

D-211
DISTRICT NO. 11.

No 1.

Topog.



ENGINEERS'
FIELD BOOK

No. 404

10 92

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.

II	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 1 $\frac{1}{2}$ see inside of back cover.

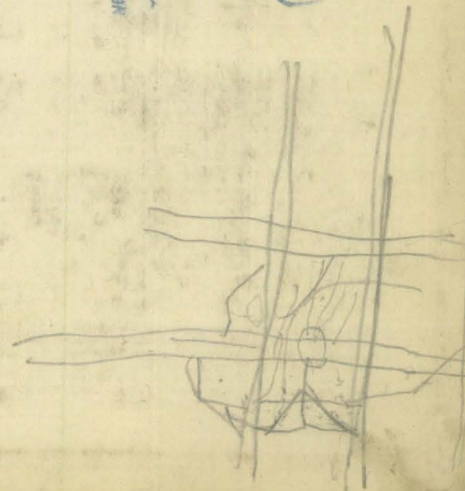
Copyright, 1914, by Eugene Dietzgen Co.

R. P. BRIGGS,
CIVIL ENGINEER
WATERLOO, - IOWA

AUG - 8 '21

FILED

J. W. Baker
COUNTY AUDITOR



Index

LINE	Levels	Topog	Pg.
All	"	"	1-47
Main	Preliminary	"	52-54 (on 98-5)
Bt. 6	"	"	54-55
Δ Correction from $\Delta 16$ Cont. LINE			56

Dist # 11

Δ # 0 = 2690' ^{North} From SW. Cor
Sec. 15 Bennington Twp.

π At Δ # 0

351°-36'	B.S. lath
82°-30'	ETW 1/4 line
262°-30'	" " "

0-1 258°-35' 1360'

π At Δ # 1

B.S.	258°-35'	1370'	# 0
1-2	286°-06'	1480'	

π At Δ # 2

B.S.	286°-06'	1495'	# 1
Cor.	171°-08'	500'	Center Sec.
	172°-00		1/4 line ¹⁵
	352°-00		" "
Tic	112°-44'		Brick Silo NW.

H	234°	1050	W. Side
H	227	1060	E. "
W	231	960	W "

425
7870
82°
2690

June 9-1920
Briggs
Hoff
Whalen

Δ # 0 is on ETW 1/4 line Sec. 15

2622' From A-D to B.S. Lath
829' " B.S. lath to sec. Cor
Elevated 6/28/20

Δ # 1 is 4' W 1/6 line

Δ # 2 is 6' E. NW 3 1/4 line Sec. 15

Creek on ETW 1/4 line approximate Outlet
Creek

H	221 $\frac{1}{2}$	970	Creek	W	187°	1560	Creek
W	227 $\frac{1}{2}$	1020	"	H	261°	1200	"
H	224	1120	"	W	184°	1500	"
W	219	930	"	W	181°	1520	"
W	213	960	"	H	266 $\frac{1}{2}$	1270	"
W	212	1000	"	W	179	1600	"
H	222 $\frac{1}{2}$	1180	"	H	270	1460	"
W	212 $\frac{1}{4}$	1080	"	W	174	1700	"
W	214 $\frac{1}{2}$	1100	"	H	276 $\frac{1}{2}$	1580	"
H	212 $\frac{1}{2}$	1120	"	W	171 $\frac{1}{2}$	1720	Creek on N + S $\frac{1}{4}$ line
W	219 $\frac{1}{2}$	1080	"	H	230 $\frac{1}{2}$	950	N. side Topog.
W	219 $\frac{1}{2}$	1140	"	W	238 $\frac{1}{2}$	940	Creek west side
W	215 $\frac{1}{2}$	1110	"	W	240	980	"
W	211 $\frac{1}{2}$	1100	"	H	215 $\frac{1}{2}$	880	"
W	210 $\frac{1}{2}$	1180	"	W	241	1030	Creek
W	211	1200	"	W	244	1100	Creek
W	209	1280	"	H	208	770	"
W	204	1200	"	W	250	1120	Creek
W	197	1220	"	H	197	730	"
W	191	1300	"	H	191 $\frac{1}{2}$	710	"
W	190 $\frac{1}{4}$	1400	"	W	235	930	S. side Topog.
H	241 $\frac{1}{2}$	1110	Tile Outlet	H	183°	810	"
W	191	1420	Creek	W	235	820	"
H	251 $\frac{1}{2}$	1180	"	H	171 $\frac{1}{2}$	920	$\frac{1}{4}$ line
W	189°	1540	"	W	237	630	"
H	256 $\frac{1}{2}$	1260	"				

W	241 $\frac{1}{2}$	500
W	241	400
W	227	320
W	199 $\frac{1}{2}$	270
W	170 $\frac{1}{2}$	220
W	123	270
H	167 $\frac{1}{2}$	1080
W	110	410
H	159	970
W	105	600
H	214	1130
W	93 $\frac{1}{2}$	570
W	84	540
H	155	1320
W	71	480
H	151 $\frac{1}{2}$	1420
W	59°	410
H	151	1560
W	41 $\frac{1}{2}$	400
H	153	1660
W	34	490
H	150 $\frac{1}{2}$	1800
W	42 $\frac{1}{2}$	620
W	56	660
H	154	1960
W	69	880

$\frac{1}{4}$ line

W	71 $\frac{1}{2}$	1060
W	69°	1240
W	66°	1320
<u>2-6</u>	58°-45'	1250
H	148°	2200
H	145 $\frac{1}{2}$	2360
H	14.5	2600

June 10/20

π At A #0

F.S. 258°-35' #1

O-3 186°-10' 1920'

Tie 128°-25' Brick Silo NW.

O-4 140°-46' 1820'

O-5 73°-52' 1300'

π At A #6

B.S. 58°-45' 1250 #2

Tie 123°-40' Brick Silo NW.

Tie 114°-50' A #0

6-7 12°-26' 1210

W 89° 130'

W 39° 155'

W 342 310'

W 337 440'

W 309 $\frac{1}{2}$ 600'

6-8

W 306° 650

298°-55' 1045

W 305° 710

At A #8

B.S. 298°-55' 1050 #6

W 85½ 170

W 32 150

H 90 950

W 339 180

H 82½ 750

W 316 300

H 68½ 760

W 313½ 420

W 324½ 580

W 334 650

W 318 750

H 357½ 1090

H 4½ 900

H 6½ 820

At A #7

B.S. 12°-26 1220

H 198½ 730

H 199 620

H 207 490

H. 219½ 435

H 240½ 400

H 256¼ 435

H 274 530

W 178 410

H 278 690

W 162 515

H 278½ 800

W 142 560

H 290 770

W 134½ 650

W 129½ 790

W 125 770

H 300½ 830

W 123½ 680

W 100° 530

W 89° 410

H 295 600

W 59 425

H 285 355

W 35½ 570

H 253½ 320

W 27½ 675

W 22½ 690

H 214 375

W 6½ 670

W-12/400d

Barn yard

E+IN Hiny

H 195 615

W 356 740

H 185 715

W 335 770

W 325 710

Tio 134° 51'

7-9 353° 46'

π at Δ #9

BS. 353° 40'

W 281½ 810

W 289 920

W 299 900

W 306½ 830

W 315½ 900

W 321½ 990

BS. Lath 85° 22' 1120

H. 83° 36' 1280

W 322½ 1140

H 75 1200

W 329 1420

H 63½ 1340

W 333½ 1380

H 56 1240

W 340 1300

W 342½ 1260

Close On W

Brick S. 1/2 NW

575'

(S. Side Hwy)

580' 47

B.S. Lath

E+W Hwy.

E+W LF

W 348½ 1500

H 494 1240

W 355 1500

H 41½ 1320

W 7¾ 1360

H 34° 1390

W 13½ 1220

H 30° 1280

W 24° 1140

B.S. Lath. 29' N. CoR.

π at BS. Lath

BS. 85° 22'

H 172° 15' 1010

H 169½ 1300

W 165 2000

W 164½ 1800

H 165½ 1440

W 162½ 1540

H 163¾ 1320

W 158½ 1360

H 161 1220

W 156 1200

H 162¾ 1040

W 158½ 1045

H 167 950

N + S. Hwy

E+W LF

Close

E+W LF + E Hwy

E+W LF

W 156 1000'
H 160 880

T at A # 4

B.S. 140°-46' 1820 0

Cor. 212°-04' 1470

Tie 250°-06'

Tie 115°-07'

4-10 167°-28'

4-19 75°-08'

W 53 $\frac{1}{2}$ 460

W 37 $\frac{1}{2}$ 350

W 358 270

W 327 235

W 300 $\frac{1}{2}$ 170

W 273° 230

W 244 250

W 223 270

W 233 $\frac{1}{2}$ 370

W 245 420

W 251 $\frac{1}{2}$ 515

W 246 $\frac{1}{2}$ 590

W 232 $\frac{3}{4}$ 630

W 225 735

W 216 760

A # 3
Brick Silo NW.

1940

1500

N. Side Main

W 211 720

W 211 $\frac{3}{4}$ 640

W 225 $\frac{1}{2}$ 550

W 231° 520

W 229 $\frac{1}{2}$ 410

W 233 $\frac{1}{2}$ 370

W 202 $\frac{1}{2}$ 250

W 187 330

W 205 $\frac{1}{2}$ 580

W 198 $\frac{1}{2}$ 690

W 197 700

W 202 820

W 200 $\frac{1}{2}$ 950

W 196 $\frac{1}{2}$ 1000

W 194 980

W 190 $\frac{1}{2}$ 920

W 186 870

W 176 $\frac{1}{2}$ 780

W 170 $\frac{1}{2}$ 750

W 151 600

W 141 580

W 134 680

At # 10

BS.	167°-28'	1940	#4	H	152	250	
Tie	44°-10'		Brick Silo SW.	H	143½	450	
Tie	100°-00'		Grey Silo NW.	H	150½	570	
	H	237½			145	670	Close Pond
	IN	3½		H	109½	470	H. Island
	H	234½		H	124	340	
	IN	12		H	162	325	
	H	219½		H	207½	330	
	IN	17½		H	238½	210	
	H	201½		H	300	160	
	IN	22½		H	356½	200	
	H	187½		IN	61	1260	
	IN	27½		H	35	290	
	H	169½		H	59½	470	
	IN	37°		H	83¾	530	
	H	175		IN	80	1090	
	H	166½		H	98½	530	Close H island
	IN	42½		IN	84	1120	
File H	168¾	720	Pond 50' Dia.	IN	80½	1200	
W	48½	1400	E+IN Hwy	H	117	890	
H	146½	740		IN	71½	1440	
H	130½	750	E+IN 1/6	H	113½	1090	E+IN 1/6
H	132½	650	Pond	H	112½	1320	
H	125	530		H	116½	1400	
H	139½	330		W	70½	1500	

	H	126 $\frac{1}{2}$	1360	
	H	132 $\frac{1}{2}$	1500	
10-11	78°-04'		1630	
	H	137 $\frac{1}{2}$	1640	
	H	133	1920	
11-12	140°-00'		2200	
	Tie	24°	460	10° Main
	Tie	57	630	
	Tie	91 $\frac{1}{2}$	940	
	Tie	100 $\frac{1}{2}$	1160	
	π At A #11			
B.S.	78°-04'		1620	#10
Tie	112°-04'		Grey S. 1/2 NW.	
	W	251 $\frac{1}{2}$	315	N+S. 1/4 line
	W	256	520	
	W	6°	600	
COR.	352 $\frac{1}{2}$	680		
	H	174	680	1/6 COR.
	H	186 $\frac{1}{2}$	520	T.O.P.
	W	35	780	
	H	175 $\frac{1}{2}$	290	N+S. 1/4
	H	131	370	
	H	116 $\frac{1}{4}$	570	
	H	102	770	
	W	43	830	

	H	103	990	
	W	55	810	
	H	95 $\frac{1}{2}$	1200	
	W	59 $\frac{1}{2}$	900	
	H	91	1220	
	W	68 $\frac{1}{2}$	780	
	H	89 $\frac{1}{2}$	1120	
	W	69	550	
	H	90	920	
	H	84	715	
	W	350	110	1/4 N+S.
	H	90 $\frac{1}{2}$	490	
	H	112	260	
	W	324 $\frac{1}{2}$	145	
	H	179 $\frac{1}{2}$	150	1/4 N+S.
	W	282 $\frac{1}{2}$	150	
	W	255	170	
11-13	142°-04'		1130	
	π At A #13			
B.S.	142°-04'		1150	#11
Tie	95°-48'			Grey S. 1/2 NW.
Tie	216°-55'		1436'	#12
	W	292 $\frac{1}{2}$	690	1/4 N+S
	W	294 $\frac{1}{2}$	550	
	W	307 $\frac{1}{2}$	340	

IN	289	240	
Cor.	202°-18'	1200	Center Jc.
IN	261 $\frac{1}{2}$	220'	
IN	233 $\frac{1}{2}$	220'	
IN	201	115'	
IN	161	75'	
H	228 $\frac{3}{4}$	1160	
IN	53	340	
H	216	1090	
IN	43	475	
H	205 $\frac{1}{4}$	1120	N+S. $\frac{1}{4}$ line
IN	43	590	
IN	50 $\frac{1}{2}$	850	
H	205	1240	ETIN $\frac{1}{4}$ line
IN	57	1030	
IN	67	1180	
H	203	1340	
IN	70 $\frac{1}{2}$	1480	
H	202 $\frac{1}{2}$	1590	
IN	72 $\frac{1}{2}$	1700	
H	198 $\frac{1}{4}$	1740	
IN	76 $\frac{1}{2}$	1770	
H	197 $\frac{1}{2}$	2040	
IN	77 $\frac{1}{2}$	1440	
H	197	2200	
IN	80 $\frac{1}{2}$	1220	

H	194 $\frac{1}{2}$	2400	
IN	83	900	
H	195	2650?	ETIN P.L.
IN	92 $\frac{1}{2}$	640	
H	193°	2800	
IN	95	500	
H	187 $\frac{1}{2}$	2810	
IN	129 $\frac{1}{2}$	430	
H	187	2600	
IN	155	410	
IN	186	400	
H	191	2300	
IN	102 $\frac{1}{2}$	550	
H	194	2160	
H	193	2000	
IN	164 $\frac{1}{4}$	670	
H	192	1820	N+S. $\frac{1}{4}$
IN	160	810	
H	194	1540	
IN	160 $\frac{1}{2}$	920	
IN	156 $\frac{1}{2}$	770	
H	191	1340	
IN	153 $\frac{1}{2}$	830	
H	184	1300	
IN	147	840	
H	179	1460	

	W	137	920	
	H	178 $\frac{1}{2}$	1730	
13-14	178°-24'		1720	
	π At Δ #14			
BS.	178°-24'	1740	#13	
Tie	52°-13'		Grey Silo SW.	
Tie	344°-08'		4 #11	
	W	33 $\frac{1}{2}$	1200	
	Tie	10 $\frac{1}{2}$	670	Main
	W	43	1520	
	Tie	27	600	Main
	W	44 $\frac{1}{4}$	1600	
	Tie	79°	510	
	W	45	1860	
	W	47	1940	
	W	51 $\frac{1}{2}$	2040	
	H	174	690	E+W P.L.
	H	166 $\frac{1}{2}$	890	
	H	163 $\frac{1}{2}$	1100	
	H	170	1320	
	H	165	1500	
	H	164	1680	
	H	161 $\frac{1}{2}$	2060	E+W Hwy.
	H	163	2408	
	H	160	2500	

H	154	2140	E+W Hwy
H	157	1760	
H	160 $\frac{1}{2}$	1700	
W	54	2190	
H	158 $\frac{1}{2}$	1440	
W	57 $\frac{1}{2}$	2260	
H	155	1220	
W	60 $\frac{1}{2}$	2660	R/+S. Hwy
H	149	1050	
Cor.	66°-00'	2460	
H	144	790	E+W H
W	64	2020	
H	137 $\frac{1}{2}$	650	
W	67°	2000	
H	121 $\frac{1}{2}$	570	
W	72 $\frac{1}{2}$	2040	
H	111 $\frac{1}{2}$	670	
W	78	2030	
H	106 $\frac{1}{2}$	790	
W	77	1820	
H	105	960	
W	68	1480	
H	117 $\frac{1}{2}$	1200	
W	63 $\frac{1}{2}$	1440	
H	120 $\frac{3}{4}$	1400	
W	61 $\frac{1}{2}$	1200	

IV 64 1035
 IV 66 $\frac{1}{2}$ 870
 IV 74 1010
 IV 82 1230

14-15 113°-12' 1200
 IV 82 1320

At A #15

BS. 113°-12' 1190 #14
 Tie 23°-48' Grey Silo SW
 Tie 329°-20' #11
 Tie 332°-39' #13

IV 30 $\frac{1}{2}$ 750
 IV 45 780
 IV 56 900
 H 144 $\frac{1}{2}$ 700
 H 140 $\frac{1}{2}$ 780
 H 131 $\frac{1}{2}$ 960
 H 120 1100
 H 113 1140
 IV 67 1115
 H 107 970
 IV 71 $\frac{1}{4}$ 1300
 H 102 $\frac{1}{2}$ 1140
 H 97 $\frac{1}{2}$ 1300
 H 89 1420

N+S. Hwy

N+S. Hwy

IV 71 $\frac{1}{4}$ 1480 Barn yard
 H 76 $\frac{1}{4}$ 1480
 15-16 65°-53' 1420

At A #16

BS 55°-53' — #15
 CoR. 352 $\frac{1}{2}$ 650' 1/4 CoR.
 Hwy S. 353°-0'

" N 173°-0'
 Tie 345°-50' Grey Silo S.
 Tie 261°-41' (2185') A #14

Small Cor. W. of road both N+S of E & W $\frac{1}{4}$ E & S East.

At.

pt. in N+S. Hwy 830'

South of A #0

azim to 0 = 171°-0.5'

H 171 $\frac{1}{2}$ 145 $\frac{1}{2}$ Hwy Island
 IV 186 130
 IV 236 $\frac{1}{2}$ 110
 H 137 380
 IV 304 $\frac{1}{2}$ 130
 H 127 $\frac{1}{2}$ 420
 IV 351 $\frac{1}{2}$ 105 $\frac{1}{2}$ Hwy.
 H 116 $\frac{1}{2}$ 310
 H 93 145'
 H 55 90 Closest Island

W	334 $\frac{1}{2}$	315	island
H	315	250	
W	342	520	
H	315 $\frac{1}{2}$	400	
W	336 $\frac{1}{2}$	715	
H	313 $\frac{1}{2}$	550	
W	330	890	
H	305	550	
H	305 $\frac{1}{2}$	680	
W	322 $\frac{1}{2}$	1200	
H	310 $\frac{1}{2}$	850	
W	323	1300	
H	309 $\frac{1}{2}$	975	

Close this topog. on topog

Taken From A # 7.

T At A # 5

BS. 73-52' 1300' # 0
 Tie 149-44' Brick Jile NW

H	291 $\frac{1}{2}$	1260	Close on Island
H	279	1080	" " "
H	272	980	
H	264 $\frac{1}{4}$	920	
H	256	870	
H	255	700	

H	251 $\frac{1}{4}$	500	
H	235 $\frac{1}{2}$	420	ETW 1/4 line
H	205 $\frac{1}{2}$	280	
H	135	250	1/4 line "
H	95	230	
W	164	1520	N. side main
H	61	315	
W	160 $\frac{1}{2}$	1880	
H	44 $\frac{1}{2}$	490	
W	157	1840	
H	26 $\frac{1}{2}$	630	
W	156	2100	
H	17	670	ETW FL.
W	149 $\frac{1}{2}$	2140	
W	147	2120	
W	148 $\frac{1}{2}$	2000	
W	144	1700	
W	145 $\frac{1}{4}$	1540	

~~5-17 25-43' 1085~~

W	140	1360	
W	132	1260	
W	124	1220	
W	117	1240	
W	116 $\frac{1}{2}$	1420	
W	116 $\frac{1}{2}$	1720	

17

X

5-17

17°-25'

1360

NW 102 $\frac{1}{4}$ 1520 N+S P.L.NW 97 $\frac{1}{2}$ 1400NW 95 $\frac{1}{2}$ 1280NW 91 $\frac{1}{2}$ 1200 E+W $\frac{1}{4}$ line

NW 86 1160

W 80 1180

NW 72 $\frac{1}{2}$ 1440 N+S P.L.

At A # 17

BS. 17°-25' 1360 # 5

Tie 168°-36' Old # 17

Tie 164°-28' Brick Silo NW

NW 79 $\frac{1}{2}$ 830 N+S P.L.

H 208 540

NW 68 760

H 227 $\frac{1}{2}$ 3120H 250 $\frac{1}{2}$ 255

W 47° 840

H 288° 190

W 34 $\frac{1}{2}$ 830

H 183 190

H 181 350

W 25 $\frac{1}{4}$ 900H 165 $\frac{1}{4}$ 470

NW 12 940

H 159 600

H 141 680

W 7 1090

H 132 610

H 120 $\frac{1}{2}$ 600

H 107 520

W $\frac{1}{2}$ 1300 E+W Hwy.X H 94 $\frac{3}{4}$ 390

NW 356° 1400

H 76 320

H 16 $\frac{1}{2}$ 260 E+W F.L. ? P.L.

NW 355 1640

H 342 $\frac{1}{2}$ 240H 322 $\frac{1}{4}$ 480

H 317 650

H 308 835

77-18 334°-34' 1800'

H 294 $\frac{1}{2}$ 1000

At A # 18

BS. 334°-34' 1790' # 17

Tie 161°-23' Brick Silo NW.

Tie 245°-40' (BS. Lot 4 ?)

H 174 $\frac{1}{4}$ 1280H 199 $\frac{1}{2}$ 1180H 203 $\frac{1}{2}$ 1050

H 211 $\frac{1}{2}$ 975

H 220 $\frac{1}{2}$ 1010

H 225 $\frac{1}{2}$ 920

H 227° 760

H 242 $\frac{1}{2}$ 800

H 255 870

H 262 960

H 276 920

H 282 1100

H 281 1240

H 283 1320

H 297 1660

H 295 1920

H 298 1980

H 308 $\frac{1}{2}$ 1800

H 312 1600

H 308 $\frac{1}{2}$ 1400

H 297 $\frac{1}{2}$ 1080

H 295 $\frac{1}{2}$ 650

H 281 $\frac{1}{2}$ 510

W 76° 660

H 269 480

~~W 59 $\frac{1}{2}$ 600~~

H 255 312

~~W 31 $\frac{1}{2}$ 370~~

E + W. HWY.

N + S HWY

W. on divide
1.3 feet from west
to P.L.

N + S

H 280° 370

H 208° 420

H 337 $\frac{1}{2}$ 300

H 346 $\frac{1}{2}$ 170

H 262 $\frac{3}{4}$ 155

W 48° 830

W 37° 950

H 234 $\frac{1}{2}$ 130

W 29 980

H 152 130

W 20 930

H 66 $\frac{1}{2}$ 210

W 15 860

H 37 $\frac{1}{4}$ 230

W 19 $\frac{1}{2}$ 700

H 26 $\frac{1}{2}$ 330

W 7° 620

H 13° 350

W 356 $\frac{1}{2}$ 720

H 337 420

W 351 880

H 315 470

H 313 $\frac{1}{2}$ 610

H 315 780

W 347 1100

H 326 830

Pond. 900 @ N.

"

"

"

End Pond readings

8
82
86
9.0
9.3

74

H	328	710
W	347	1060
H	324 $\frac{1}{4}$	1000
W	337	1140
H	319	1080
H	315 $\frac{1}{2}$	1300
W	326 $\frac{1}{2}$	1200
H	322 $\frac{1}{2}$	1260

Close

 π At Δ #19

BS. 75°-08' 1520

Tie 291°-36'

Tie 315°-28'

Tie 175°-24'

19-20 22°-57' 1440

Tie 340°-13'

W 15 $\frac{1}{2}$ 650H 3 $\frac{1}{4}$ 1300W 29 $\frac{1}{2}$ 600

H 14 1170

W 55 530

H 22 $\frac{1}{2}$ 1140

W 81 570

H 33 $\frac{1}{2}$ 1145

W 104 660

H 33 $\frac{1}{2}$ 1400W 114 $\frac{1}{2}$ 800

H 35° 1600

H 43 1640

W 132 $\frac{1}{4}$ 980H 49 $\frac{1}{2}$ 1620W 141 $\frac{1}{4}$ 1240H 60 $\frac{1}{4}$ 1720W 130 $\frac{3}{4}$ 1280

H 65 1800

W 112 $\frac{1}{2}$ 1080

H 68 1670

W 105 $\frac{1}{2}$ 1060H 69 $\frac{1}{2}$ 1480

W 98 1080

H 77 1440

W 98 1240

H 78 $\frac{1}{2}$ 1600

H 76 1740

H 79 1900

19-21 118°-40' 1360

 π At Δ #21

BS. 118°-40' 1360

Tie 308°-53'

Tie 247°-40'

H 48' 1400

N+S P.L. ($\frac{1}{4}$?)

BOM, YOLD

#4

#0

#5

Brick Silo N.

H.

#17

N+S. P.L.

N+S. P.L.

(C.R)? N+S. P.L.

#21

#19

#5?

Brick Silo SE

6/17/20

16

W	70	190
H	47	1560
W	119 $\frac{1}{4}$	310
H	45	1760
W	131 $\frac{1}{2}$	450
H	45	1920
W	128 $\frac{3}{4}$	620
H	46 $\frac{1}{2}$	2060
W	133	685
H	51	2020
W	138 $\frac{1}{2}$	930
H	56	2080
W	143°	1140
H	62 $\frac{1}{4}$	2100
W	139°	1260
H	69 $\frac{1}{2}$	1940
W	131	1400
H	72 $\frac{1}{4}$	1800
W	129	1580
H	73	1580
H	66	1220
21-22	127°-26'	1780
H	56	990
H	48 $\frac{1}{4}$	770
H	73	775
W	84	870

ETW HWY.

N+5 HWY.

N+5 F.?

H	93	990
H	96	1110.
H	95	1320
H	100	1560

T At A# 22 07 Topog

BS. 127°-26'

1770

#21

Tie 154°-49'

Grey Silo HWY

H	6 $\frac{1}{4}$	750
H	17	640
H	36 $\frac{1}{2}$	590
H	51 $\frac{1}{2}$	560
W	66	490

Culv 309 $\frac{1}{2}$

980

ETW HWY

H 91 $\frac{1}{2}$ 340

Close

Sec. Cor. 33°-42' 480

X HWY 55.

T At. A# 20

BS. 22°-57'

1440

#19

Tie 161°-50'

#21

Tie 312°-06'

#17

Tie 190°-56'

Brick Silo NE

Center Sec. 278 $\frac{3}{4}$ 510'

Center Sec.

H	335	1680
H	342 $\frac{1}{2}$	1500
W	337'	700'

E. + W. P.L.

6/17/20

#7

W 251 670

W 15 $\frac{1}{2}$ 580H 4 $\frac{1}{2}$ 1600W 61 $\frac{1}{4}$ 400

H 14 1640

20-23

18°-53'

2020

H.

W 80 $\frac{3}{4}$ 360~~W 83 560~~

This Could be

W 88 580

taken North

W 86 870

N+S. F.L.

W 73 890

 $\frac{1}{16}$ Cor.

W 68 700

W 45 $\frac{1}{2}$ 535W 30 $\frac{1}{2}$ 580

W 16 880

W 21 $\frac{3}{4}$ 1040W 28 $\frac{1}{2}$ 1120W 40 $\frac{1}{2}$ 1160At Δ # 23

B3.

18°-53' 2040

#20

Tic

194°-31'

Brick 3/10 NE

Tic

255°-55'

#17

W 171 $\frac{1}{4}$ 1100W 167 $\frac{1}{2}$ 1700E+W $\frac{1}{4}$

H 198 180

W 169 1800

W 166 1880

W 161 1720

W 160 1500

W 163 1360

W 162 $\frac{1}{2}$ 1180

W 158 1070

W 149 $\frac{1}{4}$ 1040

W 144 1040

23-24 116°-20'

1550'

24 (in Hwy)

H 88 $\frac{1}{4}$ 1280

N+S. Hwy.

H 87 $\frac{3}{4}$ 1040

H 84 870

H 69 $\frac{3}{4}$ 740

H 52 810

W 272 45'

H 44 950

W 322 $\frac{1}{4}$ 150

H 30 1030

W 332 320

W 342 $\frac{1}{2}$ 570H 31 $\frac{1}{2}$ 1220

E+W. Hwy.

W 347° 1000

W 346 $\frac{3}{4}$ 1050

E+W. Hwy.

W 343 1140

W 341 1200

275
1150

IV 337 1240

275
1150

IV 230 1180

23-25 332°-04' 1150

23-26 26°-10' 1540

275
1150

TA At A # 25

BS. 332°-04' 1135 #23

Tic 131°-24' #24

Tic 186°-16' B. S. 10 NE.

H 246 $\frac{1}{2}$ 190 ETW HWY.

H 221 $\frac{1}{4}$ 430

H 232 $\frac{1}{2}$ 620

25-27 297°-44' 1950

H 237 $\frac{3}{4}$ 820

H 246 $\frac{1}{2}$ 730

H 258 700 ETW HWY.

H 267 $\frac{1}{2}$ 800

H 281 $\frac{3}{4}$ 690

H 277 825

H 269 $\frac{1}{2}$ 1060 N. S. P. L.

H 271 $\frac{1}{2}$ 1600

H 267° 1200

IV 271 $\frac{3}{4}$ 1500

275
1950

TA At A # 27

BS. 297°-44' 1960 #25

Tic 169°-39' B. S. 10 N.

Tic 177°-57' #17

IV 235 $\frac{1}{2}$ 140

IV 174 120

IV 145 $\frac{1}{2}$ 200

IV 135 $\frac{1}{2}$ 220 Carry to pt Shot Island

IV 118 190 For divide Et W.

X to Island

IV 111 420 Island

IV 116 570 "

IV 106 590 "

IV 96 $\frac{1}{2}$ 480 "

IV 99 390 "

III 111 420 " Close Island

IV 10° 195

IV 317° 300

IV 300° 350

IV 282 480

IV 276 $\frac{1}{2}$ 600

IV 281 $\frac{1}{2}$ 870

27-28 349°-45' 1620

IV 287° 990

IV 292 $\frac{1}{4}$ 1020

IV 308 $\frac{1}{4}$ 1100

55

π At A 28

BS. 349° 45' 1620' #27

Tic 169° 41' B. S. 10 N.

W 213 760

W 223 $\frac{3}{4}$ 850

W 224 890

H 153 $\frac{3}{4}$ 1070 H. island

H 162 $\frac{1}{2}$ 1100

W 244 $\frac{1}{2}$ 1360

H 171 1000

W 248 1440

H 190 $\frac{1}{2}$ 790

H 203 750

W 257 $\frac{3}{4}$ 1260

H 188 $\frac{1}{2}$ 840

W 263 1220

H 175 835

W 265 1340

H 169 730

W 273 1380

W 286 1240

W 300 1280

W 303 $\frac{1}{4}$ 1320

W 311 $\frac{1}{4}$ 1080

W 317 $\frac{1}{2}$ 1010

W 328 $\frac{1}{2}$ 730

C. 1000 Island

W 232 840

W 248 $\frac{1}{4}$ 890

H 0° or 360-910

H 17 $\frac{3}{4}$ 1000

H 31 1020

H 39 $\frac{1}{2}$ 1380

H 40 $\frac{1}{2}$ 1540

28-29 49° 10' 1460

π At A 29

BS. 49° 10' 1440

Tic 197° 30'

Tic 177° 49'

W 205° 1080

H 254° 250

H 43 280

Divide 212 770

Divide 217 740

H 69° 450

H 61 700

Divide 56° 155

H 54° 850

H 35 $\frac{1}{2}$ 1030

-

W 77 480

W 93 $\frac{1}{2}$ 470

19

#28

#27

B. S. 10 N.

{ 1/16 Cor.
ETW 1/4 line

Small Island W.

H 41 1/2 880

H 39 1000

IV 142 570 12/10/04

H 46 1/4 1180

IV 154 1/2 470

H 41 1400

IV 110 1/2 170

IV 45 1/2 260

H 46 1520

H 45 410

H 49 1680

IV 61 440

H 77 480 Close island

29-30 62°-10' 1680

29-31 131°-16' 735

IV 151 680

IV 134 1/2 620

IV 121 1/2 520

IV 91 1/2 600

IV 87 1070

IV 72 1300

IV 74 1/2 1500

IV 75 1800

H Δ-30

B.S 62°-10' 1660'

Tie 186°-57' B.S. 16. E.

W 142 1030 close on W from Δ-29 (Hwy)

136 1/2 875 Hwy

158 530

156 1/2 460

120 655 X over.

W 56 1/4 420 Hwy

61 1/2 180 Interior Divide

322 1/2 90 close Divide

W 319 400 close on H from Δ-29

343 410

358 1/2 630

11 1/2 880

30-32 49°-37' 1350'

H Δ-32

B.S 49°-37' 1340'

Tie 236 1/2 TO Δ-32 (3. Δ-29)

W 297 1/4 820 Hwy

298 3/4 780 Not in top. Set. Cor

317 1/4 1080 Hwy

327 1/2 1400 Hwy

336 1/4 1360

W	397½	1550
W	356¼	1580
W	12¾	1670
W	15	1600
W	25¾	1570
W	35	1180
W	30½	920
W	25¼	760
W	27	560
W	38	375
W	45½	200
W	65	200
W	74½	490
W	68	630
W	51½	820
W	62½	1600?

B&K Wheelan.

B. Silo N.E.

1320 To Δ[#]33 B.S.1320 To Δ[#]32 Tie

B.S. Silo N.E.

Tie
32-33 96°-45'
⊠ A+ Δ[#]33

B.S. 96°-45'

Tie 223°-30'

W. 15½° 260

W 56½ 280

W 81 720

W 102 720

B?

Hwy

W	119°	700'
W	138½	1080
W	150	1440
W	158¾	1600
W	158	1560
W	161½	1460
W	174	1390
W	182¾	1320
W	191¼	1260
W	204½	1150
W	213	1200

33-34 213°-04' 1380' To Δ[#]34

221½ 1360

229¼ 1540

233½ 1760

⊠ A+ Δ[#]34

213°-04' 1400

Tie 196°-40'

Tie 339°-30'

279½° 680'

263½ 630

240 330

151 300

161½ 550

To Δ[#]32B. Silo N.E.
Δ[#]32

W 181 $\frac{1}{2}$ ° 580'
 209 $\frac{1}{2}$ ° 660
 242 $\frac{1}{2}$ ° 1090
 277 $\frac{1}{4}$ ° 1040

At Δ # 31

B.S. 131°-16' 735

Tie 181°-27'

Tie 37°

W 391° 180'

30 260

60 $\frac{1}{2}$ ° 560

74 590

85 675

90 740

99 $\frac{1}{2}$ ° 740

106 550

123 $\frac{1}{2}$ ° 360

128 250

161 90

196 180

165 286

138 510

134 660

128 $\frac{1}{2}$ ° 715

131 500

Close on W top from
 S-29 feet out old top.
 below this point

W 133° 430'

123 $\frac{1}{2}$ ° 360

106 $\frac{1}{2}$ ° 560

112 $\frac{3}{4}$ ° 720

112 $\frac{3}{4}$ ° 820

107 880

103 820

101 $\frac{3}{4}$ ° 720

89 $\frac{1}{2}$ ° 680

84 950

78 1190

79 1490

80 $\frac{1}{2}$ ° 1900

91 $\frac{1}{2}$ ° 1680

31-35 104°-49' 137 1390' To Δ # 35

6/22/20

At Δ # 26

B.S. 26°-10' 1560

Tie 197°-30'

H 141 $\frac{1}{2}$ ° 240

H 110° 450

H 117 $\frac{3}{4}$ ° 485

H 101 $\frac{1}{2}$ ° 860

W 35 420

23

B. S. to N.

N + S. HWY

X HWY. Cor.

E + W. HWY.

H	107	1040
W	43	510
H	108	1220
W	58 $\frac{3}{4}$	810
W	101 $\frac{3}{4}$	1430
W	65	1040
W	70 $\frac{1}{2}$	1240
H	89	1600
H	80	1680
H	75	1660
W	73 $\frac{1}{2}$	1280
H	80 $\frac{1}{2}$	1440
W	78	1280

Take W's line 200' N
of as shown in Notes

Tic	205°-41'	
26-36	71°-23'	
H	257 $\frac{1}{2}$	770
H	22	790
H	30 $\frac{1}{2}$	810
H	35	850
H	36 $\frac{3}{4}$	1110
H	41	1300

π At A # 36

BS.	71°-23'	1424
Tic	297°-53'	

N+S. Hwy

Ch. Steeple SE
1424

N+S. Hwy

Ch. Steeple SE

W	264°	1020
H	332°	870
W	266 $\frac{3}{4}$	1015
H	335 $\frac{1}{2}$	1000
W	271 $\frac{1}{2}$	840
H	340	1080
W	290 $\frac{1}{2}$	460
W	285	315
W	279	220
H	349	1180
W	322	140
H	356	1240
W	23 $\frac{1}{2}$	260
H	0°	1340
W	43 $\frac{1}{2}$	440
H	5 $\frac{1}{2}$	1480
H	10 $\frac{1}{4}$	1600
W	54 $\frac{1}{4}$	615
H	15 $\frac{1}{2}$	1645
W	52 $\frac{3}{4}$	1000
H	22 $\frac{1}{2}$	1600
W	52	1280
H	28	1400
H	32	1480
W	50 $\frac{1}{2}$	1660
H	31	1720

N+S. Road

Shoring has 2 or 3 strings
running E-W thru this
piece S.W. 1/4.

N+S. P.L.

Same P.L.

W	57	2100	N+S. P.L	H	23 $\frac{1}{2}$	595	
H	31	2020		W	31	690	
W	54 $\frac{1}{4}$	2060		H	39	700	ETW. P.L
W	54	2200		W	39	740	
H	36	2400		H	52	950	
W	50	2250		W	52	970	ETW. P.L
H	40	2600		W	48	1060	
W	47 $\frac{1}{2}$	2240		H	66	1010	
H	43	2620		W	41	1180	
W	44 $\frac{1}{2}$	2240		H	72 $\frac{1}{4}$	900	
H	42	2300	Close -	W	32 $\frac{1}{2}$	1140	
H	9 $\frac{3}{4}$	1140	CoR F.X	H	72	620	
H	24 $\frac{1}{2}$	1440	? 15/92d	W	22 $\frac{1}{4}$	1050	
H	18 $\frac{1}{2}$	1200		H	30 $\frac{1}{2}$	230	N+S. P.L
H	14	920	N+S F.L.	W	7 $\frac{1}{4}$	900	
H	1 $\frac{1}{4}$	590		H	344	315	

26-37 359°-12' 1660

H	348	530		H	315 $\frac{3}{4}$	400	
H	340 $\frac{1}{2}$	590	Close Island	W	333 $\frac{1}{2}$	730	

At A # 37

BS. 359°-12' 1680' #36

Tie 274°-0' #35

Tie 342°-50' #34

H	CoR.	8 $\frac{3}{4}$	510	CoR FS	W	300 $\frac{1}{2}$	780	ETW. P.L.
W		15 $\frac{1}{2}$	600		W	296	880	"

W	347	800		H	288 $\frac{3}{4}$	720	
H	300 $\frac{1}{2}$	550		W	302 $\frac{1}{2}$	760	
W	313 $\frac{1}{2}$	770		H	282	730	
H	298 $\frac{3}{4}$	720		W	300 $\frac{1}{2}$	780	ETW. P.L.
W	296	880					

H 268 $\frac{1}{2}$ 680
 W 300 $\frac{1}{4}$ 950
 H 258 580
 W 296 1040
 H 248 670
 W 292 1080
 H 251 860
 W 296 $\frac{1}{2}$ 1400
 W 299 1420
 W 299 1400
 H 246 $\frac{3}{4}$ 1060
 W 297 $\frac{1}{2}$ 1460
 H 231 1040
 W 288 1340
 H 230 1400

π At A # 35

BS:

104°-49

W 146 $\frac{1}{2}$ 275
 W 166 470
 176 560
 189 $\frac{1}{2}$ 510
 202 $\frac{3}{4}$ 410
 222 $\frac{1}{2}$ 280
 257 200
 289 130
 291 $\frac{1}{2}$ 10

N+S. HWY

N+S. HWY

Close

31

Island

close blood

π At A # 29 (in HWY)

BS. 116°-20'

1540

23

Tic 313°-30'

Ch. Steeple SE

Tic 128°-02'

B. vent NW.

W 223 $\frac{1}{2}$ 680

W 215 640

H 8° 880

HWY 351° Southly

" 171° Northly

H 12 1000

H 28 1030

H 34 760

H 47 750

H 55 750

H 57 $\frac{1}{2}$ 1140

H 52 $\frac{1}{2}$ 1360

24-39 223°-37' 690

W 193 600

W 189 $\frac{1}{4}$ 470

24-38 32°-45' 1480

H

W 170 340 N+S. HWY

W 157 450

W 162 $\frac{1}{2}$ 720

W 169 860

W 168 820 E+W. PL.

Note - Hwy Bridge 15
200' S. of Δ #24

W 169 $\frac{1}{2}$ 1060

W 164 $\frac{1}{2}$ 1130

W 156 1000

W 151 870

W 132 $\frac{1}{2}$ 1050

W 129 1200

W 128 $\frac{1}{2}$ 1400

W 129 1700

W 128 $\frac{1}{2}$ 2000

24-40

148°-12'

2000

W.

π At Δ #39

BS. 223°-37' 690'

#24

TIC 217°-41'

Ch. Steeple SE

H 175 230

{ Connect onto
W. Topog here.

H. E+IV P.L. 177 400

H 198 560

H 193 730

H 180 $\frac{1}{2}$ 1000

H 174 1060

π At Δ #38

BS 32°-45' 1460

#24

TIC 353°-49'

#36

W 150 $\frac{1}{2}$ 1040

N+S. P.L.

W 140 $\frac{1}{2}$ 1030

W 122 1300

H 104 $\frac{1}{2}$ 410

Same pt.

W 115 1400

W 110 $\frac{1}{2}$ 1480

H 61 $\frac{1}{2}$ 440

W 109 1600

H 40 510

N+S. P.L.

W 109 1760

H 14 $\frac{1}{2}$ 540

W 110 $\frac{3}{4}$ 1900

H 9 $\frac{1}{2}$ 630

W 109 $\frac{1}{2}$ 2120

N+S. P.L.

H 19 $\frac{1}{4}$ 860

CoR. Hwy + F.L.

H 18 $\frac{1}{4}$ 1120

W 106 $\frac{1}{2}$ 1920

H 25 1420

W 99 $\frac{1}{4}$ 2000

E+IV P.L.

H 25 1700

W 97 $\frac{1}{2}$ 2180

Same P.L.

H 26 $\frac{1}{2}$ 1940

W 91 $\frac{1}{4}$ 2300

H 29 2260

W 82 2400

H 30 2350

W 75 2600

H 34 2800

11V 73 $\frac{3}{4}$ 2800

H 37 $\frac{1}{2}$ 2900

H 36 2500

11V 66 $\frac{1}{4}$ 2740 Hwy E+M

H 38 2400

H 41 $\frac{1}{2}$ 2370

H 45 2200

H 43 1960

H 45 1800

38-41 50°-10' 1940

H 50 1440 Hwy E+M

6/23/20

At Δ # 41

BS 50°-10' 1950

Tic 293°-50' Ch. Steeple SE.

11V 78 $\frac{1}{2}$ 970

11V 70 740

11V 62 650

11V 51 430

11V 46 280

11V 170 $\frac{1}{2}$ 30'

11V 203 318 E+M. Hwy.

11V 204 450

11V 210 $\frac{1}{2}$ 490 Close with H.

41-42 179°-16' 1980

H. 27

At Δ # 42

BS. 179°-16' 2000

Tic 209°-47'

Tic 258°-0'

Tic 303°-17'

H 134 $\frac{1}{2}$ 540 P.L. ? H+S.

H 155 480

H 186 $\frac{1}{4}$ 470

H 197 610

H 186 715

11V 260 $\frac{1}{2}$ 1000 H+S. P.L.

H 174 $\frac{1}{2}$ 820

11V 254 $\frac{1}{2}$ 1020 H+S. P.L.

H 164 $\frac{1}{2}$ 1000 E+M. F.L.

11V 247 $\frac{1}{4}$ 920

H 155 $\frac{1}{4}$ 1120

11V 241 680

H 145 1120

11V 221 370

11V 208 $\frac{1}{2}$ 230

H 124 990

11V 131 $\frac{1}{2}$ 240

11V 114 $\frac{1}{2}$ 240

H 114 870

41

40

24° (Hwy)

Ch. Steeple

	W	$1\frac{1}{2}^{\circ}$	940	E+W. Hwy.	H	322°	1520
45-46		358°-43'	1320		W	335	1320
Tic		34°-23'		School Flag Pole	H	327 $\frac{1}{2}$	1440

N+S. P.L. Close.

NOTE: -

This Sub. District was laid out by H. B. Barker former County Engineer. Farmers say that starts at center with 18" tile + ends at E+W. Hwy. with 8." No tile South E+W. Hwy. 40' just N. of Hwy. thoroughly drained. Burgeo.

	π	At Δ #	46	
BS.		358°-43'	1320	# 45
Tic		119°-50'		School Flag Pole
	H	258	550	
	H	282	800	
	H	289	775	
	H	292 $\frac{1}{4}$	780	
	W	23	110	
	H	309 $\frac{1}{2}$	900	
	W	339 $\frac{1}{2}$	270	
	H	313 $\frac{1}{2}$	880	
	W	345 $\frac{1}{2}$	420	
	H	315 $\frac{1}{4}$	1000	N+S. P.L.
	W	352 $\frac{1}{4}$	570	
	H	314	1180	
	W	348	700	
	H	312	1400	
	W	344 $\frac{1}{2}$	970	
	H	313 $\frac{1}{2}$	1540	
	W	347	1140	
	H	317 $\frac{1}{2}$	1660	
	W	340 $\frac{1}{2}$	1240	

	π	At Δ #	40	
BS.		148°-12'	1990	# 24
Tic		81°-57'		# 41
Tic		120°-24		B. Vent
	W	50°	690	
	W	69 $\frac{1}{2}$	700	
	W	92 $\frac{1}{2}$	690	
	W	105	640	
	H	108 $\frac{1}{2}$	1040	E+W. P.L.
	W	122	570	
	H	118	1040	
	W	144 $\frac{1}{2}$	620	

F. line	133 $\frac{3}{4}$	900	N + S. P.L.	W	134	1140
W	157	660		H	322	770
H	143 $\frac{1}{4}$	1160	N + S. P.L.	W	127 $\frac{1}{4}$	1040
W	175 $\frac{1}{2}$	860	(This crown Just tiled - Up to Hwy.)	H	312 $\frac{1}{2}$	700
H	153	1360	only N. of E + W. P.L.	W	120 $\frac{1}{2}$	820
W	180 $\frac{1}{2}$	1080		H	303 $\frac{1}{4}$	390
H	162 $\frac{1}{4}$	1400		W	118	512
W	188	1350		H	325	190
H	168	1520		W	110 $\frac{1}{2}$	350
H	171 $\frac{1}{2}$	1660	E + W. Hwy	H	37	65'
H	176 $\frac{1}{2}$	1780				
H	183	1860				
H	191	1760	E + W. Hwy	BS.	177° - 42'	1700
H	199	1620	N.S. E + W. Hwy.	Tie	19° - 24'	
H	197	1420	Close.	44-49	146° - 23'	1600
40-47	134° - 36'	2410	W.	Tie	201° - 16'	
				Tile	9 $\frac{3}{4}$	1800
				Tile	13	1300
				Tile	357	1020
				Tile	322	810
				H	288	310
				W	107 $\frac{1}{2}$	800
				H	261	500
				W	109	600
				H	251 $\frac{1}{2}$	580
				H	240	560

E + W. Hwy.

N + S $\frac{1}{4}$ line

Close E. S. Main.

At Δ # 44

43

School Flag Pole S.

W.

47

At Δ # 47

40

B. Vert.

BS.

134° - 36'

2410

108° - 34'

138° - 44'

900

W.

H 328

1380

W 150 $\frac{1}{2}$

1110

H 340

960

W 143 $\frac{1}{2}$

1200

H 335

810

E + W. P.L.

Could close
this reading on
Whalen's ① 07 pg

W	100 $\frac{1}{2}$	430	29 $\frac{1}{2}$.
H	222 $\frac{3}{4}$	530	E + W. P.L.
W	108.	220	
H	197 $\frac{1}{2}$	570	
W	232	190	
W	240	300	
H	214	460	E + W. P.L. Close

W	49 $\frac{1}{2}$	1640	
H	84 $\frac{3}{4}$	1300	N + S. P.L. Hwy.
W	57	1660	
H	96	1220	N + S. P.L. Hwy.
W	71 $\frac{3}{4}$	1580	
H	102	1500	
W	82 $\frac{1}{4}$	1600	
W	85 $\frac{1}{2}$	1700	

π At Δ # 49

BS.	146°-23'	1640	# 44
Tic	286°-26'		# 40
Tic	4°-53'		School P. R. le J.
H.	225 $\frac{3}{4}$	350	E + W. Hwy.
W	8 $\frac{1}{2}$	1180	E + W. P.L.
H	266 $\frac{1}{4}$	400	
H	282	320	
H	350	120	
W	14 $\frac{1}{2}$	1440	
H	74	170	
H	92	360	
W	23	1680	
H	79 $\frac{1}{2}$	540	
W	30 $\frac{1}{2}$	1740	
H	98.	770	E + W. Hwy.
W	40 $\frac{1}{4}$	1720	N.S. P.L.
N	86 $\frac{1}{2}$	960	

W	229 $\frac{3}{4}$	340	4/25/20 Xed over. - Hwy.
"	210	410	
"	191 $\frac{1}{4}$	410	
"	172	358	
"	149 $\frac{3}{4}$	280	
"	137 $\frac{1}{2}$	300	
"	137 $\frac{1}{2}$	500	
"	117 $\frac{3}{4}$	670	
"	108	890	
"	101	900	
"	96 $\frac{1}{2}$	1100	
"	99 $\frac{1}{4}$	1340	
"	102 $\frac{1}{4}$	1450	
"	118 $\frac{1}{2}$	1560	
"	121 $\frac{1}{2}$	1650	
"	128 $\frac{1}{2}$	1820	

29-50-143°-20'-1500'

To Δ #50

AAΔ-50

B.S.	143°-20'	1500	To Δ-49	W	98 1/2	620
Tie	6°-00'		School K. Pole	"	96	490
Tie	281°-06'		Δ-47	"	82 3/4	360
Tie			Peak of Sod. N	"	62	270
	W.	83 1/2	550	"	24	210
	"	96 3/4	320	"	299	300
	"	126 1/2	175	"	276	340
	"	222	20	"	240 1/2	310
	"	289	170	"	198 1/2	310
	"	250	280	"	164 1/2	280
	"	228	520	"	149 1/2	380
	"	216 1/2	580	"	100 1/2	880
	"	200	710	"	66 1/2	870
	"	174 1/2	670	"	42	900

not in top
of Hwy
at Hwy

at Hwy

Ask W. below

50-51	183°-26'	1360	To Δ 51	"	77 1/2	1100
B.S.	183°-26'	1350	To Δ 50	"	83 3/4	1180
Tie	13°-35'		B. vent	"	94 1/2	1180
	"	48 1/2	100		102	1300
	"	24	490		107	1200
	"	90 1/2	540		112 1/2	960
	"	51	740		106 3/4	670
	"	61 3/4	630		119	660
		70 1/4	860		124 1/4	725
		86 1/2	840		140	680
		91 1/2	720		151	760

⊥

W	160	820
"	169½	920
"	170	1020
"	158	1160
"	146	1300

51-52 163°-48' 1905 To Δ#52

Δ#52

B.S.	163°-48'	1905	To Δ#51
Tie	353°-43'		Barnvent
Tic	192°-16'		grove of small trees
			Wm H. N.E.M.
T	14¾	725	Close on W from Δ51
T	32	870	E. Hwy

52-53 164°-18' 935' To Δ#53

T 40½ 990

~~# 160 1100~~

T 55½ 1040

W 164½ 870

T 72½ 1020

W 178 800

W 179½ 700

T 86½ 1020

W 157¾ 640

T 90 780

W 149 590

T	86¾	550
W	143	160
T	80¾	450
W	180	310
T	60½	250
T	31	140
W	150½	240
T	338	90
W	238	310
T	286	210
W	250¾	560
T	282	440
W	259½	590
T	276	560

close

Δ#48

B.S. 138°-44'

900'

To Δ#47

Tic 13°-26'

School F. Pole

Tic 16°-55'

Δ#49(?)

Tic 96°-10'

B. vent.

W 189¼ 290

185.¼

" 239 250

" 218 380

" 294¼ 670

#

" 294½ 890

6/26/20

34

AHΔ-54

W 284 1220

BS 282°-50' 1430'

TO Δ#48

48-54 282°-50' 1440

Tie 121°-25'

TO Δ#51 135°-25'

W 245 380

Island

W 62° 180'

" 260 520

" 295 1/2 90'

E

" 257 1/2 660

" 277 230

" 256 700

" 267 430

" 256 920

" 262 1/2 670

" 252 1210

" 259 920

" 251 1/2 1440

E

" 259 1/4 1420

E N 95 Hwy

" 248 1440

E

~~255 1/2 1540~~

" 243 1260

" 245 1/2 1500

E Hwy

" 242 1080

" 238 1/4 1540

E Hwy

" 242 1020

" 232 1900

" 239 3/4 860

" 225 1/2 2140

" 231 610

" 218 1/4 2140

E Hwy

" 226 590

" 213 1980

" 228 410

" 204 1600

" 245 1/2 370

Close W Island

" 196 1540

48-55 175°-24' 1200

TO Δ#55

" 186 1/2 1740

" 180 1680

" 173 1590

" 168 1/2 1520

" 158 1540

" 150 1620

" 143 1740

" 135 1860

W 132° 2020'

A+Δ^{#55}BS, 175°-24' 1200' To Δ^{#48}

Tie 63°-32' B Kent.

Tie 127°-15' Δ-52

T 897 210 1/4 E

55-56 240°-16 1680 To Δ^{#50}

T 32 260

T 60 1/2 400

T 74 600

T 91 1/2 710

T 109 1/2 760

T 121 1/2 720

T 142 1/2 420

T 177 1/4 290 1/4 E

T 201 3/4 310

T 218 410

T 220 600

W 140 750 Hand

T 215 700 1/4 E

W 145 650

W 199 1/2 980

T 205 670

W 136 1060

T 188 1/2 710

W 132 1/2 900

T 174 1/4 790 1/4 E

W 137 780

W 141 780 Close W Island.

T 158 1/2 780

T 160 1/2 830

T 174 790 1/4 E

T 186 900

W 195 515 Sec Center #8 Not in top.

A+Δ-56

BS, 240°-16' 1660

To Δ-55

Tie 63°-15

Tie 18°-52'

Tie 104°-04'

B Kent
S. Flag Pole
Δ^{#52}

T 106 1/2 600

T 129 290

T 180 110

T 269 230

T 278 1/4 750

T 287 460

" 292 560

" 287 1/2 700

" 283 940

" 218 1/4 1200

E Hwy Not in top.

AA^Δ#57

36

To Δ#56

Barn Vent.

Δ-52

Δ-55

Tic 137°-39' 1270' To Δ#16

T 277 1/2 1000

T 269 1/2 980

T 261 1040

" 250 820

" 261 1030

" 256 1/2 1150 HWY

" 241 1/2 1230 HWY

" 232 1/2 1150

" 216 1200

" 212 1500

" 205 1560

" 201 1540

" 196 1320

" 187 1/2 1350

" 174 1350

" 162 1/2 1380

" 149 1510

" 145 1640

BS, 144°-37'

1680'

Tic 38°-55'

Tic 81°-37'

Tic 12°-22'

T 25 1/4 200

" 38 320

" 48 430

" 69 1/2 780

57-58 201°-22' 390

To Δ#58

T 68 960

" 91 3/4 1100

" 80 1060

" 93 1/2 760

" 113 360

" 133 1/2 300

" 143 1/2 350

" 141 415

" 151 1/4 730

EQW. ~~7~~ Pasture fence

~~1540~~

Sh-57 144°-37' 1680 To Δ-5:

6/28/20

AA #58

BS 201°-22' 390' To Δ#59 W 241 870 & ESW Hwy
 Tie 37°-23' Barn Vents 228 980
 Tie 333°-13' To Δ#56 " 211 1/2 980
 W 119 1/4 560 Close on T from 39 " 173 1/2 920 & NRS Hwy
 " 159 1/2 330 " 175°-05' 320' Sec. Cor.

" 184 270
 " 236 440

" 246 680
 " 287 1/2 1100

" 261 1/2 1310
 " 265 1780

" 263 1560
 " 256 1600

" 259 1680
 " 246 1/2 1580

58-59 " 248°-53' 1780 To Δ#59
 58-60 " 211°-50' 1340

AA Δ#59 - on NRS Hwy

B.S. " 248°-53' 1780
 W 320 1/2 20

" 294 240
 " 276 550

" 263 630
 " 252 750

To Δ#56
 & Hwy 261 167°-02' 1340 To Δ-60

" Low divide crosses Hwy S.W. from
 " Δ-60 running NW & SE approx 400'
 " cove side of Hwy

AA Δ-60

B.S. " 211°-50'

1340'

To Δ#58

Tie 36°-06'

Barn vent

Tie 62°-38'

Δ#52

Tie 195°-13'

From Δ#52
 Same W. mill. In grave of small trees.

W 227 560
 " 204 1/2 560

" 190 600
 " 162 1/2 600

" 156 730
 " 152 1/2 940

" 153 1/2 980
 " 164 1040

" 162 1/2 1200
 " 167°-02' 1340 To Δ-60

Δ A Δ - 61

B.S. 167°-02' 1340'
 Tie 27°-33'
 Tie 9°-32'
 Tie 204-40'

W. 66½ 290
 " 87 460
 " 113 550
 " 142 550
 " 159 570
 " 185½ 620
 " 215 700
 " 243¼ 1140

61-62 " 234°-30'

"

" Δ A Δ # 62

B.S. 234°-30'
 Tie 191°-27'

W. 359½ 260
 " 348 550
 " 350 780
 " 346½ 800
 " 332½ 1240
 " 327 1340
 " 318½ 1520
 " 301½ 1720

To Δ # 60 W 193½ 1480

Barn Vent " 287 1420

To Δ - 58 " 261 1310

Same N.W. 1/182 " 248 1220

" 237½ 1120

" 227½ 1060

" 197 690

" 165½ 520 Δ N.B.S. Hwy.

" 138 690

" 129 880

" 119 1120

" 109½ 1320

1300 To Δ - 62-63 131°-47' 1630

" Δ A Δ - 63

B.S. 131°-47' 1600'

To Δ - 61 Tie 21°-02' 1840' To Δ - 62

W. Hill.

1 63-64-182°-26' 1540'

Same Barn Vent.

To Δ # 64

" 198° 420

" 189 720

" 172 650

" 155½ 620

" 139½ 620

" 125 600

" 112 510

" 92 460

BS.

182°-26'

Tie

8°-50'

Tie

113°-08'

W

346

880

329

980

311 1/4

1120

309

1210

299

1230

291

1200

282

1120

273

1000

259° 05'

247

610

230 1/2

500

205 1/2

390

189

260

242 1/2

150

265

100

99

20

143 1/2

60

171

150

W

189

260

"

151 1/2

350

"

136 1/2

470

"

115 1/4

690

NBS to 1/4 L.

A+Δ-64

30' S of ESW Hwy 69-65

132°-23'

875'

To Δ #65

1550

To Δ #65

School F. Pole.
at New Bldgs.
W Mill NW

A+Δ-58

7/16/20

B.S. 201°-22'

390 To 57-

Tie

161°-44'

W Mill N.W. at New Bldgs (?)
1/4 S of 3rd Ave.
W side of N from

W.

102 3/4

2080

W.

101

2040

W.

101

1950

108

1650

E ESW Hwy.

A+Δ-60

B.S. 211°-50'

1340

To Δ-58

0

85°

2200

Close on W from A-58

0

85

2350

0

89

2500

0

87 1/2

2200

0

87

2120

0

93

1750

0

96

2030

0

98 1/2

2400

Not in Top
Section

P/E at C Mountain

E Hwy

Q	99 $\frac{1}{4}$	2630	
"	104	2450	
"	106 $\frac{1}{2}$	2330	
"	107 $\frac{1}{2}$	2130	
"	110	1640	N 85 E

π A + Δ - 61

B.S.	167°-02'	1340'	To Δ -60
TIC	149°-07'		New Bluffs W.M.H. N.W.
Q	77 $\frac{1}{2}$	1640	
Q	78 $\frac{1}{2}$	1880	
Q	82 $\frac{1}{4}$	2180	
Q	83 $\frac{1}{2}$	2500	
Q	86	2390	
Q	91	2400	
Q	92	2440	
Q	93 $\frac{1}{2}$	2460	
Q	95	2100	
Q	98	1680	N 85 E
Q	101 $\frac{1}{2}$	1730	Same E
Q	106	1640	
Q	109	1720	
Q	112	1890	Same E
Q	113	2080	
Q	122	2080	E (E.W.)
Q	126 $\frac{1}{2}$	2220	

Q 132 $\frac{1}{2}$ 2240

π A + Δ - 64

B.S. 182°-26' To Δ -63
64-66-66°-20' 1960 To Δ -66

π A + Δ - 66

B.S. 66°-20' 1980 To Δ -64

Q	336	1100	
W	199 $\frac{1}{4}$	680	4 E 8 W Hwy
Q	23 $\frac{1}{2}$	950	
W	184	490	
Q	356 $\frac{1}{2}$	900	
W	158 $\frac{1}{2}$	400	
Q	8	740	
Q	26	700	
W	145 $\frac{3}{4}$	685	4 Hwy
Q	44	900	
W	145 $\frac{1}{2}$	890	
Q	52	700	
W	145	1100	
Q	40	650	
W	144	1280	
Q	52 $\frac{1}{2}$	410	
W	140	1480	
Q	9	195	

~~W 134~~ 1600

O 38 1/2 70

Q 71 350

Q 75 1/2 710

66-67 132°-44' 1490 To 66

Q 80 1/2 1350 Tie N.S.

O 81 1/4 1630

Q 83 1/2 2000

Q 88 1920

O 100 2040 ~~Hay~~ or Tie

O 106 1490 Tie

Tile main passing 100' N. of A-66

outlets S.E. Field W tiled recent

Main not larger than 6" Crosses

E. & W. Hwy. N.W. of A-66

Tie At A-67

B.S. 132°-44' 1480 To A-66

Tie 201°-39' W. Mill N.

W 172 180

W 182 1/2 275

W 193 390

W 192 560

W 184 700

W 172 670

W 154 660

Q 332 3/4 550 4 E. & W. Hwy.

W 145 750

Q 338 1/2 390

O 6 170

Q 84 230

W 142 1/2 1030

O 78 425

W 144 1100

Q 79 670

W 139 1100

Q 85 990

W 127 1300

Q 87 1/2 1250

W 110 1400

Q 87 1550

W 105 2000 Hwy N.E.

O 91 1800

π A+ Δ -65

 Δ -69 243°-20'

1400

To Δ -69

B.S.

132°-23'

875'

To Δ -69
 π A+ Δ -69

Tie

134.42

W.M.I.I. B.S. 243°-20'

1400

To Δ -65

O 50 1/4 1140 & Hwy

Tie 87°-35'

W.M.I.I.

O 63 1090

W 265 10 & N85 Hwy

O 75 1/2 910

W 305 250

W 355 300 N85 E

W 293 450

O 85 1000

W 285 1/2 910

W 26 210

W 273 1020

W 65 260

W 271 1250

O 102 1010

O 142 2500 N85 1/2 L.

W 91 310

W 261 1/2 1600 N85 E

W 119 440

O 145 1/2 2400

O 102 1/2 4440

W 253 1590 E8W E

W 128 1/2 500

O 151 1990

O 107 1/2 1550

W 237 1450 Top goes back to Shed

O 119 1/2 1120

O 157 1840 bare

O 121 1180

W 225 1450

O 121 1600

O 174 1620

W 172 300 N85 E

W 207 1/2 1760

W 217 910

W 200 1/2 1720

65-68 127°-04'

1950

To Δ -6

W 193 1740

W 220 600

W 216 780

W 220 1/2 940

W 227 1/2 1040

At A-68

B.S.

129°04'

1940

W 116½ 150

W 109 220

W 106 530

68-70

101°43'

1320

To A-70-71 170°-33'

1950

To A-71

Q 214 1720

Q 205¾ 1680 (draw NE?)

Q 194 1440

Q 193½ 1020

Q 191½ 900

Sec. Gen.

176½ 770 Not. Top.

Q 176 1000

Q 160 1100

Q 157½ 1060

Q 160 1360

Q 166 1320

Q 163 1800

Q 154½ 1470

At A-70

B.S.

101°43'

1320

To A-68

Q 189 1700

W 278½ 800

Q 181 1750

W 290 820

W 300 815

Q 172½ 1900

W 305 1130

Q 170½ 2150

W 324 990

W 336½ 860

W 355½ 400

W 30 600

0-72 91°-57'

Divide runs from this point to A-72

705 To A-72

Q 165 100

Q 270 180

Q 294 400

Q 309 395

358½ 180

Divide runs from Point 300' EA 70 thru A-70 to 72 + 300' NW A-72

At A-72

B.S. 91°-57'

705 To A-70

Q 216½ 850

N. side Br W.

Q 193 650

Q 160 510

Q 129½ 650

Hwy (?)

W 31 915

W 35¾ 1030

LN 85 Hwy

Q 117 925

W 33 1150

Q	106	1160
W	35	1300
Q	95 1/2	1200
W	48	1410
W	53	1460
W	65	1440
W	75	1520
W	81	1450

w 95°-00 Divide 100' wide running
thru A 70+72 continues to
point 300' E. of shed line ^{Approx 165'}

Q	112 1/2	1320
Q	108 1/2	1600
Q	105	1800
W	94 1/2	1700
Q	103	2100
Q	100 1/2	2120

AA Δ - 71

B.S. 170°-33'

Q	8 1/2	1100
Q	33 1/2	1160
Q	51 1/2	1530

Tie 336° 40'

Q	57	1800
Q	62	1980
Q	71	2170

1950 To Δ-71
close on field
From A 72

Same W mill. New SE

Q	72	2400
Q	71	2300
Q	77 1/2	2350
W	89	1285 & Hwy
Q	80	2350
W	80 3/4	1220
W	75 1/2	1285 & Hwy

Q	100 1/2	1330	Xcd Hwy
Q	101 1/4	1040	Xcd
11-73	109°-55'	1500	To Δ-73
Q	108	630	

Divide from point 500' S of A 71 runs
West 800'

AA Δ-73

B.S. 109-55'
263°-33'

102

To Δ-71
To Δ-74

AA Δ-74

B.S. 263°-33'

102'

To Δ-73

Tie

Q	278 1/2	880	close on top. From A 71
Q	261	850	
Q	243	1040	Q E & W Hwy
Q	230	1100	
Q	216	1060	

W	292 $\frac{1}{2}$	690	Close on $\odot$ Top.	W	44	525	
$\odot$	200	890		$\odot$	196 $\frac{1}{2}$	375	
W	275	560		W	76 $\frac{1}{2}$	590	
$\odot$	195	960		$\odot$	174	440	EBWHwy.
W	261 $\frac{1}{2}$	625	Island	W	100	840	
$\odot$	182	1100		W	109	965	ϕ Hwy
W	234	740	Hwy EBW	$\odot$	148	800	
W	225 $\frac{1}{2}$	580	Hwy Close/sl.	$\odot$	143 $\frac{1}{2}$	990	
W	200	310		W	116	1060	
W	162	215	ϕ Hwy NBS	$\odot$	134 $\frac{1}{2}$	1090	

ϕ X Roads

W	165 $\frac{3}{4}$	360	Not. Top.
$\odot$	169	800	NBS Hwy } ϕ s
W	123	550	EBW Hwy }

7/22/50

Tie

323 $^{\circ}$ -15'

same W Mill

ϕ 84 300

W 18 $\frac{1}{2}$ 580

ϕ 92 590

ϕ 89 750

W 49 940

W 55 1260

Δ AT Δ -53

B.S. 164 $^{\circ}$ -18'

Tie 351 $^{\circ}$ -22'

Tie 188 $^{\circ}$ -24'

$\odot$ 244 $\frac{1}{2}$ 1200

W 46 150

W 54 465

$\odot$ 216 1720

W 62 760

$\odot$ 209 $\frac{1}{2}$ 1890

$\odot$ 190 1700

ϕ 168 1880

W 105 1050

935 To Δ -52

Barn Vent S

W Mill at New ^{bridge}

74-75

79 $^{\circ}$ -24'

1230

To Δ -75

Δ AT Δ -75

B.S.

79 $^{\circ}$ -24'

1240

To Δ -7

Tie

W 13 $\frac{1}{2}$ 440

	W	108	1200
	O	190	2400
	Q	184½	2560
	Q	180	2240

53-76 161°-04'

⌒ At Δ-76

B.S. 161°-04'

Tie 199°-25'

O 205 850

Δ-76 is on S.E. Cor. of Knoll or Island 250' Dia

Q 198 1230 N.A.S. R.

O 208 1475

Q 201 1620

W 36 1350

O 192½ 2260

W 56 1580

O 187½ 2400

W 73 1560

W 80½ 1220

W 85 1010

W 101½ 1260

W 106 1520

W 107 1690

76-77 161°-23' 2200'

To Δ-7

⌒ At Δ-77-30' S of E.R.W.R.

B.S. 167°-23' 2180'

To Δ-76

Tie 216°-12'

Same @ W.M.I.I.

W 45½ 2300

W 54 2120

W 62½ 2060

O 191 1230

W 72½ 1980

Q 188¼ 815 4 N 85 1 Hwy

W 82½ 2030 E.R.W.R.

O 177 770

W 89 2150

Q 182¼ 1200 14 Hwy

77-78 70°-14' 2020 To Δ-78

O 186 1235

O 180 1580

O 174¼ 1790

O 168 1750

⌒ At Δ-78

B.S. 90°-14' 2010'

To Δ-77

Tie 736°-00'

Same @ W.M.I.I.

77-79 195°-29' 2080'

To Δ-79

B.S. 195°-29' 2090'
T.C. 257°-40' W.M. 1'

W	40	1570	
W	66	1030	
O	264	1200	
O	251 $\frac{1}{2}$	1260	
O	246 $\frac{1}{2}$	990	
W	110	1010	
O	217	250'	
O	155	180	
O	189 $\frac{1}{2}$	560	N 85 E
W	140 $\frac{1}{2}$	1640	
W	141	1490	
O	196	1200	
W	154	1430	
O	187 $\frac{1}{4}$	1190	
O	179	1300	
O	171 $\frac{1}{2}$	1315	

Prelim. Levels #11 Main

Cont. from pp. 57

48

	B.S.	H.I.	-5	Elev.
BM #6	4.09	25.19 26.19		21.10 22.10 ✓
T.P.	5.19	24.87 23.87	6.51	19.68 18.68
" "	4.90	24.87 23.87	6.22	19.97 18.97
T.P.	5.47	26.36 25.36	3.98	20.89 19.89
" "	5.12	26.36 25.36	3.63	21.24 20.24 ✓
BM #7			4.28	22.08 21.08
T.P.	5.43	27.67 26.67	4.12	22.24 21.24
" "	4.19	27.66 26.66	2.89	23.47 22.47
T.P.	4.45	28.32 27.32	3.80	23.87 22.87
" "	4.98	28.32 27.32	4.32	23.35 22.35
			6.77	20.90 19.90
T.P.	5.01	28.83 27.83	4.50	23.82 22.82
" "	4.60	28.82 27.82	4.11	24.21 23.21
BM #8			2.62	26.20 25.20
T.P.	6.33	30.47 29.47	4.68	24.14 23.14
" "	6.07	30.46 29.45	4.44	24.38 23.38
T.P.	6.61	32.04 31.04	4.99	25.47 24.47
" "	6.45	32.04 31.04	4.83	25.63 24.63
BM #9			3.04	29.04 28.04
			7.70	23.34 22.34
T.P.	4.66	30.75 29.75	4.99	26.09 25.09
" "	4.71	30.46 29.46	5.03	26.05 25.05
T.P.	5.38	31.29 30.29	4.84	25.91 24.91
" "	5.07	31.28 30.28	4.59	26.21 25.21

Hub 5 side 3^d F. post E of N 1/3 & NE 1/4 Sec 17 ^{one E. line}

Top of White Round Boulder at edge of ^{Pitch.}

Flow line 16" Tile outlet - Line S.W.

Spike in S.W. Cor. post NW 1/4 NE 1/4 Sec 17

Spike in N End of Ecap Bridge N Line Sec 17
Bottom of Ditch N. side " " " "

Not Natural Gr. level. - High Gr.

B.S. M.I. - 5 Elev.
31.28

T.P. 5.90 32.69 3.99 27.29

BM #10 3.83 32.69 2.42 28.86

T.P. 5.10 33.33 4.46 28.23

" " 4.84 ~~33.32~~ 4.21 28.48

T.P. 6.30 36.13 3.50 29.83

" " 5.94 36.14 3.13 30.20

BM #11 1.44 34.69

in ditch 8.30

Gr level 6.60 29.53

T.P. 5.69 36.84 4.98 31.15

" " 5.51 36.84 4.80 31.33

Gr level 3.90 32.94

in ditch 5.30

BM. A 2.08 34.76

T.P. 6.80 ⁸⁰ 42.54 1.05 35.79

" " 6.54 42.60 0.77 36.07

T.P. 4.31 39.14 7.77 34.83

" " 3.94 39.14 7.40 35.20

BM #12 3.36 35.78

Ditch 7.60

Gr level 6.30 32.84

T.P. 5.49 38.68 5.95 33.19

T.P. 5.24 ^{38.67} 38.66 5.72 33.42

T.P. 4.73 39.11 4.29 34.38

" " 4.41 39.43 3.95 34.72

39.12

Approx 1/4 Mi. N of BM #9
Highest point large stone between ditch & fence

last large Br N.W.
S.W. of Junction Main +
Spike in root of S.E. of Clump Maples

At Junction of Main + last large Br N.W.
" is Approx 1/4 Mi. E + 60 Rods S of N.W. cor. sec 8.

N Line sec 8
S of E + W Hwy at Br N.W. Crossing

Spike near W end Scap plank Culvert
E of N.W. cor. sec 8.

sec 8
Spike in N End E cap Bridge N Line
Under Bridge.
N of Bridge.

	+	H.I.	-	Elev.
	B.5	39.12	-5	
T.P.	5.48	39.77	4.83	34.29
" "	5.23	39.76	4.59	34.53
T.P.	5.08	40.11	4.79	35.03
" "	4.88	40.01	4.59	35.23
B.M. #13		-	2.27	37.84
T.P.	4.73	41.84	3.00	37.11
" "	4.57	41.83	2.83	37.28
T.P.	6.17	43.16	4.84	36.99
	5.94	43.15	4.62	37.21
Gr level			3.70	39.96
Ditch			4.75	
B.M. #14			1.40	41.76
T.P.	7.75	49.40	1.51	41.65
" "	7.39	49.39	1.16	42.00
			12.37	46.42
T.P.	4.30	50.80	2.79	46.60
T.P.	4.21	50.81		
T.P.	8.56	56.68	2.68	48.12
" "	8.30	56.69	2.44	48.36
T.P.	8.70	63.47	1.92	54.77
" "	8.41	63.46	1.64	55.03
	3.25	64.35	1.36	61.10
	3.00	64.35	1.10	61.35
	2.26	56.66	9.95	54.40
	1.98	56.61	9.77	54.63
		56.63		

beginning.

Spike in Cor. Post W. of gate at Gen. Sec 5.

At Bremer Co. line

" " " "

Spike S. end E. Cap Bridge on Co. Line

	B.S.	H.I. 56.63	-S	Elev
T.P.	3.20	50.12 50.25	9.61	47.02
" "	3.09	50.12 50.25	9.95	47.18
T.P.	3.73	45.89 45.92	8.09	42.16
" "	3.48	45.94 45.94	7.79	42.46
Gr level.			6.93	39.99
Ditch			8.80	

last large BR NW
At N+5 Hwy Crossing ⁹N of N.W. Cor. Sec 8

" " " " " "

Preliminary Levels Dr. #11.

52

	B.S.	H.I.	-S.	Elev
B.M. #1.	4.46	14.46		10.00
Bottom of Crane Creek			10.00	4.46
H ₂ O level			8.00	6.46
Sta 0			5.70	8.76
Sta 3	6.53	15.26	5.73	8.73
T.P.	6.30	15.27	5.48	8.98
Sta 4		15.28	9.00	6.27
in ditch			9.20	6.07
C. Sec. 15			5.85	9.42
Gr. level	5.93	15.40	5.30	9.97
T.P.	5.15	15.39	5.03	10.24
B.M. #2			3.83	11.56
Gr. level 100' N. of B.M. #2.			4.90	10.49
Gr. level	5.49	16.48	4.35	11.09
T.P.	5.35	16.50	4.24	11.15
Gr. level	5.73	16.83	5.40	11.10
T.P.	5.35	16.81	5.09	11.46
Bot. of Ditch			6.50	10.31
Gr. level	4.74	17.01	4.54	12.27
T.P.	4.43	17.01	4.23	12.58
B.M. #3			2.82	14.19
			7.30	9.71
			4.60	12.41
			4.00	13.01
T.P.	5.35	17.54	4.82	12.19

Top of N.E. cor. of South wing of Bulkhead
800' E. of
E. side Crane Creek, center sec. 15. T. 90 N. - R. 12 W.
at outlet Dr. #11.

" " " " " "
Ground level.

Ground level

In ditch.

100' S. C. Sec. 15.

Ground level

300' W. of Center Sec. 15

Spike at bottom of corner post (D beam)
approx 600' W. of Center Sec. 15.

500' N.E. of SE $\frac{1}{4}$ - NW $\frac{1}{4}$ Sec 15

1000' East Bridge on Hwy Bet Secs 15 & 16.

700' E of " " " " " "
100' water here.

500' E. of Bridge " " " " " "

15816
Spike in E. end of N. cap Bridge on Hwy Bet Secs.

Bottom of Ditch. 150' H₂O here " " " "

Ave Ground level " " " "

On Hwy " " " "

300' W of Bridge.

14.99

8.96
5.68

5 16 52

5.00 (1.077)

43.5

4.50

53

	B.S.	H.I.	-S	Elev
T.P.	4.95	18.43	4.06	13.48
	8.50	22.94	3.99	14.44
10 ditch (1.50' H ₂ O)			8.90	14.04
Gr level			6.40	16.54 ✓

1000' W of Bridge

20' S & 600' E of Center of Sec 16

On N & S $\frac{1}{4}$ Sec 16 - 700' S of E & W $\frac{1}{4}$ E.Approx 1.00 from H₂O level to Gr. level.

B.M. #3	5.83	20.02		14.19
T.P.	6.21	18.35	7.88	12.14
T.P.	5.39	21.03	2.71	15.64
T.P.	2.26	20.04	3.25	17.78
B.M. #4			1.34	18.70
10 ditch			8.20	11.84
Gr level			7.50	12.54
Ditch			6.75	13.29
Gr level			5.80	14.74
T.P.	4.36	19.01	5.91	14.63
T.P.	5.83	20.28	4.06	14.95
B.M. #5	4.74	20.86	4.16	16.12
			1.46	19.38
Gr level			5.30	15.56
Bot. of Ditch			6.90	13.96
H ₂ O level			6.15	14.71
T.P.	4.91	21.60	4.17	16.69
		24.47		18.21
	6.26	23.47	3.39	17.21

200' W of Bridge bet Secs 15 & 16.

Spike in root of W. of row willow stumps on

E & W $\frac{1}{4}$ Sec 16 800' W of E & W

800' W of E line Sec 16.

On E & W $\frac{1}{4}$ Sec 16 - 200' W ofSpike in N side at bottom of N. brace post 200' N of Ditch on N & S $\frac{1}{4}$ On N & S $\frac{1}{4}$ E, 1000' S of Center of Sec 16.

	B.S.	H.I.	-S	Elev.
		23.47		17.22
Gr level		24.47	7.25	16.22 15.17
Bot. of Ditch			9.30	14.17 18.91
T.P.	5.61	23.52	5.56	17.71 19.12
	6.96	26.08	5.40	16.12 14.53
Gr level			6.55	18.53 22.10
BM #6			3.98	21.10 9.50

On N.E. $\frac{1}{4}$ - $\frac{1}{4}$ Sec 16

=

Spikes in E end N. cap of bridge between Secs 16 & 19

Levels on Main Cont. on P 48.

Levels on Sub District South. - Rodaman Mains. BR #6

BM #6	3.55	24.65		21.10
Gr level			8.45	16.20
T.P.	4.39	22.89	6.15	18.50
T.P.	5.68	26.17	2.40	20.49
Gr level			6.90	19.27
Gr level			6.20	19.97
	3.49	27.47	2.19	23.98
			7.63	19.84
T.P.	3.11	27.95	2.63	24.84
			5.21	22.74
			6.66	21.27
T.P.	4.13	29.60	2.48	25.47
Gr level			6.50	23.10
			7.10	22.50
			5.60	24.00
Gr level			3.50	27.10
			7.45	

At outlet Main South.

Top N. End culvert E of Hwy
at E of Hwy.
500 S of Hwy at Junct. - Lines Br SE & SW

Goes into
Bottom of Pond 1000' S of Hwy. - Br SW.

Gr level, edge of Pond on N.E. 1/4
Bottom of Pond.

At sec. Center.

Bottom of small pond 25' N. E. of Sec 16

Bot E of 2 Ponds on divide

Edge of pond

Bot. of N of 2 Ponds on Divide.

29.60

T.P. 5.75 34.32 1.08 28.57

8.00 26.32

5.70 28.62

5.20 29.12

T.P. 6.20 36.17 4.35 29.97

T.P. 7.15 40.37 2.95 33.22

T.P. 7.74 40.34 4.77 35.60

R.P. 3.70 36.94

5.60 34.79

T.P. 4.80 40.47 4.67 35.67

T.P. 5.40 44.34 1.53 38.94

3.15 41.19

~~same~~
R.P. 5.81 42.75 36.94

T.P. 1.73 41.91 2.57 40.18

T.P. 3.46 37.36 8.01 33.90

4.35 33.01

T.P. 5.13 36.26 6.23 31.13

T.P. 0.32 31.76 4.82 31.44

6.70 25.06

8.60 23.16

1.9' H₂O here
Bot. of W of 2 Ponds on S Divide
Gr level at edge of pond
Gr level

Spike in Bot. of $\frac{1}{16}$ Cor Post on N & S Hwy
Gr level W side Hwy $\frac{1}{4}$ M. S of S Cor

Gr level 300' W of Sec 6 cor. S side Hwy

6" Tile Force outle/W. side Hwy here. 1st Sec.
Gr level N & S Hwy Tileline xing 600 ft

Gr level 2nd Sec. Hwy 500 ft S of Cor
15'

At Center X Roads County line

At Δ - 16

At - 8-65	108°-11'	1425'	To Δ 6 S			
Hwy N.	173°-52'			Tie	345°-50'	Grey Silo S.
Hwy E	263°-24'			Tie	261°-41'	Δ # 14
" S	352°-40'				173°-12'	To 4 th Δ Pt.
" W	83°-14'					
1 st Δ Pt.	354°-22'	1480		B.S.	173°-12'	1600' To Δ - 16
	At 1 st Δ Pt. W of & Hwy				173°-26'	1410' To 3 ^d Δ Pt.
B.S.	354°-22'	1500	To Hwy +			
To 2 ^d Δ Pt.	353°-37'	1480			At 3 ^d Δ Pt.	
	At 2 ^d Δ Pt. W of & Hwy			B.S.	173°-26'	1410' To 4 th Δ Pt.
B.S.	353°-37'	1500	To 1 st Δ Pt.		172°-09'	1030' To 2 ^d Δ Pt.
To 3 ^d Δ Pt.	352°-51'	1025'			At 2 ^d Δ Pt.	
	At 3 ^d Δ Pt.				172°-09'	1025' To 3 ^d Δ Pt.
B.S.	352°-51'	1030	To 2 ^d Δ Pt. B.S.		172°-53'	1500' To 1 st Δ Pt.
	354°-00'	990	To X Roads S			
To 4 th Δ Pt.	354°-10'	1410			At 1 st Δ - Pt.	
	At 4 th Δ Pt. W of & Hwy				172°-53'	1480' To 2 ^d Δ Pt.
B.S.	354°-10'	1410	To 3 ^d Δ Pt. B.S.		173°-40'	1500' To X Roads
To Δ - 16	353°-55'	1600	To Δ - 16			
To Δ - 59	171°-25'	112			At X Roads	

B.S.	173°-40'	1480	To 1 st Δ Pt.
	101°-57'	1425	To Δ - 65
Hwy N.	173°-37'		
Hwy W.	83°-02'		

57.

57

Recheck B.M.s Main B.M. 6-

Sept 21st 1920

Sta

B.S.

H.I.

- 5

Elev.

BM[#] 6 3.83 25.93 22.10

T.P. 4.33 24.64 5.62 20.31

" " 4.17 24.63 5.47 20.46

Sta 108 5.91 25.89 4.72 19.92

5.74 25.90 4.49 20.16

Sta 114 5.44 27.03 4.31 21.59

27.04

" " 5.12 27.05 3.97 21.93

B.M. 4.93 22.11

Hub 117+13 5.14 21.90

T.P. 5.08 27.40 4.72 22.32

27.41

" " 4.84 27.42 4.46 22.58

T.P. 5.38 28.70 4.09 23.32

Hub 126 5.17 28.69 3.89 23.52

4.40

T.P. 5.24 29.11 4.82 23.87

29.12

" " 5.02 29.13 4.58 24.11

T.P. 4.85 29.55 4.42 24.70

29.56

" " 4.63 29.57 4.18 24.94

BM[#] 3.37 26.19

T.P. 4.74 29.73 4.57 24.99

" " 4.52 29.72 4.40 25.16

T.P. 5.59 31.76 3.52 26.17

" " 5.39 31.75 3.35 26.38

T.P. 6.74 33.50 4.70 27.06

" " 6.18 33.50 4.44 27.32

Spike in E end N Cap Bridge bet Secs 16/17

Loth hub set 3^d FIP E NE cor NW SE 17Spikes in Cor post SW cor NE^{1/4} NW^{1/4} Sec 17

$$\begin{array}{r} 24.72 \\ 30.22 \\ 1.25 \\ \hline 31.47 \end{array}$$

$$\begin{array}{r} 25.88 \\ 1.25 \\ \hline 25.97 \end{array}$$

$$\begin{array}{r} 28.28 \\ 1.25 \\ \hline 29.13 \end{array}$$

$$\begin{array}{r} 28.86 \\ 1.25 \\ \hline 29.73 \end{array}$$

$$\begin{array}{r} 30.11 \\ 1.25 \\ \hline 30.11 \end{array}$$

spike A. end E cap Bridge N Sec 17

$$\begin{array}{r} 30.11 \\ 6.59 \\ \hline 36.70 \\ 1.19 \\ \hline 35.51 \end{array}$$

Sta	B.S	H.I.	-5	Elev.
B.M.		33.50	4.46	29.04
Sta 151	4.75	30.48	7.47	26.03
"	4.39	30.79	7.05	26.45
156	5.04	31.20	4.63	26.16
"	4.68	31.17	4.30	26.49
162	5.66	32.82	4.02	27.16
"	5.47	32.73	3.82	27.36
164-Hub			5.10	
168	5.09	33.35	4.47	28.26
"	4.84	33.34	4.23	28.50
174	5.60	33.92	5.02	28.32
"	5.29	33.91	4.72	28.62
= B.M.				
178+10			4.18	29.73
180	5.10	34.76	4.25	29.66
" 8r13	4.84	34.77	3.98	29.93
184			5.06	
186	6.62	36.73	4.66	30.11 <u>OK</u>
"	6.48	36.73	4.52	30.25
B.M.			1.21	35.52
Hub.				
191+50			5.23	31.50
Hub				
192			5.39	31.34

119
 spike in SE. of small maple grove W of Inct Main + BR 15

Checking BMS Oct 4 20
5301

59

B.S. H.I. -5 Elev

BM 4.52 61.44 56.92

T.P. 2.17 61.41 1.70 59.74

" 2.00 61.92 1.52 59.92

BM 1.64 55.28

69.09

spike in cor post end BR 2

End BR 18-A-1

NE Cor N end E wing Culvert NW Cor Sec 9

BM 6.09 60.70 54.61

T.P. 7.16 62.73 5.13 55.57

" 6.96 62.73 4.93 55.77

T.P. 7.01 68.80 0.94 61.79

" 6.90 68.80 0.83 61.90

T.P. 9.06 ~~73.10~~ 4.76 64.04

" 8.93 ~~73.08~~ 4.65 64.15

T.P. 3.99 69.81 7.27 65.82

" 3.76 69.80 7.05 66.04

T.P. 5.41 71.75 3.46 66.34

" 5.27 ~~71.74~~ 3.33 66.47

T.P. 3.09 68.95 2.89 65.86

" 2.94 68.95 5.74 66.01

T.P. 9.36 ~~74.14~~ 4.14 64.81

" 9.26 ~~74.15~~ 4.06 64.89

B.M. 4.25 69.91

Est 72 BR 15

spike in SW Cor post SE 1/4 SE 1/4 Sec 31

549 323 Main

NE Cor E wing Culvert W line Sec 32

South

East.

Levels Cor.

6.2

6.1

6.5

6.4

6.6

6.5

6.8

6.0

6.8

5.6

①

8.0

7.4

6.8

N. S. Hwy

7.8

6.8

7.5

6.5

7.3

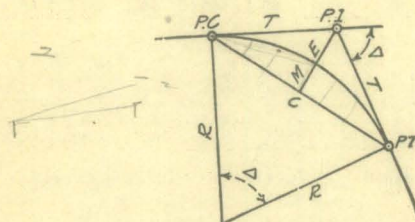
6.5

7.8

6.4

DIETZGEN'S RAILROAD CURVE AND REDUCTION TABLES

Copyright, 1914, by Eugene Dietzgen Co., New York City



CURVE FORMULAS

Radius= $R = \frac{50}{\sin \frac{D}{2}}$ (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= $E = T \tan \frac{\Delta}{4}$ (7) $= R \div \cos \frac{\Delta}{2} - R$ (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 $\div 8\frac{1}{3}=414.49$ 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= $158 - \text{Sta. P. C.}=54.50$, 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= $.3 \times 54.5 \times 8\frac{1}{3}=136.2'$ 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 115.37. For from Table IV for 1° curve $E=960.6$ for $8^\circ 20'=960.6 \div 8\frac{1}{3}=115.27$ and from Table V correction=.10 or $E=115.37$. 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	1/8	3-16	1/4	5-16	3/8	1/2	5/8	3/4	7/8
.0052	.0078	.0104	.0156	.0208	.0260	.0313	.0417	.0521	.0625	.0729
1	2	3	4	5	6	7	8	9	10	11
.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167

TABLE III.—RADI, 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	8	716.78	1.746	6.976	2.40
10	4911.15	.255	1.018	0.35	20	688.16	1.819	7.266	2.50
20	4297.28	.291	1.164	0.40	30	674.69	1.855	7.411	2.55
30	3819.83	.327	1.309	0.45	40	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

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

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

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	5759.6
20	6868.8	3215.1	20	8233.7	4301.4	20	9991.0	5789.7
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	
20°	.006	.011	.017	.022	.028	.034	.038	.045	.051	.057	.063	.070	.076	.083
25°	.009	.018	.027	.036	.046	.056	.065	.074	.083	.093	.106	.120	.127	.135
30°	.013	.025	.038	.051	.065	.078	.090	.103	.116	.129	.149	.170	.179	.188
35°	.018	.035	.054	.072	.086	.109	.131	.153	.175	.197	.213	.230	.247	.264
40°	.023	.046	.070	.093	.117	.141	.172	.203	.234	.265	.277	.290	.315	.341
45°	.030	.060	.093	.119	.153	.184	.216	.254	.289	.325	.351	.378	.411	.445
50°	.037	.075	.116	.151	.189	.227	.266	.305	.345	.384	.425	.467	.508	.550
55°	.046	.093	.142	.188	.236	.283	.332	.381	.420	.479	.530	.582	.641	.700
60°	.056	.112	.168	.225	.283	.340	.398	.457	.516	.575	.636	.697	.774	.851
65°	.067	.135	.204	.273	.343	.412	.483	.554	.625	.697	.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	.286	.383	.480	.578	.678	.777	.877	.977	1.07	1.18	1.29	1.39
80°	.110	.220	.332	.445	.558	.671	.787	.903	1.02	1.13	1.25	1.38	1.50	1.62
85°	.128	.259	.391	.524	.657	.790	.926	1.06	1.20	1.34	1.47	1.62	1.76	1.91
90°	.149	.299	.450	.603	.756	.910	1.07	1.22	1.38	1.54	1.70	1.87	2.03	2.20
95°	.174	.350	.522	.706	.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	.00	.02	1	199.99	299.97	399.92	499.85
6°	.00	.01	.01	.02	.02	.02	.02	.01	.01	.05	2	199.97	299.88	399.70	499.39
8°	.01	.02	.02	.03	.03	.03	.03	.02	.01	.08	3	199.93	299.73	399.32	498.63
10°	.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	357.23
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	235.83	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 257.06 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	.038	.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

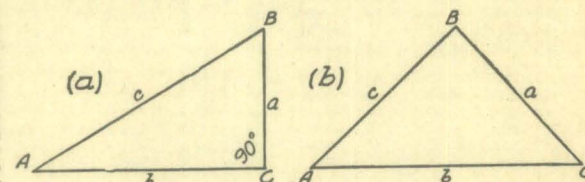
SLOPE REDUCTIONS.

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 $.286 \times 2\frac{1}{2}$ (near enough)=.57 and horizontal distance= $248.7 - .57 = 248.13$ ft.

See fig. (a).

TRIGONOMETRICAL FORMULAS.

$\sin. A = \frac{a}{c}$
 $\cos. A = \frac{b}{c}$
 $\tan. A = \frac{a}{b}$
 $\cot. A = \frac{b}{a}$
 $\sec. A = \frac{c}{b}$
 $\csc. A = \frac{c}{a}$



FORMULA FOR SOLVING TRIANGLES.

Given		Sought.		Right triangles. See fig. (a).	
a, c	A, B, b	$\sin. A = \frac{a}{c}, \cos. B = \frac{a}{c}, b = \sqrt{(c+a)(c-a)}$			
a, b	A, B, c	$\tan. A = \frac{a}{b}, \cot. B = \frac{a}{b}, c = \sqrt{a^2 + b^2}$			
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	$B = 90^\circ - A, a = c \sin. A, c = c \cos. A$			
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	$\text{area} = \frac{1}{2} b c \sin. A$			
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	00	1	90	1	0	0	0
10	.0029	.0029	343.8	.99998	50	.7660	1.1918	.8413	.6428
20	.0058	.0058	171.9	.99996	40	.6428	.6913	1.4551	.7660
30	.0087	.0087	114.6	.99994	30	.5000	.5000	1.0000	.8660
40	.0116	.0116	85.94	.99991	20	.3420	.3420	1.4618	.6913
50	.0145	.0145	68.75	.99989	10	.1736	.1736	1.5557	.5000
1	.0175	.0175	57.29	.99985	89	.9823	15.671	.0626	.1736
10	.0204	.0204	49.10	.99979	50	.7660	1.1918	.8413	.6428
20	.0233	.0233	42.96	.99973	40	.6428	.6913	1.4551	.7660
30	.0262	.0262	38.19	.99966	30	.5000	.5000	1.0000	.8660
40	.0291	.0291	34.37	.99958	20	.3420	.3420	1.4618	.6913
50	.0320	.0320	31.24	.99949	10	.1736	.1736	1.5557	.5000
2	.0349	.0349	28.64	.99939	88	.9823	15.671	.0626	.1736
10	.0378	.0378	26.43	.99929	50	.7660	1.1918	.8413	.6428
20	.0407	.0407	24.54	.99917	40	.6428	.6913	1.4551	.7660
30	.0436	.0437	22.90	.99905	30	.5000	.5000	1.0000	.8660
40	.0465	.0466	21.47	.99892	20	.3420	.3420	1.4618	.6913
50	.0494	.0495	20.21	.99878	10	.1736	.1736	1.5557	.5000
3	.0523	.0524	19.08	.99863	87	.9823	15.671	.0626	.1736
10	.0552	.0553	18.07	.99847	50	.7660	1.1918	.8413	.6428
20	.0581	.0582	17.17	.99831	40	.6428	.6913	1.4551	.7660
30	.0610	.0612	16.35	.99813	30	.5000	.5000	1.0000	.8660
40	.0640	.0641	15.60	.99795	20	.3420	.3420	1.4618	.6913
50	.0669	.0670	14.92	.99776	10	.1736	.1736	1.5557	.5000
4	.0698	.0699	14.30	.99756	86	.9823	15.671	.0626	.1736
10	.0727	.0729	13.73	.99736	50	.7660	1.1918	.8413	.6428
20	.0756	.0758	13.20	.99714	40	.6428	.6913	1.4551	.7660
30	.0785	.0787	12.71	.99692	30	.5000	.5000	1.0000	.8660
40	.0814	.0816	12.25	.99668	20	.3420	.3420	1.4618	.6913
50	.0843	.0846	11.83	.99644	10	.1736	.1736	1.5557	.5000
5	.0872	.0875	11.43	.99619	85	.9823	15.671	.0626	.1736
10	.0901	.0904	11.06	.99594	50	.7660	1.1918	.8413	.6428
20	.0929	.0934	10.71	.99567	40	.6428	.6913	1.4551	.7660
30	.0958	.0963	10.39	.99540	30	.5000	.5000	1.0000	.8660
40	.0987	.0992	10.08	.99511	20	.3420	.3420	1.4618	.6913
50	.1016	.1022	9.788	.99482	10	.1736	.1736	1.5557	.5000
6	.1045	.1051	9.514	.99452	84	.9823	15.671	.0626	.1736
10	.1074	.1080	9.255	.99421	50	.7660	1.1918	.8413	.6428
20	.1103	.1110	9.010	.99390	40	.6428	.6913	1.4551	.7660
30	.1132	.1139	8.777	.99357	30	.5000	.5000	1.0000	.8660
40	.1161	.1169	8.556	.99324	20	.3420	.3420	1.4618	.6913
50	.1190	.1198	8.345	.99290	10	.1736	.1736	1.5557	.5000
7	.1219	.1228	8.144	.99255	83	.9823	15.671	.0626	.1736
10	.1248	.1257	7.953	.99219	50	.7660	1.1918	.8413	.6428
20	.1276	.1287	7.770	.99182	40	.6428	.6913	1.4551	.7660
30	.1305	.1317	7.596	.99144	30	.5000	.5000	1.0000	.8660
40	.1334	.1346	7.429	.99106	20	.3420	.3420	1.4618	.6913
50	.1363	.1376	7.269	.99067	10	.1736	.1736	1.5557	.5000
					82				
Cosin.	Cotg.	Tan.	Sine.	Angle.	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	.4067	.4452	2.246	.91355
10	.2784	.2899	3.450	.96046	50	.4094	.4487	2.229	.91236
20	.2812	.2931	3.412	.95964	40	.4120	.4522	2.211	.91116
30	.2840	.2962	3.376	.95882	30	.4147	.4557	2.194	.90996
40	.2868	.2994	3.340	.95799	20	.4173	.4592	2.177	.90875
50	.2896	.3026	3.305	.95715	10	.4200	.4628	2.161	.90753
17	.2924	.3057	3.271	.95615	73	.4226	.4663	2.145	.90631
10	.2952	.3089	3.237	.95545	50	.4253	.4699	2.128	.90507
20	.2979	.3121	3.204	.95459	40	.4279	.4734	2.112	.90383
30	.3007	.3153	3.172	.95372	30	.4305	.4770	2.097	.90259
40	.3035	.3185	3.140	.95284	20	.4331	.4806	2.081	.90133
50	.3062	.3217	3.108	.95195	10	.4358	.4841	2.066	.90007
18	.3090	.3249	3.078	.95106	72	.4384	.4877	2.050	.89879
10	.3118	.3281	3.048	.95015	50	.4410	.4913	2.035	.89752
20	.3145	.3314	3.018	.94924	40	.4436	.4950	2.020	.89623
30	.3173	.3346	2.989	.94832	30	.4462	.4986	2.006	.89493
40	.3201	.3378	2.960	.94740	20	.4488	.5022	1.991	.89363
50	.3228	.3411	2.932	.94646	10	.4514	.5059	1.977	.89232
19	.3256	.3443	2.904	.94552	71	.4540	.5095	1.963	.89101
10	.3283	.3476	2.877	.94457	50	.4566	.5132	1.949	.88968
20	.3311	.3508	2.850	.94361	40	.4592	.5169	1.935	.88835
30	.3338	.3541	2.824	.94264	30	.4617	.5206	1.921	.88701
40	.3365	.3574	2.798	.94167	20	.4643	.5243	1.907	.88566
50	.3393	.3607	2.773	.94068	10	.4669	.5280	1.894	.88431
20	.3420	.3640	2.747	.93969	70	.4695	.5317	1.881	.88295
10	.3448	.3673	2.723	.93869	50	.4720	.5354	1.868	.88158
20	.3475	.3706	2.699	.93769	40	.4746	.5392	1.855	.88020
30	.3502	.3739	2.675	.93667	30	.4772	.5430	1.842	.87882
40	.3529	.3772	2.651	.93565	20	.4797	.5467	1.829	.87743
50	.3557	.3805	2.628	.93462	10	.4823	.5505	1.816	.87603
21	.3584	.3839	2.605	.93358	69	.4848	.5543	1.804	.87462
10	.3611	.3872	2.583	.93253	50	.4874	.5581	1.792	.87321
20	.3638	.3906	2.560	.93148	40	.4899	.5619	1.780	.87178
30	.3665	.3939	2.539	.93042	30	.4924	.5658	1.767	.87036
40	.3692	.3973	2.517	.92935	20	.4950	.5696	1.756	.86892
50	.3719	.4006	2.496	.92827	10	.4975	.5735	1.744	.86748
22	.3746	.4040	2.475	.92718	68	.5000	.5774	1.732	.86603
10	.3773	.4074	2.455	.92609	50	.5025	.5812	1.720	.86457
20	.3800	.4108	2.434	.92499	40	.5050	.5851	1.709	.86310
30	.3827	.4142	2.414	.92388	30	.5075	.5890	1.698	.86163
40	.3854	.4176	2.394	.92276	20	.5100	.5930	1.686	.86015
50	.3881	.4210	2.375	.92164	10	.5125	.5969	1.675	.85866
23	.3907	.4245	2.356	.92050	67	.5150	.6009	1.664	.85717
10	.3934	.4279	2.337	.91936	50	.5175	.6048	1.653	.85567
20	.3961	.4314	2.318	.91822	40	.5200	.6088	1.643	.85416
30	.3987	.4348	2.300	.91706	30	.5225	.6128	1.632	.85264
40	.4014	.4383	2.282	.91590	20	.5250	.6168	1.621	.85112
50	.4041	.4417	2.264	.91472	10	.5275	.6208	1.611	.84959
					66				
Cosin.	Cotg.	Tan.	Sine.	Angle.	Cosin.	Cotg.	Tan.	Sine.	Angle.

TABLE IX.—CALCULATION OF EARTHWORK.

TABLE VIII.—NATURAL TRIGONOMETRICAL FUNCTIONS.

Angle	Sine.	Tan.	Cotg.	Cosin.		Angle	Sine.	Tan.	Cotg.	Cosin.	
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	39	.6293	.8098	1.235	.77715	51
40	.5398	.6412	1.560	.84182	20	10	.6316	.8146	1.228	.77531	50
50	.5422	.6453	1.550	.84025	10	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	.6428	.8391	1.192	.76604	50
40	.5544	.6661	1.501	.83228	20	10	.6450	.8441	1.185	.76417	50
50	.5568	.6703	1.492	.83066	10	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	39	.6561	.8693	1.150	.75471	49
40	.5688	.6916	1.446	.82248	20	10	.6583	.8744	1.144	.75280	50
50	.5712	.6959	1.437	.82082	10	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	39	.6691	.9004	1.111	.74314	48
40	.5831	.7177	1.393	.81242	20	10	.6713	.9057	1.104	.74120	50
50	.5854	.7221	1.385	.81072	10	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	39	.6820	.9325	1.072	.73135	47
40	.5972	.7445	1.343	.80212	20	10	.6841	.9380	1.066	.72937	50
50	.5995	.7490	1.335	.80038	10	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	.79698	50	40	.6905	.9545	1.048	.72337	20
20	.6065	.7627	1.311	.79532	40	50	.6926	.9601	1.042	.72136	10
30	.6088	.7673	1.303	.79365	30	39	.6947	.9657	1.036	.71934	46
40	.6111	.7720	1.295	.79198	20	10	.6967	.9713	1.030	.71732	50
50	.6134	.7766	1.288	.78980	10	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
	Cosin.	Cotg.	Tan.	Sine.	Angle.		Cosin.	Cotg.	Tan.	Sine.	Angle.

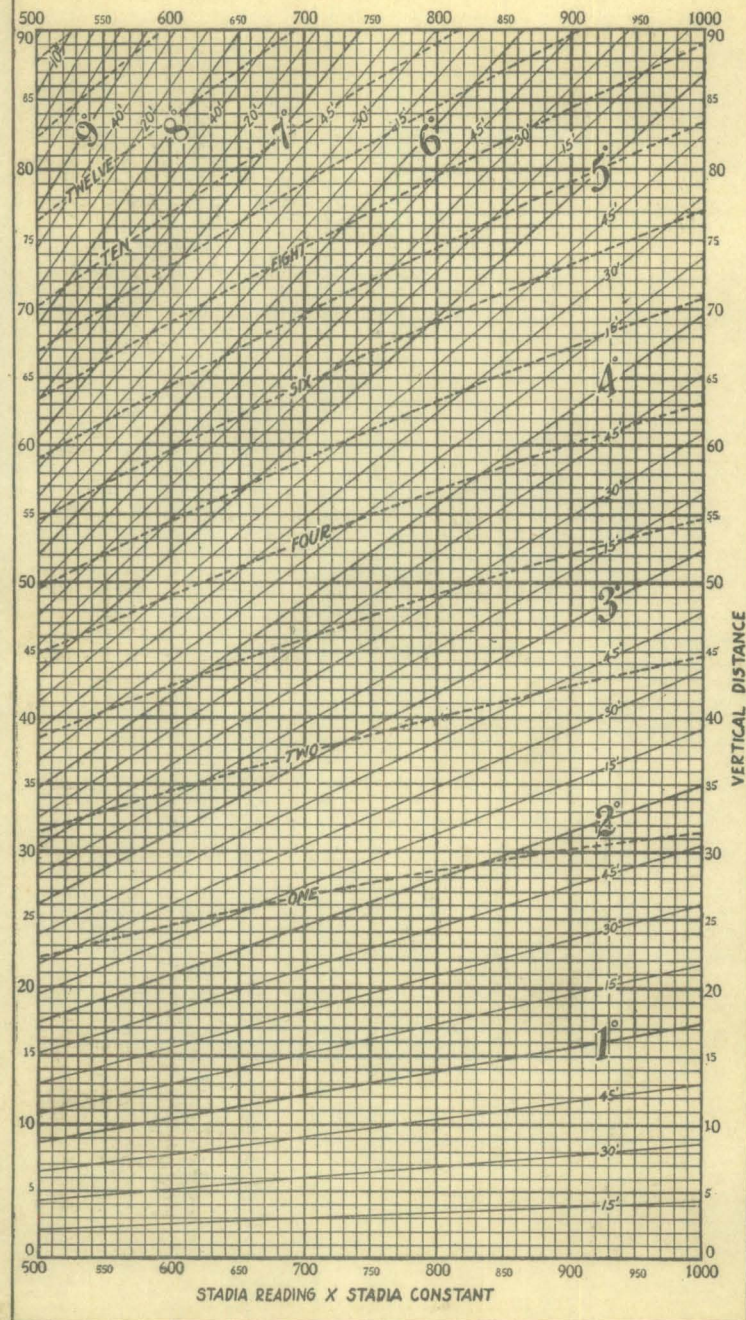
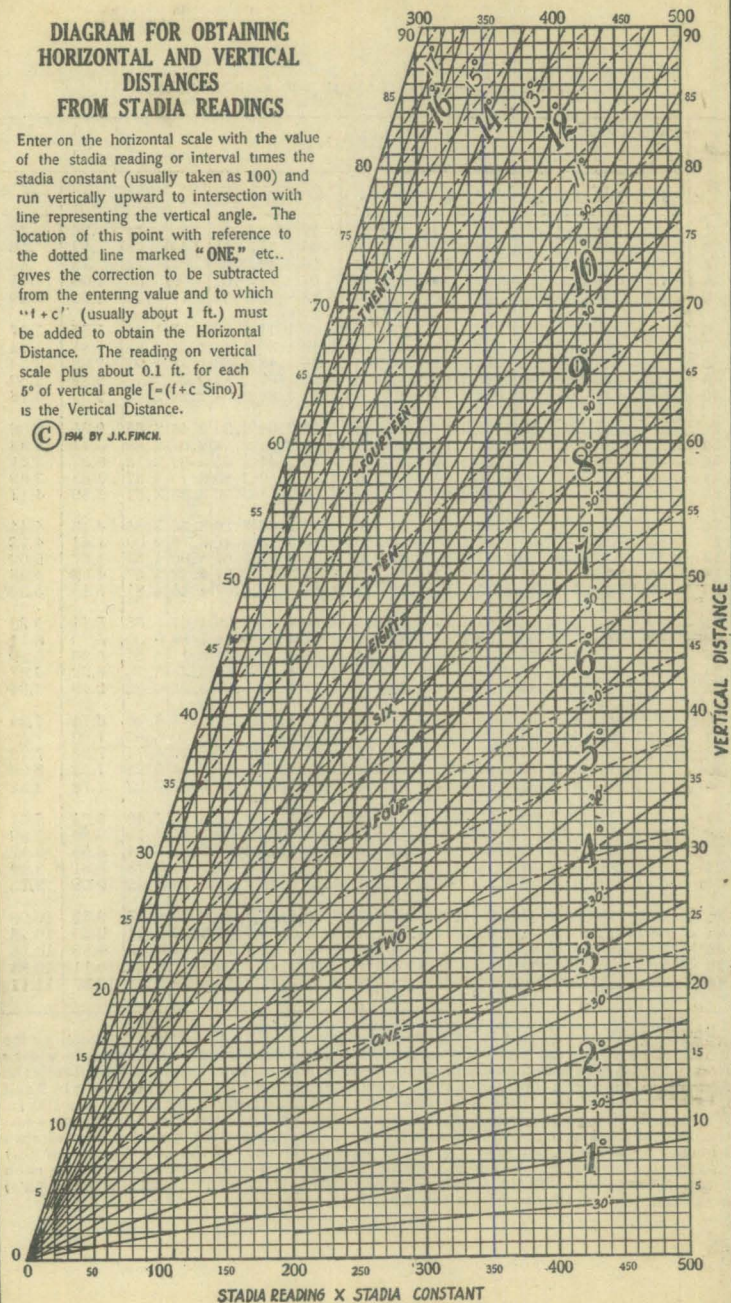
Width	HEIGHT														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	.02	.04	.06	.07	.09	.11	.13	.15	.17	.18	.20	.22	.24	.26	.28
2	.04	.07	.11	.15	.18	.22	.26	.30	.33	.37	.41	.44	.48	.52	.56
3	.06	.11	.17	.22	.28	.33	.39	.44	.50	.56	.61	.67	.72	.78	.83
4	.07	.15	.22	.30	.37	.44	.52	.59	.67	.74	.81	.89	.96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

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

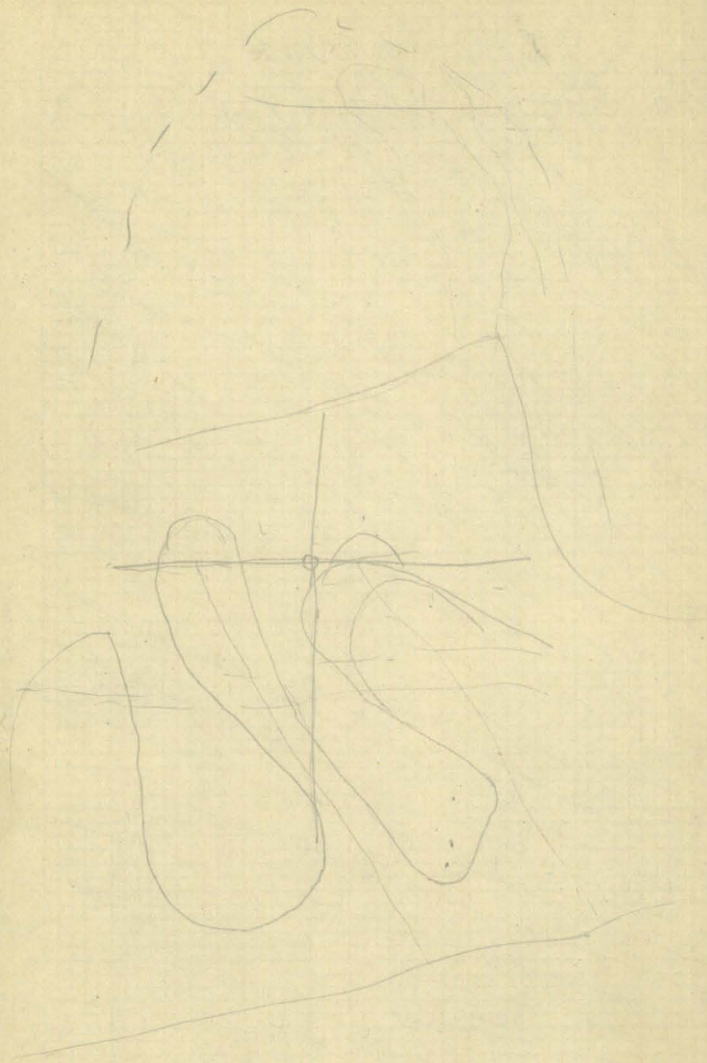
Enter on the horizontal scale with the value of the stadia reading or interval times the stadia constant (usually taken as 100) and run vertically upward to intersection with line representing the vertical angle. The location of this point with reference to the dotted line marked "ONE," etc., gives the correction to be subtracted from the entering value and to which "t+c" (usually about 1 ft.) must be added to obtain the Horizontal Distance. The reading on vertical scale plus about 0.1 ft. for each 5° of vertical angle [$= (t+c \sin \alpha)$] is the Vertical Distance.

© 1914 BY J.K.FINCH.



Lewis Nelson.

Sec. 16



123456789

1.07

10.02

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	25.2	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 $41.9 + (20 - 16) \div 2$ or 2 ft. added to 41.9 = 43.9. For slopes of 1 on 1 see inside of front cover.