

Dr. ^{if} 12 Benchmark Co.

Key 1

DIETZEN

1098

EUGENE DIETZGEN CO.

DRAWING MATERIALS, MATHEMATICAL and
SURVEYING INSTRUMENTS

Chicago New York San Francisco New Orleans Pittsburg Toronto

Distances from Center of Roadway for Cross-Sectioning
Roadway 16 feet wide. Side Slopes 1 on 1.
For Single Track Embankment.

H	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	H
0	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9	0
1	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	1
2	10.0	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8	10.9	2
3	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9	3
4	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9	4
5	13.0	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.8	13.9	5
6	14.0	14.1	14.2	14.3	14.4	14.5	14.6	14.7	14.8	14.9	6
7	15.0	15.1	15.2	15.3	15.4	15.5	15.6	15.7	15.8	15.9	7
8	16.0	16.1	16.2	16.3	16.4	16.5	16.6	16.7	16.8	16.9	8
9	17.0	17.1	17.2	17.3	17.4	17.5	17.6	17.7	17.8	17.9	9
10	18.0	18.1	18.2	18.3	18.4	18.5	18.6	18.7	18.8	18.9	10
11	19.0	19.1	19.2	19.3	19.4	19.5	19.6	19.7	19.8	19.9	11
12	20.0	20.1	20.2	20.3	20.4	20.5	20.6	20.7	20.8	20.9	12
13	21.0	21.1	21.2	21.3	21.4	21.5	21.6	21.7	21.8	21.9	13
14	22.0	22.1	22.2	22.3	22.4	22.5	22.6	22.7	22.8	22.9	14
15	23.0	23.1	23.2	23.3	23.4	23.5	23.6	23.7	23.8	23.9	15
16	24.0	24.1	24.2	24.3	24.4	24.5	24.6	24.7	24.8	24.9	16
17	25.0	25.1	25.2	25.3	25.4	25.5	25.6	25.7	25.8	25.9	17
18	26.0	26.1	26.2	26.3	26.4	26.5	26.6	26.7	26.8	26.9	18
19	27.0	27.1	27.2	27.3	27.4	27.5	27.6	27.7	27.8	27.9	19
20	28.0	28.1	28.2	28.3	28.4	28.5	28.6	28.7	28.8	28.9	20
21	29.0	29.1	29.2	29.3	29.4	29.5	29.6	29.7	29.8	29.9	21
22	30.0	30.1	30.2	30.3	30.4	30.5	30.6	30.7	30.8	30.9	22
23	31.0	31.1	31.2	31.3	31.4	31.5	31.6	31.7	31.8	31.9	23
24	32.0	32.1	32.2	32.3	32.4	32.5	32.6	32.7	32.8	32.9	24
25	33.0	33.1	33.2	33.3	33.4	33.5	33.6	33.7	33.8	33.9	25
26	34.0	34.1	34.2	34.3	34.4	34.5	34.6	34.7	34.8	34.9	26
27	35.0	35.1	35.2	35.3	35.4	35.5	35.6	35.7	35.8	35.9	27
28	36.0	36.1	36.2	36.3	36.4	36.5	36.6	36.7	36.8	36.9	28
29	37.0	37.1	37.2	37.3	37.4	37.5	37.6	37.7	37.8	37.9	29
30	38.0	38.1	38.2	38.3	38.4	38.5	38.6	38.7	38.8	38.9	30
31	39.0	39.1	39.2	39.3	39.4	39.5	39.6	39.7	39.8	39.9	31
32	40.0	40.1	40.2	40.3	40.4	40.5	40.6	40.7	40.8	40.9	32
33	41.0	41.1	41.2	41.3	41.4	41.5	41.6	41.7	41.8	41.9	33
34	42.0	42.1	42.2	42.3	42.4	42.5	42.6	42.7	42.8	42.9	34
35	43.0	43.1	43.2	43.3	43.4	43.5	43.6	43.7	43.8	43.9	35
36	44.0	44.1	44.2	44.3	44.4	44.5	44.6	44.7	44.8	44.9	36
37	45.0	45.1	45.2	45.3	45.4	45.5	45.6	45.7	45.8	45.9	37
38	46.0	46.1	46.2	46.3	46.4	46.5	46.6	46.7	46.8	46.9	38
39	47.0	47.1	47.2	47.3	47.4	47.5	47.6	47.7	47.8	47.9	39
40	48.0	48.1	48.2	48.3	48.4	48.5	48.6	48.7	48.8	48.9	40

Example—If point is 22.6 ft. above grade, how far should it be from center line to be a slope stake point? Ans. from Table 30.6. For same slopes but other widths of roadbed, correct above figures by one-half difference in width of roadbed; thus in example above, for 20 ft. roadbed distance will be $30.6 + (20 - 16) \div 2$ or 2 ft. added to 30.6 = 32.6. For slopes of 1 on 1½ see inside of back cover.

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FILED
AUG - 3 - 20
CHAS. T. AUDTIN

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Tile Check Dr #12

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Tile CA Main 2

Sta	B.S.	H.I.	-S	Elev.
B.M. #5	3.47	59.95		56.48
T.P.	4.64	59.37	5.22	54.73 Cr Giv.
0		<u>6.38</u>	4.85	
0+50		52.99	4.90	
1			4.70	48.29 48.30
+50			4.65	
2			4.62	48.37 48.40
+50			4.60	
3			4.60	48.39 48.50
+50			4.40	
4			4.26	48.73 48.60
+50			4.38	
5			4.22	48.77 48.70
+50			4.26	
6			4.13	48.86 48.80
+50			4.25	
7			4.26	48.73 48.90
T.P.	4.13	59.46	4.64	<u>54.73</u>
+50		<u>6.38</u>	4.18	
8		53.08	4.19	48.89 49.00
+50			4.21	
9			3.99	49.09 49.10
+50			4.03	
10			3.89	49.19 49.20
+50			3.87	
11			3.85	49.23 49.30
+50			3.79	

(Shutlage main #1)
 50'-22"-30'-20"
 + 30'-16"

9/1/21 3
 Hoff
 Hill

Tile Rod Length 4.05

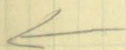
On 30" Cor Culv pipe

On 24" S.P.

On 24" Tile. No H₂O flowing at outlet

Sta	B.S.	H.I.	-S
12		59.46	5.04
+50			4.70
13			4.45
+50			
14			
+50			

2.33 = Outside Tile Dia
 4.05 = Rod Length
6.38



Track No. 2

341	B.S.	H.I.	-5	
12		59.46	3.79	49.29 49.40
+50		6.38	3.73	
13		53.08	3.78	49.30 49.50
+50			3.63	
14			3.61	49.47 49.60

B.M. 5	3.28	59.76	56.48	
14+50		6.38	3.67	49.71
15		6.16	3.68	49.70
+50		53.38	3.82	

16			3.91	49.69 49.80
+50			3.62	
17			3.54	50.06 49.90
+50			3.55	
18			3.38	50.22 50.00
+50			3.42	
19			3.45	50.15 50.10
+50			3.50	
20			3.42	50.18 50.20
+50			3.38	50.22
21			3.34	50.26 50.30
T.P.	534	61.34	3.76	56.00
21+62		6.16	4.83	
22		55.18	4.78	50.40 50.40
+50			4.77	

6.88
5.10
1.78

4.05
2.11
6.16

4.05
1.65
5.70

At N side RR Track

S. side RR Track

22' Tile

341	B.S.	H.I.	-5	Elev	Cor Green
23		61.34	5.04	51.14	50.50
+50		5.70	4.70		
24		55.64	4.45	57.19	50.95
+50			4.33		
25			4.16	57.48	51.40
+50			3.98		
26			3.70	51.94	51.85
+50			3.52		
27			3.28	52.36	52.30
+50			3.30		
R.P. - Hub	N side Bridge	3.58	57.76		

Cont on Pp 68

Topography

At B.S. Lath

Sec Line W. $80^{\circ}-45'$

" " E. $263-45'$

" " N. $175^{\circ}-0'$

" " S. $353^{\circ}-06'$

805 To $\Delta-0$

At $\Delta-0$

B.S. $353^{\circ}-06'$

810 To B.S. Lath

Tie $187^{\circ}-27'$

0-1 $189^{\circ}-00'$

2930

0-2 $17^{\circ}-42'$

1025 To $\Delta-2$

0-3 $118^{\circ}-32'$

1250

At $\Delta-3$

B.S. $118^{\circ}-32'$

To $\Delta-0$

Tie $236^{\circ}-33'$

Tie $291-50$

To $\Delta-1$

Tie $225-20$

To $\Delta-2(?)$

Tie $138-36$

To W mill alone in pasture SE $\frac{1}{4}$ sec 7

3-4 $194-58$

640 To $\Delta-4$

At $\Delta-4$

B.S. $194^{\circ}-58'$

640 To $\Delta-3$

4-5 $208-31$

1420 To $\Delta-5$

Tie $258-14$

To J's W mill

Tie $102-34$

Mill in pas sec 7

Johnson Drain - District #12

B.S. Lath is 21' W of SE cor. of Sec 7

$\Delta-0$ is 12' E of W. Hwy fence 810'S of sec. 6 cor.

To Johnson's Wind Mill.

To Johnson's W mill

B π At $\Delta-5$
 B.S. 208°-31' 1430 To $\Delta-4$
 S-6 280-14 1120 To $\Delta-6$
 Tie 56-12

π At $\Delta^{\#} 6$

B.S. 280°-14' 1125 #5
 Tie 38°-51'
 BS lat 32°-39'
 6-7 180°-26' 1940
 COR. 223°-04' 400'

π At $\Delta^{\#} 7$

B.S. 180°-26' #6
 Tie 32°-30' #5
 Tie 13°-39'
 R.R. W. 58°-30'
 R.R. E. 238°-51'
 7-8 208°-37' 2040

π At $\Delta^{\#} 8$

B.S. 208°-37' 2040 #7
 Tie 14°-56' #6
 Tie 20°-0'
 COR 204°-30' 635

$\Delta-6$ is 22' W of N&S Sec Line Sec 36
 To W.M.H. in Pas SE $\frac{1}{4}$ Sec 7

Johnsons Windmill
 To BS. lat

N&S line Between Johnson +
 $\frac{1}{16}$ COR.
 $\Delta^{\#} 7$ is 8' S. E RR.

Johnson's Windmill

Johnson Windmill
 Johnson NE COR.

10

6/30/20

		220	
H	229°	1555	
W	178	1340	Creek
W	184	1080	Creek
H	233	1755	"
W	193 $\frac{1}{2}$	1050	"
H	225 $\frac{3}{4}$	1775	"
H	224	1760	"
H	197 $\frac{1}{2}$	1400	"
W	231 $\frac{1}{4}$	1000	T. P. 9.
H	218 $\frac{3}{4}$	1040	"
W	233 $\frac{1}{2}$	800	
W	246	620	
H	199 $\frac{1}{4}$	750	
W	266 $\frac{1}{2}$	560	
H	193 $\frac{1}{2}$	570	
W	294 $\frac{1}{2}$	470	
H	212	260	
H	68 $\frac{1}{2}$	980	
H	52	730	
H	46	906	
W	336 $\frac{1}{4}$	1050	
W	341 $\frac{1}{2}$	910	
H	76	1240	
W	340	680	
H	55	1320	

outlet

E+W P.L.

N+S P.L.

E+W P.L.

 C. R. R. Track
 1st Pond

x over

W.	358½	580
H.	52½	1520
W	36½	920
H.	43	1340
W	13½	1080
H	37½	1280
H	29	1100
W.	356	1100
H.	22	1140
H	24	1400
H	26½	1560
H	30½	1760
H	36	1820
H	41	1560

At A-7

R.S.

180°-26'

W	250	1530
W	251½	1340
W	257	1180
W	252½	1100
W	255	1260
W	280½	1480
W	284¼	1660

To A-6

Island

Close W to Pond.

Note. Approx ½ of top N. of RR. runs to RR
then E on RR. R+ of Way.

Close H's Island

N. & S. E

N & S E
E & W E

T	85 $\frac{1}{2}$	1800
W	290 $\frac{1}{4}$	1550
W	289 $\frac{3}{4}$	1520
T	65	1460
W	287 $\frac{1}{4}$	1350
W	285	1120
W	296 $\frac{3}{4}$	1075
W	291 $\frac{1}{2}$	1000
W	279 $\frac{1}{2}$	1050
T	56 $\frac{1}{4}$	1020
W	259 $\frac{1}{2}$	1120
T	78	1300
W	298 $\frac{1}{2}$	920
T	47 $\frac{1}{2}$	1550
W	255 $\frac{1}{2}$	610
W	287 $\frac{1}{4}$	590
W	286	990
W	290	900
W	299	980
W	299 $\frac{1}{2}$	1130
W	309	1220
W	312 $\frac{1}{2}$	1180
W	329	1200
W	332 $\frac{1}{2}$	1280
W	336 $\frac{1}{2}$	1350
W	331 $\frac{3}{4}$	1450

Int. Divide.

F. Cor.

Not on top

Also E side 2^d Pond

F.L. X over

2^d Pond.

F cor at S RR R of Way F

N&S F.L.

Close W to 2^d Pond.

X cd Back to top.

Ask W. -

Draw runs back to B. Yard.

at Diagonal Hwy.

BS.

 π A+ A-6
 280°-14

TOD'S

W	227	760
W	251 $\frac{1}{2}$	620
T	202 $\frac{1}{2}$	640
W	260	720
T	196	650
W	266	800
T	185	750
W	277 $\frac{1}{2}$	990
W	283	1080
T	179	1020
W	288	1250
T	190	1120
W	294	1300
W	296 $\frac{1}{2}$	1320
W	295"	1120
T	207	1300
W	291 $\frac{1}{2}$	980
T	213 $\frac{1}{2}$	1280
W	292 $\frac{1}{2}$	760
W	304 $\frac{1}{2}$	730
W	312	930
T	208	840
W	317 $\frac{1}{2}$	1100

 $\pm$ Diagonal Hwy.

Pond #3.

Close To Pond.

W	320 $\frac{1}{2}$	1280
W	323	1260
W	320 $\frac{1}{2}$	1160
W	308	900
T	200	110
W	291	650
T	307 $\frac{1}{2}$	120
W	282	530
W	276	440
T	354 $\frac{1}{2}$	350
W	285	315
T	22 $\frac{1}{2}$	390
W	302	290
T	33 $\frac{1}{2}$	450
W	314	390
T	18	510
W	323	530
T	5	650
W	331	650
W	339	650
T	350 $\frac{1}{2}$	740
W	342	820
T	349 $\frac{1}{2}$	840
W	343 $\frac{1}{2}$	950
T	351	1000

red over

$\pm$ Diag Hwy

N 86 E

W	339 $\frac{1}{2}$	1130
T	350 $\frac{1}{2}$	1120
T	349	1260
W	342 $\frac{1}{2}$	1360
T	345	1350

6-9

331°-56

1315 T

W	341 $\frac{1}{2}$	450
W	337 $\frac{1}{2}$	490
W	332	475
W	326	390
W	323	290
W	331 $\frac{3}{4}$	260
W	58 $\frac{1}{2}$	495
W	52 $\frac{1}{2}$	520
W	52 $\frac{1}{2}$	730
W	41	720
T	170	180
T	113	200
T	72 $\frac{1}{2}$	165
T	57 $\frac{1}{2}$	560
W	42 $\frac{1}{2}$	610
W	46 $\frac{1}{2}$	430
W	51	370
	58	290
	42	230
	54 $\frac{1}{2}$	160

F. Cor on T & S

close on W

T & 9

Island

Close W Island

& Diag Hwy red over.

close on 1st T & 6 red over

& Hwy

& Hwy

Not in too

close on T & 1st & Hwy

B.S.

Tie

A #4 Δ-9

331°-56'

1320

105°-15'

T	184 $\frac{3}{4}$	1900(?)
W	179	1700
T	190	1760
W	182 $\frac{1}{2}$	1640
T	200	1780
W	186 $\frac{1}{2}$	1600
T	205	1820
W	191 $\frac{1}{2}$	1540
W	195	1540
W	200	1640
W	203	1620
T	213	1890
W	204	1460
T	216 $\frac{1}{2}$	1900
W	202	1460
W	200	1390
W	198 $\frac{1}{2}$	1210
W	200	1190
T	223	1800
W	205	1160
T	228	1760
W	209 $\frac{1}{2}$	1160
W	219 $\frac{1}{2}$	1190

To Δ-6

To J.S. W. Mill

#Hwy (Diag.) Close on W⁴⁹⁵ Hwy Δ-7
 #Hwy " " " 131 " " L

N.S. 72

T	229	1560
W	217 $\frac{1}{2}$	1100
T	226 $\frac{1}{2}$	1520
T	232 $\frac{1}{2}$	1560
T	237	1650
W	219 $\frac{1}{2}$	1000
T	248	1800
W	238 $\frac{1}{2}$	650
T	259	1760
W	244 $\frac{1}{2}$	490
T	249	1580
W	285 $\frac{1}{2}$	340
W	301 $\frac{1}{2}$	440
W	291 $\frac{1}{2}$	560
T	227	1430
W	291	690
W	286	800
W	273	760
W	264	750
W	256	850
W	243$\frac{1}{2}$	1000
W	241 $\frac{1}{2}$	890
W	243 $\frac{1}{2}$	1060

EQW LF. 5

From here W xed to T & T to W.

T	262 $\frac{1}{2}$	850
W	228 $\frac{1}{2}$	1430
T	271 $\frac{3}{4}$	850
W	221 $\frac{1}{2}$	1420
T	276	860
W	219	1400
T	284$\frac{1}{2}$	940
V	210	1400
W	212 $\frac{1}{2}$	1280
W	221 $\frac{1}{4}$	1220
W	229 $\frac{1}{2}$	1230
T	301 $\frac{1}{2}$	1200
W	240	1260
W	247	1320
T	292	1300
W	256	1320
W	262 $\frac{1}{2}$	1400
W	268	1400
T	292	1720

N 45. 12

E 9 W, 12

N 85 FL

N 85 12

T included too much in top of S End.

7/2/20

28

A A $\Delta-5$

B.S.

208°-31'

To $\Delta-9$

T	163	630
W	293 $\frac{1}{4}$	650
T	140 $\frac{1}{2}$	590
W	318	475
T	118 $\frac{1}{2}$	775
W	352 $\frac{1}{4}$	450
T	89 $\frac{1}{4}$	1340
W	23 $\frac{1}{2}$	520
W	43	660
W	46 $\frac{1}{2}$	760
T	85	1540
W	48	950
T	84 $\frac{1}{2}$	1750
W	52 $\frac{1}{2}$	1200
W	52	1350

A A $\Delta-4$

B.S.

194°-58'

T	118	1780
W		750
W	196	680
W	207 $\frac{1}{2}$	660
W	228	780
	236 $\frac{1}{2}$	1200

29

Close on Hs last from $\Delta-7$ Close on Ws last Hwy $\Delta-7$ NRS $\pm$ (approx)NRS R Close from here to RTR 960 east
remainder of Ts.To $\Delta-3$ Beginning draw - should close with W
top. from $\Delta-5$

W	248 1/2	920
W	260	1020
W	269	1150
W	274	890
W	268 1/2	810
W	258	710
W	245	690
W	232 1/2	610
W	220	620
W	198	610
W	189 1/2	670
W	119 1/2	680
W	106 1/2	750
W	100	710
W	95	600
W	92 1/2	540
W	80 1/2	540
W	83	640
W	89 1/2	810
W	88	875
W	80	800
W	70	750
W	61 1/4	585
W	41	750
W	51 1/2	920
	60	1100

Barn yard, (1/5)

± Hwy

Close draw - Cut out 1st top. between 12 1/2 / out
 N.S. 1/2 Points of draw.
 E.S.W. 1/2

N.S. 1/2

E.S.W. F.L. or Hwy.

W 61 1200

 π A+ Δ -3

B.S. 118°-32' 1260

W 95 $\frac{3}{4}$ 1320W 82 $\frac{1}{2}$ 1280

W 78 1200

W 73 1080

W 67 $\frac{1}{2}$ 880W 63 $\frac{1}{2}$ 685

W 51 490

W 32 350

W 26 $\frac{1}{2}$ 165

W 11 175

W 16 250

W 15 275

W 311 350

 π A+ Δ -D

W 175 495

W 210 640

W 223 710

W 238 930

W 248 1080

W 256 1200

W 262 $\frac{1}{2}$ 1290To Δ -D $\pm$ E. & W. Hwy.

To B.S. lat h.

W 263 1600

 $\pi A + A - 1$

B.S. 289°-00' 1560+870 = 2430

Tie 136°-10'

Tie 123°-14'

W 143 $\frac{3}{4}$ 1280

162 1120

170 1000

191 890

204 $\frac{1}{4}$ 925225 $\frac{1}{4}$ 895232 $\frac{1}{2}$ 950

245 675

259 730

271 780

276 $\frac{1}{2}$ 740

259 475

213 350

170 390

144 520

128 $\frac{1}{2}$ 650

127 755

130 $\frac{1}{2}$ 875

117 920

102 860

To A-0

To Johnsons W. Mill.

To B.S. Lath

N. 85° E.

E. 80° E.

N. 85° E.

E. 80° E.

E. 80° E.

W

92	670
74	580
58	520
41½	480
16	350
336	290
310	356
420	324
590	322½
600	336½
500	12
520	12½
650	21¼
14½	735
5½	850
358	990
335½	1090
331	1220
333	1240
340	1360
347	1280
356	1180
2½	1260
5	1340
3½	1540
360	1600

E & W H

N & S H

W

353½	1740
353	1800
357	1900
1°	1790
4	1760
6½	1740
9½	1600
12	1410
14½	1230
21	1120
29¾	1030
41½	990
50	1000
55	1070
55	1300
52	1410
48½	1450
39½	1550
40½	1610
51	1560
48	1740
50	1720
57¼	1700
57	1620
58½	1490
62	1500

ERW H.

ERW H.

ERW H.

ERW H.

W	63½	1490
	65	1360
	74	1300
	83½	1300
	90½	1330
	97½	1440
	102½	1580
	104	1700
	106	1820
	106½	1990
	K A + Δ - 2	

B.S

17°-42'

1030

T.C

191°-39'

W	203½	875
	196½	780
	196½	660
	217½	690
	233	620
	242½	640
	260	630
	249	460
	244½	300
	219	260
	179½	290
	140	300
	122½	340

X 15

E & W Tl

J's W Mill
 & N. & S. Hwy.

& Hwy.

& Hwy

W

113 ⁰ $\frac{1}{2}$	475 ¹
101 $\frac{1}{2}$	450
81	310
30	200
14	250
350	345
345	450
329	495
308	635
362	860
305 $\frac{1}{2}$	900
317 $\frac{1}{4}$	760
326	700
334	725
335	820
327 $\frac{3}{4}$	1050
320	1150
318	1220
320	1400
327 $\frac{1}{2}$	1350
330	1360
334 $\frac{1}{2}$	1380
342	1200
348 $\frac{1}{2}$	1120
355 $\frac{3}{4}$	990
7 $\frac{1}{2}$	1000

E Hwy

E Hwy

Hwy 6)

E Hwy

E & W $\frac{1}{4}$ E

V	21½	950
	37	905
	51½	920
	66	1000
	66	1190
	63½	1280
	60	1380
	61½	1400
	67½	1320
	74	1130
	84	1090
	92	1180
	93½	1300
	92	1490
	89	1570

Z-10 58°-01' 1190+ 520 = 1710

⌈ H Δ-10

BS 58°-01' 1720'

TIC 210-22

W	172	900
	158	920
	144½	840
	146	665
	135	510
	123	500
	111½	590

~~865~~
To Δ-10 1730

To Δ-2

To U's W mill

W	100	665
	90	658
	85	820
	91½	1080
	101	1190
	107	1290
	108½	1430
	107½	1670
	107	2080

10-11 93°-50' 1760

At A-11

B.S. 93°-50' 1780

Tie 229°-22'

W.	148½	560
	138	700
	135	840
	146	900
	153	890
	155½	1025
	146	1090
	141½	1200
	138	1350
	136¼	1510
	131¾	1720
	132	1840
	132½	1960
	125	2160

To A-11

To A-10

To Johnsons W Mill

7/6/20

N. 85° E.

Same R.

± RR Track.

± Diagonal Hwy.

± E & W Hwy.

11-12 173°-56' 2040

At A-12

B.S. 173°-56' 2060

Tic 253°-40'

Tic 240°-00'

W 3 $\frac{1}{4}$ 15

9 150

329 230

317 $\frac{1}{2}$ 310

289 $\frac{1}{2}$ 340

273 $\frac{3}{4}$ 350

261 415

192 395

174 340

183 $\frac{1}{2}$ 170

144 $\frac{3}{4}$ 82

124 220

100 215

To A-12

740 + 1320

To A-11

Johnson's W Mill

Same lone W mill in pasture
Island & E&W Hwy

& Hwy.

Close Island.

81.36

T.P. 12.05 92.45 0.96 80.40

" 11.79 92.41 0.68 80.68

92.46

R.P. 1.93

Gr level 1.00 91.46

T.P. (7) 13.70 105.45 0.71 91.75

(8) 13.40 105.42 0.44 92.02

105.43

Gr level 6.15 99.78

Ditch 8.00 97.43

R.P. 0.43 69.38 68.95

T.P. 3.49 63.72 9.15 60.28

O.B.R.D. 12.00 51.72

1 10.00 53.72

2 8.60 55.12

2+5 8.50 55.12

2+16 6.60 57.12

2+35 6.90 56.82

2+65 6.55 57.27

3 5.80 57.92

4 7.00 56.72

45

B.M.

Spike in 2nd stump on PL Not J's NE Prop Cor
At J's NE Prop Cor End of BRD

J's N.P.L. at End of Lat D-3

" " " " " " " "

Spike in tel post W of Farm 1/A.

= Sta 47+25 Main #1

N Hwy F

N Hwy Ditch

E Hwy

S Hwy F

then 45 to J's NW Prop Cor

Run from here toward Prop Cor. W of 58

N.E. Cor. N end Gong Gilbert E of J's Bldgs.

0

1

2

2+50

3

3+50

4

5

6

5/17

= 5+9 48 Main #1

N Hwy F

" " Ditch

E Hwy

S " Ditch

S " F

= N+5 F

Sbed line $\pi A + \Delta - 12 = 5.00$

B.S.

173°-56'

W 100 1/2 1100

115 1/2 1460

128 3/4 1780

131 1/4 2080

150 1/2 1820

164 1/2 1760

 $\Delta - 12 - 5.0$

182°-54'

2000

 $\pi A + 5.0$

B.S.

182°-54'

2025

Tie

282°-56'

Tie

296°-28'

W 236 1/2 930

222 1/2 800

227 920

H 336 870 CP

W 243 1030

" 249 1450

5.0 to 5.4

280°-39'

2020

To A-11

N 45 E

To S-0

S-0 is on \$.

To A-12

To Johnsons W Mill

To lone W Mill in pas.

W outlet.

C.R.R. & Cattle Pass.

To S-1

S-1 is on \$.

π A+5-1

B.S. 250°-39' 3020

S 09 04

3 01

W 254 240

235 590

S-1-5-2 229°-51' 1290

 π A+5-2

B.S. 229°-51' 1300

Tie 338°-35

229½ 1025

S-2-5-3 229°-38' 1390

 π A+5-3

B.S. 229°-38' 1390

S-3-5-4 222°-14' 1400

Tie 2°-00'

 π A+5-4 Not on SL

B.S. 222°-14' 1400

Tie 13°-43'

W. 22½ 640

1½ 430

307½ 165

291½ 315

226½ 775

227¼ 1120

To S-0

✓^s W Mill

/one W Mill

To S-2

S-2 is on π

To S-1

✓^s W Mill

To S-3

To S-2

To S-4 Not on SL

✓^s W Mill

To S-3

To J's W Mill

EQU

W 222½ 1190

223¼ 1280

S-4-S-5 226°-55 1280

A A+ 4-5

B.S. 226°-55 1280

Tie 21°-

W 250 200

5¾ 360

A A+ S-4

B.S. 222°-14'

S-4-S-6 322°-16' 1750

A A+ S-6

B.S. 322°-16' 1750

Tie 335-30

W 175¼ 690

190½ 215

236 90

332½ 190

330 515

339 690

S-6-S-7 352°-19' 860 (P)

N.B.S. # Close on Top at this point - to outlet

To S-5

S-5 Not on SL

To S-4

To J's W Mill

Close on top. from here to outlet.

To S-6 S-6 Not on SL

To S-4

W Mill

LRR on R

F&W TR Not SL

S-1 Not on S.L.

π H+ 5-7

B.S. 356°-19' 885'

Tie 46°-25'

W 229 $\frac{3}{4}$ 390

270 500

308 750

5-7-5-8 321°-54' 1280

 π A+ 5-8

B.S. 321°-54' 1280

Tie 170°-18'

W 267 $\frac{1}{4}$ 85

335 380

336 500

324 600

342 $\frac{1}{2}$ 1160

317 1350

350 $\frac{1}{2}$ 1420

356 1700

356 2040

58-5-9 2°-10' 2320

 π A+ 5-9

B.S. 2°-10' 2320

Tie 113°-43'

W 343 $\frac{3}{4}$ 390'

348 700

345 810

465	1320
495	720
1160	2310

Note - Tie should
come to point 250' H2
344° From 5.7. on E

To 5-6

To J^s W.M.II

& Ding Hwy

To 5-8

640

To 5-7

5-7 Not on E.

To J^s W.M.II

E&W E

To 5-9

To 5-8

To J^s W.M.II

E&W R

W 348 1360
355 $\frac{3}{4}$ 1420

S-9-S-10 1° 35' 1400

TAH S-10

BS 1° 35' 1400

Tie 132-21

W 21 $\frac{1}{2}$ 300

13 $\frac{1}{4}$ 1000

8 $\frac{1}{2}$ 1300

5 $\frac{1}{2}$ 1680

5 $\frac{1}{2}$ 1860

21 $\frac{1}{2}$ 1880

32 2000

S-10-S-11 50° 02' 2000

TAH S-11

BS 50° 02' 2000

Tie 161° 31'

W 100 500

S-11-S-12 111° 58' 700

TAH S-12

BS 111° 58' 700

Tie 169° 50'

W 50 $\frac{1}{4}$ 260

S-12-S-13 76° 18' 580

To S-10 S-10 Not on top.

To S-9

To J^s Whill

NBS #

NBS #

EBW #

EBW #

To S-11

To S-10

To J^s W.M. 11

To S-12

S-12 Not on 6

- To J^s Whill (?)

To S-13

NBS
10 HWY

Not on 5L

Δ A+ S-13

B.S. 96°-18' 580

Tie 149°-95'

W 351 275

53½ 520

95¼ 1150

96¾ 1480

S-13-S-14 97°-23' 1520

 Δ A+ S-14

B.S. 97°-23' 1500

Tie 202°-40'

W 86½ 390

96¾ 540

S-14-Δ-10-S-15 100°-13' 535

 Δ A+ Δ-10-S-15

B.S. 100°-13' 535

Tie 210°-26'

W 93½ 210

83½ 1040

90¾ 1260

S-15-S-16-Δ-1 93°-51' 1770

lone W Mill

lone W Mill

E & W Mill

To S-14

S-14 15 on ±

To S-13

S

To J's W Mill

To Δ-10-S-15

Not on ±

To S-14

J's W Mill

To S-15-S-16

$\Delta A + \Delta - 11 = 5-16$

B.S. 93° 57' 1770

Tie 229° 30'

W 114½ 375

122½ 790

129 1200

128½ 1340

127½ 1720

5-16-S-00 173-81

 $= \Delta 11 - \Delta 12$
 $To \Delta - 10 = 5-15$

To J's W Mill

 ∇ R.R. Track

Close 5 points.

Close on top at this
point & use Top as ∇ to
1st ∇ point from $\Delta - 12$

File CR Main #2 Cont 9/10/21
Cont from Page 5
Tile R.d 6.65

Hub N side Hwy

R.P.
Tile

6.97 64.73 67.76

28

5.20

+50

5.17

29

4.87

+50

4.75

30

4.55

30-Hub

6.22 64.62 6.33 58.40

30+50

4.04

31

3.82

+50

3.57

32

3.31

+50

3.12

33

2.83

+50

2.60

34

2.45

+50

(Needs Patch)

2.20

35

1.95

+50

2-Patch

1.82

36

1.68

~~36-Hub~~

6.50 68.19 2.93 61.69

36+50

5.14

37

4.65

+50

4.65

38

4.25

+50

4.00

5+9

13.5

H.1

-5

39

68.19 3.76

+50

3.52

40

3.36

+50

3.19

41

2.96

+50

2.74

42

2.55

42-Hub 6.48

70.86 3.81 64.38

42+50

5.00

43

4.67

+50

4.35

44

4.19

+50

4.15

45

3.74

+50

3.50

46

3.20

+50

14"

2.70

47

2.45

+50

2.09

48

1.46

48-Hub 7.68

76.48 2.06 68.80

48+50

6.65

49

6.20

+50

5.75

50

5.30

+50

4.77

Cont on Page 13

Sta	B.S.	H.I.	-S	Elev.
BM #1	3.95	53.95		50.00
T.P.	4.66	52.18	6.43	47.52
" "	4.37	52.19	6.13	47.82
0 {			14.80	37.39
			10.80	41.39
			5.75	46.44
1			5.70	46.49
2			5.45	46.74
3			4.80	47.39
4			3.65	48.54
5			3.55	48.64
6			3.65	48.54
T.P.	5.59 ³	54.16	3.57	48.62
" "	5.20	54.18	3.21	48.98
7		54.17	4.85	49.34
7+11	E+W. R. N. Line Lincoln Twp.			
8			5.30	48.87
9			5.55	48.62
10			5.65	48.54
4 10+10	N+S. R.			
11			5.65	48.52
12			5.00	49.17
13			5.40	48.97
T.P.	5.32	54.21	5.28 ⁹	48.89
" "	4.83	54.21	4.79	48.38

Spik in Johnson's N.E. Corner Post.

Bottom of Creek

H2O Level

Ground Level.

Clump of Willows 75' N. to remove.

	B.S.	H.I.	-5	Elev
		57.21		
14			3.80	50.41
15			4.10	50.11
16			4.65	49.56
17			5.05	49.16
18			4.20	50.01
19			4.00	50.21
20			4.00	50.21
T.P.	5.31	55.51	4.01	50.20
" "	4.99	55.52	3.67	50.54
21		55.52	5.20	50.32
22			6.20	49.32
High Ground			5.75	49.77
{ 23			6.90	48.62
{ 23			5.50	50.02
{ Gravel				
24				
24+73	N.	R.R. Fence		
25			6.30	49.22
B.M. #2	4.28	58.61	1.19	54.33
25+81	S.	R.R. Fence		
26			8.60	50.01
26+28				
27			8.00	50.61
28			8.25	50.36
29			8.50	50.11
30			7.90	50.71
31			6.85	51.76
231+30				

Tileck Main #2
Cont from page 69

	B.S.	H.I.	-5
51		76.48	4.25
51			3.72
+50			3.35
52			3.01
+50			2.62
53			2.20
+50			1.71
54			1.23
+50			0.79
55			1.54
T.P. 7.87			74.94
55+53			6.70
56			6.17
+50			5.68
57			5.23
+50			4.97
58			4.47
+50			4.23
59			3.65
+50			3.17
60			2.66
+50			2.32
61			1.93

pond opposite 23

12"

58.61

32			7.70	50.91
33			8.05	50.58
34			8.55	50.06
T.P.	5.81	56.41	7.95	50.66
" "	5.50	56.46	7.65	50.96
35			6.35	50.11
36			5.70	50.76
37			4.10	50.36
38			5.45	51.01

38+48 E & W. #

39			5.95	50.31
BM #3	2.10	56.36	2.20	59.26
40			5.80	50.56
41			5.90	50.46
42			6.25	50.11
43			5.70	50.66
44			5.25	51.11
45			5.20	51.16
46			4.20	52.16
T.P.	3.96	56.57	3.75	52.61
" "	3.43	56.57	3.22	53.14

46+15

47			4.60	51.97
48			5.40	51.17
49			6.60	49.97
49+97				

N & S. #

10 Pond

2^d Pond opposite60' to N.W. Cor. Willow Grove
Ponds (2) & (3)
N.W. of Row Willows between

73' - to Willows

130' to closest Willow

3^d Pond opposite

Sewer Pipe Sta 38+50 - 41+50

Splice in root of

Sta.	B.S.	H.I.	-S	Elev
50		56.57	6.40	50.17
51			5.95	50.62
52			5.85	50.72
53			5.50	51.07
54			5.50	51.07
T.P.	4.63	55.74	5.46	51.11
" "	4.34	55.74	5.17	51.40
55			4.50	51.24
56			4.45	51.29
57			4.65	51.09
58			4.65	51.09
0			6.20	49.54
59			4.60	51.14
60			4.30	51.44
61			4.55	51.19
T.P.	5.31	56.81	4.27	51.50
" "	4.91	56.79	3.86	51.88
62		56.80	5.40	51.40
0			6.80	50.00
63			6.10	50.70
63+47	N+5			
64			5.25	51.55
65			5.30	51.50
66			5.05	51.75
67			5.00	51.80

Small pond 75' N Sta 58

Pond 5 Sta. 63

E Line Sec 5

56.80

68			5.25	51.55
T.P.	4.99	56.73	5.06	51.74
" "	4.69	56.73	4.16	52.04
BM #4			1.60	55.20
69			5.60	51.13
70			5.45	51.28
71			5.25	51.48
72			4.75	51.98
73			4.85	51.88
74			4.45	52.28
75			4.50	52.23
76			4.30	52.43
T.P.	5.98	57.98	4.73	52.00
" "	5.61	54.96	4.38	52.35
76+80		57.97	5.90	52.07
T.P.	1.67	61.35	4.29	53.68
" "			3.91	44.06
BM #5			4.87	56.48
○			10.50	50.85
Gr. Level			8.10	53.25
○			9.50	51.85
T.P.	4.13	58.77	6.71	54.64
" "	3.88	54.78	6.45	54.90

48.50

Spike in Tel. Post N.W. Cor J's Grove

End of Main #1 N2512

On Bolt.
 → Top of S.E. Cor of Ecap of Cattlepass

Bot of Pond on (J High) W12
 W side " J Highs Property
 Low spot pond 600' W of P.L.

Sta	R.S.	H.I.	- S	Elev
0		58.78	11.75	47.03
			10.60	48.18
			4.80	53.98
1.			4.15	54.63
2			4.30	54.48
3			4.85	53.93
4			4.20	54.58
5			3.80	54.98
6			4.05	54.73
7			4.20	54.58
T.P	5.08	59.72		59.64
" "	4.84	59.74		59.90
8		59.73	5.15	55.58
9			5.10	54.63
10			5.20	54.53
11			5.25	54.48
12			5.40	54.33
12+96				
13			5.30	54.43
13+46				
	N RR Fence			
13+68			6.25	53.48
	N " "			
13+91			0.87	58.86
14			2.30	57.43
B.M.	3.78	60.26	3.25	56.46

Bottom of Creek
H₂O Level
Gr. level

N. RR. Ditch
Top N Rail

60.26

14+20

5.70 54.56

14+48

S. R.R. Fence

15

5.85 54.41

15+30

16

5.65 54.61

17

5.30 54.96

18

5.55 54.71

19

5.15 55.11

20

4.80 55.46

21

4.25 56.01

22

4.05 56.21

T.P.

8.16

64.91

4.01 56.25

"

7.90

64.42

3.74 56.52

1.22+50

8.25 56.17

23

8.20 56.22

24

7.50 56.92

25

7.40 57.02

26

6.90 57.52

26+98

27

6.50 57.92

27+14

7.40 57.02

27+36

5.00 57.42

27+50

7.25 57.17

27+63

B.M.

0.16

63.66

0.92

63.50

S. R.R. Ditch Main²N. Hwy Fence
Grosses
Row willows
here.

" Ditch

E Hwy

S Hwy Ditch

S " FENCE

On Hwy Bridge

3/4 M. E Hicks Sta

Sta	B.S.	H.I.	-S.	Elev
28		63.66	5.55	58.11
29			5.35	57.31
30			5.20	58.46
31			5.15	58.51
32			4.55	59.11
33			4.05	59.61
34			3.55	60.11
T.P.	7.67	67.83	3.50	60.16
" "	7.39	67.82	3.23	60.43
35			6.85	60.99
36			6.20	61.62
37			5.30	62.52
38			4.80	63.02
39			4.85	62.99
40			4.45	63.37
41			4.10	63.72
T.P.	7.29	71.06	4.05	63.77
" "	7.03	71.08	3.77	64.05
42		71.07	6.90	64.17
43			6.20	64.87
44			5.70	65.87
45			4.75	66.32
45			6.65	64.42
B.M.			4.01	67.06
45+61			5.95	65.12

Gr level

In ditch

Spike in Willow 10' N Sta 45.

In ditch

Ditch line Xes Row willows here Cement 200'

B.S. H.I. -5 Elev
71.07

46 3.60 67.47

T.P. 6.12 73.68 3.51 67.56

" " 5.81 73.61 3.21 67.86

646+45'

47 5.45 68.72

48 4.85 68.82

49 4.90 68.77

50 2.90 70.77

T.P. 6.26 77.34 2.59 71.08

" " 6.32 77.36 2.63 71.04

51 77.35 6.00 71.35

52 5.50 71.85

53 4.85 72.50

54 3.90 73.45

T.P. 7.08 80.93 3.70 73.65

" " 6.87 80.95 3.47 73.88

55 80.74 —

56 —

57 —

0 6.00 74.74

58 2.90 77.84

~~59~~

T.P. 5.85 83.51 3.08 77.66

" " 5.62 83.51 2.85 77.89

59 4.70 78.81

59+7 6.70 76.81

3 small cottonwoods +

4 " clumps willows

forem or @ bet. Stas.

46+50.

{ 6 clumps willows + 16 wood
bet. Stas 52+53+50
75' N of Ditch line

approx 0' N 1/4
4 clumps willows + 16 wood
Ditch bottom 100' N Sta 56+50

In ditch

B.S. H.I. -5. Elev
83.51 —

60

60+36

B.M. 9.45 92.19 0.77 82.74

V60+64

60+50 12.90 79.29

60+64 9.90 82.29

60+80
Top tile 13.60 78.59

61

T.P. 7.20 98.14 1.25 90.94

" " 6.94 98.14 0.99 91.20

R.P. 3.60 94.54

T.P. 8.45 105.06 1.53 96.61

" " 8.18 105.07 1.25 96.89

T.P. 1.69 98.16 8.60 96.47

" " 1.46 98.15 8.38 96.69

Gr level 6.90 91.25

T.P. 7.13 104.26 3.02 95.13

8.84 104.29 2.70 95.45

104.28

T.P. 9.38 111.58 2.08 102.20

" " 9.11 111.58 1.81 102.47

T.P. 7.64 117.60 1.62 109.96

" " 7.34 117.61 1.31 110.27

Gr level 4.25 113.36

810
22
785

W. Hwy F.

Spike in top of stump at W. end of culvert S. of
785' S of B.S. Lath.

E Hwy

W. Hwy Ditch

E Hwy

Johnson's outlet in E Hwy Ditch.

E Hwy Fence

Spike in Corner Post of ^{E side} W. Hwy

55 Rods E of E Hwy F at ditch line Xing
on N S S. R.

15 Rods W of N S S.E. P Cor. at Ditch ^{Xing}

BS H.I. -S Elev
117.61

T.P.	11.30	127.05	1.86	125.75
" "	11.02	127.06	1.57	116.04
Gr level			9.20	122.85
T.P.	10.30	134.88	2.47	124.58
" "	10.08	134.88	2.25	124.80
T.P.	9.48	144.41	1.95	132.93
" "	9.16	142.40	1.67	133.24
T.P.	5.01	144.39	3.02	139.38
" "	4.83	144.39	2.84	139.56
T.P.	4.15	142.24	6.77	138.12
	3.86	142.25	6.00	138.39
		142.26		
T.P.	2.73	140.69	4.30	137.96
	2.55	140.70	4.11	138.15
B.M.	1.30	134.65	7.35	133.35
T.P.	0.77	125.70	10.72	124.93
Gr level			13.10	112.60

End of line
20 Rds. S J^S SE. R. Cor on N 4 S PL

Spike N side 13¹ large Cottonwood tree
W. of Center Sec 8 on E + W $\frac{1}{4}$ Sec Line

Center
On E + W $\frac{1}{4}$ Sec 8 Approx 65 Rds W of

End of BR E Main # 2

E. Hwy FL	5.65	103.66	
E " Ditch	6.25	103.06	
± Hwy	5.00	109.31	
W Hwy Ditch	7.60	101.71	
Gr level	17.00	92.31	
T. P.	4.10	109.31	2.83 106.48
Lat E-1 Main # 2			

W Hwy Ditch	7.00	103.58	
± Hwy	4.85	105.73	
E Hwy Ditch	5.25	105.33	
E Hwy Fence	4.15	106.43	

T. P.	4.03	110.58 _{4 83}	1.70 108.88
-------	------	------------------------	-------------

T. P.	0.81	116.91	12.50 109.41
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BR F Main # 2

W Hwy Ditch	11.60	93.62	
± Hwy	9.75	95.47	
E. Hwy Ditch	11.30	93.92	
E. Hwy Fence	9.85	95.37	

T. P.	3.78	105.22	11.32 93.90
R. P.		97.68	3.14 94.54

Note - Figure these elevs. up from H₁

100'S of EQW & Sec 7
on E line Sec 7. End of BR E

EQW & Sec 7 400' W of E Sec Line

28 Rds N of EQW & Sec 7
Approx 93.18

0 = Sta 57 Main # 2
150' S of J^s 5th
on W Line Sec 8
Run this BR SE by 600'
from 0 then SE by E thru Hwy

Spike in J^s S.W. Cor. Post.

(E) BR ending E side N+ S Hwy E line sec 7 100' S E+ W of sec 7. 95

BS H.I. - S Elev.

B.M. 4.95 72.01 67.06

0 6.50 65.51

1 5.10 66.91

2 3.35 68.66

3 2.15 69.26

T.P. 7.60 76.94 2.67 69.34

" " 7.36 76.94 2.43 69.58

4 6.65 69.29

5 5.65 70.29

6 4.20 72.74

66+54

7 3.35 73.59

8 3.15 73.79

T.P. 7.49 81.29 3.13 73.81

" " 7.21 81.29 2.86 74.08

9 6.25 75.04

10 4.85 76.44

11 3.80 77.49

12 2.85 78.44

13 3.00 78.29

Spike in Willow 10' N sta 45
= 43+75 Main #2

Continue from here to point on E+ W of
of sec 7 then SE by E across
Hwy at point 100' S of E sec 7

1 cottonwood + 3 willow shrubs to
remove at sta 13

BR D. Main #2

96

Sta	B.S.	H.I.	-S	Elev
B.M.	0.87	64.37		63.50
0			6.35	58.02
1			6.35	58.02
2			6.05	58.32
3			6.25	58.12
0			8.00	56.37
4			6.25	58.12
5			7.15	57.22
15+35			7.05	
T.P	6.52	63.81	7.08	57.29
" "	6.23	63.79	6.81	57.56
6			5.65	58.14
7			4.80	58.99
8			4.60	59.19
9			5.60	58.19
0			6.40	57.39
10			5.15	58.64
11			3.75	60.04
11+68			2.70	61.09
T.P	8.19	69.28	2.70	61.09
" "	7.87	69.27	2.39	61.40
113				
15+65			2.25	67.02
B.M.			1.72	67.55

7.7

15+50

2.24

97

On Hwy Bridge $\frac{3}{8}$ Mi. E of Huxs.
= Sta 28 Main #2

Cement Joints Sta 2 to Sta. 6

Willow swamp at left.

Bottom Pond opposite Sta 3

Edge of Pond

In Pond

Low spot 100' NW Sta 9

Edge of pond.

E & W. A:

= End Cummings' N.E. Property Cor.
Spike in " " " " Post

Sta	B.S.	H.I.	-S	Elev.
B.M.		61.13	4.65	56.48
0			6.80	54.33
1			6.95	54.18
2			6.65	54.48
3			6.50	54.63
4			6.55	54.58
5			6.20	54.93
6			6.00	55.13
7			5.95	55.18
8			5.85	55.28
9			5.60	55.53
10			5.40	55.73
11			5.30	55.83
12			5.15	55.98
12+22			5.10	56.03

Lat. B-1

0		61.13	6.20	54.93
1			6.20	54.93
2			6.15	54.98
3			5.90	55.23
4			5.75	55.38
T.P.	6.77	62.17	5.73	55.40
T.P.	6.36	62.17	5.32	55.81
5			6.75	55.41

on RR
Same bolt Send E. Cap of Cattle Pass
= Sta 12+96 Main #2

= Sta 0 Lat B-1

= End N+512 50' N.W. of RR

= Sta 5 BR.B.

Sta			
6	62.17	6.65	55.52
6+45		6.55	55.62
		20	
0	7.00		55.17

BRA Main #2

Sta	B.S.	H.I.	-S	Elev.
B.M.	4.85	61.33		56.48
0		7.10		54.23
1		7.20		54.13
2		6.95		54.38
3		6.95		54.38
4		7.05		54.28
4+70		7.00		54.33

BRG Main #2

0	61.33	6.90	54.13
1		7.20	54.13
2		7.80	53.53
3		8.40	52.93
4		9.25	52.08

→ End of Lat B-1 58 Rods N
Pond 600' SW by W of End of Lat B-1

= Sta 12+50 Main #2

= End on J High SW PL 60' N of NRR RR

= Sta 14+48 Main #2 At SRR Fence

= End of BRG on J High SW PL
125' S of SRR F.

B.S.	H.I.	-S	Elev
B.M.	9.60	69.80	55.20
0.		13.60	51.20
1		12.30	52.50
2		10.45	54.35
3		8.05	56.75
4		6.15	58.65
6+30			
5		4.35	60.45
6		2.55	62.25
T.P.	11.84	75.15	1.49 63.31
" "	11.59	75.16	1.23 63.57
7		10.45	64.71
8		8.70	66.46
8+61			
9		4.15	71.01
10			
T.P.	7.60	81.81	0.95 74.21
10		8.20	73.61
10+28			
10+53		6.55	75.26
10+72		4.30	77.51
10+90		4.85	76.96

Spike in Tel post NW cor J's grove.
= Sta 70 Main #1

10' N J's EAV 1/4 F

In grove from 8+61 to end.
Cement joints in last 250'

= N.W. Hwy F.

NW Hwy Ditch

SE Hwy

= SE Hwy F End of BR

BRA Main #1

Sta	B.S.	H.I.	-5	Elev
B.M.	2.80	57.13		54.33
0			7.20	49.93
1			6.15	50.98
1+48			5.20	51.93

BR B Main #1

B.M.				
B.M. →	5.12	59.38		57.26
0			8.60	50.78
1			3.60	57.78
2			0.70	58.68
T.P.	6.57	65.20	0.75	58.63
3			4.90	60.30
4			4.60	60.60
4+98			3.00	62.70

BR G Main #1

B.M.	2.30	56.52		54.26
0			6.00	50.56
1			3.10	53.46
T.P.	8.66	63.50	1.72	54.84
" "	8.41	63.49	1.48	55.08
2			6.30	57.19
2+90				
T.P.	9.54	70.55	2.48	61.01
" "	9.18	70.54	2.13	61.36
3			10.10	60.44

Spike N side RR Bridge
= Sta 26+28 Main #1

End = 180' S. of RR F.N. 5 1/4 E. 5

Spike in N.W. Willow bet. Ponds No. 2+3

= Sta 36 Main #1

End of BR at Center Sec 5

= Sta 40 Main

Line runs thru groves from Sta 0-
to end.

4	70.55	7.00	63.55
4+05			
T.P.	4.57	71.02	4.10 66.45
" "	4.16	71.01	3.70 66.85
R.P.		4.60	68.95
5		6.45	64.66
5+30		6.45	
5+44		6.60	64.41
5+64		5.10	65.91
5+86		6.35	64.66
5+95			
6		5.35	65.66
7		4.15	66.86
7+37		5.10	65.91

Spike in Tel post W of Farm House

N Hwy F.

N. " Ditch

E Hwy

S " Ditch

S " F

End on # 135 S of S Diag. FL

T.P.	5.48	74.81	1.68	69.33
	5.20	74.80	1.41	69.60
T.P.	5.76	73.82	6.75	68.06
" "	5.61	73.82	6.60	68.21
Gr level			7.00	66.82
" "			6.65	67.17
T.P.	10.38	81.36	2.84	70.98
" "	10.11	81.36	2.57	71.25

Continued on P-50

end
600' Not Prop. Cor W of S-8 on N-45 R. Maybe Lot D-1
At Prop Cor Not S-8. End Lot D-2.

Levels from RR Bridge West
on N. side of RR.

B.S. H.I. - S Elev

BM#2 2.35 56.71 57.36

7.40 49.31

6.25 50.5

6.10 50.6

5.50 51.2

T.P. 5.15 56.61 5.25 51.46

5.35 51.2

5.15 51.4

4.80 51.8

T.P. 5.35 57.66 4.30 52.31

5.70 52.0

6.30 52.4

4.90 52.8

5.00 57.2

4.55 52.8

T.P. 5.32 58.43 4.55 53.11

5.40 53.0

5.50 52.9

4.75 53.6

5.25 53.1

Divide between E & W Mains
on N side RR is approx 30 rods
W of J Higs E line.

Spike in N side RR Bridge 10' E of Center,
E. level of RR Bridge

on J Higs E line.

985

Tile CK Lat E Main #2

Sta	BS	H.I	-S	Elev
0+50 Hub	7.60	73.63		66.03
1 Hub	6.57	43.68		67.06
2 Hub	5.01	73.67		68.66
Tile Top				
0+50		73.65	6.77	
		5.80		
1		67.80	6.18	
+50			5.71	
2			5.06	
+50			4.51	
3			3.85	
4			2.57	
5			1.45	
5-Hub	6.85	78.79	1.71	71.94
6			5.29	
7			4.15	
8			2.98	
9			1.57	
10			0.50	
10-Hub	7.03	83.98	1.84	76.95
11			4.50	
12			3.37	
13			2.10	
14			0.83	
14 Hub	10.74	91.97	2.75	81.23
15			7.60	
16			6.70	
17			5.50	

Used Tile rd length 5.05
7/27/21 - Hoff-Hill

110

130.5

Sta	BS	H.I	-S	Elev
18		71.97	4.06	
19			2.52	
20			0.90	
20 Hub	12.78	102.49	2.26	89.71
21			9.78	
22			8.25	
23			6.60	
24			4.86	
25			3.06	
26			1.03	
T.P.				
26 Hub	11.00	111.49	2.00	100.49
27			7.96	
28			3.85	

Tile CK BRE-1

4 BRE	10.74	91.97	81.23
0+50		3.17	
1		2.21	
2		0.00	
7-Hub	7.76	110.27	102.51
4		14.15	
5		12.20	
6		9.35	
7		6.28	
8		1.51	
8+60		-1.70	Approx.

Preliminary Levels from

B.S. H.I. - S Elev.

B.M. #1 3.91 53.91 50.00

T.P. 4.02 52.91 5.22 48.69

" 3.29 52.70 4.50 49.41

H₂O 10.80 41.90

Gr Level 6.25 46.75

Gr Level 4.65 48.05

B.M. #1 4.07 54.07 50.00

H₂O 11.30 41.77

Gr. level in Wash 6.30 47.77

Natural Gr level 5.00 49.07

B.M. #1 4.35 54.35 50.00

T.P. 5.17 55.28 4.24 50.11

" 4.51 55.27 3.59 50.76

T.P. 5.34 55.48 5.13 50.14

#10 4.88 55.49 4.66 50.61

In Pond. 11.00 44.49

11.50 43.99

12.00 43.49

B.M. #2 3.28 57.64 1.13 54.36

7.95 49.54

T.P. 4.41 57.81 5.30 52.34

3.98 56.80 4.82 52.82

Gr level 6.60 50.20

#2 In Pond 10.40 45.98

11.50 45.31

outlets Drain #12

52.60

41.90

6.70

Spike in Cor. Post. Johnson's N.E. Prop. Cor.

At outlet. (East.)

" " "

100' N of E outlet.

West outlet - Due N. of B.M. #1

" "

" "

Spike 10' E of Cen. N side R.R. Bridge
Gr. level at center of R.R. Bridge

At E side of 1st Pond S of R.R.

	B.S.	H.I.	-S	Elev.
B.M. #3	3.48	56.81	2.53	54.28
10 Pond			10.20	47.56
			10.50	47.26
T.P.	5.01	57.47	5.30	52.46
	4.56	57.47	4.85	52.91
T.P.	4.49	57.03	4.93	52.54
	3.95	57.04		
		57.05	4.37	53.10
T.P.	4.50	57.42	3.62	53.42
	3.83	57.91		
		57.90	2.97	54.07
T.P.	4.56	57.25	5.22	52.69
	4.05	57.26	4.70	53.21

In small pond
B.M. #4

T.P.	5.02	57.36	4.92	52.34
	4.65	57.37		
		57.38	4.53	52.93

In Ditch

T.P.	4.86	58.17	4.06	53.31
	4.40	58.18	3.59	53.78

T.P.	5.33	58.96	4.55	53.63
	5.04	58.97		
		58.98	7.24	53.94

In Pond

T.P.	5.52	54.04	5.45	53.52
	5.07	54.03		
		54.02	5.02	53.95

8.40 50.63

5.10 53.93

Spike in root of N.W. of Willow grove E. of Ponds (2)

N. of Johnson's W. break
Spike in Tel. pole at Fence corner Johnsons bldgs.
N.W. corner grove

500' E of N & S Tl

Low spot on N. High. S. W. Tl
Gr level " " " "

B.S.	H.I.	- S	Elev
	59.03		
T.P.	4.05	62.36	4.72 54.31
		62.35	
	7.66	62.34	4.35 54.68
T.P.	7.75	64.34	5.76 56.59
	7.37	64.35	5.37 56.98

Gr Level 6.05 58.30

In ditch 6.90 57.45

B.M. #5 0.81 63.54

^{side}
N. of Hwy

SE Cor. of N. End of Hwy Bridge $\frac{3}{8}$ mi E of Hicks

117 4.30 41.90

4.60
5.11

3.90
4.60
4.60
4.60
4.55

5.50 5.50

6.00 5.75

5.90 6.00

5.50 at top 6.15

5.70

5.50

50.00

5.50-4.50 5.45

5.40 5.50

5.50 5.80

5.50 5.50

6.00 4.50 5.10

5.75

5.60

5.30

5.35

5.20

5.20

5.17

5.02

4.98

5.39

Levels from Cattle pass SW.
to shed line at point N of Grove
N of E & W Hwy N of Hicks St.

H.1 - S Elev

58.55 7.45 51.10 at Cattle pass

6.60

6.15

5.90

6.60

5.80

5.05

} close

4.90 on R 53.65

4.25

4.90

4.50

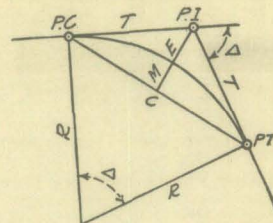
4.35 at S line 57.20

TILE CK BRF Main #2
9/27/21

249	13.5	4.1	-5	Elev
4-Hub	2.45	85.37		82.92
0+50			7.10	
1			6.35	
2			4.66	
3			2.89	
4-Hub	12.74	95.66		82.92
4			11.38	
5			7.75	
6			7.30	
7			4.58	
8			1.98	
9			-0.70	

DIETZGEN'S RAILROAD CURVE AND REDUCTION TABLES

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CURVE FORMULAS

Radius= $R = \frac{50}{\sin D/2}$ (1) Degree of Curve= D and $\sin \frac{D}{2} = \frac{50}{R}$ (2)Tangent= $T = R \tan \frac{\Delta}{2}$ (3) Length of Curve= $L = 100 \frac{\Delta}{D}$ (4)Middle ordinate= $M = R(1 - \cos \frac{\Delta}{2})$ (5) $R \text{ vers } \frac{\Delta}{2}$ (6)External= $E = T \tan \frac{\Delta}{4} = R \cos \frac{\Delta}{2} (1 - \cos \frac{\Delta}{2})$ (8) $R \text{ exsec } \frac{\Delta}{2}$ (9)Long Chord= $C = 2 R \sin \frac{\Delta}{2}$ (10) Δ =Central Angle

EXPLANATION AND USE OF TABLES

Stations.—Given P. I.=Sta. 161+60.35 to find Sta. of P. C. and P. T. $\Delta=62^\circ 10'$ $D=8^\circ 20'$. From Table IV for 1° curve $T=3454.1$ and $\div 8\frac{1}{2}=414.49$ ft. From Table V correction=.36 or $T=414.85$ ft. P. C.=Sta. P. I.— $T=157+45.50$. Also from (4) $L=746.00$ and P. T.=Sta. P. C. + $L=164+91.50$.

Offsets.—Tangent offsets vary (approximately) directly with D and with square of the distance. Thus tangent offset for Sta. 158 on above curve is 2.16 ft. found as follows. From Table III tangent offset for 100 ft.=7.27 ft. Distance=158—Sta. P. C.=54.50, hence offset=7.27 $(54.50 \div 100)^2=2.16$ ft. Also square of any distance divided by twice the radius equals (approximately) the distance from tangent to curve. Thus $(54.50)^2 \div (2 \times 688.26)=2.16$ ft.

Deflections.—Deflection angle= $\frac{1}{2} D$ for 100 ft., $\frac{1}{4} D$ for 50 ft., etc. For c ft.=(in minutes) $.3 \times C \times D^\circ$ or=defl. for 1 ft. from Table III $\times C$. For Sta. 158 of above curve=.3 $\times 54.5 \times 8\frac{1}{2}=136.2'$ or $2^\circ 16.2'$, or= $2.50 \times 54.5=136.2'$ from Table III. For Sta. 159 deflection angle= $2^\circ 16.2' + 8^\circ 20' \div 2=6^\circ 26.2'$, etc.

Externals.—May be found in similar manner to tangents. Thus E for curve above is 91.37. For from Table IV for 1° curve $E=960.6$ for $8^\circ 20'=960.6 \div 8\frac{1}{2}=91.27$ and from Table V correction=.10 or $E=91.37$ ft. Or suppose $\Delta=32^\circ$ and E is measured and found to be 42 ft. What is D ? From Table IV $E=230.9$ and $\div 42=5.5$ or $D=5^\circ 30'$.

TABLE I.—MINUTES IN DECIMALS OF A DEGREE.

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

TABLE II.—INCHES IN DECIMALS OF A FOOT.

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

TABLE III.—RADII, ORDINATES AND DEFLECTIONS.

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

TABLE IV.—TANGENTS AND EXTERNALS TO A 1° CURVE.

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
1°	50.00	.22	11°	551.70	26.50	21°	1061.9	97.57
10'	58.34	.30	10'	560.11	27.31	10'	1070.6	99.16
20	66.67	.39	20	568.53	28.14	20	1079.2	100.75
30	75.01	.49	30	576.95	28.97	30	1087.8	102.35
40	83.34	.61	40	585.36	29.82	40	1096.4	103.97
50	91.68	.73	50	593.79	30.68	50	1105.1	105.60
2	100.01	.87	12	602.21	31.56	22	1113.7	107.24
10	108.35	1.02	10	610.64	32.45	10	1122.4	108.90
20	116.68	1.19	20	619.07	33.35	20	1131.0	110.57
30	125.02	1.36	30	627.50	34.26	30	1139.7	112.25
40	133.36	1.55	40	635.93	35.18	40	1148.4	113.95
50	141.70	1.75	50	644.37	36.12	50	1157.0	115.66
3	150.04	1.96	13	652.81	37.07	23	1165.7	117.38
10	158.38	2.19	10	661.25	38.03	10	1174.4	119.12
20	166.72	2.43	20	669.70	39.01	20	1183.1	120.87
30	175.06	2.67	30	678.15	39.99	30	1191.8	122.63
40	183.40	2.93	40	686.60	40.99	40	1200.5	124.41
50	191.74	3.21	50	695.06	42.00	50	1209.2	126.20
4	200.08	3.49	14	703.51	43.03	24	1217.9	128.00
10	208.43	3.79	10	711.97	44.07	10	1226.6	129.82
20	216.77	4.10	20	720.44	45.12	20	1235.3	131.65
30	225.12	4.42	30	728.90	46.18	30	1244.0	133.50
40	233.47	4.76	40	737.37	47.25	40	1252.8	135.35
50	241.81	5.10	50	745.85	48.34	50	1261.5	137.23
5	250.16	5.46	15	754.32	49.44	25	1270.2	139.11
10	258.51	5.83	10	762.80	50.55	10	1279.0	141.01
20	266.86	6.21	20	771.29	51.68	20	1287.7	142.93
30	275.21	6.61	30	779.77	52.89	30	1296.5	144.85
40	283.57	7.01	40	788.26	53.97	40	1305.3	146.79
50	291.92	7.43	50	796.75	55.13	50	1314.0	148.75
6	300.28	7.86	16	805.25	56.31	26	1322.8	150.71
10	308.64	8.31	10	813.75	57.50	10	1331.6	152.69
20	316.99	8.76	20	822.25	58.70	20	1340.4	154.69
30	325.35	9.23	30	830.76	59.91	30	1349.2	156.70
40	333.71	9.71	40	839.27	61.14	40	1358.0	158.72
50	342.08	10.20	50	847.78	62.38	50	1366.8	160.76
7	350.44	10.71	17	856.30	63.63	27	1375.6	162.81
10	358.81	11.22	10	864.82	64.90	10	1384.4	164.86
20	367.17	11.75	20	873.35	66.18	20	1393.2	166.95
30	375.54	12.29	30	881.88	67.47	30	1402.0	169.04
40	383.91	12.85	40	890.41	68.77	40	1410.9	171.15
50	392.28	13.41	50	898.95	70.09	50	1419.7	173.27
8	400.66	13.99	18	907.49	71.42	28	1428.6	175.41
10	409.03	14.58	10	916.03	72.76	10	1437.4	177.55
20	417.41	15.18	20	924.58	74.12	20	1446.3	179.72
30	425.79	15.80	30	933.13	75.49	30	1455.1	181.89
40	434.17	16.43	40	941.69	76.86	40	1464.0	184.08
50	442.55	17.07	50	950.25	78.26	50	1472.9	186.29
9	450.93	17.72	19	958.81	79.67	29	1481.8	188.51
10	459.32	18.38	10	967.38	81.09	10	1490.7	190.74
20	467.71	19.06	20	975.96	82.53	20	1499.6	192.99
30	476.10	19.75	30	984.53	83.97	30	1508.5	195.25
40	484.49	20.45	40	993.12	85.43	40	1517.4	197.53
50	492.88	21.16	50	1001.7	86.90	50	1526.3	199.82
10	501.28	21.89	20	1010.3	88.39	30	1535.3	202.12
10	509.68	22.62	10	1018.9	89.89	10	1544.2	204.44
20	518.08	23.38	20	1027.5	91.40	20	1553.1	206.77
30	526.48	24.14	30	1036.1	92.92	30	1562.1	209.12
40	534.89	24.91	40	1044.7	94.46	40	1571.0	211.48
50	543.29	25.70	50	1053.3	96.01	50	1580.0	213.80

Note. Chord Deflection=2 times tangent deflection.

TABLE IV.—TANGENTS AND EXTERNALS TO A 1° CURVE.

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
31°	1589.0	216.3	41°	2142.2	387.4	51°	2732.9	618.4
10'	1598.0	218.7	10'	2151.7	390.7	10'	2743.1	622.8
20	1606.9	221.1	20	2161.2	394.1	20	2753.4	627.2
30	1615.9	223.5	30	2170.8	397.4	30	2763.7	631.7
40	1624.9	226.0	40	2180.3	400.8	40	2773.9	636.2
50	1633.9	228.4	50	2189.9	404.2	50	2784.2	640.7
32	1643.0	230.9	42	2199.4	407.6	52	2794.5	645.2
10	1652.0	233.4	10	2209.0	411.1	10	2804.9	649.7
20	1661.0	235.9	20	2218.6	414.5	20	2815.2	654.3
30	1670.0	238.4	30	2228.1	418.0	30	2825.6	658.8
40	1679.1	241.0	40	2237.7	421.4	40	2835.9	663.4
50	1688.1	243.5	50	2247.3	425.0	50	2846.3	668.0
33	1697.2	246.1	43	2257.0	428.5	53	2856.7	672.7
10	1706.3	248.7	10	2266.6	432.0	10	2867.1	677.3
20	1715.3	251.3	20	2276.2	435.6	20	2877.5	682.0
30	1724.4	253.9	30	2285.9	439.2	30	2888.0	686.7
40	1733.5	256.5	40	2295.6	442.8	40	2898.4	691.4
50	1742.6	259.1	50	2305.2	446.4	50	2908.9	696.1
34	1751.7	261.8	44	2314.9	450.0	54	2919.4	700.9
10	1760.8	264.5	10	2324.6	453.6	10	2929.9	705.7
20	1770.0	267.2	20	2334.3	457.3	20	2940.4	710.5
30	1779.1	269.9	30	2344.1	461.0	30	2951.0	715.3
40	1788.2	272.6	40	2353.8	464.6	40	2961.5	720.1
50	1797.4	275.3	50	2363.5	468.4	50	2972.1	725.0
35	1806.6	278.1	45	2373.3	472.1	55	2982.7	729.9
10	1815.7	280.8	10	2383.1	475.8	10	2993.3	734.8
20	1824.9	283.6	20	2392.8	479.6	20	3003.9	739.7
30	1834.1	286.4	30	2402.6	483.3	30	3014.5	744.6
40	1843.3	289.2	40	2412.4	487.2	40	3025.2	749.6
50	1852.5	292.0	50	2422.3	491.0	50	3035.8	754.6
36	1861.7	294.9	46	2432.1	494.8	56	3046.5	759.6
10	1870.9	297.7	10	2441.9	498.7	10	3057.2	764.6
20	1880.1	300.6	20	2451.8	502.5	20	3067.9	769.7
30	1889.4	303.5	30	2461.7	506.4	30	3078.7	774.7
40	1898.6	306.4	40	2471.5	510.3	40	3089.4	779.8
50	1907.9	309.3	50	2481.4	514.3	50	3100.2	784.9
37	1917.1	312.2	47	2491.3	518.2	57	3110.9	790.1
10	1926.4	315.2	10	2501.2	522.2	10	3121.7	795.2
20	1935.7	318.1	20	2511.2	526.1	20	3132.6	800.4
30	1945.0	321.1	30	2521.1	530.1	30	3143.4	805.6
40	1954.3	324.1	40	2531.1	534.2	40	3154.2	810.9
50	1963.6	327.1	50	2541.0	538.2	50	3165.1	816.1
38	1972.9	330.2	48	2551.0	542.2	58	3176.0	821.4
10	1982.2	333.2	10	2561.0	546.3	10	3186.9	826.7
20	1991.5	336.3	20	2571.0	550.4	20	3197.8	832.0
30	2000.9	339.3	30	2581.0	554.5	30	3208.8	837.3
40	2010.2	342.4	40	2591.0	558.6	40	3219.7	842.7
50	2019.6	345.5	50	2601.1	562.8	50	3230.7	848.1
39	2029.0	348.6	49	2611.2	566.9	59	3241.7	853.5
10	2038.4	351.8	10	2621.2	571.1	10	3252.7	858.9
20	2047.8	354.9	20	2631.3	575.3	20	3263.7	864.3
30	2057.2	358.1	30	2641.4	579.5	30	3274.8	869.8
40	2066.6	361.3	40	2651.5	583.8	40	3285.8	875.3
50	2076.0	364.5	50	2661.6	588.0	50	3296.9	880.8
40	2085.4	367.7	50	2671.8	592.3	60	3308.0	886.4
10	2094.9	371.0	10	2681.9	596.6	10	3319.1	892.0
20	2104.3	374.2	20	2692.1	600.9	20	3330.3	897.5
30	2113.8	377.5	30	2702.3	605.3	30	3341.4	903.2
40	2123.3	380.8	40	2712.5	609.6	40	3352.6	908.8
50	2132.7	384.1	50	2722.7	614.0	50	3363.8	914.5

TABLE IV.—TANGENTS AND EXTERNALS TO A 1° CURVE.

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
61°	3375.0	920.2	71°	4086.9	1308.2	81°	4893.6	1805.3
10'	3386.3	925.9	10'	4099.5	1315.6	10'	4908.0	1814.7
20	3397.5	931.6	20	4112.1	1322.9	20	4922.5	1824.1
30	3408.8	937.3	30	4124.8	1330.3	30	4937.0	1833.6
40	3420.1	943.1	40	4137.4	1337.7	40	4951.5	1843.1
50	3431.4	948.9	50	4150.1	1345.1	50	4966.1	1852.6
62	3442.7	954.8	72	4162.8	1352.6	82	4980.7	1862.2
10	3454.1	960.6	10	4175.6	1360.1	10	4995.4	1871.8
20	3465.4	966.5	20	4188.5	1367.6	20	5010.0	1881.5
30	3476.8	972.4	30	4201.2	1375.2	30	5024.8	1891.2
40	3488.3	978.3	40	4214.0	1382.8	40	5039.5	1900.9
50	3499.7	984.3	50	4226.8	1390.4	50	5054.3	1910.7
63	3511.1	990.2	73	4239.7	1398.0	83	5069.2	1920.5
10	3522.6	996.2	10	4252.6	1405.7	10	5084.0	1930.4
20	3534.1	1002.3	20	4265.6	1413.5	20	5099.0	1940.3
30	3545.6	1008.3	30	4278.5	1421.2	30	5113.9	1950.3
40	3557.2	1014.4	40	4291.5	1429.0	40	5128.9	1960.2
50	3568.7	1020.5	50	4304.6	1436.8	50	5143.9	1970.3
64	3580.3	1026.6	74	4317.6	1444.6	84	5159.0	1980.4
10	3591.9	1032.8	10	4330.7	1452.5	10	5174.1	1990.5
20	3603.5	1039.0	20	4343.8	1460.4	20	5189.3	2000.6
30	3615.1	1045.2	30	4356.9	1468.4	30	5204.4	2010.8
40	3626.8	1051.4	40	4370.1	1476.4	40	5219.7	2021.1
50	3638.5	1057.7	50	4383.3	1484.4	50	5234.9	2031.4
65	3650.2	1063.9	75	4396.5	1492.4	85	5250.3	2041.7
10	3661.9	1070.2	10	4409.8	1500.5	10	5265.6	2052.1
20	3673.7	1076.6	20	4423.1	1508.6	20	5281.0	2062.5
30	3685.4	1082.9	30	4436.4	1516.7	30	5296.4	2073.0
40	3697.2	1089.3	40	4449.7	1524.9	40	5311.9	2083.5
50	3709.0	1095.7	50	4463.1	1533.1	50	5327.4	2094.1
66	3720.9	1102.2	76	4476.5	1541.4	86	5343.0	2104.7
10	3732.7	1108.6	10	4489.9	1549.7	10	5358.6	2115.3
20	3744.6	1115.1	20	4503.4	1558.0	20	5374.2	2126.0
30	3756.5	1121.7	30	4516.9	1566.3	30	5389.9	2136.7
40	3768.5	1128.2	40	4530.4	1574.7	40	5405.6	2147.5
50	3780.4	1134.8	50	4544.0	1583.1	50	5421.4	2158.4
67	3792.4	1141.4	77	4557.6	1591.6	87	5437.2	2169.2
10	3804.4	1148.0	10	4571.2	1600.1	10	5453.1	2180.2
20	3816.4	1154.7	20	4584.8	1608.6	20	5469.0	2191.1
30	3828.4	1161.3	30	4598.5	1617.1	30	5484.9	2202.2
40	3840.5	1168.1	40	4612.2	1625.7	40	5500.9	2213.2
50	3852.6	1174.8	50	4626.0	1634.4	50	5517.0	2224.3
68	3864.7	1181.6	78	4639.8	1643.0	88	5533.1	2235.5
10	3876.8	1188.4	10	4653.6	1651.7	10	5549.2	2246.7
20	3889.0	1195.2	20	4667.4	1660.5	20	5565.4	2258.0
30	3901.2	1202.0	30	4681.3	1669.2	30	5581.6	2269.3
40	3913.4	1208.9	40	4695.2	1678.1	40	5597.8	2280.6
50	3925.6	1215.8	50	4709.2	1686.9	50	5614.2	2292.0
69	3937.9	1222.7	79	4723.2	1695.8	89	5630.5	2303.5
10	3950.2	1229.7	10	4737.2	1704.7	10	5646.9	2315.0
20	3962.5	1236.7	20	4751.2	1713.7	20	5663.4	2326.6
30	3974.8	1243.7	30	4765.3	1722.7	30	5679.9	2338.2
40	3987.2	1250.8	40	4779.4	1731.7	40	5696.4	2349.8
50	3999.5	1257.9	50	4793.6	1740.8	50	5713.0	2361.5
70	4011.9	1265.0	80	4807.7	1749.9	90	5729.7	2373.3
10	4024.4	1272.1	10	4822.0	1759.0	10	5746.3	2385.1
20	4036.8	1279.3	20	4836.2	1768.2	20	5763.1	2397.0
30	4049.3	1286.5	30	4850.5	1777.4	30	5779.9	2408.9
40	4061.8	1293.6	40	4864.8	1786.7	40	5796.7	2420.9
50	4074.4	1300.9	50	4879.2	1796.0	50	5813.6	2432.9

TABLE IV.—TANGENTS AND EXTERNALS TO A 1° CURVE.

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

TABLE V.—CORRECTIONS FOR TANGENTS AND EXTERNALS.

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

FOR TANGENTS ADD

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

FOR EXTERNALS ADD

Central Angle	DEGREE OF CURVE													
	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
10°	.001	.003	.004	.006	.007	.008	.009	.011	.012	.014	.015	.017	.018	.020
15°	.003	.007	.010	.014	.018	.023	.027	.032	.035	.039	.043	.047	.051	.055
20°	.006	.011	.017	.022	.028	.034	.038	.045	.051	.057	.063	.070	.076	.083
25°	.009	.018	.027	.036	.046	.056	.066	.074	.083	.093	.106	.120	.127	.135
30°	.013	.025	.038	.051	.065	.078	.090	.103	.116	.129	.149	.170	.179	.188
35°	.018	.035	.054	.072	.086	.109	.131	.153	.175	.197	.213	.230	.247	.264
40°	.023	.046	.070	.093	.117	.141	.172	.203	.234	.265	.277	.290	.315	.341
45°	.030	.060	.093	.119	.153	.184	.216	.254	.289	.325	.351	.378	.411	.445
50°	.037	.075	.116	.151	.189	.227	.266	.305	.345	.384	.425	.467	.508	.550
55°	.046	.093	.142	.188	.236	.283	.332	.381	.420	.479	.530	.582	.641	.700
60°	.056	.112	.168	.225	.283	.340	.398	.457	.516	.575	.636	.697	.774	.851
65°	.067	.135	.204	.273	.343	.412	.483	.554	.625	.697	.771	.845	.922	1.01
70°	.080	.159	.240	.321	.403	.485	.568	.652	.735	.819	.906	.994	1.08	1.17
75°	.095	.182	.266	.353	.440	.528	.617	.707	.797	.887	.977	1.07	1.18	1.29
80°	.110	.220	.332	.445	.558	.671	.787	.903	1.02	1.13	1.25	1.38	1.50	1.62
85°	.128	.259	.391	.524	.657	.790	.926	1.06	1.20	1.34	1.47	1.62	1.76	1.91
90°	.149	.299	.450	.603	.756	.910	1.07	1.22	1.38	1.54	1.70	1.87	2.03	2.20
95°	.174	.350	.522	.706	.885	1.06	1.25	1.43	1.62	1.80	1.99	2.18	2.38	2.58
100°	.200	.401	.604	.809	1.01	1.22	1.43	1.64	1.85	2.06	2.28	2.50	2.73	2.96
110°	.268	.536	.806	1.08	1.35	1.63	1.91	2.20	2.48	2.76	3.05	3.35	3.66	3.96
120°	.360	.721	1.08	1.45	1.82	2.19	2.57	2.95	3.33	3.72	4.11	4.50	4.91	5.32

TABLE VI.—CORRECTIONS FOR SUB-CHORDS AND LONG CHORDS.

FOR SUB-CHORDS ADD										Excess of arc per 100 ft.	LONG CHORDS				
D	10	20	30	40	50	60	70	80	90		D	200	300	400	500
4°	.00	.00	.01	.01	.01	.01	.01	.01	.06	.02	1	199.99	299.97	399.92	499.85
5	.00	.01	.01	.02	.02	.02	.02	.01	.01	.05	2	199.97	299.88	399.70	499.39
6	.01	.02	.02	.03	.03	.03	.03	.02	.01	.08	3	199.93	299.73	399.32	498.63
7	.01	.02	.03	.04	.05	.05	.05	.04	.02	.13	4	199.88	299.51	398.78	497.57
12	.02	.04	.05	.06	.07	.07	.07	.05	.03	.18	5	199.81	299.24	398.10	496.20
14	.02	.05	.07	.08	.09	.10	.09	.07	.04	.25	6	199.73	298.90	397.26	494.53
16	.03	.06	.09	.11	.12	.12	.12	.09	.05	.33	7	199.63	298.51	396.28	492.57
18	.04	.08	.11	.14	.15	.16	.15	.12	.07	.41	8	199.51	298.05	395.14	490.31
20	.05	.10	.14	.17	.19	.20	.18	.15	.09	.51	9	199.38	297.54	393.86	487.75
22	.06	.12	.17	.21	.23	.24	.22	.18	.10	.62	10	199.24	296.96	392.42	484.90
24	.07	.14	.20	.25	.28	.28	.26	.21	.12	.74	12	198.90	295.63	389.12	478.34
26	.09	.17	.24	.29	.32	.33	.31	.25	.15	.86	14	198.51	294.06	385.22	470.65
28	.10	.19	.27	.34	.37	.38	.36	.29	.17	1.00	16	198.05	292.25	380.76	461.86
30	.11	.22	.31	.39	.43	.44	.41	.33	.19	1.15	18	197.54	290.21	375.74	452.02
32	.13	.25	.36	.44	.49	.50	.47	.38	.22	1.31	20	196.96	287.94	370.17	441.15
34	.15	.28	.40	.50	.55	.57	.53	.43	.25	1.48	22	196.32	285.44	364.06	429.30
36	.17	.32	.45	.56	.62	.64	.59	.48	.28	1.66	24	195.63	282.71	357.43	416.53
38	.18	.36	.51	.62	.70	.71	.66	.53	.31	1.86	26	194.87	279.76	350.30	402.89
40	.21	.40	.56	.69	.77	.79	.73	.59	.35	2.06	28	194.06	276.59	342.69	388.43
42	.23	.44	.62	.76	.85	.87	.81	.65	.38	2.28	30	193.18	273.20	334.61	373.20
44	.25	.48	.68	.84	.94	.96	.89	.72	.42	2.50	32	192.25	269.61	326.08	357.28
46	.27	.52	.75	.92	1.02	1.05	.98	.78	.46	2.74	34	191.26	265.81	317.12	340.73
48	.30	.57	.81	1.00	1.12	1.14	1.06	.86	.50	2.99	36	190.21	261.80	307.77	323.61
50	.32	.62	.89	1.09	1.21	1.24	1.15	.93	.55	3.24	38	189.10	257.60	298.03	305.99
52	.35	.67	.96	1.18	1.31	1.35	1.25	1.01	.59	3.52	40	187.94	253.21	287.94	287.94
54	.38	.73	1.04	1.28	1.42	1.46	1.35	1.09	.64	3.80	42	186.72	248.63	277.51	269.54
56	.41	.78	1.12	1.38	1.53	1.57	1.46	1.17	.69	4.09	44	185.44	243.87	266.78	250.85
58	.44	.84	1.20	1.48	1.65	1.69	1.57	1.26	.74	4.40	46	184.10	239.93	255.78	231.95
60	.47	.91	1.29	1.59	1.76	1.81	1.68	1.35	.80	4.72	48	182.71	233.83	244.51	212.92

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

TABLE VII.—MIDDLE ORDINATES FOR RAILS IN FEET.

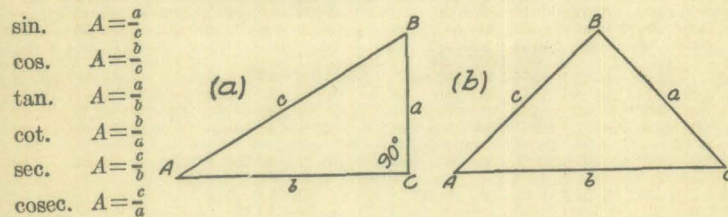
Deg. of Curve	LENGTH OF RAILS							Deg. of Curve	LENGTH OF RAILS.						
	32	30	28	26	24	22	20		32	30	28	26	24	22	20
1°	.022	.020	.016	.013	.011	.009	.008	16°	.356	.313	.273	.236	.200	.170	.139
2	.045	.038	.034	.029	.025	.021	.017	17	.378	.333	.290	.252	.213	.180	.148
3	.037	.058	.051	.044	.037	.031	.026	18	.400	.351	.306	.265	.225	.190	.156
4	.089	.079	.069	.060	.050	.042	.035	19	.423	.371	.324	.280	.238	.201	.165
5	.112	.099	.086	.074	.063	.053	.044	20	.445	.392	.341	.296	.250	.212	.174
6	.134	.117	.102	.088	.076	.064	.052	21	.466	.410	.357	.309	.262	.222	.182
7	.156	.137	.120	.104	.088	.074	.061	22	.487	.430	.375	.325	.275	.233	.191
8	.179	.158	.137	.119	.100	.085	.070	23	.509	.450	.390	.338	.287	.243	.199
9	.201	.175	.153	.133	.112	.095	.078	24	.531	.469	.408	.354	.299	.253	.208
10	.223	.196	.171	.148	.125	.106	.087	25	.552	.486	.424	.367	.311	.263	.216
11	.245	.216	.188	.163	.139	.117	.096	26	.573	.506	.441	.382	.323	.274	.225
12	.268	.236	.206	.179	.151	.128	.105	27	.594	.524	.457	.396	.335	.284	.233
13	.290	.254	.223	.192	.163	.138	.113	28	.618	.545	.475	.411	.348	.294	.242
14	.312	.275	.239	.207	.175	.148	.122	29	.638	.564	.491	.424	.361	.303	.250
15	.334	.295	.257	.223	.188	.159	.131	30	.660	.583	.508	.438	.374	.313	.259

SLOPE REDUCTIONS.

When distances are measured on a slope they may be reduced to the equivalent horizontal distance by the following approximate rule:—subtract from the slope distance the square of the rise divided by twice the slope distance. Thus for a slope distance of 250.3 ft. and a rise of 15 ft. correction= $15^2 \div 2 \times 250.3 = .45$ (by slide rule) or horizontal distance= $250.3 - .45 = 249.85$. When vertical angle=V. A. is measured horizontal distance=slope distance—slope distance (1—Cos. V. A.). Thus for slope distance of 248.7 ft. and V. A. of 4° 20' from Table VIII Cos=.99714 and correction=1—.99714=.00286 per foot or total of .286×2½ (near enough)=.57 and horizontal distance=248.7—.57=248.13 ft.

See fig. (a).

TRIGONOMETRICAL FORMULAS.



FORMULA FOR SOLVING TRIANGLES.

Given	Sought.	Right triangles. See fig. (a).
a, c	A, B, b	$\sin. A = \frac{a}{c}, \cos. B = \frac{b}{c}, b = \sqrt{(c+a)(c-a)}$
a, b	A, B, c	$\tan. A = \frac{a}{b}, \cot. B = \frac{b}{a}, c = \sqrt{a^2 + b^2}$
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	$B = 90^\circ - A, a = c \sin. A, b = c \cos. A$
Given	Sought.	Oblique triangles. See fig. (b).
A, B, a	b	$b = \frac{a \sin. B}{\sin. A}$
A, a, b	B	$\sin. B = \frac{b \sin. A}{a}$
a, b, C	$A - B$	$\tan. \frac{1}{2}(A - B) = \frac{(a - b) \tan. \frac{1}{2}(A + B)}{a + b}$
a, b, c	A	$\left\{ \begin{array}{l} \text{If } s = \frac{1}{2}(a + b + c), \sin. \frac{1}{2} A = \sqrt{\frac{(s - b)(s - c)}{bc}} \\ \cos. \frac{1}{2} A = \sqrt{\frac{s(s - a)}{bc}}, \tan. \frac{1}{2} A = \sqrt{\frac{(s - b)(s - c)}{s(s - a)}}, \\ \sin. A = \frac{2 \sqrt{s(s - a)(s - b)(s - c)}}{bc} \end{array} \right.$
A, B, C, a	area	$\text{area} = \frac{a^2 \sin. B \sin. C}{2 \sin. A}$
A, b, c	area	$\text{area} = \frac{1}{2} bc \sin. A$
a, b, c	area	$s = \frac{1}{2}(a + b + c), \text{area} = \sqrt{s(s - a)(s - b)(s - c)}$

TABLE VIII.—NATURAL TRIGONOMETRICAL FUNCTIONS.

Angle	Sine.	Tan.	Cotg.	Cosin.	Angle	Sine.	Tan.	Cotg.	Cosin.
0°	0	0	∞	1	90°	1	∞	0	0
10	.0029	.0029	343.8	.99998	50	.7660	1.1918	.8413	.6428
20	.0058	.0058	171.9	.99996	40	.6428	.6913	1.4515	.7660
30	.0087	.0087	114.6	.99993	30	.5196	.5299	1.8807	.8660
40	.0116	.0116	85.94	.99989	20	.3907	.3907	2.5761	.9397
50	.0145	.0145	68.75	.99989	10	.2618	.2618	3.8570	.9914
1	.0175	.0175	57.29	.99985	89	.9802	6.3139	.1577	.1736
10	.0204	.0204	49.10	.99979	50	.9659	12.707	.0777	.2009
20	.0233	.0233	42.96	.99973	40	.9515	19.081	.0521	.3420
30	.0262	.0262	38.19	.99966	30	.9371	25.963	.0374	.5196
40	.0291	.0291	34.37	.99958	20	.9227	33.690	.0227	.6913
50	.0320	.0320	31.24	.99949	10	.9082	42.421	.0082	.8660
2	.0349	.0349	28.64	.99939	88	.9802	6.3139	.1577	.1736
10	.0378	.0378	26.43	.99929	50	.9659	12.707	.0777	.2009
20	.0407	.0407	24.54	.99917	40	.9515	19.081	.0521	.3420
30	.0436	.0437	22.90	.99905	30	.9371	25.963	.0374	.5196
40	.0465	.0466	21.47	.99892	20	.9227	33.690	.0227	.6913
50	.0494	.0495	20.21	.99878	10	.9082	42.421	.0082	.8660
3	.0523	.0524	19.08	.99863	87	.9802	6.3139	.1577	.1736
10	.0552	.0553	18.08	.99847	50	.9659	12.707	.0777	.2009
20	.0581	.0582	17.17	.99831	40	.9515	19.081	.0521	.3420
30	.0610	.0612	16.35	.99813	30	.9371	25.963	.0374	.5196
40	.0640	.0641	15.60	.99795	20	.9227	33.690	.0227	.6913
50	.0669	.0670	14.92	.99776	10	.9082	42.421	.0082	.8660
4	.0698	.0699	14.30	.99756	86	.9802	6.3139	.1577	.1736
10	.0727	.0729	13.73	.99736	50	.9659	12.707	.0777	.2009
20	.0756	.0758	13.20	.99714	40	.9515	19.081	.0521	.3420
30	.0785	.0787	12.71	.99692	30	.9371	25.963	.0374	.5196
40	.0814	.0816	12.25	.99668	20	.9227	33.690	.0227	.6913
50	.0843	.0846	11.83	.99644	10	.9082	42.421	.0082	.8660
5	.0872	.0875	11.43	.99619	85	.9802	6.3139	.1577	.1736
10	.0901	.0904	11.06	.99594	50	.9659	12.707	.0777	.2009
20	.0929	.0934	10.71	.99567	40	.9515	19.081	.0521	.3420
30	.0958	.0963	10.39	.99540	30	.9371	25.963	.0374	.5196
40	.0987	.0992	10.08	.99511	20	.9227	33.690	.0227	.6913
50	.1016	.1022	9.788	.99482	10	.9082	42.421	.0082	.8660
6	.1045	.1051	9.514	.99452	84	.9802	6.3139	.1577	.1736
10	.1074	.1080	9.255	.99421	50	.9659	12.707	.0777	.2009
20	.1103	.1110	9.010	.99390	40	.9515	19.081	.0521	.3420
30	.1132	.1139	8.777	.99357	30	.9371	25.963	.0374	.5196
40	.1161	.1169	8.556	.99324	20	.9227	33.690	.0227	.6913
50	.1190	.1198	8.345	.99290	10	.9082	42.421	.0082	.8660
7	.1219	.1228	8.144	.99255	83	.9802	6.3139	.1577	.1736
10	.1248	.1257	7.953	.99219	50	.9659	12.707	.0777	.2009
20	.1276	.1287	7.770	.99182	40	.9515	19.081	.0521	.3420
30	.1305	.1317	7.596	.99144	30	.9371	25.963	.0374	.5196
40	.1334	.1346	7.429	.99106	20	.9227	33.690	.0227	.6913
50	.1363	.1376	7.269	.99067	10	.9082	42.421	.0082	.8660
					82	.9802	6.3139	.1577	.1736
					74	.9802	6.3139	.1577	.1736
	Cosin.	Cotg.	Tan.	Sine.	Angle.				

TABLE VIII.—NATURAL TRIGONOMETRICAL FUNCTIONS.

Angle	Sine.	Tan.	Cotg.	Cosin.	Angle	Sine.	Tan.	Cotg.	Cosin.
16°	.2756	.2867	3.487	.96126	74°	.9613	3.487	.2867	.2756
10	.2784	.2899	3.450	.96046	50	.9605	3.450	.2899	.2784
20	.2812	.2931	3.412	.95964	40	.9597	3.412	.2931	.2812
30	.2840	.2962	3.376	.95882	30	.9589	3.376	.2962	.2840
40	.2868	.2994	3.340	.95799	20	.9581	3.340	.2994	.2868
50	.2896	.3026	3.305	.95715	10	.9573	3.305	.3026	.2896
17	.2924	.3057	3.271	.95615	73	.9562	3.271	.3057	.2924
10	.2952	.3089	3.237	.95545	50	.9555	3.237	.3089	.2952
20	.2979	.3121	3.204	.95459	40	.9547	3.204	.3121	.2979
30	.3007	.3153	3.172	.95372	30	.9539	3.172	.3153	.3007
40	.3035	.3185	3.140	.95284	20	.9531	3.140	.3185	.3035
50	.3062	.3217	3.108	.95195	10	.9523	3.108	.3217	.3062
18	.3090	.3249	3.078	.95106	72	.9511	3.078	.3249	.3090
10	.3118	.3281	3.048	.95015	50	.9503	3.048	.3281	.3118
20	.3145	.3314	3.018	.94924	40	.9494	3.018	.3314	.3145
30	.3173	.3346	2.989	.94832	30	.9485	2.989	.3346	.3173
40	.3201	.3378	2.960	.94740	20	.9477	2.960	.3378	.3201
50	.3228	.3411	2.932	.94646	10	.9467	2.932	.3411	.3228
19	.3256	.3443	2.904	.94552	71	.9456	2.904	.3443	.3256
10	.3283	.3476	2.877	.94457	50	.9448	2.877	.3476	.3283
20	.3311	.3508	2.850	.94361	40	.9439	2.850	.3508	.3311
30	.3338	.3541	2.824	.94264	30	.9441	2.824	.3541	.3338
40	.3365	.3574	2.798	.94167	20	.9443	2.798	.3574	.3365
50	.3393	.3607	2.773	.94068	10	.9445	2.773	.3607	.3393
20	.3420	.3640	2.747	.93969	70	.9398	2.747	.3640	.3420
10	.3448	.3673	2.723	.93869	50	.9389	2.723	.3673	.3448
20	.3475	.3706	2.699	.93769	40	.9391	2.699	.3706	.3475
30	.3502	.3739	2.675	.93667	30	.9393	2.675	.3739	.3502
40	.3529	.3772	2.651	.93565	20	.9395	2.651	.3772	.3529
50	.3557	.3805	2.628	.93462	10	.9397	2.628	.3805	.3557
21	.3584	.3839	2.605	.93358	69	.9338	2.605	.3839	.3584
10	.3611	.3872	2.583	.93253	50	.9340	2.583	.3872	.3611
20	.3638	.3906	2.560	.93148	40	.9342	2.560	.3906	.3638
30	.3665	.3939	2.539	.93042	30	.9344	2.539	.3939	.3665
40	.3692	.3973	2.517	.92935	20	.9346	2.517	.3973	.3692
50	.3719	.4006	2.496	.92827	10	.9348	2.496	.4006	.3719
22	.3746	.4040	2.475	.92718	68	.9274	2.475	.4040	.3746
10	.3773	.4074	2.455	.92609	50	.9276	2.455	.4074	.3773
20	.3800	.4108	2.434	.92499	40	.9278	2.434	.4108	.3800
30	.3827	.4142	2.414	.92388	30	.9280	2.414	.4142	.3827
40	.3854	.4176	2.394	.92276	20	.9282	2.394	.4176	.3854
50	.3881	.4210	2.375	.92164	10	.9284	2.375	.4210	.3881
23	.3907	.4245	2.356	.92050	67	.9206	2.356	.4245	.3907
10	.3934	.4279	2.337	.91936	50	.9208	2.337	.4279	.3934
20	.3961	.4314	2.318	.91822	40	.9210	2.318	.4314	.3961
30	.3987	.4348	2.300	.91708	30	.9212	2.300	.4348	.3987
40	.4014	.4383	2.282	.91590	20	.9214	2.282	.4383	.4014
50	.4041	.4417	2.264	.91472	10	.9216	2.264	.4417	.4041
					66	.9218			
	Cosin.	Cotg.	Tan.	Sine.	Angle.				

TABLE VIII.—NATURAL TRIGONOMETRICAL FUNCTIONS.

Angle	Sine.	Tan.	Cotg.	Cosin.		Angle	Sine.	Tan.	Cotg.	Cosin.	
or						or					
32	.5299	.6249	1.600	.84805	58	30	.6225	.7954	1.257	.78261	30
10	.5324	.6289	1.590	.84650	50	40	.6248	.8002	1.250	.78079	20
20	.5348	.6330	1.580	.84495	40	50	.6271	.8050	1.242	.77897	10
30	.5373	.6371	1.570	.84339	30						
40	.5398	.6412	1.560	.84182	20	39	.6293	.8098	1.235	.77715	51
50	.5422	.6453	1.550	.84025	10	10	.6316	.8146	1.228	.77531	50
						20	.6338	.8195	1.220	.77347	40
33	.5446	.6494	1.540	.83867	57	30	.6361	.8243	1.213	.77162	30
10	.5471	.6536	1.530	.83708	50	40	.6383	.8292	1.206	.76977	20
20	.5495	.6577	1.520	.83549	40	50	.6406	.8342	1.199	.76791	10
30	.5519	.6619	1.511	.83389	30						
40	.5544	.6661	1.501	.83228	20	40	.6428	.8391	1.192	.76604	50
50	.5568	.6703	1.492	.83066	10	10	.6450	.8441	1.185	.76417	50
						20	.6472	.8491	1.178	.76229	40
34	.5592	.6745	1.483	.82904	56	30	.6494	.8541	1.171	.76041	30
10	.5616	.6787	1.473	.82741	50	40	.6517	.8591	1.164	.75851	20
20	.5640	.6830	1.464	.82577	40	50	.6539	.8642	1.157	.75661	10
30	.5664	.6873	1.455	.82413	30						
40	.5688	.6916	1.446	.82248	20	41	.6561	.8693	1.150	.75471	49
50	.5712	.6959	1.437	.82082	10	10	.6583	.8744	1.144	.75280	50
						20	.6604	.8796	1.137	.75088	40
35	.5736	.7002	1.428	.81915	55	30	.6626	.8847	1.130	.74896	30
10	.5760	.7046	1.419	.81748	50	40	.6648	.8899	1.124	.74703	20
20	.5783	.7089	1.411	.81580	40	50	.6670	.8952	1.117	.74509	10
30	.5807	.7133	1.402	.81412	30						
40	.5831	.7177	1.393	.81242	20	42	.6691	.9004	1.111	.74314	48
50	.5854	.7221	1.385	.81072	10	10	.6713	.9057	1.104	.74120	50
						20	.6734	.9110	1.098	.73924	40
36	.5878	.7265	1.376	.80902	54	30	.6756	.9163	1.091	.73728	30
10	.5901	.7310	1.368	.80730	50	40	.6777	.9217	1.085	.73531	20
20	.5925	.7355	1.360	.80558	40	50	.6799	.9271	1.079	.73333	10
30	.5948	.7400	1.351	.80386	30						
40	.5972	.7445	1.343	.80212	20	43	.6820	.9325	1.072	.73135	47
50	.5995	.7490	1.335	.80038	10	10	.6841	.9380	1.066	.72937	50
						20	.6862	.9435	1.060	.72737	40
37	.6018	.7536	1.327	.79864	53	30	.6884	.9490	1.054	.72537	30
10	.6041	.7581	1.319	.79688	50	40	.6905	.9545	1.048	.72337	20
20	.6065	.7627	1.311	.79512	40	50	.6926	.9601	1.042	.72136	10
30	.6088	.7673	1.303	.79335	30						
40	.6111	.7720	1.295	.79158	20	44	.6947	.9657	1.036	.71934	46
50	.6134	.7766	1.288	.78980	10	10	.6967	.9713	1.030	.71732	50
						20	.6988	.9770	1.024	.71529	40
38	.6157	.7813	1.280	.78801	52	30	.7009	.9827	1.018	.71325	30
10	.6180	.7860	1.272	.78622	50	40	.7030	.9884	1.012	.71121	20
20	.6202	.7907	1.265	.78442	40	50	.7050	.9942	1.006	.70916	10
							.7071	1.	1.	.70711	45
											or
	Cosin.	Cotg.	Tan.	Sine.	Angle.		Cosin.	Cotg.	Tan.	Sine.	Angle.

TABLE IX.—CALCULATION OF EARTHWORK.

Width	HEIGHT														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	.02	.04	.06	.07	.09	.11	.13	.15	.17	.18	.20	.22	.24	.26	.28
2	.04	.07	.11	.15	.18	.22	.26	.30	.33	.37	.41	.44	.48	.52	.56
3	.06	.11	.17	.22	.28	.33	.39	.44	.50	.56	.61	.67	.72	.78	.83
4	.07	.15	.22	.30	.37	.44	.52	.59	.67	.74	.81	.89	.96	1.04	1.11
5	.09	.19	.28	.37	.46	.56	.65	.74	.83	.93	1.02	1.11	1.20	1.30	1.39
6	.11	.22	.33	.44	.56	.67	.78	.89	1.00	1.11	1.22	1.33	1.44	1.55	1.67
7	.13	.26	.39	.52	.65	.78	.91	1.04	1.16	1.30	1.42	1.55	1.68	1.81	1.94
8	.15	.30	.44	.59	.74	.89	1.04	1.19	1.33	1.48	1.63	1.78	1.92	2.08	2.22
9	.17	.33	.50	.67	.83	1.00	1.17	1.33	1.50	1.67	1.83	2.00	2.17	2.33	2.50
10	.18	.37	.56	.74	.93	1.11	1.30	1.48	1.67	1.85	2.04	2.22	2.41	2.59	2.78
11	.20	.41	.61	.82	1.02	1.22	1.43	1.63	1.83	2.04	2.24	2.44	2.65	2.85	3.06
12	.22	.44	.67	.89	1.11	1.33	1.56	1.78	2.00	2.22	2.44	2.67	2.89	3.11	3.33
13	.24	.48	.72	.96	1.20	1.44	1.68	1.92	2.16	2.41	2.65	2.89	3.13	3.37	3.61
14	.26	.52	.78	1.04	1.30	1.55	1.81	2.08	2.33	2.59	2.85	3.11	3.37	3.63	3.89
15	.28	.56	.83	1.11	1.39	1.67	1.94	2.22	2.50	2.78	3.06	3.33	3.61	3.89	4.17
16	.30	.59	.89	1.18	1.48	1.78	2.07	2.37	2.67	2.96	3.26	3.56	3.85	4.15	4.44
17	.31	.63	.94	1.26	1.57	1.89	2.20	2.52	2.83	3.15	3.46	3.78	4.09	4.41	4.72
18	.33	.67	1.00	1.33	1.67	2.00	2.33	2.67	3.00	3.33	3.67	4.00	4.33	4.67	5.00
19	.35	.70	1.06	1.41	1.76	2.11	2.46	2.82	3.17	3.52	3.87	4.22	4.57	4.92	5.28
20	.37	.74	1.11	1.48	1.85	2.22	2.59	2.96	3.33	3.70	4.07	4.44	4.81	5.18	5.56
21	.39	.78	1.17	1.55	1.94	2.33	2.72	3.11	3.50	3.89	4.28	4.67	5.06	5.44	5.83
22	.41	.81	1.22	1.63	2.04	2.43	2.85	3.26	3.67	4.07	4.48	4.89	5.30	5.70	6.11
23	.43	.85	1.28	1.70	2.13	2.56	2.98	3.41	3.83	4.26	4.68	5.11	5.54	5.96	6.39
24	.44	.89	1.33	1.78	2.22	2.67	3.11	3.56	4.00	4.44	4.89	5.33	5.78	6.22	6.67
25	.46	.92	1.39	1.85	2.31	2.78	3.24	3.70	4.17	4.63	5.09	5.56	6.02	6.48	6.94
26	.48	.96	1.44	1.92	2.41	2.89	3.37	3.85	4.33	4.82	5.30	5.78	6.26	6.74	7.24
27	.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
28	.52	1.04	1.55	2.07	2.59	3.11	3.63	4.15	4.67	5.18	5.70	6.22	6.74	7.26	7.78
29	.54	1.07	1.61	2.15	2.68	3.22	3.76	4.30	4.83	5.37	5.91	6.44	6.98	7.52	8.06
30	.56	1.11	1.67	2.22	2.78	3.33	3.89	4.44	5.00	5.55	6.11	6.67	7.22	7.78	8.33
31	.57	1.15	1.72	2.30	2.87	3.44	4.02	4.59	5.17	5.74	6.32	6.89	7.46	8.04	8.61
32	.59	1.18	1.78	2.37	2.96	3.56	4.15	4.74	5.33	5.92	6.52	7.11	7.70	8.30	8.89
33	.61	1.22	1.83	2.44	3.05	3.67	4.28	4.89	5.50	6.11	6.72	7.33	7.94	8.55	9.17
34	.63	1.26	1.89	2.52	3.15	3.78	4.40	5.04	5.67	6.29	6.92	7.56	8.18	8.81	9.44
35	.65	1.30	1.94	2.59	3.24	3.89	4.53	5.18	5.83	6.48	7.13	7.78	8.42	9.08	9.72
36	.67	1.33	2.00	2.67	3.33	4.00	4.66	5.33	6.00	6.67	7.33	8.00	8.67	9.33	10.00
37	.68	1.37	2.06	2.74	3.42	4.11	4.79	5.48	6.17	6.85	7.54	8.22	8.91	9.59	10.28
38	.70	1.41	2.11	2.82	3.52	4.22	4.92	5.63	6.33	7.03	7.74	8.44	9.15	9.85	10.56
39	.72	1.44	2.17	2.89	3.61	4.33	5.05	5.78	6.50	7.22	7.95	8.67	9.39	10.11	10.83
40	.74	1.48	2.22	2.96	3.70	4.44	5.18	5.92	6.67	7.41	8.15	8.89	9.63	10.37	11.11

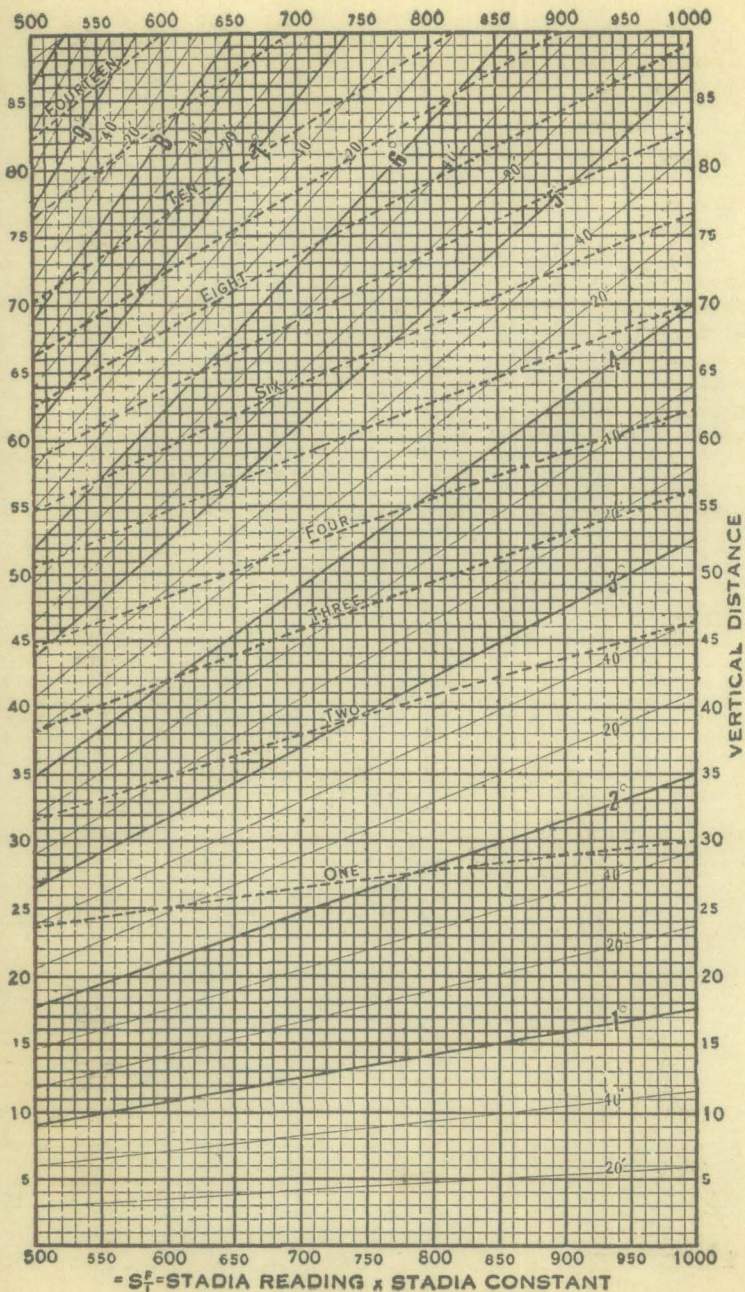
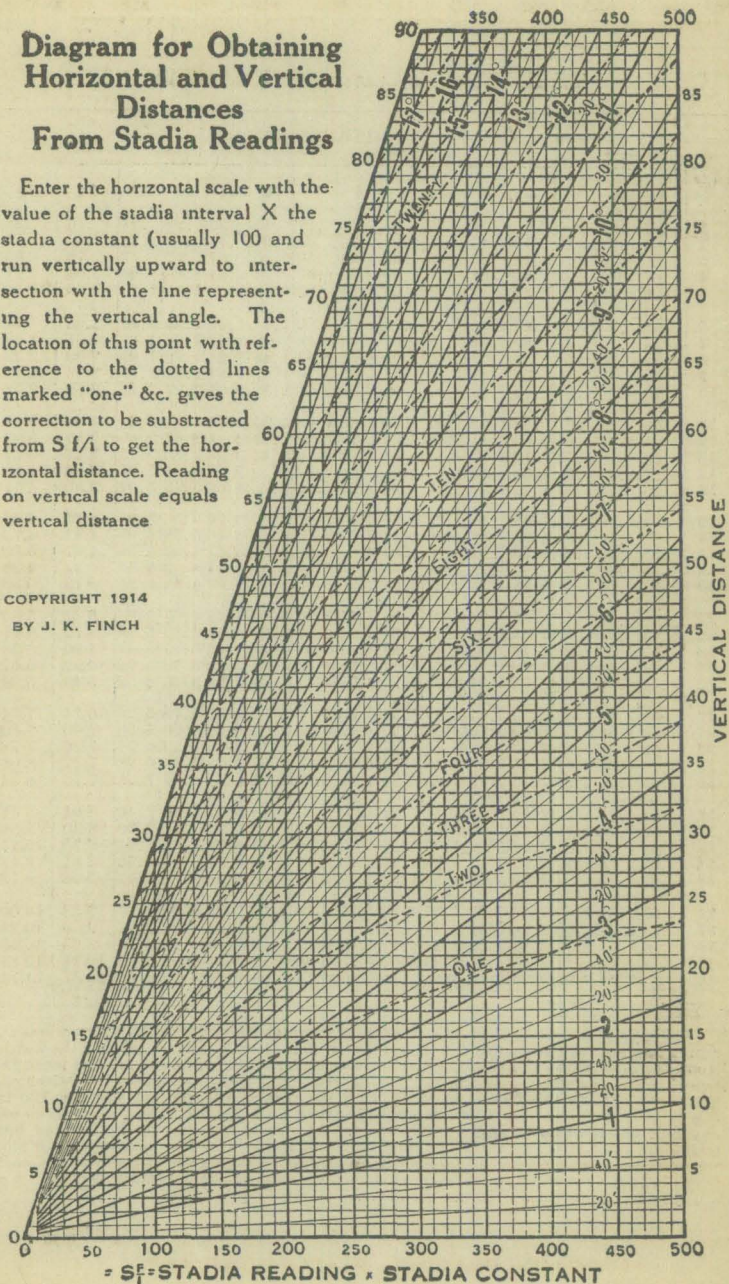
Table gives cu. yds. in 1 ft. of a triangle of given width and height. Corrections for tenths of width are one tenth the values found under each height considering the widths from 1 to 9 as tenths and similarly the corrections for tenths of height are one tenth the figures opposite width considering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

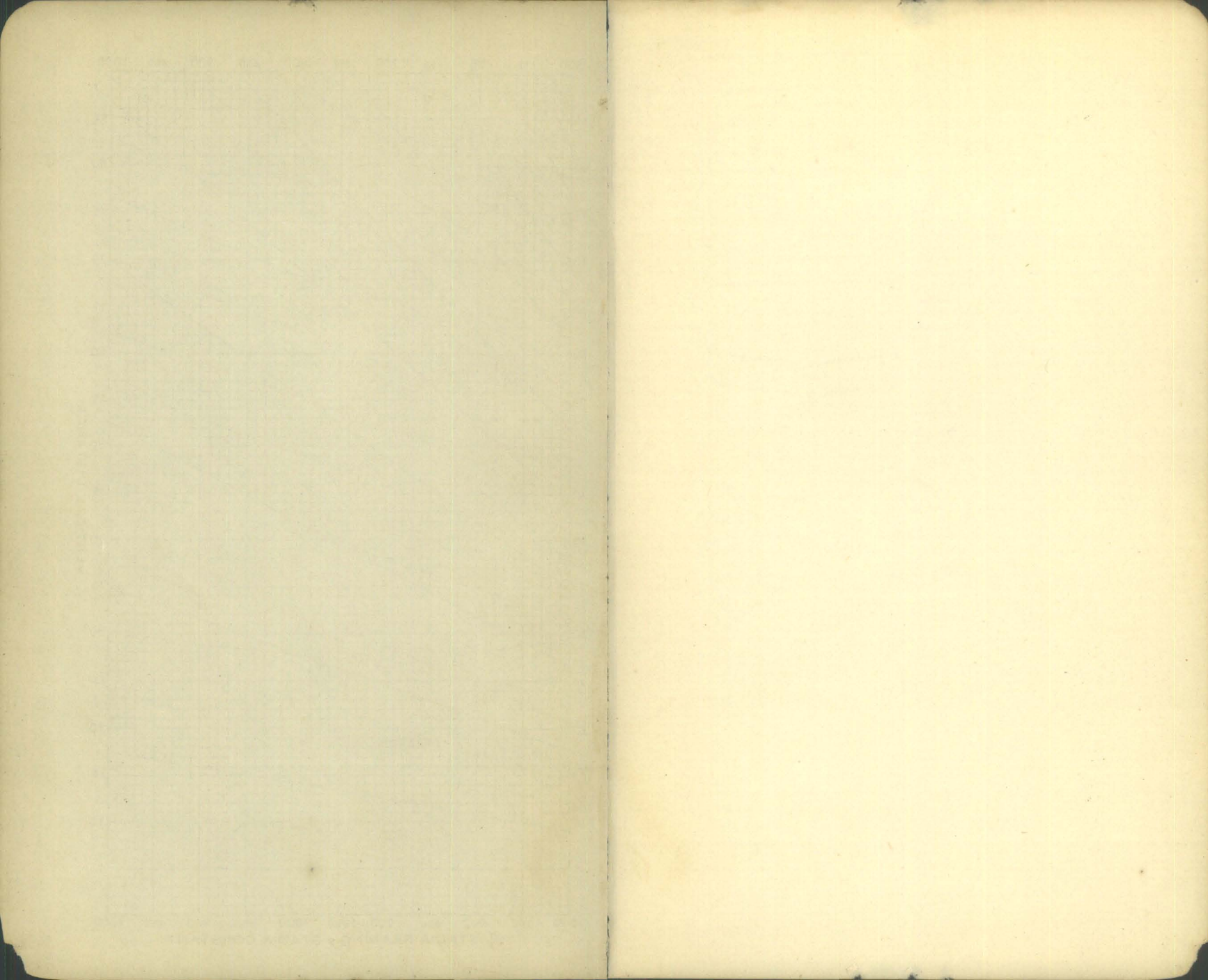
Diagram for Obtaining Horizontal and Vertical Distances From Stadia Readings

Enter the horizontal scale with the value of the stadia interval X the stadia constant (usually 100 and run vertically upward to intersection with the line representing the vertical angle. The location of this point with reference to the dotted lines marked "one" &c. gives the correction to be subtracted from $S f/i$ to get the horizontal distance. Reading on vertical scale equals vertical distance

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Cu/VBot 8.77
 Hwy D 7.87
 Bot wire 5.55

3.22
 2.32

4.60
 1.20

5.80
 2.37

2.80

3.30

2.50

.80

8.50 Culv.

6.90 Hwy D

7.65 Top of hwy/c

7.95 Hrs Level
 5.55
 2.40

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

Roadway 16 feet wide. Side Slopes 1 on 1½.
 For Single Track Embankment.

H	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	H
0	8.0	8.2	8.3	8.5	8.6	8.8	8.9	9.1	9.2	9.4	0
1	9.5	9.7	9.8	10.0	10.1	10.3	10.4	10.6	10.7	10.9	1
2	11.0	11.2	11.3	11.5	11.6	11.8	11.9	12.1	12.2	12.4	2
3	12.5	12.7	12.8	13.0	13.1	13.3	13.4	13.6	13.7	13.9	3
4	14.0	14.2	14.3	14.5	14.6	14.8	14.9	15.1	15.2	15.4	4
5	15.5	15.7	15.8	16.0	16.1	16.3	16.4	16.6	16.7	16.9	5
6	17.0	17.2	17.3	17.5	17.6	17.8	17.9	18.1	18.2	18.4	6
7	18.5	18.7	18.8	19.0	19.1	19.3	19.4	19.6	19.7	19.9	7
8	20.0	20.2	20.3	20.5	20.6	20.8	20.9	21.1	21.2	21.4	8
9	21.5	21.7	21.8	22.0	22.1	22.3	22.4	22.6	22.7	22.9	9
10	23.0	23.2	23.3	23.5	23.6	23.8	23.9	24.1	24.2	24.4	10
11	24.5	24.7	24.8	25.0	25.1	25.3	25.4	25.6	25.7	25.9	11
12	26.0	26.2	26.3	26.5	26.6	26.8	26.9	27.1	27.2	27.4	12
13	27.5	27.7	27.8	28.0	28.1	28.3	28.4	28.6	28.7	28.9	13
14	29.0	29.2	29.3	29.5	29.6	29.8	29.9	30.1	30.2	30.4	14
15	30.5	30.7	30.8	31.0	31.1	31.3	31.4	31.6	31.7	31.9	15
16	32.0	32.2	32.3	32.5	32.6	32.8	32.9	33.1	33.2	33.4	16
17	33.5	33.7	33.8	34.0	34.1	34.3	34.4	34.6	34.7	34.9	17
18	35.0	35.2	35.3	35.5	35.6	35.8	35.9	36.1	36.2	36.4	18
19	36.5	36.7	36.8	37.0	37.1	37.3	37.4	37.6	37.7	37.9	19
20	38.0	38.2	38.3	38.5	38.6	38.8	38.9	39.1	39.2	39.4	20
21	39.5	39.7	39.8	40.0	40.1	40.3	40.4	40.6	40.7	40.9	21
22	41.0	41.2	41.3	41.5	41.6	41.8	41.9	42.1	42.2	42.4	22
23	42.5	42.7	42.8	43.0	43.1	43.3	43.4	43.6	43.7	43.9	23
24	44.0	44.2	44.3	44.5	44.6	44.8	44.9	45.1	45.2	45.4	24
25	45.5	45.7	45.8	46.0	46.1	46.3	46.4	46.6	46.7	46.9	25
26	47.0	47.2	47.3	47.5	47.6	47.8	47.9	48.1	48.2	48.4	26
27	48.5	48.7	48.8	49.0	49.1	49.3	49.4	49.6	49.7	49.9	27
28	50.0	50.2	50.3	50.5	50.6	50.8	50.9	51.1	51.2	51.4	28
29	51.5	51.7	51.8	52.0	52.1	52.3	52.4	52.6	52.7	52.9	29
30	53.0	53.2	53.3	53.5	53.6	53.8	53.9	54.1	54.2	54.4	30
31	54.5	54.7	54.8	55.0	55.1	55.3	55.4	55.6	55.7	55.9	31
32	56.0	56.2	56.3	56.5	56.6	56.8	56.9	57.1	57.2	57.4	32
33	57.5	57.7	57.8	58.0	58.1	58.3	58.4	58.6	58.7	58.9	33
34	59.0	59.2	59.3	59.5	59.6	59.8	59.9	60.1	60.2	60.4	34
35	60.5	60.7	60.8	61.0	61.1	61.3	61.4	61.6	61.7	61.9	35
36	62.0	62.2	62.3	62.5	62.6	62.8	62.9	63.1	63.2	63.4	36
37	63.5	63.7	63.8	64.0	64.1	64.3	64.4	64.6	64.7	64.9	37
38	65.0	65.2	65.3	65.5	65.6	65.8	65.9	66.1	66.2	66.4	38
39	66.5	66.7	66.8	67.0	67.1	67.3	67.4	67.6	67.7	67.9	39
40	68.0	68.2	68.3	68.5	68.6	68.8	68.9	69.1	69.2	69.4	40

Example—If point is 22.6 ft. above grade, how far should it be from center line to be a slope stake point? Ans. from Table 41.9. For same slopes but other widths of roadbed correct above figures by one-half difference in width of roadbed; thus in example above for 20 ft. roadbed distance will be 41.9 + (20—16) ÷ 2 or 2 ft. added to 41.9 = 43.9. For slopes of 1 on 1 see inside of front cover.