

Exploration

Op #16.

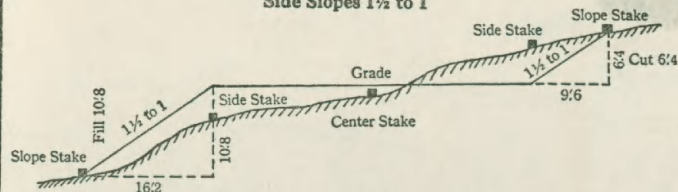
ENGINEERS'
FIELD BOOK

No. 408C

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 16½, the distance from the side stake to the slope stake at the left.

Cut or Fill	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	Cut or Fill
Distance out from Side or Shoulder Stake											
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 DIEZGEN 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.

GRANVILLE

BLA 61 (49+19.7) 1630.31

BLA #20 2330.7 211°42'

BLA #62 49°00' up str.

BLA #18 328°28'

xⁿ 49+17.9 579.1 139°00'

xⁿ 49-6L 19.7 49°00' Book #141 1629.7

xⁿ 48 ✓ 119.7 ✓ July 25. 1941 1629.7

xⁿ 47 ✓ 219.7 ✓ 1630.1

S 105 351.24

G. Eng. Off. 356°39'

AG 267 110°25'

∑ xⁿ 49+19.7 - 579.1 L.L

BLA #61 319°00'

AG 267 105°51'

G. McDonald 7°50'

G. Eng. Office 357°44'

Book #124 (40-41) page 59-62 May 16. 1941.

BLA #61 Moved upstream 73.5' on B.L

6-7

Hub 61+73.5 1629.61

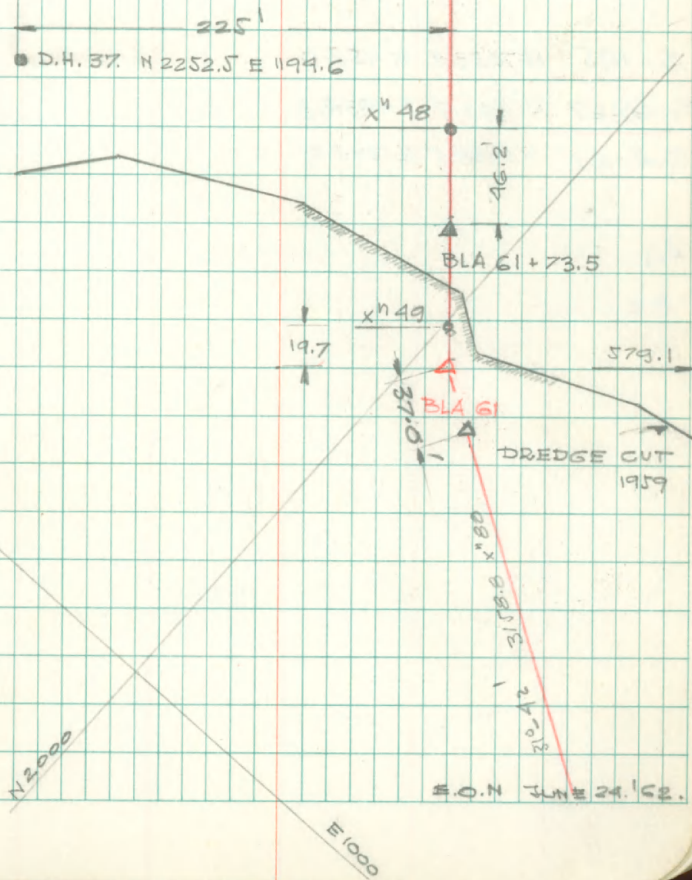
Book #212 page 35 June 9 '53

63.3

BLA 62.

230° x 48

N 1982.6 E. 1325.3



Nub on Dominion Base Line S 31-42 W

37.0 Down Str. from original BLA 61.

Reestablished June 27, 1962 E.O.N.

(Iron Pin.) BLA 61 + 37.0 (211-42

BLA# 20 2305.9 211°42

BLA# 61 31°42

S-105 31-40

Eng. Office

S-105 N-7053A E 455.0

S-6267 N 603.7 E 4934.3

BLA-61 N 1984.5 E 1224.9

A₁

A₂

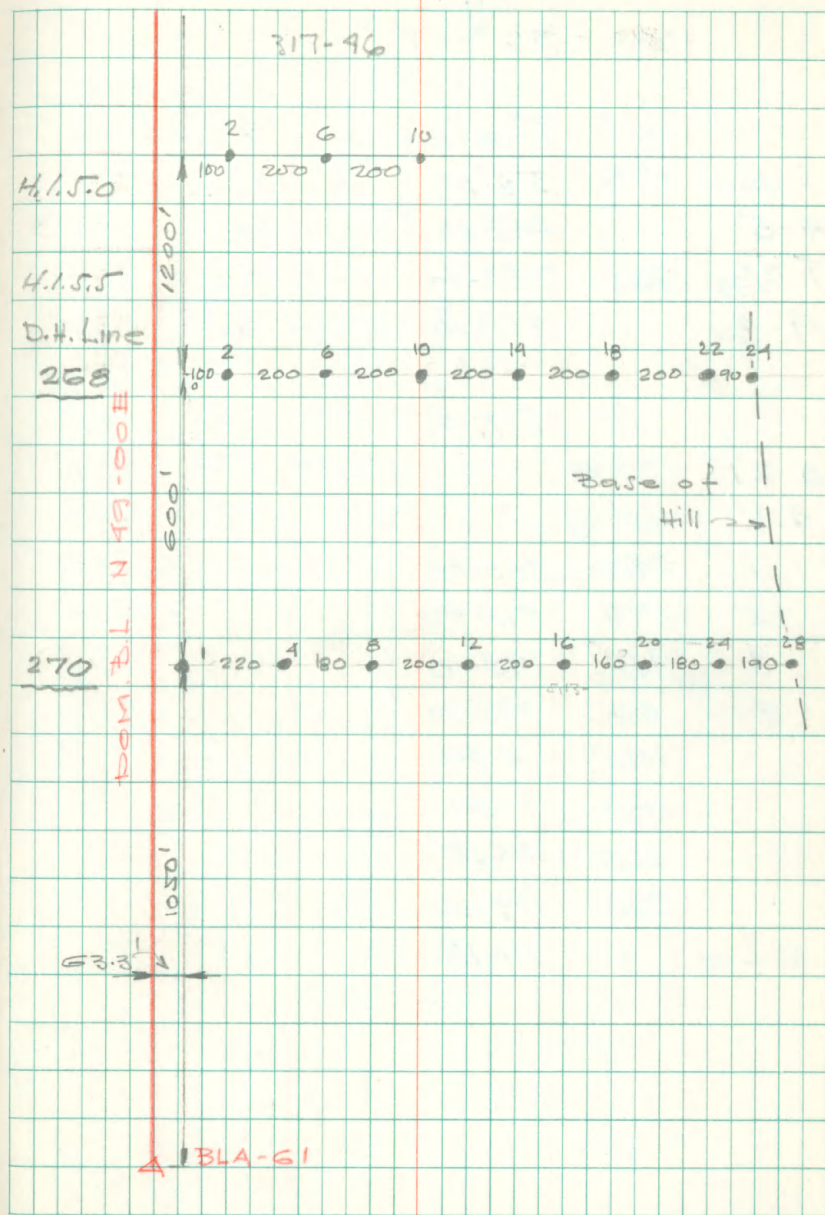
BLA 61 A N 1984.5 1931.6

E 1224.9 1178.9

S-105 351-22

D.H. Line 270-268 Granville.

	B.	I.	F.	Coll.	Elev.
$x^n - 48$	7.9			1637.6	1629.7
D.H. 270-1		7.0	✓		1630.6
		$\bar{\Delta}$ D.H. 270-1		1635.6	1630.6
D.H. 268-0		2.0	✓		1633.6
		$\bar{\Delta}$ 270-20		1638.0	1632.5
D.H. 28	6.3		✓		1631.7
✓ 24		7.5	✓		1630.5
✓ 16		7.1	✓		1630.9
✓ 12		7.4	✓		1630.6
✓ 8		7.8	✓		1630.2
✓ 4		7.2	✓		1630.8
✓ 1		7.4	✓		1630.6
	4.15.8	$\bar{\Delta}$ 268-18		1642.1	1636.3
D.H. 268-24	7.4		✓		1634.7
✓ 22		6.7	✓		1635.4
✓ 14		7.0	✓		1635.1
✓ 10		7.8	✓		1634.3
✓ 6		6.7	✓		1635.4
✓ 2		6.5	✓		1635.6
✓ 0		8.5	✓		1633.6



4 21.

180 - 89° - 17

$\overline{A}$ 4 21

b. i.

S Hub 415 316-09

A-5 267-21

T.D/33 900 357-34

A-3 171-50

$\overline{A}$. T. P.

A 21 177-34

4-3 168-08

1 240 203-33

2 190 215-40

3 150 198-10

4 60 345-30

145 4-30

180 1-50

300 4-50

320 119-10

4. Line 111-58

Mid.-Dom. Drillhole Lines

		<u>$\bar{T}$ D.H - 184-1</u>	776.4
D.H. 184-4	190	8.0	773.0
✓ 8	390	7.8	773.2
✓ 12	(640)		
✓ 16		6.0	775.0
D.H.		$\bar{T}$ Huba 183 D.H. Line	<u>776.4</u>
183-10	440	5.0	776.0
183-14	640	2.7	778.3
		<u>$\bar{T}$ D.H 183-14</u>	<u>778.3</u>
183-18	200	4.2	778.6
183-22	400	1.6	781.2
183-26	600	2.5	780.3
183-30	800	+0-23 +5.4	783.7
T.P. D. 5	535	5.8	777.0
		<u>$\bar{T}$ T.P. - 535</u>	<u>777.0</u>
T.P. - 2	185	5.8	774.9
		<u>$\bar{T}$ T.P. - 3</u>	<u>774.9</u>
185-10	465	5.5	773.2
		<u>$\bar{T}$ 185-10 10' → Left</u>	<u>773.2</u>
185-14	185	4.8	773.1
✓ - 18	400	+0-5	
✓ - 6	215		
✓ - 2	415		

H. 1. 4.6 781.0

H. 1. 4.6 781.0

H. 1. 4.5 782.8

H. 1. 3.7 780.7

H. 1. 3.8 778.7

H. 1. 4.7 777.9

$\bar{T} 185-18$

774.3

185-22 200 2.8

-26 400 +0-26

 $\bar{T} D.H - 185-26$ 777.4

185-30 200 5.0 771.1

185-34 400 2.0 780.0

185-38 600 +1-09 +11.5 788.9

185-42 785 +1-19 +18.0 795.4

185-22 5.8 776.3

185-18 7.8 774.3

185-14 8.8 773.3

185-10 800 8.9 773.2

 $\bar{T} 185-10$ 773.2

185-6 215 +1-28 +5.6 775.8

466 "185" 295 +1-16 +6.5 774.7

466 "185"

774.7

185 80 4.8 174.7

 $\bar{T} 185-2$ 774.7

T.P., 86 90°-00 5.0 774.5

 $\bar{T} T.P.-1$ 774.5

T.P.,2 200 5.0 774.3

 $\bar{T} T.P.-2$ 774.3

185.3 86 4.4 774.5

H.I. 4.5

778.8

H.I. 4.7

782.1

H.I. 4.8

778.0

H.I. 4.8

779.5

H.I. 4.8 0 → L.L.

779.5

H.I. 4.8

779.3

H.I. 4.6

778.9

$\bar{\pi}$ 185-3

774.5

185-7 200

7.8 771.8

185-11 400

7.2 772.4

 $\bar{\pi}$ 185-11

772.4

185-15 200

+2-40 +9.3 774.7

185-19 400

+1-40 +11.6 779.0

 $\bar{\pi}$ T.P. "184

777.0

184-9 45

-13-00 -9.9 767.1

184-13 230

7.3 774.7

184-17 430

+0-44 +5.5 782.5

T.P. Elev. on Road

5.3 776.7

 $\bar{\pi}$ T.P.

776.7

184-1

3.9 776.4

 $\bar{\pi}$ 183-3A

779.0

74 250

6.2 777.6

11 400

9.6 774.2

 $\bar{\pi}$ 181-5

780.0

181-9 200

6.5 778.5

181-13 400

5.0 780.0

 $\bar{\pi}$ T.P. on Road

181-4 40

4.6 778.0

✓-8 160

5.1 777.6

✓-12 360

2.7 780.0

H.I. 5.1

779.6

H.I. 4.8

7' Lower

5' Lower

H.I. 5.0

782.0

H.I. 4.8 (30'-U.S.A.)

783.8

H.I. 5.0

785.0

H.I. 4.7

782.7

$\bar{A}$ D.H. 185-19

779.0

TP-1 40

4.2

779.6

$\bar{A}$ TP-1

779.6

TP-2 200

+7-20+25.2

804.8

$\bar{A}$ T.P.-2

804.8

185-23

5.9

803.7

$\bar{A}$ D.H. 268-6

H.I. 4.8

783.8

4.8

784.4

4.8

809.6

Cranville Originals.

x^4-116

1600.0

$\bar{x} 112-375 L L$

1609.0

x^4-112 375

-1.05

-7.1

1601.9

B.L. 40

6.0

1607.9

L.L. 320

4.7

1609.2

150

5.2

1608.7

80

5.0

1608.9

x^4-112

1601.9

L.L. 250

6.4

1600.5

300

+16'

+1.2

1603.1

430

+19'

+2.4

1604.3

580

+19'

+3.2

1605.1

590

+31'

+5.3

1607.2

4.1 4.9

1613.9

original.

5.0

1606.9

Levels

#.

B.

x⁹-116

6.3

1600.0

4.1 1606.3

115

6.6

1599.7

114

5.1

1601.2

113

6.2

1600.1

112

4.4

1601.9

111

5.0

1601.3

110

4.5

1601.8

109

3.9

1602.4

108

4.1

1602.2

		$x^y - 113$		<u>1603.3</u>
L.L	560	+40	+6.5	1609.8
	550	+27	+4.3	1607.6
	450	+39	+5.1	1608.4
	420	+31	+3.8	1607.1
	280	+48	+3.9	1607.2
	240		4.4	1603.6

		$x^y - 113 - 270 L.L$		1611.0
$x^y - 113$	270	-1-38	-7.7	1603.3
L	180		5.0	1610.8
	350		5.3	1610.5
	370		5.3	1610.5

		$x^y - 114$		1601.2
	190		6.8	1599.2
	210	+32'	+2.2	1603.4
	350	+30'	+3.0	1604.2
	380	+30'	+3.3	1604.5
	430	+20'	+2.5	1603.7
	530	+40'	+6.2	1607.4

4.7

1608.0

Final.

4.8

1615.8

4.8

1606.0

Final.

		$\bar{x} \ 114 - 220 \text{ L.L.}$			1605.9
$x^h - 114$	220	-	-1-21	-4.7	1601.2
	↓	320	+0-12	+1.1	1607.0
		170		5.0	1605.9
		100		3.0	1607.9

$x^h - 115$

550

5.0

1610.9

Final.

T.P.

100.0

1.	730	308-30	+1-20	+16.0	116.0
2.	700	314-30	+2-00	+24.4	124.4
3.	620	315-40	+2-20	+25.0	125.0
D.H.	530	322-05	+3-11	+29.4	129.4
4.	490	331-15	+3-55	+33.4	133.4
D.H. ₂	370	348-12	+6-08	+39.3	139.3
5	270	22-55	+9-04	+42.0	142.0
6	300	68-40	+7-40	+39.6	139.6
D.H.-3	330	76-42	+8-47	+38.6	138.6
7.	295	76-45	+5-57	+30.4	130.4
8.	460	96-50	+4-47	+38.5	138.5
9.	640	109-20	+2-49	+31.4	131.4
10.	720	111-25	+2-21	+29.3	129.3
11.	705	115-20	+2-00	+24.6	124.6
12	690	129-55	+0-35	+7.0	107.0
13.	620	130-40	+0-20	+3.6	103.6
14.	600	129-40	-0-55	-9.6	90.4
15	650	123-55	+1-10	+13.2	113.2
16.	620	123-40	±0-00	0.0	100.0
17.	590	120-10	-0-15	-2.6	97.4
18	570	115-10	±6-00	0.0	100.0
19.	545	112-20	-0-02	0.0	100.0

June-9-1964

H.A.S.O.

105.0

Bonch Schuth

A

18-8-35

L 20-11-32

L 24-11-32

20	510	109-35 +0.54	+8.0	108.0
21	965	105-35 +1.45	+14.2	114.2
22	400	94-50 +2.30	+17.4	117.4
23	340	101-00 +1.12	+7.1	107.1
24	340	104-00 +2.45	+7.1	107.1
25	335	113-05 -0.55	-5.3	94.7
26	240	134-50 -2.04	-8.6	94.4
27	220	119-30 -1.50	-7.0	93.0
28	240	103-40 -0.50	-3.0	97.0
29	290	85-50 +1.55	+9.7	109.7
30	240	62-10 +4.20	+18.1	118.1
31	160	71-40 +3.10	+8.8	108.8
32	145	79-00 -0.51	+2.1	102.1
33	105	143-55 -4.10	-7.6	92.4
34	100	287-50 -2.50	-4.9	95.1
35	130	333-50 -0.26	-1.0	99.0
36	215	6-10 -1.40	-6.2	93.8
37	390	340-20 +3.18	+32.4	132.4
38	370	334-30 +0.55	+6.0	106.0
39	340	321-45 0.00	0.0	100.0
40	330	308-20	6.0	99.0
41	340	302-20	9.9	95.1
42	450	302-45	11.7	93.3
43	450	310-40	4.5	100.5

105.0

44.	470	316-00	2.2	102.8
45	480	319-15 +2.00	+16.8	116.8
46.	550	315-10 +1.51	+17.6	117.6
47.	550	309-40	0.0	100.0
48	560	304-15	6.2	106.2
49.	560	302-00 -0.50	-8.1	91.9
50	670	303-15 -0.30	-5.8	94.2
51.	670	307-30 +0.35	+6.8	106.8
52.	720	304-30 +0.20	+4.2	104.2
53.	720	300-30 -0.49	-4.0	96.0
T.D.	600	297-12 (17-12.	12.00	930
D.P.		29-40		4

T.T.P.

930.2

5.0

D.H. -35

55-45

D.H. -32

79-40

T.D.-2 355 332-16 (152-16)^{+23.7}+3-49 116.7

A.T.P. 2

116.7

T.D.-1

152-16

D.H 1290 354-25 +4-18 +21.8 138.5

P.P.D. 5.

131-30

T.P.3 620 29-35 +5.06

269-35

105.0

T.P. 3

T.P.-2

209-35

1

250

278-05

2.

170

269-10

20

248-40

60

126-30

210

132-10

330

137-00

14-45

41-05

67-30

83-45

2000!

$\bar{A}$ 103-1002 L

x^4-102	5.2	1613.8
x^4-101	5.2	1613.0
x^4-104	4.5	1613.7
x^4-105	3.6	1614.6

$\bar{A}$ 107-1002 L

105v	6.2	1614.6
106v	5.5	1615.3
108v	4.5	1616.3
109v 2001	5.0	1615.8
110v	6.0	1614.8
111v	3.9	1616.9

$\bar{A}$ 111. 1002 L

T.-3	93-55	1616.9
112 100	6.1	1615.5
113. (240)	6.7	1614.9
114 (100) L	8.3	1613.3

4.4

1618.2

H. 1 A. 6

1620.8

See No 6 Dredge book

4.7

1621.6

$x^4 1150$	(180)			$\bar{A} 117 \text{ 2L (600)}$	1618.1
116	150			5.0	1617.8
118	150			4.7	1618.1
117	80			6.5	1616.3
$\rightarrow 680 \text{ 2L}$				+6.0d +8.3	1626.4

$\bar{A} 117 \text{ 680 2L}$ 1626.4

119	v			9.0	1622.2
120	300			-0.244' +3.8	1622.6

$\bar{A} 125 \text{ 680 2L}$ 1622.6

$x^4 121$	v 100			-2.15	-3.9	1618.7
$x^4 122$	200			-2.08	-7.5	1615.1
$x^4 123$	330	1		-2.00	-11.5	1611.1
-124	400			-2.35		

$\bar{A} 124 - 680 \text{ 2L}$ 1610.3

125	v 150			1.9		1613.0
126	v 200			+1.18	+4.4	1614.7
127	300			+1.22	+7.2	1617.5
128	400			+1.47	+12.5	1622.8

14.1 4.7 1622.8

14.1 4.8 1631.2

14.1 4.8

4.5 1614.9

	$\bar{A} \times 9$	101-10021	<u>1613.0</u>
60		5.8	1612.2
90		-2.40 -4.2	1603.8
240		-2.31 -10.5	1602.5
400		-1.25 -9.9	1603.1
590		-0.31 -5.3	1607.7

	$\bar{A} \times 4$	102-10021	<u>1613.0</u>
600		-50 -8.7	1609.3
400		-1.31 -10.6	1602.4
230		-2.51 -11.4	1601.6
160		-2.29 -6.9	1606.9
80		-5.25 -7.7	1605.3
60		6.1	1611.9

	$\bar{A} 103 - v$		<u>1613.8</u>
40		6.1	1612.7
60		-7.15 -7.5	1604.3
200		-2.11 -7.6	1606.2
320		-1.58 -11.3	1602.5
490		-1.15 -10.7	1603.1
600		-5.5 -9.6	1604.2

5.0 1618.0

5' lower

5.0 1618.0

5.0 Stake. 1618.8

2' lower

03.5

	104 - 100 ~~LL~~	1613.7
580	-36 -6.1	1607.6
440	-1-21 -10.3	1603.4
260	-2-35 -11.7	1602.0
180	-4-00 -12.5	1601.2
60	-6-15 -6.5	1607.2
40	6.3	1607.4

105 - 100 ~~LL~~ 1614.6

25	7.0	1612.7
42	-9-10 -6.6	1608.0
240	-3-02 -12.7	1601.9
385	-1-50 -12.3	1600.9
530	-58' 9.0	1603.7

106 - 500 ~~LL~~ 1615.3

100	-1-20 -11.6	1603.7
390	-1-57 -13.3	1602.0
155	-5.16 -14.1	1601.2
55	-9-03 -8.6	1601.7
40	7.1	1613.2

5.00

1618.7

5.1 ~~low~~

5.1

1619.7

5.1

5.0

1620.3

5.1 ~~low~~

	107 - C		<u>1616.2</u>
60		8.2	1613.0
90	- 5.40	- 8.8	1602.4
300	- 2.45	- 14.4	1601.8
380	- 2.10	- 14.4	1601.8
430	- 1.30	- 11.2	1605.0

	108 - C		<u>1616.3</u>
425	- 1.46	- 13.1	1603.2
345	- 2.27	- 14.7	1601.6
230	- 3.35	- 14.4	1601.9
140	- 2.38	- 6.1	1600.2
120		10.9	1610.2

	$\bar{A}$ 109 - 100 2L		<u>1615.8</u>
135		11.3	1609.5
160	- 3.00	- 8.4	1595.4
~~330~~			
330	- 2.40	- 15.4	1600.4
460	- 2.02	- 14.2	1601.6

	$\bar{A}$ 110 - L		<u>1614.6</u>
360	- 2.05	- 13.1	1601.7
300	- 2.50	- 14.8	1599.8
170	- 4.40	- 13.8	1600.0
135	- 3.50	- 9.0	1605.8

50		1621.2
5' Low		

4.8		1621.1
-----	--	--------

10' Low

5.0		1620.8
-----	--	--------

12' Low

5.5

1' Low

	$\bar{1} - 111 - 500 \text{ RL}$	<u>1616.9</u>
175	-5-25 -16.5	1600.4
115	-5-32 -11.0	1605.9
100	-1-40 -2.9	1602.0
345	-2-40 -17.1	1699.8

	$\bar{1} - 112$	<u>1615.5</u>
305	-2-50 -15.3	1600.2
225	-3-58 -15.6	1699.9
115	-5-30 -11.0	1599.5
85	-5-30 -8.1	1607.4

	$\bar{1} 113 -$	<u>1614.9</u>
113 - 22 (478 RL.)	+12-45, +4.7	1619.6

	$\bar{1} 113 - 22 (478 \text{ RL})$	<u>1619.6</u>
45	-13-26 -10.1	1609.5
65	-15-55 -17.1	1597.5
185	-7-12 -23.0	1596.6
210	-6-21 -24.2	1595.4

4.8

2' Low

5-0

1620.5

5' Low

5-0

5' Low

$\bar{A} 114 - 100$ 2.6 1613.3

240	-3-28	-14.5	1698.8
210	-2-50	-10.4	1602.9
65	73	-8.4	1699.9
40		6.9	1611.4

$\bar{A} 115 - 500$ 2.1 1617.8

$\bar{X}^4 111 - 500$ 2.1 4.0		5.9	1616.9
114 - 0	15	8.9	1613.9
<u>115</u> 0 80		3.7	1619.1

$\bar{A} 115 - 520$ 1619.1

53		13.2	1611.1
70	-11-16	-13.3	1595.8
130	-7-40	-17.2	1601.9
230	-5-05	-20.2	1598.9
260	-4-30	-20.2	1598.9

$116 - 600$ 1618.1

335	-3-15	-19.0	1599.1
270	-4-01	-18.9	1599.2
110	-9-12	-17.3	1599.8
20		12.0	1611.1

5.2

1618.3

10.1

5.0

1622.8

4.5

1624.1

10.1

5.0

1623.1

1.1

$\bar{T} x^4$ 117-6002L 1618.1

4.5

1623.0

15		10.7	1612.3
90	-7.50	-12.1	1606.0
130	-6.50	-15.3	1602.0
245	-4.24	-18.8	1599.3
310	-3.38	-20.3	1597.8

5.2

 $\bar{T}$ 118-6802L 1624.6

4.9

1629.5

370	-4.00	-25.8	1598.8
320	-4.37	-25.8	1598.8
150	-7.15	-18.8	1605.8
115	-5.55	-11.9	1613.7

5.2

115-600		11.7	1617.8
119-680		6.8	1622.7

 $\bar{T}$ 119-6802L 1622.7

5.1

100	-6.02	-10.5	1612.2
130	-7.36	-17.1	1600.6
190	-6.35	-21.6	1601.1
300	-4.45	-24.8	1597.9
360	-3.13	-24.6	1598.1

5.2

✓ 120 - 6802L 1622.6

360	-3-10	-24.0	1608.6
290	-4-10	-24.4	1598.2
110	-9-20	-17.6	1600.0
70	7-23	-8.9	1613.7

✓ 121 - 6802L 1618.7

65		10.6	1613.1
100	-8-12	-14.1	1599.6
~~120~~	~~-6-20~~	~~-13.3~~	~~1605.4~~
360	-3-26	-21.6	1597.1

✓ 122 - 6802L 1615.1

350	-2-45	-16.8	1598.3
275	-3-30	-16.8	1598.3
90	-7-40	-11.9	1598.2
60		9.1	1610.4

✓ 123 - 6802L 1611.1

x ⁴ - 124		5.8	1610.3
65		8.1	1608.0
85	-4-36	-6.8	1599.3
350	-2-10	-13.2	1597.9

5.0

1627.6

5' 10"

5.0

1623.7

5' 10"

5.1

1620.2

5' 10"

5.0

1616.1

5' 10"

x^4 124-680RL

1610.3

75

9.2

1605.9

95

-5.05 -8.4

1601.9

335

-2.20 -13.4

1596.9

 $\bar{x}$ 125-680RL

1613.0

85

12.0

1605.3

125

-6.35 -14.2

1598.8

230

-3.54 -15.6

1597.4

315

-3.05 -16.9

1596.1

 x^4 126-680RL

1614.7

320

-3.23 -18.7

1596.0

280

-4.15 -18.5

1596.2

90

-8.90 -13.4

1596.3

80

-6.20 -8.8

1605.9

 $\bar{x}$ 127-680RL

1617.5

75

-8.30 -11.0

1606.5

90

-16.30 -16.1

1596.4

250

-9.55 -21.4

1596.1

375

-3.25 -22.4

1595.1

1615.1

4.8

4.3

1617.3

96.0

1619.5

4.8

5' Low

4.8

1622.3

5' Low

x⁴ - 12 p. 6 p. 21 1622.8

5.0

1627.8

265 - 5.55 - 27.2 1595.6

215 - 6.55 - 25.7 1597.1

60 - 14-10 - 14.2 1603.6

35 11.2 1616.6

85 169-20

2p. 51-55

406 22-18

1.

✓ Lower.

Dr #8 A¹¹4¹

A → 0. 0.0

Hub 26. 217-38

2010 159-17

Hub I 335 47-00 227-00 1.0

$\overline{A} \frac{11}{1}$

H 227-00

Last B/e 198-30

A 351-06

4.8

operation # 16. (2) Cleanup.

June 14 1965.

$\bar{A}$ 14-105 1836.9

10-105 200 270°-00 -1°30' -5.2 1831.2

$\bar{A}$ 10-105 1831.2

10-395 290 180°-00 -1°36' -8.1 1823.1

$\bar{A}$ 10-395 1823.1

7-395 150 8.0 1820.1

$\bar{A}$ 7-395 1820.1

6-395 50' 5.8 1819.3

U.S. 25' -6°12' -2.7 1817.4

D.S. 50 4.0 1821.1

✓ 75 5.1 1820.0

110 1.7 1823.4

$\bar{A}$ 6-395 1819.3

D.S. 150 3.4 1820.9

40 3.0 1821.3

U.S. 40 5.0 1819.3

55 333°-00

80 344°-30 6.6 1817.7

100 357°-00 6.5 1817.8

140 354°-00 4.0 1820.3

130 344°-20 6.8 1817.5

95 328°-00 6.0 1818.3

5.0

5.0

1828.1

5.0

1825.1

5.0

1824.3

TA

I.
#B9 180-00
B 87-00
#B. 85-08
II 78-17
A 138-18
A 126-27

D. 155-42'
Lipud 178-50
Th P. 181-35
L.O.J.T. 183-31
Stacke 184-15
172-33
2P. 182-42
2nd 183-46
Gr. L. 193-22
276-15

I II

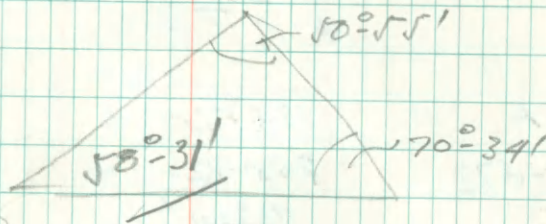
41-41
125-06

B II

53-08
159-29

50°-55'

155-42
85-08
70°-34'



181-35
188
361-35

50°-55'
70°-34'
121°-29'

179°-60'
121°-29'

58°-31'

1130'

1010 83°

550

1560

T.P.

A

1235

2-672

266-42

X₁
"B"

90-24'

44-15

T 2672

T. P.

86-42

X₂

90-00

Sight.

108-21

A

41-09'

43

24-01

B.

44-55

266-42

~~180~~

86-42

1 Sale

4

4-15

8

43-20 L

672

7-32

30p

109-50

98-17

$\bar{A} \# 8$

"4"

218-17

"6"

35-21

#86. 345 57-41 237-41

$\bar{A} \# 86$

#8 237-41

(137)

#9. 416 83-24

C

122-36

B.

173-25

175-14

F/gf. D.

350-54

98-17

~~180-~~

278-17

D-272

4C 30°-12'

6x 181-09

1-08

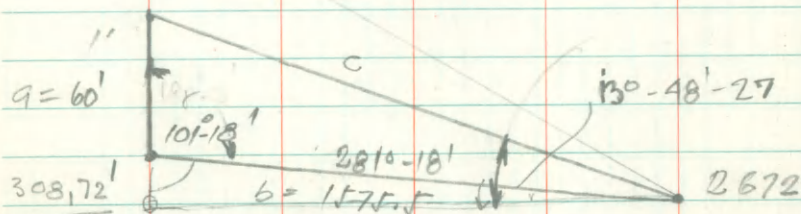
A-T.D 85-56

3x 257-50

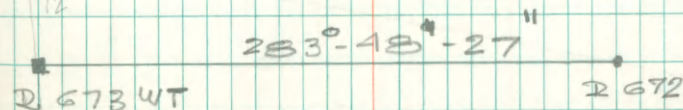
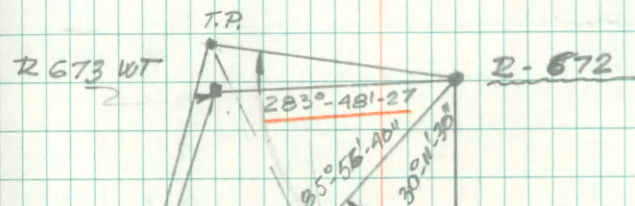
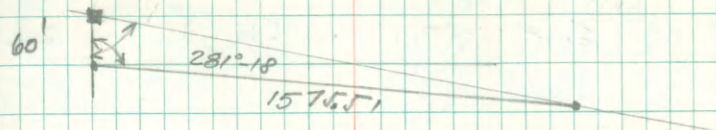
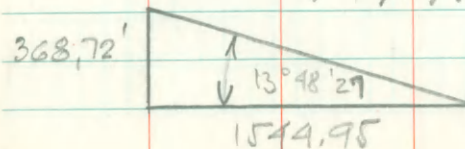
T D-272

4C 30°-12'

6x 181°-09' 30°-11'-30"



1544.95



(3) June 28. - '65.

14-105

1836.4

10-105 200 270 -1°25' -5.0 1831.4

10-525 420 180' 4.2 1827.2

10-525

1827.2

9 60' -3-45 -3.9 1823.3

8 100 -3-05 -5.4 1821.8

7 150 -2-48 -7.3 1819.9

6 200 -3-13 -11.4 1815.8

U. St. 35 -9-35 -5.7 1821.5

120 -3-55 -8.2 1819.5

140 -4-36 -11.4 1815.8

190 -3-08 -10.4 1816.8

9-525

1823.3

290 -1-40 -8.4 1814.9

180 -2-50 -8.9 1814.4

140 -4-00 -9.8 1813.5

100 -5-30 -9.6 1813.7

70 9-10 -5.1 1818.2

10' fane

r.o

r.o

1831.4

8-525

1821.4

5.0

1826.4

40

7.1

1819.3

140

-3°28'

-8.5

1812.9

200

-2°30'

-8.7

1812.7

320

-1°15'

-7.0

1814.4

7-525

1819.9

5.0

230

-1°52'

-7.4

120

-2°30'

-5.2

28

-6°00'

-2.9

79'

2672-3

80-44

3.

115-47

672-6.

356-25

1 2672.

T.P. 673

2860-35'-08"

2-673-47

2830-48'-27"

2-671

257-03' (77°-03')

T.P. 672 101'

0°-10

"A"

200-39

Sif.

107-10

1 T.P. 672

T.P. 673

0-00 180°-10

A

199-58

292-28

T.P. 673-47.

282-57

357-66

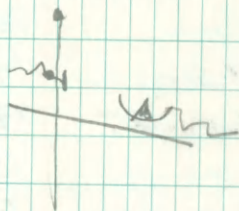
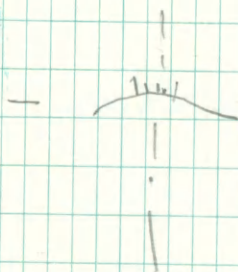
356-25

3°-35

199-58

~~180-~~

19°58'



30-12'

39

51

1 A

2.672

20°39'

T.P. V

~~19°58'~~ (20°00')

I.

11°30'

Sept.

29°57'

Cr. Bank

28-35

D.P. Road

19-12

Office G.

9°05' Bunk house

Doran

13-17

Office Window

8°07'

Br. 2 Sif

14°49'

GB UT.

352-~~12~~ 12'

TPV

352-35

II

334-51

"D"

271-57

C⁴ 2D

282-00

Road

276-53 Signal Dst.

352-12

180

172 12

465 14.1

left 10/50

673WT-672 28°-29' ~~128°-28'-00"~~

3x ## 85-24 28°-28'

6x #### 170-48'

I II 41°-42' 41°-42'-20"

3x ## 125-07

6- #### 250-14'

D II 63-13 63°-13'-40"

3 ## 189-42

6x 19-22

D-673WT 80-37 80°-37'-50"

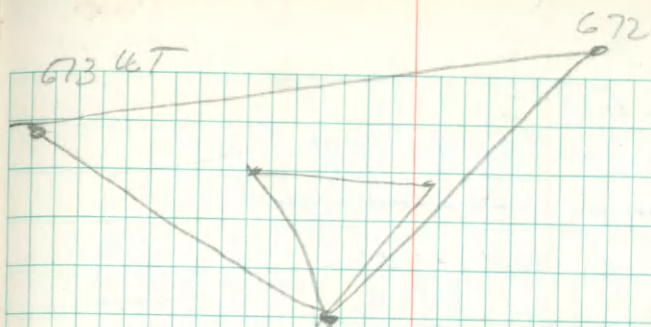
##

241-55

6x ####

123-47

80°-37'-50"



3660

123-47

483-47 : 6

250-14

296

4-14

41+6

296

80 / 324

240

19

259 = 412 x 6

6

120 : 6 = 20'

123

80 x 6
480

24

~~1234~~ 123-47

360

483-47

3°-47'

180

47

227:6

222

5

37 x 6

222

9

300 : 6 = 50

R672-T.P

40' ^{3x} 1056'

— 6

1 4

Flapb.

20°-16'

UT.T.P.

21' ^{3x} 1003

$\overline{I.A}$ $\overline{II}$
 $67^{\circ}-11^{\circ}06'$ $67^{\circ}.06'$
 $\#\#$ $201^{\circ}-18'$
 $\#\#\#\#$ $42^{\circ}-36'$ $(+360^{\circ})$

$\overline{A-D}$
 $\#\#$ $96-17$
 $\#\#\#$ $289-54$
 $\#\#\#\#$ $217-46$ $(+360)$

$\overline{A}$ $\overline{II}$
 $\overline{D}$ $154-57$
 $\overline{Hob}$ $251^{\circ}-09'$
 $\overline{T}$ $255-30$
 $\overline{Flapport}$ $87-14$
 $\overline{Bunkhouse}$ $94-27$
 $\overline{Office Le.}$ $75-08$
 $\vee$ 22 $79-08$
 $\overline{Op.}$ $108-48$
 $\overline{V on Bluff.}$ $107-38$
 $\overline{Bunkhouse S.}$ $210^{\circ}-19'$
 $\overline{Bunkhouse S.}$ $120-04$

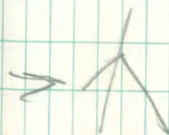
67×49
 402

247-06

$334-51$
 180
 $\overline{154^{\circ}-17'}$

$107-38$
 180
 $\overline{287-38}$

28
 $269-60$
 $251-09$
 $\overline{18^{\circ}-51'}$



o o f windor

4

1 I.

71°09'

71°10'-10"

44

213°30'

4444

67°01'

1 I.

A

191°30'

II

262-42

Office G.

232-08

V

222-45

+9°31'

Edge of M. R. 184-04

L. E - 11 - 163-23

Flagpole 151-19

Gt Slope 132-05

Cepthouse 106-09

Doran (Cora) 81-31

360 4 71x6
426

67

427:6

10 60' 10'

+

L. 64°-23'-23"

La 139-25-58.4 W

(4)

1. 10 - 525 1827.2

1. 9 51 - 4.25 - 3.9 1823.3

8 115 - 3-18 - 6.6 1820.6

U. 54 40 - 11-01' - 7.5 1819.7

90 - 5-32 - 3.5 1823.7

120 - 5-15' - 11.0 1816.2

160 - 4-12' - 11.6 1815.6

185 - 3-00' - 9.7 1817.5

250 - 2-16' - 9.8 1817.4

300 - 2-00 - 10.4 1816.8

315 - 2-10' - 12.4 1814.8

370 - 2-05 - 12.9 1814.3

1. 9. - 525 1823.3

285 - 2-01 - 10.0 1813.3

250 - 2-40 - 11.6 1811.7

220 - 1-47 - 6.9 1816.4

140 - 4-10' - 10.2 1813.1

100 - 5-50' - 10.1 1813.2

70 - 5-10' - 6.3 1817.0

8 30

July-6.

5.0

5.0

1828.3

8 - 525

1820.6

50

-7-30 -6.5 1814.1

135

-3-32 -8.3 1812.3

210

-2-26 -9.4 1811.2

295

-1-20 -6.9 1813.7

360

-1-05 -6.8 1813.8

170

672- 250-37
 D 231-08
 T.P. ~~72-02~~ 71-54
 V 213-01
 2 672.

30-28
 HHH 121-53

30°-28'-159

T.P.
 140 296-20

215-30
 1A 325-05
 U.T. 16-11

T.P.
 A. 2170-00
 U.T. 268-10
 D. 236-19
 V 223-45
 3015 188-11
 211-58

71.54
 180
 251.54

247-55

121-53 : 4

60
 53

113:4 = 28

80
 336
 (10)

28x4
 112

60:4 = 15
 20

tg 30°-28'-15

5883

(5)

11 - 105

1830.3

U. H.	160	-1°10'	-3.3	1827.0
	125	-2°30'	-5.5	1824.8
	65	-7°25'	-8.3	1822.0
	28	-16°45'	-7.8	1822.5

110 - 105

1831.2

	35'	-15°50'	-9.1	1822.1
	60	-11°30'	-11.4	1819.8
	90°	-8°30'	-13.2	1818.0
	220	-20°24'	9.2	1822.0

D#12

Narada	0°00		
Tr. 110m	153-40	153-40	
Hub	113-30	1-37	
	400	183-22	
	415	176-40	
	430	173-10	

14 11 - 105

1830.3

Dft.	310	-1.76	-8.0	1822.3
	230	-1.56	-7.8	1822.5
	170	-2.30	-6.5	1823.5
	20	-24.30	-6.8	1823.5

100' -4-35 8.00

110 -5-30 10.10

0.187 50' 131.10 1827.2
270° -4°20' -3.8 1823.4
100' 10° -2°51' -9.9 1822.3

0 30' 1.9 -525 1823.4
80' -5° -2.6 1820.8
120 -7°45' -10.7 1812.7
150 -5°25' -11.6 1811.8
153P 3°30' -9.1 1814.3

165 1.8 -525 1822.3
90' -3°35' -10.6 1811.7
30' -7°40' -11.9 1810.4
-23°31' -11.0 1811.3

D.H. 90° Bedrock

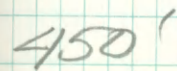
80' 316-00' 1
150' 302-00
180' 292-30
160 267-20

Lower End

12606

10" Low

140-19



Teleph. ① 173-46
2 191-00

1 Hob^{III}D

289-28

Tower 15-54

Open Bridge 294-25

Dead Sig 341-43

Flap 182-22

Dangle Pole ① 319-55

2 326-35

3 332-92

4 342-50

5 356-47

Tel. ① 326-30

2 354-57

Tel ① 233-18

2 215-02

① 227-05

2 216-30

3 206-45

4 197-00

5 188-30

6 176-82

7 154-40

8

Jackson 121-30
 Radio DJ 325-31
 324-412
 Oil House 292-28
 High Thr. 20-21.
 Cabin. 343-412

$\bar{T} C$

Dome 343-55
 No 2 Sig. 43-45
 Borr. Sig. 195-17
 Kil BCG 204-49
 Smoke St. 334-16

$\bar{T} C$

Smoke Stack 345-59
 No 2 Sig 24-47
 Gas House 287-23
 Brit pe. 290-22

301-15

300-75

287-23

13°-52

303-79

13-52

290-22

1 Feb

180' 79-20

190 97-56

190 111-00

125 117-10

90 304-00

D 2°-20'

C 353-14

Tower 14-12

Cabin ⁴ 308-57

Signal 398-12

Airport C 20-29

Cut 18-50

40' 288-04 108-04

1 40'

Line 1 173-55

10° 349-30

C 351-35

Cabin 346-49

"1
A C Top.

C

09.00

D

11.35

Cabin

351-57

Tower

15.28

Airport

25.30

A

19.02

Hub

180-20

Hub 80'

+16

A 0 → 1000

B

9.09

Cabin

16.56

Tower

46.50

Bray

353-24

290.42'

22 - 24 ⁰ 8896. 1 AG

122.05
127.43

130.00

127.43

24

22

122.05

20

117.48

60

122.05

A C 1000

CHill. 180-00

D 109-30

0101 #1 171-04

Pole 172-04

C 359-15

Dick 180

Line 1 180-02

low Pole 172-05

Flg Pole 171-04

D 109-30

E 279-03

(99-03)

Tower 17-54

44
G 00-06

A F

C 1000 232' 99-03

C 18-35

Flg 165-26

Pole 166-21

C Hill 174-11

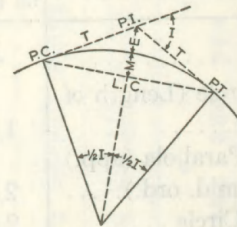
D 105-58

Tower	18-12
Cabin	350-05
Ope Bld	295-12
Signal	350-01
1	357-09
2	15-51
3	29-25

Tel - 180-0

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 - Sta. P. C. = 27.62. Hence offset = $5.66 \times \left(\frac{27.62}{100} \right)^2 = .432$ ft. Also, square of any distance, divided by twice the radius equals (approximately) the distance from tangent to curve. Thus $(27.62)^2 \div (2 \times 881.95) = .432$ 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)	$\frac{1}{2} lr$	
Area of Segment of Parabola (app.) (c = chord; m = mid. ord.)	$\frac{2}{3} cm$	
Area of Segment of Circle	$\frac{2}{3} cm$	
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	$\frac{4}{3} \pi r^3$	

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.

$\frac{1}{16}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{15}{16}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{15}{16}$	$\frac{1}{2}$
.0052	.0078	.0104	.0156	.0208	.0260	.0313	.0417	.0521	.0625	.0729	
1	2	3	4	5	6	7	8	9	10	11	
.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167	

Table III.—Radii, Ordinates and Deflections

Deg.	Radius	Mid. Ord.	Tan Offset	Def. for 1 Foot	Deg.	Radius	Mid. Ord.	Tan Offset	Def. for 1 Foot
0° 10'	34377.5	.036	.145	0.05'	7°	819.02	1.528	6.105	2.10'
20	17188.8	.073	.291	0.10	20	781.84	1.600	6.395	2.20
30	11459.2	.109	.436	0.15	30	764.49	1.637	6.540	2.25
40	8594.42	.145	.582	0.20	40	747.89	1.673	6.685	2.30
50	6875.55	.182	.727	0.25					
					8	716.78	1.746	6.976	2.40
1	5729.65	.218	.873	0.30	20	688.16	1.819	7.266	2.50
10	4911.15	.255	1.018	0.35	30	674.69	1.855	7.411	2.55
20	4297.28	.291	1.164	0.40	40	661.74	1.892	7.556	2.60
30	3819.83	.327	1.309	0.45					
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
					30	603.80	2.074	8.281	2.85
2	2864.93	.436	1.745	0.60	40	593.42	2.110	8.426	2.90
10	2644.58	.473	1.891	0.65					
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
					12	478.34	2.620	10.45	3.60
3	1910.08	.655	2.618	0.90	30	459.28	2.730	10.89	3.75
10	1809.57	.691	2.763	0.95	13	441.68	2.839	11.32	3.90
20	1719.12	.727	2.908	1.00	30	425.40	2.949	11.75	4.05
30	1637.28	.764	3.054	1.05	14	410.28	3.058	12.18	4.20
40	1562.88	.800	3.199	1.10	30	396.20	3.168	12.62	4.35
50	1494.95	.836	3.345	1.15					
					15	383.07	3.277	13.05	4.50
4	1432.69	.873	3.490	1.20	30	370.78	3.387	13.49	4.65
10	1375.40	.909	3.635	1.25	16	359.27	3.496	13.92	4.80
20	1322.53	.945	3.718	1.30	30	348.45	3.606	14.35	4.95
30	1273.57	.982	3.926	1.35	17	338.27	3.716	14.78	5.10
40	1228.11	1.018	4.071	1.40	18	319.62	3.935	15.64	5.40
50	1185.78	1.055	4.217	1.45	19	302.94	4.155	16.51	5.70
5	1146.28	1.091	4.362	1.50	20	287.94	4.374	17.37	6.00
10	1109.33	1.127	4.507	1.55	21	274.37	4.594	18.22	6.30
20	1074.68	1.164	4.653	1.60	22	262.04	4.814	19.08	6.60
30	1042.14	1.200	4.798	1.65	23	250.79	5.035	19.94	6.90
40	1011.51	1.237	4.943	1.70	24	240.49	5.255	20.79	7.20
50	982.64	1.273	5.088	1.75					
					25	231.01	5.476	21.64	7.50
6	955.37	1.309	5.234	1.80	26	222.27	5.697	22.50	7.80
10	929.57	1.346	5.379	1.85	27	214.18	5.918	23.35	8.10
20	905.13	1.382	5.524	1.90	28	206.68	6.139	24.19	8.40
30	881.95	1.418	5.669	1.95	29	199.70	6.360	25.04	8.70
40	859.92	1.455	5.814	2.00	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
20	509.68	22.62	10	1018.9	89.89	10	1544.2	204.44
30	518.08	23.38	20	1027.5	91.40	20	1553.1	206.77
40	526.48	24.14	30	1036.1	92.92	30	1562.1	209.12
50	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	483.3	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 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	3888.0	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	.103	.112	.122	.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.

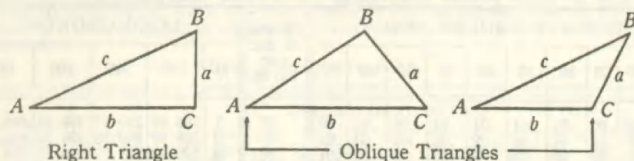
FOR SUB-CHORDS ADD										Excess of arc per 100 ft.	LONG CHORDS				
D	10	20	30	40	50	60	70	80	90		D	200	300	400	500
4°	.00	.00	.01	.01	.01	.01	.01	.01	.00	.02	1	199.99	299.97	399.92	499.85
6	.00	.01	.01	.02	.02	.02	.02	.01	.01	.05	2	199.97	299.88	399.70	499.39
8	.01	.02	.02	.03	.03	.03	.03	.02	.01	.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	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	196.90	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	.255

TRIGONOMETRIC FORMULÆ



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

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	$\text{area} = \frac{b^2 \sin A}{2}$
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 =

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

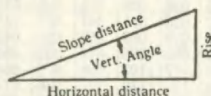


Table IX.—Natural Trigonometrical Functions.

Angle	Sin	Tan	Cot	Cos		Angle	Sin	Tan	Cot	Cos	
0	0	0	00	1	90	0	1	0	00	0	90
10	.0029	.0029	343.8	.9998	50	80	.1392	.1405	7.115	.99027	82
20	.0058	.0058	171.9	.9998	40	70	.1421	.1435	6.968	.98986	50
30	.0087	.0087	114.6	.9996	30	60	.1449	.1465	6.827	.98944	40
40	.0116	.0116	85.94	.9993	20	50	.1478	.1495	6.691	.98902	30
50	.0145	.0145	68.75	.9989	10	40	.1507	.1524	6.561	.98858	20
						30	.1536	.1554	6.435	.98814	10
1	.0175	.0175	57.29	.9985	89	9	.1564	.1584	6.314	.98769	81
10	.0204	.0204	49.10	.9979	50	10	.1593	.1614	6.197	.98723	50
20	.0233	.0233	42.96	.9973	40	20	.1622	.1644	6.084	.98676	40
30	.0262	.0262	38.19	.9966	30	30	.1650	.1673	5.976	.98629	30
40	.0291	.0291	34.37	.9958	20	40	.1679	.1703	5.871	.98580	20
50	.0320	.0320	31.24	.9949	10	50	.1708	.1733	5.769	.98531	10
2	.0349	.0349	28.64	.9939	88	10	.1736	.1763	5.671	.98481	80
10	.0378	.0378	26.43	.9929	50	10	.1765	.1793	5.576	.98430	50
20	.0407	.0407	24.54	.9917	40	20	.1794	.1823	5.485	.98378	40
30	.0436	.0437	22.90	.9905	30	30	.1822	.1853	5.396	.98325	30
40	.0465	.0466	21.47	.9892	20	40	.1851	.1883	5.309	.98272	20
50	.0494	.0495	20.21	.9878	10	50	.1880	.1914	5.226	.98218	10
3	.0523	.0524	19.08	.9863	87	11	.1908	.1944	5.145	.98163	79
10	.0552	.0553	18.07	.9847	50	10	.1937	.1974	5.066	.98107	50
20	.0581	.0582	17.17	.9831	40	20	.1965	.2004	4.989	.98050	40
30	.0610	.0612	16.35	.9813	30	30	.1994	.2035	4.915	.97992	30
40	.0640	.0641	15.60	.9795	20	40	.2022	.2065	4.843	.97934	20
50	.0669	.0670	14.92	.9776	10	50	.2051	.2095	4.773	.97875	10
4	.0698	.0699	14.30	.9756	86	12	.2079	.2126	4.705	.97815	78
10	.0727	.0729	13.73	.9736	50	10	.2108	.2156	4.638	.97754	50
20	.0756	.0758	13.20	.9714	40	20	.2136	.2186	4.574	.97692	40
30	.0785	.0787	12.71	.9692	30	30	.2164	.2217	4.511	.97630	30
40	.0814	.0816	12.25	.9668	20	40	.2193	.2247	4.449	.97566	20
50	.0843	.0846	11.83	.9644	10	50	.2221	.2278	4.390	.97502	10
5	.0872	.0875	11.43	.9619	85	13	.2250	.2309	4.331	.97437	77
10	.0901	.0904	11.06	.9594	50	10	.2278	.2339	4.275	.97371	50
20	.0929	.0934	10.71	.9567	40	20	.2306	.2370	4.219	.97304	40
30	.0958	.0963	10.39	.9540	30	30	.2334	.2401	4.165	.97237	30
40	.0987	.0992	10.08	.9511	20	40	.2363	.2432	4.113	.97169	20
50	.1016	.1022	9.788	.9482	10	50	.2391	.2462	4.061	.97100	10
6	.1045	.1051	9.514	.9452	84	14	.2419	.2493	4.011	.97030	76
10	.1074	.1080	9.255	.9421	50	10	.2447	.2524	3.962	.96959	50
20	.1103	.1110	9.010	.9390	40	20	.2476	.2555	3.914	.96887	40
30	.1132	.1139	8.777	.9357	30	30	.2504	.2586	3.867	.96815	30
40	.1161	.1169	8.556	.9324	20	40	.2532	.2617	3.821	.96742	20
50	.1190	.1198	8.345	.9290	10	50	.2560	.2648	3.776	.96667	10
7	.1219	.1228	8.144	.9255	83	15	.2588	.2679	3.732	.96593	75
10	.1248	.1257	7.953	.9219	50	10	.2616	.2711	3.689	.96517	50
20	.1276	.1287	7.770	.9182	40	20	.2644	.2742	3.647	.96440	40
30	.1305	.1317	7.596	.9144	30	30	.2672	.2773	3.606	.96363	30
40	.1334	.1346	7.429	.9106	20	40	.2700	.2805	3.566	.96285	20
50	.1363	.1376	7.269	.9067	10	50	.2728	.2836	3.526	.96206	10
	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	
°						°					
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	.4306	.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						
40	.5398	.6412	1.560	.84182	20	39	.6293	.8098	1.235	.77715	51
50	.5422	.6453	1.550	.84025	10	10	.6316	.8146	1.228	.77531	50
33	.5446	.6494	1.540	.83867	57	20	.6338	.8195	1.220	.77347	40
10	.5471	.6536	1.530	.83708	50	30	.6361	.8243	1.213	.77162	30
20	.5495	.6577	1.520	.83549	40	40	.6383	.8292	1.206	.76977	20
30	.5519	.6619	1.511	.83389	30	50	.6406	.8342	1.199	.76791	10
40	.5544	.6661	1.501	.83228	20	40	.6428	.8391	1.192	.76604	50
50	.5568	.6703	1.492	.83066	10	10	.6450	.8441	1.185	.76417	50
34	.5592	.6745	1.483	.82904	56	20	.6472	.8491	1.178	.76229	40
10	.5616	.6787	1.473	.82741	50	30	.6494	.8541	1.171	.76041	30
20	.5640	.6830	1.464	.82577	40	40	.6517	.8591	1.164	.75851	20
30	.5664	.6873	1.455	.82413	30	50	.6539	.8642	1.157	.75661	10
40	.5688	.6916	1.446	.82248	20	41	.6561	.8693	1.150	.75471	49
50	.5712	.6959	1.437	.82082	10	10	.6583	.8744	1.144	.75280	50
35	.5736	.7002	1.428	.81915	55	20	.6604	.8796	1.137	.75088	40
10	.5760	.7046	1.419	.81748	50	30	.6626	.8847	1.130	.74896	30
20	.5783	.7089	1.411	.81580	40	40	.6648	.8899	1.124	.74703	20
30	.5807	.7133	1.402	.81412	30	50	.6670	.8952	1.117	.74509	10
40	.5831	.7177	1.393	.81242	20	42	.6691	.9004	1.111	.74314	48
50	.5854	.7221	1.385	.81072	10	10	.6713	.9057	1.104	.74120	50
36	.5878	.7265	1.376	.80902	54	20	.6734	.9110	1.098	.73924	40
10	.5901	.7310	1.368	.80730	50	30	.6756	.9163	1.091	.73728	30
20	.5925	.7355	1.360	.80558	40	40	.6777	.9217	1.085	.73531	20
30	.5948	.7400	1.351	.80386	30	50	.6799	.9271	1.079	.73333	10
40	.5972	.7445	1.343	.80212	20	43	.6820	.9325	1.072	.73135	47
50	.5995	.7490	1.335	.80038	10	10	.6841	.9380	1.066	.72937	50
37	.6018	.7536	1.327	.79864	53	20	.6862	.9435	1.060	.72737	40
10	.6041	.7581	1.319	.79688	50	30	.6884	.9490	1.054	.72537	30
20	.6065	.7627	1.311	.79512	40	40	.6905	.9545	1.048	.72337	20
30	.6088	.7673	1.303	.79335	30	50	.6926	.9601	1.042	.72136	10
40	.6111	.7720	1.295	.79158	20	44	.6947	.9657	1.036	.71934	46
50	.6134	.7766	1.288	.78980	10	10	.6967	.9713	1.030	.71732	50
38	.6157	.7813	1.280	.78801	52	20	.6988	.9770	1.024	.71529	40
10	.6180	.7860	1.272	.78622	50	30	.7009	.9827	1.018	.71325	30
20	.6202	.7907	1.265	.78442	40	40	.7030	.9884	1.012	.71121	20
						50	.7050	.9942	1.006	.70916	10
							.7071	.1	1.	.70711	45
											°
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 "1 + 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 $[(1 + c) \sin \alpha]$ 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.

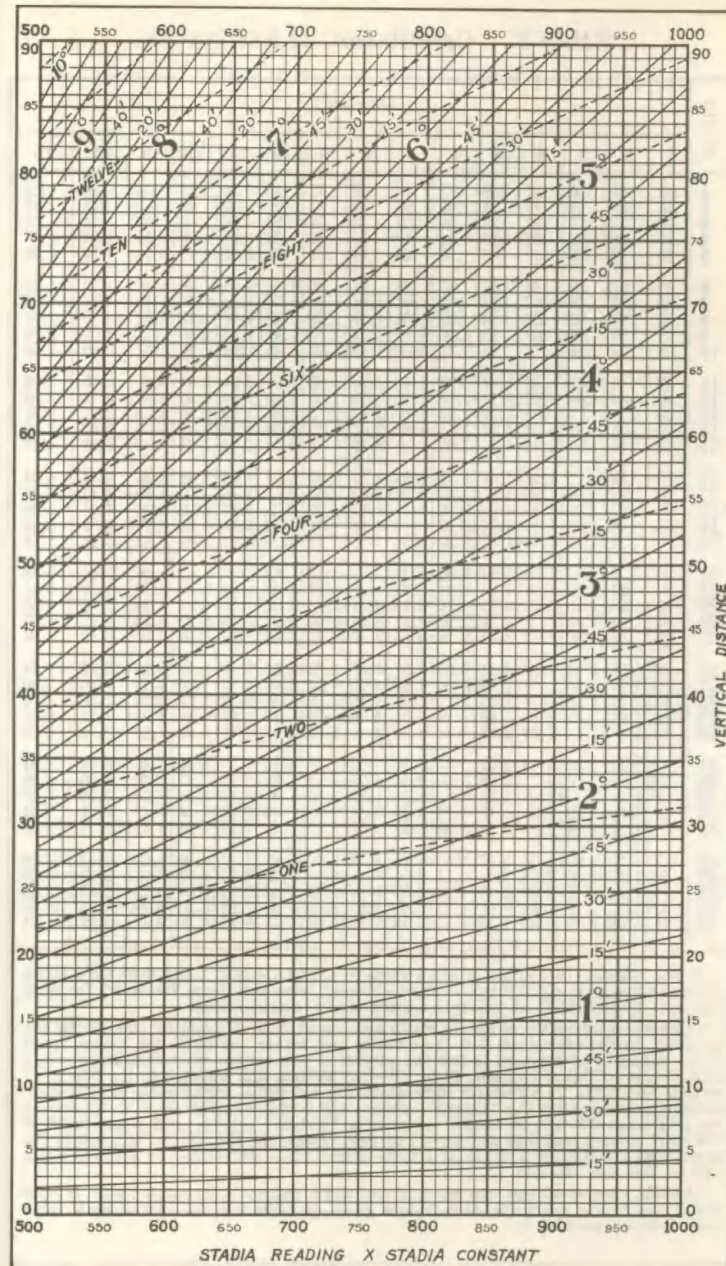
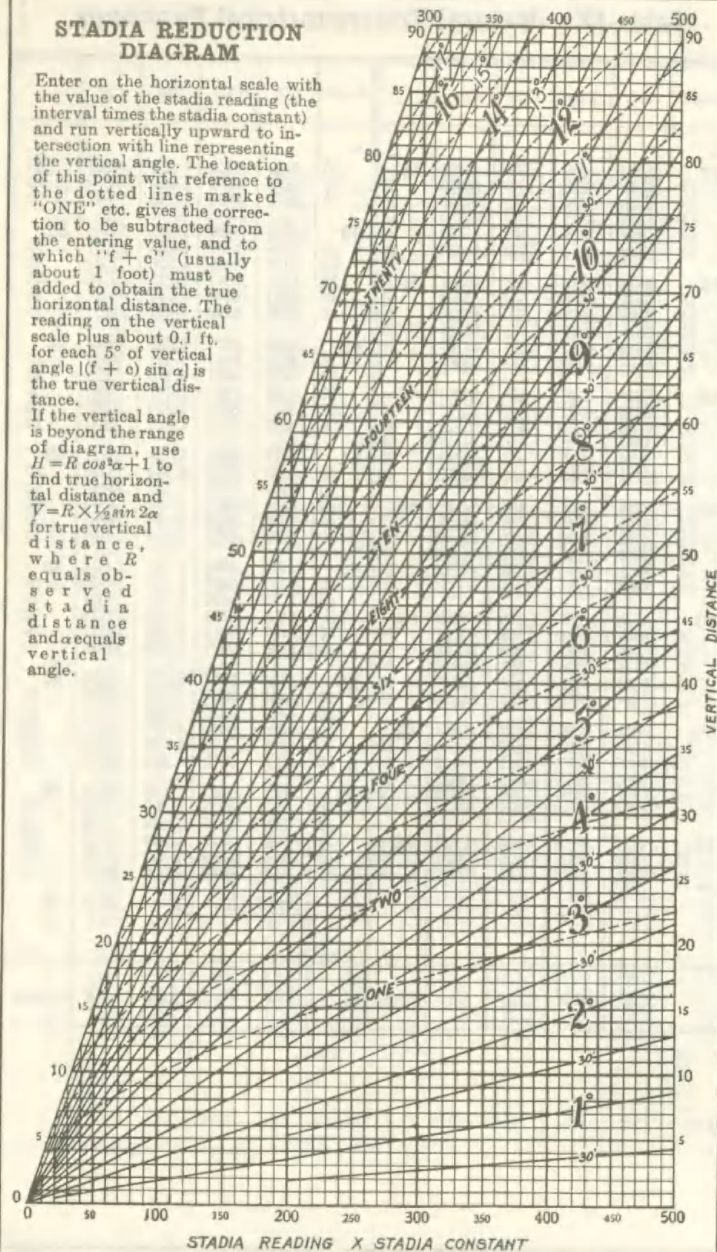


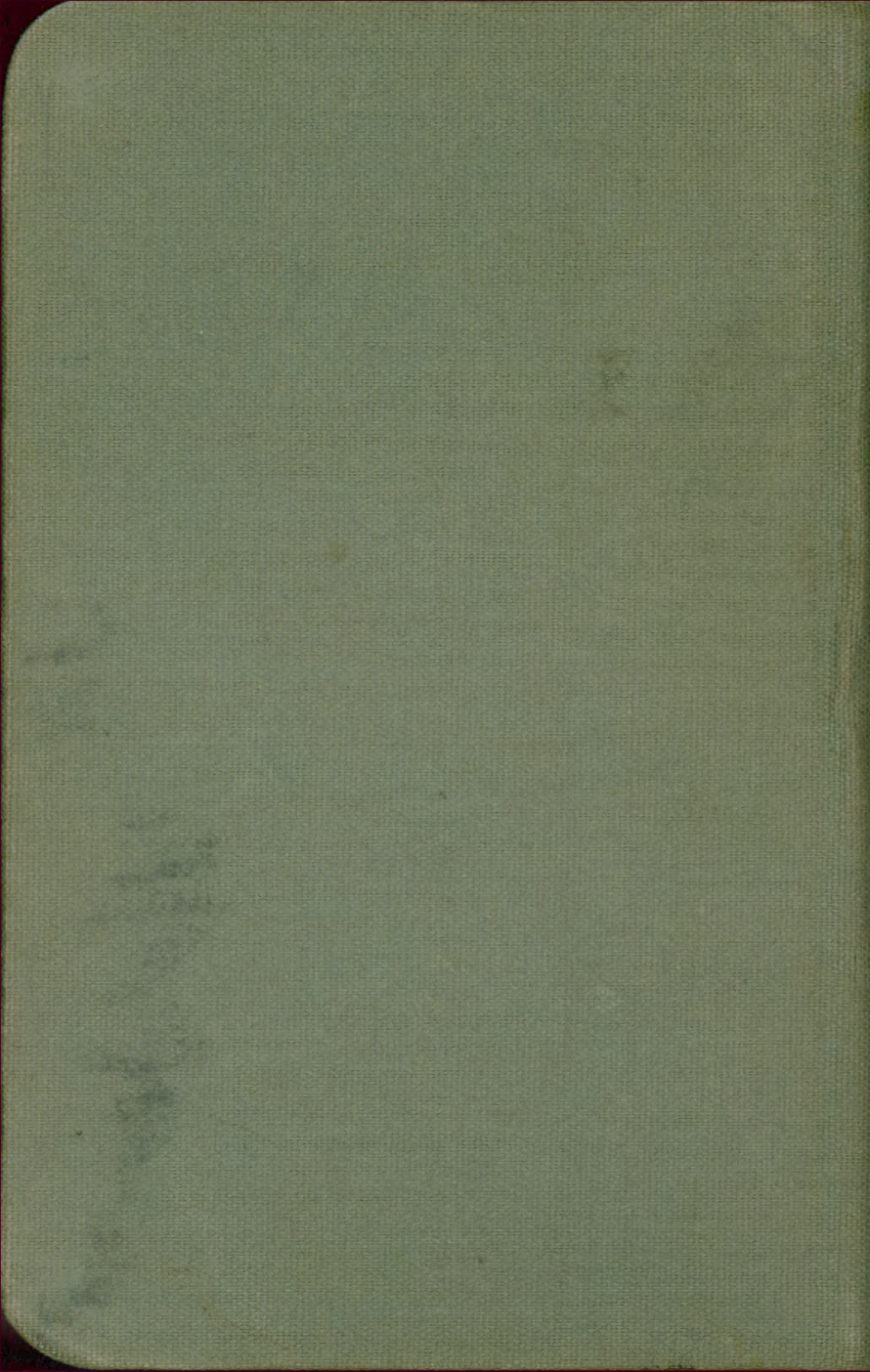
Table X.—Calculation of Earthwork.

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.





Library and Archives
Canada

395 Wellington Street
Ottawa, ON K1A 0N4

Bibliothèque et Archives
Canada

395, rue Wellington
Ottawa, ON K1A 0N4

For material still subject to legislative, contractual or institutional obligations, users warrant that they will respect those obligations and not use LAC collections in a manner that would infringe the rights of others. Liability that may arise in the use of a copy is assumed in full by the user. LAC accepts no responsibility for unauthorized use of collection material by users.

To ensure proper citation and to facilitate relocation of an item, the source of the material and its reference number should always accompany the copy.

Pour les documents faisant encore l'objet d'obligations législatives, contractuelles ou institutionnelles, les usagers s'engagent à respecter ces obligations et à ne pas utiliser les documents des collections de BAC de façon à nuire aux droits d'autrui. Ils doivent assumer entièrement toute responsabilité qui pourrait découler de l'utilisation d'une reproduction de document. BAC décline toute responsabilité quant à l'utilisation non autorisée de documents provenant de ses collections.

Afin de citer un document avec exactitude et d'en faciliter le repérage, sa source et son numéro de référence doivent toujours accompagner la reproduction.

TITLE/TITRE _____
RG _____ MG ²⁸ _____ R- _____ SERIES/SÉRIE ^{III 43} _____
ACCESSION _____ VOL ⁸⁸ _____ PAGE(S) ⁶⁶ _____
BOX/BOÎTE _____ REEL/BOBINE _____
FILE/DOSSIER ^{EXPLORATION OP#16} _____
DATE ^{MARCH 2015} _____