	20	9792.0	5615.5
30	8107.3	4197.9	30	8907.7	4861.7	30	9824.8	5643.8
40	8132.3	4218.4	40	8936.3	4885.7	40	9857.7	5672.3
50	8157.5	4239.0	50	8965.0	4909.9	50	9890.8	5700.9
110	8182.8	4259.7	**115**	8993.8	4934.1	**120**	9924.0	5729.7
10	8208.2	4280.5	10	9022.7	4958.6	10	9957.5	5758.6
20	8233.7	4301.4	20	9051.7	4983.1	20	9991.0	5787.7
30	8259.3	4322.4	30	9080.9	5007.8	30	10025.0	5817.0
40	8285.0	4343.6	40	9110.3	5032.6	40	10059.0	5846.5
50	8310.8	4364.8	50	9139.8	5057.6	50	10093.0	5876.1

Corrections to be Added (T = Tangent. E = External.)

Int. Angle	Curve 5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
100°	T=.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
	E=.200	.401	.604	.809	1.01	1.22	1.43	1.64	1.85	2.06	2.28	2.50	2.73	2.96
105°	T=.46	.94	1.42	1.90	2.38	2.87	3.34	3.84	4.35	4.84	5.35	5.87	6.40	6.93
	E=.230	.470	.700	.938	1.17	1.42	1.65	1.90	2.14	2.39	2.64	2.90	3.16	3.41
110°	T=.50	1.03	1.55	2.08	2.60	3.14	3.66	4.21	4.76	5.31	5.86	6.43	7.01	7.59
	E=.260	.535	.808	1.08	1.36	1.63	1.91	2.19	2.49	2.61	3.05	3.35	3.65	3.95
115°	T=.54	1.13	1.70	2.29	2.86	3.45	4.03	4.63	5.23	5.83	6.44	7.07	7.70	8.35
	E=.307	624	.939	1.26	1.57	1.89	2.21	2.54	2.87	3.20	3.53	3.88	4.23	4.58
120°	T=.61	1.25	1.89	2.52	3.16	3.81	4.44	5.11	5.78	6.44	7.11	7.80	8.51	9.21
	E=.339	.720	1.08	1.45	1.82	2.20	2.56	2.95	3.33	3.72	4.10	4.50	4.91	5.32

Table II. — Radii, Ordinates and Deflections. Chord = 100 ft.

Deg.	Radius	Mid. Ord.	Tan. Dist.	Def. Dist.	Def. for 1 Ft.	Deg.	Radius	Mid. Ord.	Tan. Dist.	Def. Dist.	Def. for 1 Ft.
	ft.	ft.	ft.	ft.	′		ft.	ft.	ft.	ft.	′
0° 10′	34377.	.036	.145	.291	0.05	7°	819.0	1.528	6.105	12.21	2.10
20	17189.	.073	.291	.582	0.10	20′	781.8	1.600	6.395	12.79	2.20
30	11459.	.109	.436	.873	0.15	30	764.5	1.637	6.540	13.08	2.25
40	8594.4	.145	.582	1.164	0.20	40	747.9	1.673	6.685	13.37	2.30
50	6875.5	.182	.727	1.454	0.25	8	716.8	1.746	6.976	13.95	2.40
1	5729.6	.218	.873	1.745	0.30	20	688.2	1.819	7.266	14.53	2.50
10	4911.2	.255	1.018	2.036	0.35	30	674.7	1.855	7.411	14.82	2.55
20	4297.3	.291	1.164	2.327	0.40	40	661.7	1.892	7.556	15.11	2.60
30	3819.8	.327	1.309	2.618	0.45	9	637.3	1.965	7.846	15.69	2.70
40	3437.9	.364	1.454	2.909	0.50	20	614.6	2.037	8.136	16.27	2.80
50	3125.4	.400	1.600	3.200	0.55	30	603.8	2.074	8.281	16.56	2.85
2	2864.9	.436	1.745	3.490	0.60	40	593.4	2.110	8.426	16.85	2.90
10	2644.6	.473	1.891	3.781	0.65	10	573.7	2.183	8.716	17.43	3.00
20	2455.7	.509	2.036	4.072	0.70	30	546.4	2.292	9.150	18.30	3.15
30	2292.0	.545	2.181	4.363	0.75	11	521.7	2.402	9.585	19.16	3.30
40	2148.8	.582	2.327	4.654	0.80	30	499.1	2.511	10.02	20.04	3.45
50	2022.4	.618	2.472	4.945	0.85	12	478.3	2.620	10.45	20.91	3.60
3	1910.1	.655	2.618	5.235	0.90	30	459.3	2.730	10.89	21.77	3.75
10	1809.6	.691	2.763	5.526	0.95	13	441.7	2.839	11.32	22.64	3.90
20	1719.1	.727	2.908	5.817	1.00	30	425.4	2.949	11.75	23.51	4.05
30	1637.3	.764	3.054	6.108	1.05	14	410.3	3.058	12.18	24.37	4.20
40	1562.9	.800	3.199	6.398	1.10	30	396.2	3.168	12.62	25.24	4.35
50	1495.0	.836	3.345	6.689	1.15	15	383.1	3.277	13.05	26.11	4.50
4	1432.7	.873	3.490	6.980	1.20	30	370.8	3.387	13.49	26.97	4.65
10	1375.4	.909	3 635	7.271	1.25	16	359.3	3.496	13.92	27.84	4.80
20	1322.5	.945	3.718	7.561	1.30	30	348.5	3.606	14.35	28.70	4.95
30	1273.6	.982	3.926	7.852	1.35	17	338.3	3.716	14.78	29.56	5.10
40	1228.1	1.018	4.071	8.143	1.40	18	319.6	3.935	15.64	31.29	5.40
50	1185.8	1.055	4.217	8.433	1.45	19	302.9	4.155	16.51	33.01	5.70
5	1146.3	1.091	4.362	8.724	1.50	20	287.9	4.374	17.37	34.73	6.00
10	1109.3	1.127	4.507	9.014	1.55	21	274.4	4.594	18.22	36.44	6.30
20	1074.7	1.164	4.653	9.305	1.60	22	262.0	4.814	19.08	38.16	6.60
30	1042.1	1.200	4.798	9.596	1.65	23	250.8	5.035	19.94	39.87	6.90
40	1011.5	1.237	4.943	9.886	1.70	24	240.5	5.255	20.79	41.58	7.20
50	982.6	1.273	5.088	10.18	1.75	25	231.0	5.476	21.64	43.28	7.50
6	955.4	1.309	5.234	10.47	1.80	26	222.3	5.697	22.50	44.99	7.80
10	929.6	1.346	5.379	10.76	1.85	27	214.2	5.918	23.35	46.69	8.10
20	905.1	1.382	5.524	11.05	1.90	28	206.7	6.139	24.19	48.38	8.40
30	881.9	1.418	5.669	11.34	1.95	29	199.7	6.360	25.04	50.07	8.70
40	859.9	1.455	5.814	11.63	2.00	30	193.2	6.583	25.88	51.76	9.00

The middle ordinate in inches for any cord of length (C) is equal to .0012 C^2 multiplied by the middle ordinate taken from the above table. Thus, if it desired to bend a 30 ft. rail to fit a 10 degree curve, its middle ordinate should be .0012×900×2.183 or 2.36 inches.

Table III. Deflections for Sub Chords for Short Radius Curves.

Degree of Curve	Radius 50 / sin. ½ def. ang.	½ sub chord / R = sin of ½ def. angle				Length of arc for 100 ft.
		12.5 Ft.	15 Ft.	20 Ft.	25 Ft.	
30°	193.18	1° 51′	2° 17′	2° 58′	3° 43′	101.15
32°	181.39	1° 59′	2° 25′	3° 10′	3° 58′	101.33
34°	171.01	2° 06′	2° 33′	3° 21′	4° 12′	101.48
36°	161.80	2° 13′	2° 41′	3° 33′	4° 26′	101.66
38°	153.58	2° 20′	2° 49′	3° 44′	4° 40′	101.85
40°	146.19	2° 27′	2° 57′	3° 55′	4° 54′	102.06
42°	139.52	2° 34′	3° 05′	4° 07′	5° 08′	102.29
44°	133.47	2° 41′	3° 13′	4° 18′	5° 22′	102.53
46°	127.97	2° 48′	3° 21′	4° 29′	5° 36′	102.76
48°	122.92	2° 55′	3° 29′	4° 40′	5° 50′	103.00
50°	118.31	3° 02′	3° 38′	4° 51′	6° 04′	103.24
52°	114.06	3° 09′	3° 46′	5° 02′	6° 17′	103.54
54°	110.11	3° 16′	3° 54′	5° 13′	6° 31′	103.84
56°	106.50	3° 22′	4° 02′	5° 23′	6° 44′	104.14
58°	103.14	3° 29′	4° 10′	5° 34′	6° 57′	104.43
60°	100.00	3° 35′	4° 18′	5° 44′	7° 11′	104 72

CURVE FORMULAS

$T = R \tan \frac{1}{2} I$

$T = \frac{50 \tan \frac{1}{2} I}{\text{Sin. } \frac{1}{2} D}$

$\text{Sin. } \frac{1}{2} D = \frac{50}{R}$

$\text{Sin. } \frac{1}{2} D = \frac{50 \tan \frac{1}{2} I}{T}$

$R = T \cot. \frac{1}{2} I$

$R = \frac{50}{\text{Sin. } \frac{1}{2} D}$

$E = R \text{ ex. sec } \frac{1}{2} I$

$E = T \tan \frac{1}{4} I$

$\text{Chord def.} = \frac{\text{chord}^2}{R}$

$\text{No. chords} = \frac{I}{D}$

$\text{Tan. def.} = \frac{1}{2} \text{ chord def.}$

The square of any distance, divided by twice the radius, will equal the distance from tangent to curve, very nearly.

To find angle for a given distance and deflection.

Rule 1. Multiply the given distance by .01745 (def. for 1° for 1 ft. see Table II.), and divide given deflection by the product.

Rule 2. Multiply given deflection by 57.3, and divide the product by the given distance.

To find deflection for a given angle and distance. Multiply the angle by .01745, and the product by the distance.

GENERAL DATA

Right Angle Triangles. Square the altitude, divide by twice the base. Add quotient to base for hypotenuse.

Given Base 100, Alt. 10 $10^2 \div 200 = .5$. $100 + .5 = 100.5$ hyp.

Given Hyp. 100, Alt. 25 $25^2 \div 200 = 3.125$. $100 - 3.125 = 96.875 =$ Base.

Error in first example, .002; in last, .045.

To find Tons of Rail in one mile of track: multiply weight per yard by 11, and divide by 7.

Leveling. The correction for curvature and refraction, in feet and decimals of feet is equal to $0.5774\,d^2$, where d is the distance in miles. The correction for curvature alone is closely, $\frac{2}{3}d^2$. Both corrections are negative.

Probable Error. If d_1, d_2, d_3, etc. are the discrepancies of various results from the mean, and if Σd^2 = the sum of the squares of these differences and n = the number of observations, then the probable error of the mean $= \pm 0.6745 \sqrt{\frac{\Sigma d^2}{n(n-1)}}$

Solar Ephemeris. Attention is called to the Solar Ephemeris for the current year, published by Keuffel & Esser Co., and furnished free of charge upon request, which is $3\frac{1}{4} \times 5\frac{7}{8}$ in., with about 90 pages of data very useful to the Surveyor; such as the adjustments of transits, levels and solar attachments; directions and tables for determining the meridian and the latitude from observations on the sun and Polaris; stadia measurements; magnetic declination; arithmetic constants; English and Metric conversions; trigonometric formulas; Natural and Logarithmic Functions; and Logarithms of Numbers.

Table IV. — 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 V. — 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

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

Angle.	Sin.	Tan.	Sec.	Cosec.	Cotg.	Cosin.	
° ′							
8	.1392	.1405	1.0098	7 185	7.115	.99027	82
10	.1421	.1435	1.0102	7.040	6.968	.98986	50
20	.1449	.1465	1.0107	6.900	6.827	.98944	40
30	.1478	.1495	1.0111	6.766	6.691	.98902	30
40	.1507	.1524	1.0115	6.636	6.561	.98858	20
50	.1536	.1554	1.0120	6.512	6.435	.98814	10
9	.1564	.1584	1.0125	6.394	6.314	.98769	81
10	.1593	.1614	1.0129	6.277	6.197	.98723	50
20	.1622	.1644	1.0134	6.166	6.084	.98676	40
30	.1650	.1673	1.0139	6.059	5.976	.98629	30
40	.1679	.1703	1.0144	5.955	5.871	.98580	20
50	.1708	.1733	1.0149	5.855	5.769	.98531	10
10	.1736	.1763	1.0154	5.759	5.671	.98481	80
10	.1765	.1793	1.0160	5.665	5.576	.98430	50
20	.1794	.1823	1.0165	5.575	5.485	.98378	40
30	.1822	.1853	1.0170	5.488	5.396	.98325	30
40	.1851	.1883	1.0176	5.403	5.309	.98272	20
50	.1880	.1914	1.0181	5.320	5.226	.98218	10
11	.1908	.1944	1.0187	5.241	5.145	.98163	79
10	.1937	.1974	1.0193	5.164	5.066	.98107	50
20	.1965	.2004	1.0199	5.089	4.989	.98050	40
30	.1994	.2035	1.0205	5.016	4.915	.97992	30
40	.2022	.2065	1.0211	4.945	4.843	.97934	20
50	.2051	.2095	1.0217	4.877	4.773	.97875	10
12	.2079	.2126	1.0223	4.810	4.705	.97815	78
10	.2108	.2156	1.0230	4.745	4.638	.97754	50
20	.2136	.2186	1.0236	4.682	4.574	.97692	40
30	.2164	.2217	1.0243	4.620	4.511	.97630	30
40	.2193	.2247	1.0249	4.560	4.449	.97566	20
50	.2221	.2278	1.0256	4.502	4.390	.97502	10
13	.2250	.2309	1.0263	4.445	4.331	.97437	77
10	.2278	.2339	1.0270	4.390	4.275	.97371	50
20	.2306	.2370	1.0277	4.336	4.219	.97304	40
30	.2334	.2401	1.0284	4.284	4.165	.97237	30
40	.2363	.2432	1.0291	4.232	4.113	.97169	20
50	.2391	.2462	1.0299	4.182	4.061	.97100	10
14	.2419	.2493	1.0306	4.133	4.011	.97030	76
10	.2447	.2524	1.0314	4.086	3.962	.96959	50
20	.2476	.2555	1.0321	4.039	3.914	.96887	40
30	.2504	.2586	1.0329	3.994	3.867	.96815	30
40	.2532	.2617	1.0337	3.949	3.821	.96742	20
50	.2560	.2648	1.0345	3.906	3.776	.96667	10
15	.2588	.2679	1.0353	3.864	3.732	.96593	75
10	.2616	.2711	1.0361	3.822	3.689	.96517	50
20	.2644	.2742	1.0369	3.782	3.647	.96440	40
30	.2672	.2773	1.0377	3.742	3.606	.96363	30
40	.2700	.2805	1.0386	3.703	3.566	.96285	20
50	.2728	.2836	1.0394	3.665	3.526	.96206	10
							74
	Cosin.	Cotg.	Cosec.	Sec.	Tan.	Sin.	Angle

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

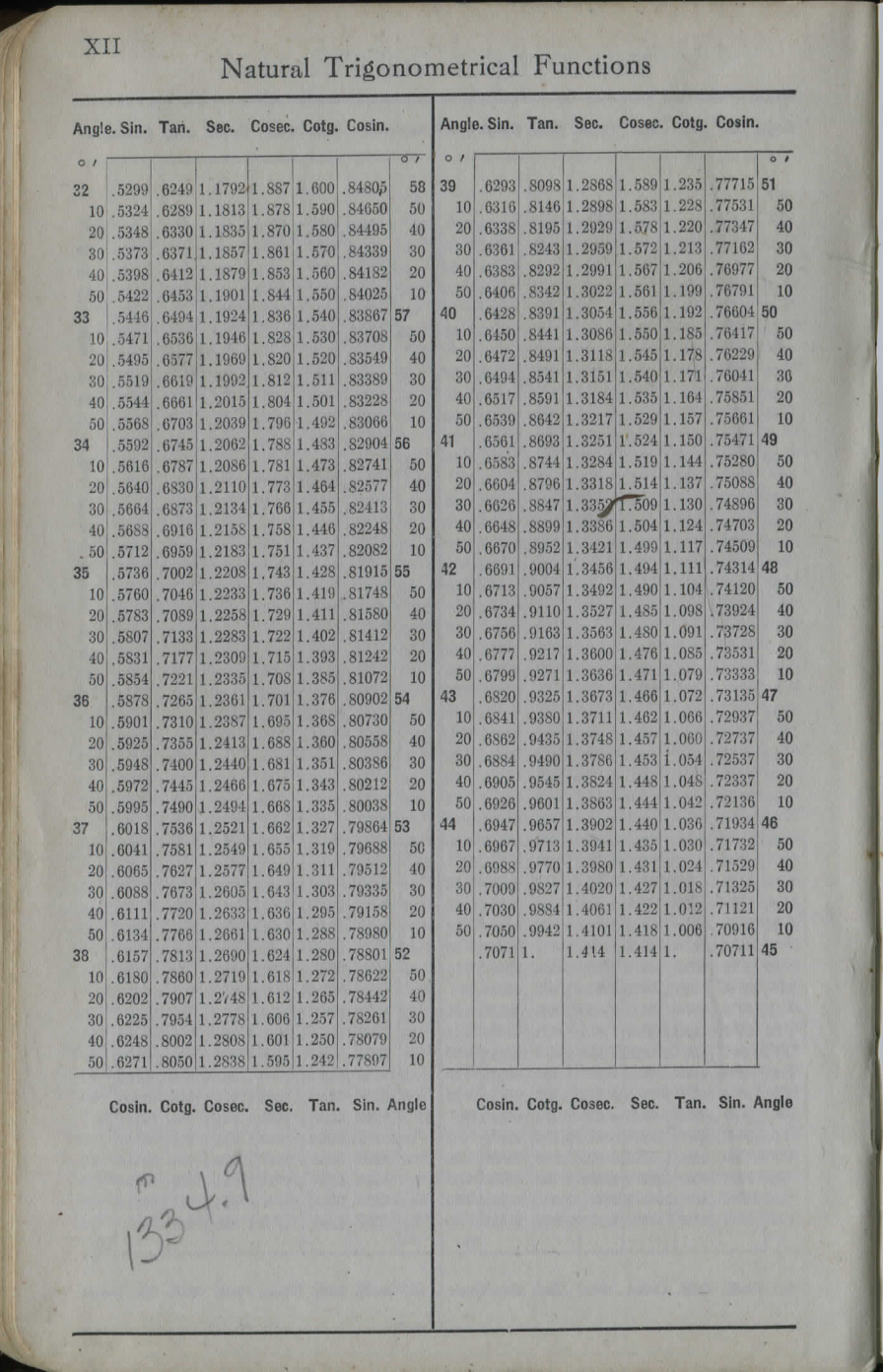
Angle.	Sin.	Tan.	Sec.	Cosec.	Cotg.	Cosin.	
° ′							
24	.4067	.4452	1.0946	2.459	2.246	.91355	66
10	.4094	.4487	1.0961	2.443	2.229	.91236	50
20	.4120	.4522	1.0975	2.427	2.211	.91116	40
30	.4147	.4557	1.0989	2.411	2.194	.90996	30
40	.4173	.4592	1.1004	2.396	2.177	.90875	20
50	.4200	.4628	1.1019	2.381	2.161	.90753	10
25	.4226	.4663	1.1034	2.366	2.145	.90631	65
10	.4253	.4699	1.1049	2.351	2.128	.90507	50
20	.4279	.4734	1.1064	2.337	2.112	.09383	40
30	.4305	.4770	1.1079	2.323	2.097	.90259	30
40	.4331	.4806	1.1095	2.309	2.081	.90133	20
50	.4358	.4841	1.1110	2.295	2.066	.90007	10
26	.4384	.4877	1.1126	2.281	2.050	.89879	64
10	.4410	.4913	1.1142	2.268	2.035	.89752	50
20	.4436	.4950	1.1158	2.254	2.020	.89623	40
30	.4462	.4986	1.1174	2.241	2.006	.89493	30
40	.4488	.5022	1.1190	2.228	1.991	.89363	20
50	.4514	.5059	1.1207	2.215	1.977	.89232	10
27	.4540	.5095	1.1223	2.203	1.963	.89101	63
10	.4566	.5132	1.1240	2.190	1.949	.88968	50
20	.4592	.5169	1.1257	2.178	1.935	.88835	40
30	.4617	.5206	1.1274	2.166	1.921	.88701	30
40	.4643	.5243	1.1291	2.154	1.907	.88566	20
50	.4669	.5280	1.1308	2.142	1.894	.88431	10
28	.4695	.5317	1.1326	2.130	1.881	.88295	62
10	.4720	.5354	1.1343	2.119	1.868	.88158	50
20	.4746	.5392	1.1361	2.107	1.855	.88020	40
30	.4772	.5430	1.1379	2.096	1.842	.87882	30
40	.4797	.5467	1.1397	2.085	1.829	.87743	20
50	.4823	.5505	1.1415	2.073	1.816	.87603	10
29	.4848	.5543	1.1434	2.063	1.804	.87462	61
10	.4874	.5581	1.1452	2.052	1.792	.87321	50
20	.4899	.5619	1.1471	2.041	1.780	.87178	40
30	.4924	.5658	1.1490	2.031	1.767	.87036	30
40	.4950	.5696	1.1509	2.020	1.756	.86892	20
50	.4975	.5735	1.1528	2.010	1.744	.86748	10
30	.5000	.5774	1.1547	2.000	1.732	.86603	60
10	.5025	.5812	1.1566	1.990	1.720	.86457	50
20	.5050	.5851	1.1586	1.980	1.709	.86310	40
30	.5075	.5890	1.1606	1.970	1.698	.86163	30
40	.5100	.5930	1.1626	1.961	1.686	.86015	20
50	.5125	.5969	1.1646	1.951	1.675	.85866	10
31	.5150	.6009	1.1666	1.942	1.664	.85717	59
10	.5175	.6048	1.1687	1.932	1.653	.85567	50
20	.5200	.6088	1.1707	1.923	1.643	.85416	40
30	.5225	.6128	1.1728	1.914	1.632	.85264	30
40	.5250	.6168	1.1749	1.905	1.621	.85112	20
50	.5275	.6208	1.1770	1.896	1.611	.84959	10
							58
	Cosin.	Cotg.	Cosec.	Sec.	Tan.	Sin.	Angle

Natural Trigonometrical Functions

Angle.	Sin.	Tan.	Sec.	Cosec.	Cotg.	Cosin.	
° ′							° ′
32	.5299	.6249	1.1792	1.887	1.600	.84805	58
10	.5324	.6289	1.1813	1.878	1.590	.84650	50
20	.5348	.6330	1.1835	1.870	1.580	.84495	40
30	.5373	.6371	1.1857	1.861	1.570	.84339	30
40	.5398	.6412	1.1879	1.853	1.560	.84182	20
50	.5422	.6453	1.1901	1.844	1.550	.84025	10
33	.5446	.6494	1.1924	1.836	1.540	.83867	57
10	.5471	.6536	1.1946	1.828	1.530	.83708	50
20	.5495	.6577	1.1969	1.820	1.520	.83549	40
30	.5519	.6619	1.1992	1.812	1.511	.83389	30
40	.5544	.6661	1.2015	1.804	1.501	.83228	20
50	.5568	.6703	1.2039	1.796	1.492	.83066	10
34	.5592	.6745	1.2062	1.788	1.483	.82904	56
10	.5616	.6787	1.2086	1.781	1.473	.82741	50
20	.5640	.6830	1.2110	1.773	1.464	.82577	40
30	.5664	.6873	1.2134	1.766	1.455	.82413	30
40	.5688	.6916	1.2158	1.758	1.446	.82248	20
50	.5712	.6959	1.2183	1.751	1.437	.82082	10
35	.5736	.7002	1.2208	1.743	1.428	.81915	55
10	.5760	.7046	1.2233	1.736	1.419	.81748	50
20	.5783	.7089	1.2258	1.729	1.411	.81580	40
30	.5807	.7133	1.2283	1.722	1.402	.81412	30
40	.5831	.7177	1.2309	1.715	1.393	.81242	20
50	.5854	.7221	1.2335	1.708	1.385	.81072	10
36	.5878	.7265	1.2361	1.701	1.376	.80902	54
10	.5901	.7310	1.2387	1.695	1.368	.80730	50
20	.5925	.7355	1.2413	1.688	1.360	.80558	40
30	.5948	.7400	1.2440	1.681	1.351	.80386	30
40	.5972	.7445	1.2466	1.675	1.343	.80212	20
50	.5995	.7490	1.2494	1.668	1.335	.80038	10
37	.6018	.7536	1.2521	1.662	1.327	.79864	53
10	.6041	.7581	1.2549	1.655	1.319	.79688	50
20	.6065	.7627	1.2577	1.649	1.311	.79512	40
30	.6088	.7673	1.2605	1.643	1.303	.79335	30
40	.6111	.7720	1.2633	1.636	1.295	.79158	20
50	.6134	.7766	1.2661	1.630	1.288	.78980	10
38	.6157	.7813	1.2690	1.624	1.280	.78801	52
10	.6180	.7860	1.2719	1.618	1.272	.78622	50
20	.6202	.7907	1.2748	1.612	1.265	.78442	40
30	.6225	.7954	1.2778	1.606	1.257	.78261	30
40	.6248	.8002	1.2808	1.601	1.250	.78079	20
50	.6271	.8050	1.2838	1.595	1.242	.77897	10
	Cosin.	Cotg.	Cosec.	Sec.	Tan.	Sin.	Angle

Angle.	Sin.	Tan.	Sec.	Cosec.	Cotg.	Cosin.	
° ′							° ′
39	.6293	.8098	1.2868	1.589	1.235	.77715	51
10	.6316	.8146	1.2898	1.583	1.228	.77531	50
20	.6338	.8195	1.2929	1.578	1.220	.77347	40
30	.6361	.8243	1.2959	1.572	1.213	.77162	30
40	.6383	.8292	1.2991	1.567	1.206	.76977	20
50	.6406	.8342	1.3022	1.561	1.199	.76791	10
40	.6428	.8391	1.3054	1.556	1.192	.76604	50
10	.6450	.8441	1.3086	1.550	1.185	.76417	50
20	.6472	.8491	1.3118	1.545	1.178	.76229	40
30	.6494	.8541	1.3151	1.540	1.171	.76041	30
40	.6517	.8591	1.3184	1.535	1.164	.75851	20
50	.6539	.8642	1.3217	1.529	1.157	.75661	10
41	.6561	.8693	1.3251	1.524	1.150	.75471	49
10	.6583	.8744	1.3284	1.519	1.144	.75280	50
20	.6604	.8796	1.3318	1.514	1.137	.75088	40
30	.6626	.8847	1.3351	1.509	1.130	.74896	30
40	.6648	.8899	1.3386	1.504	1.124	.74703	20
50	.6670	.8952	1.3421	1.499	1.117	.74509	10
42	.6691	.9004	1.3456	1.494	1.111	.74314	48
10	.6713	.9057	1.3492	1.490	1.104	.74120	50
20	.6734	.9110	1.3527	1.485	1.098	.73924	40
30	.6756	.9163	1.3563	1.480	1.091	.73728	30
40	.6777	.9217	1.3600	1.476	1.085	.73531	20
50	.6799	.9271	1.3636	1.471	1.079	.73333	10
43	.6820	.9325	1.3673	1.466	1.072	.73135	47
10	.6841	.9380	1.3711	1.462	1.066	.72937	50
20	.6862	.9435	1.3748	1.457	1.060	.72737	40
30	.6884	.9490	1.3786	1.453	1.054	.72537	30
40	.6905	.9545	1.3824	1.448	1.048	.72337	20
50	.6926	.9601	1.3863	1.444	1.042	.72136	10
44	.6947	.9657	1.3902	1.440	1.036	.71934	46
10	.6967	.9713	1.3941	1.435	1.030	.71732	50
20	.6988	.9770	1.3980	1.431	1.024	.71529	40
30	.7009	.9827	1.4020	1.427	1.018	.71325	30
40	.7030	.9884	1.4061	1.422	1.012	.71121	20
50	.7050	.9942	1.4101	1.418	1.006	.70916	10
	.7071	1.	1.414	1.414	1.	.70711	45
	Cosin.	Cotg.	Cosec.	Sec.	Tan.	Sin.	Angle

1334.9



TRIGONOMETRIC FORMULÆ

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Right Triangle — Oblique Triangles

Solution of Right Triangles

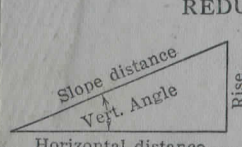
For Angle A. $\sin = \frac{a}{c}$, $\cos = \frac{b}{c}$, $\tan = \frac{a}{b}$, $\cot = \frac{b}{a}$, $\sec = \frac{c}{b}$, $\operatorname{cosec} = \frac{c}{a}$

Given	Required	
a, b	A, B, c	$\tan A = \frac{a}{b} = \cot B,\ c = \sqrt{a^2 + b^2} = a\sqrt{1 + \frac{b^2}{a^2}}$
a, c	A, B, b	$\sin A = \frac{a}{c} = \cos B,\ b = \sqrt{(c+a)(c-a)} = c\sqrt{1 - \frac{a^2}{c^2}}$
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	$B = 90° - A,\ a = c \sin A,\ b = c \cos A,$

Solution of Oblique Triangles

Given	Required	
A, B, a	b, c, C	$b = \frac{a \sin B}{\sin A},\ C = 180° - (A + B),\ c = \frac{a \sin C}{\sin A}$
A, a, b	B, c, C	$\sin B = \frac{b \sin A}{a},\ C = 180° - (A + B),\ c = \frac{a \sin C}{\sin A}$
a, b, C	A, B, c	$A + B = 180° - C,\ \tan \frac{1}{2}(A - B) = \frac{(a-b)\tan \frac{1}{2}(A+B)}{a+b},$ $c = \frac{a \sin C}{\sin A}$
a, b, c	A, B, C	$s = \frac{a+b+c}{2},\ \sin \frac{1}{2}A = \sqrt{\frac{(s-b)(s-c)}{bc}},$ $\sin \frac{1}{2}B = \sqrt{\frac{(s-a)(s-c)}{ac}},\ C = 180° - (A+B)$
a, b, c	Area	$s = \frac{a+b+c}{2},\ \text{area} = \sqrt{s(s-a)(s-b)(s-c)}$
A, b, c	Area	$\text{area} = \frac{bc \sin A}{2}$
A, B, C, a	Area	$\text{area} = \frac{a^2 \sin B \sin C}{2 \sin A}$

REDUCTION TO HORIZONTAL



Horizontal distance = Slope distance multiplied by the cosine of the vertical angle. Thus: slope distance = 319.4 ft. Vert. angle = 5° 10′. From Table, Page IX. cos 5° 10′ = .9959. Horizontal distance = 319.4 × .9959 = 318.09 ft.

Horizontal distance also = Slope distance minus slope distance times (1 — cosine of vertical angle). With the same figures as in the preceding example, the following result is obtained. Cosine 5° 10′ = .9959. 1 — .9959 = .0041. 319.4 × .0041 = 1.31. 319.4 — 1.31 = 318.09 ft.

When the rise is known, the horizontal distance is approximately:—the slope distance less the square of the rise divided by twice the slope distance. Thus: rise = 14 ft., slope distance = 302.6 ft. Horizontal distance $= 302.6 - \frac{14 \times 14}{2 \times 302.6} = 302.6 - 0.32 = 302.28$ ft.

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