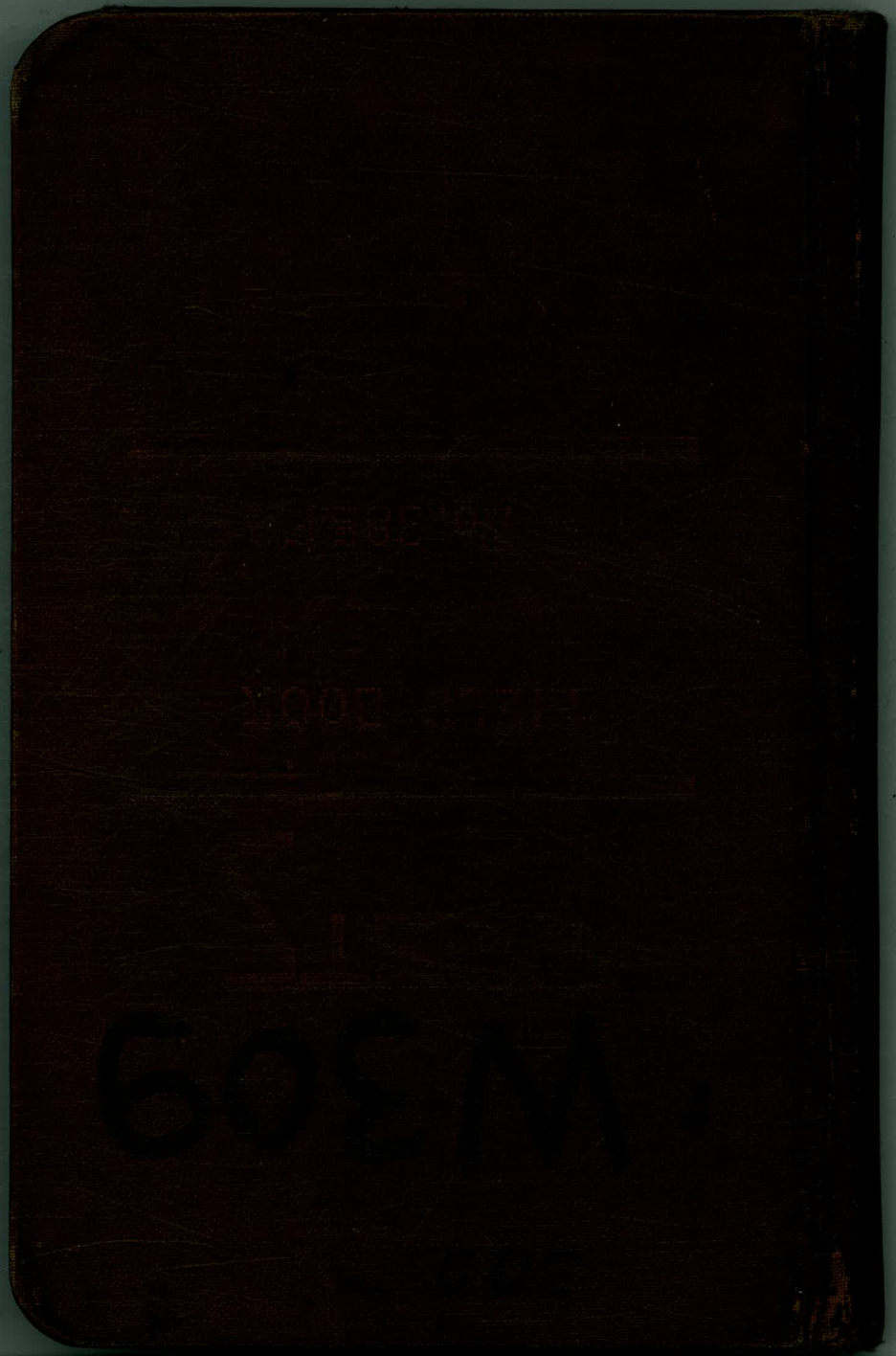

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Morena Reservoir Dam and Spillway and Safe Duty Enlargement. 1 2

306.

INDEX

Preliminary Surveys Books 305, 306.

INDEX CONT'D

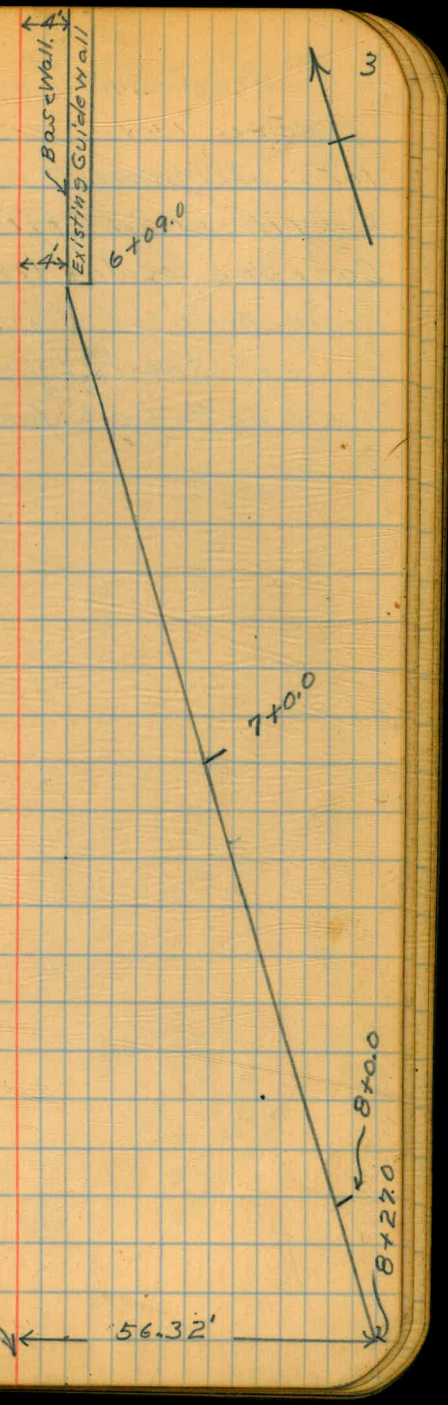
Alignment
of
Spillway Discharge. W.M.B.

Note:-
Alignment of Baseline obtained from Detail
Copy in Main Office. Book 305 P 32.

Baseline is 10' from
Top face of existing
guidewall.

6+09.0

8+20.6



Alignment of Road South of Dam.

W.M.B.

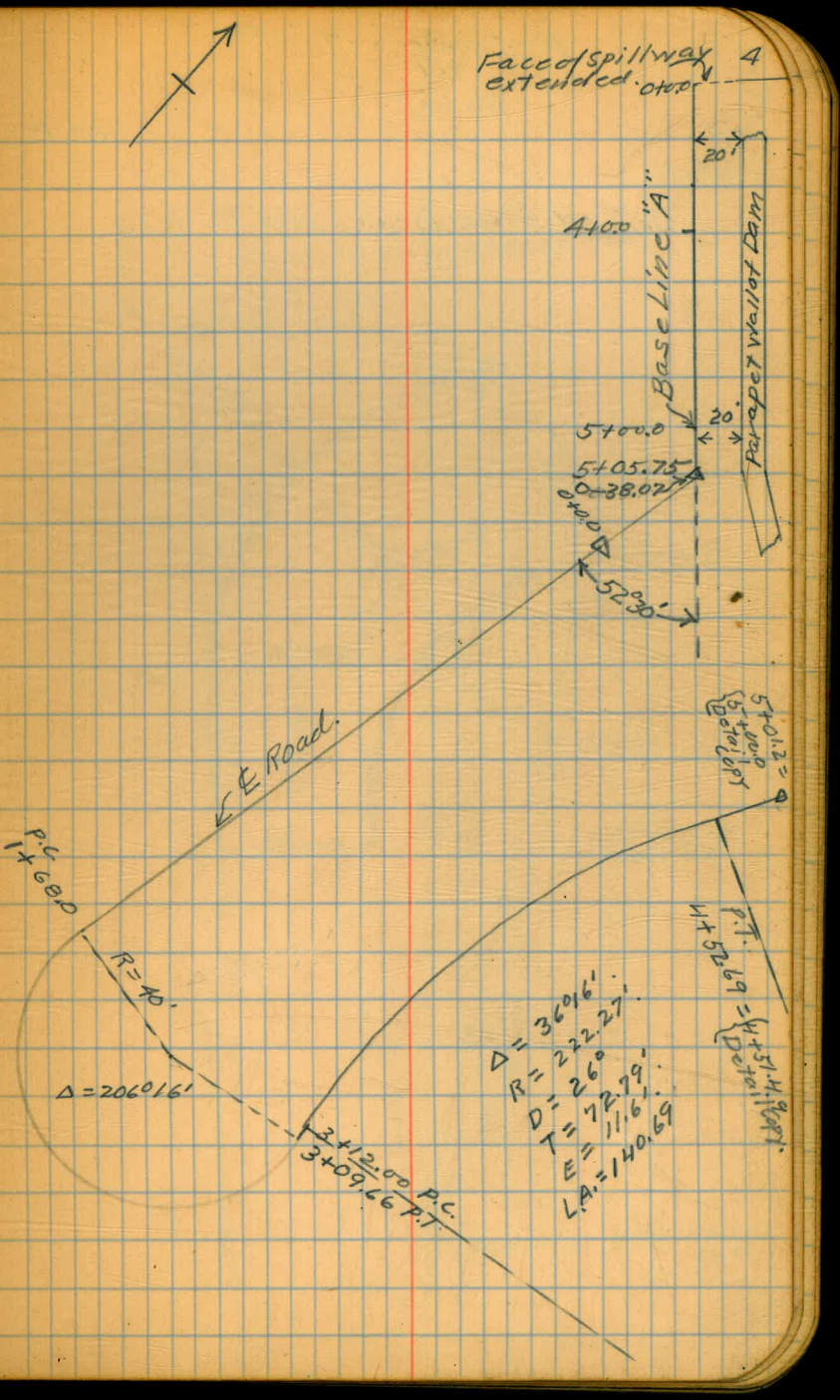
Note:-

Alignment obtained from Detail Copy in Main Office.

Baseline located from extreme East & West Piers. Book 305 P 32.

See Sheet #1 for widths of road.

See Page 6 for reference points.

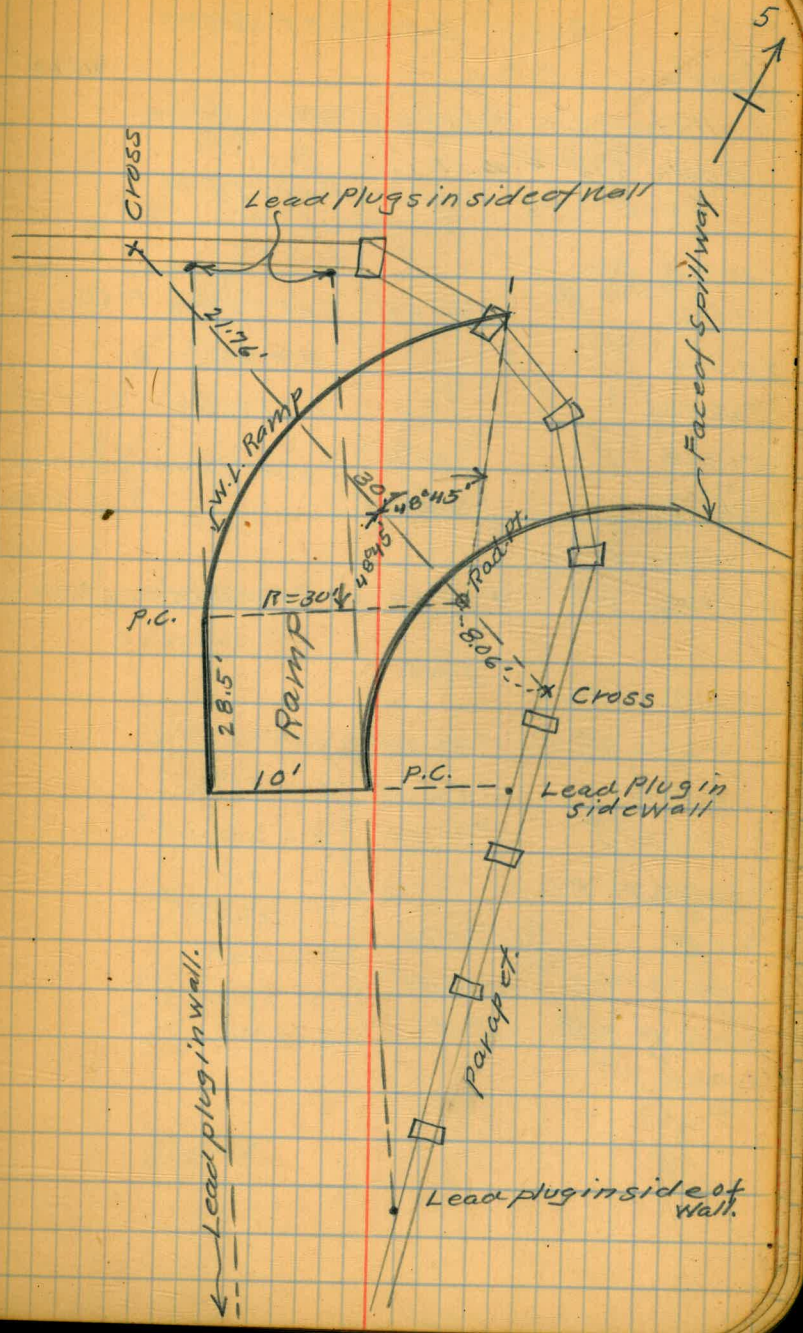


Reference Points
for
Ramp.

W.M.B

Note:-

Copied from Book 305 P. 67.



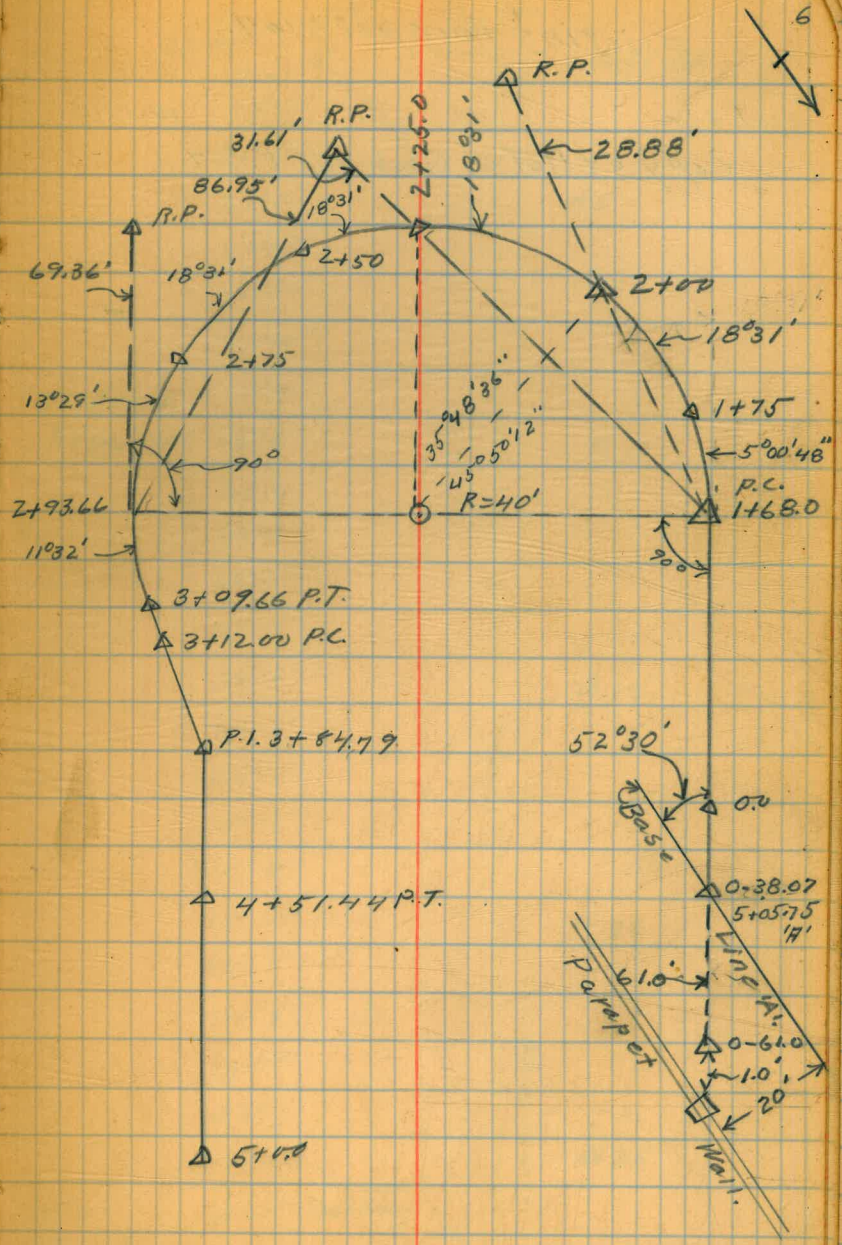
Reference Points
Road South of dam.

W.M.B.

Note:-
Reference Points Copied from Book 306 P 4.
See P 4 for alignment only.

1+68.00 P.C.		
+75.0	5°00'48"	Set from P.C.
2+00.0		R = 40'
+25.0		L = 141.66
+50.0	31°16'	Shot from 2+98.66
+75.0	13°22'	
+93.66 P.O.C.		
3+09.66 P.T.	11°27'36"	Located from 2+98.66

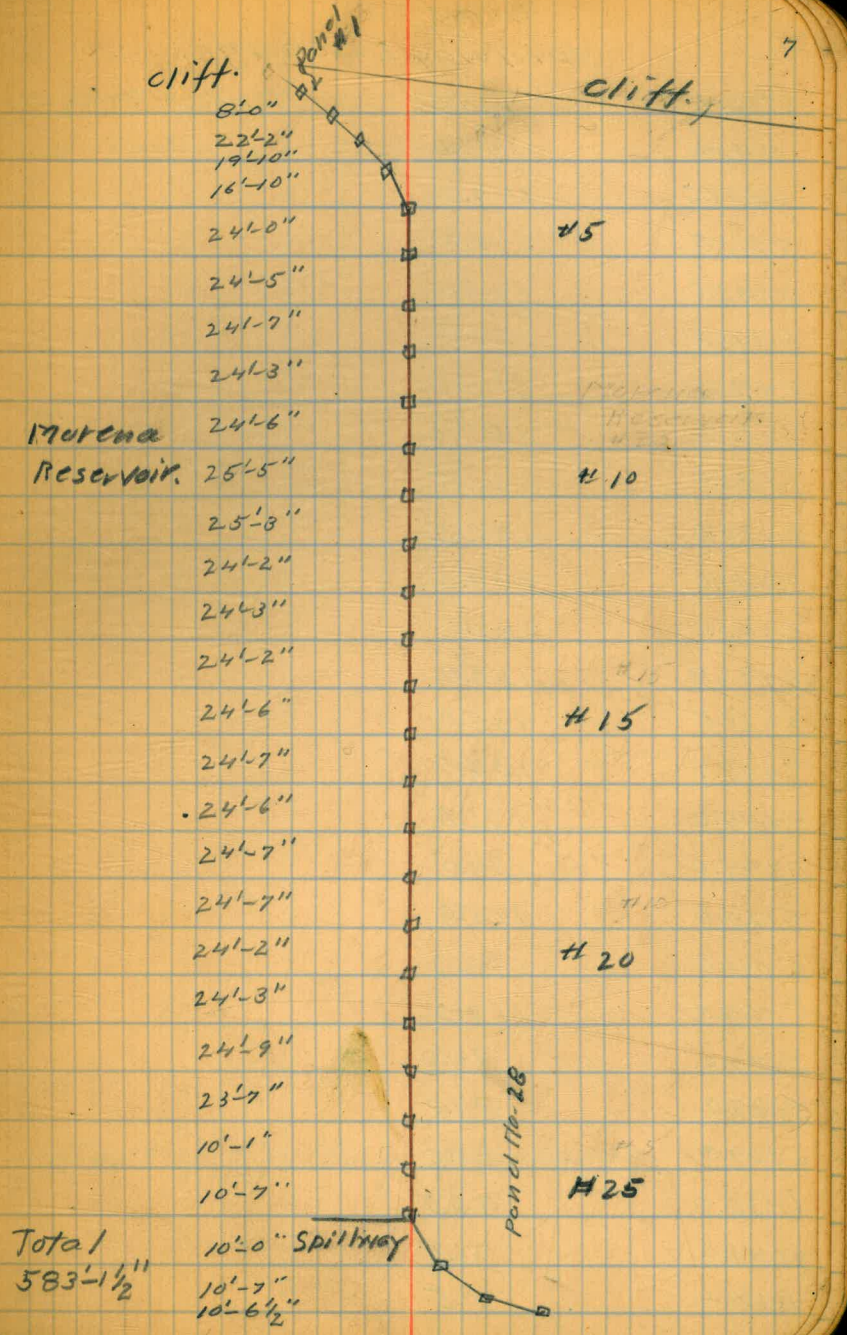
3+12.00 P.C.	Defl.	
+25.0	1°41'30"	
+50.0	4°56'30"	Δ = 36°16'
+75.0	8°11'30"	R = 222.27'
+84.79 P.I.		D = 26°
4+00	11°26'30"	T = 72.79'
+25	14°41.30"	E = 11.61'
+51.44 P.T.	18°08'	L = 139.49'
		L.A = 140.69'



Plan of Existing Parapet Wall.

Note:- W.M.B.

Copy of Notes Book 805 P. 24



Grades of Spillway Discharge.

Sta.	Grade	Parker's Grades.
0+00.0	155.0	
0+08.0	149.0	
0+20.0	148.0	
0+45.0	147.0	
0+70.0	146.0	
0+95.0	145.0	
1+45.0	142.0	
1+80.0	141.5	
2+20.0	140.5	
2+45.0	139.5	
2+95.0	137.5	
3+36.0	135.0	
3+61.0	135.0	
3+95.0	134.0	
4+45.0	133.5	
4+95.0	130.0	
5+20.0	125.0	
5+36.0	123.0	
5+64.0	110.0	
5+84.0	94.0	
5+99.0	89.0	
6+09.0	86.0	
6+25.0	85.5	
6+45.0	76.5	
6+70.0	70.5	

Note:- Grade are Guage Elevations.
= Northend of Spillway.

Start of Spillway Discharge.

Grades of Spillway Discharge.

Sta.	Grade
6+91.0	65.0
7+30.0	52.0
7+75.0	33.0
8+15.0	0-04.0
8+34.0	0-15.0
8+52.0	0-28.0

Final Record on Drill Holes in Spillway

April 22, 1930
W. M. Bonham

Pick No.	15' Hole	10' Hole	5' Hole	4' Hole	4' Hole
0+00.0 1	7.0	10.0	6.0	4.0	4.0
0+16.25 2	15.0	10.0	5.0	4.0	4.0
0+30.50 3	15.0	10.0	5.0	4.0	4.0
0+44.25 4	15.0	10.0	5.0	4.0	4.0
0+59.00 5	15.0	10.0	5.0	4.0	4.0
0+73.25 6	15.0	10.0	5.0	4.0	4.0
0+87.50 7	15.0	10.0	5.0	4.0	4.0
1+01.75 8	14.0	10.0	5.0	4.0	4.0
1+16.00 9	15.0	10.0	5.0	4.0	4.0
1+30.25 10	15.0	10.0	5.0	4.0	4.0
1+44.50 11	15.0	10.0	5.0	4.0	4.0
1+58.75 12	15.0	10.0	5.0	4.0	4.0
1+73.00 13	15.0	10.0	5.0	4.0	4.0
1+87.25 14	15.0	10.0	5.0	4.0	4.0
2+01.50 15	15.0	10.0	5.0	4.0	4.0
2+15.75 16	15.0	10.0	5.0	4.0	4.0
2+30.00 17	15.0	10.0	5.0	4.0	4.0
2+44.25 18	15.0	10.0	5.0	4.0	4.0
2+58.50 19	15.0	10.0	5.0	4.0	4.0
2+72.75 20	15.0	10.0	5.0	4.0	4.0
2+87.00 21	15.0	8.5	5.0	4.0	3.5
3+01.25 22	15.0	10.0	5.0	4.0	4.0
3+14.50 23	15.0	10.0	5.0	4.0	4.0
	336 ft.	228.5 ft.	115 ft.	92 ft.	91.5 ft.

Next to Parapet Wall

Note: All holes for Piers are 2" Holes

863.0 ft. – 2" Holes

Struck Pocket.

Checked 8/21/30
W. D. L.

N. E. End of Spillway.

Final Record on Drill Holes in Parapet Wall.

	Pilaster No.	5' Hole	5' Hole	5' Hole	2' Hole	2' Hole
	1	——	2' .	——	2' .	——
	2	5' .	4' .	4' .	1½' .	2' .
	3	5' .	4½ .	4' .	2' .	2' .
	4	4½ .	4' .	5' .	2' .	2' .
	5	4' .	4½ .	4' .	1½ .	2' .
	6	5 .	5' .	5' .	1½ .	1½ .
✓ ✓	7	4 .	5' .	5 .	2 .	1½ .
✓ ✓	8	5' .	5' .	5' .	2	2
✓ ✓	9	5 .	5' .	5' .	1½ .	2 .
✓	10	5 .	5 .	5 .	2 .	2 .
✓	11	5 .	5 .	5 .	2 .	2 .
✓	12	5	5 .	5 .	2 .	2 .
✓	13	5 .	5 .	5 .	2 .	2 .
✓	14	5 .	5 .	5 .	2 .	2 .
✓	15	5 .	5 .	4 .	2 .	2 .
✓	16	5 .	5 .	5	2 .	2 .
✓	17	5 .	4 .	4 .	2 .	2 .
✓	18	4½ .	4½ .	4½ .	2 .	2 .
✓	19	4 .	5 .	3½ .	2 .	1½ .
✓	20	5 .	5 .	5 .	2 .	2 .
✓	21	5 .	5 .	5 .	2 .	1½ .
✓	22	5 .	5 .	5 .	2 .	2 .
✓	23	5 .	5 .	5 .	2 .	2 .
✓	24	5 .	4 .	5 .	2 .	2 .
✓	25	5 .	5 .	2 .	2 .	2 .

Next to cliff at southend of Parapet Wall.

Note:- All holes in pilasters are 2" Holes.

2" Holes 503.0 = feet.

Final Record on Drill Holes in Parapet Wall

Pilaster No.	5" Hole	5' Hole	5" Hole	2' Hole	2' Hole
✓ 26	4 .	5 .	3½ .	2 .	2 .
✓ 27	4½ .	3 .	5 .	2 .	1½ .
✓ 28	4 .	5 .	5 .	2.	2.
✓ 29	4½ .	5 .	3½ .	2 .	2 .
	132 ft.	134.5 ft.	127.0 ft.	56 ft.	53.5 ft.

132 ft.
134.5
127.0
56.0
53.5
503.0 ft.

North End of Parapet Wall.

Checked 8/21/30
W. D. L.

Final Record on Drill Holes in Parapet Wall

Panel No.						
1	2'.	2'-				
2	2'.	2'.	2'.	2'.	2'.	2'.
3	2'.	2'.	2'.	2'.	2'.	
4	1½'.	1½'.	2'.	2'.		
5	2'.	1½'.	2'.	2'.	1½'.	1½'.
6	1'.	2'.	2.	1½'.	1½'.	2'.
✓ 7	2'.	2'.	2'.	2'.	2'.	2'.
✓ 8	2.	2'.	2'.	1½.	2.	2.
✓ 9	2.	2.	2.	2.	2.	2.
✓ 10	2.	2.	2.	2.	1½.	1½.
✓ 11	2.	2.	2.	2.	2.	2.
✓ 12	2.	2.	2.	2.	2.	2.
✓ 13	2.	2.	2.	2.	2.	2.
✓ 14	2.	1½.	2.	2.	2.	2.
✓ 15	2.	2.	2.	2.	2.	2.
✓ 16	1½.	2.	2.	2.	1½.	1.
✓ 17	2.	1½.	1½.	1½.	1½.	1½.
✓ 18	2.	2.	2.	2.	2.	2.
✓ 19	2.	2.	2.	2.	2.	2.
✓ 20	2.	2.	2.	2.	2.	2.
✓ 21	2.	2.	2.	2.	2.	2.
✓ 22	2.	2.	2.	2.	2.	2.
✓ 23	2.	2.	2.	2.	2.	2.
✓ 24	2.	2.	2.	—	—	—
✓ 25	1½.	2.	2.	—	—	—

South end of Parapet wall next to cliff.

Note: All Holes in Panels are 1" Holes

Final Record on Drills Holes in Parapet Walk

Panel No.						
✓ 26	1½	1½	1½	–	–	–
✓ 27	2	2	2	–	–	–
✓ 28?	2	2	2	–	–	–

53.0 ft. 53.5 ft. 53.0 ft. 42.5 ft. 39.5 ft. 36.5 ft.

53.0 ft.
53.5
53.0
42.5
39.5
36.5

278.0 ft.

North end of Parapet wall.

1" Holes = 278 feet.

Checked 8/21/30
W.D.L.

Back fill retaining walls N.E. end of spillway.

8/18/30
Lee key
Bonta

Checked W.D.L.
8/19/30

						Sq. ft	Cu ft.
0+00	0.0					0.0	
							104.13
+02 ○	12.0 / 0.0	12.5 / 8.5				104.13 ✓	
							226.20
+04 ○	12.4 / 0.0	13.3 / 9.5				122.07 ✓	
							0.00
+04 ○	12.4 / 0.0	11.7 / 4.5	9.2 / 5.0	7.5 / 9.5		97.03 ✓	
							456.26
+08 ≤	11.6 / 0.0	10.5 / 1.5	9.6 / 3.0	8.6 / 6.5	4.4 / 13.0	105.75 ✓	
							209.75
+10 ≤	10.4 / 0.0	9.5 / 3.0	7.0 / 9.5	4.7 / 12.0	1.2 / 14.0	104.00 ✓	
							296.94
+14 ○	9.9 / 0.0	8.2 / 2.5	0.0 / 13.0			65.68	
							239.63
+17 ≤	9.6 / 0.0	7.5 / 1.0	5.2 / 8.5	4.1 / 9.0	0.0 / 12.0	71.25	
							61.00
+18 ≤	7.6 / 0.0	7.2 / 4.0	5.9 / 5.0	0.0 / 10.5		50.75	
							245.86
+25 ○	6.1 / 0.0	5.7 / 2.0	3.1 / 3.5	0.0 / 7.5		24.90	
							144.94
+32 ≤	4.8 / 0.0	4.0 / 2.5	0.6 / 3.5	0.0 / 5.0		13.75	
							13.75
0+34 ≤	0.0 / 0.0						
							1998.46
							34.92
							1,963.54

Deduct Pilasters Retaining Wall #2 = 34.92 Cu ft

Total Cu. ft.

1,963.54 Cu ft = 72.7 Cu yds.

Concrete Retaining Walls N.E End of Spillway

Leekey
Bonham
8/18/30

Counterfort #1	$\frac{11.4 \times 3.0 \times 1.0}{2} =$	17.10
Counterfort #2	$\frac{9.4 \times 2.6 \times 1.0}{2} =$	12.22
Conterfort #3	$\frac{5.6 \times 2.0 \times 1.0}{2} =$	5.60
		34.92
Retaining Wall #1		105.06
Deduct	$\frac{4.7 \times 1.2 \times 0.6}{2}$	1.69
		103.37
Retaining Wall #2		346.19
Extra Bevel	$\frac{12.1 \times 0.67 \times 0.67}{2}$	2.72
Total cu ft in Counterforts		34.92
Total cu ft in retaining wall #2 + "	=	383.83
cu ft retaining wall #1	=	103.37
Total cu ft in retaining walls #2 + #1 and counterforts	=	487.20
Total cu yds	=	18.04

Note :- Counterforts goe with retaining wall #2.

Note:- Wall is 12" thick.

17.9	17.5	12.0	9.7	8.7	7.9	6.7	5.8	4.2	1.4	0.0
0.0	1.3	2.5	4.7	5.3	6.7	7.5	8.1	8.4	11.7	16.0

12.9	12.8	12.6	12.2	11.3	10.1	9.2	8.9	8.4	6.9	6.0
0.0	1.2	10.7	12.5	14.0	17.6	20.8	23.1	25.1	26.1	28.6

5.4	5.4	2.8	1.0	0.0
30.6	33.8	35.3	36.7	38.6

Checked 8/21/30
W.D.L

Concrete in Piers.

Leekey
Bonham.
8/18/30

Pier #19 Concrete below elevation 155.00

Bevel $\frac{5.0 + 4.4}{2} \times \frac{1.33}{2} = 3.05$

Pier #19 16" thick.

4.4	3.5	2.5	1.7	1.2	0.7	0.3	0.1	0.0	0.3	= 16.29 Cu ft
0.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	8.33	

Bevel $\frac{1.0 + 0.3}{2} \times \frac{1.33}{2} = 0.43$

Pier #18 16" thick

4.5	3.5	2.5	1.7	1.1	0.8	0.4	0.2	0.2	0.3	=
0.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	8.33	

= 16.80 Cu ft.

Bevel $\frac{5.1 + 4.5}{2} \times \frac{1.33}{2} = 3.19$

Bevel $\frac{1.0 + 0.3}{2} \times \frac{1.33}{2} = 0.43$

Checked 8/20/30
W.D.L.

Concrete Deck Slab.

Bonham
Leckey
8/19/30

Irregular Section. Floor 10" thick.

$\frac{32.6+30.0}{2} \times 10.0 = 313.00$ Sq. ft.

$\frac{11.2 \times 8.7}{2}$	= 48.72	
$\frac{10.2 \times 1.0}{2}$	= 5.35	
$9.5 \times 0.2 \times \frac{2}{3}$	= 1.27	
$\frac{32.6 \times 8.0}{2}$	= 130.40	Sq. ft.
		498.74

Deduct

$\frac{2}{3} \times 23.4 \times 2.1$	= 32.76	32.76
		465.98
$465.98 \times 10''$	=	388.30 cu. ft.

Deduct Cover Plates

$13.25 \times 0.55 \times .83 \times 22$	=	133.07 cu. ft.

Note 2 Irregular section form north side pier #3 to parapet wall.

	Cu. ft.
Parapet Wall to N Side Pier #3	= 388.30
Pier #3 - N side Pier #23 $285.0 \times 10' \times \frac{5}{6}'$	= 2375.00
	2763.30
Deduct Cover Plates	133.07
Concrete Deck Slabe Total Cu. ft.	2630.23
Total Cu yds =	97.41 cu. yds.

Checked 8/20/30
W.D.L.

Pipe Rails

Bonham
Leckey
8/19/30

From	To	Dist	Field Measurements.
Parapet W.	Pier #3	25.6'	South side
Parapet N.	Pier #3	38.5'	North side
Pier #3	Pier #23	570.0'	Both sides
Pier #23	End of Retaining Wall #2	36.9'	

Tower Rail

2 - 19.5' = 39.0'

Parapet Wall to Pier #3	S-side	25.6
Parapet Wall to Pier 3	N-side	38.5
Pier #3 to Pier #23	Both sides	570.0
Pier #23 to End of Retaining Wall #2 =		36.9
		671.0

Tower Rails 2 - 19.5 = 39.0

Total Lineal ft of Pipe Rail = 710.0

Checked 8/20/30
W.D.L.

Drill Holes in Tower

Holes number to right from Entrance

1" Holes

#No	FT
1	1½
2	1½
3	1½
4	1½
5	1½
6	1½
7	1½
8	1½
9	1½
10	1½
Total	15 ft

7/14/30
Bonham
Dewing

Levels on Trunnions along Spillway Crest

Pier #	+	Δ	−	Elev.
	5.88	172.88		167.00
8 #			15.88	157.00
9 #			15.88	157.00
10 #			15.88	157.00
11 #			15.88	157.00
12 #			15.88	157.00
13 #			15.88	157.00

These Trunnions also set to line 7/14/30

Note Elevs. 157.00 is set for top of pipe in center of trunnion bearing. Grade center of trunnion = 156.90 7/14/30

Note Elev 167.00 taken from Elevation set for Bridge Slab set 7/8/30 BK 310 Page 73 Pier #7

Levels on Trunnions along spillway crest 7/23/30 Dewing

Pier #	+	π	−	Elev	
	10.66	167.66		157.00	
14#			10.66	157.00	
#15			10.66	157.00	
#16			10.66	157.00	
#17			10.66	157.00	
#18			10.66	157.00	
			0.69	166.97	Top Deck slab by pier #5

Note Elev 157.00 taken from file mark in steel reinforcing set 1st of month Pier #19
Elev 157.00 = Top of pipe

Levels for Cutoffs of piers.

Barham Downing 7/25/30

Pier #	+	π	−	Elev
	2.04	169.04		167.00
#14			2.87	166.17
			2.04	167.00
#15			2.87	166.17
			2.04	167.00
#16			2.87	166.17
			2.04	167.00
#17			2.87	166.17
			2.04	167.00
#18			2.87	166.17
			2.04	167.00
#19			2.87	166.17
			2.04	167.00

Elev. 167.00 taken from top deck slab Pier #13

Top Pier
Top deck slab

7/23/30

Levels to set elevation Wall Eastend Spillway

+	π	−	Elev	
12.92	165.76		152.84	BM.
		1.45	164.31	
9.50	173.81			
		3.81	170.00	

Elev top of wall spillway extension

X-section Spillway on preliminary Stationing for State

Bonham
Dewing
7/25/30

Sta	+	⊼	−	Elev	Left	Base	Right
	4.9	149.8		144.9			
$0-32^{6'}$					$\frac{138^{7}}{70}$ $\frac{134^{1}}{57}$ $\frac{134^{7}}{41}$ $\frac{136^{0}}{28}$ $\frac{132^{1}}{15}$	136^{9}	✓
0+00					$\frac{138^{0}}{67}$ $\frac{136^{2}}{54}$ $\frac{135^{6}}{46}$ $\frac{136^{0}}{29}$ $\frac{137^{7}}{15}$	137^{8}	✓
0+25 use old x-section					none		
0+50 " " "						139^{5}	
0+75 " " "							
1+00					$\frac{142^{6}}{58}$ $\frac{140^{0}}{49}$ $\frac{140^{9}}{39}$	141^{0}	41^{2} ✓
+25					$\frac{144^{0}}{54}$ $\frac{142^{2}}{44}$	142^{2}	
+50					$\frac{146^{0}}{51}$ $\frac{143^{3}}{46}$	143^{0}	

Sta	+	℄	−	Elev
		1498		
2+75				
2+00				
2+25				
2+50				
2+83				
2+94				

151.8 (51) 144.5 (33) 142.1

148.9 (32) 145.2 (20) 144.9

146.1 (24) 145.8 (20) 145.8

148.6 (16) 146.8 (12) 147.2

152.8 (8) 148.8

156.8 152.9 (14) 155.0 (21)

7/25/30
Bonham
Deming

X-section Spillway Channel
Preliminary Stationing

	+	π	−	Elev.
	2.6	139.5		136.9
0+66				
1+00				
1+50				
2+00				

Elev Base at 0-36½ Page 26

133 3/4

132 5/8

131 7/8

129 7/8

Xsection Spillway Channel for July Estimate

7/25/30
Bonham
Dowling

Sta	+	Π	−	Elev.
	0.0	114.1		114.1

All shots taken at 90° of baseline

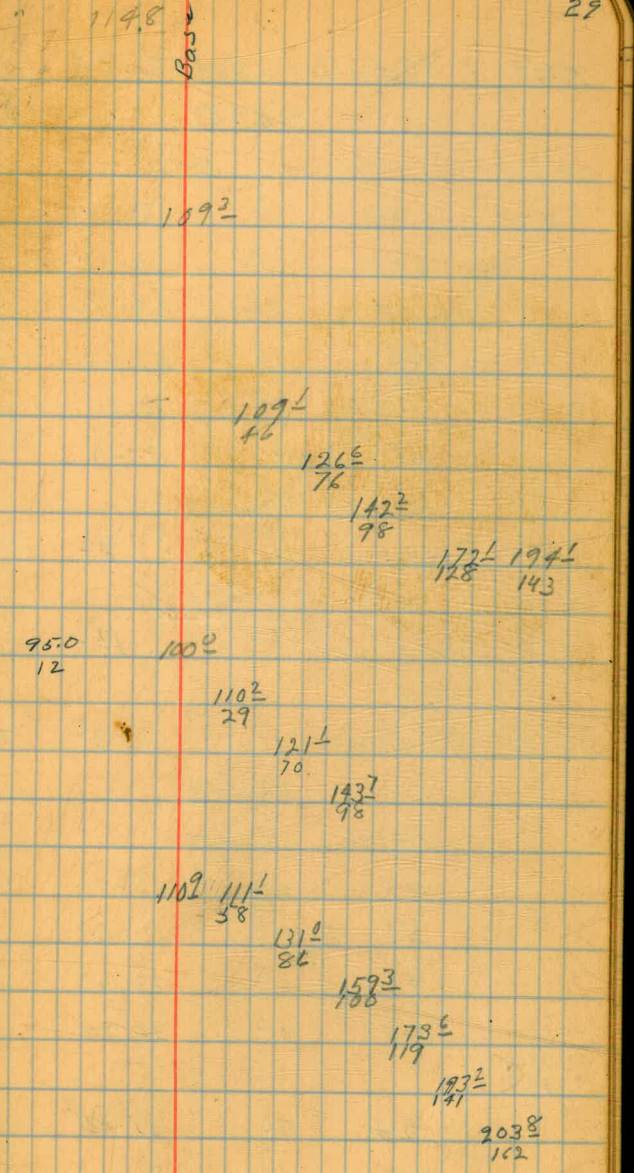
0+75

Π at	Stadia D.	On Rod	Vert. A (All Vert Angles are +)
0+75	46 Hor	5° Level	
	79	1 4/5	10°-20′
	106	0 5/5	16-24
	156	1 8/5	25-00 2/50 22′ higher 15′ back
1+00		104 9/5 = HI.	14° Level 100°
	30	1 1/5	12°-10′
	76	4 4/5	16°-25′
	115	1 6/5	22°-15′
		115 9/5 = HI.	
0+50	58 Level	4 8/5 Level	
	90	2 5/5	11-30
	120	1 6/5	24-15
	149	1 7/5	26-30
	188	3 9/5	29°-55′
	220	9 1/5	30°-50′
0+25			1° Level 114.8

0+50 Base 110.9
0+25 " 114.8

Base

29



Sta	Stadia D	On Rod	Vert A	
		120.= H.I.		Elev
0+25				
	220	$3\frac{1}{=}$	30-30	
	202	$2\frac{0}{=}$	29-30	
	155	$0\frac{8}{=}$	28-56	
	138	$1\frac{7}{=}$	27-35	
	104	$1\frac{5}{=}$	18-25	
	60	$4\frac{3}{=}$	4-30	
	32 Level	4? Level		
0+38	Baseline		$8\frac{1}{=}$	$111\frac{9}{=}$
0+68	Baseline		$11\frac{6}{=}$	$108\frac{4}{=}$
0+00	Baseline		$+3\frac{0}{=}$	$123\frac{0}{=}$
		$127\frac{5}{=}$ H.I.		
	24 Level	$6\frac{1}{=}$ Level		
	53	$1\frac{3}{=}$	7°-00'	
	55	$0\frac{3}{=}$	11°-05'	
	92	$1\frac{5}{=}$	20°-20'	
	216	$4\frac{1}{=}$	30°-35'	
Diagonal 0+00				
	205	$1\frac{0}{=}$	35°-20'	
	110	$1\frac{1}{=}$	30-10	
	70	$1\frac{4}{=}$	21-00	
	92 Level	$4\frac{3}{=}$ Level		

$114\frac{8}{=}$

$217\frac{9}{163}$

$204\frac{8}{150}$

$184\frac{7}{117}$

$175\frac{0}{109}$

$149\frac{6}{94}$

$120\frac{4}{056}$

$115\frac{3}{32}$

$121\frac{4}{54}$

$133\frac{6}{52}$

$137\frac{5}{53}$

$156\frac{0}{81}$

$217\frac{7}{160}$

$123\frac{6}{136}$

$173\frac{8}{82}$

$149\frac{6}{67}$

$123\frac{7}{22}$

Final
X-section Spillway Channel
opposite Spillway Crest

Bonham
Dewing
7/25/30

Sta	+	$\bar{\wedge}$	−	Elev.	Readings	Ex. sq. ft	Cu. ft.
	3.6	140.5		136.9			
00+10^{3}	seepage 30 for 0+00				146^{2} / 25^{5}; 18 / 8 / 6; 124^{5} / 12; 123^{0} / 31		
0+25					141^{7} / 28; 126^{3} / 7; 125^{8}		
0+50					130^{7} / 30; 129^{2} / 15; 130^{6} / 10; 130^{1}; 130^{0} / 23		
0+75					130^{8} / 33; 130^{6} / 18; 130^{3}		
1+00					133^{7} / 35; 131^{8} / 31; 130^{3} / 23; 130^{7} / 19; 131^{8}		
1+25					134^{7} / 37; 132^{0} / 29; 131^{9}; 132^{5} / 20		
1+38					134^{3} / 36; 132^{3} / 32; 132^{2}; 133^{4} / 21		
1+50					134^{4} / 37; 132^{7} / 33; 132^{4} / 24; 133^{1}; 133^{3} / 13		
1+65					135^{4} / 38; 133^{6} / 34; 132^{7} / 20; 134^{1}		

Sta	+	Π	−	Elev
		140.5		
1+75				
1+85				
2+00				
2+10				
2+19				
2+31				
2+50				

Ex.

Sq. ft.	Cu. ft.

135.7 38 | 133.4 30 | 132.7 20 | 134.0

135.1 48 | 133.0 32 | 133.0 21 | 134.7

137.5 41 | 134.1 35 | 134.1 21 | 136.1 | 136.5 4

138.7 46 | 134.1 32 | 134.5 18 | 136.3

139.0 46 | 135.5 41 | 134.0 34 | 135.0 13 | 136.3 8 | 136.7 | 137.8 21

138.8 48 | 137.2 41 | 135.1 24 | 135.7 7 | 136.9

138.5 41 | 135.8 28 | 136.5 18 | 136.0 9 | 137.2

Grade stakes
Spillway channel.

Sta	+	℄	−	Elev	Grade
	-5.0	114.41		119.41	BM.
0+00					
0+25					113°
0+50					93°
0+75					86°
1+00					?

Stad R	On Rod	Vert Ang.
96 103	0 5	15-15

Stadia shots in spillway Channel
Below Spillway Crest

7/28/30
Bonham
Dewing

⊼ at	Stad Reading	On Rod	Vert A.	Hor. Ang	
		HI. 105.4			
1+00 ✓	103	4.5	-18-00	to 1+85.85	
Elev Ground 1+00 = 100.0					
	58	6.2	-28-30	to 1+50	
	96	5.5	-27-00	to 1+75	
	107	5.5	-26-50	29-30 R	7 along
	96	5.5	-16-05	33-50 R	"
	72	5.4	8-25	46-00	"
	60 Level	3.4 Level		65-50	"

38' at 40°-00 to be figured by sine for elev 1+25

1+85.85

1+75

1+50

1+25

1+00

Note forsight at 4+00

1+85.86 50' out
1+75 " "
1+50 " "
1+25 " "

61 ~~71.4~~ 56.1/50 58.9

Present toe of berm

57.0/18 57.0/10 61.1 74.4/50

" 71.0/14 74.9 89.6/50

" 85.0/24 81.0 102.0/50

100.0

7/29/30

Setting Slope Stakes in Spillway Channel

Banham
Dewing
Grade

Sta	A			
	168.5			
1+85	85	15	167°	60
	77 9/10			
1+50				72 0
	85 6/10			
1+25				80
	104 9/10			
1+00				83 0
0+75				86 0
0+50				100 0
0+25				113 0
0+00				121 0

Baseline moved to left ft

10 0	61 0	C 7 0 / 46
15 0	74 9/10	C 21 0 / 51
15 0	81 0	C 18° / 49
7 5/10	100 0	C 41 9/10 / 73 5/10

Levels on Pier Trunnions 8/1/30

Pier #	+	π	−	Elev.
	11.63	168.53		156.90
#20			11.53	157.00
#21			11.53	157.00
#22			11.53	157.00
#23			11.53	157.00

Taken from center pier #19

Levels on Cutoffs for Piers

Pier #	+	X	−	Elev	
	5.17	172.17		167.00	Top deck slab
1				170.17	Elev. Taken from field book 310 Page 73
20				166.17	
21				166.17	
22				166.17	

172.17
166.25
5.92

X sections spillway
(For state)

Edge Concrete Spillway — F.L.R. — Rt.

Station	Edge Concrete Spillway							
0+02	153.3	152.7 / 2	153.8 F.L.R. / 8	158.0 / 23	173.0 / 30			
0+08	149.0	141.4 / 11	153.0 F.L.R. / 19	161.0 / 20	165.0 / 22	182.7 / 46		
0+20	148.4	148.5 / 2	148.2 / 8	148.0 / 15	152.4 F.L.R. / 20	163.0 / 23	179.0 / 45	
0+45	148.0	147.9 / 10	147.5 / 20	147.3 / 23	148.0 / 25	150.0 F.L.R. / 26	164.0 / 27	161.0 / 31.5	166.0 / 35
0+70	145.0	145.3 / 24	145.8 / 28	147.4 F.L.R. / 32.5	160.4 / 37.5	171.0 / 46	177.0 / 51	
0+95	145.3	145.2 / 20	144.5 / 30	146.0 / 36	149.4 F.L.R. / 40	158.0 / 46	173.0 / 62	
1+45	142.3	143.0 / 52	146.2 F.L.R. / 57	174.0 / 63	179.0 / 71			
1+80	141.0	140.8 / 10	141.2 / 20	141.3 / 40	140.0 / 53.7	144.0 F.L.R. / 63	170.0 / 71	173.9 / 78
2+20	140.7	141.2 / 4	140.3 / 12	140.0 / 40	139.2 / 44	138.4 / 64	139.4 F.L.R. / 65	161.0 / 70.0
2+45	139.6	138.9 / 48	137.2 / 65.5	140.0 F.L.R. / 66	154.0 / 72	162.0 / 80	[illegible]	
2+95	137.2	137.0 / 20	136.7 / 26	136.0 / 32	136.0 / 50	138.6 F.L.R. / 67	144.0 / 70	162.0 / 72	167.0 / 80
3+36	137.0	132.3 / 13	135.7 / 28	134.3 / 36	134.0 / 56	139.0 / 73	154.0 / 74	159.0 / 80

X sections for Spillway
For State

7/30/30.

Edge of Concrete Spillway

RT.

3+61

133.2 133.9 133.2 134 L F.L R. 164 6 166 0
34 40 68 73 84

3+95

132.4 132 1 F.L R. 135 0 163 3
61 66 72 3

4+45

131 4 132 1 132 1 131 8 131 2 132 5 133 3 F.L R. 165 1 172 0
4 8 12 32 60 65 68 82

4+95

124 6 129 2 130 3 F.L R. 150 4 170 0
40 63 67 75

5+20

125 2 125 0 F.L R. 159 0 168 0
60 65 76

Final X-Section On Spillway

9/4/30 Leekey, Bonham, Bliss, Bailey

Sta.	+ Slope Dist.	Hi. Vertical Angle	Hori. Dis.	Diff. El	Elev.
B.M.	8.68	128.09	Add 4' to All Hor. Dist from 0+00 – 0+73 incl.		119.41
0+00	56.6	14° 02'	54.9	+13.7	141.8
Oroo Diagonal 109° 16'	70.4	21° 27'	65.5	+25.7	153.8
	89.8	27° 17'	79.8	+41.2	169.3
	104.0	28° 56'	91.0	+50.3	178.4
			109.6		195.2
	Note – Distance same as following distance				
	130.6	32° 58'	109.6	+71.1	199.2
	172.2	36° 14'	138.9	+101.8	229.9
	177.0	37° 58'	139.5	+108.9	237.0
	197.0	38° 14'	154.7	+119.4 −2.5	247.5
0+00	83.8	20° 21'	78.6	+29.1	157.2
H.L. Base ahead.	110.0	25° 45'	99.1	+47.8	175.9
	164.0	30° 59'	140.6	+84.4	212.5
	182.7	31° 10'	156.3	+94.5	222.6
			156.3		226.6
	Note Same distance, elevation 4 feet higher.				
T.P.	4.63	124.04	8.68		119.41
0+13	68.0	10° 20'	66.9	+12.2	136.2
	82.4	18° 44'	78.0	+26.5	150.5
	108.6	23° 40'	99.5	+43.6	167.6

Base Line — Rt

Note – All slope and horizontal distances are measured from 4 ft out. between stations 0+00 to 0+73 inclusive.

123.7	123.7	124.2	123.4	126.4	132.3	136.2
4.4 / 0.0	4.4 / 4.0	3.9 / 11.0	4.7 / 27.0	1.7 / 42.0	+4.2 / 55.0	+8.1 / 65.0

Note – Elevation will be 4 feet lower than following elevation.

Note – Vertical face continues

123.7	123.7	122.5	124.9	133.1
4.4 / 0.0	4.4 / 4.0	5.6 / 35.0	3.2 / 47.0	+6.0 / 65.0

Note 1/4 : 1 slope continues up.

120.2	119.7	118.6	116.1	122.9
3.8 / 0.0	4.3 / 4.0	5.4 / 30.0	7.9 / 40.0	1.1 / 60.0

✓ A.C.L. 9/25/30

Base Line Rt

Sta	+ Slope Dis	Hi Ver Angle	− Hori Dis	Diff Elev	Elev
		124.04			
0+13	111.6	24°31'	101.5	+46.3	170.3
	127.4	26°25'	114.1	+56.7	180.7
	127.4	27°58'	112.5	+59.7	183.7
	139.0	29°08'	121.4	+67.7	191.7
	160.0	30°42'	137.6	+81.7	205.7
	188.5	30°58	161.6	+95.5 −1.5	219.5
T.P.		124.04	11.38		112.66
	3.37	116.03			
0+25	192.5	32°14'	162.8	+102.7	218.7
	175.7	32°03	148.9	+92.2 −1.0	208.2
	149.7	31°59'	127.0	+79.3	195.3
	127.0	29°45'	110.3	+63.0	179.0
	115.5	25°48	104.0	+50.3	166.3
	66.5	10°55'	65.3	+12.6	128.6
T.P.		116.03	11.48		104.55
	3.96	108.51			
0+38	53.6	5°20'	53.4	+5.0	113.5
	81.0	18°05'	77.0	+25.1	133.6
	115.3	30°25'	99.4	+58.3	166.8

Note – Vertical face continues up

Note – Vertical face up

112.7	111.7	111.8	116.5
3.3 / 0.0	4.3 / 1.0	4.2 / 33.0	+0.5 / 56.5

104.3	107.3	102.0
4.2 / 0.0	4.2 / 4.0	6.5 / 38.3

A.C.L.
9/25/30

Sta.	+ Slope Dis	Hi Ver Angle	− Hori Dis	Diff Elev	Elev
		108.51'			
0+38	138.0	31°45'	117.3	72.6	181.1
	188.8	33°05	158.2	103.1	211.6
			158.2'		213.9
	196.8	Elev 2.3 higher than last elev.			
B.M.	10.54	101.50			90.96
0+50	89.8	20°46'	84.0	+ 31.8	133.3
	96.0	27°06'	85.5	+43.7	145.2
	127.4	31°39	108.4	+66.8	168.3
	175.5	34°17'	145.0	+98.8	200.3
	195.3	34°00	161.9	+109.2	210.7
			161.9'		213.2
	205.3	Elev 2.5 ft higher than last elev.			
T.P.		101.50	10.54		90.96
	1.75	92.71			
0+68	Note –	Distance	172.8 41.5 Hori, out from		209.7 first slope dis.
		Distance	153.8 22.5 Hori, out from		207.2 first slope dis.
Note – First slope dis.	163.5	36°36'	131.3	+97.5	100.2
	125.6	33°36'	104.6	+69.5	162.2
	63.0	17°01'	60.2	+18.4	111.1
	53.5	16°54'	51.2	+15.5	108.2
	50.8	2°44'	50.7	+2.4	95.1

Base Line — Rt.

99.2	97.8	97.1	102.5	104.5
2.3	3.7	4.4	+1.0	+3.0
0.0	4.0	35.7	52.5	52.5

Note – Old ground.

Note – Vertical face continues up

Note – Elev 19.5 ft higher – Vertical face up

Elev 17.0 ft higher

90.1	88.1	88.5
2.6	4.6	4.2
0.0	4.0	40.9

A.L.L. 9/25/30

Sta	+ Slope Dis	H. Ver Angle	− Hori Dis	Diff Elev	Elev
		92.71			
0+73	50.8	2°44'	50.7	+ 2.4	95.1
Rt L Back Base 12°51' Lt.	53.5	16°54'	51.2	+ 15.5	108.2
	63.0	17°01'	60.2	+ 18.4	111.1
	125.6	33°36'	104.6	+ 69.5	162.2
	163.5	36°36'	131.3	+ 97.5	190.2
			153.8		207.2
	Note Distance 22.5 Hori out from last slope dis.				
			172.8		209.7
	Distance 41.5 Hori out from last slope dis.				
	End of portion which has 4' added to all Hori Dist.				
T.P.		92.71	1.75		90.96
	1.17	92.13			
0+73	99.5	25°11'	90.0	+ 42.3	134.4
Rt L Base Line Ahead	137.0	30°51'	117.6	+ 70.2	162.3
	167.3	32°12	141.6	+ 89.1	181.2
			166.6		191.4
	Note Distance 25 ft out from last slope dis.				
		92.13			
0+75	99.5	25°11'	90.0	+ 42.3	134.4
	137.0	30°51'	117.6	+ 70.2	162.3
	167.3	32°12'	141.6	+ 89.1	181.2
			166.6		191.4
	Note Distance 25 ft out from last slope dis.				

Base Line

	Rt.		
88.2	87.0	87.0	92.7
4.5	5.7	5.7	0.0
0.0	6.0	45.7	55.0

Note Elev 17.0 ft higher

Elev 19.5 ft higher Note – Vertical face continues

88.1	84.2
4.0	5.9
0.2	47.0

Note – 0+73 on forward tangent.

Note – Elevation 10.2 higer

88.1	84.2
4.0	5.9
0.0	47.0

Note- Elev 10.2 higher.

A.L.

Sta	+ Slope Dis	Hi Ver Angle	− Hori Dis	Diff Elev	Elev
		92.13			
0+82	Left of Base Line 26.0	43.02'	19.0	+17.7	109.8
Note	Same elev 10 ft from last slope				
	Distance 5' Lower at 15 ft from Slope d.s.				
	Than level for 20 ft				
	Than 1½:1 slope down				
	Right of Base Line				
	99.5	25° 11'	90.0	+42.3	134.4
	137.0	30° 51'	117.6	+70.2	162.3
	167.3	32° 12'	141.6 / 166.6	+89.1	181.2 / 191.4
	Note - Distance 25 ft out from last slope				
T.P.		92.13	3.43		88.70
T.P.	0.65	89.35			
1+00	Note - Distance		141.0		166.1
			29 ft out from first slope dis		
	129.4	30° 03'	112.0	+64.8	154.1
	79.0	23° 30'	72.4	+31.5	120.8
	62.0	11° 11'	60.8	+12.0	101.3
T.P.		89.35	12.84		76.51
	8.35	84.86			

LT RT

Base Line

					88.4°	86.5°	85.9°
1½:1 Down.	104.8	104.8	104.8	104.8	3.7	5.6	6.2
	54.0	34.0	29.0	19.0	0.0	4.0	18.0

Note - Elev 10.2 Higher

Note - Elev 12 ft higher Note - Than vertical face

					85.4°	82.8°	84.2°
1½:1 Down.	Same Elev 5+40	32°54' 5 17.6	4.1 0.0	6.5 8.0	5.1 41.0		

A.L.L.

Sta	+ Slope Dis	HI Ver Angle	− Hori Dis	Diff Elev	Elev
		84.86			
1+13	98.3	27° 31'	87.2	+ 45.4	130.3
	133.2	28° 44'	116.8	+64.0	148.9
			132.8		
Note Distance 16.0 out from last slope					150.2
T.P.		84.86	8.35		76.51
	7.40	83.91			
1+25	143.8	27° 20'	127.7	+66.0	149.9
	102.2	24° 45'	92.8	+42.8	126.7
	78.8	22° 44'	72.7	+30.4	114.3
T.P.		83.91	12.93		70.98
	2.99	73.97			
1+50	62.0	20° 18'	58.1	+21.5	95.5
	129.0	24° 05	117.8	+52.6	126.6
T.P.		73.97	12.36		61.61
	8.30	69.91			

Lt — Base Line — Rt

	96.7	96.7	81.8	80.2	81.3
1½:1 Down	Same El / 5+40.0 / 64.3	11.8 25°54' / 527.0 / 24.3	3.1 / 15.0	4.7 / 0.0	3.6 / 36.5

Note – Elev 1.3 higher   Note – 1/4 : 1 slope up.

Note – 1/4 : 1 slope up.

	94.8	94.8	82.3	79.4	78.6
1½:1 Down	Same El / 5+40 / 65.8	10.9 22°54' / 528.0 / 25.8	1.6 / 10.4	4.5 / 0.0	5.3 / 32.3

	87.1	87.1	72.3	69.3	69.6
1½:1 Down	Same El / 5+35 / 62.2	13.7 26°45' / 530.5 / 27.2	1.7 / 9.3	4.7 / 0.0	4.4 / 33.8

Note – Vertical face continues.

A.C.L.

Sta	+ Slope Dis	H. Ver Angle	− Hori Dis	Diff Elev	Elev
		69.91			
1+63	119.0	23°26'	109.2	+47.3	117.2
	107.0	22°38'	98.7	+41.2	111.1
	91.0	17°42'	86.7	+27.7	97.6
	62.3	16°30'	59.7	+17.7	87.6
	43.4	4°56'	43.2	+3.7	73.6
T.P.		69.91	8.30		61.61
	4.98	66.59			
1+75	106.0	18°24	100.6	+33.4	100.0
T.P.		66.59	4.98		61.61
	2.19	63.80			
1+85.85	106.3	18°20'	100.9	+33.4	97.2
	81.0	14°48'	78.3	+20.7	84.5
T.P.		63.80	12.15		51.65
	10.99	62.64			

Lt Base Line Rt

Note - Vertical face.

Note - O.B.G.

		81.3	81.3	67.8	65.1	63.7
		81.3	111.4			
1½:1 Down	Same El	18°08	2.1	4.8	6.2	
	5+35	536.7	12.2	0.0	32.0	
	69.2	34.9				

		82.7	82.7	71.9	62.2	61.4	61.3
			16.1	5.3			
1½:1 Down	Same El		18°17'	11°16'	4.4	5.2	5.3
	5+30		51.3	527.4	8.0	0.0	36.2
		78.7	48.7	26.9			

Note - Vor face cent.

		80.7	68.1	60.5	59.5	61.9
Note ½:1 Up.						
		16.9	4.3			
1½:1 Sa+E.		17°43'	16°32'	3.3	4.3	1.9
		555.1	516.0	7.2	0.0	11.0
		52.1	15.1			

A.C.L.

Sta	+ Slope Dis Lt	Hi Ver Angle 62.64	− Hori Dis	Diff Elev	Elev
2+00	49.0	9°50'	48.3	+5.4 −3.0	68.0
	23.0	9°15'	22.7	+3.7	66.3
T.P		62.64	12.99		49.65
	0.68	50.33			
2+25					
2+41					
T.P.		50.33	0.68		49.65
T.P.	12.91	62.56	0.64		61.92
T.P.	12.20	74.12	0.50		73.62
T.P.	12.82	86.44	1.89		84.55
T.P.	8.38	92.93	1.96		90.97

BM − 90.96
90.97 = .01 check.

A.L.L.

Lt	Base Line	Rt
	58.0°	57.2°
4.6 / 0.0	5.4 / 44.0	Note 1/4:1 slope up.
0.0 / 50.0	7.5 / 0.0	10.3 / 51.0 Note - Vertical face
11.0 / 50.0	16.0 / 0.0	18.9 / 35.0 — 24.4 / 51.0 Note Ver face

50.3° 42.8° 40.0° 34.3° 31.4° 25.9°

Finial X-Section Roadway
South End Dam

Sta	+ Slope Dis	Hor Angle	Hori Dis	Diff Elev	Elev
B.M.	1.05	192.45			191.40
T.P.	0.22	182.08	10.59		181.86
T.P.	1.22	173.27	10.03		172.05
	Lt				
0+88	24.0	3°57'	+ 23.9	+ 1.6	174.9
	48.0	10°51'	47.1	+ 9.0	182.3
	78.6	18°50'	74.3	+ 25.4	198.7
T.P.		173.27	1.22		172.05
	2.42	174.47			
	Lt				
1+00	68.5	19°37'	+ 64.5	+ 23.0	197.5
	43.0	11°12'	42.2	+ 8.4	182.9
	22.4	2°22'	22.4	+ 0.9	175.4
T.P.		174.47	2.42		172.05
	4.14	176.19			

Lt — Base Line — Rt

9/6/30

Lee Kay
Bonham
Bliss
Bailey

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167.9 — 168.4 — 168.4

5.4 / 14.4 — 4.9 / 0.0 — 4.9 / 8.0 — 1½:1 Slope down

169.1 — 169.3 — 169.7

5.4 / 12.0 — 5.2 / 0.0 — 4.8 / 11.0 — 1½:1 Slope down

A.C.L.

Sta	+ Slope Dis	Hi Ver Angle	− Hori Dis	Diff Elev	Elev
	Lt	176.19			
1+25	23.0	5°23'	22.9	+ 2.1	178.3
	56.0	21°52'	51.9	+ 20.8	197.0
T.P.		176.19	4.14		172.05
	4.54	176.59			
	Lt				
Diagonal. 1+34 45	49.6	21°19'	46.2	+18.0	194.6
	36.0	13°17'	35.0	+8.3	184.9
T.P.		176.59	4.54		172.05
	5.82	177.87			
	Lt				
1+50	23.0	3°25'	22.9	+ 1.4	179.3
	49.0	20°34'	45.8	+17.3	195.2
T.P.		177.87	5.82		172.05
	7.76	179.81			
	Lt				
1+75	51.0	21°42'	47.4	+18.8	198.6
	24.5	7°26	24.3	+ 3.2	183.0

Lt — Base Line — Rt

Lt	Lt	Lt	Rt	
171.6	171.0	171.2	170.2	
4.6 / 8.0	5.2 / 0.0	5.0 / 6.6	6.0 / 15.0	1½:1 Slope down
171.9	171.7	170.7		
4.7 / 10.0	4.9 / 0.0	5.9 / 18.0		1½:1 Slope down
173.0	172.9	173.2		
4.9 / 9.0	5.0 / 0.0	4.7 / 8.5		1½:1 Slope down.
175.0	174.8	175.1		
4.8 / 8.5	5.0 / 0.0	4.7 / 10.0		1½:1 Slope down.

A.L.L.

Sta	+ Slope Dis	Hi Ver Angle	− Horr Dis	Diff Elev	Elev
T.P.		179.81	7.76		172.05
	9.21	181.26			
	Lt				
2+00	24.5	12°45'	23.9	+ 5.4	186.7
	31.5	17°52'	30.0	+ 6.7 = 3.0	188.0
	50.0	21°55'	46.4	+ 18.7	200.0
T.P.		181.26	9.21		172.05
	10.56	182.61			
	Lt				
2+25	48.7	17°40'	46.4	+ 14.8	197.4
	43.3	17°33'	41.3	+ 11.0 − 2.0	193.6
	38.7	17°22'	36.9	+ 10.5 − 1.0	193.1
	25.0	14°55'	24.1	+ 6.4	189.0
T.P.		182.61	10.56		172.05
	11.55	183.60			
	Lt				
2+40 P.C.	25.6	14°50'	24.7	+ 6.6	190.2
	41.0	16°44'	39.3	+ 7.8 − 4.0	191.4
	45.7	17°04'	43.7	+ 9.4 − 4.0	193.0
	56.5	15°53'	54.3	+ 9.5 − 6.0	193.1

Lt — Base Line — Rt

176.5	176.2	176.1	
4.8 / 8.5	5.1 / 0.0	5.2 / 9.0	1½:1 Slope down
178.4	177.6	177.1	
4.2 / 8.7	5.0 / 0.0	5.5 / 12.7	1½:1 Slope down
179.1	178.8	178.4	
4.5 / 8.5	4.8 / 0.0	5.2 / 14.0	1½:1 Slope down.

A.C.L.

9/9/30 Lee Kay
Bonham
Bliss
Bailey

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Base Line

Lt | Rt

Sta	+ Slope Dis	Hi Ver Angle	− Hori Dis	Diff Elev	Elev
T.P.		183.60	0.40		183.20
B.M	9.83	193.03	1.62		191.41
B.M	1.04	192.45			191.40
	3.77	185.63	10.59		181.86
	Rt.				
2+62	35.0	4° 05'	34.9	-0.5	185.1
	23.6	1° 28	23.6	-3.0 / +0.6	186.2
	Lt				
	25.0	12° 26'	24.4	+5.4	191.0
	36.3	13° 07'	35.5	+5.2 / -3.0	190.8
T.P.		185.63	1.93		183.70
	3.99	187 69			
	Lt.				
2+84	22.0	9° 53'	21.7	+3.8	191.5
	Rt.				
	54.6	25° 40'	49.2	+23.6	211.3
T.P		185.63	3.99		183.70
	12.45	196.15			

B.M. = 191.40
191.41 = Check = .01

180.7	180.6	180.1
4.9 / 9.0	5.0 / 0.0	5.5 / 11.4

182.9	182.6	183.0
4.8 / 10.3	5.1 / 0.0	4.7 / 10.0

Note— Edge of huge boulders.

A.C.L.

Sta	Slope Dis	Ver Angle	Hori Dis	Diff Elev	Elev
		196.15			
3+06.	143.5	27°53'	92.2	+ 65.1 − 2.0	261.2
	133.5	26°18'	84.7	+ 56.1 − 3.0	252.2
	110.6	26°23'	64.1	+ 49.1	245.2
	65.0	20°57'	25.7	+ 23.2	219.3
3+28	53.0	22°14'	14.1	+ 20.1	216.2
	75.0	29°26'	30.3	+ 36.9	233.0
	110.0	37°05'	52.7	+ 66.3	262.4
	158.0	38°00'	89.5	+ 97.3	293.4
Omit	162.0	39°29'		−1.5	
	139.0	37°25'			
	83.0	34°55'			
	72.5	30°40'			
	56.5	27°05'			
3+49.94	55.5	26°50'	14.5	+ 25.0	221.1
	71.0	30°16'	26.3	+ 35.8	231.9
	94.0	36°25'	40.6	+ 55.8	251.9
	163.0	39°22'	91.0	+103.4	299.5
T.P.		196.15	0.84		195.31
	0.35	195.66			

Base Line

Lt Rt

Note- All slope distances on stations 3+06 3+28 and 3+49.94 are taken from from radius point.

190.8	192.6	191.6	184.9	184.8	185.4
5.3	3.5	4.5	11.2	11.3	10.7
35.0	23.0	17.0	10.0	0.0	9.0

193.1	191.7	186.7	187.1	187.3
3.0	4.4	9.4	9.0	8.8
26.0	18.0	10.0	0.0	9.0

Note- Level for 15' ft.

Note- Level for 35 ft.

Note- 14° 38' Δ from P.T. Rad = 35 Sta = ?

192.6	192.4	188.3	188.5	189.1
3.5	3.7	7.8	7.6	7.0
25.0	19.0	8.0	0.0	5.0

192.9	189.1	189.1	190.5
3.2	7.0	6.7	5.7
16.0	10.0	0.0	8.0

A.C.L.

Sta	+ Slope Dis	Hi Ver Angle	− Hori Dis	Diff Elev	Elev
		195.66			
3+75	30.5	7° 55	15.2	+ 4.2	199.9
	42.0	14° 45	25.6	+ 10.7	206.4
	50.6	36° 40′	25.6	+ 30.2	225.9
	69.20	41° 05′	37.2	+ 45.5	241.2
	84.8	41° 35′	48.4	+ 56.3	252.0
	92.8	44° 56′	50.7	+ 65.5	261.2
T.P		195.66	0.35		195.31
	2.19	197.50			
4+00	98.5	45° 45′	53.7	+ 70.6	268.1
	85.2	40° 32′	49.8	+ 55.4	252.9
	73.0	39° 12′	41.6	+ 46.1	243.6
	59.0	35° 20′	33.1	+ 34.1	231.6
	48.0	29° 43′	26.7	+ 23.8	221.3
	30.6	28° 32′	11.9	+ 14.6	212.1
	24.5	2° 00′	9.5	+ 0.8	198.3
T.P.		197.50	2.19		195.31
	3.04	198.35			

Lt — Base Line — Rt

198.4	196.2	196.7	190.9	191.1	191.5
+2.7 / 25.4	+0.5 / 25.0	+1.0 / 19.5	4.8 / 10.0	4.6 / 0.0	4.2 / 6.0

Note - All slope distance are taken from 15 ft north, offset line. on stations 3+75 - 4+00 and 4+25 (Offset at Rt Angles.)

Note - Same distance as last slope, vertical face. (Approx 20′ higher)

200.5	192.5	192.5	192.9
+3.0 / 22.0	5.0 / 13.5	5.0 / 0.0	4.6 / 3.2

A.C.L.

Sta	+ Slope Dis	Hi Ver Angle	− Horiz Dis	Diff Elev	Elev
		198.35			
4+25 71	45.5	21°40'	27.3	+ 16.8	215.1
	57.5	36°23'	31.3	+ 34.1	232.4
	75.0	38°00'	44.1	+ 46.2	244.5
	89.0	38°40'	54.5	+ 55.6	253.9
	106.5	43°46'	61.9	+ 73.7	272.0
	133.8	44°12'	80.8	+ 93.4	291.7
T.P.		198.35	3.04		195.31
	4.25	199.56 N			
4+46	146.5	40°35'	81.3	+ 95.3	294.9
	113.4	39°32'	57.4	+ 72.2	271.8
	98.7	34°37'	51.3	+ 56.1	255.7
	86.5	34°17'	41.5	+ 48.6	248.2
	74.4	30°25	36.2 +2.0	+ 37.7	237.3
	60.5	27°07'	26.8 +3.0	+ 27.6	227.2
	51	21°27'	23.5 +6.0	+ 18.6	218.2
	42.2	11°06'	11.4	+ 8.1	207.7
4+46	47.7	12°06'	16.6	+ 10.0	209.6

Note - Vertical until intersection of old ground.

Lt | Base Line | Rt

198.1	193.7	193.9	194.9
0.2 / 21.0	4.6 / 16.5	4.4 / 0.0	3.4 / 4.5

Note - Slope distances on this station are taken from a 30 ft offset Rt angles to tangent A+25 71 to 4+95 99

194.9	195.2	195.4
4.7 / 31.0	4.4 / 17.0	4.2 / 2.0

194.9	195.2	195.4
4.7 / 31.0	4.4 / 17.0	4.2 / 2.0

A.C.L.

Sta	Slope Dis	Ver Angle	Hori Dis	Diff Elev	Elev
T.P.		199.56	4.25		195.31
T.P.	4.46	199.77	0.87		198.90
	4.01	202.91			
4+75	24.2	40° 51'	18.3	15.8	218.7
4+95.84					
T.P.		202.91	0.71		202.20
	10.40	212.60			
5+25					
5+50					
5+75					

Lt

Base Line

Rt

196.7°

6.2 / 26.5

199.0°

3.9 / 20.0

197.7°

5.2 / 17.0

199.5°

3.4 / 0.0

197.9°

5.0 / 0.0

199.5°

3.5 / 5.5

198.7°

4.2 / 4.9

201.7°

1.2 / 10.5

Vertical slope

= Ver face.

199.7°

12.9 / 21.0

204.8°

202.3°

10.3 / 11.5

204.5°

201.9°

10.7 / 0.0

204.9°

201.9°

10.7 / 5.0

204.9°

204.2°

8.4 / 9.1

203°

Ver face

205.4°

7.8 / 17.0

205.7°

8.1 / 0.0

205.7°

7.7 / 2.0

206.4°

3.3 / 6.5

Ver face

7.2 / 23.0

6.9 / 00

6.2 / 4.0

Vertical

A.L.

Sta	+ Slope Dis	Hi Ver Angle 212.60	− Hori Dis	Diff Elev	Elev
6+00					
T.P.		212.60	11.31		201.29
T.P.	1.25	202.54	6.05		BM = 196.50 196.49

Check = .01

Lf — Base Line — Rt

206.7	207.3	207.8	
5.9 / 16.5	5.3 / 0.0	4.8 / 6.0	Vertical

A.CL.

10/21/30
Bonham
Dennison.

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Boat Landing Road.
Slope Stakes.

Sta.	+S	H.I.	−S	Elev.	℄ from Baseline
B.M.	10.03	171.11		171.08	
11+00					2' Rt.
					5' Rt.
10+50					5' Rt.
10+15.8					8' Rt.
9+50					14' Rt.
	9.60	171.61	9.10	162.01	
9+00					18' Rt.
8+50					17' Rt.
8+00					16' Rt.
	0.90	162.91	9.60	162.01	
7+50					15' Rt.
7+00					14' Rt.
6+50					13' Rt.
6+00					13' Rt.
	5.13	164.24	3.80	159.11	

	Lt. ℄	Rt.
Rock. Sta. 12+58'		6'7/10 Rt.
	−1.1	+6.0
	9.7	12.5
	−4.4	+5.6
	14.6	12.2
	−5.6	+3.0
	16.4	10.3
	−6.0	+11.6
	17.0	16.7
	−6.0	+7.0
	17.0	13.3
	−5.6	+3.2
	16.4	10.4
	−5.0	+6.2
	15.5	12.7
	−5.4	+6.0
	16.1	12.5
	−6.4	−2.6
	17.6	11.9
	−6.6	−5.6
	17.9	16.4
	−5.6	+3.4
	16.4	10.6

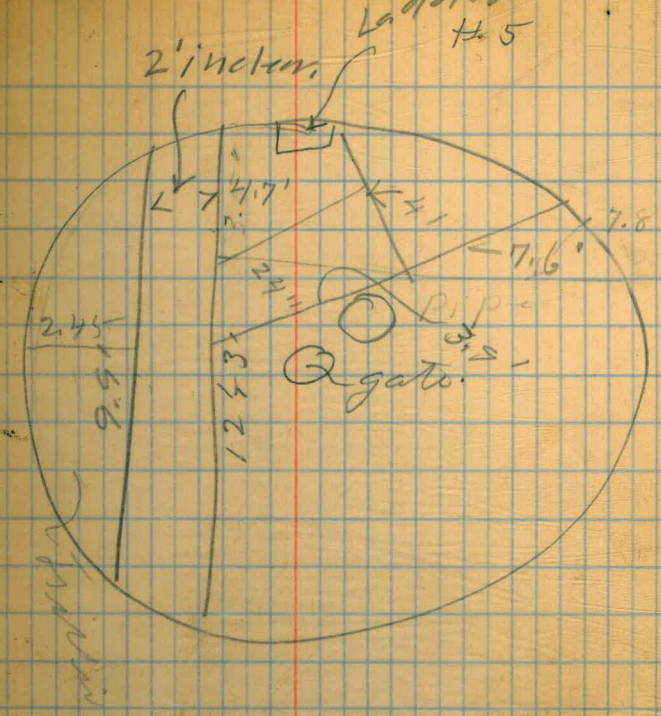
Sta.	+S	H.I	-S.	Elev.	℄ from Baseline
5+44.7		164.24			17' Rt.
5+00					16' Rt.
4+50.					15' Rt.
4+00					14' Rt.
3+72.3					14' Rt.
3+50					14' Rt.
3+00					13' Rt.
2+50					10' Rt.
2+00					0.0

Lt.	Rt.
-5.0 15.5	+6.8 13.1
-4.0 14.0	+11.2 16.4
0.0 10.2	+12.4 17.3
-3.4 13.1	+8.4 14.3
-4.0 14.0	
-3.8 13.7	
-9.0 21.5	-0.8 9.2
-1.0 9.5	+7.4 13.6

Grade stakes
Horse-Shoe Bend Road.

	+S.	H.I	-S.	Elev	Fill
B.M.	3.39	171.16		167.77	
			7.16	164.00	0.0
			9.46	161.70	2.30
			10.86	160.30	3.70
T.P.	4.26	164.40	11.02	160.14	
			3.80	160.60	3.40
			3.20	161.20	2.80
			3.50	160.9	3.10
			4.50	159.9	4.10
			5.70	158.7	5.30
			6.10	158.3	5.70
			5.40	159.0	5.00
T.P.	1.82	161.77	4.45	159.95	
			1.30	160.50	3.50
			1.30	160.50	3.50
			4.80	157.00	7.00
			5.50	156.3	7.70
			5.10	156.7	7.30
			5.00	156.8	7.20
			3.00	158.8	5.20
T.P.	9.95	169.05	2.67	159.10	
			8.95	160.10	3.90
			5.05	164.00	0.0

Platform
2" x 3/8" ∠
2" C.C. Rings 5/8"
on 8" I Beams.
Rail 2 1/2' 3 1/2'



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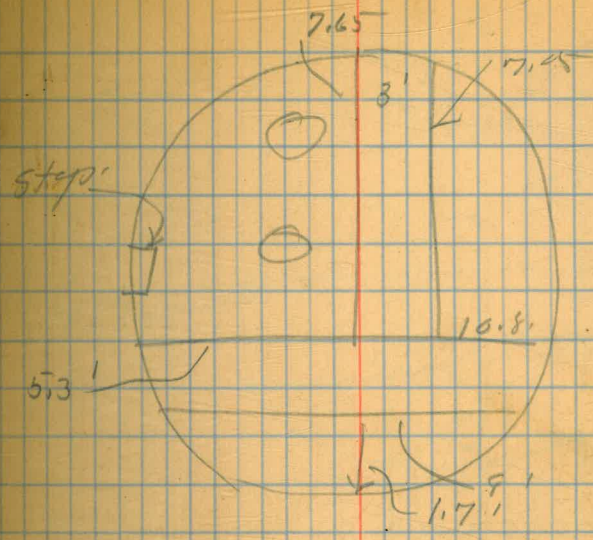
61



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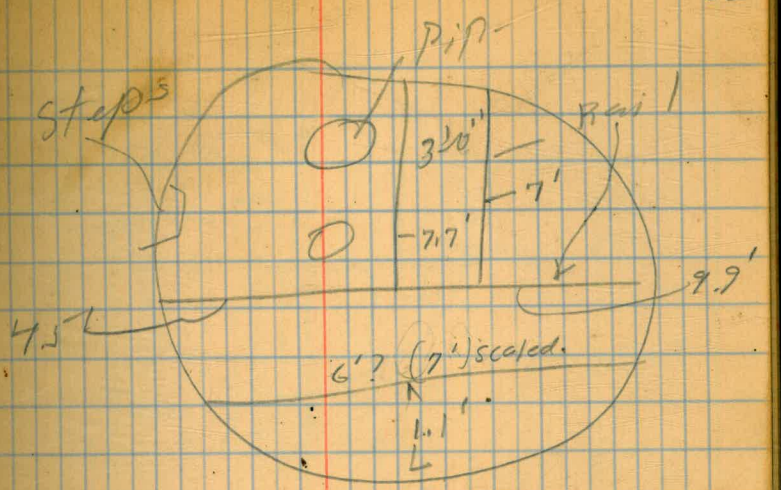
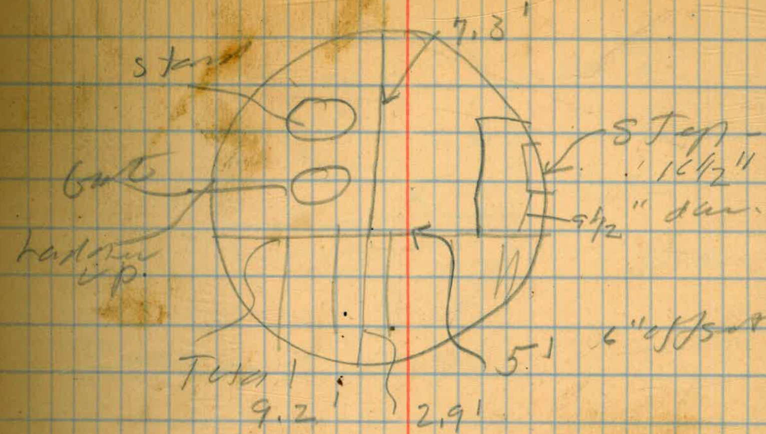
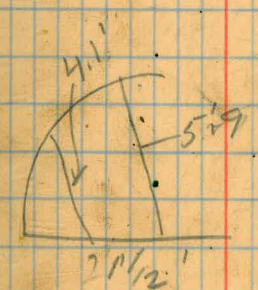
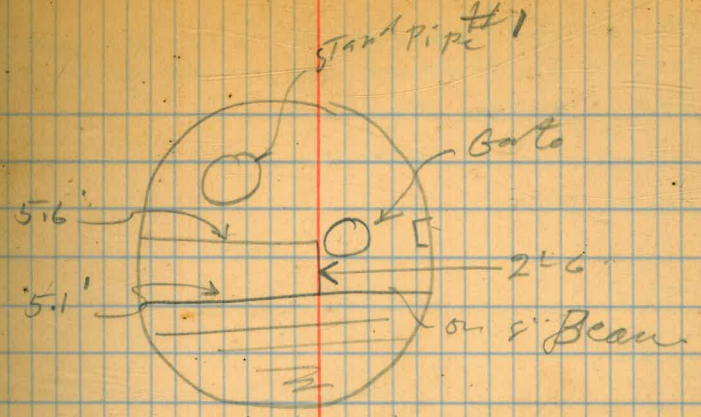



7.8'
16 1/2"
9 1/2"
6" offset
9.2'
2.9'
5.1'


4.1'
5'9'
21 1/2'



Legs 6.35' High.

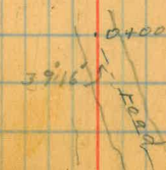
Road loc. above 176" reservoir contour - Morena.
0+00 = point about 1300' westerly of old boat landing.

4/9/40

Hill
Soper
Brooks

Sta.	Deflec.	Mag. B.	
		N 84°30'E	
5+96.9	17°51' L		
		S 78°30'E	D.G. 20% solid rock & boulders 75%
4+62.8	28°43' L		
		S 50°E	D.G. with 20% boulders
1+94.8	15°41' L		
		S 34°E	Decomposed Granite with 10% boulders
0+00			

Note line could be shifted a few feet downhill between sta's 4+50 & 6+00 for better gradient.



(cont.)

Sta.	Deflec	Mag. B.	
			D.G. 85% Boulders 15%
		S 5°3' E	
9+21.2	13°04' R		
			D.G. 10% Solid rock + Boulders 90%
		S 6° E	
8+30.3	38°19' L		
			D.F. 10% Solid rock + Boulders 90%
		S 27°30' E	
7+41.5	8°37' R		
			D.G. 60% Boulders 40%
		S 36° E	
6+58.6	59°14' R		
			D.G. 60% Boulders 40%

(cont.)

15+63.3 End of loc. = ℄ exist. road

D.G. 90% Boulders 10%

N 89° E

13+73.8 5-1°33' L

D.G. 85% Boulders 15%

S. 10° E

12+64.0 3°27' R

D.G. 85% Boulders 15%

S 43° E

11+45.1 1°35' L

D.G. 75% Boulders 25%

S. 12° E

10+66.0 10°37' R

17°

15+63.3

13+16.7 070°

U.S. Land Office
Bronze mon.

Note shift line down
bill ahead 25' at sta.
10+66.

Profile & xsecs over Morena road loc.

Sta	+S	H.I.	-S	Elev.
Datum	12.64	173.04		160.4
T.P.	10.64	183.56	0.12	172.92
-1+00	Lroad		1.2	82.4
-0+50			2.7	80.9
0+00			6.6	177.0
+40			1.6	82.0
P.I. 0+83.8	8.36	191.14	0.78 6.5	182.78 84.6
1+00			7.6	83.5
+50			5.2	85.9
+94.8			1.4	89.7
T.P.	2.65	193.29	0.50	190.64
2+50			3.8	89.5
3			10.6	82.7
+25			12.4	80.9
+50			6.6	86.7
+64			6.8	86.5
+77			13.2	80.1
4			13.7	79.6

Hill
Soper
Brooks

4/11/40

68

L & R.

Water surface of res. 4/11/40.

Note +or- readings = vert. dis. above or below L elev.

-7.4/24 -3.6/11 0.0/5 +0.9/10 +4.2/12 +9.8/26

-7.8/24 rd. -7.5/13 rd -3.5/8 +2.0/13 11.4/26

1½-1 to road 13.7/29 +2.0/10 +12.9/35

-12.7/26 -3.5/13 +7.8/20 +12.9/29

-6.6/26 -2.6/13 +5.5/13 some slope 20' further

-9.1/31 -3.2/17 +9.6/21 +13.7/31 bisec Δ

edge borrow pit → -5.5/13 +5.3/15 +12.7/35

-7.7/26 -3.5/13 +1.0/15 +6.9/22 +10.0/35

-1.6/12 +5.0/16 +8.7/24 +11.0/35

edge large boulder

-2.3/12 +6.5/18 +5.3/24

edge of rubble wall →

-2.8/12 +0.8/17 +5.3/22

-0.2/12 +0.4/3 +6.2/9 +7.0/17 +11.7/23

edge rubble wall →

-0.7/11 +1.1/8 +5.4/16 +6.2/21 +8.6/25

(cont.)

		193.29		
4+34			12.9	180.4
+50			6.6	186.7
4+62.8			4.4	88.9
T.P.	3.89	193.23	3.95	189.34
+92			5.3	87.9
5+32			13.1	80.1
+62			6.5	86.7
+96.9			3.7	89.5
6+58.6			8.6	84.6
T.P.	4.61	189.03	8.81	184.42
7			4.0	85.0
+41.5			2.6	87.4
8			7.4	81.6
+30.3			5.2	83.8
+68			10.0	79.0

L ℄ R

edge of large boulder → $\frac{-0.7}{9}$ $\frac{+2.0}{10}$ $\frac{+5.6}{24}$

all boulders

same slope 10' further $\frac{-8.0}{25}$ $\frac{-7.0}{20}$ $\frac{+7.9}{19}$ $\frac{+12.5}{32}$ bisec. Δ

" $\frac{-11.5}{26}$ $\frac{-5.1}{10}$ $\frac{+5.0}{11}$ $\frac{+8.0}{24}$ $\frac{+12.9}{35}$

edge of bank $\frac{-7.2}{26}$ $\frac{-7.1}{22}$ $\frac{-4.4}{14}$ $\frac{+8.5}{20}$ $\frac{+12.3}{35}$

edge of bank $\frac{-12.7}{33}$ $\frac{-10.4}{23}$ $\frac{-6.5}{13}$ $\frac{+3.3}{13}$ $\frac{+10.8}{33}$

same slope 10' further $\frac{-9.0}{26}$ $\frac{-4.3}{13}$ $\frac{+3.8}{13}$ $\frac{+6.2}{22}$ bisec. Δ toe of solid ledge rock

edge of bank $\frac{-9.6}{36}$ $\frac{-6.4}{27}$ $\frac{+7.9}{40}$ bisec. Δ

same slope 10' further $\frac{-7.0}{27}$ $\frac{-5.0}{22}$ $\frac{-5.0}{16}$ $\frac{+1.9}{13}$ $\frac{+5.0}{23}$ toe of ledge rock

$\frac{-13.2}{27}$ $\frac{-6.2}{14}$ $\frac{-5.7}{8}$ $\frac{+7.4}{18}$ bisec Δ " " "

$\frac{-11.3}{28}$ $\frac{-8.7}{18}$ $\frac{+7.0}{13}$ $\frac{+12.3}{23}$ " "

$\frac{-9.9}{39}$ $\frac{-8.1}{26}$ $\frac{-5.0}{13}$ $\frac{-1.2}{7}$ $\frac{+12.4}{26}$

$\frac{-5.0}{32}$ $\frac{+0.5}{8}$ $\frac{+7.2}{29}$

(cont.)

		189.03		
9			10.1	78.6
+21.2			3.5-	85.5
T.P.	10.23	197.23	2.03	187.00
+5-0			11.7	85.5
10			7.5-	89.7
+5-0			5-2	92.0
+66			3.0	94.2
11			3.0	94.2
+45-4			5-8	91.4
12			12.1	85.1
T.P. 1	0.66	185.18	12.71	184.52
+5-0			6.2	79.0
T.P.	45-2	183.11	6.5-9	178.59
+640			4.3	78.8
13			4.7	78.4
+5-0			5.7	77.4

L & R

70

	-1.1 / 38	+0.5- / 11	+3.2 / 13	+4.4 / 25	+7.2 / 31
same slope 10' further	-4.3 / 26	-3.0 / 16	+1.9 / 5-	+3.0 / 19	+3.9 / 31
top bank above borrow pit	-10.2 / 31	-8.5- / 26	+6.2 / 14-	same slope 10' further	
top of bank above borrow pit	-8.3 / 22	+5-2 / 14	"	"	"
top of bank above road	-16.3 / 46	-9.5- / 28	-1.0 / 15-	+5-0 / 15-	"
same slope 10' further	-11.9 / 33	-8.5 / 27	-2.5- / 14	+5-6 / 20	bisec. Δ
top of bank above road (½-1 for 7')	-18.4 / 45	-11.4 / 30	-5-4 / 13	+5-2 / 14	
top of bank above road (½ to 1 for 8')	-19.3 / 50	-10.7 / 26	-4.5 / 13	+5-2 / 15-	bisec Δ
½ to 1 bank to road	-13.5 / 45-	-10.0 / 33	-4.6 / 15-	+4.4 / 17	
	-18.1 / 33 rd.	-9.0 / 27	-5.5- / 17	+3.7 / 10	face of large boulder
	-11.6 / 28 rd.	-7.9 / 23	-3.2 / 13	+4.4 / 15-	bisec. Δ
	-10.4 / 35- rd.	-10.1 / 22 rd.	-5-3 / 15-	+4.0 / 10	+7.8 / 23
	-8.9 / 36 rd	-9.6 / 20 rd	+8.0 / 21	+10.6 / 28	

(cont.)

		183.11		
13+73.8	on rock		3.2	79.9
+73.8	ground		6.9	76.2
14			6.2	76.9
T.P.	3.45	183.03	3.53	179.58
+50			4.0	79.0
15			4.4	78.6
+53.8			4.7	178.3 ✓
16+03.8	on ¢ road		2.4	80.6
16+53.8	" " "		1.3	81.7
T.P.	0.97	172.12	11.88	171.15
			11.78	160.34

$\frac{-7.1}{44}$ rd $\frac{-7.1}{32}$ rd $\frac{-4.1}{23}$ $\frac{-3.7}{16}$ $\frac{+3.7}{15}$ $\frac{+7.0}{34}$ large boulders in ¢ st. bed

$\frac{-7.0}{34}$ rd $\frac{-6.6}{22}$ rd. $\frac{+3.0}{12}$ too big rk $\frac{+9.0}{22}$

$\frac{-5.7}{24}$ rd $\frac{-5.1}{12}$ rd $\frac{+8.1}{30}$

$\frac{-2.6}{16}$ rd. $\frac{-2.0}{5}$ rd. $\frac{+3.0}{6}$ $\frac{+9.7}{34}$

$\frac{+0.2}{6}$ rd. $\frac{-0.3}{8}$ rd

Water surface 4/11/40

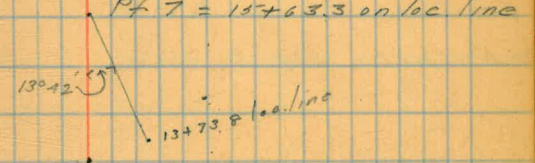
Stadia loc. over exist road from sta. 0+00 to sta. 13+63.3 of new loc.

4/12/40 Hill Soper Brooks

72.

Pt.	Dist.	Hor. ∠	Vert. ∠	H.I.	Elev.
6 to 7	(198')	47°33'L	+3°01'	5.1	
5 to 6	(179')	14°56'R	+1°17'	5.0	
4 to 5	(185')	37°04'R	−0°07'	5.2	
3 to 4	(204')	29°30'L	+0°07'	5.2	
2 to 3	(190')	17°13'L	−1°04'	5.2	
1 to 2	(197')	18°26'R	+0°33'	5.2	
0 to 1 Pt. 0 = 0+00 of loc.	(178')	18°11'R (from back tang. of road)	−3°13'	5.1	

Pt. 0 = 177.0 Elev.



Base line for xsecs. 0+00 = point at southwesterly end of horseshoe bend midway between old + new recreation centers (Morena)

Sta.	Deflec.	
9+88.2	30°49'L	
8+72	25°41'R	
8+25	29°12'L	
7+22	13°08'L	
4+05	61°35-8'L	
3+83	47°16'L	
0+58	17°41'L	
0+00	35°32'L	from back tang. of road

9/12/10 Hill
Soper
Brooks

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classification

0+00 to 1+20 10% DG 90% S.B. & boulders

1+90 to 8+25 80% D.G. 20% boulders

8+25 to 10+67 40% DG 60% boulders

10+67 to 15+19 60% D.G. 40% boulders

(cont.)

15+14.1	12°01'R	to ℄ rd ahead
13+70	9°15'L	
11+41	30°10'R	
10+67.2	15°37'L	

Levels over base line at horseshoe bend - Morena

	13.03	173.33		160.3
T.P.	8.77	181.74	0.06	173.27
	6.61	184.15	4.20	177.54
0-70			1.8	182.4
0+00			6.6	177.6
+58			8.9	175.3
T.P.	9.84	173.26	11.73	172.42
0+95			1.0	172.3
1+43			3.7	169.6
+81			4.7	168.6
2+33			7.1	165.2
+83			8.6	164.8
3+20			8.9	164.4
+55			8.6	164.7
T.P.	4.76	169.41	8.61	164.65
4+05			5.9	163.5
+90			4.9	164.5
5+55			4.9	164.5
6+55			4.5	164.9
7+22			4.6	164.8
+70			5.0	164.4
+90			5.2	164.2
8+25			5.0	164.4
+72			5.1	164.3

Water surface Morena Res. 9/12/90

(cont.)

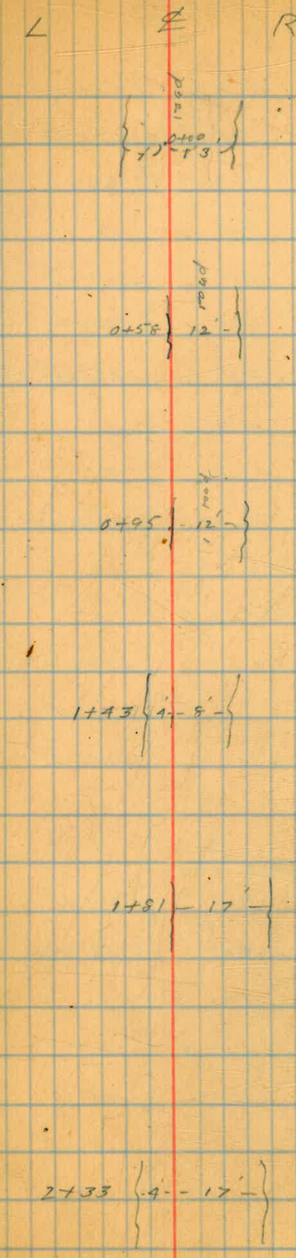
		169.41		
9+29			5.2	164.2
+88			5.3	164.1
10+27			5.2	164.2
+67			5.6	163.8
11+41			5.2	164.2
12+30			7.5	161.9
TP	12.21	177.35	4.27	165.14
13+05			12.7	164.7
+70			10.1	167.3
14+15			9.2	168.2
+80			3.1	174.3
15+14			1.3	176.1
T.P.	6.52	182.55	1.32	176.03
16+14			2.1	180.5
T.P.	1.89	172.09	12.35	170.20
			11.81	160.28

Water surface Morena Res.

stadia xsecs. from base line at horseshoe bend

4/12/40 - 4/13/40

Sta.	Dist	Hor. ∆	Vert. ∆	H.I. − Rod	Elev.	V
0+00					177.6	
Pt. 1	(13)	90° off twid tang.	+0°46'	5.0	177.8	+ 0.2
" 2	16' (18')	"	+19°16'	5.0	178.0	+ 0.4
" 3	26' (30')	"	+20°37'	5.0	187.5	+ 9.9
0+58					175.3	
Pt. 1	12.0	Bisec. ∆	0°	5.0	175.3	0
" 2	22' (25')	"	+19°44'	5.0	183.2	+7.9
" 3	29 (37')	"	+27°46	5.0	190.6	+15.3
0+95					172.3	
Pt. 1	12.0	90°	0°	4.9	172.3	0
" 2	18' (20')	"	+20°26'	4.9	178.8	+ 6.5
" 3	34 (42')	"	+26°10'	4.9	188.9	+ 16.6
1+43					169.6	
Pt 1	8.0	90°	0°	5.0	169.6	0
" 2	14' (18')	"	+29°08'	5.0	177.3	+ 7.7
" 3	25 (32')	"	+27°02'	5.0	182.6	+ 13.0
1+81					168.6	
Pt 1	17.0	90°	0°	4.5	168.6	0
" 2	29 (34')	"	+21°42'	4.5	180.3	+ 11.7
" 3	43 (48')	"	+19°10'	4.5	183.5	+ 14.9
" 4	48' (54')	"	+19°37'	4.5	185.7	+ 17.1
2+33					165.2	
Pt 1	14.0	90°	0°	5.1	165.2	0
" 2	21' (25')	"	+24°18'	5.1	174.6	+ 9.4
" 3	26 (32')	"	+25°14'	5.1	177.5	+ 12.3

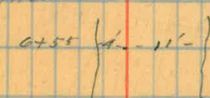


(cont.)

Sta	Dist.	Hor. ∠	Vert. ∠	H.I. Rod	Elev	"V" Dist.
2+33 - Pt. 1	35' (43')	90°	+24°12'	5.1	181.5	+16.3
						same slope for 15' further
2+83					164.8	2+83 {5' - 14' - Road}
Pt 1	14.0	90°	0°	5.0	164.8	0
" 2	20' (21)	90°	+11°30'	5.0	168.9	+4.1
" 3	27' (35)	90°	+28°03'	5.0	179.3	+14.5
" 4	36' (44)	90°	+25°21'	5.0	181.8	+17.0
						same slope 15' further
3+20					164.9	3+20 {- 18' -}
Pt. 1	18.0	90°	0°	4.9	164.4	0
" 2	49' (63')	"	+27°36'	4.9	190.3	+25.9
						same slope 10' further
3+65					164.7	{- 10' - 5' -} 3+65
Pt. 1	5.0	Bisec. ∠	0°	5.0	164.7	0
" 2	16' (21')	"	+28°07'	5.0	173.4	+8.7
" 3	34' (52')	"	+35°42'	5.0	189.3	+24.6
" 4	43' (63')	"	+34°12'	5.0	194.0	+29.3
4+05					163.5	
Pt 1	19.0	90° off back tang.	0	5.1	163.5	0
" 2	46' (53)	91°	+20°40'	5.1	181.0	+17.5
" 3	52 (61)	90°	+22°04'	5.1	184.7	+21.2
						same slope 15' further
4+05					163.5	4+05 {- 17' -}
Pt. 1	17.0	Bisec. ∠	0°	5.1	163.5	0
" 2	62' (65')	"	+12°30'	5.1	177.2	+13.7
" 3	79 (82')	"	+10°06'	5.1	177.7	+14.2
" 4	96 (105')	"	+17°10'	5.1	193.1	+29.6
4+05					163.5	
Pt 1	19.0	90° off forward tang.	0°	5.1	163.5	0

(cont.)

Sta.	Dist.	Hor.∠	Vert.∠	H.I.	Elev.	"V" Dist.
4+05 Pt 2	31.0 (31')	90°	0°	5.1	163.5	0
" 3	35' (39')	"	+17°34'	5.1	174.7	+ 11.2
" 4	62' (73')	"	+22°50	5.1	189.6	+ 26.1
" 5	71' (85')	"	+23°40'	5.1	194.8	+ 31.3
4+90					164.5	
Pt. 1	17.0	90°	0°	4.9	164.5	0
" 2	33' (42')	"	+27°42'	4.9	181.8	+ 17.3
" 3	50' (65')	"	+29°02'	4.9	192.1	+ 27.6
" 4	84' (114')	"	+31°08'	4.9 H.I. 8.9 rod	211.0	+ ~~50.5~~ +46.5
5+55					164.5	
Pt. 1	15.0	90°	0°	5.1	164.5	0
" 2	25' (32')	"	+27°54'	5.1	177.7	+ 13.2
" 3	38' (48')	"	+26°48'	5.1	183.8	+ 19.3
" 4	59' (73')	"	+26°15'	5.1	193.5	+ 29.0
" 5	70' (87')	"	+26°12'	5.1	196.9	+ 32.4 … same slope 20' further
6+55					164.9	
Pt 1	17.0	90°	0°	5.0	164.9	0
2	26' (30)	90°	+22°20'	5.0	175.4	+ 10.5
3	37' (44)	90°	+23°18'	5.0	180.9	+ 16.0
4	77' (95')	90°	+25°51'	5.0 H.I. 10.0 Rod	197.2	+ 32.3
7+22					164.8	
Pt 1	11.0	Bisec. ∠	0°	5.2	164.8	0
2	26' (29')	"	+17°18'	5.2	173.0	+ 8.2
3	48' (54')	"	18°48'	5.2	181.3	+ 16.5
4	66' (72')	"	+17°10'	5.2	185.1	+ 20.3 same slope 30' further



(cont.)

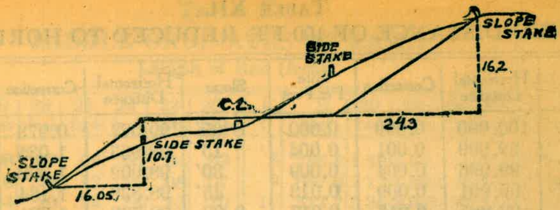
Sta.	Dist.	Hor. ∠	Vert. ∠	H.I. Rod	Elev.	V' Dist.
7+70					164.4	7+70 rod −15'−
" Pt 1	15.0	90°	0°	5.2	164.4	0
" 2	35' (35')	"	+0°24'	"	164.4	0
" 3	53' (53')	"	+11°30'	"	175.1	+10.7 old borrow pit
" 4	53' (61')	"	+20°48'	"	184.7	+20.3
" 5	66' (75')	"	+20°32'	"	189.0	+24.6 same slope 30' further
7+90					164.2	7+90 −15'−
Pt 1	15.0	90°	0°	4.9	164.2	0
" 2	27.0	"	0°	"	164.2	0
" 3	36' (42')	"	+22°57'	"	179.2	+15.0
" 4	48' (56')	"	+21°26'	"	182.9	+18.7
8+25					164.4	8+26 −5'− −11'−
Pt 1	11.0	Bisec. ∠	0°	5.1	164.4	0
" 2	39.0	"	0°	"	164.4	0
" 3	84 (86')	"	+9°38'	"	178.6	+14.2
" 4	106' (111')	"	+12°14'	"	187.4	+23.0
8+72					164.3	8+72 −17'−
Pt 1	17.0	Bisec. ∠	0°	5.1	164.3	0
" 2	27' (32')	"	+22°38'	"	175.7	+11.4
" 3	44' (48')	"	+17°44'	"	178.2	+13.9
" 4	61 (69')	"	+19°30'	"	186.0	+21.7

cont. in book # 178/50

IMPROVED TABLES

AND

INFORMATION



DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING.

SLOPE 1½ TO 1. ROADWAY OF ANY WIDTH.

	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
0	0.00	0.15	0.30	0.45	0.60	0.75	0.90	1.05	1.20	1.35	0
1	1.50	1.65	1.80	1.95	2.10	2.25	2.40	2.55	2.70	2.85	1
2	3.00	3.15	3.30	3.45	3.60	3.75	3.90	4.05	4.20	4.35	2
3	4.50	4.65	4.80	4.95	5.10	5.25	5.40	5.55	5.70	5.85	3
4	6.00	6.15	6.30	6.45	6.60	6.75	6.90	7.05	7.20	7.35	4
5	7.50	7.65	7.80	7.95	8.10	8.25	8.40	8.55	8.70	8.85	5
6	9.00	9.15	9.30	9.45	9.60	9.75	9.90	10.05	10.20	10.35	6
7	10.50	10.65	10.80	10.95	11.10	11.25	11.40	11.55	11.70	11.85	7
8	12.00	12.15	12.30	12.45	12.60	12.75	12.90	13.05	13.20	13.35	8
9	13.50	13.65	13.80	13.95	14.10	14.25	14.40	14.55	14.70	14.85	9
10	15.00	15.15	15.30	15.45	15.60	15.75	15.90	16.05	16.20	16.35	10
11	16.50	16.65	16.80	16.95	17.10	17.25	17.40	17.55	17.70	17.85	11
12	18.00	18.15	18.30	18.45	18.60	18.75	18.90	19.05	19.20	19.35	12
13	19.50	19.65	19.80	19.95	20.10	20.25	20.40	20.55	20.70	20.85	13
14	21.00	21.15	21.30	21.45	21.60	21.75	21.90	22.05	22.20	22.35	14
15	22.50	22.65	22.80	22.95	23.10	23.25	23.40	23.55	23.70	23.85	15
16	24.00	24.15	24.30	24.45	24.60	24.75	24.90	25.05	25.20	25.35	16
17	25.50	25.65	25.80	25.95	26.10	26.25	26.40	26.55	26.70	26.85	17
18	27.00	27.15	27.30	27.45	27.60	27.75	27.90	28.05	28.20	28.35	18
19	28.50	28.65	28.80	28.95	29.10	29.25	29.40	29.55	29.70	29.85	19
20	30.00	30.15	30.30	30.45	30.60	30.75	30.90	31.05	31.20	31.35	20
21	31.50	31.65	31.80	31.95	32.10	32.25	32.40	32.55	32.70	32.85	21
22	33.00	33.15	33.30	33.45	33.60	33.75	33.90	34.05	34.20	34.35	22
23	34.50	34.65	34.80	34.95	35.10	35.25	35.40	35.55	35.70	35.85	23
24	36.00	36.15	36.30	36.45	36.60	36.75	36.90	37.05	37.20	37.35	24
25	37.50	37.65	37.80	37.95	38.10	38.25	38.40	38.55	38.70	38.85	25
26	39.00	39.15	39.30	39.45	39.60	39.75	39.90	40.05	40.20	40.35	26
27	40.50	40.65	40.80	40.95	41.10	41.25	41.40	41.55	41.70	41.85	27
28	42.00	42.15	42.30	42.45	42.60	42.75	42.90	43.05	43.20	43.35	28
29	43.50	43.65	43.80	43.95	44.10	44.25	44.40	44.55	44.70	44.85	29
30	45.00	45.15	45.30	45.45	45.60	45.75	45.90	46.05	46.20	46.35	30
31	46.50	46.65	46.80	46.95	47.10	47.25	47.40	47.55	47.70	47.85	31
32	48.00	48.15	48.30	48.45	48.60	48.75	48.90	49.05	49.20	49.35	32
33	49.50	49.65	49.80	49.95	50.10	50.25	50.40	50.55	50.70	50.85	33
34	51.00	51.15	51.30	51.45	51.60	51.75	51.90	52.05	52.20	52.35	34
35	52.50	52.65	52.80	52.95	53.10	53.25	53.40	53.55	53.70	53.85	35
36	54.00	54.15	54.30	54.45	54.60	54.75	54.90	55.05	55.20	55.35	36
37	55.50	55.65	55.80	55.95	56.10	56.25	56.40	56.55	56.70	56.85	37
38	57.00	57.15	57.30	57.45	57.60	57.75	57.90	58.05	58.20	58.35	38
39	58.50	58.65	58.80	58.95	59.10	59.25	59.40	59.55	59.70	59.85	39
40	60.00	60.15	60.30	60.45	60.60	60.75	60.90	61.05	61.20	61.35	40
41	61.50	61.65	61.80	61.95	62.10	62.25	62.40	62.55	62.70	62.85	41
42	63.00	63.15	63.30	63.45	63.60	63.75	63.90	64.05	64.20	64.35	42
43	64.50	64.65	64.80	64.95	65.10	65.25	65.40	65.55	65.70	65.85	43
44	66.00	66.15	66.30	66.45	66.60	66.75	66.90	67.05	67.20	67.35	44
45	67.50	67.65	67.80	67.95	68.10	68.25	68.40	68.55	68.70	68.85	45
46	69.00	69.15	69.30	69.45	69.60	69.75	69.90	70.05	70.20	70.35	46
47	70.50	70.65	70.80	70.95	71.10	71.25	71.40	71.55	71.70	71.85	47
48	72.00	72.15	72.30	72.45	72.60	72.75	72.90	73.05	73.20	73.35	48
49	73.50	73.65	73.80	73.95	74.10	74.25	74.40	74.55	74.70	74.85	49
50	75.00	75.15	75.30	75.45	75.60	75.75	75.90	76.05	76.20	76.35	50

Computed by L. Leland Locke.

D. G. & 10% boulders 0 to ~~+50~~ 1+91.8
" 20% " 1+91.8 to 4+62.8
" 75% S.R. " " 4+62.8 to 5+96.9
" 40% boulders 5+96.9 to 6+58.6
" " 6+58.6 " 7+41.8
" 90% S.R. & " 7+41.8 " 8+30.3
" " " 8+30.3 " 9+21.2
" & 15% " 9+21.2 " 10+66
" & 25% " 10+66 to 11+45.4 12+64
" & 15% 11+45 " ~~1+91.8 road 75'~~
" & 15% 12+64 to 13+73.8 ~~4+62.8 road 75'~~
" & 10% 13+73.8 " 15+63.3

Line could be 15' (dist) lower at 4+~~62.8~~ +75
" " " 15 or 20' " " 6+00
" " 25' " " 10+66

B.M. on Wall in spillway 119.37

12.36

163.0 39°22'

172.05
11 55
18360

183.20
9.83
193.03
1.62
191.41

7 7.6
5

212.67
11.31
201.36
1.25
202.61
6.05
196.56

206.74
0.84
205.90
0.35
20625

196.50

140.4
86.0
54.4
13.6
3
40.8
50
90.8

172.05
4.54
17659

1.4
44.0

172.05
7.76
179.81

17205
9.21
18126

119.41
8.68
128.09

421 30

172.05
5.82
17787

1.3 higher
16 outs

179 59 60
4 21 30
175 38 30
87-49

17205
10.56
182.61

192.45
3.77
196.22

18.17
51.3

11.16
27.4

76.51
7.40
83.91
12.93
70.98
2.99
73.97
12.31
61.61
8.30
69.91
8.30
61.61
4.98
66.59
4.98
61.61
2.19
63.80
12.15
50.65
10.99
61.64
12.99
48.65
49.33

12.93

20590
446
11036
0.87
10949
4.01
213.50
71
212.79
10.40
223.19
10.7
112.5

48.65
12.91
61.56
64
60.92
12.20
73.12
50
7262
12.82
8544
1.89
83.55
8.38
91.93
1.96
89.97

191.40
1.05
192.45
10.59
181.86
0.22
18208
10.03
172.05
1.22
17327
172.05
2.42
174.47
172.05
4.14
176.19