TRANSIT BOOK

365

TABLES FOR EXCAVATIONS AND EMBANKMENTS.

DISTANCES FROM CENTER OF ROADWAY FOR CROSS SECTIONING.
ROADWAY 18 FEET WIDE. SIDE SLOPES 1 TO 1
FOR LONG HAUL BACK EXCAVATION.

	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
0	9.0	9.1	9.2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	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

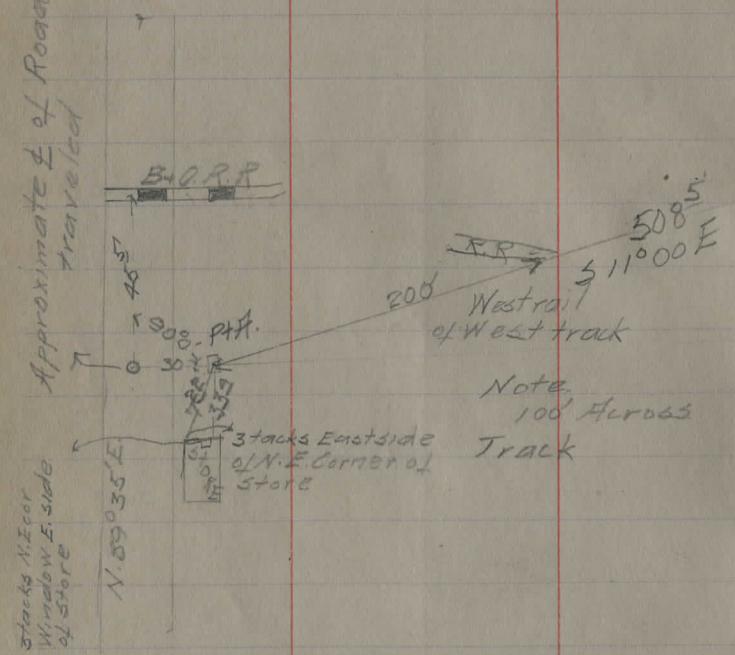
Calculated by Julien A. Hall, M. Am. Soc. C. E.

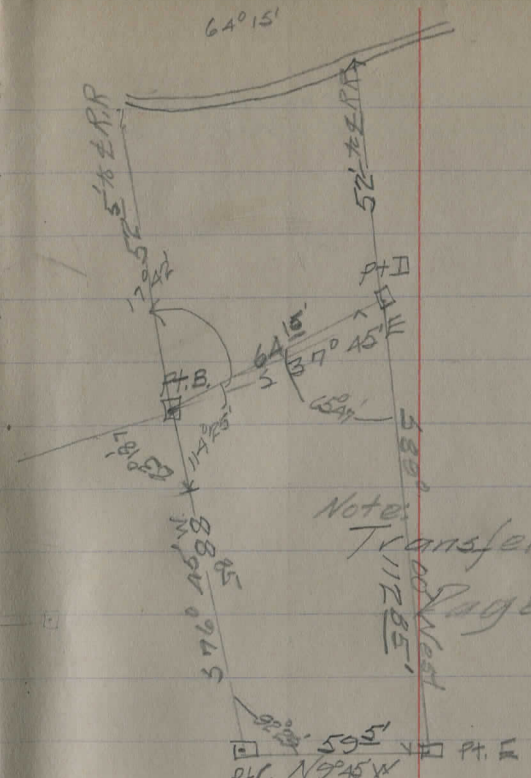
For Keith's Railroad Curve Tabels see end of book.

Contents Book 55

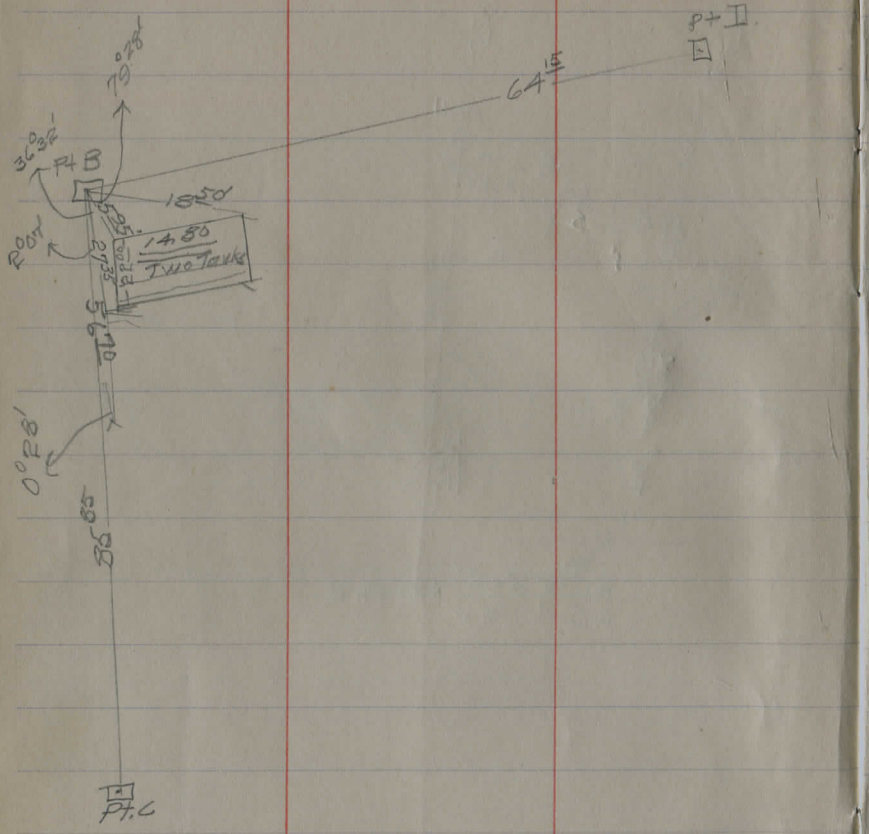
Pereference of WILDER & MITCHELL'S MILL intersection - Pg 66

Standard Oil Co. Burton Sta. 0
5/20/14 Smith-Hart Hot

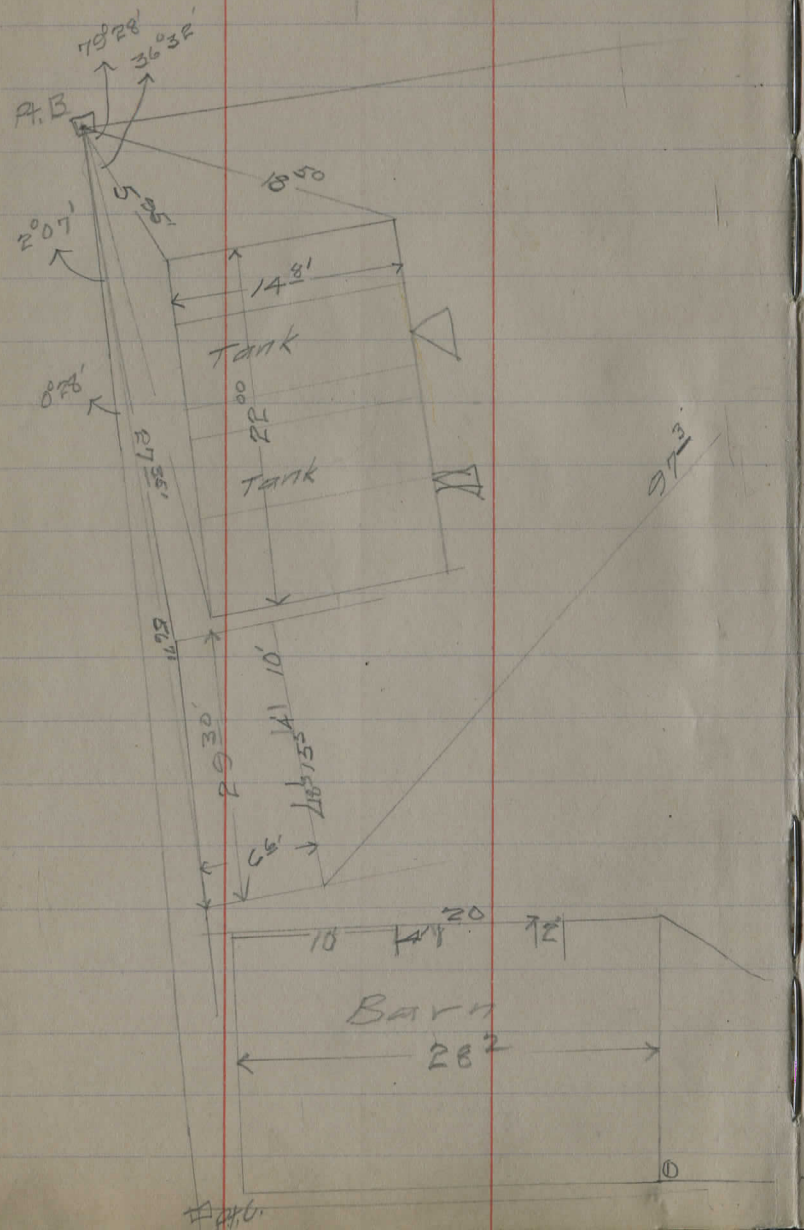


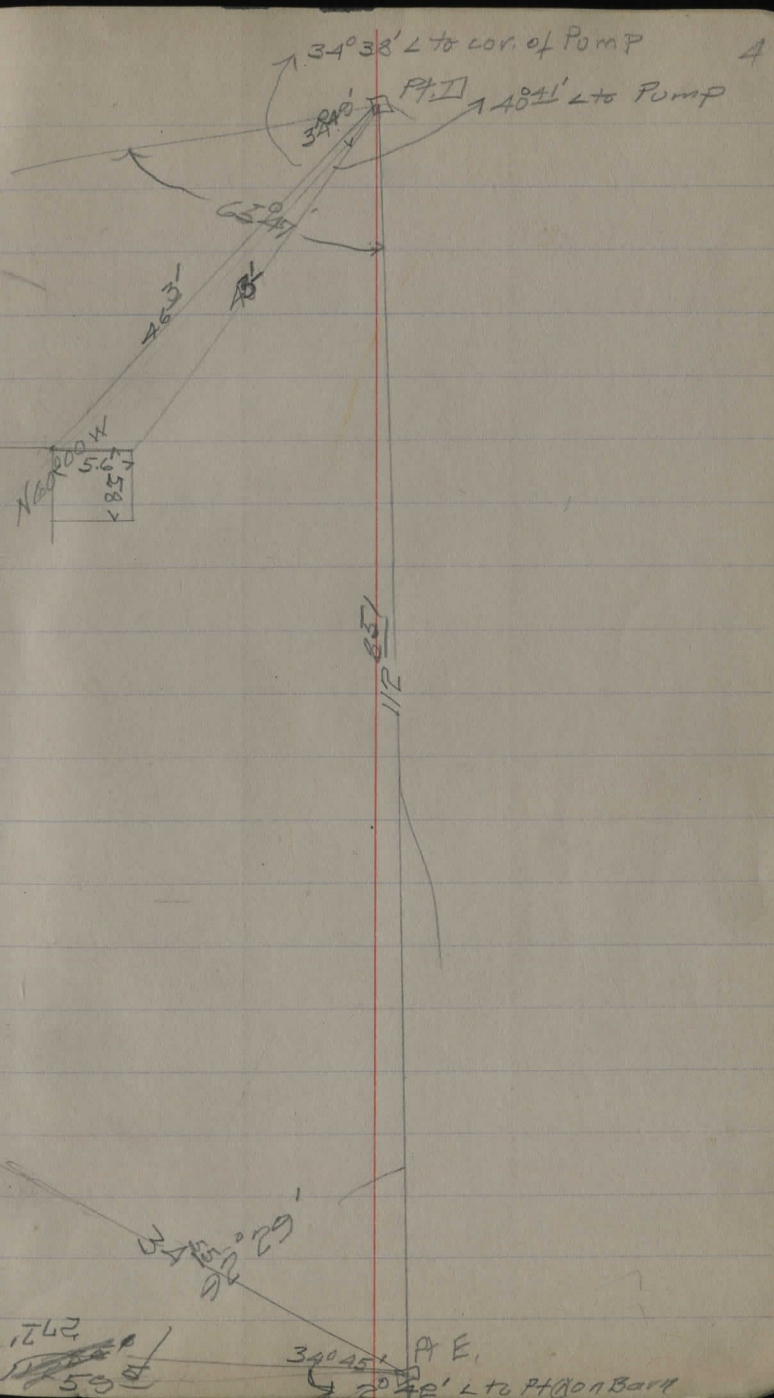


Note All angle are with reference
To Line between Pt B. & Pt. C. as base line



Note: See Preceding page





4

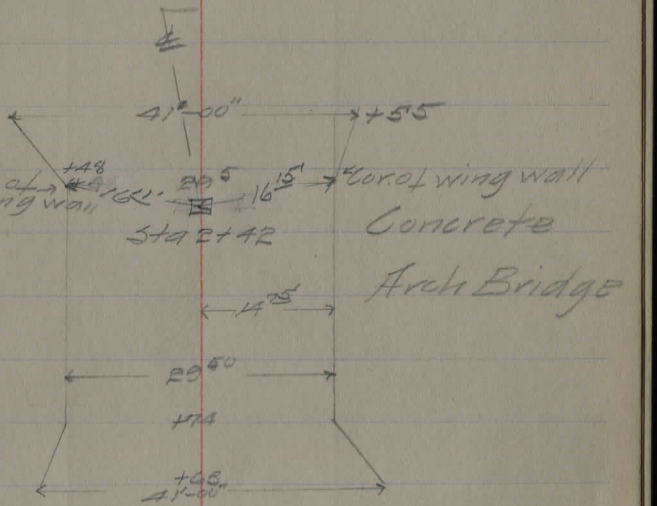
COUNTY Line Survey for: Fill over Arch Bridge Chester Twp

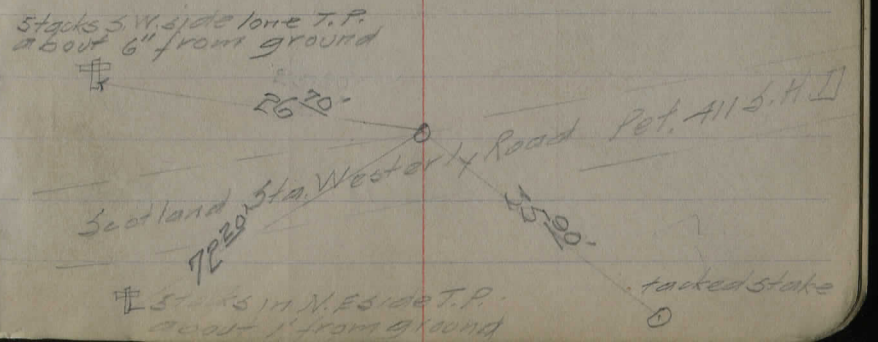
6/E1/14 P.M. R. Hart F. Zethmayr Hat Clear
R. Hanna

Sta	Bearing	Angle
4		
3		
+42.00	N 12° 00' W.	F.S. 14° 15' Lt
2	Side mark 14' from ℄ on Arch to Lt	
1	N 5° 35' W.	
0	Sta = N. edge Concrete Pavement	

Note: Side stakes set at approx. 14.30' from ℄ to the left. except where otherwise noted

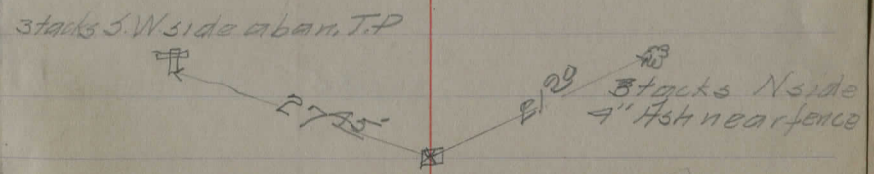
Lt. ℄ Rt





Sta.	Bearing	Angle
7		
6		
5		
4+77 55'	N22° 20' W.	F.52° 48' Lt

Lt. ℄ Rt. 7



Levels on County Line Rd. Chester 8/21/14 N. Hall
Over Arch Bridge

Sta	B.S.	H.I.	F.S.	Elev.	
S.P.	10.09	1010.09	~~.09~~	1000	00
0			0.02	1010	07
T.P.	1.40	1010.91	0.58	1009	51
			0.65	1010	26
			0.55	1010	36
0+50			8.8	1002	71
T.P.	0.35	1000.00	11.26	~~99~~ 99	65
1			3.3	996	70
1+68	end of W.W.		6.0	994	00
2			5.0	995	00
2+56			5.3	994	70
3			3.5	996	50

Lt. ℄ Rt.

B.M. Top of third iron post to guard rail from South end of Bridge Assumed Elev = 1000

		-0.7		00		+0.6		
		31.0		00		31.0		

On Pavement

Pavement at Std (Edge)

" " " 0-7 ℄

-1.6	-0.9	00	+0.2	-0.3	+1.9	+2.3		
25.0	10.0	00	12.0	14.5	17.5	25.0		
-3.5	-1.1	-0.4	00	+0.3	0.0	+1.1	+3.1	
30.5	10.5	8.0	00	6.0	13.0	16.0	29.0	
-3.4	-1.0	00	+0.1	-3.4	-5.2			
20.0	8.5	00	6.0	17.5	20			
-0.2		00		-0.2				
14.7				14.7				
-6.0	-0.8	00	-0.5	-5.4	-6.0			
22.5	10.0	00	11.0	22.0				
+0.5	-2.0	-1.7	-0.2	00	-0.1	-1.9	-1.8	+1.5
30.0	19.0	10.0	7.5	00	12.5	18.0	21.5	3.2

R. Hart
R. Hanna
F. Zeth

Sta	B.S.	H.I.	F.S.	Elev	Lt ℄ Rt
		1000.00			
T.P.			3.43	996 57	
S.P.	11.77	1011.77		1000 00	B.M.
T.P.	10.44	1016.93	5.28	1006 49	
4			11.5	1005 43	+8.1/39.0; +6.5/31.8 +7.5/26.0 +3.6/17.5 0.0/11.2 0.0/0.0 +3.1/10.0 +6.3/14.8 +10.8/17.0 +11.0/30.0 same at 40
4+50			9.0	1007 93	+4.7/44.5 +5.0/35.0 +4.8/15.2 −0.3/9.0 0.0/0.0 +1.9/7.7 +5.0/11.3 +5.5/17.0 +6.0/22.0 Level beyond
T.P.	3.70	1011.77	8.86	1008 07	
5			5.4	1006 37	+3.0/30.0 +3.4/19.0 +3.3/10.7 −0.1/6.3 0.0/0.0 +0.2/5.8 +1.4/9.8 +3.5/17.2 +4.4/21.5; +4.1/26.0
T.P.	4.64	1004.46	11.95	999 82	
6			5.8	998 66	+2.8/30.0; +2.3/20.3 +2.2/10.3 +0.8/5.3 −0.1/4.5 0.0/0.0 −0.2/9.7 +0.6/10.8 +3.2/16.3 +3.8/22.8
6+66			7.9	996 56	−1.2/31.6 0.0/18.1 −0.2/8.0 0/0 0.0/6.0 −0.4/8.0 +0.7/15.5 +1.0/23.5
7			8.6	995 86	
7+50			9.4	995 06	

TOPOGRAPHY County Line

Rt of ℄

3+36 18" Wild cherry 32.5 out

3+38 → 10" Evergreen 26.0 out ℄

3+43 → 12 Cherry 31.0 out ℄

3+63 12" Beech 27.5 " ℄

3+80 4' Chestnut 22.0 out ℄

3+92 8" Birch 23.5 out

4 8" Maple 24.0 out ℄

4+07 5' Chestnut 19.6'

4+23 10" Maple 19.0

4+45 12" Maple 22.0

4+67 8" Beech 22.6

Chester Twp

3 4 8

10

4+50 12" Chestnut 17.5 out

4+67 10" Beech 24.5 "

4+75 5" S Maple 20.0 "

4+80 5" T. Ash 20.0'

9/10 E.A. Fiedler
F.A. Zethmayr
G.R. Hanna

Slope Stakes

Sta	Lt.	Rt.
0		
+50	18.7	15.5
1	23.0	15.5
+68	20.0	23.0
2		
+		
55		
3	15.7	15.0
+50		
4	28.0	32.7
+50	23.3	25.2
5	19.1	20.4

Sta	Grade	% Grade
0	1010.07	-9%
+50	1005.60	
1	1001.10	
+68	996.30	X
2	995.80	+2%
+55	996.70	
3	998.1	X
+50	1000.6	+6%
4	1003.6	
+50	1006.6	X
5	1006.4	+.4%

9/10 Slopes Sta 0.

Sta	B.S.	H.I.	F.S.	Elev	Grade
S.P.	1037	1010.37			
T.P.	11.89	1014.72	7.54	1002.83	
T.P.	10.34	1017.00	8.06	1006.66	
5			10.60		1006.4
4+50			10.40		1006.6
4			13.40		1003.6
3+50			16.40		1000.6
T.P.	0.66	1005.31	12.35	1004.65	
3			7.21		998.1
T.P.	3.19	999.29	9.21	996.10	
2+55			2.59		996.70
2			3.50		995.80
1+68			3.00		996.30
T.P.	10.00	1004.72	4.57	994.72	
1			3.62		1001.10
0+30					1005.60
			4.74	999.98	1000.00

B.M. on bridge railing

Rt = C 4.5
Lt = C 4.0
Rt = C 7.5
Lt = C 7.0
Rt = C 13.00
Lt = C 10.00 (?)
Rt = C 13.0
Lt = C 4.0

Rt = F 2.0
Lt = F 3.0

Not set

Rt = F 4.5
Lt = F 6.0

Rt = F 3.0
Lt = F 6.0
Rt = F 2.0
Lt = F 3.5

Check B.M.

3 mi. 36 rods W. King St. 1st Survey

N 12° E 44 " Beg. new Survey

N 13° E 22 "

E 3-4 "

2d mile 320 "

N. 13° E. 27 "

N 2° E 293 "

3½ mi. 320 "

N 2° E. 178 " which would run W. King St

North 44 "

N. 15° W. 120 "

N. 25° 12 "

N. 38° W. 10 "

N. 60° W. 4 "

N. 7° W. 60 "

4 " mi. 320

N. 7° W. 17 "

N 27° E. 8 "

N 11° W. 45 "

N 1°30° W. 250

5 " mi. 320

N 1°30' W. 33 " to Mentor Road = 5 mi. 33 rds

Geauga County Road Records

"Survey of a road leading from the Chester road to near Meloon's chopping.

Beginning at 2 rods northeasterly of the 4 mile tree, Then N. 13° E. one mile, Same point 254 rods. △ Beg. new Survey Then N. 25° E. 46 rods, then N. 8° E. 20 rods 2nd mile Same point another mile (mile 3rd) same point 36 rods to the road near widow Sawins. Then N. 252 rods then N. 32 rods 4th mile. Then same point 37 rods, Then N. 45° W. 14 rods, Thence N 22° West 164 rods, Thence N 1½° E. 105 rods 5th mile. Then same point 58 rods to the road leading to Mentor. June 4th 1819. The survey taken by me Levi Edson Surveyor."

Note! A remonstrance against the adoption of the above survey, resulted in a resurvey being ordered and which was adopted to-wit:— A protraction of a highway beginning on the 2 mile 254 rods

N. 13° E. of the first mile tree. Then N. 12° E. 44 rods. thence N. 13° E. 22 rods 2nd mile same point 27 rods. Then N. 2° E. 293 rods 3d mile. Then same point 178 rods. then N. 44 rods. Then N. 15° W. 12 rods Then N. 25° 12 rods. Then No. 38° W. 10 rods Then N. 60° W. 4 rods then N. 7° W. 60 rods 4th mile. same point 17 rods. then N 27° E. 8 rods then N. 11° W 45 rods. N. 1°-30' W. 250 rods 5th mile same point 33 rods to the Mentor road. Surveyed by me Levi Odion Surveyor Nov. 4th 1819.

→ Vacation of south part of above road, See Vol. D. Road Records page 92 - 8th line = "The road leading from near William Collins in Chardon to the South line of said Township has become useless & burthensom" etc. dated Oct. 24th 1844. "Discontinued" March 4th 1845.

Vacation of North part of above road.

"The inutility of a road running on the north line of land owned by Jars Clough. running north across Lands owned by Reuben Stafford. Samuel Shattuck and Sara Dunbar running to the north line of land owned by Stephen Allen. As said road is of no manner of use to any individual" etc. "Discontinued" June 7th 1847.

Vol. 154 - P. 67 July 11, 1918
Belle Barrows, formerly Belle Tainter
to Glen Wilder
Twp. Chandos, part of lots 161 + 155, Tr. 3
Bounded
on W. by land formerly owned by S. Ford
on S. + E. by land " " " Leonard Parker
on N. by the highway
20 A.

Vol. 130 - P. 265 June 24, 1910
Frances E. Johnson to Glen V. Wilder
Chandos Twp. Tr. 3, part of lot 155
Bounded
on W. + N. by land formerly owned by Leonard Parker
" S. by the highway
" E. " " "
26 A.

Vol. 127 - P. 463 Apr. 23, 1909
From Andrew B. Schock
to John W. Lathrop
Twp. of Chandos, part of lots 149 + 155
in Tr. 3, + bounded as follows
on N. by land formerly owned by Benj. Cowles,
" E. " " " " " S. A. Ringland,
and later by Otto Tainter, and
the highway,
on S. by the highway,
on W. by land formerly owned by L. G. King
and later by Asa Hudson, containing
131 acres of land.

Also another piece of land in lot 149
beg. in C. of h-way leading from King St.
to Coughs Corners at N.E. cor of lands
conveyed to Sarah A. Ringland by Fenton
King in 1880
- W. to E. line of land formerly owned by
J and D.R. King and known as the old

(over)

Zadock King Farm

— S. far enough so that a line running east parallell with the north line to the center of said highway and from thence north along the center of said highway to the place of beginning shall contain one half acre of land.

— E. parallell with the north line to the center of said road

— N. along the center of said road to pl. bg. containing 1/2 acre of land. — Note — a small portion of this land appears to be in Lots Numbers 150 and 156

123-69 Certificate of Will — See 127/33/7 3/10 — 1908

Vol. 156 - P. 54 Sept 12 1919

from Louis Henke to John Henke + Mary Henke.

Twp. of Chardon, part of lots 154 + 155, Tr. 3

bg. at a stone standing at S.W. cor. of H.H. Huff's land

— N. 45.61 ch. to a stake at N.W. cor of said Huff's land.

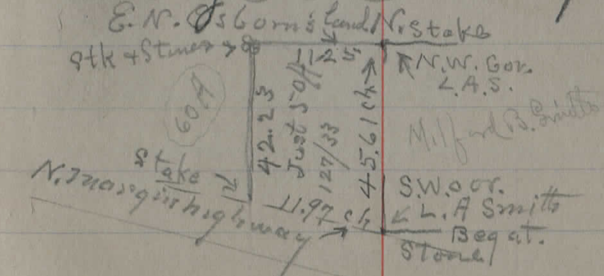
— W. 11.40 ch. on S. line of land formerly owned by E. M. Osborn,

— S. 42.20 ch. to a stake on the north margin of the road leading from Chardon to Kirtland,

— Easterly along the margin of said road 12.12 ch. to pl. Bg.

Containing 50.65 Acres of land.

see — 119/61/7 = 1109



Zadoc King - 108 A - in 1855 1/49 } 1853-60
Augustus Collins - 5-9½ A. " 1855
(Cemetery - 57/335)

Lee 5-28 - 17/267

?

421.35'

17.6'

Post

96°10'

90°40'

700'

179°30'

578.6
421.35
999.95

2.2'

578.6

Fence

73.00'

106°53'

?

330.0

660.0

116.4

1346.2

± S. Hambden

56+30±

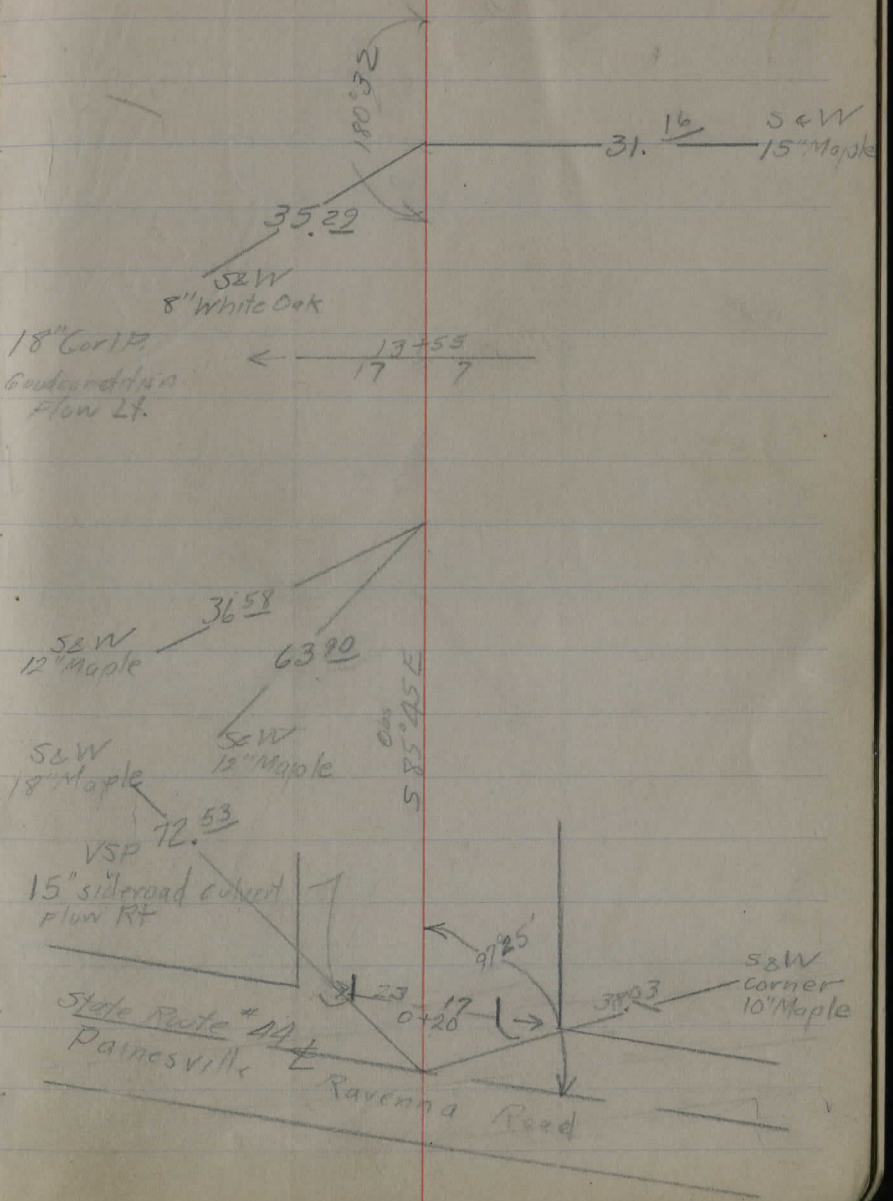
5/26/33 Rodney Goodrich Merritt

℄ Location Gites ~~Road~~ Auburn Twp

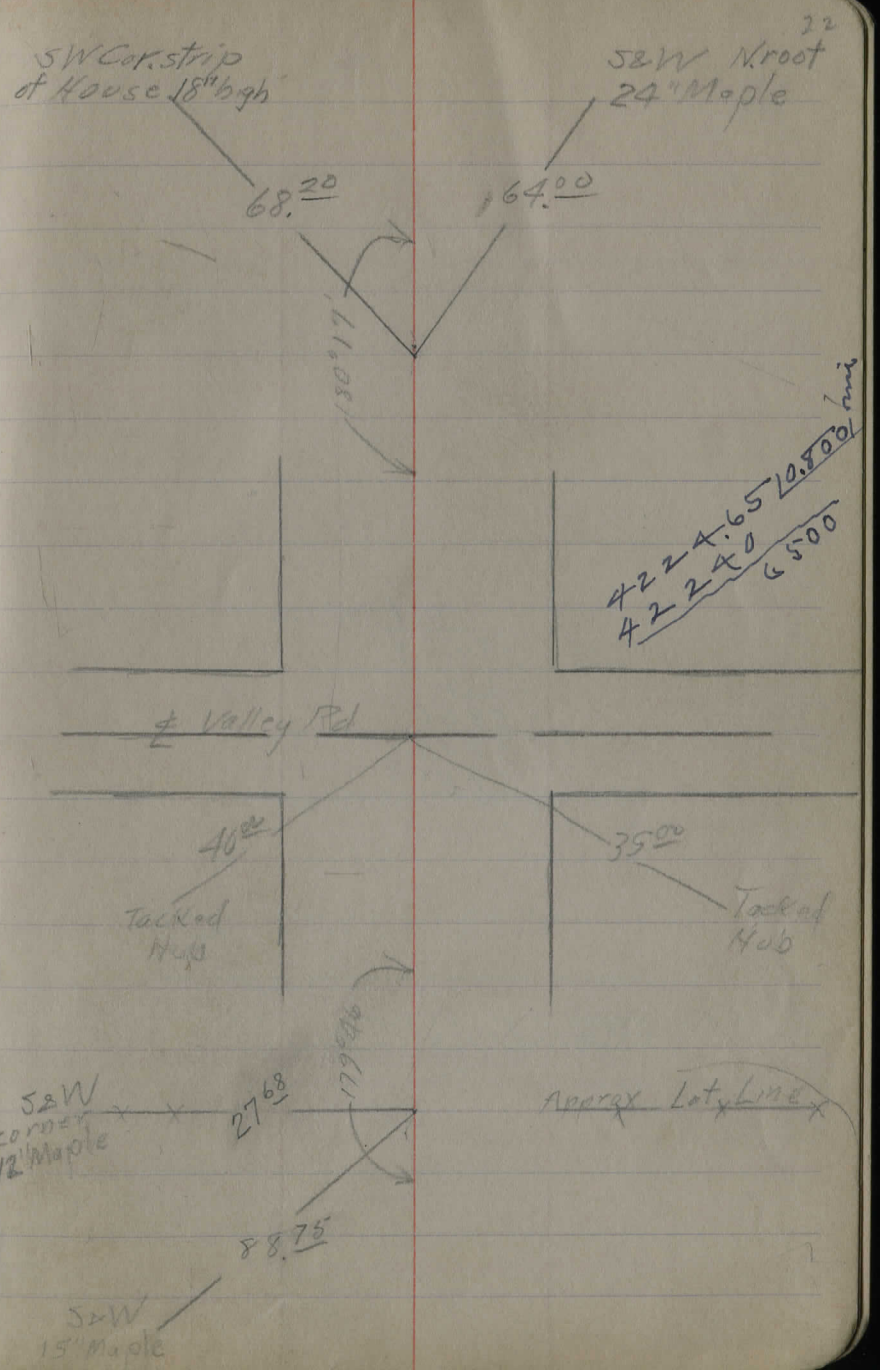
Stafford ~~REED~~ RD

~~# 184 A&S~~ 187 G&H.

Sta 16+51.52	PI Def Rt 0°32'	Iron Set
Sta 4+50	POT	Iron Set
Sta 0+00	Beginning of Trap	spike Set



Sta 49+00	Def Rt 0°17'	Iron Set
Sta 42+24.65	P.O.T.	Iron Set
Sta 26+30.00	PI Def Lt 0°14'	Iron Set



1.11 miles

5280 | 5866.08

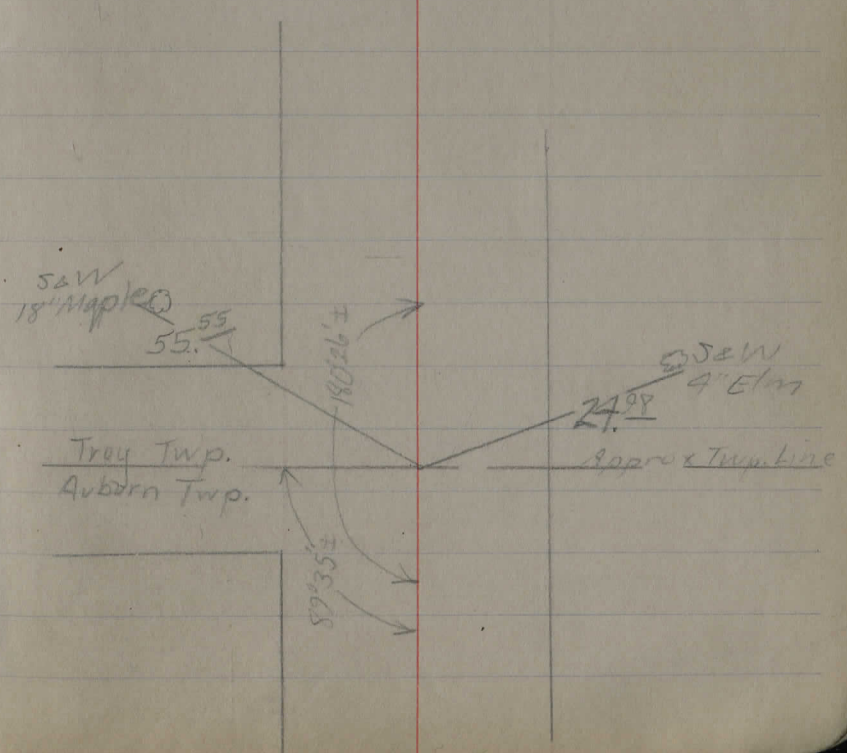
5280

5860

5280

5808

Sta 58 + 66.08	End of Imp.	Iron pin Set



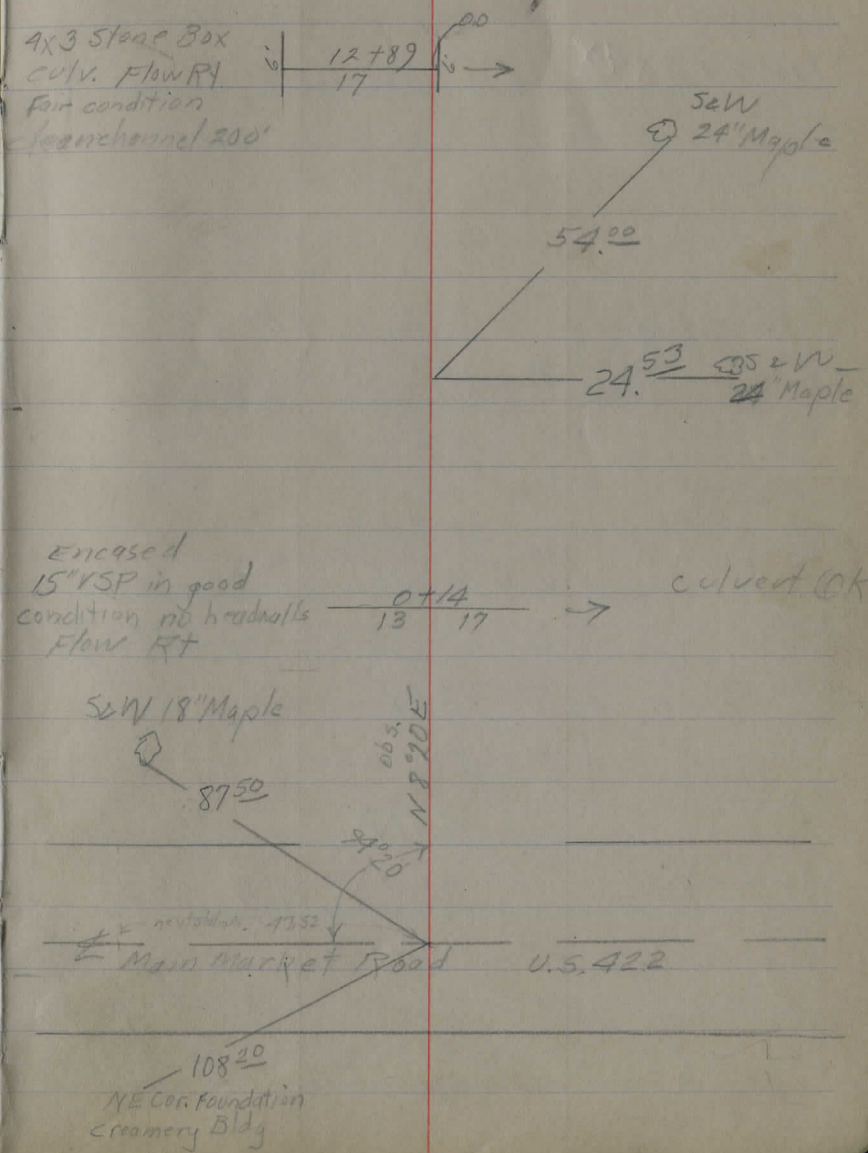
6/6/33 Richard Goodrich Merritt

℄ Location Valley Road Auburn Twp

Note: Sidestakes are set 30' Rt.

Wend falling down — Build new 3' new pipe 28' long use old stone for new headwalls

Sta 3+00	POT	Iron Set
Sta 0+00	Beginning of Imp	Spike Set



Station		Remarks
Sta 25+28.48	PI Def. Rt 7°42'	Iron set

R=1145.916

Note: P.I. is opposite ∡ in fence

Curve Data

- Δ = 7°42'
- D = 5°
- T = 77.12 — correction = .24
- E = 1.3
- L = 154.00

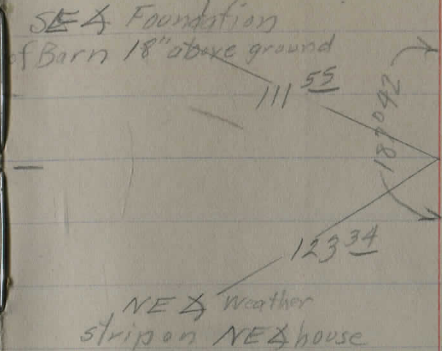
Curve Data

- Δ = 14°31
- D = 10
- T = 72.98 — correction = .79
- E = 4.6
- L = 145.17

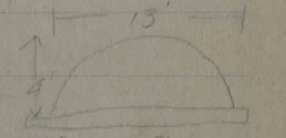
Station		Remarks
Sta 16+75.00	PI Def Rt 14°31	Iron set

R=572.958

Note: PI is opposite ∡ in fence

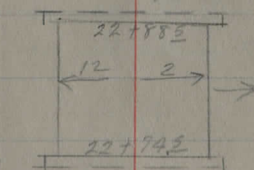


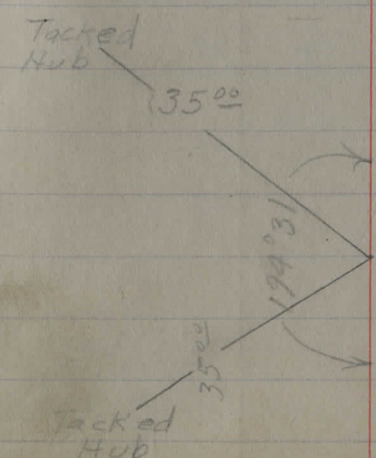
Build new ∡ plate arch



8" timber floor
24' width using old stone for headers
2700 bd. ft. approx

Bridge
Plank floor timber stringers stone walls in poor condition
12' span 14' width
3' height Fl. Rt
Clean channel 300'





Sta 43+83.00 PI Def Rt. 2°09' Iron set

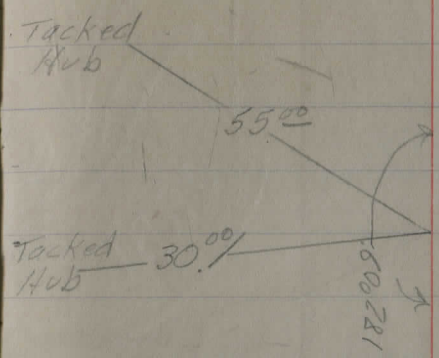
Note: PI is opposite 4 in fence

Curve Data
Δ = 2°9
D = 2°
T = 53.75
E = .5
L = 107.50
R = 2864.789

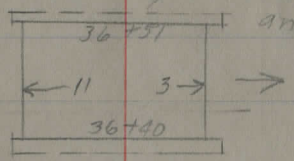
Sta 35+70.00 PI Def Rt 1°34' Iron set

Note: PI is opposite 4 in fence

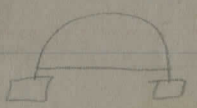
Build new 2-18" pipe 20° skew 30' long



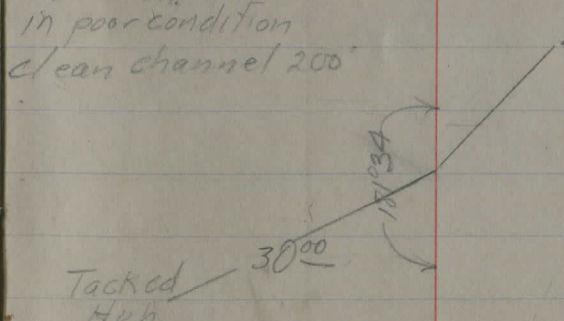
Bridge plank floor wood stringers stone walls span 8' height 3' width 14' Flow Rt. in poor condition clean channel 200'



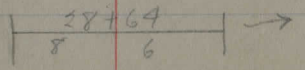
Build new 3 plate arch 8' span 45" rise using tie rods and old stone for footings 24' long



Saw 10" Maple



4x1 stone box culvert conc. slab Flow Rt in poor condition



Sta 52+46.70 POT — Iron set

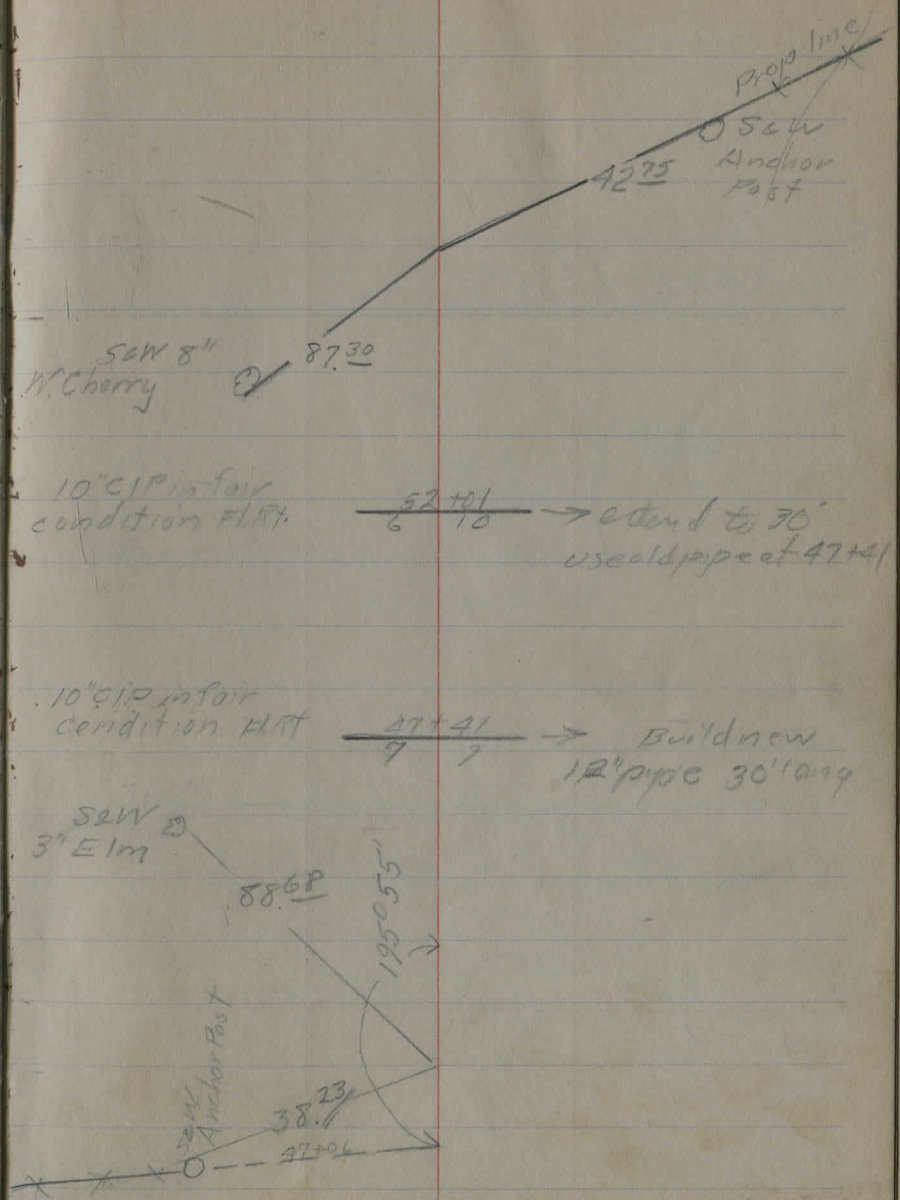
R=573.958

Curve Data

Δ = 15.55°
D = 10
T = 80.10
E = 5.5
L = 152.17

correction 1.03

47+11.10 PI Def Rt 15°55 — Iron set



Sta 60+62.62 PI Def Lt. 17°50' Iron set

Curve Data

Δ = 17°50
D = 10°
T = 89.89
E = 7.0
L = 178.42

R = 572.958

correction 1.36

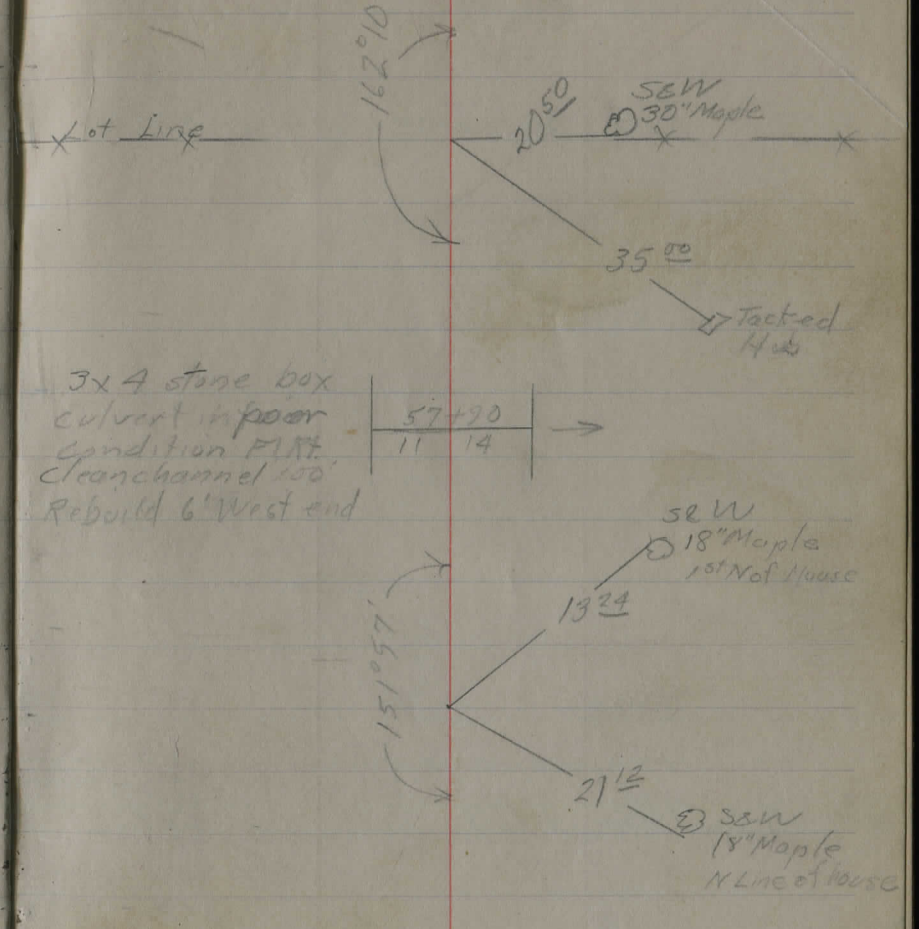
Sta 55+40.40 PI Def Lt 28°03 Iron set

Curve Data

Δ = 28°03
D = 9°
T = 153.02
E = 19.5
L = 311.67
PC = 53+81.38
PT = 56+93.05

R = 636.620

no correction figured in field



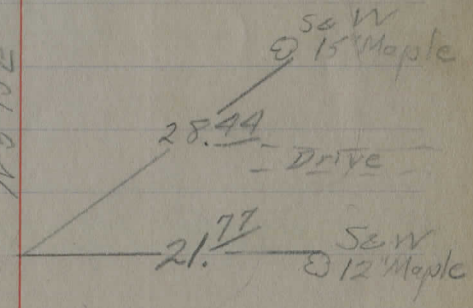
Note: South Line Bramley Sta 74+06

Sta 64+51 10	POT	Iron Set

12" CIP in good condition FIRT → 76+89 (7 5) → Build new 12" 28' pipe

12" CIP in good condition FIRT 70+77 (12 6) → extend with pipe from 76+89

10" CIP in good condition FIRT 66+98 (6 11) → extend with new pipe 12' long



Sta. 102+90.11 End of Project — Pipe Set

Sta 102+90.11 = Sta 42+24.65 Giles Rd. Imp.

corrections for curves—

16+75	−.79
25+28	−.24
47+11	−1.03
60+62	−1.36
Total	3.42

102+90.11
3.42

5280 | 10286.69 (1.95 miles)
5280
5006
4752
2546

Sta 87+35.09 PI Def Lt 0°15' — Iron Set

Tacked Hub
40.00
?
79.85
Stafford Rd.
89°53
35.00
Tacked Hub

I-5 67
Valley Rd. 1.94 mile
Giles Rd. 80 / 2.7+

2×2 Slab Top Culv. 99+04 → culvert O.K
Fair condition 11' 9' clean channel
Fl. Rt. 150' Rt.

12" Cor. I.P. on Lt. 90+52 → Fl Rt
12" C.I.P. on Rt. 9' 6' extend with 12"
Fair Condition Corr pipe

SaW 30 Oak
53.04
SpK Rd 5-13-55
17°45'
21.79
21.35
3.72
SaW NW 14" Hick
SaW Anchor Post
SaW SW 14" Oak

B.M. Ecd 97+	324 F		
98+30		1284.11	P. Nail in W root 18" Maple 32' Rt.
85+10		1267.17	C. Nail in NE root 12" Maple 35 Lt.
500+10		1123.98	Sp. in N root 24" Maple 30' Rt.

Profile Levels on Valley Road

Auburn Twp.

B.M.# 1	0.98	1124.96		1123.98
0+0			8.6	1116.4
0+14			8.1	1116.9
+50			7.5	1117.5
1+0			6.8	1118.2
2+0			4.1	1120.9
T.P.	7.02	1127.86	4.12	1120.84
3+0			3.9	1124.0
B.M. 2			4.88	1122.98
4+0			4.3	1123.6
5+0			5.0	1122.9
6+0			5.5	1122.4
7+0			5.8	1122.1
8+0			6.0	1121.9
T.P.	2.47	1123.68	6.65	1121.21
9+0			2.2	1121.5
10+0			2.6	1121.1
11+0			4.1	1119.6
12+0			4.9	1118.9

9.0/50 10.5/51 7.4/10 8.2/10 8.1 81.-10.6 Ft. 11.6/50

Spike in W. root 24" Maple 24' Rt. Sta 3+90

		1123.68		
12+89			3.4	1120.3
13+0			5.2	1118.5
14+0			5.1	1118.6
15+0			4.4	1119.3
T.P.	6.77	1124.97	5.48	1118.20
16			5.8	1119.2
16+75			5.5	1119.5
17			5.6	1119.4
18			4.6	1120.4
19			4.2	1120.8
20			4.5	1120.5
21			6.6	1118.4
22			7.3	1116.7
T.P.	7.95	1125.88	7.04	1117.93
22+81			7.2	1118.7
23			7.7	1118.2
B.M. 3			4.74	1121.14
24			6.0	1119.9

7.3/100

Varies 8.0/30 9.6 – 6.1 – 3.9/Fl. 4.9/17 4.7/10 5.6 – 8.2/Fl. 8.4/30 3.4/60 8.0/100 9.0/200 9.8/300

10.6/100 10.8/Fl. 6.9 10.7/Fl. 10.1/60 10.7/100 10.9/200 11.5/300 1113.5/404

Spike in E. root 26' Maple 37' Lt. 23+50

		1125.68		
25+0			2.1	1123.8
25+28			1.9	1124.0
26			1.9	1124.0
27			4.8	1121.1
T.P.	1.05	1121.90	5.03	1120.85
28			4.0	1117.9
28+64			5.5	1116.4
29			5.9	1116.0
30			3.9	1118.0
31			3.0	1118.9
32			2.1	1119.8
T.P.	8.15	1126.78	3.27	1118.63
33			4.1	1122.7
34			2.4	1124.4
34+25			2.2	1124.6
35			5.6	1121.2
36			7.5	1119.3
T.P.	6.50	1125.20	8.08	1118.70

$\frac{8.7}{100}$ $\frac{80}{Ft.}$ -6.5-7.8 5.5 $\frac{5.5}{5}$ $\frac{4.6}{10}$ $\frac{6.3}{6}$ $\frac{8.2}{Ft.}$ $\frac{9.2}{100}$

		1125.20		
36+45			6.1	1119.1
39			6.4	1118.8
38			5.4	1119.8
39			3.3	1121.9
40			0.1	1125.1
T.P.	9.94	1134.45	0.62	1124.51
41			5.2	1129.3
41+50			3.8	1130.7
42			4.4	1130.1
42+30	10' CIP in Fair Cond. 9 feet Rt. Lt.		4.5	1130.0
43			4.3	1130.2
44			4.2	1130.3
45			4.0	1130.5
T.P.	4.24	1134.52	4.17	1130.28
46			3.5	1131.0
47			4.5	1130.0
47+41			4.9	1129.6

9.1 / 100 10.8 Fl. 6.2 / 11

6.1-10.2 / 8 Fl. 10.0 / 100 11.0 / 200

1.3 / 30-25 5.0 / 20 5.9-5.0 Fl. 4.6 / 10 4.9 / 9 5.1-6.7 Fl. 8.2 / 30

** channel needed cleaned 3' Lt.

6.4 5.4 Fl. 4.8 / 1.0 / 5 5.6 / 9 6.3 / 1.0 7.7 Fl. 7.9 / 10 8.6 / 3.0 Good rock

		1134.52		
48			4.7	1129.8
49			4.7	1129.8
50			4.6	1129.9
51			3.6	1130.9
T.P.	6.64	1137.62	3.54	1130.98
52			6.8	1130.8
53			5.6	1132.0
BM A			6.26	1130.36
53+80			3.5	1134.1
54			2.7	1134.9
T.P.	4.81	1142.06	0.37	1137.25
B.M. 5			2.51	1134.55
54+50			3.9	1138.2
+75			1.0	1141.1
55			2.4	1139.7
+50			5.9	1136.2
56			9.0	1133.1
T.P.	0.24	1130.75	11.55	1130.51

6.0 7.0 8.3 7.4 — 7.3 7.9 8.8 9.4 10.1 Good
3.5 9. Fl. 7.0 — 8' T.P. Fl. Ditch 30 Fall

Spike in Wroot 18" Maple 14' rt. 54+53+0

Spike in Wroot 24" Maple 30' rt. 51+55+15

		1130.75		
56+93			4.1	1126.7
57			4.5	1126.3
57+90				
58			7.0	1123.8
T.P.	4.76	1128.47	7.04	1123.71
57+90			4.6	1123.9
59			3.2	1125.3
BM 6	10.66	1137.46	1.67	1126.80
60			6.9	1130.6
T.P.	12.20	1149.46	0.20	1137.26
60+42			11.4	1138.1
61			8.1	1141.4
62			4.0	1145.5
63			2.2	1147.3
64			1.4	1148.1
64+50			1.1	1148.4
65			3.3	1146.2
T.P.	3.53	1149.46	3.53	1145.93
66			4.3	1145.2

13.7 / 60 9.0 / 10 3.7 / 11 5.9 / 9 4.8 / 6 4.8 / 9 6.0 / 12 3.4 / 14 8.9 / To Fl. 13.6 / 120 15.0 Clear Channel

Spike in W root 24" Maple 20' Rt Sta 59+20

5.3 / 30 5.9 / 20 7.9 / 15 12.1 / 11 11.5 / 9 11.4 11.4 / 4 12.2 / 6 6.7 / 9 6.6 / 30

		1149.46		
66+98.			5.0	1144.5
67			5.0	1144.5
68			4.8	1144.7
69			3.5	1146.0
B.M.7	3.96	1150.61	2.81	1146.65
70			4.7	1145.9
+77	Culvert		4.4	1146.2
71			4.1	1146.5
72			3.5	1147.1
73			2.4	1148.2
T.P	11.40	1159.66	2.35	1148.26
74			10.4	1149.3
75			8.8	1150.9
76			7.1	1152.6
+89	Culvert		5.0	1154.7
77			4.9	1154.9
78			2.9	1156.8
79			1.1	1158.6
	11.34	1170.36	0.64	1159.02

4.7/5.0 4.1/F.L. 5.2/7.0 5.1/5 5.0 5.1/11 5.9/7.0 6.7/F.L. 8.0/50 10.2/100

+2 horizontal spikes W. side 14" hickory 30' Rt. Sta. 68+60

6.3/Fl. 5.0/TP 4.9 5.2/TP 6.3/Fl. 7.3/50

6.4/Fl. 5.1/TP 5.1/T.P. 6.7/Fl. 7.4/50

		1170.36		
80			7.7	1162.7
B.M. 8			3.29	1167.09
81			4.7	1165.7
82			5.0	1165.4
83			4.5	1165.9
84			3.6	1166.8
T.P.	8.75	1175.68	3.43	1166.93
85			7.4	1168.3
86			6.3	1169.4
87			4.7	1171.0
88			4.2	1171.5
89			7.0	1168.7
90			7.6	1168.1
TP	5.14	1172.65	8.17	1167.51
90+52 Culvert			4.7	1168.0
91			4.6	1168.1
92			4.4	1168.3
93			4.7	1168.0
94			5.3	1167.4

2 Horiz. Spikes in W side 30' Maple 30' Rt. 80+80

6.1 / Fl. 5.0 / TP 4.9 / Bm 4.9 / 8.4 5.5 / TP 6.6 / Fl 6.9 / Spiral pipe 6" c.i.p.

		1172.65		
95			5.2	1167.5
96			5.3	1167.4
T.P.	4.82	1172.28	5.19	1167.46
97			5.2	1167.1
98			5.2	1167.1
99			4.4	1167.9
BM 9			4.50	1167.78
99 +04			4.1	1168.2
100			4.7	1167.6
101			4.3	1168.0
102			3.9	1168.4
+92			3.5	1168.8
T.P.			3.47	1168.81

Spike in E root 24" Maple 30' Lt 98+75'

6.8 Fl. | 3.44 HW | 44 B | 4.3 B | 3.3 MW | 6.7 Fl. | 6.7 50 | 7.1 100

Culverts on Valley Road

Sta 22 + 80

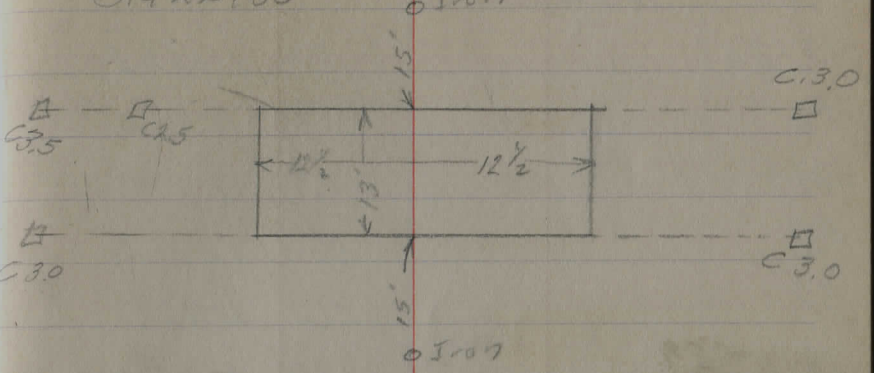
BM #3	1.55	1122.69		1121.14
Spring Line			8.19	1114.50
℄ Road			4.0	1118.7
Old Grillage			8.4	1114.3
BM #3	7.89	1129.03		1121.14
	6.23	1123.64	11.62	1117.41
	2.52	1125.84	0.32	1123.32
BM 3A			5.88	1119.96
	11.97	1131.02	6.79	1119.05
	5.64	1135.44	1.22	1129.80
BM 3B	4.78	1135.28	4.94	1130.50

Sta 36 + 45

BM 3A	4.12	1124.08		1119.96
Spring Line			9.68	1114.40
Old Grillage			9.7	

℄

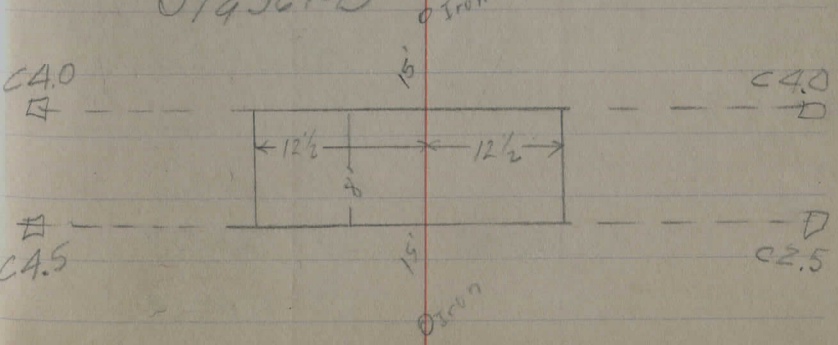
Sta 22+80



Spike in root 8" Maple 20 Rt ℄ Sta 36+00

Spike in root 24" Elm 25 Lt ℄ Sta 49+00

Sta 36+45



Giles Road Profile Levels — Auburn Twp.

T.P.	8.22	1177.53		1168.81
42+24			8.2	1168.8
42			8.0	1169.0
41			6.8	1170.2
40			5.8	1171.2
39			4.3	1172.7
38			1.0	1176.0
	12.41	1189.21	0.23	1176.80
37			8.7	1180.3
BM			3.25	1185.96
36			5.0	1184.2
35			2.4	1186.8
	12.74	1201.57	0.38	1188.83
34			11.6	1190.2
33			7.8	1193.8
32			4.2	1197.4
31			2.0	1199.6
	9.27	1210.42	0.42	1201.15
30			7.5	1202.9

2 Horiz. spikes 18" Maple 60' Rt & 5 to 37+75

		1210.42		
29			5.5	1204.9
28			4.6	1205.8
27			4.4	1206.0
BM			2.92	1207.50
26			3.8	1206.6
25			3.8	1206.6
24			3.4	1207.0
	8.63	1217.19	1.86	1208.56
23			9.3	1208.9
22			7.5	1209.7
21			4.5	1212.7
20			0.8	1216.4
	9.02	1225.48	0.73	1216.46
BM	9.92	1232.59	2.81	1222.67
19			9.2	1223.4
18			0.2	1232.4
	11.42	1243.89	0.12	1232.47
17			5.0	1238.9
16+65			3.5	1240.4

(City of Akron BM)

Spike in N root 24" Maple 30' Rt & Sta 26+30

Spike NE root 24" Maple 25' Rt & Sta 19+40

		1243.89		
16			4.3	1239.6
15			4.7	1239.2
14			4.4	1239.5
13+55	culvert		3.7	1240.2
13			2.9	1241.0
	11.66	125320	2.35	1241.54
12			2.9	1243.3
11			5.5	1247.9
	11.39	126459	0.00	1253.20
10			7.3	1257.3
	12.32	127643	0.48	1264.11
9			8.9	1269.5
	12.78	128885	0.36	1276.07
8			12.0	1276.9
7			5.6	1283.3
6			1.0	1287.9
	7.35	129608	0.12	1288.73
BM			6.71	1289.37
5			4.9	1291.2

Enters drain tile at 20' → 7.4 | 7.3 FI | 4.1 B | 4.4 B | — H | 6.6 FI | —

(City of Akron BM)

Spike N root 30" Maple 25' Rt & Sta 6+05

		129608		
4+50			4.5	1291.6
4			4.6	1291.5
3			6.6	1289.5
2			9.4	1286.7
	1.56	128821	9.43	1286.65
1			3.7	1284.5
0			6.3	1281.9
BM			3.77	1284.44 (1284.11 check 0.33)

(State BM on Route 44)

Spike W root 12" Maple 50' Lt & Sta 0+30

(Snow Road)

Troy Auburn Twp. Line Road.

℄ Location

5 sidestakes set 25' Lt.

4

3

2

1

Sta 0+00 Beginning of Project — Iron pin found

7/1/37

Richey
Strong
Barton

50

3+10 Drive

H

2+65

Madansky

Glynn

N 50 E 105

S 8 W
18" Maple

55.55

Stafford
℄ ~~Estes~~ Road

S 82 W

24.98

S 8 W
8" Elm.

S 2 W
8" Maple

14

Sta 13 + 00	POT	Pipe Set

12

11

10

9

8

7

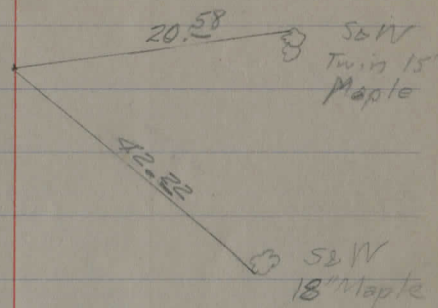
6

5

Chueriro

PL x x 13+53

Madansky



12" See C/P & RCP
fair condition
16½' long

6+50
10 6.5

23

22

Sta 22+00 POT 1 in set

20

19

18

17

16

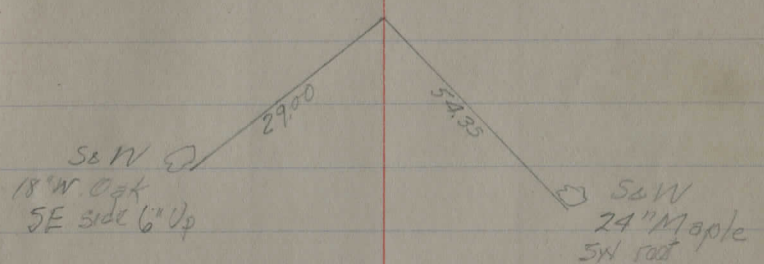
15

Sta 14 to 15 staked 200 stations not corrected in field.

14

8" CMP 14' long
Flow Rt
fair condition

23+91
2' 12'



3 x 3 Stone Box
Culv. 17' long
fair condition

19+30.
8 9

32

31

30

29

28

27

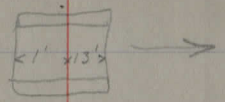
26

25

24

23

27+74
Plank Bridge
Timber Stringers
Stone Abutments
5' high 14' wide
9' Span
fair condition



41

40

39

38

37

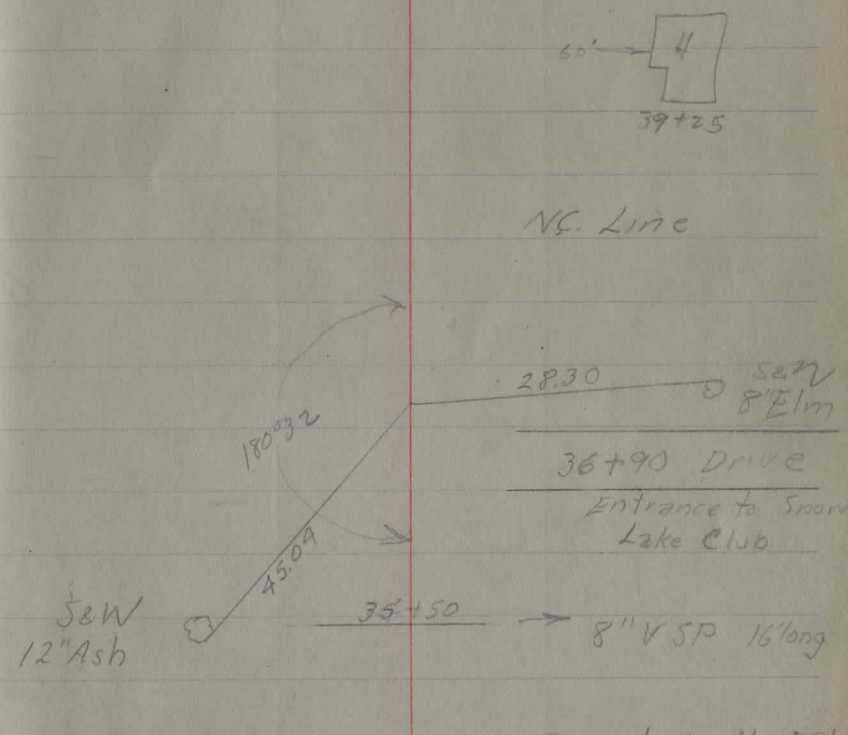
Sta 37 +00 Def Rt 0°32' Pin Set

35

34

33

32



80 chains = 1 mile

52.8 | 4231.2
4224
7.20

48 % Auburn Twp maintenance

4231 | 3690.
33848
20520
16924
35960

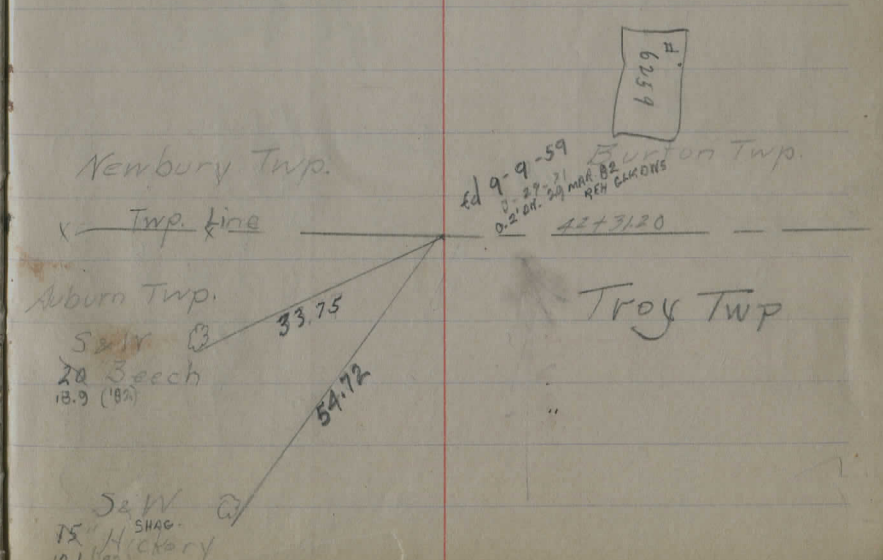
Auburn share 3690 ft.
Troy share: 541 ft.

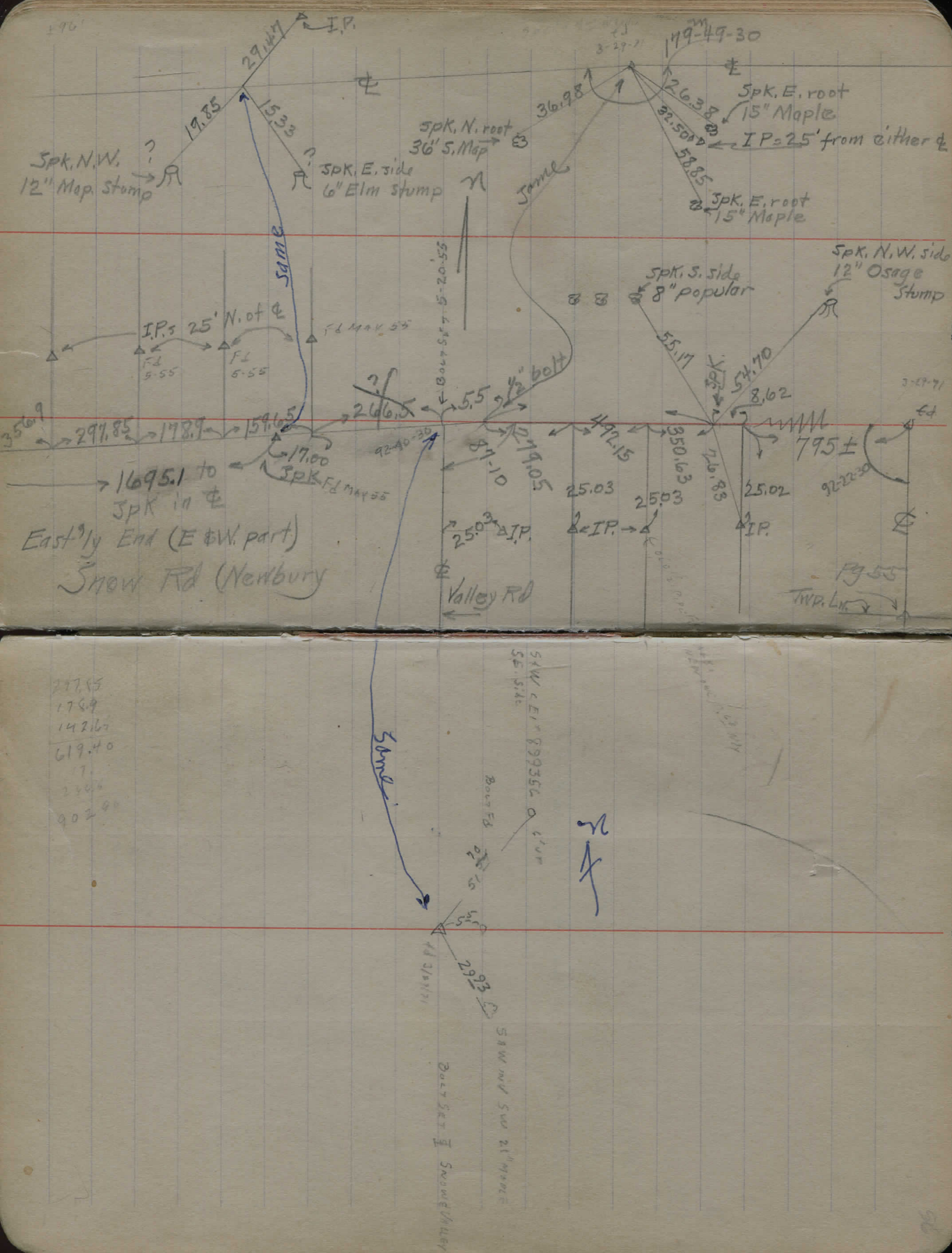
42+31.20
36+90
5 41.20

Note: 1"x15" Pin set in hole of bricks found

Sta 42+31.20 End of Project Pin Set

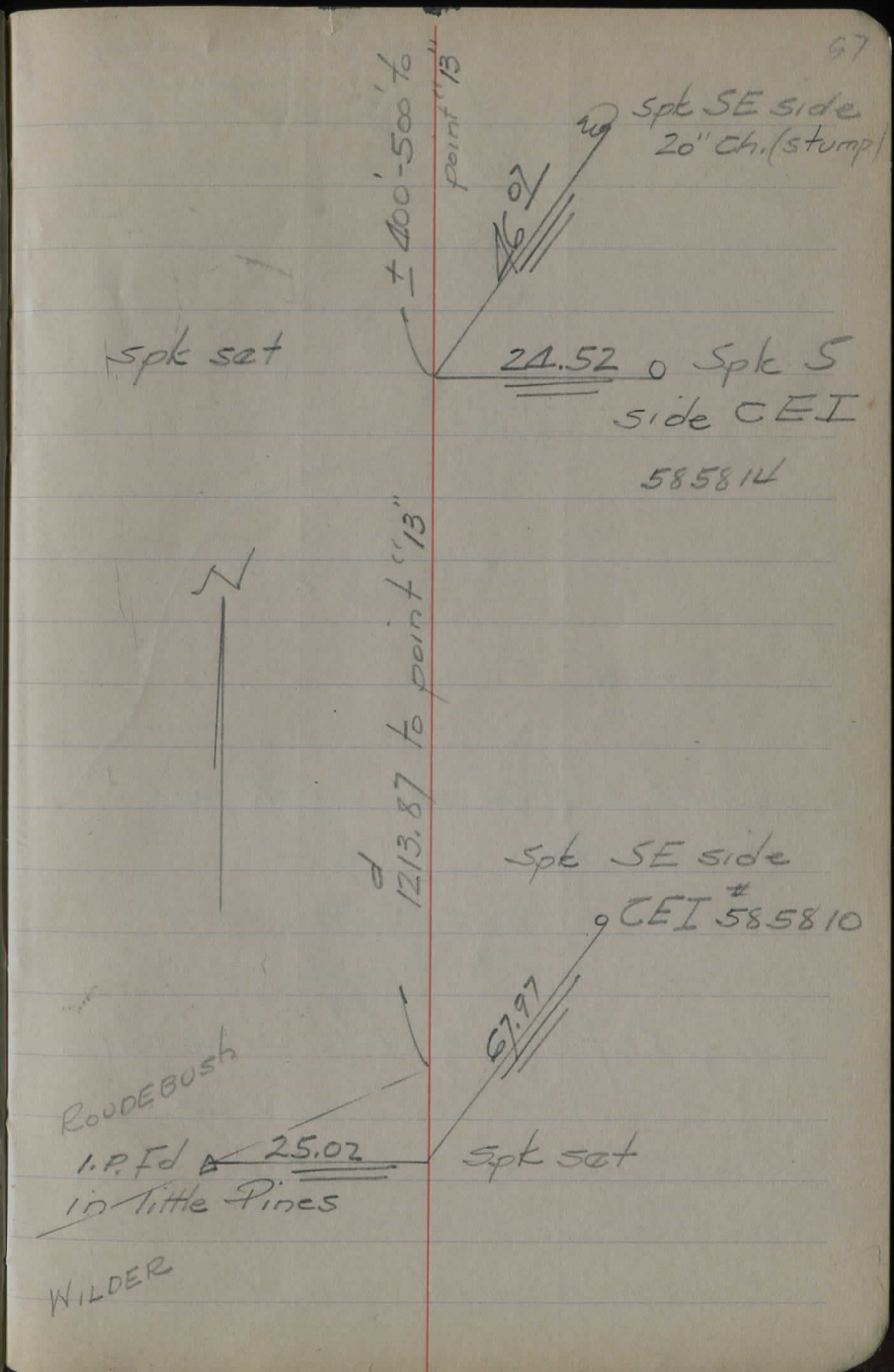
41

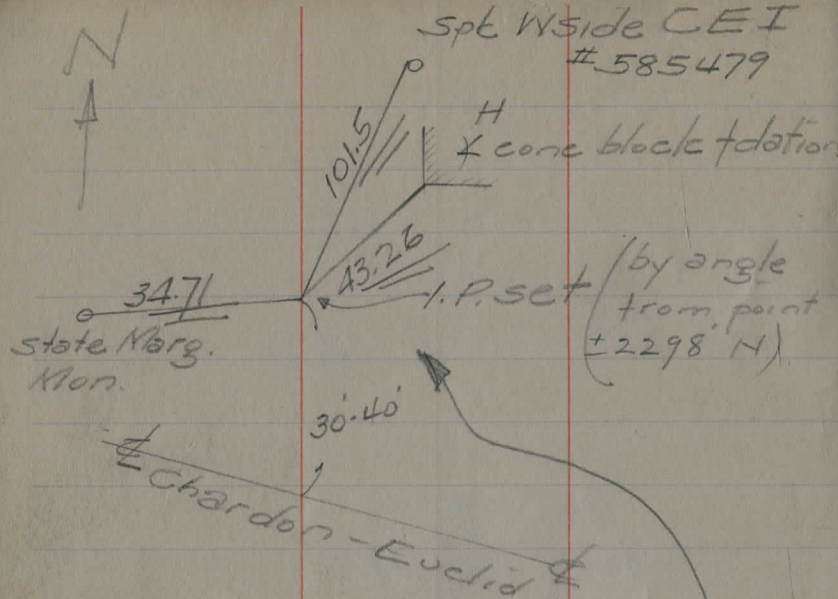



179-49-30
Fd 3-29-71
I.P.
29.47
19.85
15.33
Spk. N.W. 12" Map. Stump
Spk. E. side 6" Elm stump
36.98
26.38
32.50
58.85
Spk. N. root 36" S. Map
Spk. E. root 15" Maple
IP's 25' from either ℄
Spk. E. root 15" Maple
Same
Spk. S. side 8" popular
Spk. N.W. side 12" Osage Stump
I.P.s 25' N. of ℄
Fd May 55
Fd 5-55
Bolt Set 5-20-55
1/2" bolt
55.17
54.70
8.62
Spk
356.9
297.85
178.9
159.6.5
266.5
5.5
492.15
350.63
26.83
795 ±
17.00
Spk Fd May 55
92-40-30
87-10
279.05
25.03
25.02
92-22-30
1695.1 to Spk in ℄
East'ly End (E & W. part)
Snow Rd (Newbury
Valley Rd
I.P.
Pg 55
Twp. Ln.
297.85
178.9
142.65
619.40
Same
Bolt Fd
S&W
2993
Fd 3/29/71
S&W inv SW 21" Maple
Bolt Set Snow & Valley

WILDER RD
(See next pg)

See pg 66 for reference of
WILDER RD intersection of
MITCHELL'S MILL AND WILDER Rd.



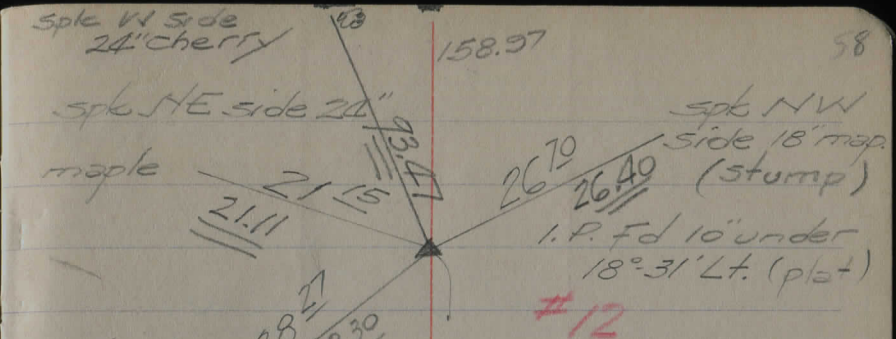


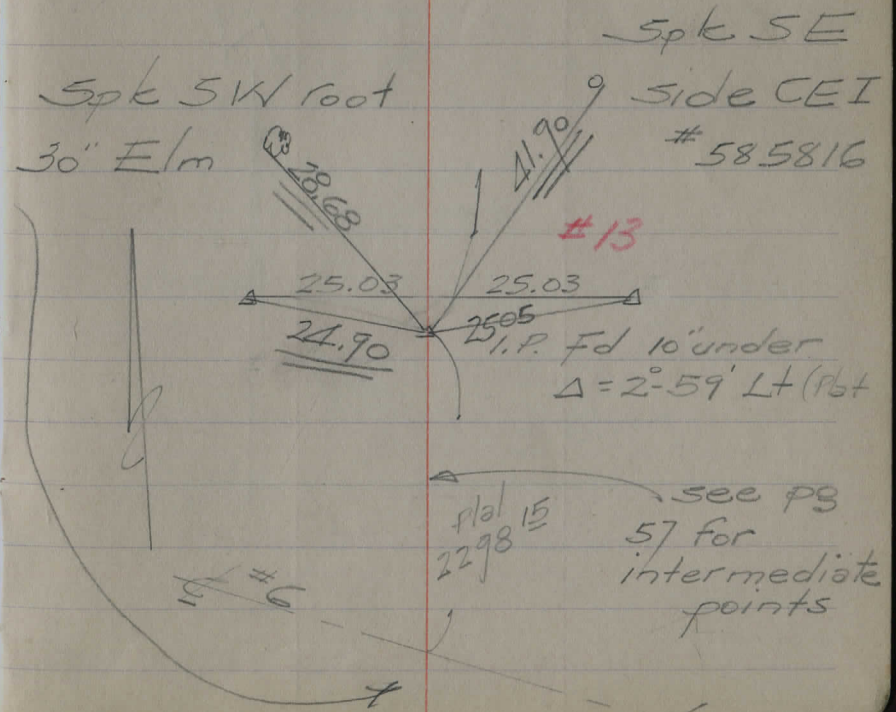
WILDER ROAD
Chardon Twp.

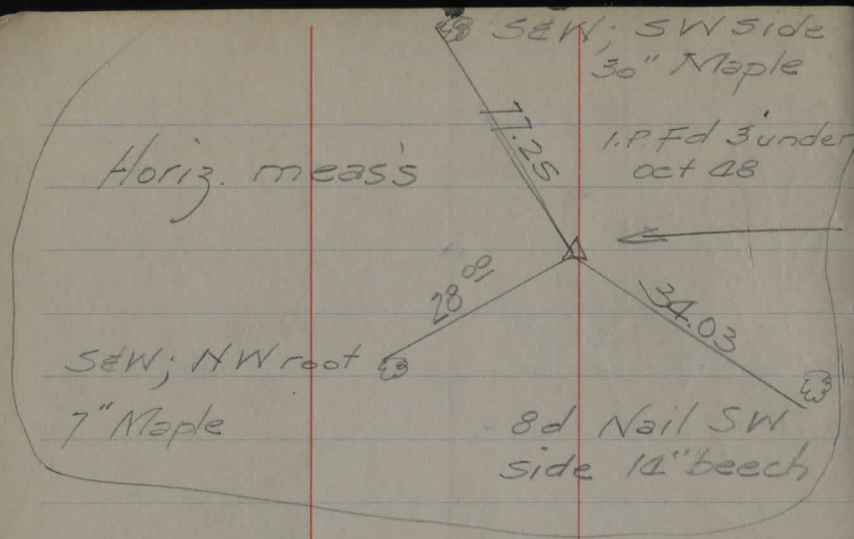
pgs 58, 59 & 60 per CEI Co.
May 1948
All ref. = point to point!

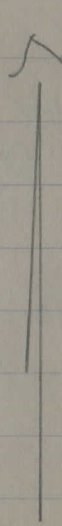
Horiz. refs = double underline
FCP & JM Nov. 48

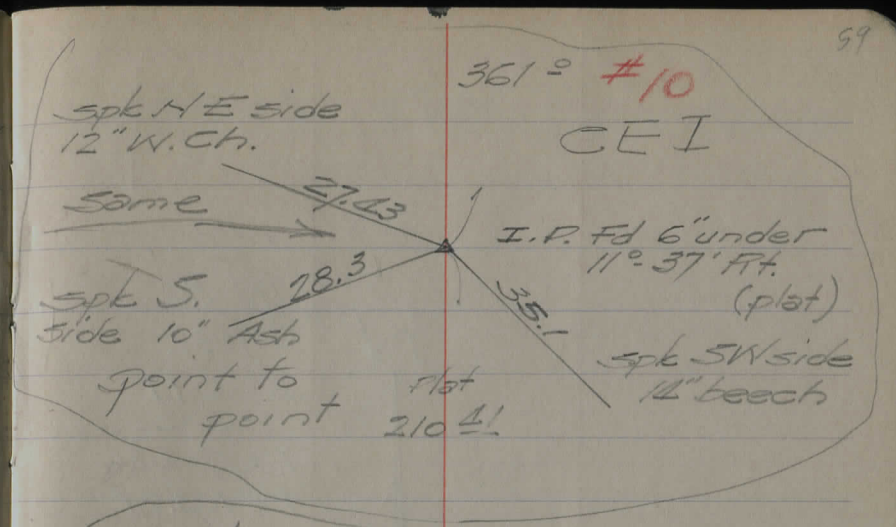
Where CEI spks are high on tree new spks were placed near root level & horiz. dist. are thereto.

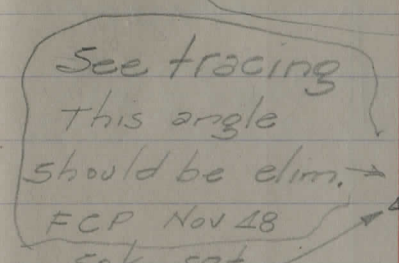




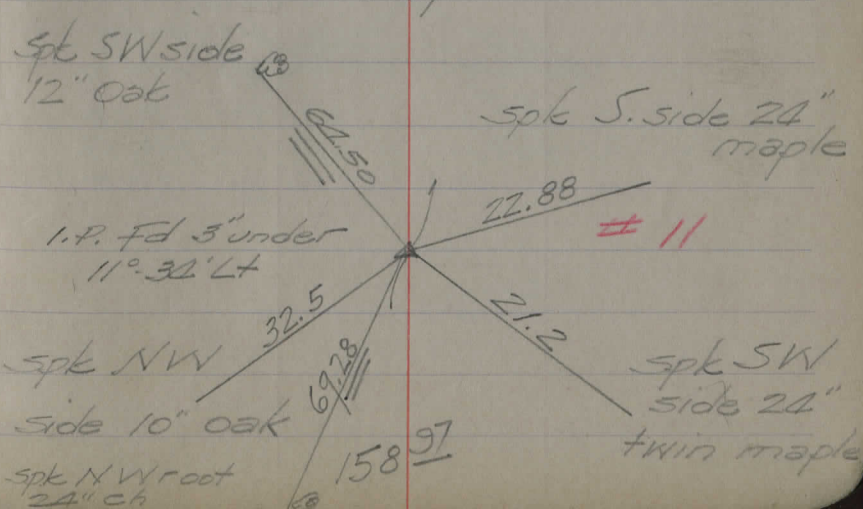

S&W; SW side
30" Maple
77.25
I.P. Fd 3 under
oct 48
Horiz. meass
28°
34.03
S&W; NW root
7" Maple
8d Nail SW
side 14" beech

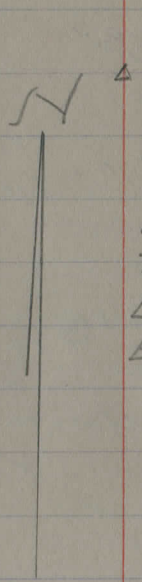



361° #10
CEI
Spk NE side
12" W. Ch.
Same
27.43
I.P. Fd 6" under
11°-37' Ft.
(plat)
Spk S.
side 10" Ash
28.3
35.1
Spk SW side
12" beech
Point to
point
Plat
210 ±!


See tracing
This angle
should be elim.
FCP Nov 48
Spk set
(at angle)
No find = CEI
1°-30' Lt

Plat
239 ±!


Spk SW side
12" Oak
64.50
Spk S. side 24"
maple
1.P. Fd 3" under
11°-32' Lt
22.88
#11
32.5
21.2
Spk NW
side 10" oak
69.28
Spk SW
side 24"
twin maple
158 97
Spk NW root
24" ch



173-46
347-32
Δ = 6-14
D = 3-00
R = 1909.86
T = 103.99
L = 207.78
E = 2.83

Δ = 13-35
D = 10-00
R = 572.96
T = 68.24
L = 135.83
E = 4.05

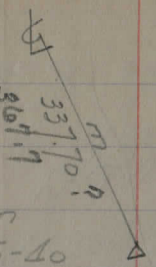
Spk SW side 12" Ash
41.55
40 12
plat 514.78
#8
Spk N side 16" maple
28.29
27.03
I.P. Fd. flush
Δ = 6-14 plat
28.65
28.00
Spk NW side 30" ash
N19°

Underlined ref. are horiz. meas. from spts near base of tree Oct 48

#9
Spk N. side 18" twin Bass'd.
19.17
19.65
I.P. Fd. flush
Δ = 13-35 Rt (plat)
41.85
29.85
29.48
Spk E side 30" elm
Spk SW side 20" maple
N61°

Δ = 24-20
D = 16
R = 358.10
T = 77.21
L = 152.08
E = 8.23

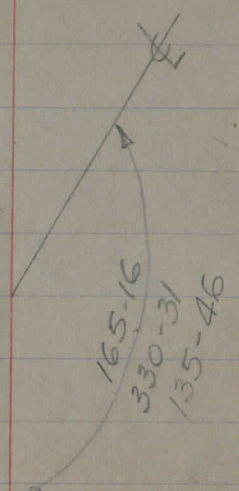
stk set
20' W
Oct 48



155-40
311-20
106-59-30

WILDER ED. Chardon Twp.
1-24,27 -47 Fom Maynard

8' Cut
Δ = 14-44-40
D = 6-00
R = 954.93
T = 123.55
L = 245.74
E = 7.96



Spk SW side twin Oak (stump)

Some

7.5 Cut
FILL MADE HERE JULY 1953

55.88

(6) I.P. Fd 12" under

85.60

126.80

Spk E side trip. Maple

Spk SE side 12" Oak

80' per min
9' wide av. depth 4"

13.6 17.6

2-steel arch culv 14.3

16.2

Spk NE side 14" Oak

32.90

(7) I.P Fd 3" under

19.49

Spk S side trip. Ash

44.05

35.29

Peele

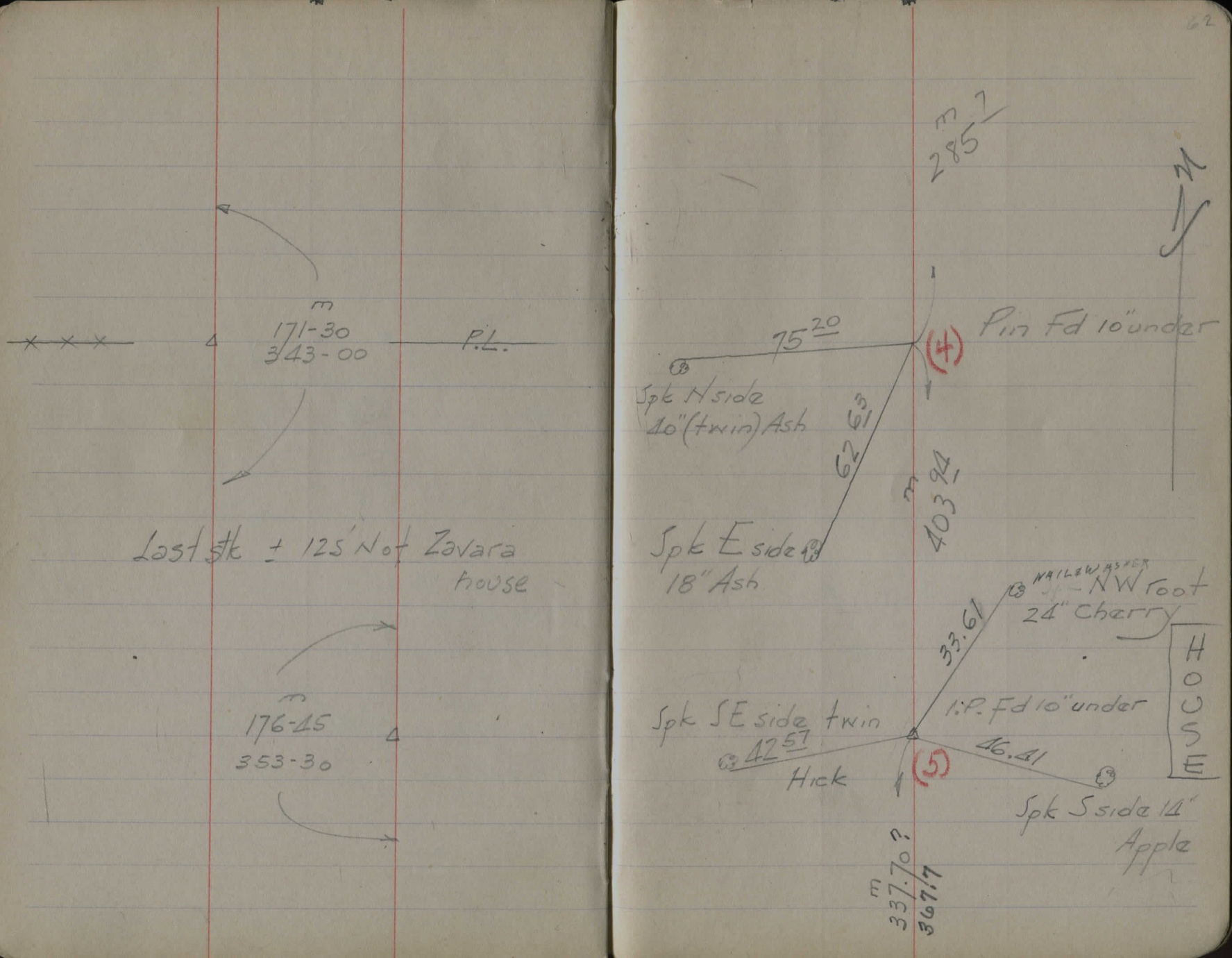
25.02

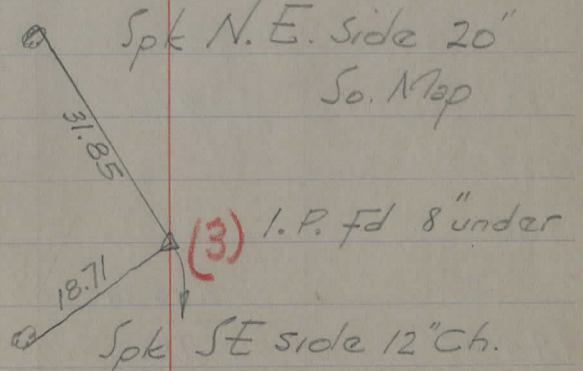
I.P. Fd 5" under

I.P. Fd

Roudabush

plat 18
5/4


285.7 m
N
75.20
(4)
Pin Fd 10" under
Spk N side
10" (twin) Ash
62.63
403.94 m
Spk E side
18" Ash
NAIL & WASHER
NW root
24" Cherry
33.61
HOUSE
I.P. Fd 10" under
Spk SE side twin
42.57
Hick
46.41
(5)
Spk S side 14"
Apple
337.70?
367.7 m
171-30
343-00
P.L.
Lost Stk ± 125' N of Zavara
house
176-45
353-30



285 m 7

Set on ℄
205.19 S of point #9

All Ls From #10 to right H/I=103.70

L	Stadia	Rod	
0-0	94'	6.2	97.5
0-0	146.5'	0.0	103.7
29-10	125.	4.8	98.9
" "	75.	2.8	100.9
51-30	117.	4.3	99.4
47-10	176.	4.25	99.4
84-30	146	1.2	102.5
65-20	78	4.3	99.4
129-30	32.5	5.2	98.5
" "	86.	5.35	98.3
180-	55.	6.7	97.0
188-10	86.	7.7	96.0
180-	132.	5.2	98.5
Pt #9	205.19	0.7	103.0
195-45	98.	7.5	96.2
186-15	140.	8.8	94.9
199-	210	10.	93.7

Levels Wilder Rd
1st Gulley N of Roadbush Pond FCP-J.M Nov 68

1	CREEK
2	
3	CREEK
4	
5	
6	SPLIT IN CREEK-MAIN CHANNEL + NORTH
7	UP STEEP NE NW
8	HI H2O WASH + HIGHER SE & NW
9	" "
10	UP STEEP NE NW
11 ✓	CREEK
12	"
13 ✓	
14 ✓	
15	CREEK
16	"
17	"

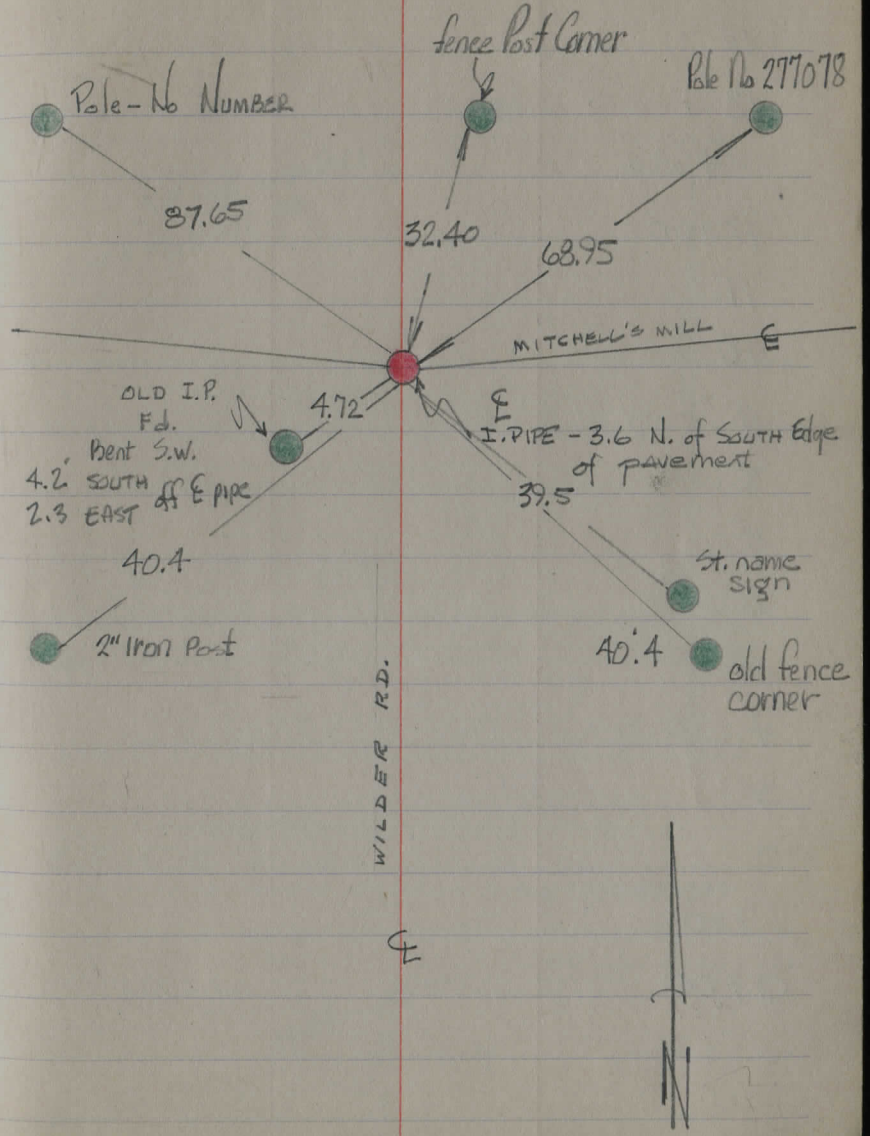
HI = 103.70

<	STAD	RED	
216-00	195	10.2	93.5
" "	191	7.9	95.8
228-30	158	8.1	95.6
242-20	132	6.4	97.3
260-00	116.	6.0	97.7
262-00	90.	7.1	96.6
" - "	80.	5.5	98.2
" - "	27	5.3	98.4
339-00	88.	4.0	99.7
146-00 3.70	103.70 HI	100.00	B.M.

18	CREEK
19	S BANK " ± STAD. SLOPE TO BOM
20	
1	
2	UP STEEP SOUTH
3	SWALE FROM SOUTH
4	
5	
6	

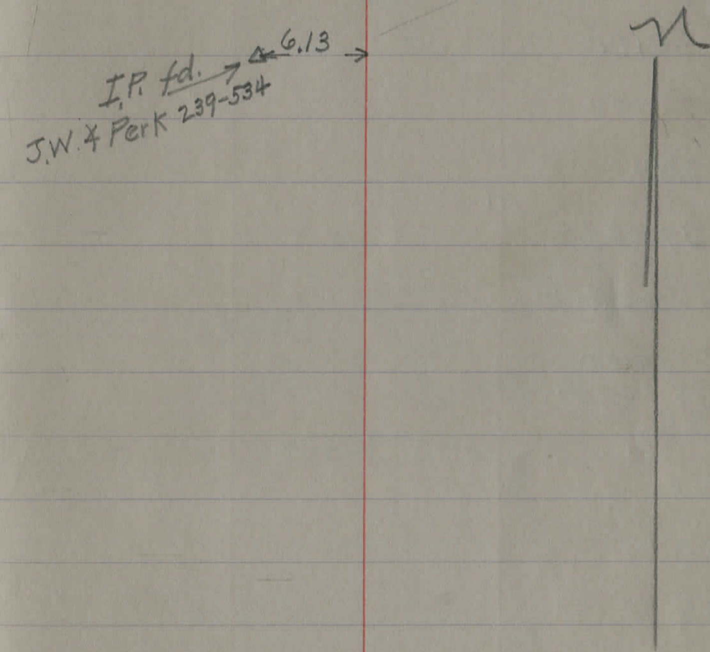
± 180' SOUTH POINT #9
S. OF SW ROOT 20" MAPLE W. SIDE ROAD

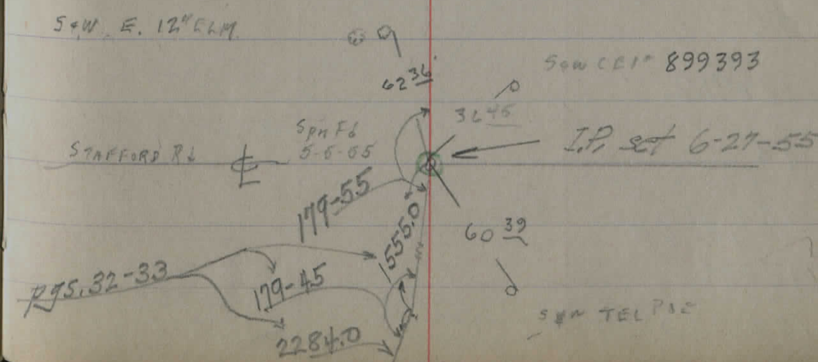
D.L. LEWIS
M.A. FERGUSON
16 APRIL, 1985



VALLEY Rd #199 Sec B
MAY 5 1955
CLEAR-BREEZY

16+00
15
14
13
+63.4
12+00
11
10
9
8
7
6
5
4
3
2
1+00
0+00





Valley RR | Sec 13

32+00

31+06.00

+82.28

30+00

29+00

28+00

27+21.55 M

27+00

26+00

25+69.50

25

24

23

22

21

20

19+91.2

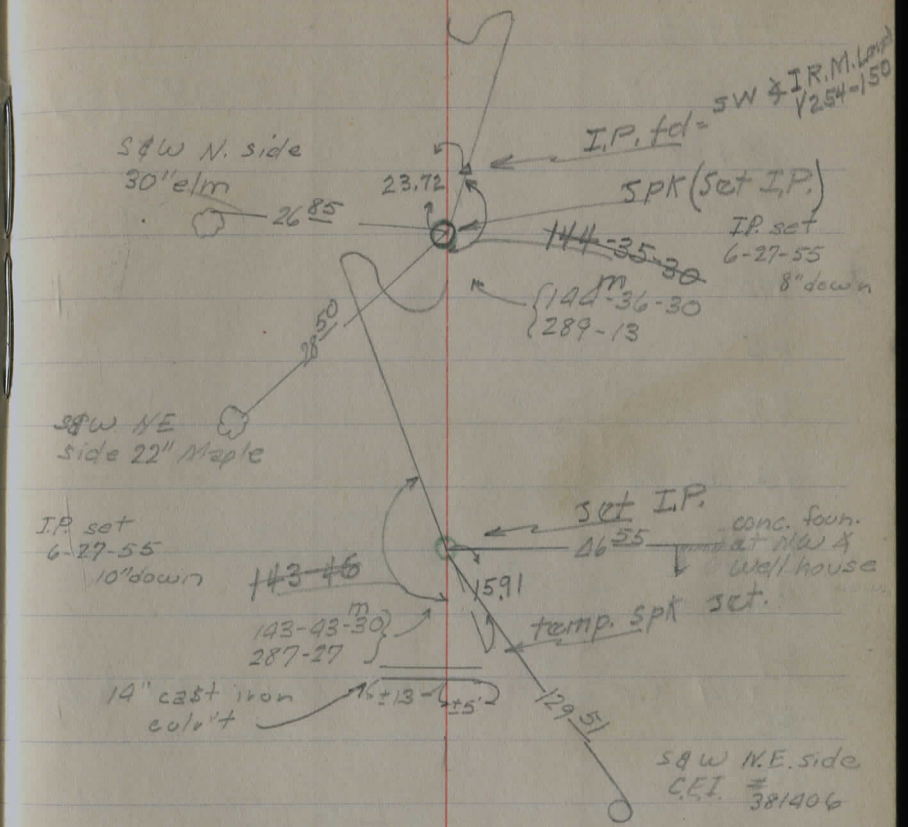
19

18+00

+93.68 M

17+00

16+11.50



Valley Rd Sec B

49+00

48+94.8 POT (sp)

48+00

47

46

45

44

43+06.92 m

43+0

42+00

41

+44 dip where water crosses Rd - to E

40

39

+91.60 m

38+00

37

36

35

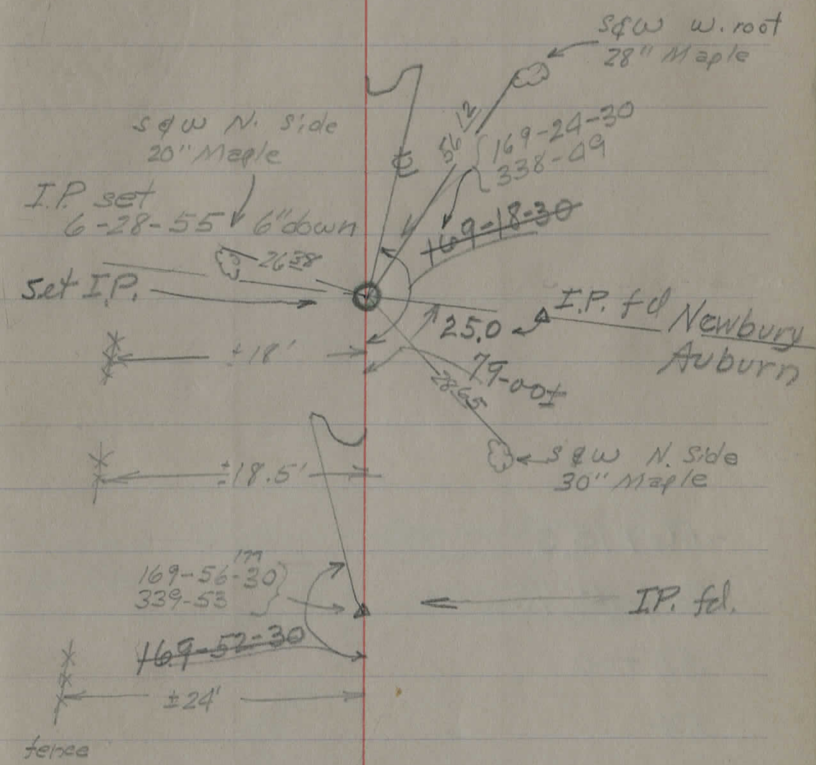
+74

34

+

33+00

old bridge
±7' x 4' to new grade
±25 sqft needed



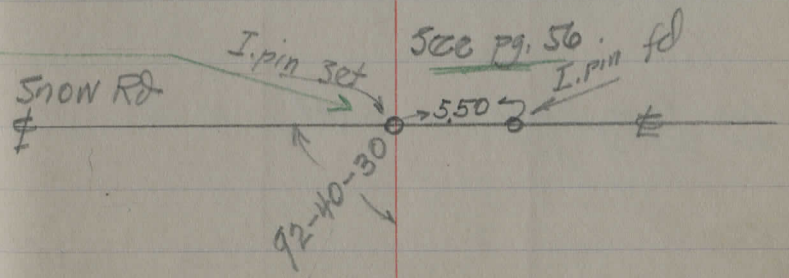
25.12 sqft

Install
2 pipes - 32' @ 48"
(=64' @ 48")

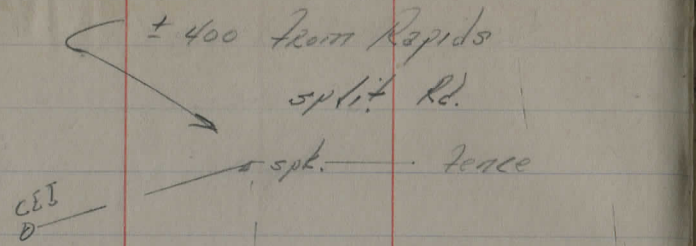
Relocate "Skew"
34 ± 60

Valley Rd

56+15.3
56+00
55+00
54
53
52
51
50+00



Young 3/10/61
Riberoux cold-rain



p.i. 29.4' from brdg.

bridge bridge Creek

p.i. 29.4' from brdg.

cross from house on top of hill · spk in ℄

snow Rd — pin found 3/10/61

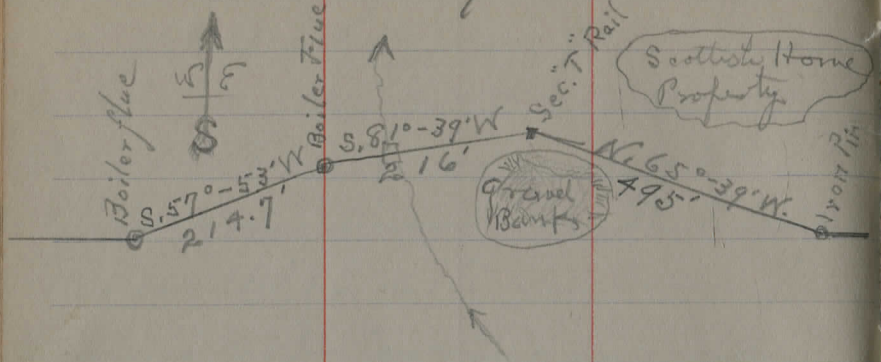
David Hudson 4/271 or 3/439 208
Wm H. Hudson 7/183 - 539
Silas Tamer - 13/98 - 538
Oliver Ranney 17/286 - 538

Chester Park

See 19/369 - 538 Chester Palmer 1834
inhabitants
David Hudson to The Twp. of (Wooster) Chester 4/213.
Bounded E. & N. by land owned by heirs of
John Miner deceased, W. on the Chillicothe
Road - So. called & S. on the road leading from
Cleveland to Burton & Circa in an Oblong
square form containing 6/4 acres according
to it's present Survey. be it's contents + or -
To be used by them for the purpose of a public
square, a public parade ground & for
public Building's if ever, and never to be
enclosed or Weahgarded &c.

Russell Twp. - N. Woodland Road

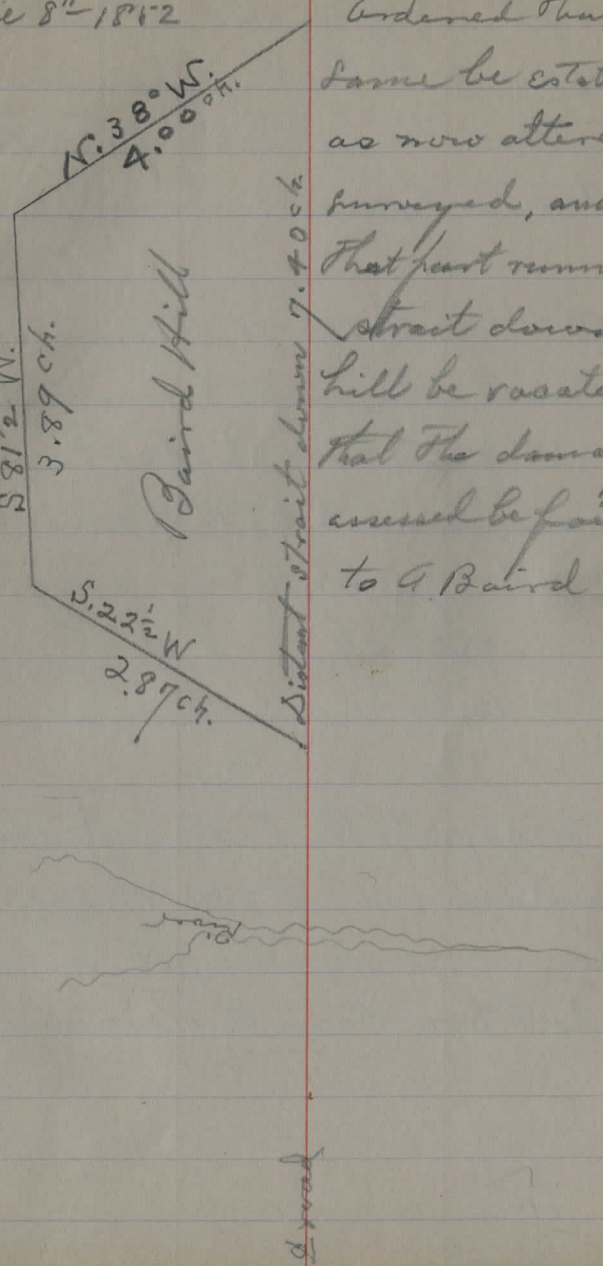
Vol. 8 - LIV Surveyors Records -



Road Records. Book D. - 170 - 2
Alteration & Vacation

June 8th 1812

"Ordered That the same be established as now altered & surveyed, and that that part running strait down the hill be vacated, & that the damages assessed be paid $5.00 to A. Baird —



Road W. of Burton Village.

Book "A" - 66 - Survey Nov. 12th 1808

Established in part 50 ft. wide. Dec. meeting 1808. (From the Center of the Square to near Lyman Burtons.)

Book "B." 2 & 3 - S. 88° - 15' W. (from intersec. of state road Warren to Painesville) 14.70 ch. to E & W center line Burton Twp. Thence on same S. 88° 15' W. 1 mi 20.70 ch.

S. 76° - 30' W. 7.31 ch. to Cuy. river

N 41° W. 9.25 ch.

N 24° W 12.67 "

N 48° W 7.90

N 56° W 32.00 to the E & W cent road in Burton, S 88° - 10' W. on same 2 mi 57.75 ch. at 27.25 State Road Chardon to Ravenna

48½
85
86½ B. B. Bryne

20 R. G. Vage

154/67 ~~348~~ 351 July 23 1918
26 G. Wildt

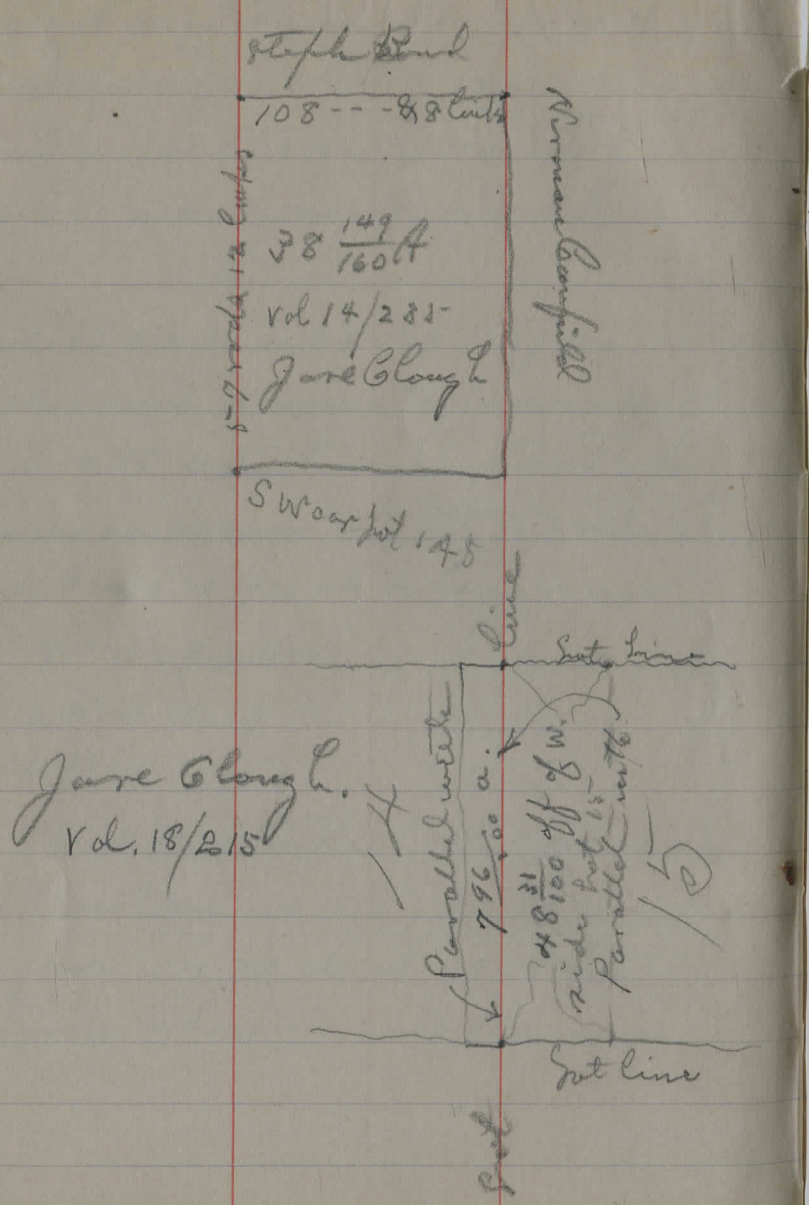
131½
26 J. W. Lathrop

May 24 - 1919 - 154/497 140/280

R & J. Svara 83. 16.30
Sept 27 - 1923

F & A Valdmian 53.25

J & M Hecke 60.65


Stephen Bond
108 - - - 88 links
38 149/160 A
vol 14/281
Jane Clough
S W corner lot 148
Norman Canfield
Line
South Line
Jane Clough
vol. 18/215
Parallel with
196 100 a.
Parallel with
Lot line

7.15	T.P. on line S. Culvert 2" from Burd, Cor.
5.50	100' S. of " " s. of " "
6.10	T.L. " " " " "
3.80	2 road summit
7.00	" " at int.
5.00	S.W. ditch at int. roads
4.60	2 road 50' South
4.20	" 100 "
4.60	" Low point
3.90	" culvert
4.30	50' S. of culvert

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.$=23^\circ 20'$ to the R. at Station 542+72.

Ext. in Tab. IV opposite $23^\circ 20' = 120.87$
$120.87 \div 12 = 10.07$. Say a 10° Curve.

Tan. in Tab. IV opp. $23^\circ 20' = 1183.1$
$1183.1 \div 10 = 118.31$.

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. $23^\circ 20' = 23.33^\circ \div 10 = 2.3333 =$ L. C.

$2^\circ 19\frac{1}{2}'$ = def. for sta.	542	I. P. = sta.	542+72
$4^\circ 49\frac{1}{2}'$ = " " "	+50	Tan. =	1.18.47
$7^\circ 19\frac{1}{2}'$ = " " "	543	B. C. = sta.	541+53.53
$9^\circ 49\frac{1}{2}'$ = " " "	+50	L. C. =	2.33.33
$11^\circ 40'$ = " " "	543+ 86.86	E. C. = sta.	543+86.86

$100 - 53.53 = 46.47 \times 3'$ (def. for 1 ft. of 10° Cur.)$= 139.41' = 2^\circ 19\frac{1}{2}''$ = def. for sta. 542.

Def. for 50 ft.$=2^\circ 30'$ for a 10° Curve.

Def. for 36.86 ft.$=1^\circ 50\frac{1}{2}'$ for a 10° Curve

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

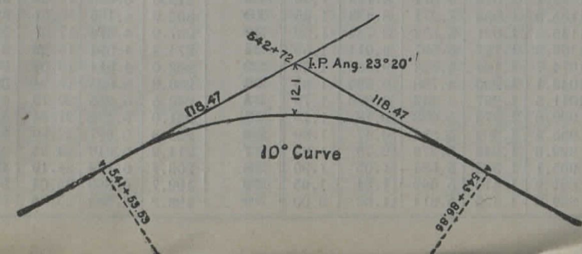


Table I. — Minutes in Decimals of a Degree.

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	3.718	7.561	1.30	30	348.5	3.606	14.35	28.70	4.95
30	1273.6	.982	3.926	7.852	1.35	17	338.3	3.716	14.78	29.56	5.10
40	1228.1	1.018	4.071	8.143	1.40	18	319.6	3.935	15.64	31.29	5.40
50	1185.8	1.055	4.217	8.433	1.45	19	302.9	4.155	16.51	33.01	5.70
5	1146.3	1.091	4.362	8.724	1.50	20	287.9	4.374	17.37	34.73	6.00
10	1109.3	1.127	4.507	9.014	1.55	21	274.4	4.594	18.22	36.44	6.30
20	1074.7	1.164	4.653	9.305	1.60	22	262.0	4.814	19.08	38.16	6.60
30	1042.1	1.200	4.798	9.596	1.65	23	250.8	5.035	19.94	39.87	6.90
40	1011.5	1.237	4.943	9.886	1.70	24	240.5	5.255	20.79	41.58	7.20
50	982.6	1.273	5.088	10.18	1.75	25	231.0	5.476	21.64	43.28	7.50
6	955.4	1.309	5.234	10.47	1.80	26	222.3	5.697	22.50	44.99	7.80
10	929.6	1.346	5.379	10.76	1.85	27	214.2	5.918	23.35	46.69	8.10
20	905.1	1.382	5.524	11.05	1.90	28	206.7	6.139	24.19	48.38	8.40
30	881.9	1.418	5.669	11.34	1.95	29	199.7	6.360	25.04	50.07	8.70
40	859.9	1.455	5.814	11.63	2.00	30	193.2	6.583	25.88	51.76	9.00

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	483.8	30	3014.5	744.6
40	1843.3	289.2	40	2412.4	487.2	40	3025.2	749.6
50	1852.5	292.0	50	2422.3	491.0	50	3035.8	754.6
36	1861.7	294.9	**46**	2432.1	494.8	**56**	3046.5	759.6
10	1870.9	297.7	10	2441.9	498.7	10	3057.2	764.6
20	1880.1	300.6	20	2451.8	502.5	20	3067.9	769.7
30	1889.4	303.5	30	2461.7	506.4	30	3078.7	774.7
40	1898.6	306.4	40	2471.5	510.3	40	3089.4	779.8
50	1907.9	309.3	50	2481.4	514.3	50	3100.2	784.9
37	1917.1	312.2	**47**	2491.3	518.2	**57**	3110.9	790.1
10	1926.4	315.2	10	2501.2	522.2	10	3121.7	795.2
20	1935.7	318.1	20	2511.2	526.1	20	3132.6	800.4
30	1945.0	321.1	30	2521.1	530.1	30	3143.4	805.6
40	1954.3	324.1	40	2531.1	534.2	40	3154.2	810.9
50	1963.6	327.1	50	2541.0	538.2	50	3165.1	816.1
38	1972.9	330.2	**48**	2551.0	542.2	**58**	3176.0	821.4
10	1982.2	333.2	10	2561.0	546.3	10	3186.9	826.7
20	1991.5	336.3	20	2571.0	550.4	20	3197.8	832.0
30	2000.9	339.3	30	2581.0	554.5	30	3208.8	837.3
40	2010.2	342.4	40	2591.0	558.6	40	3219.7	842.7
50	2019.6	345.5	50	2601.1	562.8	50	3230.7	848.1
39	2029.0	348.6	**49**	2611.2	566.9	**59**	3241.7	853.5
10	2038.4	351.8	10	2621.2	571.1	10	3252.7	858.9
20	2047.8	354.9	20	2631.3	575.3	20	3263.7	864.3
30	2057.2	358.1	30	2641.4	579.5	30	3274.8	869.8
40	2066.6	361.3	40	2651.5	583.8	40	3285.8	875.3
50	2076.0	364.5	50	2661.6	588.0	50	3296.9	880.8
40	2085.4	367.7	**50**	2671.8	592.3	**60**	3308.0	886.4
10	2094.9	371.0	10	2681.9	596.6	10	3319.1	892.0
20	2104.3	374.2	20	2692.1	600.9	20	3330.3	897.5
30	2113.8	377.5	30	2702.3	605.3	30	3341.4	903.2
40	2123.3	380.8	40	2712.5	609.6	40	3352.6	908.8
50	2132 7	384.1	50	2722.7	614.0	50	3363.8	914.5

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

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	.10	.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

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 $\frac{50}{\text{sin. def. ang.}}$	$\frac{\frac{1}{2}\text{ sub chord}}{R}$ = 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	1279	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.

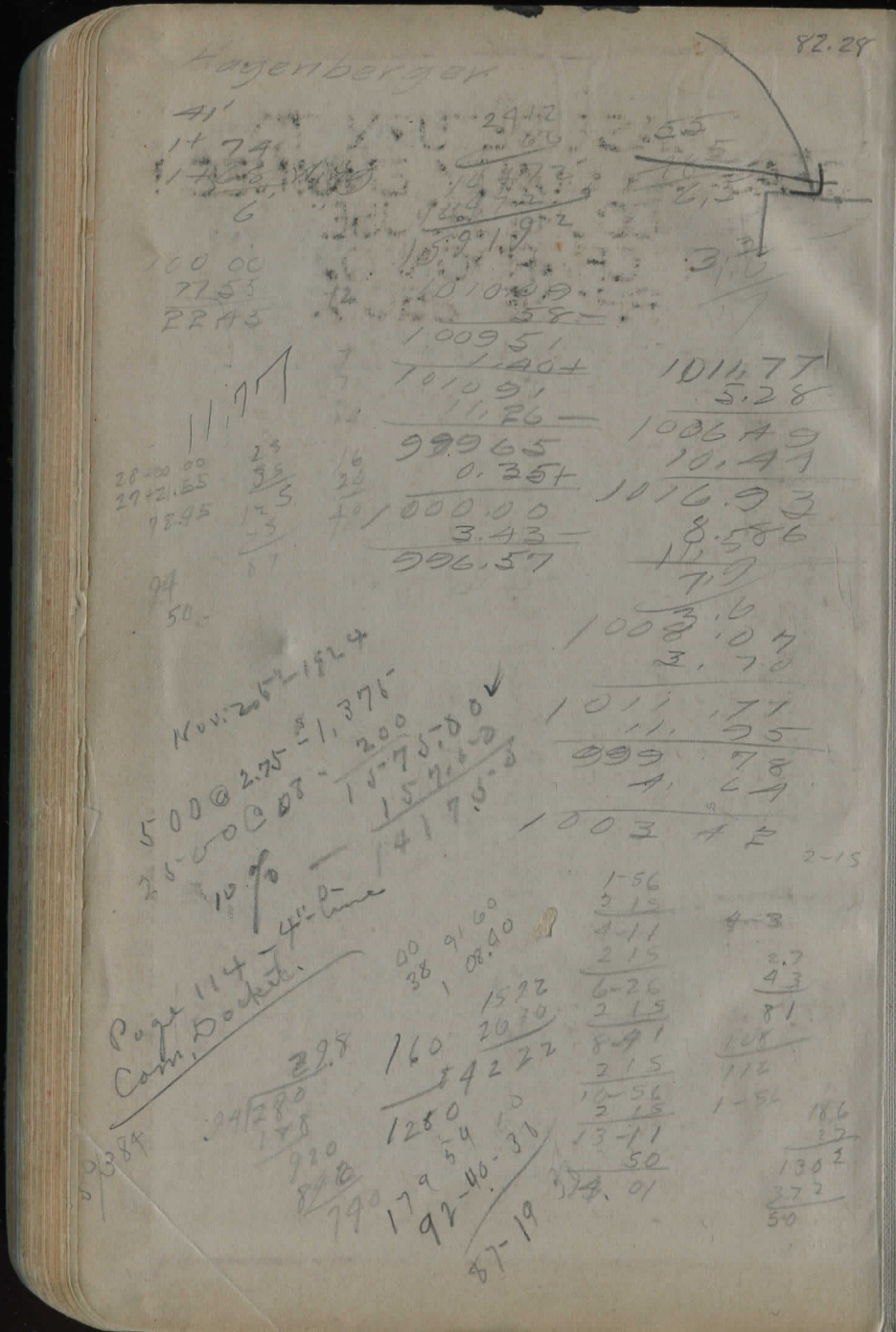
Natural Cosines

Natural Tangents

deg.	0′	10′	20′	30′	40′	50′	deg.	deg.	0′	10′	20′	30′	40′	50′	deg.
0	0000	0029	0058	0087	0116	0145	89	40	8391	8441	8491	8541	8591	8642	49
1	0175	0204	0233	0262	0291	0320	88	41	8693	8744	8796	8847	8899	8952	48
2	0349	0378	0407	0437	0466	0495	87	42	9004	9057	9110	9163	9217	9271	47
3	0524	0553	0582	0612	0641	0670	86	43	9325	9380	9435	9490	9545	9601	46
4	0699	0729	0758	0787	0816	0846	85	44	9657	9713	9770	9827	9884	9942	45
5	0875	0904	0934	0963	0992	1022	84	45	1.0000	1.0058	1.0117	1.0176	1.0235	1.0295	44
6	1051	1080	1110	1139	1169	1198	83	46	1.0355	1.0416	1.0477	1.0533	1.0599	1.0661	43
7	1228	1257	1287	1317	1346	1376	82	47	1.0724	1.0786	1.0850	1.0913	1.0977	1 1041	42
8	1405	1435	1465	1495	1524	1554	81	48	1.1106	1.1171	1.1237	1.1303	1.1369	1.1436	41
9	1584	1614	1644	1673	1703	1733	80	49	1.1504	1.1571	1.1640	1.1708	1.1778	1.1847	40
10	1763	1793	1823	1853	1883	1914	79	50	1.1918	1 1988	1.2059	1.2131	1.2203	1.2276	39
11	1944	1974	2004	2035	2065	2095	78	51	1.2349	1.2423	1.2497	1.2572	1.2647	1.2723	38
12	2126	2156	2186	2217	2247	2278	77	52	1.2799	1.2876	1.2954	1.3032	1.3111	1.3190	37
13	2309	2339	2370	2401	2432	2462	76	53	1.3270	1.3351	1 3452	1.3514	1.3597	1 3680	36
14	2493	2524	2555	2586	2617	2648	75	54	1.3764	1.3848	1.3934	1.4019	1.4106	1.4193	35
15	2679	2711	2742	2773	2805	2836	74	55	1.4281	1.4370	1.4460	1.4550	1.4641	1.4733	34
16	2867	2899	2931	2962	2994	3026	73	56	1.4826	1.4919	1.5013	1.5108	1.5204	1.5301	33
17	3057	3089	3121	3153	3185	3217	72	57	1.5399	1.5497	1.5597	1 5697	1 5798	1.5900	32
18	3249	3281	3314	3346	3378	3411	71	58	1.6003	1.6107	1.6212	1.6319	1.6426	1.6534	31
19	3443	3476	3508	3541	3574	3607	70	59	1.6643	1 6753	1.6864	1.6977	1.7090	1 7205	30
20	3640	3673	3706	3739	3772	3805	69	60	1.7321	1.7437	1.7556	1.7675	1 7797	1.7917	29
21	3839	3872	3906	3939	3973	4006	68	61	1.8040	1.8165	1.8291	1.8418	1.8546	1.8676	28
22	4040	4074	4108	4142	4176	4210	67	62	1.8807	1.8940	1.9074	1.9210	1.9347	1.9486	27
23	4245	4279	4314	4348	4383	4417	66	63	1.9626	1.9768	1.9912	2.0057	2.0204	2.0353	26
24	4452	4487	4522	4557	4592	4628	65	64	2.0503	2.0655	2.0809	2.0965	2.1123	2.1283	25
25	4663	4699	4734	4770	4806	4841	64	65	2 1445	2.1609	2.1775	2 1943	2.2113	2.2286	24
26	4877	4913	4950	4986	5022	5059	63	66	2.2460	2.2637	2.2817	2.2998	2.3183	2.3369	23
27	5095	5132	5169	5206	5243	5280	62	67	2.3559	2.3750	2.3945	2.4142	2.4342	2.4545	22
28	5317	5354	5392	5430	5467	5505	61	68	2.4751	2.4960	2.5172	2.5386	2.5605	2.5826	21
29	5543	5581	5619	5658	5696	5735	60	69	2.6051	2 6279	2.6511	2.6746	2.6985	2.7228	20
30	5774	5812	5851	5890	5930	5969	59	70	2.7475	2.7725	2.7980	2.8239	2.8502	2.8770	19
31	6009	6048	6088	6128	6168	6208	58	71	2.9042	2.9319	2.9600	2.9887	3.0178	3.0475	18
32	6249	6289	6330	6371	6412	6453	57	72	3.0777	3 1084	3.1397	3.1716	3.2041	3.2371	17
33	6494	6536	6577	6619	6661	6703	56	73	3.2709	3.3052	3.3402	3.3759	3.4124	3.4495	16
34	6745	6787	6830	6873	6916	6959	55	74	3.4874	3.5261	3 5656	3.6059	3.6470	3.6891	15
35	7002	7046	7089	7133	7177	7221	54	75	3.7321	3.7760	3.8208	3.8657	3.9136	3.9617	14
36	7265	7310	7355	7400	7445	7490	53	76	4.0108	4.0611	4.1126	4.1653	4.2193	4.2747	13
37	7536	7581	7627	7673	7720	7766	52	77	4 3315	4.3897	4.4494	4.5107	4.5736	4.6382	12
38	7813	7860	7907	7954	8002	8050	51	78	4 7046	4.7729	4.8430	4.9152	4.9894	5 0658	11
39	8098	8146	8195	8243	8292	8342	50	79	5 1446	5.2257	5.3093	5.3955	5.4845	5.5764	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	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



Hagenberger

82.28

Lynn Hartford - 186/312 - 92 77 A.

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

ROADWAY 14 FEET WIDE. SIDE SLOPES 1½ TO 1.

FOR USE IN THE BLACK 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.