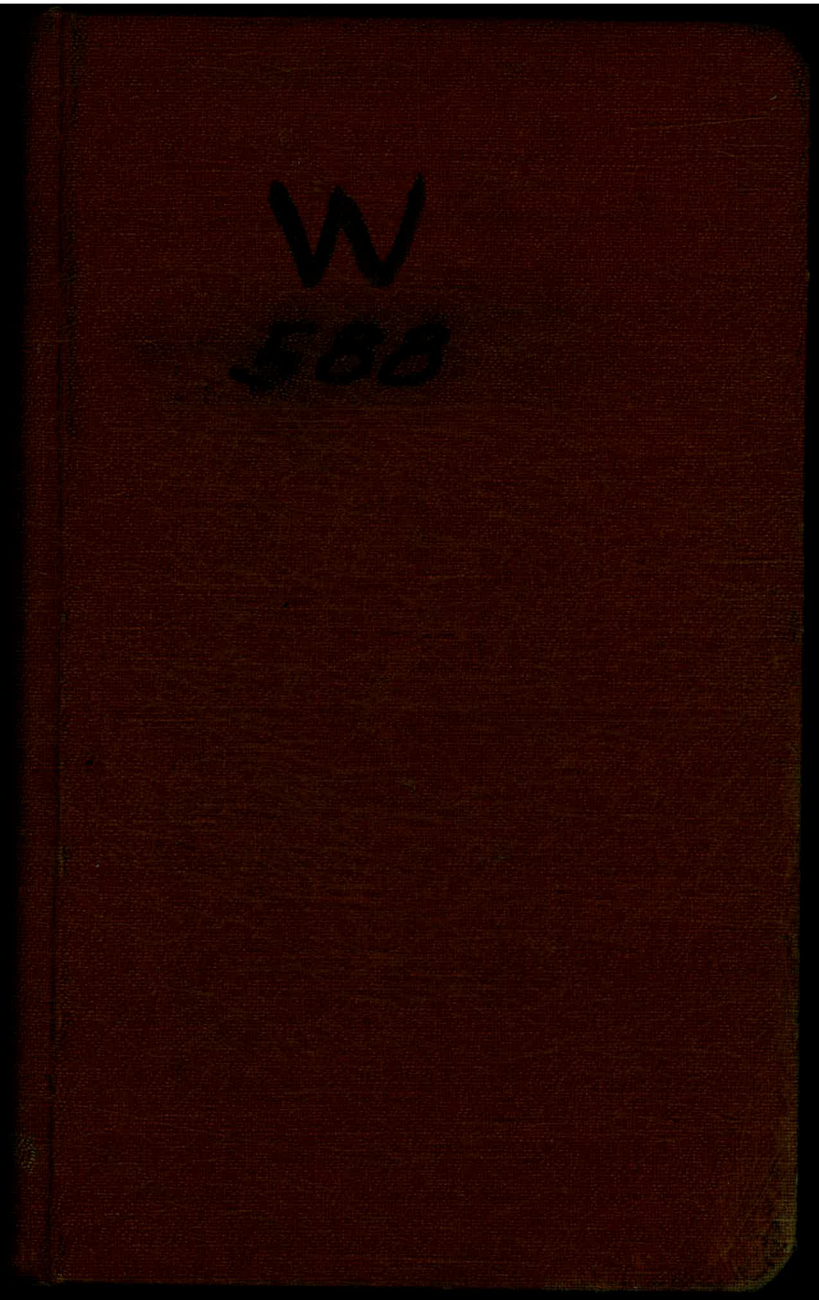
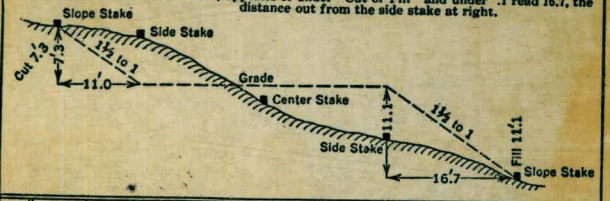

W
$88

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.



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.

588

10,455. cm, h, ai. cM.

PARTIAL ESTIMATES
Nov. 1941

Item	Pg
Levels on X-section control (East K.)	4
X-Sections - East Keyway	5-10
X-Sections - West Keyway	10-20
" " "	35-37
Levels on X-Section Control (East K)	38-39
X-Sections East Keyway	40-61
Profile of axis (east slope) 12+25 to 9+50 - also profile line 50' south of axis 11+75 to 9+75 (Dec 12.)	62-66
Profile of Axis - W. side	67-68

LEVELS ON X-SECTION CONTROL

overcast
Warm

11/26/41
Ecker
King
Bruce

B.M #32				626.06
	12.86	638.92 ✓		
12+50/50N			8.77	630.15 ✓
TP			0.57	638.35 ✓
	12.20	650.55 ✓		
12+60/50N			10.21	640.34 ✓
12+70/50N			4.05	646.50 ✓
12+80/50N			0.38	650.17 ✓
TP			1.37	649.18 ✓
	13.06	662.24 ✓		
12+90/50N			5.79	656.45 ✓
TP			2.48	659.76 ✓
	7.13	666.89 ✓		
13+00/50N			2.44	664.45 ✓
B.M #31			3.79	663.10 663.09

X-SECTION - EAST KEYWAY

11-26-41
Dickinson
Ecker
Jackson
Cole
Laing
King
Polak

13+00

Sta	V.A.	Funct.	dist	DIFF.	EL	Notes	Soil
50 N	⊼				664.45	Level Elevation (Pg 4)	
30 S	+16°35	.297 (8)	80	23.8	688.3	W. edge headtower rd	LR
20 S	+15°35	.279	70	19.5	684.0		LR
10 S	+13°53	.247	60	14.8	679.3		LR
Axis	+12°28	.221	50	11.1	675.6		LR
10 N	+10°41	.189	40	7.6	672.1		R
20 N	+11°12	.198	30	5.9	670.4		LR
30 N	+9°05	.160	20	3.2	667.7		LR
40 N	+8°04	.142	10	1.4	665.9		LR

12+90

56.6 N	⊼				656.45	Level elevation (Pg 4)	
40 N	+4°02	.071	16.6	1.2	57.8 (7)		LR
30 N	+7°16	.128	26.6	3.4	59.9		LR
20 N	+9°02	.159	36.6	5.8	62.3		LR

Elevs. comp. by D.W.L. 12-1-41
checked RRE 12-2-41

STA	VA	FUNCT	DIST	DIFF	EL	NOTES	11-26-41
		12+90			656.45		
10 N	+5°17	.092	46.6	4.3	660.8		R
AXIS	+4°02	.071	56.6	4.0	660.5		R
10S	+14°26	.257	66.6	17.1	73.6		R
20S	+14°05	.251	76.6	19.2	75.7		L R
30S	+16°55	.304	86.6	26.3	82.8		L R
40S	+16°53	.304	96.6	29.4	85.9	℄ of headtower rd.	L R
		12+80					
50N	⊼				650.17	Level elevation (Pg 4)	
40N	+8-21	.147	10.0	1.5	51.7		L R
30N	+10-10	.179	20.0	3.6	53.8		L R
20N	+7-20	.129	30.0	3.9	54.1		L R
10N	+1-05	.019	40.0	0.8	51.0		R
AXIS	-0-16	.005	50.0	-0.3	49.9		R
10S	+6-15	.110	60.0	6.6	56.8		R
20S	+11-05	.196	70.0	13.7	63.9		R
30S	+16-13	.291	80.0	23.3	73.5	Elevs comp by DWL 12-1-41	R
						checked RRE 12-2-41	

STA	VA	FUNCT	DIST	DIFF	EL
		12+80			650.17
40S	+19-45	.359	90.0	32.3	682.5
50S	+18-30	.335	100.0	33.5	683.7
		12+70			
Mat 41N					647.4
50S	+20-14	.369	91.0	33.6	81.0
60S	+18-39	.338	101.0	34.1	81.5
40S	+19-19	.351	81.0	28.4	75.8
30S	+15-53	.285	71.0	20.2	67.6
20S	+9-14	.163	61.0	9.9	57.3
10S	-1-43	.030	51.0	-1.5	45.9
AXIS	-11-12	.198	41.0	-8.1	39.3
10N	-5-44	.106	31.0	-3.1	44.3
20N	-2-28	.043	21.0	-0.9	46.5
30N	-4-55	.086	11.0	-0.9	46.5
50N					646.5
		12+60 - Next page			

NOTES 11/26/41

Soil	
	R
West edge Headtower (dirt) road	L R
Ground elevation	L R
Top of bank	L R
W. edge Head Tower rd.	L R
	R
	R
	R
	R
	R
	R
	R
	R
	L R
Refer To page 4 for level elev.	L R

Elevs comp. by D.W.L. 12-1-41
checked RRE 12-2-41

12+60

Sta.	V A	Funct.	Dist.	Diff	Elev.
50 N			18.9		640.34
40 N			8.9		642.7
31.1 N	℄ at				643.4
20 N	-13-25	.239	11.1	-2.7	40.7
10 N	-11-12	.198	21.1	-4.2	39.2
Axis	-20-09	.367	31.1	-11.4	32.0
10 S	-7-16	.128	41.1	-5.3	38.1
20 S	+5-27	.095	51.1	+4.9	48.3
30 S	+12-48	.227	61.1	13.9	57.3
40 S	+16-17	.292	71.1	20.8	64.2
50 S	+20-02	.365	81.1	29.6	73.0
60 S	+19-35	.356	91.1	32.4	75.8
70 S	+19-08	.347	101.1	35.1	78.5
	12+50	—	—	—	—
80 S	+24-09	.448	95.4	42.7	75.7
70 S	+24-44	.461	85.4	39.4	72.4
60 S	+25-13	.471	75.4	35.5	68.5
					633.0

Notes 11/26/41

Level elevation (Page 4)

Ground level

℄ of 15.4 N

Elev. comp. by DWL 12-1-41
Checked RRE 12-2-41

Soil

L R
L R
L R
R
R
R
R
R
R
L R
L R
L R
L R
L R
R

Sta	V A	Funct	Dist	DIFF.	El.	Notes 11/26/41	
		12+50					Soil
50 S	+25-23	.474	65.4	31.0	664.0		R
40 S	+25-10	.470	55.4	26.0	59.0		R
30 S	+25-06	.468	45.4	21.2	54.2		R
20 S	+15-33	.278	35.4	9.8	42.8		R
10 S	-4-33	.080	25.4	-2.0	31.0		R
Axis	-19-33	.355	15.4	-5.5	27.5		R
10 N	+4-34	.080	5.4	+0.4	33.4		R
15.4 N	⊼ aT				633.0	Ground elevation	R
20 N	+1-55	.033	4.6	0.2	33.2		R
30 N	+1-45	.031	14.6	0.5	33.5		R
40 N	-2-25	.042	24.6	-1.0	32.0		L R
50 N			34.6		630.15	Level Elev. (Page 4)	L R
	12+40						
40 N	-8-20	.146	15.0	-2.2	28.2		L R
30 N	-2-12	.038	5.0	-0.2	30.2		L R
25 N	⊼ aT				630.4	Ground elev.	R

checked by RRE 12-2-41

Sta	Y A	Funct	Dist	Diff	El.	Soil
		12+40			630.4	
20 N	-0-16	.005	5.0	0.0	630.4	R
10 N	-0-45	.013	15.0	-0.2	30.2	R
Axis	-17-02	.306	25.0	-7.7	22.7	R
10 S.	-8-06	.142	35.0	-5.0	25.4	R
20 S	-4-55	.086	45.0	-3.9	26.5	R
30 S	+16-39	.299	55.0	+16.4	46.8	R
40 S	+15-20	.274	65.0	12.8	48.2	R
50 S	+18-39	.338	75.0	25.4	55.8	L R
60 S	+18-18	.321	85.0	28.1	58.5	L R
70 S	+19-59	.363	95.0	34.5	65.0	L R
80 S	+20-31	.374	105.0	39.3	69.7	L R
90 S	+20-12	.368	115.0	42.3	72.7	L R
						L R

Notes 11/26/41

West edge Headtower rd.

Elev comp by D.W.L. 12-1-41
checked - RRE - 12-2-41

Cross-Sections on W. Side of Dam

11/29/41
Cool - cloudy

Jackson
King
Laing

11

Sta.	+	H.I.	-	Elev
A-16 B.M.				649.55
	1.56	651.11		
		3+61		
40's ✓			0.40	650.7 ✓
30's ✓			6.1	645.0 ✓
		3+71		
30's ✓			9.8	641.3 ✓
40's ✓			1.1	650.0 ✓
		3+81		
40's ✓			7.4	43.7 ✓
		3+91		
40's ✓			8.6	42.5 ✓
30's ✓			11.1	40.0 ✓
T.1				

Reductions + check
by DWL + RRE
12-2-41

11/29/41 NOTES

Sta.	+	H.I	−	Elev.
		651.11 ✓		
T.P.			12.67	638.44 ✓
	0.66	639.10 ✓		
		3+81		
30's ✓			2.2	36.9 ✓
		3+61		
20's ✓			4.4	34.7 ✓
10's ✓			7.0	32.1 ✓
Axis ✓			11.7	27.4 ✓
10'N ✓			8.8	30.3 ✓
20'N ✓			1.6	37.5 ✓
30'N ✓			1.7	37.4 ✓
40'N ✓			3.2	35.9 ✓
		3+71		
40'N ✓			4.8	34.3 ✓

11/29/41 Notes

13.

Sta	+	H.I	−	Elev.
		639.10 ✓		
		3+71		
30'N ✓			6.3	32.8 ✓
20'N ✓			6.3	32.8 ✓
10'N ✓			8.7	30.4 ✓
10'S ✓			12.9	26.2 ✓
20'S ✓			10.9	28.2 ✓
		3+81		
40'N ✓			10.1	29.0 ✓
30'N ✓			11.7	27.4 ✓
20'N ✓			11.9	27.2 ✓
T.P.			11.95	627.15 ✓
	1.35	628.50 ✓		

11/29/41 Notes

Stg.	+	H.I	−	Elev
		628.50		
		3+91		
40'N			3.6	624.9
30'N			4.2	24.3
20'N			5.1	23.4
10'N			10.2	18.3
Axis			12.6	15.9
10's			11.6	16.9
20's			10.1	18.4
		3+71		
Axis			5.9	23.1
		3+81		
10's			7.5	21.0
20's			4.9	23.6
Axis			7.6	20.9

Sta.	+	H.I.	−	Elev.
		628.50		
		4+01		
40'N			5.8	622.7
30'N			7.4	21.1
T.P.			13.01	615.49
	5.51	621.00		
		4+01		
20'N			6.3	14.7
10'N			8.3	12.7
Axis			9.8	11.2
10'S			8.3	12.7
20'S			7.7	13.3
30'S			0.9	20.1

Sta.	+	H.I	−	Elev
		621.00 ✓		
		4+11		
40'S ✓			2.3	618.7 ✓
30'S ✓			8.4	12.6 ✓
20'S ✓			11.1	09.9 ✓
10'S ✓			12.2	08.8 ✓
Axis ✓			12.0	09.0 ✓
10'N ✓			10.8	10.2 ✓
20'N ✓			9.1	11.9 ✓
30'N ✓			8.7	12.3 ✓
40'N ✓			7.9	13.6 ✓
		4+21		
40'N ✓			10.7	10.3 ✓
30'N ✓			11.0	10.0 ✓
20'N ✓			11.3	09.7 ✓

Stg	+	H.I	−	Elev.
		621.60		
		4+21		
10'N			11.8	09.2
Axis			13.2	07.8
10'S			12.0	09.0
30'S			12.3	08.7
40'S			6.7	14.3
		4+31		
50'S			8.3	12.7
40'S			8.6	12.4
10'N			13.2	07.8
20'N			11.8	09.2
30'N			11.5	09.5
40'N			10.9	10.1

Sta.	+	H.I.	−	Elev
		621.00		
T.P			10.03	610.97
	3.49	614.46		
		4+21		
20's			7.5	607.0
		4+31		
Axis			7.9	06.6
10's			8.9	05.6
20's			10.2	04.3
30's			9.0	05.5
50's			2.9	11.6
T.P.			.77	613.69
	12.64	626.33		

11/29/41
Cool - Cloudy

Jackson
King
Laing

Cross-sections for W. side of Dam

Sta.	+	H.I.	−	Elev.	
		626.33 ✓			
T.P. ⊗			1.80	624.53 ✓	
	11.23	635.76 ✓			
		4+11			
50's ✓			12.5	623.3 ✓	
		4+21			
50's ✓			17.2	18.6 ✓	
B.M. A-13			6.40 ~~5.40~~	630.36 ~~629.36~~ 629.36	629.73
B.M. # A-13					629.33
	6.33	635.66			
TP ⊗				11.16	624.50

Check

(See L.B. 554 Page 66)

Dec 1, 1941
Dickinson
Jackson

X-SECTION- WEST KEYWAY

A-16			649.58	
	12.71	662.29		
3+11 / 10N		1.2	661.1	✓
AXIS		2.5	59.8	✓
10S		2.2	60.1	✓
3+21 / 20S		2.9	59.4	✓
10S		9.5	52.8	✓
AXIS		7.5	54.8	✓
10N		4.1	58.2	✓
3+31 / 10N		9.4	52.9	✓
20S		5.5	56.8	✓
10S		12.7	49.6	✓
TP		0.50	661.79	
	10.34	672.13		
3+01 / 10N		6.4	65.7	✓
AXIS		8.0	64.1	✓

NOTES

Ecker
Cole
Polak

11/28/41

(These partial estimate elevations determined by engineers level)

11/28/41

		672.13			
3+01 / 10S			6.0	666.1	✓
20S			2.1	70.0	✓
3+11 / 20S			4.3	667.8	✓
TP			11.78	660.35	✓
	1.33	661.68			
TP			11.74	649.94	✓
	2.80	652.74			
3+31 / AXIS			5.6	47.1	✓
3+41 / 10N			9.7	43.0	✓
AXIS			12.2	40.5	✓
10S			8.5	44.2	✓
20S			2.0	50.7	✓
3+51 / 20S			7.7	45.0	✓
20N			12.5	40.2	✓
TP			12.80	639.94	✓
	1.23	641.17			

11/28/41

		641.17 ✓			
3+51 / 10S ✓			3.2	638.0 ✓	
AXIS ✓			8.1	33.1 ✓	
10N ✓			2.3	38.9 ✓	
TP			0.84	640.33 ✓	
	10.67	651.00 ✓			
3+51 / 30S ✓			0.6	50.4 ✓	
TP			1.11	649.89 ✓	
	10.64	660.53 ✓			
3+41 / 30S ✓			2.2	58.3 ✓	
TP				649.89	
	10.56	660.45 ✓			
BM #A16			10.90	649.55 ✓	649.58

Level Control for V.A. X-section

11/28/41 Jackson Laing

Sta	+	H.I.	-	Elev.	
A-32 B.M.				626.06	
	0.16	626.22			
12+30			4.4	621.8	50' N of Axis
T.P.			11.39	614.83	
	0.36	615.19			
12+20			2.7	612.5	" " " "
12+10			8.0	607.2	
12+00			8.1	607.1	

11/28/41
Fair - Warm

Jackson
Laing

Sta	+	H.I.	-	Elev.	
		615.19			
11+90			8.0	607.2	
T.P.			11.79	603.40	
	1.01	604.41			
11+80			4.3	600.1	
A-33 BM.			9.69	594.72	594.72

Cross-section on E side of dam

Sta	+	HI.	−	Elev
12+30 50N	6.5	628.3		621.8
12+30 10N			4.6	623.7

12+30

Sta	VA	Funct	Dist	Diff	Elev
T at 10N			0.0		623.7
50N			40.0		621.8
40N	-0-18	.005	30.0	-0.2	623.5
30N	+/-10	.020	20.0	+0.4	624.1
20N	+2-48	.049	10.0	+0.5	624.2
Axis	-33 47	.669	10.0	-6.7	617.0
10S	-9-45	.172	20.0	-3.4	620.3
20S	-6-58	.122	30.0	-3.7	620.0

12+20

T at 10S					609.9
50N					612.5

11/28/42 Jackson
Fair - Warm Laing

40.

Refer To page 38

Soil

R

Ground Elevation L R

Refer To page 38 L R

L R

L R

L R

R

R

Cont. on Page 42 R

Ground Elev. R

Refer To page 38 L R

Computed + checked by
OWL + RRE 12-1-41

Sta	V A	Funct	Dist	Diff.	Elev	
		12+20			609.9	
40 N	+3-30	.061	50.0	+3.2	613.0	L R
30 N	+4-30	.079	40.0	3.1	613.0	L R
20 N	+3-16	.057	30.0	1.7	611.6	L R
10 N	+5-32	.097	20.0	1.9	611.8	L R
Axis	-2-55	.051	10.0	-0.5	609.4	R
20 S	-3-58	.069	10.0	-0.7	609.2	R
30 S	+1-12	.021	20.0	+0.4	610.3	R
40 S	+14-06	.251	30.0	± 7.5	617.4	R
		12+10				
50 N	Π at				607.2	
40 N	-0-43	.013	10.0	-0.1	607.1	L R
30 N	+1-18	.023	20.0	+0.5	607.7	L R
20 N	+1-56	.034	30.0	+1.0	608.2	L R
10 N	-1-29	.026	40.0	-1.0	606.2	L R
Axis	-2-14	.039	50.0	-2.0	605.2	R
10 S	-2-25	.042	60.0	-2.5	604.7	R

Notes 11/28/41

Cont on Page 43

Refer To page 38

Sta	VA	Funct	Dist	Diff	Elev	Notes 11/28/41	Soil
		12+10			602.2 7.2		
20S	-1-36	.028	70.0	-2.0	605.2		R
30S	-0-54	.016	80.0	-1.3	605.9		R
40S	-0-41	.012	90.0	-1.1	606.1		R
50S	+7-25	.130	100.0	+13.0	620.2		R
60S	+12-53	.229	110.0	+25.2	632.4		R
70S	+16-58	.305	120.0	+36.6	643.8		R
80S	+18-53	.342	130.0	+44.5	651.7		LR
90S	+18-51	.341	140.0	+47.8 7	655.0 54.9		LR
	Cont From Page 40						
		12+30					
Δ at	10N				623.7	Ground elev. Refer To page 40	
30S	+11-14	.199	40.0	+8.0	631.7		R
40S	+19-03	.345	50.0	17.3	641.0		R
50S	+18-36	.337	60.0	20.2	643.9		R
60S	+22-16	.409	70.0	28.6	652.3		R
70S	+24-16	.451	80.0	36.1	659.8		LR

Sta	VA	Funct	Dist	Diff	Elev	Notes 11/28/41	Soil
		12+30			623.7		L
80S	+23-28	.434	90.0	~~39.1~~	662.8		L R
90S	+23-30	.435	100.0	43.5	667.2		
		Con. from Page 41					
		12+20					
Π at 10S					609.9	Ground elevation	L R
90S	+32-21	.633	80.0	50.6	660.5		L R
80S	+34-14	.680	70.0	47.6	657.5		L R
70S	+35-01	.701	60.0	42.1	652.0		R
60S	+30-23	.586	50.0	29.3	639.2		R
50S	+28-43	.548	40.0	21.9	631.8		R
		12+00					
Π at 50N					607.1	Ground elevation Refer To Page 38	L R
90S	+17-15	.311	140.0	43.5 ~~19.4~~	50.6 ~~626.7~~		L R
80S	+16-48	.302	130.0	39.3	646.4		L R
70S	+11-39	.206	120.0	24.7	631.8		R

Sta.	VA	Funct	Dist	Diff	Elev	Notes 11/28/41	Soil
		12+00			607.1		
60 S	+7-50	.138	110.0	15.2	622.3		R
50 S	+0-33	.010	100.0	1.0	608.1		R
40 S	-6-54	.121	90.0	-10.9	596.2		R
30 S	-9-00	.158	80.0	-12.6	594.5		R
20 S	-10-50	.191	70.0	-13.4	593.7		R
Δ at 30 N					608.1	Ground elevation	LR
10 S	-18-39	.338	40.0	-13.5	594.6		R
AXIS	-23-32	.436	30.0	-13.1	595.0		R
10 N	-24-46	.461	20.0	-9.2	598.9		R
20 N	-15-46	.282	10.0	-2.8	605.3		R
40 N	-4-50	.085	10.0	-0.9	607.2		LR
	11+90						
Δ at 30 N					608.0	Ground elevation	LR
50 N			20.0		607.2	Ground elevation refer To page 39	LR

Sta	V A	Funct	Dist.	Diff	Elev.	Notes 11/28/41	45 Soil
		11+90			608.0		
40 N	-2-30	.044	10.0	-0.4	607.6		L R
20 N	-3-26	.712	10.0	-7.1	600.9		R
10 N	-41-11	.875	20.0	-17.5	590.5		R
Axis	-29-50	.573	30.0	-17.2	590.8		R
10 S	-23-56	.444	40.0	-17.8	590.2		R
20 S	-20-10	.367	50.0	-18.4	589.6		R
30 S	-16-22	.294	60.0	-17.6	590.4		R
40 S	-12-30	.222	70.0	-15.5	592.5		R
50 S	-7-10	.126	80.0	-10.1	597.9		R
60 S	+3-34	.062	90.0	+5.6	613.6		R
70 S	+10-47	.190	100.0	19.0	627.0		R
80 S	+17-32	.316	110.0	34.8	642.8		R
90 S	+17-55	.323	120.0	38.8	646.8		L R
		11+80					
T at 34.5 N					607.2	Ground Elevation	L R

Notes 11/28/41

Sta.	V.A	Funct	Dist	Diff	Elev		
		11+80			608.2 7.2		
90 S	+16-09	.290	124.5	+36.1	643.3		L R
80 S	+15-41	.281	114.5	32.2	639.4		L R
70 S	+9-43	.171	104.5	17.9	625.1		R
60 S	+1-19	.023	94.5	2.2	609.4		R
50 S	-7-11	.126	84.5	-10.6	596.6		R
40 S	-13-40	.243	74.5	-18.1	589.1		R
30 S	-17-07	.308	64.5	-19.9	587.3		R
20 S	-21-58	.403	54.5	-22.0	585.2		R
10 S	-28-05	.534	44.5	-23.8	583.4		R
Axis	-34-12	.680	34.5	-23.5	583.7		R
10 N	-37-33	.769	24.5	-18.8	588.4		R
20 N	-32-43	.642	14.5	-9.30	597.9		L R
30 N	+2-55	.051	4.5	+0.2	607.4		L R
40 N	-3-49	.067	5.5	-0.4	606.8		L R
50 N	-24-14	.450	15.5	-7.0	600.2		L R

Levels for Cross-section on E side of Dam

11/29/41 Cool-cloudy

Jackson Haig

Sta.	+	H.I.	−	Elev.
A-34 B.M.				553.58
	12.84	566.42		
10+50			5.6	560.8
10+60			5.3	561.1
10+70			4.5	561.9
10+80			3.5	562.9
T.P.			0.87	565.55
	12.96	578.51		
10+90			10.9	567.6
11+00			0.7	577.8
T.P.			0.88	577.63
	11.28	588.91		

11/29/41
Cool - cloudy

Levels for Cross-sections on E. side of Dam

Sta	+	H.I.	-	Elev.	
		588.91			
11+10			5.5	583.4	
11+20			6.2	582.7	
11+30			5.5	583.4	
11+40			3.6	585.3	
11+50			1.4	587.5	
T.P.			0.24	588.67	
	9.71	598.38			
11+60			9.3	589.1	
11+70			4.6	593.8	
B.M.			3.66	594.72	594.72

Cross-section on E. side of Dam

Sta	V. Δ	Fund. Dist	Diff.	Elev
Tan T 30 N				601.2
50 N				593.8
40 N	-3-26 .060	10.0	-0.6	600.6
20 N	-35-33 .715	10.0	-7.2	594.0
10 N	-42-30 .916	20.0	-18.3	582.9
Axis	-39-06 .813	30.0	-24.4	576.8
10 S	-31-51 .621	40.0	-24.8	576.4
20 S	-27-04 .511	50.0	-25.6	575.6
30 S	-20-50 .381	60.0	-22.9	578.3
40 S	-16-46 .301	70.0	-21.1	580.1
50 S	-5-57 .104	80.0	-8.3	592.9
60 S	+5-37 .098	90.0	+8.8	610.0
70 S	+9-28 .167	100.0	16.7	617.9
80 S	+15-58 .286	110.0	31.5	632.7
90 S	+17-55 .323	120.0	38.8	640.0

11/29/41
Cool - cloudy.

Sta. ? (11+70)

Ground elevation

(Ground elevation Refer to page 48)

Soil
L R
L R
L R
L R
L R
L R
R
R
R
R
R
R
R
R
R
R
L R
L R

Sta	V A	Funct	Dist	Diff.	Elev.
	11+60				
Δ at 30 N					594.3
90 S.	+17-57	.324	120.0	38.9	633.2
80 S.	+17-48	.321	110.0	35.3	629.6
70 S.	+10-53	.192	100.0	19.2	613.5
60 S.	+4-07	.072	90.0	6.5	600.8
50 S.	-3-36	.063	80.0	-5.0	589.3
40 S.	-14-51	.265	70.0	-18.6	575.7
30 S.	-18-19	.331	60.0	-19.9	574.4
20 S.	-23-33	.436	50.0	-21.8	572.5
10 S.	-27-57	.531	40.0	-21.2	573.1
Axis	-33-50	.670	30.0	-20.1	574.2
10 N.	-38-35	.798	20.0	-16.0	578.3
20 N.	-34-54	.698	10.0	-7.0	587.3
40 N.	-14-46	.264	10.0	-2.6	591.7
50 N.			20.0		589.1

11/29/41 Notes

Ground elevation

Ground elevation refer To page 48

Soil

L R
L R
R
R
R
R
R
R
R
R
R
L R
L R
L R

11/29/41

Sta	VA	Funct	Dist	Diff	Elev.	Notes	Soil
		11+50					
T at 30 N					588.7	Ground elevation	L R
50 N			20.0		587.5	Ground elevation - Refer to page 48	L R
40 N	-8-31	.150	10.0	-1.5	587.2		L R
20 N	-45-02	.001	10.0	-10.0	578.7		L R
10 N	-33-14	.655	20.0	-13.1	575.6		L R
Axis	-30-36	.591	30.0	-17.7	571.0		R
10 S	-23-48	.441	40.0	-17.6	571.1		R
20 S	-18-46	.340	50.0	-17.0	571.7		R
30 S	-14-24	.257	60.0	-15.4	573.3		R
40 S	-10-18	.182	70.0	-12.7	576.0		R
50 S	-0-18	.005	80.0	-0.4	588.3		R
60 S	+5-04	.089	90.0	+8.0	596.7		R
70 S	+11-21	.201	100.0	20.1	608.8		R
80 S	+17-16	.311	110.0	34.2	622.9		L R
90 S	+17-21	.312	120.0	37.4	626.1		L R

Sta	YA	Funct	Dist	Diff.	Elev.	Notes	Soil
		11+40					
At 40N					584.9	Ground elevation -	LR
90S	+16-17	.292	130.0	38.0	622.9		LR
80S	+16-44	.301	120.0	36.1	621.0		LR
70S	+9-45	.172	110.0	18.9	603.8		R
60S	+6-25	.112	100.0	11.2	596.1		LR
50S	+1-17	.028	90.0	2.8	587.0 ~~586.9~~		LR
40S	-4-18	.075	80.0	-6.0	578.9		LR
30S	-9-26	.166	70.0	-11.6	573.3		LR
20S	-13-07	.233	60.0	-14.0	570.9		R
10S	-6-22	.112	50.0	-5.6	579.3		R
Axis	-21-23	.392	40.0	-15.7	569.2		R
10N	-24-48	.462	30.0	-13.9	571.0		R
20N	-25-05	.468	20.0	-9.4	575.5		LR
30N	-10-39	.188	10.0	-4.9	583.0		LR
50N			10.0		585.3		LR
							LR

Sta	VA	Funct	DIST					
		11+30						
At 34.5 N					583.9	Ground elevation		L R
50 N			15.5		583.4	" "	Refer To page 48	L R
40 N	+2-00	.035	5.5	0.2	584.1			L R
30 N	-17-50	.322	4.5	-1.4	582.5			L R
20 N	-32-11	.629	14.5	-9.1	574.8			L R
10 N	-29-53	.575	24.5	-14.1	569.8			R
Axis	-23-21	.432	34.5	-14.9	569.0			R
10 S	-17-31	.316	44.5	-14.1	569.8			R
20 S	-14-26	.257	54.5	-14.0	569.9			R
30 S	-10-42	.189	64.5	-12.2	571.7			R
40 S	-4-48	.084	74.5	-6.3	577.6			L R
50 S	+1-14	.022	84.5	+1.9	585.8			L R
60 S	+6-26	.113	94.5	10.7	594.6			L R
70 S	+9-10	.161	104.5	16.8	600.7			L R
80 S	+16-54	.304	114.5	34.8	618.7			L R
90 S	+16-46	.301	124.5	37.5	621.4			L R

11/29/41

Sta	VA	Funct	Dist	Diff	Elev.	Notes	Soil
		11+20					
⊼	0+32.3 N				583.1	Ground elevation	L R
90 S	+16-03	.288	122 3	35.2	618.3		L R
80 S	+15-39	.280	112 3	31.4	614.5		L R
70 S	+9-19	.164	102.3	16.8	599.9		L R
60 S	+6-16	.110	92.3	10.2	593.3		L R
50 S	-0-58	.017	82.3	-1.4	581.7		L R
40 S	-5-58	.105	72.3	-7.6	575.5		R
30 S	-10-44	.190	62.3	-11.8	571.3		R
20 S	-15-42	.281	52 3	-14.7	568.4		R
10 S	-18-48	.340	42.3	-14.4	568.7		R
AXIS	-26-18	.494	32.3	-16.0	567.1		R
10 N	-35-53	.723	22.3	-16.1	567.0		R
20 N	-50-09	1.198	12. 3	-14.7	568.4		L R
30 N	-16-06	.289	2. 3	-0.7	582.4		L R
40 N	-0-35	.010	7. 7	-0.1	583.0		L R
50 N			17.7		587.7	Ground elevation Refer To Page 48	L R

11/29/41

Sta	VA	Funct 11+10	Dist	Diff	Elev.	Notes	
⊼ at 36.5 N					581.6		L R
50 N			13.5		583.4	Ground elevation refer to page 48	L R
40 N	+4-22	.076	3.5	0.3	581.9		L R
30 N	-44-09	.997	6.5	-6.3	575.3		L R
20 N	-44-50	.994	16.5	-16.4	565.2		L R
10 N	-31-46	.619	26.5	-16.4	565.2		R
Axis	-23-21	.432	36.5	-15.8	575.8		R
10 S	-17-20	.312	46.5	-14.5	567.1		R
20 S	-13-31	.240	56.5	-13.6	568.0		R
30 S	-9-03	.159	66.5	-10.6	571.0		R
40 S	-6-05	.107	76.5	-8.2	573.4		L R
50 S	-2-11	.038	86.5	-3.3	578.3		L R
60 S	+4-18	.075	96.5	+7.2	588.8		L R
70 S	+7-40	.135	106.5	14.4	596.0		R
80 S	+14-15	.254	116.5	29.6	611.2		L R
90 S	+14-26	.257	126.5	32.5	614.1		L R

Sta.	V A	Funct	Dist	Diff	Elev.	Soil
		11+00				
TOT ZON					564.4	
90 S	+22-50	.421	110.0	46.3	610.7	R
80 S	+23-10	.428	100.0	42.8	607.2	L R
70 S	+18-05	.327	90.0	29.4	593.8	L R
60 S	+16-13	.291	80.0	23.3	587.7	L R
50 S	+13-19	.235	70.0	16.5	580.9	L R
40 S	+12-02	.213	60.0	12.8	577.2	L R
30 S	+9-19	.164	50.0	8.2	572.6	L R
20 S	+5-41	.100	40.0	4.0	568.4	R
10 S	+2-49	.049	30.0	1.5	565.9	R
AXIS	+1-19	.023	20.0	0.5	564.9	R
10 N	+0-52	.015	10.0	0.2	564.6	R
30 N	+23-43	.439	10.0	4.4	568.8	L R
40 N	+24-11	.449	20.0	9.0	573.4	L R
50 N			30.0		577.8	L R

Ground elevation

Ground elevation refer To page 47

11/29/41

Sta	VA	Funct	Dist	Dif	Elev	Notes	Soil
		10+90					
Tot 20 N					563.5		R
50 N					567.6	Ground elev. refer to page 47	LR
40 N	+9-46	.172	20.0	3.4	566.9		LR
30 N	-0-15	.004	10.0	0.0	563.5		LR
10 N	+2-04	.036	10.0	0.4	563.9		R
Axis	+3-15	.057	20.0	1.1	564.6		R
10 S	+4-48	.084	30.0	2.5	566.0		R
20 S	+5-37	.098	40.0	3.9	567.4		R
30 S	+8-17	.146	50.0	7.3	570.8		LR
40 S	+11-20	.200	60.0	12.0	575.5		LR
50 S	+14-15	.254	70.0	17.8	581.3		L
60 S	+17-22	.313	80.0	25.0	588.5		
70 S	+19-35	.356	90.0	32.0	595.5		
80 S	+22-35	.416	100.0	41.6	605.1		
90 S	+22-18	.410	110.0	45.1	608.6		

Sta	V A	Funct	Dist	Diff.	Elev.	Notes 11/29/41	Soil
	70+80						
50N	⊼ at				562.9	Refer to page 47	L R
90S	+17-01	.306	140.0	42.8	605.7		L R
80S	+17-24	.313	130.0	40.7	603.6		L R
70S	+15-17	.273	120.0	32.8	595.7		L R
60S	+12-03	.213	110.0	23.4	586.3		L R
50S	+10-27	.184	100.0	18.4	581.3		L R
40S	+7-14	.127	90.0	11.4	574.3		L R
30S	+5-21	.094	80.0	7.5	570.4		R
20S	+3-45	.066	70.0	4.6	567.5		R
10S	+2-11	.038	60.0	2.3	565.2		R
AXIS	+1-13	.021	50.0	1.1	564.0		R
10N	+0-49	.014	40.0	0.6	563.5		R
20N	-0-18	.005	30.0	-0.2	562.7		R
30N	-0-30	.009	20.0	-0.2	562.7		R
40N	-0-52	.015	10.0	-0.2	562.7		R
							R

11/29/41

Ground elevation [refer to page 47]

Sta	VA	Funct	Dist	DIFF.	Elev.	Soil
	10+70					
50 N	TOT				561.9	R
40 N	+0-31	.009	10.0	0.1	562.0	R
30 N	+0-54	.016	20.0	0.3	562.2	R
20 N	+1-27	.025	30.0	0.8	562.7	R
10 N	+1-51	~~.032~~ .015	40.0	~~1.3~~ 0.6	563.2	R
Axis	+2-00	.035	50.0	1.8	563.71	R
10 S	+2-39	.046	60.0	2.8	564.71	R
20 S	+3-53	.068	70.0	4.8	566.71	R
30 S	+5-52	.103	80.0	8.2	570.1	R
40 S	+9-06	.160	90.0	14.4	576.3	L R
50 S	+10-26	.184	100.0	18.4	580.3	L R
60 S	+13-00	.231	110.0	25.4	587.3	L R
70 S	+15-54	.285	120.0	34.2	596.1	R
80 S	+17-27	.314	130.0	40.8	602.7	L R
90 S	+17-06	.308	140.0	43.1	605.0	L R

Sta	VA	Funct	Dist	Diff	Elev	11/29/41	Soil
		10+60					
50N	Tat				561.1	Refer To page 47 - Ground elevation	R
80S	+16-49	.302	130.0	39.3	600.4		LR
70S	+18-04	.326	120.0	39.1	600.2		R
60S	+14-37	.261	110.0	28.7	589.8		R
50S	+9-31	.168	100.0	16.8	577.9		LR
40S	+7-23	.130	90.0	11.7	572.8		LR
30S	+4-56	.086	80.0	6.9	578.0		LR
20S	+4-12	.073	70.0	5.1	566.2		R
10S	+3-49	.067	60.0	4.0	565.1		R
Axis	+3-12	.056	50.0	2.8	563.9		R
10N	+3-02	.053	40.0	2.1	563.2		R
20N	+2-35	.045	30.0	1.4	562.5		R
30N	+1-52	.033	20.0	0.7	561.8		R
40N	+1-43	.030	10.0	0.3	561.4		R
							R

11/29/41

Sta	V A	Funct	Dist	Diff.	Elev.	Soil
		10+50				
50 N	At 9T				560.8	R
40 N	+0-13	.004	10.0	0.0	60.8	R
30 N	+2-02	.036	20.0	0.7	64.5	R
20 N	+3-00	.052	30.0	1.6	62.4	R
10 N	+3-54	.068	40.0	2.7	63.5	R
Axis	+3-53	.068	50.0	3.4	64.2	R
10 S	+4-03	.071	60.0	4.3	65.1	R
20 S	+4-05	.071	70.0	5.0	65.8	R
30 S	+5-09	.090	80.0	7.2	68.0	R
40 S	+6-09	.108	90.0	9.7	70.5	LR
50 S	+8-09	.143	100.0	14.3	75.1	LR
60 S	+12-19	.228	110.0	25.1	85.9	R
70 S	+14-16	.254	120.0	30.5	91.3	R
80 S	+14-47	.264	130.0	34.3	595.1	LR
90 S	+16-20	.293	140.0	41.0	601.8	LR

Refer To page 47. Ground elevation

Elevs. Corrected by D.W.L. 12-1-41
Checked by

Profile of Axis - E. Keyway

Sta.	+	H.I.	−	Elev
A-32				626.06
B.M.				~~629.06~~
	0.24	626.30		
		~~629.30~~		
				614.43
T.P.			11.87	~~617.43~~
	0.22	614.65		
		~~617.65~~		
12+25			2.0	612.7
12+19			6.4	608.3
12+11			12.7	602.0
				601.57
T.P.			13.08	~~604.57~~
	1.56	603.13		
		~~606.13~~		
12+07			6.0	597.1
12+00			11.6	591.5
				590.46
T.P.			12.67	~~593.46~~
	1.24	591.70		
		~~594.70~~		
11+98			5.9	585.8
11+91			11.4	580.3

12/11/41
Fair - Warm

Dickinson
Laing
Jackson
Polak
King
Cole.

Note. For profile of axis betw. 12+25 and 12+88 use elev's taken for monthly est. taken 11/26/41 - Pages 4 to 10

12/11/41
Fair - Warm

Dickinson
Jackson
Polak
Laing
King
Cote.

Profile of Axis - E. Keyway

Sta.	+	H.I.	-	Elev	
		591.70			
		~~594.70~~			
				579.31	
T.P			12.39	~~582.31~~	
		580.58			
	1.27	~~583.58~~			
11+75			4.9	~~575.7~~	
				567.87	
T.P			12.71	~~570.87~~	
		569.31			
	1.44	~~572.31~~			
				556.79	
T.P			12.52	~~559.79~~	
		560.09			
	3.30	~~563.09~~			
A-34				553.58	
B.M.			6.50	~~556.59~~	553.58

12/12/41
Fair-Worm

Dickinson
Jackson
Laing
Potat
King
Cole.

Profile of Axis - East Side

Sta	+	H.I.	−	Elev
T.P.				579.31
	1.80	581.11		
11+50			11.2	569.9
T.P.			12.60	568.51
	0.47	568.98		
11+25			1.5	567.5
11+00			9.0	560.0
T.P.			12.71	556.27
	0.24	556.51		
10+75			2.5	554.0
10+50			3.8	552.7
10+25			8.3	548.2
10+00			9.7	546.8
T.P.			12.44	544.07
	0.27	544.34		

12/12/41
Cool - cloudy

Dickinson
Jackson
Long
Pelot
King
Cole

Profile of Axis - E slope

Sta.	+	H.I.	-	Elev.	
		544.34			
9+75			10.9	533.4	toe of bench -
9+50			12.8	531.5	W. edge of bench - top of bank

Profile - 50' S. of Axis

9+75			4.0	540.3	
T.P.			0.99	543.35	
	12.97	556.32			
10+00			7.4	548.9	
T.P.			0.45	555.87	
	12.85	568.72			
10+25			10.5	558.2	
10+50			0.0	568.7	
T.P.			0.54	568.18	
	9.44	577.62			
10+75			2.9	574.7	℄ Block #16

12/12/41
Cool - cloudy

Dickinson
Jackson
Laing
Polak
King
Cole

Profile of Axis - E Slope

Sta	+	H.I.	−	Elev.	
		577.62			
11+00			4.6	573.0	
11+25			3.8	573.8	
11+50			0.1	577.5	
11+75			+0.4	578.0	
T.P.			0.67	576.95	
	3.47	580.42			
T.P.			1.12	579.30	579.31

℄ Blk. #18

→ Starting point of this circuit
This T.P. checked into B.M. See F.B.
#587 Page 38

12/12/41
Cool-cloudy

Jackson
Polak
Laing
King
Cole

Profile of Axis - W side

Sta.	+	H.I.	-	Elev.	
A-16 B.M.				649.55	
	0.09	649.64			
3+41			9.0	640.6	
T.P.			12.30	637.34	
	0.74	638.08			
3+50			6.3	631.7	Break
T.P.			12.63	625.45	
	1.01	626.46			
3+69			2.1	624.4	"
T.P.			12.65	613.81	
	0.37	614.18			
3+98			8.0	606.2	"
4+01			7.9	606.3	
T.P.			13.09	601.09	
	0.48	601.57			
4+26			10.8	590.8	Break & toe of rock

12/12/48
Cool - cloudy

Jackson
Polak
Laing
King
Cote

Profile of Axis - W. side

Sta.	+	H.I.	-	Elev.	
		601.57			
T.P.			12.70	588.87	
	0.03	588.90			
4+53			5.0	583.9	
4+96			3.3	580.6	Bench - top of dirt bank
T.P.			1.07	587.83	
	10.48	598.31			
C-2 T.B.M			1.87	596.44	596.48
Cut in on H.I.		594.61			See pg 71 Rt 587
4+40			12.6	82.0	
TP			12.76	581.85	
	0.63	82.48			
4+70			5.2	77.3	
TP			11.92	70.56	
	2.80	73.36			

Cont'd Pg #71

12/16/41
Fair - Warm

Dickinson
Jackson
Polaris
Lying
King
Cole.

Profile of 50's of Axis - E. side

Sta.	+	H.I.	-	Elev.
A-23 B.M.				523.86
	12.39	536.25		
9+42			13.2	~~523.0~~
9+59			11.2	~~525.0~~
9+69			6.6	~~529.6~~
9+79			3.1	~~533.1~~
T.P.			0.63	535.62
	12.88	548.50		
9+88			10.0	~~538.5~~
10+03			9.0	~~539.5~~
T.P.			0.99	547.51
	12.94	560.45		
10+25			1.1	559.3
T.P.			0.06	560.39
	13.06	573.45		
10+50			5.2	568.2

Profile of 50'S. of Axis. E. side

12/16/45.
Fair - Warm

Dickinson
Jackson
Polak
Laing
King
Cote.

Sta	+	H.I.	-	Elev.	
		573.45			
T.P.			12.91	560.54	
	3.98	564.52			
A-34					
B.M.			10.94	553.58	553.58
		533.51			
9+94			2.6	530.9	
+42			8.6	524.9	

See pg. 69 BK 587 - Cot In on H.I.
12/20/41 RE

12/20/41

PROFILE West Keyway Axis

		733.6		
4+90			5.6	67.8
5+20			7.0	66.4
TP			1.65	571.71
	3.45	575.16		
BM #7			9.26	575.90

12-20-41

PROFILE AXIS EAST KYWX

BM A34				553.58
	11.43	565.01		
TP			5.34	559.67
	8.63	568.30		
11+70			1.5	66.8
11+47			9.1	59.2
TP			12.76	555.54
	0.96	556.50		
11+20			4.3	52.2
10+64			9.0	47.5
10+47			6.9	49.6
10+10			14.0	42.5
TP			11.31	545.19
	0.83	546.02		
			12.66	533.36
	1.10	34 46		

Ecker
Cole
Polak
Dickinson

AXIS PROFILE 12.20.41 (CONT)

		534.46			
9+70			7.1	527.4	
TP			13.00	521.46	
	1.61	523.07			
9+60			5.8	17.3	
9+20			9.8	13.3	
TP			4.61	518.46	
	10.74	529.20			
BM #16			5.36	523.84	523.86

	V.A	Funct	Dist	Diff. El.	GR. ELEV.
		12+60			
50N	-7°06'	.952			462.30
40N			10'		
30N			20'		
20N			30'		
10N			40'		
AXIS			50'		

(Level)

VA	Funct	Dist	Diff	E

598.4
4.6
593.8

624.53
11.16
635.69
6.33
629.36

11+25

11+70

11.2
36

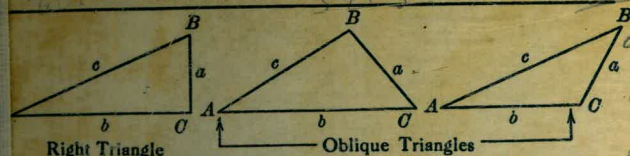
491.5
80
11.0

606.2
13.0
619.2
2.2
621.0
6.0

640.6

631.7
8.7
640.4
4.4
636.0

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	
1, B, a	b, c, C	$b = \frac{a \sin B}{\sin A}, C = 180° - (A + B), c = \frac{a \sin C}{\sin A}$
1, a, b	B, c, C	$\sin B = \frac{b \sin A}{a}, C = 180° - (A + B), c = \frac{a \sin C}{\sin A}$
z, b, C	A, B, c	$A + B = 180° - C, \tan \frac{1}{2}(A - B) = \frac{(a-b)\tan \frac{1}{2}(A+B)}{a+b}$, $c = \frac{a \sin C}{\sin A}$
$, b, c$	A, B, C	$s = \frac{a+b+c}{2}, \sin \frac{1}{2}A = \sqrt{\frac{(s-b)(s-c)}{bc}}$, $\sin \frac{1}{2}B = \sqrt{\frac{(s-a)(s-c)}{ac}}, C = 180° - (A+B)$
$, b, c$	Area	$s = \frac{a+b+c}{2}$, area $= \sqrt{s(s-a)(s-b)(s-c)}$
1, b, c	Area	area $= \frac{bc \sin A}{2}$
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.