FIELD BOOK

S 1135

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

#4(Sec. I)

S Newbury Cemetery Page 1
Smiths Crossing Ditch " Page 3
B CH.#4 & T.M. 144
SAUBURN-CHARDON ROAD
Rt. 87 to Pekin Rd. Line data Page 14
Levels Smiths Xing ditch 1950 " 17
No 4 DEFG X Sections cont'd 19
1950
BRIDGE CREEK DRAINAGE FROM C.H.#4 & AUB-NEW T/L. Pg 33

SHAW'S
PIONEERS
SINCE 1831

No 4 ABC 1951 35-
LEVELS BRIDGE CREEK AT C.H.#4 SEC. B Pg 39
PROFILE CH#4 SEC B Pg 42
No 4 DEFG

Field Book

No. S 1135

No 4 I Pr... Pg. 61
X Section Pg. 64

MADE IN 88 LEAVES

A Product of Wilson-Jones Co.
Made in U. S. A.

L BARTHOLOMEW RD T.M. 195 ± 1500' EAST of MOUNT RD CH 132 Pg 79

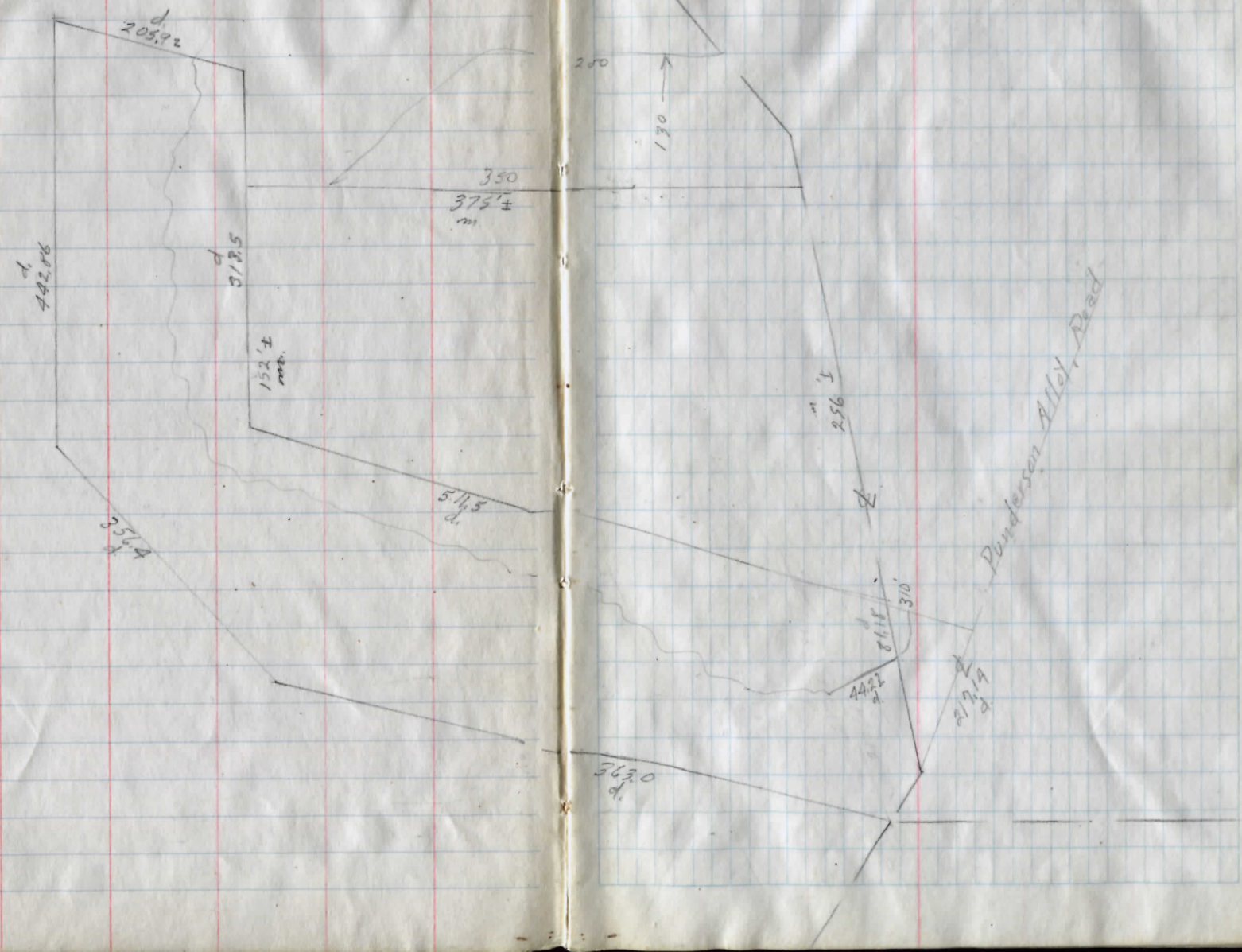
157

No 4 Sec D X sec Pg 71

No 4 I profile 1951

PAPER AND LITHOGRAPHING
GUARANTEED WATERPROOF

South Newbury Cemetery Survey



NOTE! Smith's Crossing is ½ Ch. #4 & T.H. 144 Auburn Rd. Pekin Rd.

Main Ditch Smith Crossing Ditch
Sideotes set 20' Rt.

Sta 4+00 Def Lt. 18°06'

3

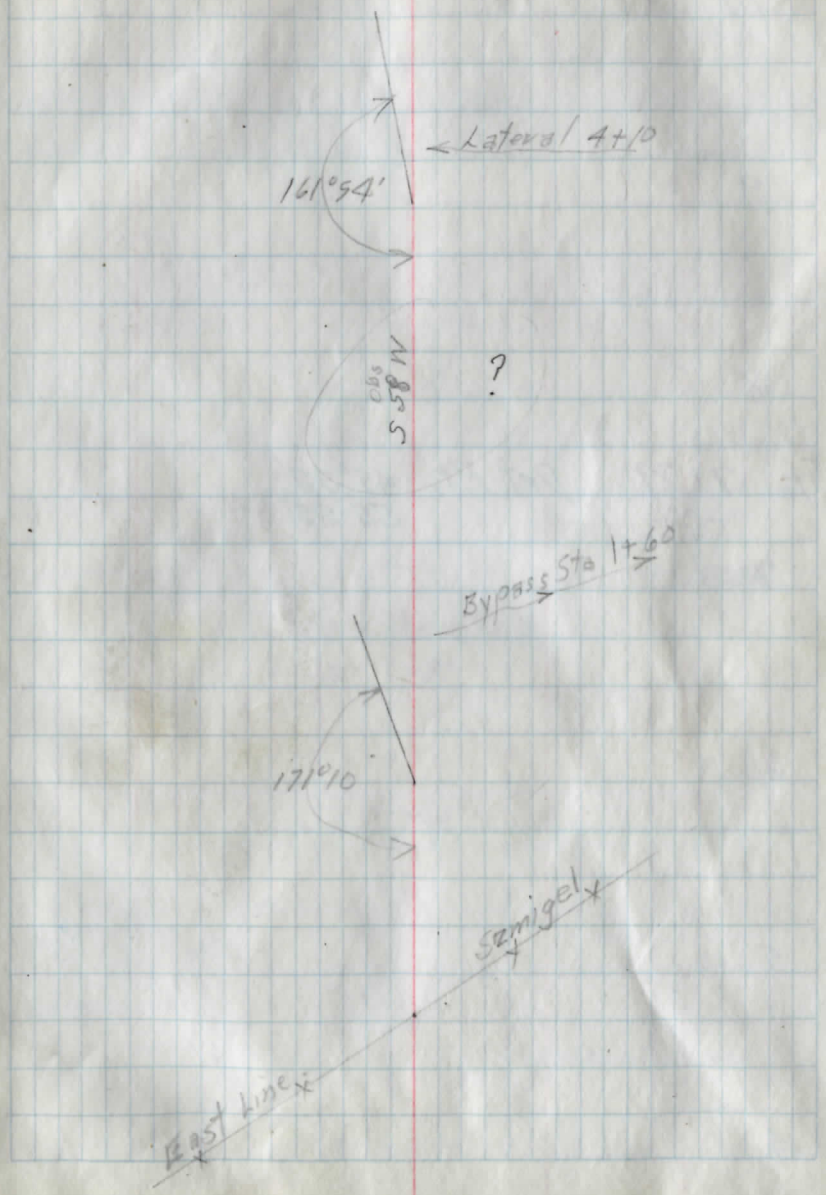
2

Sta 1+00 Def Lt 8°50

Sta 0+00 Beginning of Project

SZMIGEL = S.E. ½ ½ Ch. #4 & T.H. 144 on Smiths Crossing

Swamp Drainage Elv's. 8/23/38. Richey Richards 3



10 17

9 12

8 15

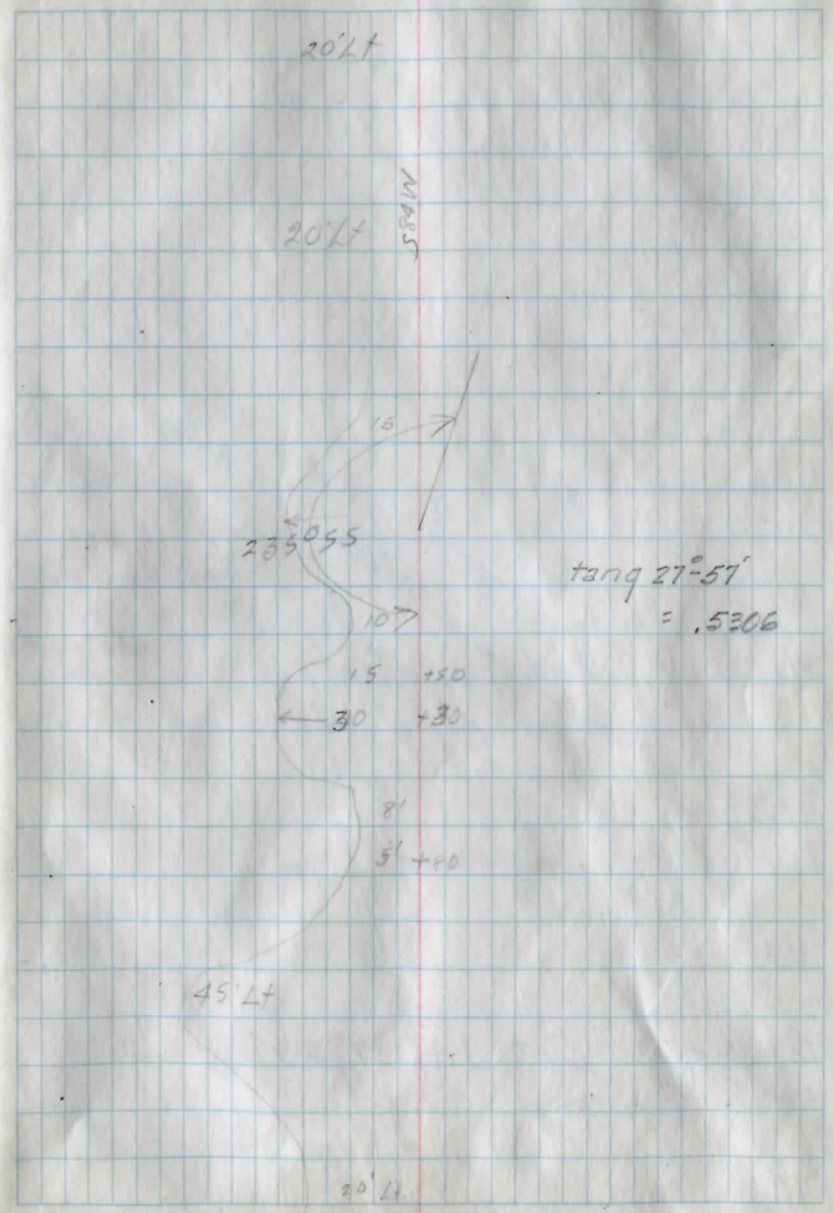
Sta 7+79 Def. Rt. ~~45°55'~~ 55-55

7 14

6 13

5 : 12

4



Sta 12+17 End of Project

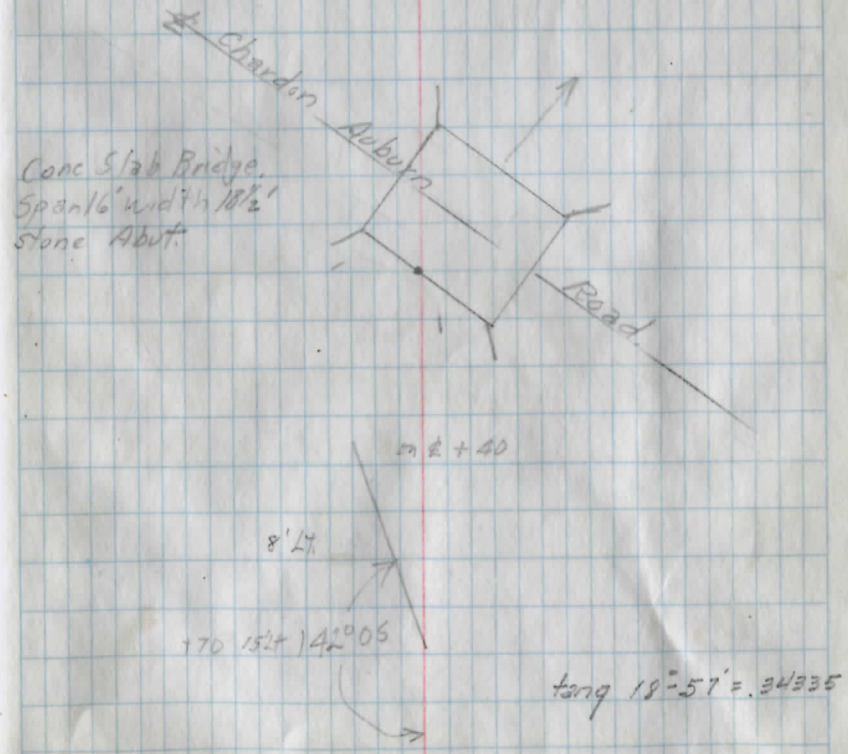
℄E end Bridge

12 19

11 18

Sta 10+70 Dot Lt. 37° 55'

10



Lateral #1 Smith Crossing Ditch
Sidestakes set 10' Rt.

4

3

2

1

Sta 0+ Def Rt 41°36

Sta 0+00 Beginning of Project

S. 42°-30 E.

221°36

Chardon Auburn

Stone Box
Culv. long

Road

10

9

Sta 8+10 Def Rt 40°00'
" " 50°-00'

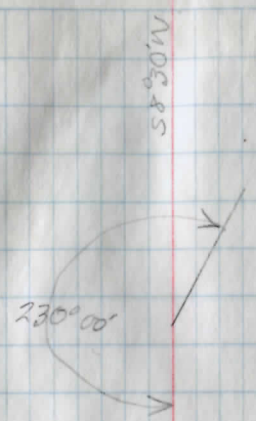
8

7

6

5

4

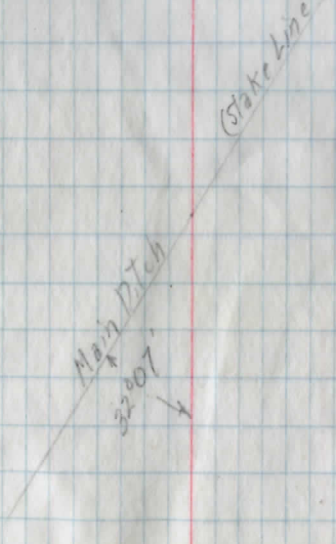


Tang 25° = .46631
- 9.32

Sta 11+39.2 End of Lateral X with State Line
= Sta 4+35 Main Ditch

11

10



tang 16°03' = .28770
-8.62

Levels on Lateral #1 Smith Crossing

BM #1	7.09	1162.10		1155.01
Road 100' N			6.3	55.8
" 200' N			4.8	.3
Culvert ℄			4.7	54.20
Swamp 100' NW			7.4	1154.7
0			5.92	
1			7.35	54.75
2			7.55	
3			7.93	
	6.27	1161.08	7.29	1154.81
4			6.85	54.23
5			6.67	
6			6.63	
7			5.70	
8			5.41	
9	4.67	1161.15	4.60	1156.48
10			4.34	56.81
11			6.55	
BM #2			4.83	1156.32

Ditch

Spike Root 10" Elm E side Road. 75' N. of Sta 0+10

Same culvert as Sta 1+71.1

FL	TO	H	H	TO	FL
7.9	7.3	3.2	3.1	7.1	7.9

Water surface flow = 1153.0

9.0 53.1

10	6-5		2	5-6
8.5	8.0	9.4	7.7	7.5

9.7

0 to 8 same section as 2

8.6
9.0
9.1
8.5
7.9
8.0

6-5	1		2	8
4.0	8.0		8.0	4.0

8.4 52.7

9 & 11 same section as 10

Spike S side root 12" Basswood 75' Lt Sta 10+60

Levels on Main Ditch Smith Crossing

BM#2	6.18	1162.50		1156.32
3			5.02	57.5
2			3.20	59.3
1			5.98	1156.5
BM#2	4.62	1160.94		1156.32
0			3.55	57.4
0-100			9.9	1151.0
BM#2	3.56	1159.58		1156.32
4			4.37	55.51
4+50				
4+60				
5			5.28	
5+40				
5+60				
6			4.77	
7			4.43	
7+40				
7+50				
7+79			5.24	
8	5.56	1159.53	5.91	1153.97
9			4.85	
10			5.28	

Ditch

Spike Structure 12" Basswood 25' Rt & Sta 3+20

1152.0 10.5 2&3 same Sid.

$\frac{-26}{5.2}$ $\frac{20-18}{3.2}$ $\frac{9}{8.4}$ $\frac{1}{9.2}$ $\frac{2-6}{10.5}$ $\frac{13-}{5.3}$ —

1153.0 9.5

0&1 = 5-12-25-30

1151.7

1151.8 9.1

1152.0	7.9	1152.0	10-15-22-30
1152.3	7.6		
1155.5	4.4		2bill on 4 from 4+55 to 5+50
1154.7	5.1		
1154.6	5.3		
1152.1	7.8		
51.8	8.1		3-7-14-20
51.9	8.0		2-6-15-30
52.1	7.8		
55.0	4.9		
51.6	5.3	51.6	
51.0	8.5		10-15-25-30
51.0	8.5	51.0	
50.8	8.7		

8 to 1 same section

		1159.53		
11			5.92	53.6
12			1.58	57.9
12+17 Flow				
BM #3			0.72	1158.81
	1.11	1159.92		
E Road			1.3	58.6
Channel 100 W			8.8	51.1
200'			9.2	1150.7
300			9.3	1150.6

Check Level

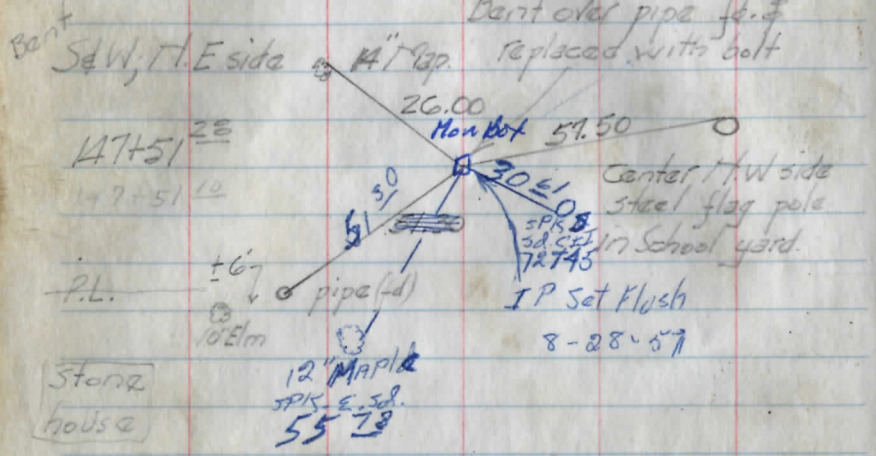
BM #3	9.72	1168.53		1158.81
	12.49	1180.59	0.43	1168.10
	3.93	1184.22	0.30	1180.29
	0.54	1172.09	12.67	1171.55
	1.89	1161.84	12.13	1159.95
BM #1			6.85	1154.99 1155.01

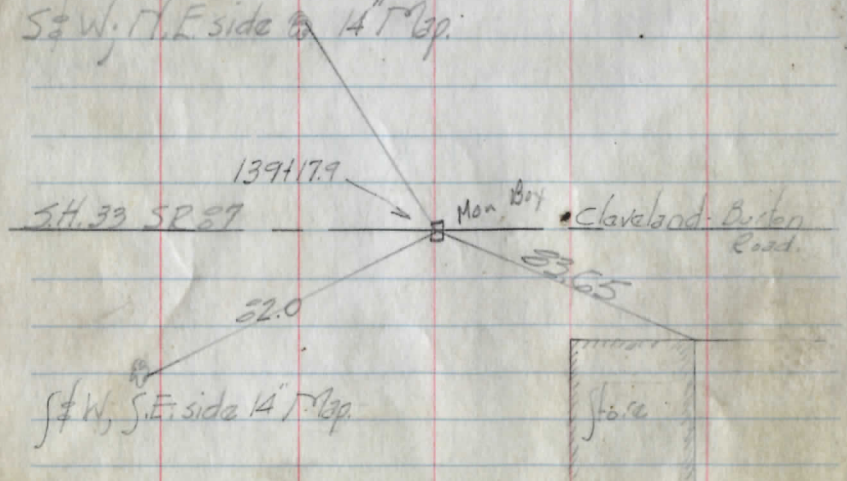
1150.4	9.1	
1150.9	8.6	
1150.5	9.0	1150.3

X cut NE Cor E Parapet Culv. Sta 12+17

9-2-40 Pomeroy Richards Hosford.

Raf for Auburn - Chardon Road





Co. Highway #1. Sec I

P.O.T.

S&W. SW Side 8" Maple
1st N of Drive

87.15

S&W. S.W. Side 12" Maple

S.W. Side 18" Maple

82.02

54.77

192+99 51

Hub fd & replaced with bolt.

same

bent I.P. fd
10-25-55

I.P. set Flush
8-28-57

2800.1

185+06.2 = ℄ X Bdge

△ spk Pot see Pg 16 for Ref.

S&W; S.W. side 8" Basswood

20.82

S&W; S.E. side C.E. #401 pole

S&W; S.W. side 10" Elm

59.23

35.10

164+99 41

I.P. fd 10-25-55

Mon Box

27.20

= Pk. N. Side CEI

Pipe fd. Δ = 1° 16' Lt

2581.5 N. of #87

IP set Flush
8-28-57

S&W SW side 8" Maple

86 38

S&W S.W. side 12" Maple

81 90

193+00.30

I. Pipe set Pot

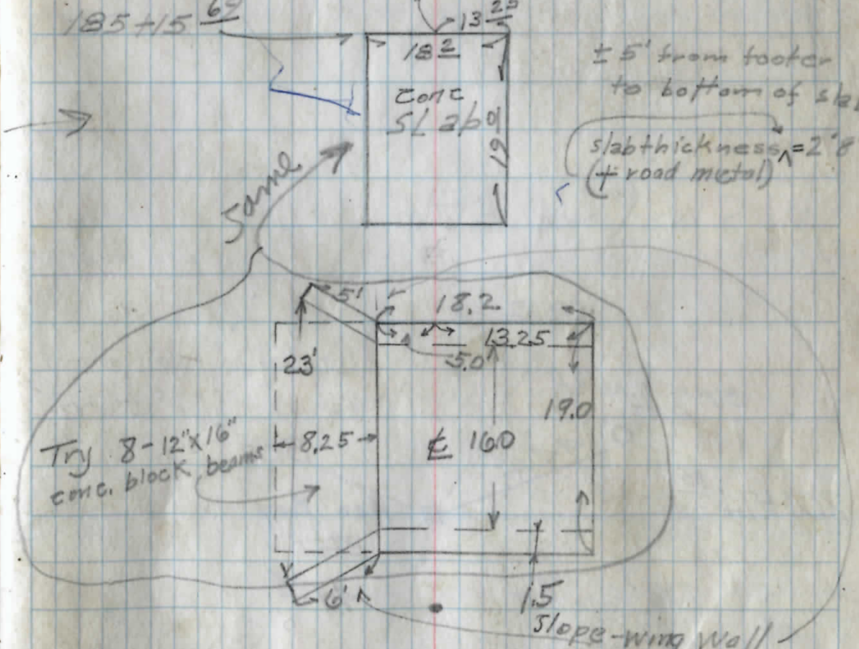
I Pin

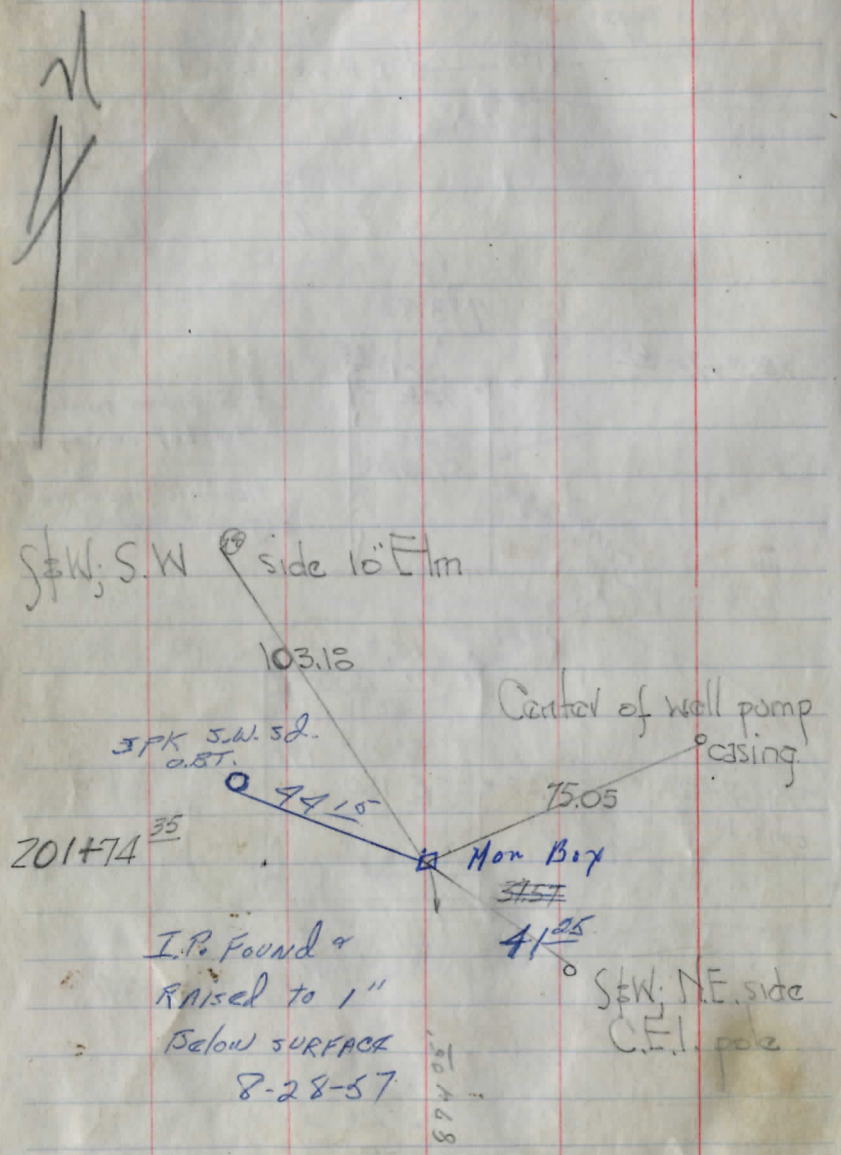
N

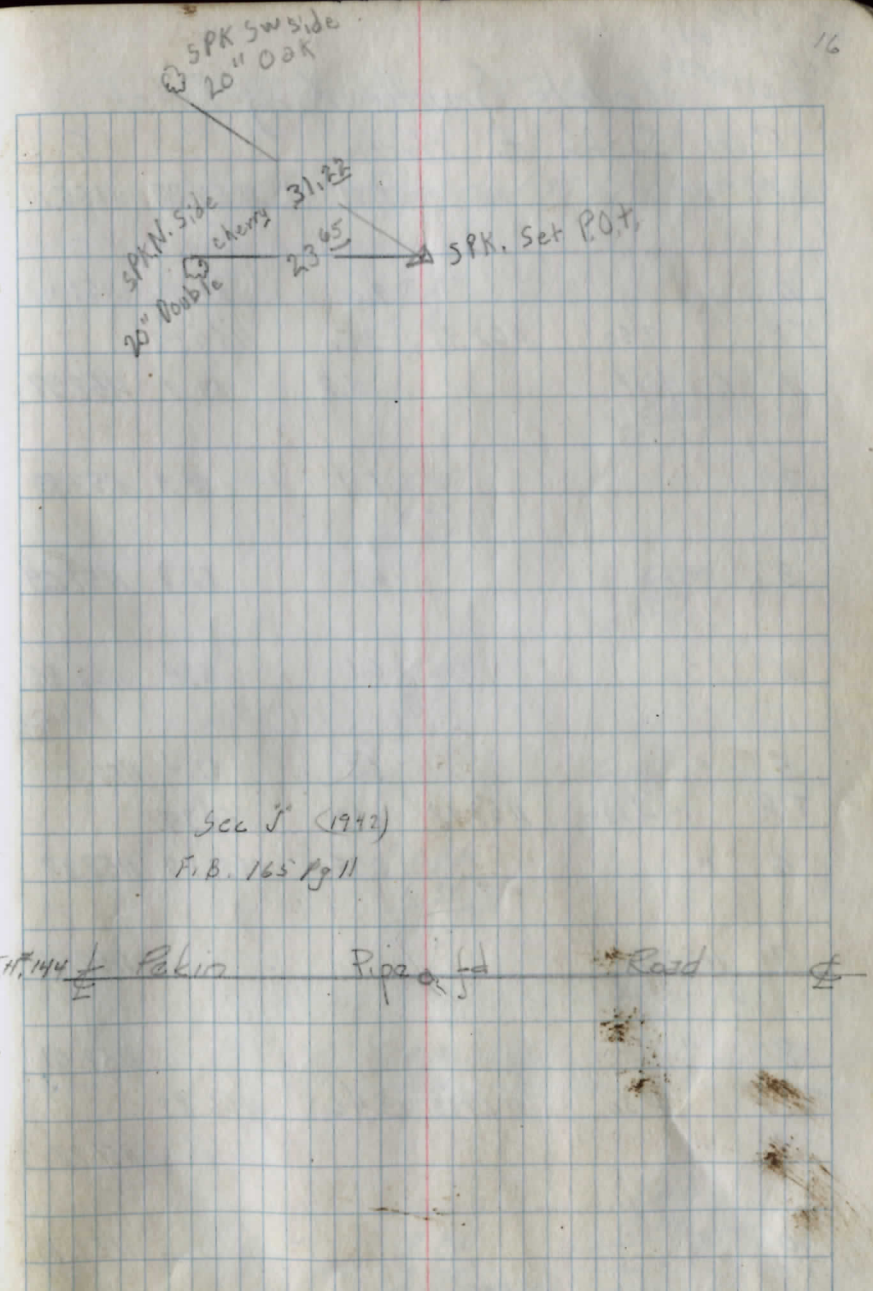
P.O.T.

℄
783.82

185+15 69




S&W; S.W side 16" Elm
103.18
Center of well pump casing
SPK S.W. Sd. o.B.T.
44 1/2°
75.05
201+74 35
Mon Box
37.5T
41.25
I.P. Found & Raised to 1" Below SURFACE 8-28-57
S&W; N.E. side C.E.I. pole


SPK SW side 20" Oak
31.32
SPK N. Side 20" Double cherry
23.65
SPK. Set P.O.T.
Sec 5 (1943)
F.B. 165 Pg 11
144 + Pekin
Pipe
Road

12-18-40
Pomeroy
Richards

Levels Smiths Xing Ditch

Run South to North.

					G.
B.M.			8.21	1154.77	1155.01
0			9.0	53.98	1153.11
T.P	7.50	1162.98	3.50	1155.48	
1	5' offset		5.8	53.2	1152.97
2	"		6.1	52.9	1152.83
3	"		6.2	52.8	1152.69
4	"		6.1	52.9	1152.55
5	"		6.6	52.4	1152.42
T.P.	4.19	1158.98	6.33	1154.79	
6	"		8.75	52.37	1152.28
7	10' offset				1152.15
8	"				1152.01
T.P.	4.30	1161.12	3.46	1156.82	
9	"				1151.88
10	"				1151.74
		1160.28			

Spike root 10" Elm Eside road 75' N 0+13

9.87
6.87
C 3.0

6.01
3.51
C 2.5

6.15
3.65
C 2.50

6.29
3.79
C 2.50

6.43
3.93
C 2.50

6.56
4.06
C 2.5

8.84
6.34
C 2.5

8.97
5.47
3.50

9.11
4.86
C 4.25

8.40
3.40
C 5.0

8.54
2.54
C 6.0

			Ch30.		G
BM 2			3.97	1156.31	1156.32
11	10' offset				1151.60
+40			7.75	52.53	1151.55
12	20' offset				1151.47
13					1151.33
T.P.	3.61	1160.28	6.13	1156.67	
14					1151.20
15					1151.06
16					1150.92
17					1150.79
18			12.5	50.3	1150.65
19					1150.52
BM.	3.99	1162.80		1158.81	

8.68
5.68
C 3.0

8.73
8.73
C 5.0

8.81
4.81
C 4.0

8.95
4.45
C 4.50

11.60
6.10
C 5.5

11.74
8.24
C 3.5

11.88
7.38
C 4.5

12.01
7.51
C 4.5

12.15
8.15
C 4.0

X H.E.& E parapet Culvt 12+17

11-16-'50 CH #4 SEC BROUGHT FORWARD FROM F.B. 158 Pg 79

	+	HI	-	Elev	
		1208.06			
B.M. #10	9.99	1216.08 1216.11	2.01	1206.05	1206.09 1206.12
150					
151					
152					
+50					
153					
154					
155					
T.P.	1.41	1212.59 1212.62	4.90	1211.18 1211.21	
156					
157					
158					

CH #4 DEF'G
con't'd from F.B. 158 Pg 79

□ = ℄ trav rdwy
O = edge trav rdwy

W | E

06.1 05.3 04.9 05.3 1206.1 | 05.3 06.5 05.5
10.0 10.5 11.2 10.8 10.0 | 10.8 9.6 10.6
25 13 12 (10) [1] | (8) 9 12 20 30

08.5 08.3 06.8 07.0 1207.6 | 06.9 06.5 07.5 07.7
7.6 7.7 9.3 9.1 8.5 | 9.2 9.6 8.6 8.4
26 14 11 (10) | (9) 10 12 30

11.7 12.0 09.9 1210.9 | 10.2 09.9 12.2 12.0
4.4 4.1 6.2 5.2 | 5.9 6.2 3.9 4.1
27 16 13 (13) [2] | (7) 8 13 30

1212.2
3.9

11.2 12.4 11.5 1212.6 | 11.9 11.5 12.9 13.6
4.9 3.7 4.6 3.5 | 4.2 4.6 3.2 2.5
30 17 15 (14) [4] | (6) 8 11 30

11.0 11.5 11.0 1212.7 | 11.5 11.3 12.0 12.8 13.2
5.1 4.6 5.1 3.9 | 4.6 4.8 4.5 3.3 2.9
30 18 16 (15) [5] | (5) 7 9 15 30

1211.4
4.7

1210.2
2.4
(13) | (5) 30

1209.1
3.5

1208.4
4.2
(12) | (7)

WINDY CH #6	+	1212.62 HI	−	FLW	
159					
+715					CULVERT
160					
161					
TP	5.30	1213.19 1213.22	4.70	1207.89 1207.92	
162					
163					
164					
165					
166					
+62					CULVERT
+99.48				CH #10	
BM #11	2.85	1213.22	2.85	1210.37	1210.37
168					
TBP.	1.84	1207.33 ✓	4.73	1205.49	

1208.0
4.6

1207.9

04.6 06.2 06.3
8.0 6.4 6.3
100 FL. FL.

H.I

1207.7
4.9

(12) (2)

1207.6
5.0

1208.0
5.2

(10) (4)

1208.8
4.9

1209.7
3.5

(9) (3)

1208.6
4.6

1207.3
5.9

1204.1 1206.7 1205.0
9.1 6.5 8.2
FL. FL.

1206.58 08.47 1209.32
6.64 4.75 3.9 3.9
STA 136+00 +80 137+00

1205.6
7.7

(11) (8)

CH#4

	+	1207.33 H.I.	−	ELEV	
169					
170					
171					
172					
173					
174					
175					
+50					Dirty Sewer & Culvert
176					
TP	6.87	1206.52	7.68	1199.65	
177					
178					

W E

1205.3
2.0

05.2
2.1

(13) (6)

05.5
1.8

04.6
2.7

(14) (6)

02.1
5.2

1200.8
6.5

(14) (6)

00.2
7.1

97.3 1197.3 1199.8 1197.3 1196.8 1196.0
10.0 10.0 7.5 10.0 10.5 11.3
FL FL FL Chan'l 100
Sewer Culvert Culvert Rt Ditch
175+18

99.2 98.9 98.4 99.2 99.7 99.2 98.8 99.1 98.5 98.2
8.1 8.4 8.9 8.1 7.6 8.1 8.5 8.2 8.8 9.1
30 17 16 (13) [3] (6) 8 10 14 30

99.4 98.7 99.2 1199.8 98.9 99.2 98.8
7.1 7.8 7.3 6.7 7.6 7.3 7.7
17 15 (14) [14] (5) 6 7 30

99.9 99.5 1199.8 1200.6 1199.6 1200.3 1200.5
6.6 7.0 6.7 5.9 6.9 6.2 6.0
20 18 (17) [6] (5) 7 30

CH #4

1206.52

	+	Ht	−	Elev
179				
180				
181				
182				
183				
TP.	C.44	1206.02	C.94	1199.58
184				
	+17			CULVERT
185				
186				
187				
TP	8.77	1213.74	1.06	1204.97

W

01.5 01.2 1201.5
5.0 5.3 5.0
30 (12) [3]

03.1 02.5 01.1 01.3 1201.6
3.4 4.0 5.4 5.2 4.9
30 20 12 (11)

00.9 00.3 1199.7 1200.2
5.6 6.2 6.8 6.3
25 13 11 (9)

99.9 99.5 98.9 1199.3
6.6 7.0 7.6 7.2
25 12 11 (9)

1199.5
7.0

1198.5
7.5

1196.1
9.9
FL.

1198.4
7.6

1198.8
7.2

1202.5 1201.5 99.4 1199.7 1200.6
3.5 4.5 6.6 6.3 5.4
30 25 18 9 [7] [4]

1203.5
2.5

E

00.7 01.3 00.9
5.6 5.2 5.6
(9) 8 30

00.8 01.1 1200.0
6.7 5.4 6.5
(11) 12 30

00.6 99.8 00.1 99.4
5.9 6.7 6.4 7.1
[2] (14) 15 30

1194.9 98.9 99.1 98.9
6.6 7.6 7.4 7.6
[2] (14) 15 30

1194.9 1193.4
11.1 12.6
FL. 100

1199.8 99.3 1202.1 1202.6
6.2 6.7 3.9 3.4
(14) 16 21 28

CHAIN	+	H.I.	−	ELEV
		1213.74		
188				
189				
190				
BM SET #12		2.61		1211.13
		18-17-50 SHOWING 1 MASTY		
	7.54	1218.67		
190+90				
191+00				DRUG
192+0				
	750			
193+0				
194				
TP.	2.12	1208.65	12.14	1206.53

W						E
03.5	04.2	1203.9	04.7		03.9	04.6	05.4	05.3
10.2	9.5	9.8	9.0		9.5	9.1	8.3	8.4
25	10	(11)	3		(13)	14	16	21	30
04.7	05.6	04.9	05.2	1205.8	05.2	05.7	06.1	05.8
9.0	8.1	8.8	8.5	7.9	8.5	8.0	TC	7.9
25	11	9	(8)		(13)	14	15	30
09.1	09.0	07.4	07.5	1208.2	07.4	08.4	09.7	09.5
4.6	4.7	6.3	6.2	5.5	6.3	5.3	4.0	4.2
27	13	11	(9)		(11)	12	16	30

NE Row 30° ELM W. SIDE ROAD ± 190+03

13.2	11.9	10.2	11.0	1211.2		10.4	12.1	11.8
6.5	6.8	8.5	7.7	7.5		8.3	6.6	6.9
35	28	14	11	(9)		(10)	11	16	30
			12.4	1211.5				
			Down 6.3	7.2				
			46					
15.3	14.9	13.8	13.2	1213.9		13.2	14.0	13.0
3.4	3.8	4.9	5.5	4.8		5.5	4.7	5.7
36	16	12	11	(10)			(10)	15	30
				1213.9				
				4.8				
15.0	14.7	11.8		1212.3		11.3	13.4	12.1
3.7	4.0	6.9		6.4		7.4	5.3	6.6
35	16	11	(10)		(10)	11	15	25	30
13.6	12.7	05.9		1207.0		04.1	04.4	06.0	07.0	05.5
5.2	6.0	12.8		11.7		12.6	12.3	12.7	11.7	13.2
33	27	12	(10)			(9)	10	13	18	30

C.H.#4

1208.65

	+	H.	−	Elv	
194					
195					
	+53				CULVERT
196					
	7.60	1214.13		1206.53	
197					
	+23				DRIVE
	+60				
198					
199					
200					
BM. SET #13 +10		4.71	1209.83	9.01	1205.12
	+66				CULVERT

W

02.7	01.7	02.0	03.1	1203.8			03.2	00.2	1196.7	1198.3
6.8	7.0	6.7	5.6	4.9			5.5	8.5	12.0	10.4
30	20	14	(10)				(9)	17	23	30
		1200.1		1203.0	1199.1		1198.1			
		8.6		5.7	9.6		10.6			
		FL.			FL.		36			
03.0	02.0	03.1		1203.7			03.0	00.9	00.3	00.1
5.7	6.7	5.6		5.0			5.7	7.8	8.4	8.6
30	14	(10)					(10)	15	18	30
11.5	11.9	07.7	07.9	1208.3			07.7	07.3	10.1	10.5	09.8
2.6	2.2	6.4	6.2	5.8			6.4	6.8	4.0	3.6	4.3
30	19	11	(10)				(10)	18	17	21	30
				1209.3	08.9	09.5					
				4.8	5.2	4.6					
					12	30					
09.5	09.6	09.1		1209.8					09.3	09.2	09.5
4.6	4.5	5.0		4.3					4.8	4.9	4.6
30	14	11	(10)						(10)	13	30
08.1	09.6	08.5	08.7	1209.4			08.7	09.8		11.0
6.0	4.5	5.6	5.4	4.7			5.4	4.3		3.1
30	14	10	(9)				(10)	14	24	30
08.5	07.8	05.6		1206.3					05.7	05.9	06.5	05.1
5.6	6.3	8.5		7.8					8.4	8.2	7.6	9.0
30	14	10	(9)						(11)	13	18	30
				1204.7								
				9.4								

SE. Root 70° Elm W 5.6 Rd

		02.5		1204.2				00.4	
		7.3		5.6		No Field		9.4	
		FL.				Notes		50	

CH. #	+	1209.83	-	ELV	
201					
202					
203					
+10					CULVERT
204					
205					
206					
TP.	5.62	1215.10	0.35	1209.48	
207					
208					
208+50					
209					
210					
211					

W E

1204.2
5.6

1204.3
5.5

1204.7
5.1

1202.2
7.6
FL.

1204.8
5.0

1201.4
8.4
FL.

1199.3
10.5
100

1205.4
4.4

1207.4
2.4

1209.4
0.4

1210.2
4.9

1210.6
4.5

1211.0
4.1

1210.8
4.3

1208.3
6.8

1208.0
7.1

(7) (13) (12) (9) (9) (11)

CH #4

1215.10

	+	H.I.	−	ELV	
211+30					CULVERT
212					
+50					
213					
TP	3.66	1211.15	7.61	1207.49	
214					
215					
+30					
+94.5					CULVERT
216					
+75					
217					
218					
219					
220					
+50					

221±07 = ℄ WITH MUSIC STREET

W E

05.5 9.6 FL. 1207.2 7.9 04.6 10.5 FL. 02.4 12.7 60

1207.8 7.3 (9) (11)

1208.3 6.8

1208.0 7.1

1206.6 4.6

1205.4 5.8

1205.4 5.8

02.5 8.7 FL. 1206.3 4.9 02.4 8.8 FL. 01.1 10.1 100 K=0.15'

1206.3 4.9 (9) 1205.9 5.3 (9)

1206.0 5.2

1206.3 4.4 (7) (13)

1207.7 3.0

1209.1 2.1

1210.5 0.7

C.H.#4 1211.15

	+	HI	-	ELV
T.P.	9.50	1220.23	0.42	1210.73
BM SET			0.66	1219.57
T.P.	10.84	1230.95	0.12	1220.11
T.P.	5.42	1235.29	1.08	1229.87
BM SET			2.87	1232.42
T.P.	6.17	1237.64	3.82	1231.47
BM Fd			3.42	1234.22

4-10-51

4+76 to 12+36 either tile 12" E ditch (& put in X rd culvt?) or tile (12") to 9+20 & put in X rd culvt (on skew). If W ditch should erode put in tile later

21+0 Relocate culvert 6' N on skew use new pipe

43+79 4-10-51 all H_2O is going thru small tile
extend our culvert and outlet of small tile
40' W of X OK

W E

W Root 26" Cherry E Side Rd (Second tree N of drive) ± 330' N of Music St (C.H.4)

W Root (Cord Noted) 36" Elm E Side AUBURN Rd C.H.#4 ' N of Music St

87±69 ± 4" tile across rd ℄ thru fill better replace with 12" culvt (across rd)

95+69 can't see thru to tell

116±05 culvert should be lowered 6"
How deep does W ditch have to be to carry H_2O north to X

145+0 147+0 17 trees W side 14" average

151+50 to 156+50 W side 12 trees 16" 20

170 Why not lower grade sufficient to carry H_2O ~~H~~

place
200+25 12" x rd culvt
200+45 no drive pipe regrd
200+66 salvage exist culvt

200+55 shallow ditch and gradually deepen to n carry H_2O n to 203+10

217+0 Place 36" pipe culvt

215+96 Salvage exist 36" culvt
250'

More Sections #4 DEFG

BM #3	0.93	1229.82 ✓		1228.89
TP.	1.54	1222.11 ✓	9.25	1220.57 ✓
TP.	1.74	1212.35 ✓	11.50	1210.61 ✓
36				
38				
40				
TP.	0.04	1205.81 ✓	6.58	1205.77 ✓
42				
44				
TP.	10.72	1210.39 ✓	6.14	1199.67 ✓
46				
48				
BM. IH			3.47	1206.92 ✓ (1206.93)
50				
BM #5	4.41	1205.99 ✓		1201.58
T.P.	5.16	1202.12 ✓	9.03	1196.96 ✓
67				

W ℄ E

□ = ℄ Travel

29

Ref spk E root 28" Map. W side #4 & N side drive 30+0

11.0 10.6 10.9 08.6 09.1

1.4 / 30 — 1.8 / 11 — 1.5 / 55 — 4.0 / 5. — 3.3 / 3

09.6 09.0 08.7 10.4 08.2

2.8 / [8] — 3.4 / 17 — 3.7 / 18 — 2.0 / 21 — 4.2 / 32

06.1

6.7 / 30 — 6.2 / 12 — 6.1 / 10 — 6.8 / 7 — 7.2 / 6 — 6.7 / 6 — 6.3

6.1 / [6] — 6.8 / 16 — 7.3 / 18 — 6.6 / 19 — 6.0 / 22 — 6.4 / 24 — 7.2 / 31

05.0

4.4 / 32 — 5.6 / 12 — 7.5 / 8 — 8.2 / 7 — 7.4 / 5

6.6 / [6] — 7.6 / 15 — 8.2 / 18 — 6.7 / 21 — 7.3 / 32

01.7

2.1 / 32 — 3.4 / 12 — 4.3 / 8 — 5.6 / 7 — 4.7 / 5 — 4.1

3.9 / [5] — 4.5 / 15 — 5.0 / 17 — 4.7 / 18 — 3.6 / 20 — 3.9 / 32

1199.1

8.2 / 30 — 7.8 / 10 — 8.2 / 8 — 7.3 / 6 — 6.7

6.5 / [8] — 7.3 / 15 — 8.8 / 19 — 8.7 / 30

01.5

7.0 / 31 — 7.7 / 21 — 7.5 / 13 — 10.1 / 9 — 9.8 / 8

8.9 / [4] — 9.5 / 12 — 10.3 / 15 — 8.5 / 16 — 8.4 / 20 — 9.0 / 24 — 9.5 / 31

05.3 04.9 05.3 04.4 04.9 05.6

5.1 / 31 — 5.5 / 18 — 5.1 / 12 — 6.0 / 11 — 5.5 / 9 — 4.8

05.7 04.7 04.4 04.7

4.7 / [3] — 5.7 / 13 — 6.0 / 15 — 6.2 / 24 & 31

04.1 04.2 03.5 03.1 03.6 04.3

4.3 / 31 — 6.2 / 16 — 6.9 / 12 — 7.3 / 11 — 6.8 / 10 — 6.1

6.1 / [8] — 03.5 / 6.9 / 12 — 03.8 / 6.6 / 13 — 03.9 / 6.5 / 20 — 03.0 / 7.4 / 26 — 02.7 / 7.7 / 31

96.1

7.4 / 30 — 8.4 / 25 — 7.9 / 19 — 8.1 / 17 — 8.2 / 13 — 6.6 / 9 — 6.0

6.5 / 10 — 8.6 / 15 — 8.7 / 18 — 8.2 / 23 — 8.5 / 30

CK.#4 1202.12

65

63

61

BM.#10	5.17	1211.26		1206.09
149				
TP.	6.43	1217.25	0.44	1210.82
~~150+50~~	152+50			
TP.				
155				
156				
BM.#12	7.58	1218.71		1211.13
192+50				
BM.#13	9.17	1209.29		1205.12
200+0				
201+0				

W E E 30

96.8

4.9 4.6 5.3 5.8 6.5 6.1 5.3 5.9 6.2 5.8 4.2 3.6 3.9 DownEZ
30+28 22 19 12 11 10 9 10 11 15 22 26

97.6

DownEZ 5.0 4.7 5.3 5.6 5.2 4.5 5.1 5.5 5.0 4.4 4.7 DownEZ
23 15 12 11 9 10 13 16 21 26

95.2 95.1 96.2 96.9 96.0 94.8 94.8
6.9 7.0 5.9 5.2 6.1 7.3 8.1
30+ 25 15 9 11 14 27+30

9.2 7.7 7.2 8.0 7.5 6.6 7.3 5.9 5.6
32 22 14 12 11 9 11 28+30

5.6 4.6 6.4 5.9 5.0 5.5 6.0 4.2 3.9
30 15 12+5 11 7 9 12 26+35

7.1 6.9 6.6 7.7 6.8 5.9 6.1 6.7 7.2 6.2 5.2 5.3 4.9 EZ UP
30 24 17 15 14 [4] 6 7 8 13 20 24

7.5 7.2 7.7 8.5 7.7 7.0 7.2 7.7 8.3 7.4 5.5 5.8 4.7
30 23 17 16 14 [5] 5 7 8 13 17 30

13.9

4.3 4.6 5.0 5.6 5.3 4.8 5.7 5.4 5.3 5.6 6.5
30 20 12 11 10 10 11 14 18 30

04.8

4.7 4.9 5.5 5.9 5.2 4.5 5.8 6.7 7.7
32 28 15 13+11 9 [2] 14 20 32

04.3

UpEZ 1.3 2.65 6.07 6.5 5.5 5.0 5.7 7.3 9.1
29 30 12½ 12 9 [2] 10 19 31

CH #4 1209.29

202				
203				
204				
205				
T.P.	8.29	1215.95	1.63	1207.66
206				
207				
208				
208+50				
209				
210				
T.P.	5.63	1212.84	8.74	1207.21
211				
212				
+60				

W E

A.A

2.8 3.8 6.3 5.6 4.9 6.1 5.3 6.6 7.0
30# 25 15 11 9 12 13 15 25 35

LEVEE 6.0 6.2 6.8 5.2 4.4 5.2 6.7 6.5 6.8
23 12 11 8 11 15 18 30

3.3 4.0 4.9 4.4 3.8 4.3 5.2 3.9 2.9
30# 23# 15 11 10 9 1 10 13 16 30

07.5

0.4 0.8 3.2 7.3 1.8 2.7 1.5 0.4
30 16 11 9 10 13 30

09.5

5.6 5.0 6.7 8.3 7.4 6.5 7.3 6.6 6.9 7.0
32 28 15 13 11 10 11 22 30

10.2

4.7 4.9 6.3 6.2 7.3 6.4 5.8 6.7 7.3 8.0
30 28 18 15 14 11 10 18 27 #30

10.7

5.6 6.4 7.0 6.3 5.3 6.3 6.5 6.6 6.8
30 14 13 12 11 14 20 30

11.1

4.0 4.1 5.3 6.5 5.2 4.9 5.9 4.7 4.6
30 12 14 13 11 10 11 30

10.8

3.7 4.1 5.4 6.2 5.9 5.2 6.1 5.6 6.2 6.4
30 15 12 11 10 10 11 22 32

08.5

5.0 6.4 8.0 8.9 8.2 7.5 8.6 8.8 10.3
29 19 12 11 9 11 12 30

07.3

5.0 6.4 7.0 6.4 5.5 6.7 7.3 7.7 7.9 8.7 8.9
30 13 12 11 11 13 16 21 26 30

07.8

2.6 4.0 5.7 6.5 5.7 5.0 5.9 6.1 5.9 6.9
30 16 12 11 9 10 11 12 30

08.2

2.0 2.7 4.7 6.1 5.1 4.6 5.6 5.3 4.9 5.6 DOWN 67
31 19 12 11 9 11 12 16 23 P.INV

CH#4		1212.84			
213					
214					
215					
T.P.	7.01	1212.20	7.65	1205.19	
216				06.3	
217					
218					
219+10					
220					
T.P.	6.89	1219.09	0.0	1212.20	
Music St	221±07				
T.P.	5.90	1220.49	4.50	1214.59	
B.M.			1.02	1219.47	
T.P.	5.82	1211.01		1205.19	
Transit			6.9	04.1	
			6.3	04.7	39'
			7.8	03.2	102'
			8.2	02.8	192
			10.1	00.9	210'
			8.52 / 8.61	02.5	

W 6.4 at 35' E

07.9

3.1 3.9 5.5 6.6 5.4 4.9 5.9 5.5 6.8 6.7
30 17 12 11 10 11 12 28 33

06.5

5.2 6.5 7.5 6.8 6.3 7.2 6.4 5.7 6.2
30 13 12 10 10 11 15 30

05.3

5.6 5.8 8.1 5.9 8.1 7.5 8.4 7.6 6.2 7.2
30 22 13 12 10 11 12 16 36

06.3

7.4 8.4 7.8 6.4 5.9 6.3 7.7 8.2
30 25 22 & 17 9 10 17 31

05.9

8.2 8.2 6.8 6.3 6.9 7.6 6.9 7.9
40 & 23 10 8 [3] 13 15 16 26 & 30

7.3 7.1 6.9 6.3 7.2 6.3 5.5 6.2 6.9 6.4 5.6
30 24 21 12 11 9 [3] 13 15 16 & 22 24 & 30

4.2 4.0 4.9 5.8 5.2 4.7 5.6 6.2 5.4 4.6
30 19 14 12 & 11 10 12 14 15 23 & 30

1.7 3.1 5.0 4.0 3.4 4.0 4.6 4.7 3.5 3.1
30 15 13 10 10 11 12 14 17 & 30

17.1 15.9 15.0 14.6 13.3 12.5 11.6 11.9 10.6 09.6 08.9
2.0 3.2 4.1 4.5 5.8 6.6 7.5 7.2 8.5 9.5 10.2
500 400 300 200 100 100 200 300 400 500

W root 26" Cherry & 330 N of Music St

Swamp W of rd NW of 217+0 30' from ℄

30 E of ℄

Place pipe at 217+0 45° skew

Old Chan'l

FL inlet existing culvert BELL on

" outlet " "

6-1-51 BRIDGE W/R FROM £ #4 AT NEWBURY-AUBURN TOWN LINE

	STA	ROD	£ TO RT	
BM #9	0.41	1188.52		1188.11
T.P.	6.12	1188.38	6.26	1182.26
SET ON B.B ON A.	80.	7.9	261-50	80.5
A - P.I. 138+04.2'	90.	7.2	297-43	79.2
B - P.I. 139+54.2'	121.	7.8	312-45	80.6
	110.	9.8	274-47	78.6
	225.	8.7	276-39	79.7
	272.	8.9	257-33	79.5
	260.	7.0	251-57	81.4
	370.	9.0	251-08	79.4
	390.	7.2	256-31	81.2
	450.	8.7	259-05	79.7
	103	9.7	89-48	1178.7
B.M.			7.20	1181.18
T.P.	7.19	1188.37	7.18	1181.19
	92	7.8	117-49	80.6
T.P.	4.20	1185.39	7.18	1181.19
	271		114-46	
Set on pt C and backsight on pt B				
	13	7.2	35-06	78.2
	57	5.3	90-00	80.1
	39	5.6	270-00	79.8
	59	7.3	146-33	78.1
	280	4.5	180-00	1180.9
Set on pt D & BS on pt C 4.04		1184.9		

BRIDGE CREEK DRAINAGE WESTERLY FROM AUBURN RD (C.H. #4) at AUBURN-NEWBURY TOWNSHIP LINE. 33

Spk SE Root 28" Cherry W Side ?143.7

Top of Base Plate NW & Bridge

Ground Level N. of Creek

H_2O - 43/100 most Sely pt. £ Channel

Ground Level S. of Creek

£ Channel 5' wide

S. edge of H_2O 5' wide 4/10 deep Rod H_2O Level

£ Channel 6' wide 3/10 H_2O

Ground 30' N. of Channel Level

£ Channel H_2O 7/10

Ground 30' S. of Creek Level

£ Channel 5/10 H_2O

£ Channel 6' wide H_2O 6/10 10' W. of Cheese Factory Creek

Vertical Spk SW root 10" Elm 92' W of Rd 50' N of Creek

Ground @ BM.

P.T.C

£ Channel 4' wide H_2O 6/10

Ground Level all directions

Gr. gradual up N.

£ Channel 6' wide H_2O 6/10

Pt. D Hub

+	1184.9	−	
Stadia	Rod	∠	
.87	7.5	14-16	77.4
19	7.0	76-49	77.9
24	5.8	76-49	79.1
61	6.0	76-49	78.9
13	5.2	76-49	79.7
18	4.7	256-49	80.2
137	7.2	155-32	1177.7
180	4.5	172-12	1180.4
	1184.3		
Set on Pt E BS on Pt	D	3.9	
0.10	5.0	00-00	79.3
51	7.2	108-10	77.1
128'	3.65	202-30	1180.6
	1183.9		
SET ON F BS on	E	H. 3.3	
150'	6.9	103-	11 77.0

℄ Channel 9' wide 9/10 H_2O

℄ Channel 4' wide 9/10 H_2O

S. Bank

Level + Swampy all directions

N. Bank

Very ez up N.

℄ Channel 5' wide 9/10 H_2O

Pt E Hub

Ground Swamp all around

℄ Chan'l 4' wide, 6 H_2O

Hub F

℄ Chan'l 4 H_2O at Fence

4-4-51

CH #4 ABC

Mileage

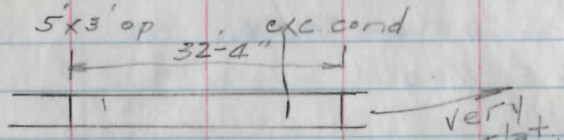
32' b-b
20' pavt

62.02
61.76
.26 = 13+70

3" 7' 6" 5" 7'

Hill 61.94
61.76
.18 = 9+50

230' NPSD

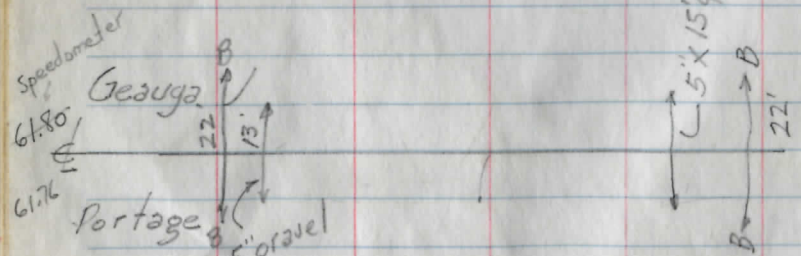


61.88
61.80
.08 = 4+20
= 6+32 per plan

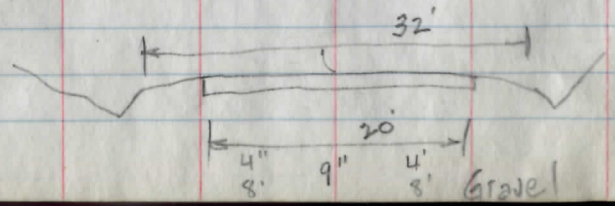
32' b-b
20' pavt

61.83
61.80
.03 = 1+60

3" 9' 5" 5" 9'



+100



20' pavt
28' b-b

62+52
4" 9'
7'
2" 11'

→ ± 450 to main ch →

62.52
1.76
.76
= 0+13

swampy pond

15" corr 1.P both ends under H_2O

62.42
1.76
.66 = 34+85

155' NPSD 26' B-B

9' side banks need expensive to cut further

62.35
1.76
.59 = 31+15

1/2 ac. swamp

15"x45' Corr 1.P ok

62.26
1.76
.50 = 26+40

7" 3' 6" 4'

62.25
1.76
.49 = 25+87

15"x40.75 corr 1.P ok

hill 62.18
1.76
.42 = 22+18

210 NPSD

62.11
61.76
.35 = 18+50

15"x43' corr 1.P

OK

Mileage

63.11
1.76 / 1.35 = 71 ± 78
68+66 plan

15" x 44.5 corr OK

Lell 62.99
1.76 / 1.23 = 64 ± 94

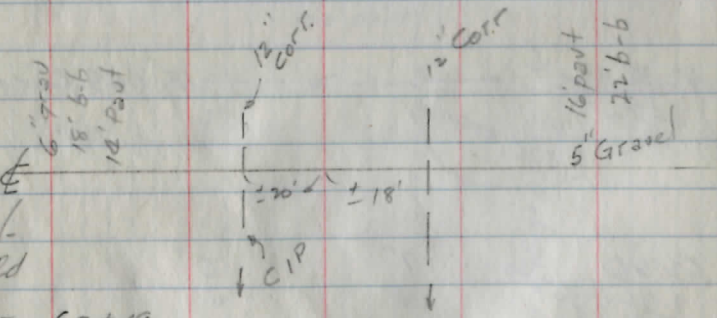
100' NPSD not much side bank

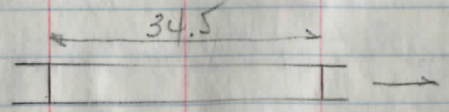
20' pavt
32 b-b

62.99

5" 4" 6'

62.90 ℄
Barthol-
omew Rd
1.76 / 1.14 = 60 ± 19





62.65
1.76 / .89 = 47 ± 00

3'x5' Con culvt Excellent

Lell 62.58
1.76 / .82 = 43 ± 30

210' NPSD
S.O. = nearly unlimited

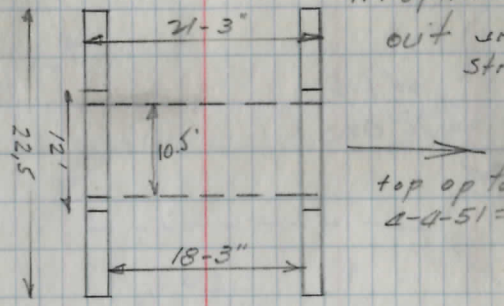
20' pavt
29' b-b

235' NPSD

63.55

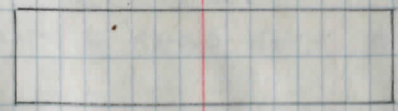
4" 4" 10' bank on
6' 6' E

10.5 x ± 5' x Conc culvt OK
H'l of hole gouged out under structure



63.39

conc. abut. ± 12" I-beams Wood-laminated
abut F/F = 27.75 Rdwy = 19.75 Floor
Good condit



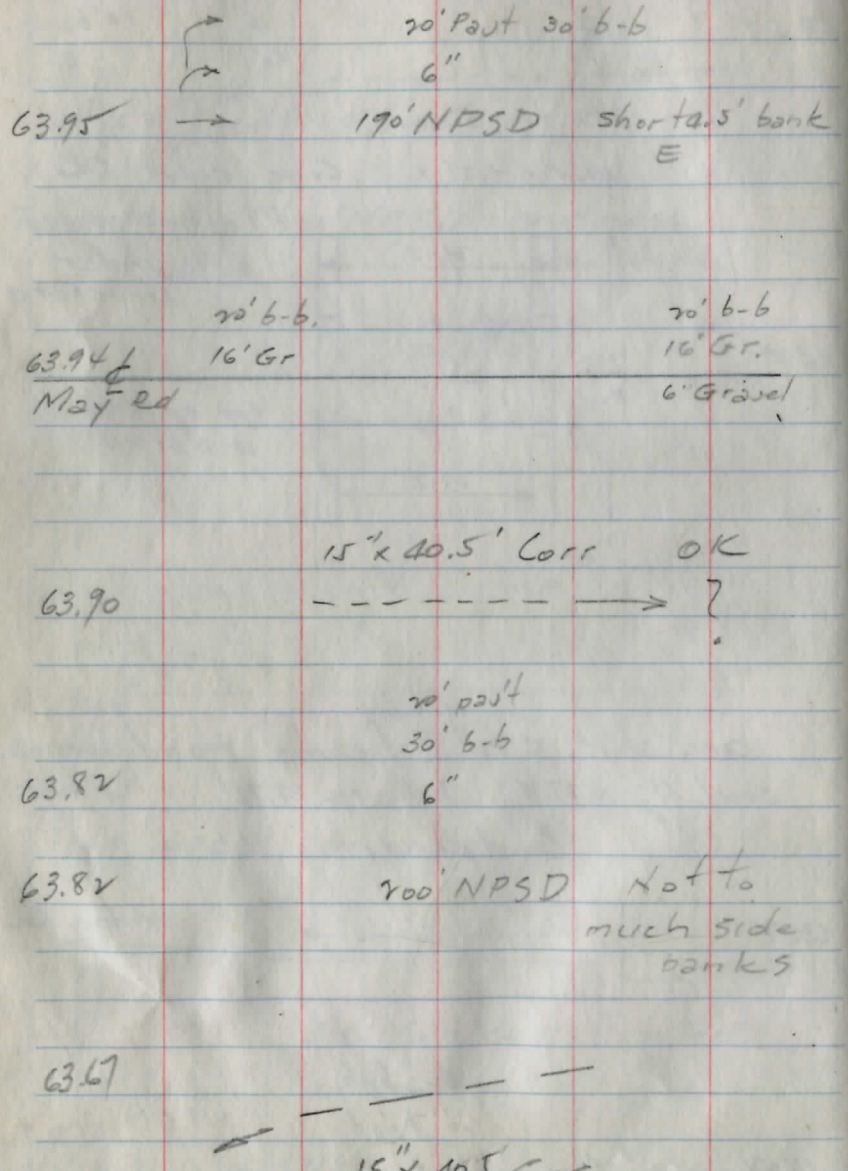
63.37

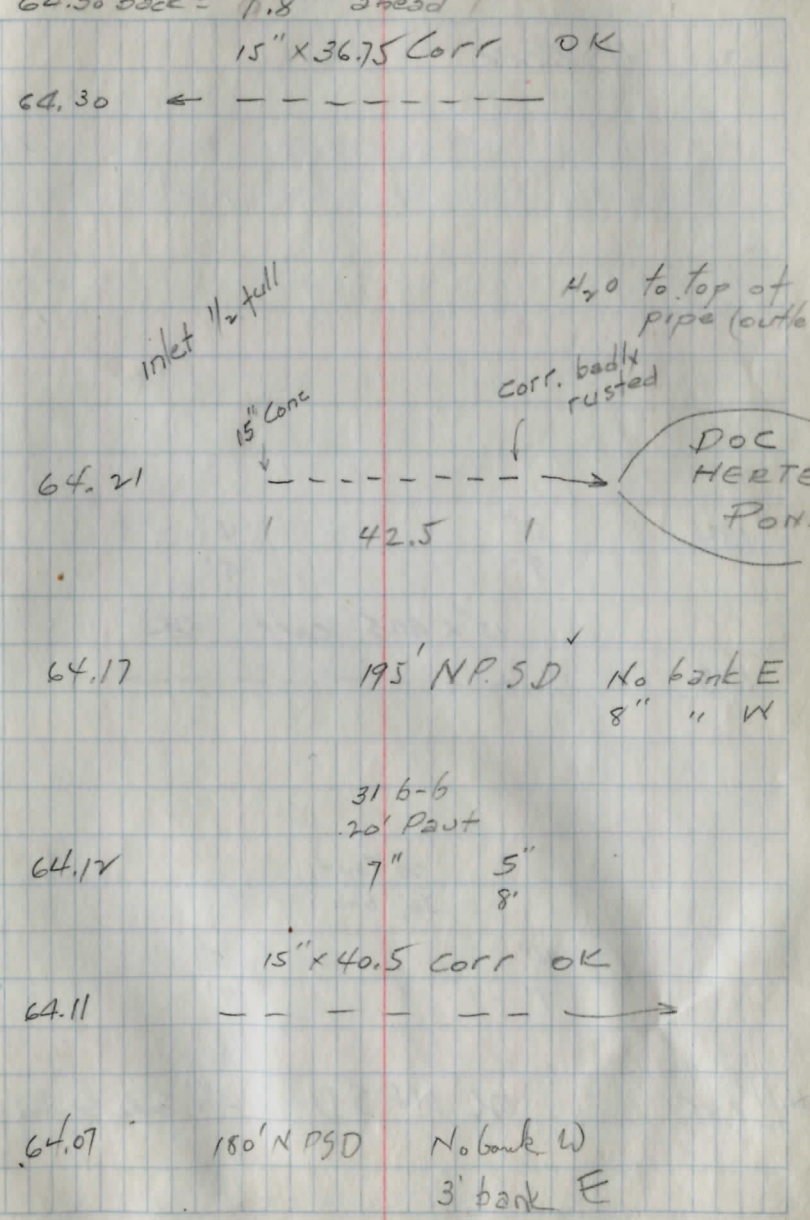
Bridge Ck

32' b-b
20' pavt
NPSD 300' ±

63.27

4" 6"
6'


20' Past 30' b-b
6"
63.95
190' NPSD
short a.s' bank
E
20' b-b.
16' Gr
20' b-b
16' Gr.
63.94
6" Gravel
May Rd
15" x 40.5' Corr OK
63.90
20' past
30' b-b
63.82
6"
63.82
700' NPSD
Not to
much side
banks
63.67
15" x 40.5 Corr


64.30 back = 1.8 ahead
15" x 36.75 Corr OK
64.30
inlet 1½ full
H2O to top of
pipe (outlet)
15" Conc
corr. badly
rusted
64.21
DOC
HERTEL
POND
42.5
64.17
195' NPSD
No bank E
8" " W
31 b-b
20' Past
64.12
7"
5"
8'
15" x 40.5 corr OK
64.11
64.07
180' NPSD
No bank W
3' bank E

02.70 US 422

1.94 5" 4"
9' 9'

15" x 40.5' corr OK

1.93 — — — — — — →

20' Pavt
30' b-b

4" 7" 5"
9' 9'

Hill 1.85 126' NPSD 3½' Side banks

8-6-51

Levels Bridge Creek on No 4 Sec B

BM	1.12	1160.92		1159.80
T.P.	0.92	1149.25	12.59	1148.33
T.P.	0.65	1136.94	12.96	1136.29
T.P.	2.26	1129.57	9.63	1127.31
B.M.			2.75	1126.82
			8.5	21.1
			9.2	20.4
			11.7	17.9
			8.9	20.7
			12.1	17.5
			4.6	25.0
			9.4	20.2
			10.2	19.4
			10.3	19.3
			11.6	1118.0
Quit			7.90	1127.67
BM	5.31	1130.13		1124.82
New BM			2.13	1128.00

Sd W in W root 40" Map 91+83 Et=28

X at most SWly cor conc hdw west

30' W of ℄ on ℄ of culvt (in ch)
3' W of W hdwl (ch)
℄ culvt at W hdwl
30' E of ℄ in ch
℄ culvt at E hdwl (jumps up ± 7' E of here)
℄ rd & ℄ culvt
50' E of ℄ (ch)
100' E " " "
150 " " " " ch ± ± 12' Wide
side banks ± 1.5' high

h.o
165' = bridge ct
± 100' below confluence

Hub 35' N of S Bridge Creek 100' E of Confluence
Hd Wl

NW root
Rent over spk 40" Map E side rd 1st
S of Bridge creek

1130.13

Set at	Bk St		Stadia	Rod	
A	± ℄ South		116'		
"	"		58	4.78	
"				12.6	1117.5
"				13.3	
"		N79-40	119	12.1	
		250-00	223		
B	A				
	4.70	1126.37		1121.67	
B	A	343-00	90	9.0	
"	"	285-30	50	± 8.5	
		190-00	215	8.5	
		190-00	340	± 8.9	17.5
		180°	350	4.45	1121.92
C	A ℄ B				
	4.65	1126.57			1121.92
		233-40	180	9.0	17.6
		206-40	350	8.9	17.7

BM #4	1.16	1163.03		1161.87	
T.P.	3.16	1159.39	6.80	1156.23	
	10.46	65.00	4.85	1154.54	✓

Levels at Culvt 39+95

H_2O ± 3' over top of pipe W end 7.45

10.68 1154.32

40

℄ culvt
℄ rd at N Abut Bridge
W F/L ctr of bridge
E " " " "
creek bends NE
Hub B (turned on last eve)

Note: Channel from culvert = gradual bend to confluence

" " " " " "
℄ bridge ck at confluence 4.7
ck ch bends E
± ℄ ch

Sapling hub "C" ± 50' N of Ck

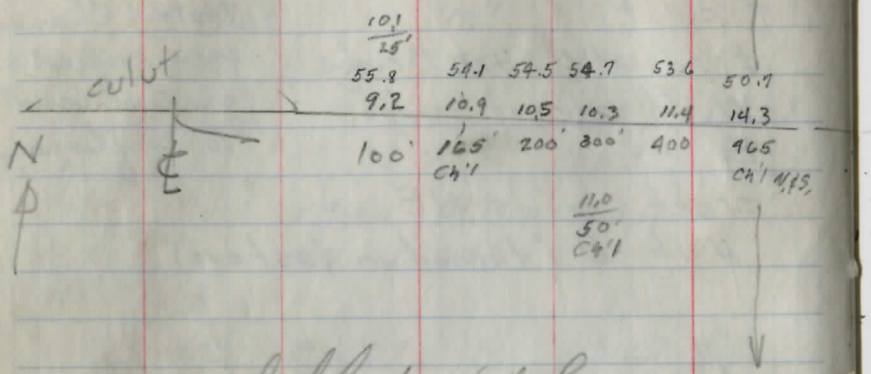
℄ ch ℄ entrance of high H_2O channel
℄ ch bends S from N

SW root Walnut SE quad

S W ∡ of W end slab Culvt 45 + 90
culvt has floor 3.68 down from T.P

± FL = 11.15
℄ rd ℄ culvt
FL E = outlet

1165.00



H_2O probably doesn't harm road any

T.P.	8.83	1165.98	7.85	1157.15
BM set			3.86	1162.12

	+	HI	-	Elv
4-10-51	Ck levels at Bridge Ck			
BM	4.75	1129.57		1124.82
T.P. (B)			7.89	1121.68
			4.22	1125.35
			12.15	1117.42
T.P (B)	4.67	1126.35		1121.68
T.P.(c)			4.41	1121.94 (1121.92)
			8.80	17.55

Same

300 to 440 = dry land

±440 H_2O bubbling up

Frank says ± 6"

tile ± 1.6 under ground

Spk HE root 20" Map W side Rd in Fence line 36 ± 95

Culvt + Hdwl

Hub 35' N Bridge Crk 100' E. Co Reference

℄ N End Bridge

P.L. W Side Rd 100'

C.H. #4 SEC B PROFILE

BM	10.16	1169.96		1159.80
Sta. 91			11.5	58.5
92			9.5	60.5
93			6.8	63.2
94			2.4	67.6
T.P.	13.07	1182.74	0.29	1169.67
95			10.2	72.5
96			6.1	76.6
97			2.3	80.4
T.P.	12.11	1194.29	0.56	1182.18
98			9.2	85.1
99			3.9	90.4
T.P.	12.98	1206.71	0.56	1193.73
B.M.			10.22	1196.49
100			9.9	1196.8
101			1.4	1205.3
T.P.	13.28	1219.81	0.18	1206.53
102			4.6	15.2
T.P.	12.62	1231.46	0.97	1218.84
+50			11.7	19.8
103			8.2	23.3
104			5.0	26.5
105			2.9	28.6
106			2.4	29.1
T.P.	11.54	1239.45	3.55	1227.91

NW. S&W. N. Post 30" Maple 27' East Sta 91+83 = No. 6

Highest Point Drain Big Boulder 50' East ±99+70

Top N. End W Drive Pipe 106400

+	1239.45	-	Elev
107		10.7	1228.8
108		8.5	31.0
109		3.5	36.0
109+06		3.25	1236.20
+50		1.8	37.7
110		1.5	38.0
BM.		5.56	1233.89

4-21-51

Sections 4 ABC

BM	12.41	1174.53		1162.12
37			12.1	67.4
36			7.1	67.4
35			0.3	74.2
TP.	11.50	1184.91	1.12	1173.41
35				
				-30 drive
34			1.1	80.8
33+50			7.1	82.5
33+56		1197.36		115' MAPLE

TAYLORMAY T.H. 186

VERT. SPK W ROOT 28" CUCUMBER? 28' WEST STA 110+75±

	20.3	25.1	28.2	30.5	1233.3	34.5	36.3	11.37 = HI 1250.67		42.1	48.3	43.8		
N TH. 186	19.2	14.1	11.3	9.0	6.2	3.0	3.2	0.0		8.7	2.5	7.0		E
	500	400	300	200	100	100	200	TP		300	400	500		

Spk NE root 36+95 □ = Edge road

WEST ℄ EAST

	60.2	61.5	60.2	61.4	61.6			61.9		61.5	60.6	61.5	61.1	
down	14.3	13.0	14.3	13.1	12.9	12.1		12.6		13.0	13.9	13	13.4	
ditch	36	26	20	15	12			13		16	18	22	36	
	70.5	70.8	65.6	66.5	66.8			66.8	66.4	65.4	66.1	66.4	65.8	
	4.0	3.7	8.9	8.0	7.7	7.1		7.7	8.1	9.1	8.4	8.1	8.7	
	43	32	20	18	14			11	14.5	19	20	26	35	
		72.7	73.8	74.0				73.4	73.3	72.4				
		1.8	0.7	0.5	0.3			1.1	1.2	2.1				
		20	16	11				11	13	19				
	75.9	76.5	76.0								77.7	78.0		
	9.0	8.4	8.9								7.2	6.9		
	40	33	30								27	40		
				78.2	80.3			80.5	80.2	82.6				
				6.7	4.6	4.1		4.4	4.7	2.3				
				38	14			10	19	40				
down	84.6	84.7	82.0	82.1	118.5			82.0	82.4					
easy	0.3	0.2	2.9	2.8	2.4			2.9	2.5					
	33	26	18	13				12	17					
											89.3	91.0	91.5	
											8.1	4.4	5.9	
											21	34	45	

CH#4 1184.91 ✓

33+00			3.0	81.9
33+00		1197.36		
				49¢ 45° HOOK 31'
32+50			5.7	79.7
32+50		1197.36		
32			8.5	76.4
TP	0.30	1173.52	11.69	1173.22
TP	12.45	1197.36	0.0	1184.91
		1173.57		
31			3.7	69.8
30			6.7	67.3
29			5.4	68.1
28+50			4.9	68.6
28			5.7	67.8
27			7.6	65.9
26		/	8.3	65.2
TP	9.48	1173.73	8.27	1165.25 ✓
25			8.4	65.3

W C E

44

			80.6	81.4	1181.9	81.4	82.3		
			4.3	3.5	3.0	2.5	2.6		
			18	12		11	17		
91.2	92.4	92.3						91.5	93.5	94.4
6.2	5.0	5.1						5.9	3.9	3.0
35	46	37						27	36½	50
			78.6	79.0	1179.7	79.1	79.0	86.		87.2
			6.3	5.9	5.2	5.8	5.9	-1.1	UNDUT	-2.3
			18	11		11	15	26		40
			86.7	85.8						
			10.7	11.6						
			48	32						
			77.0	75.8	75.3	75.7	75.9	1176.4	75.9	75.4	74.8	74.9
LEV. OUT			7.9	9.1	9.6	9.2	9.0	8.5	9.2	9.5	10.1	10.0
			29	24	20	16	11		11	15	26	35

To Be Soon

For Items

		64.6	65.0	68.9	69.2	1169.8	69.2	68.9	67.0	66.5
Swamp		3.9	8.5	4.6	4.3	3.7	4.3	4.8	6.5	7.0
		40	32	17	11		11	16.5	23	32
"		64.3	64.9	66.6	66.8	1167.3	66.8	66.5	65.1	
		9.2	8.6	6.9	6.7	6.2	6.7	7.0	8.4	LEVEL OUT
		35	22	15	11		11	16	26	
		67.1	66.1	67.1	69.4	1168.1	67.6	67.0	67.7	68.0
" down	6.4	6.4	7.4	6.4	6.1	5.4	5.9	6.5	5.8	5.5
	27	22	19	14.5	11		11	18	20	32

4.9
5.7
7.6
8.3

8.4

C.H. #4		1173.73 ✓			
24					
24			6.9	66.8	
23+50			5.8	67.9	
23			4.6	69.1	
22+60			3.8	69.9	
22			3.8	69.9	
TP.	3.71	1173.64 ✓	3.80	1169.93 ✓	
BM.			3.38	1170.26 ✓	
21+50			4.5	69.1	
21			6.5	67.1	
20+50			9.3	64.3	
20 Begin	5-3-51		12.5	61.1	
TP.	0.0	1161.83	11.81	1161.83	W SIDE Hub - Road
19+0				55.8	
18+0				54.7	
17+0				55.2	
BM 16+85			6.12	1155.71	VERT SPK E Root 26" Maple 30' W of L

W E 43

6.9

	68.8	66.2	66.9	67.2	1167.9	67.3	66.4	67.6	67.2
LEV. OUT	4.9	7.5	6.8	6.5	5.8	6.4	7.3	6.1	5.5
	25	18	16	11		11	19	23	35
	69.4	67.4	67.7	68.4	1169.1	68.4	67.8	68.7	69.4
LEV. OUT	4.3	6.3	6.0	5.3	4.6	5.3	5.9	5.0	4.3
	26	19	18	11		11	19	23	35
	69.0	69.8	68.1	68.7	1169.9		68.8	69.7	70.2
DOWNEY	4.0	3.9	5.6	5.0	3.8		4.9	4.0	3.5
	28	26	20	18			19	23	35
	69.5	69.1	67.9	68.7	1169.9		68.8	69.3	68.9
DOWNEY	4.2	4.6	5.8	5.0	3.8		4.9	4.4	4.6
	26	22	19	16			19	25	30

REF SPK (Horizontal) SW. Side 12" Cherry 35' West Sta 22+08 ±

	67.8	65.5	67.9	1169.1		68.1	67.5	66.2	
	5.8	8.1	5.7	4.5		5.5	6.1	7.4	
	35	25	12.5			18	20	35	
	(Tile Piece)								
	69.6	64.9	66.2	1167.1		66.1	65.8	68.0	69.3
± LEV.	4.0	8.8	7.4	6.5		7.5	7.8	5.6	4.3
	26	21	17			17	19	24	36
	69.0	68.4	62.0	63.2		63.3	62.6	69.1	
	4.6	5.2	11.6	10.4	9.3	10.3	11.0	4.5	4.5
	40	30	19	16		15	20	30	40
TILE DRAIN OUTLET									
	67.2	59.7	60.5			59.7	59.2	60.9	59.1
UPEZY	6.4	13.9	13.1	12.5		13.9	14.4	12.7	14.5
	30	19	17			18	19	23	35
	54.9	54.4	53.9	54.9	55.3	55.0	54.7	54.2	51.0
SWALE	6.9	7.4	7.9	6.9	6.5	6.8	7.1	7.6	10.8
	32	22	21,20	17	10.	11	16	20	35
	53.0	52.8	53.7		54.1	54.0	53.7	53.4	52.1	51.7
	8.8	9.0	8.1	7.1	7.7	7.8	8.1	8.4	9.7	10.1
	31	21	16		10	11	17	20	25	35
	54.3	54.2	53.6	54.0	54.6	54.6	53.9	51.6		
	7.5	7.6	8.2	7.8	7.2	7.2	8.1	10.2		
	32	25	20	17	10	11	20	30		

5-5-51

	+	H.I.	−	Elev.
B.M.	6.62	1162.33		1155.71
T.P.	3.49	1160.64	5.18	1157.15
T.P.	9.52	1158.69	11.47	1149.17
T.P.	6.46	1160.37	4.78	1153.91
B.M. Set			4.11	1156.26

CRACKED PROFILE

5-1-51

B.M.	0.10	1162.22		1162.12

38+0

39+0

40+0

41+0

+72 0.0

E end of South wing Eastend of culvt
Sta. 6+32

Spk NW root 20" So Map

S. SIDE CRACKED
19W' W & CRK'd

3.8	3.7	3.3	4.1	4.8	4.5	5.0	3.5	2.9	2.8	2.8
300	400	300	200	100		100	200	300	400	500

Spk NE root 36+95

54.0	54.9	58.0	58.8	1159.3		58.7	58.2	57.3	57.6	57.4
6.2	5.3	4.2	[3.4]	2.9		[3.5]	4.0	4.9	4.6	4.8
30	16	15	9			11	16	17	20	32
54.9	55.6	56.8	57.2	1159.8		57.1	56.5	55.9	55.6	55.2
7.3	6.7	5.4	[5.0]	4.4		[5.1]	5.7	6.3	6.6	7.0
30	17	13	10			13	17.5	20	26	35
54.9	55.2	56.7	57.0	1157.7		57.1	56.6	56.5	55.2	
7.5	7.5	7.0	5.5	[5.2]	4.5	[5.1]	5.6	6.7	7.0	
35	24	19	15	11		12	18	23	30	
57.9	58.1	57.8	58.4	58.8	1159.7	59.0	58.5	58.3	62.0	
4.3	4.1	4.4	3.8	[3.4]	2.5	[3.2]	3.7	3.9	0.2	
30	22	18	16	11		12	17	18	32	

EZY DOWN

5-2-51

BM	C.84	1168.71 ✓		1161.87 ✓
58+	Profile Barth. Rd			
N. on CH.#4				
59				
60+0				
TP.	9.18	1176.24 ✓	1.65	1167.06 ✓
61+0				
+10				
62+0				
+50				
63+0				
TP	1.40	1165.77 ✓	11.87	1164.37 ✓
64+0				
65+0				
TP.	1.40	1155.95 ✓	11.22	1154.55 ✓
66+0				
67+0				
TP.			7.36	1148.59 ✓

WEST TOP CULVERT @ 68+50

W E E

SW root Walnut S.E. Quad. CH #4 & 7 #195

65.0

63.8 65.8 65.7 64.4 1162.4 63.5 64.1 64.4 64.5
3.7 4.8 4.9 2.9 3.0 4.3 6.3 5.2 4.6 4.3 4.2 4.2
500 400 300 200 150 100 700 600 500 400 300 Hump 3' N. of + 30+ E of

66.2 65.6 62.7 63.3 64.1 1164.7 64. 63.7 63.0 65.2 65.9 65.9
2.5 3.1 4.0 5.4 4.6 4.0 4.7 5.0 5.7 3.5 2.8 2.8
35 25 20 15 10 12 17 19 27 31 40

69.5 68.2 65.3 66.0 66.5 1167.1 66.4 65.6 65.3 65.9 67.7 67.9
-0.8 -0.5 3.4 2.7 2.2 1.6 2.3 3.1 3.4 2.8 1.0 0.8
35 27 20 17 11 12 19 20 22 29 35

DRIVE

71.2 71.2 1169.9
3.0 5.0 6.3
30

73.8 73.6 68.7 70.1 70.0 1170.2 69.5 68.9 68.3 70.7
2.4 2.6 7.5 6.1 6.2 6.0 6.7 7.3 7.9 5.5 Level
35 29 19 17 10 11 17 20 24

73.7 72.7 69.8 70.4 70.8 1171.4 71.0 70.6 69.7 70.0 70.8
UP 2.5 3.5 6.4 5.8 5.4 4.8 5.2 5.6 6.5 6.2 5.4 5.4
35 26 19 16 11 13 17 20 21 26 34

71.5 70.9 68.9 69.7 70.2 1170.9 70.5 70.2 69.1 70.0 70.6 70.8
UP 4.7 5.3 7.3 6.5 6.0 5.3 5.7 6.0 7.1 6.2 5.6 5.4
34 28 19 17 11 11 16 20 21 24 35

68.5 68.7 67.1 68.2 68.6 1169.3 68.8 68.5 67.3 72.3
7.7 7.5 9.1 8.0 7.6 6.9 7.4 7.7 8.9 3.9 Level
35 29 19 16 11 11 15 19 28

63.0 62.8 63.0 60.9 62.3 62.6 1163.1 62.3 61.9 60.5 63.2 63.4
7.8 3.0 2.8 4.9 3.5 3.7 2.7 3.5 3.9 5.3 2.6 2.4 L=2'x4"D
35 26 24 20 15 11 12 17 21 25 32

57.2 57.3 54.9 56.0 56.4 1157.1 56.5 56.1 54.4 58.4 58.6
9.6 8.5 10.9 9.8 9.4 8.7 9.3 9.7 11.6 7.4 7.2
35 27 21 18 13 10 15 20 26 35

51.2 50.8 51.4 51.9 1152.5 52.0 51.7 50.6 51.3 51.9 51.3 50.9
LEV 4.7 5.1 4.5 4.0 3.4 3.9 4.2 5.3 4.6 4.0 4.6 5.0
22 19 17 11 11 16 19 20 23 26 31

48.9 49.6 1150.1 49.6 49.2 48.5 48.6 47.9 47.6
LEVEL 7.0 6.3 5.8 6.3 6.7 7.4 7.3 8.0 8.3
18 11 11 15 18 22 27 31

5-3-51
P.M. - MAYNARD
CH.=4 SEC'S

BM.	10.79	1207.28		1196.49
101+0				
TP	13.08	1219.78	0.58	1206.70
102+0				
TP.	13.01	1231.83	0.96	1218.82
103				
	102 to 103 add 10 CY for hi bank E			
104				
105				
106				
107				
108				
TP.	11.55	1242.62	0.76	1231.07

Rock N side @ 108

5-5-51

109+65				
	+77			
110+0				
B.M.			8.75	1233.87 (1233.59)

N E 18

Highest Point Dame Big Boulder 50' East of 99+70±

03.5	04.3	03.9	04.1	04.7	1205.1		04.7	04.0	02.6	05.8	06.4	05.7
3.8	3.0	3.4	3.2	2.6	2.2		2.6	3.3	4.7	1.5	0.9	1.6
30	28	20	18	11			9	15	19&21	27	30	36
17.0	17.5	13.0	14.2	14.7	1215.1			14.5	14.0	12.9	19.2	
2.8	2.3	6.8	5.6	5.1	4.7			5.3	5.8	6.9	0.6	L&V
35	29	20	18	10				9	15	19&20	31	
	21.9	21.4	22.2	22.6	1223.1		22.5		22.1	21.6	22.9	23.2
L&V	9.9	10.4	9.6	9.2	8.7		9.3		9.7	10.2	8.9	8.6
	22	19	17	10			10		16	17&18	22	30
	27.3	26.9	25.0	25.6	26.1	1226.4	26.0		25.4	24.7	25.0	24.9
	4.5	4.9	6.8	6.2	5.7	5.4	5.8		6.4	7.1	6.5	6.7
	30	24	18	16	10		9		15	15	20	30
		31.5	26.6	27.5	28.0	1228.5	25.1		27.4	26.8	27.6	26.9
L&V		0.3	5.2	4.3	3.8	3.3	3.7		4.4	5.0	4.2	4.7
		30	18&19	16	10		9		16	15	23	30
34.1	33.5	31.5	27.1	28.6	1229.0				28.4	27.7	26.8	26.0
-2.3	-2.0	0.0	4.7	3.2	2.8				3.4	4.1	5.0	5.8
40	32	29	19	16					9	16	19	30
27.3		26.4	27.7	28.3	1228.8				28.4	27.9	25.3	24.5
4.5		5.4	4.1	3.5	3.0				3.4	3.6	6.5	7.3
30		22&19	15	10					9	14	24	36
29.6	29.5	29.1	30.0	30.4	1230.8					30.3	29.6	26.7
2.2	2.3	2.7	1.8	1.4	1.0					1.5	2.2	5.1
30	23	18	16	10						9	14	32
	40.0	40.1		37.5	1237.8		37.3	36.9	41.2	41.5		
Bldg	2.6	2.5	5.1	5.1	4.8		5.3	5.7	1.4	1.1		
	31	27	18	10			11	17	28	35		
E&J Conc Drive			37.9	37.5	37.9							
			4.7	5.1	4.7							
			31	9.5								
		39.7	36.4	37.1	37.5	1237.9	37.5	37.0	36.6	39.0	38.3	
V Bldg	7.9	2.9	6.2	5.5	5.1	4.7	5.1	5.6	6.0	3.1	4.3	
	32	27	19	16	10		11	16	18	26	32	

V. Spk 28" Conc 28' W 110+75 ±

C.H.#4

1242.62

111+0				
112				
TP	9.33	1244.83	7.12	1235.50
113				
114				
115				
115+37				
116				
117				
TP	3.47	1235.83	12.47	1232.36
118				
119				
120				
121				
121+50				

29.1 31.6 32.6 34.8 35.3 1235.8 35.2 34.7 34.0 34.3 34.0

13.5 11.0 10.0 7.8 [7.3] 6.8 [7.4] 7.9 8.6 8.3 8.6

45 33 23 16 11 12 17 19 21 31

33.6 32.5 31.6 33.6 33.8 1234.5 34.0 33.1 32.5

9.0 10.1 11.0 9.0 [8.8] 8.1 [8.6] 9.5 10.1

29 23 20 16 11 12 22 33

34.6 33.6 34.4 34.6 1236.0 34.4 34.0 33.6 34.2 33.9

10.2 11.2 10.4 [10.2] 9.8 [10.4] 10.8 11.2 10.6 10.9

29 19 18 15 11 14 18 19 23 31

38.4 35.8 35.3 35.7 34.0 1234.7 35.9 35.5 34.9 35.5 35.8

6.4 9.0 9.5 9.1 [8.9] 8.1 [8.9] 9.3 9.9 9.3 8.8

32 20 19 18 12 14 18 20 22 30

39.1 39.0 37.9 37.6 37.8 38.3 1239.0 38.2 37.6 34.9 38.2 38.3

5.7 5.8 6.9 7.2 7.0 [6.5] 5.8 [6.6] 7.2 7.9 6.6 6.5

35 28 21 20 19 17 12 13 18 20 24 31

CE. POLE 28'

38.7 38.4 38.9 39.2 1239.8 39.3 38.9 38.6 42.3 42.8

6.1 6.4 5.9 [5.6] 5.0 [5.6] 5.9 6.2 2.5 2.0

32 19 17 12 13 19 21 31 39

34.6 35.9 34.1 33.6 34.5 34.8 1235.3 34.6 34.2 33.8 34.7 33.8

8.2 8.9 10.7 11.2 10.3 [10.0] 9.5 [10.2] 10.6 11.0 10.1 11.0

36 28 20 19 16 12 14 18 20 24 31

30.6 29.7 38.9 30.9 1231.6 30.6 28.7 27.5

5.2 5.2 6.1 6.9 [4.9] 4.2 [5.2] 7.1 8.3

36 30 23 19 15 18 23 35

32.9 32.2 29.6 29.1 24.3 30.1 1230.6 30.0 29.1 25.3 24.3

2.9 3.6 6.2 6.7 C.0 [5.7] 5.2 [5.8] 6.7 10.5 11.5

40 32 20 19 17 12 13 19 30 38

33.0 34.8 29.9 29.4 29.8 1230.9 29.5 28.9

2.8 4.0 [5.9] 6.4 [6.0] 4.9 6.3 6.9

33 28 20 19 17 21 32

38.3 30.9 30.1 30.9 31.0 1231.5 30.8 30.2 29.9

-2.5 4.9 5.7 [5.1] [4.8] 4.3 [5.0] 5.6 5.9

40+ 31 20 19 17 13 13 21 33

40.2 39.6 29.9 29.0 29.3 1230.2 28.8 29.7 28.7

-4.4 -3.8 5.9 6.8 [6.5] 5.6 7.0 6.1 7.1

45 36 20 19 15 18 23 31

CH.#4		1235.83 ✓			
122					
123					
T.P. N.D 12.06	11.28	1234.66 ✓	12.45	1223.38 ✓	WEND HERTEL CULVERT
124					
125					
126					
127					
128					
T.P.	11.67	1243.36 ✓	2.97	1231.69 ✓	
129					
130					
BM 130+17 East			6.53	1236.83 ✓	
131+0					
132					
T.P.	8.90	1250.40 ✓	1.86	1241.50 ✓	

29.8 29.7 26.8 26.2 27.0 27.2 1227.9 27.2 26.5 24.4 25.0

6.0 6.1 9.0 9.6 8.8 [8.6] 7.9 [8.6] 9.3 11.4 10.8 LEV
34 27 21 19 17 16 13 20 29 32

23.0 21.8 24.1 1225.5 24.9 22.8 23.5
12.8 14.0 11.7 10.3 10.9 13.0 12.3
31 26 21 15 20 25

0+20 12.05 Vista East

24.9 25.8 26.4 1227.4 26.5 25.3 25.9 29.2 29.3
9.8 8.9 8.3 7.3 8.2 9.4 8.8 5.5 5.2
31 20 17 16 19 20 21 29 35

29.7 30.7 28.2 29.2 29.5 1230.1 29.6 29.2 28.1 34.4
Down 5.0 4.0 6.5 5.5 5.2 4.6 5.1 5.5 6.6 0.3 LEV
Swamp 35 27 20 17 12 11 17 19 20 31

29.6 29.9 28.8 29.3 1230.3 29.1 28.2 30.4 29.8
5.1 4.8 5.9 5.4 4.4 5.6 6.5 4.3 4.8
30 22 20 18 17 20 27 34

27.8 28.1 28.8 29.4 1230.1 29.6 29.2 27.4 26.8
6.9 6.6 5.9 5.3 4.6 5.1 5.5 7.3 7.9
31 22 17 11 11 14 23 31

8.8 8.45
W.F.L. E.F.L.

1231.3

27.9 30.1 30.4 29.5 30.2 33.9 34.7
6.8 4.6 3.4 4.3 5.2 4.5 0.8 0.0
31 17 17 19 20 21 28 35

33.5 34.7 33.1 33.9 36.0 34.1 33.2 34.1 35.4 36.1
9.9 8.7 10.3 9.5 8.4 9.3 10.2 7.3 7.0 7.3
34 22 20 19 17 17 20 21 26 35

38.8 37.7 36.2 37.5 37.8 38.4 37.6 36.9 35.9 35.6
4.6 5.7 7.2 5.9 [5.6] 5.0 [6.8] 6.5 7.5 7.8
33 23 20 19 17 12 13 18 27 32

37.0 36.6 38.1 1239.0 37.7 36.9 35.9
6.4 6.8 5.3 4.4 5.7 6.5 7.5
30 22 21 20 17 18 20 30

37.9 38.1 37.8 38.5 1239.7 38.6 38.2 38.6 38.3
5.5 5.3 5.6 4.9 3.7 4.8 5.2 4.8 5.1
32 21 20 18 18 20 21 30

CH#4 1250.40

133

134

133+49	36" MAPLE	28'	E of ℄	to W Side	Pyrees
+81	18"	"	"	"	"
134+14	28"	"	"	"	"
+48	28"	"	27'	"	"
+78	28"	"	27'	"	"
135+09	40"	"	27'	"	"

134+50

135+0

TP	1.17	1238.71	12.86	1237.54

136+0

137+0

410

138

BM	138+38	SE W.R.	30" S. MAPLE	6.24	1232.47

1238.71
6.24
32.52

CONTINUED ON PG 70

W E 51

42.8 42.7 40.5 41.0 1242.1 41.1 40.2 43,3 43,0

7.6 7.7 9.9 9.4 8.3 9.3 10.2 7.1 7.4

37 27 20 19 18 18 21 26 31

47.3 47.3 44.0 44.7 1245.7 44.8 44.0 48.2 48.0

3.1 3.1 6.4 5.7 4.7 5.6 6.4 2.2 2.4

34 27 20 18 18 20 27 31

1245.9

4.5

46.4 47.3 41.8 43.1 43.6 1243.9 43.4 43.0 42.7 46.4 45.4

4.0 3.1 8.6 7.3 6.8 6.5 7.0 7.4 7.7 4.0 5.0

39 33 20 18 11 12 17 19 25 35

34.7 35.9 35.4 36.0 36.4 1237.1 35.8 35.9 36.1 34.9

4.0 2.8 3.8 2.7 2.3 1.6 2.9 2.8 3.6 3.8

30 22 20 18 15 19 23 27 29

30.7 31.0 33.3 1234.0 33.0 30.4

8.0 7.7 5.4 4.7 5.7 8.3

30 25 20 16 30

30.66

8.05

W FL

30.34

8.37

E FL

CLEAN OUTLET

37.0 32.0 31.6 32.7 1233.6 32.5 31.6 30.6

6.7 6.7 7.1 6.3 5.2 6.2 7.1 8.1

35 23 22 17 17 19 27

LEV

Level for Slope Stakes on CH #4 Sec. 9

	(+) BS	HI	(−) FS	Elev
BM,	0.44	20.01		1219.57
TP	0.54	10.79	9.76	1210.25
218+00				
217+00				
216+05				
TP	5.39	12.03	4.15	06.64
215+00				
214+00				
213+00				
TP	5.90	14.29	3.64	8.39
212+00				

8-13-51 Bender Temple

Top/Stk	30' W grind	End of Travel	30' E grind	Top/Stk
Spk W. root 26" Cherry		E. side Auburn Rd ± 300' N Music St.		
08.0		06.9		10.0
2.8	5.8	3.9	3.9	0.8
07.7		06.1		07.5
3.1	6.3	4.7	6.3	3.3
07.8		06.5		07.3
3.0	6.2	4.3	6.6	3.5
10.2		05.5		09.5
1.8	4.6	6.5	5.6	2.5
10.7		06.6		10.0
1.3	4.3	5.4	5.2	2.0
12.6		08.0		09.4
+0.6	2.2	4.0	5.8	2.6
13.6		08.0		09.3
0.7	3.9	6.3	8.0	5.0

12/4.79

211+00				
210+00				
T.P.	5.25	16.19	3.35 (14.39)	10.94
209+00				
208+00				
T.P.	0.47	09.57 (4.29)	7.09	09.10
BM_2			4.28	1205.29

Top/Stk	30' W grnd		30' E grnd	Top/Stk
10.7		07.5		07.3
3.6	6.5	6.8	10.2	7.0
13.9		08.6		09.0
0.4	3.3	5.7	8.5	5.3
16.7		10.9		13.7
.01	3.2	5.3	6.2	30
13.5		10.7		17.3
2.7	5.8	5.5	6.8	3.9

Spk SE root 20' Elm Sta. 200+12 Elev 1205.12

	T BS	HI	FS	Elev
BM,	3.88	09.00		1205.12
199+50				
200+00				
200+50				
201+00				
201+50				
T.P.	5.12	09.40	4.72	04.28
202+00				
203+00				
T.P.	6.44	11.67	4.17	05.23

W TOP/STK	W 30'g'nd	℄	E 30'g'nd	E TOP/STK
Spk S.E. root 20' Elm Sta 200+10 Elev 1205.12				
10.6		05.5		06.1
+1.6	1.8	3.5	6.0	2.9
06.9		04.6		04.9
2.1	4.5	4.4	7.4	4.1
08.5		04.3		04.8
0.5	3.6	4.7	7.5	4.2
11.4		04.2		04.7
+2.4	0.8	4.8	7.7	4.3
11.7		04.4		04.0
+2.9	0.3	4.6	8.2	5.0
10.0		04.4		05.9
+0.6	2.8	5.0	6.9	3.5
06.6		04.8		05.8
2.8	5.7	4.6	6.8	3.6

11.67

204+00				
205+00				
206+00				
T.P.	5.45	15.05	2.07	09.60
207+00				
T.P.	1.58	10.11	6.52	08.53
T.P.	4.84	09.33	5.62	04.49
BM,			4.20	1205.13
BM,	5.89	11.01		1205.12
199+00				
198+50				

W Top/Str	30' W grnd	E	30' E grnd	E Top/Str.
08.7		05.5		09.7
3.0	6.3	6.2	5.2	2.0
12.1		07.5		12.0
+0.4	3.1	4.2	2.8	+0.3
12.8		09.4		12.6
+1.1	1.0	2.3	2.6	+0.9
14.4		10.2		11.5
0.6	4.0	4.8	6.9	3.5

Spk SE root + 20" Elm Sta. 200+10 Elev. 1205.12

12.2		06.4		08.3
+1.2	1.9	4.6	5.8	2.7
11.5		07.9		11.9
+0.5	2.8	3.1	2.3	+0.9

	BS	HI	FS	Elev
T.P.	6.72	14.86	2.87	08.14
198+00				
197+50				
197+00				
196+00				
T.P.	4.95	08.93	10.88	03.98
195+00				
194+00				
T.P.	10.52	18.22	1.23	07.70
194+00				

W Top/Str	30' W grd	E	30' E grd	E Top/Str
11.5		09.4		14.3
3.4	6.3	5.5	3.8	0.6
13.4		09.8		13.1
1.5	4.7	5.1	5.2	1.8
14.5		08.4		13.7
0.4	3.8	6.5	5.0	1.7
05.9		03.9		02.9
9.0	12.2	11.0	15.4	12.0
05.0		03.7		01.1
3.9	7.0	5.2	10.7	7.8
		06.9		08.6
↓	↓	2.0	3.2	0.3
16.7				
1.5	4.6			

1211.13 18.77

193+00

192+00

T.P.	1.55	14.07 (2.48)	5.70	12.52

190+90

190+00

B.M.2			2.99	1211.08

Culvt new r17+0
inlet FL exist culvt 6.30
" new "

50'

6.5
.27
6.77

G

W Top/Stk	30' W gl'nd	℄	30' E gl'nd	E Top/Stk
18.3		12.3		15.5
+0.1	3.3	5.9	6.2	2.7
18.5		13.8		16.3
+0.3	3.0	4.4	5.3	1.9
16.3		11.4		15.0
+2.2	0.9	2.9	2.4	+0.9
12.7		08.3		12.7
1.4	4.8	58	4.6	1.4

Spk N.E. root 30" Elm Sta 190+03 Elev. 1211.13

2.9
℄ road

4.3
ground

Sthy
6.30
1.80 Road
C 4.50

3.7
ground ← outlet → 6.5
1.0 rod
C 5.5

5.3

6.77
1.77
C 5.0 5.0

100'

6.77
.27
7.04 G

200'

7.04
.54
7.58

West Channel 223'

217+00 5 pc. 36" & 1 pc 30" Conc. Pipe

211 ± 30 No Pipe

200±60 1 pc 15" Conc. Pipe

196+00 18 pc 15" Conc Pipe

?? 1 pc 12" Conc Pipe

± 500 N of Bell 9 pc 12" Conc. Pipe

Ground

5.75

6.2

7.7

Ech

7.04
2.54
C 4.50

7.58
0.0 5.08 ~~0.0~~
C 2.50

CH. #4 SEC G

					Grade
BM	7.06	1218.19		1211.13	
190+50					09.40
191+50					11.02
192+50					11.08
193+50					09.58
T.P.	10.27	1219.32	9.14	1209.05	
T.P.	1.05	1209.67	10.70	1208.62	
194+50					07.30
195+50					06.02
T.P.	7.55	1211.69	5.53	1204.14	
196+50					06.72
196+00 E	Top Stk		9.79	1207.90	

W E

59

Spk NE root 30" Elm 190+03 Lt

18.19 8.79
9.40 3.79 R
8.79 C 5.0

6.7 Gd

8.4

4.6 Gd

8.79
4.79 R
4.00
C 4.0

18.19
11.02
7.17

7.17
2.67 R
C 4.50

5.7 Gd

5.3

4.0 Gd

7.17
1.17 R
C 6.00

18.19
11.08
7.11

7.11
0.61 R
C 6.50

3.5 Gd

4.2

5.7 Gd

7.11
3.11
C 4.00

18.19
9.58
8.61

8.61
3.61 R
C 5.00

6.5 Gd

8.1

1.96 Gd

8.61
+ .39
C 9.00

1209.67
7.30
2.37

2.37
0.37 R
C 2.00

2.56 Gd

4.5

2.37
5.87 R
F 3.50

1209.67
6.02
3.65

3.65 R
6.15
F 2.50

8.9 Gd

6.7

11.2 Gd

3.65
8.15 R
F 4.50

11.69
6.72
4.97

4.97
0.47 R
C 4.50

3.6 Gd

6.1

7.5 Gd

4.97
4.47 R
C .50

CH. #4 SEC G

19.32

194 08.44

1209.67

195 06.41

196 06.12

19.32 10.88 5.4
8.44 252 R G2
10.88 C 8.36

1209.67 3.26 6.65
6.41 4.26 R G2
3.26 F 1.00

09.67 3.55 6.7
6.12 3.55 R G2
3.55 0.0

CH #4 Sec I Profile 9-11-57
H. Patterson
T. Adams
E. Summers
SR 87 to Pekin Rd.

		1250.56		1245.26	USE
BM #1	5.30	105.30		100.00	
SR87+CH#4				48.10	
0+0			2.96	102.84	
1+0			4.70	45.86	
				100.60	
2+0			5.84	44.72	
				99.46	
3+0			6.65	43.91	
				98.65	
4+0			6.92	43.64	
				98.38	
5+0			6.94	44.12	
				98.86	
6+0			5.50	45.06	
				99.80	
7+0			5.27	45.29	
				100.03	
8+0			4.76	45.80	
				100.54	
9+0			4.27	46.29	
				101.03	
10+0			6.02	44.54	
				99.28	
11+0			8.00	42.56	
				97.30	

Horty SPK W. side CEI #72796 25' Rt Sta. 6+60

		1250.56		
		105.30		
12+00			9.32	41.24
				95.98
13+00 TP	2.61	1243.07	10.10	1240.46
		97.81		95.20
14+00			3.44	39.63
				94.37
15+00			4.00	39.07
				93.81
16+00			4.47	38.60
				93.34
17+00			4.86	38.21
				92.95
18+00			4.98	38.09
				92.83
19+00			5.85	37.22
				91.96
20+00			6.69	36.38
				91.12
BM #2			4.97	1238.10
				92.84
21+00			7.90	35.17
				89.91
22+00			8.75	34.32
				89.06
23+00 TP	1.70	1235.27	9.50	1233.57
		90.01		88.31

Vert Spk. E Side Triple Elm 22' Lt Sta 20+33

CH #4
Sec I

		1235.27		
		90.01		
24+0			2.67	32.60
				87.34
25+0			3.43	31.84
				86.58
26+0			5.05	30.22
				84.96
27+0			7.46	27.81
				82.55
28+0+TP.	0.19	1224.88	10.58	1224.69
		79.62		79.43
29+0			3.82	21.06
				75.80
30+0+TP.	0.79	1216.61	9.06	1215.82
		71.35		70.56
31+0			6.95	09.66
				64.40
TP.	1.56	1207.62	10.55	1206.06
		62.36		60.80
32+0			3.62	04.00
				58.64
33+0			8.35	1199.27
				54.01
34+0+TP	1.80	1198.49	10.93	1196.69
		53.23		51.43
35+0			3.88	1194.61
				49.35
36+0 TP	0.17	1193.23	5.43	1193.06
		47.97		47.80

CH #4
Sec I

		1193.23			
		47.97			
37+0			3.97	89.26	
				44.00	
38+0 & TP	1.40	84.30	10.33	82.90	80.85
		82.25		37.64	
BM # 3			4.90	79.40	
				34.14	77.35 ADS
39+0			5.84	78.46	76.41
				33.20	
		73.61			
40+0 & TP	1.63	75.66	10.27	74.03	71.98
		29.40		28.77	
41+0			5.39	70.27	68.22
				24.01	
42+0			6.49	69.17	67.12
				22.91	
		74.05			
43+0 & TP	5.34	76.10	4.90	70.76	68.71
		29.84		24.50	
44+0			6.54	69.56	67.51
		64.06		23.30	
T.P.	0.79	11 66.11	10.78	11 65.32	63.27
		19.85		19.06	
45+0		63.84	3.52	62.59	60.54
				16.32	
				60.82	58.77
46+0			5.29	14.56	
BM # 4			4.94	11 61.17	59.12
				14.91	58.90 ADS
47+0			5.14	60.97	58.70
				14.71	
		72.32			
48+0 & T.P.	9.98	11 74.59	1.50	11 64.61	62.34
		28.33		18.35	
				70.35	68.08
49+0			4.24	24.09	
T.P.	10.32	38.16	0.49	27.94	
		11 84.42		11 74.10	71.83
		82.15			

Horiz. Spk. S.E. Side 12" Locust 27' Lt. Sta 38+90

See pg 67 for X sec. this book
at. sta's 39+0 40+0 41+0 & 42+0

X Section CH #4

69.7	71.2	67.6	68.6	68.7	68.4	67.3	69.3		72.4	
26	12	12	8		10	12	15		25	
3.94	2.36	5.95	5.01	4.90	5.22	6.32	4.28		1.21	
71.2	22.2	66.1	68.1	67.5	67.7				69.4	
25	18	12	8	✓	5				25	
3.94	1.55	8.00	6.01	6.54	6.43	Drive			4.24	
	54.5	54.1	60.4	60.6	60.8	58.5			55.4	
	20	12	8		12	12			25	
Out	9.57	5.04	3.72	3.52	3.30	5.55			8.71	
53.3			58.6	58.8		58.7			53.4	
25 FL			Pond	✓		3.5	E. end		25 FL	
10.25	Bridge		5.54	5.29		5.43			10.70	
X Cut	NW	NW	Hdwl	Bridge	58.6	Sta		46+03		
57.1	56.6	58.7	✓	58.7	3	14	55.5	25	52.8	
6.14	6.35	5.14	5.14		5.15	8.26		10.25		
58.8	60.6	62.1	62.3	62.2	61.2	57.9				
25	13	9		10	15	25				
+5.00	3.15	1.68	1.50	1.63	2.60	5.94				out
70.0	66.2	67.7	68.1	67.8	65.7	70.5				
25	13	10	✓	9	14	25				
2.21	6.08	4.64	4.24	4.47	6.56	1.80				

CH 4 Sec I	+	HI	−	Elev	
		82.15 1184.42 38.16			
50+0			9.69	1174.73 28.47	72.46
51+0			5.99	78.43 32.17	76.16
+50			4.59	79.83 33.57	77.56
52+0			3.15	81.27 35.01	79.00
		90.05 1192.32			
+50 TP	9.70	46.06	1.80	1182.62 36.36	80.35
53+0			8.69	83.63 37.37	81.36
+50			7.69	84.63 38.37	82.36
54+0			7.66	85.10 38.84	82.83
+50			7.99	84.33 38.07	82.06
55+0		82.27	11.96	80.36 34.10	78.09
T.P.	3.64	1184.54 38.28	11.42	1180.90 34.64	78.63
+50			8.34	76.20 29.94	73.93
56+0		72.54	12.55	71.99 25.73	69.72
T.P.	0.17	1174.81 28.55	9.90	1174.64 28.38	72.37
+50			6.45	68.36 22.16	66.09

73.0 25 9.23	73.6 17 8.69	70.6 14 11.69	72.2 10 9.85	72.5 4 9.67	72.6 9 9.62	71.3 14 10.96	75.0 18 7.18	75.5 25 6.66
74.8 25 7.38	75.6 18 6.57	74.0 13 8.21	75.6 9 6.55	76.2 5.99	76.1 9 6.11	74.7 13 7.45	77.7 17 4.53	78.7 25 3.49
77.4 25 4.83	77.7 17 4.50	75.9 13 6.30	77.3 9 4.92	77.6 4.57	77.6 9 4.55	76.6 13 5.56	79.3 18 2.91	80.5 25 1.72
79.0 25 3.29	79.4 17 2.81	77.2 13 4.85	78.8 9 3.34	79.0 3.15	79.0 9 3.19	77.9 17 4.25	80.7 19 1.96	81.7 25 0.53
79.6 25 2.57	80.0 17 2.20	78.6 13 3.56	80.0 9 2.18	80.4 1.80	80.4 2 1.53	78.8 17 3.41	80.8 17 1.37	82.1 25 0.21
80.4 25 9.68	80.4 17 9.74	79.3 13 10.79	81.1 9 9.01	81.4 4 8.69	81.3 10 8.79	79.5 13 10.55	81.4 20 8.65	82.3 25 7.82
81.4 25 8.25	81.4 15 8.65	80.5 13 9.62	82.1 9 8.02	82.4 7.69	82.3 12 7.80	80.6 13 9.52	83.4 20 6.73	83.3 25 6.82
83.2 25 6.93	82.8 15 7.29	82.1 13 7.98	82.7 9 7.44	82.9 7.22	82.8 10 7.26	81.7 14 8.44	84.5 20 5.53	84.8 25 5.32
83.4 25 6.38	Drive		82.3 8 7.81	82.1 7.99	81.8 8 8.33	79.9 13 10.15	85.7 25 4.37	
86.0 25 3.50	86.1 25 3.45	78.1 12 12.00	78.3 8 11.84	78.1 11.96	78.1 12 12.00	76.6 17 13.51	81.4 25 8.34	
	79.3 25 9.00	73.3 12 9.02	74.0 8 8.31	79.0 4 8.34	73.8 12 8.45	72.2 16 10.05	76.8 26 5.54	
	76.9 26 5.33	68.5 13 13.75	69.5 9 12.51	69.7 12.55	69.6 10 12.92	67.6 17 14.67	70.0 26 12.30	67.2 25 15.12
	72.0 27 0.50	64.6 14 7.55	66.1 9 6.44	66.0 6.45	65.7 11 6.81	62.3 19 10.22	60.7 26 11.78	

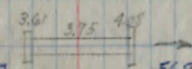
Sta.	B.S.	H.I.	F.S.	Elev.	
		72.54 1174.81 28.55			
57+0		62.50	9.44	65.37 19.11	63.10
T P	1.48	1164.77 18.51	11.52	1163.29 17.03	61.02
+50			1.78	62.99 16.73	60.72
58+0			3.18	61.59 15.33	59.32
B.M. #5	3.66	61.47 11~~63.77~~ 17.51	4.66	1160.11 13.85	57.84 (57.81) ADS
+50			3.75	60.02 13.76	57.72
59+0			4.75	59.02 12.76	
+50			4.66	59.11 12.85	
60+0			3.78	59.99 13.73	
61+0			2.62	61.15 14.89	58.85
62+0			1.87	61.90 15.64	59.60
Pekin Rd +56.45			0.72	63.05 16.79	60.75

(crossed out)

BM #	3.50	1237.72		1234.22
T.P.	5.43	1235.94	7.21	1230.51
T.P.	9.58	1245.05	0.47	1235.47
T.P.	8.85	1253.84	0.06	1244.99
T.P.	8.54	1262.36	0.02	1253.82

	64.3 30 8.22	W 61.6 18 10.89	63.2 8 9.39	℄ 63.1 9.44	62.8 11 9.65	E 59.3 21 13.24	58.6 30 18.85	
	59.5 30 3.02	59.2 15 3.33	60.8 8 1.67	60.7 1.78	60.8 12 1.84	57.2 19 5.25	56.1 30 6.44	Swamp
	57.3 30 5.20	57.2 18 5.28	59.3 10 3.18	59.3 3.18	59.2 10 3.34	55.6 19 6.86	54.6 30 7.91	Swamp

X Cut 12" NW ¼ W Hdwl Culvt 11' Rt Sta. 58+60



10" X 24 Stone Box Culvt Flo East.

	54.2 30 7.27	54.1 17 7.42	56.8 9 4.63	56.7 4.75	56.8 10 4.76	53.1 18 8.40	53.2 30 8.25	Swamp
Swamp	54.1 30 7.35	54.1 18 7.33	56.9 9 4.20	56.8 4.66	56.4 10 5.05	52.8 19 8.64	53.2 30 8.29	Swamp
Swamp	54.6 31 6.54	55.4 17 6.32	57.6 9 3.85	57.7 3.78	57.4 11 4.03	53.8 20 7.64	53.6 30 7.85	Swamp
Swamp	56.3 31 5.15	56.4 12 5.03	58.9 9 2.60	58.9 2.62	58.6 10 2.83	55.4 20 6.05	54.3 30 7.20	Swamp
Swamp	57.6 20 3.83	57.6 18 3.85	59.8 9 1.64	59.6 ℄ 1.87	60.0 11 1.45	56.9 20 4.57	56.7 30 4.73	Swamp

(Sec I)

Spk SW. Root 24" Elm 32' Rt. Sta. 100+11

		1262.36		
T.P.	2.51	1265.64	9.23	53 1263.13
T.P.	9.16	1270.89	3.91	51 1264.73
T.P.	3.31	1274.17	0.03	60 1270.86
T.P.	1.38	1264.09	11.46	52 1262.71
T.P.	3.15	1258.59	8.65	45 1255.44
B.M. #1			3.03	45 1255.56
T.P.	10.89	1266.30	3.18	45 1255.41
T.P.	11.60	1277.28	0.62	55 1265.68
T.P.	0.04	1268.13	9.19	58 1268.09
T.P.	9.89	1270.67	7.35	50 1260.78
T.P.	0.03	1265.87	4.73	55.94 1265.84
T.P.	0.33	1254.67	11.51	44.46 1254.36
T.P.	2.53	1245.85	11.37	33.42 1247.32
T.P.	7.11	1248.79	4.17	31.78 1241.68
			4.10	34.79 1244.69

B.M. #3	4.60	81.95 1184.00		77.35 1179.40
37+00				
40+00				
T.P.	3.75	74.05 1176.10	11.65	70.30 1172.35
41+00				
42+00				
T.P.	10.91	81.21 1183.26	3.75	70.30 1172.35
B.M. #3			3.86	77.35 1179.40

W E

75.4	76.2	75.3	76.3	76.4	76.2	75.8	76.00	75.6	
54	5.80	6.65	5.69	5.55	5.71	6.15	5.97	6.32	
50	17	16	14		9	12	16	30	
74.2	73.8	70.5	71.9	✓72.0	71.8	71.1	72.8	72.7	72.2
7.80	8.20	11.40	10.10	9.94	10.14	10.62	8.20	9.30	9.72
30	19	13	11		9	12	15	25	30
67.2	68.1	67.5	68.2	68.2	67.7	67.0	66.7		
6.86	6.00	6.55	5.83	✓5.82	6.35	7.02	7.30	swamp	
20	20	16	11		11	14	28		
	64.3		63.2	66.8	67.1	67.1	66.6	69.0	65.8
	9.76		10.55	7.28	6.95	6.95	7.40	10.05	8.25
	30		17	12		9	13	17	30

CH #4 Sec I 9-21-57
H. Patterson
P. Young

Profile Levels

BM #1	3.44	103.44		100.00
T.P.	5.13	106.69	1.88	101.56
+CH #4 + SR 87				
0+0			3.92	102.77
SR 87 East				
1+0			4.53	102.16
2+0			6.11	100.58
3+0			8.75	97.94
4+0			11.24	95.45
5+0			13.00	93.69
6+0			12.87	93.82
SR 87 West				
1+0			4.74	9195
2+0			6.16	100.53
3+0			8.00	98.69
4+0			9.61	97.08
5+0			11.17	95.52
6+0			12.73	93.96
T P	9.31	112.39	3.61	103.08
CH #4 South				
1+0			8.17	104.22
2+0			5.66	106.73
3+0			3.35	109.04
4+0 & T P	8.04	119.83	.60	111.79

See Pg 61 This Book

	+	HI	-	Elev
		119.83		
5+0			5.41	114.42
6+0			2.30	117.53
T.P.	1.14	109.39	11.56	108.25
T.P.	5.66	104.60	10.45	98.94
B.M.			9.55	100.05

CH ¼ Continued from pg 51

H.I. for all reading = 1241.31 →

Station	Description	Reading	W					℄				E	
139					4.6/28	8.8/20	7.7/16	1234.7 6.6	8.0/17	7.6/22	8.4/28		
140			3.6/38	3.0/30	6.5/19	6.5/18	5.9/16	1236.3 5.0	6.3/15	7.1/19	6.0/22	7.3/45	
141				6.6/31	6.0/25	5.8/18		1237.0 4.3	4.8/15	5.0/24	5.4/40		
142				6.2/31	6.0/25	5.6/18		1237.0 4.3	4.9/14	4.9/20	4.6/35		
143				3.6/31	4.2/22	4.6/18		1237.0 4.3	5.0/15	5.0/21	3.0/26	2.7/37	
144			6.3/35	6.5/25	8.1/20	8.1/18		1234.5 6.80	7.4/16	7.0/22	5.5/39	4.6/46	
± 144+78	F/L Culvert W Side	10.90	26' From ℄										
± 144+78	F/L Culvert E Side	10.90	25 From ℄										
145	On LS 422 Pavement							1232.7 8.60					

#11
B.M 145+40 x in S.E Cor. N. Howall Culvert 9.28 Elev = 1232.03

F Line Culvert E. Side 145+40 11.80

Auburn Rd CH 4
X sec. from US 422 W to Stafford Rd.

	+	HI	-	Elev
BM1	0.32	1232.16		1231.84
			-0.4	
1+0				1231.86
2+0				1229.56
3+0				1228.56
4+0				1227.76
5+0				1225.26
BM			3.01	1229.15
6+0				1222.16
TP	1.01	1221.42	11.75	1220.41
7+0				1218.22
8+0				1213.52
9+0				1210.62
TP	0.14	1209.87	11.69	1209.73
10+0				1206.67
11+0				1200.37
TP	0.65	1198.64	11.88	1197.99

W ℄ E

X in SE 7 W Hd w/ 422 culv't
INT. ℄ US 422 & CH 4

out 1.3/15 1.7/11.5 1.3 1.7/18 2.6/30

out 3.0/15 2.8/6.5 2.6 3.2/20 3.6/30

out 4.5/15 3.9/5 3.6 4.0/20 3.8/22 3.6/30 up easy

6.2/30 5.5/15 4.7/7 4.4 4.9/16 3.8/20 2.8/3.0

6.2/30 6.1/15 7.1/9 6.9 7.4/12 8.9/15 4.8/20 3.5/30

Vert spk w side 24" Weak ± 30' Rt & Sta 5+05

down easy 10.8/20 10.4/10 10.0 10.4/10 11.7/13 9.2/17 8.7/25 7.3/33

up easy 1.9/30 2.4/15 3.7/10 3.2 3.5/10 5.2/14 1.0/20 -0.5/30

out 7.7/20 8.7/10 7.9 8.6/14 9.6/16 7.2/20 7.1/30

out 11.9/18 11.4/10 10.8 11.4/16 13.0/18 10.9/20 10.1/30

1.6/30 0.3/15 4.0/9 3.2 4.0/16 5.7/18 4.5/20 -0.8/26 -1.4/30

out 4.7/20 10.3/10 9.5 10.3/14 12.3/17 5./26 out

	+	HI	-	Elev
		1198.64		
12+0				1194.24
13+0				1190.74
TP	5.91	1195.13	9.42	1189.22
BM			8.86	1186.27
14+0				1189.53
15+0				1188.80
16+0				1180.80
TP	10.50	1205.13	0.50	1194.63
17+0				1195.43
18+0				1199.73
TP	11.11	1214.55	1.69	1203.44
19+0				1203.35
20+0				1206.95
21+0				1207.25
22+0				1211.95
23+0				1213.05
TP	10.26	1224.29	0.52	1214.03

W E E

out 3.0/20 5.1/15 4.4 5.2/14 6.7/16 5.1/20 1.9/24 1.3/30

down cliff 12.4/25 11.3/18 8.7/11 7.9 8.4/12 9.3/14 8.5/17 9.7/30

SPK. W. Root 30" Elm E. side Road Sta. 19+08

11.8/30 10.2/20 6.1/11 5.6 6.2/12 9.8/20 8.7/32

8.8/28 8.3/15 6.9/11 6.3 7.0/11 9.3/20 10.2/30

1.0/30 4.2/20 5.2/16 4.9/14 4.3 5.0/11 6.0/14 4.8/15 5.2/20 6.4/30

5.8/28 10.4/13 9.7 10.8/11 8.2/15 8.9/20 9.4/30

2.9/30 3.4/19 5.7/14 5.0 6.2/10 4.4/14 4.8/20 5.5/30

7.3/30 9.4/20 10.9/12 11.2 11.9/10 10.4/15 11.3/20 11.1/30

3.9/30 5.2/17 8.8/11 7.9/9 7.6 8.2/12 6.5/15 7.1/20 out

Or 3.9/20 4.4/8 4.3 4.8/13 5.4/20 6.2/30

out 0.9/20 1.1/15 3.6/11 3.2/8 2.6 3.3/15 2.7/20 out

up easy 0.1/14 2.7/6 2.1/7 1.5 2.0/14 3.7/28

See Pg 74

	+	HI 1224.29	−	Elev
24+0				1214.69
25+0				1217.19
26+0				1219.89
BM	5.67	1229.52	0.44	1223.85
27+0				1222.42
28+0				1223.92
29+0				1224.72
BM			0.68	1228.84
30+0				1226.22
31+0				1224.22
32+0				1222.12
33+0				1218.82
TP	2.51	1221.08	10.55	1218.97
34+0				1215.58
35+0				1212.08

W				℄			E
8.0/27	8.3/15	10.7/8	10.1/7	9.6	10.4/17	9.4/20	out
3.7/30	4.5/16	8.5/8	7.3/6	7.1	7.0/7	7.9/18	6.4/20 out
1.0/30	2.0/13	5.1/8	4.9/6	4.4	4.2/7	5.0/18	4.3/20 5.2/30

Tem BM CEL 509931 + Sta 26+0

5.1/25	5.4/15	8.1/6	7.1/4	7.1	7.3/10	7.9/18	6.5/20 8.3/35
3.6/25	4.0/10	5.9/5	5.6/2	5.6	5.5/10	6.6/20	7.5/25 8.3/35
3.5/25	4.0/10	5.0/5		4.8	4.6/11	5.6/21	6.5/25 8.0/35

Sta 30+0 E root 28" Maple ±20' Nside Dr Elev. 1228.89

S2 mg grade out	2.6/20	2.9/10	3.3	3.5/10	4.4/21	4.7/25	6.3/35
2.6/25	3.6/12	6.0/5	5.4/3	5.3	5.0/9	6.1/21	6.4/25 8.4/35
out 4.0/20	4.4/11	7.8/4	7.5/2	7.4	7.2/10	7.9/21	7.1/22 7.4/25 8.3/35
out 7.8/20	7.3/10	11.8/3	10.8/2	10.7	10.5/10	11.2/20	11.3/21 10.4/25 10.6/35
out 2.9/20	3.3/11	7.2/4	6.0/3	5.9	5.8/8	6.5/19	5.5/21 5.8/25 6.3/35
out 6.7/20	7.2/10	10.7/4	9.5/3	9.4	9.2/8	9.8/19	9.0/25 8.4/35

	+	HI	−	Elev
BM	1.90	1208.91		1207.01
			0.10	1208.81
83+0				1207.91
82+0				1203.91
81+0				1202.11
80+0				1201.41
TP	4.28	1205.84	7.35	1201.56
79+0				1201.64
78+0				1201.54
77+0				1201.44
76+0				1201.24
75+0				1201.64
74+0				1202.24
73+0				1201.84
72+0				1201.74

W ℄ E

Spk NW root 30" cherry ±25' Rt Sta 82+63 Elev 1207.01

℄ int CH #4 ℄ Stafford Rd

out 1.5/30 2.6/21 1.9/15 1.0 2.2/14 1.8/20 1.4/28

out 3.0/29 4.8/16 6.4/11 5.6/10 5.0 5.8/12 5.4/13 5.4/20 out

8.8/29 8.2/16 8.3/13 7.5/11 6.8 7.7/12 8.5/16 8.9/20 9.3/30

9.0/29 9.0/12 8.0/10 7.5 8.3/13 9.0/16 9.4/20 out

2.9/29 4.0/17 5.5/13 4.7/11 4.2 4.9/12 4.5/13 4.9/20 out

3.9/28 4.5/18 5.5/13 4.9/11 4.3 5.0/12 5.6/20 out

4.6/29 5.3/14 5.2/11 4.4 5.0/12 5.7/16 5.9/20 out

5.3/29 6.1/13 5.3/10 4.6 5.3/12 6.0/14 6.2/30

3.7/29 3.8/20 5.1/13 4.8/10 4.2 5.0/14 4.6/20 4.4/30

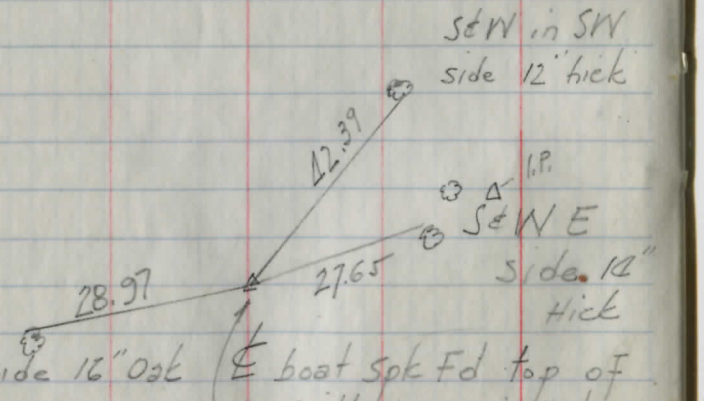
4.1/30 4.2/15 3.8/10 4.0/9 3.6 4.8/15 4.5/20 4.2/30

4.5/30 4.7/11 4.0 4.9/15 4.7/20 out

out 4.2/20 4.9/16 4.8/13 4.1 5.0/14 4.6/16 5.4/27

+	HI 1205.84	−	Elev
		6.8	1199.04
		6.5	1199.34
		6.8	1199.04
		8.0	1197.84
		9.4	1196.44

·E cul-t FL
W " "
E rd margin
100' E of "
200' " " "



BARTHOLOMEW RD

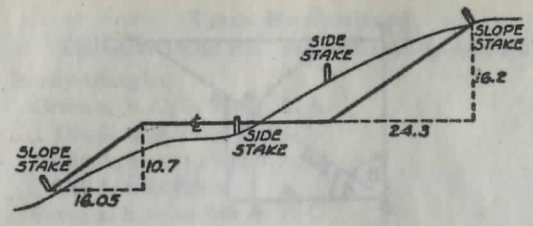


TABLE I.—DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING

SLOPE 1½ TO 1. ROADWAY OF ANY WIDTH

	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
0	0.00	0.15	0.30	0.45	0.60	0.75	0.90	1.05	1.20	1.35	0
1	1.50	1.65	1.80	1.95	2.10	2.25	2.40	2.55	2.70	2.85	1
2	3.00	3.15	3.30	3.45	3.60	3.75	3.90	4.05	4.20	4.35	2
3	4.50	4.65	4.80	4.95	5.10	5.25	5.40	5.55	5.70	5.85	3
4	6.00	6.15	6.30	6.45	6.60	6.75	6.90	7.05	7.20	7.35	4
5	7.50	7.65	7.80	7.95	8.10	8.25	8.40	8.55	8.70	8.85	5
6	9.00	9.15	9.30	9.45	9.60	9.75	9.90	10.05	10.20	10.35	6
7	10.50	10.65	10.80	10.95	11.10	11.25	11.40	11.55	11.70	11.85	7
8	12.00	12.15	12.30	12.45	12.60	12.75	12.90	13.05	13.20	13.35	8
9	13.50	13.65	13.80	13.95	14.10	14.25	14.40	14.55	14.70	14.85	9
10	15.00	15.15	15.30	15.45	15.60	15.75	15.90	16.05	16.20	16.35	10
11	16.50	16.65	16.80	16.95	17.10	17.25	17.40	17.55	17.70	17.85	11
12	18.00	18.15	18.30	18.45	18.60	18.75	18.90	19.05	19.20	19.35	12
13	19.50	19.65	19.80	19.95	20.10	20.25	20.40	20.55	20.70	20.85	13
14	21.00	21.15	21.30	21.45	21.60	21.75	21.90	22.05	22.20	22.35	14
15	22.50	22.65	22.80	22.95	23.10	23.25	23.40	23.55	23.70	23.85	15
16	24.00	24.15	24.30	24.45	24.60	24.75	24.90	25.05	25.20	25.35	16
17	25.50	25.65	25.80	25.95	26.10	26.25	26.40	26.55	26.70	26.85	17
18	27.00	27.15	27.30	27.45	27.60	27.75	27.90	28.05	28.20	28.35	18
19	28.50	28.65	28.80	28.95	29.10	29.25	29.40	29.55	29.70	29.85	19
20	30.00	30.15	30.30	30.45	30.60	30.75	30.90	31.05	31.20	31.35	20
21	31.50	31.65	31.80	31.95	32.10	32.25	32.40	32.55	32.70	32.85	21
22	33.00	33.15	33.30	33.45	33.60	33.75	33.90	34.05	34.20	34.35	22
23	34.50	34.65	34.80	34.95	35.10	35.25	35.40	35.55	35.70	35.85	23
24	36.00	36.15	36.30	36.45	36.60	36.75	36.90	37.05	37.20	37.35	24
25	37.50	37.65	37.80	37.95	38.10	38.25	38.40	38.55	38.70	38.85	25
26	39.00	39.15	39.30	39.45	39.60	39.75	39.90	40.05	40.20	40.35	26
27	40.50	40.65	40.80	40.95	41.10	41.25	41.40	41.55	41.70	41.85	27
28	42.00	42.15	42.30	42.45	42.60	42.75	42.90	43.05	43.20	43.35	28
29	43.50	43.65	43.80	43.95	44.10	44.25	44.40	44.55	44.70	44.85	29
30	45.00	45.15	45.30	45.45	45.60	45.75	45.90	46.05	46.20	46.35	30
31	46.50	46.65	46.80	46.95	47.10	47.25	47.40	47.55	47.70	47.85	31
32	48.00	48.15	48.30	48.45	48.60	48.75	48.90	49.05	49.20	49.35	32
33	49.50	49.65	49.80	49.95	50.10	50.25	50.40	50.55	50.70	50.85	33
34	51.00	51.15	51.30	51.45	51.60	51.75	51.90	52.05	52.20	52.35	34
35	52.50	52.65	52.80	52.95	53.10	53.25	53.40	53.55	53.70	53.85	35
36	54.00	54.15	54.30	54.45	54.60	54.75	54.90	55.05	55.20	55.35	36
37	55.50	55.65	55.80	55.95	56.10	56.25	56.40	56.55	56.70	56.85	37
38	57.00	57.15	57.30	57.45	57.60	57.75	57.90	58.05	58.20	58.35	38
39	58.50	58.65	58.80	58.95	59.10	59.25	59.40	59.55	59.70	59.85	39
40	60.00	60.15	60.30	60.45	60.60	60.75	60.90	61.05	61.20	61.35	40
41	61.50	61.65	61.80	61.95	62.10	62.25	62.40	62.55	62.70	62.85	41
42	63.00	63.15	63.30	63.45	63.60	63.75	63.90	64.05	64.20	64.35	42
43	64.50	64.65	64.80	64.95	65.10	65.25	65.40	65.55	65.70	65.85	43
44	66.00	66.15	66.30	66.45	66.60	66.75	66.90	67.05	67.20	67.35	44
45	67.50	67.65	67.80	67.95	68.10	68.25	68.40	68.55	68.70	68.85	45
46	69.00	69.15	69.30	69.45	69.60	69.75	69.90	70.05	70.20	70.35	46
47	70.50	70.65	70.80	70.95	71.10	71.25	71.40	71.55	71.70	71.85	47
48	72.00	72.15	72.30	72.45	72.60	72.75	72.90	73.05	73.20	73.35	48
49	73.50	73.65	73.80	73.95	74.10	74.25	74.40	74.55	74.70	74.85	49
50	75.00	75.15	75.30	75.45	75.60	75.75	75.90	76.05	76.20	76.35	50

Computed by L. Leland Locke.

TABLE No. 1

Distance of slope stake from side or shoulder stake for any width roadway, slope 1½ to 1. If ground is nearly level, the cut or fill at side stake is located by the double entry method in left column and top row. The number in body of table in same row and column gives distance from side stake to slope stake. If ground is not level estimate the difference in elevation between the side stake and slope stake, lower target by this amount if cut, elevate if fill. Add this amount to cut or fill and find distance in table. Set up rod at this point, and line of sight should cut target. If it does not make the slight adjustment necessary.

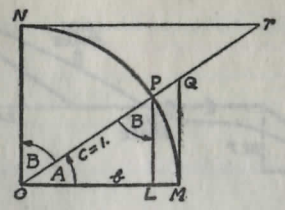


Table II

TRIGONOMETRIC FORMULAE

$\angle A = \angle MOP \qquad \angle B = \angle PON = \angle OPL$

$R = OB = c = 1$

$$\sin A = \frac{a}{c} = \frac{a}{1} = a = \cos B = LP$$

$$\cos A = \frac{b}{c} = \frac{b}{1} = b = \sin B = OL$$

$$\tan A = \frac{a}{b} = \frac{MQ}{OM} = \frac{MQ}{1} = MQ = \cot B = MQ$$

$$\cot A = \frac{NT}{ON} = \frac{NT}{1} = NT = \tan B = NT$$

$$\sec A = \frac{OQ}{OM} = \frac{OQ}{1} = OQ = \csc B = OQ$$

$$\csc A = \frac{OT}{ON} = \frac{OT}{1} = OT = \sec B = OT$$

$$\text{vers } A = \frac{LM}{OP} = LM = \text{covers } B \#$$

$$\text{covers } A = \frac{OP - LP}{OP} = OP - LP = \text{vers } B$$

$$\text{exsec } A = PQ = \text{coexsec } B$$

$$\text{coexsec } A = PT = \text{exsec } B$$

$$\sin \tfrac{1}{2}A = \sqrt{\frac{1 - \cos A}{2}} \qquad \cos \tfrac{1}{2}A = \sqrt{\frac{1 + \cos A}{2}}$$

$$\sin 2A = 2 \sin A \cos \qquad \cos 2A = \cos^2 A - \sin^2 A$$

Law of Sines $\dfrac{\sin A}{a} = \dfrac{\sin B}{B} = \dfrac{\sin C^1}{C}$

Law of Cosines $c^2 = a^2 + p^2 - 2\,ab \cos C$

Law of Tangents $\dfrac{a+b}{a-b} = \dfrac{\tan \frac{1}{2}(A+B)}{\tan \frac{1}{2}(A-B)}$

Table II—Continued

TRIGONOMETRIC FORMULAE (continued)

In any triangle:

Given a, b, C; to find c, B, A.

Use Law of Tangents.

Given A, B, c; to find a, b, C.

Use Law of Sines.

Given a, b, c; to find A, B, C.

Let $\dfrac{a+b+c}{2} = s, \sqrt{\dfrac{(s-a)}{s} \dfrac{(s-b)\ (s-c)}{s}} = r$

$$\cos \tfrac{1}{2}A = \sqrt{\frac{s(s-a)}{bc}}$$

$$\tan \tfrac{1}{2}A = \frac{r}{s-a}$$

$$\tan \tfrac{1}{2}B = \frac{r}{s-b}$$

$$\tan \tfrac{1}{2}C = \frac{r}{s-c}$$

Area of a triangle:

Area $= \frac{1}{2}$ ab Sin C

Area $= \sqrt{s(s-a)\ (s-b)\ (s-c)}$

PRISMOIDAL FORMULA

$$\text{Vol.} = \frac{h}{6}(B + b + 4M)$$

h = altitude; b B = bases; M = midsection

Table III

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	.10000

Table IV

Inches in Decimals of a Foot

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

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

Table V.—Radii, Ordinates and Deflections

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

Note. Chord Deflection =2 times tangent deflection.

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

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

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

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

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

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
51°	3375.0	920.2	**71°**	4086.9	1308.2	**81°**	4893.6	1805.3
10′	3386.3	925.9	10′	4099.5	1315.6	10′	4908.0	1814.7
20	3397.5	931.6	20	4112.1	1322.9	20	4922.5	1824.1
30	3408.8	937.3	30	4124.8	1330.3	30	4937.0	1833.6
40	3420.1	943.1	40	4137.4	1337.7	40	4951.5	1843.1
50	3431.4	948.9	50	4150.1	1345.1	50	4966.1	1852.6
52	3442.7	954.8	**72**	4162.8	1352.6	**82**	4980.7	1862.2
10	3454.1	960.6	10	4175.6	1360.1	10	4995.4	1871.8
20	3465.4	966.5	20	4188.5	1367.6	20	5010.0	1881.5
30	3476.8	972.4	30	4201.2	1375.2	30	5024.8	1891.2
40	3488.3	978.3	40	4214.0	1382.8	40	5039.5	1900.9
50	3499.7	984.3	50	4226.8	1390.4	50	5054.3	1910.7
53	3511.1	990.2	**73**	4239.7	1398.0	**83**	5069.2	1920.5
10	3522.6	996.2	10	4252.6	1405.7	10	5084.0	1930.4
20	3534.1	1002.3	20	4265.6	1413.5	20	5099.0	1940.3
30	3545.6	1008.3	30	4278.5	1421.2	30	5113.9	1950.3
40	3557.2	1014.4	40	4291.5	1429.0	40	5128.9	1960.2
50	3568.7	1020.5	50	4304.6	1436.8	50	5143.9	1970.3
54	3580.3	1026.6	**74**	4317.6	1444.6	**84**	5159.0	1980.4
10	3591.9	1032.8	10	4330.7	1452.5	10	5174.1	1990.5
20	3603.5	1039.0	20	4343.8	1460.4	20	5189.3	2000.6
30	3615.1	1045.2	30	4356.9	1468.4	30	5204.4	2010.8
40	3626.8	1051.4	40	4370.1	1476.4	40	5219.7	2021.1
50	3638.5	1057.7	50	4383.3	1484.4	50	5234.9	2031.4
55	3650.2	1063.9	**75**	4396.5	1492.4	**85**	5250.3	2041.7
10	3661.9	1070.2	10	4409.8	1500.5	10	5265.6	2052.1
20	3673.7	1076.6	20	4423.1	1508.6	20	5281.0	2062.5
30	3685.4	1082.9	30	4436.4	1516.7	30	5296.4	2073.0
40	3697.2	1089.3	40	4449.7	1524.9	40	5311.9	2083.5
50	3709.0	1095.7	50	4463.1	1533.1	50	5327.4	2094.1
56	3720.9	1102.2	**76**	4476.5	1541.4	**86**	5343.0	2104.7
10	3732.7	1108.6	10	4489.9	1549.7	10	5358.6	2115.3
20	3744.6	1115.1	20	4503.4	1558.0	20	5374.2	2126.0
30	3756.5	1121.7	30	4516.9	1566.3	30	5389.9	2136.7
40	3768.5	1128.2	40	4530.4	1574.7	40	5405.6	2147.5
50	3780.4	1134.8	50	4544.0	1583.1	50	5421.4	2158.4
57	3792.4	1141.4	**77**	4557.6	1591.6	**87**	5437.2	2169.2
10	3804.4	1148.0	10	4571.2	1600.1	10	5453.1	2180.2
20	3816.4	1154.7	20	4584.8	1608.6	20	5469.0	2191.1
30	3828.4	1161.3	30	4598.5	1617.1	30	5484.9	2202.2
40	3840.5	1168.1	40	4612.2	1625.7	40	5500.9	2213.2
50	3852.6	1174.8	50	4626.0	1634.4	50	5517.0	2224.3
58	3864.7	1181.6	**78**	4639.8	1643.0	**88**	5533.1	2235.5
10	3876.8	1188.4	10	4653.6	1651.7	10	5549.2	2246.7
20	3889.0	1195.2	20	4667.4	1660.5	20	5565.4	2258.0
30	3901.2	1202.0	30	4681.3	1669.2	30	5581.6	2269.3
40	3913.4	1208.9	40	4695.2	1678.1	40	5597.8	2280.6
50	3925.6	1215.8	50	4709.2	1686.9	50	5614.2	2292.0
59	3937.9	1222.7	**79**	4723.2	1695.8	**89**	5630.5	2303.5
10	3950.2	1229.7	10	4737.2	1704.7	10	5646.9	2315.0
20	3962.5	1236.7	20	4751.2	1713.7	20	5663.4	2326.6
30	3974.8	1243.7	30	4765.3	1722.7	30	5679.9	2338.2
40	3987.2	1250.8	40	4779.4	1731.7	40	5696.4	2349.8
50	3999.5	1257.9	50	4793.6	1740.8	50	5713.0	2361.5
60	4011.9	1265.0	**80**	4807.7	1749.9	**90**	5729.7	2373.3
10	4024.4	1272.1	10	4822.0	1759.0	10	5746.3	2385.1
20	4036.8	1279.3	20	4836.2	1768.2	20	5763.1	2397.0
30	4049.3	1286.5	30	4850.5	1777.4	30	5779.9	2408.9
40	4061.8	1293.6	40	4864.8	1786.7	40	5796.7	2420.9
50	4074.4	1300.9	50	4879.2	1796.0	50	5813.6	2432.9

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

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
91°	5830.5	2444.9	101°	6950.6	3278.1	111°	8336.7	4386.1
10′	5847.5	2457.1	10′	6971.3	3294.1	10′	8363.7	4407.6
20	5864.6	2469.3	20	6992.0	3310.1	20	8388.9	4429.2
30	5881.7	2481.5	30	7012.7	3326.1	30	8415.1	4450.9
40	5898.8	2493.8	40	7033.6	3342.3	40	8441.5	4472.7
50	5916.0	2506.1	50	7054.5	3358.5	50	8468.0	4494.6
92	5933.2	2518.5	102	7075.5	3374.9	112	8494.6	4516.6
10	5950.5	2531.0	10	7096.6	3391.2	10	8521.3	4538.8
20	5967.9	2543.5	20	7117.8	3407.7	20	8548.1	4561.1
30	5985.3	2556.0	30	7139.0	3424.3	30	8575.0	4583.4
40	6002.7	2568.6	40	7160.3	3440.9	40	8602.1	4606.0
50	6020.2	2581.3	50	7181.7	3457.6	50	8629.3	4628.6
93	6037.8	2594.0	103	7203.2	3474.4	113	8656.6	4651.3
10	6055.4	2606.8	10	7224.7	3491.3	10	8684.0	4674.2
20	6073.1	2619.7	20	7246.3	3508.2	20	8711.5	4697.2
30	6090.8	2632.6	30	7268.0	3525.2	30	8739.2	4720.3
40	6108.6	2645.5	40	7289.8	3542.4	40	8767.0	4743.6
50	6126.4	2658.5	50	7311.7	3559.6	50	8794.9	4766.9
94	6144.3	2671.6	104	7333.6	3576.8	114	8822.9	4790.4
10	6162.6	2684.7	10	7355.6	3594.2	10	8851.0	4814.1
20	6180.2	2697.9	20	7377.8	3611.7	20	8879.3	4837.8
30	6198.3	2711.2	30	7399.9	3629.2	30	8907.7	4861.7
40	6216.4	2724.5	40	7422.2	3646.8	40	8936.3	4885.7
50	6234.6	2737.9	50	7444.6	3664.5	50	8965.0	4909.9
95	6252.8	2751.3	105	7467.0	3682.3	115	8993.8	4934.1
10	6271.1	2764.8	10	7489.6	3700.2	10	9022.7	4958.6
20	6289.4	2778.3	20	7512.2	3718.2	20	9051.7	4983.1
30	6307.9	2792.0	30	7534.9	3736.2	30	9080.9	5007.8
40	6326.3	2805.6	40	7557.7	3754.4	40	9110.3	5032.6
50	6344.8	2819.4	50	7580.5	3772.6	50	9139.8	5057.6
96	6363.4	2833.2	106	7603.5	3791.0	116	9169.4	5082.7
10	6382.1	2847.0	10	7626.6	3809.4	10	9199.1	5107.9
20	6400.8	2861.0	20	7649.7	3827.9	20	9229.0	5133.3
30	6419.5	2875.0	30	7672.9	3846.5	30	9259.0	5158.8
40	6438.4	2889.0	40	7696.3	3865.2	40	9289.2	5184.5
50	6457.3	2903.1	50	7719.7	3884.0	50	9319.5	5210.3
97	6476.2	2917.3	107	7743.2	3902.9	117	9349.9	5236.2
10	6495.2	2931.6	10	7766.8	3921.9	10	9380.5	5262.3
20	6514.3	2945.9	20	7790.5	3940.9	20	9411.3	5288.6
30	6533.4	2960.3	30	7814.3	3960.1	30	9442.2	5315.0
40	6552.6	2974.7	40	7838.1	3979.4	40	9473.2	5341.5
50	6571.9	2989.2	50	7862.1	3998.7	50	9504.4	5368.2
98	6591.2	3003.8	108	7886.2	4018.2	118	9535.7	5395.1
10	6610.6	3018.4	10	7910.4	4037.8	10	9567.2	5422.1
20	6630.1	3033.1	20	7934.6	4057.4	20	9598.9	5449.2
30	6649.6	3047.9	30	7959.0	4077.2	30	9630.7	5476.5
40	6669.2	3062.8	40	7983.5	4097.1	40	9662.6	5504.0
50	6688.8	3077.7	50	8008.0	4117.0	50	9694.7	5531.7
99	6708.6	3092.7	109	8032.7	4137.1	119	9727.0	5559.4
10	6728.4	3107.7	10	8057.4	4157.3	10	9759.4	5587.4
20	6748.2	3122.9	20	8082.3	4177.5	20	9792.0	5615.5
30	6768.1	3138.1	30	8107.3	4197.9	30	9824.8	5643.8
40	6788.1	3153.3	40	8132.3	4218.4	40	9857.7	5672.3
50	5808.2	3168.7	50	8157.5	4239.0	50	9890.8	5700.9
100	6828.3	3184.1	110	8182.8	4259.7	120	9924.0	5729.7
10	6848.5	3199.6	10	8208.2	4280.5	10	9957.5	5758.6
20	6868.8	3215.1	20	8233.7	4301.4	20	9991.0	5787.7
30	6889.2	3230.8	30	8259.3	4322.4	30	10025.0	5817.0
40	6909.6	3246.5	40	8285.0	4343.6	40	10059.0	5846.5
50	6930.1	3262.3	50	8310.8	4364.8	50	10093.0	5876.1

Table VII.—Corrections for Tangents and Externals

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

For Tangents Add

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

For Externals Add

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

Table VIII.—Corrections for Sub-Chords and Long Chords

D	FOR SUB-CHORDS ADD 10	20	30	40	50	60	70	80	90	Excess of Arc per 100 ft.
4°	.00	.00	.01	.01	.01	.01	.01	.01	.00	.02
6	.00	.01	.01	.02	.02	.02	.02	.01	.01	.05
8	.01	.02	.02	.03	.03	.03	.03	.02	.01	.08
10	.01	.02	.03	.04	.05	.05	.05	.04	.02	.13
12	.02	.04	.05	.06	.07	.07	.07	.05	.03	.18
14	.02	.05	.07	.08	.09	.10	.09	.07	.04	.25
16	.03	.06	.09	.11	.12	.12	.12	.09	.05	.33
18	.04	.08	.11	.14	.15	.16	.15	.12	.07	.41
20	.05	.10	.14	.17	.19	.20	.18	.15	.09	.51
22	.06	.12	.17	.21	.23	.24	.22	.18	.10	.62
24	.07	.14	.20	.25	.28	.28	.26	.21	.12	.74
26	.09	.17	.24	.29	.32	.33	.31	.25	.15	.86
28	.10	.19	.27	.34	.37	.38	.36	.29	.17	1.00
30	.11	.22	.31	.39	.43	.44	.41	.33	.19	1.15
32	.13	.25	.36	.44	.49	.50	.47	.38	.22	1.31
34	.15	.28	.40	.50	.55	.57	.53	.43	.25	1.48
36	.17	.32	.45	.56	.62	.64	.59	.48	.28	1.66
38	.18	.36	.51	.62	.70	.71	.66	.53	.31	1.86
40	.21	.40	.56	.69	.77	.79	.73	.59	.35	2.06
42	.23	.44	.62	.76	.85	.87	.81	.65	.38	2.28
44	.25	.48	.68	.84	.94	.96	.89	.72	.42	2.50
46	.27	.52	.75	.92	1.02	1.05	.98	.78	.46	2.74
48	.30	.57	.81	1.00	1.12	1.14	1.06	.86	.50	2.99
50	.32	.62	.89	1.09	1.21	1.24	1.15	.93	.55	3.24
52	.35	.67	.96	1.18	1.31	1.35	1.25	1.01	.59	3.52
54	.38	.73	1.04	1.28	1.42	1.46	1.35	1.09	.64	3.80
56	.41	.78	1.12	1.38	1.53	1.57	1.46	1.17	.69	4.09
58	.44	.84	1.20	1.48	1.65	1.69	1.57	1.26	.74	4.40
60	.47	.91	1.29	1.59	1.76	1.81	1.68	1.35	.80	4.72

D	LONG CHORDS 200	300	400	500
1	199.99	299.97	399.92	499.85
2	199.97	299.88	399.70	499.39
3	199.93	299.73	399.32	498.63
4	199.88	299.51	398.78	497.57
5	199.81	299.24	398.10	496.20
6	199.73	298.90	397.26	494.53
7	199.63	298.51	396.28	492.57
8	199.51	298.05	395.14	490.31
9	199.38	297.54	393.86	487.75
10	199.24	296.96	392.42	484.90
12	198.90	295.63	389.12	478.34
14	198.51	294.06	385.22	470.65
16	198.05	292.25	380.76	461.86
18	197.54	290.21	375.74	452.02
20	196.96	287.94	370.17	441.15
22	196.32	285.44	364.06	429.30
24	195.63	282.71	357.43	416.53
26	194.87	279.76	350.30	402.89
28	194.06	276.59	342.69	388.43
30	193.18	273.20	334.61	373.20
32	192.25	269.61	326.08	357.28
34	191.26	265.81	317.12	340.73
36	190.21	261.80	307.77	323.61
38	189.10	257.60	298.03	305.99
40	187.94	253.21	287.94	287.94
42	186.72	248.63	277.51	269.54
44	185.44	243.87	266.78	250.85
46	184.10	239.93	255.78	231.95
48	182.71	233.83	244.51	212.92

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

Table IX.—Middle Ordinates for Rails in Feet

Deg. of Curve	LENGTH OF RAILS 32	30	28	26	24	22	20
1°	.022	.020	.016	.013	.011	.009	.008
2	.045	.038	.034	.029	.025	.021	.017
3	.037	.058	.051	.044	.037	.031	.026
4	.089	.079	.069	.060	.050	.042	.035
5	.112	.099	.086	.074	.063	.053	.044
6	.134	.117	.102	.088	.076	.064	.052
7	.156	.137	.120	.104	.088	.074	.061
8	.179	.158	.137	.119	.100	.085	.070
9	.201	.175	.153	.133	.112	.095	.078
10	.223	.196	.171	.148	.125	.106	.087
11	.245	.216	.188	.163	.139	.117	.096
12	.268	.236	.206	.179	.151	.128	.105
13	.290	.254	.222	.192	.163	.138	.113
14	.312	.275	.239	.207	.175	.148	.122
15	.334	.295	.257	.223	.188	.159	.131

Deg. of Curve	LENGTH OF RAILS 32	30	28	26	24	22	20
16°	.356	.313	.273	.236	.200	.170	.139
17	.378	.333	.290	.252	.213	.180	.148
18	.400	.351	.306	.265	.225	.190	.156
19	.423	.371	.324	.280	.238	.201	.165
20	.445	.392	.341	.296	.250	.212	.174
21	.466	.410	.357	.309	.262	.222	.182
22	.487	.430	.375	.325	.275	.233	.191
23	.509	.450	.390	.338	.287	.243	.199
24	.531	.469	.408	.354	.299	.253	.208
25	.552	.486	.424	.367	.311	.263	.216
26	.573	.506	.441	.382	.323	.274	.225
27	.594	.524	.457	.396	.335	.284	.233
28	.618	.545	.475	.411	.348	.294	.242
29	.638	.564	.491	.424	.361	.303	.250
30	.660	.583	.508	.438	.374	.313	.259

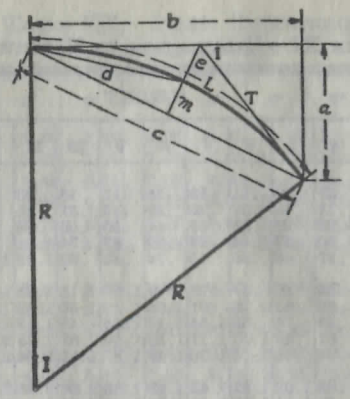


Table X
CURVE FORMULAE FOR SIMPLE CURVES
Compiled by J. Calvin Locke, C.E.

(1) $c = \sqrt{2Ra}$ (2) $c = \sqrt{a^2+b^2}$

(3) $c = \sqrt{2R\,(R-\sqrt{(R+b)\,(R-b)}} = \sqrt{2R(R-\sqrt{R^2-b^2})}$

(4) $c = 2\sqrt{m\,(2R-m)}$

(5) $c = 2R \sin \frac{1}{2} I$ (6) $c = 2T \cos \frac{1}{2} I$

(7) $e = R \operatorname{exsec} \frac{1}{2} I$

(8) $e = R \tan \frac{1}{2} I \tan \frac{1}{4} I$ (9) $e = T \tan \frac{1}{4} I$

(10) $b = \sqrt{a\,(2R-a)}$

(11) $b = \sqrt{\left(c+\frac{c^2}{2R}\right)\left(c-\frac{c^2}{2R}\right)} = \sqrt{c^2-\frac{c^4}{4R^2}}$

(12) $b = R \sin I$ (13) $b = a \cot \frac{1}{2} I$

(14) $R = \frac{a^2+b^2}{2a} = \frac{c^2}{2a}$ (15) $R = \frac{d^2}{2m} = \frac{c^2+4m^2}{8m}$

(16) $d = \sqrt{R\,(2R-\sqrt{(2R+c)\,(2R-c)}} = \sqrt{R(2R-\sqrt{4R^2-c^2})}$

(17) $d = \sqrt{2Rm}$ (18) $d = 2R \sin \frac{1}{4} I$ (19) $m = \frac{d^2}{2R}$

(20) $m = R \mp \sqrt{\left(R+\frac{c}{2}\right)\left(R-\frac{c}{2}\right)} = R \mp \sqrt{R^2-\frac{c^2}{4}}$

(21) $m = R \operatorname{vers} \frac{1}{2} I$ (22) $m = R \sin \frac{1}{2} I \tan \frac{1}{4} I$ (23) $m = \frac{1}{2} c \tan \frac{1}{4} I$

(24) $a = \frac{c^2}{2R}$ (25) $a = R-\sqrt{(R+b)\,(R-b)} = R-\sqrt{R^2-b^2}$

(26) $a = 2R\,(\sin^2 \frac{1}{2} I)^2$ (27) $a = R \operatorname{vers} I$ (28) $a = R \sin I \tan \frac{1}{2} I$

(29) $a = b \tan \frac{1}{2} I$ (30) $a = T \sin I$ (31) $T = R \tan \frac{1}{2} I$

(32) $I = \frac{L}{R} \times 57.295780$ (33) $R = \frac{L}{I} \times 57.295780$

(34) $L = IR \times 0.01745329$ (35) $L = \frac{8d-c}{3}$

(36) Area Seg. $= \frac{LR-R^2 \operatorname{Sin} I}{2} = \frac{LR-Rb}{2}$

Table XI.—Calculation of Earthwork

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

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

Table XII. Stadia Reductions

Vertical Heights

Minutes	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°
0....	0.00	1.74	3.49	5.23	6.96	8.68	10.40	12.10	13.78	15.45	17.10
2....	0.06	1.80	3.55	5.28	7.02	8.74	10.45	12.15	13.84	15.51	17.16
4....	0.12	1.86	3.60	5.34	7.07	8.80	10.51	12.21	13.89	15.56	17.21
6....	0.17	1.92	3.66	5.40	7.13	8.85	10.57	12.26	13.95	15.62	17.26
8....	0.23	1.98	3.72	5.46	7.19	8.91	10.62	12.32	14.01	15.67	17.32
10....	0.29	2.04	3.78	5.52	7.25	8.97	10.68	12.38	14.06	15.73	17.37
12....	0.35	2.09	3.84	5.57	7.30	9.03	10.74	12.43	14.12	15.78	17.43
14....	0.41	2.15	3.90	5.63	7.36	9.08	10.79	12.49	14.17	15.84	17.48
16....	0.47	2.21	3.95	5.69	7.42	9.14	10.85	12.55	14.23	15.89	17.54
18....	0.52	2.27	4.01	5.75	7.48	9.20	10.91	12.60	14.28	15.95	17.59
20....	0.58	2.33	4.07	5.80	7.53	9.25	10.96	12.66	14.34	16.00	17.65
22....	0.64	2.38	4.13	5.86	7.59	9.31	11.02	12.72	14.40	16.06	17.70
24....	0.70	2.44	4.18	5.92	7.65	9.37	11.08	12.77	14.45	16.11	17.76
26....	0.76	2.50	4.24	5.98	7.71	9.43	11.13	12.83	14.51	16.17	17.81
28....	0.81	2.56	4.30	6.04	7.76	9.48	11.19	12.88	14.56	16.22	17.86
30....	0.87	2.62	4.36	6.09	7.82	9.54	11.25	12.94	14.62	16.28	17.92
32....	0.93	2.67	4.42	6.15	7.88	9.60	11.30	13.00	14.67	16.33	17.97
34....	0.99	2.73	4.48	6.21	7.94	9.65	11.36	13.05	14.73	16.39	18.03
36....	1.05	2.79	4.53	6.27	7.99	9.71	11.42	13.11	14.79	16.44	18.08
38....	1.11	2.85	4.59	6.33	8.05	9.77	11.47	13.17	14.84	16.50	18.14
40....	1.16	2.91	4.65	6.38	8.11	9.83	11.53	13.22	14.90	16.55	18.19
42....	1.22	2.97	4.71	6.44	8.17	9.88	11.59	13.28	14.95	16.61	18.24
44....	1.28	3.02	4.76	6.50	8.22	9.94	11.64	13.33	15.01	16.66	18.30
46....	1.34	3.08	4.82	6.56	8.28	10.00	11.70	13.39	15.06	16.72	18.35
48....	1.40	3.14	4.88	6.61	8.34	10.05	11.76	13.45	15.12	16.77	18.41
50....	1.45	3.20	4.94	6.67	8.40	10.11	11.81	13.50	15.17	16.83	18.46
52....	1.51	3.26	4.99	6.73	8.45	10.17	11.87	13.56	15.23	16.88	18.51
54....	1.57	3.31	5.05	6.79	8.51	10.22	11.93	13.61	15.28	16.94	18.57
56....	1.63	3.37	5.11	6.84	8.57	10.28	11.98	13.67	15.34	16.99	18.62
58....	1.69	3.43	5.17	6.90	8.63	10.34	12.04	13.73	15.40	17.05	18.68
60....	1.74	3.49	5.23	6.96	8.68	10.40	12.10	13.78	15.45	17.10	18.73

Horizontal Corrections

Dist.	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°
100...	0.0	0.0	0.1	0.3	0.5	0.8	1.1	1.5	1.9	2.5	3.0
200...	0.0	0.1	0.2	0.5	1.0	1.5	2.2	3.0	3.9	4.9	6.0
300...	0.0	0.1	0.4	0.8	1.5	2.3	3.3	4.5	5.8	7.4	9.1
400...	0.0	0.1	0.5	1.1	2.0	3.0	4.4	6.0	7.8	9.8	12.1
500...	0.0	0.2	0.6	1.4	2.5	3.8	5.5	7.5	9.7	12.3	15.1
600...	0.0	0.2	0.7	1.6	2.9	4.6	6.5	8.9	11.6	14.7	18.1
700...	0.0	0.2	0.8	1.9	3.4	5.3	7.6	10.4	13.6	17.2	21.1
800...	0.0	0.2	1.0	2.2	3.9	6.1	8.7	11.9	15.5	19.6	24.2
900...	0.0	0.3	1.1	2.4	4.4	6.8	9.8	13.4	17.5	22.1	27.2
1000...	0.0	0.3	1.2	2.7	4.9	7.6	10.9	14.9	19.4	24.5	30.2

Table XII. Stadia Reductions

Vertical Heights

Minutes	11°	12°	13°	14°	15°	16°	17°	18°	19°	20°
0	18.73	20.34	21.92	23.47	25.00	26.50	27.96	29.39	30.78	32.14
2	18.78	20.39	21.97	23.52	25.05	26.55	28.01	29.44	30.83	32.18
4	18.84	20.44	22.02	23.58	25.10	26.59	28.06	29.48	30.87	32.23
6	18.89	20.50	22.08	23.63	25.15	26.64	28.10	29.53	30.92	32.27
8	18.95	20.55	22.13	23.68	25.20	26.69	28.15	29.58	30.97	32.32
10	19.00	20.60	22.18	23.73	25.25	26.74	28.20	29.62	31.01	32.36
12	19.05	20.66	22.23	23.78	25.30	26.79	28.25	29.67	31.06	32.41
14	19.11	20.71	22.28	23.83	25.35	26.84	28.30	29.72	31.10	32.45
16	19.16	20.76	22.34	23.88	25.40	26.89	28.34	29.76	31.15	32.49
18	19.21	20.81	22.39	23.93	25.45	26.94	28.39	29.81	31.19	32.54
20	19.27	20.87	22.44	23.99	25.50	26.99	28.44	29.86	31.24	32.58
22	19.32	20.92	22.49	24.04	25.55	27.04	28.49	29.90	31.28	32.63
24	19.38	20.97	22.54	24.09	25.60	27.09	28.54	29.95	31.33	32.67
26	19.43	21.03	22.60	24.14	25.65	27.13	28.58	30.00	31.38	32.72
28	19.48	21.08	22.65	24.19	25.70	27.18	28.63	30.04	31.42	32.76
30	19.54	21.13	22.70	24.24	25.75	27.23	28.68	30.09	31.47	32.80
32	19.59	21.18	22.75	24.29	25.80	27.28	28.73	30.14	31.51	32.85
34	19.64	21.24	22.80	24.34	25.85	27.33	28.77	30.19	31.56	32.89
36	19.70	21.29	22.85	24.39	25.90	27.38	28.82	30.23	31.60	32.93
38	19.75	21.34	22.91	24.44	25.95	27.43	28.87	30.28	31.65	32.98
40	19.80	21.39	22.96	24.49	26.00	27.48	28.92	30.32	31.69	33.02
42	19.86	21.45	23.01	24.55	26.05	27.52	28.96	30.37	31.74	33.07
44	19.91	21.50	23.06	24.60	26.10	27.57	29.01	30.41	31.78	33.11
46	19.96	21.55	23.11	24.65	26.15	27.62	29.06	30.46	31.83	33.15
48	20.02	21.60	23.16	24.70	26.20	27.67	29.11	30.51	31.87	33.20
50	20.07	21.66	23.22	24.75	26.25	27.72	29.15	30.55	31.92	33.24
52	20.12	21.71	23.27	24.80	26.30	27.77	29.20	30.60	31.96	33.28
54	20.18	21.76	23.32	24.85	26.35	27.81	29.25	30.65	32.01	33.33
56	20.23	21.81	23.37	24.90	26.40	27.86	29.30	30.69	32.05	33.37
58	20.28	21.87	23.42	24.95	26.45	27.91	29.34	30.74	32.09	33.41
60	20.34	21.92	23.47	25.00	26.50	27.96	29.39	30.78	32.14	33.46

Horizontal Corrections

District	11°	12°	13°	14°	15°	16°	17°	18°	19°	20°
100	3.6	4.3	5.1	5.9	6.7	7.6	8.5	9.5	10.6	11.7
200	7.3	8.6	10.1	11.7	13.4	15.2	17.1	19.1	21.2	23.4
300	10.9	13.0	15.2	17.6	20.1	22.8	25.6	28.6	31.8	35.1
400	14.6	17.3	20.2	23.4	26.8	30.4	34.2	38.2	42.4	46.8
500	18.2	21.6	25.3	29.3	33.5	38.0	42.7	47.7	53.0	58.5
600	21.8	25.9	30.4	35.1	40.2	45.6	51.3	57.3	63.6	70.2
700	25.5	30.2	35.4	41.0	46.9	53.2	59.8	66.8	74.2	81.9
800	29.1	34.6	40.5	46.8	53.6	60.8	68.4	76.4	84.8	93.6
900	32.8	38.9	45.5	52.7	60.3	38.4	76.9	85.9	95.4	105.3
1000	36.4	43.2	50.6	58.5	67.0	76.0	85.5	95.5	106.0	117.0

Table XIII.—Sines, Cosines, Tangents, Cotangents

Deg.	sin 0′	tan 0′	sin 10′	tan 10′	sin 20′	tan 20′	sin 30′	tan 30′	sin 40′	tan 40′	sin 50′	tan 50′	Deg.
0	0000	0000	0029	0029	0058	0058	0087	0087	0116	0116	0145	0145	89
1	175	0175	0204	0204	0233	0233	0262	262	291	291	320	320	88
2	349	349	378	378	407	407	436	437	465	466	494	495	87
3	523	524	552	553	581	582	610	612	640	641	669	706	86
4	698	699	727	729	756	758	785	787	814	816	843	864	85
5	872	875	901	904	929	934	958	963	987	992	1016	1022	84
6	1045	1051	1074	1080	1103	1110	1132	1139	1161	1169	190	198	83
7	219	228	248	257	279	287	305	317	334	346	363	376	82
8	392	405	421	435	449	465	478	495	507	524	536	554	81
9	564	584	593	614	622	644	650	673	679	703	708	733	80
10	736	763	765	793	794	823	822	853	851	883	880	914	79
11	908	944	937	974	965	2004	994	2035	2022	2065	2051	2095	78
12	2079	2126	2108	2156	2136	186	2164	217	193	247	221	278	77
13	250	309	278	339	306	370	334	401	363	432	391	462	76
14	419	493	447	524	476	555	504	586	532	617	560	648	75
15	588	679	616	711	644	742	672	773	700	805	728	836	74
16	756	867	784	899	812	931	840	962	868	994	896	3026	73
17	924	3057	952	3089	939	3121	3007	3153	3035	3185	3062	217	72
18	3090	249	3118	281	3145	314	173	346	201	378	228	411	71
19	256	443	283	476	311	508	338	541	365	574	393	607	70
20	420	640	448	673	475	706	502	739	529	772	557	805	69
21	584	839	611	872	638	906	665	939	692	973	719	4006	68
22	746	4040	773	4074	800	4108	827	4142	854	4176	881	210	67
23	907	245	934	279	961	314	987	348	4014	383	4041	417	66
24	4067	452	4094	487	4120	522	4147	557	173	592	200	628	65
25	226	663	253	699	279	734	305	770	331	806	358	841	64
26	384	877	410	913	436	950	4462	986	488	5022	514	5059	63
27	540	5095	566	5132	592	5169	617	5206	643	243	669	280	62
28	695	317	720	354	746	392	772	430	797	467	823	505	61
29	848	543	874	581	899	619	924	658	950	696	975	735	60
30	5000	774	5025	5812	5050	851	5075	890	5100	930	5125	969	59
31	150	6009	175	6048	200	6088	225	6128	250	6168	275	6208	58
32	299	249	324	289	348	330	5373	371	398	412	422	453	57
33	446	494	471	536	495	577	519	619	544	661	568	703	56
34	592	745	616	787	640	830	664	873	688	916	712	959	55
35	736	7002	760	7046	783	7089	807	7133	831	7177	854	7221	54
36	878	265	901	310	925	355	948	400	972	445	995	490	53
37	6018	536	6041	581	6065	627	6088	673	6111	720	6134	766	52
38	157	813	180	860	202	907	225	954	248	8002	271	8050	51
39	293	8098	316	8146	338	8195	361	8243	383	292	406	342	50
40	428	391	450	441	472	491	494	541	517	591	539	642	49
41	561	693	583	744	604	796	626	847	648	899	670	952	48
42	691	9004	713	9057	734	9110	756	9163	777	9217	799	9271	47
43	820	325	841	380	862	435	884	490	905	545	926	601	46
44	947	657	967	713	988	770	7009	827	7030	884	7050	942	45
45	7071	1.0000	7092	1.0058	7112	1.0117	133	1.0176	153	1.0235	173	1.0295	44
Deg.	60′ cos	60′ cot	50′ cos	50′ cot	40′ cos	40′ cot	30′ cos	30′ cot	20′ cos	20′ cot	10′ cos	10′ cot	Deg.

Table XIII.—Sines, Cosines, Tangents, Cotangents (Continued)

Deg.	sin 0′	tan 0′	sin 10′	tan 10′	sin 20′	tan 20′	sin 30′	tan 30′	sin 40′	tan 40′	sin 50′	tan 50′	Deg.
46	7193	1.0355	7214	1.0416	7234	1.0477	7254	1.0533	7274	1.0599	7294	1.0661	43
47	314	.0724	333	.0786	353	.0850	373	.0913	392	.0977	412	.1041	42
48	431	.1106	451	.1171	470	.1237	490	.1303	509	.1369	528	.1436	41
49	547	.1504	566	.1571	585	.1640	604	.1708	623	.1778	642	.1847	40
50	660	1.1918	7679	1.1988	7698	1.2059	7716	1.2131	7735	1.2203	7753	1.2276	39
51	771	.2349	790	.2423	808	.2497	826	.2572	844	.2647	862	.2723	38
52	880	.2799	898	.2876	916	.2954	934	.3032	951	.3111	969	.3190	37
53	986	.3270	8004	.3351	8021	.3452	8039	.3514	8056	.3597	8073	.3680	36
54	8090	.3764	107	.3848	124	.3934	141	.4019	158	.4106	175	.4193	35
55	192	.4281	208	.4370	225	.4460	241	.4550	258	.4641	274	.4733	34
56	290	.4826	307	.4919	323	.5013	339	.5108	355	.5204	371	.5301	33
57	387	.5399	403	.5497	418	.5597	434	.5697	450	.5798	465	.5900	32
58	480	.6003	496	.6107	511	.6212	526	.6319	542	.6426	557	.6534	31
59	572	.6643	587	.6753	601	.6864	616	.6977	631	.7090	646	.7205	30
60	660	1.7321	8675	1.7437	8689	1.7556	8704	1.7675	8718	1.7797	8732	1.7917	29
61	746	.8040	760	.8165	774	.8291	788	.8418	802	.8546	816	.8676	28
62	829	.8807	843	.8940	857	.9074	870	.9210	884	.9347	897	.9486	27
63	910	.9626	923	.9768	936	.9912	949	2.0057	962	2.0204	975	2.0353	26
64	988	2.0503	9001	2.0655	9013	2.0809	9026	.0965	9038	.1123	9051	.1283	25
65	9063	.1445	075	.1609	088	.1775	100	.1943	112	.2113	124	.2286	24
66	135	.2460	147	.2637	159	.2817	171	.2998	182	.3183	194	.3369	23
67	205	.3559	216	.3750	228	.3945	239	.4142	250	.4342	261	.4545	22
68	272	.4751	283	.4960	293	.5172	304	.5386	315	.5605	325	.5826	21
69	336	.6051	346	.6279	356	.6511	367	.6746	377	.6985	387	.7228	20
70	397	2.7475	9407	2.7725	9417	2.7980	9426	2.8239	9436	2.8502	9446	2.8770	19
71	455	.9042	465	.9319	474	.9600	483	.9887	492	3.0178	502	3.0475	18
72	511	3.0777	520	3.1084	528	3.1397	537	3.1716	546	.2041	555	.2371	17
73	563	.2709	572	.3052	580	.3402	588	.3759	596	.4124	605	.4495	16
74	613	.4874	621	.5261	628	.5656	636	.6059	644	.6470	652	.6891	15
75	659	.7321	667	.7760	674	.8208	681	.8657	689	.9136	696	.9617	14
76	703	4.0108	710	4.0611	717	4.1126	724	4.1653	730	4.2193	737	4.2747	13
77	744	.3315	750	.3897	757	.4494	763	.5107	769	.5736	775	.6382	12
78	781	.7046	787	.7729	793	.8430	799	.9152	805	.9894	811	5.0658	11
79	816	.1446	822	5.2257	827	5.3093	833	5.3955	838	5.4845	843	.5764	10
80	9848	5.6713	9853	5.7694	9858	5.8708	9863	5.9758	9868	6.0844	9872	6.1970	9
81	877	6.3138	881	6.4348	886	6.5606	890	6.6912	894	.8269	899	.9682	8
82	903	7.1154	907	7.2687	911	7.4287	914	7.5958	918	7.7704	922	7 9530	7
83	925	8.1443	929	8.3450	932	8.5555	936	8.7769	939	9.0098	942	9.2553	6
84	945	9.5144	948	9.7882	951	10.078	954	10.385	957	10.711	959	11.059	5
85	962	11.430	964	11.826	967	12.250	969	12.706	971	13.197	974	13.727	4
86	976	14.300	978	14.924	980	15.605	981	16.350	983	17.169	985	18.075	3
87	986	19.081	988	20.206	989	21.470	990	22.903	992	24.542	993	26.432	2
88	994	28.636	9995	31.242	9996	34.368	997	38.189	997	42.964	9998	49.104	1
89	9998	57.290	9999	68.750	9999	85.940	9999	114.58	1.000	171.88	1.000	343.77	0
Deg.	60′ cos	60′ cot	50′ cos	50′ cot	40′ cos	40′ cot	30′ cos	30′ cot	20′ cos	30′ cot	10′ cos	10′ cot	Deg.

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