

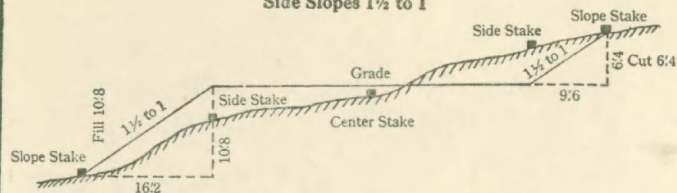
Hub S.

DIETZGEN

ENGINEER'S
FIELD BOOK

No. 1030

DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING
Roadway of any Width
Side Slopes 1½ to 1



In the figure above: Opposite 6 under "Cut or Fill" and under .4 read 9/6 the distance from the side stake to the slope stake at right. Opposite 10 under "Cut or Fill" and under .8 read 16/2, the distance from the side stake to the slope stake at the left.

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

EUGENE DIETZGEN CO.

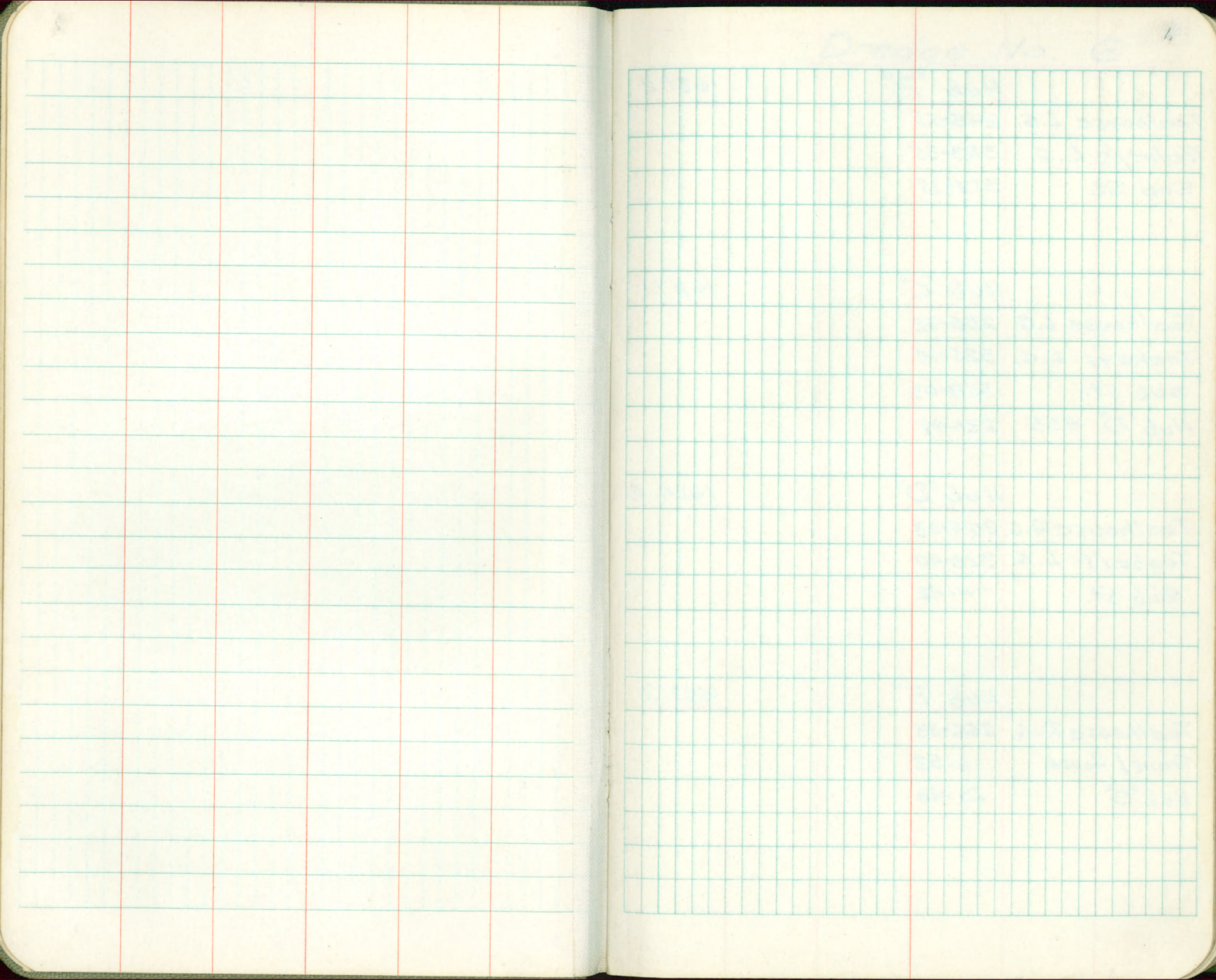
Property of _____

Address _____

Phone _____

This Field Book is manufactured of a High Grade 100% Rag Paper Having a WATER RESISTING SURFACE, and is sewed with RUST PROOF wire.

Made in U. S. A.



Dredge No. 6.Hub "B"1631.2

Toolhouse L.G. 246-25

Toohey's L.G. 323-35

Sub. St. 357-35

Hub "C"1627.1

Toolhouse L.G. 256-32

Toohey's L.G. 325-14

Sub St. 358-03

Hub "D" 855 231-44

Hub "D"1624.4

Toolhouse R.G. 264-03

Toohey's L.G. 328-40

Sub St. 4-42

Hub "E"1622.9

Toolhouse R.G. 266-33

Transf. House 6-52

Hub "D" 58-46

Dredge # 6.Hub "F"1618.7

Red Transf. H. 162-03

Transf. House 75-51

Isolator 143-13

Hub "G"1617.2

Transf. House 77-54

Log House Left. 149-48

Granville Office 158-00

P.P. Sulph. 127-55

Hub "H"1623.3

Isolator Closest 278-52

Red Tr. House 19-02

School B/. 26-08

BL-80 161-25

Hub "I"1632.7

Closest Pole 2360-41

Johnson House 40-22

Log Building 295-51

BL-80 83-18

BL-801614.6

Cabin L.G. 152-16

School House 169-39

Transf. ✓ L.G. 72-11

BL-82 211-42

BL-901606.5

BL-80 31-42

Baseline Hubs.

B.L.A. 61.	1624.3
x ⁿ 50	1623.2
52	23.4
54	22.6
56	21.8
58	19.6
60	20.9
62	21.1
64	19.6
66	19.5
68	16.7
70	16.4
72	16.8
74	13.2
76	15.1
80	14.6
82	15.1
84	08.3
86	06.6
88	06.8
90	06.5
92	08.2

BLA-61		1630.31
61+73.5	Up. Stream on B.L.	1629.61
	$\bar{T} \text{ BL. X}^n 80$	1629.7
T.P.-1	432	431-42
v 2	920	
	$\bar{T} \text{ T.P.-1}$	
T.P.-2	488	
	$\bar{T} \text{ T.P.-2}$	
T.P.-3	481	31-42
P.D.-4	830	L
	$\bar{T} \text{ T.P.-4.}$	
T.P.-5	528	200 up 54
Eng. Off	154-33	
Signal	~~143-66~~	
670	$\bar{T} \text{ T.P.-5}$	0 - P. St.
T.P.-6	692.8	0 $\rightarrow$ 2.54 692.8
Eng. Office	151-39	
Signal	145-26	
	$\bar{T} \text{ T.P. 6}$	
(Hub 61)	210.81	

moved up stream 73.5' on Bl. 3. 212 June 9/53

H.1

705
670

35

$\bar{A}$ Hub 61

x^2-80 211-42
 Eng. Office 356-35
 Signal 357-18
 Sub. St. 0.42
 Thoysh. G 322-25

200
 $\bar{A}$ Hub. -235.6 dist.

x^2-80 211-42
 S. 105 352-43
 Eng. Office 358-17
 P. 4 57-22
 T.P. 1 49-00 255

Hub 200 $\bar{A}$ T.P. -1

262
 213
 49

$$224.8 \times 999$$

20232
 8992
 20232
 2133352

207 20
 210.8
 24.8
 235.6

48-60

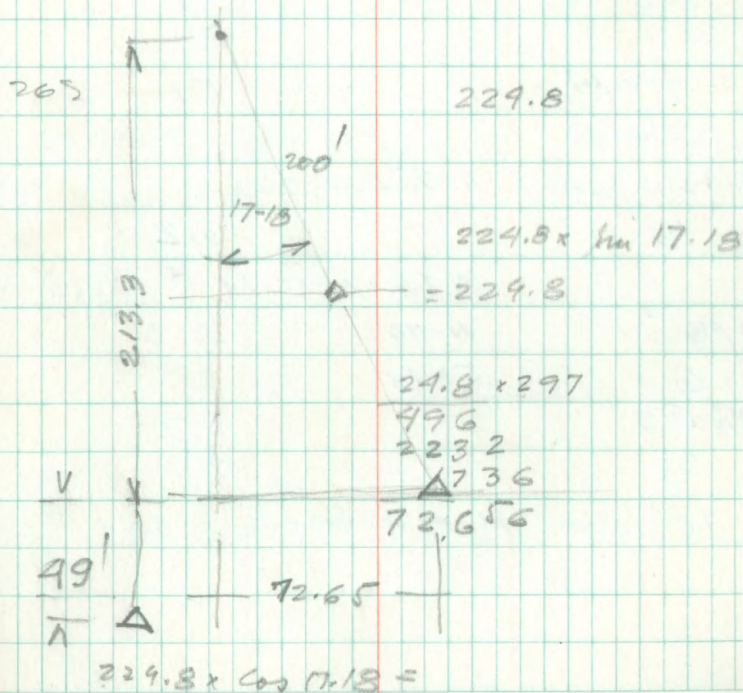
31-42

17-18

235.6

35.6

200.0



x⁹-48 119.7

x⁹-48 80' $\bar{\pi}$ 465 1629.7
357.7 7.9 1629.7
52' 49.00 7.7 1629.9

OH 270-1 ~~1800~~¹⁰⁰ v 7.0 1630.6

$\bar{\pi}$ DH 270-1 1630.6

1600! 2th Line. (0) 2.00 1633.6

$\bar{\pi}$ DH. 268-6

OH-268-10 5.7

5.1

v-14 5.1

13-62 Signal

$\bar{\pi}$ DH-268-6

12-16 3.2

$\bar{\pi}$ DH-268-16¹⁸

11-90

51-53

Signal

Builed

288-22

6.7

23

7.9

10' from the riverbank 60+

1. DH. Line 1050

- 49
1001

H. 15.0

H 1635.6

H. 1. 9.8

Signal 13-02

0 $\rightarrow$ π

H. 1. 50

H. 1. 5.8

18
 $\bar{A} DH 268-16$
 #5

22 8.5

23 7.4

1639.5

✓ 19.18 7.0

✓ 10.19 7.8

✓ 6.25 6.7

✓ 2.4 6.5

✓ 1.21 8.3 (2.940) 1633.6

0 8.5

$\bar{A} DH-270$

4 220 4.8

8 400 5.6

$\bar{A} DH-270-8$

200 4.5

476 The 179-28

4.1 5.8

4.1 4.8

DREDGE N° 8Hub "A"1709.3

Nearst Isolator 41-59

Ditch Cabin 182-46

Highline D.S. 144-36

Hub "B"1694.8

Toohey's Gable 327-34

Ditch Cabin 183-39

Cabin Left G. D.S. 115-30

Hub "C"1697.5

Toohey's L. Gable 338-50

Ditch Cabin 175-97

Transf House D.G. 96-11

Hub "D"1699.4

Ditch Cabin 186-27

P.P. Up. St Isolator 352-34

P.P. D.S. Isolator 87-39

Hub "E"1713.1

Toohey's D.G. 328-41

Ditch Cabin 175-51

Transf. House L.G. 126-50

Highline Isol. 50-35

Hub "X"

1695.1

Toohey's L.G. 347-26

Ditch Cabin 166-36

D.R. L.L. 53-12

High Tree B.L. 220-42

Hub "Z"

1697.1

Toohey's L.G. 347-22

Ditch Cabin 166-37

High Line Isol. 30-36

DREDGE No 8.

DREDGE N^o 9.Hub "P"2100.0

Sub St. 113-06
 Cabin D.G. 151-00
 Nearest Pool 56-12

Hub "Q"2121.0

Closest Pool 2-32
 Boiler 167-00
 High L.I at Sub St. 107-24

Hub "R"2108.5

Sub. St. 121-02
 P.P. L.L. 47-41
 High Tree 314-10

Hub "S"2105.5

Volt Cabin D.G. 151-18
 Closest P.P. 43-28
 High Tree 313-00

Hub "T"

Volt Cabin D.G. 151-05
 P.P. Isolator 131-10
 High Tree 311-26

Hub "G-4"1832.4

Van Strappen G. 52-11

Farr's G. 111-29

Nearest P.P. 210-10

Hub "Z"1822.6

Pole on Hor. 317-08

Van Streppen G. 24-51

Sub Str. 57-10

Farr's House 105-41

Nearest P.P. 14-10

Hub "A"1821.7

Van Strappen G. 355-37

P.P. on Horizont 313-45

Farr's Chimney 102-03

3200 v P. Line L.L. 53-16

Hub "B"

Van Strappen G. 7-35

Farr's Left G. 85-05

P.P. D.S. 137-23

Hub "C"

1820.4

Van Strappen G. 341-33

P.P. on Horizont 312-29

D.P. on Left L. 42-50

Hub "D"

1824.2

P.P. on Horizont 315-50

H.L.L. Limit 345-40

—" — 67-02

Spur Line 317-01

Hub "E" (56JA)

P.P. on Horizont 316-31

Van Strappen G. 342-15

Farr's L.G. 32-18

Hub "D" 325-15

Hub "F" 142-30

Hub "F"

P.P. on Horizont 317-22

Van Strappen 336-53

Farr's R.G. 357-24

Sub St. 135-40

π BLA-66

xⁿ-416

173-42

Farrs House

347-20

Transf. 2.G.

5°06'

Hub "I" 830

6°38' (186-39)

π Hub "I"

BLA-66

186-39

xⁿ-457

175-33

High L. Pole

319-56

Hub "E"

328-25

Van Str. House

334-45

Hub "H"

149-45

173-42

180

353-42

Hub "W"

1078.4

P.P. on Horizon 121-42

P. Isol. 25-20

Ligh Tree 178-58

Hub "X"

1050.3

P.P. on horizon 311-49

Odig House 88-25

Ttransf ✓ 80-23

Near Is. 355-33

Hub "W" 77-40

Hub "Y"

1048.2

Garage Chimn. 103-54

H.L. Pole 323-24

Boiler Dome 233-53

Left Edge

Hub "Z"

Hub "Y" 123-38

H.L. Pole is. 23-59

Garage Sur St. 105-49

Old garage L.G. 92-05

Boiler's Dom L. 209-24

Dredge No 11.

Hub "A"

Boiler's Dom. L.S. 159-57'

H.L. Pole 15. 39-18

Odeq. Gable 87-16

Pole on R.L. 340-50

Hub "B"

Odeq. Gable 77-59

H.L. Pole 340-18

Boiler D.L.S. 258-02

Hub "C" Mushr. Head Bolt

Odegard Hse. 77-28

Hub "B" 300 259-32

H.L. Pole 352-30

v v 321-50

Tel. Pole with 287-50

Brace D.S.

Hub "D"

1053.3

Boiler dome 206-08

Left edge

Hub "B" 91-50

B.M.V St. 293.55

Hub Th # 22

Hub "B" 91-05

Boyl L.E. 176-40

H.L. Pole 28-11

11

BLA-21

BLA-22 290-44

High Line Pole 312-58

B.M. "A" 383.5' 290-44

B.M. "B" 225.5' 290-44

B.M. "C" 150.6' 90-43

B.M. "D" 350.4 90-43

H-A₃ 102-44-17H-A₅

A-5 198-02

HA-3 102-30 102-43

B.M. 246-46 54-16

Wb 117-15

N 8951.9 E 12,769.0

N 8303.3 E 15,687.9

N 8033.8 E 12,471.7

Hub "D" on Base Line

B.L.A. - 21 305.4 270-43

High L. Pole 308-36

✓ ✓ 42-45

H.A-3 104-10

A-5 215-28

Hub "E" 400 140-01 2.3

2. Edge Boyler D. 134-34

Hub "E"

Hub "D" 400 320-01

Dome D.E 127-40

Od. Gable 81-25

H.L. Pole 3-45

✓ ✓ 309-58

H. I. 4.4

A B

BM A on BL

BLA 21 383.5

BM I

N 9, 128, 9
E 12, 301, 4

BLA 21. 500'

BLA 22 290-44

BM H/H. 303-41 (123-40)

HL Pole 37-47 (217-50)

Dumphoose G. 293-20

BM II

BLA 21 1000

BLA 22 290-44

BM H/H. 307-28 127-29

HL Pole 50-34 230-36

Dornett's Cabin 215-01

BLA 21 1500 BM III

BLA 22 290-44

BM H/H. 314-15 134-16

HL Pole 60-45 240-49

Korn's L. 181-50

21. May 1963

E. NEMESGARI

B. Hilton

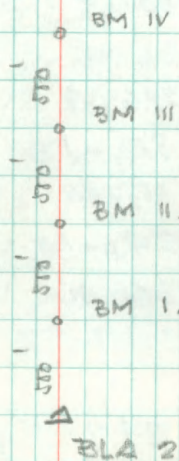
200 + 183.5 Clear.

Re. Ecl. Marker B.L. From.

BLA 21.

Incl B.M. H/H. (About 30' from
Original AT-3) Steel pipe

BM H/H.



4 B

BM IV.

BLA 21 2000

BLA 22

290-44

BM Hill.

328-58 148-59

H.L. Pole

68-37 298-40

Kornell's C.

157-40

A-3

105-45 / 285-47

BM V.

BLA 21 2370' 110-44

BLA 22 290-44

BM Hill 353-49 173-50

H.L. J.S. 73-15 253-18

Kornell 146-50 146-50

Pump 4 Left G. 299-27 119-27

✓ 2. G. 301-32

A-3 106-06 /

286-07

Manny Pole 1 316-58

2 333-44

3 296-14

264-46

~~249-22~~

Rr # 2 247-59

290-44

260

127-50

180-00

160

154-25

110-44

110

138-45

80

100-00

110

75-40

BM IV

Sign 355-23,

Hub VA 300' 89°-40'

(269-40)

✓ UB 160

140-20

(320-20)

TA

110 741-30

60 64-10

70 277-36

243-25 B

250 161-10

272 172-25

270 180-50

BM VI

3LA 21 2500

BLA 22 290-44

7-10 187-12

14-3 106-12 286-14

Dump House

Left G. 301-05

2. G. 303-22

H.L. Isdahr 74-40 254-42

Dole 1 22-52

2 12-19

309-27

233-25

227-35

BM VII (BLA 22)

BLA-21 2935.5 110-44

BLA-2

Hill 466 53-51 233-52 X 56

L.E. Pump H 318-55

2 323-26

H.L. Pole 78-47 258-49

14-3 106-31 / 286-33

1

200
165-6"

35

3000

35.6

3000.0

2960.7 # 21-22

39.3'

4

2 BM VII

BLA-21 3000 110-44

58-51 238-54

Radio

Beam L 321-52 141-53

195'

330-25

220'

334-28

205

325-14

#17

348-53

3000.0

2960.7

39.3

3.9

2960.7

2935.5

25.2

2960.7

2945.9

2935.5

10.41

12.

x" - 286 on B.L.

1851.6

Left hand G.

of Nevada Cor. 321-02

Hub "A"

H.L. Pole 135-57

Cl. H.L. Js. 54-13

High Twin Trees 232-47

Hub "B"

Hub "A" 205 234-32

High L. Pole 139-32

Cl. Pole Js. 54-02

Tw. Trees 232-45

AREA NO 17 Dr# 12.

Iron Pin.

July 11/63

$\bar{A}$ BM # 2

BLA-22

290-44

Mark #1

30-12

#2

72-20

#3

89-52

$\bar{A}$ BM #1.

BLA-22

290-44

#1

345-40 (165-40)

#2

22-47 (202-46)

#3

50-36 (230-35)

BLA-22-0

#1

54-57

#2

92-03

#3

119-52

B.L.A.-21

290-44

~~286-44~~

#1

327-16 (147-14)

323-15

#2

334-48 (154-47)

330-48

#3

342-18 (162-17)

338-18

A-5

201-58

197-58

A-3

107-25

103-25

July 13/63

A-O-BLA-21

T.P.#1

32-02

HTT

128-05

32° 01' - 15"

A-I

500'

T.P.#1

50-41

HTT

202-46

50° 41' - 30"

A-II

1000'

0-22

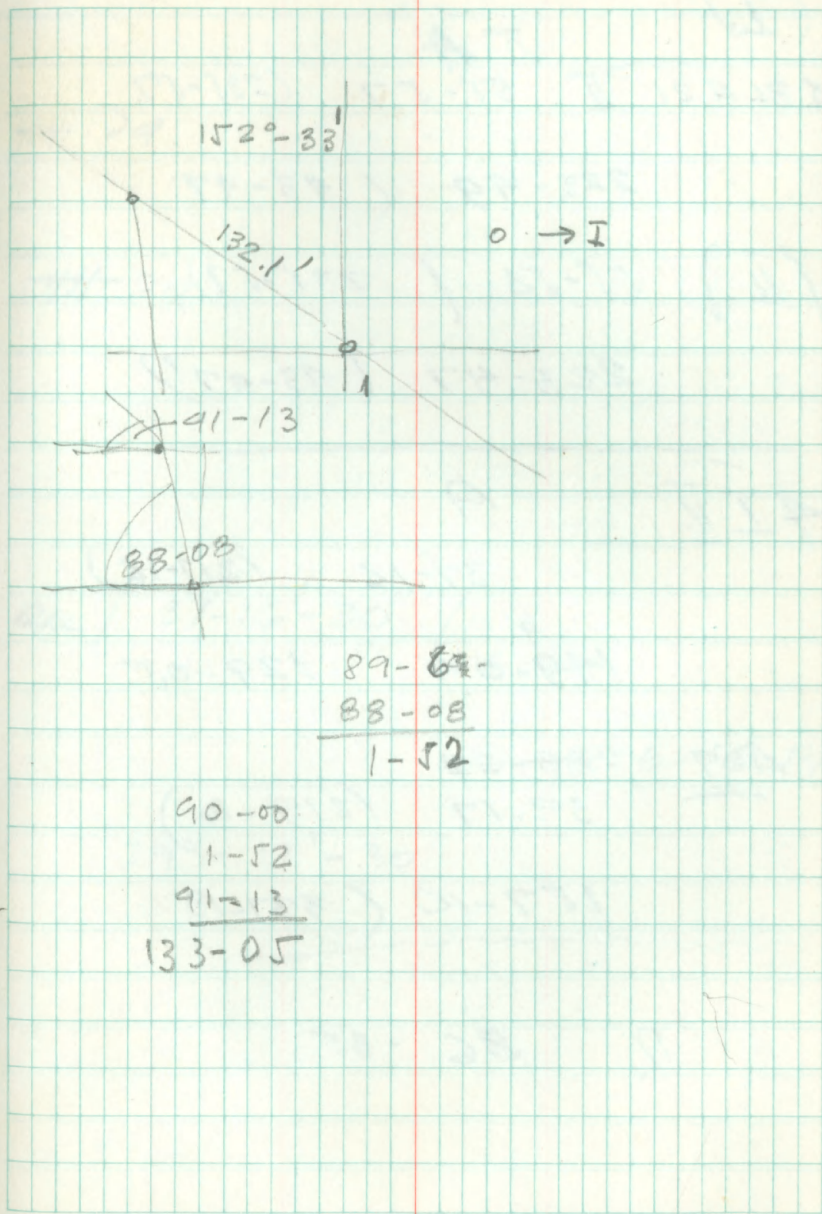
88-08

30 HTT

352-31

(172-33)

88° 08' - 00"



(I.)

~~A~~ ²⁴

436421 II 55-57 (235-57)

223-49 (43-47)

(II.) 55-58 (235-57)

223-47 (43-47')

4 I II

A

37-16' (217-16)

⁹
149-04 329-05

A-9 188-22

39-17 (219-16)

157-10 (337-10)

2

86-35

~~##~~ 24

~~##~~ 29

~~##~~ / 37-16'-30" /

236-56-59

39°-17'-30

Marker "A"

A-5	Azimuth	166-59'-34"
BL II	✓	198°-42'-08"
A-7	✓	216-48'-47"
A-9	✓	237-56'-54"
A-8	✓	286°-54'-28"
BLA-22	✓	272°-30'-27"
BLA-21		
"B"		313°-21'-10"

BLA-21

Ref Hub	390.5	10°-43'-30"E
"B"	453.93	338°-51'-31"

"4" 322-41

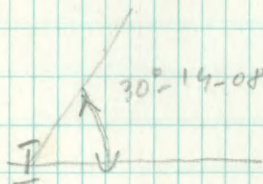
"3" 80-30 60°-08'

Concession Point

198-52' 166-59-30
~~180~~
 346 19-34

On Concession Line 313°-21'-10
~~- 180-00-00~~
 133-21-10

286-54-28
~~180~~
 106 54-28



I II.

BLA-21 2 290-44'

A-A.5

Hub A-BLA-21 31-00 44T

123-53

Azin. R.P. 320-04.

" X 260-56

BLA-21 17-57

A-21

A-5 197-57

A 322-42

$\overline{A}-\sqrt{}$
A-9 265-00
A-7 251-45
A 346-45
A-3 85-00

$\overline{A} \# \overline{I}$
B-A-5 120-10 239-41.

O-22
A 50-39
B 120-12
Q.P. 4-08
A-9 318-32
240-28

O. A

DIST 3LA-21 - "C" L.M.

150'.



π 3LA-21.

#1 #2 24

~~##~~ 30-04 120-16 (300-16)

#2 #3 24.

~~##~~ 36-12 144-46 (324-46)

1-3 24 66⁰-~~19~~16¹-30¹¹

265-04

#3 4-5

2°-31' 24

~~##~~ 10°-08'

30-04

36-12

56.16

4-5-48

104° 12'

BLA-22-A-8

11-28-30 (191-28)

~~###~~ 45° 51' (225-51)

4-5-22

92° 45' (272-45')

40

~~###~~ (11-05 / 191-04)

4-3-45

95° 30'

360

11-05

371-05

368

3-05

92° 46'

180

09

189

92° 46' - 08"

300

4

11-04-30

1 31A-21

31A-22

290°-44'

A-8

302°-12' (122-10)

A-5

197-56 (17-56)

A-3

102-25 (202-25)

2#1

129-08 (309-08)

2#2

159-12 (339-13)

2#3

195-23 (15-23)

U.S.

90-40

1 2#1

2#2-21 55°-14' (235-14)

220°-58 (41-59)

195-23

129-08

180

180

375 23

309-08

2#2 - #3

22-57.

A-5 - 21

86-53.

A#1

3LA-21

309-08.

A-8

303-06 (123-06)

2-3

276-53 (96-53)

2-2

253-55 73-55

A-5

222-16 (42-15)

π 2#1

4-5 - #3.

40 54°-33' (234-32)

~~41~~ 218-21 (30) (38-21)

π 2#2.

3LA 21'-2#1

94-41.

~~41~~

18-43 (198-42)

3LA-21

339-12

A-5

214-02.

2#3.

299-48 (119-46)

2#1

73-52 (253-52)

38

12#3

BLA-21 #7

81-27'

325°-44 (145-43)

BLH-21 15°23'

B#1 96-49 (

119-47 (295-47)

4-5 198-39 (18-39

$\bar{A} \# 2-2$

421' 339°-12'
 $\bar{B} \# 4.$ 307°-38'
 4-5. 214°-03'
 4-8. 306-00

1	405	76°-00		+1-14
2.	380	66°-10'	✓	+0-30
3.	305	60-45		4.5
4.	310	54-40		4.0
5	260	48-50		4.6
	240	31-25		6.6
	270	22-00		7.1
	315	21-31.		7.0
	345	21-20		6.5
	400	20-35		9.2
	450	19-25		11.2
	485	17-25		9.5

$\bar{B} \# 4$ 634' +0-54

107-38
 180
 287-38

$\bar{D} \# 11.$

187-

$\Delta H. \bar{B} \# 4.$

61°-39'

###

246-32

66-32

$\alpha. L$

1 21

244 378 31-58 11-18

A-5 197-57

4-8 302-12

Mus62 30/1. 246-40 (66-40)

(211-57)

31

~~101-10~~
4-8 - 244

89-48

1111 359°-10 09'

179°-08'

1 24

455 207.

370 204-40

320 207-20

260 206-40

225 205-40

4-5

301-52

D.H.

1 24

430 273-30

420 276-40 -1-39

350 278-50 -2-10

305 277-40 -2-06

270 275-45

235 271-50 -3-55

110 227-25

2

2/1-58

121-50

Aug-1-'63

H.I. F.4

K.L

12 C +

T.D.

T.D. 160' 121-32 (301-32)

129-41

295

82-45

T.D.

~~130-11~~

315

61-10

315

55-25

400

47-30

490

41-15

510

38-30

600

34-00

640

31-15

Pr.H.

130-58

445

13-10

375

16-25

255

27-00

185

37-20

135

82-30

A. $\overline{1} x^4 48$
 350-37 (350-13)

Date *Go to*
Go in or
Per

49
 180
 229

$\overline{b}$
 23.6
 66.2
 100.0
 189.8

100

Doc. Petroken Lin

$\overline{V}$
 $\times$

66.2
 $x^4 48$

$\overline{1} \beta$

4.1 3.95

190 49° 8.4

A 352-28 (352-01)
 Eng office 357-55

203.00

AB 32

T 673 47.

152-45'

50°-55'-00"

10-56

B

109-33

122-56

1 I.

A

0°-00

M.K. S 122' 352-35

✓

130' 331-521

Average 100' 65-05

115' 45-45

II

600 71-12

23 213-33 71°-11'

Eig. photo 80 102-06 (75')

1 II.

I

157-12

"A"

218-21

218-19

IA

23

67-06

201-22

67-06-20°

67-07-20°

218-21

67-06

151-12

218-18

201.22.

67x3
201 2

180

71-12

25P 12

151-12

67-07-20

218-19 67.21

21833

a. 90 170-15 (350-15)

#B. 190' 319-00 139-00
1

$\overline{A}$ #7.

~~#8 1000'~~

#4 139-00

#8 1000' 333-20 153-20

A 206-33

B 330-98 150-98

L. Post #9. 332-96

Post: #6 89-14

Flare P. 153-39.

(
AB 124-13. $\overline{B}$ 12°42

1330 $\overline{A}$ #8

Lot 7. 2x665 332-22 152-22

"B" 328-58 148-58

A 178-25

Flay 153-34)

II. 2
 Af. 2.
 A
 F.H.P.

19.
 350-15
 42-28
 223-06
 232-36

A
 Huba, 110'

1 #1
 0°00
 302-48 122-48

Flap 2

320°20

A

6°53

#7.

74-49.

92 446 175-30 355-30

A

2°47'

F/94

0°53'

#4. 850 158-08 338-08

#5. 195 157-19

Cu. Rins 170' 168-08

66' 243-27

Comm. 178' 248-28

160 266-40

Dole - 308-10

93 280 246-10 66-10

Pipe 211 245-28

92
 42 2-47

375 158-14

T 93.

9.2 66 66-10

4 538' 207-45 27-45.

T 94

E13 2- 27-45

Flapp. 26-31

D4 (0140V 43-47

✓ 36-07

3. 315' 229-55

Coal House

64. 220-25

50 203-46

82 190-20

Log 237-05

9.5 380' 345-11 165-08

T 95

9.5 165-08

100 272-45

88 259-00

200 279-00

71-90

1 #4.

92 850 338-08

2470 338-95

"A" 352-36

Rand 550 338-90

Flagpole 345-49

350 341-20

240 343-25

195 343-35

85 339-50

35 337-40

62 214-10

155 199-12

260 197-15

390 197-10

T.P. 1000 197-51 17-51

~~1130~~

T.T.P.

A 1-41'

Rc 2. 20-09

600 18-45

475 20-00

385 22-48

340 25-00

295 29-02

235 39-16

180 61-20

170 84-54

180 96-00

190 103-20

215 101-40

250 105-20

2 1521 226-~~40~~⁰ 46-08'

R.D.S. 90-31 270-31

Roanoke 150 21-37

150 94-10

160 106-30

165 113-30

150 120-31

110 147-55-

115

192.

12 D.S.

1560

2x720 270-31 266-41.

A 336-13

D.L.S. 351-02

~~28-50~~

26-02

253-70

1 #41

92

338-08

A

352-37

B

50-33(34) (230-34.)

2

22-22

Th. Cable

296-15-

Ph. G.

294-56

T.P.

197-58 (17-58) ~~230-5~~

Top. L.

203-03

1.T.P.

4. 17-53

A. 1

1-41.

2. D. S.

90-30 270-30

2. 081.

226-07

Stake

238-35-

Sign

122-31

V

14-37.

12.

T. P.

270-30

Q.

255-35

Sig. 11

265-20

A

336-07

3.

25-58.

791

357-00

V 352-21

336-07

180

156 07

0-25. # 12.

$\bar{x}^n - 265$

Hub 4 650 68-59 +1-57

Hub 8 785 33-09 +1-47

$\bar{x}$ Hub 4

x^n

249-00

155 278-05 -4-00

120 285-45 -4-20

70 331-00 10.6

140 341-40

185 342-30

215 345-10

270 346-50

300 345-35

330 346-00

365 343-05

B 460 337-21 157-00

$\bar{x}$ Hub 8

$x^n 265$

50 178-10

65 248-30

120 232-00

230 185-50

275 183-30

400 184-00

4.1. 4.3

249-00

213-06

4.1. 4.8

u. L

#10

$\overline{1406}$ L
 D.P. 0-00 185-37
 T.P. 425 54-12 (234-13) 10.4
 500 150-50
 490 148-55
 415 150-55
 330 150-40
 210 152-20
 130 153-25 5.4
 135 97-30 8.7
 - W.L. 10.6
 240 74-30 10.5
 305 71-30 10.4
 415 72-45 10.0

$\overline{1}$ T.P.

12 234-13
 D.P. 344-42
 540 162-45
 340 158-50
 230 153-40

H.I. 4.9

54-12
 180-

 234 12

Corr.

Note 15' From + the Cut.

T.T.P. -17. Hub(x) 0

Hub(x)	355	0.0
Pomph	317-10	
Booth Lamp	250-31	
	$\bar{A}$ BM-A	
BLA 22	290-44	
BME	303-01/123-01/304-15	
A-3	103-21 (283-22)	

	2x515	$\bar{A}$ 0-A
Creek	1030'	137-40-4.16'-76.5
Hump.	190-30	
U.S	44-15	
D.SI	224-40	

Dogol. 70-45

Bottom of Ditch

70' 329' +4.26

o. let to
7' lower water

Middle of road

5.4
76.5
81.9'
7.4
89.0' Depth

Dominion Ditch

T x 0 → N

			+6.5
D ₁	4175	251-53	+8-00 7.55
	480	"	+7-44'
	525	225-50	+7-10
	530	274-20	+7-04
	240	280-30	-1-10
	180	299-00	6.0
	260	10-00	5.4
	360	42-25'	5.5
1.	240	52-00	
	72	99-45	
	190	191-20	8.5
	191-20		
	320	191-35	5.4
	485	182-5	4.0

Level

Road Lowpoint	5.4
B.M. Bridge	3.5
Bank	6.3
W.L.	13.00

4.1 4.5

Ditch

2' Lower Bottom of Ditch
Top of Ditch - 3' Bottom

1' Lower

14' Back
Down Bridge B.M. D.S. R.H. ^{Bracing}
Road

✓
✓

+6.5
5.5
70.5

13.0

83.

Do

$\bar{A}$ DH-270-12

DH v 16, 200

5.7

v 20-~~400~~ 360

5.0

$\bar{A}$ D.H-270-20

D.H. v 24 ~~300~~ 180

7.5 1630.5

v 28 370

6.3 1631.7

D.H. v 16

7.1 1630.9

v - 12

7.9 1630.6

v - 8

7.8 1630.2

v - 9

(no) (

7.2 1630.8

v - 1

7.9 1630.6

July-6-62.

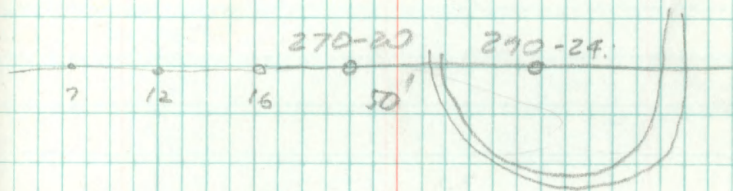
H. 1 9.8

Upper Hair

v

H. 1 5.5

Coll: 1638.0



x

268-2

v-6

v-10

v-14

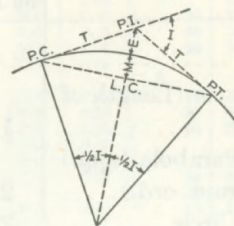
v-18

v-22

(-23)

CURVE AND REDUCTION TABLES

Published by Eugene Dietzgen Co.



CURVE FORMULAS

1. Radius : $R = \frac{50}{\sin D/2}$
2. Degree of Curve: $D = 100 \frac{I}{L}$. Also, $\sin D/2 = \frac{50}{R}$
3. Tangent : $T = R \tan \frac{1}{2} I$. Also, $T = \frac{T \text{ for } 1^\circ \text{ curve}}{D} + C$.
4. Length of Curve: $L = 100 \frac{I}{D}$
5. Long Chord : $L.C. = 2R \sin \frac{1}{2} I$.
6. Middle Ordinate: $M = R (1 - \cos \frac{1}{2} I)$
7. External : $E = \frac{R}{\cos \frac{1}{2} I} - R$. Also, $E = T \tan \frac{1}{4} I$.

EXPLANATION AND USE OF TABLES

Given P.I. Sta. 83+40.7, $I = 45^\circ 20'$ and $D = 6^\circ 30'$ find:

Stations—P.C. = P.I. - T. $T = \frac{T \text{ for } 1^\circ \text{ Curve}}{D} + C$. From Tables V and VI

$$T = \frac{2398.8}{6.5} + 197 = 368.32 = 3 + 68.32. \text{ Sta. P. C.} = 83 + 40.7 - (3 + 68.32) = 79 + 72.38.$$

$$P. T. = P. C. + L, \text{ and } L = 100 \frac{I}{D} = 100 \frac{45.33}{6.5} = 697.38 \text{ Therefore, } P. T. = (79 + 72.38) + (6 + 97.38) = 86 + 69.76.$$

Offsets—Tangent offsets vary (approximately) directly with D and with the square of the distance. From Table III Tangent Offset for 100 feet = 5.669 feet. Distance

$$= 80 - \text{Sta. P. C.} = 27.62. \text{ Hence offset} = 5.66 \times \left(\frac{27.62}{100} \right)^2 = .432 \text{ ft. Also, square of any distance, divided by twice the radius equals (approximately) the distance from tangent to curve. Thus } (27.62)^2 \div (2 \times 881.95) = .432 \text{ ft.}$$

Deflections—Deflection angle = $\frac{1}{2} D$ for 100 ft., $\frac{1}{4} D$ for 50 ft., etc. For "X" ft., Deflection Angle (in minutes) = $.3 \times X \times D$. For Sta. 80 of above curve Deflection Angle = $.3 \times 27.62 \times 6.5 = 53.86'$. Also Deflection Angle = dfl. for 1 ft. from Table III $\times X = 1.95 \times 27.62 = 53.86'$. For Sta. 181 Deflection Angle = $53.86' + \frac{6^\circ 30'}{2} = 4^\circ 8.86'$.

Externals—From Table V for 1° curve, with central angle of $45^\circ 20'$, $E = 479.6$. Therefore, for $6^\circ 30'$ curve, $E = \frac{479.6}{6.5} + \text{Correction from Table VI} = 7.378 + .039 = 7.417$.

General Equations and Useful Data

	Symbol on Equation	Numerical Value
Area of circle	$\frac{\pi d^2}{4}$	
Area of Sector of Circle (Length of arc = l)	$1/2 lr$	
Area of Segment of Parabola (app.) (c = chord; m = mid. ord.)	$2/3 cm$	
Area of Segment of Circle	$2/3 cm$	
Cubic Feet in 1 Cubic Meter		35.3145
Cubic Inches in 1 Imperial Gallon .		277.274
Cubic Inches in 1 U.S. Gallon . . .		231
Feet in 1 Meter		3.2808
Feet in 1 Mile		5280
Gallons (Imperial) in 1 Cubic Foot .		6.2321
Gallons (U.S.) in 1 Cubic Foot . . .		7.48
Miles in 1 Kilometer		0.6213
Pounds (Av.) in 1 Kilogram		2.2046
Ratio of Circumference to Diameter	π	3.14159
Reciprocal of π		0.31831
Square Feet in 1 Acre		43,560
Volume of Sphere	$4/3 \pi r^3$	

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.

$\frac{1}{16}$	$\frac{3}{32}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$
.0625	.09375	.125	.1875	.25	.3125	.375	.4375	.5	.5625	.625	.75
1	2	3	4	5	6	7	8	9	10	11	12
.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167	1.0000

Table III.—Radii, Ordinates and Deflections

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

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

Table V.—Tangents and External 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 V.—Tangents and External 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	483.8	30	3014.5	744.6
40	1843.3	289.2	40	2412.4	487.2	40	3025.2	749.6
50	1852.5	292.0	50	2422.3	491.0	50	3035.8	754.6
36	1861.7	294.9	46	2432.1	494.8	56	3046.5	759.6
10	1870.9	297.7	10	2441.9	498.7	10	3057.2	764.6
20	1880.1	300.6	20	2451.8	502.5	20	3067.9	769.7
30	1889.4	303.5	30	2461.7	506.4	30	3078.7	774.7
40	1898.6	306.4	40	2471.5	510.3	40	3089.4	779.8
50	1907.9	309.3	50	2481.4	514.3	50	3100.2	784.9
37	1917.1	312.2	47	2491.3	518.2	57	3110.9	790.1
10	1926.4	315.2	10	2501.2	522.2	10	3121.7	795.2
20	1935.7	318.1	20	2511.2	526.1	20	3132.6	800.4
30	1945.0	321.1	30	2521.1	530.1	30	3143.4	805.6
40	1954.3	324.1	40	2531.1	534.2	40	3154.2	810.9
50	1963.6	327.1	50	2541.0	538.2	50	3165.1	816.1
38	1972.9	330.2	48	2551.0	542.2	58	3176.0	821.4
10	1982.2	333.2	10	2561.0	546.3	10	3186.9	826.7
20	1991.5	336.3	20	2571.0	550.4	20	3197.8	832.0
30	2000.9	339.3	30	2581.0	554.5	30	3208.8	837.3
40	2010.2	342.4	40	2591.0	558.6	40	3219.7	842.7
50	2019.6	345.5	50	2601.1	562.8	50	3230.7	848.1
39	2029.0	348.6	49	2611.2	566.9	59	3241.7	853.5
10	2038.4	351.8	10	2621.2	571.1	10	3252.7	858.9
20	2047.8	354.9	20	2631.3	575.3	20	3263.7	864.3
30	2057.2	358.1	30	2641.4	579.5	30	3274.8	869.8
40	2066.6	361.3	40	2651.5	583.8	40	3285.8	875.3
50	2076.0	364.5	50	2661.6	588.0	50	3296.9	880.8
40	2085.4	367.7	50	2671.8	592.3	60	3308.0	886.4
10	2094.9	371.0	10	2681.9	596.6	10	3319.1	892.0
20	2104.3	374.2	20	2692.1	600.9	20	3330.3	897.5
30	2113.8	377.5	30	2702.3	605.3	30	3341.4	903.2
40	2123.3	380.8	40	2712.5	609.6	40	3352.6	908.8
50	2132.7	384.1	50	2722.7	614.0	50	3363.8	914.5

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

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

Table VI.—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	.029	.032	.035	.039	.043	.047	.051
20°	.006	.011	.017	.022	.028	.034	.038	.045	.051	.057	.063	.070	.076	.083
25°	.009	.018	.027	.036	.046	.056	.065	.074	.083	.093	.106	.120	.127	.135
30°	.013	.025	.038	.051	.065	.078	.090	.103	.116	.129	.149	.170	.179	.188
35°	.018	.035	.054	.072	.086	.109	.131	.153	.175	.197	.213	.230	.247	.264
40°	.023	.046	.070	.093	.117	.141	.172	.203	.234	.265	.277	.290	.315	.341
45°	.030	.060	.093	.119	.153	.184	.216	.254	.289	.325	.351	.378	.411	.445
50°	.037	.075	.116	.151	.189	.227	.266	.305	.345	.384	.425	.467	.508	.550
55°	.046	.093	.142	.188	.236	.283	.332	.381	.420	.479	.530	.582	.641	.700
60°	.056	.112	.168	.225	.283	.340	.398	.457	.516	.575	.636	.697	.774	.851
65°	.067	.135	.204	.273	.343	.412	.483	.554	.625	.697	.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	2.53
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 VII.—Corrections for Sub-Chords and Long Chords.

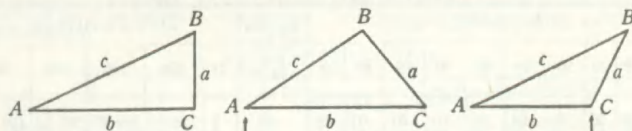
FOR SUB-CHORDS ADD										Excess of arc per 100 ft.	LONG CHORDS				
D	10	20	30	40	50	60	70	80	90		D	200	300	400	500
4°	.00	.00	.01	.01	.01	.01	.01	.01	.00	.02	1	199.99	299.97	399.92	499.85
6	.00	.01	.01	.02	.02	.02	.02	.01	.01	.05	2	199.97	299.88	399.70	499.39
8	.01	.02	.02	.03	.03	.03	.03	.02	.01	.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	296.63	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	196.90	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	388.42
42	.23	.44	.62	.76	.85	.87	.81	.65	.38	2.28	30	193.18	273.20	334.61	373.20
44	.25	.48	.68	.84	.94	.96	.89	.72	.42	2.50	32	192.25	269.61	326.08	357.28
46	.27	.52	.75	.92	1.02	1.05	.98	.78	.46	2.74	34	191.26	265.81	317.12	340.73
48	.30	.57	.81	1.00	1.12	1.14	1.06	.86	.50	2.99	36	190.21	261.80	307.77	323.61
50	.32	.62	.89	1.09	1.21	1.24	1.15	.93	.55	3.24	38	189.10	257.60	298.03	305.99
52	.35	.67	.96	1.18	1.31	1.35	1.25	1.01	.59	3.52	40	187.94	253.21	287.94	287.94
54	.38	.73	1.04	1.28	1.42	1.46	1.35	1.09	.64	3.80	42	186.72	248.63	277.51	269.54
56	.41	.78	1.12	1.38	1.53	1.57	1.46	1.17	.69	4.09	44	185.44	243.87	266.78	250.85
58	.44	.84	1.20	1.48	1.65	1.69	1.57	1.20	.74	4.40	46	184.10	239.93	255.78	231.95
60	.47	.91	1.29	1.59	1.76	1.81	1.68	1.35	.80	4.72	48	182.71	233.83	244.51	212.92

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

Table VIII.—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	.067	.058	.051	.044	.037	.031	.026	18	.400	.351	.306	.265	.225	.190	.156
4	.089	.079	.069	.060	.050	.042	.035	19	.423	.371	.324	.280	.238	.201	.165
5	.112	.099	.086	.074	.063	.053	.044	20	.445	.392	.341	.296	.250	.212	.174
6	.134	.117	.102	.088	.076	.064	.052	21	.466	.410	.357	.309	.262	.222	.182
7	.156	.137	.120	.104	.088	.074	.061	22	.487	.430	.375	.325	.275	.233	.191
8	.179	.158	.137	.119	.100	.085	.070	23	.509	.450	.390	.338	.287	.243	.199
9	.201	.175	.153	.133	.112	.095	.078	24	.531	.469	.408	.354	.299	.253	.208
10	.223	.196	.171	.148	.125	.106	.087	25	.552	.486	.424	.367	.311	.263	.216
11	.245	.216	.188	.163	.139	.117	.096	26	.573	.506	.441	.382	.323	.274	.225
12	.268	.236	.206	.179	.151	.128	.105	27	.594	.524	.457	.396	.335	.284	.233
13	.290	.254	.222	.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

TRIGONOMETRIC FORMULÆ



Right Triangle

Oblique Triangles

Solution of Right Triangles

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

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

Solution of Oblique Triangles

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

REDUCTION TO HORIZONTAL

Horizontal distance = slope distance multiplied by the cosine of the vertical angle. Thus, for a slope distance of 403.6 ft. and a vertical angle of $4^\circ 40'$ —the cosine of $4^\circ 40'$, taken from a table of natural trigonometrical functions, = .9967, and horizontal distance = $403.6 \times .9967 = 402.27$ ft.

Horizontal distance also = Slope distance minus slope distance times (1—cosine of vertical angle). Using the same figures as in the preceding example—Cos. $4^\circ 40' = .9967$, $1 - .9967 = .0033$, $403.6 \times .0033 = 1.33$ ft. Horizontal dist. = $403.6 - 1.33 = 402.27$ ft.

When the rise is known, the horizontal distance may be found by the following approximate rule:—the slope distance less the square of the rise divided by twice the slope distance. Thus, for a slope distance of 372.5 ft., and a rise of 15 ft. the horizontal distance =

$$372.5 - \frac{15 \times 15}{2 \times 372.5} = 372.5 - .30 = 372.2 \text{ ft.}$$

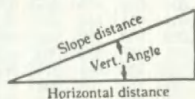


Table IX.—Natural Trigonometrical Functions.

Angle	Sin	Tan	Cot	Cos	Angle	Sin	Tan	Cot	Cos
0	0	0	∞	1	90	1	∞	0	0
10	.0017	.0034	295.2	.9998	80	.9848	6.41	.0156	.1736
20	.0034	.0068	147.6	.9994	70	.9397	3.44	.2865	.3420
30	.0051	.0102	98.4	.9986	60	.8660	1.73	.5774	.5000
40	.0068	.0136	72.7	.9975	50	.7660	1.19	.8391	.6428
50	.0084	.0172	57.7	.9961	40	.6428	.7539	1.3270	.4397
60	.0102	.0204	43.3	.9942	30	.5000	.5000	1.0000	.8660
70	.0136	.0262	32.1	.9914	20	.3420	.3420	1.4142	.6913
80	.0172	.0344	23.1	.9877	10	.1736	.1736	1.9613	.5000
90	.0204	.0436	16.7	.9830	0	0	0	∞	1
100	.0233	.0543	12.5	.9777	360	0	0	∞	1
110	.0262	.0672	9.5	.9714	300	.5000	.5000	1.0000	.8660
120	.0291	.0825	7.2	.9642	240	.6913	1.1033	.9007	.5000
130	.0320	.1000	5.8	.9563	180	.8660	1.7321	.5774	.0000
140	.0349	.1196	4.8	.9479	120	.9659	2.3029	.4330	-.5000
150	.0378	.1413	4.0	.9397	90	1.0000	∞	0	0
160	.0407	.1657	3.4	.9308	80	.9848	6.41	.0156	.1736
170	.0436	.1928	2.9	.9214	70	.9397	3.44	.2865	.3420
180	.0465	.2227	2.5	.9115	60	.8660	1.73	.5774	.5000
190	.0494	.2555	2.2	.9012	50	.7660	1.19	.8391	.6428
200	.0523	.2913	1.9	.8905	40	.6428	.7539	1.3270	.4397
210	.0552	.3303	1.7	.8796	30	.5000	.5000	1.0000	.8660
220	.0581	.3727	1.5	.8685	20	.3420	.3420	1.4142	.6913
230	.0610	.4186	1.4	.8572	10	.1736	.1736	1.9613	.5000
240	.0640	.4680	1.3	.8457	0	0	0	∞	1
250	.0669	.5209	1.2	.8341	360	0	0	∞	1
260	.0698	.5774	1.1	.8223	300	.5000	.5000	1.0000	.8660
270	.0727	.6375	1.0	.8104	240	.6913	1.1033	.9007	.5000
280	.0756	.7015	1.0	.7984	180	.8660	1.7321	.5774	.0000
290	.0785	.7694	0.9	.7862	120	.9659	2.3029	.4330	-.5000
300	.0814	.8413	0.9	.7739	90	1.0000	∞	0	0
310	.0843	.9174	0.8	.7616	80	.9848	6.41	.0156	.1736
320	.0872	.9976	0.8	.7492	70	.9397	3.44	.2865	.3420
330	.0901	1.0831	0.7	.7367	60	.8660	1.73	.5774	.5000
340	.0930	1.1731	0.7	.7242	50	.7660	1.19	.8391	.6428
350	.0959	1.2676	0.6	.7117	40	.6428	.7539	1.3270	.4397
360	.0988	1.3666	0.6	.6992	30	.5000	.5000	1.0000	.8660
370	.1016	1.4701	0.5	.6867	20	.3420	.3420	1.4142	.6913
380	.1045	1.5781	0.5	.6742	10	.1736	.1736	1.9613	.5000
390	.1074	1.6906	0.4	.6617	0	0	0	∞	1
400	.1103	1.8076	0.4	.6492	360	0	0	∞	1
410	.1132	1.9291	0.3	.6367	300	.5000	.5000	1.0000	.8660
420	.1161	2.0551	0.3	.6242	240	.6913	1.1033	.9007	.5000
430	.1190	2.1856	0.2	.6117	180	.8660	1.7321	.5774	.0000
440	.1219	2.3206	0.2	.5992	120	.9659	2.3029	.4330	-.5000
450	.1248	2.4601	0.1	.5867	90	1.0000	∞	0	0
460	.1276	2.6041	0.1	.5742	80	.9848	6.41	.0156	.1736
470	.1305	2.7526	0.1	.5617	70	.9397	3.44	.2865	.3420
480	.1334	2.9056	0.0	.5492	60	.8660	1.73	.5774	.5000
490	.1363	3.0631	0.0	.5367	50	.7660	1.19	.8391	.6428
500	.1392	3.2251	0.0	.5242	40	.6428	.7539	1.3270	.4397
510	.1421	3.3916	0.0	.5117	30	.5000	.5000	1.0000	.8660
520	.1450	3.5626	0.0	.4992	20	.3420	.3420	1.4142	.6913
530	.1479	3.7381	0.0	.4867	10	.1736	.1736	1.9613	.5000
540	.1508	3.9181	0.0	.4742	0	0	0	∞	1
550	.1536	4.1026	0.0	.4617	360	0	0	∞	1
560	.1565	4.2916	0.0	.4492	300	.5000	.5000	1.0000	.8660
570	.1594	4.4851	0.0	.4367	240	.6913	1.1033	.9007	.5000
580	.1623	4.6831	0.0	.4242	180	.8660	1.7321	.5774	.0000
590	.1652	4.8856	0.0	.4117	120	.9659	2.3029	.4330	-.5000
600	.1681	5.0926	0.0	.3992	90	1.0000	∞	0	0
610	.1710	5.3041	0.0	.3867	80	.9848	6.41	.0156	.1736
620	.1739	5.5191	0.0	.3742	70	.9397	3.44	.2865	.3420
630	.1768	5.7386	0.0	.3617	60	.8660	1.73	.5774	.5000
640	.1797	5.9626	0.0	.3492	50	.7660	1.19	.8391	.6428
650	.1826	6.1911	0.0	.3367	40	.6428	.7539	1.3270	.4397
660	.1855	6.4241	0.0	.3242	30	.5000	.5000	1.0000	.8660
670	.1884	6.6616	0.0	.3117	20	.3420	.3420	1.4142	.6913
680	.1913	6.9036	0.0	.2992	10	.1736	.1736	1.9613	.5000
690	.1942	7.1501	0.0	.2867	0	0	0	∞	1
700	.1971	7.4011	0.0	.2742	360	0	0	∞	1
710	.2000	7.6566	0.0	.2617	300	.5000	.5000	1.0000	.8660
720	.2029	7.9166	0.0	.2492	240	.6913	1.1033	.9007	.5000
730	.2058	8.1811	0.0	.2367	180	.8660	1.7321	.5774	.0000
740	.2087	8.4501	0.0	.2242	120	.9659	2.3029	.4330	-.5000
750	.2116	8.7236	0.0	.2117	90	1.0000	∞	0	0
760	.2145	9.0016	0.0	.1992	80	.9848	6.41	.0156	.1736
770	.2174	9.2841	0.0	.1867	70	.9397	3.44	.2865	.3420
780	.2203	9.5711	0.0	.1742	60	.8660	1.73	.5774	.5000
790	.2232	9.8626	0.0	.1617	50	.7660	1.19	.8391	.6428
800	.2261	10.1586	0.0	.1492	40	.6428	.7539	1.3270	.4397
810	.2290	10.4591	0.0	.1367	30	.5000	.5000	1.0000	.8660
820	.2319	10.7641	0.0	.1242	20	.3420	.3420	1.4142	.6913
830	.2348	11.0736	0.0	.1117	10	.1736	.1736	1.9613	.5000
840	.2377	11.3876	0.0	.0992	0	0	0	∞	1
850	.2406	11.7061	0.0	.0867	360	0	0	∞	1
860	.2435	12.0291	0.0	.0742	300	.5000	.5000	1.0000	.8660
870	.2464	12.3566	0.0	.0617	240	.6913	1.1033	.9007	.5000
880	.2493	12.6886	0.0	.0492	180	.8660	1.7321	.5774	.0000
890	.2522	13.0251	0.0	.0367	120	.9659	2.3029	.4330	-.5000
900	.2551	13.3661	0.0	.0242	90	1.0000	∞	0	0
910	.2580	13.7116	0.0	.0117	80	.9848	6.41	.0156	.1736
920	.2609	14.0616	0.0	.0092	70	.9397	3.44	.2865	.3420
930	.2638	14.4161	0.0	.0067	60	.8660	1.73	.5774	.5000
940	.2667	14.7751	0.0	.0042	50	.7660	1.19	.8391	.6428
950	.2696	15.1386	0.0	.0017	40	.6428	.7539	1.3270	.4397
960	.2725	15.5066	0.0	.0092	30	.5000	.5000	1.0000	.8660
970	.2754	15.8791	0.0	.0167	20	.3420	.3420	1.4142	.6913
980	.2783	16.2561	0.0	.0242	10	.1736	.1736	1.9613	.5000
990	.2812	16.6376	0.0	.0317	0	0	0	∞	1
1000	.2841	17.0236	0.0	.0392	360	0	0	∞	1

Table IX.—Natural Trigonometrical Functions.

Angle	Sin	Tan	Cot	Cos		Angle	Sin	Tan.	Cot	Cos	
o'						o'					
16	.2756	.2867	3.487	.96126	74	24	.4067	.4452	2.246	.91355	66
10	.2784	.2899	3.450	.96046	50	10	.4094	.4487	2.229	.91236	50
20	.2812	.2931	3.412	.95964	40	20	.4120	.4522	2.211	.91116	40
30	.2840	.2962	3.376	.95882	30	30	.4147	.4557	2.194	.90996	30
40	.2868	.2994	3.340	.95799	20	40	.4173	.4592	2.177	.90875	20
50	.2896	.3026	3.305	.95715	10	50	.4200	.4628	2.161	.90753	10
17	.2924	.3057	3.271	.95615	73	25	.4226	.4663	2.145	.90631	65
10	.2952	.3089	3.237	.95545	50	10	.4253	.4699	2.128	.90507	50
20	.2979	.3121	3.204	.95459	40	20	.4279	.4734	2.112	.90383	40
30	.3007	.3153	3.172	.95372	30	30	.4305	.4770	2.097	.90259	30
40	.3035	.3185	3.140	.95284	20	40	.4331	.4806	2.081	.90133	20
50	.3062	.3217	3.108	.95195	10	50	.4358	.4841	2.066	.90007	10
18	.3090	.3249	3.078	.95106	72	26	.4384	.4877	2.050	.89879	64
10	.3118	.3281	3.048	.95015	50	10	.4410	.4913	2.035	.89752	50
20	.3145	.3314	3.018	.94924	40	20	.4436	.4950	2.020	.89623	40
30	.3173	.3346	2.989	.94832	30	30	.4462	.4986	2.006	.89493	30
40	.3201	.3378	2.960	.94740	20	40	.4488	.5022	1.991	.89363	20
50	.3228	.3411	2.932	.94646	10	50	.4514	.5059	1.977	.89232	10
19	.3256	.3443	2.904	.94552	71	27	.4540	.5095	1.963	.89101	63
10	.3283	.3476	2.877	.94457	50	10	.4566	.5132	1.949	.88968	50
20	.3311	.3508	2.850	.94361	40	20	.4592	.5169	1.935	.88835	40
30	.3338	.3541	2.824	.94264	30	30	.4617	.5206	1.921	.88701	30
40	.3365	.3574	2.798	.94167	20	40	.4643	.5243	1.907	.88566	20
50	.3393	.3607	2.773	.94068	10	50	.4669	.5280	1.894	.88431	10
20	.3420	.3640	2.747	.93969	70	28	.4695	.5317	1.881	.88295	62
10	.3448	.3673	2.723	.93869	50	10	.4720	.5354	1.868	.88158	50
20	.3475	.3706	2.699	.93769	40	20	.4746	.5392	1.855	.88020	40
30	.3502	.3739	2.675	.93667	30	30	.4772	.5430	1.842	.87882	30
40	.3529	.3772	2.651	.93565	20	40	.4797	.5467	1.829	.87743	20
50	.3557	.3805	2.628	.93462	10	50	.4823	.5505	1.816	.87603	10
21	.3584	.3839	2.605	.93358	69	29	.4848	.5543	1.804	.87462	61
10	.3611	.3872	2.583	.93253	50	10	.4874	.5581	1.792	.87321	50
20	.3638	.3906	2.560	.93148	40	20	.4899	.5619	1.780	.87178	40
30	.3665	.3939	2.539	.93042	30	30	.4924	.5658	1.767	.87036	30
40	.3692	.3973	2.517	.92935	20	40	.4950	.5696	1.756	.86892	20
50	.3719	.4006	2.496	.92827	10	50	.4975	.5735	1.744	.86748	10
22	.3746	.4040	2.475	.92718	68	30	.5000	.5774	1.732	.86603	60
10	.3773	.4074	2.455	.92609	50	10	.5025	.5812	1.720	.86457	50
20	.3800	.4108	2.434	.92499	40	20	.5050	.5851	1.709	.86310	40
30	.3827	.4142	2.414	.92388	30	30	.5075	.5890	1.698	.86163	30
40	.3854	.4176	2.394	.92276	20	40	.5100	.5930	1.686	.86015	20
50	.3881	.4210	2.375	.92164	10	50	.5125	.5969	1.675	.85866	10
23	.3907	.4245	2.356	.92050	67	31	.5150	.6009	1.664	.85717	59
10	.3934	.4279	2.337	.91936	50	10	.5175	.6048	1.653	.85567	50
20	.3961	.4314	2.318	.91822	40	20	.5200	.6088	1.643	.85416	40
30	.3987	.4348	2.300	.91706	30	30	.5225	.6128	1.632	.85264	30
40	.4014	.4383	2.282	.91590	20	40	.5250	.6168	1.621	.85112	20
50	.4041	.4417	2.264	.91472	10	50	.5275	.6208	1.611	.84959	10
					66						58
	Cos	Cot	Tan.	Sin	Angle		Cos	Cot	Tan.	Sin	Angle

Table IX.—Natural Trigonometrical Functions.

Angle	Sin	Tan	Cot	Cos		Angle	Sin	Tan	Cot	Cos	
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	40
10	.5616	.6787	1.473	.82741	50	40	.6517	.8591	1.164	.75851	30
20	.5640	.6830	1.464	.82577	40	50	.6539	.8642	1.157	.75661	10
30	.5664	.6873	1.455	.82413	30	41	.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	42	.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	43	.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	.79688	50	40	.6905	.9545	1.048	.72337	20
20	.6065	.7627	1.311	.79512	40	50	.6926	.9601	1.042	.72136	10
30	.6088	.7673	1.303	.79335	30	44	.6947	.9657	1.036	.71934	46
40	.6111	.7720	1.295	.79158	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
											o/
	Cos	Cot	Tan	Sin	Angle		Cos	Cot	Tan	Sin	Angle

STADIA REDUCTION DIAGRAM

Enter on the horizontal scale with the value of the stadia reading (the interval times the stadia constant) and run vertically upward to intersection with line representing the vertical angle. The location of this point with reference to the dotted lines marked "ONE" etc. gives the correction to be subtracted from the entering value, and to which "f + c" (usually about 1 foot) must be added to obtain the true horizontal distance. The reading on the vertical scale plus about 0.1 ft. for each 5' of vertical angle ($(f + c) \sin \alpha$) is the true vertical distance.

If the vertical angle is beyond the range of diagram, use $H = R \cos^2 \alpha + 1$ to find true horizontal distance and $V = R \times \frac{1}{2} \sin 2\alpha$ for true vertical distance, where R equals observed stadia distance and α equals vertical angle.

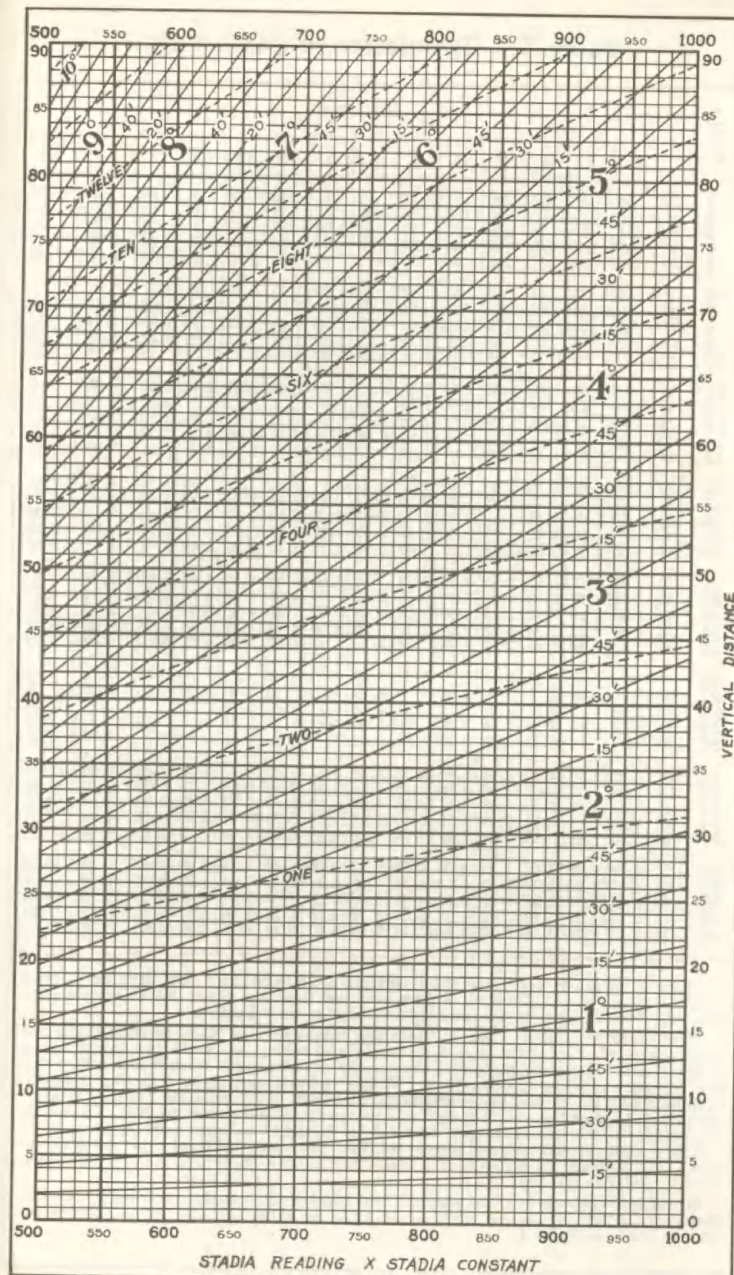
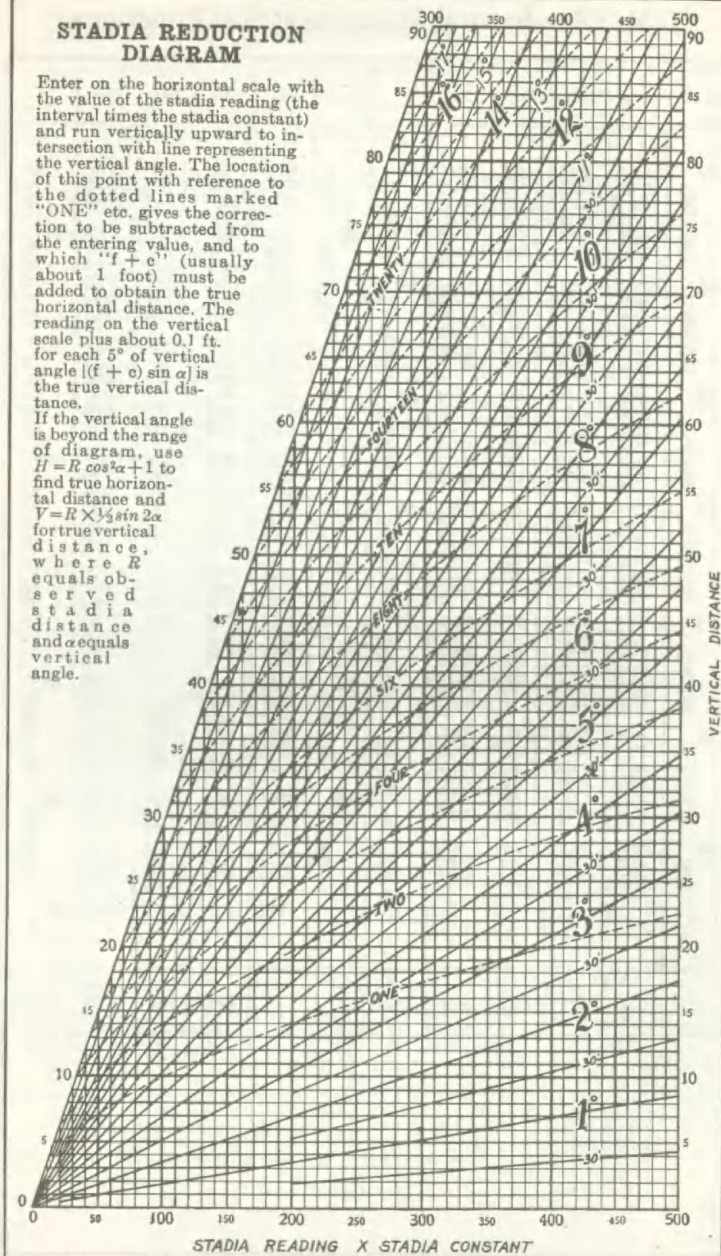


Table X.—Calculation of Earthwork.

Width	HEIGHT														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	.02	.04	.06	.07	.09	.11	.13	.15	.17	.18	.20	.22	.24	.26	.28
2	.04	.07	.11	.15	.18	.22	.26	.30	.33	.37	.41	.44	.48	.52	.56
3	.06	.11	.17	.22	.28	.33	.39	.44	.50	.56	.61	.67	.72	.78	.83
4	.07	.15	.22	.30	.37	.44	.52	.59	.67	.74	.81	.89	.96	1.04	1.11
5	.09	.19	.28	.37	.46	.56	.65	.74	.83	.93	1.02	1.11	1.20	1.30	1.39
6	.11	.22	.33	.44	.56	.67	.78	.89	1.00	1.11	1.22	1.33	1.44	1.55	1.67
7	.13	.26	.39	.52	.65	.78	.91	1.04	1.16	1.30	1.42	1.55	1.68	1.81	1.94
8	.15	.30	.44	.59	.74	.89	1.04	1.19	1.33	1.48	1.63	1.78	1.92	2.08	2.22
9	.17	.33	.50	.67	.83	1.00	1.17	1.33	1.50	1.67	1.83	2.00	2.17	2.33	2.50
10	.18	.37	.56	.74	.93	1.11	1.30	1.48	1.67	1.85	2.04	2.22	2.41	2.59	2.78
11	.20	.41	.61	.82	1.02	1.22	1.43	1.63	1.83	2.04	2.24	2.44	2.65	2.85	3.06
12	.22	.44	.67	.89	1.11	1.33	1.56	1.78	2.00	2.22	2.44	2.67	2.89	3.11	3.33
13	.24	.48	.72	.96	1.20	1.44	1.68	1.92	2.16	2.41	2.65	2.89	3.13	3.37	3.61
14	.26	.52	.78	1.04	1.30	1.55	1.81	2.08	2.33	2.59	2.85	3.11	3.37	3.63	3.89
15	.28	.56	.83	1.11	1.39	1.67	1.94	2.22	2.50	2.78	3.06	3.33	3.61	3.89	4.17
16	.30	.59	.89	1.18	1.48	1.78	2.07	2.37	2.67	2.96	3.26	3.56	3.85	4.15	4.44
17	.31	.63	.94	1.26	1.57	1.89	2.20	2.52	2.83	3.15	3.46	3.78	4.09	4.41	4.72
18	.33	.67	1.00	1.33	1.67	2.00	2.33	2.67	3.00	3.33	3.67	4.00	4.33	4.67	5.00
19	.35	.70	1.06	1.41	1.76	2.11	2.46	2.82	3.17	3.52	3.87	4.22	4.57	4.92	5.28
20	.37	.74	1.11	1.48	1.85	2.22	2.59	2.96	3.33	3.70	4.07	4.44	4.81	5.18	5.56
21	.39	.78	1.17	1.55	1.94	2.33	2.72	3.11	3.50	3.89	4.28	4.67	5.06	5.44	5.83
22	.41	.81	1.22	1.63	2.04	2.44	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 X gives the number of cubic yards in a TRIANGLE 1 foot deep for a given width and height. CAUTION: Values obtained from the above tables are for only the one TRIANGLE of the cross-section under consideration.

Corrections for tenths of feet in width and height may be made by considering the numbers on the table from 1 to 9 as tenths and taking one tenth the values found in the tables. For example, to find the number of cubic yards when Width = W = 16.2 and Height = H = 5.3, opposite 16 in "Width" column and under 5 in the "Height" column read 1.18. To correct for additional 0.2 foot of width, opposite 2 in the "Width" column and under 5 in the "Height" column read 0.18 and correct to .018. To correct for additional 0.3 foot in height, under 3 in "Height" column and opposite 16 in "Width" column read 0.89 and correct to .089. Therefore, the total cubic yards in the given TRIANGLE for a depth of 1 foot = $1.18 + .018 + .089 = 1.587$ or approximately 159 cu. yds. per 100 feet.

If width exceeds 40 feet, use one half real width and multiply result by 2. If both width and height are larger than values given on table use one half of each value and multiply result by 4.

BLA th 21 2x515

HA-3 102-44-17

N 69°-00' 16" K

89-17

291°-01'

9.3

0.9

480

2.8

+ 0-39'

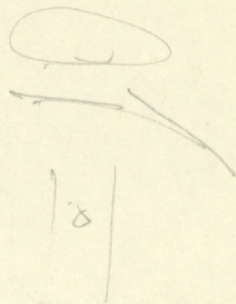
9.3

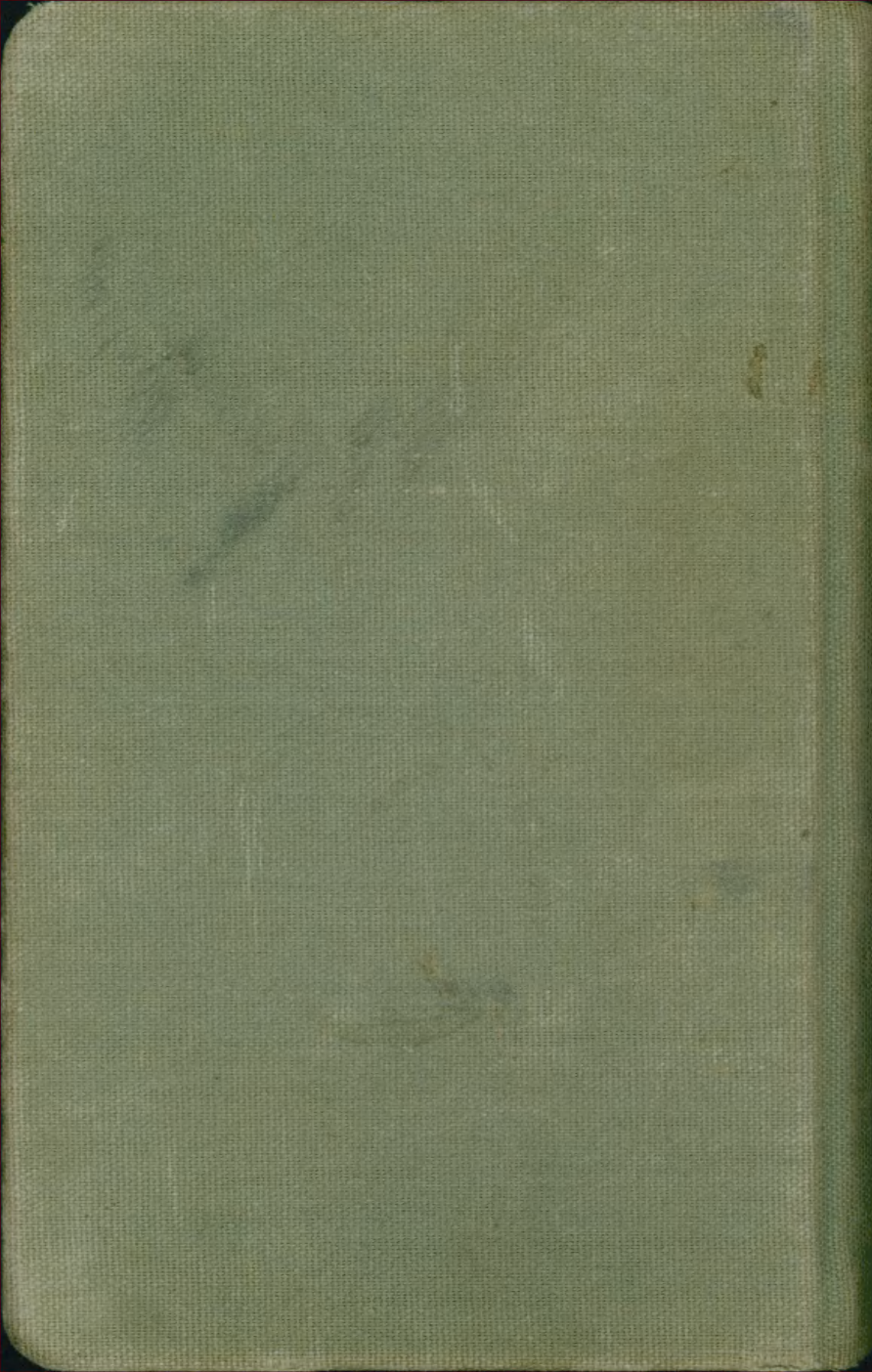


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