FIELD BOOK
360

KEUFFEL & ESSER CO.

DRAWING MATERIALS
AND
SURVEYING INSTRUMENTS.
NEW YORK.

CHICAGO. ST. LOUIS. SAN FRANCISCO. MONTREAL.

TABLES FOR EXCAVATIONS AND EMBANKMENTS.

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

ROADWAY 18 FEET WIDE. SIDE SLOPES 1 TO 1.
FOR SINGLE TRACK EXCAVATION.

	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
0	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	0
1	10.0	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8	10.9	1
2	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9	2
3	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9	3
4	13.0	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.8	13.9	4
5	14.0	14.1	14.2	14.3	14.4	14.5	14.6	14.7	14.8	14.9	5
6	15.0	15.1	15.2	15.3	15.4	15.5	15.6	15.7	15.8	15.9	6
7	16.0	16.1	16.2	16.3	16.4	16.5	16.6	16.7	16.8	16.9	7
8	17.0	17.1	17.2	17.3	17.4	17.5	17.6	17.7	17.8	17.9	8
9	18.0	18.1	18.2	18.3	18.4	18.5	18.6	18.7	18.8	18.9	9
10	19.0	19.1	19.2	19.3	19.4	19.5	19.6	19.7	19.8	19.9	10
11	20.0	20.1	20.2	20.3	20.4	20.5	20.6	20.7	20.8	20.9	11
12	21.0	21.1	21.2	21.3	21.4	21.5	21.6	21.7	21.8	21.9	12
13	22.0	22.1	22.2	22.3	22.4	22.5	22.6	22.7	22.8	22.9	13
14	23.0	23.1	23.2	23.3	23.4	23.5	23.6	23.7	23.8	23.9	14
15	24.0	24.1	24.2	24.3	24.4	24.5	24.6	24.7	24.8	24.9	15
16	25.0	25.1	25.2	25.3	25.4	25.5	25.6	25.7	25.8	25.9	16
17	26.0	26.1	26.2	26.3	26.4	26.5	26.6	26.7	26.8	26.9	17
18	27.0	27.1	27.2	27.3	27.4	27.5	27.6	27.7	27.8	27.9	18
19	28.0	28.1	28.2	28.3	28.4	28.5	28.6	28.7	28.8	28.9	19
20	29.0	29.1	29.2	29.3	29.4	29.5	29.6	29.7	29.8	29.9	20
21	30.0	30.1	30.2	30.3	30.4	30.5	30.6	30.7	30.8	30.9	21
22	31.0	31.1	31.2	31.3	31.4	31.5	31.6	31.7	31.8	31.9	22
23	32.0	32.1	32.2	32.3	32.4	32.5	32.6	32.7	32.8	32.9	23
24	33.0	33.1	33.2	33.3	33.4	33.5	33.6	33.7	33.8	33.9	24
25	34.0	34.1	34.2	34.3	34.4	34.5	34.6	34.7	34.8	34.9	25
26	35.0	35.1	35.2	35.3	35.4	35.5	35.6	35.7	35.8	35.9	26
27	36.0	36.1	36.2	36.3	36.4	36.5	36.6	36.7	36.8	36.9	27
28	37.0	37.1	37.2	37.3	37.4	37.5	37.6	37.7	37.8	37.9	28
29	38.0	38.1	38.2	38.3	38.4	38.5	38.6	38.7	38.8	38.9	29
30	39.0	39.1	39.2	39.3	39.4	39.5	39.6	39.7	39.8	39.9	30
31	40.0	40.1	40.2	40.3	40.4	40.5	40.6	40.7	40.8	40.9	31
32	41.0	41.1	41.2	41.3	41.4	41.5	41.6	41.7	41.8	41.9	32
33	42.0	42.1	42.2	42.3	42.4	42.5	42.6	42.7	42.8	42.9	33
34	43.0	43.1	43.2	43.3	43.4	43.5	43.6	43.7	43.8	43.9	34
35	44.0	44.1	44.2	44.3	44.4	44.5	44.6	44.7	44.8	44.9	35
36	45.0	45.1	45.2	45.3	45.4	45.5	45.6	45.7	45.8	45.9	36

Calculated by Julion A. Hall, M. Am. Soc. C. E.

For Keith's Railroad Curve Tabels see end of book.

Page 1-10

Bainbridge-Auburn
Center Road
Profile Levels Page 52
C.H. #32
Browns Cor. South Road Page 24
Centerline North to Browns Cor. to 33
Profile Levels Page 63

Geauga Lake Rd Sec. C
Snake Hill Bainbridge Twp.
Page 36
Bainbridge Geauga Lake Rd Sec. C.
Cross Sections Page 41

Levels. Brown Rd. Culvt 145+10
Easterly Pg 45, 46

Grades Clemens ditch (~~Brown Rd~~
Pgs 47, 48 Munn"

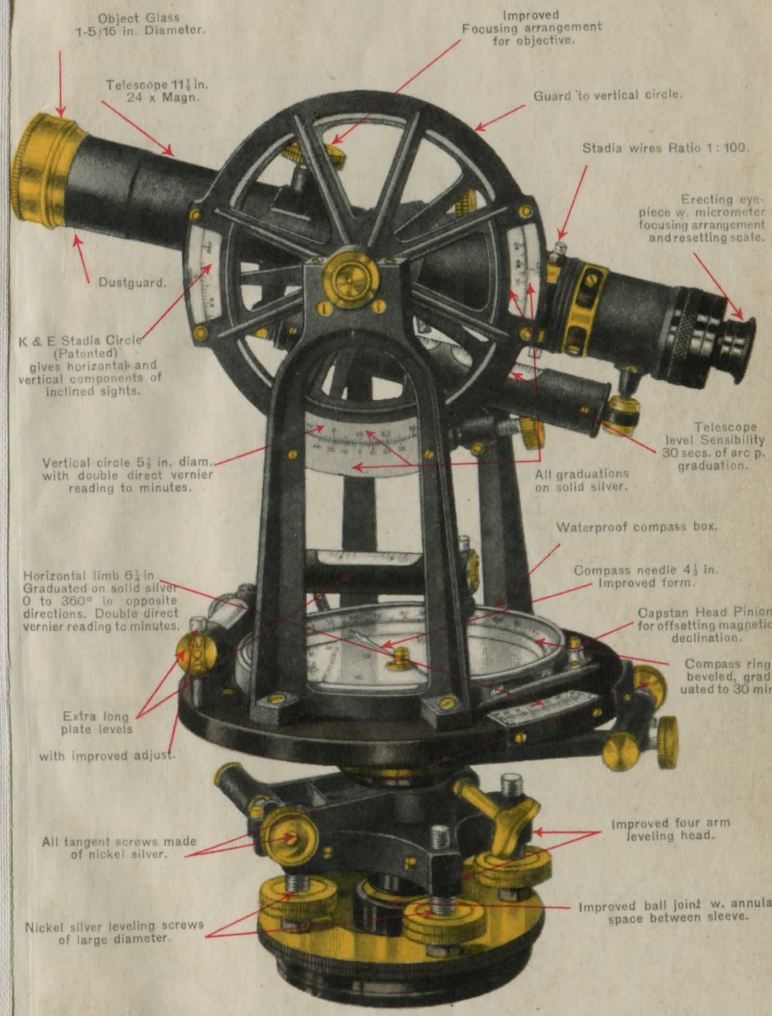
Topography, Kenston school property,
Snyder Rd. Bainbridge Twp. ± 1300' S. US422
Pg 14-23 E. side Rd.

131
Please return to the
County Surveyors Office
Chardon Ohio

EXTRA FINE ENGINEERS' TRANSIT

No. 5060 S

KEUFFEL & ESSER CO., N.Y.



ALSO MADE WITH

INTERNAL FOCUSING TELESCOPE

PRACTICALLY DUST AND MOISTURE PROOF.

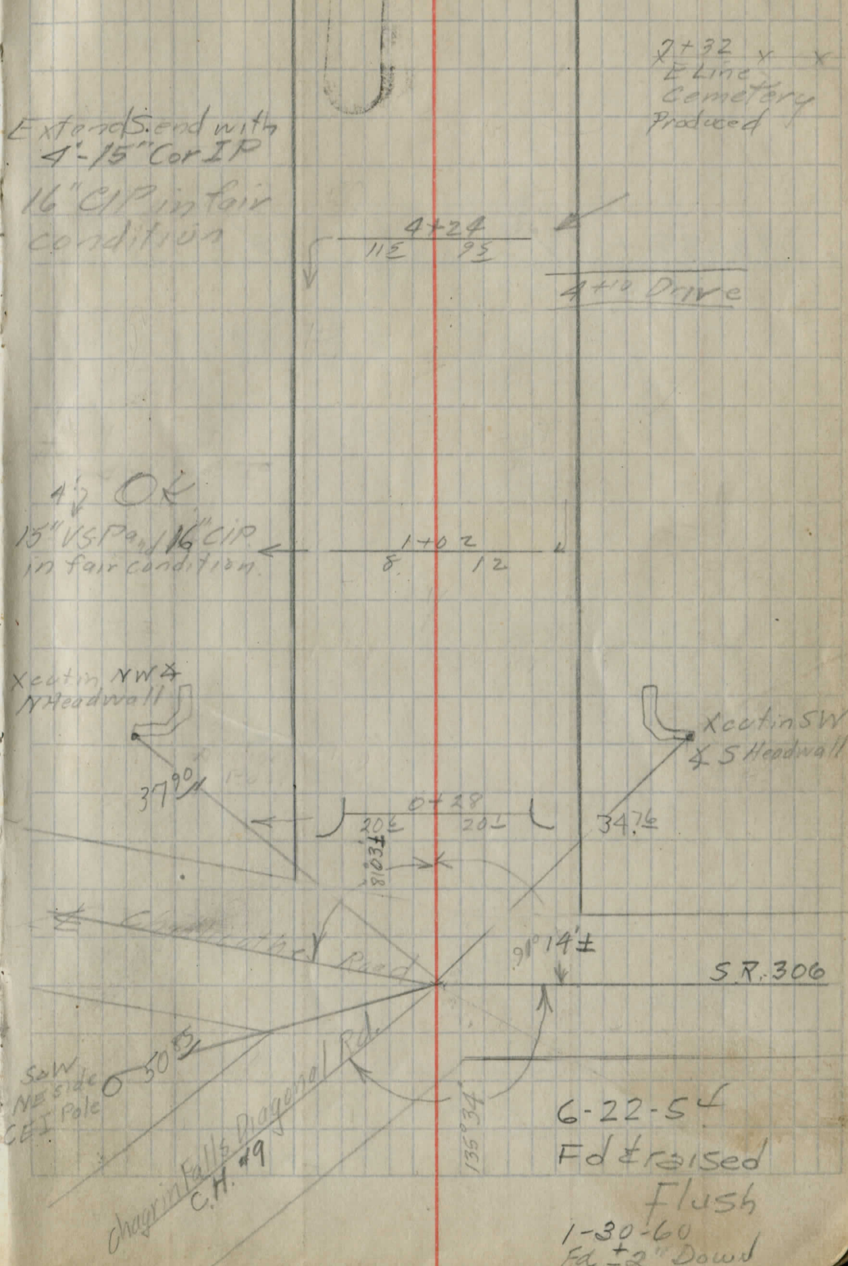
C.H.#11

℄ Location Bainbridge Auburn Center Road

Note: Sidestakes set 25' Rt.

1/23/33

Bliss
Merritt
Dietz



Sta 0+14 = Edge Pvt

Sta 0+00 ℄ Chillicothe Rd Iron Pound

Sta 33+17.98 Pt RT 0°09' Pipe Set

1.63 H.

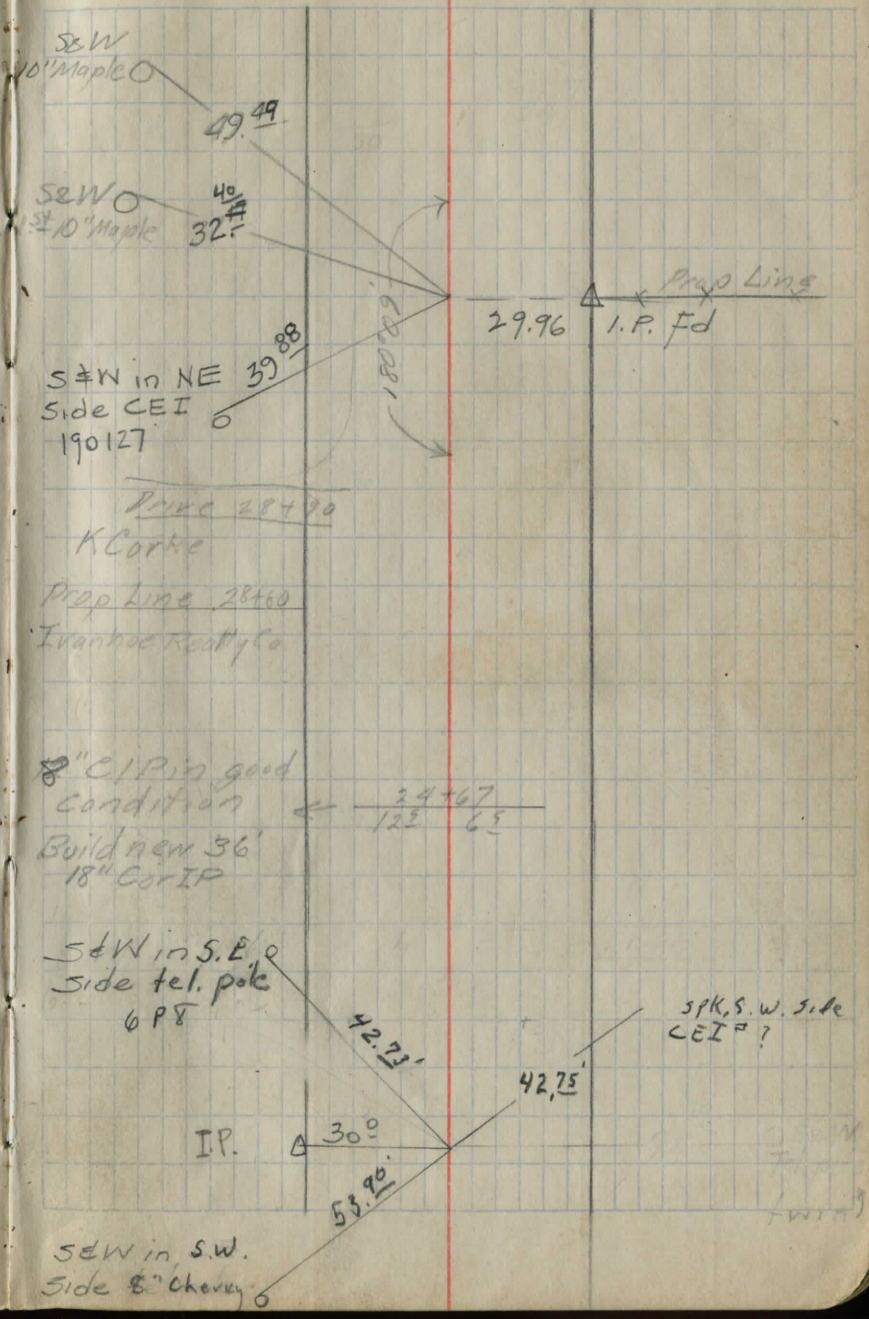
Fd t rel. 8/73

Sta 13+00 POT 3/4" pin Set

Fd 11-17-53

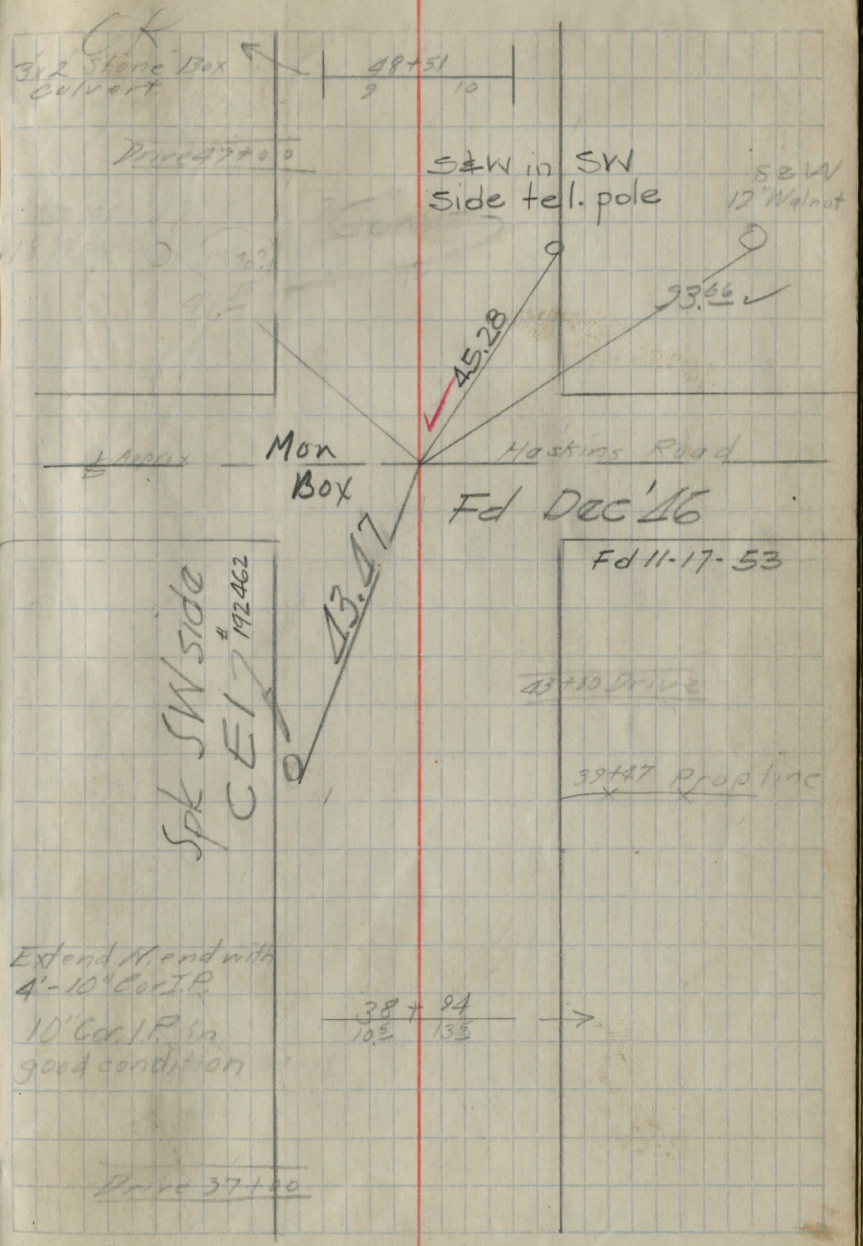
Fd 1-30-60

± 3" Down



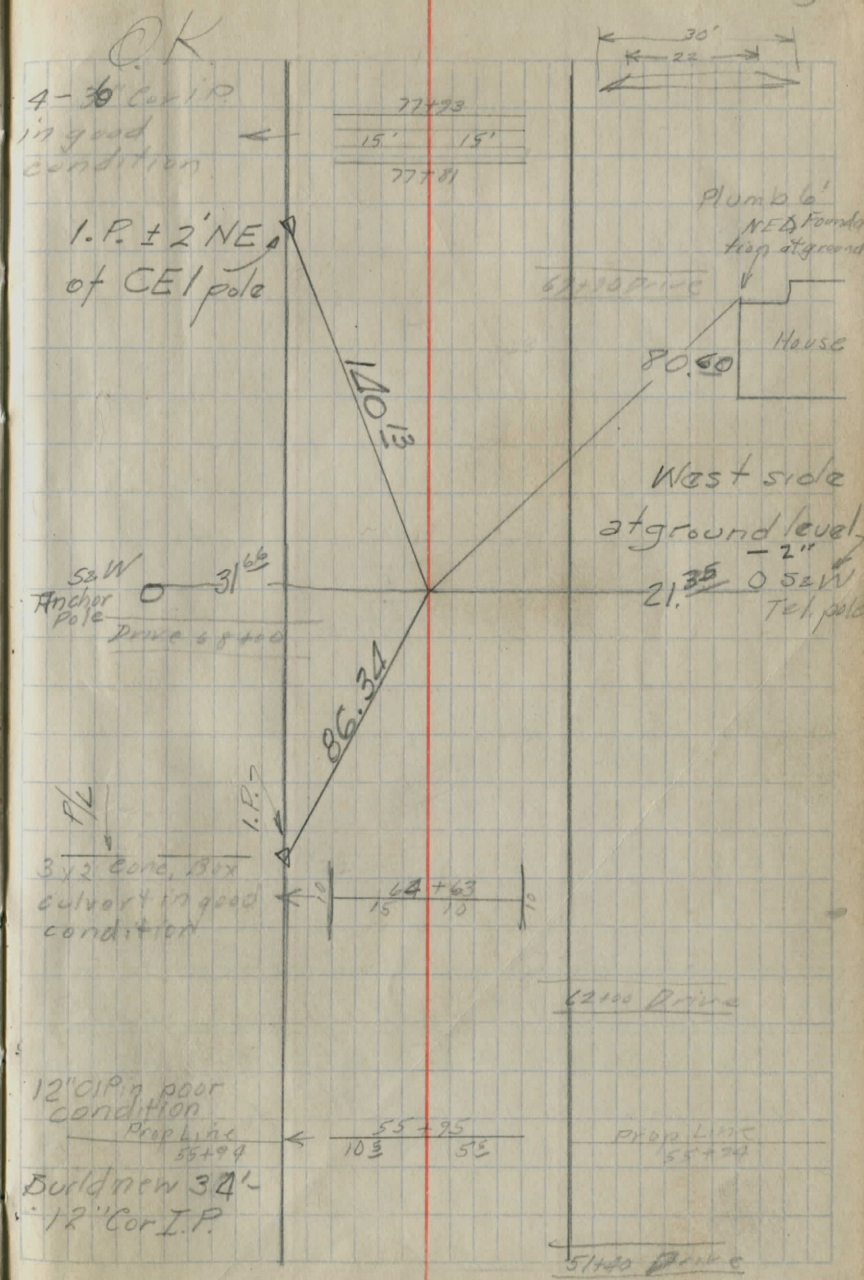
Sta 44+98.32 POT Pipe Set

.85 Mi.



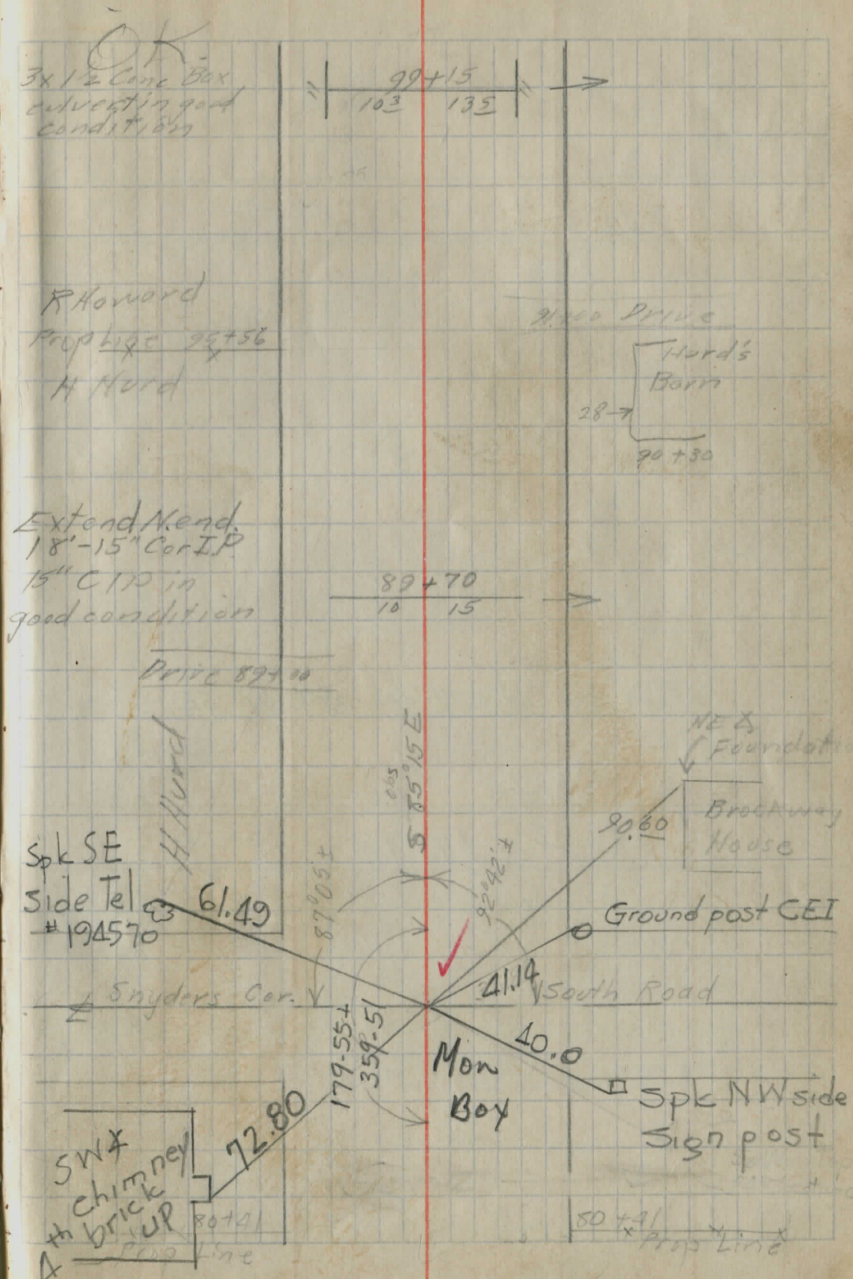
Pipe Fd Dec. '46
± 14" under FCP

Sta 69+00	POT	Pipe Set
1.36 Mi	Fd 4 Rasco with Boat Spk	Mar '54



Sta 85+59.89 PI Def Lt. 0°04' Pipe Set

*Note: Sta 85+59.89 was set using references on Snyders Cor. South Road Imp.



Sta 114+26.32 PI Def Rt. 6°10'

Pipe Set

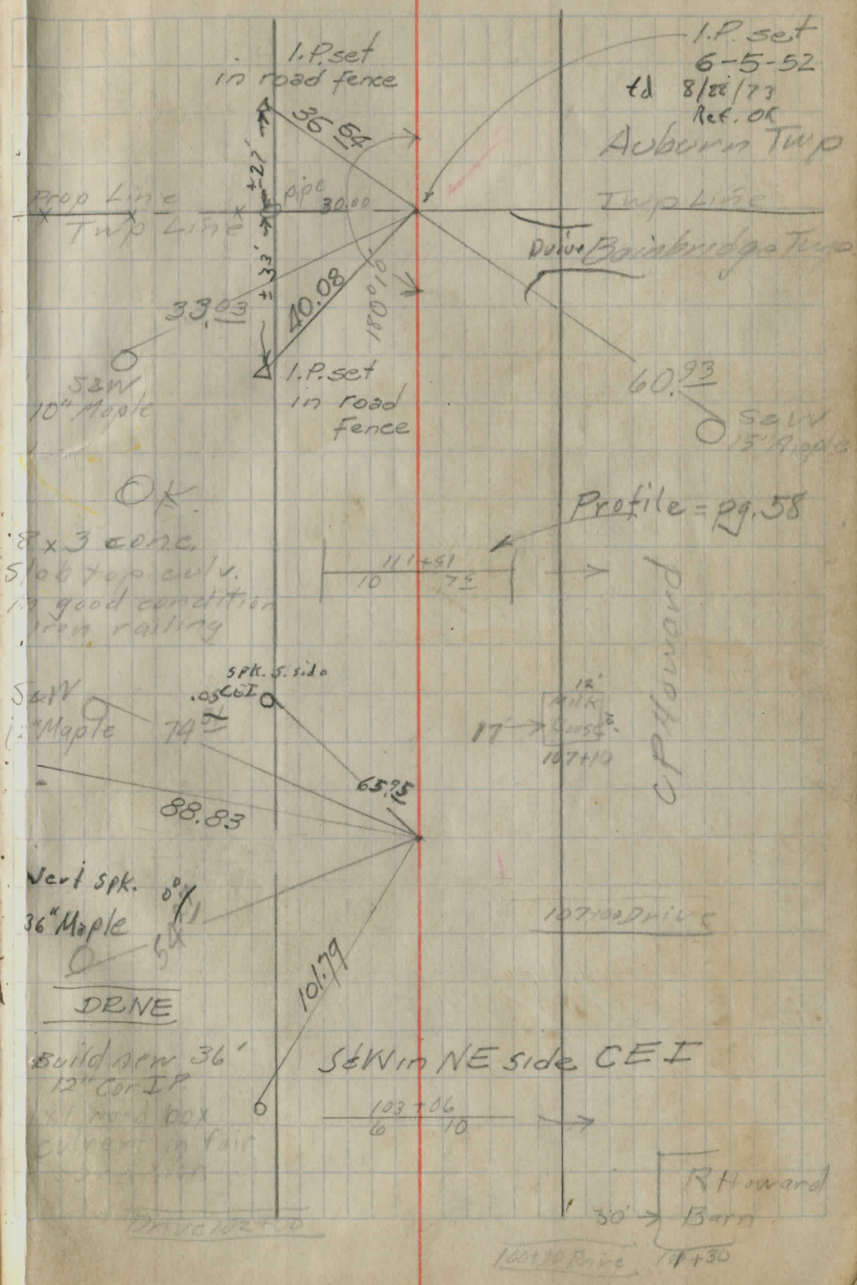
2.16
5100 | 11426

bottom cor of 2nd conc blk (up) SE + hse

Sta 106+01.85 POT

Pipe Set

Fd 6-5-52
fd 8/28/73
Ref. OK



122+20 65
117 26 32
7 94.33

129 26 05
122 20 65
7 05.40

1 56   45 00

Sta 129+26 05 PI Def Rt 0°07'   Pipe Set

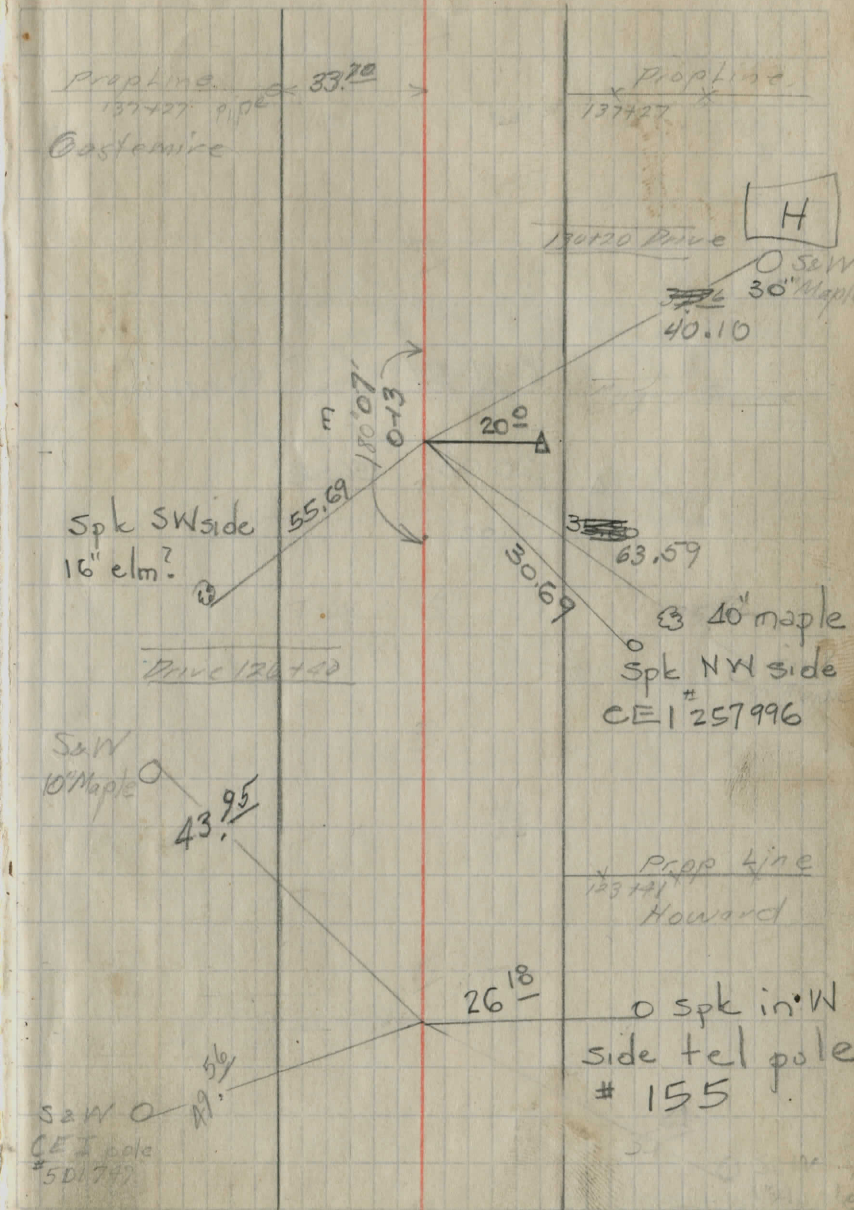
27   19

Fd 1' under & raised with pole step Nov 53

Sta 122+20 65 POT   Pipe Set

Fd 3" under Nov '53

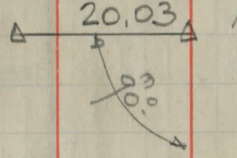
fd 8/28/73 Ref OK

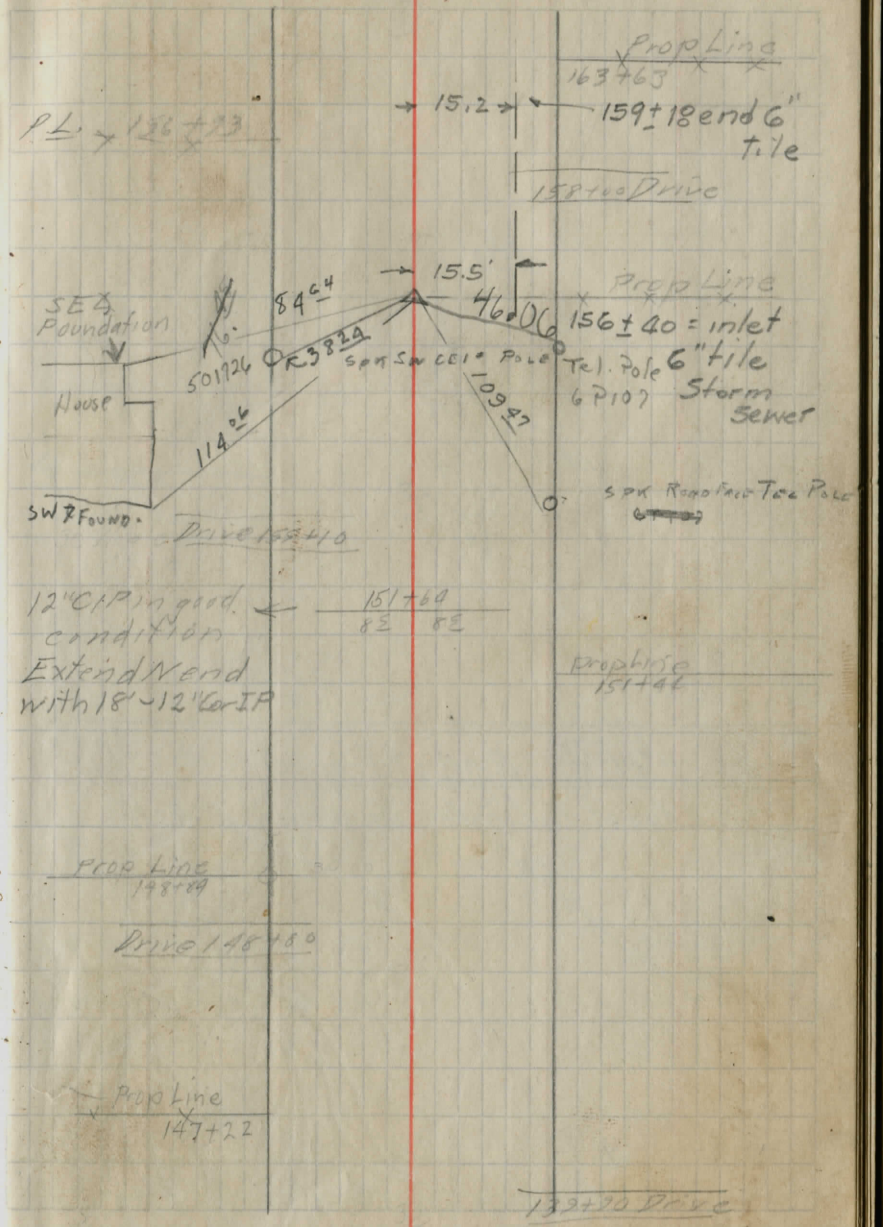


Sta 156+45 ℄ POT

Pipe Set
Fd May '54
ERASED
Ed. 8/28/73

6-21-54





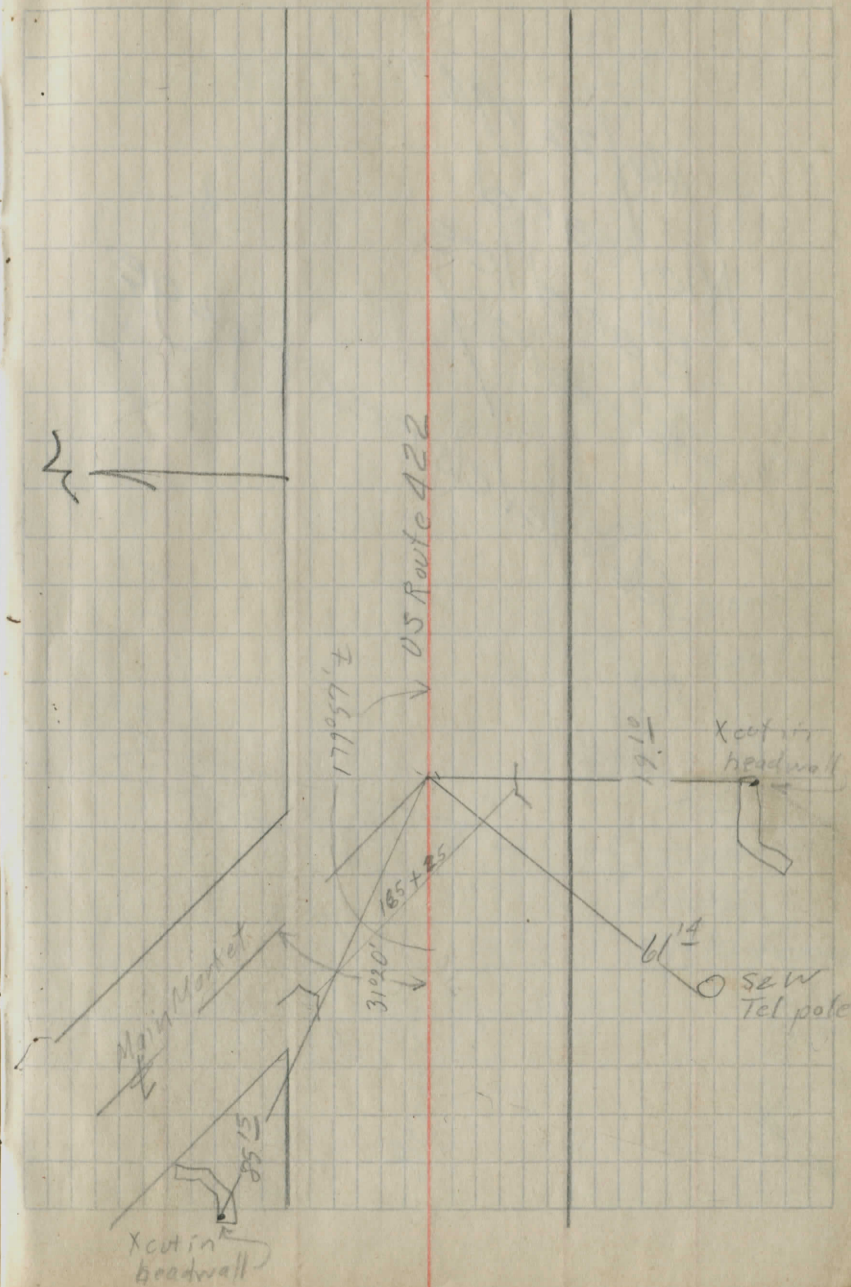
✓

3.14 miles

5280 | 16571.78
15840
7317
5280
2037.78
20

165+71.78 End of Project — Spike Set

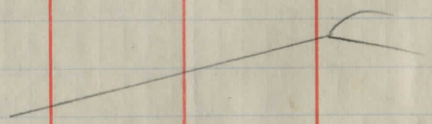
Edge of Mix in place macadam Sta 164+85



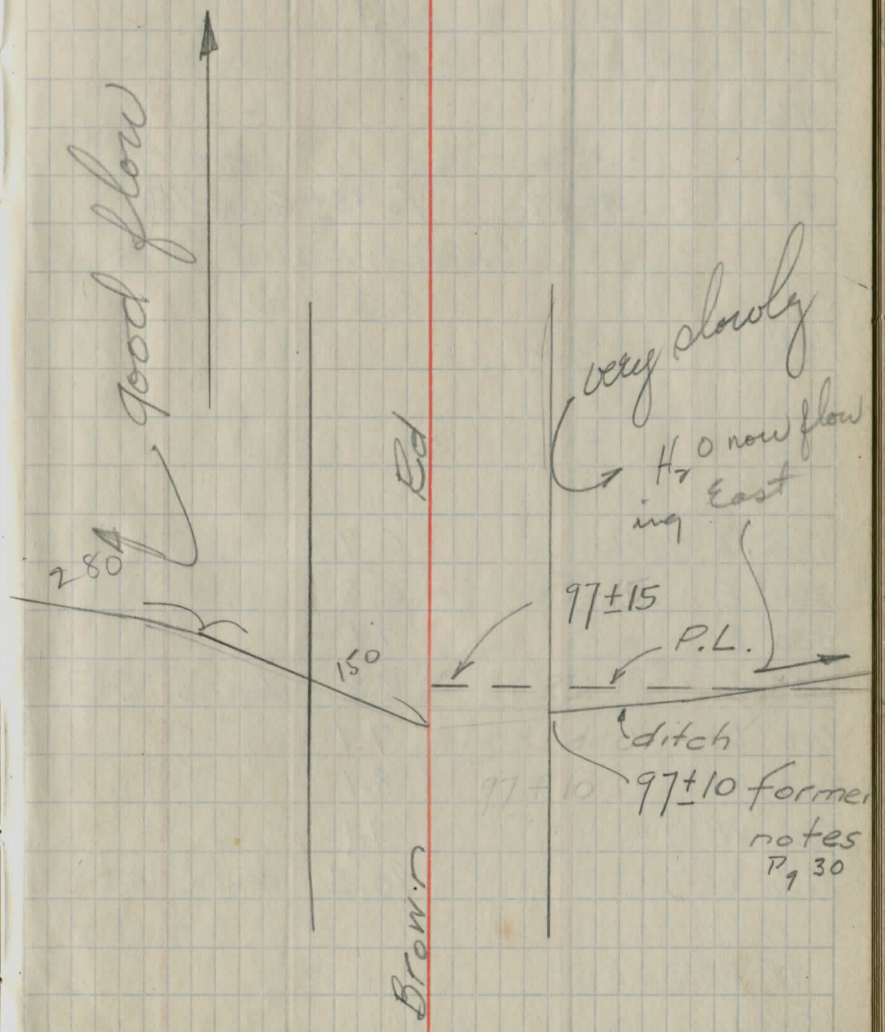
May 22 1947

Maynard
Randles
Pomeroy

See levels next page



430
150
280



	+	HI	−	
B.M. Set			5.10	1173.23
97+0			4.9	
96				
95	93+90		from rd ditch to 95+60 on ℄ 150' back = swamp hole 6.6 = alt.	
94				
93				
100' E	97+10		6.9	
200' E	"		6.8	
300' E	"		7.1	
425' E	"		8.2	down SE
100' W	"		7.1	
200 W	"		8.1	
300 W	"		9.1	
400 W	"		10.5	down W & S W
98+0				
99+0				
		1178.33		

West 12 East

Lt Rt

Vertspk SW root +14 "Elm ±90' Rt 97+15

Lt		Rt
6.6 ditch 97+10	4.9 ℄	6.6 ditch 97+10
6.7	5.2	6.4
6.5	5.3	6.4
6.2	4.7	6.3
5.2	3.9	5.3
5.9	4.5	5.4 ↖ ditch
5.0	3.8	4.8 ↖ are in pd

BROWN RD.
C.H. #32 SEC. C
May '47

	+		−	
100				
101				
T.P.	2.70	1178.33	7.35	1175.63
T P.	1.09	1182.98	11.11	1181.89
B M. No 13	2.37	1193.00		1190.63

West East 13

3.9 2.7 3.7

1.6

Sft W side CEI # 191155

Kenston School (E. side Snyder Rd ±2000 Nth. of Bainbdge Rd

	+	HI	−	Elev	
B.M.	9.46	1127.39		1117.93	B.M. #9, sta 80+50, 30'L, S root 30" elm, C.H. #11, per Pg 56, this book
T.P.	10.83	1138.01	0.21	1127.18	
T.P.	11.57	1149.13	0.45	1137.56	
T.P.	10.67	1159.61	0.19	1148.94	
T.P.	9.07	1168.53	0.15	1159.46	
T.P.	10.98	1179.46	0.05	1168.48	
T.P.	10.57	1189.38	0.65	1178.81	
T.P.	8.11	1197.12	0.37	1189.01	
T.P.	9.29	1206.22	0.19	1196.93	
T.P.	9.02	1214.74	0.50	1205.72	
B.M.			5.53	1209.21	±360' S. of S.W. cor of prop Kenston school site E. side road. vert spk. S root 30" ash.
T.P.	9.40	1224.06	0.08	1214.66	
T.P.	10.83	1234.69	0.20	1223.86	
B.M.			6.65	1228.04	vert spk leaning 8" twin ash (N. side) ±18' E of S.W. cor of prop. Kenston school site
T.P.	9.18	1243.22	0.65	1234.04	I.P.
T.P.	2.29	1245.26	0.25	1242.97	
B.M.			3.00	1241.86	Hor spk. E. side C.E.I. #(191197)
B.M.			2.88	1242.38	Vert spk. W. root 10" pig hickory ±115' N of I.P. S.W. cor stone parcel.
			6.62 E	1238.64	Flow line 8" cast iron c/o midway between C.E.I. & Hickory B.M.'s
			7.27 W	1237.99	Hor spk E. side C. E. I. #(191197)
B.M.	10.80	1252.66		1241.86	
T.P.	9.80	1260.49	1.97	1250.69	
T.P.	3.36	1262.69	1.16	1259.33	
B.M.			1.25	1261.44	Vert spk W. side 40" elm, ±175' S. of N.E. cor prop Kenston school site, W. side woven wire fence

	+	H.I.	−	Elev
T.P.	6.26	1264.14	4.81	1257.88
T.P.	0.86	1262.02	2.98	1261.16
B.M.			12.12	1249.90
B.M.	4.40	1254.30		1249.90
T.P.	0.58	1243.34	11.54	1242.76
T.P.	3.52	1235.54	11.32	1232.02
B.M.			8.38	1227.16
Check levels				
B.M.	9.57	1237.61		1228.04
T.P.	10.60	1247.71	0.50	1237.11
B.M.			5.10	1242.61
B.M.			4.02	1243.09
T.P.	0.80	1237.92	10.59	1237.12
B.M.			9.87	1228.05
T.P.	0.28	1227.23	10.97	1226.95
T.P.	1.43	1216.73	11.93	1215.30
B.M.			7.48	1209.25
T.P.	0.23	1205.97	10.99	1205.74
T.P.	0.43	1194.46	11.94	1194.03
T.P.	0.35	1182.98	11.83	1182.63
T.P.	0.45	1172.10	11.33	1171.65
T.P.	0.37	1161.19	11.38	1160.72
T.P.	0.04	1149.47	11.76	1149.43

Hor. spk N. side 10" ash, 9' N of I.P. at S.E. cor of C.R. Howard V.208 Pg.232

" " " " " " " "

Vert spk 8" leaning twin ash (N.side) ±18' E of S.W. cor I.P. of prop Kenston school site.

Vert spk 8" leaning twin ash

Hor. spk S. side C.E.I. # 191197

Vert spk W root 10" hickory ±115' W of I.P. SW cor stone par.

8" leaning twin ash

spk S root 30" ash ±360' S of SW cor of property

	+	H.I.	−	Elev	
T.P.	1.18	1139.03	11.62	1137.85	
T.P.	0.98	1128.72	10.33	1128.70	
B.M.			9.98	1118.86 (1117.93)	
B.M.	6.45	1124.38			1117.93
	12.70	1136.09	0.99	1123.39	
	12.37	1147.83	0.63	1135.46	
	12.85	1160.35	0.33	1147.50	
	13.02	1173.04	0.33	1160.02	
	12.85	1185.53	0.36	1172.68	
	12.69	1197.68	0.54	1184.99	
	12.22	1209.57	0.33	1197.35	
B.M.	9.52	1218.82	0.27	1209.30	
	12.56	1231.01	0.37	1218.45	
B.M.			2.80	1228.21	use
	12.38	1243.02	0.37	1230.64	
	4.56	1247.24	0.34	1242.68	
B.M.			4.55	1242.69	use CE1 BM
B.M.			3.97	1243.27	use P.4 BM
	check	levels			
B.M.	5.11	1248.38		1243.27	P.4 BM
B.M.			5.64	42.74	CE1 BM
S. drive pipe	0.17	1238.03	10.52	1237.86	
B.M.			9.80	1228.23	
B.M.	2.23	1230.46		1228.23	
	0.14	1218.60	12.00	1218.46	
	8.75	1214.63	12.72	1205.88	

BM #9, sta. 80+50, 30'L, S root 30" elm, C.H. #11 per pg. 56 this book

Vert spk. S root 30" ash ±360' S. of S.W. cor of prop Kenston school site (E. side road)

Vert. spk N side 8" leaning twin ash ±18' E of S.W. cor (T.P.) of prop Kenston school site

Hor. spk. E side C.E.I. #19197

Vert. spk W. root 10" pig hickory ±115' N of T.P., S.W. cor stone prop V.210 Pg.249

Vert spk N. side 8" leaning ash

		1214.63		
	+	HI	−	Elv
B.M.	0.80	1210.18	5.25	1209.38
	0.94	1198.67	12.45	1197.73
	0.43	1186.36	12.74	1185.93
	0.23	1174.47	12.12	1174.24
	0.74	1162.35	12.86	1161.61
	0.38	1150.61	12.12	1150.23
	1.17	1140.96	10.82	1139.79
	0.42	1128.69	12.69	1128.27
			6.99	1121.75
	Check	levels		
B.M.	0.18	1209.52		1209.38 USE
			3.65	1205.87
	0.39	1197.79	12.12	1197.40
	0.21	1185.25	12.75	1185.04
	0.33	1173.08	12.50	1172.75
	0.22	1160.32	13.00	1160.08
	0.37	1147.92	12.77	1147.55
	1.07	1137.69	11.30	1136.62
	0.92	1126.79	11.32	1126.37
BM			8.70	1118.09 (1117.93)
B.M.	11.60	1239.81		1228.21 USE
	11.83	1251.30	0.34	1239.47
	7.71	1258.69	0.32	1250.98
B.M.			7.53	1251.16 USE

360° Azimuth of Kenston

ash 368' S of SW cor school site

elm on C.H. #11

Vert. spk. N. side 8" leaning twin ash ±18' E of SW cor (IP) of prop Kenston school site

Hor spk N. side 10" ash 9' N of IP at SE cor of CR Howard V. 208 Pg 232

	+	1258.69 HI	-	Elev	
	4.91	1263.58	0.02	1258.67	
B.M.			0.83	1262.75	use
	0.79	1257.70	6.67	1256.91	
B.M.			14.93	1242.77	
B.M.	12.88	1241.09		1228.21	Location
			10.0	31.09	B2
			8.30	32.79	B3
			5.50	35.59	B4
			3.60	37.49	B5
			1.90	39.19	B6
			0.10	40.99	B7
			12.80	28.29	B1
			9.70	31.39	C1
			6.60	34.49	D1
			4.70	36.39	E1
			2.70	38.39	F1
			1.20	39.89	F2
			3.20	37.89	E2
			6.00	35.09	D2
			8.30	32.79	C2
			10.00	31.09	B2
			11.90	29.19	A2
			9.70	31.39	A3
			6.10	34.99	C3

Vert spk W. side 40" elm ± 175' S of N.E. cor of prop Kenston school site.
Hor spk S side C.E. 191/197

Vert spk N side 8" leaning twin ash ±18' E of SW cor (I.P.) of school site

1241.09 ✓

	+	HI	−	Elev	Location
			3.80	37.29	D3
			2.20	38.89	E3
			0.0	41.09	F3
			0.30	40.79	E4
			1.80	39.29	D4
			3.70	37.39	C4
			7.60	33.49	A4
			5.90	35.19	A5
			1.90	39.19	C5
			9.10	36.99	A6
T.P.	12.42	1253.33 ✓	0.18	1240.91 ✓	chipped rock
			15.10	38.23	A7
			9.60	43.73	C7
			6.50	46.83	D7
			5.00	48.33	E7
			4.30	49.03	F7
			6.60	46.73	F6
			7.50	45.83	E6
			9.20	44.13	D6
			11.80	41.53	C6
			11.90	41.43	D5
			10.20	43.13	E5
			9.00	44.33	F5
			11.20	42.13	F4
			3.30	50.03	F8

+	1253.33 HI	-	Elev	Location
		4.10	49.23	E8
		5.30	48.03	D8
		8.30	45.03	C8
		13.50	39.83	A8
		11.20	42.13	B8
		2.90	50.43	G8
		2.80	50.53	H8
		2.20	51.13	I8
		0.90	52.43	J8
		2.10	51.23	J7
		3.30	50.03	I7
		4.40	48.93	H7
		4.10	49.23	G7
		6.20	47.13	G6
		6.00	47.33	H6
		4.60	48.73	I6
		3.30	50.03	J6
		4.90	48.43	J5
		6.10	47.23	I5
		7.70	45.63	H5
		8.30	45.03	G5
		10.0	43.33	G4
		8.7	44.63	H4
		7.6	45.13 45.63	I0
		6.4	46.93	J4

	+	1253.33 HI	-	Elev	Location	
			9.60	43.73	I3	
			8.30	45.03	J3	
			10.30	43.03	H3	
			11.00	42.33	G3	
			12.40	40.93	G2	
			11.50	41.83	H2	
			11.00	42.33	I2	
			9.50	43.83	J2	
		✓	11.10	42.23	J1	
T.P.	0.57	1240.95	12.95	1240.38	✓	
B.M.			12.70	1228.25	(1228.21)	Leaning twin ash
B.M.	7.81	1250.50 ✓		1242.69	✓	Hor spk E. side C.E.I. ± 19/197
			10.7	1239.80	U1	
			9.8	40.70	U2	
			8.2	42.30	T2	
			7.1	43.40	S2	
			6.6	43.90	R2	
			6.3	44.20	Q2	
			5.6	44.90	Q3	
			5.9	44.60	R3	
			6.5	44.00	S3	
			7.8	42.70	T3	
			8.8	41.70	U3	
			7.3	43.20	U4	

+	1250.50 HI	−	Elev	Location
		6.4	44.10	T4
		5.5	45.00	S4
		4.9	45.60	R4
		5.0	45.50	Q4
		4.2	46.30	Q5
		4.2	46.30	R5
		4.4	46.10	S5
		5.0	45.50	T5
		5.9	44.60	U5
		4.6	45.90	U6
		3.7	46.80	T6
		3.2	47.30	S6
		3.3	47.20	R6
		3.3	47.20	Q6
		2.5	48.00	Q7
		2.2	48.30	R7
		2.1	48.40	S7
		2.7	47.80	T7
		3.3	47.20	U7
		1.5	49.00	U8
		1.2	49.30	T8
		0.7	49.80	S8
		1.0	49.50	R8
		0.20	50.30	Q8
		6.8	43.70	P2

	+	1250.50 HI	-	Elev	Location
			6.70	43.80	O2
			5.8	44.70	N2
			4.7	45.80	M2
			4.7	45.80	L2
			5.5	45.00	K2
			4.0	46.50	K3
			3.2	47.30	L3
			3.6	46.90	M3
			4.5	46.00	N3
			5.7	44.80	O3
			6.3.	44.20	P3
			5.3	45.20	P4
			4.2	46.30	O4
			3.6	46.90	N4
			2.1	48.40	M4
			1.9	48.60	L4
			2.5	48.00	K4
			0.1	50.40	K5
			0.5	50.00	M5
			1.2	49.30	N5
			2.9	47.60	O5
			4.5	46.00	P5
			3.5	47.00	P6
			1.6	48.90	O6
T.P.	5.73	1255.47	0.76	1249.74	

Continued on pg 51 in field bk. No. 132

CH #32

℄ Location: Browns Cor. South Road Auburn Twp.

County Line North to Brown's Corners

County Highway - 12A

Note: sidestakes are set 25' Rt

Section A & B, C & D

Note: Section A improved as separate section See BK. 138

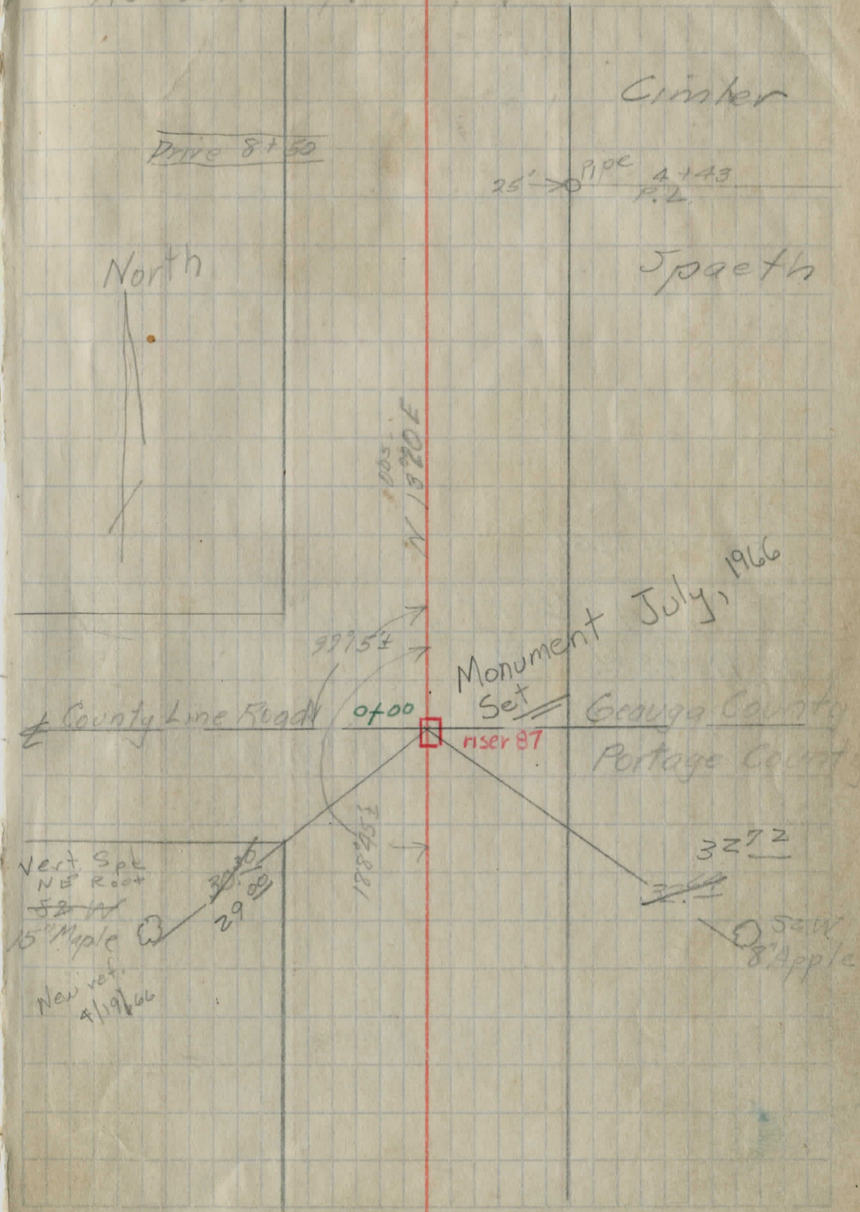
NOTE: RE-SURVEY CONDUCTED by G. Mahnacsky

instrument used: TOPCON GTS-2B

☐ - MONUMENT BOXES SET - 6-87 w/ 1" I pin

END SURVEY - 58+15.00

Sta 0+00 Beginning of Project Rec Set

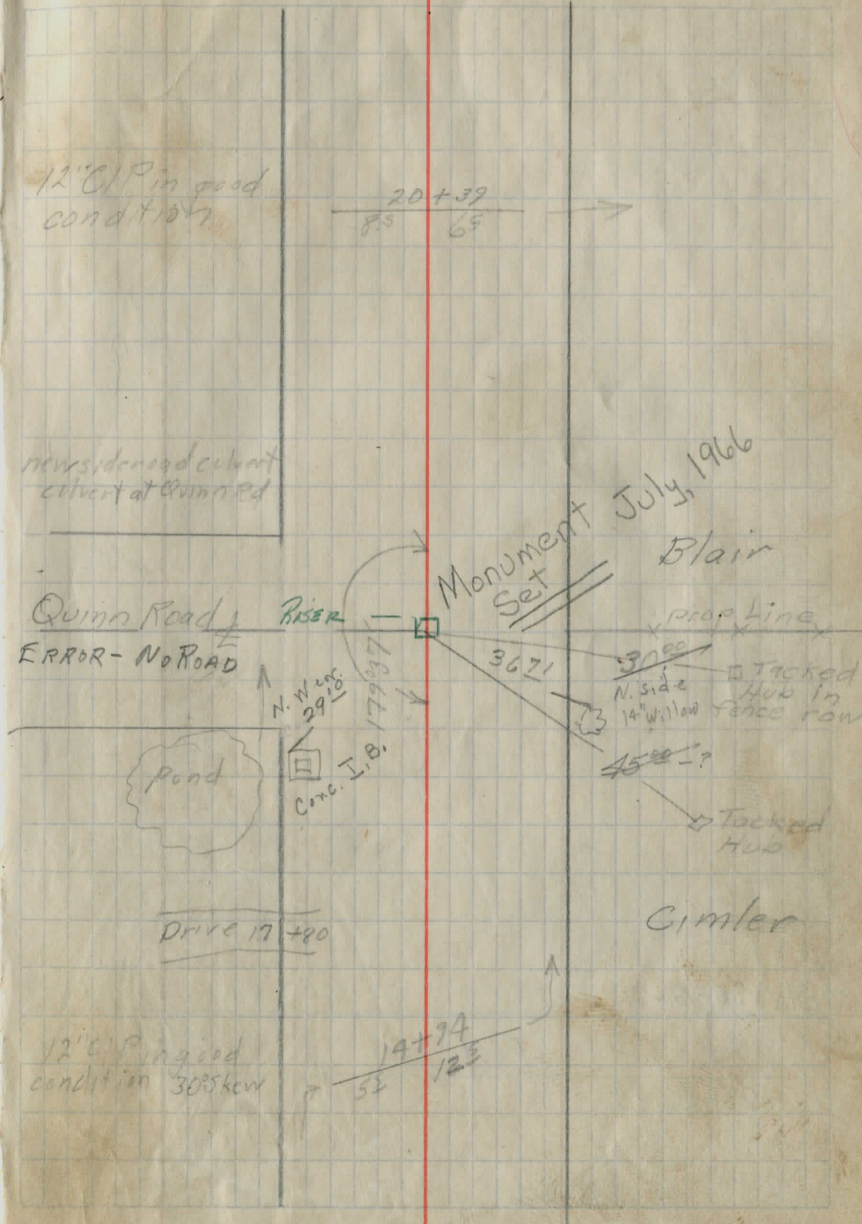


sta 19+42.69

Sta 19+43 75 PI Defl Lt. 0°23' Pipe Set

Sta. 19+43 .51 6-87

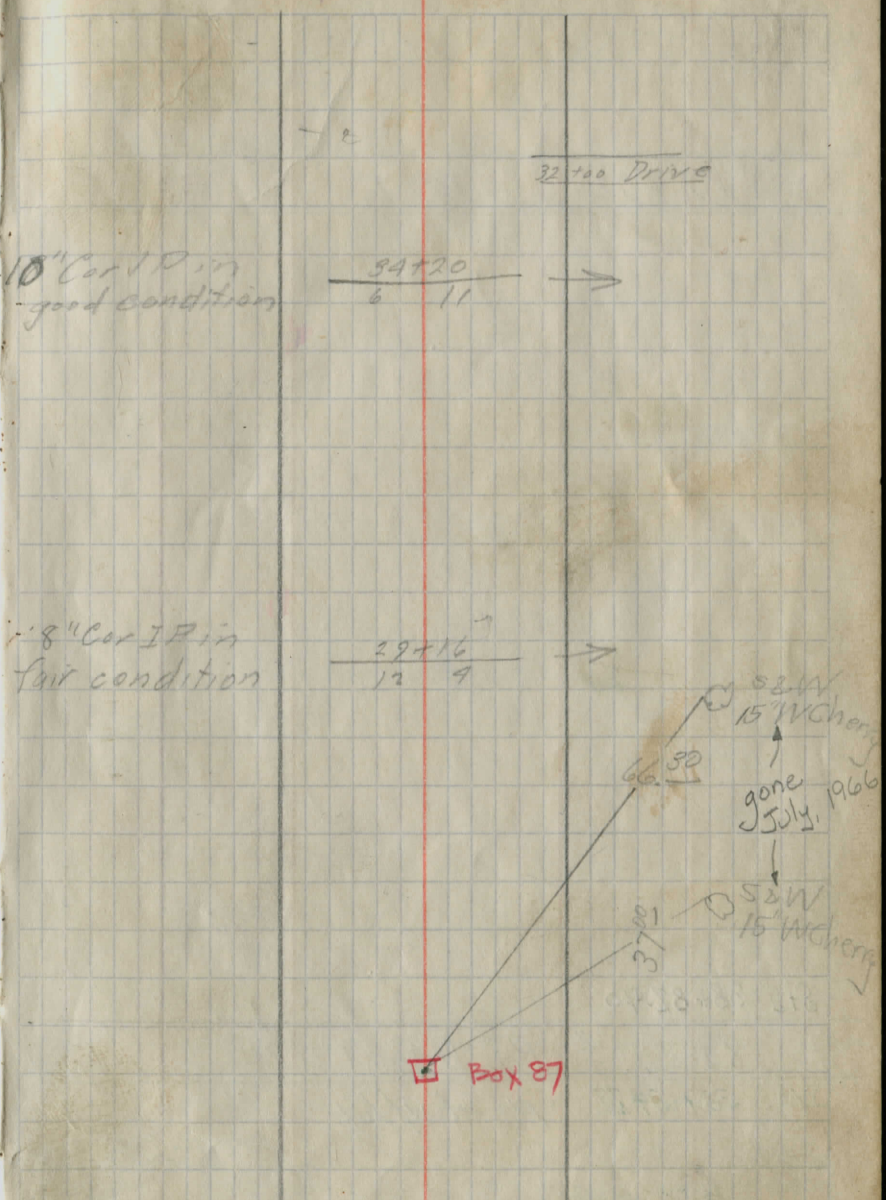
Fd 4/21/66 (bnt)
new ref



Sta 25+61.61

Sta 25+63.18 POT No of 87 Pipe Re-Set-87

Sta -25+62.24 -

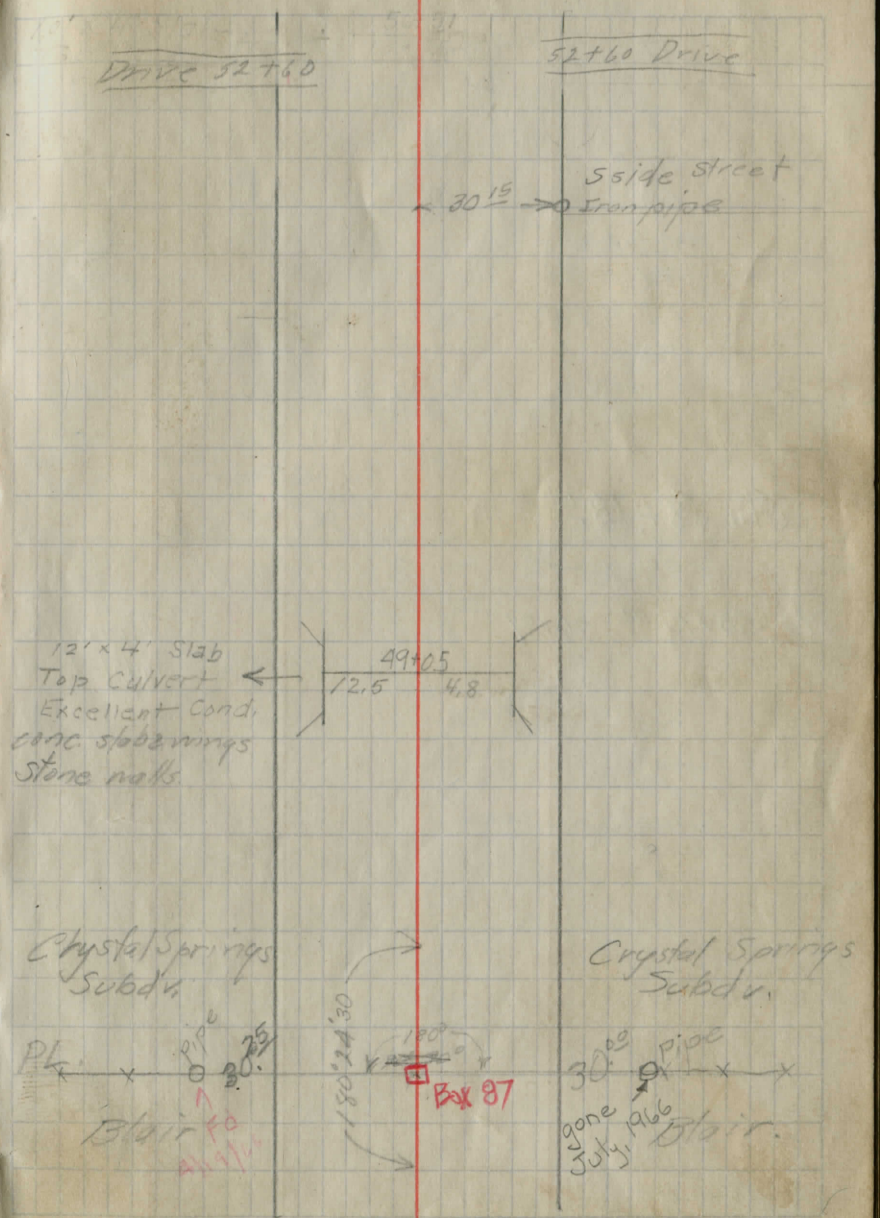


Sta 52+32 | P.O.T.

Sta 38+87.90

Sta 38+85.02 | PI Dg Rt 0°24' | Stone found

Sta. 38+84.78 - pin set w/ box



move Cent Line to east

57 = 18"
61 = 24"
63 = 30"
65 = 36"
67 = 42"
69 = 48"
71 = 36"
73 = 24"
75 = 0"

Section A C

Sta 58+13.00

Sta 58+13.00 FI Def Lt 0°09' Stone found

Sta 58+15.00 -6-87

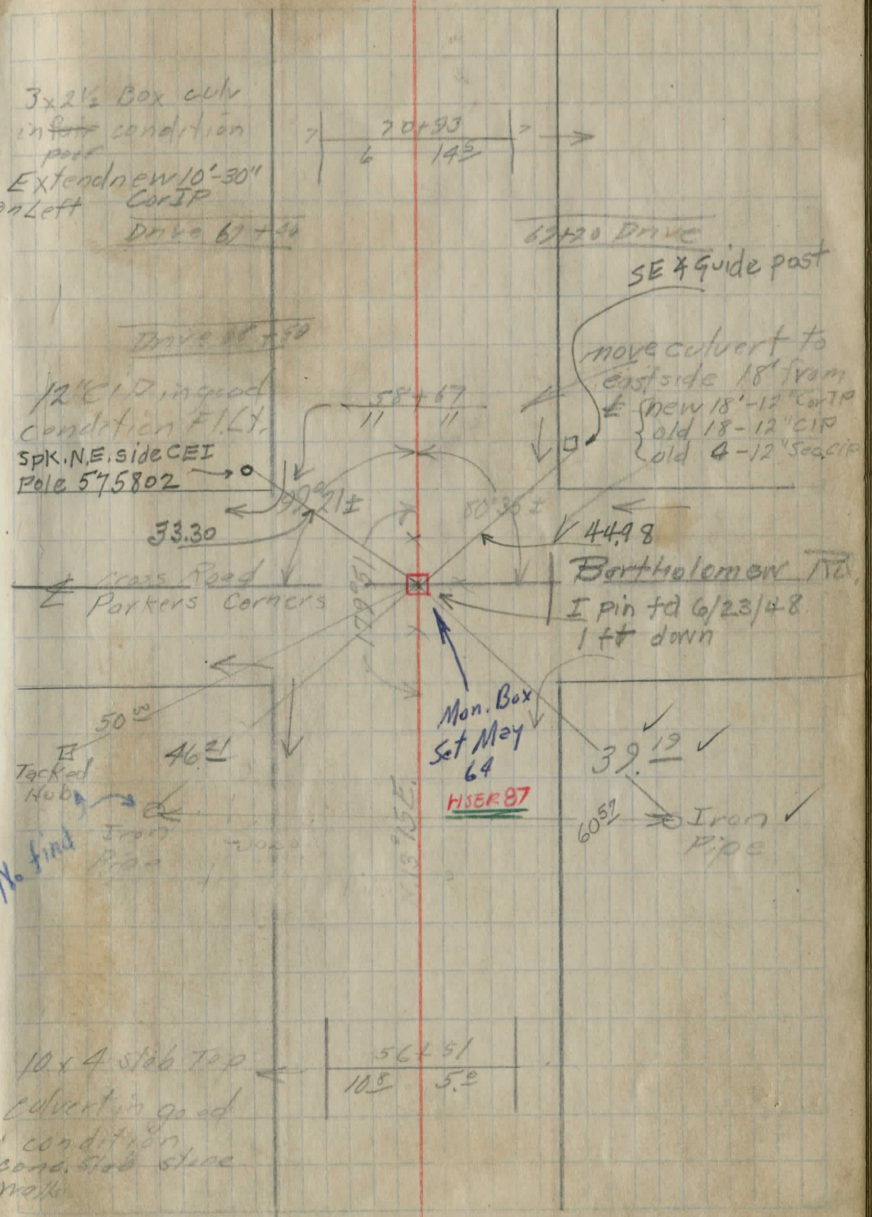
I. pin fd 6/5/39

Section B B

NOTE G-28-48
STARTING AT BARTHOLOMEW 0+00

STA	OFFSET
8+00	18
10+00	20'
12+00	20
ALL OTHERS	15'
START AT MAY	0+00
39+34 (422)	20'
START 422	0+00
8+00	17'
10+00	17
12+00	17
42+00	17'
OTHERS	15'

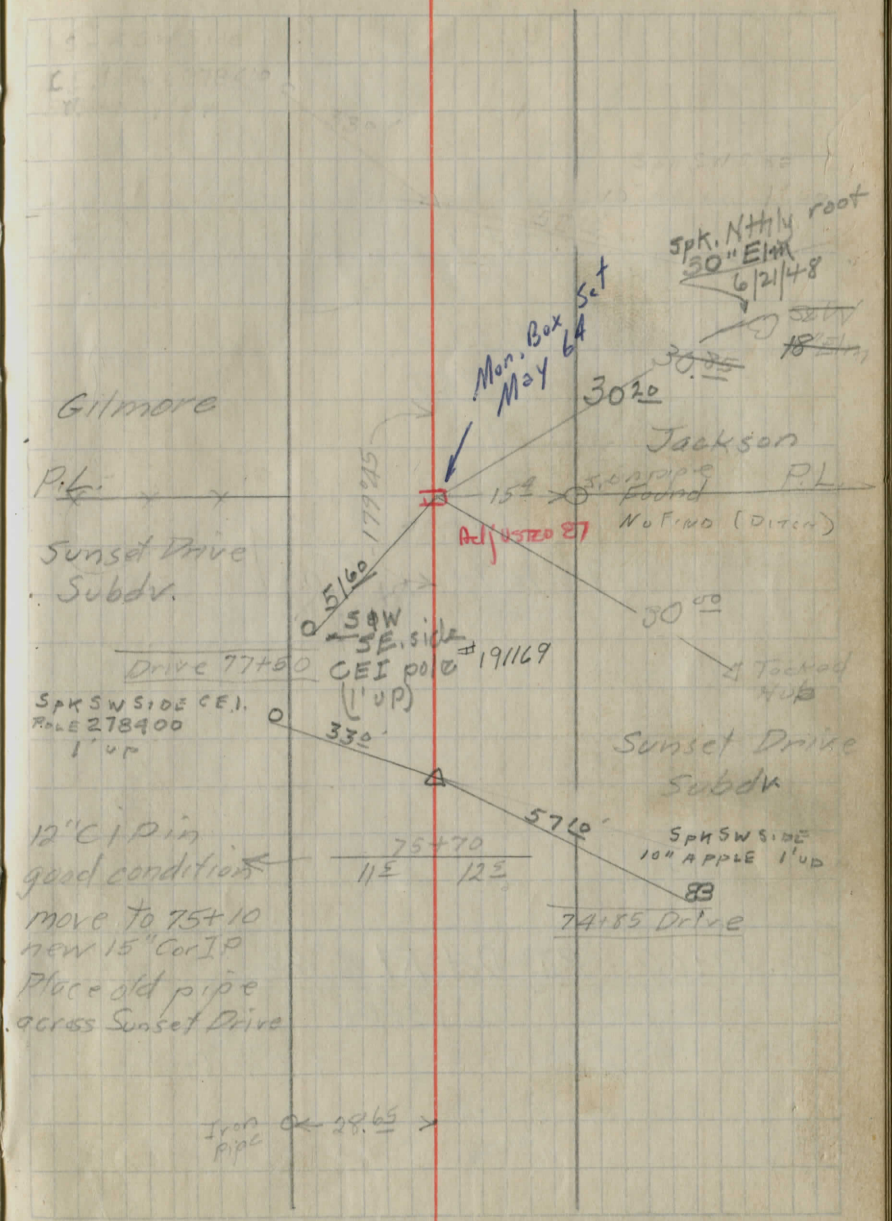
ALL STAKES ON EAST



Sta 77+62.65 PI Def Lt 0°15' Stone found 6-48

STA 73+62.65 POT I.P. SET 6-21-48

Sta 74+79 POT No Fnd



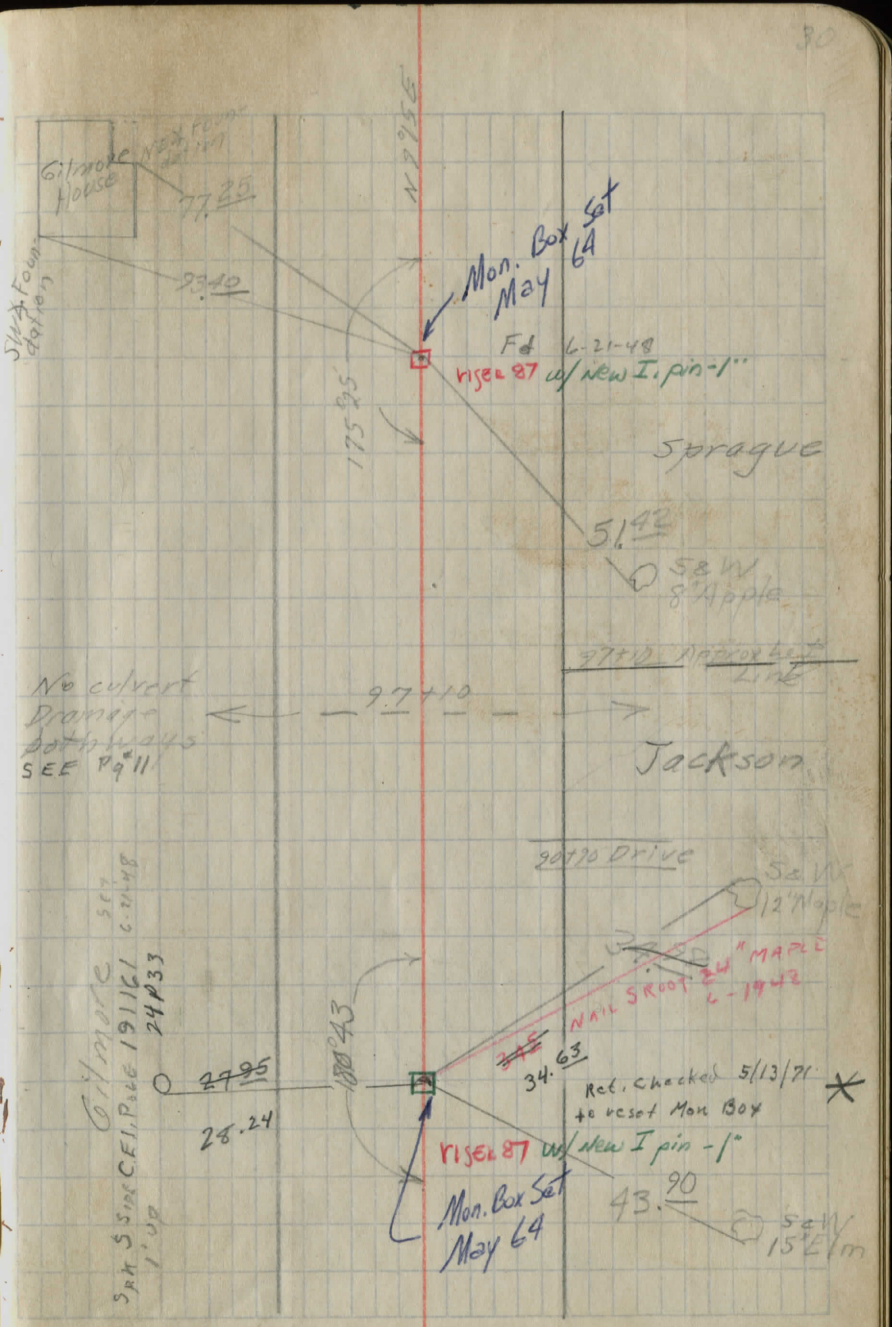
Sta. 105 + 89.00 PI Dot. Lt. 4°35' Pipe Set

Curve Data
- Δ = 4°35' Lt.
- D = 1°30'
- T = 152.87
- E = 3.1
- L = 305.55
- PC = 104+36.13
- PT = 107+41.68

105 – .55
106 – 2.66
107 – .25

Sta 90+00 PI Dot Rt. 0°43' Pipe Set

THIS PIPE 1" DOWN. 2 BENT
T.T. SPT SET AT TRUE P.I. 0.34' EAST OF CENTER OF PIPE.



125

120

2.09 miles to Gilmores Cor.

5280 | 110+48.08

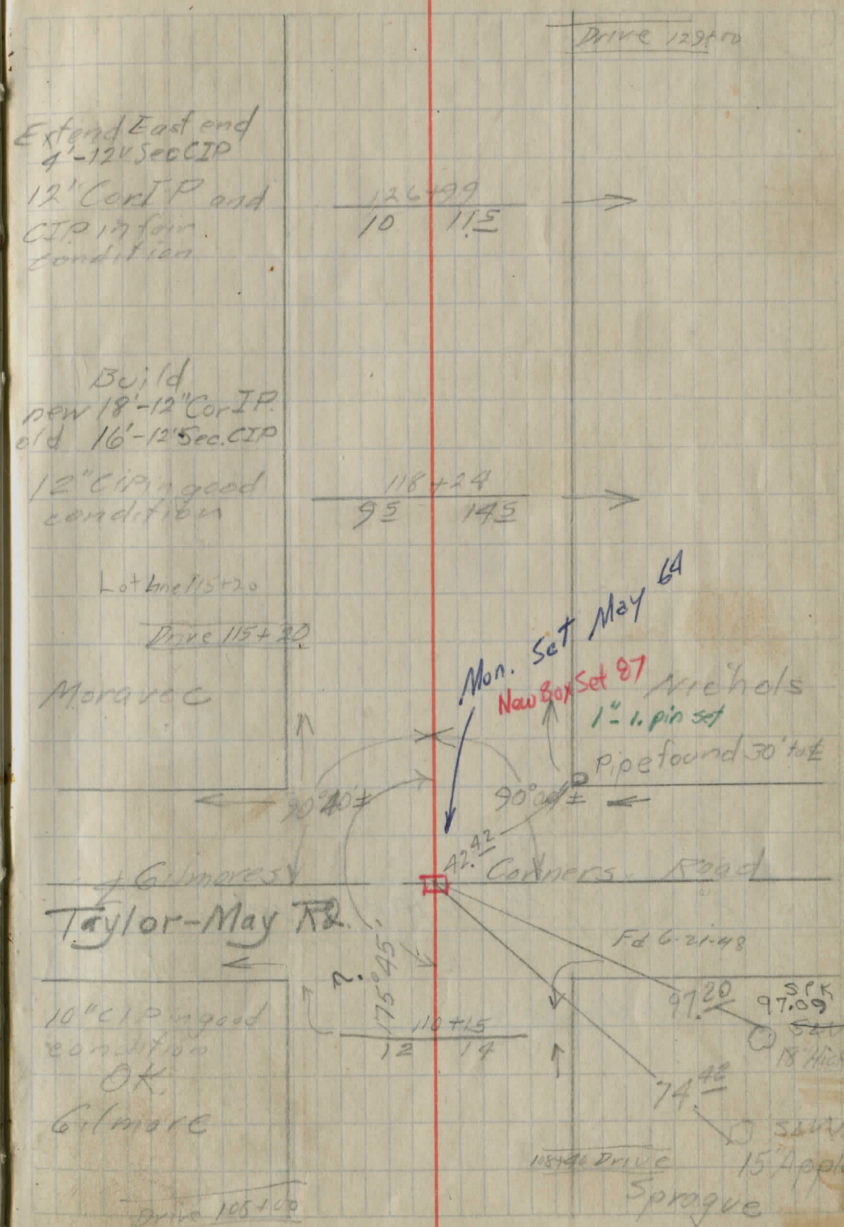
10560

48.08

115

Sta 110+48.08 PI Def. Lt. 4°07' Pipe Found 6/21/48

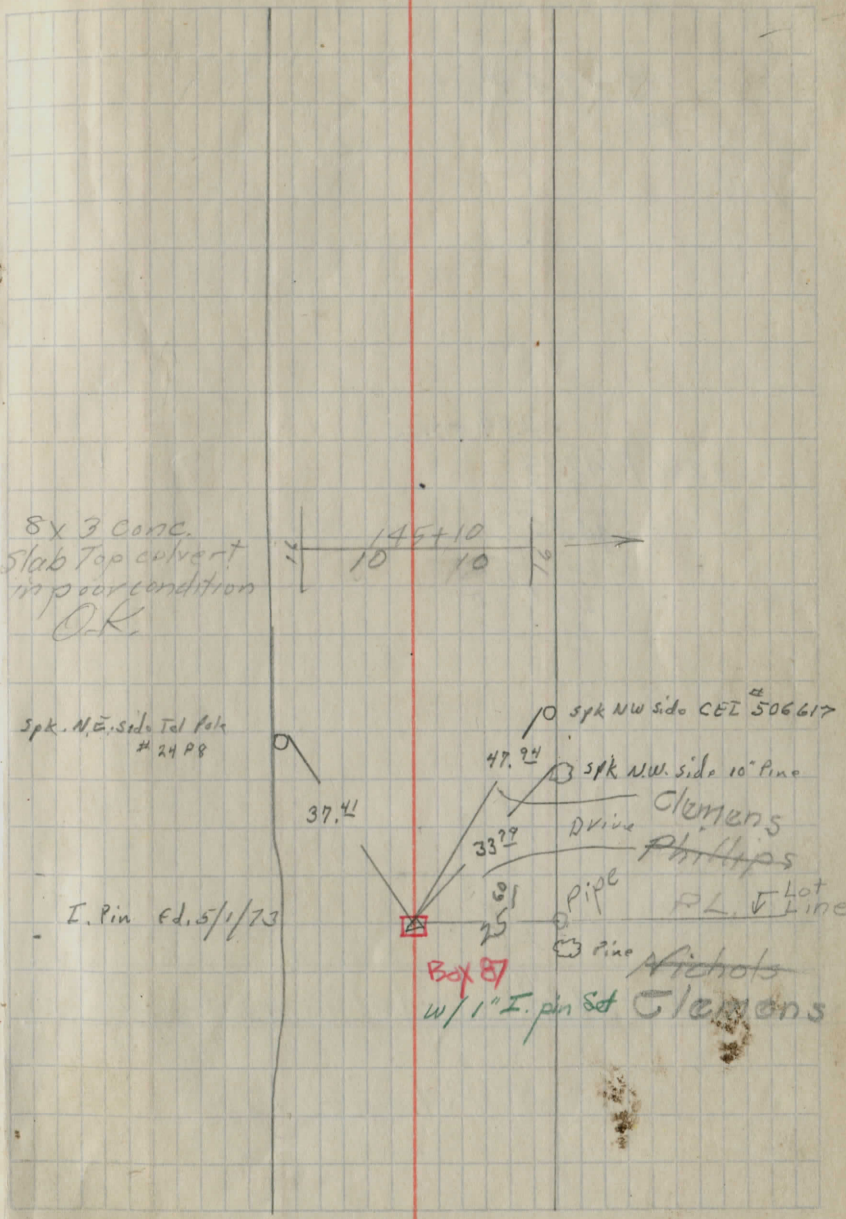
Sta 111+35.08 start of Bath.



Sta 132+87 72 Def Rt 0°18' Pipe Set

No find 6/22/48

DEF SHOULD BE LEFT

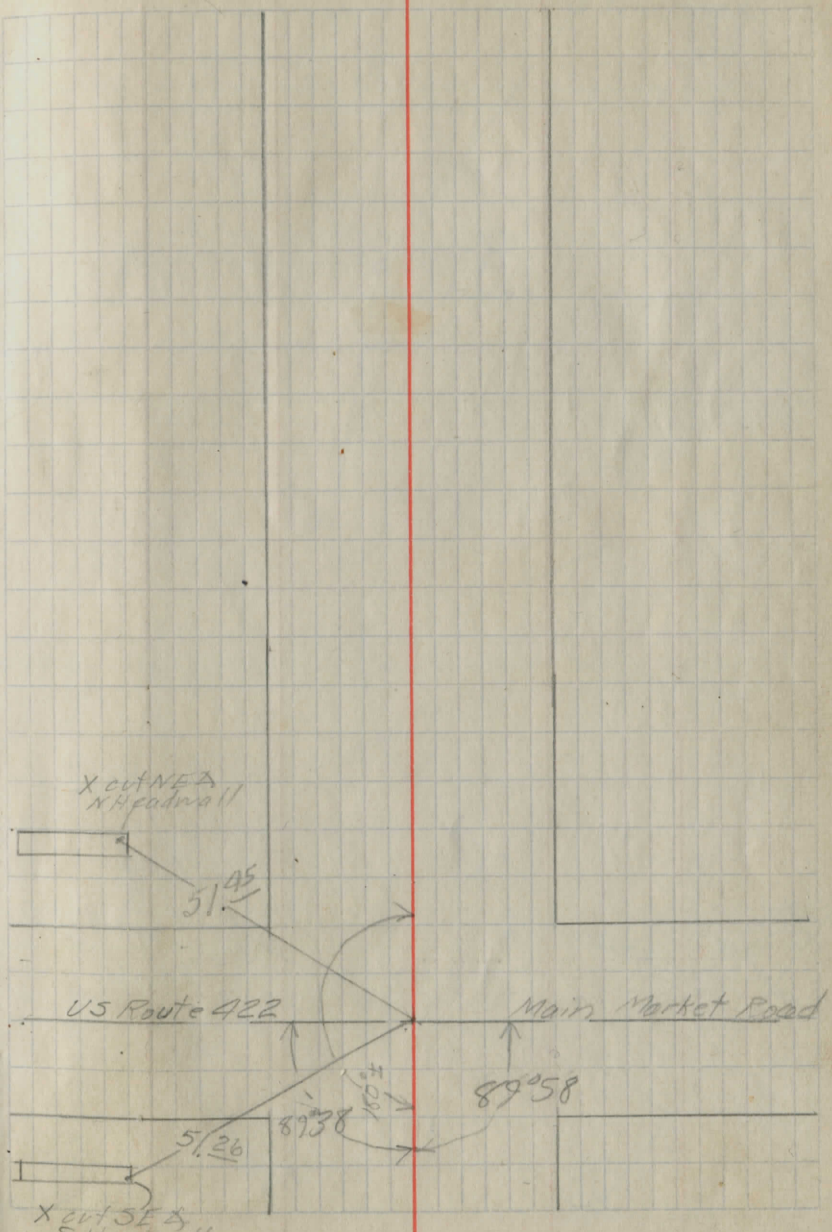


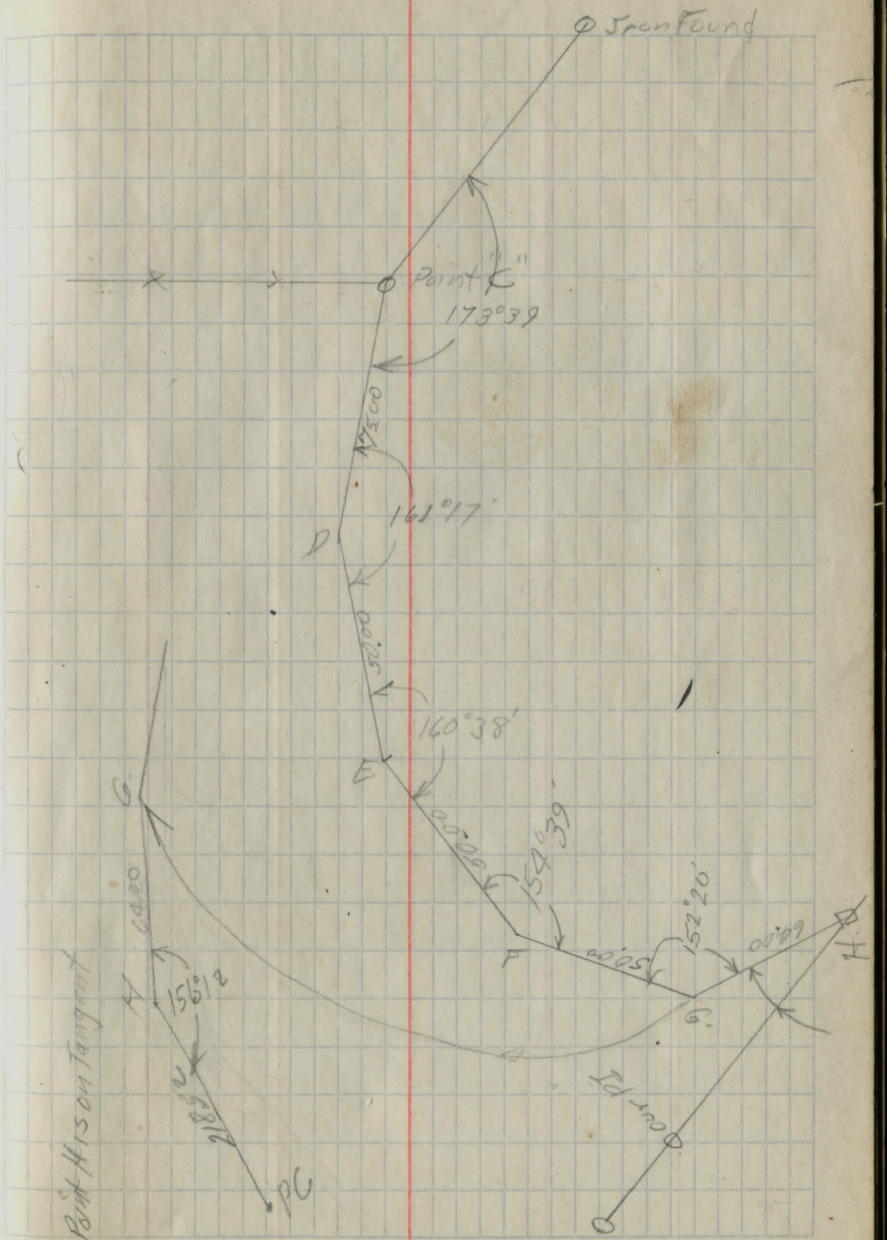
move 145 - 1.4 East
140

2.84 miles
5280 | 14975
10560
44350
42240
2110
21120

Sta 150+14.35 End of Project Hole Drilled

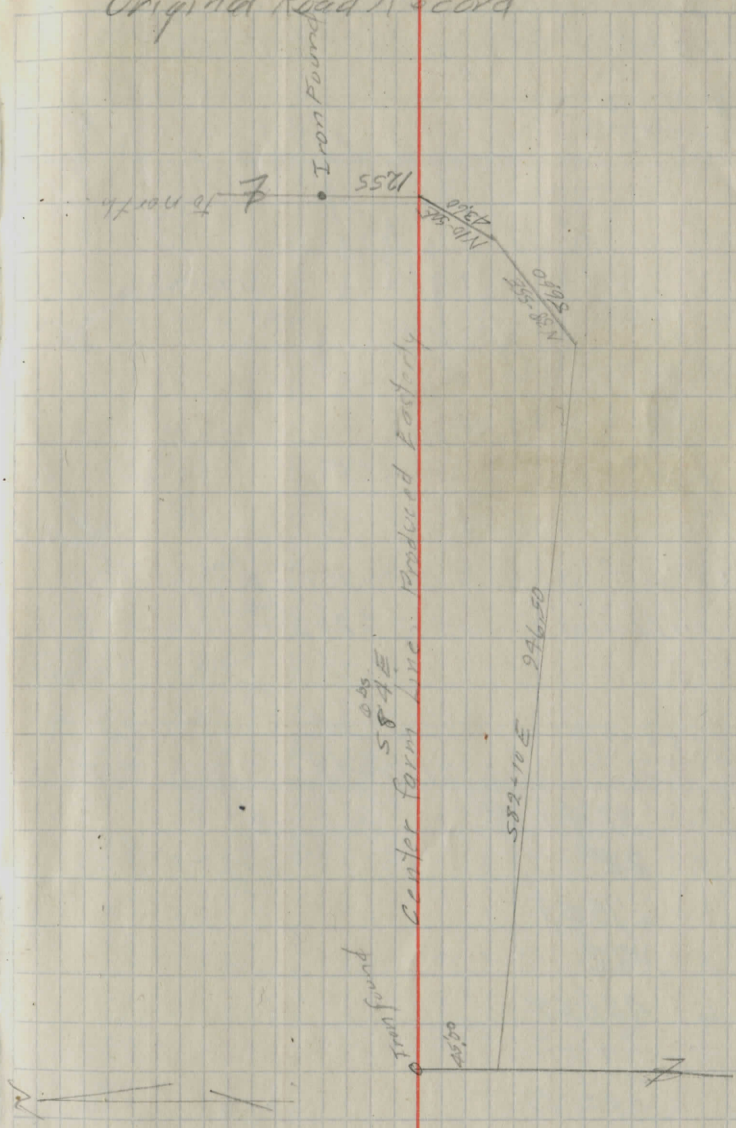
Edge of Pvt. 149+95




Iron Found
Point "C"
173°39'
D
161°17'
160°38'
154°39'
152°20'
Point His on Tangent
156°12'
PC

Snake Hill Road Location

Original Road Record



T.H.# 183

℄ Location Snake Hill
Bainbridge Geauga Lake Rd Sec C

Sta ~~7+50.00~~ 43+61.70 POT Pipe Set

Restaked Vol 147

Tacked Hub set 186.55 measured E. on Tangent

See

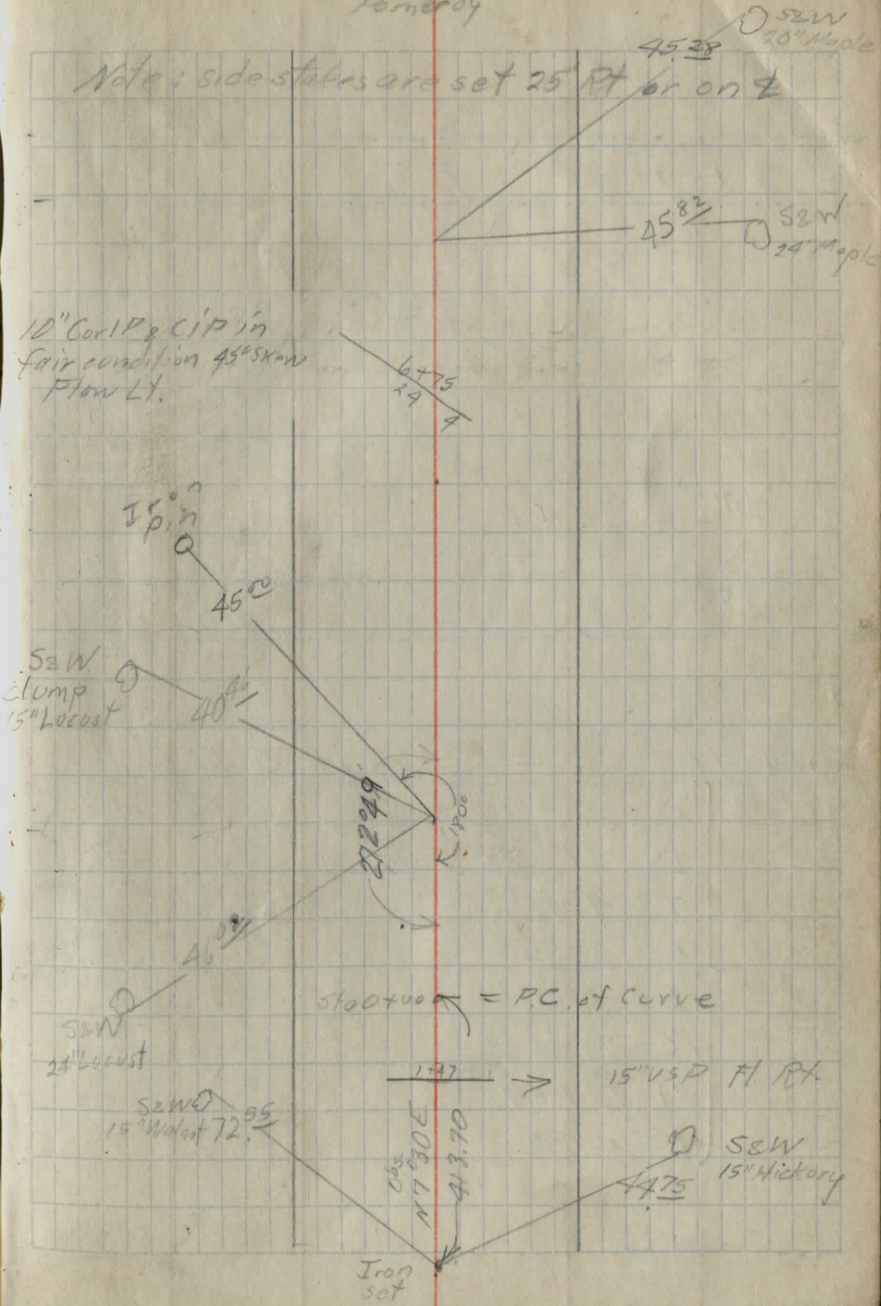
Note: Pipe found 45 ft. North of P.I. at Sta 2+23.59 on tangent from 0+00 to 2+73.59

Sta ~~2+73.59~~ 38+85.29 Def Rt 92°49' Pipe Set

Curve Data		
Δ = 92°49' Rt.	0	0°
D = 22°	0+50	5°30
T = 273.59	1	11°00
E = 117.3	+50	16°30
L = 421.89	2	22°00
PC = ~~0+00~~ 36+11.70	+50	27°30
PT = ~~4+21.89~~ 40+33.59	3	33°00
	3+349	36°50
	+50	38°30
R = 260.44	4	44°00
	4+	46°24

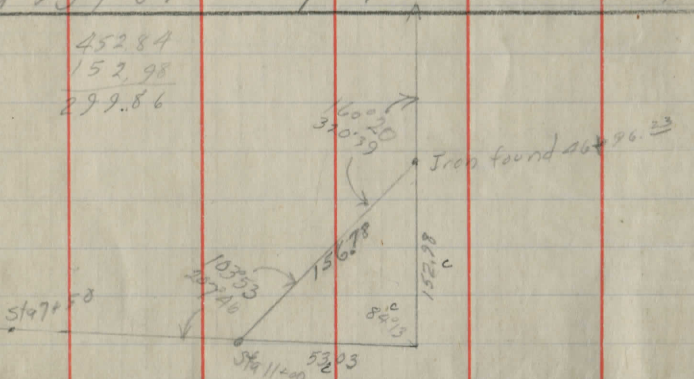
Sta 0 - 413.70 P.I.

2/21/34 Richey, Goodrich, Pomeroy 36



Sta ~~13+84~~.36 (49+96.09) PT — Iron Set

452.84
152.98
299.86



46+96.23 ~~11+00.84~~ POT 299.86 S from P.T. — Iron Found

Sta ~~11+53.03~~ (47+64.73) PI Def. Lt 95°47

Curve Data:

- Δ = 95°47' Lt.
- D = 14°
- T = ~~452.84~~ 452.81
- E = 201.1
- L = 684.17
- PC = ~~7+00.19~~ 43+11.92
- PT = ~~13+84.36~~ 49+96.09
- R = 409.26

chord = 607.24

PI = 11+53+03

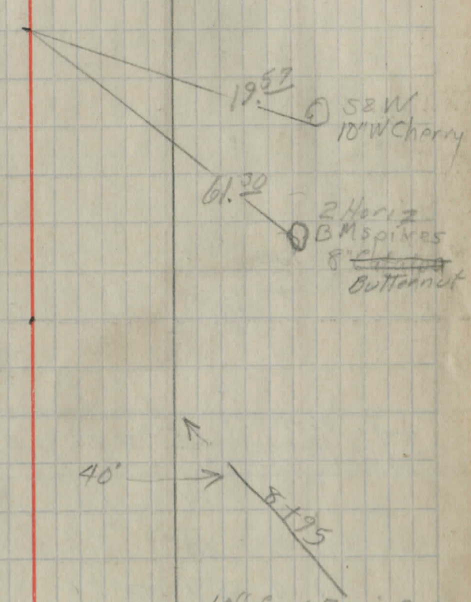
13+84.36	0°00
13+50	2°24
13	5°54
12+50	9°24
12	12°54
11+50	16°24
11	19°54
10+50	23°24
10	26°54
9+50	30°24
9	33°54
8+50	37°24
8	40°54
7+50	44°24
7+00.19	47°53

50 = 3°30'
25 = 1°45

1384.36
299.86
1084.50

obs. N4°30E

47°53
41°59
34°59
27°59
20°59
13°59
10°29
6°59
3°29
0°00



10" Corr P in fair condition Fl Lt 23' long

353
3

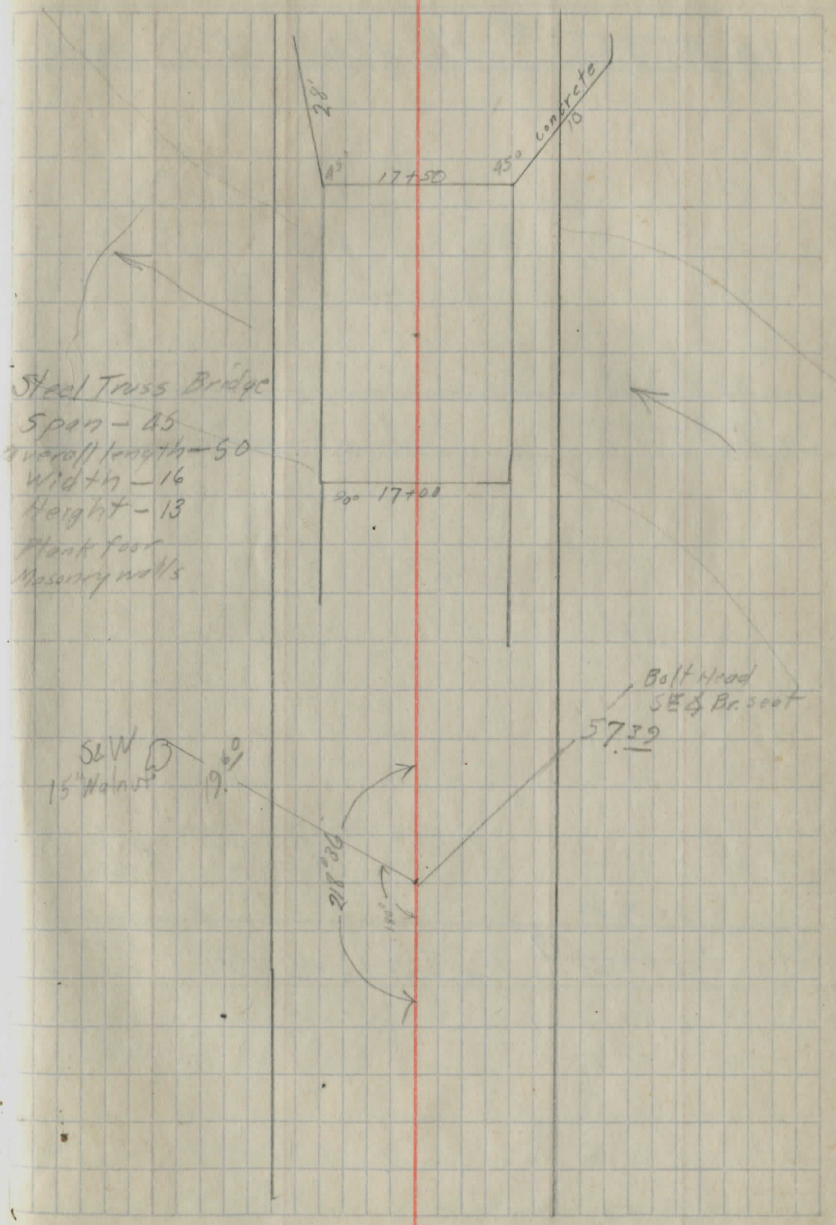
114.63
59.02
55.61
02.94
52.57

Sta 53+36.30 ~~17+24.57~~ P.O.T. Spike Round

Steel Truss Bridge
Span – 45
Overall length – 50
Width – 16
Height – 13
Plank foot
Masonry walls

Sta ~~16+48.45~~ 52+60.18 PI Def Rt 38°36' Iron Found

Curve Data
Δ = 38°36' Rt
D = 34°
T = 59.02
E = 10.53
L = 113.53
PC = ~~15+89.43~~ 52+01.16
PT = ~~17+02.96~~ 53+14.69



61785.28

Sta 257+73.55 PI Def Rt 28°33' Pipe Found

600610
229
5781

257395
234855
22540

59760.28

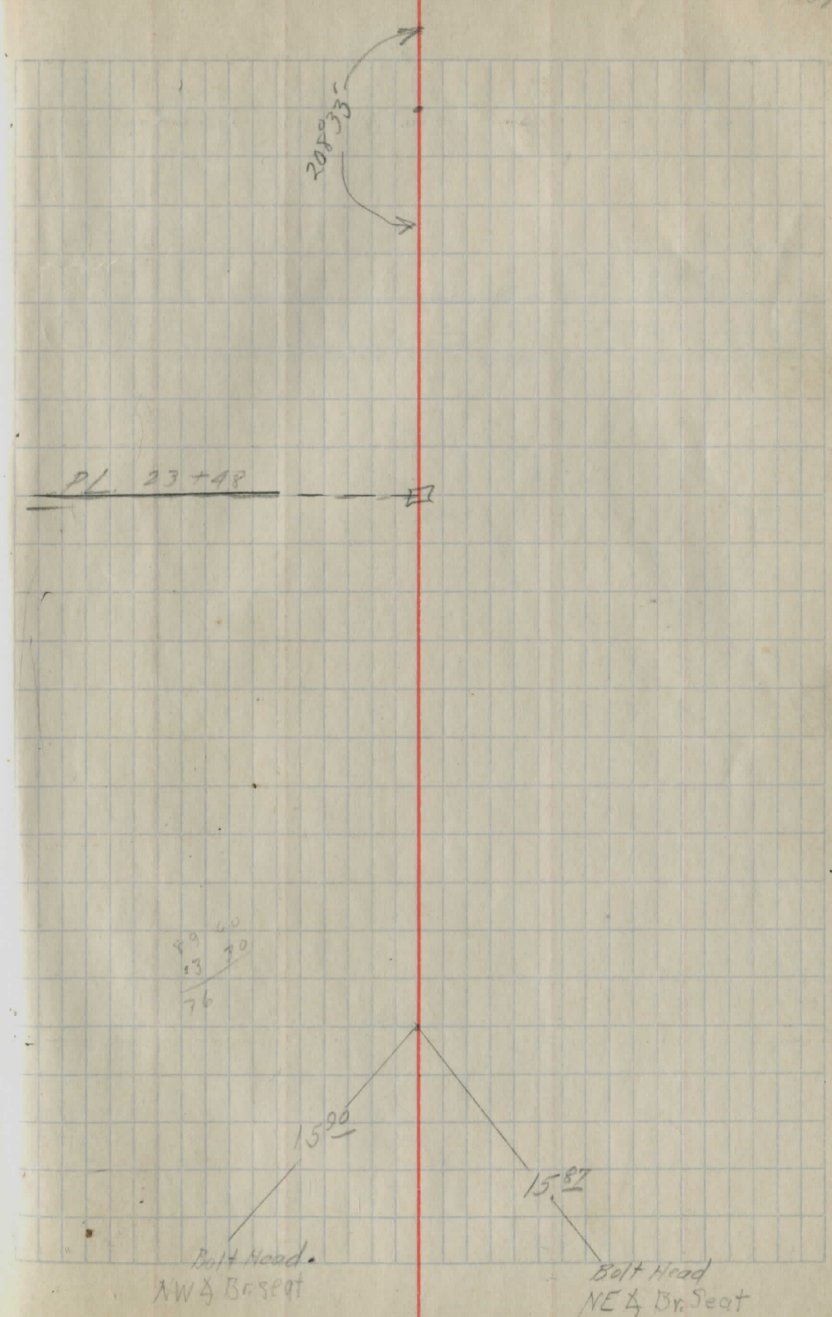
Sta 23+48.55 POT Spike Found

1762.57
585.98
2348.55

1762.57
810.98
2573.55

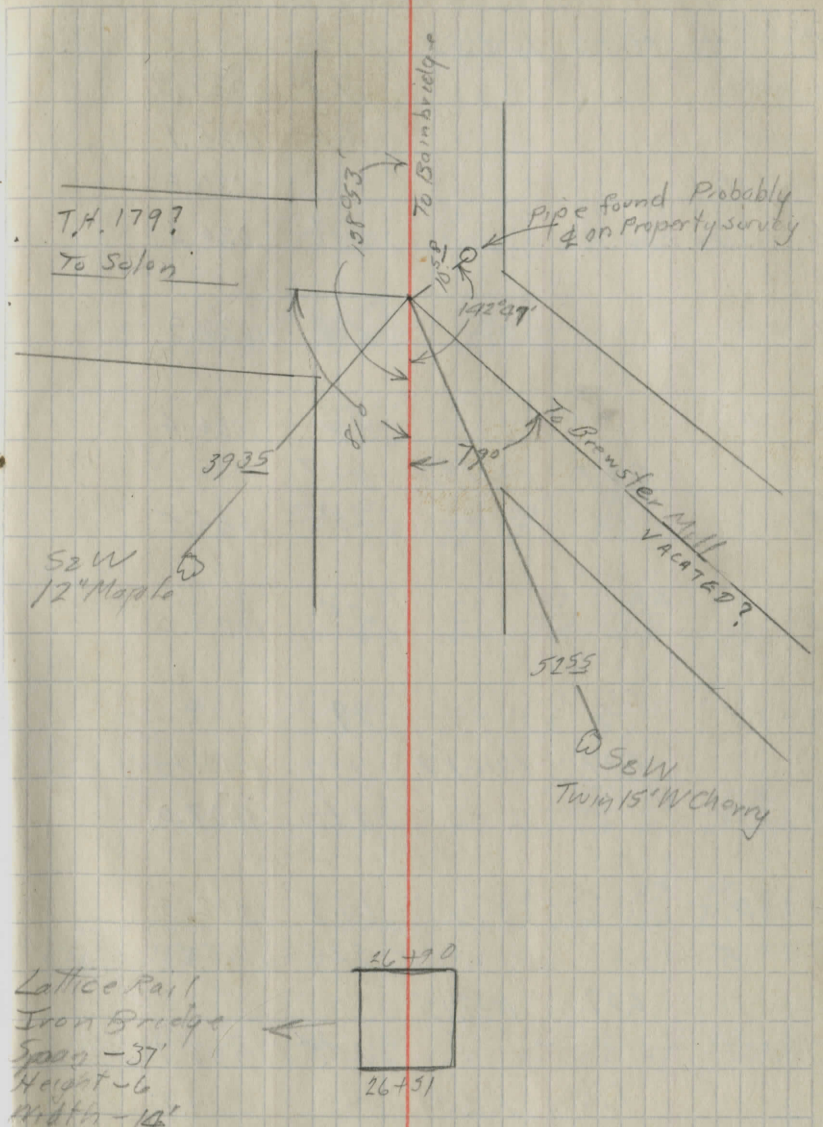
53+74.30

Sta 17+62.57 PI Def Lt 46°59 Iron Found



6997.37

Sta ~~93~~ + 85 ~~69~~ End of Imp Bolt Found



Bainbridge Geauga Lake Rd Sec C.

Cross Sections Snake Hill Bainbridge Twp

BM#4	4.66	1031.65			1026.99
0-100			7.8	1023.9	
0-200			6.6	1025.1	
0-300			0.9	1030.8	
0+00			5.4	1026.3	
1+00			4.8	1026.9	
2+00			5.3	1026.4	
	2.27	1027.85	6.07	1025.58	
3+00			2.4	1025.5	
3+50			4.4	1023.5	
3+75			9.9	18.0	
	0.17	1016.12	11.90	1015.95	
4+00			9.1	1007.0	
4+50			13.8	1002.3	
BM#5			9.24	1006.88	1006.88
	0.27	1007.15			
5+00			10.5	996.7	
	1.20	995.51	12.84	994.31	
5+50			5.8	989.7	
6+00			8.3	987.2	

2/10/34

Richey
Merritt
Pomeroy

Spike N Root 15" Maple 30' Lt ℄ Sta 0-100

— 25/3.8 12/5.4 11/6.4 8/5.3 | 3/5.4 6/6.2 8/5.1 13/4.4 25/4.1

— 28/4.6 16/4.5 13/5.5 11/4.8 | 25/5.7 —

— — 25/4.3 | 25/6.1 — —

40/1.5 25/1.9 | 25/3.1 34/2.7 41/3.1

46/13.5 35/14.8 22/9.2 11/5.1 | 12/3.2 27/2.9 42/2.8

33/1110.0 18/1103.6 17/1009.1 | 11/4.8 20/3.7 38/2.8

27/13.1 17/11.3 11/9.3 | 5/9.7 8/10.3 13/6.6 25/2.2 30/0.4 36/1018.6 46/1021.5

— — 25/999.3 | 9/12.7 16/11.9 26/12.4 29/13.0 32/11.8 43/6.5

Spike N root twin 15" Maple 75' Rt ℄ Sta 5+10

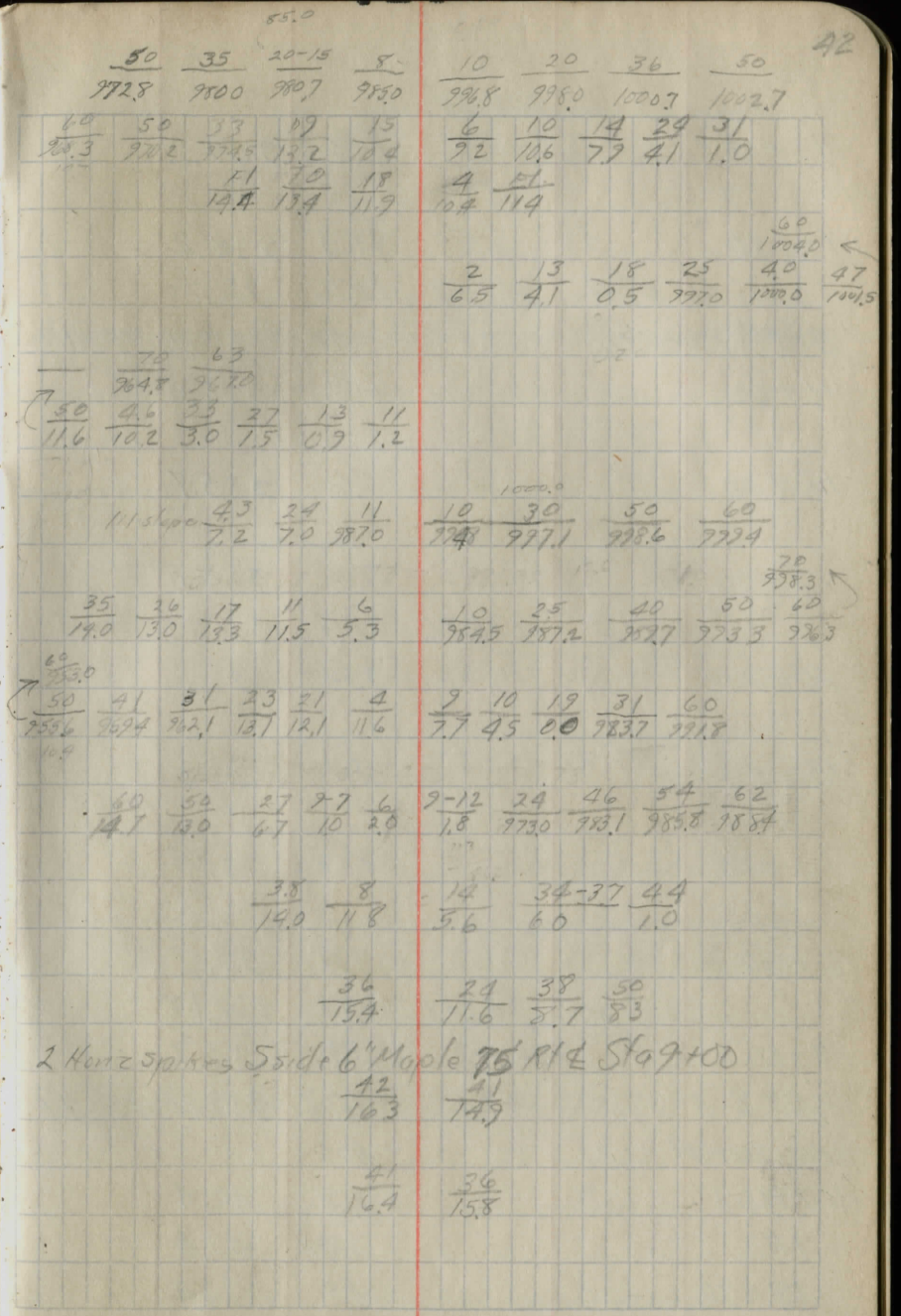
50/983.5 39/988.0 30/989.6 23/991.8 12/12.9 | 8/9.0 13/8.0 15/8.5 19/7.6 28/7.0 39/7.5

60/974.5 42/978.8 33/977.8 25/12.6 22/11.0 13/8.0 | 8/3.4 15/2.3 — 17 19/1.3 26/0.5 36/1.0

60/970.5 48/974.5 39/975.1 29/978.0 11/980.7 7/12.5 | 5/6.1 17/5.0 25/5.4 29-31/7.0

95 13 840

7+25				993.4	
6+50		995.51	9.0	986.5	
6+75	culvert		10.3	985.2	
7+00			9.0	986.5	
Top Pipe POT Sta 7+50			1.47	994.04	
	0.77	983.52	12.76	982.75	
7+00					
Top Post			4.46	979.06	979.04
7+50				991.7	
8+00			2.4	981.1	
Post	-.004	979.00			979.04
8+30			11.2	967.8	
	0.33	967.31	12.02	966.98	
8+50			1.8	965.5	
8+75			10.3	957.0	
9+00			14.6	952.7	
BM #6	1.80	967.27	1.80	965.51	965.47
10+00			15.8	951.5	
10+60			15.2	952.1	
	1.34	956.42	12.19	955.08	
	1.41	949.49	8.34	948.08	



		949.47			
11+00			0.3	949.2	
11+50			11.3	938.2	
	5.34	942.07	12.76	936.73	
BM#7			-0.37	942.44	942.44
11+60			6.3	935.8	
12+00			6.6	935.5	
13+00			7.3	934.8	
	1.13	936.96	6.24	935.83	
14+00			3.2	33.8	
15+00			4.4	32.6	
16+00			4.7	32.3	
16+50			3.4	33.6	
	11.00	943.18	4.78	932.18	
17+00			3.5 - floor	39.7	
BM#8			3.76	939.42	939.37
Bridge seat SW			4.60		
floor N end			2.8	40.4	
18			1.8	41.4	
18+30		-	0.8	42.4	

36 / 19 / 15 / 3.7
951.2 / 951.1 / 0.9 / 4.6

40 / 26 / 13 / 12 / 31
12 / 9.1 / 9.9 / 13.5 / 13.3

2 Horiz Scratches W side 6" Bolt Hex nut 0.125 Rt ± Sta 10+50
38 / 28 / 22 / 13 / 40
2.3 / 2.9 / 3.4 / 6.1 / 5.8

28 / 25
6.9 / 6.4

27 / 13 / 9 / 4 / 1 / 7 / 13 / 19 / 21
75 / 6.8 / 68 / 8.3 / 7.5 / 6.7 / 7.4 / 7.9 / 6.7

Top Boulder Sta 13+30 Rt
21 / 15 / 14-13 / 12 / 7 / 9-0 / 11-14 / 15 / 25
3.2 / 3.6 / 4.5 / 4.0 / 3.8 / 4.5 / 3.7 / 4.2 / 4.1

20 / 15 / 14-13 / 12 / 9 / 11-12 / 14 / 25
4.2 / 5.0 / 5.8 / 4.9 / 4.9 / 5.4 / 4.6 / 4.5

20 / 15 / 14-12 / 10 / 17 / 13-14 / 16 / 25
5.0 / 5.3 / 6.6 / 5.5 / 5.2 / 5.2 / 5.1 / 5.1

30 / 25 / 16 / 12 / 3 / 9 / 14 / 16-17 / 19 / 25 / 30
6.8 / 6.2 / 6.1 / 5.7 / 3.3 / 3.8 / 3.8 / 6.3 / 4.5 / 6.2 / 5.0

Level 10 / 8 / 8 / 10 Level
17.1 / 3.4 / 3.4 / 926.4

Top Vertical Bolthead SE 4 Bridge 8' Rt Sta 17+00

19+00		943.38	3.5	39.9	
20+00			3.2	40.2	
	Check Level				
BM #7	8.17	950.61		942.44	
	9.70	960.28	0.03	950.58	
	9.02	968.46	0.84	959.44	
BM #6			2.96	965.50	965.47

5-18-42
Pomeroy
Hosford

LEVELS From Culv't

B.M.	±1.87	1164.64		1162.77
B.M.			4.56	1160.08
E F.L.	0+0		7.9	1156.7
	2		9.6	1155.0
	4		10.4	1154.2
T.P.	2.23	1160.16	6.71	1157.93
	6		6.4	1153.76
	8		6.7	1153.5
	10		8.2	1152.0
T.P.	4.41	1159.27	5.30	1154.86
	12		7.7	1151.6
	14		9.4	49.9
	16	S. ch.	10.1	49.2
T.P.#1			8.50	S+k
	16	N. ch	10.3	49.0
T.P.#2	3.80	1158.35	4.72	1154.55
	18		10.2	48.2
T.P.	5.36	1152.84	10.87	1147.48
	20		6.9	45.7
	+65	F.L.	8.3	1144.5
	+65		6.7	46.1

Sta. 145±10 Brown Road easterly to Bridge Creek

Spike S. root 36" Map ±200' W of inter. Brown Rd & ±422
× N.E. ∠ of E Hdwl Culv't 145±10

chan. Bridge ck.
H_2O level (Low flood)

1152.84

T.P.	9.02	1160.65	1.21	1151.63	
T.P.	4.61	1159.63	5.63	1155.02	
T.P.	3.60	1161.70	1.53	1158.10	
			1.40	1160.30	(1160.08)

Grades for Clemens Ditch

9-1242 Pom. Clark

Stations numbered 0 to 8 at culvt

BM.	2.07	1162.15		1160.08	
T.P. (2)	1.57	1160.68	3.04	1159.11	
T.P. (8)	1.54	1157.45	4.77	1155.91	
13+0					
12				1151.65	
11					
10					
9					
8					
T.P.	4.17	1160.08	1.54	1155.91	
7					

0.2%

increasing downstream 10' off Rt.

X H.E. & E hdwl

Ground	Grade	Rod	Cuts
6.3			
5.8	51.10	6.35	4.85 = 1.5' ✓
5.0	51.3	6.15	3.65 = 2.5' ✓
5.6	51.5	5.95	2.75 = 3.0' ✓
4.6	51.7	5.75	2.25 = 3.5' ✓
3.9	51.9	5.55	1.55 4.0' ✓
6.6	52.1	7.98	3.98 4.0' ✓

		1160.08			
6					
5					
4					
3					0.2% Gr.
	3.86	1162.27	1.67	1158.41	
2					
1					
0					
BM.			2.19	1160.08	(1160.08)

Gd	Grade	Rod	Reading	Cut
6.3	1152.3	7.78	3.28 =	4.5'
5.7	52.5	7.58	3.08 =	4.5'
5.8	52.7	7.38	1.88 =	5.5
4.9	52.9	7.18	1.68 =	5.5'
6.8	53.1	9.17	3.17 =	6.0'
6.0	53.3	8.97	2.77 =	6.0'
	53.5	8.77	2.27 =	6.5'

	Profile	Benderson	Asbuilt	Centerline	Road
BM #1	8.27	1179.68			1166.41
Sta 0			5.4	66.3	
0+28					
1			6.6	68.1	
1+02			6.6	68.1	
2			5.8	68.9	
3			4.3	70.4	
4			2.5	72.2	
4+24			1.7	73.0	
5			0.4	74.3	
	7.58	1182.04	0.2±	1179.46	
6			7.1	74.9	
7			5.9	76.1	
8			4.8	77.2	
9			3.4	78.7	
10			1.6	80.4	
	11.23	1193.12	0.15	1181.89	
11			0.4	82.7	
12			7.0	86.1	
BM #2	1.59	1193.12	1.59		1191.53
13			2.5	90.6	
14			3.9	89.2	
15			4.5	88.6	
	3.92	1193.92	3.12	1190.00	
16			5.3	88.6	

Revised USGS BM #1 Chiseled Rd Imp 50'Lt & Sta 0-20

	Fl 9.7	TO	TO 9.4	Fl 10.7
Flow down ditch	Fl 9.7	TO 8.0	TO 7.9	—
Flow down ditch	Fl 3.1	TO 3.4	TO 2.5	Fl 3.7

Top 29 Boulder 20'Lt & Sta 12+80

17		1193.92	5.3	88.6	
18			5.3	88.6	
BM #3	4.12	1193.92	4.12		1189.80
19			5.8	88.1	
20			6.1	87.8	
	3.36	91.3 1193.29	5.99	1187.93	
21			3.5	87.8	
22			4.1	87.2	
23			4.8	86.5	
24			5.1	86.2	
24+67			5.1	86.2	
25			4.7	86.6	
26			4.3	87.0	
	7.57	95.3 1195.29	3.57	1187.72	
27			7.6	87.7	
28			6.7	88.6	
BM #4	2.80	1195.29	2.80		1192.49
29			5.5	89.8	
30			3.5	91.8	
31			2.6	92.7	
32			1.1	94.2	
	3.26	95.1 1198.06	0.49	1194.80	
33			3.0	95.1	
34			5.3	92.8	
35			7.1	91.0	

Spike S root 8" Maple 25' Lt ℄ Sta 18+52

$\frac{200}{8.2}$ $\frac{110}{7.8}$ FL $\frac{TO}{6.6}$ $\frac{TO}{6.1}$ FL

Spike N root 8" Apple 30' Lt ℄ Sta 28+80

36		1198.06 (98.1)	8.1	90.0	
BM #5	6.48	1198.06	6.48		1191.58
37			5.8	89.3	
	3.18	1193.52	7.72	1190.34	
38			4.6	88.9	
38+94			5.0	88.5	
39			5.0	88.5	
40			4.6	88.9	
41			3.2	90.3	
42			2.8	90.7	
	4.44	1195.61	2.35	1191.17	
43			5.0	90.6	
44			4.9	90.7	
44+78			6.7	88.9	
45			6.9	88.7	
	1.34	1184.20	12.75	1182.86	
BM #6			0.91		1183.29
46			3.2	81.0	
47			9.7	74.5	
48			12.7	71.5	
	4.84	1176.15	12.89	1171.31	check to here
48+51			5.5	70.6	
49			5.6	70.5	
50			4.3	71.8	
51			6.1	70.0	

Spike Shoot 10" Maple 30' Lt ℄ Sta 36+05

~~5~~ / 7.1	FL / 6.5	TO / 5.7	TO / 5.8	H / 6.8	TO / 7.1

(10" Corr. I.P. →)

See pg 62

℄ Haskins Rd. 100 / 5.5 — 100 / 8.1

Spike S root 24" N Cherry 25 Lt ℄ Sta 46+10

Good to 11

FL / 10.3	TO / 8.5	H / 6.0	H / 6.4	TO / 8.2	FL / 10.4

52		1176.15	10.7	65.4	
	0.28	1164.14	12.29	1163.86	
53			2.9	61.2	
54			6.3	57.8	
55			8.9	55.2	
BM #7	1.82	1155.32	1064		1153.50
55+25			2.4	52.9	
56			2.5	52.8	
57			5.8	49.5	
58			8.6	46.7	
59			11.4	43.9	
	0.86	1143.78 (13.8)	1240	1142.92	
60			2.3	41.5	
61			5.1	38.7	
62			8.0	35.8	
	0.01	1130.68 (30.7)	13.11	1130.67	
63			0.6	30.1	
64			4.7	26.0	
64+63			5.5	25.2	
65			5.4	25.3	
BM #8	3.75	1130.68	3.75		1126.93
66			3.4	27.3	
	11.75	1141.28 (41.3)	1.15	1122.53	
67			8.1	33.2	
68			3.3	38.0	

Spike N root 42' Elm 30' Rt ℄ Stg 55+30

Fl / 42 . TO / — . Tl / — . Fl / 30

Fl / 30 (Extension) TO / 40 — Fl / 12.3 — Extension

Spike SW root 42' Elm 30' Lt ℄ Stg 65+25

		41.3			
69		1141.28	1.1	40.2	
70			2.7	38.6	
		36.5			
	0.53	1136.49	5.32	1135.96	
71			2.7	33.8	
72			5.4	31.1	
73			8.6	27.9	
		24.9			
	0.53	1124.87	12.15	1124.34	
74			2.1	22.8	
75			6.9	18.0	
76			9.0	15.9	
		21.0			
	5.48	1120.97	9.38	1115.49	
77			5.8	15.2	
77+86			5.1	15.9	
78			5.3	15.7	
79			5.3	15.7	
80			4.3	16.7	
BM#9	3.04	1120.97	3.04		1117.93
81			3.3	17.7	
82			1.7	19.3	
	9.16	1129.00	1.13	1119.84	
83			8.3	20.7	
84			5.6	23.4	
85			1.8	27.2	
	5.87	1137.42	0.45	1128.55	

$\frac{Fl}{10.2}$ $\frac{To}{7.2}$ $\frac{To}{7.1}$ $\frac{Fl}{10.1}$

Spike Sroot 24" Elm 30' Lt & Sta 80+50

		1137.42			
BM #10	4.35	1137.42	4.35		1133.07
85+59			5.7	31.7	
86			4.6	32.8	
87			2.7	34.7	
88			1.2	36.2	
	10.38	1147.46 (47.5)	0.34	1137.08	
89			8.9	38.6	
89+70			7.0	40.5	
90			6.1	41.4	
BM #11	3.15	1147.46	3.15		1144.31
91			3.7	43.8	
~~92~~	11.67	1158.25	0.88	1146.58	
92			10.5	46.7	
93			5.9	52.3	
94			2.3	55.9	
	10.67	1168.77 (68.5)	0.15	1158.10	
95			9.9	58.9	
96			7.4	61.4	
97			5.0	63.8	
98			3.1	65.7	
99			2.5	66.3	
99+15			2.4	66.4	
BM #12	11.82	1178.97 (77.0)	1.62		1167.15
100			11.0	68.0	

Spike & Washer Top 24" Elm Stump 30' Rt ℄ Sta 85+40

SNYDER RD

100 / 4.6 — 100 / 6.8

El / To 11.3 — To / El 11.6

3 Horiz Spikes 10" Maple 30' Lt ℄ Sta 90+30

El / To 7.1 — To / H 26 — H / To 28 — To / El 54 — El / 7.1

Spike SE root 18" Maple 30' Lt ℄ Sta 99+60

101		72.0 1178.97	6.8	72.2	
102			2.4	76.6	
103			1.2	77.8	
103+06			1.2	77.8	
.	9.54	1188.34	0.17	1178.80	
104			9.3	79.0	
105			7.1	81.2	
106			4.6	83.7	
107			7.1	81.2	
Base Milk House			5.0	83.3	
108			12.6	75.7	
	2.42	1178.14	12.62	1175.72	
BM #13	4.21	1178.14	4.21		1173.93
109			6.2	71.9	
110			10.5	67.6	
	2.97	1168.23	12.88	1165.26	
111			4.6	63.6	
111+51			4.7	63.5	
112			4.8	63.4	
113			2.4	65.8	
T.P.			0.89	1167.34	
	13.07	1180.41			
114			10.6	69.8	
115			2.8	77.6	
	11.38	1191.49	0.30	1180.11	

Pg 7 = Alignment

Elev
63.5 = ℄ grade
1.3
62.2 = Top culvert
3
59.2 = F.L. "
4.3

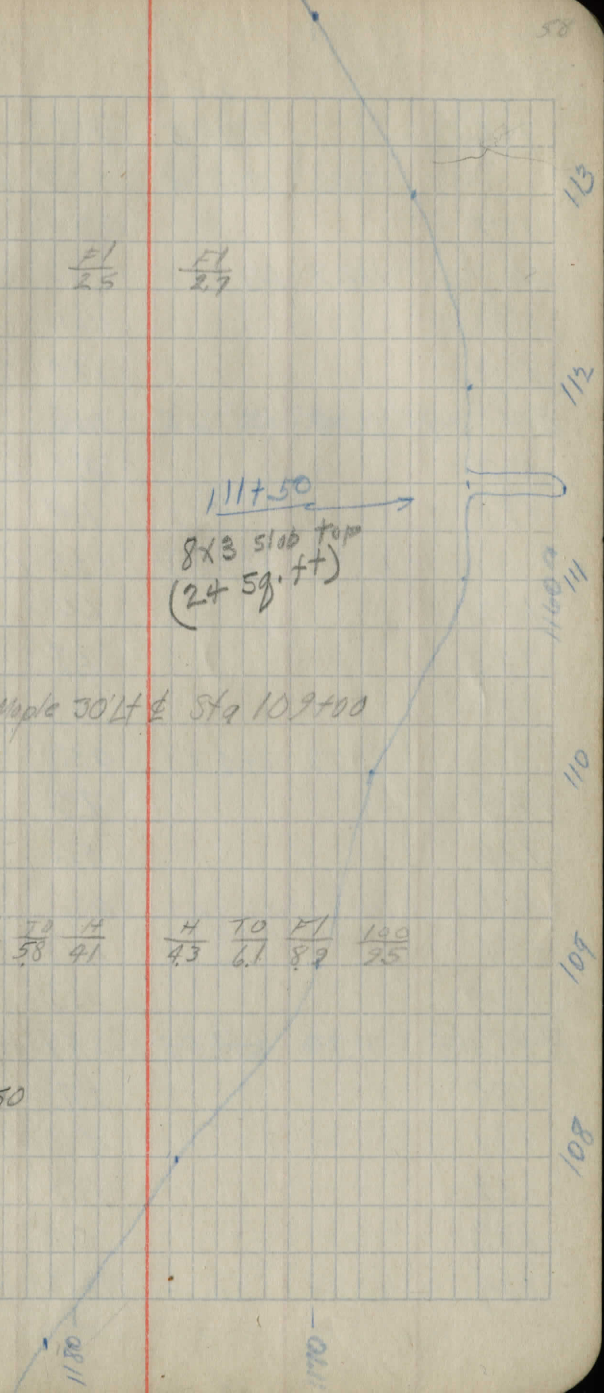
Fl 2.5 Fl 2.7

111+50
8x3 slab top
(24 sq. ft)

Spike S root 12" Maple 30' Lt ℄ Sta 109+00

El 9.6 TO 5.8 H 4.1 H 4.3 TO 6.1 Fl 8.9 100 9.5

Top rock Sta 113+50



		91.5				
116		1191.47	3.5	88.0		
	12.42	1203.84	0.07	1191.42		
117			6.5	97.3		
	11.29	1214.83	0.30	1203.54		
118			10.1	04.7		
119			4.0	10.8		
BM #14	11.55	1225.22	1.16		1213.67	Spike 5" root 20" Maple 25' Lt ℄ Sta 1197+10
120			8.2	17.0		
121			1.4	23.8		
	12.92	1236.79	36.9 1.35	1223.87		
122			6.0	30.8		
123			2.8	34.0		
124			0.9	35.9		
	8.32	1244.60	0.51	1236.28		
125			7.3	37.3		
126			5.6	39.0		
127			4.6	40.0		
128			4.0	40.6		
129			3.3	41.3		
BM #15	2.30	1244.03	2.87	1241.73		Spike 5" root 15" Maple 25' Lt ℄ Sta 1130+00
130			2.7	41.3		
131			4.0	40.0		
132			6.5	37.5		
133			10.2	33.8		
134			12.8	31.2		

		1244.03				
	0.01	1230.84	13.20	1230.83		
135			1.9	28.9		
136			3.6	-27.2		
137			6.0	24.8		
138			10.5	20.3		
BM #16	0.40	1221.12	10.12		1220.72	Spike in root 42" Elm 40' Rt & Sta 138+85
139			5.1	16.1		
140			9.5	11.6		
141			13.6	07.5		
	0.19	1208.73	12.58	1208.54		
142			44	04.3		
143			67	02.0		
144			9.0	01.7		
145			11.0	97.7		
146			12.5	96.2		
	1.17	1197.86 (97.2)	12.04	1196.69		
147			3.3	94.6		
148			4.9	93.0		
BM #17	5.55	1197.86	5.55		1192.31	Spike Snag 12" Pine 35' Lt & Sta 148+85
149			6.4	91.5		
150			7.2	90.7		
151			8.2	89.7		
	6.12	1195.73	8.25	1189.61		
151+64			6.0	89.7		

— Fl 10.7 Fl 9.7 —

152		1135.73	6.6	89.1		
153			5.6	90.1		
154			3.0	92.7		
155			2.3	93.4		
156			2.7	93.0		
	1.18	94.3 1134.29	26.2	1193.11		
157			3.4	90.9		
158			6.3	88.0		
159			10.8	83.5		
BM #8	6.49	1134.29	6.49		1187.80	Spike S side 15" Apple 30' Lt & Sta 158+40
	-0.04	1181.61	12.72	1181.57		
160			2.1	79.5		
161			5.5	76.1		
162			8.1	73.5		
163			9.5	72.1		
	2.65	73.9 1173.88	10.38	1171.23		
164			3.6	70.3		
165			4.6	69.3		
165+72			5.2	68.7		
BM #9			6.26		1167.62	X cut NW Hdwall N Headwall Culvert 38' Lt & Sta 164+80
165+25 culvert						FI 87 FI 93
166			5.6	68.3		
167			5.8	68.1		
168+00			6.0	67.9		Edge Pvt

		1173.88				
	6.65	1176.08	4.45	1169.43		
	3.87	1168.10	11.85	1164.23		
BM 20			5.29	1162.81	1162.77	Spike S root 48" Maple 30' N. ℄ Main Market 200' W of Brown's Corners Road = Main Market B.M. #19
	11/10/49	Rd.				
		5.97			How Line	10" Cow at Sta 38+94
		4.20			℄ grade	38+94
		3.85			℄ "	39+94
		2.55			℄ "	40+94
		1.90			℄	41+94
		6.13			outlet	Ditch 50 ft S ℄ ℄ at 38+94
		5.90			Ground	" " " " " " " "
		6.43			"	100 " " " " " " "
		6.50			"	150 " " " " " " "

Bench Mark Levels — Browns Cor. So. 4th Road

BM #18	2.28	1165.05			1162.77
BM #17	4.42	1164.33	4.54		1160.51
	9.55	1170.19	4.29	1160.64	
	8.06	1175.77	2.48	1167.71	
BM #16	4.20	1175.77	4.20		1171.57
	3.37	1178.23	0.91	1174.86	
	8.27	1181.67	4.83	1173.40	
BM #15	1.37	1181.82	1.22		1180.45
	7.42	1184.33	4.91	1176.91	
BM #14	9.54	1182.26	4.61		1177.72
	6.47	1175.24	0.49	1188.77	
BM #13	4.61	1195.24	4.61		1190.63
	0.03	1184.15	11.12	1184.12	
	0.57	1178.40	6.32	1177.83	
	7.60	1180.66	5.34	1173.06	
BM #11	1.66	1180.14	2.18		1178.48
	0.01	1171.38	8.77	1171.37	
	0.28	1164.31	7.35	1164.03	
BM #10	5.58	1164.31	5.58		1158.73
	2.10	1156.75	9.66	1154.65	
	0.51	1144.60	12.66	1144.09	
BM #9	1.84	1144.60	1.84		1142.76
	0.73	1132.71	12.62	1131.98	
	4.06	1125.97	10.80	1121.91	
BM #8	4.99	1125.97	4.99		1120.98

Spike S root 48" Maple 30' Rt & 200' W of Brown's Cor. Road = Main Market BM. #19

X cor. NE Cor. NE Wing Culvert Sta 145+10

Spike W root 12" Maple 30' Rt & Sta 132+90

Spike W root 24" Maple 30' Rt & Sta 121+75

Spike E root 48" Elm 30' Lt & Sta 112+85

Top 24" Boulder 30' Rt & Sta 105+25

Top std. stake Sta 101

Spike W root 18" Elm 25' Rt & Sta 89+35

2 Horiz. Spikes W side 10" Elm 25' Rt & Sta 77+85

Spike SE root 20" Hickory 40' Lt & Sta 72+20

Top 18" Boulder 23' Rt & Sta 63+55

Elev (?) Use 1120.90

		1125.97				
	2.31	1122.77	5.51	1120.46		
BM #7			11.78		1110.99	X cut NE Cor E Headwall Sta 56+55
	9.13	1120.12				
	8.66	1126.78	1.80	1118.32		
BM #6	6.25	1122.09	11.14		1115.84	X cut SW Cor W Headwall Sta 49+05
	11.27	1132.75	0.61	1121.48		
	11.38	1143.70	0.43	1132.32		
	12.71	1156.19	0.22	1143.48		
	8.60	1164.18	0.61	1155.58		
BM #5	5.56	1164.18	5.56		1158.62	Spike NE root 18" W Cherry 45 Lt ± Sta 38+85
	3.28	1164.13	3.33	1160.85		
	4.01	1161.74	6.40	1157.73		
	12.52	1174.25	0.01	1161.73		
BM #4	9.80	1174.25	9.80		1164.45	Spike E root 15" W Cherry 25' Rt ± Sta 27+40
	2.85	1177.09	0.01	1174.24		
	4.22	1169.88	11.43	1165.66		
BM #3	11.39	1169.88	11.39		1158.49	2 Horiz Spikes 6" W Cherry 20' Rt ± Sta 21+15
	12.36	1172.58	9.66	1160.22		
	13.14	1185.18	0.54	1172.04		
	11.85	1196.34	0.69	1184.49		
BM #2	10.40	1205.84	0.90		1195.44	Spike SE root 36" Elm 25 Lt ± Sta 9+20
	12.90	1218.40	0.34	1205.50		
	6.23	1224.20	0.43	1217.97		
BM #1			3.60		1220.60	Spike NE root 15" Maple 30' S.W. Sta 0+00

	Profile	Levels	Browns Cor	South Road
BM#1	360	122420		1220.60
0+00			4.1	20.1
1			4.7	19.5
2			4.9	19.3
3			7.4	16.8
	0.71	1217.37	7.54	1216.66
4			3.4	14.0
5			6.6	10.8
6			11.7	05.7
	0.72	120522	12.87	1204.50
7			3.2	02.0
8			7.0	98.2
9			10.8	94.4
BM#2			9.79	1195.43 1195.44
	0.12	1193.09	12.25	1192.97
10			1.8	91.3
11			4.2	88.9
12			6.4	86.7
13			9.4	83.7
	0.75	1183.93	9.91	1183.18
14			4.4	79.5
15			6.8	77.1
14+94	culvert		6.7	77.2
16			9.5	74.4
	0.43	1172.38	11.98	1171.95

3/7/34

Richey
Goodrich
Pomeroy

65

West $\frac{100}{6.0}$ $\frac{100}{4.5}$ South

$\frac{El}{7.7}$ $\frac{El}{79}$

		1172.38 (7.2.9)			
17			1.1	71.3	
18			7.2	65.2	
P 19			11.9	60.5	
19	3.20	1163.67 (6.3.7)	11.91	1160.47	
Pond			6.3	57.4	
20			4.5	59.2	
20+32	culvert		4.5	59.2	
21			4.7	59.0	
BM #3			5.19	1158.48	1158.92
22			1.4	62.3	
	10.05	1173.44	0.28	1163.39	
23			6.6	66.8	
24			2.8	70.6	
	2.68	1175.84	0.28	1173.16	
25			1.3	74.5	
26			3.5	72.3	
27			12.0	63.8	
BM #4			11.39	1164.45	1164.45
	2.03	1164.99 (6.5.0)	12.88	1162.96	
28			7.8	57.2	
29			9.9	55.1	
29+16	culvert		10.0	55.0	
30			9.6	55.4	
31			8.1	56.9	
32			3.4	61.6	

Fl / 7.4 — Fl / 7.5 — 100 / 10.0

Fl. / 12.0 — Fl / 11.6

		1164.99			
33			5.4	59.6	
	6.29	1166.00	5.28	1159.71	
34			6.9	59.1	
34+20	culvert		7.0	59.0	
35			6.6	59.4	
36			4.3	61.7	
37			5.1	60.9	
38			6.4	59.6	
BM#5	2.26	1160.88	7.36	1158.64	1158.62
39			1.9	59.0	
40			3.2	57.7	
	0.43	1148.91	12.40	1148.48	
41			1.1	47.8	
42			8.5	40.4	
	1.47	1138.95	11.43	1137.48	
43			4.5	34.4	
44			9.2	29.7	
	0.94	1127.07	12.82	1126.13	
45			1.7	25.4	
46			8.1	19.0	
47			10.6	16.5	
48			12.6	14.5	
49			12.4	14.7	
BM#6	7.32	1123.17	11.32	1115.85	1115.84
49+05	culvert			14.7	

Fl 8.7 Fl 9.2

Fl 13.3 FP 9.6 FP 9.5 Fl 13.3

		23.2 1123.17			
50			9.2	140	
51			6.1	17.1	
T2	4.48	26.3 1126.26	1.39	1121.78	
52			3.0	23.3	
53			1.7	24.6	
54			9.4	16.9	
	1.42	1115.13	12.55	1113.71	
55			3.2	11.9	
56			4.6	10.5	
+55			4.9	10.2	
BM #7	4.10	1115.13	4.10	1111.03	1110.99
57			4.7	10.4	
58			2.8	12.3	
	10.48	1124.15	1.91	1113.22	
58+15	Side	Road	10.7	13.4	
59			6.6	17.5	
60			4.9	19.2	
61			4.4	19.7	
62			3.9	20.2	
63			3.3	20.8	
BM #8			3.25	1120.90	1120.98
	5.40	1126.30			
64			5.2	21.1	
65			5.1	21.2	
66			4.6	21.7	

200/9.1 100/8.7 FI/9.4 IO/6.0 TO/6.1 EI/8.9

100/11.7 100/6.2

← Elev. (3) Use 1120.90

		1126.30			
67			3.2	231	
68			0.7	25.6	
	12.88	1138.42	0.76	1125.54	
69			5.6	29.8	
70			3.4	35.0	
70+93	culvert		1.4	1137.0	
	12.23	1149.63	1.02	1137.90	
BM #9			6.85	1142.78	1142.76
71			12.4	37.2	
72			9.4	40.2	
73			3.3	46.3	
	11.03	1160.54	0.12	1149.51	
74			7.3	53.2	
75			4.9	55.6	
75+70			5.0	55.5	
76			5.2	55.3	
77			4.3	56.2	
BM #10	7.95	1166.68 (66.7)	1.80	1158.74	1158.73
78			8.7	58.0	
79			7.0	59.7	
80			4.9	61.8	
81			3.5	63.2	
82			2.3	64.4	
83			0.4	66.3	
	9.38	1175.72	0.34	1166.34	

$\frac{Fl}{5.4}$ $\frac{7.2}{5.4}$ $\frac{7.0}{3.6}$ $\frac{Fl}{5.8}$

$\frac{Fl}{7.7}$ $\frac{Fl}{7.1}$

		1175.72			
84			7.6	68.1	
85			5.7	70.0	
86			3.7	72.0	
87			1.6	74.1	
	7.56	1182.69 (827)	0.59	1175.13	
88			6.7	76.0	
89			4.9	77.8	
BM #11			4.16	1178.53	1178.48
90			3.4	79.3	
91			3.4	79.3	
92			6.7	76.0	
	2.26	1178.29 (783)	6.66	1176.03	
93			4.1	74.2	
94			4.7	73.6	
95			5.3	73.0	
96			5.4	72.9	
97			5.2	73.1	
BM #12	5.46	1178.88 (789)	4.87	1173.42	
97+15					
98			5.4	73.5	
99			4.7	74.2	
100			3.7	75.2	
101			2.4	76.5	
102			1.4	77.5	
	9.84	1187.98	0.74	1178.14	

Taylor Mag = 110+48.08

See page 11-12-13 levels drainage 97+10 ± vicinity

2 Horiz. Spikes 6" Elm 90' RT ℄ Sta 97+20
Ditch to Right

14	100	300
7.4	7.6	8.4

		880 1187.98			
103			9.3	78.7	
104			6.8	81.2	
105			2.0	86.0	
	7.38	94.6 1194.58	0.78	1187.20	
B.M. # 13			4.02	1190.56	1190.63
106			4.7	89.9	
107			4.1	90.5	
108			5.6	89.0	
109			8.4	86.2	
110			9.9	84.7	
	2.29	1187.15	9.72	1184.86	
110+15	culvert		2.6	84.5	
110+48			3.5	83.6	
111			4.8	82.3	
112			5.7	81.4	
B.M. = 14	4.24	1183.92	7.47	1179.68	1179.72
113			3.4	80.5	
114			4.3	79.6	
115			4.5	79.4	
116			5.8	78.1	
117			7.1	76.8	
118			7.4	76.5	
118+24			7.7	76.2	
	6.06	1182.35	7.63	1176.29	
119			5.9	76.4	

$\frac{TO}{5.3}$ $\frac{TO}{3.8}$ $\left(\frac{FI}{4.7}\right)$

$\frac{100}{6.1}$ $\frac{100}{0.0}$

$\frac{FI}{10.5}$ $\frac{FI}{10.6}$

		1182.35			
120			5.2	77.1	
121			3.8	78.5	
BM #15			1.72	1180.43	1180.45
122			2.8	79.5	
123			4.5	77.8	
	0.24	1178.96 (73.0)	3.63	1178.72	
124			3.0	76.0	
125			4.9	74.1	
126			5.9	73.1	
126+99			6.0	73.0	
127			6.0	73.0	
128			5.9	73.1	
	7.38	1180.11	6.23	1172.73	
129			6.8	73.3	
130			6.0	74.1	
131			4.9	75.2	
132			7.9	72.2	
BM #16	1.89	1173.44	8.56	1171.55	1171.57
133			3.3	70.1	
134			4.6	68.8	
135			5.6	67.8	
136			6.4	67.0	
137			6.8	66.6	
	1.55	1167.32	7.67	1165.77	
138			2.3	65.0	

$\frac{Fl.}{7.8}$ $\frac{Fl}{80}$

		1167.32			
139			4.4	62.9	
140			5.8	61.5	
141			6.6	60.7	
142			7.1	60.2	
	4.03	1164.38 (14.4)	6.77	1160.35	
143			4.6	59.8	
144			4.5	59.9	
145			4.0	60.4	
BM #17			3.84	1160.54	1160.51
145+10			4.0	60.4	
146			4.5	59.9	
147			4.5	59.9	
148			4.2	60.2	
149			3.9	60.5	
150			3.1	61.3	
150+15			2.8	61.6	
BM #18			1.62	1162.76	1162.77

$\frac{FI}{7.9}$ $\frac{TO}{4.9}$ $\frac{TO}{5.1}$ $\frac{FI}{8.2}$

$\frac{100}{2.4}$ $\frac{100}{3.1}$

				State	grade	
BM 13	0.78	1174.71		1173.93		
	9.15	1173.24	10.62	1164.09		
112			9.45	63.79	116372	F 0.13
+50			8.34	64.90	116480	C 0.10
113			6.48	66.76	116636	C 0.40
+50			4.63	68.61	116861	C 0.00
114			3.00	70.24	117155	F 1.31
+50	12.12	1183.72	1.64	1171.60		
			10.10	73.62	117518	F 1.56
115			5.74	77.98	117947	F 1.49
+50	8.61	1190.67	1.66	182.06	118399	F 1.93
116			2.07	88.60	118850	C 0.10

Stinking ditch S side from Timmons east ± 1000'

Fresh tirds in S ditch east of Brandt

scrape ± 2' sod front of Brandts

BM Check Levels from Shepherds Corners

BM #7	5.76	104.526			1039.50
	4.39	104.687	2.78	1042.48	
BM #7	~~3.48~~	~~104.687~~	3.48	104339	Corrected Elev 1043.35
	~~3.49~~	~~104.456~~	6.00	104057	
BM #2	4.06	104112	~~5.26~~	~~1038.10~~	Corrected Elev 1037.06
	1.84	103029	12.67	1028.45	
BM #3	6.02	1030.29	6.02		1024.27
	8.99	1038.28	1.00	1029.29	
	3.53	1031.46	10.35	1027.93	
BM #4	4.47	1031.46	4.47		1026.99
	2.23	1027.33	6.36	1025.10	
	0.15	1015.42	12.06	1015.27	
BM #5	8.54	1015.42	8.54		1006.88
	0.96	1003.44	12.94	1002.48	
	1.63	991.96	13.11	990.33	
	0.88	980.30	12.54	979.42	
TP	1.26	980.30	1.26		979.04
	1.10	968.67	12.73	967.57	
BM #6	3.20	968.67	3.20		965.47
	0.98	956.73	12.92	955.75	
	-0.11	944.24	12.60	944.13	
BM #7	1.57	944.21	1.57		942.64
	2.57	938.31	8.47	935.74	
	10.59	943.98	4.92	933.39	
BM #8			4.41		939.57
	54.57		162.14		

2/9/34 Richey Goodrich 76

North to Snake Hill

Spike in S root 24" Ash 350' East of Shepherds Corners Sta 54+40 Pa Moine Rd I mp.

Spike NE root 20" Elm 30' Lt & 600' ± North

Spike N root 18" Maple 60' Rt & Sendcurve 800' North

Spike E root 24" Maple 75' SW intersection Jackson Road

Spike W root 15" Maple 30' Lt & 100' South Sta 0+00

Spike N root twin 15" Maples 40' Rt & Sta 5+10

Top fencepost 30' Lt Sta 9+30

32.50
21.50
11.06
5.03
28.03

2 Horiz spikes S side 6" Maple Sta 9+60 25' Rt &

Corrected Elev 942.44

2 Horiz Butternut
Spike W Side 6" ~~Catalpa~~ Sta 10+50 / 25' Rt &

Corrected Elev 939.37

Bolt head on bridge shoe SE Cor bridge

Check Level

BM #4	918	1036.17		1026.99	
	1.45	1033.58	4.04	1032.13	
BM #3	7.33	1031.59	932	1024.26	1024.27
	965	1040.82	042	1031.17	
BM #2	5.28	1042.28	382	1037.00	1037.06
	7.30	1045.98	3.60	1038.68	
BM #1	~~2.69~~	~~1047.00~~	2.69	1043.29	1043.35
			~~6.18~~	~~[illegible]~~	~~[illegible]~~
	~~3.48~~	~~1043.18~~	~~7.30~~	~~1032.90~~	
~~BM 2~~			~~5.15~~	~~1038.03~~	~~1038.10~~
BM 1	to this elevation			43.39	
	4.20	1047.59			
	6.10	1043.75	9.94	1037.65	
BM 7			4.21	1039.54	1039.50

385.29
45
30.29
39 84.52
37
225.77

KEITH'S RAILROAD CURVE TABLES.

Published by KEUFFEL & ESSER CO., New York.

HOW TO USE KEITH'S TABLES.

EXAMPLE.

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

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

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

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

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

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

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

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

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

(These tables are published in Field Books of
KEUFFEL & ESSER Co., New York, N. Y.)

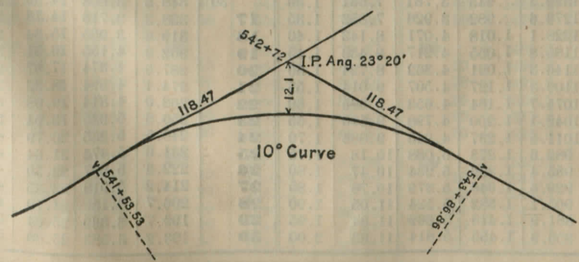


Table I. — Minutes in Decimals of a Degree.

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

Table II. — Inches in Decimals of a Foot.

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

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

Table III. — Radii, Ordinates and Deflections.

Deg.	Radius	Mid. Ord.	Tan. Def.	Chd. Def.	Def. for 1 Foot	Deg.	Radius	Mid. Ord.	Tan. Def.	Chd. Def.	Def. for 1 Foot
0° 10′	34377.	.036	.145	.291	0.05′	7°	819.0	1.528	6.105	12.21	2.10′
20	17189.	.073	.291	.582	0.10	20′	781.8	1.600	6.395	12.79	2.20
30	11459.	.109	.436	.873	0.15	30	764.5	1.637	6.540	13.08	2.25
40	8594.4	.145	.582	1.164	0.20	40	747.9	1.673	6.685	13.37	2.30
50	6875.5	.182	.727	1.454	0.25	8	716.8	1.746	6.976	13.95	2.40
1	5729.6	.218	.873	1.745	0.30	20	688.2	1.819	7.266	14.53	2.50
10	4911.2	.255	1.018	2.036	0.35	30	674.7	1.855	7.411	14.82	2.55
20	4297.3	.291	1.164	2.327	0.40	40	661.7	1.892	7.556	15.11	2.60
30	3819.8	.327	1.309	2.618	0.45	9	637.3	1.965	7.846	15.69	2.70
40	3437.9	.364	1.454	2.909	0.50	20	614.6	2.037	8.136	16.27	2.80
50	3125.4	.400	1.600	3.200	0.55	30	603.8	2.074	8.281	16.56	2.85
2	2864.9	.436	1.745	3.490	0.60	40	593.4	2.110	8.426	16.85	2.90
10	2644.6	.473	1.891	3.781	0.65	10	573.7	2.183	8.716	17.43	3.00
20	2455.7	.509	2.036	4.072	0.70	30	546.4	2.292	9.150	18.30	3.15
30	2292.0	.545	2.181	4.363	0.75	11	521.7	2.402	9.585	19.16	3.30
40	2148.8	.582	2.327	4.654	0.80	30	499.1	2.511	10.02	20.04	3.45
50	2022.4	.618	2.472	4.945	0.85	12	478.3	2.620	10.45	20.91	3.60
3	1910.1	.655	2.618	5.235	0.90	30	459.3	2.730	10.89	21.77	3.75
10	1809.6	.691	2.763	5.526	0.95	13	441.7	2.839	11.32	22.64	3.90
20	1719.1	.727	2.908	5.817	1.00	30	425.4	2.949	11.75	23.51	4.05
30	1637.3	.764	3.054	6.108	1.05	14	410.3	3.058	12.18	24.37	4.20
40	1562.9	.800	3.199	6.398	1.10	30	396.2	3.168	12.62	25.24	4.35
50	1495.0	.836	3.345	6.689	1.15	15	383.1	3.277	13.05	26.11	4.50
4	1432.7	.873	3.490	6.980	1.20	30	370.8	3.387	13.49	26.97	4.65
10	1375.4	.909	3.635	7.271	1.25	16	359.3	3.496	13.92	27.84	4.80
20	1322.5	.945	3.781	7.561	1.30	30	348.5	3.606	14.35	28.70	4.95
30	1273.6	.982	3.926	7.852	1.35	17	338.3	3.716	14.78	29.56	5.10
40	1228.1	1.018	4.071	8.143	1.40	18	319.6	3.935	15.64	31.29	5.40
50	1185.8	1.055	4.217	8.433	1.45	19	302.9	4.155	16.51	33.01	5.70
5	1146.3	1.091	4.362	8.724	1.50	20	287.9	4.374	17.37	34.73	6.00
10	1109.3	1.127	4.507	9.014	1.55	21	274.4	4.594	18.22	36.44	6.30
20	1074.7	1.164	4.653	9.305	1.60	22	262.0	4.814	19.08	38.16	6.60
30	1042.1	1.200	4.798	9.596	1.65	23	250.8	5.035	19.94	39.87	6.90
40	1011.5	1.237	4.943	9.886	1.70	24	240.5	5.255	20.79	41.58	7.20
50	982.6	1.273	5.088	10.18	1.75	25	231.0	5.476	21.64	43.28	7.50
6	955.4	1.309	5.234	10.47	1.80	26	222.3	5.697	22.50	44.99	7.80
10	929.6	1.346	5.379	10.76	1.85	27	214.2	5.918	23.35	46.69	8.10
20	905.1	1.382	5.524	11.05	1.90	28	206.7	6.139	24.19	48.38	8.40
30	881.9	1.418	5.669	11.34	1.95	29	199.7	6.360	25.04	50.07	8.70
40	859.9	1.455	5.814	11.63	2.00	30	193.2	6.583	25.88	51.76	9.00

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

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

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

Angle	Tangent	External	Angle	Tangent	External	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	483.4	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	2o31.1	534.2	40	3154.2	810.9
50	1963.6	327.1	50	2541.0	538.2	50	3165.1	816.1
38	1972.9	330.2	**48**	2551.0	542.2	**58**	3176.0	821.4
10	1982.2	333.2	10	2561.0	546.3	10	3186.9	826.7
20	1991.5	336.3	20	2571.0	550.4	20	3197.8	832.0
30	2000.9	339.3	30	2581.0	554.5	30	3208.8	837.3
40	2010.2	342.4	40	2591.0	558.6	40	3219.7	842.7
50	2019.6	345.5	50	2601.1	562.8	50	3230.7	848.1
39	2029.0	348.6	**49**	2611.2	566.9	**59**	3241.7	853.5
10	2038.4	351.8	10	2621.2	571.1	10	3252.7	858.9
20	2047.8	354.9	20	2631.3	575.3	20	3263.7	864.3
30	2057.2	358.1	30	2641.4	579.5	30	3274.8	869.8
40	2066.6	361.3	40	2651.5	583.8	40	3285.8	875.3
50	2076.0	364.5	50	2661.6	588.0	50	3296.9	880.8
40	2085.4	367.7	**50**	2671.8	592.3	**60**	3308.0	886.4
10	2094.9	371.0	10	2681.9	596.6	10	3319.1	892.0
20	2104.3	374.2	20	2692.1	600.9	20	3330.3	897.5
30	2113.8	377.5	30	2702.3	605.3	30	3341.4	903.2
40	2123.3	380.8	40	2712.5	609.6	40	3352.6	908.8
50	2132.7	384.1	50	2722.7	614.0	50	3363.8	914.5

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

Angle	Tangent	External	Angle	Tangent	External	Angle	Tangent	External
61°	3375.0	920.2	**71°**	4086.9	1308.2	**81°**	4893.6	1805.3
10′	3386.3	925.9	10′	4099.5	1315.6	10′	4908.0	1814.7
20	3397.5	931.6	20	4112.1	1322.9	20	4922.5	1824.1
30	3408.8	937.3	30	4124.8	1330.3	30	4937.0	1833.6
40	3420.1	943.1	40	4137.4	1337.7	40	4951.5	1843.1
50	3431.4	948.9	50	4150.1	1345.1	50	4966.1	1852.6
62	3442.7	954.8	**72**	4162.8	1352.6	**82**	4980.7	1862.2
10	3454.1	960.6	10	4175.6	1360.1	10	4995.4	1871.8
20	3465.4	966.5	20	4188.5	1367.6	20	5010.0	1881.5
30	3476.8	972.4	30	4201.2	1375.2	30	5024.8	1891.2
40	3488.3	978.3	40	4214.0	1382.8	40	5039.5	1900.9
50	3499.7	984.3	50	4226.8	1390.4	50	5054.3	1910.7
63	3511.1	990.2	**73**	4239.7	1398.0	**83**	5069.2	1920.5
10	3522.6	996.2	10	4252.6	1405.7	10	5084.0	1930.4
20	3534.1	1002.3	20	4265.6	1413.5	20	5099.0	1940.3
30	3545.6	1008.3	30	4278.5	1421.2	30	5113.9	1950.3
40	3557.2	1014.4	40	4291.5	1429.0	40	5128.9	1960.2
50	3568.7	1020.5	50	4304.6	1436.8	50	5143.9	1970.3
64	3580.3	1026.6	**74**	4317.6	1444.6	**84**	5159.0	1980.4
10	3591.9	1032.8	10	4330.7	1452.5	10	5174.1	1990.5
20	3603.5	1039.0	20	4343.8	1460.4	20	5189.3	2000.6
30	3615.1	1045.2	30	4356.9	1468.4	30	5204.4	2010.8
40	3626.8	1051.4	40	4370.1	1476.4	40	5219.7	2021.1
50	3638.5	1057.7	50	4383.3	1484.4	50	5234.9	2031.4
65	3650.2	1063.9	**75**	4396.5	1492.4	**85**	5250.3	2041.7
10	3661.9	1070.2	10	4409.8	1500.5	10	5265.6	2052.1
20	3673.7	1076.6	20	4423.1	1508.6	20	5281.0	2062.5
30	3685.4	1082.9	30	4436.4	1516.7	30	5296 4	2073.0
40	3697.2	1089.3	40	4449.7	1524.9	40	5311.9	2083.5
50	3709.0	1095.7	50	4463.1	1533.1	50	5327.4	2094.1
66	3720.9	1102.2	**76**	4476.5	1541.4	**86**	5343.0	2104.7
10	3732.7	1108.6	10	4489.9	1549.7	10	5358.6	2115.3
20	3744.6	1115.1	20	4503.4	1558.0	20	5374.2	2126.0
30	3756.5	1121.7	30	4516.9	1566.3	30	5389.9	2136.7
40	3768.5	1128.2	40	4530.4	1574.7	40	5405.6	2147.5
50	3780.4	1134.8	50	4544.0	1583.1	50	5421.4	2158.4
67	3792.4	1141.4	**77**	4557.6	1591.6	**87**	5437.2	2169.2
10	3804.4	1148.0	10	4571.2	1600.1	10	5453.1	2180.2
20	3816.4	1154.7	20	4584.8	1608.6	20	5469.0	2191.1
30	3828.4	1161.3	30	4598.5	1617.1	30	5484.9	2202.2
40	3840.5	1168.1	40	4612.2	1625.7	40	5500.9	2213.2
50	3852.6	1174.8	50	4626.0	1634.4	50	5517.0	2224.3
68	3864.7	1181.6	**78**	4639.8	1643.0	**88**	5533.1	2235.5
10	3876.8	1188.4	10	4653.6	1651.7	10	5549.2	2246.7
20	3889.0	1195.2	20	4667.4	1660.5	20	5565.4	2258.0
30	3901.2	1202.0	30	4681.3	1669.2	30	5581.6	2269.3
40	3913.4	1208.9	40	4695.2	1678.1	40	5597.8	2280.6
50	3925.6	1215.8	50	4709.2	1686.9	50	5614.2	2292.0
69	3937.9	1222.7	**79**	4723.2	1695.8	**89**	5630.5	2303.5
10	3950.2	1229.7	10	4737.2	1704.7	10	5646.9	2315.0
20	3962.5	1236.7	20	4751.2	1713.7	20	5663.4	2326.6
30	3974.8	1243.7	30	4765.3	1722.7	30	5679.9	2338.2
40	3987.2	1250.8	40	4779.4	1731.7	40	5696.4	2349.8
50	3999.5	1257.9	50	4793.6	1740.8	50	5713.0	2361.5
70	4011.9	1265.0	**80**	4807.7	1749.9	**90**	5729.7	2373.3
10	4024.4	1272.1	10	4822.0	1759.0	10	5746.3	2385.1
20	4036.8	1279.3	20	4836.2	1768.2	20	5763.1	2397.0
30	4049.3	1286.5	30	4850.5	1777.4	30	5779.9	2408.9
40	4061.8	1293.6	40	4864.8	1786.7	40	5796.7	2420.9
50	4074.4	1300.9	50	4879.2	1796.0	50	5813.6	2432.9

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

Angle	Tangent	External	Angle	Tangent	External	Angle	Tangent	External
91°	5830.5	2444.9	**101°**	6950.6	3278.1	**111°**	8336.7	4386.1
10′	5847.5	2457.1	10′	6971.3	3294.1	10′	8362.7	4407.6
20	5864.6	2469.3	20	6992.0	3310.1	20	8388.9	4429.2
30	5881.7	2481.5	30	7012.7	3326.1	30	8415.1	4450.9
40	5898.8	2493.8	40	7033.6	3342.3	40	8441.5	4472.7
50	5916.0	2506.1	50	7054.5	3358.5	50	8468.0	4494.6
92	5933.2	2518.5	**102**	7075.5	3374.9	**112**	8494.6	4516.6
10	5950.5	2531.0	10	7096.6	3391.2	10	8521.3	4538.8
20	5967.9	2543.5	20	7117.8	3407.7	20	8548.1	4561.1
30	5985.3	2556.0	30	7139.0	3424.3	30	8575.0	4583.4
40	6002.7	2568.6	40	7160.3	3440.9	40	8602.1	4606.0
50	6020.2	2581.3	50	7181.7	3457.6	50	8629.3	4628.6
93	6037.8	2594.0	**103**	7203.2	3474.4	**113**	8656.6	4651.3
10	6055.4	2606.8	10	7224.7	3491.3	10	8684.0	4674.2
20	6073.1	2619.7	20	7246.3	3508.2	20	8711.5	4697.2
30	6090.8	2632.6	30	7268.0	3525.2	30	8739.2	4720.3
40	6108.6	2645.5	40	7289.8	3542.4	40	8767.0	4743.6
50	6126.4	2658.5	50	7311.7	3559.6	50	8794.9	4766.9
94	6144.3	2671.6	**104**	7333.6	3576.8	**114**	8822.9	4790.4
10	6162.6	2684.7	10	7355.6	3594.2	10	8851.0	4814.1
20	6180.2	2697.9	20	7377.8	3611.7	20	8879.3	4837.8
30	6198.3	2711.2	30	7399.9	3629.2	30	8907.7	4861.7
40	6216.4	2724.5	40	7422.2	3646.8	40	8936.3	4885.7
50	6234.6	2737.9	50	7444.6	3664.5	50	8965.0	4909.9
95	6252.8	2751.3	**105**	7467.0	3682.3	**115**	8993.8	4934.1
10	6271.1	2764.8	10	7489.6	3700.2	10	9022.7	4958.6
20	6289.4	2778.3	20	7512.2	3718.2	20	9051.7	4983.1
30	6307.9	2792.0	30	7534.9	3736.2	30	9080.9	5007.8
40	6326.3	2805.6	40	7557.7	3754.4	40	9110.3	5032.6
50	6344.8	2819.4	50	7580.5	3772.6	50	9139.8	5057.6
96	6363.4	2833.2	**106**	7603.5	3791.0	**116**	9169.4	5082.7
10	6382.1	2847.0	10	7626.6	3809.4	10	9199.1	5107.9
20	6400.8	2861.0	20	7649.7	3827.9	20	9229.0	5133.3
30	6419.5	2875.0	30	7672.9	3846.5	30	9259.0	5158.8
40	6438.4	2889.0	40	7696.3	3865.2	40	9289.2	5184.5
50	6457.3	2903.1	50	7719.7	3884.0	50	9319.5	5210.3
97	6476.2	2917.3	**107**	7743.2	3902.9	**117**	9349.9	5236.2
10	6495.2	2931.6	10	7766.8	3921.9	10	9380.5	5262.3
20	6514.3	2945.9	20	7790.5	3940.9	20	9411.3	5288.6
30	6533.4	2960.3	30	7814.3	3960.1	30	9442.2	5315.0
40	6552.6	2974.7	40	7838.1	3979.4	40	9473.2	5341.5
50	6571.9	2989.2	50	7862.1	3998.7	50	9504.4	5368.2
98	6591.2	3003.8	**108**	7886.2	4018.2	**118**	9535.7	5395.1
10	6610.6	3018.4	10	7910.4	4037.8	10	9567.2	5422.1
20	6630.1	3033.1	20	7934.6	4057.4	20	9598.9	5449.2
30	6649.6	3047.9	30	7959.0	4077.2	30	9630.7	5476.5
40	6669.2	3062.8	40	7983.5	4097.1	40	9662.6	5504.0
50	6688.8	3077.7	50	8008.0	4117.0	50	9694.7	5531.7
99	6708.6	3092.7	**109**	8032.7	4137.1	**119**	9727.0	5559.4
10	6728.4	3107.7	10	8057.4	4157.3	10	9759.4	5587.4
20	6748.2	3122.9	20	8082.3	4177.5	20	9792.0	5615.5
30	6768.1	3138.1	30	8107.3	4197.9	30	9824.8	5643.8
40	6788.1	3153.3	40	8132.3	4218.4	40	9857.7	5672.3
50	6808.2	3168.7	50	8157.5	4239.0	50	9890.8	5700.9
100	6828.3	3184.1	**110**	8182.8	4259.7	**120**	9924.0	5729.7
10	6848.5	3199.6	10	8208.2	4280.5	10	9957.5	5758.6
20	6868.8	3215.1	20	8233.7	4301.4	20	9991.0	5787.7
30	6889.2	3230.8	30	8259.3	4322.4	30	10025.0	5817.0
40	6909.6	3246.5	40	8285.0	4343.6	40	10059.0	5846.5
50	6930.1	3262.3	50	8310.8	4364.8	50	10093.0	5876.1

Table V. Corrections for use with Table IV,

For Tangents Add

△ Angle / 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	4.49	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

For Externals Add

Angle / 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

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

Degree of Curve	Radius 50 / sin. def. ang.	½ sub chord / R = sin of def. angle				Length of arc for 100 ft.
		12.5 Ft.	15 Ft.	20 Ft.	25 Ft.	
30°	193.18	1° 51′	2° 17′	2° 58′	3° 43′	101.15
32°	181.39	1° 59′	2° 25′	3° 10′	3° 58′	101.33
34°	171.01	2° 06′	2° 33′	3° 21′	4° 12′	101.48
36°	161.80	2° 13′	2° 41′	3° 33′	4° 26′	101.66
38°	153.58	2° 20′	2° 49′	3° 44′	4° 40′	101.85
40°	146.19	2° 27′	2° 57′	3° 55′	4° 54′	102.06
42°	139.52	2° 34′	3° 05′	4° 07′	5° 08′	102.29
44°	133.47	2° 41′	3° 13′	4° 18′	5° 22′	102.53
46°	127.97	2° 48′	3° 21′	4° 29′	5° 36′	102.76
48°	122.92	2° 55′	3° 29′	4° 40′	5° 50′	103.00
50°	118.31	3° 02′	3° 38′	4° 51′	6° 04′	103 24
52°	114.06	3° 09′	3° 46′	5° 02′	6° 17′	103 54
54°	110.11	3° 16′	3° 54′	5° 13′	6° 31′	103.84
56°	106.50	3° 22′	4° 02′	5° 23′	6° 44′	104.14
58°	103.14	3° 29′	4° 10′	5° 34′	6° 57′	104.43
60°	100.00	3° 35′	4° 18′	5° 44′	7° 11′	104.72

CURVE FORMULAS.

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

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

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

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

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

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

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

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

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

$\text{No. chords} = \frac{\frac{1}{2} I}{D}$

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

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

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

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

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

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

To find angle for a given distance and deflection.

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

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

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

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

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

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

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

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

Natural Sines

DEG.	0′	10′	20′	30′	40′	50′	DEG.	DEG.	0′	10′	20′	30′	40′	50′	DEG.
0	0000	0029	0058	0087	0116	0145	89	40	6428	6450	6472	6494	6517	6539	49
1	0175	0204	0233	0262	0291	0320	88	41	6561	6583	6604	6626	6648	6670	48
2	0349	0378	0407	0436	0465	0494	87	42	6691	6713	6734	6756	6777	6799	47
3	0523	0552	0581	0610	0640	0669	86	43	6820	6841	6862	6884	6905	6926	46
4	0698	0727	0756	0785	0814	0843	85	44	6947	6967	6988	7009	7030	7050	45
5	0872	0901	0929	0958	0987	1016	84	45	7071	7092	7112	7133	7153	7173	44
6	1045	1074	1103	1132	1161	1190	83	46	7193	7214	7234	7254	7274	7294	43
7	1219	1248	1276	1305	1334	1363	82	47	7314	7333	7353	7373	7392	7412	42
8	1392	1421	1449	1478	1507	1536	81	48	7431	7451	7470	7490	7509	7528	41
9	1564	1593	1622	1650	1679	1708	80	49	7547	7566	7585	7604	7623	7642	40
10	1736	1765	1794	1822	1851	1880	79	50	7660	7679	7698	7716	7735	7753	39
11	1908	1937	1965	1994	2022	2051	78	51	7771	7790	7808	7826	7844	7862	38
12	2079	2108	2136	2164	2193	2221	77	52	7880	7898	7916	7934	7951	7969	37
13	2250	2278	2306	2334	2363	2391	76	53	7986	8004	8021	8039	8056	8073	36
14	2419	2447	2476	2504	2532	2560	75	54	8090	8107	8124	8141	8158	8175	35
15	2588	2616	2644	2672	2700	2728	74	55	8192	8208	8225	8241	8258	8274	34
16	2756	2784	2812	2840	2868	2896	73	56	8290	8307	8323	8339	8355	8371	33
17	2924	2952	2979	3007	3035	3062	72	57	8387	8403	8418	8434	8450	8465	32
18	3090	3118	3145	3173	3201	3228	71	58	8480	8496	8511	8526	8542	8557	31
19	3256	3283	3311	3338	3365	3393	70	59	8572	8587	8601	8616	8631	8646	30
20	3420	3448	3475	3502	3529	3557	69	60	8660	8675	8689	8704	8718	8732	29
21	3584	3611	3638	3665	3692	3719	68	61	8746	8760	8774	8788	8802	8816	28
22	3746	3773	3800	3827	3854	3881	67	62	8829	8843	8857	8870	8884	8897	27
23	3907	3934	3961	3987	4014	4041	66	63	8910	8923	8936	8949	8962	8975	26
24	4067	4094	4120	4147	4173	4200	65	64	8988	9001	9013	9026	9038	9051	25
25	4226	4253	4279	4305	4331	4358	64	65	9063	9075	9088	9100	9112	9124	24
26	4384	4410	4436	4462	4488	4514	63	66	9135	9147	9159	9171	9182	9194	23
27	4540	4566	4592	4617	4643	4669	62	67	9205	9216	9228	9239	9250	9261	22
28	4695	4720	4746	4772	4797	4823	61	68	9272	9283	9293	9304	9315	9325	21
29	4848	4874	4899	4924	4950	4975	60	69	9336	9346	9356	9367	9377	9387	20
30	5000	5025	5050	5075	5100	5125	59	70	9397	9407	9417	9426	9436	9446	19
31	5150	5175	5200	5225	5250	5275	58	71	9455	9465	9474	9483	9492	9502	18
32	5299	5324	5348	5373	5398	5422	57	72	9511	9520	9528	9537	9546	9555	17
33	5446	5471	5495	5519	5544	5568	56	73	9563	9572	9580	9588	9596	9605	16
34	5592	5616	5640	5664	5688	5712	55	74	9613	9621	9628	9636	9644	9652	15
35	5736	5760	5783	5807	5831	5854	54	75	9659	9667	9674	9681	9689	9696	14
36	5878	5901	5925	5948	5972	5995	53	76	9703	9710	9717	9724	9730	9737	13
37	6018	6041	6065	6088	6111	6134	52	77	9744	9750	9757	9763	9769	9775	12
38	6157	6180	6202	6225	6248	6271	51	78	9781	9787	9793	9799	9805	9811	11
39	6293	6316	6338	6361	6383	6406	50	79	9816	9822	9827	9833	9838	9843	10
DEG.	60′	50′	40′	30′	20′	10′	DEG.	DEG.	60′	50′	40′	30′	20′	10′	DEG.

DEG.	0′	10′	20′	30′	40′	50′	DEG.
80	9848	9853	9858	9863	9868	9872	9
81	9877	9881	9886	9890	9894	9899	8
82	9903	9907	9911	9914	9918	9922	7
83	9925	9929	9932	9936	9939	9942	6
84	9945	9948	9951	9954	9957	9959	5
85	9962	9964	9967	9969	9971	9974	4
86	9976	9978	9980	9981	9983	9985	3
87	9986	9988	9989	9990	9992	9993	2
88	9994	9995	9996	9997	9997	9998	1
89	9998	9999	9999	9999	1.0000	1.0000	0
DEG.	60′	50′	40′	30′	20′	10′	DEG.

Natural Cosines

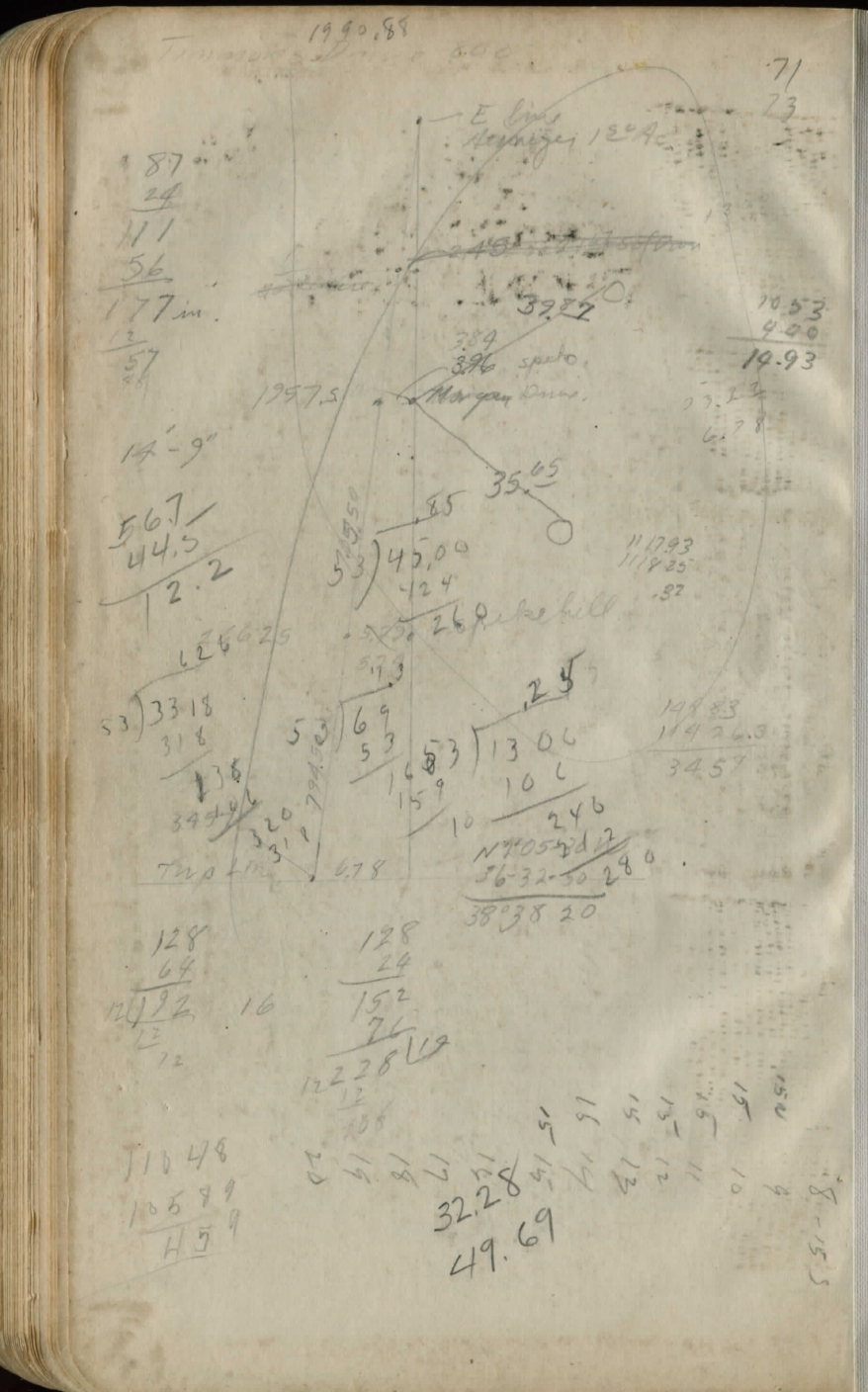
Natural Tangents

DEG.	0′	10′	20′	30′	40′	50′	DEG.
0	0000	0029	0058	0087	0116	0145	89
1	0175	0204	0233	0262	0291	0320	88
2	0349	0378	0407	0437	0466	0495	87
3	0524	0553	0582	0612	0641	0670	86
4	0699	0729	0758	0787	0816	0846	85
5	0875	0904	0934	0963	0992	1022	84
6	1051	1080	1110	1139	1169	1198	83
7	1228	1257	1287	1317	1346	1376	82
8	1405	1435	1465	1495	1524	1554	81
9	1584	1614	1644	1673	1703	1733	80
10	1763	1793	1823	1853	1883	1914	79
11	1944	1974	2004	2035	2065	2095	78
12	2126	2156	2186	2217	2247	2278	77
13	2309	2339	2370	2401	2432	2462	76
14	2493	2524	2555	2586	2617	2648	75
15	2679	2711	2742	2773	2805	2836	74
16	2867	2899	2931	2962	2994	3026	73
17	3057	3089	3121	3153	3185	3217	72
18	3249	3281	3314	3346	3378	3411	71
19	3443	3476	3508	3541	3574	3607	70
20	3640	3673	3706	3739	3772	3805	69
21	3839	3872	3906	3939	3973	4006	68
22	4040	4074	4108	4142	4176	4210	67
23	4245	4279	4314	4348	4383	4417	66
24	4452	4487	4522	4557	4592	4628	65
25	4663	4699	4734	4770	4806	4841	64
26	4877	4913	4950	4986	5022	5059	63
27	5095	5132	5169	5206	5243	5280	62
28	5317	5354	5392	5430	5467	5505	61
29	5543	5581	5619	5658	5696	5735	60
30	5774	5812	5851	5890	5930	5969	59
31	6009	6048	6088	6128	6168	6208	58
32	6249	6289	6330	6371	6412	6453	57
33	6494	6536	6577	6619	6661	6703	56
34	6745	6787	6830	6873	6916	6959	55
35	7002	7046	7089	7133	7177	7221	54
36	7265	7310	7355	7400	7445	7490	53
37	7536	7581	7627	7673	7720	7766	52
38	7813	7860	7907	7954	8002	8050	51
39	8098	8146	8195	8243	8292	8342	50
DEG.	60′	50′	40′	30′	20′	10′	DEG.

DEG.	0′	10′	20′	30′	40′	50′	DEG.
40	8391	8441	8491	8541	8591	8642	49
41	8693	8744	8796	8847	8899	8952	48
42	9004	9057	9110	9163	9217	9271	47
43	9325	9380	9435	9490	9545	9601	46
44	9657	9713	9770	9827	9884	9942	45
45	1.0000	1.0058	1.0117	1.0176	1.0235	1.0295	44
46	1.0355	1.0416	1.0477	1.0533	1.0599	1.0661	43
47	1.0724	1.0786	1.0850	1.0913	1.0977	1.1041	42
48	1.1106	1.1171	1.1237	1.1303	1.1369	1.1436	41
49	1.1504	1.1571	1.1640	1.1708	1.1778	1.1847	40
50	1.1918	1 1988	1.2059	1.2131	1.2203	1.2276	39
51	1.2349	1.2423	1.2497	1.2572	1.2647	1.2723	38
52	1.2799	1.2876	1.2954	1.3032	1.3111	1.3190	37
53	1.3270	1.3351	1.3432	1.3514	1.3597	1.3680	36
54	1.3764	1.3848	1,3934	1.4019	1.4106	1.4193	35
55	1.4281	1.4370	1.4460	1.4550	1.4641	1.4733	34
56	1.4826	1.4919	1.5013	1.5108	1.5204	1.5301	33
57	1.5399	1.5497	1.5597	1.5697	1.5798	1.5900	32
58	1,6003	1.6107	1.6212	1.6319	1.6426	1.6534	31
59	1.6643	1 6753	1.6864	1.6977	1.7090	1.7205	30
60	1.7321	1.7437	1.7556	1.7675	1.7797	1.7917	29
61	1.8040	1.8165	1.8291	1.8418	1.8546	1.8676	28
62	1.8807	1.8940	1.9074	1.9210	1.9347	1.9486	27
63	1.9626	1.9768	1.9912	2.0057	2.0204	2.0353	26
64	2.0503	2.0655	2.0809	2.0965	2.1123	2.1283	25
65	2.1445	2.1609	2.1775	2.1943	2.2113	2.2286	24
66	2.2460	2.2637	2.2817	2.2998	2.3183	2.3369	23
67	2.3559	2.3750	2.3945	2.4142	2.4342	2.4545	22
68	2.4751	2.4960	2.5172	2.5386	2.5605	2.5826	21
69	2.6051	2 6279	2.6511	2.6746	2.6985	2.7228	20
70	2.7475	2.7725	2.7980	2.8239	2.8502	2.8770	19
71	2.9042	2.9319	2.9600	2.9887	3.0178	3.0475	18
72	3.0777	3.1084	3.1397	3.1716	3.2041	3.2371	17
73	3.2709	3.3052	3.3402	3.3759	3.4124	3.4495	16
74	3.4874	3.5261	3.5656	3.6059	3.6470	3.6891	15
75	3.7321	3.7760	3.8208	3.8667	3.9136	3.9617	14
76	4.0108	4.0611	4.1126	4.1653	4.2193	4.2747	13
77	4.3315	4.3897	4.4494	4.5107	4.5736	4.6382	12
78	4.7046	4.7729	4.8430	4.9152	4.9894	5.0658	11
79	5.1446	5.2257	5,3093	5.3955	5.4845	5.5764	10
DEG.	60′	50′	40′	30′	20′	10′	DEG.

DEG.	0′	10′	20′	30′	40′	50′	DEG.
80	5.6713	5.7694	5.8708	5.9758	6.0844	6.1970	9
81	6.3138	6.4348	6.5606	6.6912	6.8269	6.9682	8
82	7.1154	7.2687	7.4287	7.5958	7.7704	7.9530	7
83	8.1443	8.3450	8.5555	8.7769	9.0098	9.2553	6
84	9.5144	9.7882	10.078	10.385	10.711	11.059	5
85	11.430	11.826	12.250	12.706	13.197	13.727	4
86	14.300	14.924	15.605	16.350	17.169	18.075	3
87	19.081	20.206	21.470	22.903	24.542	26.432	2
88	28.636	31.242	34.368	38.189	42.964	49.104	1
89	57.290	68.750	85.940	114.588	171.885	343.77	0
DEG.	60′	50′	40′	30′	20′	10′	DEG.

Natural Cotangents



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

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

ROADWAY 14 FEET WIDE. SIDE SLOPES 1½ TO 1.
FOR SOLID TRAP EMBANKMENT.

	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
0	7.0	7.2	7.3	7.5	7.6	7.8	7.9	8.1	8.2	8.4	0
1	8.5	8.7	8.8	9.0	9.1	9.3	9.4	9.6	9.7	9.9	1
2	10.0	10.2	10.3	10.5	10.6	10.8	10.9	11.1	11.2	11.4	2
3	11.5	11.7	11.8	12.0	12.1	12.3	12.4	12.6	12.7	12.9	3
4	13.0	13.2	13.3	13.5	13.6	13.8	13.9	14.1	14.2	14.4	4
5	14.5	14.7	14.8	15.0	15.1	15.3	15.4	15.6	15.7	15.9	5
6	16.0	16.2	16.3	16.5	16.6	16.8	16.9	17.1	17.2	17.4	6
7	17.5	17.7	17.8	18.0	18.1	18.3	18.4	18.6	18.7	18.9	7
8	19.0	19.2	19.3	19.5	19.6	19.8	19.9	20.1	20.2	20.4	8
9	20.5	20.7	20.8	21.0	21.1	21.3	21.4	21.6	21.7	21.9	9
10	22.0	22.2	22.3	22.5	22.6	22.8	22.9	23.1	23.2	23.4	10
11	23.5	23.7	23.8	24.0	24.1	24.3	24.4	24.6	24.7	24.9	11
12	25.0	25.2	25.3	25.5	25.6	25.8	25.9	26.1	26.2	26.4	12
13	26.5	26.7	26.8	27.0	27.1	27.3	27.4	27.6	27.7	27.9	13
14	28.0	28.2	28.3	28.5	28.6	28.8	28.9	29.1	29.2	29.4	14
15	29.5	29.7	29.8	30.0	30.1	30.3	30.4	30.6	30.7	30.9	15
16	31.0	31.2	31.3	31.5	31.6	31.8	31.9	32.1	32.2	32.4	16
17	32.5	32.7	32.8	33.0	33.1	33.3	33.4	33.6	33.7	33.9	17
18	34.0	34.2	34.3	34.5	34.6	34.8	34.9	35.1	35.2	35.4	18
19	35.5	35.7	35.8	36.0	36.1	36.3	36.4	36.6	36.7	36.9	19
20	37.0	37.2	37.3	37.5	37.6	37.8	37.9	38.1	38.2	38.4	20
21	38.5	38.7	38.8	39.0	39.1	39.3	39.4	39.6	39.7	39.9	21
22	40.0	40.2	40.3	40.5	40.6	40.8	40.9	41.1	41.2	41.4	22
23	41.5	41.7	41.8	42.0	42.1	42.3	42.4	42.6	42.7	42.9	23
24	43.0	43.2	43.3	43.5	43.6	43.8	43.9	44.1	44.2	44.4	24
25	44.5	44.7	44.8	45.0	45.1	45.3	45.4	45.6	45.7	45.9	25
26	46.0	46.2	46.3	46.5	46.6	46.8	46.9	47.1	47.2	47.4	26
27	47.5	47.7	47.8	48.0	48.1	48.3	48.4	48.6	48.7	48.9	27
28	49.0	49.2	49.3	49.5	49.6	49.8	49.9	50.1	50.2	50.4	28
29	50.5	50.7	50.8	51.0	51.1	51.3	51.4	51.6	51.7	51.9	29
30	52.0	52.2	52.3	52.5	52.6	52.8	52.9	53.1	53.2	53.4	30
31	53.5	53.7	53.8	54.0	54.1	54.3	54.4	54.6	54.7	54.9	31
32	55.0	55.2	55.3	55.5	55.6	55.8	55.9	56.1	56.2	56.4	32
33	56.5	56.7	56.8	57.0	57.1	57.3	57.4	57.6	57.7	57.9	33
34	58.0	58.2	58.3	58.5	58.6	58.8	58.9	59.1	59.2	59.4	34
35	59.5	59.7	59.8	60.0	60.1	60.3	60.4	60.6	60.7	60.9	35
36	61.0	61.2	61.3	61.5	61.6	61.8	61.9	62.1	62.2	62.4	36

Calculated by Julien A. Hall, M. Am. Soc. C. E.

MADE IN GERMANY.

R.