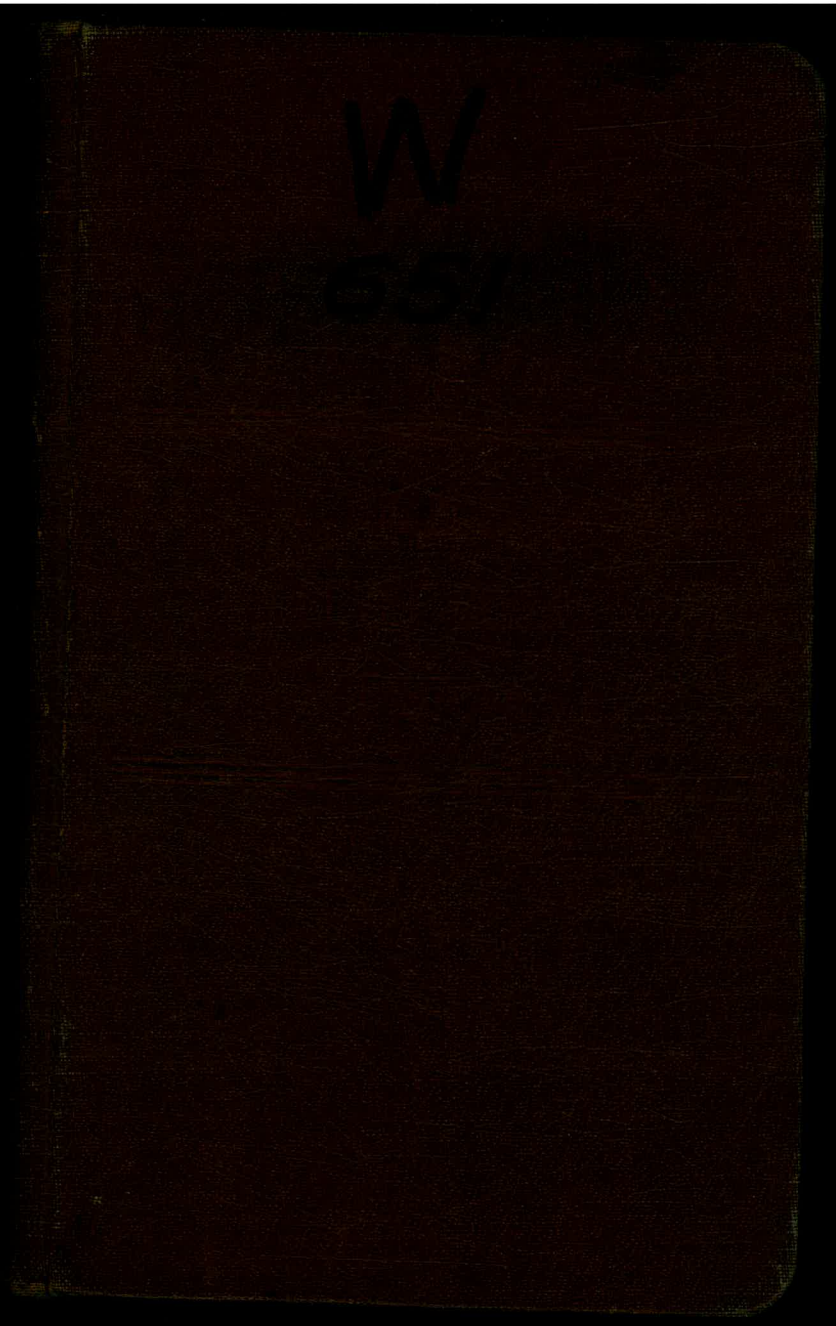
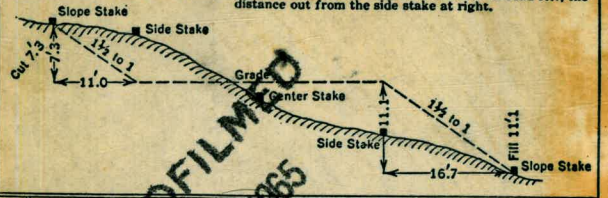

W
651

DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING

Roadway of any Width. Side Slopes 1½ 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.



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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

KEUFFEL & ESSER CO., N. Y.

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The paper in this book **No. 370A** is made of **50%** high grade rag stock with a **WATER RESISTING** surface sizing.

11,083-5. k, m, yc. kM.

INDEX

FINAL X-SECTION Blk #11 April 28 - 1942 Rogers 1

	1.14	462.98		461.84
	3.20	454.25	1193	451.05
		Sta 8+13		
31 N			3.8	451.0
20 N			3.8	451.0
10 N			3.1	451.7
0			4.6	450.2
4.5			4.3	450.5
5 S			2.7	452.1
10 S			1.6	453.2
20 S			2.6	452.2
30 S			3.9	450.9
40 S			4.4	450.4
50 S			6.0	448.8
60 S			8.0	446.8
70 S			7.7	447.1

FINAL X- SECTION Blk #11 April 28-1942

	4547.5		
	8+13		
80 S		9.1	445.7
	8+17		
20 N		1.6	453.2
10 N		1.8	453.0
0		1.4	453.4
10 S		2.6	452.2
16 S		4.0	450.8
20 S		4.7	450.1
30 S		4.9	449.9
40 S		3.5	451.3
50 S		4.7	450.1
60 S		7.9	446.9
70 S		9.5	445.3
80 S		8.8	446.0
90 S		9.6	445.2

FINAL X-SECTION Blk #11

	45+75		
	8+17		
100S		9.8	445.0
110S		9.4	445.4
120S		10.6	444.2
128S		10.3	444.5
130S		9.0	445.8
140S		7.6	447.2
150S		8.6	446.2
160S		4.9	449.9
170S		9.5	445.3
178S		9.0	445.8
	8+27		
10S		0.9	453.9
20S		2.0	452.8
30S		2.2	452.6
37S		3.0	451.8

(448.3 / 155.79) D.S. toe of dam.

FINAL X-SECTION Bit #11 April 28-1942

454.25

8+27

38S	4.5	450.3
40S	4.2	450.6
44S	3.6	451.2
46S	2.5	452.3
50S	4.4	450.4
57S	6.6	448.2
60S	6.5	448.3
68S	2.5	447.3
70S	6.1	448.7
74S	7.3	447.5
80S	8.6	446.2
90S	8.5	446.3
100S	7.4	447.4
110S	6.6	448.2
120S	8.3	446.5

FINAL X-SECTION Blk #11

	45+75		
	8+27		
126S		8.5	446.3
130S		6.5	448.3
140S		4.2	450.6
150S		5.9	448.9
160S		7.2	447.6
162S		6.8	448.0
	8+30		
30S		2.7	452.1
32S		5.0	449.8
40S		4.9	449.9
46S		3.8	451.0
50S		6.2	448.6
	8+37		
30S		3.1	451.7
40S		2.4	452.4

448 1/
155.94 D.S. toe of dam.

FINAL X-SECTION BLK 41

454.75

8+37

44S		2.9	452.4
50S		5.1	449.7
55S		4.5	450.3
60S		2.8	452.0
65S		1.7	453.1
67S		4.5	450.3
70S		5.4	449.4
75S		6.2	448.6
80S		4.4	450.4
86S		5.3	449.5
90S		3.6	451.2
100S		3.5	451.3
101S		5.6	449.2
106S		3.8	451.0
117S		3.6	451.2

FINAL X SECTION Blk # 11 April 28-1942 Rogers

		454.75			
		8+37			
113 S				3.9	450.9
120 S				1.8	453.0
122 S				2.4	452.4
123 S				5.5	449.3
126 S				5.1	449.7
130 S				3.6	451.2
140 S				4.3	450.5
145 S				6.8	448.0
149 S				7.3	447.5
150 S				6.1	448.7
158 S				3.7	451.1
TP	8.43	459.69	3.49		451.26
		8+27			
8 S				4.1	455.6
0				3.1	456.6

450± / 154.50 D.S. toe of dam

FINAL X-SECTION Blk #11 April 28-1942

	459.69		
	8+27		
9N		3.9	455.8
10N		5.7	454.0
	8+37		
26S		4.2	455.5
22.5		4.4	455.3
20S		5.7	454.0
12.5		4.0	455.7
10S		4.7	455.0
1S		4.5	455.2
0		3.0	456.7
	8+47		
20S		2.8	456.9
27S		4.2	455.5
30S		4.2	455.5
32S		6.6	453.1

FINAL X-SECTION Blk # 11 April 28-1942

	459.69		
	8+47		
40S		7.5	452.2
	8+44		
40S		8.2	451.5
42S		9.5	450.2
50S		8.9	450.8
60S		6.7	453.0
70S		10.5	449.2
	8+47		
50S		5.3	454.4
55S		3.2	456.0
60S		4.1	455.6
67S		4.5	455.2
70S		5.8	453.9
74S		6.9	452.8
80S		5.4	454.3

FINAL X-SECTION Blk #11 April 28-1947

459.69

8+47

87S	5.9	453.8
88S	8.0	451.7
90S	8.0	451.7
100S	5.7	454.0
106S	4.3	455.4
107S	6.8	452.9
110S	5.9	453.8
115S	4.5	455.2
116S	7.0	452.7

8+92

110S	7.9	451.8
115S	9.4	450.3
120S	9.8	449.9
123S	9.2	450.5
130S	6.9	452.8

✓

FINAL X-SECTION Blk # 11

459.69

8+47

1205				7.0	452.7
1255				6.4	453.3
1305				4.9	454.8
1315				7.0	452.7
1345				6.2	453.5
1405				9.2	450.5
1425				4.4	455.3
1505				8.9	450.8
1585				6.7	453.0
~~1605~~				~~4.2~~	~~455.0~~
		8+37			
1605	0			6.5	453.2
	929	468.85	0.13		459.56
B.M.			201		461.84

451.7 − 153.21 D.S. toe of dam.

= 461.84

FINAL X-SECTION Blk #9

Cont. from F.B. #623 p 78

T.BM	9.97	454.56		444.59
		7+24		
160S			5.5	449.1
164S			4.8	449.8
		7+34		
160S			5.8	448.8
170S			1.2	453.4
		7+44		
160S			6.2	448.4
		7+24		
170S			0.0	454.6
		7+90.5		
~~160S~~			~~12.1~~	~~442.5~~
170S			13.8 ~~12.0~~	440.8 ~~442.6~~

pd

FINAL X-SECTION Blk #9 April 29-1942

	45+56		
	8+00		
160S		13.6 ~~12.9~~	441.0 ~~442.1~~
170S		13.5 ~~12.8~~	441.1 ~~442.1~~
	8+07		
~~160S~~		~~12.1~~	~~442.5~~
170S		12.5 ~~11.6~~	42.1
	7+80		
160S		13.6 ~~13.8~~	441.0 ~~442.8~~
170S		12.7 ~~11.9~~	441.9 ~~442.7~~
B/L	9.97		440.59

FINAL X-SECTION Blk #6 April 29-1942

	243	465.81		463.38
		5+92		
20 S			3.0	462.8
30 S			3.3	462.5
			1.2	464.6
		5+91		
3 S			1.0	464.8
10 S			+1.9	467.7
		5+88		
3 S			0.7	465.1
5 S			+0.6	466.4
10 S			+3.9	469.7
		5+86		
0			0.1	465.7
6 S			+1.1	466.9
8 S			+4.6	470.4
10 S			+5.5	471.3

+66

FINAL X-SECTION Blk #6

April 29-1942

	465.81			
	5+80			
0		+0.8	466.6	
45		+1.5	467.3	
105		+6.7	472.5	
BM.	2.43		463.38	= 463.38

FINAL X-SECTIONS BIKE #11

Rogers
May 1-42 16

0.56 462.40 461.84

8+53.5

157.5	9.8
152.5	VOID 10.4
151.5	9.1
150.5	9.3
145.5	10.5
140.5	8.2
134.5	8.3
130.5	6.5
124.5	7.5
120.5	6.5
116.5	4.0
110.5	3.2
105.5	3.9
100.5	5.0

FINAL X-SECTION Blk #11

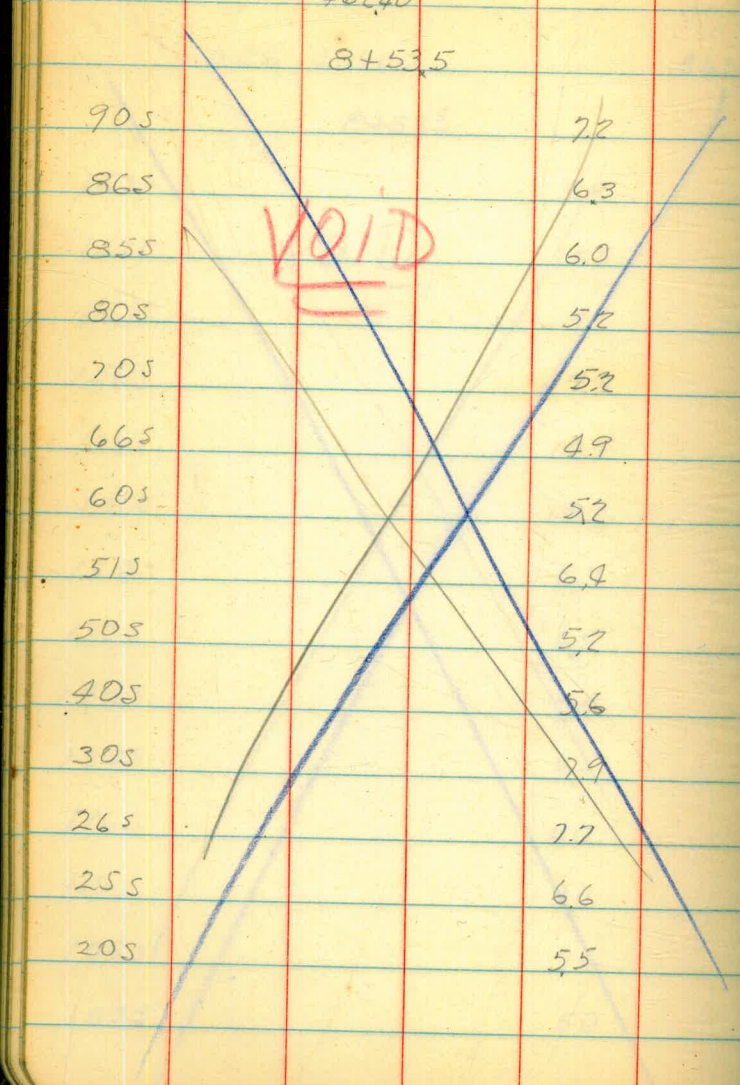
Rogers

May 1-42

17

46240

8+53.5



Rogers
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FINAL X-SECTION BIE #11

	103	462.87			461.84
	831	460.32	10.86		452.01
		8+53.5			
1575				8.5	451.8
1525				8.8	451.5
1515				7.4	452.9
1505				7.6	452.7
1405				8.7	451.6
1365				7.2	453.1
1345				5.0	455.3
1305				4.7	455.6
1245				5.9	454.4
1205				4.5	455.8
1165				4.0	456.3
1155				2.7	457.6
1105				2.7	457.6

451.6
153.28 D.S. toe of dam.

FINAL X-SECTION Bit #11

460.32

8+53 S

107 S	2.0	458.3
100 S	3.5	456.8
90 S	5.7	454.6
85 S	6.5	453.8
84 S	4.7	456.1
80 S	3.3	457.0
70 S	3.7	456.6
60 S	3.1	457.2
51 S	4.5	455.8
50 S	3.4	456.9
40 S	3.4	456.9
30 S	5.8	454.5
26 S	6.4	453.9
25 S	4.3	456.0

FINAL X-SECTION BIKE #11

460.32

8+53.5

30 S				3.5	456.8	
BM	3.21	462.76	0.77		459.55	
			0.93		461.83	= 461.84

FINAL X-SECTIONS Blk #6

		47047		
		6+01		
~~30 S~~			~~13.0~~	~~457.5~~
30 N			9.5	461.0
B.M.	1273	487.96		475.23
		6+01		
134 S			5.6	482.4
130 S			6.1	481.9
126 S			7.1	480.9
125 S			10.0	478.0
120 S			9.6	478.4
117 S			9.0	479.0
111 S			11.0	477.0
110 S			15.0	473.0

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FINAL X-SECTIONS Blk #6

	487.96		
	6+01		
105 S		11.5	476.5
100 S		9.5	478.5
92 S		9.3	478.7
90 S		11.1	476.9
80 S		12.7	475.3
78 S		14.5	473.5
72 S		15.7	472.3
70 S		16.9	471.1
	5+91		
125 S		1.0	487.0
120 S		1.2	486.8
117 S		1.5	486.5
116 S		3.9	484.1
113 S		3.9	484.1
110 S		2.2	485.8

pl

FINAL X-SECTIONS Blk # 6

487.96

5791

108 S			1.2	486.8
100 S			2.3	485.7
BM 1	13.02	488.28		475.26
92 S			3.5	484.8
90 S			3.5	484.8
86 S			2.1	486.2
80 S			5.1	483.2
79 S			7.0	481.3
75 S			7.0	481.3
70 S			6.1	482.2
68 S			6.4	481.9
67 S			9.2	479.1
60 S			9.3	479.0

FINAL X-SECTIONS Blk #6

48828

5+91

58S			10.8	477.5
53S			10.6	477.7
52S			9.1	479.2
50S			8.7	479.6
47S			9.3	479.0
44S			9.5	478.8
40S			10.8	477.5

5+94

40S			23.3	465.0
45S			11.2	477.1
50S			15.4	472.9
T.P.	11.25	499.46	0.07	488.21

5+88

110S			10.2	489.3
108S			11.7	487.8

FINAL X-SECTION BK # 6

499.46

5788

107S	7.8	491.7
103S	11.0	488.5
100S	10.6	488.9
90S	11.1	488.4
82 S	10.9	488.6
80S	12.5	487.0
78S	13.7	485.8
70S	13.0	486.5
67S	14.7	484.8
60S	14.3	485.2
50S	16.2	483.3
40S	17.6	481.9
35S	14.0	485.5
30S	19.0	480.5

FINAL X-SECTIONS BLK #6

499+16

5781

10S	19.5	480.0
20S	16.0	483.5
24S	17.5	482.0
25S	14.0	485.5
30S	14.0	485.5
32S	11.7	488.3
30S	10.9	488.6
40S	13.1	486.4
50S	12.8	485.7
51S	8.7	490.8
56S	7.0	492.5
60S	8.6	490.9
57S	8.7	490.8
58S	10.2	489.3
70S	10.3	489.2

FINAL X-SECTIONS Blk # 6

499.46

5+81

73S	9.1	490.4
80S	10.6	488.9
90S	10.3	489.2
94S	7.3	492.2
100S	5.3	494.2
103S	2.2	497.3
110S	2.2	497.3
118S	2.9	496.6
120S	+0.9	500.4

5+75

20S	12.3	487.2
22S	10.5	489.0
27S	7.6	491.9
30S	8.3	491.2
40S	9.9	489.6

Rogers

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FINAL X-SECTIONS Blk # 6

		4994.6			
		5+75			
50S				9.2	490.3
55S				6.7	492.8
60S				6.7	492.8
66S				7.0	492.5
70S				9.6	489.9
80S				10.3	489.2
90S				7.3	492.2
	1176	509.03	2.19		497.27
BM1			6.17		502.86 = 502.87
		5+91			
21N					466.8
20N					465.0

Elev. taken from points for forms

" " " " " "

FINAL X-SECTIONS BLK #11

	3.52	46536	46184
		8+53.5	
18S		6.6	458.8
		8+47	
10S		8.7	456.7
		8+44	
20S		9.2	456.2
15S		7.2	458.2
10S		7.8	457.6
0		7.8	457.6
		8+37	
3N		8.5	456.9
5N		7.0	458.4
10N		7.3	458.1
		8+27	
20N		10.1	455.3

8+ 456.5

FINAL X-SECTIONS BK# 11

Rogers
May 1942 30

46536

8+27

~~21 N~~ ~~8.0~~ ~~457.1~~

~~22 N~~ ~~8.0~~ ~~457.4~~

See Page 41

8+17

13.0 452.4

?

3.52 461.8

FINAL X-SECTIONS Blk # 6

	5.20	480.46		475.26
		5791		
21.5N			12.0	468.5
22 N			9.6	471.1
32 N			9.6	475.9
		5781		
5S			5.6	474.9
0			6.1	474.4
10N			3.7	476.8
11N			5.6	474.9
19N			3.0	477.5
	11.28	486.54	5.20	475.26
		5781		
20N			3.2	483.3
24N			2.5	484.0

80.17

13091
19
13083

FINAL X-SECTIONS Blk # 6

		480.46			
		5+76			
10 N				5.8	474.7'
13 N				3.9	476.6'
14 N				0.7	479.8'
18 N				2.7	478.3'
20 N				0.7	479.8'
21 N				+2.9	483.4'
23 N				+3.2	483.7'
			5.20		475.26
	10.22	485.48			475.26
		6+11			
134 S				8.6	476.9
136 S				8.6	476.9
137 S				7.0	478.5
140 S				5.1	480.4

FINAL X-SECTION BL#6

485.48

6+11

144S		3.7	481.8
150S		+2.5	488.0

Rogers

HIGHWAY X-SECTION FROM TUNNEL OUTLET — MAY 27-82 — 34

Sta | H.I. | Note: Axis = Sta 0+00 | ℄

All sections Lt. of red line taken from underlined H.I.

El 461.84
6.57
HI 468.41

El 475.23
3.29
478.52

El 461.84
6.82
HI 468.66

Sta	H.I.												
	468.4	w. edge of road											
1+90	478.5	475.9	473.2	471.2	464.1	463.5	457.4	456.2	455.3	457.2			
		3.3	5.3	7.3	4.3	4.9	11.0	12.2	13.1	11.2			
		101	93	77	65	49	26		32	50			
		w. edge											
2+00		475.3	472.6	470.6	464.6	463.9	463.4	457.7	456.5	457.7	459.2		
		3.2	5.9	7.9	3.8	4.5	5.0	10.7	11.9	10.7	9.4		
		91	83	64	60	49	36	18		28	50		
		w. edge of Road											
2+12		474.6	472.9	471.5	467.2	464.2	464.0	463.5	459.4	458.2	460.6	459.3	460.2
		3.9	5.6	7.0	1.2	4.2	4.4	4.9	9.0	10.2	7.8	9.1	8.2
		82	72	59	50	43	33	24	6.0		20	42	50
2+25			474.5	474.9	473.3	471.3	466.1	463.8	463.7	461.8	459.7	461.2	461.2	460.0	460.8
			4.0	3.6	5.2	7.2	2.3	4.6	4.7	6.6	8.7	7.2	7.2	8.4	7.6
			73	70	65	47	30	22	11		8.0	13	27	45	50
		w. edge of Road													
2+33		474.1	472.1	472.6	471.7	465.5	464.0	463.8	462.3	461.7	459.8	459.8			
		4.4	3.4	5.9	6.8	2.9	4.4	4.6	6.1	6.7	8.6	8.6			
		60	58	48	38	22	13		4	23	47	50			
		w. edge													
2+50	468.66	474.1	473.2	473.6	474.0	467.3	465.8	463.7	463.0	460.8	460.0	460.3			
		4.4	5.3	4.9	4.5	1.4	2.9	5.0	5.7	2.9	8.7	8.4			
	478.5	50	39	23	20	16	9.0		24	29	46	50			

HIGHWAY X-SECTION FROM TUNNEL OUTLET

Sta	HI													
		w. edge							℄	HI. 468.66				
2+60	46866	474.1	473.5	471.8	473.5	473.1	467.2	464.7	464.3	463.7	463.2	460.1	459.6	461.1
		4.4	5.0	6.7	5.0	5.4	1.5	4.0	4.4	5.0	5.5	8.6	9.1	7.6
	47852	50	35	28	25	12	7	2.0		12	29	33	46	50
		w. edge of Road												
		474.0												
2+75		473.0	473.6	467.7	473.4		466.5	466.0		464.2	464.1	463.3	462.9	461.2	466.0	459.0
		4.5	4.9	10.8	5.1		2.2	2.7		3.5	4.6	5.2	5.8	7.5	7.7	9.7
		35	23	1.7	14		7.0			3.0	16	2.5	33	34	41	50
				w. edge of Road												
				474.3	473.7		465.1			464.5	464.4	465.1	464.4	458.1		458.1
3+00				4.2	4.8		3.6			4.2	4.3	3.6	4.3	10.6		10.6
				30	11					1.0	11	13	31	38		50
				w. edge												
				474.3	472.6		467.1			462.6	464.7	464.5	458.2		458.2	
3+13				4.2	3.9		1.6			6.1	4.0	4.2	10.5		10.5	
				20	13					9	16	36	44		50	
				w. edge of Road												
				474.4	474.6		469.1			464.8	464.8	459.3				
3+30				4.1	3.9		0.6			3.9	3.9	9.4				
				20	14					12	42	50				
					474.5	474.6				470.1	465.2	465.0				
3+50					4.0	3.9				8.9	3.5	3.7				
					6					15	28	50				

HIGHWAY X-SECTION FROM TUNNEL OUTLET

Sta.	H.I.			℄			
			474.4	474.5	474.3	465.2	463.9
3+75	468.6		4.1	4.0	4.2	3.5	4.8
			2		9	27	50
	478.57						
				474.0	474.1	466.5	466.7
4+00				4.5	4.4	2.2	2.0
					12	29	50

HIGHWAY X-SECTION from TUNNEL to INLET

Rogers
May 29-47
37

Sta | H.I. | Note: Axis = Sta. 0+00

All sections Rt. of red ℄ line taken from under lined H.I.

Sta	H.I.												
	461.84												
	9.47												
	471.31												
0+30					445.6	449.6	451.8	456.5	456.7	454.7	461.4	462.6	464.7 (W. edge of Road)	477.8	477.4
					25.7	21.7	19.5	14.8	14.6	16.6	9.9	8.7	6.6	7.0	7.4
					50	30	10		8	12	28	44	53	70	74
	483.61												
	1.17												
	484.78												
0+44		467.5	468.5	467.5	457.7	457.8		461.8	464.7	464.7 (W. edge of Road)	473.0	477.5	477.5		
		3.8	2.8	3.8	13.6	13.5		9.5	6.6	6.6	11.8	7.3	7.3		
		50	40	27	14	6			8	24	37	62	70		
0+52				467.6	471.3	469.3		464.9	465.5	472.6	472.9	479.6	477.6	477.7 (W. edge Road)	
				3.7	0.0	2.0		6.4	5.8	12.2	11.9	5.3	7.3	7.1	
				50	27	22			14	23	26	37	47	60	
0+65		468.1	468.2	472.1	468.6	464.9		466.0	474.8	475.2	480.5	477.8	477.9 (W. edge Road)		
		3.2	3.1	+0.8	2.7	6.4		5.3	10.0	9.6	4.3	7.0	6.9		
		50	40	32	25	13			12	18	31	42	52		
0+87	467.5	469.5	468.7	465.2	465.3	469.0		478.7	479.6	477.3	478.0	480.9	478.2	478.4 (W. edge)	
	3.8	1.8	3.1	6.1	6.0	2.3		6.1	5.2	7.5	6.8	3.9	6.6	6.4	
	50	45	42	40	27	25			5	8	21	26	31	40	
0+93		467.8	465.0	465.1		476.3		477.8	478.1	478.6 (W. edge Road)					
		3.5	6.3	6.2		8.5		7.0	6.7	6.2					
		50	46	32		14			23	40					

HIGHWAY X-SECTION from TUNNEL INLET

Sta	H.I					℄		
	471.31						W. edge of Road	
1+19	484.78	465.0	465.0	479.7	478.9	479.6	479.6	
		6.3	6.3	5.1	5.9	5.2	5.2	
		50	33	21		23	30	
							W. edge of Road	
1+61		467.0	470.3	473.9	478.9	480.5	480.5	480.2
		17.8	14.5	10.9	5.9	4.3	4.3	4.6
		50	45	35	11		23	30

103
77

63

FINAL X-SECTIONS BLK # 11

	7.06 ✓	468.90			461.84
		8+37			
10 N				10.6	458.3
12 N				10.4	458.5
15 N				8.4	460.5
20 N				8.6	460.3
		8+47			
10 S				11.0	457.9 ✓
0				10.8	458.1
3 N				10.0	458.9
4 N				8.5	460.4
10 N				7.8	461.1
11 N				5.4	463.5
15 N				4.6	464.3
20 N				4.6	464.3

✓

FINAL X-SECTIONS Blk # 11

46890

8+53.5

105			10.8	458.1	
15			11.0	457.5	
0			10.1	458.8	
3 N			7.6	461.3	
9 N			6.2	462.7	
10 N			4.9	464.0	
15 N			4.4	464.5	
18 N			1.6	467.3	
~~B.M.~~		7.06		461.8±	check on BM.

8+17

B.M.	1.14	476.37		475.23	
21 N			22.5	453.9	
24 N			18.0	458.4	
29 N			14.2	462.2	462.2
35 N			13.1	463.3	

Rogers

FINAL X-SECTION BK # 11 JUNE 11-82 41

47637 ✓

8+17

41 N		10.9	465.5
46 N		4.2	472.2

8+27

40 N		3.3	473.1 ✓
30 N		13.7	462.7 ✓
22 N		18.7	457.7 ✓
20 N		18.7	457.7 ✓

See Page 29

8+37

21 N		15.4	461.0 ✓
25 N		12.6	463.8 ✓
30 N		10.5	465.9 ✓
35 N		7.5	468.9 ✓
40 N		2.7	474.2 ✓

✓

Rogers

FINAL X-SECTION B/C #11 JUNE 11-68 42

476.37

8+47

23 N		11.6	465.0	
30 N		6.6	469.8	469.8
	8+53			
22 N		8.6	467.8	
25 N		3.3	473.1	
	7.06		461.80	?
	484.73		483.61	
	8+53			
33 N		7.0	477.7	
40 N		7.2	477.5	
	8+47			
40 N		7.2	477.5	
50 N		7.0	477.7	

Rogers

FINAL X-SECTION BK #11 June 11-62 43

	48473 ✓			
	8+37			
45N		7.3	477.4 ✓	
53N		7.1	477.6 ✓	
	8+27			
47N		6.1	478.6 ✓	
50N		6.1	478.6 ✓	
60N		7.1	477.6 ✓	
	8+17			
50N		6.9	477.8 ✓	
46N		7.9	476.8 ✓	
BM.	1.12		483.61 ✓	= 483.61

✓

FINAL X-SECTION Blk #12

June 18-92 44

	4.74	466.58		461.84
		8+56		
1405			12.4	454.2
1325			12.5	454.1
1305			10.9	455.7
1295			10.3	456.3
1235			12.2	454.4
1205			10.9	455.7
		8+635		
1535			10.4	456.2
1505			11.0	455.6
1445			12.5	454.1
1405			10.9	455.7
1385			9.6	457.0
1305			10.1	456.5
1255			9.0	457.6

456.5

FINAL X-SECTION Blk # 12

466,58

8+63.5

120 S	9.2	457.4
118 S	9.3	457.3
110 S	6.0	460.6
107 S	5.0	461.6
100 S	6.5	460.1
8+59		
140 S	11.2	455.4
130 S	12.3	454.3
120 S	11.6	455.0
118 S	9.9	456.7
110 S	5.6	461.0
106 S	6.2	460.4
100 S	7.8	458.8

FINAL X-SECTION Blk # 12

Rogers

June 18-12 26

	466.58		
	8+76		
152 S.		8.4	458.2
150 S.		7.1	459.5
146 S		8.6	458.0
144 S		6.7	459.9
140 S		6.7	459.9
	8+73.5		
152 S		5.9	460.7
150 S		6.4	460.2
140 S		5.8	460.8
130 S		5.4	461.2
124 S		5.8	460.8
120 S		4.8	461.8
115 S		5.4	461.2
110 S		3.3	463.3
103 S		5.6	461.0
100 S		4.8	461.8

FINAL X-SECTION BK #12

6.39	468.23			461.84
		8+59.5		
90S			10.8	457.4
87S			12.4	455.8
80S		8+63.5	?	
90S			9.2	459.0
87S			9.7	458.5
82S			8.9	459.3
80S			8.9	459.3
70S			9.3	459.9
74S			9.7	458.5
60S			9.5	458.7
58S			10.0	458.2
50S			9.7	458.5
41S			7.6	460.6
40S			5.8	462.4

Copied from book
F.B. No. 619
Page 32

FINAL X-SECTIONS Blt#12

468.23

8+73.5

44S		6.1	462.1
50S		6.8	461.4
53S		8.1	460.1
59S		6.4	461.8
60S		9.3	458.9
70S		6.2	462.0
80S		5.2	463.0
90S		5.4	462.8
94S		4.4	463.8
98S		6.2	462.0
	6.39		461.84

Copied from book
F.B. No. 619
Page 33

Rogers

FINAL X-SECTION BK # 12 July 1-02 ~~June 31-02~~ 49

BM.	4.19	466.03		461.84	
		8+59			
40S			5.5	460.5	
35S			4.9	461.1	
30S			6.0	460.0	
		8+63.5			
36S			3.2	462.8	
30S			3.9	462.1	
22S			6.1	459.9	
20S			3.8	462.2	
15S			3.5	462.5	
10S			3.8	462.2	
0			4.5	461.5	
		8+83.5			
150S			1.5	460.5	
140S			2.0	460.0	
BM.		4.19		461.84	=461.84

Rogers

July 12-42 50

FINAL X-SECTION Blk # 12

	3.36	472.41		469.05
		8+83.5		
130S			6.3	466.1
90S			5.9	466.5
80S			5.6	466.8
70S			3.2	469.2
66S			2.4	470.0
60S			3.1	469.3
57S			4.6	467.8
50S			4.7	467.7
44S			4.9	467.5
43S			0.1 ~~1.0~~	472.3
40S			+0.5	472.9
		8+85		
40S			+0.6	473.0
44S			1.3	471.1
50S			1.4	471.0

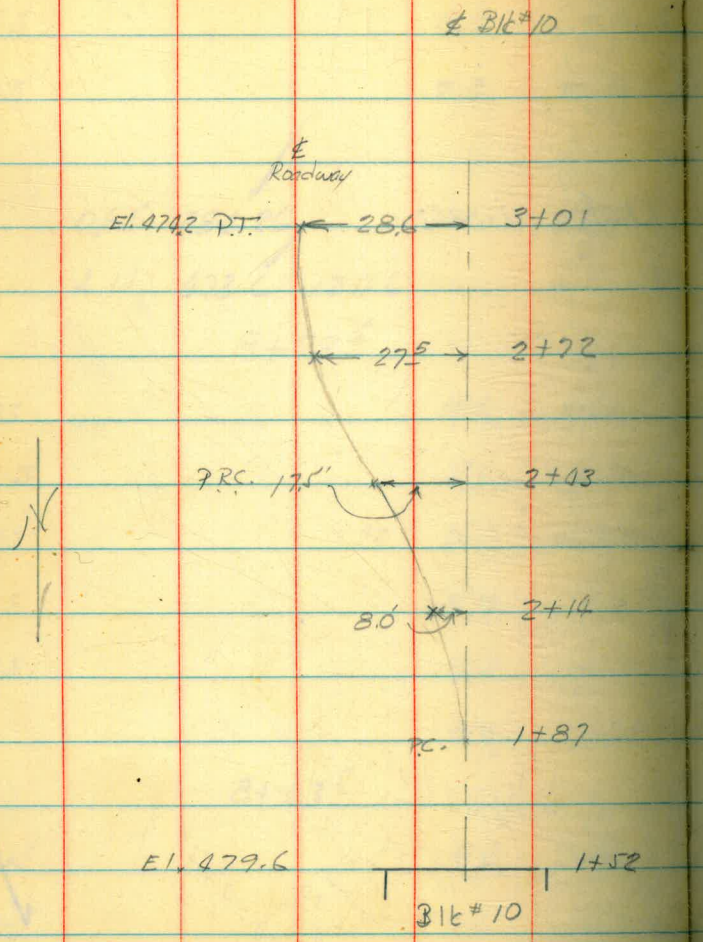
FINAL X-SECTION Bit # 12

472.01

8+85

55S		0.9	471.5	
60S		2.3	470.1	
	0.65 484.26		483.61	July 10-1962
	2.11 473.61 12.76		471.50	
	8+73.5			
40S		9.1	464.5	
38S		5.3	468.3	
30S		5.1	468.5	
20S		5.7	467.9	
10S		7.7	465.9	
0		8.9	464.7	
	8+63.5			
4N		9.5	461.1	
10N		9.2	464.4	
16N		7.3	466.3	

TUNNEL OUTLET ROADWAY

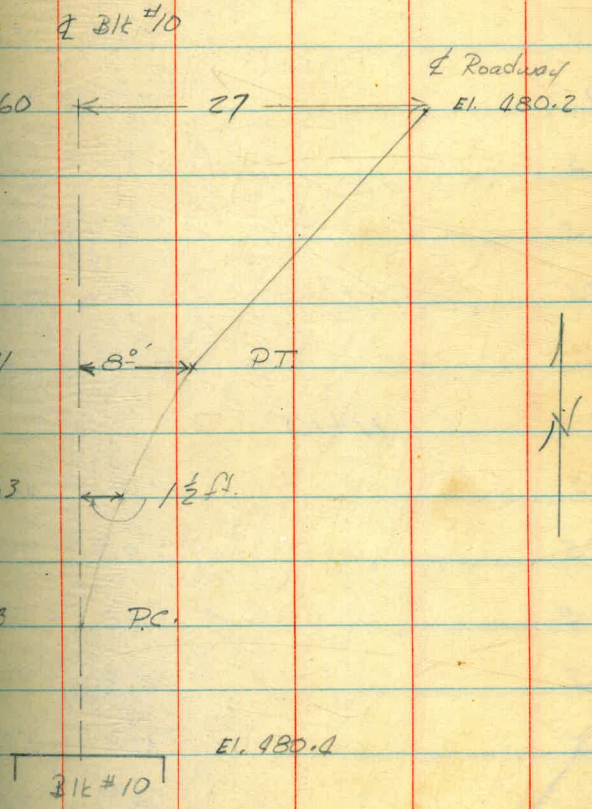


TUNNEL INLET ROADWAY

Rogers

.52

July 17-1942



FINAL X-SECTIONS BK # 17

BPT.	664	562.50		555.86
		11+00		
10 N			12.2	550.3
6 N			13.6	548.9
0			12.0	550.5
4 S			11.8	550.7
10 S			9.7	552.8
15 S			7.5	555.0
20 S			+ 1.4	563.9
		11+10		
30 S			+1.1	563.6
27 S			+0.3	562.8
20 S			4.4	558.1
15 S			5.8	556.7
10 S			11.3	551.2
0			12.7	549.8

	562.50		
	11+10		
10N		12.3	550.2
	11+20		
10N		12.4	550.1
0		12.8	549.7
10S		10.0	552.5
18S		7.2	555.3
~~20S~~		~~7.8~~	~~561.3~~
	11+30		
20S		3.4	559.1
18S		5.0	557.5
10S		7.6	554.9
2S		7.3	555.2
0		8.5	554.0
4N		9.1	553.4
10N		7.7	554.8

See book 622 Page 48

FINAL X-SECTION Blk # 17

July 30-02 Rogers 55

562.50

11+40

10N	5.9	556.6
0	6.8	555.7
5S	7.4	555.1
10S	6.3	556.2
20S	4.4	558.1
25S	+6.0	568.5
30S	+8.7	570.7

11+50

30S	+8.5	571.0
26S	+4.7	567.2
20S	+2.1	564.6
10S	2.7	559.8
0	5.9	556.6
10N	4.5	558.0

Rogers

FINAL X-SECTION Blk #12 August 4-12 56

P.	0.77	48027		480.0	
		8+63.5			
160S			19.8	461.0	
170S			18.3	462.5	
180S			14.9	465.9	
190S			9.2	471.6	
200S			8.4	472.4	
210S			6.0	474.8	Roadway
		8+73.5			
160S			18.2	462.6	
170S			11.8	469.0	
180S			9.1	471.7	
190S			7.8	473.0	
200S			5.7	475.1	Roadway
		8+83.5			
160S			13.4	467.4	

Rogers

FINAL X-SECTION Blk # 12 August 11-42 57

480.77 ✓

8+83.5

170S		10.7	470.1	
180S		6.2	474.6	
190S		5.1	475.8	Roadway
	0.65 484.22 ✓		483.57	August 11-42

9+00

0		8.9	475.3
8N		8.0	476.2
10N		10.5	473.7
20N		11.5	472.7
26N		3.3	480.9
30N		1.2	482.8
40N		+5.9	490.1
50N		+10.2	496.4
10S		10.4	473.8
20S		9.4	474.8
30S		10.2	474.0

FINAL X-SECTION Blk #12

	48+22		
	9+00		
40S		7.9	476.3
50S		8.7	475.5
60S		10.2	474.0
70S		10.7	473.5
80S		11.3	472.9
90S		11.6	472.6
100S		13.4	470.8
110S		14.0	470.2
120S		13.6	470.6
130S		13.3	470.9
140S		13.9	470.3
	8+93.5		
140S		14.7	469.5
130S		12.9	471.3
120S		14.3	469.9

FINAL X-SECTION BK #12

484.22 ✓

8+93.5

110 S		13.9	470.3 ✓
100 S		14.3	469.9 ✓
90 S		13.5	470.7 ✓
80 S		12.2	472.0 ✓
70 S		12.0	472.2 ✓
60 S		11.2	473.0 ✓
50 S		9.0	475.2 ✓
40 S		7.8	476.4 ✓
30 S		7.5	476.7 ✓
20 S		8.3	475.9 ✓
10 S		9.9	474.3 ✓
0		10.2	474.0 ✓
10 N ✓		9.5	474.7 ✓
16 N ✓		11.4	472.8 ✓
20 N ✓		10.5	473.7 ✓

FINAL X-SECTION Blk #12

	484.22		
	8+93.5		
30 N		4.6	479.6
40 N		+3.9	487.6
42 N		+5.8	490.0
50 N		+5.2	489.4
	8+91.5		
20 S		10.3	473.9
25 S		7.8	476.4
30 S		7.8	476.4
40 S		7.8	476.4
	8+83.5		
0		12.8	471.4
10 S		13.0	471.2
20 S		12.4	471.8
30 S		10.9	473.3
10 N		12.1	472.1
20 N		11.8	472.4

FINAL X-SECTION Bk #12

484.22

8+83.5

30 $ N		7.0	477.2
40 $ N		5.8	478.4
50 $ N		+4.7	478.9 (489)
60 $ N		+5.8	490.0

8+73.5

10 N		16.7	467.5
20 N		14.4	469.8
25 N		12.0	472.2
30 N		6.2	478.0
40 N		7.0	477.2
50 N		4.7	479.5

8+63.5

17 N		15.1	469.1
20 N		13.9	470.3
25 N		12.0	472.2
30 N		6.6	477.6

8 422
13

Rogers

FINAL X-SECTION Blk #12 August 11-12 62.

		4842 ✓			
		8+63.5			
40 N ✓			7.0	477.2 ✓	
50 N ✓			7.0	477.2 ✓	
		8+83.5			
120 S			16.2	468.0 ✓	
110 S			15.7	468.5 ✓	
100 S			15.7	468.5 ✓	
		✓			
BM 1	1.72	479.71		477.97	8-11-62
		8+93.5			
150 S			11.5	468.2 ✓	
153 S			11.6	468.1 ✓	
160 S			5.9	~~477.8~~ 473.8	
170 S			4.2	475.5 ✓	Roadway

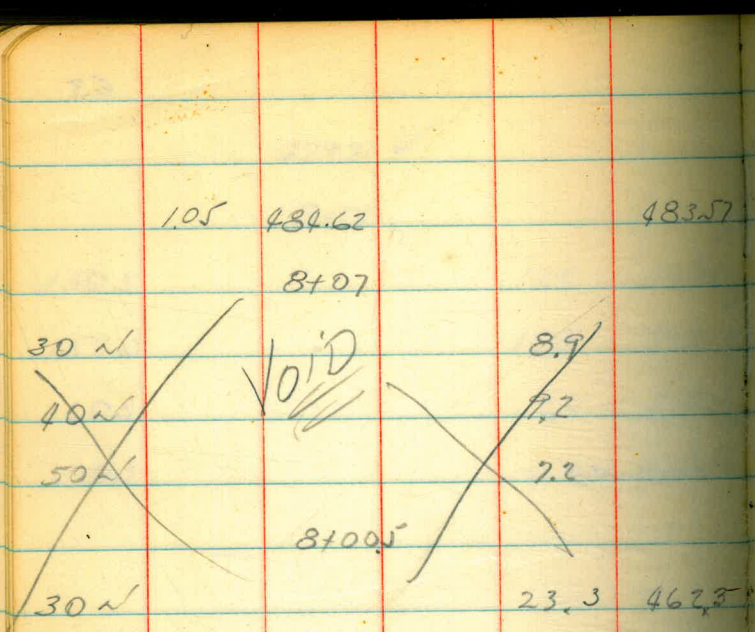
✓

479.21 ✓

9+00

150 S	11.2	468.5 ✓	
152 S	10.8	468.9 ✓	
160 S	5.3	474.4 ✓	
170 S	4.2	475.5	Roadway

✓


1.05
484.62
8+07
30 N
40 N
50 N
30 N
8+00 S
8.9
7.2
7.2
23.3
483.57
462.3

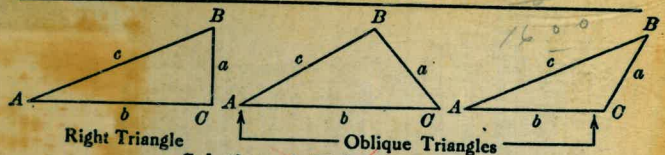
PROFILE STA 9+00 . . 11-3-42

T.P	7.37	487.37	480.00	
0+00		13.9	473.5	Sta 0+00 = 151.9 S. Axis
0+07		13.7	473.7	
0+12		10.8	476.6	
+55		10.4	477.0	
+66		6.0	481.4	
1+00		4.4	483.0	
+50		0.7	486.7	
	STA 9+16.5			
0+00		12.1	475.3	Sta 0+00 = 144.02 S. Axis
+10		12.5	474.9	
+60		8.1	479.3	
+70		1.4	486.0	
1+00		3.7	483.7	
1+50		+2.2	489.6	

PROFILE OF BEDROCK - STA. 9+00

T.P.	1.22	481.22	480.0
0+00			468.9 Sta 0+00 = 151.9 So. of axis
0+07		6.3 / 3.3 = Drilled / 9.6	471.6 = Bedrock
0+12		4.7 / 5.0 = Drilled / 9.7	471.5 = Bedrock
0+25		4.6 / 4.6 = Drilled / 9.2	472.0 = " "
0+35		4.1 / 5.7 = Drilled / 9.8	471.4 = Bedrock
0+50		4.3 / 5.5 = Drilled / 9.8	471.4 = " "
0+55		4.3 / 7.5 = Drilled / 11.8	469.4 = " "
0+65		0.4 / 11.5 = Drilled / 11.9	469.3 (Did not strike Bed rock)

TRIGONOMETRIC FORMULÆ



Right Triangle — Oblique Triangles

Solution of Right Triangles

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

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	$B = 90° - A$, $b = a \cot A$, $c = \frac{a}{\sin A}$
A, b	B, a, c	$B = 90° - A$, $a = b \tan A$, $c = \frac{b}{\cos A}$
A, c	B, a, b	$B = 90° - A$, $a = c \sin A$, $b = c \cos A$,

Solution of Oblique Triangles

Given	Required	
A, B, a	b, c, C	$b = \frac{a \sin B}{\sin A}$, $C = 180° - (A + B)$, $c = \frac{a \sin C}{\sin A}$
A, a, b	B, c, C	$\sin B = \frac{b \sin A}{a}$, $C = 180° - (A + B)$, $c = \frac{a \sin C}{\sin A}$
a, b, C	A, B, c	$A + B = 180° - C$, $\tan \frac{1}{2}(A - B) = \frac{(a-b)\tan \frac{1}{2}(A+B)}{a+b}$, $c = \frac{a \sin C}{\sin A}$
a, b, c	A, B, C	$s = \frac{a+b+c}{2}$, $\sin \frac{1}{2}A = \sqrt{\frac{(s-b)(s-c)}{bc}}$, $\sin \frac{1}{2}B = \sqrt{\frac{(s-a)(s-c)}{ac}}$, $C = 180° - (A+B)$
a, b, c	Area	$s = \frac{a+b+c}{2}$, area $= \sqrt{s(s-a)(s-b)(s-c)}$
A, b, c	Area	area $= \frac{bc \sin A}{2}$
A, B, C, a	Area	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° 10′. From Table, Page IX. cos 5° 10′ = .9959. Horizontal distance = 319.4 × .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. Cosine 5° 10′ = .9959. 1 − .9959 = .0041. 319.4 × .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.

MADE IN U. S. A.