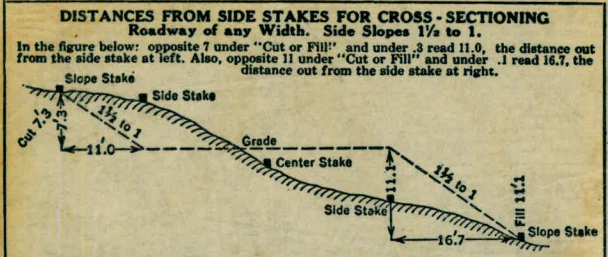


W

587

587



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

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JAN 13 1965

The paper in this book No. F370A is made of 50% high grade rag stock with a WATER RESISTING surface sizing.

10,465. cm, h, ai. cM.

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Levels on E. side of dam 12

± BIK #11 Tie-Outs 13

Levels on E. side of dam 14-19

In
From
Cut

Out of
Fill

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20
- 21
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2001 X 1 1/2

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2

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Sta	H.I.	I.S.	Elev.	Date - 10/27/41	Notes - Jackson 3
				Weather - Fair	⊥ - Ecker
				Coolest	⊕ - Polak
					chain - Laing
BM #1			476.89		chis. O. top of culvert headwall
3.20	480.09				E. side of Ramona Highway
0+00	± 316				
2+30	#11 on axis	2.76	477.33		± of Conc. highway - 1.7 W
0+045		2.85	477.24		" " " " - 1.7 W
0+50.5		3.77	476.32		" " " " - 7.8 E
1+00.5		4.53	475.56		" " " " - 17.4 E
1+10.5		4.64	475.45		" " " " - 18.5 E
1+50.5		5.29	474.80		" " " " - 24.4 E
2+00.5		5.80	474.29		" " " " - 23.8 E
2+50.5		5.82	474.27		" " " " - 13.8 E
2+88.5		5.68	474.41	B.C. of	{ Inter. of Conc. hiway & dirt road
3+00.5		5.63	474.46	± of	" " " " - 5.4 W

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

4

48009

3+50.5 5.72 474.37 1/4 of Conc. highway - 28.7W.

2+50.5 6.6 473.5 1/4 of dirt road - 24.5W

2+00.5 9.0 471.1 " " " " 49.7W

1+50.5 10.5 469.6 " " " " 63.0W

1+12.5 10.8 469.3 " " " " 67.3W - E.G. curve

1+00.5 10.9 469.2 " " " " 66.3W

0+50.5 10.3 469.8 " " " " 65.0W

Date - 10/27/41
Weather - Fair
Warm

Notes - Jackson 5
K - Ecker
Reelmen - Polak
Chain - Laing

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

480.09

Sta.	H.I.	I.S.	Elev	Notes
0+00		8.8	471.3	¢ of dirt road 62°W
0+06 N.		8.3	471.8	" " " " 63°W B.C. curve
0+50 N.		5.7	474.4	" " " " 57°W
1+00 N.		1.9	478.2	" " " " 42°W
1+50 N		0.0	480.1	¢ of dirt road - 18°W E.C. curve W. Edge Pave.
1+50 N		0.25	479.84	¢ of conc. highway - 9°W Int. of ¢
1+74 N				" " " " - 7.3W of dirt road
2+00 N		0.01	480.08	" " " " 4.3W

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

Date - 10/27/41 Notes - Jackson 6
Fair T - Decker
Weather - Warm Radman Polak
Chain - Loing

480.09

1+00N 0.87 479.22

¢ of Conc. highway - 108 W

0+50N 1.75 478.34

- 80 W

#1
BM 3.20 476.89

Chis O on culvert headwall
E side of Ramona highway
5' S of dam axis

Levels for E. side of Dam

Date - 11/5/41 Notes - Jackson 7
 Weather ^{Fair} Hot Rodman - Polak
 - King
 - Laing
 - Cole

Sta.	+	H.I.	-	Elev	Remarks
A-31 B.M.				663.16	Top of rock - 100' N. of Axis
		5.31		668.47	
				9.47 659.0	Top of dam - E. side
T.P.				12.38 656.09	
		0.55		656.64	
				6.64 650.0	2.5' N & 14' S. of Axis Line
				11.64 645.0	2.7' N & " " " "
T.P.				0.86 655.78	
		11.28		667.06	
A-31 B.M.				3.89 663.17	Top of rock - 100 ± N of Axis

Levels for W. Side
of Dam

Date - 11/6/41
Weather - Fair
Warm

Notes - Jackson 8
Radman - Polak
Leing
King
Cote

Sta + H.I. - Elev.

A-16
B.M. 649.55

Steel pin on rock - 75' N. of Axis

11.51 661.06

T.P. 5.57 655.49

7.47 662.96

① 3.96 659.0

El. of top of W. side of dam

② 12.96 650.0

25' N. & 14' S. of Axis Line.

T.P. 11.39 651.57

5.09 656.66

③ 11.66 645.0

27' N. & 14' S. of Axis Line

B.M. 0.52 656.14 656.15

SpK. in Oak tree - 50' S. of Axis

Levels for East Side
of Dam

Date - 11/7/41

Weather - Fair
Warm

Jackson

Laing

Polak

Cole

9

Sta. + H.I. - Elev.

A-31
B.M. 663.16

0.53 663.69

7.77 655.92

6.26 662.18

① 3.18 659.0

② 12.18 650.0

T.P. 12.91 649.27

1.47 650.74

③ 5.74 645.0

Corrected El = 663.09

SEE Page 11

Top of rock - 100' N. of Axis.

El. of top of dam - 0' N. & 14' S.

2.2' N. & 14' S. of Axis Line

2.7' N. & 14' S. of Axis Line

Levels for East Side
of Dam

Date - 11/7/41 Jackson
Weather - Fair Laina
Warm Polak
Cole

9

Sta + H.I. - Elev.

650.74

④ 10.74 640.0

30' N. & 14.6' S. of Axis Line

T.P. 12.58 638.16

3.05 641.21

⑤ 6.21 635.0

32' N. & 16.6' South of Axis

⑥ 11.21 630.0

35' N. & 18.9' South of Axis

T.P. 14.23 629.98

5.82 635.80

Levels for East Side
of Dam

Date - 11/7/41
Weather - Fair
Warm

Jackson
Laing
Polak
Cole

10

Sta + H.I. - Elev

635.80

17.2 618.6

Cut stake @ 27.6' S. of Axis

15.8 620.0

" " @ 4.0' N. of Axis

A-32

B.M.

9.66 626.14 626.06

Top of rock - 100' N. of Axis

3.92 630.06

T.P.

12.49 617.57

0.55 618.12

T.P.

11.64 606.48

0.85 607.33

A-33

B.M.

12.52 594.81 594.72

Steel pin in rock on E. of Block

#17 - approx. 250' N. of Axis

check levels on B.M. #A-31
E. side of dam

Date - 11/7/41 Jackson 11
Weather - Fair Laing
Warm Potok
Cold

Sta	+	H.I.	-	Elev.
A-32 B.M.				626.06
	11.79	637.85		
T.P.		0.81	637.04	
	12.50	649.54		
T.P.		1.54	648.00	
	10.94	658.94		
T.P.		2.03	656.91	
	8.41	665.32		

A-31
B.M. 2.23 663.09 ~~663.16~~

Top of rock - 100' N. of Axis

{ Top of rock - 100' N. of Axis
Note!! From two way check
levels - indicates benchmark
has been disturbed by
blasting.

Levels For East Side of Dam

B.M. A-32 626.06

1.63 627.69

T.P. 12.42 615.27

3.20 618.47

T.P. 12.23 606.24

2.39 608.63

B.M. A-26 6.30 602.33 602.32

11-8-41 12
Dickinson
Ecker
Polak
Cole

B.M. A-32 (Top of rock 100' N. of Axis)

OFFSET EI 609 - 32.9

B.M. A-26 Knob on rock outcrop

£ BLK #11 TIEOUTS

Instrument occupying punch
mark at intersection of £ BLK #11
and £ of AXIS, foresighting
target on South hill, set Tk+
Hub at 100' S. of intersection,
set Ld+Tk 50' S. of intersection.

Foresighting target on N.
Hill, set Ld+Tk 50' N. of
intersection.

£
BLK #11

11-8-11 13

Ecker

Polak

Cole



set Ld+Tk

50'

punch mark
Ld+Tk

AXIS

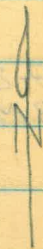
AXIS

50'

set Ld+Tk
2' E of W½ of Paving

50'

set Hub of Tk
8' W of £ of Pavement



Levels for E. side of Dam

Date - 11/13/41

Jackson

14

Weather - Cloudy
Cool

King
Patak
Laing
Cole

Sta + H.I. - Elev

Remarks

A-26

B.M.

602.32

4.31 606.63

19.16 587.47

Drill hole @ 49³/₅ of Axis

14.6 592.0

Drill hole @ 45° S of Axis

A-26

B.M.

4.30 602.33

Levels for E side of Dam

Date - 11/14/41

Jackson
King
Potok
Laing
Cote

15

Weather - Fair
Warm

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

A-26 B.M.				602.32
--------------	--	--	--	--------

	8.09	610.41		
--	------	--------	--	--

		1.4		609.0
--	--	-----	--	-------

		+2.6		613.0
--	--	------	--	-------

A-26 B.M.		8.09		602.32
--------------	--	------	--	--------

cut stake @ 31.4 S. of Axis

" " " 30.0 S. of Axis

Levels for E. side of Dam

Date - 11/15/41 Dickinson 16
 Jackson
 Weather - Fair King
 Warm Lging

Sta + H.I. - Elev.

A-33
 B.M. 594.72

3.21 597.93

7.9 590.0

11.5 586.4

A-33
 B.M. 3.21 594.72

A-32
 B.M. 626.06

0.89 626.95

11.95 615.0

Cut stake @ 47.4 So. of Axis

" " " 50.1 So. " "

Fillet line = 47' No. of Axis

Levels on E side of Dam

Sta. + HI - Elev.

626.95

6.95 620.0

Fillet line = 3.7' No. of Axis

1.95 625.0

" " = 3.5' " " "

T.P. 2.38 624.57

12.78 637.35

7.35 630.0

Fillet Line = 3.2' No. of Axis

2.35 635.0

" " = 3.0' " " "

T.P. 1.59 635.76

Levels on E side of Dam:

Date - 11/15/41

Dickinson

18

Weather - Fair

Jackson

Warm

King

Leitzig

Sta + H.I - Elev.

T.P. 12.65 648.41 635.76

12.65 648.41

8.41 640.0

Fillet line = 2.7' No. of Axis

3.41 645.0

" " = 2.2' No. of Axis

T.P. 12.85 635.56

0.81 636.37

T.P. 12.43 623.94

2.97 626.91

T.P. 11.04 615.87

1.12 616.99

T.P. 0.50 616.49

Levels on E side of Dam

Date - 11/15/41

Dickinson

19

Jackson

Weather - Fair
Warm

King
Laing

Sta	+	H.I.	-	Elev
T.P				616.49
A-32	11.08	627.57		
B.M		1.52	626.05	626.06
Error = 0.01				

Levels on W. side of dam

Date - 11/17/41

Jackson

20

Weather - Cool
Cloudy

Laing

King

Polak

Cole

Sta. + H.I. - Elev.

A-16
B.M. 649.55

10.84 660.39

1.39 659.00

① 10.39 650.0

T.P. 8.95 651.44

0.22 651.66

② 6.66 645.0

A-16
B.M. 2.11 649.55

Top of Dam - Axis to 14' South

Fillet line = 2.2' N. of Axis & South
face = 14.0' S. of Axis

Top of steel pin @ ϕ BIK. #1 - 30' ±
S. of Axis

Fillet line = 2.2' N. & South face =
14.0' S. of Axis.

Levels on W. side of Dam

Date - 11/18/41 Jackson 21
 Weather - Fair King
 Warm Polak
 Cole

Sta. + H.I. - Elev.

A-16
 B.M. 649.55

0.67 650.22

12.8 637.4

Cut stake @ 15.5 So. of Axis
 & 2.9 No. of Axis

T.P. 12.04 638.18

0.86 639.04

13.0 626.0

Cut stake @ 21.2 So. of Axis
 & 3.5 No. of Axis

T.P. 1.88 637.16

13.10 650.26

A-16
 B.M. 0.71 649.55

Levels on W. side of Dam

Date - 11/19/41 Jackson 22
 Weather - Fair King
 Cool Laing
 Polak
 Cole

Sta. + H.I. - Elev.

A-16
 B.M. 649.55

13.01 662.56

① 3.56 659.0

Top of dam - Axis to 14' South

② 12.56 650.0

Axis to 14' South

T.P. 12.75 649.81

1.92 651.73

③ 6.73 645.0

22' No. to 14' So. of Axis

④ 11.73 640.0

27' N. to 14' S. of Axis

T.P. 13.00 638.73

Levels on W. side of dam

Date - 11/19/41
Weather - Fair
Warm

Jackson
King
Laing
Polak
Cole

29

Sta. + HI. - Elev.

T.P. 638.73

0.22 638.95

⑤ 3.95 635.0

30' N. to 16.5' S. of Axis

⑥ 8.95 630.0

37' N. to 18.9' S. of Axis

T.P. 12.28 626.67

2.57 629.24

⑦ 4.24 625.0

35' N. to 21.7' S. of Axis

T.P. 1.55 627.69

10.06 637.75

A-13
B.M.

8.41 629.34 629.33

(Near 2 BIK #2)
Top of rock - 100' S. of Axis

Levels on E. side of Dam

Date - 11/19/41 Jackson King
 Weather - Fair Loring
 Warm Polaris Cole

Sta. + H.I. - Elev.

A-32
 B.M. 626.06

9.28 635.34

① 5.34 630.0

3.2' N. to 18.9' S. of Axis

② 10.34 625.0

3.5' N. to 21.7' S. of Axis

T.P. 11.86 623.48

2.80 626.28

③ 6.28 620.0

3.7' N. to 24.8' S. of Axis

④ 11.28 615.0

4.7' N. to 28.4' S. of Axis

Levels on E. side of Axis

Date - 11/9/41

Jackson

25

Weather - Fair
Warm

King
Potok
Lairg
Cole

Sta + H.I. - Elev

626.28

T.P.

12.23 614.05

1.19 615.24

⑤

5.24 610.0

4.9' N to 32.2' S. of Axis

⑥

10.24 605.0

5.2' N to 35.9' S. of Axis

T.P.

12.10 603.14

0.19 603.33

A-33

B.M.

8.58 594.75 594.72

Levelson E. side of Dam

Jackson
King
Potak
Lairg
Cole

26

Sta. + H.I. - Elev.

A-33

B.M.

594.72

Levels on E. Side of Dam

11/21/41 27
 Dickinson
 Ecker
 Polak
 King
 Cole

B.M. 594.72

1.06 595.78

T.P. 12.92 582.86

5.42 588.28⁸

9.7 578.7

9.3 79.0

75' No. 80 55.7 50.

10.3 78.0

6.3 82.0

2.7 85.6

53.4 50.

6.3 86.0

2.3 ~~86.0~~

6.8 No. 60

T.P. 1.63 586.65

11.46 598.11

B.M. 9.84 588.21 588.25

Levels W Side of Dam

11/22/41 Dickinson
Ecker
Potok
Cole

28

649.55

B.M. A-16 - Rock knob on prominent
outcrop.

12.01 661.56

12.76 648.80

3.40 652.20

12.82 639.38

1.04 640.42

11.67 628.75

1.22 629.97

10.00 620.00

offset 24.8 South

11.42 608.55

1.03 609.58

12.70 596.88

2.19 599.07

7.66 591.41 591.43

B.M. A-18

Levels on E side of Dam

Date - 11/24/41
 Weather - Fair
 Warm

Dickinson
 Jackson
 Laing
 Polak
 Cole

Sta + H.I. - Elev

A-34

B.M.

553.58

12.90 566.48

①

1.48 565.0

96' N. of Axis

②

6.48 560.0

10.1' N. " "

T.P.

0.85 565.63

12.78 578.41

③

8.41 570.0

9.1' N. " "

④

3.41 575.0

7.9 " " "

T.P.

2.52 575.89

Levels for E-side of Dam

Date - 11/24/41
Weather - Fair
warm

Dickinson 30
Jackson
Lairg
Polak
Cole

Sta + H.I. - Elev

T.P. 575.89

12.79 588.68

⑤ 8.68 580.0

7.4' N. of Axis - 55' S. of Axis

⑥ 3.68 585.0

6.9' "

T.P. 3.34 585.34

A-33 12.91 598.25

B.M. 3.53 594.72 594.72

Levels for W. side of Dam

Date - 11/24/41
Weather - Fair
Warm

Jackson
Polak
Loing
Cole

31

Sta + H.I. - Elev.

A-13
B.M. 629.33

4.33 633.66

T.P. 12.08 621.58

0.27 621.85

11.58 610.0

49' N. to 322' S. of Axis

6.85 615.0

47' N. to 284' S. of Axis

1.85 620.0

37' N. to 248' " " "

T.P. 0.71 621.14

11.79 632.93

Levels for W. side of Dam

Date - 11/24/41 Jackson
 Weather - Fair Polak
 Warm Loing
 Cole

Sta + H.I. - Elev

63293

7.93 6250

3.5' N. to 217' S. of Axis

2.93 630.0

3.2' N. to 18.9' S. of Axis

T.P. 1.16 631.77

12.34 644.11

9.11 635.0

3.0' N. to 16.5' S. of Axis

4.11 640.0

27' N. to 146' " " "

T.P. 3.79 640.32

Levels on W side of Dam

Date - 11/24/41

Jackson

33

Weather - Fair
Warm

Polak

Lairg

Cole

Sta	+	HI	-	Elev.
T.P				640.32
A-16	10.83	651.15		
B.M			1.58	649.57 649.55

T.P

640.32

10.83 651.15

A-16

B.M

1.58 649.57 649.55

Levels for E. Side of Dam

Date - 11/25/41
Weather - Fair
Warm

Dickinson 34
Ecker
Jackson
Laing
Polak
King
Cote

Sta. + H.I. - Elev.

A-33
B.M. 594.72

13.09 607.81

T.P. 0.60 607.21

10.32 617.53

① 7.53 610.0

49' N. to 32.1' S. of Axis

② 2.53 615.0

47' N " 28.3' " " "

T.P. 0.43 617.10

13.11 630.21

③ 10.21 620.0

44' N. to 24.8' S. of Axis

Levels for E side of Dam

Date - 11/25/41

Weather Fair
Warm

Dickinson
Eckler
Jackson
Laing
Polak
King
Cote

35

Sta + H.I. - Elev

630.21

④ 5.21 6250

34' N to 217' S of Axis

⑤ 0.21 630.0

3.2' N to 189' S " "

T.P. 0.33 629.88

13.03 642.91

⑥ 7.91 635.0

29' N of Axis

⑦ 2.91 640.0

2.7' N " "

T.P. 12.07 630.84

Levels for E. side of Dam

Sta + H.I. - Elev.

T.P.

630.84

0.92 631.76

A-32

B.M.

5.71 626.05 626.06

Date - 11/25/41

Weather - Fair
Warm

Dickinson
Ecker
Jackson
Laing
Polak
King
Cote

36

Levels for E side of Dam

Date - 11/26/41 Jackson 37
 Weather - Fair Polak
 Warm Cole

Sta + H.I. - Elev

A-12

B.M.

592.42

12.02 604.44

T.P.

0.91 603.53

11.17 614.70

9.70 605.0

52' N. to 36' 0.5 of Axis

4.70 610.0

49' N. to 32' 1' S of Axis

T.P.

0.43 614.27

13.07 627.34

T.P.

3.68 623.66

8.64 632.30

A-13

B.M.

2.91 629.39

Levels for E. side of Dam

11/28/41
Fair - Warm

Dickinson
Jackson
Loing
King

38

Sta + H.I. - Elev.

A-34
B.M. 553.58

1047 564.05

T.P. 1.49 562.56

1228 574.84

① 9.8 565.0

66.3' S of Axis

T.P. 1.00 573.84

1212 585.96

② 0.96 585.0

51.1' S of Axis

T.P. 0.71 585.25

1007 595.32

Levels for E. side of Dam

11/28/41
Fair - WarmDickinson 39
Jackson
Loing
King

Sta. + H.I. - Elev.

595.32

③ 5.32 590.0

Grd stake - 47.3' S. of AXIS

④ 0.32 595.0

" " 5.7' N. of AXIS
" " 43.5' S. of AXIS

T.P. 11.19 584.13

13.02 597.15

A-33

B.M.

2.41 594.74 594.72

Levels for W. side of Dam

12/1/41
Fair - Warm

Jackson
Laing
King
Cole

40

Sta + H.I. - Elev

A-12
B.M.

592.42

12.10 604.52

T.P.

2.54 601.98

10.89 612.87

①

7.87 605.0

5.2' N to - 36.0 S. of AXIS

②

2.87 610.0

42' " " 32.2' " " "

T.P.

0.06 612.81

10.16 622.97

③

7.97 615.0

4.7' N to 28.4 S. of AXIS

④

2.97 620.0

44' " " 24.8' " " "

T.P.

2.45 620.52

11.36 631.88

⑤

6.88 625.0

34' " " 21.7' " " "

Levels for W. Side of Dam

12/1/41
Fair - Warm

Dickinson 41
Jackson
Lairg
King
Cole

Sta	+	H.I.	-	Elev.
		631.88		
⑥		1.88		630.0
T.P.		0.30		631.58
	12.63	644.21		
⑦		9.21		635.0
⑧		4.21		640.0
T.P.		0.35		643.86
A-16	8.34	652.20		
B.M.		2.64		649.56 649.55

32' N to 18.95 of Axis

29' " " 16.5' " " "

27' " " 14.6' " " "

12-2-21

42

LEVELS FOR E. SIDE OF DAM

DICKINSON
POLACK
LAING

B.M.

A-34 7.41 560.99 553.58

T.P. 0.17 560.82

10.18 571.00

① 6.0 565.00 9.7 N to 66.4 S

② 1.0 570.00 9.18 N to 62.6 S

③ 8.0 563.00 9.9 N

T.P. 11.09 559.91

0.52 560.43

Check 6.85 553.58 BM A-34 Record El-553.58

Levels for W. side of Dam

12/3/41
Fair - Warm

Dickinson 43
Jackson
King
Polak
King
Cole

Sta. + H.I. - Elev.
A-16
B.M. 649.55

0.44 649.99

T.P. 10.85 639.14

0.77 639.91

T.P. 11.68 628.23

1.68 629.91

① 4.91 625.0

34' N. to 217' S. of AXIS

② 9.91 620.0

4.4 " " 24.8' " " "

T.P. 12.59 617.32

2.19 619.51

③ 4.51 615.0

4.7' N. " 28.3' " " "

④ 9.51 610.0

4.9' N. " 32.1' " " "

T.P. 11.00 608.51

0.25 608.76

⑤ 3.76 605.0

5.2' " " 35.9

Levels for W. side of Dam

12/3/41
Cool-cloudy

Dickinson
Jackson
Loring
Polak
King
Cote

44

Sta + H.I. - Elev.

608.76

© 8.76 6000

5.4' N. to 39.7' S. of Axis

T.P. 9.93 59883

3.57 60240

A-12

B.M. 9.98 59242 59242

Levels for E. side of Dam

12/3/41
Cool - Cloudy

Dickinson
Jackson
King
Laird
Pope
Cole 45

Sta + H.I. - Elev

A-34
B.M. 553.58

6.70 560.28

① 5.28 555.0

10.7' N to 74.0' S. of Axis

② 0.28 560.0

10.2' " " 70.1' " "

③ 10.28 550.0

T.P. 0.61 559.67

10.66 570.33

5.33 565.0

9.7' N of Axis

0.33 570.0

9.2' " " "

T.P. 2.12 568.21

9.45 577.76

T.P. 12.95 564.81

1.87 566.68

A-34
B.M. 1301 553.57 553.58

Levels for W. Side of Dam

12/4/41
Fair-Warm

Jackson
Polak
King
Laing
Cole

46

Sta	+	H.I.	-	Elev
A-12				59242
B.M.				
	9.20	601.62		
①			1.62	6000
T.P.			0.94	60068
	7.76	60844		
②			3.44	6050
T.P.			8.11	60033
	4.09	60442		
A-12				
B.M.			1200	59242 59242

5.4' N. to 39.7' S. of Axis

52' " " 36.0' " " "

Levels for E. Side of Dam

12/5/41
Fair-Cool

Dickinson 47
Jackson
Potter
Laing
King
Cole

Sta	+	H.I.	-	Elev
A-33				
B.M.				594.72

0.26 594.98

①				
A-33		2.98		592.0
B.M.		0.26		594.72

6.2' N to 46.6' S. of Axis

A-34				
B.M.				553.58

12.26 565.84

①		0.84		565.0
---	--	------	--	-------

9.7' " " 66.3' S. " "

②		5.84		560.0
---	--	------	--	-------

10.2' " " 70.1' S. " "

③		10.84		555.0
---	--	-------	--	-------

10.7' " " 73.9' " " "

A-34				
B.M.		12.26	553.58	553.58

Levels for W. side of Dam

12/5/41
Fair Warm

Jackman
Polak
Loing
King
Cole

48

Sta	+	H.I.	-	Elev.
A-12				
B.M.				592.42

12.42 604.84

①		9.84		595.0
---	--	------	--	-------

5.7' N to 43.5' S of Axis

T.P.		1.77		603.07
------	--	------	--	--------

12.68 615.75

②		5.75		610.0
---	--	------	--	-------

4.9' N to 32.1' " " "

③		0.75		615.0
---	--	------	--	-------

4.7' " " 28.3' " " "

T.P.		1.15		614.60
------	--	------	--	--------

12.25 626.85

④		6.25		620.0
---	--	------	--	-------

4.4' " " 24.8' " " "

T.P.		0.37		626.48
------	--	------	--	--------

Levels for W. side of Dam

12/5/4
Fair - Warm

Jackson
Polak
Laird
King
Cote

49

Sta. + H.I. - Elev.

T.P. 62648

8.93 635.41

A-13

B.M. 6.07 629.34 629.33

Levels for E. side of Dam

12/5/41
Fair - Warm

Jackman
Polak
Leing
King
Cote

50

Sta + H.I. - Elev.

A-34

B.M.

553.58

12.21 565.79

T.P.

0.49 565.30

11.62 576.92

1.92 575.0

598 to S. of Ax N

T.P.

12.22 564.70

0.93 565.63

A-34

B.M.

12.06 553.57 553.58

Levels for E Side of Dam

12/8/41
Cool-cloudy

Dickinson
Jackson
Palata
Kainy
King
Cote

51

Sta + H.I. - Elev
A-33
B.M. 594.72

4.51 599.23

① 0.23 599.0

-40.55 of Axis

T.P. 0.62 598.61

12.52 611.13

1.13 610.0

49' N. to 321' S. of Axis

6.13 605.0

5.2 " " 36.0 " " "

11.13 600.0

5.4 " " 39.7' " " "

T.P. 12.30 598.83

1.30 600.13

5.13 595.0

5.7 " " 43.5' " " "

10.13 590.0

6.4 " " 47.3' " " "

T.P. 12.53 587.60

0.85 588.45

3.45 585.0

51.1' " " "

Levels for E. side of Dam

12/8/41

Cool - cloudy

Dickinson
Jackson
Laird
Palak
King
Cole

52

Sta + H.I. - Elev

588.45

8.45 580.0

74' N to 55.0' S of Ax N

T.P.

12.04 576.41

2.13 578.54

1.54 577.0

57.2' " " "

3.54 575.0

T.P.

12.35 566.19

2.44 568.63

1.63 567.0

95' N. of Ax N

6.63 562.0

100' " " "

T.P.

11.51 557.12

3.02 560.14

A-34

B.M.

6.57 553.57 553.59

Levels for E. side of Dam

12/9/41
Cool-cloudy

Dickinson
Jackson
Loring
Potter
King
Cole

53

Sta	+	H.I.	-	Elev.
A-24				
B.M.				55212
	6.50	55862		
①			3.62	555.0
②			10.62	544.0
T.P.			1.34	557.28
	12.65	569.93		
③			4.93	565.0
T.P.			12.45	557.48
	1.19	558.67		
A-24				
B.M.				55211 55212

10.7' N. to 73.9' S. of Ax. N

11.8' N. of Ax. N

66.3' " " "

Levels for East Keyway

12/10/41
Cool - Cloudy

Dickinson
Jackson
Laing
Polak
Cole

54

Sta	+ HI	- Elev.
A-33 B.M.		594.72
	11.83	606.55
	1.55	605.0
	6.55	600.0
	11.55	595.0
T.P.	12.65	593.90
	0.10	594.00
	4.00	590.0
	9.00	585.0
T.P.	12.47	581.53
	0.21	581.74
	1.74	580.0
	6.74	575.0
	11.74	570.0
T.P.	0.50	581.24

5.2' N. to 360' S. of Axis

5.4' " " 39.7' " " "

5.7' " " 43.5' " " "

6.4' " " 47.3' " " "

6.9' " " 51.1' " " "

Levels for East Keyway

12/10/41
Fair - Warm

Dickinson
Jackson
Polak
Loing
King
Cote

55

Sta	+	H.I.	-	Elev.
T.P.				581.24
	12.95	594.19		
T.P.			1.11	593.08
	3.80	596.88		
A-33 B.M.			2.14	594.74 594.72

Levels for E Keyway

12/11/41
Fair Warm

Dickinson 56
Jack Bron
Laing
King
Potter
Cole

Sta	+ H.I.	- Elev
A-34		
B.M.		553.58
	12.79	566.37
T.P.		1.09 565.28
	11.59	576.87
		6.87 570.0
		1.87 575.0
T.P.		1.67 575.20
	10.60	585.80
		0.80 585.0
		5.8 580.0
T.P.		11.59 574.21
	1.92	576.13
		3.13 573.0
		2.13 574.0
T.P.		6.33 569.80

627.5 of AXIS
58.8 " " "
51.2' " " "
55.0' " " "
60.3' " " "
59.5' " " "

Levels for East Keyway

12/11/41
Fair-Worm

Dickinson 57
Jackson
Polak
Loing
King
Cote

Sta. + H.I. - Elev.

T.P. 569.80

0.95 570.75

0.75 570.0

626' S. of Axis

5.75 565.0

66.4' " " "

10.75 560.0

702' " " "

T.P. 10.99 559.76

0.89 560.65

A-34
B.M. 7.05 553.60 553.58

Levels for W Keyway

12/11/41
Cool & cloudy

Jackson
Laing
Potter
King

Sta. + H.I. - Elev.
A-11
B.M. 558.56

1248 571.04

T.P. 0.16 570.88

1249 583.37

8.37 575.0

7.9' N to 58.7' S of Axis

3.37 580.0

7.4' N of Axis

T.P. 0.30 583.07

1247 595.54

5.54 590.0

6.4' N to 47.3' S of Axis

0.54 595.0

5.7' " 43.5' " " "

T.P. 0.16 595.38

1287 608.25

8.25 600.0

5.4' " 39.7' " " "

3.25 605.0

5.2' " 36.0' " " "

T.P. 0.79 607.46

Levels for W. Keyway

12/11/41
Cool-cloudy

Jackson
Polak
Lairg
King

59

Sta + H.I. - Elev.

T.P. 607.46

13.03 620.49

10.49 610.0

49' N. to 32.1' S of Axis

5.49 615.0

28.3' " " "

0.49 620.0

24.8' " " "

T.P. 9.11 611.38

11.49 622.87

C-1

T.B.M.

0.74 622.13

Top of rock on construction road

1.64 623.77

T.P.

12.70 611.07

0.69 611.76

T.P.

8.54 603.22

0.59 603.81

C-2

T.B.M.

7.33 596.48

Top of rock on construction road

1.87 598.35

Temporary Bench Levels

West Slope

Sta. + H.I. - Elev

598.35

T.P. 1308 585.27

9.45 594.72

A-12

B.M.

2.30 592.42 592.42

12/12/41
Cool-cloudy

Jackson
Laing

60

Levels for Fillet Line on

E. Keyway

Sta. + H.I. - Elev.
 A-34 B.M. 553.58

12.11 565.69

T.P. 0.46 565.23

12.45 577.68

① 12.68 565.0

9.7' N. of Axis

② 10.68 567.0

9.5' " " "

③ 7.68 570.0

9.2' " " "

④ 5.68 572.0

8.2' " " "

⑤ 2.68 575.0

7.9' " " "

T.P. 0.10 577.58

10.83 588.41

⑥ 10.41 578.0

7.6' " " "

⑦ 8.41 580.0

7.4' " " "

⑧ 6.41 582.0

7.2' " " "

⑨ 3.41 585.0

6.9' " " "

12/15/41
 Fair-Cool

Dickinson
 Jackson
 Laing
 Polak
 King
 Cole

61

Levels for Fillet Line on

E. Keyway

Sta.	+	H.I.	-	Elev
		588.41		
T.P.		12.99		575.42
	0.41	575.83		
T.P.		13.10		562.73
	1.80	564.53		
⑩		2.53		562.0
⑪		4.53		560.0
A:34				
B.M.		10.96		553.57 553.58

12/15/41
Fair-Cool

Dickinson 62
Jackson
Polak
Laing
King
Cole

10.0' N of Axis

10.2' " " "

Levels for E Keyway

12/15/41
Fair - Warm

Dickinson
Jackson
Potter
Laird
King
Cole

63

Sta.	+	H.I.	-	Elev.
A-34 B.M.				553.58
	10.96	564.54		
T.P.			3.19	561.35
	0.90	562.25		
T.P.			12.30	549.95
	0.58	550.53		
①			12.13	538.0
T.P.			0.89	549.64
	6.99	556.63		
A-24 B.M.			4.50	552.13 552.12

86.9' S. of Axis

Levels for E. Keyway

Sta	+	H.I.	-	Elev.
A-23				523.86
B.M.				
	12.39	536.25		
①			11.25	525.0
②			6.25	530.0
③			1.25	535.0
T.P.	12.88	548.50		
			8.50	540.0
			3.50	545.0
T.P.			0.99	547.51
	12.94	560.45		
T.P.			0.06	560.39
	13.06	573.45		
			12.91	560.45
A-34	3.98	564.52		
B.M.			10.94	553.58, 553.58

12/16/41
Fair-Warm

Dickinson
Jackson
Polak
Laing
King
Cole

64

96.7' South of Axis

93.0' " " "

89.1' " " "

85.3' " " "

81.3' " " "

Levels for E. Keyway

12/18/41
Fair-Warm

Dickinson 65
Jackson
Polak
Laing
King
Cote

Sta + H.I. - Elev.
A-33
B.M. 594.72

0.46 595.18

T.P. 12.87 582.31

0.40 582.71

① 2.71 580.0

74 North of Axis

② 7.71 575.0

79 " " "

③ 12.71 570.0

92 " " "

T.P. 13.05 569.66

0.60 570.26

④ 5.26 565.0

97 " " "

⑤ 10.26 560.0

102 " " "

T.P. 12.94 557.32

1.37 558.69

⑥ 3.69 555.0

107 " " "

⑦ 8.69 550.0

11.2 " " "

T.P. 4.24 554.44

Levels for E. Keyway

12/13/41
Fair - Warm

Dickinson 66
Jackson
Polak
King
Loring
Cole

Sta + H.I. - Elev.

T.P. 55444

A-34 4.97 55941

B.M. 5.83 553.58 553.58

Levels for E. Keyway

12/19/41
Fair-Cool

Dickinson
Jackson
Polak
King
Laing
Cole

67

Sta.	+	H.I.	-	Elev.
A-23				
B.M.				52386
		10.32		534.18
①			9.18	525.0
②			4.18	530.0
A-23				
B.M.		10.32		52386

967 South of Axis

929 " " "

Levels for E. Keyway

Sta	+	H.I.	-	Elev.
A-34				553.58
B.M.				
	10.98	564.56		
①			4.56	5600
②			9.56	5550
T.P.			1.23	563.33
	12.20	575.53		
③			10.53	5650
④			5.53	570.0
⑤			0.53	575.0
⑥			2.53	573.0
T.P.			12.54	562.99
	1.46	564.45		
A-34				
B.M.			10.86	553.59 553.58

12/19/41
Fair-

Dickinson
Jackson
Polak
Laing
King
Cole

68

701' South of Axis

739' " " "

66.3' " " "

62.5' " " "

58.7' " " "

60.3' " " "

Levels for East Keyway

B.M.#23

523.86

9.65 533.51

1.51 532.00 91.43

13.51 520.00 100.55

10.51 523.00 98.27

B.M.#23

9.65 523.86

Weather
Cool
Bright
4mi wind

Dickinson 69
Ecker
Polak
Cole 11/20/61

Downstream

9+82

"

"

9+42

Levels in West Keyway for
Painted fillet

70

Dickinson
+ Ecker
? Polak
φ Cole

B.M. #16

649.55

0.19 49.74

TP

12.35 637.39

1.22 638.61

TP

12.88 625.73

0.82 626.55

4.4 N

6.55 620.00 24.79 S

4.7 N

11.55 615.00 28.4 S

TP

12.39 614.16

2.79 616.95

32.2 S

6.95 610 4.9 N

36.0 S

11.95 605 5.2 N

10.95 606 5.1 N

TP

12.07 604.88

0.50 605.38

FILLET (Cont.)

605.38

5.43N

5.38 600.00 3985

53.1N

3.38 602.00

5.7N

10.38 595.00 43.66

TP

11.64 593.74

⁷
0.88 ¹
94.68

6.4N

4.61 590.00 47.45

6.9N

9.61 585.00 51.26

6.6N

⁶
8.61 588.00

TP

⁷
12.86 581.85

0.63 82.48

11.92 570.56

2.80 79.36

1.65 571.71

3.45 575.16

B.M.#7

⁶
9.26 575.90 565.91

Levels for E. Keyway

Sta	+ H.I.	- Elev.
A-34		
B.M.		553.58
	3.17	556.75
T.P.		12.82 543.93
	0.21	544.14
①		4.14 540.0
②		9.14 535.0
T.P.		1.08 543.06
	12.66	555.72
③		10.72 545.0
④		5.72 550.0
⑤		0.72 555.0
⑥		8.72 547.0
T.P.		4.50 551.22
	8.31	559.53
A-34		
B.M.		5.96 553.57 553.58

12/22/41
Fair - Warm

Dickinson
Jackson
Potter
Laird
King
Cole

12.

122' N of Axis

12.7' " " "

11.7' " " "

11.2' " " "

10.7' " " "

11.5' " " "

Levels for W. Keyway

Sta.	+	H.I.	-	I.S.	Elev
A-11					
B.M.					558.57

10.41 568.98

A-11				0.98	568.0
B.M.		10.41			558.57

12/24/41
Fair-Cool

Dickinson
Jackson
Palatka
King 73

64.1'S. of Axis - 94'N. of Axis

Levels for East Keyway

12/28/31

Dickinson 74.
Polack
King
Cole

A-23

BM

1.43 525.29

523.86

5.29 520.00

100.6 South of axis

10.29 515.00

104.4 " " "

510.00

(Hand level) 108.2 " " "

1.43 523.86 52386 87

— Levels in East Keyway —

12/31/41

Dickinson
Polack

A-23

B.M

1.10 524.96

523.86

T.P.

12.99 511.97

6.68 518.65

12.65 506⁰⁰

16.5 North

8.65 510⁰⁰

16.1 "

T.P.

0.52 518.13

12.58 530.71

Levels for East Keyway

12/31/41

Dickinson 755
Polak

sta. + HI - 1.5 Elev

530.71

10.71 520.0

15.1 North

0.71 530.0

13.2 "

TP

0.73

529.98

1274542.72

2.72 540.0

12.2 "

TP

0.31

542.41

6.19 548.60

TP

1.69

546.91

10.81 557.72

BM

4.20

553.52

553.58

BM # A-34

€ BIK #1	Sta
1	3+46
2	3+96
3	4+46
4	4+96
5	5+46
6	5+96
7	6+44 ²⁵
8	6+90 ²⁵
9	7+37 ²⁵
10	7+83 ²⁵
11	8+30 ²⁵
12	8+76 ²⁵
13	9+25
14	9+75
15	10+25
16	10+75
17	11+25
18	11+75

19 12+25 8.4

20 12+75 561
573.4

5.0
1.1
5.11
4.5
9.6

568.4

575.53
12.14
662.99

4.5
5.4

551

6.4

563.4

6.15
4.5
10.65

$$\begin{array}{r} "A" = 2.5 \\ \text{bottom} = 1.25 \\ \hline 3.75 \end{array}$$

$$\begin{array}{r} 52 \\ \hline 620 \\ 672 \end{array}$$

$$\begin{array}{r} 5.7 \\ 630.2 \\ \hline A = 2.5 \\ 1.0 \\ \hline 3.5 \end{array}$$

$$\begin{array}{r} .75 \\ 2.5 \\ \hline 3.25 \\ 640.2 \end{array}$$

$$\begin{array}{r} 2.5 \\ 0.5 \\ \hline 3.0 \\ 645 \end{array}$$

± BIK.#1 = 3+46

sta @ top of dam

613

618.5
9.5
609.0

$$\begin{array}{r} 32.15 \\ 2.28 \\ \hline 29.97 \\ 51.15 \\ 47.35 \\ \hline 3.80 \\ 1.90 \\ 663.16 \\ 5.31 \\ \hline 668.47 \\ 12.38 \\ \hline 656.09 \end{array}$$

$$\begin{array}{r} 51.15 \\ 1.90 \\ \hline 49.25 \\ 668.47 \\ 12.38 \\ \hline 656.09 \end{array}$$

$$\begin{array}{r} 47.35 \\ 53.55 \\ \hline 2.8 \end{array}$$

596.1

$$\begin{array}{r} .76 \\ \hline 1.52 \end{array}$$

$$\begin{array}{r} 1.52 \\ 76 \\ \hline 2.28 \end{array}$$

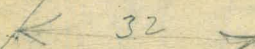
$$\begin{array}{r} 43.15 \\ 39.75 \\ \hline 3.80 \end{array}$$

$$\begin{array}{r} 47.35 \\ 2.28 \\ \hline 45.07 \end{array}$$

$$\begin{array}{r} 513.50 \\ 76 \\ \hline 530 \end{array}$$

1.7

$$\begin{array}{r} .76 \\ .07 \\ \hline .83 \end{array}$$



616.9

$$\begin{array}{r} 43.55 \\ 87 \\ \hline 48.72 \end{array}$$

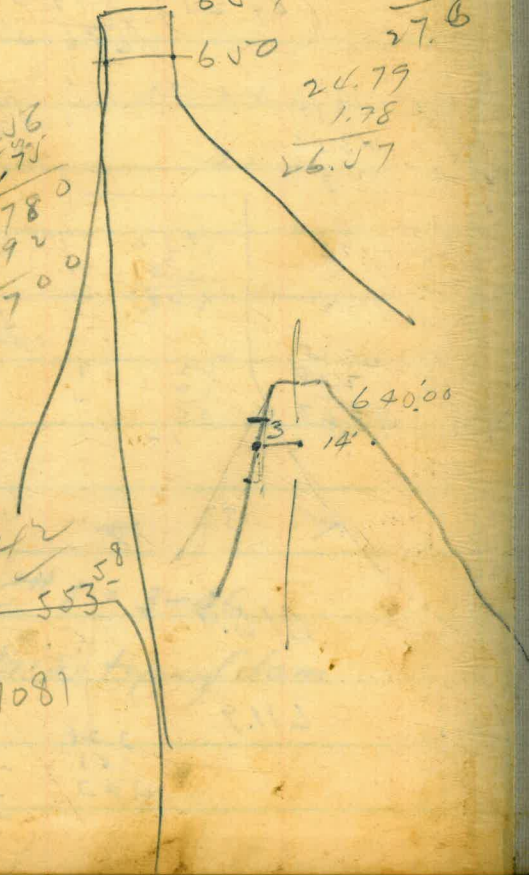
611.9

$$\begin{array}{r} 3.28 \\ 1.61 \\ \hline 4.93 \\ 1.9 \\ \hline 3.3 \\ \hline 5.5 \end{array}$$

10.0 8.2

578.7
 28.35
 24.79
 4.02
 33
 91.93
 9175
 7.64
 16.7
 27.6
 24.8
 2.8
 27.6

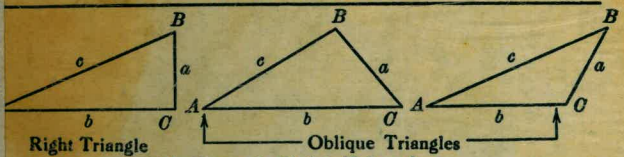
3 3.56
 1780
 2092
 27700



59242
 55358
 A34
 +4.20
 -1081
 +1.69

5119
 1299
 496

TRIGONOMETRIC FORMULÆ



Right Triangle
 Oblique Triangles

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

Solution of Oblique Triangles
 Given B, a Required b, c, C $b = \frac{a \sin B}{\sin A}$, $C = 180^\circ - (A + B)$, $c = \frac{a \sin C}{\sin A}$
 Given a, b Required B, c, C $\sin B = \frac{b \sin A}{a}$, $C = 180^\circ - (A + B)$, $c = \frac{a \sin C}{\sin A}$
 Given b, c Required A, B, c $A + B = 180^\circ - C$, $\tan \frac{1}{2}(A - B) = \frac{(a - b) \tan \frac{1}{2}(A + B)}{a + b}$
 $c = \frac{a \sin C}{\sin A}$
 Given b, c Required A, B, C $s = \frac{a + b + c}{2}$, $\sin \frac{1}{2}A = \sqrt{\frac{(s - b)(s - c)}{bc}}$
 $\sin \frac{1}{2}B = \sqrt{\frac{(s - a)(s - c)}{ac}}$, $C = 180^\circ - (A + B)$
 Given b, c Area $s = \frac{a + b + c}{2}$, $\text{area} = \sqrt{s(s - a)(s - b)(s - c)}$
 Given a, b, c Area $\text{area} = \frac{bc \sin A}{2}$
 Given 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° 10'. From Table, Page IX, $\cos 5^\circ 10' = .9959$. Horizontal distance = 318.4 × .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. $\text{Cosine } 5^\circ 10' = .9959$, $1 - .9959 = .0041$. $318.4 \times .0041 = 1.31$. $318.4 - 1.31 = 318.09$ 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.