

K&S

FIELD BOOK

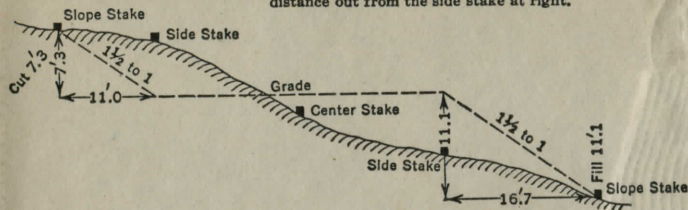
W 360

313

DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING

Roadway of any Width. Side Slopes 1 1/2 to 1.

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



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

KEUFFEL & ESSER CO., N. Y.

For Curve Tables see end of book.

Align.
 Chardon-Windsor Rd. Sec D. Pt. of Sec C. Pg 1
 " " " Topo Pg 5
 " " " X Sec & B.Ms. Pg 9
 Invert Elev. X Rd & Dr Culverts. 2/23/67 Pg 29
 #13 Storm Drain (E. Vill. line - S. Side) 25
 Ravenna Road & data 33
 Ditch elevations #13 at ground surface Chardon Windsor (Big Creek) 46
 Chardon-Windsor Rd #13 Align. Sec G. (75/76) 48
 C.H. #37 CLAY ST. (PART #1000' N.E.S. of C.H. 13) 75/76 52
 Topo - 1976 #37 53
 " " #13 57
 LEVELS 2 X SEC #13 & 37 60
 DRIVE PROFILES 71
 TR 58A SIDLEY - DITCH PROFILES, F.G., CUTS 73

The paper in this book No. 360 is made of 100% high grade rag stock with a WATER RESISTING surface sizing.

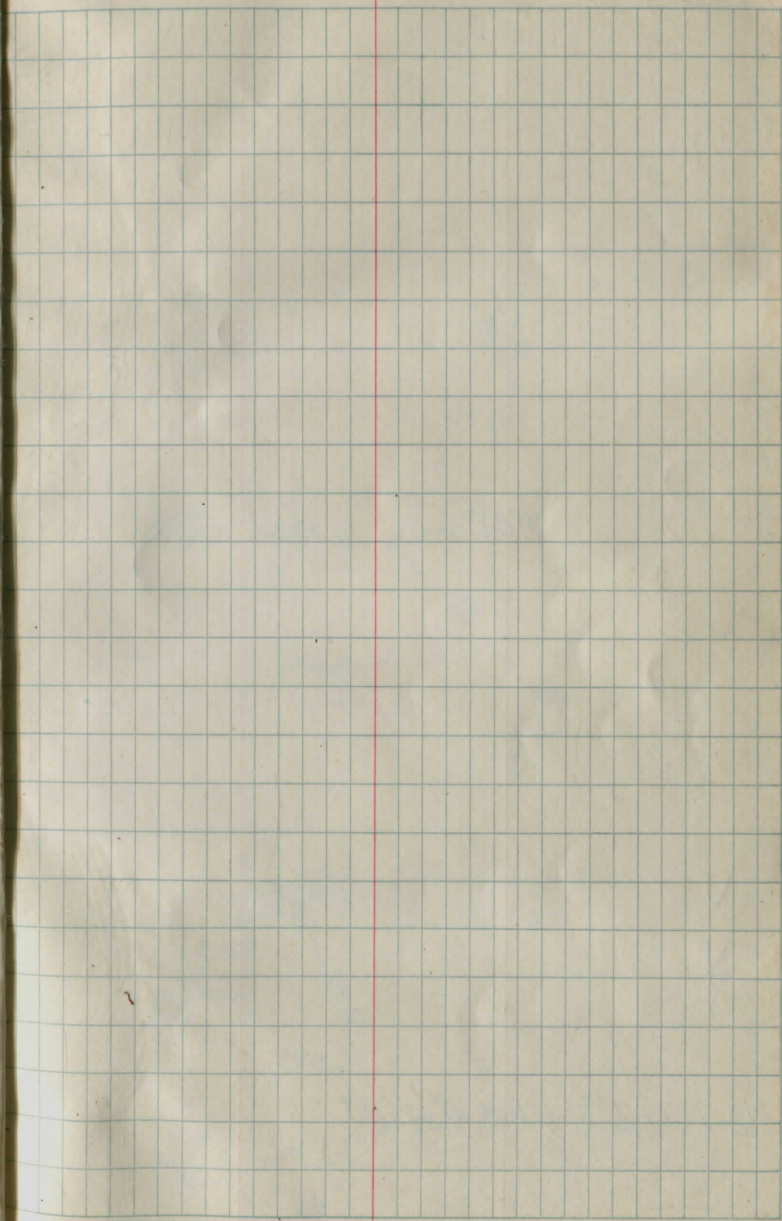
In the f
from th



Out of
Fill

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1	1
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H. Patterson
H. Clary
A. Winchell
P. Ranney

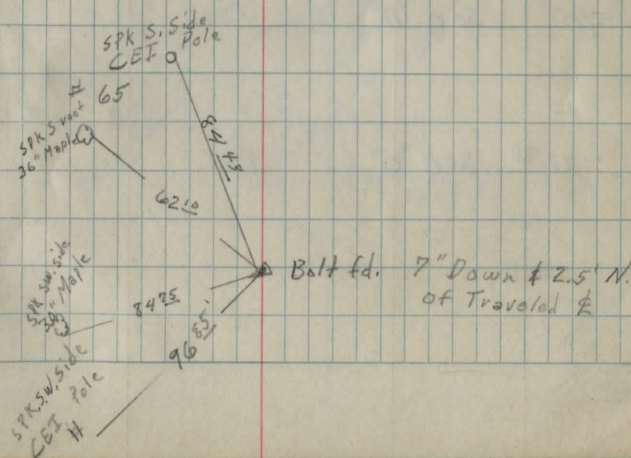
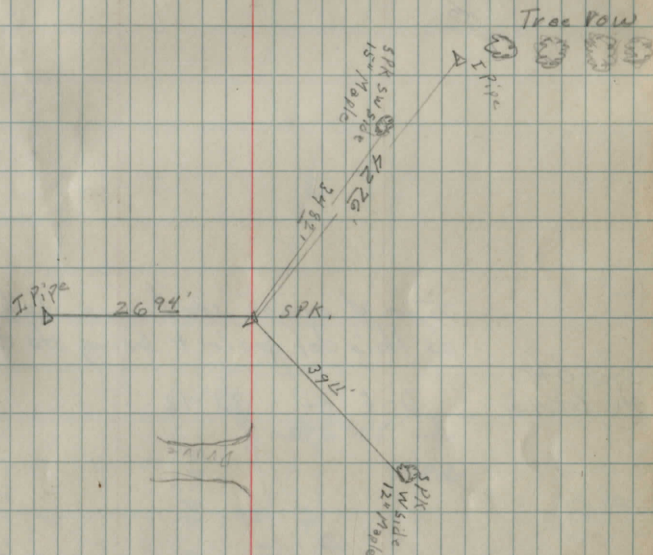
Chardon-Windsor Rd
Sec "D" & Pt. of sec "C"

6-26-63

P.O.T.

"C"
Sec

Sta. 107+61⁴⁰ Dec 0°-35' Lt.



Topo of cross sections taken
as this def. point being sta 0+0

Sta 0+0
Sta ~~0+45~~

Def Rt 33'-12"

Sta -45⁰⁰

Sec "D"

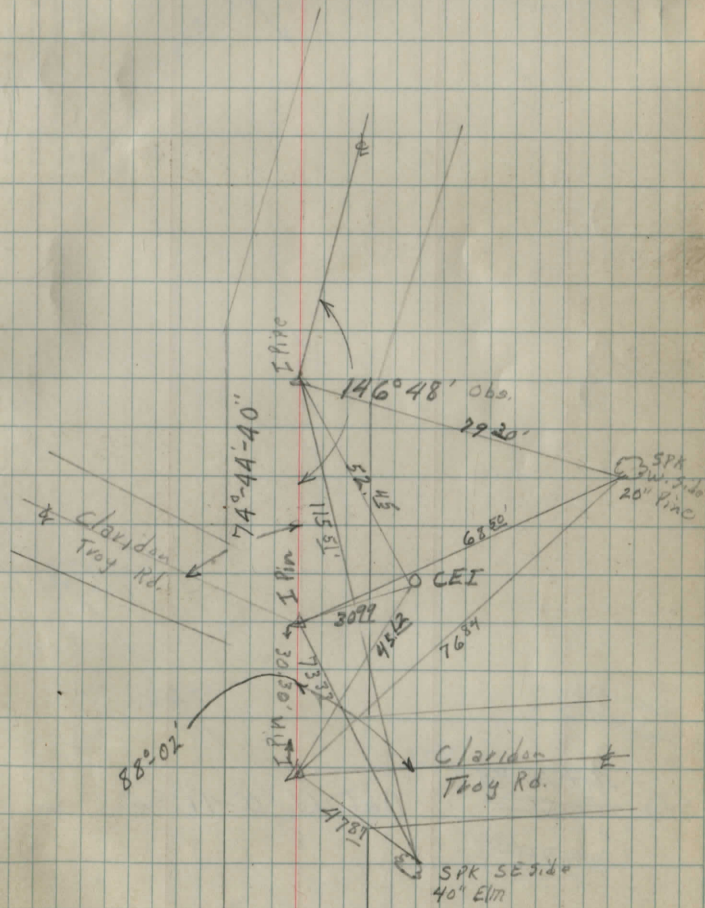
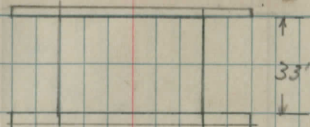
P.O.T.

Sta -75.3⁰⁰

Sec "C"

P.O.T.

K-10.3-10.5'4



sta 35+91.86

~~35+36.40~~

~~35+36.40~~

P.O.T.

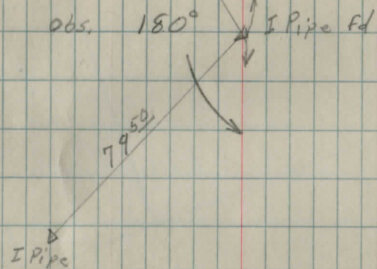
P.O.T.

16+13.88
sta ~~16+58.40~~

~~16+58.40~~

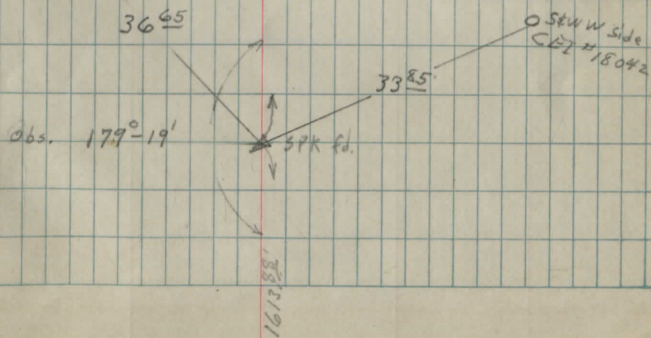
Def Lt 0°-41'

SPK N. Side
CE# 589351



197796

SPK E Road
36" Elm



1613.88

Sta 46+12.68

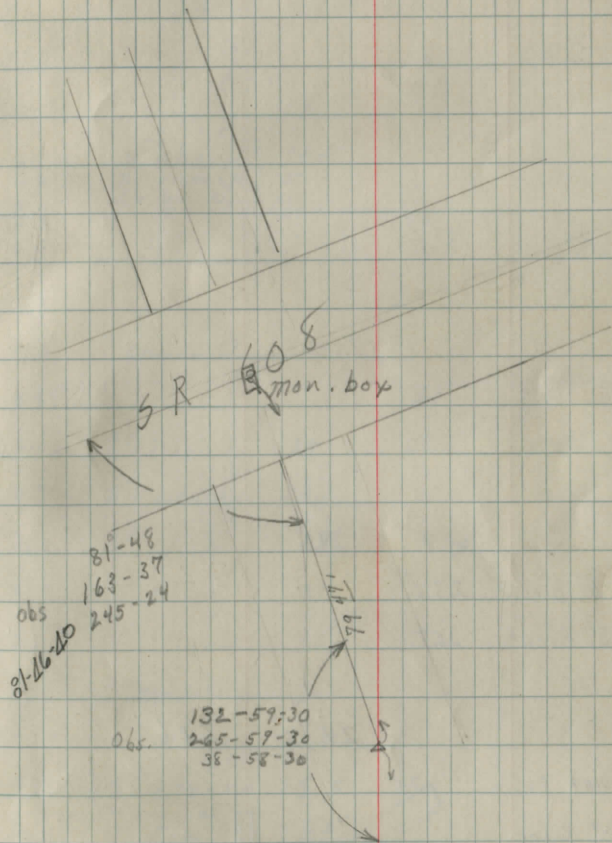
46+57.68

45+33.21

Sta ~~45+77.60~~

Def Lt 47°-00'-30"

~~45+78.24~~



(S)

Topo

(N)

-500

-452 Brush 24.5'

-450 6" Birch 23.5'

-445 8" Birch 25.5'

-280 24' CEI

-154 Inlet 30"

-151 30" Conc.

-147

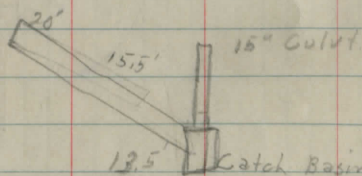
-142 12.5' Catch Basin 3X3

-110 40" Elm 28' 22.5' CEI

-59 CEI 32'

-54 24" Pine 68.5'

0+0



	N		S
6+90		23'	
+78			28.5' CEI
+25		18'	
5+23	5" cherry	20.5'	
+79	8" cherry	21.5'	
+29	Drive No pipe		
+24			28' fence
4+23			29' CEI
3+18			23' fence
+68	cherry clump	29.5'	
+48			21' Barbwire fence
2+46	8" cherry	29'	28.5' CEI
+99	5" cherry	28.5'	
+62	6" cherry	28'	
+52	10" cherry	29.5'	
+38	6" Maple	28'	
+38	6" cherry	25'	
+33	5" cherry	26.0'	
+31	8" cherry	26.5'	
+29	8" Elm	26.5'	
+11	8" Locust	26.8'	
1+06	8" cherry	25.5'	
+92			30" stamp
0+83	8" Locust	28.5'	
0+73			29' CEI

N

S

+70	6" Tulip Tree	24.5'		
15+54	Cherry ^(Clump) Bush	20.5'		
+54		28.5'		CEI
14+28	12" X 16' Conc.	16.5'		
+98	End Fence	18.7'		
+75	Bay Wood Fence	15.7'		
+66	12" 50' Boiler ^{end wood}	16.5'		
13+46	Fence	20'		
+99	6" Cherry	21'		
+98	Bay Wood fence	21'		
12+80		28.5'		CEI
12+74				
+93	12" X 22' CMP.	16'		
11+07	CEI	29'	28'	CEI
+53	Fence &	29.5'		
+83	4" Cherry	23.5'		
+29	4" cherry	23.5'		
10+11	6" cherry	20.5'		
+81		24.5'	Fence Corner	
+81		17'	12" X 16' CMP ^{Drill} (on X)	
+31		28.5'		CEI
9+25	fence	25.5'	25.5'	fence
+86	12" X 16' CMP.	17'		
8+68	8" Apple	28.5'		
+91	Bridge	10.3'	10.5'	
7+58	Bridge	10.2'	10.4'	
7+47		28.5'		CEI

N

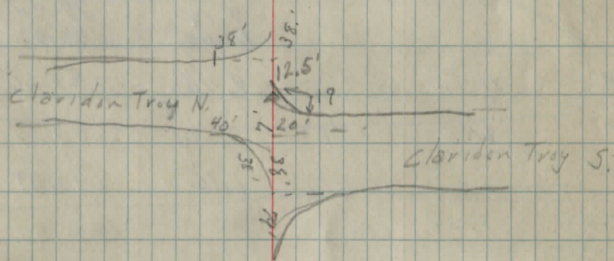
S

+66	8" Twin Apple	24'		
+35	10" Cherry	25.5'		
22+29	12" X 32.5' CMP.	16.5' X 16'		18° S Row
+35		28'		O.B.T.
21+00		22.5'		Brush
+61	10" Twin Cherry	27'		
20+40	Brush	25'		field Dr. No PIPE
20+10				
+92	36" Maple	19'		
+28		24'		Brush
+97		29.5'		CEI
+63	30" Maple	23'		
+35	12" X 18' CMP	17'		
19+00	30" Maple	23.5'		
+54	2" ? Tulip	21'		
+38	30" Maple	21'		
+19	Brush	23'		
18+06	End Hedge	21.5'	28.5'	CEI
+80	20" Cherry stump	21.5'		
+67	30" Maple	21'		
+60	Begin Hedge row	22'		
+48	4" V.T. tile X 19'	17'		
17+86	Hedge row	22.5'		
+54	Begin Hedge row	24'		
+35	30" Elm	31.2'		
16+32			28'	CEI

+31	15'	21.5'	15" Maple	
33+19	12" X 17" (Steel) Dr. Pipe Brush	15.5'		
+80	10" Ash	21'		
+59		29'	O.B.T.	
+33	10" Ash	22'		
32+24	8" Ash	19.5'		
+76	2-8" Elms	23'		
31+35	8" Elm	23.5'		
+77		28'	O.B.T.	
+65	36" Elm Stump	18.5'		
30+61	Twin 8" Ash	20'		
30+30	15" C.M.P.	17' 15"		
+51	8" ? Tulip	21.4'		
+49	24" Stump	18.5'		
29+33		28'	O.B.T.	
+84	15" stump	18'		
28+01	20" Stump	18.5'		
27+77		28.5'	O.B.T.	
+72	8" Maple	27.5'	21' Brush	
26+19	24" Elm	20'	26.5' O.B.T.	Foot sheet
+97	8" Twin cherry	25.5'		
+63	8" cherry	25'		
24+57		28'	O.B.T.	
+92	24" Maple	22.5'		
23+07	Trip 8" Apple	26.7'		
22+97		29'	O.B.T.	

		N		5
+67	12" x 20' Paved drive Cons.	16.8'		
+54	3" Apple	20.5'		
+51	4" Evergreen	28.5'		
+48	2" Birch	20.5'		
+43	1" Lilac Tree	24'		
+42	3" Evergreen	28.5'		
+31	4" Cherry	23.5'		
+29	2" Evergreen	26.5'		
+24	8" Cherry	23'		
+20		28'	O.B.T.	
37+03	3" Evergreen Tree	22.5'		
+94	4" Apple	22.5'		
+81	4" Maple	22.5'		
+69	2" maple	22.5'		
+68	C.F.I.	28'		
+55	Evergreen shrub	19.5'		
+42	12" Ash	21'		
36+17	8" cherry	20.5'		
+95	Drive no pipe			
+57		28.9'	O.B.T.	
+35	End Brush	21' 21'	Begin Brush	
35+16	C.F.I.	28.7'		
+90	10" Maple	20'		
+83	10" Ash	21'		
+47	Brush	20'		
+36	15" Bolted pipe	15'		
35+16		28'	O.B.T.	
+97	End Brush	19'		
33+62	10" Ash	19'		

45+84	18" CMP	<u>37</u>	<u>15</u>	
✓ 490	8" Ash	37'		
✓ 44+17		22'		Kilax
✓ 499	(30" Maple	28')		→ This side
✓ 187	CEL	23.4'		
✓ 471	6" Ash	21.8'		
✓ +59		22.5'		O.B.T.
✓ 43+55	12" cherry	18.5'		
✓ 456		29.5'	12'	Apple
✓ 4270		28'		O.B.T.
✓ 485	CEL	29.5'		
		11.3'	16.7'	
✓ 482	12" x 2" CMP	<u>37</u>	<u>15</u>	
✓ 41+36	10" Twin Ash	29'		
✓ 40+42	Brush	26'	28.5'	O.B.T.
✓ 497	CEL	28.5'		
✓ 490	8" Ash	27.5'		
✓ 39+34	Drive Maple			
✓ 481		29'		O.B.T.
✓ 450	Evergreen	26'		
✓ 447	Evergreen	20.5'		
✓ 431	CEL	28'		
✓ 431	Shrub	25'		
✓ 38+14	2" Locust	20'		
✓ 494	6" Silver Poplar	19.7'		
✓ 37+87	4" Birch tree	19.5'		



H. Patterson
H. Cary
A. Winchell
P. Ranney

Chardon - Windsor Rd
Pl sec C & Sec D

Cloudy - 70°
7-9-63

		HI		Elev.
BM #1	+8.19 7.62	109.62 108.19		100.00
-1000.0			3.44	104.75
-900.0			8.16	100.03
T.P.	0.43	96.98 98.41	11.64	96.55 99.98
-800.0			1.67	95.31
-700.0			5.76	91.22
-600.0			7.87	87.11
T.P.	1.40	86.61 88.04	11.77	85.21 86.58
-500.0			2.40	84.21
-400.0			4.55	82.03
-300.0			6.33	80.28
-200.0			7.70	78.91
-100.0			9.54	77.07
BM #2		102.02	9.17	77.44 77.02
T.P.	11.71	96.92	1.40	85.21
T.P.	8.49	101.85	3.66	93.36
BM #1			1.76	100.09
BM #1	1.75	101.25		100.00
T.P.	0.27	90.08	11.94	89.81
T.P.	3.84	86.27	7.65	82.43
BM #2	2.52	79.97	8.82	77.45
T.P.	1.52	69.79	11.70	68.27
T.P.	1.73	59.85	11.67	58.12
BM #3			3.92	55.93
T.P.	11.73	69.85	1.73	58.12

SPK. S. side CET # 194323 29' Lt. & Sta. ? - 580

SPK S.W. side CET # 84 29' Lt. & Sta.
Gone See Pg. 22 for New B.M.

2/29/67

X Cut in S. end W. Adwell Bridge

		69.85		
T.P.	11.80	80.07	1.58	68.27
BM#2			2.61	77.46
BM#3	7.99	63.91		55.93
T.P.	11.41	74.86	0.46	63.45
T.P.	8.42	82.32	0.96	73.90
BM#4			1.61	80.71
T.P.	0.52	74.43	8.41	73.91
T.P.	0.53	63.96	11.00	63.43
BM#3			8.04	55.92
BM#4	4.56	85.27		80.71
T.P.	6.49	87.85	3.91	81.36
BM#5			3.70	83.95 ✓
T.P.	6.87	86.45	8.27	79.58
BM#6			4.30	82.15 ✓
T.P.	8.41	88.00	6.86	79.59
BM#5			4.05	83.95 ✓
T.P.	4.37	85.75	6.62	81.38
BM#4			5.04	80.71 ✓
BM#6	5.96	88.11		82.15 ✓
T.P.	9.52	97.14	0.49	87.62
T.P.	4.41	101.50	0.05	97.09
BM#7			3.79	97.71 ✓
T.P.	4.62	97.45	8.67	92.83
T.P.	4.32	99.44	2.33	95.12
BM#8			1.57	97.87 ✓

Spk SE root 36" Elm 21' Lt. sta. 16+70

Vent
Spk SE root 24" Maple 22.5' Lt. sta 23+92

Bent SW
Spk. S. side 10" Ash 37' Lt. sta 32+33

Bent Hart. spk S. side 8" Cherry 20.5' Lt. sta. 37+24

Vent. spk. E. side 36" Maple 32' R+ sta 44+00

HI

BM² 3.93 81.38 77.45

-40.

0+0

BM² 3.85 81.30 77.45

0+50

1+0

BM² 2.07 79.52 77.45

750

T.P. 3.18 71.76 10.94 68.58

2+0

750

3+0

4+0

T.P. 1.54 63.71 9.59 62.17

5+0

6+0

T.P. 6.53 61.37 8.87 54.84

7+0

BM³ 5.47 55.90

8+0

N

E

S

12

6.75	5.65	5.90	6.05	3.30	1.55	2.50
22.5	27	28.5	33	51	67.5	
7.25	6.95	7.20	7.80	6.60		
30	21	18	15	5		

9.45	8.35	10.10	10.15	8.55	8.75	8.50	8.90	9.15	9.80	4.20	2.50	2.85
30	23.5	19	16	11.5	9.5		9	12.5	18	30	68.5	90

10.90	10.80	11.30	11.55	10.45	10.70	10.00	10.20	10.75	10.20	10.65	6.95	4.25
30	21	16.5	15.5	12.5	9		8	10	13	12.5	30	94

9.60	10.70	11.0	11.2	9.50	9.75	9.45	9.20	9.25	10.20	10.50	8.10	6.40
30	20	17.5	15	12.5	9		8	9.5	14	14.5	21	60

3.45	3.20	4.30	4.40	3.00	3.05	2.85	3.10	3.25	4.10	4.35	2.90	1.85
30	21	17.5	15	12.5	9		8	10	14	16	21	50

Down steep -32	4.70	4.85	5.40	5.40	4.45	4.30	4.95	4.20	4.80	5.15	5.10	4.35	3.40
	30	21.5	17.5	15	11.5	8.5		8	10.5	14.5	14.5	14	58

9.40	6.20	6.60	6.25	5.75	5.50	5.20	5.75	5.45	6.30	6.25	4.85	6.55
30	22.5	18.5	15.5	13.5	8.5		8	10	14.5	17	20.5	50

14.05	14.50	11.10	10.25	9.90	9.65	9.40	9.65	9.10	11.10	10.80	6.10	6.90
30	25.5	17.5	15	10	8		9	10	15	17	25.5	40

8.15	7.65	7.85	7.55	6.45	6.70	5.95	6.20	6.25	7.20	7.55	5.05	6.10
30	19	16	14	10	8		8.5	11.5	15	17.5	23.5	30

10.25	9.80	9.80	9.85	7.90	9.85	8.45	8.20	8.85	10.40	10.45	10.60	11.25
30	19	16	14	10	8.5		8	10	15	15	24	30

9.45	6.50	7.40	7.25	6.65	6.65	6.25	6.50	6.30	8.00	8.25	7.35
30	19	16	13.5	10.5	9.5		8	12	17.5	20.5	30

9.80	12.05	12.15	6.45	5.05	5.50	5.35	5.55	5.60	11.35	12.15	11.30
30	27.5	26	15.5	10	7.5		7.5	10	24	25.5	30

61.37

9+0

10+0

T.P. 10.23 71.58 0.02 61.35

11+0

12+0

T.P. 9.42 79.66 1.34 70.24

12+0

13+0

14+0

15+0

T.P. 6.76 84.78 1.64 78.62

15+0

16+0

BM #4 4.10 80.68

17+0

18+0

19+0

13

N

S

5.15	4.85	5.75	5.85	4.45	4.25	4.10	4.20	4.25	6.30	6.20	5.00	6.83
30	22	18	16.5	12.5	8		8	12	16	12.5	23	30

7.65	1.90	3.40	2.80	2.15	1.95	1.70	1.55	1.85	2.60	3.25	1.90	2.60
30	22	17	14	11	8.5		8	12	16	12.5	21.5	30

3.60	3.70	8.70	5.55	7.10	6.95	6.75	6.80	7.00	8.65	8.65	8.20	4.70
30	26.5	12.5	14	10	8.4		8	11	14.5	12.0	24.5	30

0.25	0.20	2.20	3.95	1.90	1.85	1.60	1.70	1.95	3.80	3.25	7.24
30	21	16.5	16.5	13	9		8.5	12	15	12.5	

2.75	2.65
24	30

5.05	5.05	7.20	2.40	6.60	6.45	6.25	6.50	6.65	8.20	8.55	5.45	5.80
30	23	16	15	11.5	9		8.5	12	16	12.5	23	30

3.40	4.10	5.30	5.20	3.75	4.00	3.75	3.95	4.10	6.15	6.15	3.65	3.10	3.25
30	20.5	16.5	16	12	8.50		8.5	11.5	16	12.5	21.5	27.5	30

1.10	2.45	3.15	3.20	1.50	1.80	1.55	1.85	2.00	3.25	3.65	1.25
30	19	16.5	15.5	12	9		8.5	11.5	16	12.5	24

6.30	6.80
26.5	30

5.70	5.10	6.45	6.55	5.60	5.65	5.20	5.45	5.60	6.55	7.25	4.60	5.20	5.05
30	21	12.5	15.5	12.5	9.5		8.5	11	15.5	12.5	22.5	28	30

4.75	4.20	6.00	5.95	5.00	4.85	4.55	4.75	4.95	6.30	6.30	4.20	5.20
30	22	17	16.5	13	8.5		8.5	11.5	15.5	12	22	30

5.90	5.20	6.00	6.00	4.75	4.65	4.40	4.60	4.75	6.20	5.75	4.55	4.40
30	17.5	17	16	12	8.5		8.5	12	16	17	21	30

4.20	4.35	5.45	5.80	4.30	4.10	3.85	4.10	4.25	5.30	5.20	3.80	3.70
30	20	17	16.5	12	8		9	12.5	16	17	21.5	30

8478

T.P.	4.98	86.00	3.76	81.02
------	------	-------	------	-------

20+0

21+0

22+0

BM#4

4.10 80.68

BM#5

2.45

86.40

83.95

23+0

24+0

BM#5

3.67

87.62

2.45

83.95

25+0

26+0

T.P.

3.37

84.90

6.09

81.53

27+0

28+0

T.P.

4.30

84.05

5.15

79.75

+50

29+0

+50

N

S

14

5.90	5.10	6.20	6.00	5.10	5.10	4.75	4.85	5.00	5.65	5.90	4.40	3.95	0.84
30	20.5	17	15	11	8.5	9	11.5	15	17	20.5	29.5		

4.90	4.95	6.20	6.05	4.75	4.70	4.50	4.80	4.85	5.90	6.20	3.85	3.90
30	22	17	16	12	8	9	12	15.5	17	21.5	30	

6.05	5.50	6.25	6.40	4.95	4.80	4.55	4.85	5.70	6.30	6.25	4.15	4.55
30	19.5	17	15	11.5	9	8.5	12	15.5	18.5	20	30	

5.10	4.30	6.35	6.20	5.05	4.90	4.68	5.05	5.80	6.20	6.20	4.90	4.75
30	22	17	16	12.0	8	9.5	11.5	15.5	17.1	19.5	30	

4.30	3.70	5.25	5.20	4.20	4.05	3.85	4.00	4.10	5.30	5.10	3.80	3.70
30	21	17	16.5	12.5	7.5	9.5	12.0	15.5	18.0	21	30	

5.25	5.25	5.85	5.9	5.00	4.85	4.50	4.70	4.80	5.80	5.85	3.55	3.40
30	17.5	15.5	14.5	11.5	8	9	12.0	15.5	16.5	21.5	30	

7.40	6.40	7.05	6.75	6.10	5.90	5.60	5.60	5.70	6.45	6.70	4.30	4.25
30	19.5	16.5	15.5	11.5	8.5	8.5	12.0	14.5	16.0	21.0	30	

7.75	6.25	6.80	6.35	6.25	5.70	4.95	4.65	4.70	5.75	5.55	3.25	2.85
30	28.5	19.0	16.5	15.5	11.0	8.5	8.5	12.0	15.5	17.5	22.5	30

7.40	6.90	6.50	7.10	6.65	5.50	5.45	5.10	5.30	5.35	6.80	6.80	6.00	6.20
30	22.5	18.0	16.5	14.0	10.5	8.0	9.5	12.5	16.5	17.5	21.5	30	

5.65	5.10	5.90	5.70	4.65	4.55	4.35	4.55	4.60	6.20	6.25	5.20	5.70
30	19.5	16.5	15.5	10.5	7.5	7.5	9.5	12.0	15.5	17.0	19.5	30

5.70	5.20	6.10	6.0	4.70	4.70	4.90	4.65	4.75	5.80	6.70	5.65	5.80
30	18.5	16.5	15.5	11.0	7.5	9.5	12.5	15.5	18.0	21.5	30	

6.05	5.20	6.45	6.30	4.90	4.85	4.50	4.85	5.0	6.70	6.50	6.10	6.60	6.80
30	20	16.5	15.0	10.5	9.5	9.5	13.0	16.5	17.5	20.5	23.5	30	

84.05

T.P. 4.80 84.33 4.52 79.53

30+0

+50

31+0

T.P. 5.47 86.74 3.06 81.27

+50

32+0

BM+6 4.61 82.13 (82.15)

+50

T.P. 7.79 91.14 3.39 83.35

33+0

+50

T.P. 7.72 98.71 0.15 90.99

34+0

+50

35+0

T.P. 6.64 104.34 1.01 97.70

+50

6.75
7.59

N

S

15

79.58
 $\frac{7.0}{3.0}$ $\frac{6.70}{1.5}$ $\frac{7.0}{1.5}$ $\frac{6.90}{1.5}$ $\frac{5.15}{1.0}$ $\frac{5.10}{8.0}$ $\frac{4.75}{1.0}$ $\frac{5.15}{1.0}$ $\frac{5.20}{1.0}$ $\frac{6.75}{1.0}$ $\frac{6.80}{1.0}$ $\frac{6.50}{1.0}$ $\frac{7.15}{3.0}$

80.03
 $\frac{7.25}{3.0}$ $\frac{6.45}{1.9}$ $\frac{7.0}{1.5}$ $\frac{6.90}{1.6}$ $\frac{4.70}{1.15}$ $\frac{4.60}{1.15}$ $\frac{4.70}{1.0}$ $\frac{4.75}{1.0}$ $\frac{5.0}{1.0}$ $\frac{6.5}{1.0}$ $\frac{6.5}{1.0}$ $\frac{5.05}{20.0}$ $\frac{7.05}{3.0}$

80.53
 $\frac{6.50}{3.0}$ $\frac{5.70}{1.7}$ $\frac{5.80}{1.2}$ $\frac{4.45}{1.25}$ $\frac{4.10}{1.25}$ $\frac{3.80}{1.0}$ $\frac{4.15}{1.0}$ $\frac{4.45}{1.0}$ $\frac{5.70}{1.0}$ $\frac{5.70}{1.0}$ $\frac{5.30}{1.0}$ $\frac{5.70}{1.0}$ $\frac{5.75}{1.0}$

81.24
 $\frac{7.80}{3.0}$ $\frac{7.0}{18.5}$ $\frac{7.20}{1.7}$ $\frac{7.30}{1.6}$ $\frac{6.10}{1.3}$ $\frac{5.70}{8.5}$ $\frac{5.50}{9.0}$ $\frac{5.80}{1.0}$ $\frac{6.25}{1.3}$ $\frac{7.40}{15.5}$ $\frac{7.5}{16.5}$ $\frac{6.8}{16.5}$ $\frac{7.28}{3.0}$

82.14
 $\frac{6.80}{3.0}$ $\frac{5.80}{16.5}$ $\frac{6.25}{1.7}$ $\frac{5.70}{1.6}$ $\frac{5.30}{1.4}$ $\frac{4.70}{9}$ $\frac{4.60}{9.0}$ $\frac{5.00}{1.0}$ $\frac{5.25}{13.5}$ $\frac{5.75}{15.5}$ $\frac{5.75}{17.0}$ $\frac{5.25}{1.7}$ $\frac{5.70}{24}$ $\frac{6.10}{3.0}$

83.29
 $\frac{4.70}{3.0}$ $\frac{4.20}{1.7}$ $\frac{5.20}{16.5}$ $\frac{5.20}{15.5}$ $\frac{4.30}{13.5}$ $\frac{3.75}{8.5}$ $\frac{3.45}{9.0}$ $\frac{4.50}{1.0}$ $\frac{4.85}{13.5}$ $\frac{4.25}{15.5}$ $\frac{4.25}{17.5}$ $\frac{3.65}{1.7}$ $\frac{3.65}{3.0}$

84.89
 $\frac{6.40}{3.0}$ $\frac{6.25}{2.1}$ $\frac{7.85}{1.6}$ $\frac{7.85}{1.5}$ $\frac{6.90}{1.5}$ $\frac{6.55}{8.5}$ $\frac{6.25}{9.0}$ $\frac{6.55}{1.0}$ $\frac{6.50}{1.0}$ $\frac{7.68}{1.0}$ $\frac{7.50}{1.0}$ $\frac{5.00}{1.0}$ $\frac{4.90}{3.0}$

87.19
 $\frac{3.85}{3.0}$ $\frac{3.00}{1.5}$ $\frac{5.85}{1.5}$ $\frac{5.75}{1.4}$ $\frac{4.55}{1.2}$ $\frac{4.15}{8}$ $\frac{3.95}{9.5}$ $\frac{4.30}{14.5}$ $\frac{4.50}{12.5}$ $\frac{5.15}{17.5}$ $\frac{5.15}{17.5}$ $\frac{1.40}{2.3}$ $\frac{1.20}{3.0}$

89.76
 $\frac{8.0}{3.0}$ $\frac{7.70}{21.5}$ $\frac{10.65}{1.4}$ $\frac{10.65}{14.5}$ $\frac{9.5}{12.5}$ $\frac{9.20}{8.5}$ $\frac{8.75}{9.5}$ $\frac{9.20}{1.0}$ $\frac{9.6}{1.0}$ $\frac{12.1}{15.5}$ $\frac{9.9}{16.5}$ $\frac{5.75}{2.3}$ $\frac{5.80}{3.0}$

92.26
 $\frac{5.35}{3.0}$ $\frac{5.70}{2.0}$ $\frac{8.35}{1.6}$ $\frac{8.70}{1.5}$ $\frac{7.15}{12.5}$ $\frac{6.65}{8.0}$ $\frac{6.45}{1.0}$ $\frac{6.80}{1.0}$ $\frac{9.28}{14.5}$ $\frac{8.0}{1.0}$ $\frac{8.05}{1.0}$ $\frac{3.70}{2.5}$ $\frac{3.8}{3.0}$

94.51
 $\frac{3.30}{3.0}$ $\frac{3.85}{2.2}$ $\frac{5.80}{1.7}$ $\frac{5.80}{1.6}$ $\frac{4.70}{1.3}$ $\frac{4.50}{8.5}$ $\frac{4.20}{9.5}$ $\frac{4.40}{14.5}$ $\frac{4.90}{1.0}$ $\frac{5.30}{1.0}$ $\frac{5.80}{1.0}$ $\frac{2.70}{23.5}$ $\frac{2.95}{3.0}$

92.89
 $\frac{6.75}{3.0}$ $\frac{6.40}{2.4}$ $\frac{7.80}{1.9}$ $\frac{7.30}{1.2}$ $\frac{7.70}{8.5}$ $\frac{7.45}{7}$ $\frac{7.70}{1.0}$ $\frac{8.15}{1.0}$ $\frac{8.00}{1.0}$ $\frac{8.90}{1.0}$ $\frac{6.50}{1.0}$ $\frac{6.45}{3.0}$

104.34
5.45
98.89

36+0

+50

BM #7 6.59 104.30 6.64 97.70 (97.71)

37+0
5.20
8.8

+50

38+0

+50

39+0

T.P. 1.51 97.78 8.03 96.27

40+0

41+0

42+0

43+0

T.P. 7.42 100.75 4.45 97.33

44+0

45+0

N

S

99.14
5.90 5.90 5.46 5.20 5.5 5.9 7.0 6.85 4.20 4.10
30 Drive 230 8.5 9 13.5 16 17 23 30

100.09
5.45 5.45 4.55 4.60 4.25 4.40 4.45 5.80 5.90 3.55 3.15
30 17.5 12.5 8.5 9 12.5 17 18 21.5 30

99.33
7.30 6.20 6.30 5.50 5.50 4.97 5.00 5.25 6.20 6.20 3.45 2.70
30 20.5 16 11 8.5 8.5 12 16.5 17.5 23 30

97.65
9.50 8.40 8.75 8.20 7.30 7.30 6.65 6.20 7.90 7.20 7.85 4.75 4.45
30 19 17 16 11.5 8.5 9.5 13 17 18.5 25.5 30

96.80
10.55 9.25 9.90 9.80 8.05 8.05 7.50 7.55 7.55 8.65 8.80 2.25 7.10
30 18.5 17 16 11 9 9 12 17.5 19 24 30

96.55
12.20 9.35 9.20 9.90 8.15 8.20 7.75 7.70 7.70 9.05 9.15 6.90 6.85
30 20 17.5 16.5 11 8.5 9 12 17.5 18.5 24.5 30

96.25
9.65 9.00 10.10 10.10 8.50 8.50 8.05 8.00 8.05 9.05 9.50 6.05 6.10
30 21 17 16 12 8.5 9 13.5 18 19 25 30

94.18
4.65 4.20 5.20 5.20 4.05 4.05 3.60 3.75 3.20 5.20 5.30 6.65 1.55
30 17.5 16.5 15 11 8.5 9.5 11.5 19 18.5 27.5 30

93.23
7.65 7.20 7.20 6.70 5.50 5.35 4.65 4.90 5.05 6.60 6.50 5.85 5.25
30 18 16 14 10 8.5 9 12 18 18.5 23 30

92.65
5.85 6.80 7.40 7.20 5.45 5.40 5.10 5.40 5.40 6.55 4.90 6.20 6.50
30 18 15.5 14.5 9.5 8 9.5 12.5 16 17.5 20 30

93.03
4.35 4.45 5.55 6.05 4.85 4.70 4.45 4.50 4.25 5.65 5.75 4.35 4.30
30 18.5 15 13 10.5 8 10 12.5 16 17 23.5 30

95.00
6.35 5.80 6.90 6.70 5.70 5.65 5.75 5.55 5.60 6.10 6.05 4.20 3.85
30 20 16 15 11 9 8 11 15 16 20.5 30

46.5 45.15
5.65 5.15 5.05 4.60 5.00 5.00 5.60 5.85 5.85 4.00 4.05
30 27 24 15.5 3.5 1 1.5 2.5 16.5 30
Eggs Print Hgs Print Tank in Dial

¹⁰⁰⁷
 Profile = 46+572 100.75 95.40
 Chardon-Windsor East 5.35
 47+0 45.00
 48+0 5.75 96.10
 49+0 4.65 97.25
 50+0 3.50 98.10
 51+0 2.65 98.35
 52+0 2.40 98.50
 53+0 2.25

SR 608 South

SR 608 North

T.P. 5.14 101.32 4.57 96.18
 B.M. 2.64 98.68

BM # 3 4.45 60.41 55.93

Bridge Needs Guard rails.

BM # 5 2.25 86.20 83.95

22+29 12" x 32.5' C.M.P. (Good)

BM # 8 1.11 98.98 97.87

41+82 12" x 28' C.M.P. (Good)

N

S

5.35	4.95	4.25	4.10	3.30	2.95
0	100	200	300	400	500

5.35	5.60	5.60	5.55	5.40	5.90
0	100	200	300	400	500

14.5	13.5	15.5	12.95	4.32	4.24	4.53	13.00
150	100	50	105	10.3		10.8	10.5

← 7.14 4.70 6.76
16.5 16

← 8.99 6.30 8.67
11.3 16.7

149 N. = outlet S.S. 21'

- 50 storm sewer 49

- 74 storm sewer 23'

- 100 storm sewer 16.5'

- 142 Catch Basin 13.5

- 151 15" culvt. 13.5'

- 154 18' 30" X Conc. Culvt.

Invert Elev. X Rd. & Dr. Culverts.

20

	+	HI	-	Elev.
BM # 8	2.63	100.50		97.87
Invert 18" CMP 45+84 (X Rd.)			8.30	92.20
Invert 12" CMP 41+82 (X Rd.)			10.35	90.15
BM # 7	6.81	104.52		97.71
Invert 12" Conc. (Dr. Pipe) 37+67			9.33	95.19
BM # 6	10.88	93.03		82.15
Invert 15" Boiled (Dr. pipe) 34+36			13.38	89.65
Invert 12" steel (Dr. pipe) 33+19			9.07	83.96
BM # 5	3.74	87.69		83.95
Invert 15" CMP (X Rd) 30+35			10.62	99.07
Invert 12" CMP (X Rd) 22+29			8.25	99.44
BM # 4	3.37	84.07		80.70
Invert 12" CMP (Dr. Pipe) 19+15			4.96	99.11
Invert 4" Vit. (Dr. pipe) 17+45			5.58	98.49
" 12" Conc (Dr. pipe) 14+25			9.10	94.97
" 12 Vit. tile (Dr. pipe) 13+66			10.16	93.91
T.P.	1.34	74.16	11.25	92.82
Invert 12" CMP (Dr. Pipe) 11+92			6.69	67.47
BM # 3	4.64	60.59		55.93
Invert 12" CMP (Dr. pipe) (8+86)			5.91	54.68

BM # 2	2.95	80.40	77.45
Invert 30" Conc. (X Rd) -154	5.62		74.78
Invert 15" Conc. (S.S.) -151	6.07		74.33
Invert 24" Conc. (Catch Basin) -142	6.35		74.05
NWA House	109°-00	176.0'	
NEA "	126°-06	204.0'	
Total	95°	371.0'	

BM # 8	1.34	99.21	97.87
18" CMP	45+54 (+ Rd)	7.00	92.21
" "	" "	7.72	91.49
12" CMP	91+82 (+ Rd)	9.05	90.16
" "	" "	9.39	89.82

BM # 6	4.52	86.67	82.15
15" CMP	30+35 (+ Rd)	10.45	76.22
" "	" "	9.61	77.06

BM # 5	1.52	85.47	83.95
12" CMP	22+29 (+ Rd)	6.27	79.20
" "	" "	6.02	79.45

snowing ¹⁸ 2/23/67 Patterson - Dierich - Karsbach

Vert. Spk. E. side 36" Maple 32' Rt. Sta. 44+0

S. end } flows Nth.

S. end } flows Nth.

Beet spk. S.W. side 10" Ash 37' Lt. Sta. 32+83

N. end } flows Nth.

Vert. spk. S.E. root 24" Maple 22.5' Lt. Sta. 23+92

N. end } flows Nth.

BM #3	9.02	64.95		55.93
T.P.	12.78	77.30	0.43	64.52
T.P.	4.37	81.02	0.65	76.65
BM #2a			3.23	77.79
			3.50	77.52
BM #2a	1.54	79.33		77.79
T.P.	0.45	67.91	11.87	67.46
BM #3			11.95	55.96

BM #2a	2.83	80.62		77.79
12" V.T.P. X Rd. Cleridon-Troy	9.20	71.42		W. end
" " " " "	9.34	71.28		E. end
24" storm sewer	"	"	10.76	69.86 N. end
2.2 X 3 Box X Rd.	"	"	11.30	69.32 W.
" " " " "	"	"	11.59	69.03 E.
T.P.	0.23	69.12	11.73	68.89
T.P.	4.49	60.74	12.87	56.25
BM #3			4.90	55.84

BM #3	4.90	60.83		55.93
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X cut in s end w. Hdwl. Bridge

Conc.
S.W. Cor. Bott. step House N.W. Quad ^{Chardon Wind.} + Cler-Troy Rds
Top of Catch Basin Sta. - 142.0

3/9/67

± 300' S. of Chard. Wind.

" " " " "

± 150' N. of " "

± 200' N. of " "

" " " " "

59.12 59.57 60.19 60.81 Gravel
12.00 11.55 8.93 8.31 Dr. Lt. Sta 4+29 15' wide
100' 50' 11' ±

X cut s. end w. Hdwl. Bridge

57.21 58.63 60.31 60.9
3.62 3.20 0.51
100 50 12

Cont Midd. Pg 23

A. Winchell
P. Young

Drive Profiles

Dec 21, 1965

BM #7 5.25 102.96 97.71

35+95

37+67

39+34

BM #7

5.25 97.71

60.83

B.M. #3

4.90

23

18' Gravel Dr. 99.06 98.82 98.53 98.88 Gravel
3.90 4.17/10' 4.43/40' 60' 67'

15' Gravel Dr. 97.18 96.57 93.85 91.71 91.16
Paved 5.78 6.39/10' 9.11/40' 11.25/60' 50'

9' Gravel Dr. 95.74 95.30 94.32 Dr. ends
7.22 7.66/10' 8.61/40' at 40'

57.25 56.83 Cont from Pg 22
out 3.68 4.30 4.05 57.13 3.70 Gravel Dr. 2' Sta. 8+89 10' wide
100 50 12 8

Grass Field 59.22 59.16 59.29 59.47
Dr. Rt. Sta 9+81 10' wide 1.61 1.73 1.54 1.36
12" CMP x 15' 8' 14' 50' 100'
E. 3.91 W. 3.70

#13 Storm Drain @
Village Line to E. (S. Side)

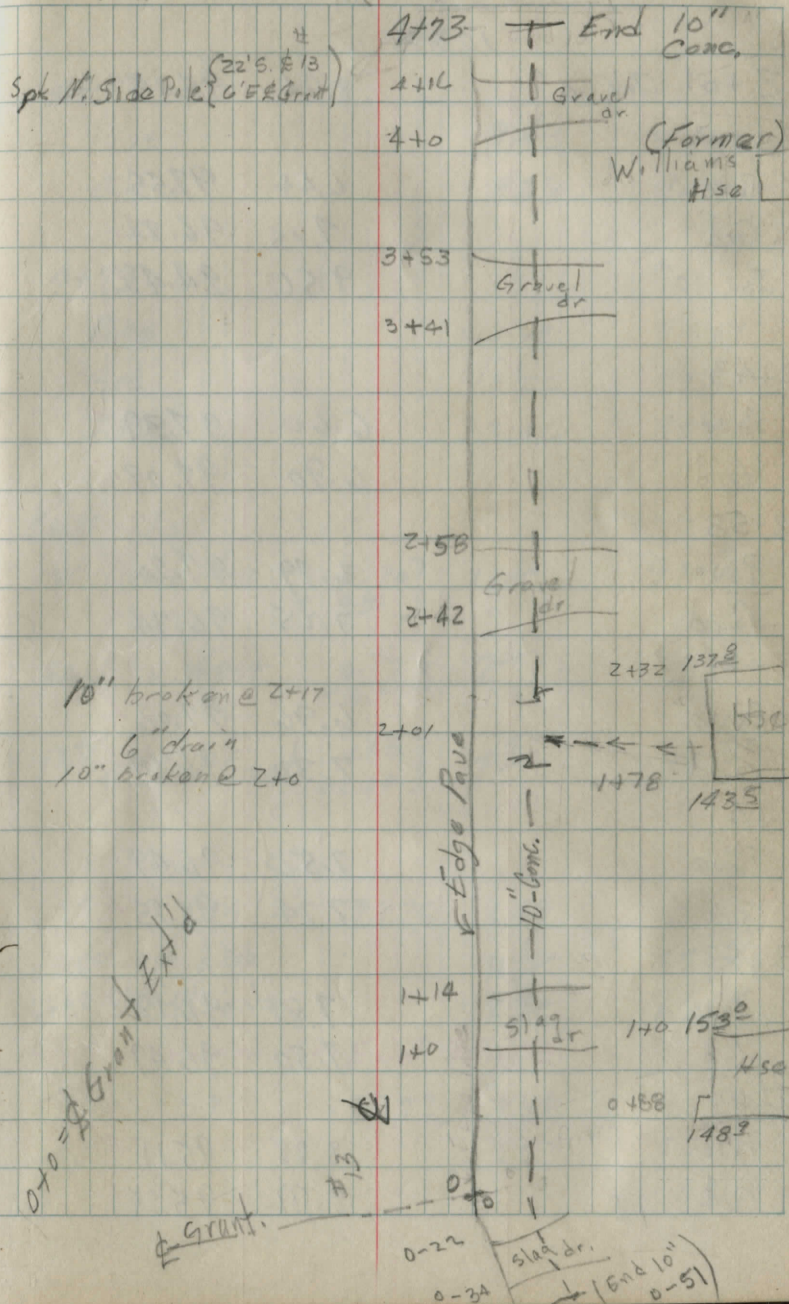
TBM.	3.99	103.99	100.00
0-51			
Pave Edge	4.47	99.52	
In. 10"	7.47	96.52	
Ext. G. Grd	4.96	99.03	
0-34			
Pave	4.43	99.56	
Ext. G. Grd	4.95	99.04	
0-22			
Pave	4.51	99.48	
Grd	4.89	99.10	
0+0			
Pave	4.54	99.45	
Grd	4.58	99.41	
1+0			
Pave	5.33	98.66	
Grd	6.35	97.64	
1+14			
Pave	5.51	98.48	
Grd	6.42	97.57	
2+0			
Pave	6.32	97.67	
Grd	7.02	96.97	
In. 10"	9.49	94.50	

Davidson
Patterson
R. Diendorf

sunny-coal
(40°)

3/15/66

25



#13 Storm Drain

103.99

2+01 Inv. 6" 8.94 95.05 ✓

2+17

Pave 6.44 97.55 ✓

Grd 7.15 96.84 ✓

Inv. 10" 9.56 94.43 ✓

2+43

Pave 6.60 97.39 ✓

Grd 6.90 97.09 ✓

2+58

Pave 6.79 97.20 ✓

Grd 7.25 96.74 ✓

3+0

Pave 6.96 97.03 ✓

Grd 7.30 96.69 ✓

3+41

Pave 7.50 96.49 ✓

Grd 7.74 96.25 ✓

3+53

Pave 7.81 96.18 ✓

Grd 7.50 96.49 ✓

4+0

Pave 8.88 95.11 ✓

Grd 8.72 95.24 ✓

3/15/66

27

103.99

4+17

Pave 9.43 94.56 ✓

Grd 9.28 94.71 ✓

4+73

Pave 10.68 93.31 ✓

Grd 11.26 92.73 ✓

Inv. 10" 13.46 90.53 ✓

Bsm't E/s.

Williams Hse 6.70 } 11' 92' ✓
+ 4.5 }Next Hse West 0.74 } 7' 96' ✓
+ 6.3 }1st Hse East Grant 1.45 } 7' 96' ✓
+ 6.04 }

T.P. 1.25 98.75 6.49 97.50 ✓

6+50 end ditch 11.6 87' 3' ✓

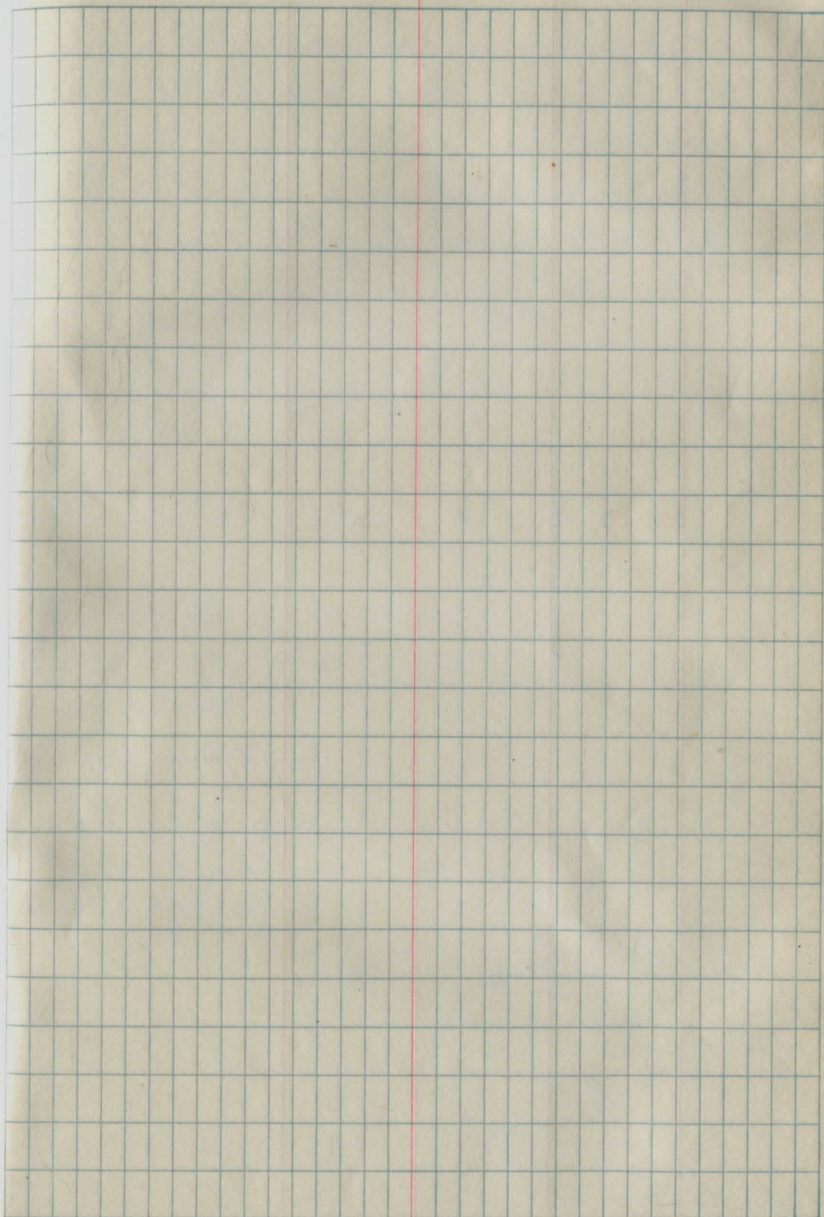
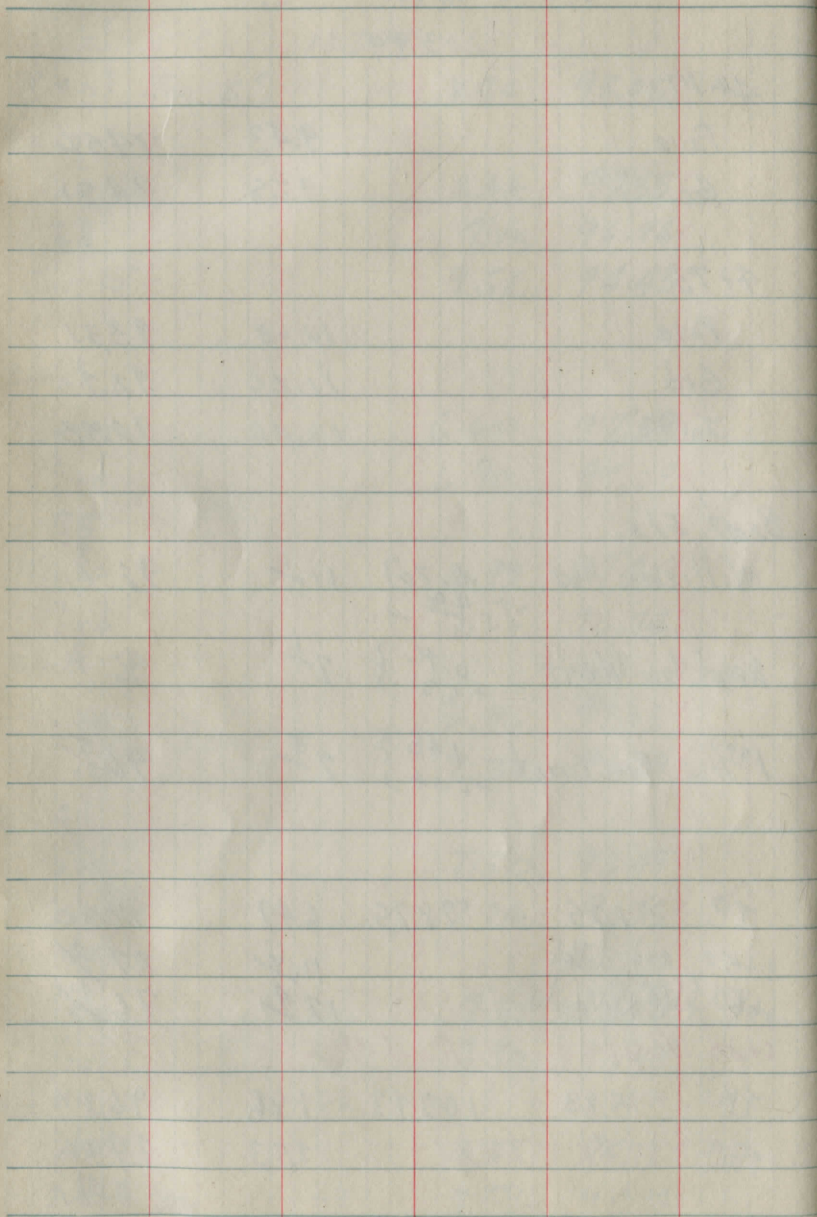
6+60 fl @ x 12' culv 12.9 86' 4' ✓

6+50 Payment End 96.52

T.P. 5.83 102.72 1.86 96.89

+BM 2.73 99.90

OK 0.01 R



Ravenna Road

7 ± 1966

The following points were located and ref. in 1966. Stationing was taken from a 1923 state highway plan which shows a sta. of $19+28.8$ ⁸¹ for the north Corp. line of Chardon Village.

32+90.3

7°-13' R.

19+84.80

18+40.20

P.O.T.

9+81.7

P.O.T.

At Winchell

33

Spk NE. side
C.E.I. pole
7X515

95.71

Spk N.W.
side C.E.I. pole
none

36.15

Spk N. side
C.E.I. pole
#

24.06

Spk S.E. side
24" Maple

57.24

24" Maple

Dr.

Spk NE. side
C.E.I. pole
7X507

49.69

Spk E. side
15" Maple

66.18

Dr. to Colonial
Park

18" Maple

81.12

29.04

Spk E. side
C.E.I. pole
580857

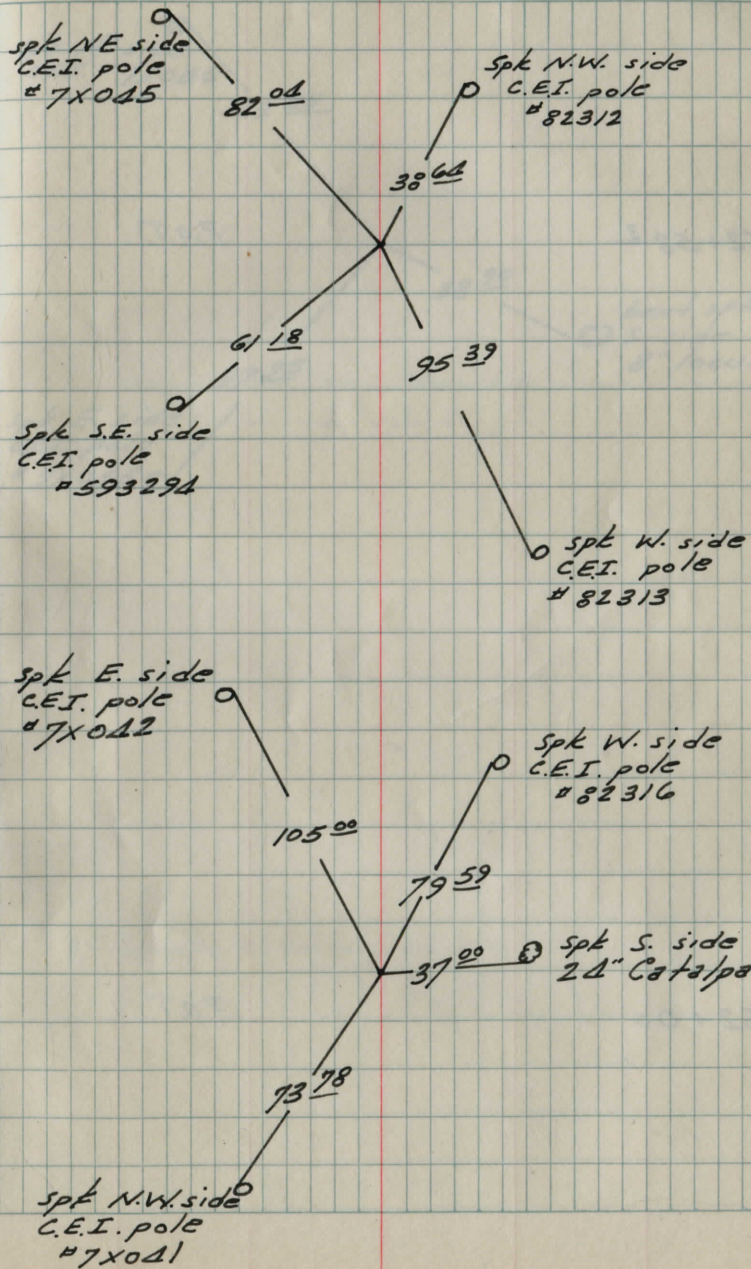
Spk S. side
C.E.I.

47+16 ³

P.O.T.

42+00

P.O.T.



Spk N. side
C.E.I. # 7X056

63 55

97 95

38 90

bent spk
S. side
8" locust

Spk E. side
C.E.I. pole
7X055

62+58³

P.O.T.

52+00

P.O.T.

79+53

1°-22' LT

↙ did not find but should
be looked for more

75+36

P.O.T.

64+0

nail fd. on surface ± traveled $\frac{1}{2}$

3°-08' RT.

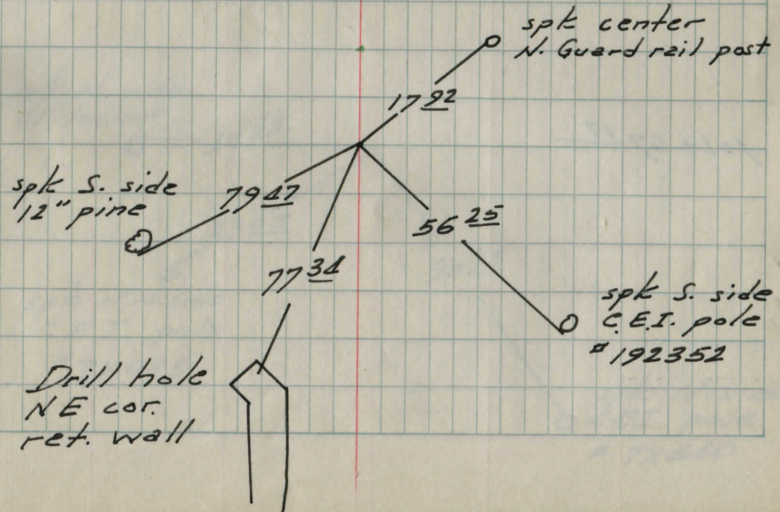
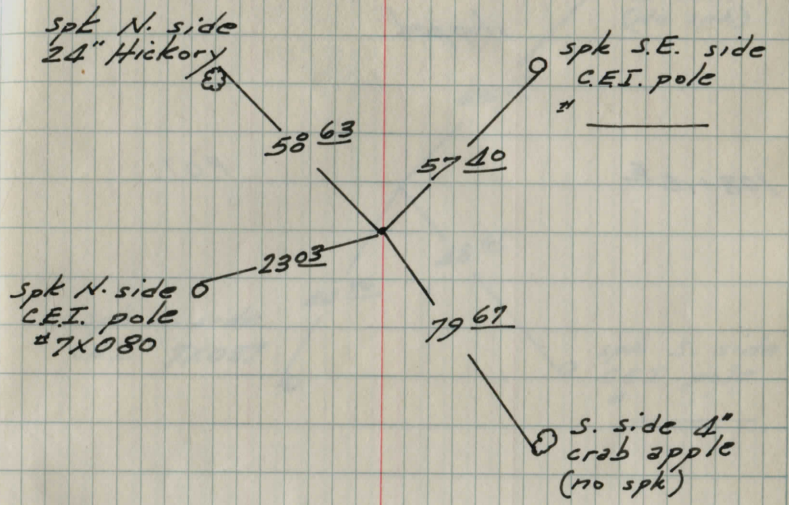
96+83³

0°-19' 47"

92+17¹³ TRACT LINE = S LINE HASFORD TR 78

91+0

P.O.T.



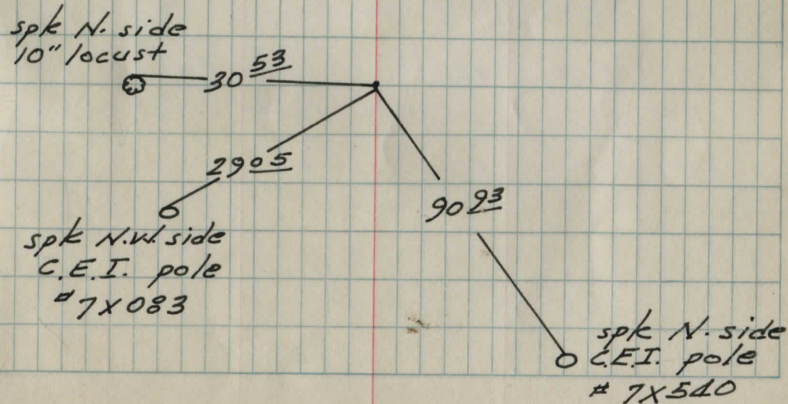
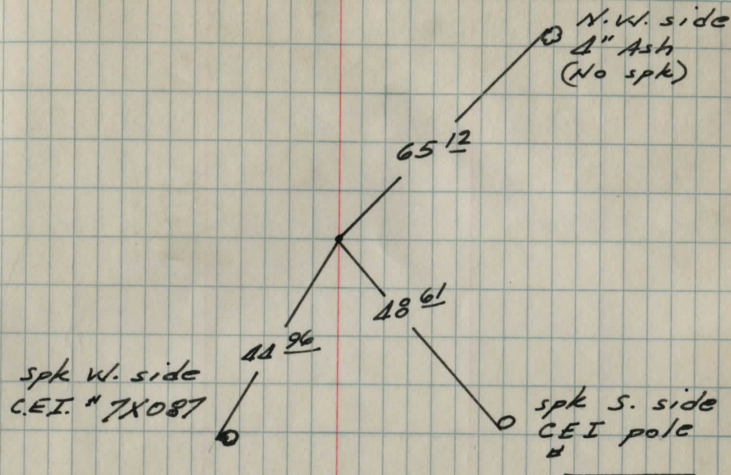
stopped

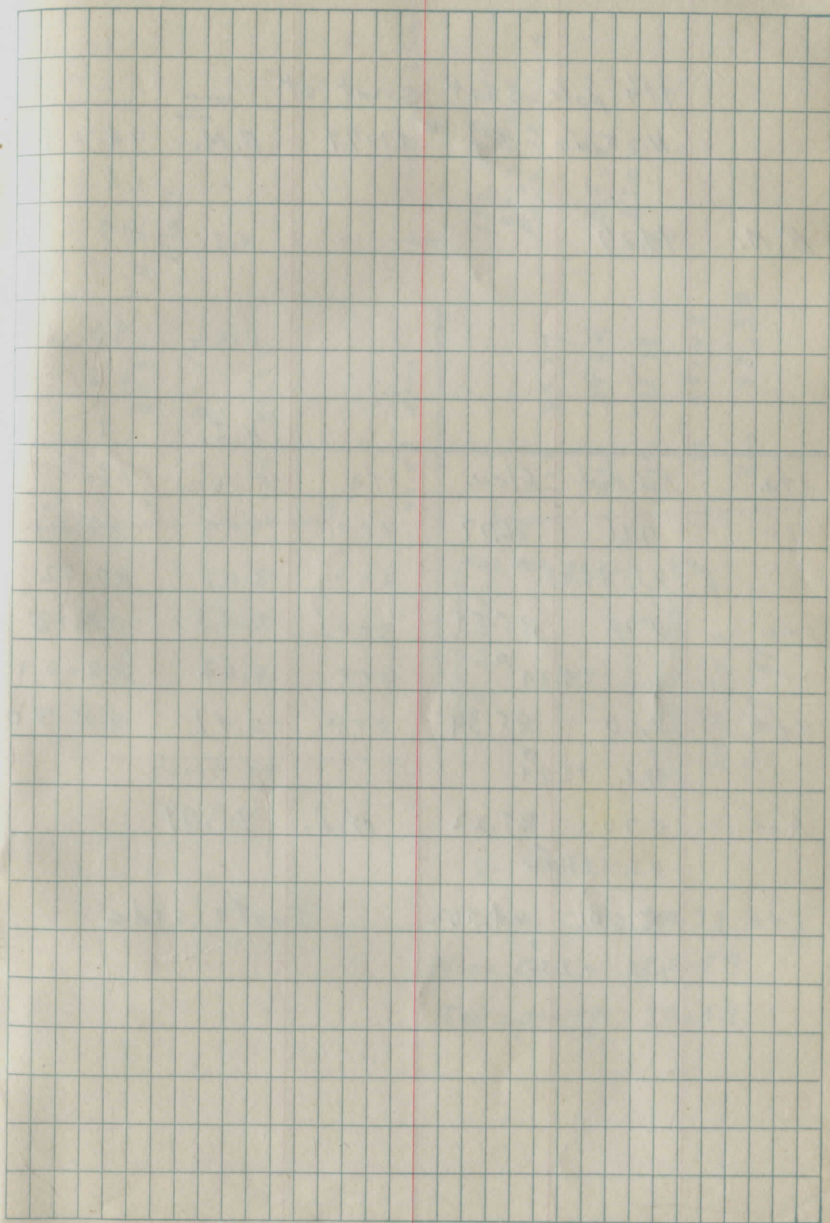
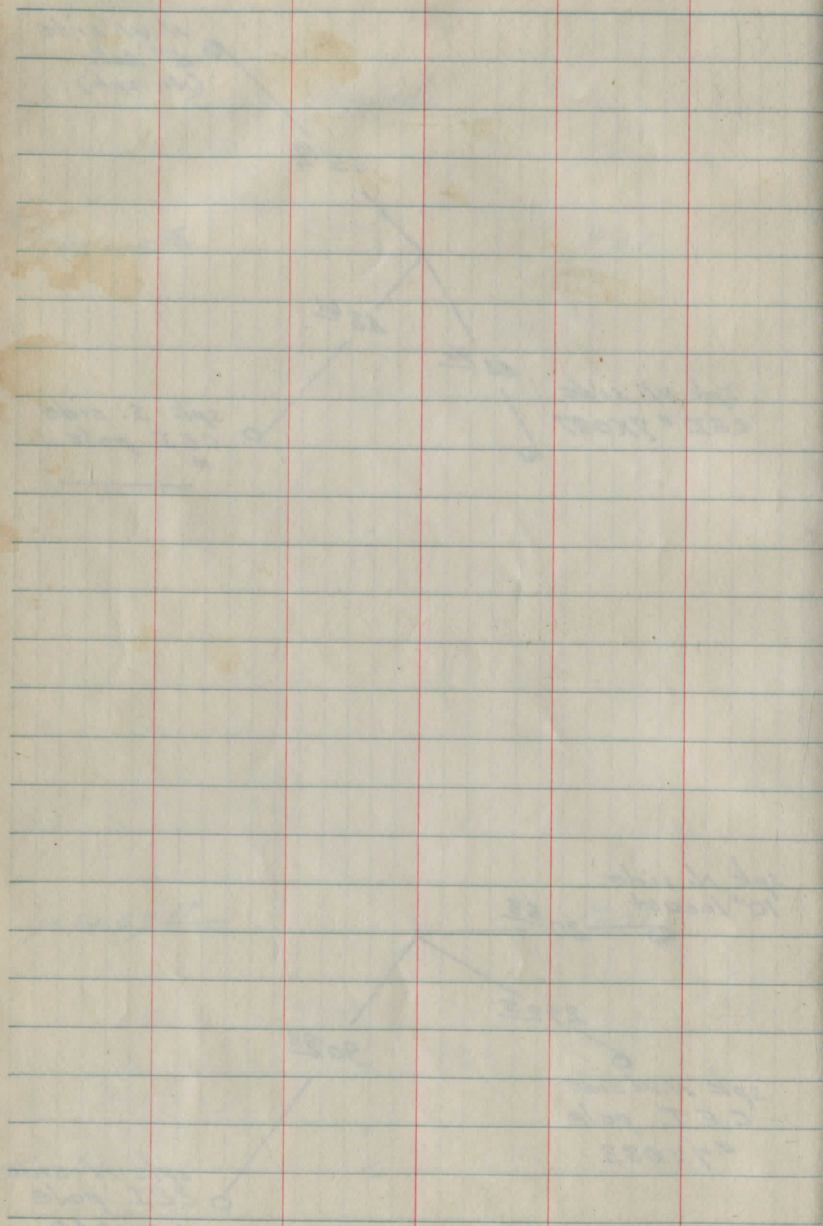
108+15^E

P.O.T.

101+67¹⁷

P.O.T.





B.M. spt. N. side Pole S. side Chardon
Windsor Rd C.E. & Grant st E = 100.00

+ 2.20
102.20
- 7.93

4th pole east Grant st

N. side Rd # 49079 B.M. 94.27

+ 3.24

B.M. 94.27 H.I. 97.51

- 7.40

Elev 90.11

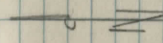
+ 5.60

H.I. 95.71

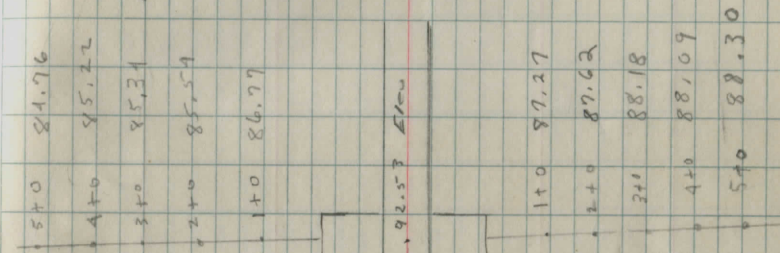
sta.	Rod Read	Elev.	sta.	Rod Read	Elev.
1+0	7.66	86.77	1+0	8.91	87.27
	H.I. 94.93 [↑]		2+0	8.09	87.62
2+0	8.20	85.54	3+0	7.53	88.18
	H.I. 94.21 [↑]		4+0	7.62	88.09
3+0	8.60	85.34	5+0	7.41	88.30
	H.I. 93.94 [↑]				
4+0	8.70	85.22	H.I. 95.71		
	H.I. 93.92 [↑]				
5+0	8.60	84.76	South side		
	H.I. 93.36 [↑]				

Bob Korie 9/12/67
Don Korie
Paul Ranney

46



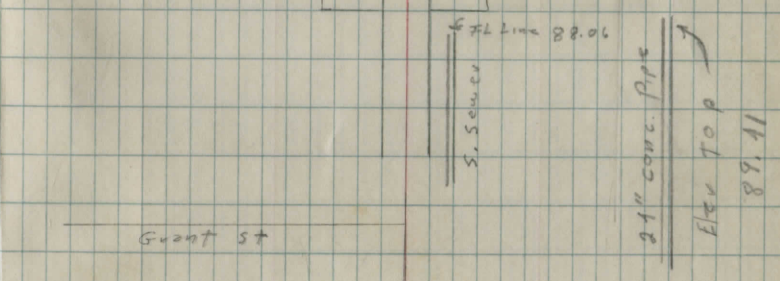
Actual Elev.



Chardon Windsor Rd

Sta. 15 from edge Pav. Pav. 18' wide

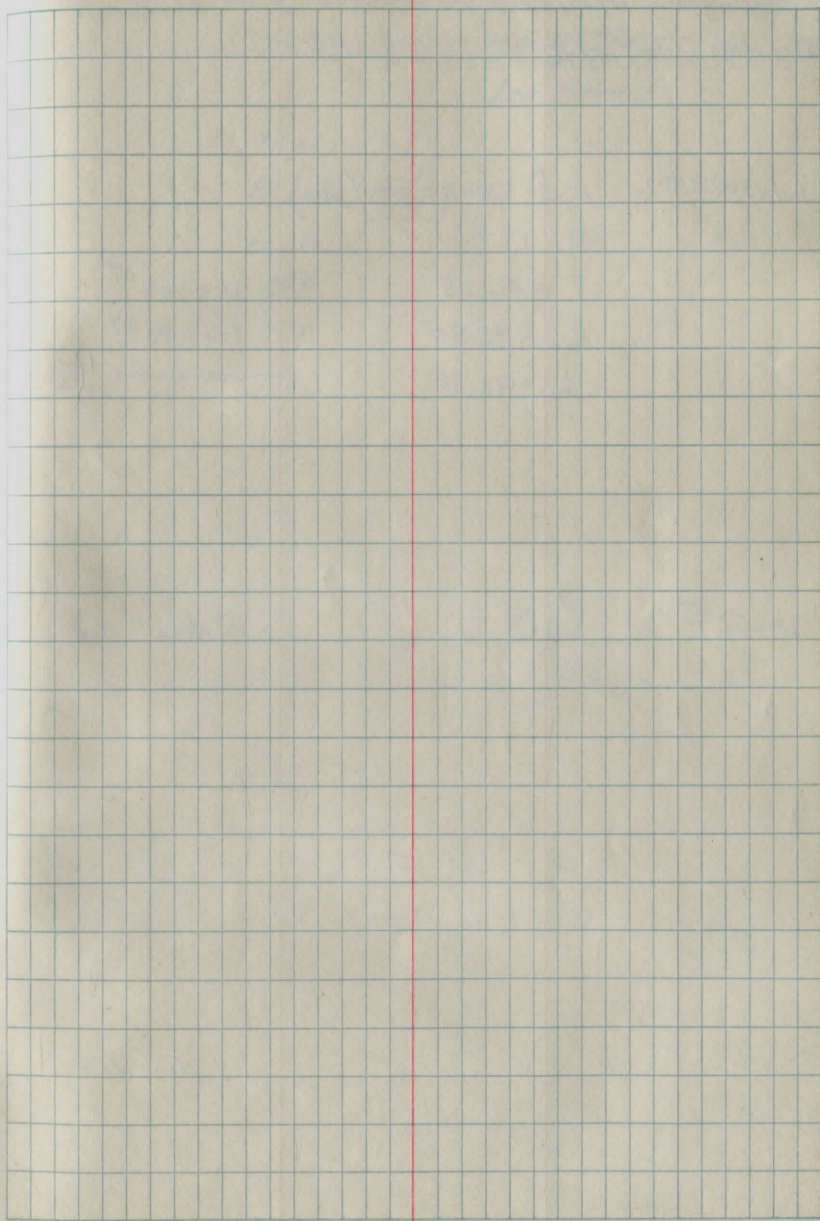
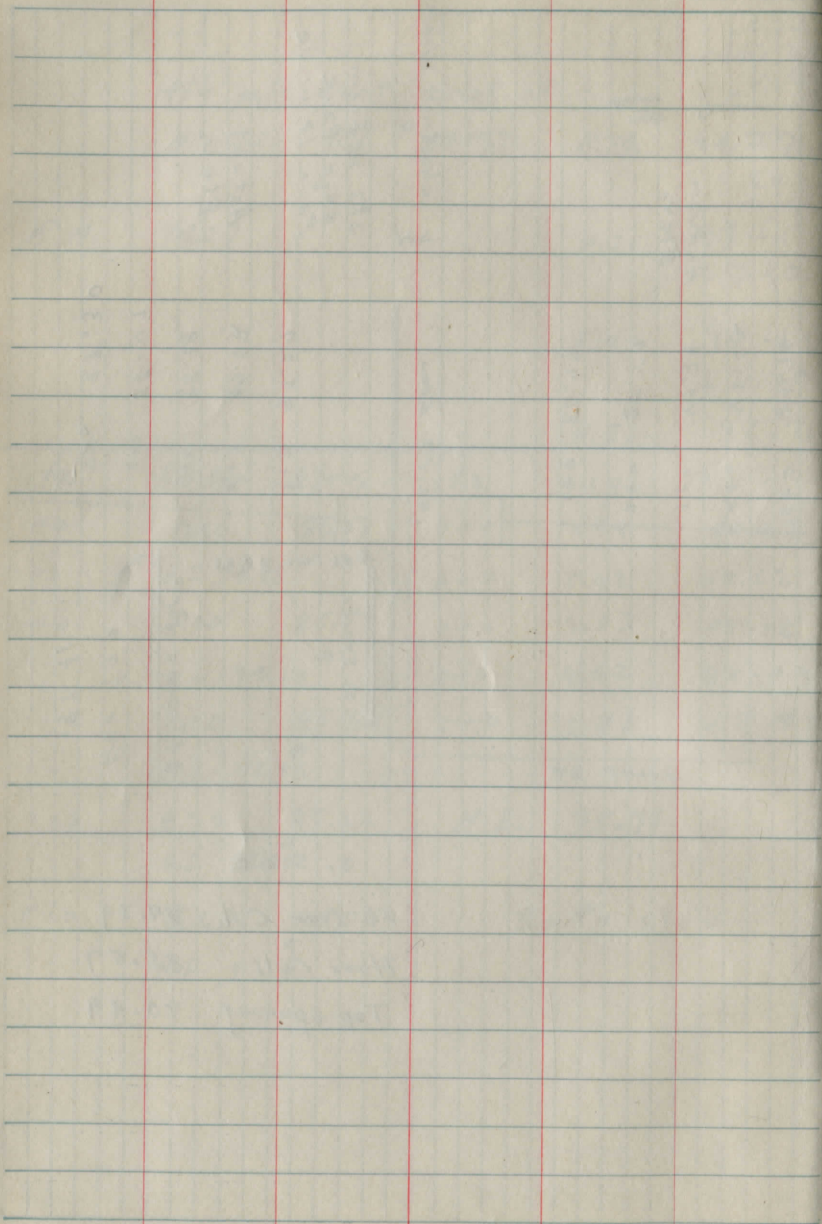
Actual Elev.



S. Side

Fl. Line Cul. 87.39
Floor Cul. 85.59
Top opening 90.19

21" conc. pipe
Elev Top
89.41



H. Patterson
R. Harshberger

Chardon - Windsor
sec. 6

L. Bollinger 11/24/75

Cold 32°

Davidson thru
5/14/76

100+50⁵² PI A 0°-55'-30" Rt (obs)

set. D 1°

T = 46.25 PC 100+04³⁷

Arc = 92.50 PT 100+96⁸⁷

Lc = 92.50

78+52⁸⁹

Man. Box

Man. Box

NOTE: DATA SHOWN THESE PMS ARE FOUND

1975-76 NOT NECESSARILY \perp

PER RECORD

PK 567

PK 567

PK 567

Z —————

Kile

Road

157+88 ⁷³ Δ 0°-48'-30" Lt (obs)

REF NEXT PAGE

155+85 ¹⁴ POT131+65 ⁷³ Δ 0°-11' Rt (obs)

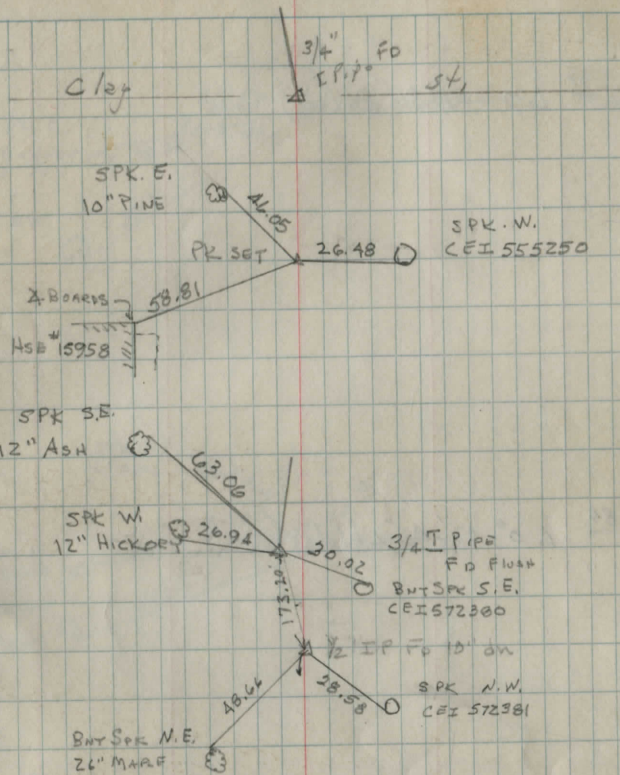
I. Pipe

129+92 ⁵³ Δ 0°-07'-00" Lt (obs)

I. Pin

107+56 ³¹ Δ 0°-11'-45" Lt (obs)

Men Box = 0.



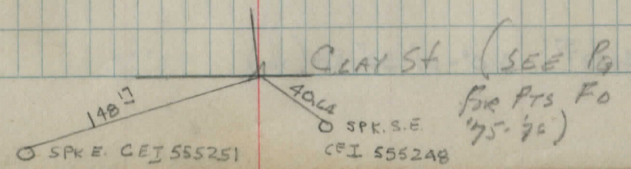
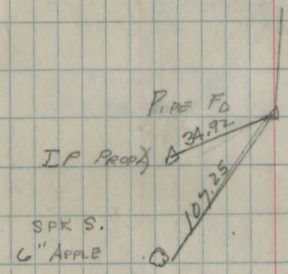
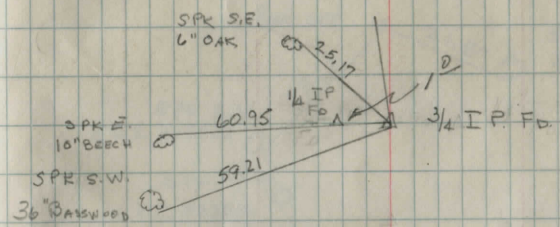
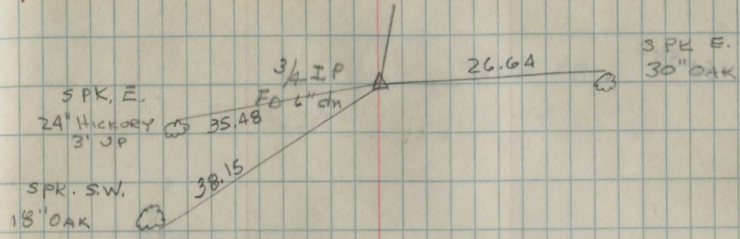
Princeton Rd.

184+62 ³⁷ Δ 0°-07'-30" Lt (obs)

179+03 ⁸⁴ Δ 0°-07'-45" Lt (obs)

163+35 ⁸⁸ Δ 0°-27'-45" Lt (obs)

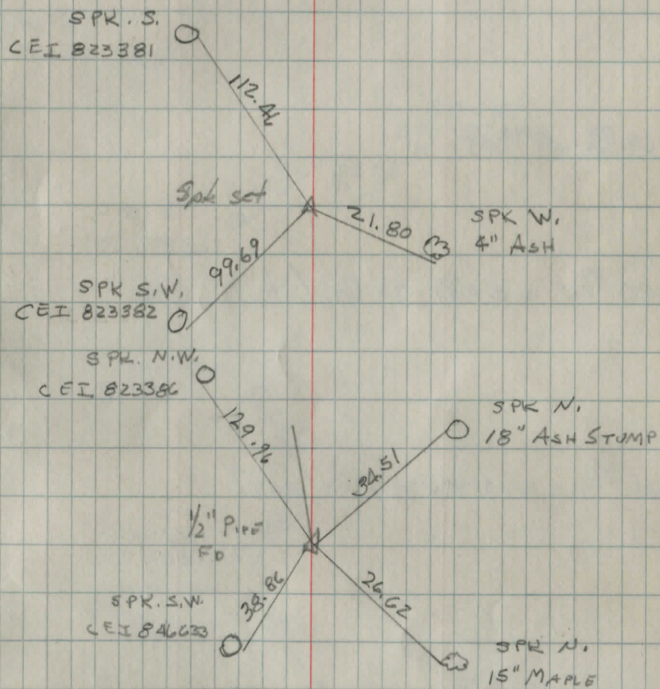
157+88 ⁹³ Δ 0°-42'-30" Lt (obs)



Z11+44⁸⁴204+69⁷¹ POT194+47⁹⁶ Δ 0°-49' Lt (obs)184+62³⁷ Δ 0°-07'-30" Rt (obs)

MON FD

SR528



5/4\" EP

37
 CLAY ST (PART = 100' NEE OF CH 13)

STA 114+00²⁰ Pave FB 126 Pg 55 Δ 0°-26' Lt (obs.)

102+67⁸³ POT

100+85⁰⁷ Δ 0-07-30 Lt. (obs.)

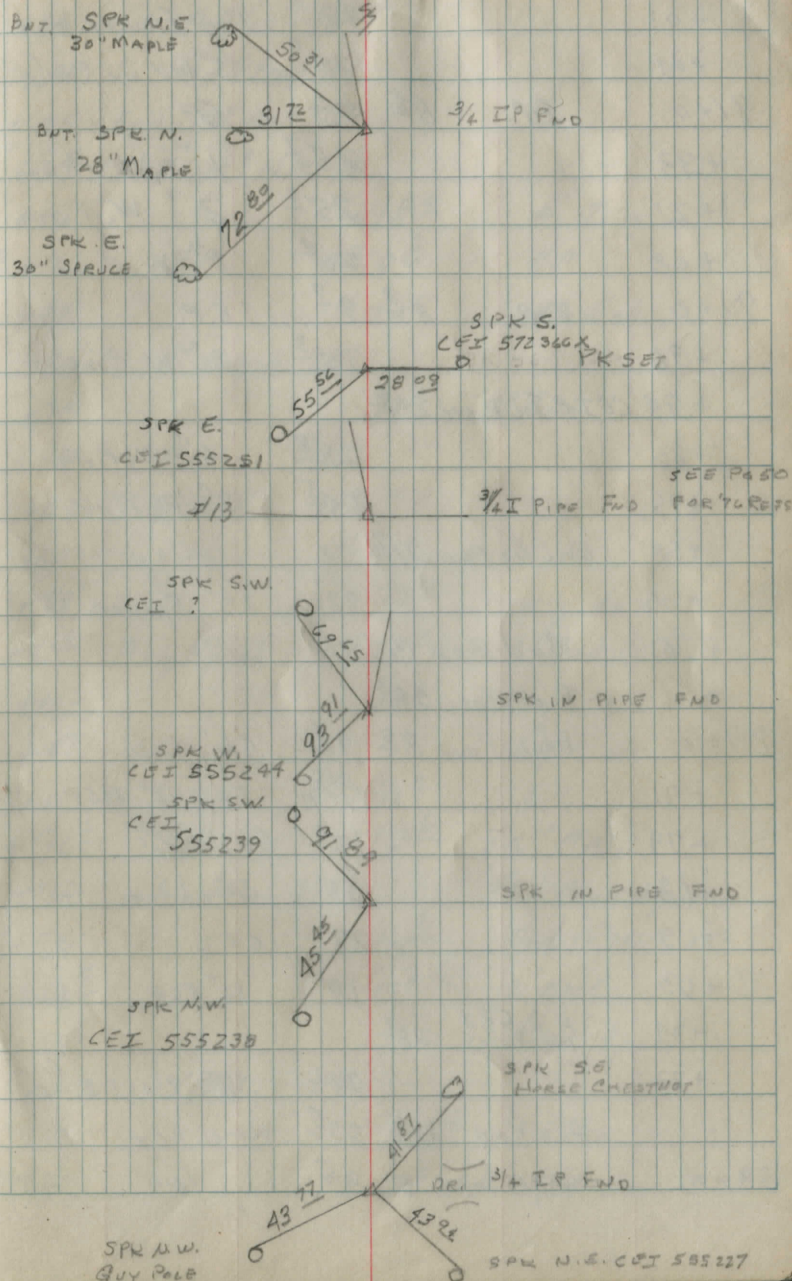
95+01²⁴ Δ 0-05-30 Rt (obs.)

86+01¹² POT

70+00⁹⁸ (REC Δ 0-20' Rt Not OBS)

DATA SHOWN THESE PAGES ARE AS FOUND 1975-76
 NOT NECESSARILY & PER RECORD

52



	W		E	
+01		19 ⁵	Bay flower bed	
+01		20 ⁰	5" W. Pine Row (E)	
91+0	EP.	8 ⁵	9 ⁵	EP.
+33		25 ⁷	1" W. Pine	
+21		25 ⁵	2" W. Pine	
+08		26 ⁰	1" W. Pine	
90+0	E.P.	8 ³	9 ⁷	E.P.
+96		25 ³	3" W. Pine	
+94	CEI & Tel. Riser	28 ⁶		
+86		25 ⁸	4" W. Pine	
+75		25 ⁵	3" W. Pine	
+58	End fee Row	27 ⁸		
+05		32'	18" Spruce	
+01	Mail Box	13		
	Fee Row	28 ³		
89+0	Edge Pave	8 ⁵	9 ⁹	Edge Pave
+91		17 ⁵	End 12' RCP	
+79		12'	Gr. Dr.	
+68		23'	End fee	
+65		27	CEI	
+63		18'	12" RCP	
+39	0 2 CEI Poles	28 ⁰		
+22		20 ²	8" Plastic from E.	
	Fee Row	28 ²	22 ⁵	Wire Fee
88+0	Edge Pave	8 ⁵	9 ⁵	Edge Pave

	W		E	
+54		6" Maple	20 ⁵	
+45		Step Ahead	12 ³	
+45	End 12" RCP	16 ¹		
+37	Field Dr			
+29	End Brush	12" RCP	12 ³	
+16		18 ⁰	4" Tile	
93+0	EP.	8 ²	9 ⁵	EP.
+98		24 ²	8" Ash	
+80	8" Maple	20 ³		
+78		21 ⁵	3" Ash	
+69	CEI	28 ⁸		
+65	8" Ash	20 ⁴		
+60	12" Apple	27 ²		
+59		22 ³	Bay fee	
+51 ⁰	Bay Brush	23 ⁰	23 ⁰	6" Ash (Dead Top)
+16 ⁶		17 ⁰	End 15" CMP	
+07			12" Gr. Dr.	
92+0	EP.	8 ⁴	10 ⁰	EP.
+96 ⁶		17 ⁶	15" CMP	
+79	Mail Box	13 ²		End Conc Apron
+76		16 ⁶	End 12" CMP	
+60 ⁵		17 ⁴	12" CMP	
+58 ⁵			Conc. Apron	
+42	CEI	28 ⁵		
+12		27 ⁸	Rose bush	
91+0A		19 ⁰	4" Tile Full E.	

	W	E		
+87			30 ²	End Hilar Clump
+81	CEI		30 ²	
+73			25	Bag L. loc Clump
+70	Wt. Sign	17 ²	28 ²	CEI
+03			30 ²	30" Willow
98+0	E.P.	8 ²	9 ²	E.P.
+83			29 ²	End Shrub
+68			28 ²	Bag Shrub & 12" Scotch Pine
+09	CEI		28 ⁰	
+02			16 ²	End 15" RCP
97+0	E.P.	8 ²	9 ²	E.P.
+92				12' Gr. Dr.
+86	Mail Box	14 ²		
+80			17 ²	15" RCP
+80			35 ²	End Wire fce
+74			22 ²	End Brush
			23 ²	Wire fce
96+0	EP	8 ²	9 ²	EP
+77			21 ²	Bag Brush
+63	CEI E Tel. Riser	29 ²	27 ²	Wire fce
95+0	EP	8 ²	9 ²	EP
+10	CEI		29 ²	
			22 ²	Wire fce
94+0	EP	8 ²	9 ²	EP
93+71			24 ²	4-4" Maple

	W	E		
+15				10' Gr Dr.
+02			29 ²	2" I.P. Post
102+0	E.P.	9 ²	8 ²	EP
+80			22 ²	End Light Brush
+39			17	Light Brush
+32			27 ²	Bag Light Brush
+17	stop Sign	14 ²	13 ²	Stop Sign
+13			27 ²	24" Stump
+10			12" RCP? x Rd 21 ²	
+06			18 ²	12" RCP? x Rd
101+00	EP Rd	20 ²	8 ²	EP
+95	EP. W			#13
+85 ⁰¹				
+18	EP. W.			
+76	EP. Rd	20 ²		
+66	Ditch W.			
* +51	Bag Pav. End			
+57	CEI, Field	27 ²		
+58	15" RCP x Rd	16 ²		
+55		16 ²	15" RCP x Rd	
+53		24 ²	Street Sign	
+51	stop Sign	13 ²	13 ²	Stop Sign
100+00	E.P.	8 ²	9 ²	E.P.
+84			24 ²	End Light Brush
99+00	EP	8 ²	9 ²	EP
+95			22 ²	Bag Light brush

37

	W	E
+ 94	STONE WALL (To W.) 16 ³	
+ 92	FLOWER BED (To W.) 16 ³	
+ 85		28 ³ 20" MAPLE
+ 83		13 ¹ MAIL BOX
+ 71	5" TREE 24 ^A	
+ 64	CONC. (To W.) PATIO BLOCK Wk 14 ²	
+ 27	E FIELD DR.	
+ 19	6" VCP 15 ¹	
+ 12	WILD ROSE 29 ¹	
+ 06		24 ⁰ SHRUB CLUMP
+ 04	LILAC 29 ^A	
+ 02		22 ⁶ 3" SPRUCE
103+0	EP 9 ⁹	8 ² EP.
+ 98		15 ⁵ 4 WOOD STEPS 2' WIDE
+ 92		23 ⁴ 6" SPRUCE
+ 89		20 ³ SHRUB
+ 85		21 ⁰ ROSE BUSH
+ 81		19 ¹ END HEDGE
+ 78		28 [?] CEI
+ 70		15 ¹ W. SIGN
+ 31		20 ⁰ 10" ASH
+ 30	CEI 29 ⁶	
+ 28		12 ⁶ MAIL BOX
+ 26		18 ⁸ BIG HEDGE ROW
102+24		17 [±] 15" □ Brick Column

5/20/76

55

	W	E
+ 79		28 ⁰ 3" SCOTCH PINE
+ 70		27 ⁶ 3" SCOTCH PINE
+ 62		27 ⁴ 3" SCOTCH PINE
+ 55	CEI (OLD) 29 ⁸	
+ 54	CEI (NEW) 29 ^B	
+ 52		27 ³ 2" SCOTCH PINE
+ 51		12 ¹ MAIL BOX
+ 43		29 ⁸ WOOD RAIL FOR X 3x2 ¹
+ 43		23 ⁰ STONE NAME MARKER
+ 28		11' GR DR
+ 20		29 ⁵ END LILAC
+ 12		16 ⁵ BIG LILAC
+ 11		24 ^B 3" W. APPLE
+ 0	FCE 21 ⁸	
105+0	EP 10 ⁰	8 ⁰ EP.
+ 97		22 ^B 2" W. APPLE
+ 74	W. FEE X	22 ⁶
+ 69		15 ⁵ 12" RCP X RD.
+ 67		12" RCP X RD. 17 ²
+ 52		30 ⁰ 10" W. CHERRY
+ 26		28 ² 3" W. CHERRY
+ 15	CEI 30 ⁰	
+ 12	Tel. Pole 30 ⁰	
+ 03	♀ 12' GR DR.	
104+0	EP 9 ⁰	8 ² EP.

	W	37 8/2	E	
+31		22 ⁶	WIRE FCE X	
+26	BEG BRUSH	21 ⁰		
+23		24 ⁴	6" HAWTHORNE CLUMP	
109+0	EP	9 ⁵ 8 ⁶	EP.	
+64	GUY ANCHOR	29 ¹		
+56	CEI	29 ¹		
+54	TEL. RIBER	28 ⁸		
+53		16 ²	15" RCP X RD	
+52	15" RCP X RD	17 ⁴		
+29	END WIRE FCE	21 ²		
+16	STOP AHEAD	14 ⁰		
+0	WIRE FCE	21 ⁷		
108+0	EP	9 ⁶ 8 ³	EP	
+06	CEI	29 ⁵		
+0	WIRE FCE	22 ⁰		
107+0	EP	9 ⁹ 8 ²	E.P.	
+78			DRAINAGE FROM E.	
+45		30 ⁵	END RAIL FCE	
+30		28 ⁴	2' HIGH SCOTCH PINE	
+02		28 ⁰	2" SCOTCH PINE	
+0	WIRE FCE	22 ¹ 29 ⁹	WOOD RAIL FCE	
106+0	EP	10 ⁴ 8 ⁰	EP	
+97		28 ²	2" SCOTCH PINE	
+92		28 ³	3" SCOTCH PINE	
105+84		27 ²	3" SCOTCH PINE	

	W	5/20/76 8/2	E	
+0		29 ⁴	DEAD TWIG 8" W. CHERRY	
+0		21 ⁵	WIRE FCE	
110+0	EP	9 ⁴ 8 ⁶	EP	
+88		16 ⁴	12" CMP	
+82			FIELD DR.	
+74		16 ⁴	12" CMP	
+64	28" MAPLE	26 ⁴		
+53		27 ²	18" ASH	
+45		25 ²	8" PEAR	
109+35		19 ⁰	3" W. CHERRY	

N	S
+63	12 ⁴ 12" CMP.
+44	25 ¹ I.P.
+20	2" ARBOR VITAE 27 ⁵
+09	± 10' SLAB DR.
148+0	0 E.P. 12 ³ 5 ⁸ E.P.
+99	2" ARBOR VITAE 28 ²
+74	9 ¹ MAIL BOX
+71	9 ⁵ MAIL BOX
+61	13 ¹ 12" CMP
+51	± 10' GE. DR.
+41	13 ² 12" CMP
+31	20 ² END SCATTERED LIGHT BRUSH
+14	26 ³ CEI
147+0	EP 12 ⁶ 5 ⁶ EP
+86	1/4" I.P. (18") 24 ²
+02	28 ⁴ BEG. SCATTERED LIGHT BRUSH
+02	9 ⁵ MAIL BOX
146+0	EP. 12 ⁸ 5 ⁶ EP.
+83	12 ⁵ END 12" CMP
+74	11 ⁰ ± GE DR.
+43	12 ³ 12" CMP
+43	25 ² I.P.
+41	CEI 31 ⁴ 26 ⁹ CEI
145+0	EDGE PAVE 12 ⁴ 5 ⁶ EDGE PAVE

N	S.
+11	26 ⁷ CEI
+0	WIRE FCE 22 ⁷
154+0	EP 12 ⁴ 5 ⁸ EP
+77	24" WILLOW 30 ²
+08	21 ² I.P.
+0	WIRE FCE 24 ⁹
153+0	EP 12 ⁷ 5 ⁷ EP
+34	26 ² CEI
+0	WIRE FCE 24 ⁷
152+0	EP 12 ⁷ 6 ⁰ EP
+0	WIRE FCE 22 ³
151+0	EP. 12 ⁰ 5 ⁹ EP.
+61	26 ⁷ CEI
+49	WIRE FCE 20 ³
+47	STOP AHEAD 16 ⁰ 10 ³ STOP AHEAD
+0	WIRE FCE 20 ⁸
150+0	EP 12 ³ 6 ¹ EP
+95	25 ² I.P.
+71	20 ³ 12 ⁸ 15" BCP X RD
+20	18 ² BEG. SCATTERED LIGHT BRUSH
+03	WIRE FCE X 23 ²
149+0	EP 12 ² 6 ⁰ EP.
+93	26 ¹ CEI
+83	12 ⁵ 12" CMP.
148+71	± 10' SLAB DR.

	N		S
+86		26 ³	CEI
+86	5' TALL SOUTH PINE	22 ²	
+84	5' TALL SOUTH PINE	21 ⁸	
+78	1' TALL SOUTH PINE	21 ⁰	
+74	4' TALL SOUTH PINE	22 ³	
+72	2 1/2' TALL SOUTH PINE	21 ³	
+70	BEG FLOWER BED	24 ²	
+60	12" SOUTH PINE	25 ¹	
+51		9 ⁹	MAIL BOX
+49	4 CONC. STEPS	18 ⁸	
+36	16" SOUTH PINE SHRUB	26 ³	
+32	END FLOWER SHRUB	25 ⁵	
+07	BEG FLOWER BED SHRUB	25 ⁶	
+01	END SHRUB	21 ²	
155+0	EP	12 ² 6 ²	EP
+97	? CMP	20 ⁶	
+95	BEG SHRUB	21 ⁵	
+88	10' GR DR		
+80	END SHRUB	21 ⁰	
+75	? CMP	19 ⁸	
+72	BEG SHRUB	21 ⁰	
+72	14" SCOTCH PINE	20 ³	
+48	? DR PIPE	18 ⁸	
+40	10' GR DR		
154+33	? DR PIPE	18 ⁹	

	N		S
+61	6" APPLE	21 ¹	
+53	BEG SHRUBS	17 ⁶	
+22		20 ⁰	BEG SCATTERED LIGHT BRUSH
+20	STOP	16 ⁶	
+20	EDGE GR. RAD	15 ⁰ 17 ⁰	EDGE GR RAD
158+0			
+97	E EDGE	N-S	PAVE (BEG GR TO E.)
+89 ⁶	E	IP PVE	
+80	W. EDGE	N-S	PAVE
+60		28 ³	CEI
+59		27 ²	Tel Riser
+53	EP RAD	11 ⁰ 8 ⁰	EP RAD
+51	WIRE FENCE	29 ⁶	
+50	STOP	16 ² 13 ¹	STOP
+34		17 ⁸	18" RCP X RD
+15	18" RCP X RD	18 ⁸	
+04	WT SIGN	20 ²	
+0	WIRE FENCE	29 ³	
157+0	EP	10 ⁹ 7 ³	EP SCATTERED LIGHT BRUSH
+91		22 ⁵	END
* +19	BEG WIRE FENCE	31 ⁸	
+26	END ROSES	20 ⁰	
+09	BEG ROSES	25 ⁰	
+01	END FLOWER BED	25 ⁰	
156+0	EP	11 ⁴ 6 ⁹	EP

	N	#	S
163+0	E. Ge.	11 ¹	12 ² E. Ge.
+ 30	8" APPLE	18 ⁴	
+ 19	3" APPLE	15 ⁶	
162+0	E. Ge.	11 ²	12 ³ E. Ge.
+ 89	5" W. CHERRY	19 ¹	
+ 42	END BRUSH	18 ²	
+ 35	4" W. CHERRY	19 ²	
+ 32		18 ³	6" W. CHERRY
+ 04		17 ²	4" ELM
161+0	E. Ge.	12 ²	12 ³ E. Ge.
+ 78		18 ⁸	8" W. CHERRY
+ 57		19 ³	2-3" DEAD ELM
+ 15		17 ⁵	END BRUSH
160+0	E. Ge.	12 ⁸	11 ² E. Ge.
+ 88	BEG BRUSH	19 ⁰	23 ² 2-4" W. CHERRY
+ 54		27 ⁶	6" ELM
+ 49		28 ²	GRY ANG.
+ 38	END BRUSH	23 ³	
+ 34		28 ²	CEI
+ 19	BEG BRUSH	25 ²	
+ 17	12" RCP	18 ²	
+ 05	♀ 10' GR. DR.		
159+0	E. GR	13 ⁶	12 ⁹ E. Ge.
159+0	12" RCP	17 ⁹	
158+89	END SHRUB	21 ⁸	

	N	S
168+0	E. Ge.	13 ³ 12 ⁷ E. Ge.
+ 83	Apple Clump	9 ⁵
+ 26	END BRUSH	19 ²
+ 11	4" W. CHERRY	21 ⁰
+ 10	6" W. CHERRY	21 ⁰
167+0	E. Ge.	11 ⁹ 12 ³ E. Ge.
+ 93	4" W. CHERRY	20 ²
+ 59	BEG BRUSH	19 ¹
+ 40	8" W. CHERRY	22 ⁰
+ 12	END BRUSH	18 ³
166+0	E. Ge.	11 ⁷ 12 ⁴ E. Ge.
+ 90	BEG BRUSH	17 ²
165+0	E. Ge.	12 ⁴ 12 ⁸ E. Ge.
+ 98		23 ² END BRUSH
+ 97	END BRUSH	15 ²
+ 75		23 ² BEG BRUSH
164+0	E. Ge.	11 ⁵ 13 ⁵ E. Ge.
+ 96	BEG BRUSH	17 ⁵
163+17	IP	29 ⁷

B.M.	3.08	223.48		1220.4
			2.92	221.56 ⁰
T.P.	0.95	214.14	10.29	213.19
"	0.60	205.03	9.71	204.43
"	0.85	196.00	9.88	195.15
"	0.97	188.36	8.61	187.39
"	1.71	183.22	6.85	181.51
"	3.09	179.68	6.63	176.59
"	1.80	175.49	5.99	173.69
"	3.87	173.33	6.03	169.46
* T.B.M.	4.18	174.98	2.53	1170.80
T.P.	5.71	177.82	2.87	172.11
* T.B.M. ₂	5.91	178.45	5.28	1172.54
T.P.	8.01	184.23	2.23	174.22
"	7.87	190.31	1.79	182.44
"	7.10	195.40	2.01	188.30
"	9.21	202.87	1.74	193.66
"	6.83	209.02	0.68	202.19
"	9.93	216.47	2.48	206.54
"	6.55	222.28	0.74	215.73
"	9.10	229.96	1.42	220.86
"	6.55	236.09	0.42	229.54
"	10.87	244.03	2.93	233.16
* T.B.M. ₃			0.73	1243.30

GEODESY Mon #1131 NE. X KILE E. CHARDAN - WINDSIC

ELEV. PROVIDED ONLY TO NEAREST TENTH

NEA OF S.E. WALL HOWL @ NE 4 "449" #13

PAINTED ORANGE

TOP CONC NAIL IN TOP S.W. WINDWALL BRIDGE STA 100+52

PAINTED ORANGE

S. BOLT IN HIGH BR, E. BBL. OF PBL BBL W.S. DE PRINCE

TOP CONC. FULLED 2" T PIPE 30 FT OF STA 194+0

TBM ₃	8.59	251.89		1243.30
T.P.	4.23	255.95	0.17	251.72
"	6.38	257.79	4.54	251.41
"	9.02	266.01	0.80	256.99
"	7.62	273.18	0.45	265.56
"	4.65	271.15	6.68	266.50
TBM ₄	3.38	271.20	3.33	1267.82
T.P.	2.20	270.44	2.96	268.24
"	1.11	260.84	10.71	259.73
"	4.93	256.07	9.70	251.14
"	0.82	249.95	6.94	249.13
TBM ₃			6.69	1243.26

RE RUN

TBM ₃	7.08	250.38		1243.30
	6.85	256.21	1.02	249.36
	9.95	261.64	4.52	251.69
	10.95	271.34	1.25	260.39
	4.25	271.35	4.24	267.10
*TBM ₄	3.30	271.17	3.48	1267.87
	3.94	271.03	4.08	267.09
	1.13	261.57	10.59	260.44
	4.47	256.43	9.61	251.96
	3.53	248.25	11.71	244.72
TBM ₃			4.95	1243.30

HO. REF SPK S.E. CEI 555248 - SEX #13 #37

Top Conc. Filled 2" I.P.P. ± 30 Lt. STA ± 144+0

HO. REF SPK S.E. CEI 555248 - SEX #13 #37

ck 0.00

TBM ₃	3.24	246.54		1243.30
	1.26	236.29	11.51	235.03
	1.16	232.31	5.14	231.15
	0.08	220.88	11.51	220.80
	0.66	210.89	10.65	210.23
	1.50	204.76	7.63	203.26
	2.17	194.64	12.29	192.47
	1.02	187.23	8.43	186.21
	1.68	178.85	10.06	177.17
TBM ₂	5.32	177.81	6.36	1172.49
TBM ₁	3.32	174.07	7.06	1170.75
	7.11	179.70	1.48	172.59
	8.10	185.67	2.13	177.57
	10.12	194.79	1.00	184.67
	12.91	207.42	0.28	194.51
	11.02	217.83	0.61	206.81
	9.38	225.53	1.68	216.15
			4.93	220.60
B.M.			5.08	220.45

ck 0.05%

ck 0.15%

MER OF SEAWALL HOWAL NO 2 # 11.31

BEA. CIV Mon # 11.31 ck 0.05%

#13
X-SEC.

NOTE: BASE LINE
STUDB & TO 0.00

5/26/76
PFLY CLOY 50"
N S

TBM ₃	10.43	253.73		1243.30
145+0				
+63	12" CMP S.	8.27		245.46
+83	" "	7.87		245.86
146+0				
147+0				
TP	5.05	255.60	3.18	250.55
+41	12" CMP S	5.72		249.88
+61	" "	5.58		250.02
148+0	W. 30° OF DEN.			
+63	12" CMP S	5.75		249.85
+83	" "	6.15		249.45
149+0				
+71	15" XRD			
150+0				
T.P.	10.35	260.03	5.92	249.68
151+0				
152+0				
153+0				
TP.	11.77	269.84	1.96	258.07

46.3	48.8	44.4	44.7	44.86	240.86	44.7	44.4	43.7	45.6	41.4
7.8/35	9.9/19	9.3/16	9.0/12	8.87/13	8.37	9.0/5	9.3/9	10.0/12	7.7/17	6.3/30
49.4	47.2	47.9	48.0	48.16	248.17	48.0	47.6	46.5	49.7	51.4
4.3/35	6.1/19	5.9/16	5.7/12	5.57/13	5.56	5.7/5	6.1/9	7.2/12	4.0/21	2.3/30
50.6	49.4	50.3	50.5	50.62	252.61	50.4	50.2	49.2	51.5	52.4
3.1/35	4.1/18	3.1/15	3.1/12	3.1/13	3.12	3.3/5	3.5/8	4.1/12	2.7/20	1.3/30
51.7	51.5	51.5	51.61	251.61	244.44	51.4	51.2	50.2	52.3	53.4
0.9/35	4.1/18	4.1/12	3.9/13	3.97	4.7/5	4.7/9	5.0/11	3.3/18	2.5/30	
50.2	50.0	50.8	51.0	51.10	251.08	50.9	50.7	49.5	51.3	52.4
5.0/35	5.6/20	4.0/16	4.0/12	4.5/13	4.52	4.7/6	4.0/8	6.1/12	4.3/10	3.0/14
48.6	49.1	50.7	50.9	50.97	250.98	50.8	50.5	49.3	48.9	
2.0/35	1.5/20	4.5/16	4.7/12	4.6/13	4.52	4.8/6	5.1/9	6.3/13	6.7/30	
51.8	52.3	52.9	52.0	52.1	252.29	52.1	51.8	51.0	51.2	50.2
8.0/35	7.1/21	9.1/8	8.0/15	7.9/12	7.96	7.9/5	8.2/9	9.0/12	8.0/15	9.8/30
50.5	50.4	51.6	54.5	54.7	254.84	54.6	54.2	53.2	55.3	56.0
3.0/35	1.5/20	4.1/18	5.5/16	5.3/13	5.19	5.4/6	5.8/9	6.8/12	4.7/20	4.0/30
50.2	50.8	50.8	50.0	50.2	258.53	50.3	50.1	50.9	50.9	
1.8/35	7.1/21	3.1/16	2.0/16	1.8/13	1.50	1.7/6	1.9/9	3.1/12		

#13

DAVIDSON PATENT 77 RUMBLE N 5/27/76 CLONE 55° CS
 NOT 1/2 E 1/2 W 1000' 5

160+0	280.59				✓
161+0					✓
TP.	13.15	290.46	3.28	297.31	
161+0					✓
162+0					✓
163+0					✓
*TBM 5	2.35	290.60	2.21	1288.25	
164+0					✗
165+0					✓
166+0					✓
167+0					✓
168+0					✓
TBM 5	2.80	291.05	2.35	1288.25	
TP.	2.24	283.74	9.55	281.50	
"	1.32	274.21	10.85	272.89	
TBM 4			6.42	1267.79	

72.1 1 1/30	74.0 1 1/18	71.4 1 1/16	72.9 1 1/13	73.1 1 5/11	73.46 1 1/13	73.0 1 1/13	72.8 1 1/12	71.6 1 1/12	76.0 1 1/21	76.9 1 1/30
75.9 1 1/14	76.9 1 1/13	76.9 1 1/13	77.7 3 2/5	77.0 3 1/11	76.8 3 1/13	76.1 4 1/15	78.4 2 2/18	78.3 2 3/30		
80.1 1 1/30	80.3 1 1/30									
84.2 1 1/30	84.3 1 1/20	79.9 1 1/13	81.1 1 1/11	81.2 1 1/10	81.52 1 1/14	81.50 1 1/11	81.1 1 1/11	81.0 1 1/14	80.4 1 1/15	83.4 1 1/22
87.9 1 1/30	88.0 1 1/20	84.3 1 1/13	85.0 1 5/12	85.1 1 5/10	85.37 5 1/9	85.35 5 1/11	85.7 5 1/13	85.0 5 1/14	84.3 6 1/16	86.8 3 7/20
87.9 1 1/30	87.6 1 1/18	85.2 1 5/13	85.7 1 1/12	85.8 1 1/10	86.08 1 1/12	86.0 1 1/14	85.6 5 1/13	85.4 5 1/15	84.3 5 1/17	86.8 1 1/22
84.9 1 1/30	84.9 1 1/18	83.6 1 1/15	84.0 1 1/13	84.1 1 1/12	84.69 5 1/9	84.6 5 1/11	84.2 1 1/13	84.0 1 1/15	83.4 1 1/16	85.3 1 1/21
84.6 1 1/30	84.0 1 1/18	82.3 1 1/15	82.3 1 1/13	83.4 1 1/11	83.78 1 1/12	83.73 1 1/10	83.2 1 1/13	83.1 1 1/15	82.7 1 1/16	84.1 1 1/21
83.6 1 1/30	82.9 1 1/18	81.7 1 1/15	82.7 1 1/13	82.8 1 1/12	82.29 1 1/12	82.7 1 1/10	82.5 1 1/13	81.9 1 1/14	83.3 1 1/16	82.9 1 1/21
82.9 1 1/30	82.7 1 1/18	81.4 1 1/15	81.9 1 1/13	82.0 1 1/12	82.00 1 1/12	82.1 1 1/10	82.2 1 1/15	81.6 1 1/16	82.5 1 1/20	82.2 1 1/21

TBM ₄	7.94	275.74		1267.80
	10.76	285.42	1.08	274.66
	5.85	289.44	1.83	283.59
	7.42	295.31	1.55	287.89
	5.41	297.41	3.31	292.00
*TBM ₆	2.73	297.13	3.01	1294.40
	3.62	294.79	5.96	291.17
	4.02	288.88	9.93	284.86
	1.80	282.70	7.98	280.90
	1.80	272.38	12.12	270.58
TBM ₄			4.62	1267.76

TBM ₆	2.97	297.37		1294.40
88+0	(POND @ ±92' E)			✓
TP.	3.80	294.21	6.96	290.41
88+0				✓
89+0				✓
* 88+63	12" RCP E	5.31		288.90
* 88+91	" "	5.50		288.71
90+0				✓
91+0				

Ho R = F Spk S.W. C E I 555239 ± 28° LT ± STA 87+0

ok 0.02%

W B/L E

Ho R = F Spk S.W. C E I 555239

90.1	89.5	90.3	90.4	89.8	90.5	90.4	88.9	90.4	90.2
1 2/8	1 9/15	1 1/11	1 7/8	6 9	6 9/5	7 1/12	8 5/18	1 0/22	1 2/30
10.2	88.7	89.6	88.8	89.9	90.1	89.7	88.9	90.8	91.5
4 0/20	5 5/30	4 3/19	5 4/16	4 3/12	4 1/8	3 9/5	4 1/9	A 3/4	6 3/17
87.6	88.1	87.8	88.6	88.8	88.7	88.9	88.8	87.6	89.9
6 1/10	6 1/10	6 4/5	5 4/11	5 1/11	5 1/8	5 2/9	5 2/12	6 1/13	4 8/20
5.9	86.7	85.8	86.5	86.8	87.0	86.9	85.6	88.2	88.8
8 2/10	1 2/16	8 1/5	1 9/12	1 1/8	1 1/8	1 2/9	1 3/12	8 1/16	6 0/24

T.P. 4.92 277.00 272.08

99+0 ✓

T.P. 3.33 271.44 8.89 268.11

100+0

+55 15" RCP x R0 (E) 7.94 263.50

+58 " " " (W) 8.09 263.35

+85 B/L INTERS. 4.44 267.00

TBM₄ 7.88 275.72 3.60 1267.84

101+0 (IN N. BECM #13) ✓

+06 12" RCP² x R0 (E) 11.47 264.25

+10 12" " " (W) 12.22 263.50

102+0 ✓

103+0

* 102+50

103+19 6" VTP W. 8.19 267.53

T.P. 9.26 266.46

	W	E
	70.1 3 1/2 30	70.3 1 1/8
	70.4 3 3/8 22	70.5 1 1/8
	70.2 7 8/15	70.6 6.55
	70.0 1 0/12	70.7 6 7/8
	70.3 1 1/8	70.8 270.45
	70.1 6 7/8	70.9 70.1
	70.7 7 1/3	71.0 69.7
	70.8 8 2/18	71.1 68.8
	71.3 2 7/27	71.2 71.3
	71.2 2 8/30	71.3 71.2
	69.2 4 1/2 30	69.3 3 9/20
	69.5 5 4/16	69.4 6.58
	69.8 6 0/14	69.5 6.4
	69.2 4 1/8	69.6 27.23
	69.7 4 1/9	69.7 67.0
	69.2 5 2/15	69.8 66.2
	69.5 5 9/30	69.9 65.5
	69.8 8 7/9	69.8 6.8
	69.9 8.9	69.9 27.00
	69.8 8 8/8	69.8 6.8
	69.8 9 6/30	69.8 6.1
	69.1 8 1/2 30	69.9 6.9
	69.9 7 8/20	69.2 6.2
	69.0 6 7/12	69.3 6.3
	69.2 6 5/10	69.4 6.4
	69.0 6 1/12	69.5 6.5
	69.1 6 2/8	69.6 6.6
	69.2 6 3/10	69.7 6.7
	69.3 6 4/13	69.8 6.8
	69.4 6 5/15	69.9 6.9
	69.5 6 6/18	70.0 7.0
	69.6 6 7/21	70.1 7.1
	69.7 6 8/24	70.2 7.2
	69.8 6 9/27	70.3 7.3
	69.9 6 10/30	70.4 7.4
	70.0 7 1/30	70.5 7.5
	70.1 7 2/30	70.6 7.6
	70.2 7 3/30	70.7 7.7
	70.3 7 4/30	70.8 7.8
	70.4 7 5/30	70.9 7.9
	70.5 7 6/30	71.0 8.0
	70.6 7 7/30	71.1 8.1
	70.7 7 8/30	71.2 8.2
	70.8 7 9/30	71.3 8.3
	70.9 7 10/30	71.4 8.4
	71.0 7 11/30	71.5 8.5
	71.1 7 12/30	71.6 8.6
	71.2 7 13/30	71.7 8.7
	71.3 7 14/30	71.8 8.8
	71.4 7 15/30	71.9 8.9
	71.5 7 16/30	72.0 9.0
	71.6 7 17/30	72.1 9.1
	71.7 7 18/30	72.2 9.2
	71.8 7 19/30	72.3 9.3
	71.9 7 20/30	72.4 9.4
	72.0 7 21/30	72.5 9.5
	72.1 7 22/30	72.6 9.6
	72.2 7 23/30	72.7 9.7
	72.3 7 24/30	72.8 9.8
	72.4 7 25/30	72.9 9.9
	72.5 7 26/30	73.0 10.0
	72.6 7 27/30	73.1 10.1
	72.7 7 28/30	73.2 10.2
	72.8 7 29/30	73.3 10.3
	72.9 7 30/30	73.4 10.4
	73.0 8 1/30	73.5 10.5
	73.1 8 2/30	73.6 10.6
	73.2 8 3/30	73.7 10.7
	73.3 8 4/30	73.8 10.8
	73.4 8 5/30	73.9 10.9
	73.5 8 6/30	74.0 11.0
	73.6 8 7/30	74.1 11.1
	73.7 8 8/30	74.2 11.2
	73.8 8 9/30	74.3 11.3
	73.9 8 10/30	74.4 11.4
	74.0 8 11/30	74.5 11.5
	74.1 8 12/30	74.6 11.6
	74.2 8 13/30	74.7 11.7
	74.3 8 14/30	74.8 11.8
	74.4 8 15/30	74.9 11.9
	74.5 8 16/30	75.0 12.0
	74.6 8 17/30	75.1 12.1
	74.7 8 18/30	75.2 12.2
	74.8 8 19/30	75.3 12.3
	74.9 8 20/30	75.4 12.4
	75.0 8 21/30	75.5 12.5
	75.1 8 22/30	75.6 12.6
	75.2 8 23/30	75.7 12.7
	75.3 8 24/30	75.8 12.8
	75.4 8 25/30	75.9 12.9
	75.5 8 26/30	76.0 13.0
	75.6 8 27/30	76.1 13.1
	75.7 8 28/30	76.2 13.2
	75.8 8 29/30	76.3 13.3
	75.9 8 30/30	76.4 13.4
	76.0 9 1/30	76.5 13.5
	76.1 9 2/30	76.6 13.6
	76.2 9 3/30	76.7 13.7
	76.3 9 4/30	76.8 13.8
	76.4 9 5/30	76.9 13.9
	76.5 9 6/30	77.0 14.0
	76.6 9 7/30	77.1 14.1
	76.7 9 8/30	77.2 14.2
	76.8 9 9/30	77.3 14.3
	76.9 9 10/30	77.4 14.4
	77.0 9 11/30	77.5 14.5
	77.1 9 12/30	77.6 14.6
	77.2 9 13/30	77.7 14.7
	77.3 9 14/30	77.8 14.8
	77.4 9 15/30	77.9 14.9
	77.5 9 16/30	78.0 15.0
	77.6 9 17/30	78.1 15.1
	77.7 9 18/30	78.2 15.2
	77.8 9 19/30	78.3 15.3
	77.9 9 20/30	78.4 15.4
	78.0 9 21/30	78.5 15.5
	78.1 9 22/30	78.6 15.6
	78.2 9 23/30	78.7 15.7
	78.3 9 24/30	78.8 15.8
	78.4 9 25/30	78.9 15.9
	78.5 9 26/30	79.0 16.0
	78.6 9 27/30	79.1 16.1
	78.7 9 28/30	79.2 16.2
	78.8 9 29/30	79.3 16.3
	78.9 9 30/30	79.4 16.4
	79.0 10 1/30	79.5 16.5
	79.1 10 2/30	79.6 16.6
	79.2 10 3/30	79.7 16.7
	79.3 10 4/30	79.8 16.8
	79.4 10 5/30	79.9 16.9
	79.5 10 6/30	80.0 17.0
	79.6 10 7/30	80.1 17.1
	79.7 10 8/30	80.2 17.2
	79.8 10 9/30	80.3 17.3
	79.9 10 10/30	80.4 17.4
	80.0 10 11/30	80.5 17.5
	80.1 10 12/30	80.6 17.6
	80.2 10 13/30	80.7 17.7
	80.3 10 14/30	80.8 17.8
	80.4 10 15/30	80.9 17.9
	80.5 10 16/30	81.0 18.0
	80.6 10 17/30	81.1 18.1
	80.7 10 18/30	81.2 18.2
	80.8 10 19/30	81.3 18.3
	80.9 10 20/30	81.4 18.4
	81.0 10 21/30	81.5 18.5
	81.1 10 22/30	81.6 18.6
	81.2 10 23/30	81.7 18.7
	81.3 10 24/30	81.8 18.8
	81.4 10 25/30	81.9 18.9
	81.5 10 26/30	82.0 19.0
	81.6 10 27/30	82.1 19.1
	81.7 10 28/30	82.2 19.2
	81.8 10 29/30	82.3 19.3
	81.9 10 30/30	82.4 19.4
	82.0 11 1/30	82.5 19.5
	82.1 11 2/30	82.6 19.6
	82.2 11 3/30	82.7 19.7
	82.3 11 4/30	82.8 19.8
	82.4 11 5/30	82.9 19.9
	82.5 11 6/30	83.0 20.0
	82.6 11 7/30	83.1 20.1
	82.7 11 8/30	83.2 20.2
	82.8 11 9/30	83.3 20.3
	82.9 11 10/30	83.4 20.4
	83.0 11 11/30	83.5 20.5
	83.1 11 12/30	83.6 20.6
	83.2 11 13/30	83.7 20.7
	83.3 11 14/30	83.8 20.8
	83.4 11 15/30	83.9 20.9
	83.5 11 16/30	84.0 21.0
	83.6 11 17/30	84.1 21.1
	83.7 11 18/30	84.2 21.2
	83.8 11 19/30	84.3 21.3
	83.9 11 20/30	84.4 21.4
	84.0 11 21/30	84.5 21.5
	84.1 11 22/30	84.6 21.6
	84.2 11 23/30	84.7 21.7
	84.3 11 24/30	84.8 21.8
	84.4 11 25/30	84.9 21.9
	84.5 11 26/30	85.0 22.0
	84.6 11 27/30	85.1 22.1
	84.7 11 28/30	85.2 22.2
	84.8 11 29/30	85.3 22.3
	84.9 11 30/30	85.4 22.4
	85.0 12 1/30	85.5 22.5
	85.1 12 2/30	85.6 22.6
	85.2 12 3/30	85.7 22.7
	85.3 12 4/30	85.8 22.8
	85.4 12 5/30	85.9 22.9
	85.5 12 6/30	86.0 23.0
	85.6 12 7/30	86.1 23.1
	85.7 12 8/30	86.2 23.2
	85.8 12 9/30	86.3 23.3
	85.9 12 10/30	86.4 23.4
	86.0 12 11/30	86.5 23.5
	86.1 12 12/30	86.6 23.6
	86.2 12 13/30	86.7 23.7
	86.3 12 14/30	86.8 23.8
	86.4 12 15/30	86.9 23.9
	86.5 12 16/30	87.0 24.0
	86.6 12 17/30	87.1 24.1
	86.7 12 18/30	87.2 24.2
	86.8 12 19/30	87.3 24.3
	86.9 12 20/30	87.4 24.4
	87.0 12 21/30	87.5 24.5
	87.1 12 22/30	87.6 24.6
	87.2 12 23/30	87.7 24.7
	87.3 12 24/30	87.8 24.8
	87.4 12 25/30	87.9 24.9
	87.5 12 26/30	88.0 25.0
	87.6 12 27/30	88.1 25.1
	87.7 12 28/30	88.2 25.2
	87.8 12 29/30	88.3 25.3
	87.9 12 30/30	88.4 25.4
	88.0 13 1/30	88.5 25.5
	88.1 13 2/30	88.6 25.6
	88.2 13 3/30	88.7 25.7
	88.3 13 4/30	88.8 25.8
	88.4 13 5/30	88.9 25.9
	88.5 13 6/30	89.0 26.0
	88.6 13 7/30	89.1 26.1
	88.7 13 8/30	89.2 26.2
	88.8 13 9/30	89.3 26.3
	88.9 13 10/30	89.4 26.4
	89.0 13 11/30	89.5 26.5
	89.1 13 12/30	89.6 26.6
	89.2 13 13/30	89.7 26.7
	89.3 13 14/30	89.8 26.8
	89.4 13 15/30	89.9 26.9
	89.5 13 16/30	90.0 27.0
	89.6 13 17/30	90.1 27.1
	89.7 13 18/30	90.2 27.2
	89.8 13 19/30	90.3 27.3
	89.9 13 20/30	90.4 27.4
	90.0 13 21/30	90.5 27.5
	90.1 13 22/30	90.6 27.6
	90.2 13 23/30	90.7 27.7
	90.3 13 24/30	90.8 27.8
	90.4 13 25/30	90.9 27.9
	90.5 13 26/30	91.0 28.0
	90.6 13 27/30	91.1 28.1
	90.7 1	

#37

267.39

T.P.	10.27	272.33	5.33	262.06
*T.B.M. ₇	1.28	271.25	2.36	269.97
	4.86	266.45	9.66	261.59
	5.96	269.74	2.67	263.78
	4.94	273.08	1.60	268.14
			5.30	267.78

70

HO	R	S	E.	30"	S	P	R	V	C	E	35	L	#	STA.	113	+40
----	---	---	----	-----	---	---	---	---	---	---	----	---	---	------	-----	-----

DRIVE PROFILES
#13

STA 145+74 RT

146+0 3.56 251.73 1248.17 ^{B/L}
 47.24 ✓ 47.0 ✓ 47.0 ✓ 47.5 ✓ 47.7 ✓ 49.2 ✓
 TRULO
 4.49 4.7/9² 4.1/15² 4.2/27⁵ 4.0/30² 2.5/50²

STA 147+51 RT

148+0 4.52 256.13 1251.61 ^{B/L}
 TRULO
 51.37 ✓ 51.4 ✓ 51.6 ✓ 51.9 ✓ 52.5 ✓
 4.76 4.9/9² 4.5/13² 4.2/30² 3.6/50²

STA 148+09 LT

148+0 4.52 256.13 1251.61 ^{B/L}
 52.0 ✓ 51.7 ✓ 51.6 ✓ 51.5 ✓ TRULO
 4.5/50² 4.0/30² 4.3/42² 4.6/42² 51.66 ✓
 4.47

STA 148+71 RT

148+0 4.52 256.13 1251.61 ^{B/L}
 TRULO
 51.34 ✓ 51.2 ✓ 51.0 ✓ 51.8 ✓ 53.1 ✓
 4.99 4.9/9² 5.1/17⁸ 4.3/30² 3.0/50²

STA 154+40 LT

155+0 3.37 268.93 1265.56 ^{B/L}
 62.1 ✓ 62.5 ✓ 62.6 ✓ 62.7 ✓ TRULO
 6.8/50² 5.6/30² 6.3/35² 6.4/31² 5.8/9² 263.21 ✓
 5.72

DAVIDSON
BR24AER62E. A
BALLINAGE

6/1/70

SHOWERS 60"

71

STA 154+88 LT

268.93 ^{B/L}
 63.8 ✓ 63.4 ✓ 64.0 ✓ 64.3 ✓ 64.7 ✓ 65.0 ✓ TRULO
 5.1/50² 5.3/43² 4.9/30² 4.8/21² 4.2/43² 3.9/43² 45.14 ✓
 3.79

STA 159+05 LT

159+0 5.11 273.75 1268.66 ^{B/L}
 69.4 ✓ 69.6 ✓ 69.5 ✓ 69.3 ✓ 68.8 ✓ TRULO
 4.4/50² 4.7/30² 4.3/23² 4.5/77² 5.0/12⁸ 68.97 ✓
 4.78

DRIVE PROFILES

#37

STA 88+79 RT

89+0 4.62 294.88 1290.26

TRVL	90.4	90.10	90.6	90.6	90.8
4.51	4 ¹ / ₈	4 ⁶ / ₁₅	4 ³ / ₂₈	4 ³ / ₃₀	4 ¹ / ₅₀

STA 91+69 RT

92+0 4.35 289.69 1285.34

TRVL	85.8	86.3	87.0	87.9
3.92	3 ⁹ / ₁₅	3 ¹ / ₁₆	2 ¹ / ₂₉	1 ⁸ / ₄₈

STA 93+37 LT

93+0 4.16 289.01 1284.85

TRVL	84.5	84.3	84.9	83.8	84.5	80.4
4.24	4 ¹ / ₅₀	4 ¹ / ₃₀	5 ⁰ / ₁₈	5 ¹ / ₁₄	4 ⁵ / ₉	4.34

STA 96+92 RT Skew = 30° Fwd

97+0 4.81 283.54 1278.73

TRVL	78.9	79.0	79.1	79.7
4.22	4 ⁶ / ₁₀	4 ⁵ / ₁₇	4 ² / ₂₈	3 ⁸ / ₅₀

SHOWERS

72

STA 103+27 LT

103+0 3.90 273.67 1269.77

TRVL	67.0	67.6	67.9	68.1	68.47
4.73	6 ¹ / ₃₀	6 ¹ / ₉	5 ⁸ / ₁₃	5 ⁶ / ₈	5.20

STA 102+15 RT

102+0 5.61 275.21 1269.60

TRVL	70.2	70.2	70.3	71.4	72.8
4.85	5 ⁰ / ₉	5 ⁰ / ₁₃	4 ⁹ / ₁₉	3 ⁸ / ₃₀	2 ⁴ / ₅₀

STA 105+28 RT

105+0 4.56 269.19 1264.63

TRVL	64.9	65.0	65.4	66.9
4.24	4 ³ / ₈	4 ² / ₁₄	3 ⁸ / ₂₈	2 ³ / ₅₀

STA 109+02 RT SEE X 500

110+0 4.33 267.16 1262.83

TRVL	62.5	62.4	62.7	63.1	62.9
4.43	4 ¹ / ₈	4 ² / ₁₃	4 ⁵ / ₂₃	4 ¹ / ₃₀	3 ³ / ₅₀

E. HEISHBERGER, CHIEF TR 58 A SIDLEY
L. KOVACH
A. FERGUSON, ROD.
DITCH WORK

17 OCTOBER 1983
53° M.C., CALM 73

17+71

N

58 S-1.585-3

17+39

17+00

16+00

15+00

14+00

13+00

12+00

11+00

10+00

9+00

8+00

7+00

6+00

5+00

4+00

58 S-1.31-1

3+45

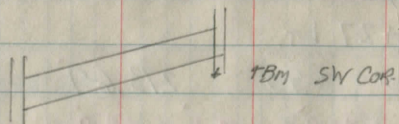
3+00

2+00

1+00

0+00

58 S-235-1



TBM SW COR

3+50

0+05

DISTANCE WHEELED

HUBS SET 3-5' BACK OF DITCH

STA.	B.S.	H.I.	F.S.	ELEV.	NOTES
TBM	2.57	102.57		100.00	SW COR. E + BRIDGE RAIL.
TP			1.16	101.41	
	7.60	109.01			
TP			0.64	108.37	
	7.57	115.94			
TP			3.00	112.94	
	6.21	119.15			
0+00					PIPE INV.
05					
1+00					
2+00					
3+00					
			7.86	111.29	
	3.93	115.22			
3+4.5					
4+00					
5+00					
TBM 6+00			5.97	109.25	HUB E
	1.41	110.66			

W			E	
HUB	DITCH.	↓	DITCH	HUB
		113.6	115.6	
		0.6	3.5	117.4
				1.8
		115.4	113.4	115.2
		3.7	5.7	3.9
		113.6	111.6	113.4
		5.5	7.5	5.8
		111.8	109.8	111.0
		7.3	9.4	8.2
110.7	108.6	111.3	108.4	110.1
4.5	6.6	3.9	6.8	5.1
111.0	109.1	110.7	108.6	109.8
4.2	6.1	4.5	6.6	5.4
110.6	108.5	110.2	107.9	109.4
4.6	6.7	5.0	7.3	5.8

	H.I.	F.S.	ELEV.	
	110-66			
5+3.5		2.1	108.6	12" INV. DR. PIPE W
5+50		2.4	108.3	INV. 12" DR. PIPE W
6+00				
6+85		3.8	106.9	INV. 18" DR. PIPE W
7+00		4.7	106.0	INV. 18" DR. PIPE W
8+00				
9+00				
10+00				
11+00				
TP		7.33	103.33	
12+00	1.66		104.99	
13+00				
18		6.1	98.9	INV. 12" CMP DR. E
38		6.3	98.7	INV. 12" CMP DR. E
14+00				
35		7.0	98.0	INV. 12" CMP DR. E
50		7.3	97.7	INV. 12" CMP DR. E
15+00				
TP		7.96	97.03	W HUB

HUB	W	DITCH	d	DITCH	E	HUB
110.0		107.8	109.4	107.2		109.2
0.7		2.9	1.3	3.5		
109.1		106.0	108.4	106.2		108.2
1.6			2.3	4.5		2.5
107.3		104.6	106.6	104.7		106.9
3.4		6.1	4.1	6.0		3.8
105.3		103.3	105.1	103.2		105.1
5.4		7.4	5.6	7.5		5.6
104.1		101.8	103.8	102.0		104.0
6.6		8.9	6.9	8.7		6.7
103.4		100.9	102.9	100.9		103.4
7.3		9.8	7.8	9.8		7.3
102.4		99.8	101.9	100.0		102.6
2.6		5.2	3.1	5.0		2.4
101.3		99.1	100.9	99.2		101.5
3.7		5.9	4.1	5.8		3.5
100.8		98.1	99.8	98.5		100.7
4.2		6.9	5.2	6.5		4.3
99.4		96.5	98.3	96.1		99.5
5.6		8.5	6.7	8.9		5.5

	B.S.	H.I.	F.S.	ELEV.	
	4.86	101.89		97.03	
16+00					
17+00					
39					END W DITCH
			9.5	92.4	CREEK INV.
71					END E DITCH
TBM			1.86	100.03	

BY 1016-83 CLK

W MVB	DITCH	C.T.D.	DITCH	F	HUB
97.0	95.5	97.5	95.0		97.9
	6.4	4.4	6.9		4.0
96.3	93.7	97.0	93.8		96.8
5.6	8.2	4.9	8.1		5.1
94.0	93.1				
7.9	8.8				
			93.6		95.5
			8.3		6.4
1394' HAS 16.1' FALL = 1.15%		1771' HAS 23.2' FALL = 1.31%			
		1426	16.2		1.14
		345	7.2		2.09

CUT FROM

HUB

WT

W DITCH

FINAL GRADE

F.G.

CUT

DITCH E

CUT FROM⁷⁷

HUB

0+00

5

1+00

2+00

3+00

45

4+00

5+00

35

50

6+00

85

7+00

8+00

9+00

10+00

11+00

12+00

13+00

18

38

14+00

35

50

15+00

12"

DR. PIPE W

12"

DR. PIPE W

18" DR. W.

18" DR.

PIPE W

CUT FROM HUB	WT W DITCH	FINAL GRADE	F.G.	CUT DITCH E	CUT FROM ⁷⁷ HUB
				115.6	0.0
				113.5	0.0
				111.4	0.2
				109.3	0.5
2.1	0.0	108.6	108.4	0.0	1.7
3.2	1.3	107.8	108.0	0.6	1.8
4.0	1.9	106.6	106.9	1.0	2.5
				106.3	
				106.1	
4.5	2.3	105.5	105.7	1.2	3.5
				104.6	
5.2	1.6	104.4	104.6	1.6	3.6
4.1	1.4	103.2	103.2	1.3	3.5
3.3	1.3	102.0	102.3	0.9	2.8
3.2	0.9	100.9	101.2	0.8	2.8
3.6	1.1	99.8	100.0	0.9	3.4
3.8	1.2	98.6	98.9	1.1	3.7
3.9	1.7	97.4	97.7	1.5	3.8
				97.5	1.4
				97.3	1.4
4.5	1.8	96.3	96.6	1.9	4.1
				96.3	1.7
				96.1	1.6
4.2	1.3	95.2	95.5	0.6	4.0

TR 58A SIDLEY

78

CUT SHEET CTD.

CUT	FR. HVB	DITCH	FINISH GR. 2	FIN. GR.	DITCH CUT	HVB CUT
	30	1.5	94.0	94.3	0.7	3.6
	34	0.8	92.9	93.2	0.6	3.6
	1.5	0.6	92.5			
				92.4	1.4	3.1

16+00

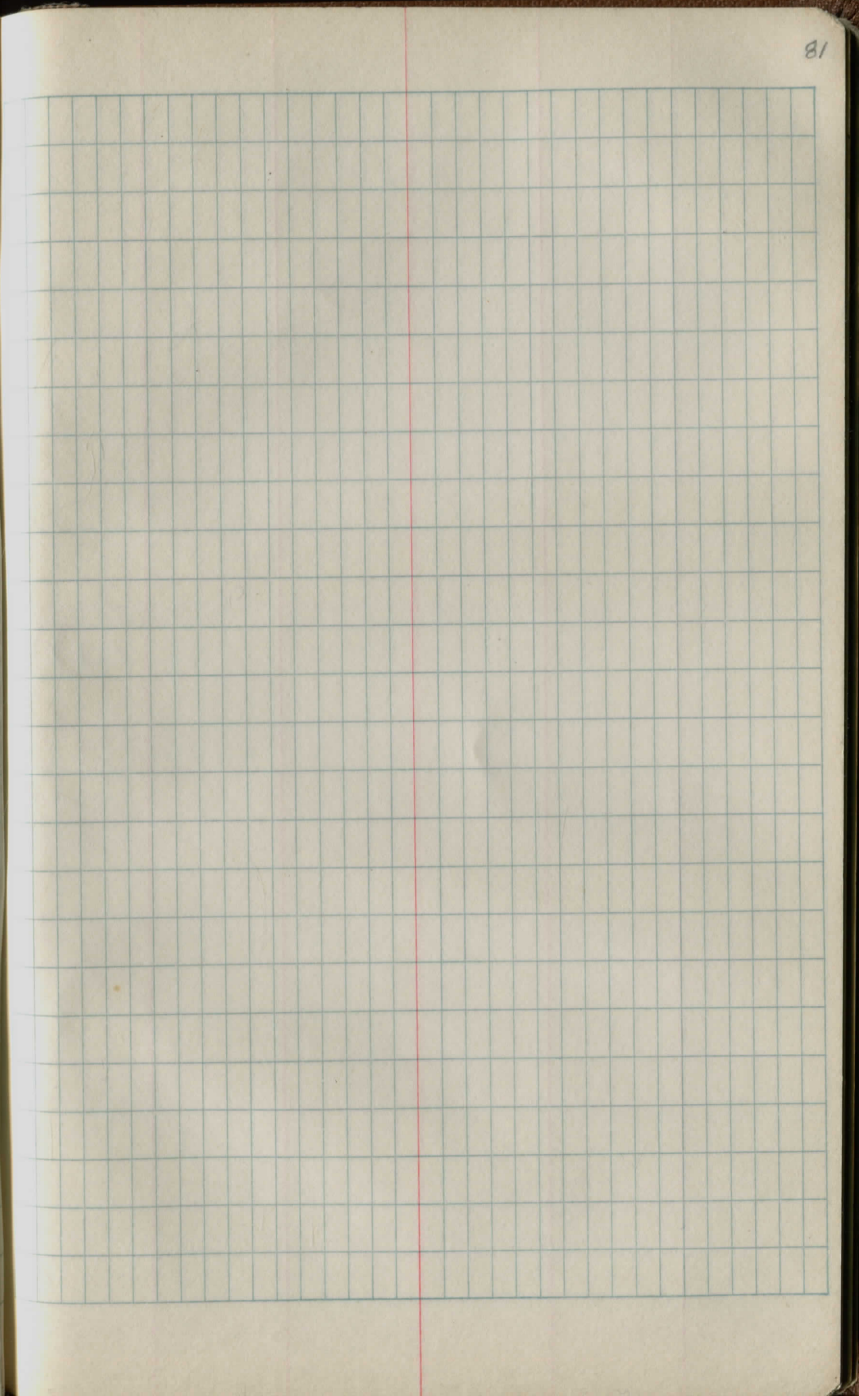
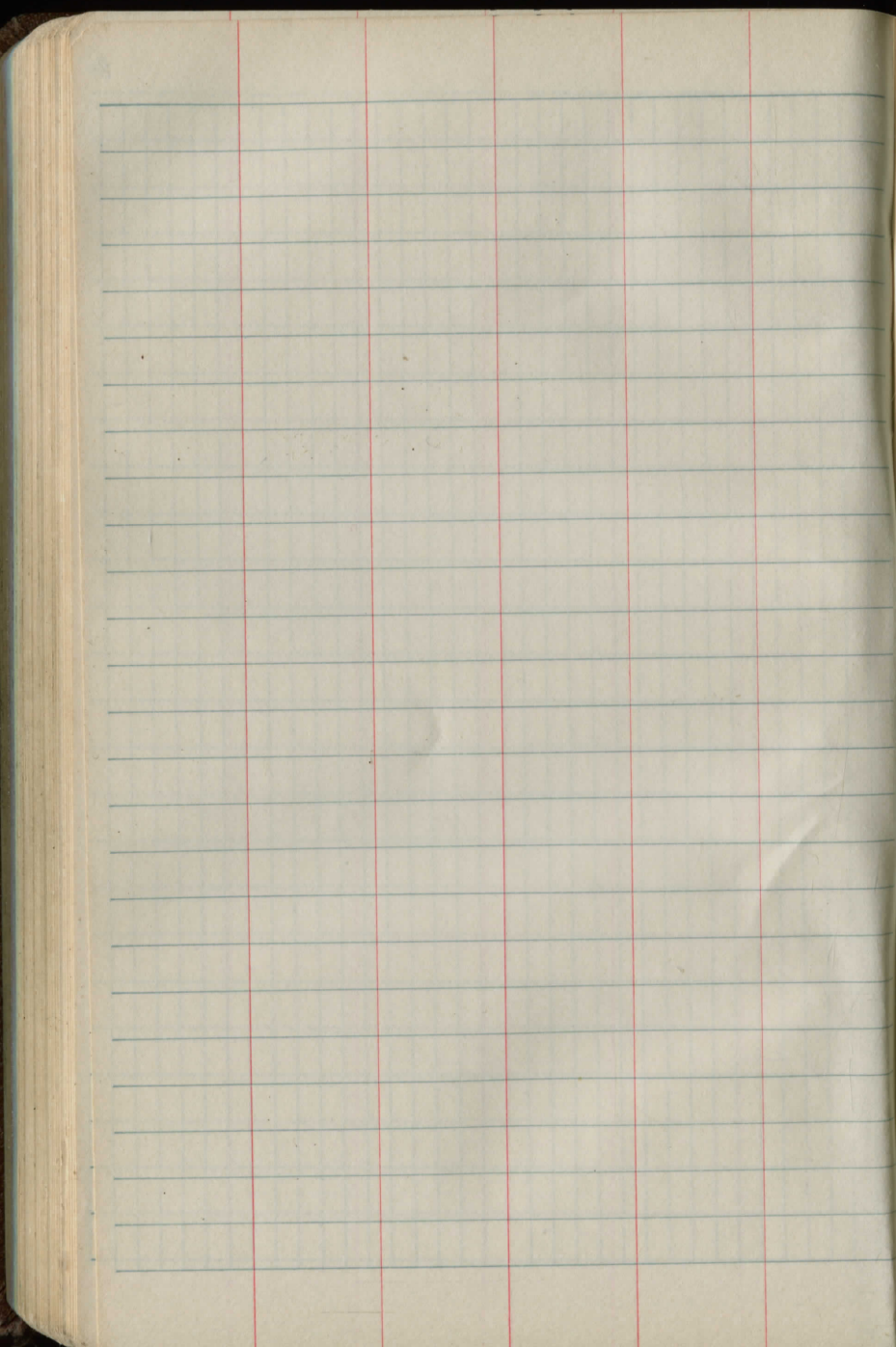
17+00

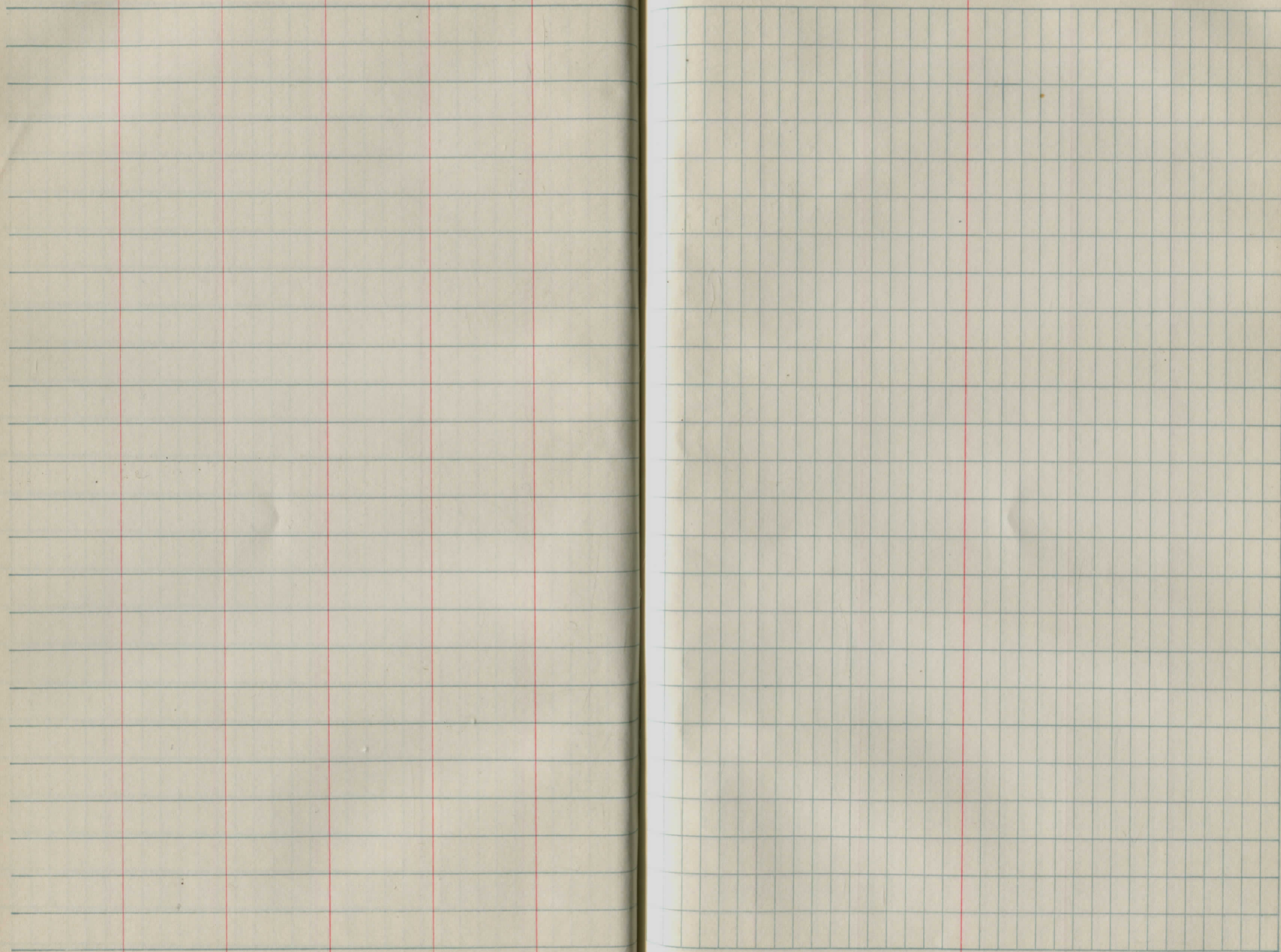
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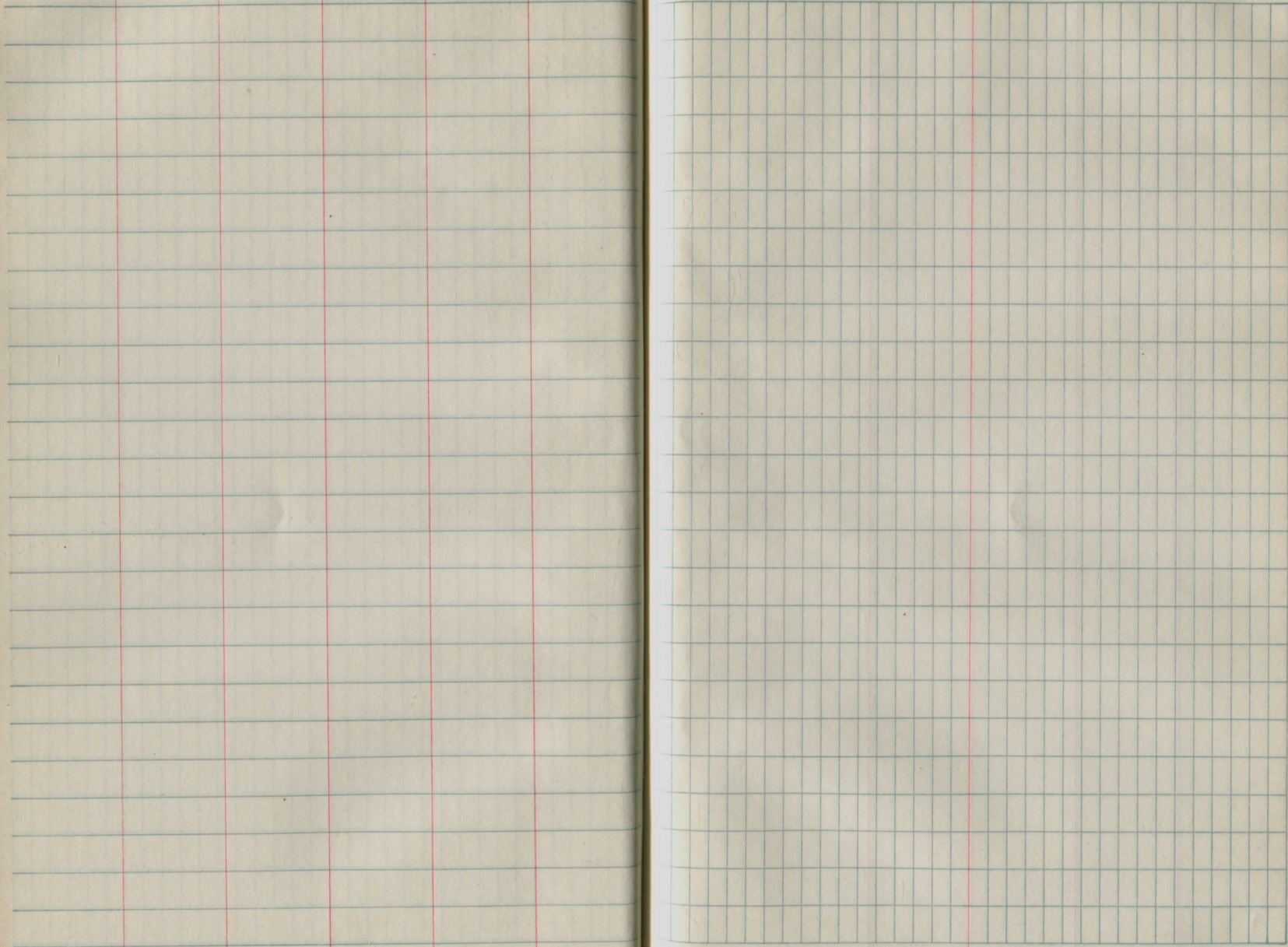
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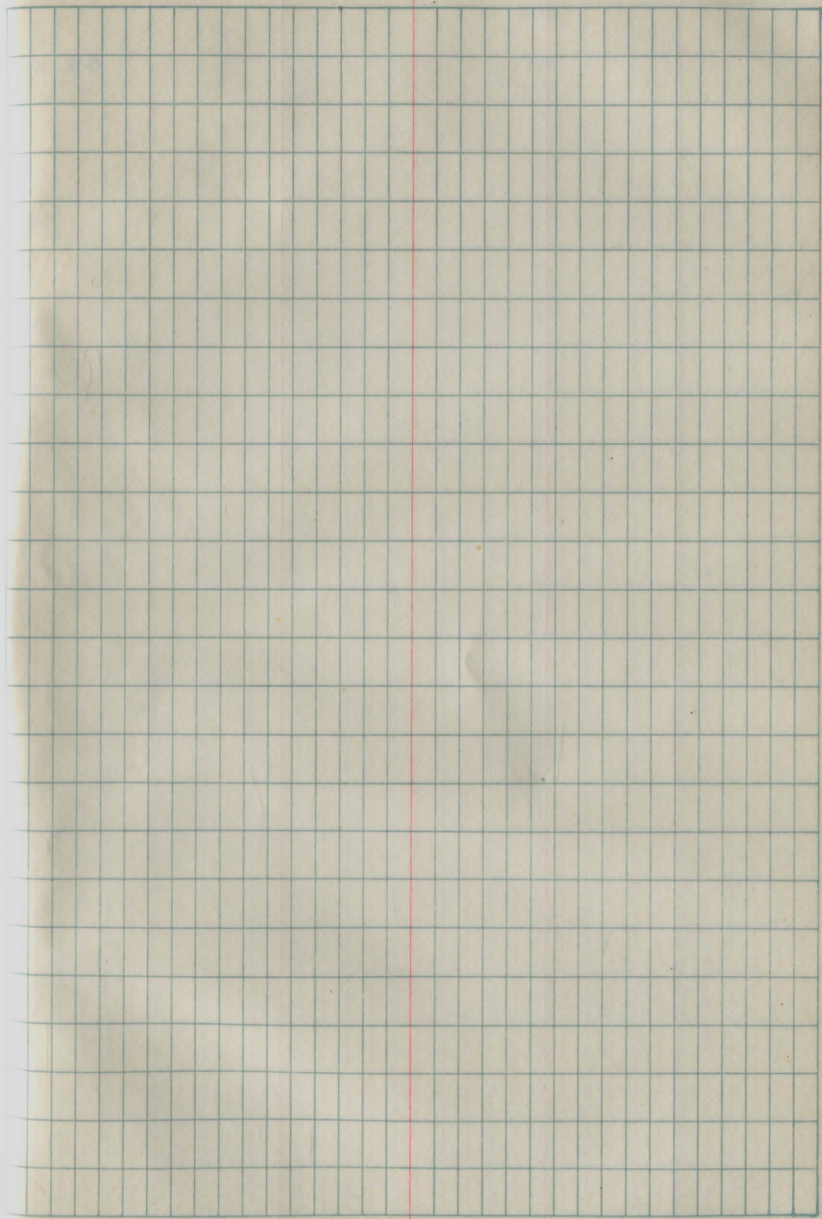
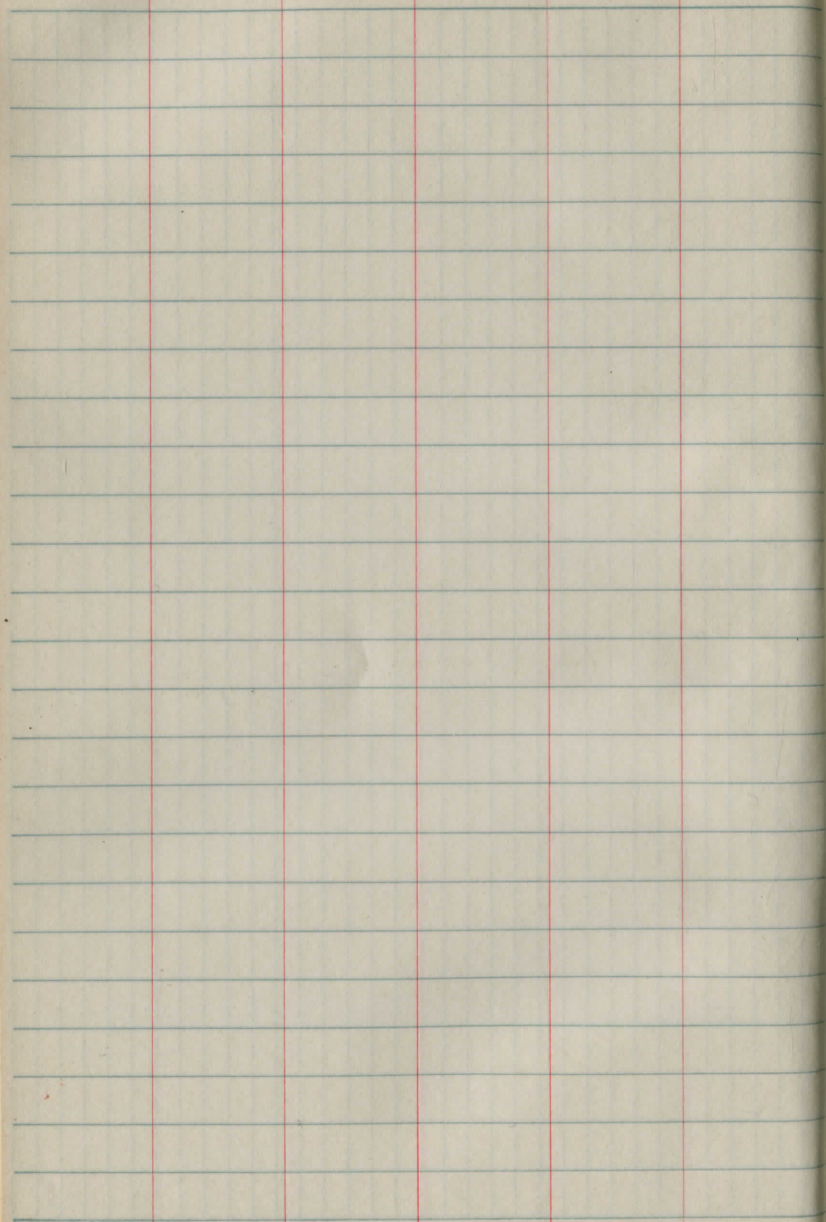
This page is a blank ledger sheet. It features a series of horizontal blue lines spaced evenly down the page. There are four vertical red lines that create five columns of varying widths. The columns are roughly in the proportions of 1:1:1:1:2 from left to right. The paper is off-white and shows some signs of age and wear.

This page is a blank ledger sheet with a grid layout. It has a single vertical red margin line on the left side, creating a narrow left margin. The rest of the page is filled with a grid of blue lines, forming a table with 20 columns and 25 rows. The paper is off-white and shows some signs of age and wear.









30

30

7.5

The image shows an open notebook with two pages. The left page is ruled with horizontal blue lines and has three vertical red margin lines. The right page is ruled with a grid of blue lines and has one vertical red margin line. The pages are cream-colored and show some signs of age. The number 88 is printed in the top right corner of the right page.

CURVE TABLES.

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HOW TO USE CURVE TABLES.

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

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

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

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

EXAMPLE.

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

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

Tan. in Tab. I opp. 23° 20' = 1183.1
 $1183.1 \div 10 = 118.31$.

Correction for A. 23° 20' for a 10° Cur. = 0.16
 $118.31 + 0.16 = 118.47 = \text{corrected Tangent}$.

(If corrected Ext. is required find in same way)
 Ang. 23° 20' = 23.33° $\div 10 = 2.3333 = \text{L. C.}$

2° 19½' = def. for sta.	542	I. P. = sta.	542+72
4° 49½' = " " "	+50	Tan. =	1 118.47
7° 19½' = " " "	543	B. C. = sta.	541+53.53
9° 49½' = " " "	+50	L. C. =	2 33.33
11° 40' = " " "	543+	E. C. = Sta.	543+86.86
	86.86		

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

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

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

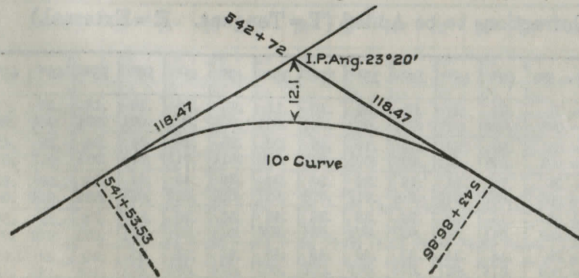


TABLE I. — Tangents and External to a 1° Curve.
Chord = 100 ft.

Int. Angle	Tangent	External	Int. Angle	Tangent	External	Int. Angle	Tangent	External
1°	50.00	.22	8°	400.66	13.99	15°	754.32	49.44
10'	58.34	.30	10'	409.03	14.58	10'	762.80	50.55
20	66.67	.39	20	417.41	15.18	20	771.29	51.68
30	75.01	.49	30	425.79	15.80	30	779.77	52.82
40	83.34	.61	40	434.17	16.43	40	788.26	53.97
50	91.68	.73	50	442.55	17.07	50	796.75	55.13
2	100.01	.87	9	450.93	17.72	16	805.25	56.31
10	108.35	1.02	10	459.32	18.38	10	813.75	57.50
20	116.68	1.19	20	467.71	19.06	20	822.25	58.70
30	125.02	1.36	30	476.10	19.75	30	830.76	59.91
40	133.36	1.55	40	484.49	20.45	40	839.27	61.14
50	141.70	1.75	50	492.88	21.16	50	847.78	62.38
3	150.04	1.96	10	501.28	21.89	17	856.30	63.63
10	158.38	2.19	10	509.68	22.62	10	864.82	64.90
20	166.72	2.43	20	518.08	23.38	20	873.35	66.18
30	175.06	2.67	30	526.48	24.14	30	881.88	67.47
40	183.40	2.93	40	534.89	24.91	40	890.41	68.77
50	191.74	3.21	50	543.29	25.70	50	898.95	70.09
4	200.08	3.49	11	551.70	26.50	18	907.49	71.42
10	208.43	3.79	10	560.11	27.31	10	916.03	72.76
20	216.77	4.10	20	568.53	28.14	20	924.58	74.12
30	225.12	4.42	30	576.95	28.97	30	933.13	75.49
40	233.47	4.76	40	585.36	29.82	40	941.69	76.86
50	241.81	5.10	50	593.79	30.68	50	950.25	78.26
5	250.16	5.46	12	602.21	31.56	19	958.81	79.67
10	258.51	5.83	10	610.64	32.45	10	967.38	81.09
20	266.86	6.21	20	619.07	33.35	20	975.96	82.53
30	275.21	6.61	30	627.50	34.26	30	984.53	83.97
40	283.57	7.01	40	635.93	35.18	40	993.12	85.43
50	291.92	7.43	50	644.37	36.12	50	1001.7	86.90
6	300.28	7.88	13	652.81	37.07	20	1010.3	88.39
10	308.64	8.31	10	661.25	38.03	10	1018.9	89.89
20	316.99	8.76	20	669.70	39.01	20	1027.5	91.40
30	325.35	9.23	30	678.15	39.99	30	1036.1	92.92
40	333.71	9.71	40	686.60	40.99	40	1044.7	94.46
50	342.08	10.20	50	695.06	42.00	50	1053.3	96.01
7	350.44	10.71	14	703.51	43.03	21	1061.9	97.57
10	358.81	11.22	10	711.97	44.07	10	1070.6	99.16
20	367.17	11.75	20	720.44	45.12	20	1079.2	100.75
30	375.54	12.29	30	728.90	46.18	30	1087.8	102.35
40	383.91	12.85	40	737.37	47.25	40	1096.4	103.97
50	392.28	13.41	50	745.85	48.34	50	1105.1	105.60

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

Int. Angle	Curve 5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
5°	T = .02 E = .000	.03 .000	.05 .001	.06 .001	.08 .002	.10 .002	.11 .002	.13 .003	.15 .003	.16 .004	.18 .004	.20 .004	.21 .005	.23 .005
10°	T = .03 E = .001	.06 .003	.09 .004	.13 .006	.16 .007	.19 .008	.22 .009	.25 .011	.28 .012	.31 .014	.34 .015	.38 .017	.42 .018	.46 .020
15°	T = .04 E = .003	.10 .007	.14 .010	.19 .014	.24 .018	.29 .023	.34 .027	.39 .032	.45 .035	.51 .039	.58 .043	.63 .047	.68 .051	
20°	T = .06 E = .006	.13 .011	.19 .017	.26 .022	.32 .028	.39 .034	.45 .038	.51 .045	.58 .051	.65 .057	.72 .063	.79 .070	.84 .076	.90 .083
25°	T = .08 E = .009	.16 .018	.24 .027	.33 .036	.43 .046	.53 .056	.63 .065	.73 .074	.83 .083	.93 .093	1.09 .109	1.29 .129	1.39 .149	1.59 .169
30°	T = .10 E = .013	.19 .025	.29 .038	.39 .051	.49 .065	.59 .078	.69 .090	.79 .103	.89 .116	.99 .129	1.19 .149	1.29 .170	1.39 .190	1.59 .213
35°	T = .11 E = .018	.22 .035	.34 .054	.47 .072	.58 .086	.69 .109	.80 .131	.93 .153	1.05 .175	1.17 .197	1.29 .218	1.42 .241	1.54 .264	1.66 .286
40°	T = .13 E = .023	.26 .046	.40 .070	.53 .093	.67 .117	.80 .141	.93 .172	1.06 .203	1.20 .234	1.34 .265	1.49 .297	1.64 .329	1.79 .351	1.94 .384
45°	T = .15 E = .030	.30 .060	.44 .093	.60 .119	.76 .153	.91 .184	1.06 .216	1.21 .254	1.37 .289	1.52 .325	1.70 .351	1.87 .378	2.04 .411	2.21 .445

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

Int. Angle	Tangent	External	Int. Angle	Tangent	External	Int. Angle	Tangent	External
22°	1113.7	107.24	29°	1481.8	188.51	36°	1861.7	294.9
10'	1122.4	108.90	10'	1490.7	190.74	10'	1870.9	297.7
20	1131.0	110.67	20	1499.6	192.99	20	1880.1	300.6
30	1139.7	112.25	30	1508.5	195.25	30	1889.4	303.5
40	1148.4	113.95	40	1517.4	197.53	40	1898.6	306.4
50	1157.0	115.66	50	1526.3	199.82	50	1907.9	309.3
23	1165.7	117.38	30	1535.3	202.12	37	1917.1	312.2
10	1174.4	119.12	10	1544.2	204.44	10	1926.4	315.2
20	1183.1	120.87	20	1553.1	206.77	20	1935.7	318.1
30	1191.8	122.63	30	1562.1	209.12	30	1945.0	321.1
40	1200.5	124.41	40	1571.0	211.48	40	1954.3	324.1
50	1209.2	126.20	50	1580.0	213.86	50	1963.6	327.1
24	1217.9	128.00	31	1589.0	216.3	38	1972.9	330.2
10	1226.6	129.82	10	1598.0	218.7	10	1982.2	333.2
20	1235.3	131.65	20	1606.9	221.1	20	1991.5	336.3
30	1244.0	133.50	30	1615.9	223.5	30	2000.9	339.3
40	1252.8	135.35	40	1624.9	226.0	40	2010.2	342.4
50	1261.5	137.23	50	1633.9	228.4	50	2019.6	345.5
25	1270.2	139.11	32	1643.0	230.9	39	2029.0	348.6
10	1279.0	141.01	10	1652.0	233.4	10	2038.4	351.8
20	1287.7	142.93	20	1661.0	235.9	20	2047.8	354.9
30	1296.5	144.85	30	1670.0	238.4	30	2057.2	358.1
40	1305.3	146.79	40	1679.1	241.0	40	2066.6	361.3
50	1314.0	148.75	50	1688.1	243.5	50	2076.0	364.5
26	1322.8	150.71	33	1697.2	246.1	40	2085.4	367.7
10	1331.6	152.69	10	1706.3	248.7	10	2094.9	371.0
20	1340.4	154.69	20	1715.3	251.3	20	2104.3	374.2
30	1349.2	156.70	30	1724.4	253.9	30	2113.8	377.5
40	1358.0	158.72	40	1733.5	256.5	40	2123.3	380.8
50	1366.8	160.76	50	1742.6	259.1	50	2132.7	384.1
27	1375.6	162.81	34	1751.7	261.8	41	2142.2	387.4
10	1384.4	164.86	10	1760.8	264.5	10	2151.7	390.7
20	1393.2	166.95	20	1770.0	267.2	20	2161.2	394.1
30	1402.0	169.04	30	1779.1	269.9	30	2170.8	397.4
40	1410.9	171.15	40	1788.2	272.6	40	2180.3	400.8
50	1419.7	173.27	50	1797.4	275.3	50	2189.9	404.2
28	1428.6	175.41	35	1806.6	278.1	42	2199.4	407.6
10	1437.4	177.55	10	1815.7	280.8	10	2209.0	411.1
20	1446.3	179.72	20	1824.9	283.6	20	2218.6	414.5
30	1455.1	181.89	30	1834.1	286.4	30	2228.1	418.0
40	1464.0	184.08	40	1843.3	289.2	40	2237.7	421.4
50	1472.9	186.29	50	1852.5	292.0	50	2247.3	425.0

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

Int. Angle	Curve 5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
20°	T = .06 E = .006	.13 .011	.19 .017	.26 .022	.32 .028	.39 .034	.45 .038	.51 .045	.58 .051	.65 .057	.72 .063	.79 .070	.84 .076	.90 .083
25°	T = .08 E = .009	.16 .018	.24 .027	.33 .036	.43 .046	.53 .056	.63 .065	.73 .074	.83 .083	.93 .093	1.09 .109	1.29 .129	1.39 .149	1.59 .169
30°	T = .10 E = .013	.19 .025	.29 .038	.39 .051	.49 .065	.59 .078	.69 .090	.79 .103	.89 .116	.99 .129	1.19 .149	1.29 .170	1.39 .190	1.59 .213
35°	T = .11 E = .018	.22 .035	.34 .054	.47 .072	.58 .086	.69 .109	.80 .131	.93 .153	1.05 .175	1.17 .197	1.29 .218	1.42 .241	1.54 .264	1.66 .286
40°	T = .13 E = .023	.26 .046	.40 .070	.53 .093	.67 .117	.80 .141	.93 .172	1.06 .203	1.20 .234	1.34 .265	1.49 .297	1.64 .329	1.79 .351	1.94 .384
45°	T = .15 E = .030	.30 .060	.44 .093	.60 .119	.76 .153	.91 .184	1.06 .216							

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

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

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

Int. Angle	Curve 5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
40°	T = .13 E = .023	.26 .046	.40 .070	.53 .093	.67 .117	.80 .141	.93 .172	1.06 .203	1.20 .234	1.34 .265	1.49 .297	1.64 .315	1.79 .315	1.94 .307
45°	T = .15 E = .030	.30 .060	.44 .093	.60 .119	.76 .153	.91 .184	1.06 .216	1.21 .254	1.37 .289	1.52 .325	1.72 .351	1.91 .378	2.10 .411	2.29 .444
50°	T = .17 E = .037	.34 .075	.51 .116	.68 .151	.85 .189	1.02 .227	1.19 .266	1.36 .305	1.54 .345	1.72 .384	1.91 .425	2.10 .467	2.29 .508	2.48 .550
55°	T = .19 E = .046	.38 .093	.57 .147	.76 .188	.95 .236	1.14 .283	1.32 .332	1.52 .381	1.72 .420	1.92 .479	2.14 .530	2.35 .582	2.56 .641	2.77 .700
60°	T = .21 E = .056	.42 .112	.63 .168	.84 .225	1.05 .283	1.27 .340	1.49 .398	1.71 .457	1.94 .516	2.17 .575	2.38 .636	2.60 .697	2.83 .774	3.07 .851
65°	T = .23 E = .067	.46 .135	.69 .204	.93 .273	1.16 .343	1.40 .412	1.64 .483	1.88 .554	2.13 .625	2.38 .697	2.63 .771	2.88 .845	3.13 .922	3.39 1.01
70°	T = .25 E = .080	.51 .159	.76 .240	1.02 .321	1.28 .403	1.54 .485	1.80 .568	2.06 .652	2.33 .735	2.60 .819	2.88 .906	3.16 .994	3.44 1.08	3.72 1.17
75°	T = .27 E = .095	.56 .182	.83 .286	1.12 .383	1.40 .480	1.69 .578	1.98 .677	2.27 .777	2.57 .877	2.87 .977	3.17 1.07	3.47 1.18	3.78 1.29	4.09 1.39
80°	T = .30 E = .110	.61 .201	.91 .332	1.22 .445	1.53 .558	1.84 .671	2.15 .787	2.46 .903	2.78 1.02	3.10 1.13	3.44 1.25	3.78 1.38	4.12 1.50	4.46 1.62
85°	T = .33 E = .128	.66 .259	1.00 .391	1.33 .524	1.68 .657	2.02 .790	2.36 .926	2.70 1.06	3.05 1.20	3.40 1.34	3.77 1.47	4.14 1.62	4.55 1.76	4.89 1.91

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

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

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

Int. Angle	Curve 5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
60°	T = .21 E = .056	.42 .112	.63 .168	.84 .225	1.05 .283	1.27 .340	1.49 .398	1.71 .457	1.94 .516	2.17 .575	2.38 .636	2.60 .697	2.83 .774	3.07 .851
65°	T = .23 E = .067	.46 .135	.69 .204	.93 .273	1.16 .343	1.40 .412	1.64 .483	1.88 .554	2.13 .625	2.38 .697	2.63 .771	2.88 .845	3.13 .922	3.39 1.01
70°	T = .25 E = .080	.51 .159	.76 .240	1.02 .321	1.28 .403	1.54 .485	1.80 .568	2.06 .652	2.33 .735	2.60 .819	2.88 .906	3.16 .994	3.44 1.08	

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

Int. Angle	Tangent	External	Int. Angle	Tangent	External	Int. Angle	Tangent	External
85°	5250.3	2041.7	92°	5933.2	2518.5	99°	6708.6	3092.7
10'	5265.6	2052.1	10'	5950.5	2531.0	10'	6728.4	3107.7
20	5281.0	2062.5	20	5967.9	2543.5	20	6748.2	3122.9
30	5296.4	2073.0	30	5985.3	2556.0	30	6768.1	3138.1
40	5311.9	2083.5	40	6002.7	2568.6	40	6788.1	3153.3
50	5327.4	2094.1	50	6020.2	2581.3	50	6808.2	3168.7
86	5343.0	2104.7	93	6037.8	2594.0	100	6828.3	3184.1
10	5358.6	2115.3	10	6055.4	2606.8	10	6848.5	3199.6
20	5374.2	2126.0	20	6073.1	2619.7	20	6868.8	3215.1
30	5389.9	2136.7	30	6090.8	2632.6	30	6889.2	3230.8
40	5405.6	2147.5	40	6108.6	2645.5	40	6909.6	3246.5
50	5421.4	2158.4	50	6126.4	2658.5	50	6930.1	3262.3
87	5437.2	2169.2	94	6144.3	2671.6	101	6950.6	3278.1
10	5453.1	2180.2	10	6162.6	2684.7	10	6971.3	3294.1
20	5469.0	2191.1	20	6180.2	2697.9	20	6992.0	3310.1
30	5484.9	2202.2	30	6198.3	2711.2	30	7012.7	3326.1
40	5500.9	2213.2	40	6216.4	2724.5	40	7033.6	3342.3
50	5517.0	2224.3	50	6234.6	2737.9	50	7054.5	3358.5
88	5533.1	2235.5	95	6252.8	2751.3	102	7075.5	3374.9
10	5549.2	2246.7	10	6271.1	2764.8	10	7096.6	3391.2
20	5565.4	2258.0	20	6289.4	2778.3	20	7117.8	3407.7
30	5581.6	2269.3	30	6307.9	2792.0	30	7139.0	3424.3
40	5597.8	2280.6	40	6323.3	2805.6	40	7160.3	3440.9
50	5614.2	2292.0	50	6344.8	2819.4	50	7181.7	3457.6
89	5630.5	2303.5	96	6363.4	2833.2	103	7203.2	3474.4
10	5646.9	2315.0	10	6382.1	2847.0	10	7224.7	3491.3
20	5663.4	2326.6	20	6400.8	2861.0	20	7246.3	3508.2
30	5679.9	2338.2	30	6419.5	2875.0	30	7268.0	3525.2
40	5696.4	2349.8	40	6438.4	2889.0	40	7289.8	3542.4
50	5713.0	2361.5	50	6457.3	2903.1	50	7311.7	3559.6
90	5729.7	2373.3	97	6476.2	2917.3	104	7333.6	3576.8
10	5746.3	2385.1	10	6495.2	2931.6	10	7355.6	3594.2
20	5763.1	2397.0	20	6514.3	2945.9	20	7377.8	3611.7
30	5779.9	2408.9	30	6533.4	2960.3	30	7399.9	3629.2
40	5796.7	2420.9	40	6552.6	2974.7	40	7422.2	3646.8
50	5813.6	2432.9	50	6571.9	2989.2	50	7444.6	3664.5
91	5830.5	2444.9	98	6591.2	3003.8	105	7467.0	3682.3
10	5847.5	2457.1	10	6610.6	3018.4	10	7489.6	3700.2
20	5864.6	2469.3	20	6630.1	3033.1	20	7512.2	3718.2
30	5881.7	2481.5	30	6649.6	3047.9	30	7534.9	3736.2
40	5898.8	2493.8	40	6669.2	3062.8	40	7557.7	3754.4
50	5916.0	2506.1	50	6688.8	3077.7	50	7580.5	3772.6

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

Int. Angle	Curve 5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
85°	T = .33 E = .128	.66 .259	1.00 .391	1.33 .524	1.68 .657	2.02 .790	2.36 .926	2.70 1.06	3.05 1.20	3.40 1.34	3.77 1.47	4.14 1.62	4.55 1.76	4.89 1.91
90°	T = .36 E = .149	.72 .299	1.09 .450	1.45 .603	1.83 .756	2.20 .910	2.57 1.07	2.94 1.22	3.32 1.38	3.70 1.54	4.10 1.70	4.50 1.87	4.91 2.03	5.32 2.20
95°	T = .39 E = .174	.79 .350	1.19 .522	1.55 .706	2.00 .985	2.40 1.06	2.80 1.25	3.20 1.43	3.61 1.62	4.02 1.80	4.49 1.99	4.98 2.18	5.38 2.38	5.83 2.53
100°	T = .43 E = .200	.86 .401	1.30 .604	1.74 .809	2.19 1.01	2.62 1.22	3.06 1.43	3.50 1.64	3.95 1.85	4.40 2.06	4.88 2.28	5.37 2.50	5.85 2.73	6.34 2.96
105°	T = .46 E = .230	.94 .470	1.42 .700	1.90 .938	2.38 1.17	2.87 1.42	3.34 1.62	3.84 1.82	4.35 2.01	4.84 2.21	5.35 2.41	5.87 2.61	6.40 2.81	6.93 3.01
110°	T = .50 E = .260	1.03 .535	1.55 .808	2.08 1.08	2.60 1.36	3.14 1.63	3.66 1.91	4.21 2.19	4.76 2.49	5.31 2.61	5.86 3.05	6.43 3.35	7.01 3.65	7.59 3.95
115°	T = .54 E = .307	1.13 .624	1.70 .939	2.29 1.26	2.86 1.57	3.45 1.89	4.03 2.21	4.63 2.54	5.23 2.87	5.83 3.20	6.44 3.53	7.07 3.88	7.70 4.23	8.35 4.58
120°	T = .61 E = .339	1.25 .720	1.89 1.08	2.52 1.45	3.16 1.82	3.81 2.20	4.44 2.56	5.11 2.95	5.78 3.33	6.44 3.72	7.11 4.10	7.80 4.50	8.51 4.91	9.21 5.32

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

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

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

Int. Angle	Curve 5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
100°	T = .43 E = .200	.86 .401	1.30 .604	1.74 .809	2.18 1.01	2.62 1.22	3.06 1.43	3.50 1.64	3.95 1.85	4.40 2.06	4.88 2.28	5.37 2.50	5.85 2.73	6.34 2.96
105°	T = .46 E = .230	.94 .470	1.42 .700	1.90 .938	2.38 1.17	2.87 1.42	3.34 1.65	3.84 1.90	4.35 2.14	4.84 2.39	5.35 2.64	5.87 2.90	6.40 3.16	6.93 3.41
110°	T = .50 E = .260	1.03 .535	1.55 .808	2.08 1.08	2.60 1.36	3.14 1.63	3.66 1.91	4.21 2.19	4.76 2.49	5.31 2.61	5.86 3.05	6.43 3.35	7.01 3.65	7.59 3.95
115°	T = .54 E = .307	1.13 .624	1.70 .939	2.29 1.26	2.86 1.57	3.45 1.89	4.03 2.21	4.63 2.54	5.23 2.87	5.83 3.20	6.44 3.53	7.07 3.88	7.70 4.23	8.35 4.58
120°	T = .61 E = .339	1.25 .720	1.89 1.08	2.52 1.45	3.16 1.82	3.81 2.20	4.44 2.56	5.11 2.95	5.78 3.33	6.44 3.72	7.11 4.10	7.80 4.50	8.51 4.91	9.21 5.32

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

Deg.	Radius	Mid. Ord.	Tan. Dist.	Def. Dist.	Def. for 1 Ft.	Deg.	Radius	Mid. Ord.	Tan. Dist.	Def. Dist.	Def. for 1 Ft.
	ft.	ft.	ft.	ft.	ft.		ft.	ft.	ft.	ft.	ft.
0° 10'	34377.7	.036	.145	.291	0.05	7°	819.0	1.528	6.105	12.21	2.10
20	17189.0	.073	.291	.582	0.10	20'	781.8	1.600	6.395	12.79	2.20
30	11459.9	.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	12	499.1	2.511	10.02	20.04	3.45
50	2022.4	.618	2.472	4.945	0.85	30	478.3	2.620	10.45	20.91	3.60
3	1910.1	.655	2.618	5.235	0.90	40	459.3	2.730	10.89	21.77	3.75
10	1809.6	.691	2.763	5.526	0.95	13	441.7	2.839	11.32	22.64	3.90
20	1719.1	.727	2.908	5.817	1.00	30	425.4	2.949	11.75	23.51	4.05
30	1637.3	.764	3.054	6.108	1.05	14	410.3	3.058	12.18	24.37	4.20
40	1562.9	.800	3.199	6.398	1.10	30	396.2	3.168	12.62	25.24	4.35
50	1495.0	.836	3.345	6.689	1.15	15	383.1	3.277	13.05	26.11	4.50
4	1432.7	.873	3.490	6.980	1.20	30	370.8	3.387	13.49	26.97	4.65
10	1375.4	.909	3.635	7.271	1.25	16	359.3	3.496	13.92	27.84	4.80
20	1322.5	.945	3.718	7.561	1.30	30	348.5	3.606	14.35	28.70	4.95
30	1273.6	.982	3.926	7.852	1.35	17	338.3	3.716	14.78	29.56	5.10
40	1228.1	1.018	4.071	8.143	1.40	18	319.6	3.935	15.64	31.29	5.40
50	1185.8	1.055	4.217	8.433	1.45	19	302.9	4.155	16.51	33.01	5.70
5	1146.3	1.091	4.362	8.724	1.50	20	287.9	4.374	17.37	34.73	6.00
10	1109.3	1.127	4.507	9.014	1.55	21	274.4	4.594	18.22	36.44	6.30
20	1074.7	1.164	4.653	9.305	1.60	22	262.0	4.814	19.08	38.16	6.60
30	1042.1	1.200	4.798	9.596	1.65	23	250.8	5.035	19.94	39.87	6.90
40	1011.5	1.237	4.943	9.886	1.70	24	240.5	5.255	20.79	41.58	7.20
50	982.6	1.273	5.088	10.18	1.75	25	231.0	5.476	21.64	43.28	7.50
6	955.4	1.309	5.234	10.47	1.80	26	222.3	5.697	22.50	44.99	7.80
10	929.6	1.346	5.379	10.76	1.85	27	214.2	5.918	23.35	46.69	8.10
20	905.1	1.382	5.524	11.05	1.90	28	206.7	6.139	24.19	48.38	8.40
30	881.9	1.418	5.669	11.34	1.95	29	199.7	6.360	25.04	50.07	8.70
40	859.9	1.455	5.814	11.63	2.00	30	193.2	6.583	25.88	51.76	9.00

The middle ordinate in inches for any cord of length (C) is equal to .0012 C² multiplied by the middle ordinate taken from the above table. Thus, if it desired to bend a 30 ft. rail to fit a 10 degree curve, its middle ordinate should be .0012×900×2.183 or 2.36 inches.

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

Degree of Curve	Radius 50		½ sub chord = sin of ½ def. angle				Length of arc for 100 ft.
	sin. ½ def. ang.		12.5 Ft.	15 Ft.	20 Ft.	25 Ft.	
30°	193.18	1° 51'	2° 17'	2° 58'	3° 43'	4° 15'	101.15
32°	181.39	1° 59'	2° 25'	3° 10'	3° 58'	4° 33'	101.33
34°	171.01	2° 06'	2° 33'	3° 21'	4° 12'	4° 51'	101.48
36°	161.80	2° 13'	2° 41'	3° 33'	4° 26'	5° 06'	101.66
38°	153.58	2° 20'	2° 49'	3° 44'	4° 40'	5° 22'	101.85
40°	146.19	2° 27'	2° 57'	3° 55'	4° 54'	5° 38'	102.06
42°	139.52	2° 34'	3° 05'	4° 07'	5° 08'	5° 54'	102.29
44°	133.47	2° 41'	3° 13'	4° 18'	5° 22'	6° 10'	102.53
46°	127.97	2° 48'	3° 21'	4° 29'	5° 36'	6° 26'	102.76
48°	122.92	2° 55'	3° 29'	4° 40'	5° 50'	6° 42'	103.00
50°	118.31	3° 02'	3° 38'	4° 51'	6° 04'	6° 58'	103.24
52°	114.06	3° 09'	3° 46'	5° 02'	6° 17'	7° 14'	103.54
54°	110.11	3° 16'	3° 54'	5° 13'	6° 31'	7° 30'	103.84
56°	106.50	3° 22'	4° 02'	5° 23'	6° 44'	7° 46'	104.14
58°	103.14	3° 29'	4° 10'	5° 34'	6° 57'	8° 02'	104.43
60°	100.00	3° 35'	4° 18'	5° 44'	7° 11'	8° 18'	104.72

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

$$T = \frac{50 \tan \frac{1}{2} I}{\sin \frac{1}{2} D}$$

$$\sin \frac{1}{2} D = \frac{50}{R}$$

$$\sin \frac{1}{2} D = \frac{50 \tan \frac{1}{2} I}{T}$$

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

$$R = \frac{50}{\sin \frac{1}{2} D}$$

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

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

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

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

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

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

To find angle for a given distance and deflection.

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

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

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

GENERAL DATA

RIGHT ANGLE TRIANGLES. Square the altitude, divide by twice the base. Add quotient to base for hypotenuse.

Given Base 100, Alt. 10.10²÷200 = .5. 100+.5 = 100.5 hyp.

Given Hyp. 100, Alt. 25.25²÷200 = 3.125. 100-3.125 = 96.875 = Base.

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

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

LEVELING. The correction for curvature and refraction, in feet and decimals of feet is equal to 0.574 d², where d is the distance in miles. The correction for curvature alone is closely, ⅓ d². The combined correction is negative.

PROBABLE ERROR. If d₁, d₂, d₃, etc. are the discrepancies of various results from the mean, and if Σd²=the sum of the squares of these discrepancies and n=the number of observations, then the probable error of the mean =

$$\pm 0.6745 \sqrt{\frac{\Sigma d^2}{n(n-1)}}$$

SOLAR EPHEMERIS. Attention is called to the Solar Ephemeris for the current year, published by Keuffel & Esser Co., and furnished free of charge upon request, which is 3¼x5½ in., with about 90 pages of data very useful to the Surveyor; such as the adjustments of transits, levels and solar attachments; directions and tables for determining the meridian and the latitude from observations on the sun and Polaris; stadia measurements; magnetic declination; arithmetic constants; English and Metric conversions; trigonometric formulas; Natural and Logarithmic Functions; and Logarithms of Numbers.

TABLE IV. — Minutes in Decimals of a Degree.

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

TABLE V. — Inches in Decimals of a Foot.

1-16	3-32	¼	3-16	½	5-16	¾	¾	5/8	¾	¾
.0052	.0078	.0104	.0156	.0208	.0260	.0313	.0417	.0521	.0625	.0729
1	2	3	4	5	6	7	8	9	10	11
.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167

Natural Trigonometrical Functions

Table of trigonometric functions for angles 0 to 90 degrees. Columns include Angle, Sin., Tan., Sec., Cosec., Cotg., and Cosin. Values are provided for every 10 minutes.

Natural Trigonometrical Functions

Table of trigonometric functions for angles 90 to 180 degrees. Columns include Angle, Sin., Tan., Sec., Cosec., Cotg., and Cosin. Values are provided for every 10 minutes.

Natural Trigonometrical Functions

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

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

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

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

Angle	Sin.	Tan.	Sec.	Cosec.	Cotg.	Cosin.
39	.6293	.8098	1.2868	1.589	1.235	.77715
10	.6316	.8146	1.2898	1.583	1.228	.77531
20	.6338	.8195	1.2929	1.578	1.220	.77347
30	.6361	.8243	1.2959	1.572	1.213	.77162
40	.6383	.8292	1.2991	1.567	1.206	.76977
50	.6406	.8342	1.3022	1.561	1.199	.76791
34	.6428	.8391	1.3054	1.556	1.192	.76604
10	.6450	.8441	1.3086	1.550	1.185	.76417
20	.6472	.8491	1.3118	1.545	1.178	.76229
30	.6494	.8541	1.3151	1.540	1.171	.76041
40	.6517	.8591	1.3184	1.535	1.164	.75851
50	.6539	.8642	1.3217	1.529	1.157	.75661
35	.6561	.8693	1.3251	1.524	1.150	.75471
10	.6583	.8744	1.3284	1.519	1.144	.75280
20	.6604	.8796	1.3318	1.514	1.137	.75088
30	.6626	.8847	1.3352	1.509	1.130	.74896
40	.6648	.8899	1.3386	1.504	1.124	.74703
50	.6670	.8952	1.3421	1.499	1.117	.74509
36	.6691	.9004	1.3456	1.494	1.111	.74314
10	.6713	.9057	1.3492	1.490	1.104	.74120
20	.6734	.9110	1.3527	1.485	1.098	.73924
30	.6756	.9163	1.3563	1.480	1.091	.73728
40	.6777	.9217	1.3600	1.476	1.085	.73531
50	.6799	.9271	1.3636	1.471	1.079	.73333
37	.6820	.9325	1.3673	1.466	1.072	.73135
10	.6841	.9380	1.3711	1.462	1.066	.72937
20	.6862	.9435	1.3748	1.457	1.060	.72737
30	.6884	.9490	1.3786	1.453	1.054	.72537
40	.6905	.9545	1.3824	1.448	1.048	.72337
50	.6926	.9601	1.3863	1.444	1.042	.72136
38	.6947	.9657	1.3902	1.440	1.036	.71934
10	.6967	.9713	1.3941	1.435	1.030	.71732
20	.6988	.9770	1.3980	1.431	1.024	.71529
30	.7009	.9827	1.4020	1.427	1.018	.71325
40	.7030	.9884	1.4061	1.422	1.012	.71121
50	.7050	.9942	1.4101	1.418	1.006	.70916
	.7071	1.	1.414	1.414	1.	.70711

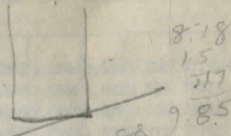
Cosin. Cotg. Cosec. Sec. Tan. Sin. Angle

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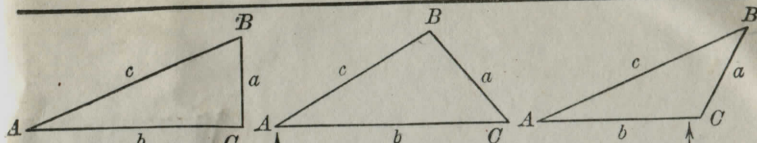
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227-14°

74-45
149-29+

74-44-40
227-14°

74-44-40
227-14°

TRIGONOMETRIC FORMULÆ



Right Triangle

Oblique Triangles

Solution of Right Triangles

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

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

Solution of Oblique Triangles

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

REDUCTION TO HORIZONTAL

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

Horizontal distance also = Slope distance minus slope distance times (1 - cosine of vertical angle). With the same figures as in the preceding example, the following result is obtained. $\cos 5^\circ 10' = .9959$. $1 - .9959 = .0041$. $319.4 \times .0041 = 1.31$. $319.4 - 1.31 = 318.09$ ft.

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

