

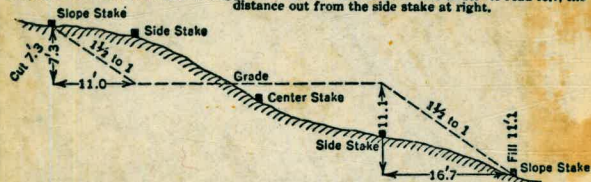
W

6/9

DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING

Roadway of any Width. Side Slopes $1\frac{1}{2}$ to 1.

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



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

KEUFFEL & ESSER CO., N. Y.

MICROFILMED

JAN 13 1965

The paper in this book No. F370A

is made of 50% high grade rag stock

with a WATER RESISTING surface sizing.

10,892-2. y, cc, ys. cM.

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Profile on Line of Half
Round Drainage Trench 1-6
(8.75') south of Axis
(STA 3+11 to 5+67)

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Profile on Line of Half Round

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sta. 7+84-8+50
Profile on Line of Half Round 18-19

PROFILE OF FILLET LINE ~

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PROFILE - Half Round Drain

Sta 7+78 to Sta 5+93 22-24

PROFILE ON
LINE OF HALF ROUND DRAIN TRENCH

3/3/42 Jackson 1
Fair-Worm Cole

Sta. + H.I. - I.S. Elev.

T.B.M. 663.14

0.58 663.72

3+11 4.4 659.3

T.P. 12.89 650.83

0.87 651.70

3+26 1.5 650.2

3+31 2.3 649.4

3+40 7.8 643.9

3+43 7.8 643.9

3+46 8.9 642.8

T.P. 12.55 639.15

0.20 639.35

3+50 1.3 638.0

3+60 6.5 632.8

3+65 10.1 629.2

NOTE: PROFILE TAKEN
ON FOUNDATION ROCK - 8.75'
SOUTH OF AXIS

→ STA. 3+11⁰ - Beginning of Trench

3/3/42

2

Sta. + H.I. - 1.5 Elev. Fair-Warm

639.35

3+71 12.8 626.5 ✓

T.P. 12.53 626.82 ✓

1.54 628.36 ✓

3+74 4.8 623.6 ✓

3+76 4.6 623.8 ✓

3+80 6.3 622.1 ✓

T.P. 12.10 616.26 ✓

0.50 616.76 ✓

3+86 2.3 614.5 ✓

3+96 10.6 606.1² ✓4+00 12.0 604.7⁸ ✓

T.P. 12.49 604.27 ✓

1.26 605.53 ✓

4+19 13.2 592.9 ✓

4+22 13.1 592.4 ✓

3/3/42

3

Sta + H.L. - 1.5 Elev. Fair-Warm

605.53

T.P. 13.02 592.51

0.62 593.13

4+27 4.9 588.2

4+31 6.1 587.1

4+35 8.3 584.8

4+37 10.4 582.7

4+41 12.2 580.9

T.P. 12.79 580.34

1.42 581.76

4+50 13.0 568.8

T.P. 12.89 568.87

0.23 569.10

4+54 1.4 567.7

4+56 0.2 568.9

4+58 1.0 568.1

4+68 10.3 ~~567.8~~
558.8

3/3/42
Fair - Warm

4

Sta. + H.I. - I.S. Elev.

569.10

4+81 11.6 557.5 ✓

T.P. 13.11 555.99 ✓

1.03 557.02 ✓

4+86 9.1 547.9 ✓

4+96 10.0 547.0 ✓

5+03 12.8 544.2 ✓

T.P. 12.25 544.77 ✓

0.71 545.48 ✓

5+05 5.0 540.5 ✓

5+10 7.0 538.5 ✓

5+11 8.6 536.9 ✓

5+14 9.6 535.9 ✓

5+15 12.3 533.2 ✓

T.P. 12.46 533.02 ✓

2.25 535.27 ✓

5+18 4.0 531.3 ✓

3/3/42
Fair - Warm

5

Sta	+	H.I.	-	I.S.	Elev.
		535.27			
5+19				7.6	527.7 ✓
5+25				9.5	525.8 ✓
T.P.			12.44		522.83 ✓
	1.58	524.41 ✓			
5+26				2.9	521.5 ✓
5+28				3.4	521.0 ✓
T.B.M.			12.81		511.60 ✓
	0.32	511.92 ✓			511.60 = Recorded E.I.
5+38				5.8	506.1 ✓
5+40				5.0	506.9 ✓
5+48				12.4	490.5 ✓
5+51				12.2	499.7 ✓
T.P.			12.59		499.33 ✓
	1.17	500.50 ✓			
5+58				3.7	496.8 ✓
5+67				5.2	495.3 ✓
T.P.			1.61		498.89 ✓

Sta	+	H.I.	-	IS	Elev.			
T.P.					498.89			
	0.27	499.16						
T.P.			6.08		493.08			
	12.10	505.18						
T.B.M.			2.29		502.89			
						502.87 = Rec. El.		

3/4/42

Jackson

6

Fair-Warm

King

Profile Cont'd on P. 16

PROFILE OF FILLET LINE

MAR 10 1942

Dickinson
ROGERS
POLAK

657	656.12		649.50
3+22 ⁵		6.12	650.00
+25		8.0	648.1
7 +27		8.1	648.0
+31		12.0	644.1
TP 2.74	646.00	12.86	643.26
+44		8.0	638.0
TP 1.31	634.53	12.78	633.22
+49		2.5	632.0
+51		2.9	631.6
+56		4.6	629.9
+57		6.2	628.3
+59		6.1	628.4
+61		7.7	626.8
+64		9.2	625.3
+71		11.5	623.0

Profile (Contd)

63453

3+74 12.5 622.0

T.P. 0.41 622.14 12.80 621.73

+81 5.9 616.2

7 +86 9.7 612.4

+91 10.5 611.6

T.P. 1.38 610.66 12.86 609.28

3+93 4.5 606.2

+97 5.3 605.4

4+02 8.6 602.1

4+06 599.2

~~+06 8.8 601.9~~

+08 12.7 598.0

T.P. 0.45 598.43 12.68 597.98

4+11 0.9 597.5

+14 3.5 594.9

+18 5.6 592.8

+20 9.3 589.1

Profile (Cont'd)

10

598.43

4+26 10.9 587.5

T.P. 20.1 588.06 12.41 586.02

+28 3.7 584.4

+31 4.3 583.8

+35 8.5 579.6

+37 8.6 579.5

+43 11.3 576.8

T.P. 0.31 575.46 12.91 575.15

4+46 1.2 574.3

+52 5.2 570.3

+60 11.0 564.5

+63 12.3 563.2

T.B.M. 0.52 563.94 7.03 563.43 = 563.42 Point on Rock Bet. Bks. 3 & 4

+69 3.2 560.7

+73 4.7 559.2

4+78 6.0 557.9

Profile (Cont'd)

March 11-1942

12

563.94

TP 0.43 552.00 12.37 551.59

4187 2.5 549.5

+91 2.3 549.7

+97 6.7 545.3

5103 7.6 544.4

406 12.6 539.4

TP 0.35 539.50 12.85 539.15

5116 6.2 533.2

+21 6.9 532.6

TP 0.35 527.59 12.26 527.24

Marked Back near Blks 4 & 5

5127 2.3 525.3

March 11-42

TP 1.05 515.62 13.01 514.58

5145 9.7 505.9

+47 10.3 505.3

TP 0.32 503.48 12.46 503.16

5151 2.1 501.4

Profile (cont'd)

5153 50348 39 499.6

+57 5.6 497.9

+58 7.6 495.9

+61 8.9 494.6

TP 9.68 512.84 0.32 503.16

TBM 1.26 511.58 Marked 511.60

3-20-42

Rogers
Cole

16

Profile on Line of Half Round Drain Trench (Cont'd from P 6)

T.B.M. 0.33 511.93 511.60

0.92 500.16 12.71 499.22

~~576~~~~53~~

5+69 8.7 491.5

0.85 488.45 12.56 487.60

+78 7.4 481.0

0.37 476.37 12.45 476.00

+83 2.8 473.6

+87 6.6 469.8

T.B.M. 1.12 475.25 = 475.23 Marked Rock

(cont'd on page 24)

Profile on Line of Half Round Drain 3-27-42

Rogers
Cole 18
King

Continued in Book 592
Page 23

TBM	0.17	462.01		461.84
8+53.5			By INTERPOLATION	458.4
8+50			4.8	457.2
+44			4.6	457.4
+41			6.8	455.2
+36			7.2	454.8
+33			8.4	453.6
+32			7.5	454.5
+27			7.8	454.7
+25			9.2	452.8
+23			9.5	452.5
+22			8.7	453.3
+18			9.2	452.8
+11			9.7	452.3
T.P.	0.31	449.66	12.66	449.35
8+04			0.8	448.9
8+03			+0.4	450.1
				449.3

set T.B.M.

Profile Cont'd.

3-27-42

Party - same 19

	✓	449.66					
7+99			1.9	✓	447.8		
+96			5.2	✓	444.5		
+90			7.0	✓	442.7		
7+84			7.5	✓	442.2		
Groot Hole # 10-23.2			7.3	✓	442.4		
Groot Hole # 9-23.2			7.7	✓	442.0		
TP	11.18	✓	455.77	507	✓	444.59	Set T.B.M.
	9.64	✓	462.89	2.52	✓	453.25	
T.B.M.			1.05		✓	461.84	= 461.84 Check on T.B.M.

(Cont'd on page 22)

PROFILE OF FILLET LINE

BLOCKS # 10-9-8-7-6

T.B.M. 8.03 452.62		444.59
8+07	2.8	449.8
8+02	7.4	445.2
7+97	9.1	443.5
7+82	8.4	444.2
7+72	10.9	441.7
7+60.5	11.1	441.5
7+43	11.5	441.1
7+42	10.4	442.2
7+37.25	10.7	441.9
7+33	10.0	442.6
7+18	10.6	442.0
7+14	11.7	440.9
7+06	12.7	439.9
7+05	11.6	441.0
6+90.75	13.1	439.5

MAR. 31 (20)

DICKINSON
POLAK

PROFILE OF FILLET LINE (Cont'd)

452.62

MAR. 31 (21)
DICKINSON
POLAK

6+67.50	12.2	404	
6+61	12.7	439.9	
6+59	10.0	442.6	
6+52	9.4	443.2	
6+44 ²⁵	11.3	441.3	
6+33	10.1	442.5	
6+21	9.1	443.5	
6+19	7.6	445.0	
6+06	7.1	445.5	
5+97	1.8	450.8	
TBM	3.30	449.32	MARKED E.I. 449.35

5+71

~~488.8~~
482.4

5+61

494.6

See pg. 1A

(Cont'd from page 19)

PROFILE ON LINE OF HALF ROUND

DRAIN - Blocks 10⁺-9-8-7-6⁺

APR 22
DICKINSON

T.B.M. 3.32	447.91	444.59
7+78	6.3	441.6
7+77	4.9	443.0
7+67	6.0	419
7+63	7.8	401
7+60 ⁵	8.1	398
7+57	8.3	396
7+52	5.3	42.6
7+41	5.0	429
7+31	4.9	43.0
7+29	6.2	41.7
7+27	6.5	41.4
7+26	5.7	42.2
7+20	7.4	40.5
7+13	7.3	40.6
7+06	6.4	41.5

APR. 4 (23)
Dickinson

447.91

6+94	6.7	412
6+90	5.4	425
6+77	5.1	428
6+72	6.0	419
6+71	4.5	434
+67	5.2	427
+66	6.2	417
+59	7.2	407
+52	7.1	408
+50	6.2	417
+48	6.4	415
+47	5.4	425
+44	4.6	433
+41	5.1	428
+38	6.3	416
6+30	6.9	410

PROFILE - Half Round DRAIN

APR. 4th (24)
DICKINSON

447.91

6+27	2.4	445.5	
+23	2.8	45.1	
+22	2.1	45.8	
+20	0.7	447.2	
7P	1.90	446.01	
8.20	454.21		
6+15	7.1	447.1	
+13	5.5	48.7	
+08	5.1	49.1	
+05	4.1	50.1	
6+00	4.1	50.1	
5+98	3.5	50.7	
5+95	1.2	53.0	
5+93	1.0	453.2	Toe
T. BM	9.63	444.58	

Marked E.I. 444.59

(STATION 5+87 to 5+69 - Page 16)

Profile of Fillet Line

Blocks 13-14-15-16-17-18-19 and 20

4/13/42
Soper
King
Bowlin
Davis

T.B.M.	0.26	483.87		483.61
TP	11.63	489.81	5.69	478.18
9+25			6.4	483.4
9+29			5.7	484.1
9+32			3.7	486.1
TP	12.02	500.85	0.98	488.83
9+36			10.5	490.3
9+42			8.9	491.9
9+47			5.7	495.1
9+51			3.9	496.9
TP	12.54	513.02	0.37	500.49
9+52			11.3	501.7
9+56			9.9	503.1
9+61			9.1	503.9
9+64			2.5	510.5
T.B.M.			1.49	511.53

Marked 511.52

T.B.M	12.84	524.36		511.52
9+76			9.9	514.5
9+80			10.7	513.7
9+88			9.7	514.7
9+95			7.7	516.7
9+96			2.9	521.5
10+00			0.3	524.1
TR	11.96	535.97	0.35	524.01
10+08			9.3	525.7
10+09			7.5	528.5
10+12			6.0	530.0
10+15			3.6	532.4
10+17			3.2	532.8
10+21			0.0	536.0
TR	12.81	548.38	0.40	535.57
10+25			10.8	537.6
10+30			9.8	538.6

548.38

T	10+33	7.9	540.5
	10+43	6.6	541.8
9	10+44	5.4	543.0
9		3.95	544.2
9	10+53	4.9	543.5
0	10+60	4.7	543.7
	+70	3.0	545.4
1	+80	1.6	546.8
	10+88	0.2	548.2
1	TP	13.01	561.14
		0.25	548.13
	11+00	10.5	550.6
	11+10	10.4	550.7
	11+20	10.0	551.1
	11+30	6.4	554.7
	+35	4.2	556.9
	+38	3.6	557.5
	11+40	4.1	557.0

marked 544.42

561.14 ✓

11+47			4.1	557.0 ✓
+50			2.7	558.4 ✓
+54			1.8	559.3 ✓
+56			0.8	560.3 ✓
TP	13.07	573.67 ✓	0.54 0.54	560.60 ✓
11+62			11.1	562.6 ✓
+67			11.1	562.6 ✓
+70			9.7	564.0 ✓
+74			8.5	565.2 ✓
+76			4.8	568.9 ✓
+78			3.1	570.6 ✓
11+81			0.3	573.4 ✓
π	13.01	586.66 ✓	0.02	573.65 ✓
11+82			12.9	573.8 ✓
11+86			8.2	578.5 ✓
11+93			2.0	584.7 ✓
11+97			0.3	586.4 ✓

586.66 ✓

5.49 + .17 581.17 ✓ Marked 581.14

T.B.M. 13.01 594.15 ✓ 581.14

11+99 7.3 586.8 ✓

12+01 2.4 591.7 ✓

12+04 1.5 592.6 ✓

TP 7.51 601.00 ✓ 0.66 593.74 ✓

12+05 6.6 594.4 ✓

12+09 3.2 597.8 ✓

12+10 0.6 600.4 ✓

TP 12.58 612.72 ✓ 0.86 600.44 ✓

12+13 10.9 601.3 ✓

+16 7.8 604.9 ✓

+19 6.2 606.3 ✓

+20 2.6 610.1 ✓

12+24 1.2 611.5 ✓

T.B.M. 13.05 624.65 ✓ +12 1.12 611.60 ✓ Marked 611.60

12+25 9.4 615.2 ✓

624.65

12+30			8.3		616.3
12+32			6.0		618.3
+36			6.0		618.6
+40			4.0		620.6
+41			1.2		623.4
+46			0.1		624.5
TP	12.48	636.66	0.5	0.47	624.18
12+54			6.6		630.1
12+63			3.7		633.0
TP	11.85	648.01	0.5	0.50	636.16
12+70			8.3		639.7
+74			5.1		642.9
+78			4.7		643.3
TP	12.97	660.82		0.16	647.85
12+80			10.4		650.7
12+85			4.2		656.6
12+90			0.2		660.6

660.82 ✓

P

7.92

665.22 ✓

3.52

657.30 ✓

T.B.M. #A-31

2.13

663.09 ✓

Marked 663.16 check for corrected elev.

FINAL X-SECTION BIK # 12

Rogers

32

June 19-42

6.39 468.23

461.81

8+59⁵

Copied in book

F.B. No. 651

Page 47

905

10.8

875

12.4

805

8+63⁵

905

9.2

875

9.7

825

8.9

805

8.9

705

9.3

745

9.7

605

9.5

585

10.0

505

9.7

415

7.6

405

5.8

FINAL X SECTION BIK#12

June 19-42

46823

84735

405

6.1

Copied in book

505

6.8

F.B. No 651

535

8.1

Page 48

595
605

6.4

605

9.3

705

6.2

805

5.7

905

5.4

945

4.4

985

6.2

6.39

461.84

Aug 67

PROFILE FILLET LINE 9+ 7925

	0.10	481.67		481.57
9+25			0.0	481.7
+19			3.2	478.5
+11			6.7	475.0
+01			7.8	473.9
8+94			10.4	471.3
8+81			10.3	471.4
+68			12.1	469.6

Start ϕ BIT 13

Check ϕ BIT 15

" ϕ BIT 18

" ϕ BIT 20

	OFFSET U				
Elev	0	1	2	3	4
650	2.20				
640	2.70	2.65	2.60	2.55	2.
630	3.20	3.15	3.10	3.05	3.
620	4.43	3.65	3.60	3.55	3.
610	4.93	4.88	4.83	4.78	4.
600	5.43	5.38	5.33	5.28	5.
590	6.44	6.34	6.24	6.14	5.
580	7.44	7.34	7.24	7.14	7.
570	9.18	8.34	8.24	8.14	8.
560	10.18	10.08	9.98	9.88	9.
550	11.18	11.08	10.98	10.88	10.
540	12.18	12.08	11.98	11.88	11.
530	13.18	13.08	12.98	12.88	12.
520	15.06	14.08	13.98	13.88	13.
510	16.06	15.96	15.86	15.76	15.
500	17.06	16.96	16.86	16.76	16.
490	18.06	17.96	17.86	17.76	17.
480	19.06	18.96	18.86	18.76	18.
470	20.65	19.96	19.86	19.76	19.
460	21.65	21.55	21.45	21.35	21.

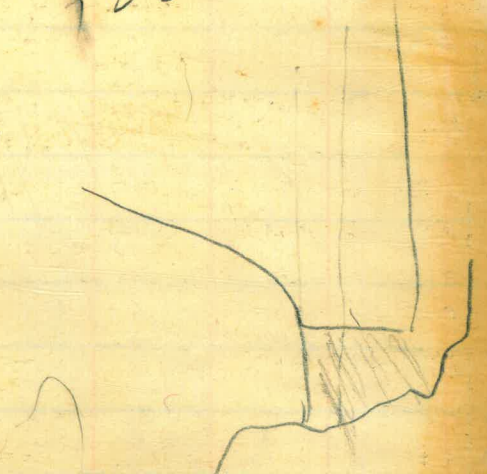
Start E BIT 13

Check E BIT 15

STREAM

	5	6	7	8	9
50	2.20	2.20	2.20	2.20	2.20
00	2.95	2.90	2.85	2.80	2.75
00	3.45	3.40	3.35	3.30	3.25
33	4.68	4.63	4.58	4.53	4.48
33	5.18	5.13	5.08	5.03	4.98
33	5.68	5.63	5.58	5.53	5.48
44	6.94	6.84	6.74	6.64	6.54
44	7.94	7.84	7.74	7.64	7.54
88	9.68	9.58	9.48	9.38	9.28
88	10.68	10.58	10.48	10.38	10.28
88	11.68	11.58	11.48	11.38	11.28
88	12.68	12.58	12.48	12.38	12.28
88	13.68	13.58	13.48	13.38	13.28
66	15.56	15.46	15.36	15.26	15.16
66	16.56	16.46	16.36	16.26	16.16
66	17.56	17.46	17.36	17.26	17.16
66	18.56	18.46	18.36	18.26	18.16
66	19.56	19.46	19.36	19.26	19.16
55	21.15	21.05	20.95	20.85	20.75

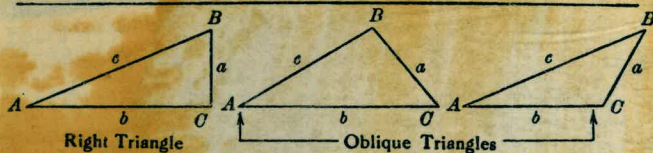
76840
605
235



482.4
475
487.15

605-8707
175

TRIGONOMETRIC FORMULÆ



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

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

Solution of Oblique Triangles

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

REDUCTION TO HORIZONTAL



Horizontal distance = Slope distance multiplied by the cosine of the vertical angle. Thus: slope distance = 318.4 ft. Vert. angle = $5^\circ 10'$. From Table, Page IX. $\cos 5^\circ 10' = .9959$. Horizontal distance = $318.4 \times .9959 = 318.06$ ft. Horizontal distance also = Slope distance minus slope distance times (1 - cosine of vertical angle). With the same figures as in the preceding example, the following result is obtained. $\text{Cosine } 5^\circ 10' = .9959$. $1 - .9959 = .0041$. $318.4 \times .0041 = 1.31$. $318.4 - 1.31 = 318.09$ ft. When the rise is known, the horizontal distance is approximately: — the slope distance less the square of the rise divided by twice the slope distance. Thus: rise = 14 ft. slope distance = 302.6 ft. Horizontal distance = $302.6 - \frac{14 \times 14}{2 \times 302.6} = 302.6 - 0.32 = 302.28$ ft.