VOLCAN LAND & WATER COMPANY

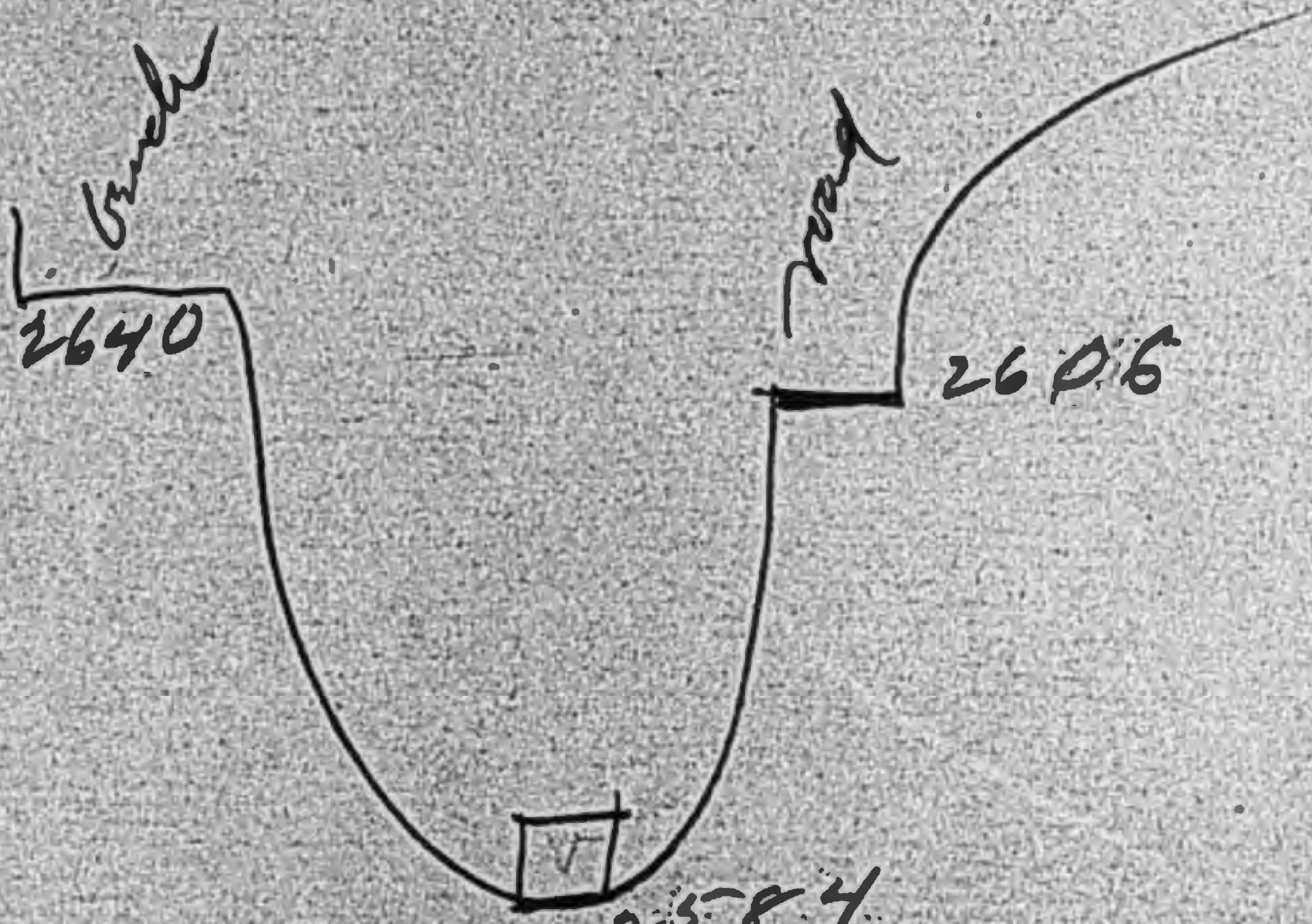
WARNER RESERVOIR CAPACITIES

July 17, 1917

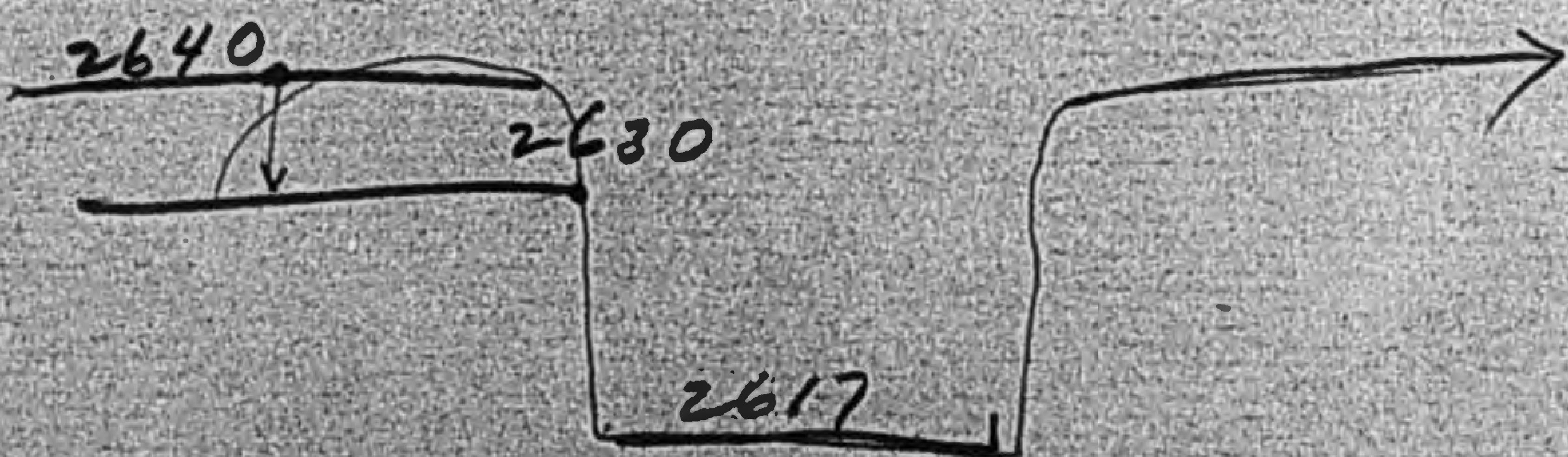
Contour U.S.G.S.	Depth	Acres Flooded	Total Acre Feet
2620	0	0	0
2630	10	17	58
2640	20	58	453
2650	30	260	2,023
2660	40	875	7,698
2670	50	1,405	19,098
2680	60	1,822	36,233
2690	70	2,300	55,845
2700	80	2,960	82,145
2710	90	4,010	116,995
2715	95	4,560	138,420
2720	100	5,240	163,170
2727	107	6,080	203,140

26 2680
2644
2738
2560

Sta 5300



House 2725
BM 2724.63



Warner Cut Off Wall

LOGS OF TEST HOLES.

AT WARNER'S DAM, V. L. & W. CO.

BORINGS BY BYLLESBY & CO.

October-1911 - May-1912.

December 17.

Two days ago the drilling gang completed hole No. 5, (60' deep) and I asked for the reports as I had done before, at the completion of each hole. The reports for the first 41' were missing Mills took everything with him, Dec. 5th, when he left and reports for first of hole No. 5, went too. Larson says it was all disintegrated granite.

December 23.

Drillers are down 30' on hole No. 6.

COMPLETE RECORD. HOLE NO. 6. TEST BORINGS.

Located 25 ft. N. of hole No. 4. Started Dec. 16, finished Jan 23.

Depth ft.	Description
0 - 10'	Concrete
10 - 15	Hard granite. Solid piece core 3' long.
15 - 18	Hard broken granite.
18 - 27	Hard broken granite.
27 - 37	Very broken granite with seams of sand.
37 -44	Hard broken granite.
44 - 52	Very broken granite. Hole caving badly fills up with sand. 12' had hard time getting tool out.
52 - 60	Very broken granite.
60 - 62	Very soft. Did not get any core.
62 - 64	Hard broken granite. Put 3" casing to 62'. Proceeding with smaller drill.
64 - 68	Hard broken granite.
68 - 78	Very soft broken granite.
78 - 97	Hard broken granite.
97 - 107	Hard granite.
107 - 121	Hard broken granite.
121 - 130	Soft broken granite.
130- 135	Hard granite solid.
135 - 136	Badly broken granite.
136 - 147	Hard granite solid.
147 - 149	Soft broken granite.

TEST BORINGS ± WARNER'S CUT-OFF WALL.

Hole No. 7. 25' south of Hole No. 2. on C.L. of wall.

Depth ft.	
0 - 19'	Concrete.
19 - 24	Disintegrated granite.
24 - 34	Sand - no core.
34 - 35	Hard broken granite.
35 - 41	Hard & broken - very little core.
41 - 44	Hard granite.
44 - 49	Very soft with sand seams, no core.
49 - 50	Very soft, no core.
50 - 52	Hard solid granite.
52 - 54	Very broken granite.
54 - 56	Hard broken granite. hole caving badly.
56 - 60	Hard broken granite. Hole fills with sand 8 or 10' when rod is taken out.
60 - 68	Hard solid granite.
68 - 69	Very broken granite.
69 - 81	Disintegrated granite, did not get any core.
81 - 83	Hard broken granite, hole caving bad, very little core.
83 - 87	Very broken granite, very little core.
87 - 94	Very broken granite, hole caving bad, fills 15'.
94 - 100	Ground very broken and caving bad. Did not get any core. Had to use jar to get rod out. Hole fills in 20' with sand and hard rock over night.
100 - 103	Took 5 hours getting to bottom of hole. Ground broken. Did not get any core.

End of Hole No. 7. February 12, 1912.

Drill hole No. 8. Feb 18 - Mar 9, 1912. 56' N. of Hole No 1.

Depths are measured down from top of highest concrete shoulder, Elevation 2626.0.

0 - 12	Disintegrated granite.
12 - 14	Granite boulder.
14 - 44	Disintegrated granite.
44 - 59	Very broken granite. Getting very little core.
59 - 62	Very broken granite. Hole caving bad.
62 - 68	Very broken granite with sand seams.
68 - 78	Hard broken granite. Broken quartz with sand seams.
78 - 81	Hard broken granite. Hole caving so bad could not get rods down. Cemented hole.
81 - 86	Hard broken granite. Big pieces of granite caving in. Cement did not set.
86 - 98	Hard broken granite.
98 - 101	Very broken granite. Very little core.
101 - 108	Hard solid granite.

End of Hole No. 8 Mar. 16, 1912.

Drill hole No. 9. Hole No. 9 - 82' S Hole No 5. Elev. of reference point for depths - 2663. Distance of hole from vertical face of shoulder at automatic gage - 57' horiz/

0 - 15	Decomposed granite.
15 - 22	" " mixed clay seams.
22 - 27	" " and sand.
27 - 40	Disintegrated granite with blue clay and sand.

Hole No 9. cont'd.

Depth ft.

40 - 45	Disintegrated granite mixed with clay.
45 - 60	" " and fine sand.
60 - 70	" " fine sand and blue clay.
70 - 74	Very broken hard granite.
74 - 79	Hard broken granite.
79 - 90	Disintegrated granite.
90 - 97	" " and blue clay.
97 - 101	Borken granite and sand seams.
101 - 108	Very broken granite.
108 - 113	Disintegrated granite and sand seams.
113 - 123	" " fine sand and blue clay. Very small core.

Engine shaft broke. Now waiting for new shaft.
April 27, 1912.

Mesa Grande, Cal.
July 17-1911.

Mr. H. Hawgood,
Los Angeles Cal.

My dear Mr. Hawgood=

I enclose herewith excavation progress sheet.

I have been obliged to go up and tighten above the water seepages in the main Creek or Agua Caliente ~~Fibia~~ + am preparing to put in the flume over to the south Branch or Carrizo Creek ~~Agua Fobia~~ as the pump cannot lower the water plane beyond 5 ft. at present without continuous pumping. As I have been using the pump for sluicing down all that can be moved of the high north side, ~~it is~~ + much water has returned to the sumps, this does

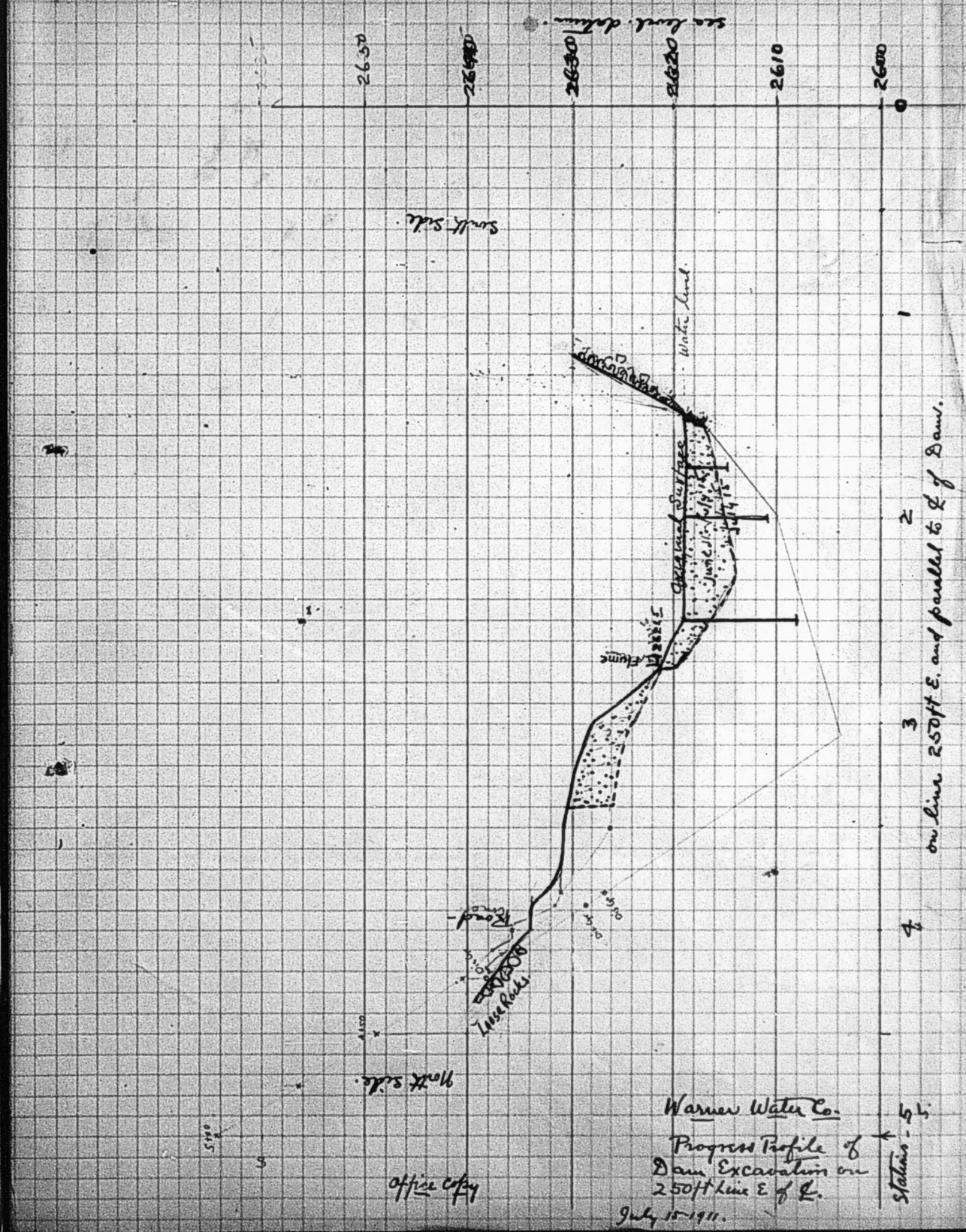
not mean that we have reached our pump capacity, but this combined with a 50% increase of water due to rain ~~obliged~~ makes necessary more cutting off ~~preliminary work~~. more water.

I think with these rearrangements by the end of week we should be down to the borings between stations 1+50 to 2+75.

We are getting a six inch layer of peet about 3 ft down, but the rest is uniform coarse sand.

Very Sincerely Yours

3.3 / 2.4 3.7 / 1.89



Copy

Mesa Grande, Cal
July 17-1911.

Mr. H. W. Keller,
Los Angeles Cal.

Dear Sir:

I enclose a profile of progress on cut to July 15th.

The trench has to be some sixty feet wide at the top, gradually narrowing of course as we make depth. So the yardage to be moved near the surface is considerable.

The water has increased from 100 Miners Inches surface flow to about 150 ~~to~~ Inches on account of summer rains. I have decided to put in a 5ft dam in the narrows just below the ford, to protect the work done against heavy rain or cloud burst.

The rainfall to July 17th is .87 Inch. at the Dam site.

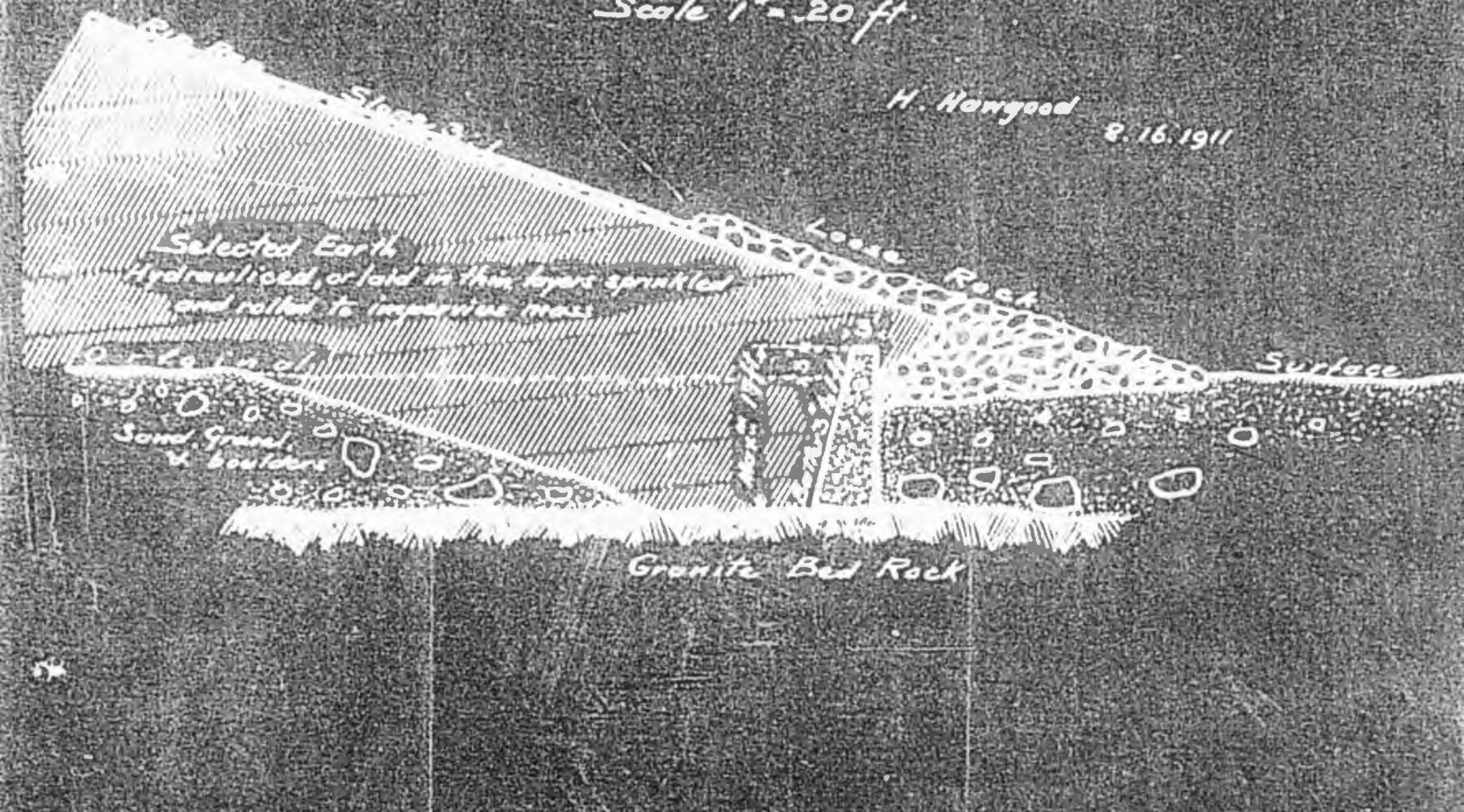
Very Sincerely Yours
W. S. Post

Warner Dam

Concrete Cut-off Wall

Scale 1" = 20 ft.

H. Honeywood 8. 16. 1911



Warner Dam. ~~Pay~~ Progress for wk ending Oct 14

Date	No. of Labors	Character	Where	Concrete yds
Oct. 9	14	Excavation.	South end	
" 10	14	Excav & Road.	"	
" 11	14	Excavation	"	4
" 12	15	Timbering & Concrete.	"	19
" 13	13	Concrete & Excav.	"	28
" 14	9	" "	"	9

Total for week 51

Total ~~placed~~ place last wk. 295

Total to date 346

% completed 46% - about.

30 | 2

3 8 3

should have been 362 →

all deep ~~excavation~~ hoisted on Winze ~~used for deep~~ timbering continued - but pressure due to clays is severe & several caves, including dropping pump frame. 2 men on hand pumps in addition to Gas Engine. Week ends with water cut off and south end 25 ft deep below bed ~~partial wall~~ ~~walls~~ continuous wall showing along upper toe at large pieces. Decided to concrete and cease further exc.

295 / 147 / 442 — 346 / 147 / 493 — 24 / 2 — 9 to add -

Progress Work ending Oct 21. 1911

39 / 24 / 21 / 84 / 15 / 235 / 15 / 141

Date-	No of Laborers -	Character	Where -	Concrete yds -	
Oct 16	9	Concrete	Blk 19	25 ✓	25
" 17	12	Concrete + Forms	" 20	29 ✓	32
18	12	Concrete	" 20+21	21 ✓	21
19	17	" + Forms	" 21+22	31	25
20	15	"	" 22+23		35
21	15	Concrete + Forms			29
					167
Total Reported Oct 14	346				
Omissions 7th + 14th	16				362
Corrected Total -	362				529

70% completed.

Cost of

FARMERS RANCH INVESTIGATION

by Bellamy & Co. Results of Borings furnished & core were to W.L.H.W. Co & are now in their possession.

Legal			$6,492.18
Report of H. M. O'Shaughnessy			1,122.85
Traveling Expenses			5,635.71
Engineering Services			9,301.85
Automobile Hire			422.40
Miscellaneous, including freight, telegraph, telephone, etc.			830.66
Drilling Outfit			1,980.81
Camp Outfit			139.15
Drilling			
Labor	$3,777.08		
Material, supplies and repairs	1,033.62		
Boarding	979.82		
Insurance	159.50		
Taxes	11.60	5,961.52	$31,887.13
Less Credit:			
Drilling machinery returned			1,152.62
			$30,734.51

COST OF WARNERS RANCH INVESTIGATION BY BYLLESBY & COMPANY

Results of Borings and Cores were furnished to Volcan Land & Water Company and are now in their possession.

Legal			$6,492.18
Report of M. M. O'Shaughnessy			1,122.85
Traveling Expenses			5,635.71
Engineering Services			9,301.85
Automobile Hire			422.40
Miscellaneous, including freight, telegraph, telephone, etc.			830.66
Drilling Outfit			1,980.81
Camp Outfit			139.15
Drilling			
Labor	$3,777.08		
Material, supplies and repairs	1,033.52		
Boarding	979.82		
Insurance	159.50		
Taxes	11.60	5,961.52	$31,887.15
Less Credit:			
Drilling machinery returned			1,152.62
			$30,734.51

		Unit	Price	Quantities.	Post estimate Quantity	Post estimate Amt.
VII.	Pamo Dam.					
(a)	Hydraulic fill type					
	1. Material for Hyd. fill in place.....	cu yd	.15	958,000	958,000	$143,700
	2. Concrete for cutoff walls, ~~slopes advised~~ slopes advised	2½:1	$7.7	3,000		21,000
(b)	Loose Rock fill type;					
	1. Loose rock	cu yds	.65			
	2. Concrete for cutoff walls, etc.,.....	cu yds	$7			
	3. Planking up stream face in place.	1,000 B. M.	$50			
(c)	Masonary Type.			121,000		
	1. Concrete rubble	cu yds.	$4			
(d)	Foundation excavations					
	1. Sand 2. Dinintegrated Granite etc.,.....	~~lump sum~~ cu. yds.	.30	60,000	60,000	18,000
(e)	Outlet Tower, Crates, etc		$50,000		Includes 800 tunnel	
(f)	Alternative shaft		$40,000		Gates Shaft. includes tunnel outlet - 800 ft.	40,000
	Gate Chamber Gates, etc.	lump sum				$222,700

	Unit	Price	Quantity	Post Estimate Quantity	Post Estimate Amt.	Albersow Final Estimate Quantity
VIII. Pamo Conduit.						Granite 5.28' 4'10"x4' Redwood Flume. @2.5 cu.ft.
1 Paved Ditch 13 miles	~~13~~ miles	$15,000	13	13	$215,000	
2. 36" Steel Pipe 5660 Lin ft.	5660 Lin ft.	$3	5660.	5660	17.000	
3. 42" dia. wood pipe 9½ miles	~~9½~~ miles	$16,000	9.5	9.5	161.500	
4. 80 Air valves	Each	$ 3	80	80	300	
5. 25 Blow offs	"	$ 15	25	25.	400	
6. Lumber for pipe trestles, 10,000' B M.	1000 Ftm.	$ 50	10 m.	10m.	500.	
					$394,700	
7. Flume						
IX. Miscellaneous						
1. Engineering & Supt.	5%				20,000	
2. Roads	miles	$ 500	20		10,000	
3. Rights of Way	—	—			-----	
4. Telephone.	miles	150	25		3,800	
					$428,500	

Center Line of Warner Dam.

Sta.	Elev.	Ft. above or below top of dam.	
0+00	2712.53	+2.53	
0+25	2712.06	+2.06	
0+50	2716.68	+6.68	
0+75	2712.87	+2.87	
0+83	2710.0	0.00	
1+00	2701.99	-8.01	
1+25	2686.56	-23.44	
1+50	2671.76	-38.24	
1+75	2649.26	-60.74	
2+00	2624.29	-85.71	
2+07	2618.66	-91.34	bottom of hill
2+25	2617.56	-92.44	
2+50	2617.76	-92.24	
2+75	2618.16	-91.84	
3+00	2618.06	-91.94	
3+25	2620.02	-89.98	
3+50	2626.54	-83.46	
3+75	2625.63	-84.37	
3+85	2626.20	-83.80	bottom of hill
4+00	2633.20	-76.80	
4+25	2653.66	-56.34	
4+50	2671.16	-38.84	
4+75	2678.22	-31.78	
5+00	2682.77	-27.23	
5+25	2688.64	-21.36	
5+50	2695.47	-14.53	
5+75	2705.02	-4.98	
5+90.5	2710.00	0.00	
6+02	2714.51	+4.51	

Note { Station 0+00 is at S. end of center line of dam.
Bearing of center line is (N 10° 48' E true bearing)
Top of dam is 20ft. wide.
3-1 slope up stream.
2-1 " down "

N 3 Line
N 87° 11' E
80' 11"
N 7 00' E

Sheet 1.

Line 1+00		
25 E	2700.0	10.0
50 E	2699.1	10.9
25 W	2701.4	8.6
Line 1+25		
25 E	2684.4	25.6
50 E	2675.5	34.5
75 E	2672.8	37.2
100 E	2669.5	40.5
125 E	2665.4	44.6
150 E	2658.7	51.3
175 E	2649.9	60.1
25 W	2688.5	21.5
50 W	2690.2	19.8
75 W	2692.2	17.8
Line 1+50		
25 E	2662.6	47.4
50 E	2662.7	47.3
75 E	2654.4	55.6
100 E	2645.6	64.4
125 E	2635.8	74.2
150 E	2631.7	78.3
175 E	2623.0	87.0
200 E	2622.5	87.5
225 E	2620.0	90.0
250 E	2620.5	89.5
275 E	2621.0	89.0
25 W	2672.8	37.2
50 W	2673.9	36.1
75 W	2679.1	30.9
100 W	2678.9	31.1
Line 1+75		
25 E	2642.7	67.3
50 E	2640.3	69.7
75 E	2625.4	84.6
100 E	2621.9	88.1
125 E	2618.7	91.3
150 E	2618.1	90.9
175 E	2619.5	90.5
200 E	2619.9	90.1
225 E	2620.4	89.6
250 E	2620.7	89.3

Line 1+75 cont'd.		
275 E	2621.0	89.0
25 W	2652.1	57.9
50 W	2655.7	54.3
75 W	2658.9	51.1
100 W	2660.8	49.2
125 W	2677.0	33.0
Line 2+00		
25 E	2620.3	89.7
50 E	2617.8	92.2
75 E	2618.1	91.9
100 E	2618.5	91.5
125 E	2619.1	90.9
150 E	2618.8	91.2
175 E	2619.2	90.8
200 E	2619.6	90.4
225 E	2620.1	89.9
250 E	2620.7	89.3
275 E	2621.0	89.0
25 W	2628.0	82.0
50 W	2632.6	77.4
75 W	2637.4	72.6
100 W	2637.3	72.7
125 W	2640.3	69.7
150 W	2645.1	64.9
Line 2+25		
25 E	2617.8	92.2
Uniform grade to		89.0
275 E	2621.0	
25 W	2617.5	92.5
50 W	2617.4	92.6
75 W	2621.5 (2618.7)	88.5 (91.3)
100 W	2624.2	85.8
125 W	2626.3	83.7
150 W	2625.7	84.3
175 W		

Sheet 2.

Line 2+50

25 E	2617.9	92.1
Uniform grade to		
275 E	2621.0	89.0
25 W	2617.6	92.4
Uniform grade to		
200 W	2619.9	90.1

Line 2+75

275 E	2621.0	89.0
Uniform grade to		
200 W	2616.6	93.4

Line 3+00

25 E	2618.4	91.6
50 E	2618.9	91.1
75 E	2619.7	90.3
100 E	2620.7	89.3
125 E	2621.2	88.8
150 E	2623.5	86.5
175 E	2627.6	82.4
200 E	2628.2	81.8
225 E	2630.7	79.3
250 E	2633.1	76.9
25 W	2617.8	92.2
Uniform grade to		
200 W	2616.5	93.5

Line 3+25

25 E	2620.4	89.6
50 E	2620.6	89.4
75 E	2622.7	87.3
100 E	2624.5	85.5
125 E	2625.3	84.7
150 E	2626.1	83.9
175 E	2626.7	83.3
200 E	2628.4	81.6
225 E	2630.8	79.2
250 E	2633.4	76.6
25 W	2618.7	91.3
Uniform grade to		
200 W	2616.4	93.6

Line 3+50

25 E	2626.5	83.5
50 E	2628.0	82.0
75 E	2629.2	80.8
100 E	2631.1	78.9
125 E	2632.6	77.4
150 E	2631.7	78.3
175 E	2630.4	79.6
200 E	2630.8	79.2
225 E	2631.3	78.7
250 E	2633.5	76.5
25 W	2626.3	83.7
50 W	2624.5	85.5
75 W	2621.7	88.3
100 W	2620.5	89.5
125 W	2619.6	90.4
150 W	2617.4	92.6
175 W	2617.3	92.7
200 W	2616.3	93.7

Line 3+75

25 E	2626.2	83.8
50 E	2627.3	82.7
75 E	2628.5	81.5
100 E	2629.7	80.3
125 E	2631.4	78.6
150 E	2631.7	78.3
175 E	2631.1	78.9
200 E	2631.8	78.2
225 E	2631.9	78.1
250 E	2632.9	77.1
25 W	2625.1	84.9
50 W	2625.8	84.2
75 W	2626.9	83.1
100 W	2626.1	83.9
125 W	2625.3	84.7
150 W	2625.5	84.5
175 W	2620.8	89.1
200 W	2621.2	88.8

Sheet 3.

Line 4+00

25 E	2634.2	75.8
50 E	2634.9	75.1
75 E	2636.7	73.3
100 E	2636.9	73.1
125 E	2636.6	73.4
150 E	2637.0	73.0
175 E	2630.5	79.5
200 E	2635.6	74.4
225 E	2635.8	74.2
250 E	2635.9	74.1
25 W	2633.4	76.6
50 W	2631.4	78.6
75 W	2628.6	81.4
100 W	2626.6	83.4
125 W	2625.8	84.2
150 W	2625.0	85.0
175 W	2626.2	83.8

Line 4+25

25 E	2650.8	59.2
50 E	2650.4	59.6
75 E	2652.2	57.8
100 E	2650.5	59.5
125 E	2648.3	61.7
150 E	2643.4	66.6
175 E	2636.4	73.6
200 E	2641.0	69.0
225 E	2644.1	65.9
25 W	2656.5	53.5
50 W	2655.5	54.5
75 W	2650.5	59.5
100 W	2643.5	66.5
125 W	2640.6	69.4
150 W	2637.4	72.6
175 W	2632.2	77.8

Line 4+50

25 E	2666.5	43.5
50 E	2663.5	46.5
75 E	2662.3	47.7
100 E	2660.8	49.2
125 E	2656.8	53.2
150 E	2650.8	59.2

Line 4+50 cont'd.

175 E	2641.3	68.7
200 E	2646.7	63.3
25 W	2673.8	36.2
50 W	2673.9	36.1
75 W	2666.3	43.7
100 W	2662.1	47.9
125 W	2656.5	53.5

Line 4+75

25 E	2674.4	35.6
50 E	2671.7	38.3
75 E	2671.9	38.1
100 E	2667.9	42.1
125 E	2663.1	46.9
150 E	2656.3	53.7
175 E	2646.5	63.5
200 E	2649.2	60.8
25 W	2679.9	30.1
50 W	2679.7	30.3
75 W	2677.2	32.8

Line 5+00

25 E	2681.3	28.7
50 E	2680.3	29.7
75 E	2677.1	32.9
100 E	2672.9	37.1
125 E	2665.9	44.1
150 E	2658.5	51.5
175 E	2652.2	57.8
200 E	2649.5	60.5
25 W	2684.6	25.4
50 W	2683.7	26.3
75 W	2681.5	28.5

Line 5+25

25 E	2688.2	21.8
50 E	2688.3	21.7
75 E	2686.6	23.4
100 E	2675.3	34.7
125 E	2665.7	44.3
150 E	2663.6	46.4
25 W	2689.4	20.6
50 W	2689.2	20.8
75 W	2687.0	23.0

Sect.	Area. Sq.ft.	Vol. Cu.ft.	Bet. Sect's.
0+83	0.0	2995.0	0+83 — 1+00
1+00	352.4	41000.0	1+00 — 1+25
1+25	2927.5	177940.0	1+25 — 1+50
1+50	11307.6	746485.0	1+50 — 2+00
1+75	14737.5	1079957.0	2+00 — 2+50
2+00	19320.5	1122705.0	2+50 — 3+00
2+25	21887.5	1037936.0	3+00 — 3+50
2+50	22724.3	900291.0	3+50 — 4+00
2+75	22704.9	344305.0	4+00 — 4+25
3+00	21180.7	223731.0	4+25 — 4+50
3+25	21000.6	233566.0	4+50 — 5+00
3+50	19369.2	62521.0	5+00 — 5+25
3+75	18134.7	32495.0	5+25 — 5+50
4+00	16126.9	14446.0	5+50 — 5+75
4+25	11417.5	2010.0	5+75 — 5+90.5
4+50	6481.0		
4+75	4562.6		
5+00	3306.5		
5+25	1695.2		
5+50	904.4		
5+75	251.3		
5+90.5	0.0		

Total= 6,022,383.0 Cu.ft.

= 223,051.0 Cu.yds.

Line 5+50

25 E	2694.6	15.4
50 E	2693.8	16.2
75 E	2688.9	21.1
25 W	2697.2	12.8
50 W	2696.3	13.7

Line 5+75

25 E	2703.1	6.9
50 E	2697.5	12.5
25 W	2705.5	4.5

Line 5+96.4

10 E	2710.0	0.0

Line 5+87.5

10 W	2710.0	0.0

Cross-section for slope stakes.

			5+96.4			0.0 / 10.0
			0.0 / 5+90.5			
0.0 / 10.0			5+87.5			
4.5 / 19.0			5.0 / 5+75			12.5 / 47.5
13.7 / 37.4			14.5 / 5+50			18.4 / 65.2
20.8 / 51.6			21.4 / 5+25		23.4 / 75.0	46.0 / 148.0
27.7 / 65.4			27.2 / 5+00	32.9 / 75.0	57.8 / 175.0	61.5 / 194.5
32.8 / 75.6	———	———	31.8 / 4+75	42.1 / 100.0	63.5 / 175.0	61.2 / 193.6
49.5 / 108.0	43.7 / 75.0	36.2 / 25.0	38.8 / 4+50	49.2 / 100.0	68.7 / 175.0	63.3 / 199.9
73.7 / 157.4	69.4 / 125.0	66.6 / 100.0	56.3 / 4+25	57.8 / 75.0	73.6 / 175.0	68.3 / 215.0
83.8 / 177.6	76.6 / 25.0		76.8 / 4+00		73.3 / 75.0	74.2 / 232.6
89.0 / 188.0	84.5 / 150.0		84.4 / 3+75		72.9 / 75.0	77.5 / 242.5
93.0 / 196.0	87.3 / 75.0		83.5 / 3+50		82.0 / 125.0	77.5 / 242.5
93.0 / 196.0	92.9 / 100.0		90.0 / 3+25		83.3 / 175.0	77.5 / 242.5
93.0 / 196.0	92.3 / 100.0		91.9 / 3+00		84.6 / 150.0	77.5 / 242.5
93.0 / 196.0	93.3 / 100.0		91.8 / 2+75		91.1 / 100.0	88.5 / 275.5
91.0 / 192.0	92.8 / 100.0		92.2 / 2+50		92.0 / 100.0	88.5 / 275.5
83.5 / 177.0	91.3 / 75.0		92.4 / 2+25		89.8 / 125.0	88.5 / 275.5
66.6 / 143.2	72.6 / 75.0		85.7 / 2+00		92.2 / 50.0	88.5 / 275.5
48.6 / 107.2	54.3 / 50.0		60.7 / 1+75		91.3 / 125.0	88.5 / 275.5
31.7 / 73.4	36.1 / 50.0		38.2 / 1+50	47.3 / 50.0	87.0 / 75.0	88.5 / 275.5
19.7 / 49.4	21.5 / 25.0		23.4 / 1+25		25.2 / 25.0	60.5 / 191.5
9.3 / 28.6			7.9 / 1+00			29.1 / 37.3
			0.0 / 0+83			0.0 / 10.0
0.0 / 10.0			0+79			

W. D. LOVELL
1415 8TH STREET SOUTHEAST
MINNEAPOLIS, MINNESOTA
PHONES: N.W. EAST 692
T.S. SPRUCE 241

Minneapolis, Minn.,
Nov. 29, 1912.

Mr. W. S. Post,
San Diego, Cal.

Dear Sir:

Referring again to the matter of foundations and building a dam at Warner's Dam site. Perhaps you will remember Byllesby's criticism of the dam foundations. It is a matter we have got to give careful consideration. In addition to the foundations for the dam there is the other difficulty, namely--the probability that water will escape through the disintegrated granite around the dam at the edges of the reservoir.

We ought to have some information concerning this possibility and probability. That water does perculate through disintegrated granite, there is no doubt, and that for a time at least after the dam is completed we would probably lose considerable water from seppage. Just how much no one can tell. If we can collect some data as to the rate of seppage through disintegrated granite, the data will be favorable to our project. So long as the matter rests without data it becomes a matter of opinion and any man can set up his opinion and although you know that his opinion is not worth anything, nevertheless it has its effect.

In the El Cajon Valley the residents are pumping water out of open wells from 50 to 75 feet deep. The flow of these wells is through disintegrated granite. I happen to know that the flow is slow, but nevertheless it flows and is reasonably constant. The flow in disintegrated granite in the El Cajon Valley is probably not under much pressure. If this water was under say 80 feet of head, the flow would probably be much greater. We would also want to know if a greater flow would wash out the finer particles and disintegrate the balance so that in the end our dikes or wings would fail.

I have spent a lot of time on a scheme to make such tests as will determine these problems and answer them favorably to our cause. I have not yet satisfied myself just how to go about it. My personal opinion is that the reservoir itself will soon "silt up" so that there will be but little leakage, but my opinion simply is an opinion. In this connection you must remember what I said in a former letter about the character of that granite. Do you know of any water being stored in a reservoir which is built on this granite foundation? If so, what is the history?

Yours truly,

W D Lovell

WDL:AAJ

V.L.&W.Co. Engr.

Mesa Grande Cal.
Dec 10-1912

Mr. W. S. Post
San Diego - Calif.

Dear sir:

I am sending a box of rock samples, by express C.O.D. to you at #514 Am. Nat. Bank. I have labeled the samples in the box. I found several good samples which were separated from the foundation about half way between where the ~~concrete mixer~~ sump was ~~stood~~. and the north end of the wall, about station 3+50 as I remember it. I also got a sample out of the test pit you had dug just above the road at the north end. I took some pieces of rock from the bank at the south end of the wall, both at the water surface and some twenty feet in elevation above. The formation is crumbling at the surface and the samples are probably a little harder than the average. I tried to get as near the typical as I could.

Sincerely
H. L. Davis

California State Mining Bureau

FERRY BUILDING, SAN FRANCISCO, CAL.
F. McN. HAMILTON
W. H. STORMS STATE MINERALOGIST.

DEPARTMENT FOR DETERMINATION OF MINERALS.

No 15009

Date, April 14th 1913

Name William S. Post P. O. San Diego
514 American Nat. Bank Bldg. County " "
Specimen from Cutoff Wall, Excavation about Station 3x50: Warner Dam

Rock badly decayed - minerals - Plagioclase is the chief primary mineral. Hornblende is fresh, Biotite plentiful, badly weathered. Wuartz small amount chlorite secondary. Apatite chief accessory. The rock is a decomposed granO-diorite.

E. B. Preston
Determinative Mineralogist.

(Over)

California State Mining Bureau

FERRY BUILDING, SAN FRANCISCO, CAL.
F. McN. HAMILTON
W. H. STORMS STATE MINERALOGIST.

FILE

DEPARTMENT FOR DETERMINATION OF MINERALS.

No 15010

Date, April 14th 1913

Name William S. Post P. O.
County
Specimen from South end of cut off wall at present river bed elevation 2620.

Rock has granitoid texture and is a granodiorite, carries plagioclase, between an oligoclase and andesine, Hornblende, Biotite, Quartz chlorite. Chief accessories are titanite and apatite, with secondary epidote and a zeolite as a seam filling - It is a plutonic rock.

E. B. Preston
Determinative Mineralogist.

(Over)

California State Mining Bureau

FERRY BUILDING, SAN FRANCISCO, CAL.
F. McN. HAMILTON
W. H. STORMS STATE MINERALOGIST.

DEPARTMENT FOR DETERMINATION OF MINERALS.

No 15011

Date, April 14th 1913

Name William S. Post P. O.
County
Specimen from 15 feet below river bed.

Carries badly decomposed plagioclase, epiolote (secondary), chlorite and quartz (Primary), with titanite, apatite as accessories. Rock badly altered, but not metamorphosed. Is a granodiorite.

All of the three samples are of great similarity.

E. B. Preston
Determinative Mineralogist.

(Over)

DETERMINATION OF MINERAL SAMPLES.

Samples (limited to three at one time) of any mineral found in the State may be sent to the Bureau for identification, and the same will be classified free of charge. **No samples will be determined if received from points outside the State. It must be understood, that No Assays, or Quantitative Determinations will be Made. Samples should be in a lump form if possible, and marked plainly with name of sender outside of package, postoffice address, etc. No samples will be received unless charges are prepaid. A letter should accompany sample and a stamp should be enclosed for reply.**

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COPY

CALIFORNIA STATE MINING BUREAU.

Ferry Building, San Francisco, Cal.

F. McN. Hamilton, State Mineralogist.

Department for Determination of Minerals.

No 15009. Date April 14th 1913.
Name William S. Post. P O San Diego
514 American Nat.
Bank Bldg. County " "

Specimen from Cutoff Wall, Excavation about Station 3x50
Warner Dam.

Rock badly decayed - Minerals - Plagioclase is the chief primary mineral. Hornblende is fresh, Biotite plentiful, badly weathered. Wuartz small amount chlorite secondary. Apatite chief accessory. The rock is a decomposed granodiorite.

E. B. Preston
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COPY

CALIFORNIA STATE MINING BUREAU.

Ferry Building, San Francisco, Cal.

F. McN. Hamilton, State Mineralogist.

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No 15010. Date April 14th, 1913.

Name William S. Post

Specimen from South End of cut off wall at present river bed, Elevation 2620.

Rock has granitoid texture and is a granodiorite, carries plagioclase, between an oligoclase and andesine, Hornblende, Biotite, Quartz Chlorite. Chief accessories are titanite and apatite, with secondary epidote and a zeolite as a seam filling - It is a plutonic rock.

E. B. Preston,

Determinative Mineralogist.

ESTIMATED COST OF WARNERS DAM

Height 95 feet; Top Elevation 2715 feet; Depth of water 90 feet.

October 8, 1914. computed by Hitchcock. OK. W.S.P. May 1915

- ooo -

Excavation,		
10350 cu.yds. at 70¢	$ 7,245.00	
51800 cu.yds. at 25¢	12,950.00	$ 20,195.00
Pumping		5,000.00
Embankment - 336569 cu. yds at 30¢		100,971.00
Facing of Concrete Slabs - 20700 sq.yds. at $1.50		31,050.00
Cut-off Wall		30,000.00
Concrete Gutter - 600 lin. ft. at $1.00		600.00
6" Drain Tile - 2700 lin. ft. at 15¢		405.00
Outlet Tunnel - 1020 lin. ft. at $18.00		18,360.00
Outlet Basin, Wier, etc.,		3,000.00
Outlet Tower		15,000.00
Footbridge to Tower		1,000.00
Spillway on south side - 200' wide		
482 cu.yds.concrete at $8.00	$ 3,856.00	
225 cu.yds.excavation at 50¢	112.00	
Flashboard Arrangements	500.00	4,468.00
Spillway on north side - 100' wide		
48330 cu.yds.excavation at 30¢	14,500.00	
3" Concrete Lining - 5900 sq. yds. at $1.00	5,900.00	
Flashboards and foundations	1,000.00	21,400.00
Buildings		6,000.00
Water Supply to Buildings		1,000.00
Equipment, Tools		4,000.00
Improvement of Grounds, Fencing, etc.,		2,000.00
Total cost without overhead		$264,449.00
Deduct Expenditures to September 1st, 1914:		
Cut-off Wall	$30,000.00	
Outlet Tunnel	9,050.00	
Buildings	6,000.00	
Water Supply to Buildings	1,000.00	
Equipment, Tools	4,000.00	
Improvement of Grounds	2,000.00	52,050.00
		$212,399.00
Add 25% for engineering and contingencies		53,100.00
		$265,499.00
Interest during construction: 8% for 4 months (⅓ period)		7,080.00
Total cost to complete		$272,579.00

Schedule of Work accomplished

1911.
Jany 17 - Began survey to determine practicalness of the Lusardi - Temescal Divide. } 2 miles

" 28± In Temescal Canyon. Work - Transitmen, Cook, - + 4 mules - pack Camp -

" 31 - Cost - in month - all survey
Exp Acct 60.30
Pay Roll 222.85

Feb. 11 - Return to S.D.

Mar - Temescal - Lusardi Survey. 4 miles
+ Pipe Line Power

Apr. - Survey office - + consult with J.E. White - Hewins -

May - Start - Prospecting Warm Dam

" 20 - Shutoff Temporarily on 2/c hitch in pipeline.

June 18 - Gas Engine on ground & ready June 21st
Water going through by pass following June 24.
Test borings June 26th

Mean Gross Evaporation Runoff & Accumulated runoff

Warners Reservoir - 2·8 ft = 33.5 Inches.

Drawing 434 [a]
File No. F 60
1 sc ft = 723.92 Ac ft per Yr.

July to July Year	Total 12 Station Rainfall	Evaporation Warners Reservoir 33.5	Actual Evaporation Multiplier	Inch Feet Multiplier	Run off	Accumulated Run off
				Start	78310	
1894-1895	27.53	33.5	5.97	.50	✓ 71000	✓ 149310
1895-1896	11.15	33.5	22.35	1.86	✓ 4160	✓ 153470
1896-1897	21.64	33.6	11.86	.98	✓ 18750	✓ 172220
1897-1898	12.07	33.5	21.43	1.78	✓ 2080	✓ 174300
1898-1899	10.68	33.5	22.82	1.90	✓ 1100	✓ 175400
1899-1900	12.68	33.5	20.82	1.74	✓ 2080	✓ 177480
1900-1901	19.82	33.5	13.68	1.14	✓ 10400	✓ 187880
1901-1902	14.31	33.5	19.19	1.60	✓ 4160	✓ 192040
1902-1903	21.18	33.5	12.32	1.03	✓ 14560	✓ 206600
1903-1904	10.05	33.5	23.45	1.96	✓ 1872	✓ 208472
1904-1905	31.35	33.5	2.15	.18	✓ 53000	✓ 261472
1905-1906	32.08	33.5	1.42	.12	✓ 66960	✓ 328432
1906-1907	23.34	33.5	10.16	.85	✓ 52000	✓ 380432
1907-1908	19.31	33.5	14.19	1.18	✓ 7290	✓ 387722
1908-1909	22.02	33.5	11.48	.96	✓ 39500	✓ 427222
1909-1910	20.28	33.5	13.22	1.10	✓ 20800	✓ 448022
1910-1911	19.45	33.5	14.05	1.17	✓ 12500	✓ 460522
1911-1912	18.86	33.5	14.64	1.22	✓ 12129	✓ 472651
1912-1913	13.62	33.5	19.88	1.65	✓ 6042	✓ 478693
1913-1914	21.50	33.5	12.00	1.00	22200	500893
	382.92	670.0	287.08	23.92	500893	
	=	=	=	=		

Mean Gross Evaporation for Warners Reservoir = 2·8 ft = 33.5 Inches.
Subtract from This. The total Rainfall of 12 Station San Diego County Chart for each year — Difference will be net or actual Evaporation.
This means that the Multiplier To get Evaporation Acre feet in the tabulation, will vary somewhat from year To year.

I consider The rainfall of The 12 Station chart as practically equal in Amount To what would fall on The Reservoir so it happens that it can be used without correction

July 10th 1914

Wm S. Post Engr

Details for Mass Curve Warners Reservoir

[7]

Drawing 434
File No. F. 60

Based on being Full at the beginning. 78310 Ac Ft. =
assuming 17000 Ac Ft draft per year - 29 sq. Sq. ft.

		Acres flooded	Ac Ft flooded Total in Mean	Evaporation Multiplier	Total Evaporation	In Reservoir at end of Year	Accumulated Evaporation	Elevation of Water in Reservoir
Full	78310							
Run off	71000							
July 1st to July 1st								
1894-1895	149310	5370	0170					2719
Draft	17000							
	132310	4800	5085	.50	2542	129768	2542	2714
	2542							
1895-1896	129768							
Run off	4160							
	133928	4900	9130					
Draft	17000						8491	
	116928	4230	4565	1.86				
Evaporation	8491				8491	108437	11033	2710
1896-1897	108437							
Run off	18750							
	127187	4620	8560					
Draft	17000						4194	
	110187	3940	4280	.98				
Evaporation	4194				4194	105993	15227	2709
1897-1898	105993							
Run off	2080							
	108073	3880	7180					
Draft	17000						6390	
	91073	3300	3590	1.78				
Evaporation	6390				6390	84683	21617	2703
1898-1899	84683							
Run off	1100							
	85783	3200	5900					
Draft	17000						5605	
	68783	2700	2950	1.90				
Evaporation	5605				5605	63178	27222	2695
1899-1900	63178							
Run off	2080							
	65258	2500	4720					
Draft	17000						4136	
	48258	2220	2360	1.74				
	4136				4136	44122	31358	2687
1900-1901	44122							
Run off	10400							
	54522	2350	4350					
Draft	17000						2479	
	37522	2000	2175	1.14				
	2479				2479	35043	33837	2683
	35043							

Drawing Office [illegible]

Details for Mass Curve "Warners Reservoir" Continued File No. F. 60

Year		Acres Flooded	Ac-ft Flooded Total & Mean	Evaporation Multiplier	Total Evaporation	In Reservoir at end of Year	Accumulating Evaporation	Elevation of Water in Reserv.
1901-1902	brought forward					35043	33837	2683
1901-1902	35043							
Run off	4160							
	39203	2070	3640					
Draft	17000						2820	
	22203	1570	1820	1.60				
Evaporation	2820				2820	19383	36657	2673
1902-1903	19383							
Run off	14560							
	33943	1920	3270					
Draft	17000						1684	
	16943	1350	1635	1.03				
Evapn	1684				1684	15259	38341	2667
1903-1904	15259							
Run off	1872							
	17131	1380	1580					
Draft	17000						131	
	131	200	790	1.96				
Evapn	1545				1545	———	38472	2644
1904-1905	0600							
Run off	53000							
	53000	2330	1970					
Draft	17000						177	
	36000	1970	985	.18				
Evap'n	177				177	35823	38649	2683
1905-06	35823							
Run off	66960							
	102783	3750	7030					
Draft	17000						422	
	85783	3280	3515	.12				
Evap	422				422	85361	39071	2704
1906-07	85361							
Run off	52000							
	137361	5100	9500					
Draft	17000						4038	
	120361	4400	4750	.85				
Evap?	4038				4038	116323	43109	2711
	116323							

Plotted Aug 10th 1914

A Barth.

Drawing File No F. 434 60

Details for Mass Curve Warners Reservoir Continued

Year		Acres Flooded	Acres flooded Total & Mean	Evaporation Multiplier	Evaporation Ins Feet	in Reservoir at end of Year	Accumulated Evaporation	Elevation of Water in Resv.
1906-1907	brought forward					116323	431.09	2711
1907-1908	116323							
Runoff	7290							
	123613	4550	8450					
Draft	17000						4985	
	106613	3900	4225	1.18				
Evap^n	4985				4985	101628	48094	2709
1908-1909	101628							
Run off	39500							
	141128	5220	9770					
Draft	17000						4690	
	124128	4550	4885	.96				
Evap^n	4690				4690	119438	52784	2712
1909-1910	119438							
Run off	20800							
	140238	5180	9700					
Draft	17000						5335	
	123238	4520	4850	1.10				
Evap^n	5335				5335	117903	58119	2711
1910-1911	117903							
Run off	12500							
	130403	4950	9100					
Draft	17000						5324	
	113403	4150	4550	1.17				
Evap^n	5324				5324	108079	63443	2710
1911-1912	108079							
Run off	12129							
	120208	4400	8150					
Draft	17000						4972	
	103208	3750	4075	1.22				
Evap^n	4972				4972	98236	68415	2707
1912-1913	98236							
Run off	6042							
	104278	3800	7050					
Draft	17000						5816	
	87278	3250	3525	1.65				
Evap^n	5816				5816	81462	73231	2702
1913-1914	81462							
Run off	22200							
	103662	3760	7000					
Draft	17000						3500	
	86662	3240	3500	1.00				
Evap^n	3500				3500	83162	76731	2703
	83162							

August 1914 Report

H. HAWGOOD
CONSULTING ENGINEER
H.W.HELLMAN BUILDING

M.AM.SOC.C.E.
M.INST.C.E.(LONDON)
M.AM.RY. ENG.& M.W. ASSOC.

LOS ANGELES, CALIFORNIA

June 30th, 1911.

Mr. W. S. Post,

Witch Creek, San Diego Co., Cal.

Dear Mr. Post:-

The first of our measurements at the lower dam site worked out 88.5 Miners Inches, and the second 91.0 Miners Inches, which is a very close agreement, and we can accept 90 inches as a reliable figure.

We measured in the flume 35 M. I., and assuming there was an equal ammount of surface flow not yet taken in, we would have 70 inches accounted for, leaving 20 for underflow. I look forward with interest to what your float measurements gave.

I find that my old notes, dated 18 May, 1905, give "Granite ledges above dam site strike S. 34° E., dip 72° S. 56° W." Also, at west end of Monkey Hill, "Strike S. 50° E., dip nearly 90° Wly." The above courses are magnetic. The strike at the dam, as noted above, agrees with the direction of the ledge that you have discovered.

Yours very truly,

H. Hawgood

BLDG WARNR

BUILDING WARNER DAM

From the papers of Ed Fletcher, the following letters were removed to the alphabetized correspondence files

BENT, Arthur S. to Fletcher, 9/21/22
KING, T.H. to Fletcher, 4/7/22
Fletcher to KLAUBER, Hugo, 4/7/22
STARR, R.E.
Fletcher to Starr, [4 letters] 4/4/22, 4/7/22, 4/18/22, 4/26/22
Starr to Fletcher, 4/15/22, with an attached letter, Starr to Treanor, 4/15/20
SWALLOW, Charles H., to Fletcher, 9/2/22
Fletcher to SWYCAFFER, J.D., 4/14/22
THOMAS, Carl C., to Fletcher, 4/1/22
Fletcher to TREANOR, 4/15/22
WHITE, F.M. to Fletcher, 11/10/22

Ed Fletcher Papers

1870-1955

MSS.81

Box: 50 Folder: 11

Business Records - Water Companies - Volcan Land and Water Company - San Dieguito System - Warner Dam (Lake Henshaw) and associated projects - Construction Notes and costs