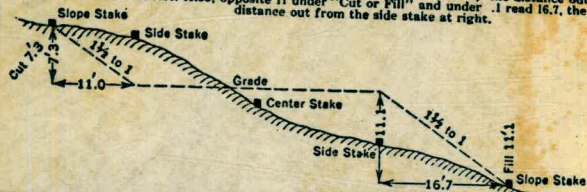


W

620

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

10,892-3. km, cc, ys. cM.

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JAN 13 1965

This paper, in this book No. F-370A
 is made of 50% high grade rag stock
 with a WATER RESISTING surface sizing.

Index

Title	Pg.
Cross Sections for Feb. Est.	①
Cross Sections for Mar. Est.	28

CROSS SECTION NOTES FOR

FEBRUARY MONTHLY EST.

FEB 27 ①

π DICKINSON

▣ Lovell

⊕ KING

BM.	0.74	462.58 ✓	461.84
	6+	97.5	
40N	1.9		460.5 ✓
30N	5.7		56.9 ✓
20N	6.4		56.2 ✓
10N	6.1		56.5 ✓
0	6.6		56.0 ✓
10S	5.7		56.9 ✓
20S	5.8		56.8 ✓
30S	6.4		56.2 ✓
40S	7.7		54.9 ✓
50S	8.0		54.6 ✓
60S	8.0		54.6 ✓
70S	8.3		54.3 ✓
80S	8.0		54.6 ✓
90S	7.5		55.1 ✓
100S	6.4		456.2 ✓

Monthly Est cont

2-27-42

②

462.58

6+97.5

1105	2.2	460.4
1205	3.4	59.2
1305	3.2	59.4
1405	4.6	58.0
1505	2.6	60.0
1605	0.5	62.1
1705	1.5	61.1
1805	4.0	58.6

7+07.5

1805	0.5	61.1 62.1
1705	2.0	60.6
1605	1.2	61.4
1505	3.7	58.9
1405	4.4	458.2

Monthly Est. (Cont.)

2-27-42

(3)

	46258	
	7+075	
130S	6.5	456.1
120S	7.5	55.1
110S	7.9	54.7
100S	7.4	55.2
90S	7.7	54.9
80S	8.5	54.1
70S	8.6	54.0
60S	8.4	54.2
50S	8.1	54.5
40S	7.3	55.3
30S	6.5	56.1
20S	5.5	57.1
10S	5.8	56.8
0	6.2	456.4

Monthly Est. (Cont)

2-27-42

(4)

462.58

7+0.75

10N	6.4	456.2
20N	6.3	56.3
30N	6.1	56.5
40N	0.0	62.6
	7+14	
40N	+1.0	63.6
30N	5.6	57.0
20N	6.1	56.5
10N	5.3	57.3
0H	6.0	56.6
10S	6.2	56.4
20S	5.6	57.0
30S	6.6	56.0
40S	7.4	465.2

Monthly Est. (Cont.)

2-27-42

(5)

	462.58	
	7+14	
505	7.6	455.0
605	8.4	54.2
705	8.2	54.4
805	7.9	54.8
905	7.5	55.1
1005	7.5	55.1
1105	8.3	54.3
1205	8.7	53.9
1305	8.7	53.9
1405	7.4	55.2
1505	6.1	56.5
1605	4.9	57.7
1705	4.2	58.4
1805	3.2	459.8

Monthly Est. (cont.)

2-27-42

(6)

462.58

7+2.4

1805	4.3	458.3
1705	4.4	58.2
1605	6.9	55.7
1505	8.7	53.9
1405	8.8	53.8
1305	8.8	53.8
1205	8.7	53.9
1105	7.9	54.7
1005	7.4	55.2
905	7.7	54.9
805	7.9	54.7
705	7.7	54.9
605	7.5	55.1
505	7.4	455.2

Monthly Est. (cont.)

2-27-42

(7)

	462.58	
	7+24	
40S	7.4	455.2
30S	7.1	55.5
20S	7.1	55.5
10S	7.6	55.0
0	5.3	57.3
10N	6.1	56.5
20N	6.0	56.6
30N	5.3	57.3
40N	72.0	64.6
	7+34	
	13.0	
	72.0	
40N		65.6
30N	5.3	57.3
20N	6.2	56.4
10N	6.2	456.4

Monthly Est (Cont.)

462.58

7+34

0	6.1	456.5
100	8.4	54.7
200	8.5	54.1
300	7.6	55.0
400	8.3	54.3
500	8.0	54.6
600	7.3	55.3
700	7.9	54.7
800	8.1	54.5
900	8.1	54.5
1000	7.9	54.7
1100	8.2	54.4
1200	8.4	54.2
1300	8.8	453.8

Monthly Est. Cont.

9

462.58

7+34

140S 8.8 453.8

150S 8.8 453.8

160S 8.8 453.8

170S 8.0 454.6

180S 7.6 455.0

7+44

180S 8.3 454.3

170S 8.3 454.3

190S 8.3 454.3

160S 9.1 453.5

150S 8.3 454.3

140S 8.6 454.0

130S 8.5 454.1

120S 8.0 454.6

110S 7.9 454.7

Monthly Est. (Cont)

(10)

462.58

7+44

100S	7.8	454.8
90S	8.3	454.3
80S	7.8	454.8
70S	7.9	454.7
60S	9.0	453.6
50S	8.5	454.1
40S	8.5	454.1
30S	7.6	455.0
20S	8.2	454.4
10S	7.0	455.6
0	7.2	455.4
10N	6.6	456.0
20N	7.6	455.0
30N	5.4	457.2
40N	3.2	459.4

Monthly Est (Cont.)

(11)

462.58

7754

40N	3.6	459.0
30N	5.4	457.2
20N	6.8	455.8
10N	7.9	454.7
0	7.3	455.3
10S	6.5	456.1
20S	6.4	456.2
30S	9.3	453.3
40S	7.9	454.7
50S	9.0	453.6
60S	9.5	453.1
70S	9.5	453.1
80S	9.2	453.4
90S	9.0	453.6

Monthly Est. (cont.)

(12)

462.58

7+54

1005 7.6 455.0

1105 7.9 454.7

1205 7.8 454.8

1305 7.9 454.7

1405 8.0 454.6

1505 8.4 454.2

1605 8.8 453.8

1705 9.0 453.6

1805 8.6 454.0

7+60.5

1805 8.1 454.5

1705 8.5 454.1

1605 8.0 454.6

1505 7.6 455.0

Monthly Est. (Cont.)

(13)

462.58

7+60.5

140s	7.4	455.2'
130s	7.8	454.8'
120s	7.4	455.2'
110s	7.5	455.1'
100s	8.0	454.6'
90s	9.7	452.9'
80s	10.4	452.2'
70s	10.5	452.1'
60s	9.9	452.7'
50s	9.0	453.6'
40s	7.2	455.4'
30s	10.9	451.7'
20s	10.1	452.5'
10s	8.9	453.7'

Monthly Est. (Cont.)

462.58

7+60.5

0	7.1	455.5
10N	6.5	456.1
20N	5.7	456.9
30N	6.2	456.4
40N	4.0	458.6
	7+70.5	
40N	9.9	457.7
30N	4.8	457.8
20N	6.2	456.4
10N	7.7	454.9
0	9.1	453.5
10S	9.0	453.6
20S	10.9	451.7
30S	8.5	454.1

Monthly Est. (Cont.)

(15)

462.58

7+70.5

40S	6.5	456.1
50S		
30S	7.6	455.0
80S	9.3	453.2 ³
70S	10.5	452.1
80S	10.4	452.2
90S	10.5	452.1
100S	11.4	451.2
110S	12.6	450.0
120S	11.7	450.9
130S	9.6	453.0
140S	7.8	454.8
150S	7.5	455.1
160S	7.5	455.1
170S	7.7	454.9
180S	7.0	455.6

Monthly Est. (Cont.)

(16)

462.58

7780.5

1805	6.6	456.0
1705	7.2	453.4
1605	7.7	454.9
1505	9.4	453.2
1405	10.8	451.8
1305	12.3	450.3
1205	12.3	450.3
1105	12.2	450.4
1005	10.8	451.8
905	10.7	451.2
805	11.6	451.0
705	13.0	449.2
605	11.9	450.2
505	8.4	454.2

Monthly Est (Cont)

462.58

7780.5

40S 10.0 452.6

30S 10.3 452.3

20S 9.9 452.7

10S 9.0 453.6

0 8.6 454.0

10N 12.1 450.5

20N 11.7 450.9

30N 9.1 453.5

40N 7.3 455.3

7790.5

40N 5.5 457.1

30N 9.8 452.8

20N 11.7 450.9

10N 11.7 450.9

Monthly Est. (Cont.)

(18)

462.58

7490.5

0	11.3	451.3
105	9.4	453.2
205	9.4	453.2
305	10.8	451.8
405	11.2	451.4
505	13.0	449.6
605	13.0	449.6
705	13.0	449.6
805	13.0	449.6
905	11.8	450.8
1005	11.5	451.1
1105	12.2	450.4
1205	11.6	451.0
1305	11.0	451.6

Monthly Est (cont.)

(19)

462.58

7+90.5

140S 11.0 451.6

150S 9.9 452.7

160S 8.5 454.1

170S 7.1 455.6

180S 6.6 456.8

8+00.5

180S 6.6 456.0

170S 7.6 455.0

160S 8.4 454.2

150S 10.0 452.6

140S 11.1 451.5

130S 10.5 452.1

120S 10.9 451.7

110S 11.1 451.5

Monthly Est. (Cont.)

(20)

462.58

8+00.5

100S	12.5	450.1
90S	13.4	449.2
80S	13.4	449.2
70S	13.4	449.2
60S	13.4	449.2
50S	11.1	451.5
40S	10.2	452.4
30S	9.2	453.4
20S	9.4	453.2
10S	9.4	453.2
0	10.9	451.7
10N	11.2	451.4
20N	10.3	452.3
30N	5.8	456.8
40N	+2.0	464.6

Monthly Est. (Cont.)

	462.58	
	8707.8	
	11.0	
40N	12.0	463.6 ✓
30N	1.1	461.5 ✓
20N	6.0	456.6 ✓
10N	8.4	454.2 ✓
0	11.0	451.6 ✓
10 ^S	10.2	452.4 ✓
20S	9.4	453.2 ✓
30S	9.0	453.6 ✓
40S	9.2	453.4 ✓
50S	9.2	453.4 ✓
60S	12.6	450.0 ✓
70S	12.6	450.0 ✓
80S	12.6	450.0 ✓
90S	11.8	450.8 ✓
		451.8

Monthly Est (Cont.)

(22)

462.58

8+0.7

100s 11.3 451.3

110s 10.6 452.0

120s 10.6 452.0

130s 10.4 452.2

140s 11.0 451.6

150s 9.8 452.8

160s 8.1 454.5

170s 7.4 455.2

180s 6.8 455.8

8+1.7

180s 6.6 456.0

170s 7.6 455.0

160s 8.2 454.4

150s 8.7 453.9

Monthly Est. (Cont.)

(23)

	462.58 [✓]	
	8417	
1405	8.8	453.8 [✓]
1305	9.6	453.0 [✓]
1205	10.2	452.4 [✓]
1105	10.4	452.2 [✓]
1005	10.5	452.1 [✓]
905	10.9	451.7 [✓]
805	10.2	452.4 [✓]
705	11.7	450.9 [✓]
605	9.1	453.5 [✓]
505	9.2	453.4 [✓]
405	9.4	453.2 [✓]
305	9.3	453.3 [✓]
205	9.4	453.2 [✓]
105	9.4	453.2 [✓]

Monthly Est. (Cont.)

(24)

	462.58	
	8+17	
0	8.7	453.9 454.9
10N	8.4	454.2
20N	5.5	457.1
30N	1.3	461.3
	8+27	
30N	2.5	460.1
20N	5.1	457.5
10N	6.1	456.5
0	5.3	457.3
10S	7.8	454.8
20S	8.5	454.1
30S	8.8	453.8
40S	9.1	453.5
50S	9.3	453.3

Monthly Est. (C)

(25)

462.58

8427

60S	8.9	453.7
70S	8.7	453.9
80S	8.8	453.8
90S	9.3	453.3
100S	9.3	453.3
110S	9.9	452.7
120S	9.8	452.8
130S	9.3	453.3
140S	8.7	453.9
150S	8.3	454.3
160S	8.0	454.6
170S	7.1	455.5
180S	5.7	456.9

Monthly Est. (Cont.)

(26)

462.58

843.7

180s	1.7	460.9
170s	6.5	456.1
160s	7.2	453.4
150s	8.2	454.4
140s	8.2	454.4
130s	9.2	453.4
120s	9.4	453.2
110s	9.1	453.5
100s	8.5	454.1
90s	7.8	454.8
80s	7.8	454.8
70s	8.2	454.4
60s	8.4	454.2
50	8.8	453.8

Cross Section Notes For Monthly Est.

2-27-42

(27)

462.58

8+37

40S

8.6

454.0

30S

7.9

454.7

20S

7.3

455.3

10S

6.6

456.0

0

4.9

457.7

10N

3.0

459.6

20N

1.5

461.1

30N

1.0

461.6

BS HI FS

Elev Recorded elev

462.58

469.

8.58 469.66 1.50

461.08

0.19

469.47

Monthly Est

477

4-2-42
 Rodgers
 Lovell
 Cole

28

Sta BS HI FS Elev

Sta B.S. H.I. FS Elev

LEVEL #1

Level #2

TBM	2.06	463.90		461.84
8+37 10N		4.8		459.1
AXIS 8+70		7.70		456.2
AXIS 8+37		7.6		456.3
10S		9.0		454.9
20S		10.0		453.9
30S		11.9		452.0
40S		11.6		452.3
50S		14.1		449.8
<u>8+47</u>				
165S		8.1		455.8
160S		10.2		452.7
150S		13.0		450.9
140S		13.3		450.6
130S		9.3		454.6

6.50	455.85		449.35
8+37 60S		3.8	452.1
70S		6.2	449.7
80S		5.6	450.3
90S		5.0	450.9
100S		5.0	450.9
110S		5.3	450.6
120S		3.2	452.7
130S		5.5	450.4
140S		5.7	450.2
150S		7.2	448.7
160S		5.2	450.7
170S		1.3	454.6

Monthly Est.

4-2-42

29

Sta	BS	HI #1	FS	Elev.
<u>8+47</u>		463.90		
1205			11.1	452.8
1105			10.0	453.9
1005			9.9	454.0
905			11.8	452.1
805			10.1	453.8
705			9.9	454.0
605			8.7	45 ⁵ 2.2
505			9.5	454.4
405			11.4	452.5
305			8.7	455.2
205			6.5	457.4
105			6.7	457.2
0			4.1	459.8

Sta	BS	HI #2	FS	Elev.
		455.85		

4-2-42

30

Monthly Est

Sta	BS	HI	FS	Flev	Sta	BS	HI	FS	Flev
		#1					#2		
<u>8453.5</u>		463.90				455.85			
105			3.5	460.4					
205			5.3	458.6					
305			8.8	455.1					
405			6.4	457.5					
505			7.5	456.4					
605			6.0	457.9					
705			7.1	456.8					
805			7.2	456.7					
905			9.0	454.9					
1005			6.6	457.3					
1105			6.3	457.6					
1205			8.5	455.4					
1305			8.2	455.7					
1405			11.2	452.7					

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31

Monthly Est

Sta	BS	FS #1	FS	Elev
-----	----	------------------	----	------

8+53.5

463.90

1505

11.8

452.1

1605

7.5

456.4

8+27

7
1605

9.6

454.3

1605

7.0

456.9

Sta	BS	HL	FS	Elev.
-----	----	----	----	-------

455.85

8+27

1505

1405

1305

1205

1105

1005

905

805

705

605

505

405

305

7.3

7.0

5.4

4.3

6.9

5.4

8.7

6.9

7.2

8.7

8.0

7.2

9.7

9.3

7.2

7.6

7.6

6.0

6.0

5.2

5.2

3.1

448.6

450.5

449.0

447.2

448.7

447.9

446.2

446.6

448.7

448.3

449.9

450.7

452.8

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32

Monthly Est

Sta	BS	HI #1	FS	Elev	Sta	BS	HI #2	FS	Elev
<u>8+27</u>		463.90			<u>8+27</u>		455.85		
205			3.1		205			3.1	452.8
105			0.8		105			0.8	455.1
0			7.4	456.5	<u>8+17</u>				
10N			10.4	453.5	20N			2.8	453.1
20N			5.8	458.1	10N			2.9	453.0
<u>8+17</u>					0			2.6	453.3
25N			4.6	459.3	105			3.0	452.9
					205			6.0	449.9
					305			4.7	451.2
					405			5.7	450.2
					505			6.7	449.2
					605			9.0	446.9
					705			10.6	445.3
					80			10.0	445.9

Monthly Est

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33

Sta. BS HI FS Elev
#1

Sta BS HI FS Elev
#2

8+17

455.85

90s

10.8

445.1

100s

10.0

445.9

110s

10.6

445.3

120s

11.9

444.0

130s

9.9

446.0

140s

8.9

447.0

150s

9.6

446.3

160s

10.3

445.6

170s

11.4

444.5

180s

0.0

455.9

8+07

180s

0.0

455.9

170s

13.9

442.0

160s

13.3

442.6

Monthly Est

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34

Sta	BS	HI	FS	Elev	Sta	BS	HI	FS	Elev
		#1					#2		
					<u>8+07</u>		455.85		
					1505		12.5		443.4
					1405		12.0		443.9
					1305		12.0		443.9
					1205		13.2		442.7
					1105		13.5		442.4
					1005		12.7		443.2
					905		12.9		443.0
					805		11.4		444.5
					705		9.7		446.2
					605		9.4		446.5
					505		8.9		447.0
					405		8.2		447.7
					305		6.3		449.6
					205		5.9		450.0

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35

Monthly Est

Sta	BS	HI #1	FS	Elev.	Sta	BS	HI #2	FS	Elev.
<u>8+07</u>		463.90			<u>8+07</u>		455.85		
30N			4.3	459.6	10S			9.5	451.4
<u>8+00.5</u>					0			7.5	448.4
40N			+0.2	464.1	10N			6.4	449.5
30N			7.2	456.7	20N			6.1	449.8
					<u>8+00.5</u>				
					20N			11.1	444.8
					10N			8.8	447.1
					0			9.1	446.8
					10S			7.1	448.8
					20S			8.4	447.5
					30S			9.4	446.5
					40S			9.1	446.8
					50S			8.7	447.2
					60S			9.7	446.2

Monthly Est.

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36

Sta	BS	HI #1	FS	Elev.
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Sta	BS	HI #2	FS	Elev.
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8+00.5

455.85

705			10.3	445.6
-----	--	--	------	-------

805			12.1	443.8
-----	--	--	------	-------

905			12.9	443.0
-----	--	--	------	-------

1005			12.8	443.1
------	--	--	------	-------

1105			12.8	443.1
------	--	--	------	-------

1205			13.5	442.4
------	--	--	------	-------

1305			13.3	442.6
------	--	--	------	-------

1405			13.6	442.3
------	--	--	------	-------

1505			14.6	441.3
------	--	--	------	-------

1605			15.1	440.8
------	--	--	------	-------

1705			13.2	442.7
------	--	--	------	-------

1805			6.6	449.3
------	--	--	-----	-------

1905			+0.5	
1905			+0.5	456.4

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37

Monthly Est.

sta.	BS	HI	FS	Elev	sta	Dist	HI	FS	Elev.
		#1					#2		
				<u>7490.5</u>			455.85		
				1905			10.4		456.3 ✓
				1805			6.3		449.6 ✓
				1705			13.8		442.1 ✓
				1605			15.5		440.4 ✓
				1505			14.2		441.7 ✓
				1405			13.7		442.2 ✓
				1305			14.3		441.6 ✓
				1205			14.1		441.8 ✓
				1105			13.2		442.7 ✓
				1005			14.6		441.3 ✓
				905			14.7		441.2 ✓
				805			13.0		442.9 ✓
				705			12.6		443.3 ✓
				605			12.8		443.1 ✓

Monthly Est.

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38

Sta	BS	HI	FS	Elev	Sta	BS	HI	FS	Elev.
		#1					#2		
<u>790.5</u>		463.90			<u>790.5</u>		455.85		
50N		+0.5		464.4	50S		12.2		443.7
		1.4			10S		12.4		443.5
<u>7780.5</u>					30S		12.2		443.7
50N		+1.4		465.3	20S		11.9		444.0
40N		6.5		457.4	10S		12.8		443.1
					0		12.4		443.5
					10N		12.8		443.1
					20N		12.5		443.4
					30N		3.5		452.4
					40N		4.0		451.9
					50N		10.8		
					<u>7780.5</u>				
					30N		5.4		450.5
					20N		12.3		443.6

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Sta	BS	HI #1	FS	Elev.	Sta	BS	HI #2	FS	Elev
					<u>7+80.5</u>		455.85		
					10N			13.5	442.4 ✓
					0			13.6	442.3 ✓
					10S			14.0	441.9 ✓
					20S			11.1	444.8 ✓
					30S			11.1	444.8 ✓
					40S			12.2	443.7 ✓
					50S			13.0	442.9 ✓
					60S			15.0	440.9 ✓
					70S			15.7	440.2 ✓
					80S			16.0	439.9 ✓
					90S			13.2	442.7 ✓
					100S			13.1	442.8 ✓
					110S			12.7	443.2 ✓
					120S			14.3	441.6 ✓

Sta	BS	HI	FS	Elev	Sta	BS	HI	FS	Elev
		#1					#2		
					<u>770.5</u>		<u>455.85</u>		
770.5		463.90			130S			15.0	440.9
55N			+4.0	467.9	140S			14.8	441.1
50N			1.3	465.7	150S			14.7	441.2
40N			7.8	471.7	160S			14.7	441.2
			5.8		170S			11.1	444.8
					180S			6.2	449.7
					190S			10.2	456.1
					<u>770.5</u>				
					30N			5.8	450.1
					20N			14.1	441.8
					10N			14.0	441.9
					0			13.6	442.3
					10S			13.3	442.6
					20S			12.8	443.1
					<u>30S</u>			12.4	443.5
					17.4				

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41

Sta	BS	HI #1	FS	Elev	Sta	BS	HI #2	FS	Elev
					<u>7+70.5</u>		455.85		
					405			13.6	442.3
					505			14.7	441.2
					605			15.4	440.5
					705			15.4	440.5
					805			16.0	439.9
					905			16.3	439.6
					1005			15.7	440.2
					1105			15.4	440.5
					1205			14.4	441.5
					1305			11.9	444.0
					1405			10.7	445.2
					1505			10.0	445.9
					1605			6.4	449.5
					1705			1.6	454.3

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42

Sta	BS	HI	FS	Elev.	Sta	BS	#2 HI	FS	Elev
				<u>7460.5</u>			455.85		
				1705				1.9	453.0 54.0
				1605				8.5	447.4 ✓
				1505				10.1	445.8 ✓
				1405				10.2	445.7 ✓
				1305				10.2	445.7 ✓
				1205				10.7	445.2 ✓
				1105				12.2	443.7 ✓
				1005				13.6	442.3 ✓
				905				15.5	440.4 ✓
				805				13.7	442.2 ✓
				705				12.4	443.5 ✓
				605				11.8	444.1 ✓
				505				14.8	441.1 ✓
				405				15.2	440.7 ✓
				305				15.3	440.6 ✓

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43

Sta	BS	HI	FS	Elev	Sta	BS	HI	FS	Elev
		#1					#2		
<u>7+60.5</u>		463.90			<u>7+60.5</u>				
40N			5.6	458.3	20S	455.85		14.9	441.0
50N			+3.1	467.0	10S			14.2	441.7
60N			+7.0	470.9	0			13.7	442.2
<u>7+54</u>					10N			12.8	443.1
53N			+7.0	470.9	20N			13.7	442.2
50N			+4.8	468.7	30N			4.5	451.4
40N			3.8	460.1	TBM	11.15	455.79	6.50	449.35
30N					<u>7+54</u>				449.59
					30N			5.0	450.7
					20N			14.3	441.4
					10N			14.0	441.7
					0			13.0	442.7
					10S			13.2	442.5
					20S			13.2	441.4
					30S			14.3	441.2
								12.5	441.8
								14.4	441.8

use crossed
out values →

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#2

Sta	BS	HI #1	FS	Elev.	Sta	BS	HI #2	FS	Elev.
					<u>754</u>		455.74		
					405		12.8 ⁷		442.9 ✓
					505		13.8 ^{12.5}		443.2 ✓
					605		12.1 ^{11.3}		444.4 ✓
					705		13.0 ^{12.0}		443.7 ✓
					805		11.7+12.6 ¹²		442.1 ✓
					905		11.6 ^{12.5}		443.2 ✓
					1005		11.6 ^{11.4}		444.3 ✓
					1105		11.4		444.3 ✓
					1205		10.6 ^{11.4}		445.1 ^{44.3} ✓
					1305		10.3		445.4 ✓
					1405		10.3		445.4 ✓
					1505		10.9		444.8 ✓
					1605		8.4		447.3 ✓
					1705		3.3		452.4 ✓
					1805				

Use crossed out
values →

Turned back 2 pages
by mistake A.P.R.L.
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45

Sta	BS	HI #1	FS	Elev.	Sta	BS	HI #2	FS	Elev.
<u>7+34</u>		463.90			TBM	11.13	455.78		444.59 454
50N			13.7	467.6	<u>7+34</u>				
40N			5.4	458.5	30N			5.7	450.0
					20N			14.1	441.6
					10N			13.8	441.9
					0			13.2	442.7
					10S			13.2	442.5
					20S			13.2	442.5
					30S			12.5 12.7	443.2
					40S			12.7 13.8	443.0
					50S			13.8 12.1	441.9
					60S			12.1 12.9	443.6
					70S			13.0 11.7	442.7
					80S			7 11.8	444.0
					90S			11.8 6	444.1

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46

Sta	BS	HI	FS	Elev.	Sta	BS	HI	FS	Elev.
		#1					#2		
					<u>7434</u>		455.72		
					1005		10.6	11.6	444.1
					1105			11.4	444.3
					1205			10.6	445.1
					1305			10.4	445.3
					<u>1405</u>			10.4	
					1405			8.8	446.9
					1505			6.8	448.9
					1605			2.7	453.0
					<u>7444</u>				
					1605			4.5	451.2
					1505			8.7	447.0
					1405			9.9	445.8
					1305			9.9	445.8
					1205			10.6	445.1

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47

Sta	BS	HI #1	FS	Elev	sta	BS	HI #2	FS	Elev
					⁴ <u>7+74</u>		455.72		
					1105			11.4	444.3
					1005			11.9	443.8
					905			11.8	443.9
					805			13.5	442.2
					705			12.0	443.7
					605			11.8	443.9
					505			11.2	444.5
					405			11.4	444.3
					305			11.8	44 ³ 2 .9
					205			14.2	441.5
					105			13.2	442.5
					0			12.0	443.7
					10N			13.1	442.6
					20N			10.0	445.7

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48

Sta	BS	HI #1	FS	Elev	Sta	BS	HI #2	FS	Elev
<u>7+34</u> ⁴		463.90			<u>7+34</u> ⁴		455.72		
40N			6.3	457.6	30N			6.7	449.0
50N			+4.4	468.3					
					<u>7+24</u>				
<u>7+24</u>					30N			7.0	448.7
50N			41.7	465.6	20N			14.9	440.8
40N			4.8	459.1	10N			15.1	440.6
30N					0			14.0	441.7
					105			14.0	441.7
					205			14.0	441.7
					305			13.0	442.7
					405			13.6	442.1
					505			13.5	442.2
					605			13.5	442.2
					705			11.4	444.3

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49

Sta	BS	HI	FS	Elev.	Sta.	BS	HI	FS	Elev.
		#1					#2		
					<u>7+24</u>		455.72		
					805			11.7	444.0
					905			10.3	445.4
					1005			10.6	445.1
					1105			10.3	445.4
					1205			10.3	445.4
					1305			8.5	447.2
					1405			8.2	447.5
					1505			6.5	449.2
					1605			2.2	453.5
					<u>7+14</u>				
					1705			10.6	456.3
					1605			4.0	451.7
					1505			7.5	448.2
					1405			6.3	449.4

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50

Sta	BS	HI #1	Fs.	Elev.	Sta	BS	HI #2	Fs	Elev.
					<u>7714</u>		455.72		
					1305			7.0	448.7
					1285			10.3	445.4
					1105			9.7	446.0
					1005			10.5	445.2
					905			10.4	445.3
					805			11.6	444.1
					705			12.0	443.7
					605			11.7	444.0
					505			11.6	444.1
					405			12.3	443.4
					305			12.2	443.5
					205			13.2	442.5
					105			14.9	440.8
					0			13.9	441.8

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Sta	BS	HI #1	FS	Elev	Sta	BS	HI #2	F.S.	Elev
<u>7+14</u>		463.90			<u>7+14</u>		455.72		
40N			11.3	452.6	10N			15.3	440.4
50N			8.7	455.2	20N			15.3	440.4
<u>7+07.5</u>					30N			11.3	444.4
50N			11.5	452.4	<u>7+07.5</u>		6		
					40N			11.7	444.0
					30N			12.5	443.2
					20N			15.2	440.5
					10N			15.4	440.3
					0			14.9	440.8
					105			14.4	440.3
					205			12.6	443.1
					305			10.8	444.9
					405			11.0	444.7
					505			11.7	444.0

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53

sta	BS	HI	F.S.	Elev.	sta	BS	HI	F.S.	Elev.
		#1					#2		
					<u>6+97.5</u>				
					1705		3.7		452.0
					1605		7.5		448.2
					1505		8.0		447.7
					1405		9.2		446.5
					1305		10.4		445.3
					1205		10.9		444.8
					1105		10.1		445.6
					1005		10.5		445.2
					905		10.5		445.2
					805		10.5		445.2
					7805		10.6		445.1
					805		11.5		444.2
					605		11.5		
					505		11.6		444.1
					405		12.8		442.9

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Sta	BS	HI	FS	Elev.	sta	BS	HI	FS	Elev.
<u>6+97.5</u>		463.90			<u>6+97.5</u>		455.72		
40N			16.9	447.0	30S			12.6	443.1
50N			10.8	453.1	20S			12.4	443.3
<u>6+87.5</u>					10S			14.2	441.5
50N			5.3	458.6	0			14.0	441.7
40N			9.7	454.2	10N			13.7	442.0
					20N			15.8	439.9
					30N			14.6	441.1
					<u>6+87.5</u>				
					30N			10.6	445.1
					20N			14.7	441.0
					10N			12.5	443.2
					0			12.9	442.8
					10S			12.9	442.8
					20S			12.7	443.0

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55

Sta	BS	HI	FS	Elev.	Sta	BS	HI	FS	Elev.
	#1					#2			
					<u>6+87.5</u>		455.72		
					305		14.5		441.2
					405		11.1		444.6
					505		11.9		443.8
					605		11.1		448.6
					705		10.5		445.2
					805		10.2		445.5
					905		9.8		445.9
					1005		10.8		444.9
					1105		10.7		445.0
					1205		11.8		443.9
					1305		11.1		444.6
					1405		11.0		444.7
					1505		10.6		445.1
					1605		8.4		447.3

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Sta	BS	HI	FS	Elev	Sta	BS	HI	FS	Elev
	#1					#2			
<u>6+87.5</u>		463.90			<u>6+87.5</u>		455.72		
1805		3.50		460.4	1705		2.0		453.7
<u>6+77.5</u>					<u>6+77.5</u>				
1805		3.0		460.9	1705		1.8		453.9
					1605		7.7		448.0
					1505		10.1		445.6
					1405		11.7		444.0
					1305		12.2		443.5
					1205		12.4		443.3
					1105		12.1		443.6
					1005		12.4		443.3
					905		10.9		444.8
					805		10.9		444.8
					705		11.4		444.3

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sta	BS	HT	FS	Elev	sta	BS	HT	FS	Elev.
		#1	S#				#2	#	
					<u>6+67.5</u>		455.72		
		P.P			30N		7.3		448.4
		P.N			20N		14.8		440.9
		P.OI			10N		13.6		442.1
		P.O			0		12.7		443.0
		P.OI			10S		12.3		443.4
		P.O			20S		15.2		440.5
		P.OI			30S		13.6		442.1
		P.OI			40S		12.4		443.3
		P.OI			50S		11.8		443.9
		P.OI			60S		12.2		443.5
		P.O			70S		12.6		443.1
		P.O			80S		11.1		444.6
		P.O			90S		10.7		445.0
		P.O			100S		11.8		443.9

4-2-42

59

sta	BS	HI #1	FS	Elev	sta	BS	HI #2	FS	Elev
<u>6+67.5</u>		463.90			<u>6+67.5</u>		455.72		
1705			5.4	458.5	1105			11.4	444.3
1805			5.3	458.6	1205			10.4	445.3
					1305			11.1	444.6
					1405			10.6	445.1
					1505			9.3	446.4
					1605			5.1	450.6
					1705				

4-3-42
Only one level used 60

sta	BS	HI #1	FS	Elev	sta	BS	HI #2	FS	Elev
BS	7.40	451.99		444.59			451.99		
<u>6+61</u>			4.0		<u>6+61</u>				
30N			4.0	448.0	100S			6.0	446.0
20N			11.5	440.5	110S			5.7	446.3
10N			10.6	441.4	120S			5.7	446.3
0			10.3	441.7	130S			6.2	445.8
10S			11.2	440.8	140S			5.7	446.3
20S			12.1	439.9	150S			5.8	446.2
30S			9.9	442.1	160S			1.3	450.7
40S			8.7	443.3	170S			4.5	447.5
50S			9.1	442.9	<u>6+51</u>				
60S			9.0	443.0	180S			3.4	448.6
70S			8.6	443.4	150S			5.2	446.8
80S			8.0	444.0	140S			5.7	446.3
90S			6.6	445.4	130S			5.8	446.2

4-3-42

61

Sta	BS	HI	FS	Elev.	Sta	BS	HI	FS	Elev.
<u>6751</u>		#1 451.99			<u>6751</u>		#2 451.99		
1205			5.6	446.4	20N			9.7	442.3
1105			6.3	445.7	28N			9.4	442.6
1005			6.8	445.2	<u>6741</u>				
905			7.3	444.7	28N			8.7	443.3
805			7.3	444.7	20N			10.5	441.5
705			8.3	443.7	10N			9.6	442.4
605			10.3	441.7	0			9.8	442.2
505			8.2	443.8	105			8.7	443.3
405			9.0	443.0	205			9.8	442.2
305			9.1	442.9	305			9.4	442.6
205			9.1	442.9	405			8.8	443.2
105			10.3	441.7	505			9.4	442.6
0			10.4	441.6	605			8.9	443.1
10N			10.9	441.1	705			9.0	443.0

4-3-42

62

Sta.	BS	HI	FS	Elev.	Sta.	BS	HI	FS	Elev.
		#1					#2		
<u>6+41</u>		451.99			<u>6+31</u>		451.99		
805			7.9	444.1	7805			6.5	445.5
905			7.7	444.3	505			6.5	445.5
1005			6.5	445.5	5405			7.9	444.1
1105			4.4	447.6	4305			8.4	443.6
1205			4.8	447.2	3205			8.1	443.9
1305			4.0	448.0	205			7.5	444.5
1405			2.7	449.3	105			10.7	441.3
1505			1.9	450.1	0			8.6	443.4
⁵⁷ 1605			0.0	452.0	10N			9.2	442.8
³ <u>6+41</u>					20N			9.5	442.5
1405			3.7	448.3	26N			7.9	444.1
1005			3.8	448.2	⁶ <u>7+21</u>				
905			4.1	447.9	26N			8.5	443.5
805			4.6	447.4	20N			8.5	443.5

4-3-42

63

Sta	BS	HI #1	FS	Elev.	Sta	BS	HI #2	FS	Elev.
<u>6</u> <u>7+21</u>		451.99			<u>6</u> <u>7+11</u>		451.99		
10N			8.7	443.3	30S			2.8	449.2
0			6.1	445.9	20S			3.5	448.5
10S			5.9	446.1	10S			3.6	448.4
20S			4.8	447.2	0			4.6	447.4
30S			5.5	446.5	10N			7.2	444.8
40S			5.5	446.5	20N			7.5	444.5
50S			4.7	447.3	25N			6.1	445.9
60S			3.2	448.8	<u>6+01</u>				
70S			6.9	445.1	20N			3.8	448.2
80S			4.6	447.4	10N			2.7	449.3
90S					0			0.8	451.2
<u>6</u> <u>7+11</u>					<u>5</u> <u>10#</u>			2.3	449.7
50S			1.3	450.7	<u>5</u> <u>20#</u>			2.2	449.8
40S			2.4	449.6	30S				
					TBM			7.40	444.59

4-3-42

64

Sta	BS	HI #1	FS	Elev	Sta	BS	HI #2	FS	Elev
TBM	2.67	477.90		475.23	<u>6+31</u>		486.87		
¹⁹⁴³ 6+61			4.3	473.6	60N			3.9	483.0
⁶⁺⁵¹ ¹⁹⁴³ 6+41			4.2	473.7	⁶⁺²¹ 60N			0.2	486.7
¹⁸⁵⁵ 6+31			3.5	474.4	⁶⁺¹¹ 55N			0.0	486.9
¹⁷⁰⁵ TBM			3.0	474.9	⁶⁺¹¹ 60N			+2.4	489.3
		2.67		475.23	^{60N} 601			+6.8	493.7
	11.64	486.87	486.87	475.23	⁶⁺⁰¹ 50N			+2.6	489.5
6+61								11.64	475.23
53N			12.3	474.6					
40N			21.4	465.5					
6+51									
40N			21.4	465.5					
⁶ 60N			5.8	481.1					
⁶⁺⁴¹ 55N			6.4	480.5					
60N			9.8	482.1					

X-SECTION ROADWAY to 9+50

April 29-42

BM. 833 491.94 483.61

15 N Axis

8+72 14.6 477.3 W. edge of Roadway

+97 14.4 477.5 E " " "

9+15 12.8 479.1

9+28 8.6 483.3 Edge of loose Rock

9+30 6.4 485.5

9+40 0.9 491.0

Axis

8+82 14.8 477.1 W. edge of Roadway

9+00 15.0 476.9 E " " " 27

9+15 12.0 477.9

9+30 10.4 481.5 Edge of loose Rock

+34 3.4 488.5

25 S Axis

8+81 14.5 477.4 W. edge of Roadway

X-SECTION ROADWAY to 9+50

April 29-42

Rogers

66

491.94

25' S. Axis

9+10	15.0	476.9	E. edge of Roadway
9+15	14.0	477.9	
9+26	11.2	480.7	Edge of loose Rock
+34	3.6	488.3	

50' S. Axis

8+89	15.6	476.3	W. edge of Roadway
9+11	15.6	476.3	E. " " "
+15	14.9	477.0	
+30	9.6	482.3	Edge of loose Rock
+36	3.1	488.8	
+39	2.9	489.0	

75' S. Axis

8+91	16.0	475.9	W. Edge of Roadway
9+14	15.8	476.1	E. " " "

X-SECTION ROADWAY to 9+50

April 29-42

491.94

75' S Axis

9+28	12.7	479.2	End of loose Rock
+35	2.6	487.3	

100' S Axis

8+93	17.0	474.9	W edge of Roadway
9+17	16.0	475.9	E " " "
+32	9.8	482.1	
+34	8.8	483.1	End of Rock

125' S Axis

8+95	16.4	475.5	W edge of Roadway
9+18	15.7	476.1	E " " "
+33	10.9	481.0	
+41	9.0	482.9	End of loose Rock

151' S Axis

8+94	16.6	475.3	W edge of Roadway
9+18	15.8	476.1	E " " "

April 29-42

X-SECTION ROADWAY to 9+50

491.94

1519.5 Axis

9+27 14.0 477.9

+44 6.9 485.0 End of Loose Rock

T.P. 12.29 504.55 0.18 491.76

15' N. Axis

9+45 12.2 492.4

+47 10.0 494.6

+50 9.5 495.1

Axis

9+45 9.8 494.8

+50 3.7 500.9

25.5 Axis

9+39 10.0 494.6

+47 4.5 500.1

+50 0.7 503.9

Rogers 69
April 29-1942

X-SECTION ROADWAY to 9+50

504.55

50 S. Axis

9+41	9.7	494.9
9+50	5.0	499.6

75 S. Axis

9+45	10.2	494.6
+47	5.8	498.8
+50	4.4	500.2

100 S

9+50	5.4	499.2
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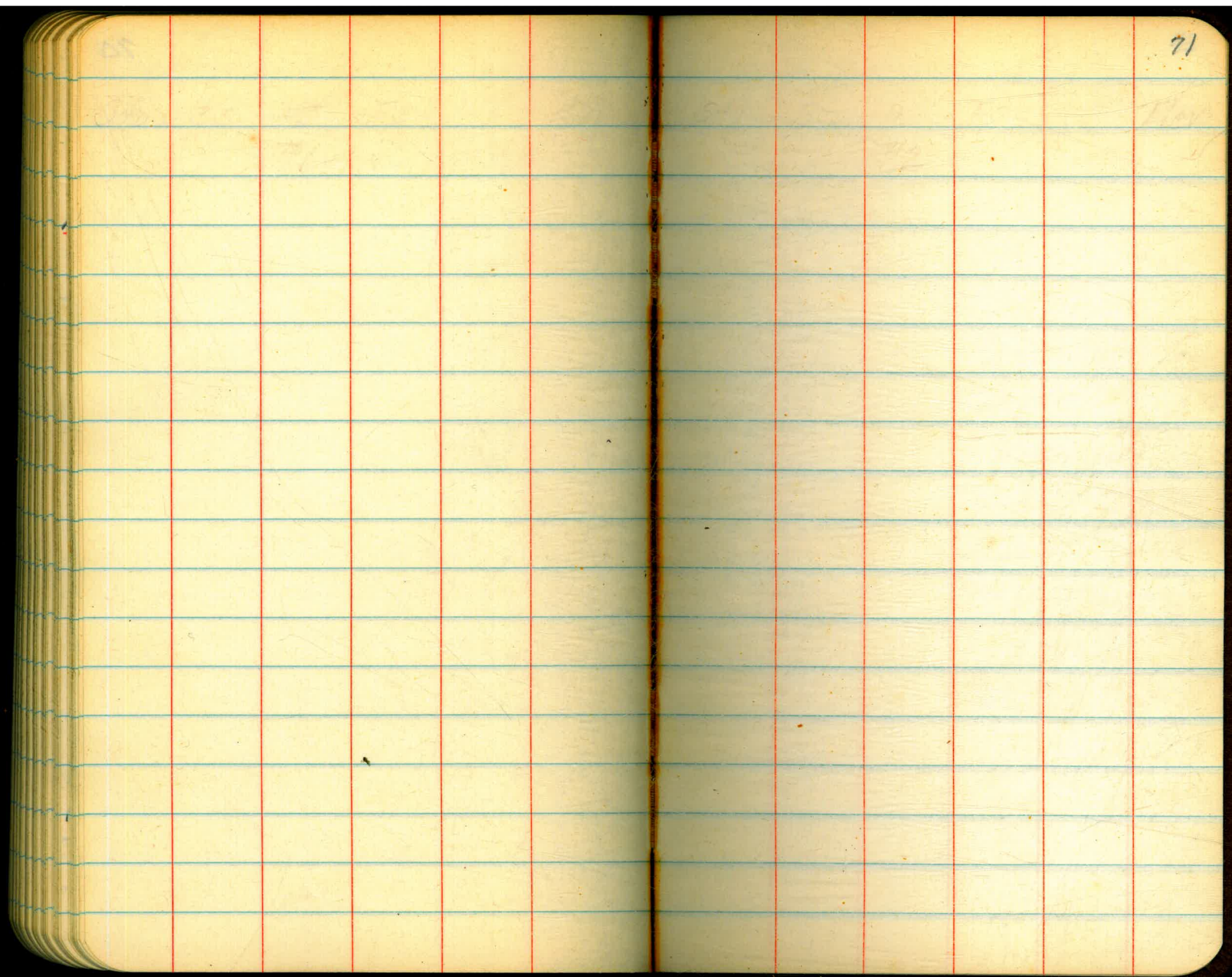
125 S

9+47	12.9	491.7
+50	7.4	497.2

150 S

9+50	86	496.0
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B.M.	1065	493.90	= 493.94
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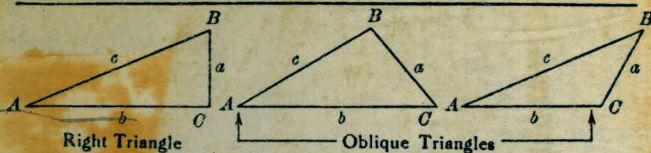
71

370

Sta BS HI FS Elev

78
Sta BS HI FS Elev

TRIGONOMETRIC FORMULÆ



Right Triangle

Oblique Triangles

Solution of Right Triangles

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

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	$\text{area} = \frac{bc \sin A}{2}$
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 = 319.4 ft. Vert. angle = $5^\circ 10'$. From Table, Page 1X, $\cos 5^\circ 10' = .9959$. Horizontal distance = $319.4 \times .9959 = 318.09$ 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. $\text{Cosine } 5^\circ 10' = .9959, 1 - .9959 = .0041$. $319.4 \times .0041 = 1.31$. $319.4 - 1.31 = 318.09$ 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.