

309

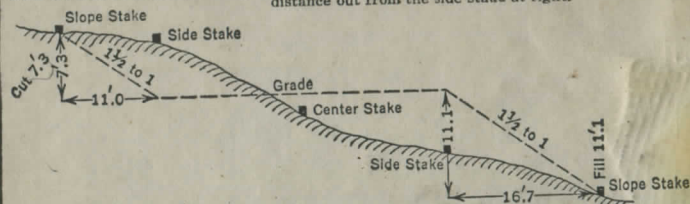
KX

FIELD BOOK

W 360

**DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING**  
 Roadway of any Width. Side Slopes 1 1/2 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.



Cut or Fill	Distance out from Side or Shoulder Stake										Cut or Fill
	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
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

# 341  
 Drainage Prob. Thomas V. Bell Rd. Pg 1  
 Auburn Rd sec 1 X sec. Pg 5  
 New Align Pg 10  
 Topo Pg 12  
 BM elev's Pg 17  
 Stadia for Dr. relocation Pg 18-19  
 Kiwanis Lake Swamp Pg 20

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Valley view Dr. Chardon  
 # 202 BM's Pg 25  
 Topo Pg 26  
 X Secs. Pg 28

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Valley view Dr. & Pts 1962 Pg 25  
 CH # 11 Bainbridge Rd Pg 35  
 Howards Creek

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CH # 11 Bainbridge  
 1500 W. of Smedley Pg 36

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CH # 29 Mumford Rd ± 1600' S of Howers Relocate Culvt. Pg 39

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CH # 13 Chardon Windsor Rd Pg 40  
 Ditch levels ± 100' W of Astabula Co. line

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CH # 13 Chardon Windsor Rd Pg 41  
 1st culvt E. of Hunt Rd running S. Ely

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CH # 370 Prescott Dr. Alignment. Pg 46

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Marilyn Dr Ditch levels Pg 42  
 Storm Sewer The paper in this book No. 360 Pg 31  
 (Marilyn Dr.) is made of 100% high grade rag stock with a WATER RESISTING surface sizing. Pg. 76-77-78  
 CH # 13 Chardon Windsor Rd Align. Pg 49  
 sec. "G" Topo Pg 50  
 B.M. Pg 54  
 (Over)

CH #13 Chardon-Windsor sec. H B.M. Pg 60

Sidley Rd. <sup>Ditch</sup> Levels 1st. colvt. <sup>1961</sup> S. of SR 166 Pg 70

H. Patterson  
P. Young  
B. Mass

Thomas & Bell Rds  
Cool & Cloudy 60° 9-12-60

BM<sup>1</sup> 0.31 100.31 100.00  
BM<sup>2</sup> 4.86 95.45

6.65 93.66

O+O 8.39 91.92

S +50

S +100

S +50

S +81

W 7+00

West on Bell

W +50

W 3+00

W 3+50

T.P. 3.90 98.48 5.73 94.58

W 4+00

W 4+50

Basement

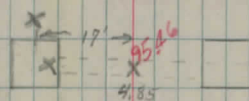
Top Window Sill at SE 4

House

Spt. E. side GET\*

1st. Pole Mark Bell St.

W. P. I. C. H. \*



91.21 95.56  
6.04 4.75

91.08 95.73  
5.23 4.58

93.93 95.81  
6.33 4.50

94.24 95.48  
6.05 4.83

93.41 95.10  
6.90 5.21

93.36 94.98  
6.75 5.33

93.47 94.87  
6.84 5.44

93.24 94.70  
7.05 5.61

92.67 94.18  
5.81 4.34

92.25 94.02  
6.23 4.46

Thomas & Bell  
 + 98.48 - Elev.  
 H I

5+00

5+50

6+00

6+50

7+00

7+50

7+75

culv.

Bell  
 E

~~91.97~~

~~6.57~~ 91.97

~~4.57~~ 93.89

~~99.80~~ 91.80  
~~2.68~~

~~89.81~~ 93.81  
~~4.67~~

~~97.83~~ 91.83  
~~6.65~~

~~89.63~~ 93.63  
~~4.55~~

~~97.57~~ 91.57  
~~6.97~~

~~89.55~~ 93.55  
~~4.93~~

~~97.29~~ 91.29  
~~7.19~~

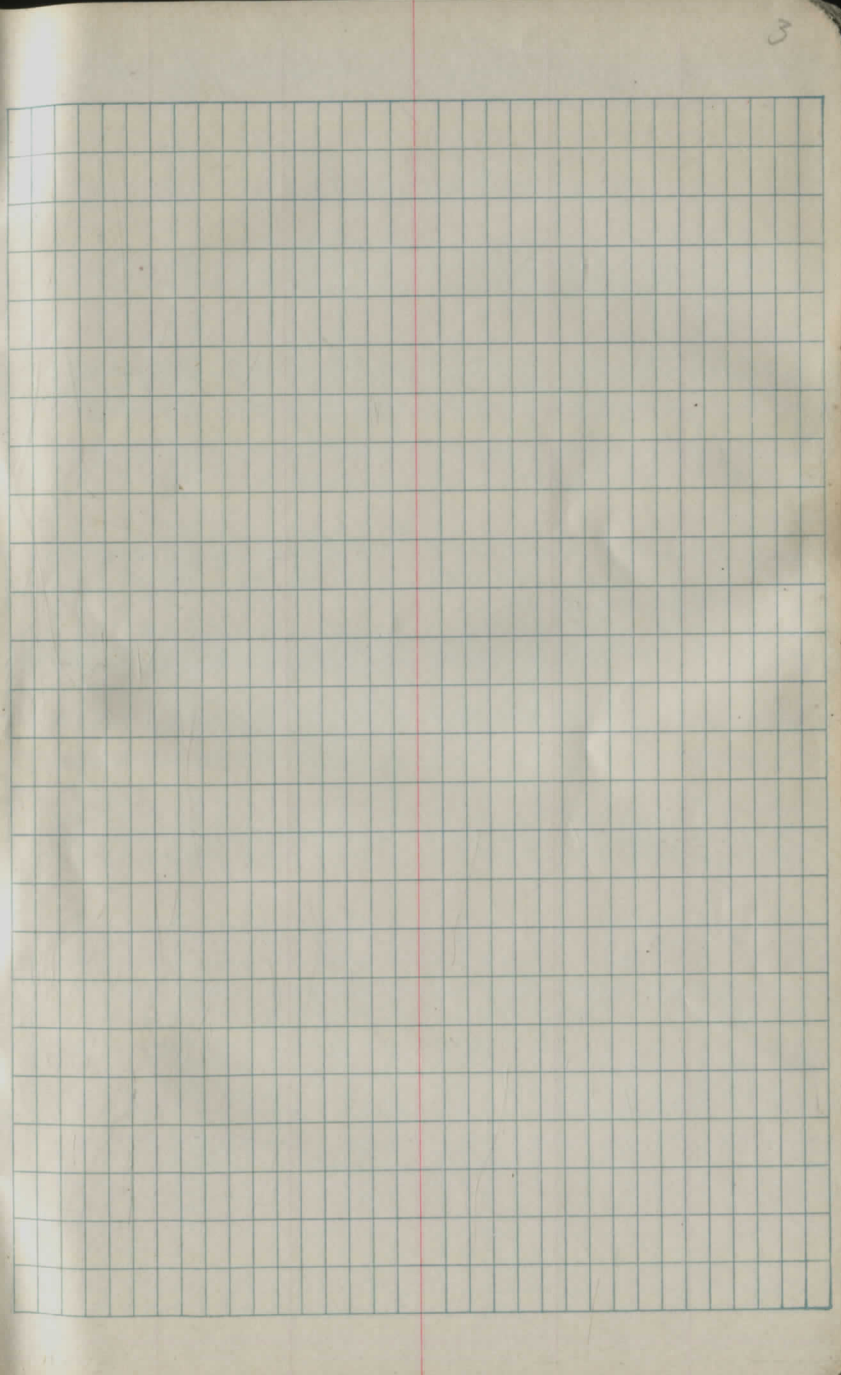
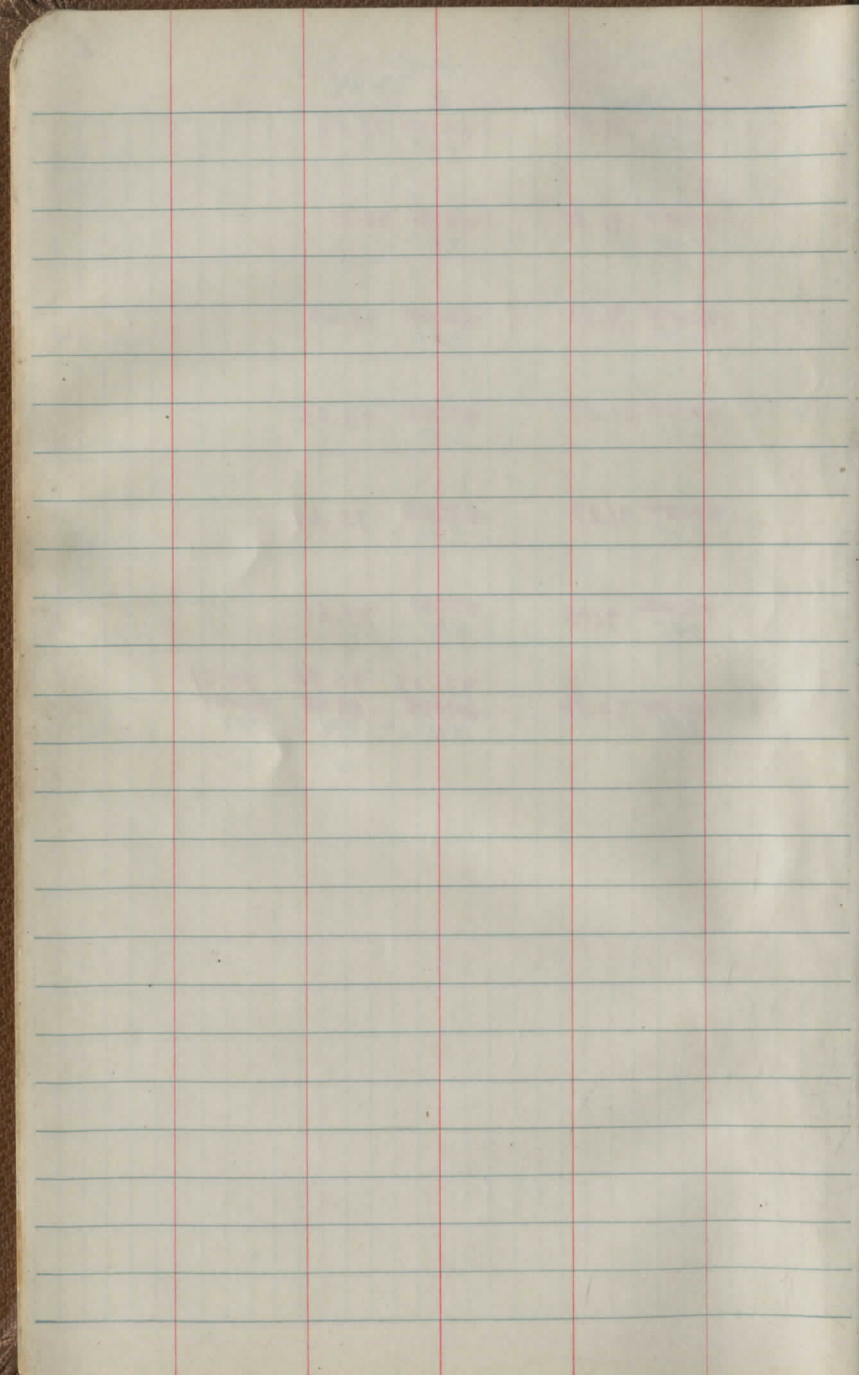
~~89.55~~ 93.55  
~~4.95~~

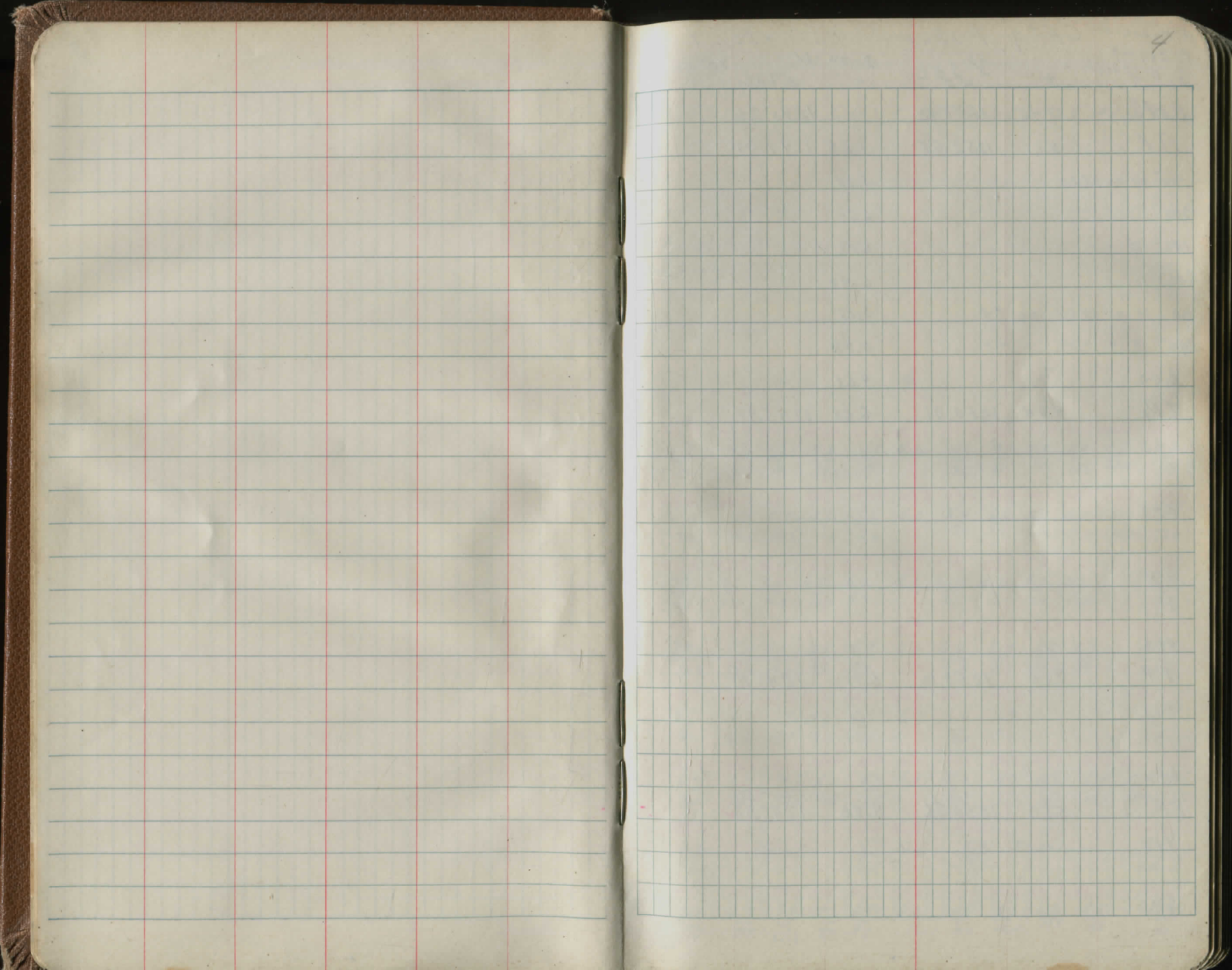
~~97.03~~ 91.03  
~~7.45~~

~~87.51~~ 93.51  
~~4.97~~

~~96.76~~ 90.76  
~~7.92~~

93.33 90.74 90.61  
~~89.55~~ ~~86.92~~ ~~86.61~~  
~~5.15~~ 7.74 2.87  
 10 60





H. Patterson CH #4 Auburn Rd. Sec I  
 P. Young  
 G. Diehrich + X Sec. 2-20-61 30° Chl  
 H<sub>2</sub> Elev

BM #1	3.46	1248.72	1245.26
T.P.	5.61	1252.65	1.68 1247.04
100' W on SR87			5.39
200' " " " "			6.65
100' E " " "			5.07
200' " " " "			6.47
100' S of SR87 on #4			3.15
200' " " " " " "			0.78
0+0			4.61
T.P.	4.04	1250.01	6.68 1245.97

1+0			
2+0			
3+0			
4			
4+0			
T.P.	7.00	1250.10	6.91 1243.10

5+0			
6+0			
BM #1	5.60	1250.86	4.80 1245.30 <sup>26</sup>

7+0			
8+0			

Hortz Spr. W. Side C&G #22746 25' H 50 6+60

	W	±	E
44.71	45.41	44.21	45.41
5.3	4.6	5.6	4.6
30	16.9	14	12.2
44.01	44.01	43.11	44.51
6.0	6.0	6.7	5.5
30	16.5	14.2	10.6
42.3	42.4	42.0	43.8
7.7	7.6	8.0	6.2
30	19.1	14.9	10.0
42.3	42.5	41.9	42.6
8.7	7.5	8.1	6.4
30	18.7	14.5	9.8
43.4	43.8	42.2	44.0
6.7	6.3	7.9	6.1
30	16.8	13.7	9.2
43.4	44.1	42.7	44.5
6.7	6.0	7.2	5.3
30	16.8	13.5	9.8
44.3	45.1	44.5	45.1
6.6	5.1	5.7	5.3
30	16.1	11.1	7.5
44.7	45.3	45.2	45.1
6.2	5.6	5.7	5.0
30	15.9	12.3	8.9
44.7	43.8	43.7	43.5
6.0	6.2	7.1	5.2
30	15.9	12.3	8.9
44.7	45.9	44.7	45.1
6.0	5.0	4.2	5.8
30	15.9	12.3	8.9



1250.86

H.L.

Elev

9+0				
10+0				
11+0				
T.P.	2.42	1244.63	8.65	1242.21
12+0				
13+0				
14+0				
15+0				
16+0				
17+0				
T.P.	2.49	1240.30	6.82	1237.81
18+0				
19+0				
20+0				
BM # 2	2.20	1240.50	2.99	1237.31

6

	L					E				
43.6	45.9	44.7	46.1	46.0	46.4	46.3	46.6	45.1	45.7	46.2
5.5	5.0	6.2	4.8	4.9	4.5	4.6	4.3	5.8	5.2	4.8
30	13.8	12.7	8.9	7.1		7.7	11.3	12.0	15.1	20
45.1	46.1	43.5	44.5	44.3	44.6	44.5	44.5	43.5	44.6	45.0
5.8	5.8	7.4	6.4	6.6	6.3	6.4	6.4	7.4	6.3	5.9
30	16.0	12.7	9.4	7.1		7.1	11.9	15.1	14.4	30
43.5	43.1	41.6	42.1	42.4	42.5	42.6	42.6	41.2	42.6	42.8
7.6	7.8	9.3	8.8	8.5	8.4	8.3	8.2	9.7	8.3	8.1
30	16	12.6	9.4	7.0		9.2	11.1	14.1	12.4	30
42.7	41.8	40.0	41.0	41.0	41.2	41.1	41.2	39.9	40.7	41.2
1.9	2.5	4.6	3.6	3.6	3.4	3.5	3.4	4.7	3.9	3.4
30	4.5	12.2	8.9	7.3		9.7	11.7	14.9	17	30
40.7	39.7	38.9	39.9	39.9	40.3	40.3	40.3	38.7	39.5	38.9
3.9	4.7	5.7	4.7	4.7	4.3	4.3	4.7	6.9	5.1	5.2
30	15.8	12.0	8.6	6.7		9.7	12.4	15.6	12.0	30
40.4	40.0	38.1	39.5	39.5	39.6	39.6	39.6	38.2	39.0	38.6
3.7	4.6	6.5	5.1	5.1	5.0	5.0	5.0	6.4	5.6	6.0
30	16.4	12.4	8.3	6.3		9.6	12.0	14.8	15.4	30
38.5	38.1	37.5	38.7	38.9	39.1	39.0	39.0	37.4	37.8	37.2
6.1	6.5	7.1	5.9	5.7	5.5	5.6	5.6	7.2	6.8	7.4
30	14.9	12.5	8.4	6.1		7.9	12.1	15.8	12.8	30
37.4	37.4	36.7	37.6	38.1	38.5	38.4	38.5	36.7	37.9	37.1
7.2	7.2	7.9	7.0	6.5	6.1	6.2	6.1	7.7	6.7	7.5
30	15.9	12.9	12.1	7.3		8.9	11.6	15.0	18.3	30
37.6	37.1	36.6	37.8	37.9	38.2	38.0	37.9	36.8	38.0	37.7
7.0	7.5	8.0	6.8	6.7	6.4	6.6	6.7	7.8	6.6	6.9
30	15.0	13.5	10.7	8.2		9.2	12.0	15.0	15.1	30
37.2	37.4	36.1	37.7	37.7	38.0	37.4	38.0	36.4	38.3	37.7
3.1	2.9	4.2	2.6	2.6	2.7	2.4	2.3	3.9	2.0	2.3
30	16.5	13.1	9.7	7.6		8.9	11.4	15.1	15.8	21.5
36.9	37.2	35.0	36.7	36.7	37.0	37.0	37.0	35.4	37.6	37.5
3.4	3.1	5.3	3.6	3.6	3.3	3.3	3.3	4.9	2.7	2.8
30	17.2	12.5	9.9	8		9.7	11.3	14.3	12.9	30
36.3	36.3	34.1	35.4	35.4	35.6	35.5	35.5	34.2	36.4	36.5
4.0	4.0	6.2	4.9	4.9	4.7	4.8	4.8	6.0	3.7	3.8
30	17.7	12.3	9.8	7.8		9	11.3	14.7	15.5	30
Vert. S.P.R.	E	Root	Trip	Elm	20 Lt. Sto.	20+30				

2943  
1240.30

2170					
2270					
2310					
2470					
BM#2		2.20		37.23	1238.10

3/2/61 continue xsec. to sta 38+0 Inc.  
 Temple  
 Diederich  
 Young  
 Windy, fair, mild  
 Temp ± 05

BM#2	0.15	37.38		37.23	
		1238.75		1238.10	
TP	-0.05	29.65	7.78	29.60	1230.47
26+0		1230.22		1230.47	
27+0					
28+0					
29+0					

39.6	39.2	32.7	33.8	33.8	33.9	33.9	33.9	32.5	39.8	34.9
4.5	5.2	6.7	5.6	5.4	5.5	5.5	5.5	6.9	4.6	4.5
30	17.7	7.5	9.8	7.8	9.2	9.2	16.4	18.9	18.0	30
33.1	32.8	31.5	32.4	32.5	32.7	32.6	32.7	31.4	33.4	33.2
6.3	6.6	7.9	7.0	6.9	6.7	6.5	6.7	8.0	6.9	6.2
30	16.1	12.5	10.3	7.9	9.2	9.2	11.1	14.7	15.5	30
32.4		32.2		31.3	31.5	31.5	31.5	30.2	31.3	31.3
7.0	Drive	7.2		8.1	7.9	7.9	7.9	9.2	8.1	8.1
30		14.4		7.2	9.9	4.7	15.6	12.9		30
31.6	31.1	29.0	30.3	30.1	30.5	30.5	30.5	29.2	30.9	30.7
7.8	5.7	10.4	7.1	7.3	8.9	8.9	8.9	10.2	9.0	9.2
30	16.3	11.9	7.1	8.2	9.5	11.5	15.2	17.4		30
30.5	30.0	27.6	29.4	29.3	29.8	29.8	29.7	28.1	29.4	28.7
8.9	9.4	11.8	10.0	10.1	7.6	9.6	9.7	11.7	10.0	11.0
30	17.3	12.6	9.4	2.4		7.3	11.5	15.2	18.8	21.9
29.1	29.3	26.1	28.0	28.0	28.4	28.3	28.2	26.4	28.4	27.3
1.5	0.3	3.5	1.6	1.6	1.2	1.3	1.2	3.2	1.2	2.3
30	17.6	11.8	9.6	7.2	9.8	12.2	15.3	18.5	25	30
28.7	27.9	23.9	25.6	25.6	25.8	25.6	25.6	23.9	26.6	25.6
0.9	1.7	5.7	2.0	2.0	3.8	2.0	2.0	5.7	3.0	2.0
30	17.6	10.7	9.1	7	10	12.7	15.7	20.9	24.9	30
25.2	24.3	20.3	22.2	22.4	22.6	22.5	22.5	20.8	22.9	22.6
4.2	5.3	9.3	2.4	2.2	7.0	7.1	7.1	8.8	6.7	7.0
30	17.9	14.5	9	6.7	10.4	12.5	16.1	20.5	24.6	30
22.5	22.4	16.7	18.5	19.1	19.0	18.7	18.7	16.8	20.7	20.6
7.1	7.2	12.9	10.8	10.5	10.6	10.9	10.9	12.8	8.9	9.0
30	22.9	12.7	8.9	6.8	10.3	12.8	15.8	21.5	30	

	+	HI 29.65 <del>1230.42</del> 18.75	-	elev
TP	1.95	<del>1219.52</del>	12.85	<del>1277.57</del> 16.80
30+0				
31+0				
TP	0.13	<del>1206.89</del> 06.12	12.76	<del>1206.76</del> 05.99
32+0				
33+0				
34+0				
TP	0.23	<del>1195.99</del> 94.76	11.39	<del>1195.50</del> 94.73
35+0				
36+0				
37+0				
TP	1.20	<del>1187.81</del> 87.04	12.12	<del>1183.61</del> 82.84
38+0				
BM#3			9.61	<del>1178.22</del> <del>1178.20</del> 77.43 <small>adj see pg 17 for final</small>
BM#3	9.61	1187.81		
TP	11.02	1198.50	0.33	1187.48
TP	11.16	1209.21	0.45	1198.05
TP	12.60	1220.60	1.21	1208.00
TP	11.28	1231.11	0.77	1219.83

	W	E
18.2	17.8	10.7
13.3	13.4	13.7
13.5	13.5	11.6
14.9	16.1	16.4
0.5	2.9	8.0
5.2	5.3	5.0
5.2	5.2	7.1
1.8	2.6	2.3
30	22.6	13.0
9.3	7.2	5.0
9.7	11.5	15.1
22.2	20.5	30
10.7	10.4	04.8
7.2	7.3	7.5
7.4	7.3	5.9
9.9	9.6	9.6
8.0	8.3	13.9
11.5	11.4	11.2
11.3	11.4	12.8
8.8	9.1	9.1
30	21.2	13.2
9.6	7.2	7.2
9.2	11.6	14.9
21.3	30	
5.2	5.5	9.8
1.7	1.7	1.7
1.6	1.5	9.7
3.0	2.7	
0.9	0.6	6.3
4.4	4.4	4.4
4.2	4.5	4.6
6.4	3.1	3.2
30	26	13.8
10.7	7.6	9.3
12.3	14.7	20.3
30		
97.5	95.4	95.6
77.1	97.1	97.2
97.0	97.0	97.0
95.9	97.1	96.7
8.6	7.7	10.5
9.0	8.9	9.1
9.1	9.1	10.2
9.0	9.0	9.0
30	18.3	12.7
9.7	7.1	9.9
12.1	10.6	13.4
30		
93.7	94.3	93.5
94.5	94.5	94.7
94.3	94.3	93.2
93.9	92.5	
12.0	11.8	12.6
11.6	11.4	11.4
11.8	11.8	12.9
12.2	13.6	
30	19.2	12
10.9	6.1	10.1
13	14.9	16.2
30		
93.2	92.0	91.1
92.0	92.6	92.7
92.9	92.4	91.4
91.7	89.9	
1.8	3.0	3.9
3.0	2.4	2.3
2.6	2.6	3.6
3.3	5.1	
30	15.8	13.3
10.7	6.2	9.9
12.6	12.0	16.5
30		
94.6	92.9	89.3
90.8	90.9	91.1
90.8	90.8	90.8
89.4	90.2	89.0
0.4	2.1	5.7
4.2	4.1	3.9
4.2	4.2	5.6
4.8	6.0	
30	18.0	13.1
9.0	6.6	7.0
12.5	15.1	17.2
30		
91.0	91.1	83.7
87.0	87.2	87.2
86.8	86.7	85.4
87.4	87.3	
4.0	3.9	11.3
8.0	7.8	8.2
8.3	9.6	5.6
5.7		
30	20.6	14.2
9.7	7.0	10.4
12.6	14.1	20
30		
84.8	83.6	78.6
80.1	80.9	80.3
80.4	80.3	77.9
81.5	82.3	
2.2	3.4	8.2
6.9	6.6	6.2
6.6	6.7	7.6
5.5	4.2	
30	20	13
7.0	7.3	9.6
11.9	12.3	18.7
30		

	+	HI	-	elev
		1231.11		
T.P.	7.96	1238.76	0.31	1230.80
BM#2			0.61	1238.15

3/3/61 Check levels on BM's  
 Temple Partly cloudy  
 Young slight breeze  
 Temp 25

<del>BM#1</del>	<del>5.29</del>	<del>1250.55</del>		<del>1245.26</del>
<del>T.P.</del>	<del>1.11</del>	<del>1242.94</del>	<del>8.72</del>	<del>1241.83</del>
<del>BM#2</del>			<del>6.03</del>	<del>1236.91</del>
<del>T.P.</del>	<del>8.16</del>	<del>1249.70</del>	<del>1.34</del>	<del>1241.60</del>
<del>BM#1</del>			<del>4.81</del>	<del>1244.89</del>

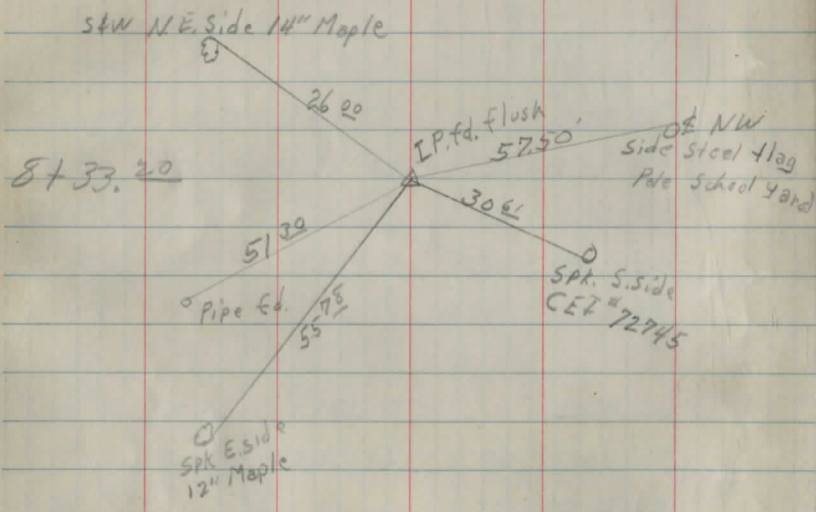
BM#1	4.81	1250.07		1245.26
T.P.	2.47	1243.56	8.98	1241.09
BM#2			6.27	1237.23 USE
T.P.	8.62	1250.57	1.61	1241.95
BM#1			5.32	1245.25

BM#3	0.24	1179.64		1179.40
T.P.	2.08	1171.06	10.66	1168.98
BM#4			10.07	1160.99 <sup>1160.95</sup> see pg 17 for final
T.P.	10.33	1179.55	1.84	1169.22
			.23	1179.32

Check levels cont  
 on Pg 17

H. Patterson  
P. Young  
G. Dieblich

CH #4 Auburn R sec I  
2-27-61 Cool



OTO

△ SR 87  
MON. BOX

SPK SW side  
20" OAK

31.82

43785<sup>69</sup>

23.92  
SPK N. side  
20" Double Cherry

SPK set. POT.

SEW SW side

8" Basswood

SEW SW side  
10" Elm

80.82

35.28

25782<sup>85</sup>

IP Cd.  
27.92

SPK N side  
CET.

62757<sup>66</sup>

IP in  
Mon Box  
Pekin Rd

SEW S.W. side  
12" Maple

83.35

53783<sup>67</sup>

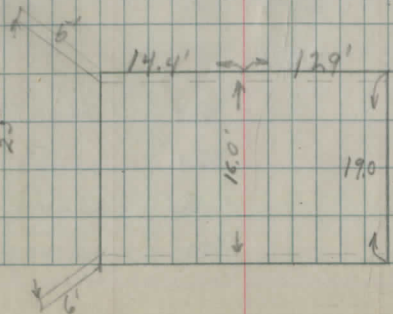
SEW S.W. side  
18" Maple

81.80

1.93  
Elm

I. Pipe set POT.

45788



H. Patterson CH#4 Hubert Rd Sec T  
 P. Young  
 G. Diarrist Topo 2-20-61 49° Mid  
 W E

4+00	Rail fence	24.5	
+91	10 CMP 2 Coal Mark x 16.5'	17.5	
+84	Rail fence	24.5	
+99	Rail	18.5	
+67	Rail fence	18.5	
+55	6" Drain tile flow west 16' off k		
+55	10" x 29.5' Cast Iron Cross Culvert		
+37		28.5	CEI
+13	10" Apple Flashing walk	21'	
3+04	16" Boiler x 5'	14.5'	
+97	10" Apple	21'	
+44		12'	12" x 18.5' Conc
+35		23.	CEI
+120	O.B.T.	29	
+15	Hedge	23.0'	
2+10	End fence	23.5	
+82		28.5	CEI
1+15	Wire fence	24.5	
1+05	12" x 16' CMP	10'	
+57	O.B.T.	29.5'	
+57	15" Maple	23'	
+34		21'	Steel Post
+33		21'	
0+28		29	CEI

+23		29'	CEI	12
+06	O.B.T. w	29.5		
8+00		18'	End 12" CMP	
+95	End 8" Tile	13.5'		
+82	15" Maple	21.5'		
+81		28.5'	Wood Post	
+49	12" Maple	21		
+14	10" Maple	21'		
7+00	Drive			
+51		28.5'	CEI	
+50		14'	Begin 6" x 40' 20" 12" CMP full ?	
+35	Begin 8" Tile	19'		
6+33	O.B.T.	29.5	27	Small Pine
+90	10" Maple	21'		
+64		26	Lilac Bush	
+56	12" Maple	21'		
+27		27'	Small Pine	
+22		27'	Small Pine	
+15		27	Wood light Post	
5+10		13.5'	12" x 28' Cast Iron	
+93		28.5	CEI	
+88	12" Maple	22'		
+61		13.5'	Paved Dr. 10" x 32.5' Concs	
+21	O.B.T.	29'		
+16	Rail fence	19'		
+06	Rail fence	19'		
4+02	Wood light Post	19'		

	W		E
+65	OBT.	29'	
+34	15" Elm	26'	
21+27	13" Elm	26'	
+57		28.5'	CET
+50	12"X16" R.R.P.	13.5'	
<del>+57</del>		<del>2</del>	<del>CET</del>
20+33	30" Trip Elm	23.5'	
19+90	OBT.	29'	
18+15	OBT.	29.0'	
17+04		29.5'	CET
16+40	OBT.	28.5'	
15+29		29'	CET
+64	OBT.	28'	
14+57		16'	12"X16" Conc. <sup>OK</sup>
13+53		29'	CET
12+90	OBT.	28'	
+79		29'	CET
+35		14'	12"X31" C.M.P. w <sup>OK</sup> Conc. <sub>Fit w/</sub>
11+16	OBT.	29'	
+51	12"X15" C.M.P. <sup>Stone W/nd.</sup>	12.5'	
+39	10" Maple	20.5'	
10+00		27'	CET
+59	OBT.	29.5'	
+49		16.5'	12" Conc end
+49		23'	CET
9+14		17'	12" Conc. Beg.
8+50	23" Maple	20'	

	W		E
33+99	OBT.	28.5'	
+99		28.5'	CET
+47	12"X16" Conc. <sup>OK</sup>	10'	
32+29		16'	15"X15" C.M.P. <sup>OR</sup>
32+16'	OBT.	28'	
31+18		28.5'	CET
30+36	OBT.	28'	
29+38		29'	CET
28+67	OBT.	28'	
+68		28.5'	CET
27+26	15" Elm	21'	
+88	12" Elm	24'	
+58	CET	29.5'	
+58	15" Ash	25'	
26+09	13" Elm	21.5'	
25+89		28'	CET
+34	Steel Post	25'	
+26	12X16 Conc.	13'	
+20	Steel Post	21'	
25+17	OBT.	29'	
24+12		29'	CET
23+42	OBT.	29'	
+95	12"X21" Conc. <sup>OK</sup>	12'	
22+33		28.5'	CET

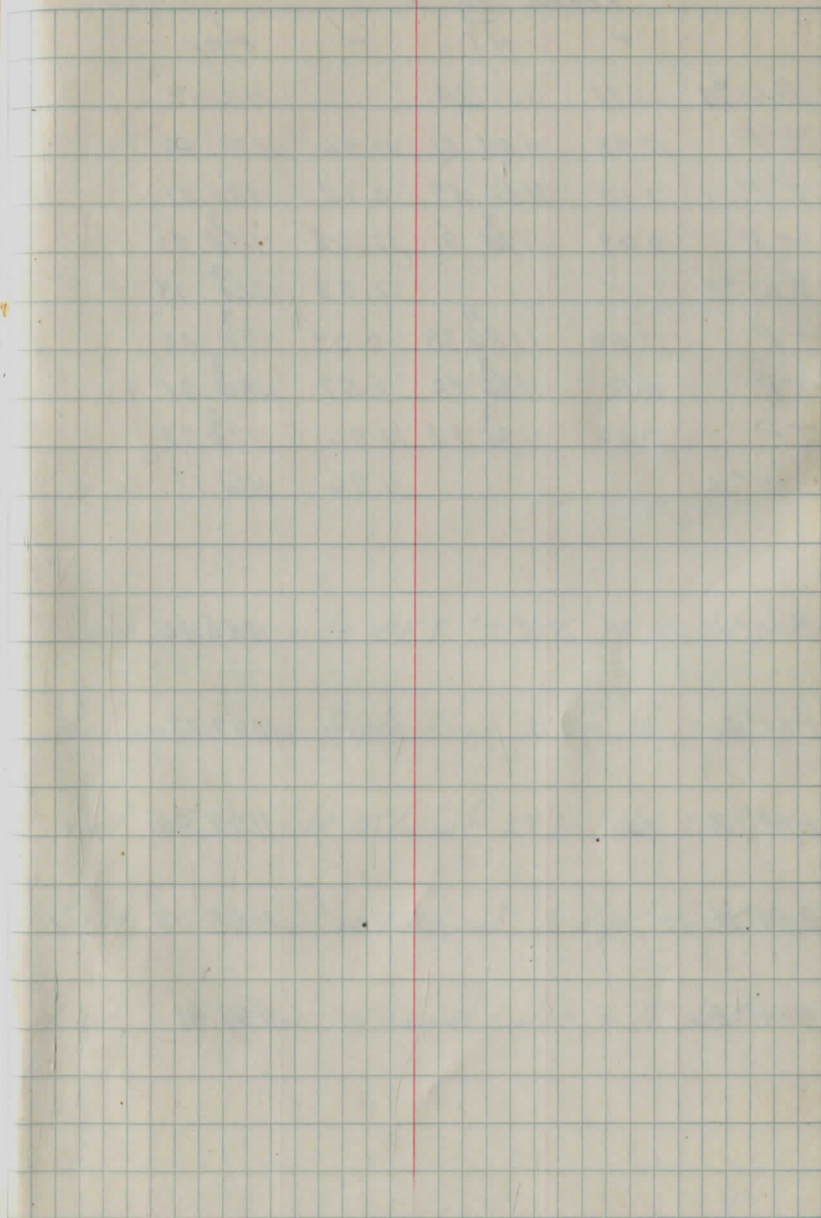
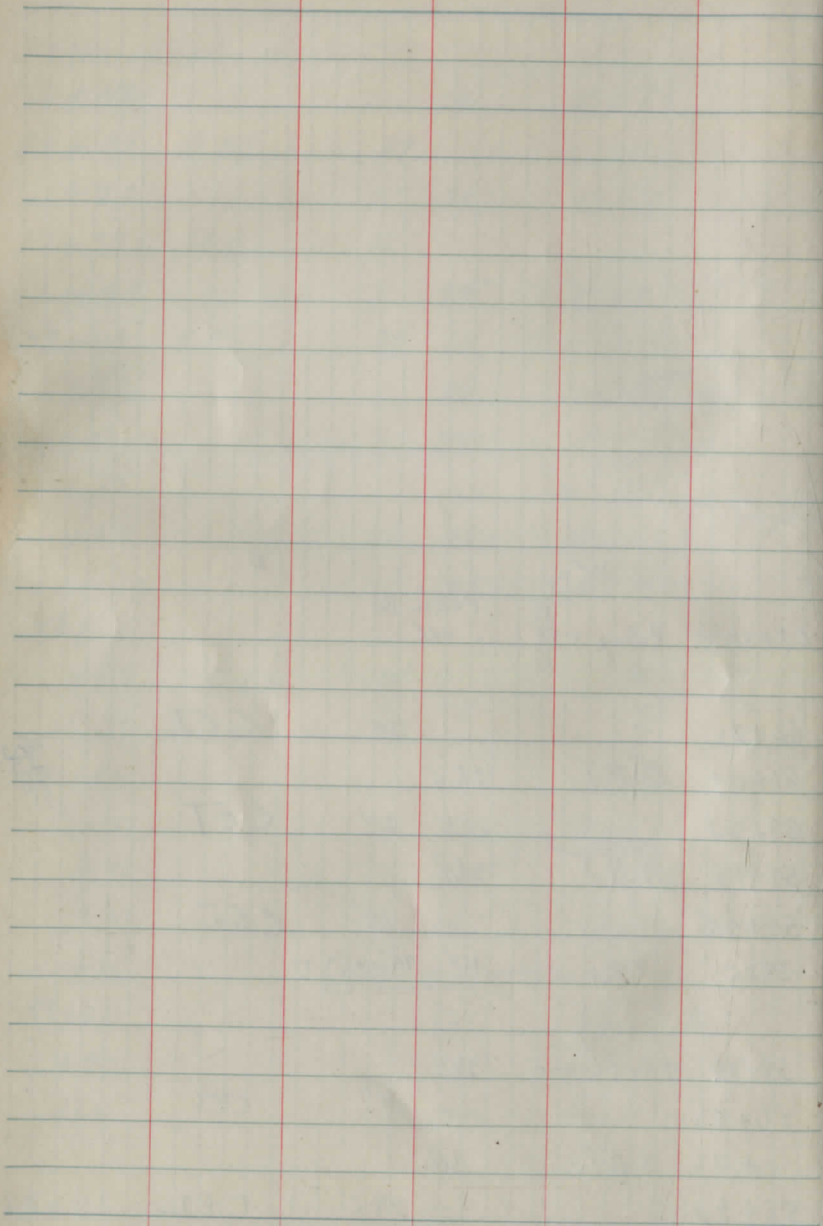


	W	E	
+81	18" Locust	19'	
+63	Begin fence 15" Locust +	19'	
+62		28'	CEI
39+07		28'	Steel fence Post
+85	12" Locust +	24'	
+80	OBT.	28.5'	
+55	Drive ? No Pipe		
+52	15" Locust	23.5'	
+46		29'	End fence
+38	54" Locust	19'	
+32		24'	OBT.
+23	10" Cherry	18.5'	
38+01	15" Locust	24'	29' CEI
+94	13" Osage	23'	
+80	18" X 21" Conc.	13.5'	
+69	14" Osage	23'	
+56	10" Maple	23'	
+26	12" Maple	26.5'	
37+15	18" Locust	24.5'	
+78		14.5'	11" X 15" CH? Wire Gate Fence
+69	12" Locust	25'	27'
+41	10" Locust	23'	
36+37		28'	CEI
35+22	OBT.	29'	
+73		19.5'	CEI
34+41	12" X 15.5" Vit. Conc.	13'	

	W	E.	
+60	12" Cherry	24.5'	29' CEI
+46	OBT	29.5'	<del>29'</del>
44+0.7	20" Oak	23.5'	
+0.1		23.5'	Drive No Pipe
+86	20" Double Cherry		
+76		23'	7" Pine
+60		23'	Clump of 5 Pines
+45		20.5'	8" Pine
43+00	20" Double Oak	22'	
+94	12" Oak	22'	
+89		21'	3" Pine
+80		21'	6" Pine
+82	15" Oak	17'	29' CEI
+66	40" Double Oak	24.5'	
42+32		22'	10" Pine
+93		<u>13.5'</u> <u>20'</u>	30" X 33.3" RCP
41+22		29'	CEI
+96	30" Elm	20'	
+53	OBT.	28.5'	
+48	24" Oak	21'	
+43	18" Cherry	21'	
+17	18" Locust	20'	
+12	10" Locust	23'	
40+0.1	8" Locust	20'	
+90	40" Double Locust	25'	

	W		E
54+41	Drive No Pipe		
+42		29'	CET
53+40	O.B.T.	29'	
+72		29'	CET
51+39	O.B.T.	28.5'	
+93		29'	CET
49+63	O.B.T.	29'	
+83		25'	OBT
+48		22.5'	Pine Clamp
+39		12.5'	12" Boiler
+25		28.5'	Pipe
		28.5'	CET
48+21			
+88	OBT	29'	
	End Wire fence 27'		
47+33			
+79		27.5'	Pine Fence on
+41		29'	CET
+22		14.5'	Guard Post
+15		29'	4 in Row
46+00		12.5'	Guard Post
+77		13'	Guard Post
+65		15.3'	Guard Post
			5 in Hole
45+36		15.5'	Guard Post

	W		E
62+57			
			Pack Rd
			? Box x 28' long 24.5'
62+25		29'	CET
61+00	O.B.T.	28.5'	
60+53		29'	CET
59+15	OBT	28.5'	
58+75		29'	CET
58+55			? Box colt 16.5' 9.5'
57+27	OBT + 16' fence	28.5'	
56+28		28'	CET
+42	O.B.T.	30'	
55+20		29.5'	CET



check level continued  
from Pg 9

	+	HI	-	elev
BM#1	10.77	1171.94		1161.17
T.P.	12.93	1184.51	0.36	1171.58
T.P.	1.10	1185.17	0.14	1184.37
T.P.	0.09	117 <sup>2</sup> <del>8</del> .91	12.65	117 <sup>2</sup> <del>8</del> .82
BM#5			12.83	116 <sup>0</sup> <del>4</del> .08
T.P.	12.56	118 <sup>5</sup> <del>6</del> .38	0.09	117 <sup>2</sup> <del>8</del> .82
T.P.	0.12	118 <sup>3</sup> <del>2</del> .93	1.57	118 <sup>3</sup> <del>2</del> .81
T.P.	0.16	117 <sup>3</sup> <del>2</del> .13	10.96	117 <sup>2</sup> <del>2</del> .97
BM#4			11.96	1161.17

BM#1 1245.26

BM#2 1237.23

BM#3 1177.35

BM#4 1158.90

BM#5 1157.81

Hort spk W side CEI #72786 25'lt sta 6+60

Vert spk E. side triple Elm 22'lt sta 20+33

Hort spk SE side 12" Locust 27'lt sta 38+90

X cut in NW cor NW Hdwal Bridge sta 46+03

X cut in NW cor W Hdwal culv't 11'lt sta 58+60

H. Patterson #4 Auburn Rd Sec I

P. Young Stad. for Dr. Relocation 4-11-61  
 Cloudy - Cool - Windy

+ HI - E 1<sup>st</sup> Hgt. 4

B.M. 5.41 1187.21 1182.80

53+80.62 Sittling on

43+85.83 Dead Sign

CET 37°-47' 50.0'

16" Maple 120°-05' 81.0'

16" Hickory 116°-43' 103.0'

12" cherry stump 112°-16' 123.5'

SW 2 Hoop 138°-09' 158.0'

SE 4 " 144°-11' 122.4'

12" Maple 136°-24' 85.5'

1/2 Drive at Pt. edge 172°-05' 57.5'

1/2 Rd & Dr. as exists now 5.82 1181.39

Edge P.V. & Dr 5.61 1181.60

25 W in Dr. from edge 4.97 1182.44

50 W " " " 3.10 1184.11

75 W " " " 2.44 1184.77

100 W " " " 1.52 1185.69

125 W " " " 0.90 1186.31

Sta. Dist.

1/2 Rd. at Sta. 54+0.0

H. Patterson  
P. Long

CH #4 Auburn Rd

4-24-61

Dr. Profile

cloudy &  
Warm 64°

	+	HI	-	Elev.
BM #3	1.23	1178.58		1177.35
T.P.	9.25	1178.03	9.50	1168.78
<sup>10.81</sup> E Rd.			10.66	87.3
0 E edge exist Pmt.				
25			8.36	69.6
50			6.10	71.9
75			4.32	73.7
100			2.69	75.3
25			1.25	76.7
49			0.00	78.0
T.P.	10.32	1178.28	10.07	1167.96
BM #3			0.92	1177.36

Hort Spt SE side 12 August 27' Lt. Sta. 38+90

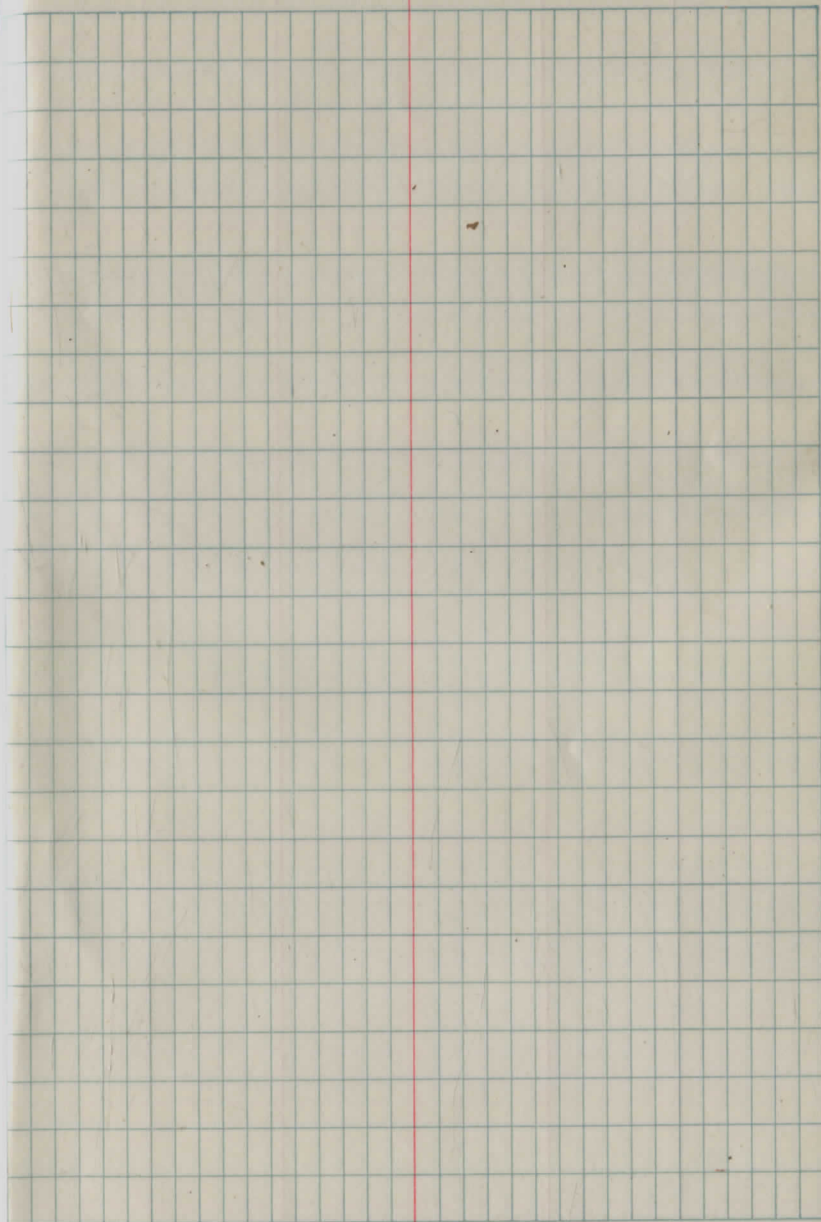
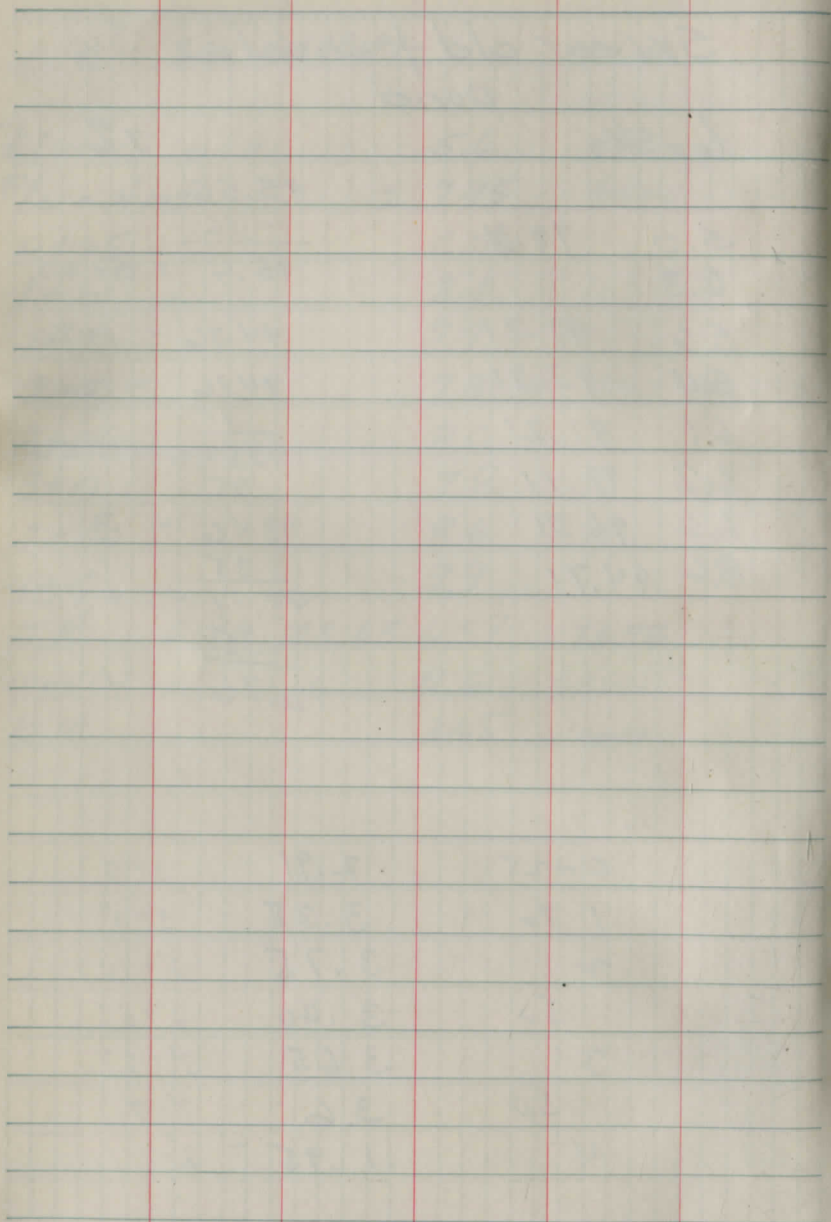
Kiwanis Lake  
Swamp

B.M.	3.31	103.31		100.00
E Elmer 15' cutlot			5.6	
F/L outlet			± 7.75	95.56
0+25			6.70	
1+0			8.1	
1+70			7.7	
2+0			7.8	
2+50			8.0	
3+0			7.8	
3+50			8.6	
4+0			9.9	
T.P.	6.91	103.65	6.57	96.74
± 4+50			11.6	92.06
B.M.			3.65	100.00

SW cor old foundation Set  
pond.

top stks			7%	$\frac{17}{17}$
			95.56	$\frac{17}{17}$
			- 16	
5.0	98.31		95.4	= 0+25
6.3				
5.6	97.71		94.36	= 1+70
5.4	97.91		94.16	= 2
			35	
6.1	97.21		93.81	= +50
			35	
6.2	97.11			
6.6	96.71		93.46	= 3
			35	
8.6	94.71		93.11	= +50
			35	
			92.76	= 4

0+25	2.91	3-0
1 70	3.35	3'-5"
2	3.75	3'-10"
50	3.40	3'-5"
3	3.65	3'-8"
50	3.6	3'-7"
4	1.95	= 2'-0"

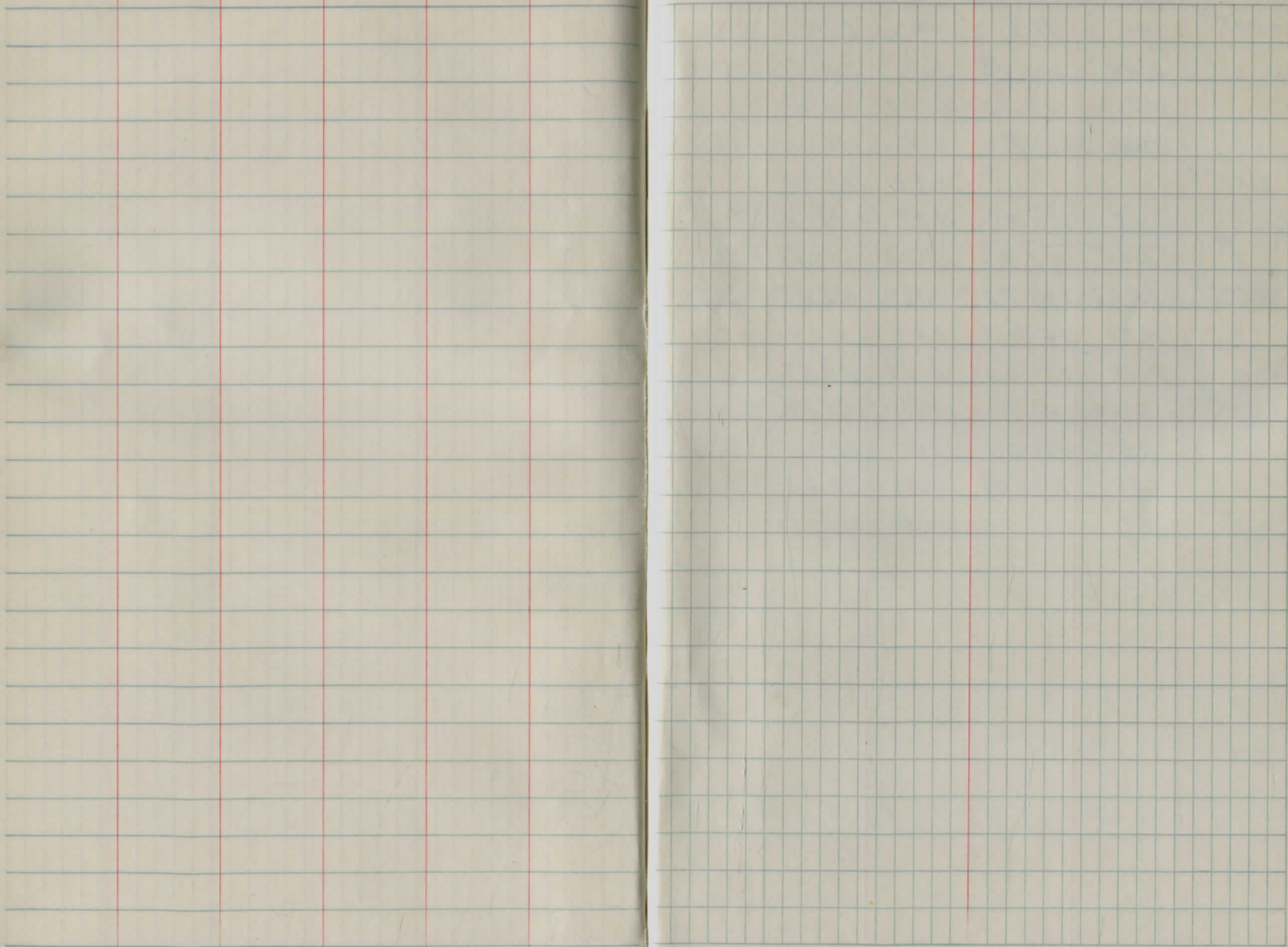




This page is a blank ledger sheet. It features horizontal blue lines for writing. There are four vertical red lines that create five columns of varying widths. The columns are roughly in the proportions of 1:1:1:1:2 from left to right. The page is otherwise empty.

This page is a blank ledger sheet with a grid layout. It has horizontal blue lines. A single vertical red line is positioned on the right side, creating a narrow margin. The rest of the page is filled with a grid of small squares, typical of a ledger for recording transactions. The page is otherwise empty.





H. Patterson Valley View Dr Chester

P. Young

BM's.  
Cool-Clear

3-30-61

BM #1	+	H.I.	-	Elev.
	6.48	106.48		100.00 ✓
	11.75	117.76	0.97	106.01
	5.68	122.73	0.71	117.05
BM #2			0.54	122.19 ✓
			11.37	111.36
#1	0.65	112.01	12.02	99.99 ✓
BM #2	12.53	134.72		122.19
	11.33	145.56	0.49	134.23
	9.19	154.06	0.69	144.87
BM #3			7.01	147.05
	0.05	142.06	12.05	142.01
	1.37	133.00	10.43	131.63
✓ #2			10.80	122.20

SPK, E. side CEI # 395815 25' Lt. Sta. 2+96

SPK, E. side CEI # 25' Lt. Sta. 9+0.3

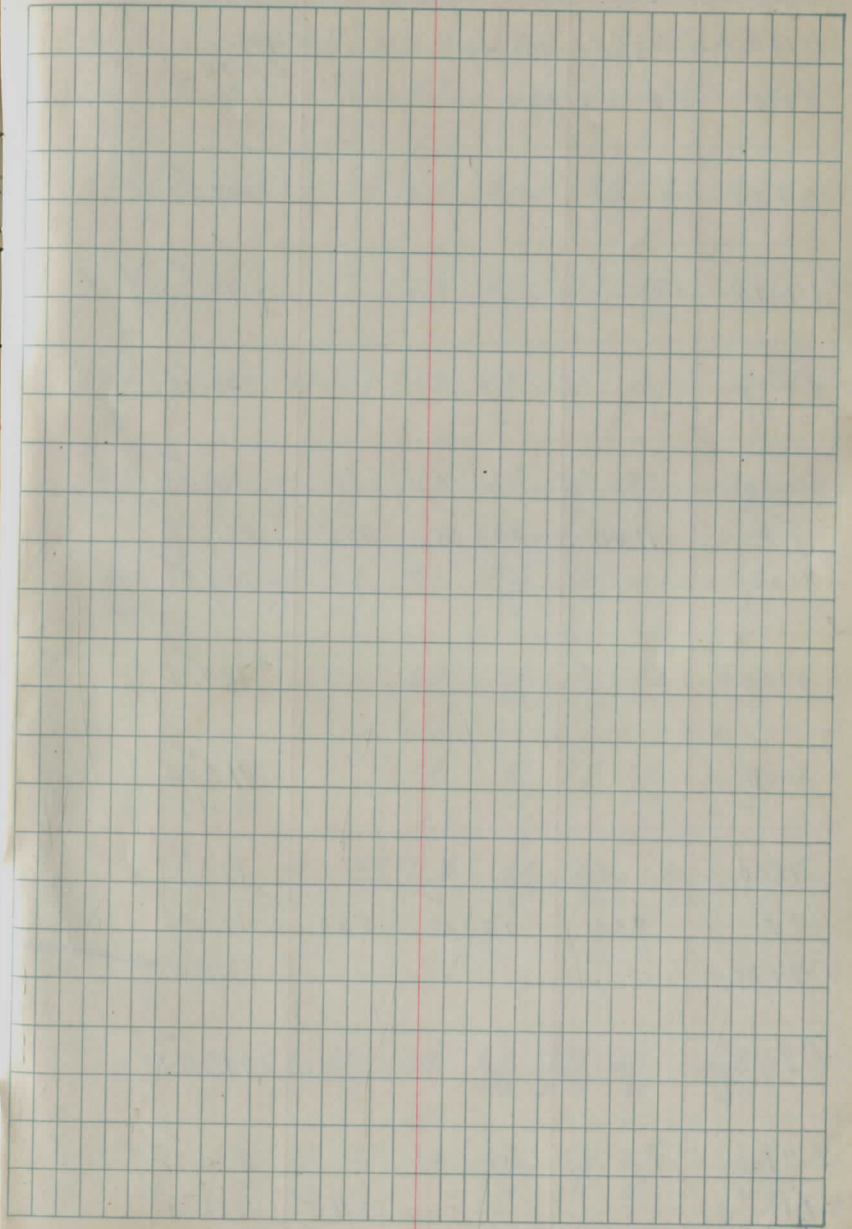
SPK, E. side CEI # 133258 Sta 18+12 25' Lt. ♀

Topo 3-30-61

✓ 10+25	End 10" vit	19'	25'	Brush
✓ +10	Begin 10" vit	17'		
✓ 9+03	CEI	25'		
✓ +82	End 10" vit	19.5'		
✓ 7+54	CEI	25'		
✓ 7+0		25'		
✓ +76	Steel Lamp Post	23'		
✓ 6+0	CEI	25'		
✓ 5+15	Wood Lamp Post	29'		
✓ +83	Begin 10" vit pipe	16'		
✓ +50	CEI	25'		
✓ 4+19	12" X 20.5 Conc.	14'		
✓ 3+30	Swamp	14.5'	18'	? 15" Conc Culvert
✓ +96	CEI	35'		
✓ 2+0	24" Conc	16'		
✓ +34	Catch Basin	16'		
✓ +37		30'	24" Conc Culvert	
✓ 1+23	CEI	25'		

✓ +95		24.5	CEI
✓ +64	12 Ash	27'	
✓ +62	15" Elm	27'	
✓ 19+59	CEI	25'	20' 18" Elm
✓ +76	15" Elm	25'	
✓ +64		16'	10" X 15.5 Conc Dr.
✓ 18+47		24'	12" Elm
✓ +18	12" Maple	28'	
✓ 18+12	CEI	25'	
✓ +37		13'	Dr. No pipe
✓ 17+42	Steel Post	25'	
✓ +90	6" Cast Iron <sup>X26'</sup>	15'	
✓ +79	Steel Post	26'	
✓ +65		13'	Paved Dr No Pipe
✓ 16+1	CEI	25'	25' wide
✓ 16+22	6" X 20.5 Conc. Iron	13'	
✓ +33	6" X 17.5 Conc	15'	
✓ 15+07	CEI	25'	
✓ +54	CEI	25'	
✓ 13+27	8" X 21' Conc.	15'	
✓ +45		16'	12" X 20' CMP
✓ 12+05	CEI	25'	
✓ +28		24'	10" Cherry
✓ 11+03	12" X 20.5' Conc.	17'	16' 12" X 20' CMP
✓ 10+56	CEI	25'	

- ✓ +54 x 15' 12" x 20' CMP.
- ✓ 24+37 12" x 20' Conc 16'
- ✓ +70 17 12 x 24' CMP
- ✓ +50 18 x 32' Conc ~~15'~~ 17'
- ✓ +50 End 6" Vit. tile 15'
- ✓ +10 6" Vit. Tile 18'
- ✓ 23705 Steel Lamp Post 2.8'
- ✓ +99 12" x 18' Conc 18'
- ✓ +49 25' 4" Galv 12" dia
- ✓ +41 26'
- ✓ +19 28' 12" Rig Hickory
- ✓ 22701 CEI 25'
- ✓ +61 Light Post in Conc 24'
- ✓ +51 12" x 16' Conc 16'
- ✓ +27 Star Post in Conc 12'
- ✓ 21+12 19 12" x 18' Conc pipe
- ✓ +59 CEI 25'
- ✓ +61 10' x 20' Conc 18'
- ✓ +59 15' x 46' Conc ~~18'~~ 16'
- ✓ 20+33 Culvert 19'



H. Patterson  
P. Young  
S. Robertson

Valley View Dr

X. Sec.

3-31-61

35°  
Cool-Cloudy

B.M. #1	5.00	105.00		100.00
0+0	4	U.S. 322		E elev 100.20
0+30				99.90
1+00				99.30
2+00				99.30
3+00				101.60
T.P.	11.50	113.35	3.15	101.35
4+00				102.25
5+00				107.15
6+00				110.65
7+00				113.15
T.P.	9.56	122.62	0.29	113.06
7+00				119.02
8+00				116.82
9+00				120.92
B.M. #2			0.75	122.17

	W.				E.				
SPR. E Side	CEZ #395815	25' LA	4	Sta. 1423					
2.5	3.8	4.8	4.8	4.3	3.0	1.6			
150	100	50		50	100	100			
4.5	00.00		5.1	5.6	8.9	9.3			
30				17	24	30			
4.6	00.00		5.2	6.5	8.1	10.2	11.6		
30				12	16	22	30		
2.9	9.7	2.8	6.3	5.2	5.9	7.0	6.1	5.2	
30	165	11	8		12	15	17.5	30	
5.4	5.1	7.3	5.9	4.8	3.4	3.8	4.7	3.9	2.5
30	225	21	17	13		11	16	21	30
11.7	11.3	11.8	11.2	11.1	11.6	12.1	11.7	9.6	
30	17	14	12		13	15	16	50	
5.4				6.2	6.8	7.1	6.9	6.0	
30					12.5	14	15	30	
3.5	3.2			2.9	3.3	3.7	3.2	2.2	
30	25				13	15	16.5	30	
		0.1	0.3	0.2	1.2	0.6	0.1	0.5	
		10	8		15	16	18	30	
8.6									
30									
5.7	5.7	6.8	6.4	5.8	6.5	7.1	5.8	6.3	
30	24.5	17	16		14.5	16.5	20	50	
1.9	2.1	3.5	2.1	1.7	2.6	3.3	2.5	2.8	
30	19	16	11		15	17	19	30	

		HI		SI
B.M. #2	11.54	134.03		122.19
10+0				126.83
11+0				131.13
T.P.	11.38	143.00	2.41	131.62
12+0				134.50
13+0				136.80
14+0				140.70
T.P.	12.49	154.38	1.11	141.59
15+0				144.68
16+0				148.78
17+0				149.68
18+0				147.88
B.M. #3	2.53	149.56	2.35	147.23
19+0				144.36
20+0				142.26
21+0				142.16

	5.6	7.0	7.4	7.2	8.4	8.8	8.0	9.0		
	30	10.5	9		13.5	17	17	30		
	1.6							5.0		
	30	Drive		2.9	Drive			30		
	2.4	7.9	9.6	8.7	8.5	9.5	10.5	9.6	11.2	
	30	15.5	15.5	14		14.5	16	17.5	30	
	4.7	5.7	6.8	6.4	6.2	7.1	7.5	7.0	6.3	8.0
	30	18.5	14	12		14	15	17	19	30
	2.3	3.1	4.8	2.8	2.3	3.6	2.9		3.3	
	30	16	13	11		17	20		30	
	12.0		10.4	9.7	10.9			11.3		
	30		11		13			30		
	5.1	5.5	6.2	5.8	5.6	6.4	3.8	3.9		
	30	17.5	14	10.5		13.5	20	30		
	4.6				4.7	5.5		4.3		
	30					14.5		30		
	7.0	8.3	9.0	6.6	6.5	7.2	8.0	8.1		
	30	19	15.5	10		16	18.5	30		
	9.3	9.0	5.7	5.3	5.2	5.7	7.5	6.7	5.9	
	30	24	17	11		13.5	16	19	30	
	9.1	9.3	7.8	7.3	8.0	9.7		9.0		
	30	19.5	12.5		12	17		30		
	8.0	8.4	7.5	7.4	7.9	8.8		8.2		
	30	14.5	11.5		11	18.5		30		



149.56

21+89 Intersection 143.66 ✓

✓ 22+0 144.06 ✓

✓ 23+0 145.56 ✓

✓ 24+0 147.46 ✓

25+00 149.36 ✓

B.M. #3 2.53 147.03 ✓

26+00

W ‡ E

5.9 Road 6.9  
50

$\frac{4.0}{30}$   $\frac{6.0}{15.5}$   $\frac{5.6}{10}$  5.5  $\frac{6.6}{18.5}$   $\frac{7.2}{30}$

$\frac{3.0}{30}$  Drive 4.0  $\frac{4.9}{10}$   $\frac{5.6}{18}$   $\frac{4.7}{23}$   $\frac{5.0}{30}$

$\frac{2.4}{30}$   $\frac{2.6}{17.5}$   $\frac{4.3}{16}$   $\frac{2.4}{13}$   $\frac{2.5}{9}$  2.1  $\frac{3.1}{14.5}$   $\frac{4.5}{18}$   $\frac{3.3}{21}$   $\frac{2.7}{30}$

$\frac{0.1}{30}$   $\frac{0.9}{15.5}$   $\frac{1.3}{13}$   $\frac{0.4}{9.5}$  0.2  $\frac{0.5}{11.5}$   $\frac{1.8}{14}$   $\frac{1.2}{17}$   $\frac{0.6}{30}$

HP 2.0' in Elev.

H. Patterson  
E. Spitz

Marilyn Dr. Storm Sewer  
Profiles

11-30-62

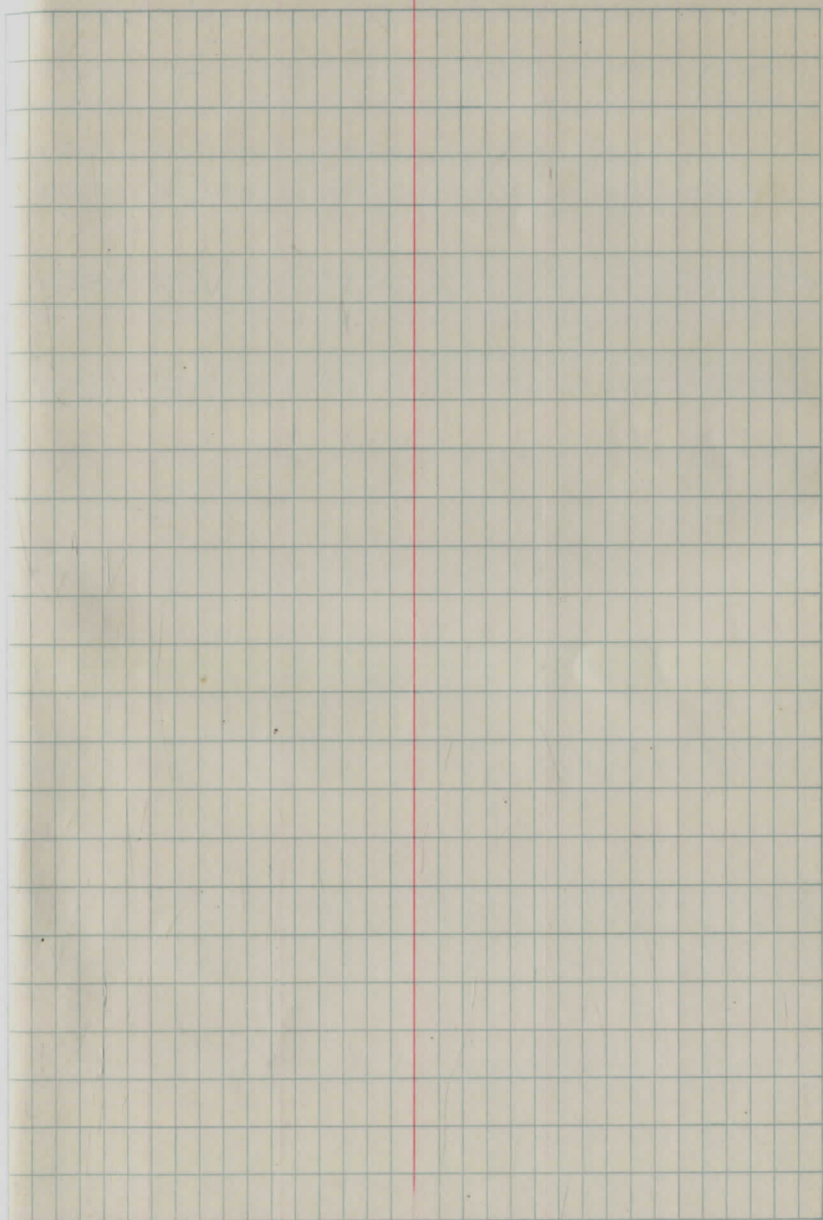
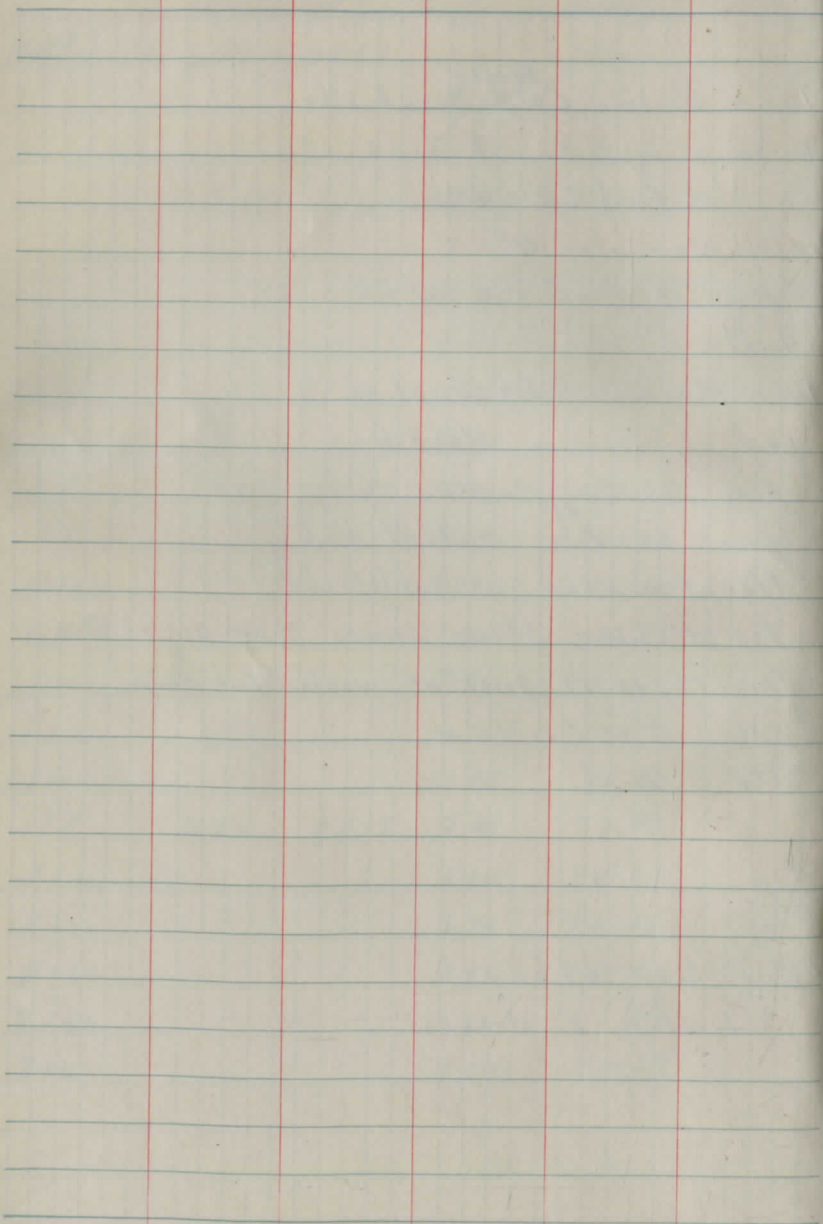
	+	HI	-	Elev.
BM #1	3.89	103.89		100.00
			8.55	
			+ 3.77	
			12.32	
			12.83	
			9.76	
			12.43	
			7.31	
			12.98	
			13.20	
T.P.	3.45	101.42	5.92	97.97
0+00			11.39	90.03
0+00			9.92	91.50
BM #2			7.50	93.92
1+00			9.80	91.62
2+00			10.30	91.12
3+00			10.90	90.52
T.P.	3.22	96.18	8.46	92.96
4+00			5.60	90.58
5+00			5.70	90.48
6+60			5.60	90.58
7+60			7.60	88.58
8+60			7.80	88.38

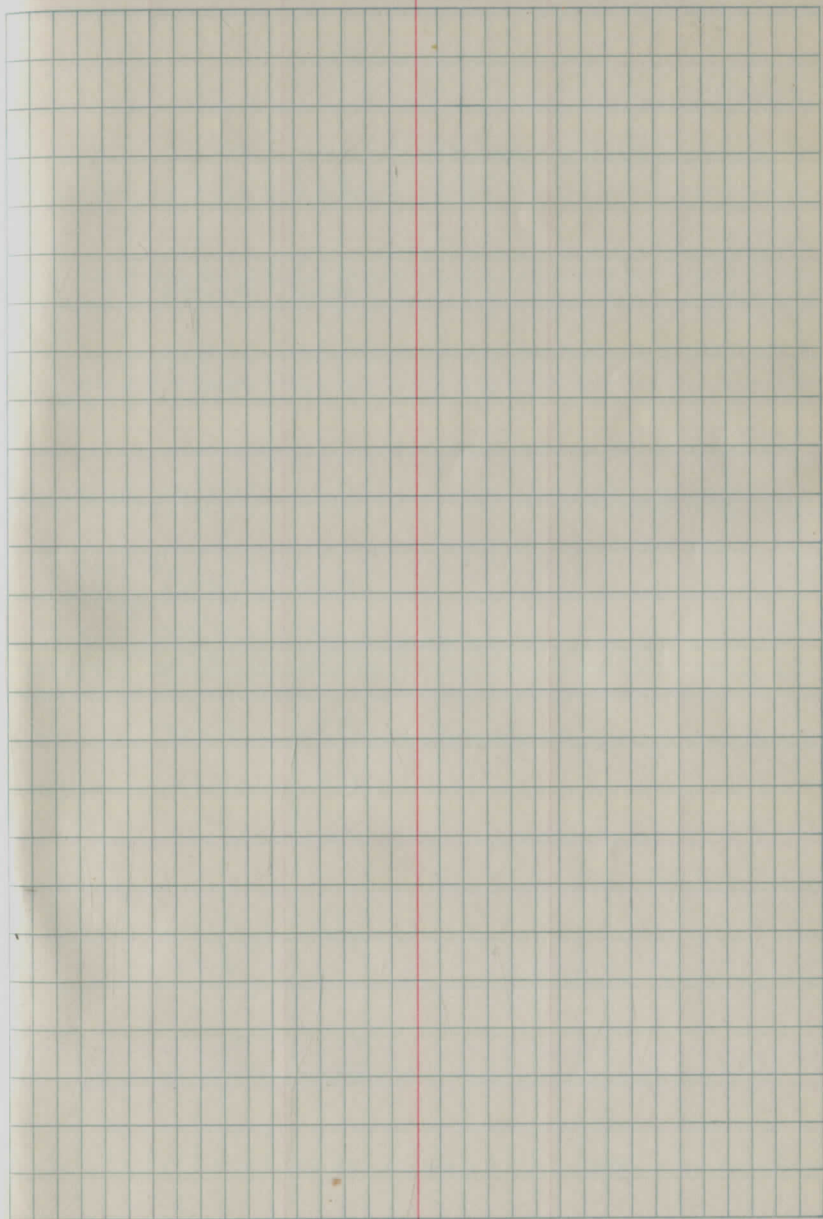
5.92  
92.8  
77.00

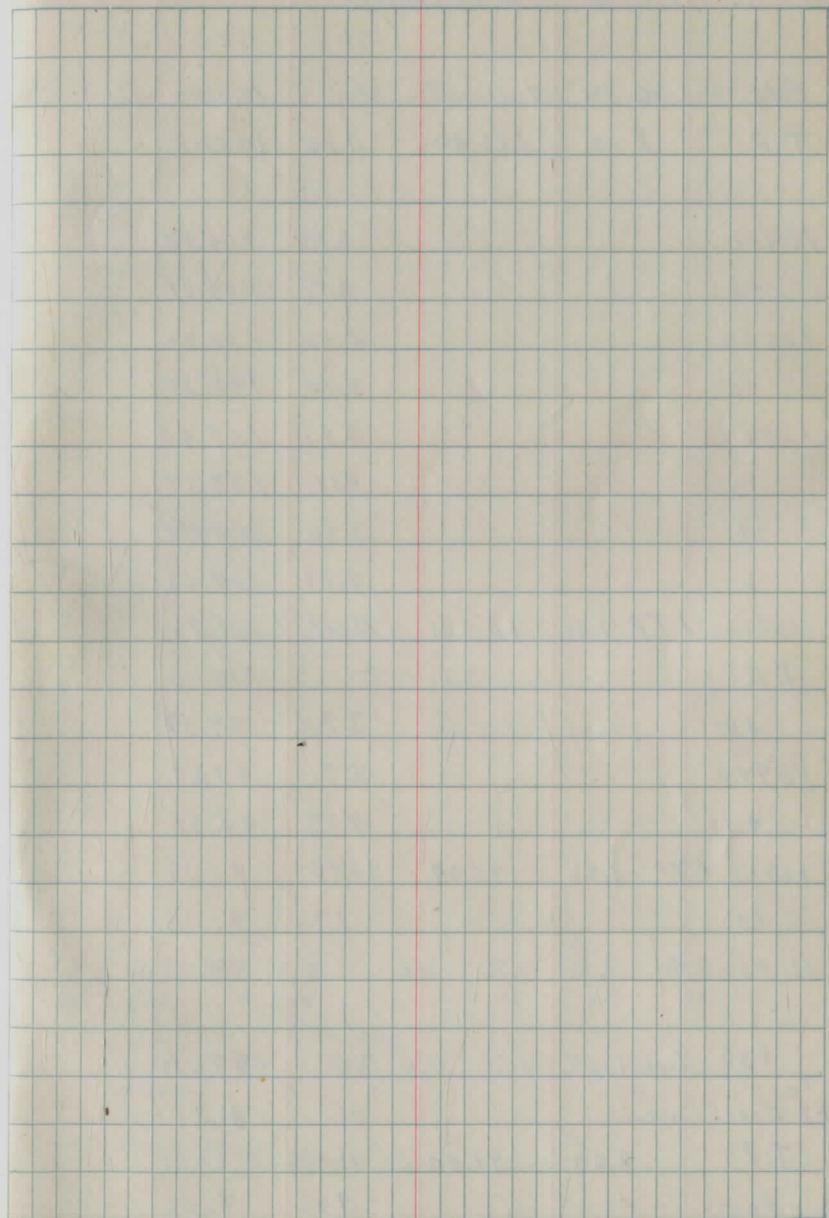
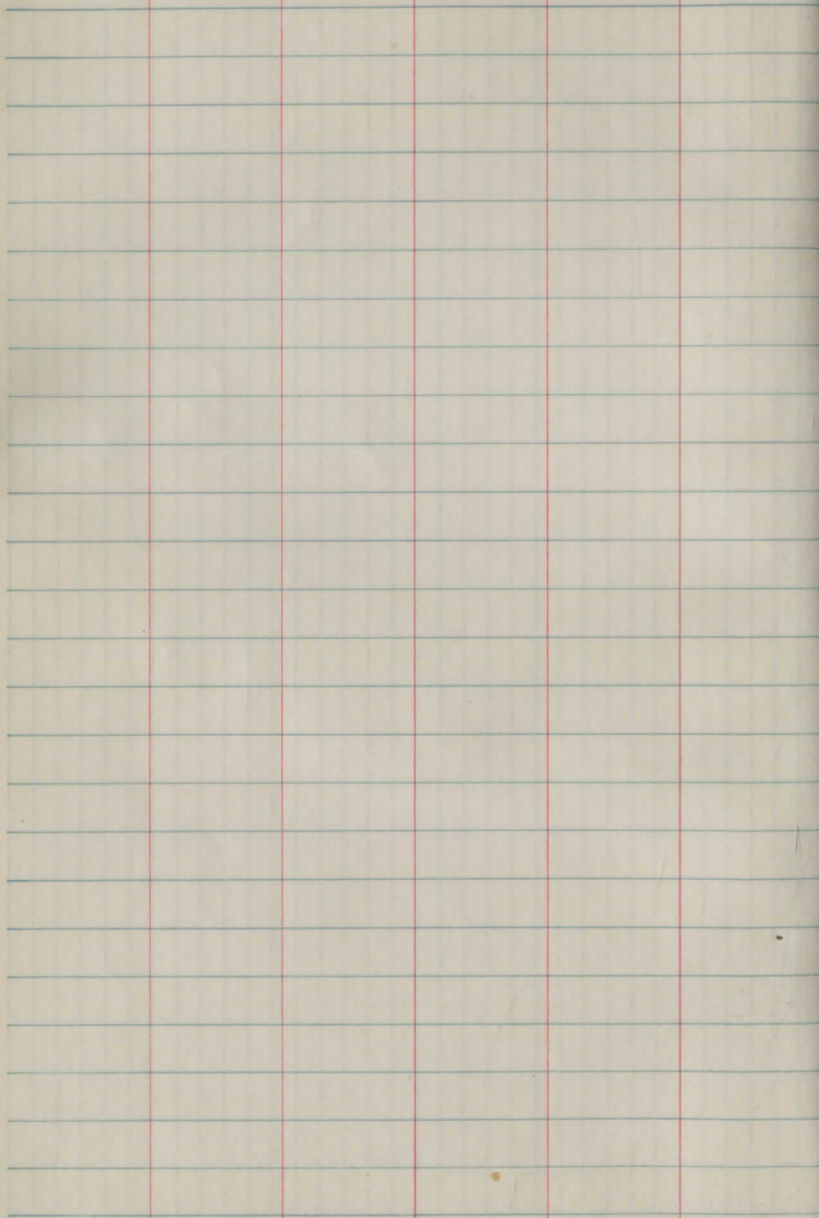
5.25  
7.15  
2.43

31

Top of Grating <sup>Square</sup> Catch Basin E. side  
 Bottom of Sp. C.B. E. side  
 " of Round C.B. E. side  
 Inlet New pipe 18"  
 Bottom of Round C.B. W. side  
 4 Rd.  
 Inv. Manhole  $\pm$  100' E. of Rd.  
 Inv. Junction Manhole  
 Rim Junction Manhole  
 Invert at Pipe outlet and  
 12"  
 F/L of water at outlet and  
 Top of Conc. Storm Sewer Pipe outlet and  
 This pt is 13' south of wooden foot bridge  
 " 130 I W Prop line  
 " 120 " " "  
 " 110 " " "  
 " 100 " " "  
 End Dug Channel  
 $\pm$  Junction 2 streams









91.44  
~~95.04~~

1+50			9.47	81.97
2+00			10.60	80.84
+50			10.85	80.59
3+00			11.26	80.15
T.P.	10.05	99.44	2.05	89.39
112+00				90.04
+50			8.23	91.11
113+00			6.62	92.82
+00			4.70	94.74
114+00	T.P. 11.94	109.39	1.99	97.45
+50			8.47	100.92
115+00			4.65	104.94
+50	T.P. 11.28	120.57	0.16	109.23
116+00			6.57	113.94
+50	T.P. 11.85	130.53	1.83	118.68
117+00			7.52	123.01
+50			3.55	126.98
118+00	T.P. 9.21	139.74	0.00	130.53
BM # 2			2.26	137.48
+50			5.84	133.90
119+00			2.53	137.21
T.P.	6.41	145.77	0.38	139.36
+50			5.20	140.57
120+00			2.03	143.74
T.P.	0.00	134.02	11.75	134.02

	N			S			
12.5		11.5	9.9	9.4	9.7	11.3	10.7
30		20	11		12	16	26
							11.0
							30

SPK S. side CBI

25 ft. Sta 118+79





Bad Hump w. of Snyder Rd ±1500'

B.M. #1 4.45 104.45 100.00

0+0 ± Drive ± Hump

50 W

45 W

40 W

35 W

30 W

25 W

20 W

15 W

10 W

5 W

0+0

5 E

10 E

15 E

20 E

25 E

30 E

35 E

40 E

45 E

50 E

B.M.

4.45 100.00

S

4.40

4.42

4.45

4.47

4.49

4.56

4.60

4.63

4.73

4.76

4.95

5.32

5.78

6.19

6.64

7.01

7.25

7.60

7.94

8.25

8.52

±

4.36

4.41

4.44

4.51

4.57

4.64

4.75

4.87

5.00

5.13

5.34

5.66

5.93

6.23

6.57

6.89

7.20

7.50

7.82

8.15

8.46

N

4.60

4.64

4.67

4.74

4.81

4.92

5.04

5.19

5.29

5.55

5.75

5.97

6.21

6.46

6.75

7.00

7.29

7.57

7.87

8.15

8.40

2.48  
25'± Drive



H. Patterson CH #13 Chardon Windsor Rd  
P. Young 5-25-61 warm-windy 70°

B.M.	2.38	102.38	100.00
Inlet		5.80	96.58
Outlet		5.5 <sup>70</sup> <del>5.5</del>	96.68
0+50		5.70	96.68
1+00		5.96	96.42
1+50		6.06	96.32
2+00		6.00	96.38
2+50		6.04	96.34
3+00		6.46	95.92
3+50		6.35	96.03
Inlet		6.66	95.72
Outlet		7.00	95.38
± 50 E		6.85	95.53
B.M.	2.38	100.00	

SPK N.E. Side 15" Hickory 46' S. of E Rd & 20' W of Culvert.

H. Patterson  
P. Young

CH #13 Chardon Windsor Rd  
1st Culvt. E. of Hunt Rd.  
5-25-61

BM	2.37	102.37	100.00
outlet		6.75	
+50		6.18	
1+00		6.13	
+50		6.75	
2+00		7.62	
3+00		8.27	
BM	2.37	100.00	

41

SW & S. Hdvt. Culvt

H. Patterson Marilyn Dr.  
R. Young Storm Sewer

1961

B.M. #1	4.50	104.50		100.00
C.B. W side Rd.			12.81	91.67
C.B. #1 E "			13.06	91.44
W.D. tub			8.14	95.66
E.			9.80	94.70
on line by house			4.69	99.81
on line in channel			12.23	92.27
+ 100' in " by wall			12.95	91.55
+ 200' " " "			12.20	91.30
Outlet old Pipe & Channel			13.25	91.25

B.M.	5.94	105.94		100.00
T.P.	6.90	101.85	10.99	94.95
+ 300' in channel			10.90	90.95
+ 400' " "			11.00	90.85
+ 500' " "			11.26	90.59
+ 600' " "			11.55	90.30
T.P.	2.32	106.13	3.04	98.81
B.M. #1	2.46	102.46	6.13	100.00
B.M. #2			8.57	93.89
Fl. outlet SS <sup>new</sup> 0+0			12.45	90.01
10' "			11.10	91.36
100' from outlet new SS Pipe in channel			11.14	91.32
T.P.	8.84	101.05	10.25	92.21
200'			9.82	91.23
300'			9.95	91.10

42

NW & Sidewalk <sup>front</sup> R. Swan #130 Marilyn Dr.

NW & sidewalk  
Top Conc. Storm Sewer Pipe outlet End



101.05				
400'			10.21	90.84
500'			10.30	90.75
600'			10.64	90.41
T.P.	4.23	96.04	9.24	91.81
660'			5.20	90.84
700'			6.27	89.77
T.P.	3.11	97.69	1.46	94.58
800'			9.15	88.54
900'			10.50	87.19
T.P.	2.35	94.24	5.80	91.89
1000'			7.33	86.91
1100'			8.83	85.41
1200'			10.80	83.44
T.P.	3.53	90.39	7.38	86.86
1300'			7.54	82.85
1400'			8.06	82.33
1500'			8.83	81.56
T.P.	6.97	90.17	7.19	83.20
1600'			10.42	79.75
1700' inlet Pipe			12.75	77.42
B.M. #3	9.97	91.47	8.67	81.50
T.P.	8.40	99.71	0.16	91.31
T.P.	11.07	106.13	4.65	95.06
B.M. #1			6.16	99.97

End of dug channel

lg. mark

Temp: Just Dropped 15° Berr. was ± 65°

Top Culvert Cedar Rl. N. side

This page is a blank ledger with horizontal blue lines and three vertical red margin lines. The margins are located approximately at the 15%, 25%, and 40% marks from the left edge of the page.

This page is a blank ledger with a grid of blue lines and one vertical red margin line. The grid consists of 10 columns and 25 rows. The red margin line is located approximately at the 85% mark from the left edge of the page.

H. Patterson  
P. Young

Prescott Dr. Chester

6-1-61 Clear-warm 70°

# 370

5190<sup>60</sup>

Iron Pin set P.O.T.

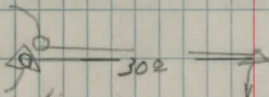
Stks. set every 100' on N side  
30' off ~~st~~

OTO £ SR 306

45

CEI #593017

I. Pipe Prop. line  
of Perry



590.6



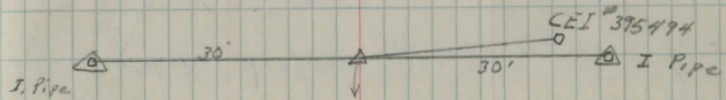
15768<sup>22</sup>

I Pin set POT Turn around Rad. Pt.

30' to  $\frac{1}{2}$  Prop pipe

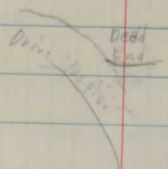
14189.02

I Pin Set Pot.



899.09

H. CoHerser - I Prescott 01  
 P. Young  
 D. Kidenov  
 B. Christie Topo 6-3-61 Cloudy Cool 58°



- 15793
- +93 22' CET
- 14+77 15'x21' Balcon 16' 24' 6" Ash
- 13+04 23' CET
- +90
- +70 12' 12'x16' Conc
- 12+82 22' Twin d' Ash
- 10+87 22' CET
- 9+96 23' CET
- 8+82 13' 10'x16' CMP
- 8+72 20' steel foot in Conc.
- 6+91 25' CET
- +88 Evergreen 18'
- +96 12x16' Conc. 16.5'
- +66 shrub 19'
- 6+61 shrub 19'
- +90 28.5'
- 5+0 24' CET
- 3+16 23' CET
- 1+49 22' X CET
- 0+42
- 0+30 OBT 22' 9' 7' 17' 4'
- 0+0 \$ SR 306

Light House

Dashed Area

CH # 13 Chardon Windsor Rd

SEC. G

1959?

New 22+36<sup>22</sup>

old 51+35<sup>82</sup>

I. Pin P.O.T.

New 0+0

= old 28+99<sup>20</sup>

Mon. Box P.O.T.

SPK. E. Side

8" Twin  
Apple

38<sup>89</sup>

FD. 11/75

SW S.E. Side  
30" maple

1' from Ground

49<sup>28</sup>

2867

SPK. S. Side  
28" Maple

SPK. N.W. Side  
CEI #572381

Princeton Rd.

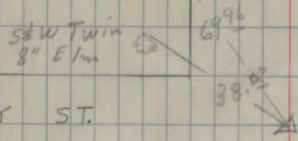
50+32<sup>90</sup>

I Pipe flush

40+65<sup>3E</sup>

SPK set Pot

CLAY ST.



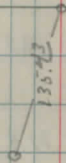
5PK

20.9

20.0

5PK

I Pipe ed.



H. Patterson  
R. Christian  
J. Donahue

CH #13 Chardon-Windsor Rd

6-16-61

Cloudy & Warm 70°

8+12	12' x 20' Conc	19'	
+95	4' Cherry Clump	22.5'	
+67	36" Quad Cherry	27.5'	
+24	20" Maple	27'	
7+45	12' x 16' Castleman	19.5'	
+85	8' Cherry	22.5'	
+70	15" Apple	27'	
+32		21.5'	CEI
6+00	15" Evergreen	28'	
	Conc. Drive	17.5'	
+81	12' x 21' Conc	19.5'	4" Drain tile on top of 12' x 21'
5+24	15' Evergreen	28'	
+			
+77			22' CEI
+70	End wire fence	28.5'	
4+28	26" Maple	26'	
4+00	wire fence	24'	
3+34	wire fence	29.5'	
+99		23'	CEI
	Bare wire fence	30'	
2+95	15" x 13' Vit. tile	18'	
1+26		30'	21.5' CEI
		30'	
		30'	
+70	Twin 8" Hickorys	32'	
0+58	Edge Fmnt.	11' 9"	
0+0	Man Bay		

Precedon Rd

50

21+15			22'	fence
+82	Begin Hedge	24.5'		
+75	12" x 20' CMP	18'		
+63	End Hedge	25'		
+44			21'	CEI
20+10	low privet Hedge	24.5'		
+99	12' x 14' Clay tile	19.5'	19'	fence
19+57	30" Ash + fence	22.5'		
18+20	fence	26'	22'	CEI & Barb fence
+66	Wire fence	25.5'		
+60	Iron fence stake	23'		
17+53				needs one Drive No pipe
16+94			22'	CEI
15+20	fence	22'	22'	CEI
13+47	fence	26.5'	22'	CEI
+92	24" Maple + Begin wire fence	25.5'		
+76	Lilac Bush	24'		
+71			22'	CEI
+62	Lilac Bush	24'		
+45	24" Maple	27'		
+45	30" Maple	27'		
11+00	10" x 16' CMP	19.5'		
+79	18" Maple	20.5'		
10+38	36" Maple	28'		
9+98			22'	CEI
+26			22.5'	CEI
8+24	12" Ash	28'		

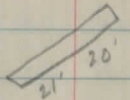
+70	8" Pig Hickory	25'	
+65		25'	CEI
+47	fence	23.5'	
+40	6" Elm	25.5'	
+13			
+02	<u>Brush</u>	27'	
23+00	30" Maple	30'	
+95	8" Cherry	26'	
+85	8" Pig Hickory	26.5'	
+64	8" Ash	27'	
+29		14.5'	15" X 17' Conc.
+28	18" Cherry	26'	
+17	10" Hickory	28.5'	
+06	Begin fence	24'	
24+02	<u>Brush</u>	27'	
+88		21'	CEI
23+83	15" X 24" C.M.P.	21'	
+63	8" Twin Apple	27.5'	
+58	6" Apple	28.5'	
+55	4" Apple	21.5'	
22+15		21.5'	CEI & fence
+97	30" Maple	27'	
<u>?</u> +78		24.5'	
+62	Small Bush	24'	
21+60	End Hedge	24'	

+42		17'	Begin Wire fence
+39	12" Hickory	23'	
+24	6" Hickory,	29'	
+24	12" Hickory	26'	
+14	8" Hickory	27'	
28+08	6" Twin Pig Hickory	24'	
+90	12" Hickory	23'	
+80		14'	12" X 12" Cast Iron Drive
+79	10" Ash	24'	
+68	12" Hickory	25'	
+64	10" Ash	26'	
+57	10" Ash	24'	
+42	14" Hickory	26.5'	
+38	8" Ash	24.5'	
29+10	15" Elm	26'	
+95	10" Pig Hickory	27'	
+84	12" Pig Hickory	24'	
+66	fence	25.5'	
+64	8" Pig Hickory	26.5'	
+58	12" Ash	25'	
+40	12" Pig Hickory	28'	
+20	12" Ash	23'	
+17	8" Hickory	24'	
26+02	12" Pig Hickory	23'	
198	10" Pig Hickory	25.5'	
	10" Ash	27.5'	
25+87	15" Cherry	23'	

+14	12" X 12' Cast Iron	18.5'		
32+01			13' 15" X 16'	CMP Good
+87	15" Ash	26'		
+81	15" Elm	25'		
+61	15" Maple <sup>fence</sup>	24.5'		
+40	10" Maple	24.5'		
+32	8" Cherry	24.5'		
+28	10" Maple	23.5'		
+25	14" Elm	22.5'		
31+05	12" Maple	21'		
+86		26'		CEI
+88		20.5'	13' 18" X 33.5'	Conc. Good
+34	8" Ash fence	23'		
+21	36" Maple	25'		
30+05	8" Hickory	24'		
+96	8" Hickory	24'		
+91	6" Hickory <sup>fence</sup>	27'		
+70	12" Hickory	26'	20'	End flowers
+49	36" Maple	29.5'	20'	start flowers
+25	fence			
+18	8" Pig Hickory	25'	12' 15" X 19'	CMP
+11	12" Cherry	27.5'	26'	CEI
29+08			19'	End fence
+97	10" Ash	29'		
+87	fence	26'		
+86	10" Ash	27'		
28+46	24" Maple	23.5'		

52

+94	Fence x	20.5'		
+41		25'		15" X 42' Conc Good
36+07		25.5'		CEI
+98	18" Maple	25.5'		
35+82	10" Maple	25'		
+79	8" Hickory <sup>fence</sup>	27'		
+53	12" Maple	23.5'		
+45	6" Maple	26'		
+35			26'	CEI
+34	12" Hickory	24'		
+24	12" Hickory	25'		
34+00	15" Ash	25'		
+22	6" Pig Hickory	28'		
+45	8" Pig Hickory	29'		
+24	10" Elm	27.5'		
+16	6" Elm	29.5'		
33+14	12" Maple	27.5'		
+95	8" Twin	30'		
+87	12" Hickory	27'		
+81	6" Maple	24'		
+57			26'	CEI
+56	8" Hickory	25'		
+54	6" Elm	26'		
+54	15" Elm	24'		
+46	6" Maple	27'		
+41	12" Elm	28'		
32+32	24" Maple	23'		

109		26'	Steel sign Post
50+01		26'	CET
49+70		20'	18" x 41' Conc. Good
+29		25.5'	CET
48+05	10" Spruce	25'	
+93	Steps	21'	
+80	12" Spruce	26'	
+32	10" x 22' tile	19'	
+26	Large Rose bush	19'	
47+17	12" Spruce	25.5'	
+94	shrub flowers	22'	
+84	8" x 15' tile	19'	
46+54		26.5'	CET
45+15	fence +	23.5'	
+76		26.5'	CET
44+00	fence	22'	
43+06		26'	CET
+70	fence	22.5'	
41+31		26'	CET
40+00	begin fence	22.5'	
39+56		26'	CET
+85		27'	CET
37+14	12" x 22'	17.5'	



H. Gatterson  
R. Christian  
J. Donoghue

CH #13 Chardon Windsor Rd

B.M.

		HI		Sta. V.	
BM #1	1.96	1101.46		1100.00	use
T.P.	10.94	1112.08	0.32	1101.14	
T.P.	12.00	1123.99	0.09	1111.99	
BM #2			3.25	1120.74	use
T.P.	1.60	1115.05	10.54	1113.45	
T.P.	1.36	1104.86	11.55	1103.50	
BM #1			4.88	199.98	
6-24-61					
BM #2	7.34	1128.08		1120.74	
	11.61	1138.81	0.88	1127.20	
	11.22	1148.74	1.29	1137.52	
BM #3			0.96	1147.98	use
	10.4	1138.31	11.49	1137.27	
	0.87	1127.41	11.77	1126.54	
BM #2			0.66	120.75	
BM #3	8.54	1156.32		1147.98	
	11.62	1167.14	0.80	1156.52	
	10.37	1176.34	1.17	1165.97	
BM #4			5.40	1170.94	use
	10.92	1181.26	0.27	1180.99	
BM #5	12.31	1193.30	7.43	<del>1185.87</del> 1186.61	use
			11.67	1180.63	
BM #4	0.57	1181.20	11.29	1170.91	
	5.30	1176.21	10.89	1165.32	
	0.62	1165.94	11.90	1154.04	
BM #3	2.19	1156.23	8.80	1147.43	

Redchecked  
OK

vert. Spt. W. side 24" Maple 26' Lt. Sta. 4+28

Horiz. Spt. N. side CEI #572385 22' Rt. Sta. 15+20

Horiz. Spt. N. side CEI #572378 Sta. 27+05

Horiz. Spt. N. side CEI #572369 Sta.

S.W. & clay st. Horiz. st N. side Sta.



2461

1204.21

	+	HI	-	ELEV
10400				
11400				
12400				
T.P.	10.42	1212.89	1.74	112.37
13400				
14400				
15400			1.99	
B.M. #2				120.80
7.1.61 T.P.	6.90	1217.74		
16400				
17400				
18400				
T.P.	11.99	1226.67	3.06	124.58
19400				
20400				

AS

4N

56

	9.79	8.4	9.0	9.1	1177.89	9.8	9.625	9.63	9.85	9.9
	6.30	5.9	5.7	7.5	6.32	7.2	8.06	7.46	5.7	5.85
2005	30	12.7	12.2	11		15.2	17.3	19	24.6	30
2005	30	98.6	14.2	98.7	1177.11	99.0	18.3		4.22	30
3.5.9	30	5.72	5.55	6.45	5.35	4.8		drive		
30	18.3	15.2	13.1	11		13.4			30	
	201.2	3.01.1	14.5	99.15	90.2	1200.91	00.4	99.8	00.7	00.8
30	3.5	5.06	4.42	3.30	3.87	4.72	3.47		3.53	
30	18.9	13.1	10.2	10.2	14.9	16.5	22.5		30	
01.7	11.24	01.8	00.6	01.9	1202.48	01.75	01.31	01.0	00.1	00.15
30	19.2	13.1	11	11		15.2	16.7	20.1	30	
30	9.4	9.55	10.57	9.65	8.94	9.68	10.14	9.5	10.66	0.4
30	20.3	13.1	11	11		16.1	17	18.6	24.2	30
7.9	8.3	6.4	14.5	6.0	1206.68	6.6	18.2	8.3	8.5	
504	4.57	4.51	7.80	6.85	6.21	7.27	7.95	4.57	4.57	
30	18.9	15	12.8	10.5	16.1	17.5	24.2		30	
10.5	10.6	9.3	8.4	9.3	1210.09	9.3	8.4	9.2	12.76	
7.21	7.1	8.2	9.3	8.4	7.65	8.45	9.32	8.56	5.0	0.4
30	19.8	14	11.5	10		14.7	17.2	18.9	24.4	
14.3	13.6	12.5	13.8	12.0	1212.69	12.1	15.2	11.9	13.2	11.6
3.44	4.12	5.5	5.97	5.75	5.05	5.65	6.00	5.86	4.55	6.15
30	17.1	12.6	10.9	10		15.2	17	19.5	24.1	30
3.6	13.0	12.4	12.8	12.8	1213.74	12.9	18.5	12.3	12.1	
4.16	4.74	5.5	4.92	4.0	4.87	5.26	5.4	5.62		
15.2	14.8	17.4	12.3	11		16.1	18.3	2.4	30	
11.5	11.9	14.0	14.3	14.4	1215.02	14.3	20.3	14.1	13.1	
30	12.4	12.71	13.65	12.25	11.65	12.38	13.05	12.60	13.55	
30	10.9	16.3	14.0	12.5	10.5	16.2	17.6	20.2	30	
18.3	17.9	16.7	14.2	16.7	1217.50	17.1	19.2	17.7	17.7	
8.45	2.00	9.95	11.4	10.0	9.17	9.53	9.0	8.95		
30	17.8	14.1	13.2	10		15	24.2	drive	30	

7-1-61

1226.67

	+	HI	-	Elev.
7 T.P.	8.38	1234.00	1.05	135.52
2100		143.90		
2200				
2300				
2400		1238.53		
T.P.	8.83	1424.3	4.30	139.60
PM <sup>th</sup>		1240.87	0.68	147.75
2500	2.99	150.77		
2600				
2700		1246.60		
T.P.	8.72	156.30	1.77	147.8
2800				
2900				
3000				
3100				

WS & N

57

8.2	26.8	26.5	30.75	30.0	31.3	1221.8	12.7	12.85	13.3	13.08	13.09	12.9	23.3
30	23.5	14.2	13.2	14.1	14.1	1225.28	9.22	8.72	9.6	24.2	18.8	20.8	24.5
20.6	20.6	20.2	24.2	24.3	24.4	1226.26	25.5	25.2	15.6	16.6	22.8	23.6	30
25.75	24	14.2	12.8	10.7	10.7	1227.4	26.6	26.6	17.2	19.2	26.3	26.1	
7.50	26.5	25.75	25.0	25.0	26.0	1229.62	29.1	28.6	29.1	28.6	29	30.4	
30	18.7	15	18.5	10.4	10.4	1232.97	11.20	11.31	12.24	11.9	10.45	10.45	out
30.1	29.9	27.2	28.9	28.9	29.1	1235.77	34.9	34.4	34.1	34.7	34.7	34.7	
10.8	11.0	13.63	11.91	11.20	11.31	1238.05	8.50	9.3	9.62	9.22	8.50	8.50	37.4
35.3	35.75	32.8	31.1	30.4	30.4	1240.78	39.7	39.7	39.7	39.7	39.7	39.7	37.4
5.55	5.12	8.07	8.22	8.5	8.5	1241.39	5.21	5.73	6.24	5.8	4.22	4.43	9.2
30	16	12.4	10.2	9.1	9.1	1242.78	15.8	16.5	17.9	18.2	20.5	20.5	30
26.6	36A	31.7	30.3	31.7	31.7	1244.79	40.7	40.7	40.7	40.7	42.4	42.4	30
2.3	2.5	6.2	7.03	6.21	6.21	1246.60	5.14	5.15	6.0	6.15	6.15	6.15	30
30	18.4	14.2	11.8	10.2	10.2	1248.05	31.3	31.3	31.3	31.3	31.3	31.3	30
29.1	28.8	31.1	30.1	31.4	31.4	1249.78	8.50	9.3	9.62	9.22	8.50	8.50	37.4
7.50	7.76	7.55	7.91	7.14	7.14	1250.78	5.82	6.72	7.05	6.56	7.25	7.25	9.2
30	22.2	14.2	11.8	10.5	10.5	1251.39	5.21	5.73	6.24	5.8	4.22	4.43	30
30	19.8	13.7	11.3	9.8	9.8	1252.78	41.2	41.2	41.2	41.2	42.4	42.4	30
42.4	41.1	40.1	38.8	40.1	40.1	1254.79	4.01	4.42	4.85	4.25	4.01	4.01	30
30	19.8	13.7	11.3	9.8	9.8	1256.60	5.14	5.15	6.0	6.15	6.15	6.15	30
48.0	47.0	40.1	38.8	40.1	40.1	1258.05	4.01	4.42	4.85	4.25	4.01	4.01	30
3.65	4.05	6.18	6.78	5.56	5.56	1259.78	14.3	14.3	14.3	14.3	14.3	14.3	30
30	18.4	14.2	11.8	10.2	10.2	1261.39	15.8	16.5	17.9	18.2	20.5	20.5	30



H. P. ... OH #13 Chardon Windy  
 B. G. ... X.500 Sac. H Clay to 31525  
 J. ... 7-10-61 Norm Cloudy

BM #5	7.12	1193.73		1186.61	Use
T.P.	11.00	1203.75	.98	1192.75	
T.P.	7.98	1211.37	.36	1203.39	
BM #6	1.00	1208.38	3.99	1207.39 <sup>6</sup>	Use
T.P.	6.06	1209.61	4.83	1203.55	
T.P.	3.69	1208.75	4.55	1205.06	
BM #7	1.02	1208.75	1.02	1207.73	Use
T.P.	4.59	1209.67	3.67	1205.08	
T.P.	4.43	1208.24	5.86	1203.81	
BM #6	3.10	1210.44	-0.90	1207.34 <sup>6</sup>	
T.P.	.65	1200.99	10.60	1199.84	
T.P.	.88	1192.40	8.97	1191.52	
BM #5			5.31	1186.54 <sup>61</sup>	
BM #7	0.60	1208.33		1207.73	Use
T.P.	1.71	1200.83	9.21	1199.12	
T.P.	10.58	1207.82	3.59	1197.24	
BM #8	1.10	1207.82	1.10	1296.82 <sup>82</sup>	Use
T.P.	9.88	1216.97	0.73	1207.09	
T.P.	2.22	1217.72	1.47	1215.50	
BM #9	0.53	1206.97	11.28	1296.54 <sup>54</sup>	Use
T.P.	0.30	1195.36	11.91	1195.06	
T.P.	0.31	1189.00	11.67	1183.69	
T.P.	0.61	1173.01	11.60	1172.40	
BM #10	11.65	1173.01	11.65	1161.36	Use
T.P.	11.42	1189.09	0.34	1172.67	

Hart. spk. N. side CET # SW of Clay & Chardon Windy

Bent Hart Spk N. side 18" Hickory

Ret. Spk. SW. side 30" <sup>Katalpa</sup> Lt. sta. 71+20

vert. spk N root 18" Beech 32' rt sta

Hart. spk. S. side CET # 823384 27' Lt. Sta

Hart. spk S. side CET # 572483 29' Lt. Sta

H. ... CH #13 Chardon Windsor  
 B. ... X. Soc. Soc. H Clay to 3452E  
 J. ... 7-10-61 Warm Cloudy

BM #5	7.12	1193.73		1186.61	USE
T.P.	11.00	1203.75	.98	1192.75	
T.P.	7.98	1211.37	.36	1203.39	
BM #6	1.00	1208.38	3.99	1207.38 <sup>6</sup>	USE
T.P.	6.06	1209.61	4.83	1203.55	
T.P.	3.69	1208.75	4.55	1205.06	
BM #7	1.02	1208.75	1.02	1207.73	USE Hart
T.P.	4.59	1209.67	3.67	1205.08	
T.P.	4.43	1208.24	5.86	1203.81	
BM #6	3.10	1210.44	0.90	1207.38 <sup>6</sup>	
T.P.	.65	1200.49	10.60	1199.84	
T.P.	.88	1192.40	8.97	1191.52	
BM #5			5.51	1186.54 <sup>61</sup>	
BM #7	0.60	1208.33		1207.73	USE
T.P.	1.71	1200.83	9.21	1199.12	
T.P.	10.58	1207.82	3.59	1197.24	
BM #8	1.10	1207.82	1.10	1296.82 <sup>use</sup> 1206.72 <del>use</del>	
T.P.	9.88	1216.97	0.73	1209.09	
T.P.	2.22	1217.72	1.47	1215.50	
BM #9	0.53	1206.97	11.28	1296.54 <sup>use</sup> 1206.44 <del>use</del>	
T.P.	0.30	1195.36	11.91	1195.06	
T.P.	0.31	1189.00	11.67	1183.69	
T.P.	0.61	1173.01	11.60	1172.40	
BM #10	11.65	1173.01	11.65	1161.36	USE
T.P.	11.42	1189.09	0.34	1172.67	

Hart. spk. N. side CET # SW of clay & Chardon Windsor

Bent Hart Spk N. side 18" Hickory

Ref. Spk. SW. side 30" <sup>Katalpa</sup> Lt. sta 71+20

vert. spk N root 18" Beech 33' rt sta

Hart. spk. S. side CET # 823387 27' Lt. Sta

Hart. spk S. side CET # 572433 29' Lt. Sta

1184.09

T.P. 10.00 1194.03 0.06 1184.03

T.P. 11.59 1205.41 0.21 1193.82

T.P. 11.05 1215.06 1.40 1204.01

BM #9 8.63 1206.43<sup>9</sup>

T.P. 3.07 1217.78 0.35 1214.71

T.P. 2.81 1208.83 11.76 1206.02

BM #8 1.02 1207.75 2.10 1206.73<sup>2</sup>

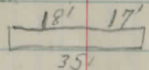
T.P. 12.00 1207.82 11.93 1195.82

BM #7 0.13 1207.69<sup>73</sup>

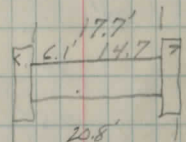


25+30	10" Hickory	23'	
+31		19.5'	12" Maple
24+11	8" Oak	21.75'	
+74		20.5'	14" Black Ash
23+53	10" Oak	21.25'	
22+15		28'	12" Beech
+96	10" Ash	24'	
19+16	Twin 10" Oak	23.5'	
19+0	End Ash Row	25'	
13+93	10" Elm	30'	
13+00	Start Row 6" Ash	25'	
11+82		18' 17'	15" x 35" C.M.P. <sup>Fain</sup>
6+95		22'	18" Hickory
?		28'	CEI
1+18	12" x 16.4" Conc.	19'	
+93	?	28'	
+70	?	27'	
+65	30" Stump	20.5'	
0+28	18" Twin Elm	27'	

Brush



+48		24'	12" Py Hickory
+34		22'	15" Hickory
29+31		23.25'	12" Ash
+97		22.75'	10" Hickory
+86		23.25'	10" Ash
+74		22.75'	15" Elm
+71		25'	12" Hickory
+50			
+14		28.5'	24" Elm
28+01		29'	12" Hickory
+90		28'	10" Hickory
+60		27.2'	24" Elm
27+17		24'	Double 6" & Trip 12" Elms
+81	Brush	18' 25.2'	30" Oak
+64	Dump	18'	
+43	12" Hickory	21.7'	
+32		29'	15" Beech
+22	8" Hickory	22'	
+22	5" Hickory	24.2'	→
+12	5" Hickory	24.7'	→
+04	18" Twin Elm	21.5'	
26+00	10" Elm	22'	
25+61	12" Elm	25'	



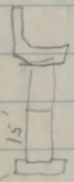
3.8' x 3' Stone Box

+13	22" Maple	22.25	
37+04		21.5'	18" Maple
+88		21.75	22" Ash
+57		24.2	22' Elm
+47		23.75'	20" Elm
+41		24.5"	15" Maple
36+03		24.5'	12" Pig Hickory
+79	18" Maple	30'	
+68	20" Maple	29'	
+67		24'	15" Elm
+54		25'	12" Maple
+43		26'	12" Maple
+40		24.5	15" Elm
35+15'		27'	15" Maple
34+20		24'	15" Beech
+93		30'	36" Maple
+65		21.7	12" Hickory
33+07		25.5	10" Pig Hickory
+52		19'	24" Elm
+41	18" Beech	29.5	
32+32		25'	15" Ash
+97		24.5'	12" Pig Hickory
31+29		18'	18" Elm
+92		25.5	Twin 10" Hickory
+81		21.75	15" Bass
30+58		20	12" Ash

63

+67		25'	8" Apple
+37		25'	8" Peach
+18		12.5'	12" x 16.5" Conc.
52+11	12" x 16.5" Conc.	13'	
+85		25'	8" Apple
57+56		28'	8" Sweet cherry
43+85	CEZ	30'	
41+90	CEZ	28.5'	
+88	CEZ	28.5	<del>27.5</del>
37+15		25'	
38+18	Drive No pipe		
+83	CEZ	28.5	
+81		26'	Bush 15" Elm
+75		25'	15" Ash
+64		26.75	Twin 15" <del>ET</del> Ash
37+15		21.5	18" Ash

53+25 steel Post in conc  
16.75'



+42.83 SR 528

17.5 Hdwl conc

53+16

25.1 6" Quince



	+	HI	-	Elev
56+00				
57+00		1299.27		
BM# 6	1.81	1209.17		1207.36
58+00				
59+00				
60+00				
61+00				
62+00		1299.03		
TP# 3	6.00	1208.93	6.24	1202.93
63+00				
64+00				
65+00				
66+00				
67+00		1300.59		
TP# 4	5.69	1210.49	4.13	1204.80

66

HI  
1302.03

	98.4	98.25	98.25	96.3	1296.83	96.7	95.9	97.1	97.3
3.6	3.75	6.2	5.7	5.2	5.8	6.6	4.9	4.7	
30	20 <sup>25</sup>	14 <sup>25</sup>	13 <sup>25</sup>		10 <sup>25</sup>	13 <sup>25</sup>	16	30	
96.3	96.7	95.5	94.5	95.1	1295.83	95.1	95.4	96.4	
5.7	5.3	6.5	7.5	6.9	6.2	6.9	7.4	6.6	5.6
30	20 <sup>25</sup>	17 <sup>25</sup>	18 <sup>25</sup>	14	10 <sup>25</sup>	12 <sup>25</sup>	13 <sup>25</sup>	30	
96.0	96.1	94.7	94.8	94.8	1295.57	96.0	94.4	95.6	95.7
3.3	3.3	4.1	5.1	4.5	3.7	4.3	4.9	3.7	3.6
30	21	18	16 <sup>25</sup>	15	10	13	12 <sup>25</sup>	15	30
95.6	96.6	94.4	93.6	94.2	1295.07	94.5	93.8	94.9	95.2
3.7	3.7	5.3	5.7	5.1	4.2	4.8	5.5	4.4	4.1
30	23	19	17 <sup>25</sup>	15 <sup>25</sup>	10 <sup>25</sup>	12 <sup>25</sup>	14 <sup>25</sup>	30	
94.7	94.7	93.3	92.9	93.8	1294.47	93.8	93.1	93.0	
4.6	4.6	6	6.4	5.5	4.8	5.5	6.2	4.9	5.3
30	22 <sup>25</sup>	19 <sup>25</sup>	17 <sup>25</sup>	14 <sup>25</sup>	10 <sup>25</sup>	12 <sup>25</sup>	15	30	
94.2	93.8	92.4	92.1	92.1	1294.07	93.0	92.5	93.4	93.1
5.1	5.5	6.7	6.2	5.2	6.3	6.8	5.9	5.6	5.8
30	20 <sup>25</sup>	17 <sup>25</sup>	15 <sup>25</sup>		11 <sup>25</sup>	12 <sup>25</sup>	16 <sup>25</sup>	18 <sup>25</sup>	30
94.0	94.2	92.3	93.5	93.5	1294.27	93.5	92.4	93.1	93.5
5.3	5.1	7	5.8	5.0	5.7	6.9	6.2	6.4	
30	22 <sup>25</sup>	17 <sup>25</sup>	14 <sup>25</sup>		10 <sup>25</sup>	13 <sup>25</sup>	16 <sup>25</sup>	18 <sup>25</sup>	30
94.8	94.8	91.9	92.7	92.7	1293.63	92.7	92.0	92.5	93.1
4.2	4.1	7.1	6.3	5.4	6.3	7	5.5	5.6	
30	22 <sup>25</sup>	16 <sup>25</sup>	14 <sup>25</sup>		12	14 <sup>25</sup>	12 <sup>25</sup>	30	
95.1	95.0	92.5	93.1	93.1	1294.13	93.5	92.8	95.1	95.0
3.9	4	6.3	5.9	4.9	5.5	6.2	3.9	3.7	
30	21	15 <sup>25</sup>	14 <sup>25</sup>		11 <sup>25</sup>	14 <sup>25</sup>	17	30	
94.5	94.1	92.8	93.3	93.3	1294.03	93.4	92.7	93.0	93.5
4.5	4.9	6.2	5.7	5.0	5.6	6.3	5.4	5.7	
30	17 <sup>25</sup>	15 <sup>25</sup>	13 <sup>25</sup>		11 <sup>25</sup>	13 <sup>25</sup>	15	30	
95.8	95.1	93.3	93.7	93.7	1294.43	93.8	93.1	96.1	94.4
3.2	3.4	5.8	5.3	4.6	5.2	5.9	3.9	4.6	
30	20 <sup>25</sup>	15 <sup>25</sup>	13 <sup>25</sup>		12	14 <sup>25</sup>	17 <sup>25</sup>	30	
95.4	95.9	95.7	94.2	94.2	1295.03	95.8	93.1	93.0	93.5
3.1	3.1	5.3	4.8	4.0	4.3	5.1	4.2	5.9	
30	20 <sup>25</sup>	15 <sup>25</sup>	14		11 <sup>25</sup>	12 <sup>25</sup>	14 <sup>25</sup>	16 <sup>25</sup>	30

	+	HI	-	Elev
68+00				
69+00				
70+00				
BM# 7			2.76	1207.73
TP#3			7.28	1204.21 ✓
			7.59	1204.90 ✓
BM# 6	0.59	1207.95		1207.36 ✓
TP#3			5.00	1202.95 ✓
BM# 7	0.20	1298.03		1207.93
71+00				
72+00		1294.66		
TP	3.57	1204.56	6.94	1200.99
73+00				
74+00		1292.30		
TP	4.01	1202.20	6.37	1198.19
75+00		1291.21		
Close	1.29	1201.11	2.38	1199.82
76+00				
77+00		Junk Pile on N side		

130059

	N	E			S				
95.4	95.3	94.1	94.8	1295.39	94.5	93.8	94.4	95.1	94.5
5.2	5.3	6.5	5.8	5.2	6.1	6.8	6	5.5	6.1
30	20	14.25	14.5		11.5	14	14.25	17	30
96.3	96.3	94.0	94.6	1295.29	94.1	94.1	95.1	96.1	95.7
4.3	4.3	6.6	6	5.3	5.9	6.5	5.5	4.5	4.9
30	21	17	14.5		10.5	13	14	17	30
95.2	94.8	93.8	92.9	1293.69					
5.4	6	7.2	6.7	6.9		6.8	7.2	5.8	5.8
30	18.5	16.25	14		10.5	13	12.25	15	30
95.6	95.0	93.2	93.6	1294.33	93.7	93.1	93.0	94.5	94.1
2.5	3	4.8	4.4	3.7	4.3	4.9	4.1	3.5	3.9
30	19.25	15.5	13.25		10.75	13.25	13.5	16.5	30
93.7	94.0	91.6	92.1	1292.73	92.0	91.5	93.5	92.4	
4.3	4	6.4	5.9	5.3	6	6.5	4.7	4.6	
30	19.25	14.25	12.25		11	12.25	15.25	30	
92.2	92.1	89.3	89.0	1290.66	90.2	89.4	93.1	92.4	
2.5	2.6	5.4	4.7	4.0	4.5	5.2	1.6	10.8	
30	19	14.25	13		10	12.25	.18	30	
89.3	89.3	89.7	88.2	1288.86	88.3	87.5	87.9	88.3	
5.4	5.4	7	6.5	5.8	6.4	7.2	6.8	6.4	
30	18.5	14.5	12.25		11.5	14	15	30	
87.3	88.5	88.5	86.1	86.8	1287.50	86.3	86.8	86.7	
5	3.8	3.8	6.2	5.7	4.8	5.4	5.5	5.6	
30	25.5	21.5	16	14.25		11.5	14.25	15.5	30
86.9	86.0	85.3	85.9	1286.71	86.0	85.5	85.8	85.9	
5.4	5.2	5.9	5.3	4.5	5.0	5.2	5.9	5.4	5.3
30	20	15.25	13.25		13.25	16	15.25	16.5	30
85.4	84.9	85.1	85.1	1286.11	85.5	84.6	85.3	86.1	
5.8		6.3	5.8	5.1	6.2	6.6	5.9	5.1	
30		13	11.25		14.25	16.25	18.25	30	

	+	HI	-	Elev
78+0		1201.11 <del>1199.97</del>		
TP	5.43	1201.35 <del>1195.21</del>	5.19	1195.92 <del>1189.78</del>
79+0		1291.95		
80+0				
81+0				
82+0		1297.56 1207.46		1198.91
TP	8.55	<del>1201.32</del>	2.44	1192.77
BM # 8	0.66	1297.48 1207.38	0.66	1206.80 <del>1200.66</del>
83+0				1296.82 <del>1200.72</del>
84+0				
BM # 8	5.96	1302.78 1212.68		1296.82 1206.72
85+0				
TP	10.59	1311.82 1221.72	1.55	1211.13
86+0				
Close (not used)			3.09	1218.63 Rain
86+50				
87+0				
87+50		1309.21		
TP	3.28	1219.11	5.89	1215.83

68

		N				E		S			
	84.1	84.3	84.0	84.9	1285.71	84.9	84.0	84.3	84.8		
	7.1	6.9	7.2	6.3	5.5	6.3	7.2	6.9	6.4		
	30	16 <sup>75</sup>	14 <sup>75</sup>	12		14 <sup>75</sup>	10	18 <sup>50</sup>	30		
	84.2	84.6	84.1	84.7	1286.25	86.1	84.0	84.8	84.1		
	7.3	6.9	7.4	6.7	5.2	5.4	7.5	7.1	6.8		
	30	19 <sup>25</sup>	17 <sup>25</sup>	9		18 <sup>25</sup>	17 <sup>25</sup>	19 <sup>25</sup>	30		
	86.5	87.2	84.6	86.3	1286.25	86.7	84.7	86.0	86.1		
	5	4.3	6.9	6.2	5.2	5.8	6.8	6.3	5.4		
	30	22	16	14		12 <sup>25</sup>	15	17 <sup>25</sup>	19 <sup>50</sup>	30	
	86.3	86.5	85.5	86.7	1287.45	86.1	86.4	86.4	86.1		
	5.2	5	5.6	4.8	4.0	4.8	5.5	5.1	5.6		
	30	18	15	12 <sup>50</sup>		12 <sup>25</sup>	14 <sup>25</sup>	15 <sup>50</sup>	30		
	86.9	87.2	87.0	87.9	1288.75	86.0	87.4	86.3	86.3		
	4.6	4.3	4.5	3.6	2.7	3.5	4.1	5.2			
	30	17	15 <sup>25</sup>	12 <sup>25</sup>		11 <sup>50</sup>	13	12 <sup>25</sup>	30		
	88.8	88.9	88.3	88.3	1289.98	89.9	88.6	89.3	88.8		
	8.7	8.6	9.2	8.2	7.5	8.1	8.9	9.2	8.7		
	30	16 <sup>75</sup>	15 <sup>25</sup>	12 <sup>50</sup>		11	14 <sup>25</sup>	15	30		
	92.8	93.1	91.3	91.8	1292.38	91.5	91.2	91.8	93.2		
	4.7	4.4	6.4	5.7	5.1	6	6.3	5.5	4.4	4.3	
	30	20	14 <sup>25</sup>	13		11 <sup>25</sup>	13 <sup>25</sup>	17 <sup>50</sup>	19	30	
	96.0	98.2	95.0	95.6	1296.38	95.8	95.2	96.0	98	98.5	
	4.8	4.6	7.8	7.2	6.4	7	7.6	6.8	4.7	4.3	
	30	22 <sup>50</sup>	14 <sup>50</sup>	13		10 <sup>50</sup>	13 <sup>25</sup>	14 <sup>50</sup>	20	30	
	91.7	91.8	91.9	91.6	1301.12	90.5	91.8	90.6	93.3	91.4	
	10.1	10	9.9	12.2	11.7	10.7	11.3	11.2	8.5	7.4	
	30	22 <sup>25</sup>	19 <sup>50</sup>	15 <sup>25</sup>	14		10 <sup>25</sup>	12 <sup>25</sup>	13 <sup>25</sup>	20	
	301.8	30.9	32.8	31.7	30.3	30.6	31	28	30.4	31.1	
	7	6.6	9	10.1	7.5	8.6	9.2	9.7	9	5.4	
	30	20	16	14 <sup>50</sup>	13		10.5	12 <sup>25</sup>	13 <sup>25</sup>	19 <sup>25</sup>	
	6.1	6.6	6.5	3.7	4.2	1304.82	4.3	5.9	4.5	4.2	
	5.7	5.2	5.3	8.1	7.6	7.0	7.5	7.9	7.3	4.6	
	30	23 <sup>25</sup>	19 <sup>25</sup>	14 <sup>25</sup>	13		10	12	13	17 <sup>50</sup>	
	6.4	6.7	5.2	4.6	5.1	1305.72	5.0	4.6	5.2	10	
	5.4	5.1	6.6	7.2	6.7	6.1	6.8	7.2	6.6	4.8	
	30	19	13 <sup>50</sup>	14 <sup>25</sup>	13		11 <sup>25</sup>	13	15 <sup>25</sup>	18	

	+	1309.21 H.I	-	Elev
88+0				
89+0				
90+0				
91+0				
TP	1.43	1299.15 1209.05	11.49	1207.62
RM 9	2.07	1298.61 1208.51	2.66	1206.39 <span style="color:red">1296.54</span>
92+0				
93+0				
94+0				
95+0				
TP	2.06	1289.28 1199.18	11.39	1197.12
96+0				
97+0				
97+50				
98+0				

Cont.  
on 72

		0921 N					S				
6.5	6.6	6.2	6.3	4.4	5.1	1305.71	4.9	4.2	4.0	6.3	6.1
3.7	3.6	3	2.9	4.8	4.1	3.5	4.3	5	4.4	2.8	2.5
30	24	22	18	13	11		12 25	14 20	15	21	30
2.7	3.4	2.7	2.4	3.4	3.4	03.91	3.0	2.5	2.9	3.5	3.6
3.7	5.8	6.5	6.8	6	5.3	5.3	6.2	6.7	6.3	6.3	5.6
30	19 25	16	14	14	12		13	16	16 25	30	
2.1	3.5	0.6	1.4	0.1	0.1	01.91	1.3	0.7	3.9	4.4	
6.5	5.9	8.6	7.8	7.3	7.3	7.9	8.5	5.3	4.8		
30	19	14	11 25			13	15 25	19 20	30		
1.1	1.4	0.6	0.7	1.2	1.2	1291.85	9.2	9.6	9.9	9.1	
8	7.3	12.8	11.8	11.3	11.3	12	12.8	9.3	9		
30	21 25	12 25	11 20			13	15 25	20 20	30		
4.9	4.3	4.3	4.9	4.6	4.7	1294.41	4.7	4.3	4.3	4.4	
3.7	4.3	5	5.7	5	4.2	4.9	5.4	5	4.3	4.2	
30	18 25	16	14 25	13 25		13 5	15 25	16 25	19 25	30	
8.6	9.4	8.3	7.1	6.5	5.9	1292.71	8.6	9.9	9.6	9.5	
30	18	14 25	14 25	12 25			16	13 25	20	30	
9.0	9.5	9.1	9.1	9.1	7.2	1291.47	9.9	9.1	9.0	9.0	
7.6	7.3	8.5	7.9	7.2	7.2	8	8.5	6.6	6.6		
30	17 25	14 25	12			14	17	21	30		
8.1	8.3	10.1	11.1	9.3	9.6	1289.01	8.6	8.4	8.8	9.0	
30	21	16 25	15 25	13 20			14 25	17 25	17 20	22	30
8.5	8.5	8.5	8.5	8.5	3.1	1286.18	8.5	8.4	8.3	8.2	
4.1	3.8	4.5	4	4	3.1	3.1	3.9	4.6	4	4.1	
30	16	14	13 20				15 20	18	18 25	30	
8.4	8.4	8.1	8.2	8.2	5.9	1283.37	8.2	8.1	8.1	8.3	
4.7	5	7.6	6.9	5.9	5.9	7	7.6	6.2	6.3		
30	17 25	13 5	11 25			17	18 25	21	30		
8.3	8.3	8.0	8.8	7.8	7.8	1281.48	8.0	8.0	8.1	8.5	
4.3	4.3	9	9.4	8.8	7.8	9.2	10.1	9.5	5.2	4.8	
30	23 25	16 25	14	12		17 25	18 25	19 25	26	30	
8.3	8.1	7.6	7.6	7.6	10.7	11.3	15.9	8.6	8.1		
7	7.2	12.7	11.7	10.7	10.7	12	13.4	6.7	6.2		
30	24	14 20	12 20			17	18 25	26 25	30		



H. Patterson  
B. Christian  
J. Donoghue

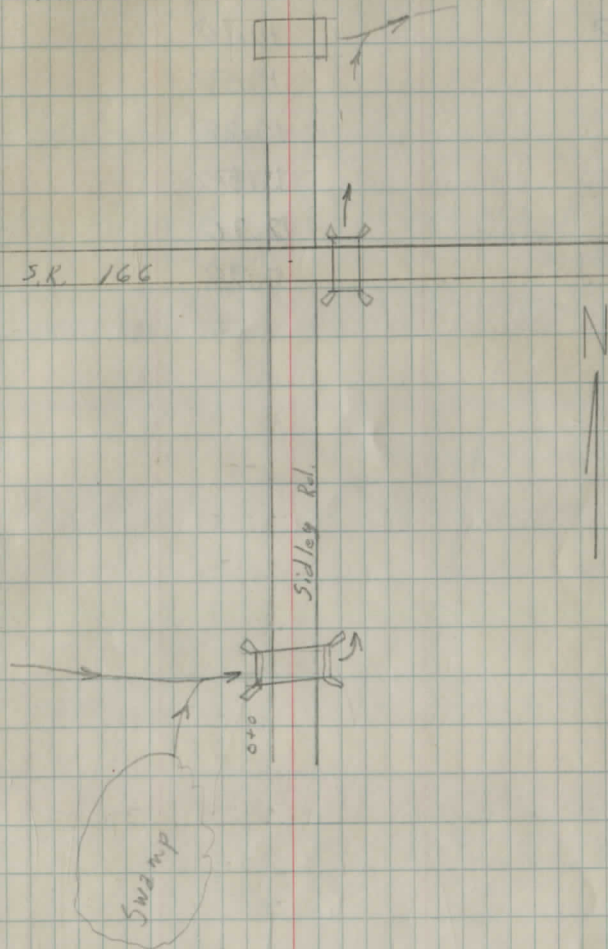
Sidley Rd S. of SR 166

Channel Level 2-12-61

BM	2.07	102.07	100.00	
0-100 <sub>S</sub>			5.84	
0-50 <sub>S</sub>			7.30	
0-200 <sub>N</sub>			8.81	
0-150 <sub>N</sub>			7.39	
0-100 <sub>N</sub>			7.49	
0-50 <sub>N+S</sub>			7.75	
INLET CULVT. 0+0			7.76	
OUTLET CULVT. 0+32			9.09	
0+50			8.40	
1+00			9.05	
1+50			10.23	
2+00			8.83	
2+50			10.43	
3+00			10.47	
3+50			10.20	
4+00			10.35	
TP #1	4.98	99.72	7.33	94.74
4+50			8.41	
5+00			9.02	
5+50			9.34	
INLET CULVT. 6+04			9.04	
OUTLET CULVT. 6+26			8.96	
6+50			9.12	
7+00			9.83	

20

SW & W. Hdw. Culvt ± 500 S. of SR 166



STA	+	HI	-	ELEV.
7+50			9.97	
8+00			10.40	
8+50			10.10	
9+00			10.58	
9+50			10.28	
10+00			11.50	
13+00			12.70	
TP#1			4.98	

	+	HI	-	Elev.
98+50				
99+0				
TP <sub>1</sub>	0.38	<del>1279.23</del>	9.84	<del>1279.44</del>
98+50				
99+00				
TP	0.54	<del>1269.29</del>	10.98	<del>1268.75</del>
100+00				
101+00				
TP	0.76	<del>1257.41</del>	11.64	<del>1257.75</del>
101+00				
102+00				
TP	4.51	<del>1242.44</del>	10.48	<del>1242.93</del>
BM			1.11	1161.33
103+00				1161.36

		N		E		S		72		
71.5	11.8	72.2	11.1	1289.28				79.6	80.8	
30	30	24	24					9.7	8.5	
70.4	10.9	71.8	17.5					27	30	
30	30	21.50						15.1	13.6	
									30	
		11	7.2	12.6	13.5	1274.63	13.4	12.8	12.1	13.4
			6.3	5.2			6.4	7.	7.7	6.4
							15.25	17.5	18.75	19
		6.76	12.2	11.4	10.0	1269.73	6.3	11.5	12.2	11.6
							17	18.25	18.50	
58.8	10.6	60.0	9.4	29.3	58.7	60.1	58.9	58.9	63.1	63.3
30	30	17.50	15	14.50	11.25	1261.09	8.3	9.5	10.5	6.3
							16.25	17.50	26	30
									56.6	57.5
									12.7	11.8
									22.25	30
52.8	5.7	54.5	4.0	54.1	52.6	53.1	53.5	52.3	53.0	
30	30	20.50	13.50	12.75	10.25	1254.61	5.0	6.2	5.5	
							14.25	18.25	18.25	
50.5	8	48.8	10.1	47.4	48.6	48.9	48.7	47.6	48.5	50.1
30	30	14.25	13.25	11	8.8	1249.71	9.8	10.9	10	7.8
							15.50	18	18.50	23
										51.4
45.25	7.3	44.8	7.7	45.7	45.25	45.9	44.9	44.2	46.6	46.9
30	30	15.50	13	10	6.6	1245.94	7.6	8.3	5.9	5.6
							14.50	18.75	23.75	30

B.M. Windsor  
8-1-61

Clay St Profile at Chardon - Windsor

	+	HI	-	Elev
BM#5	9.50	1286.21		1276.71
0+0			9.02	1277.19
0+50N			8.95	1277.26
1+0N			7.26	1278.95
1+50N			5.00	1281.21
2+0N			5.63	1280.58
2+50N			7.90	1278.31
3+0N			9.90	1276.31
4+0N			11.58	1274.63
5+0N			10.79	1275.42
6+0N			13.51	1272.70
1+0S			8.61	1278.60
2+0S			5.78	1280.43
TP	10.88	1296.41	0.68	1285.53
3+0S			9.83	1285.58
4+0S			7.03	1288.38
5+0S			4.08	1291.33
6+0S			2.71	1292.70
T.P.	0.59	1196.09	10.81	1195.50
BM#5			9.48	1186.61

Topo - Clay St - 600' W of Chardon - Windsor 73

West

(approx. E. of pavement)  
East

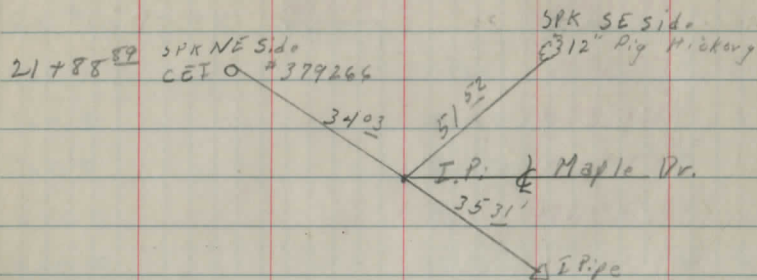
4+46				
3+83				15.5' Drive 12" Cond. Cross pipe
3+27	28'			C.E.I.
3+18				12' 12" Cond. Cross pipe
3+09	14.5'			Stone Wall
3+00			29.5'	22" Maple
2+97	50'			Other Corner of House
2+69			22.5'	6" Elm
2+61	50'			Corner of House
2+28	28'			Rose Bush
2+21			26'	Lilac
2+20	28'			Lilac
2+06			24'	Evergreen
1+97			20'	Hedge Row
1+93			29'	C.E.I.
1+49	29'			C.E.I.
1+46			21'	10" Walnut
1+40			21'	Hedge Row
1+38			18'	Concrete Retainer
1+30				
1+16			27'	Shrubs
1+16			24.5'	Steel 3" Flagpole
0+28			27'	30" Twin Elm

	+	HI	-	Elev
BM #10	2.75	<del>116.40</del> 1254.21		<del>1161.26</del> 1251.46
0+0 (Chardon Windsor)			11.24	1242.97 ✓
1+0 E			10.47	1243.74 ✓
2+0 E			8.33	1245.88 ✓
3+0 E			8.7	1245.51 ✓
4+0 E			11.5	1242.71 ✓
5+0 E			15.4	1238.81 ✓
6+0 E			19.6	1234.61
TP	5.38	<del>1158.25</del> 1248.35	11.24	<del>1152.87</del> 1242.97
1+0 N			6.86	1241.49 ✓
2+0 N			7.91	1240.44 ✓
3+0 N			8.86	1239.49 ✓
4+0 N			11.47	1236.88 ✓
5+0 N			12.5	1235.85 ✓
6+0 N			12.1	1236.25 ✓
1+0 S			4.56	1243.79 ✓
2+0 S			4.65	1243.70 ✓
3+0 S			5.52	1242.73 ✓
4+0 S			6.96	1241.49 ✓
5+0 S			8.0	1240.35 ✓
6+0 S			7.9	1240.45
TP	8.41	<del>1143.91</del> 1254.01	2.75	<del>1155.50</del> 1245.60
			2.53	1161.38

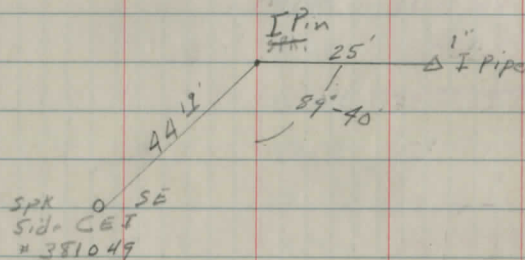
#262

Valleyview Dr.

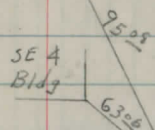
July 1962



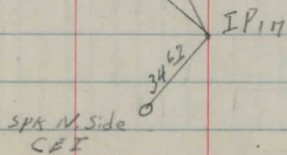
15+56.89



SPK E side  
C&E



0+29.22

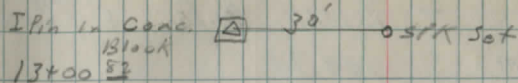


75

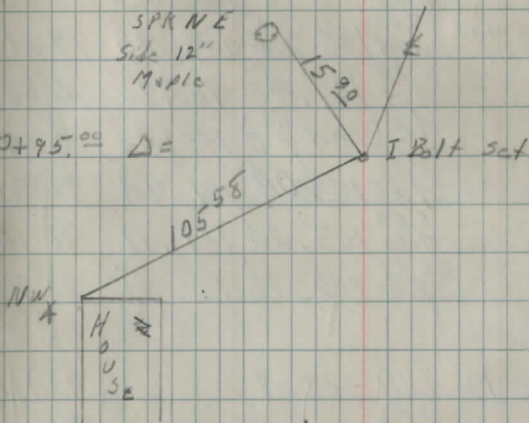
+ 13+30.82

Sherman

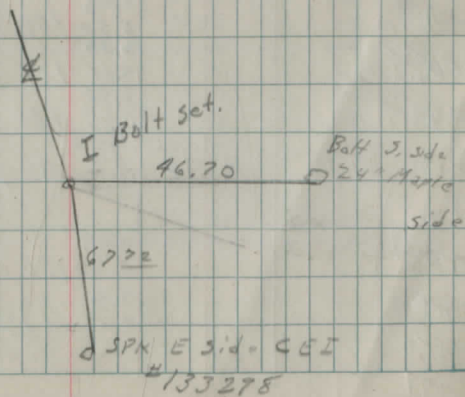
43+30.82?



30+95.00 Δ =

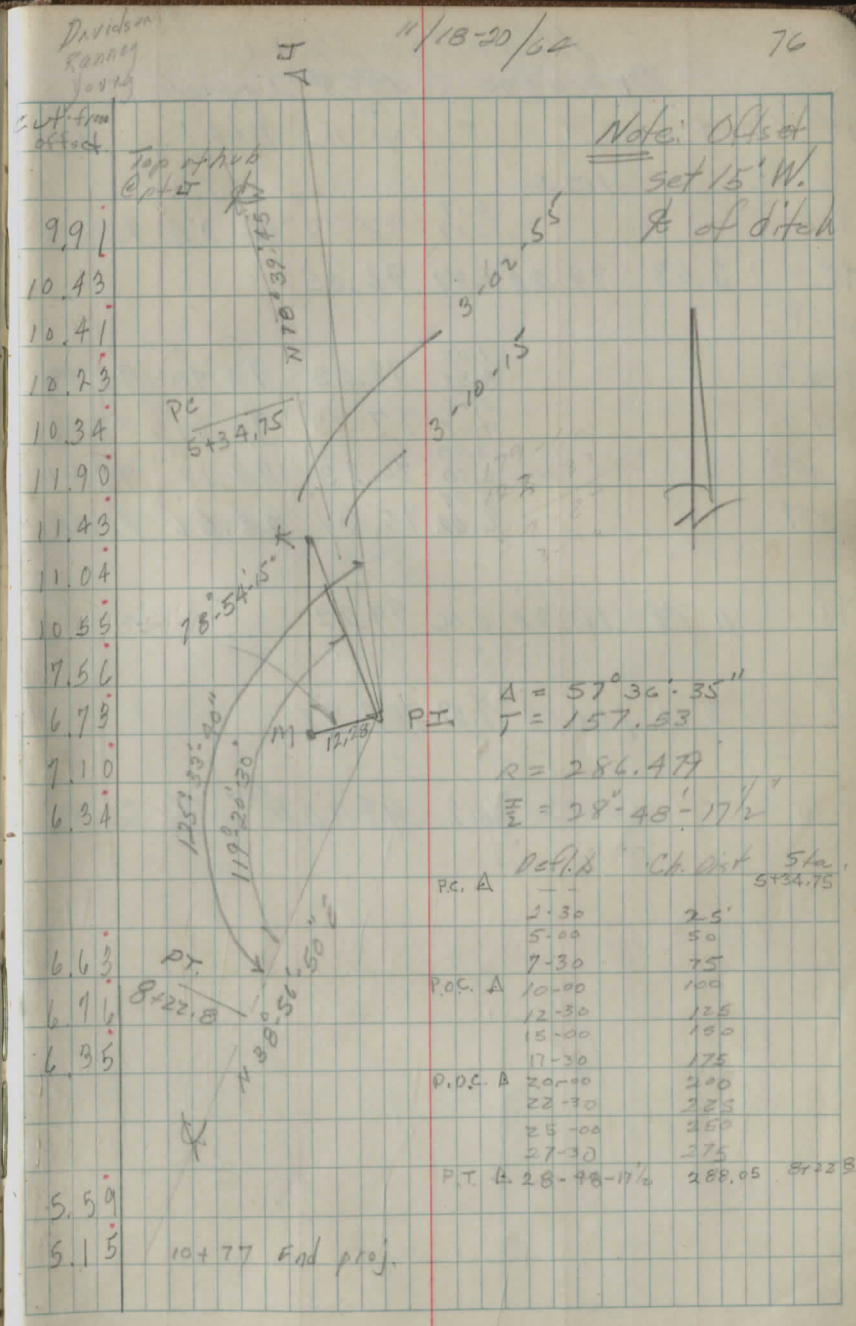


27+55.95 Δ =



Marilyn Drive  
Drainage 1964 Improve.

Sta	+ T	-	Elev Top Stk	ℓ Bl.	Prop Grd.
B.M.	7.00	112.10	104.90		
			2.63		
0+50			9.61	109.47	102.89 99.56
			2.44		
1+0			9.86	109.66	102.24 99.73
			2.80		
+50			10.22	109.30	101.88 98.89
			3.31		
2+0			10.35	108.79	101.75 98.56
			3.54		
+50			10.58	108.56	101.52 98.22
			2.32		
3+0			10.85	109.78	101.25 97.88
			3.12		
+50			11.27	108.98	100.83 97.55
IP 5+2	0.52		3.85		
4+0		108.77	7.88	108.25	100.93 97.21
			1.34		
+50			8.07	107.43	100.70 96.88
			7.07		
5+0			7.07	104.10	100.54 96.54
			5.73		
134 <sup>75</sup>			7.03	103.04	101.74 96.31
			5.59		
159 <sup>75</sup>			7.66	103.24	101.11 96.14
			6.62		
6+09 <sup>75</sup>			8.55	102.15	100.22 95.81
T.P. =					
6+09 <sup>75</sup>	3.05	105.13	6.69	102.08	
			3.03		
+59 <sup>75</sup>			5.50	102.10	99.63 95.47
			3.23		
7+09 <sup>75</sup>			5.61	101.90	99.52 95.14
			3.78		
+59 <sup>75</sup>			6.55	101.15	98.58 94.80
T.P. = 7+59	2.12	102.54	4.71	100.42	
			2.49		
8+09 <sup>75</sup>			4.80	100.05	97.74 94.46
			3.20		
+50			4.76	99.34	97.79 94.19
4+0					
+50					



Marilyn Drive  
Drainage 1964 Improve

Sta	+	T	-	Elev. Topstk	Relat	Prop Grd
		102.54				
9+0			4.17 6.19	98.37	96.35	93.85
T.P. =	2.63	99.28	5.89	96.65		
10+0						
9+50			1.05 4.58	98.23	94.70	93.52
10+0			2.05 4.67	97.23	94.61	93.18
+50			3.05 6.10	96.23	93.18	92.84
+77			3.97 6.62	95.31	92.66	92.66

T.P. 11.08 110.30 0.06 99.22

T.P. 3.11 106.02 7.39 102.91

B.M. 6.12 99.90 <sup>Sta. 10</sup> of

Davidson  
Ranney  
Young

11/23/64  
clear-cold

77

4.67

4.67

4.91

4.05

3.39

2.65

End project.

NE. Cor. Main Box & Cedar Sta 45+66



Restk.	Marilyn	Drive	Drainage
TBM <sup>#1</sup>	7.80	111.69	103.89
+50		2.30	109.99 99.56
+10		2.13	109.56 99.23
+50		2.47	109.22 98.89
2+0		3.00	108.69 98.56
+50		3.24	108.45 98.22
3+0		2.05	109.64 97.88
+50		2.73	108.96 97.55
4+0		3.53	108.16 97.21
+50		4.37	107.32 96.88
TBM <sup>#2</sup>	1.60	104.07	9.22 102.47
8+50		5.30	98.77 94.19
9+0		5.63	98.44 93.85
+50		6.70	97.37 93.52
10+0		7.20	96.87 93.18
+50		8.26	95.81 92.84
+77		8.92	95.15 92.66
TBM <sup>#2</sup>	2.53	105.00	1.59 102.48 <del>ok 1.1%</del>
5+0		1.64	103.36 96.54
+59		2.07	102.93 96.14
6+09		3.48	101.52 95.81
+59		3.23	101.77 95.47
7+09		3.86	101.14 95.14
+59		4.37	100.63 94.80
8+09		5.52	99.48 94.46
TBM <sup>#2</sup>	8.07	111.15	2.52 102.48
TBM <sup>#1</sup>			1.25 103.89

Davidson  
Friedrich  
Young

cldy-cool 2/18/65

78

cut		Top 42" RCP
9.83	9-10	Top offset @ 15' W R
10.33	10-4	
10.33	10-4	
10.13	10-1 1/2	
10.23	10-2 3/4	
11.76	11-9 5/8	
11.41	11-5	
10.95	10-11 1/2	
10.44	10-5 1/4	
		Spike S.E. side 10" Elm + 5+50
4.58	4-7	
4.59	4-7	
3.85	3-10 1/2	
3.69	3-8 1/2	
2.97	2-11 3/4	
2.49	2-6	
6.82	6-10	
6.79	6-9 1/2	
6.71	5-8 1/2	
6.30	6-3 1/2	
6.00	6-0	
5.83	5-10	
5.02	5-2 1/4	
ok 1.00%		

	+	H.I	-	Elev
	7.34	1187.44	<del>4.77</del>	1180.10
T.P.	7.73	1190.86	4.71	1182.23
			.36	1190.10
T.P.	4.61	1188.04	7.03	1183.43
			7.94	1180.10

Correlation of Bridge with Benchmark  
Chardon Windsor Rd.

bridge slab sta 100+50

B.M Vert. Spk 30" Maple Sta 4+20 <sup>old sta.</sup> ↙

bridge slab sta 100+50 (good work)

BM 5

6.55

11.35

0.75

11.62

# CURVE TABLES.

Published by KEUFFEL & ESSER CO.

## HOW TO USE CURVE TABLES.

Table I. contains Tangents and External 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 External: 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. =	118.47
7° 19½' = " " "	543	B. C. = sta.	541+53.53
9° 49½' = " " "	+50	L. C. =	2.3333
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.

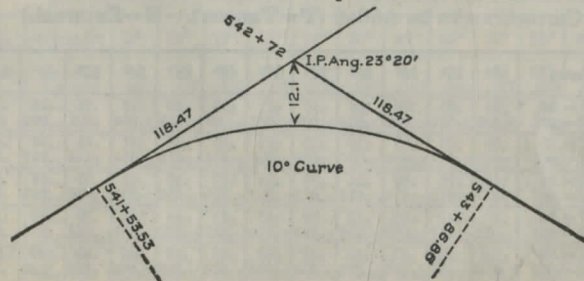


TABLE I. — Tangents and Externals to a 1° Curve.  
Chord = 100 ft.

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 E = .000	.03 .000	.05 .001	.06 .001	.08 .002	.10 .002	.11 .002	.13 .003	.15 .003	.16 .004	.18 .004	.20 .004	.21 .005	.23 .005
10°	T = .03 E = .001	.06 .003	.09 .004	.13 .006	.16 .007	.19 .008	.22 .009	.25 .011	.28 .012	.31 .014	.34 .015	.38 .017	.42 .018	.46 .020
15°	T = .04 E = .004	.10 .007	.14 .010	.19 .014	.24 .018	.29 .023	.34 .027	.39 .032	.45 .035	.51 .039	.53 .043	.58 .048	.63 .053	.68 .051
20°	T = .06 E = .006	.13 .011	.19 .017	.26 .022	.32 .028	.39 .034	.45 .038	.51 .045	.58 .051	.65 .057	.72 .063	.79 .070	.84 .076	.90 .083
25°	T = .08 E = .009	.16 .018	.24 .027	.33 .036	.42 .045	.51 .054	.59 .063	.69 .072	.78 .081	.88 .090	.99 .100	1.06 .110	1.14 .120	1.21 .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	256.6	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 E = .006	.13 .011	.19 .017	.26 .022	.32 .028	.39 .034	.45 .038	.51 .045	.58 .051	.65 .057	.72 .063	.79 .070	.84 .076	.90 .083
25°	T = .08 E = .009	.16 .018	.24 .027	.33 .036	.42 .045	.51 .054	.59 .063	.67 .072	.75 .081	.83 .090	.90 .099	1.06 .109	1.14 .118	1.21 .135
30°	T = .10 E = .013	.19 .025	.29 .039	.39 .051	.49 .065	.59 .078	.69 .090	.79 .103	.89 .116	.99 .129	1.09 .149	1.20 .170	1.29 .179	1.39 .188
35°	T = .11 E = .018	.22 .035	.34 .054	.47 .072	.58 .086	.69 .109	.80 .131	.93 .153	1.05 .175	1.17 .197	1.29 .213	1.42 .230	1.54 .247	1.66 .264
40°	T = .13 E = .023	.26 .046	.40 .070	.53 .093	.67 .117	.80 .141	.93 .172	1.06 .203	1.20 .234	1.34 .265	1.49 .277	1.64 .304	1.79 .315	1.94 .341
45°	T = .15 E = .030	.30 .060	.44 .093	.60 .119	.76 .153	.91 .184	1.06 .216	1.21 .254	1.37 .289	1.52 .325	1.70 .351	1.87 .378	2.04 .411	2.21 .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 E = .023	.26 .046	.40 .070	.53 .093	.67 .117	.80 .141	.93 .172	1.06 .203	1.20 .234	1.34 .265	1.49 .277	1.64 .290	1.79 .315	1.94 .341
45°	T = .15 E = .030	.30 .060	.44 .093	.60 .119	.76 .153	.91 .184	1.06 .216	1.21 .254	1.37 .289	1.52 .325	1.70 .351	1.87 .378	2.04 .411	2.21 .445
50°	T = .17 E = .037	.34 .075	.51 .116	.68 .151	.85 .189	1.02 .227	1.19 .266	1.36 .305	1.54 .345	1.72 .384	1.91 .425	2.10 .467	2.29 .509	2.48 .550
55°	T = .19 E = .046	.38 .093	.57 .142	.76 .188	.95 .236	1.14 .283	1.32 .332	1.52 .381	1.72 .420	1.92 .479	2.14 .530	2.35 .582	2.56 .641	2.77 .700
60°	T = .21 E = .056	.42 .112	.63 .168	.84 .225	1.05 .283	1.27 .340	1.49 .398	1.71 .457	1.94 .516	2.17 .575	2.38 .636	2.60 .697	2.83 .774	3.07 .851
65°	T = .23 E = .067	.46 .135	.69 .204	.93 .273	1.16 .343	1.40 .412	1.64 .483	1.88 .554	2.13 .625	2.38 .697	2.63 .775	2.88 .859	3.13 .944	3.39 1.01
70°	T = .25 E = .080	.51 .159	.76 .240	1.02 .321	1.28 .403	1.54 .485	1.80 .568	2.06 .652	2.32 .735	2.60 .819	2.86 .906	3.14 .994	3.44 1.08	3.72 1.17
75°	T = .27 E = .095	.56 .182	.83 .286	1.12 .383	1.40 .480	1.69 .578	1.98 .678	2.27 .777	2.57 .877	2.87 .977	3.16 1.07	3.47 1.18	3.78 1.29	4.09 1.39
80°	T = .30 E = .110	.61 .220	.91 .332	1.22 .445	1.53 .558	1.84 .671	2.15 .785	2.46 .903	2.78 1.02	3.10 1.13	3.44 1.25	3.78 1.38	4.12 1.50	4.46 1.62
85°	T = .33 E = .128	.66 .259	1.00 .391	1.33 .524	1.68 .657	2.02 .790	2.36 .926	2.70 1.06	3.05 1.20	3.40 1.34	3.77 1.47	4.14 1.62	4.55 1.76	4.89 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
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 E = .056	.42 .112	.63 .168	.84 .225	1.05 .283	1.27 .340	1.49 .398	1.71 .457	1.94 .516	2.17 .575	2.38 .636	2.60 .697	2.83 .774	3.07 .851
65°	T = .23 E = .067	.46 .135	.69 .204	.93 .273	1.16 .343	1.40 .412	1.64 .483	1.88 .554	2.13 .625	2.38 .697	2.63 .771	2.88 .845	3.13 .922	3.39 1.01
70°	T = .25 E = .080	.51 .159	.76 .240	1.02 .321	1.28 .403	1.54 .485	1.80 .568	2.06 .652	2.32 .735	2.60 .819	2.86 .906	3.14 .994	3.44 1.08	

TABLE I. — Tangents and External 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 E=.128	.66 .259	1.00 .391	1.33 .524	1.68 .657	2.02 .790	2.36 .926	2.70 1.06	3.05 1.20	3.40 1.34	3.77 1.47	4.14 1.62	4.55 1.76	4.89 1.91
90°	T=.36 E=.149	.72 .299	1.09 .450	1.45 .603	1.83 .758	2.20 .910	2.57 1.07	2.94 1.22	3.32 1.38	3.70 1.54	4.10 1.70	4.50 1.87	4.91 2.03	5.32 2.20
95°	T=.39 E=.174	.79 .350	1.19 .522	1.55 .706	2.00 .985	2.40 1.06	2.80 1.25	3.20 1.43	3.61 1.62	4.02 1.80	4.49 1.99	4.98 2.18	5.38 2.38	5.83 2.58
100°	T=.43 E=.200	.86 .401	1.30 .604	1.74 .809	2.18 1.01	2.62 1.22	3.06 1.43	3.50 1.64	3.95 1.85	4.48 2.06	4.88 2.28	5.37 2.50	5.87 2.73	6.40 2.96
105°	T=.46 E=.230	.94 .470	1.42 .700	1.90 .938	2.38 1.17	2.87 1.42	3.34 1.65	3.84 1.90	4.35 2.14	4.84 2.39	5.35 2.64	5.87 2.90	6.40 3.16	6.93 3.41

TABLE I. — Tangents and External 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	30	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 E=.200	.86 .401	1.30 .604	1.74 .809	2.18 1.01	2.62 1.22	3.06 1.43	3.50 1.64	3.95 1.85	4.40 2.06	4.88 2.28	5.37 2.50	5.85 2.73	6.34 2.96
105°	T=.46 E=.230	.94 .470	1.42 .700	1.90 .938	2.38 1.17	2.87 1.42	3.34 1.65	3.84 1.90	4.35 2.14	4.84 2.39	5.35 2.64	5.87 2.90	6.40 3.16	6.93 3.41
110°	T=.50 E=.260	1.08 .535	1.55 .808	2.08 1.08	2.60 1.36	3.14 1.63	3.66 1.91	4.21 2.19	4.76 2.49	5.31 2.61	5.86 3.05	6.43 3.35	7.01 3.65	7.59 3.95
115°	T=.54 E=.307	1.13 .624	1.70 .939	2.29 1.26	2.86 1.57	3.45 1.89	4.03 2.21	4.63 2.54	5.23 2.87	5.83 3.20	6.44 3.53	7.07 3.88	7.70 4.23	8.35 4.58
120°	T=.61 E=.339	1.25 .720	1.89 1.08	2.52 1.45	3.16 1.82	3.81 2.20	4.44 2.56	5.11 2.95	5.78 3.33	6.44 3.72	7.11 4.10	7.80 4.50	8.51 4.91	9.21 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.	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	490.1	2.511	10.02	20.04	3.45
50	2022.4	.618	2.472	4.945	0.85	40	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<sup>2</sup> 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 .0012x900x2.183 or 2.36 inches.

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

Degree of Curve	Radius 50	1/2 sub chord R = sin of 1/2 def. angle				Length of arc for 100 ft.
		sin. 1/2 def. ang.	12.5 Ft.	15 Ft.	20 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

$T = R \tan \frac{1}{2} I$	$R = T \cot. \frac{1}{2} I$	Chord def. = $\frac{\text{chord}^2}{R}$
$T = \frac{50 \tan \frac{1}{2} I}{\text{Sin. } \frac{1}{2} D}$	$R = \frac{50}{\text{Sin. } \frac{1}{2} D}$	No. chords = $\frac{I}{D}$
$\text{Sin. } \frac{1}{2} D = \frac{50}{R}$	$E = R \text{ ex. sec } \frac{1}{2} I$	Tan. def. = $\frac{1}{2}$ chord def.
$\text{Sin. } \frac{1}{2} D = \frac{50 \tan \frac{1}{2} I}{T}$	$E = T \tan \frac{1}{2} I$	

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<sup>2</sup> ÷ 200 = .5. 100 + .5 = 100.5 hyp.

Given Hyp. 100, Alt. 25.25<sup>2</sup> ÷ 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 0.574 d<sup>2</sup>, where d is the distance in miles. The correction for curvature alone is closely,  $\frac{1}{8} d^2$ . The combined correction is negative.

PROBABLE ERROR. If d<sub>1</sub>, d<sub>2</sub>, d<sub>3</sub>, etc. are the discrepancies of various results from the mean, and if Σd<sup>2</sup> = 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 1/4 x 5 1/2 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	1/4	3-16	1/2	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

Natural Trigonometrical Functions

Angle.	Sin.	Tan.	Sec.	Cosec.	Cotg.	Cosin.	Angle.	Sin.	Tan.	Sec.	Cosec.	Cotg.	Cosin.
0	0	0	1	∞	∞	1	90	0	0	1	∞	∞	1
10	.0029	.0029		343.8	343.8	1	50	10	.1421	.1435	1.0102	7.040	6.968
20	.0058	.0058		171.9	171.9	.99998	40	20	.1449	.1465	1.0107	6.900	6.827
30	.0087	.0087		114.6	114.6	.99996	30	30	.1478	.1495	1.0111	6.766	6.691
40	.0116	.0116	1.0001	85.94	85.94	.99993	20	40	.1507	.1524	1.0115	6.636	6.561
50	.0145	.0145	1.0001	68.76	68.75	.99989	10	50	.1536	.1554	1.0120	6.512	6.435
1	.0175	.0175	1.0002	57.30	57.29	.99985	89	1	.1564	.1584	1.0125	6.394	6.314
10	.0204	.0204	1.0002	49.11	49.10	.99979	50	10	.1593	.1614	1.0129	6.277	6.197
20	.0233	.0233	1.0003	42.98	42.96	.99973	40	20	.1622	.1644	1.0134	6.166	6.084
30	.0262	.0262	1.0003	38.20	38.19	.99966	30	30	.1650	.1673	1.0139	6.059	5.976
40	.0291	.0291	1.0004	34.38	34.37	.99958	20	40	.1679	.1703	1.0144	5.955	5.871
50	.0320	.0320	1.0005	31.26	31.24	.99949	10	50	.1708	.1733	1.0149	5.855	5.769
2	.0349	.0349	1.0006	28.65	28.64	.99939	88	10	.1736	.1763	1.0154	5.759	5.671
10	.0378	.0378	1.0007	26.45	26.43	.99929	50	10	.1765	.1793	1.0160	5.665	5.576
20	.0407	.0407	1.0008	24.56	24.54	.99917	40	20	.1794	.1823	1.0165	5.575	5.485
30	.0436	.0437	1.0010	22.93	22.90	.99905	30	30	.1822	.1853	1.0170	5.488	5.396
40	.0465	.0466	1.0011	21.49	21.47	.99892	20	40	.1851	.1883	1.0176	5.403	5.309
50	.0494	.0495	1.0012	20.23	20.21	.99878	10	50	.1880	.1914	1.0181	5.320	5.226
3	.0523	.0524	1.0014	19.11	19.08	.99863	87	11	.1908	.1944	1.0187	5.241	5.145
10	.0552	.0553	1.0015	18.10	18.07	.99847	50	10	.1937	.1974	1.0193	5.164	5.066
20	.0581	.0582	1.0017	17.20	17.17	.99831	40	20	.1965	.2004	1.0199	5.089	4.989
30	.0610	.0612	1.0019	16.38	16.35	.99813	30	30	.1994	.2035	1.0205	5.016	4.915
40	.0640	.0641	1.0020	15.64	15.60	.99795	20	40	.2022	.2065	1.0211	4.945	4.843
50	.0669	.0670	1.0022	14.96	14.92	.99776	10	50	.2051	.2095	1.0217	4.877	4.773
4	.0698	.0699	1.0024	14.34	14.30	.99756	86	12	.2079	.2126	1.0223	4.810	4.705
10	.0727	.0729	1.0027	13.76	13.73	.99736	50	10	.2108	.2156	1.0230	4.745	4.638
20	.0756	.0758	1.0029	13.23	13.20	.99714	40	20	.2136	.2186	1.0236	4.682	4.574
30	.0785	.0787	1.0031	12.75	12.71	.99692	30	30	.2164	.2217	1.0243	4.620	4.511
40	.0814	.0816	1.0033	12.29	12.25	.99668	20	40	.2193	.2247	1.0249	4.560	4.449
50	.0843	.0846	1.0036	11.87	11.83	.99644	10	50	.2221	.2278	1.0256	4.502	4.390
5	.0872	.0875	1.0038	11.47	11.43	.99619	85	13	.2250	.2309	1.0263	4.445	4.331
10	.0901	.0904	1.0041	11.10	11.06	.99594	50	10	.2278	.2339	1.0270	4.390	4.275
20	.0929	.0934	1.0045	10.76	10.71	.99567	40	20	.2306	.2370	1.0277	4.336	4.219
30	.0958	.0963	1.0046	10.43	10.39	.99540	30	30	.2334	.2401	1.0284	4.284	4.165
40	.0987	.0992	1.0049	10.13	10.08	.99512	20	40	.2363	.2432	1.0291	4.232	4.113
50	.1016	.1022	1.0052	9.839	9.788	.99482	10	50	.2391	.2462	1.0299	4.182	4.061
6	.1045	.1051	1.0055	9.567	9.514	.99452	84	14	.2419	.2493	1.0306	4.133	4.011
10	.1074	.1080	1.0058	9.309	9.255	.99421	50	10	.2447	.2524	1.0314	4.086	3.962
20	.1103	.1110	1.0061	9.065	9.010	.99390	40	20	.2476	.2555	1.0321	4.039	3.914
30	.1132	.1139	1.0065	8.834	8.777	.99357	30	30	.2504	.2586	1.0329	3.994	3.867
40	.1161	.1169	1.0068	8.614	8.556	.99324	20	40	.2532	.2617	1.0337	3.949	3.821
50	.1190	.1198	1.0073	8.405	8.345	.99290	10	50	.2560	.2648	1.0345	3.906	3.776
7	.1219	.1228	1.0075	8.206	8.144	.99255	83	15	.2588	.2679	1.0353	3.864	3.732
10	.1248	.1257	1.0079	8.016	7.953	.99219	50	10	.2616	.2711	1.0361	3.822	3.689
20	.1276	.1287	1.0082	7.834	7.770	.99182	40	20	.2644	.2742	1.0369	3.782	3.647
30	.1305	.1317	1.0086	7.661	7.596	.99144	30	30	.2672	.2773	1.0377	3.742	3.606
40	.1334	.1346	1.0090	7.496	7.429	.99106	20	40	.2700	.2805	1.0386	3.703	3.566
50	.1363	.1376	1.0094	7.337	7.269	.99067	10	50	.2728	.2836	1.0394	3.665	3.526
						82							74

Cosin. Cotg. Cosec. Sec. Tan. Sin. Angle

Cosin. Cotg. Cosec. Sec. Tan. Sin. Angle

Natural Trigonometrical Functions

Angle.	Sin.	Tan.	Sec.	Cosec.	Cotg.	Cosin.	Angle.	Sin.	Tan.	Sec.	Cosec.	Cotg.	Cosin.
60	.5	1.732	2	1.155	0.577	0.5	30	0.5	1.732	2	1.155	0.577	0.5
61	.5150	1.801	2.039	1.141	0.564	0.496	29	.5150	1.801	2.039	1.141	0.564	0.496
62	.5299	1.875	2.142	1.126	0.551	0.481	28	.5299	1.875	2.142	1.126	0.551	0.481
63	.5450	1.955	2.261	1.111	0.538	0.466	27	.5450	1.955	2.261	1.111	0.538	0.466
64	.5603	2.041	2.397	1.095	0.525	0.451	26	.5603	2.041	2.397	1.095	0.525	0.451
65	.5759	2.133	2.551	1.079	0.512	0.436	25	.5759	2.133	2.551	1.079	0.512	0.436
66	.5917	2.231	2.724	1.062	0.500	0.421	24	.5917	2.231	2.724	1.062	0.500	0.421
67	.6077	2.335	2.918	1.045	0.488	0.406	23	.6077	2.335	2.918	1.045	0.488	0.406
68	.6239	2.445	3.135	1.028	0.476	0.391	22	.6239	2.445	3.135	1.028	0.476	0.391
69	.6403	2.561	3.378	1.011	0.464	0.376	21	.6403	2.561	3.378	1.011	0.464	0.376
70	.6569	2.684	3.649	0.994	0.452	0.361	20	.6569	2.684	3.649	0.994	0.452	0.361
71	.6737	2.815	3.949	0.977	0.440	0.346	19	.6737	2.815	3.949	0.977	0.440	0.346
72	.6907	2.954	4.279	0.960	0.428	0.331	18	.6907	2.954	4.279	0.960	0.428	0.331
73	.7079	3.101	4.641	0.943	0.416	0.316	17	.7079	3.101	4.641	0.943	0.416	0.316
74	.7253	3.255	5.037	0.926	0.404	0.301	16	.7253	3.255	5.037	0.926	0.404	0.301
75	.7429	3.417	5.470	0.909	0.392	0.286	15	.7429	3.417	5.470	0.909	0.392	0.286
76	.7607	3.587	5.943	0.892	0.380	0.271	14	.7607	3.587	5.943	0.892	0.380	0.271
77	.7787	3.765	6.460	0.875	0.368	0.256	13	.7787	3.765	6.460	0.875	0.368	0.256
78	.7969	3.951	7.025	0.858	0.356	0.241	12	.7969	3.951	7.025	0.858	0.356	0.241
79	.8153	4.145	7.643	0.841	0.344	0.226	11	.8153	4.145	7.643	0.841	0.344	0.226
80	.8339	4.347	8.319	0.824	0.332	0.211	10	.8339	4.347	8.319	0.824	0.332	0.211
81	.8527	4.558	9.059	0.807	0.320	0.196	9	.8527	4.558	9.059	0.807	0.320	0.196
82	.8717	4.778	9.869	0.790	0.308	0.181	8	.8717	4.778	9.869	0.790	0.308	0.181
83	.8909	5.007	10.756	0.773	0.296	0.166	7	.8909	5.007	10.756	0.773	0.296	0.166
84	.9103	5.245	11.727	0.756	0.284	0.151	6	.9103	5.245	11.727	0.756	0.284	0.151
85	.9299	5.493	12.791	0.739	0.272	0.136	5	.9299	5.493	12.791	0.739	0.272	0.136
86	.9497	5.751	13.957	0.722	0.260	0.121	4	.9497	5.751	13.957	0.722	0.260	0.121
87	.9697	6.019	15.235	0.705	0.248	0.106	3	.9697	6.019	15.235	0.705	0.248	0.106
88	.9899	6.297	16.635	0.688	0.236	0.091	2	.9899	6.297	16.635	0.688	0.236	0.091
89	.9999	6.585	18.168	0.671	0.224	0.076	1	.9999	6.585	18.168	0.671	0.224	0.076



Natural Trigonometrical Functions

Angle.	Sin.	Tan.	Sec.	Cosec.	Cotg.	Cosin.	Angle.	Sin.	Tan.	Sec.	Cosec.	Cotg.	Cosin.		
32	.5299	.6249	1.1792	1.887	1.600	.84805	58	39	.6293	.8098	1.2868	1.589	1.235	.77715	51
10	.5324	.6289	1.1813	1.878	1.590	.84650	50	10	.6316	.8146	1.2898	1.583	1.228	.77531	50
20	.5348	.6330	1.1835	1.870	1.580	.84495	40	20	.6338	.8195	1.2929	1.578	1.220	.77347	40
30	.5373	.6371	1.1857	1.861	1.570	.84339	30	30	.6361	.8243	1.2959	1.572	1.213	.77162	30
40	.5398	.6412	1.1879	1.853	1.560	.84182	20	40	.6383	.8292	1.2991	1.567	1.206	.76977	20
50	.5422	.6453	1.1901	1.844	1.550	.84025	10	50	.6406	.8342	1.3022	1.561	1.199	.76791	10
33	.5446	.6494	1.1924	1.836	1.540	.83867	57	40	.6428	.8391	1.3054	1.556	1.192	.76604	50
10	.5471	.6536	1.1946	1.828	1.530	.83708	50	10	.6450	.8441	1.3086	1.550	1.185	.76417	50
20	.5495	.6577	1.1969	1.820	1.520	.83549	40	20	.6472	.8491	1.3118	1.545	1.178	.76229	40
30	.5519	.6619	1.1992	1.812	1.511	.83389	30	30	.6494	.8541	1.3151	1.540	1.171	.76041	30
40	.5544	.6661	1.2015	1.804	1.501	.83228	20	40	.6517	.8591	1.3184	1.535	1.164	.75851	20
50	.5568	.6703	1.2039	1.796	1.492	.83066	10	50	.6539	.8642	1.3217	1.529	1.157	.75661	10
34	.5592	.6745	1.2062	1.788	1.483	.82904	56	41	.6561	.8693	1.3251	1.524	1.150	.75471	49
10	.5616	.6787	1.2086	1.781	1.473	.82741	50	10	.6583	.8744	1.3284	1.519	1.144	.75280	50
20	.5640	.6830	1.2110	1.773	1.464	.82577	40	20	.6604	.8796	1.3318	1.514	1.137	.75088	40
30	.5664	.6873	1.2134	1.766	1.455	.82413	30	30	.6626	.8847	1.3352	1.509	1.130	.74896	30
40	.5688	.6916	1.2158	1.758	1.446	.82248	20	40	.6648	.8899	1.3386	1.504	1.124	.74703	20
50	.5712	.6959	1.2183	1.751	1.437	.82082	10	50	.6670	.8952	1.3421	1.499	1.117	.74509	10
35	.5736	.7002	1.2208	1.743	1.428	.81915	55	42	.6691	.9004	1.3456	1.494	1.111	.74314	48
10	.5760	.7046	1.2233	1.736	1.419	.81748	50	10	.6713	.9057	1.3492	1.490	1.104	.74120	50
20	.5783	.7089	1.2258	1.729	1.411	.81580	40	20	.6734	.9110	1.3527	1.485	1.098	.73924	40
30	.5807	.7133	1.2283	1.722	1.402	.81412	30	30	.6756	.9163	1.3563	1.480	1.091	.73728	30
40	.5831	.7177	1.2309	1.715	1.393	.81242	20	40	.6777	.9217	1.3600	1.476	1.085	.73531	20
50	.5854	.7221	1.2335	1.708	1.385	.81072	10	50	.6799	.9271	1.3636	1.471	1.079	.73333	10
36	.5878	.7265	1.2361	1.701	1.376	.80902	54	43	.6820	.9325	1.3673	1.466	1.072	.73135	47
10	.5901	.7310	1.2387	1.695	1.368	.80730	50	10	.6841	.9380	1.3711	1.462	1.066	.72937	50
20	.5925	.7355	1.2413	1.688	1.360	.80558	40	20	.6862	.9435	1.3748	1.457	1.060	.72737	40
30	.5948	.7400	1.2440	1.681	1.351	.80386	30	30	.6884	.9490	1.3786	1.453	1.054	.72537	30
40	.5972	.7445	1.2466	1.675	1.343	.80212	20	40	.6905	.9545	1.3824	1.448	1.048	.72337	20
50	.5995	.7490	1.2494	1.668	1.335	.80038	10	50	.6926	.9601	1.3863	1.444	1.042	.72136	10
37	.6018	.7536	1.2521	1.662	1.327	.79864	53	44	.6947	.9657	1.3902	1.440	1.036	.71934	46
10	.6041	.7581	1.2549	1.655	1.319	.79688	50	10	.6967	.9713	1.3941	1.435	1.030	.71732	50
20	.6065	.7627	1.2577	1.649	1.311	.79512	40	20	.6988	.9770	1.3980	1.431	1.024	.71529	40
30	.6088	.7673	1.2605	1.643	1.303	.79335	30	30	.7009	.9827	1.4020	1.427	1.018	.71325	30
40	.6111	.7720	1.2633	1.636	1.295	.79158	20	40	.7030	.9884	1.4061	1.422	1.012	.71121	20
50	.6134	.7766	1.2661	1.630	1.288	.78980	10	50	.7050	.9942	1.4101	1.418	1.006	.70916	10
38	.6157	.7813	1.2690	1.624	1.280	.78801	52		.7071	1.	1.414	1.414	1.	.70711	45
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

Cosin. Cotg. Cosec. Sec. Tan. Sin. Angle

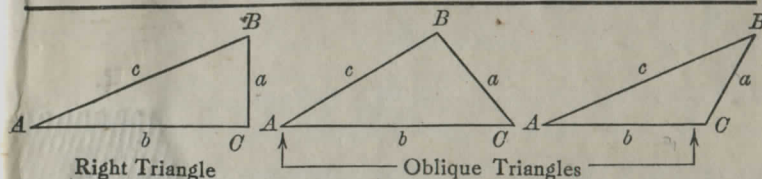
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 182 F.93  
 22 36 22  
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 360  
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 22 36 22  
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### TRIGONOMETRIC FORMULÆ



#### Solution of Right Triangles

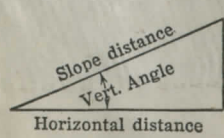
For Angle  $A$ .  $\sin = \frac{a}{c}$ ,  $\cos = \frac{b}{c}$ ,  $\tan = \frac{a}{b}$ ,  $\cot = \frac{b}{a}$ ,  $\sec = \frac{c}{b}$ ,  $\text{cosec} = \frac{c}{a}$   

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

#### Solution of Oblique Triangles

Given	Required	Formulas
$A, B, a$	$b, c, C$	$b = \frac{a \sin B}{\sin A}$ , $C = 180^\circ - (A + B)$ , $c = \frac{a \sin C}{\sin A}$
$A, a, b$	$B, c, C$	$\sin B = \frac{b \sin A}{a}$ , $C = 180^\circ - (A + B)$ , $c = \frac{a \sin C}{\sin A}$
$a, b, C$	$A, B, c$	$A + B = 180^\circ - C$ , $\tan \frac{1}{2}(A - B) = \frac{(a - b) \tan \frac{1}{2}(A + B)}{a + b}$ $c = \frac{a \sin C}{\sin A}$
$a, b, c$	$A, B, C$	$s = \frac{a + b + c}{2}$ , $\sin \frac{1}{2}A = \sqrt{\frac{(s - b)(s - c)}{bc}}$ $\sin \frac{1}{2}B = \sqrt{\frac{(s - a)(s - c)}{ac}}$ , $C = 180^\circ - (A + B)$
$a, b, c$	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 =  $5^\circ 10'$ . From Table, Page IX.  $\cos 5^\circ 10' = .9959$ . Horizontal distance =  $319.4 \times .9959 = 318.09$  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.  $\text{Cosine } 5^\circ 10' = .9959$ ,  $1 - .9959 = .0041$ .  $319.4 \times .0041 = 1.31$ .  $319.4 - 1.31 = 318.09$  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.

