

Killed: replace with Ellis Ref.

San LUIS REY WATER DEVELOPMENT
for lands adjacent to
OCEANSIDE, SOUTH OCEANSIDE, and CARLSBAD.

by William S. Post.

June 22, 1912.

FIRST PROPOSITION. (250 Miners Inches)

Erect pumping plant on Guajome Ranch, with capacity of 250 Miners Inches.

Construct 24" Pipe line to Oceanside and Carlsbad, to terminate in small local distribution reservoirs immediately over the lands

Estimate of cost

Guajome pumping plant					\$25,000
24" Pipe Line					
Cement pipe 33,000 ft.	\$/.80	26400			
" " 5,500	1.00	5500			
Riv. " 3400	1.50	5100			
" " 2100	2.00	4200			
					<u>41,200</u>
Distribution Reservoirs					4,000
Branch to Oceanside					8,000
					<u>78,200</u>
First cost per Miners inch					\$ 313

Annual Operating Cost

XXXXXX Operating Expense	\$	10,000
Interest and Dep. 10%		7,800
		<u>17,800</u>

Cost per continuous miners inch \$71
" " 1000 Gallons 1 1/2 cents

**OCEANSIDE WATER SYSTEM.
The Volcan Land & Water Co.**

**Table Showing Lengths in Feet of Various Kinds of
Construction.**

(Report of June, 1918, W. S. Post, Engr)

Sta.	Concrete Pipe	Reinforced Concrete Pipe	Steel Riveted Pipe (low pressure)	Steel Riveted (high pressure)	Tunnel
0-12			1200		
12-35		2500			
35-42	700				
42-104		6200			
104-136	3200				
136-153		1700			
153-155	200				
155-166		1100			
166-258			9200		
258-261		300			
261-267	600				
267-279		1200	3300		
279-312					
312-320		800			
320-325	500				
325-333		800			
333-343	1000				
343-365			2200		
365-368	300				
368-379			1100		
379-388	900				
388-392		400			
392-406			1400		
406-428				2200	
428-440			1200		
440-444		400			
444-446	200				
446-450		400			
450-451	100				
451-458		200			
453-463			1000		
463-476				1300	
476-481			500		
481-483		200			
483-486	300				
486-491		500			
491-496	500				
496-535		3900			
535-539	400				
539-553		1400			
553-560			700		
560-562		200			
562-566	400				
566-572		600			
572-578			600		
578-580		200			

Sta.	Concrete Pipe	Reinforced Concrete Pipe	Steel Riveted (low pressure)	Steel Riveted (high pressure)	Tunnel
580-585	500				
585-587		200			
587-590	300				
590-593		300			
593-609	1600				
609-613		400			
613-619			600		
619-623		400			
623-672	4900				
672-675		300			
675-677			200		
677-681				400	
681-683			200		
683-685		200			
685-736	5100				
736-739		300			
739-768	2900				1000
768-778					
778-797	1900				
797-802		500			
802-857	5500				
857-866		900			
866-872			600		
872-882				1000	
882-885			300		
885-887		200			
887-904	1700				
904-908		100			
905-907			200		
907-909		200			
909-912	300				
912-914		200			
914-917			300		
917-919		200			
919-938	1900				
938-943		500			
943-946			300		
946-953				700	
953-954			100		
954-956		200			
956-967	1100				
967-969		200			
969-980			1100		
980-984		400			
984-987	300				
987-992		500			
992-1017	2500				
1017-1022		500			
1022-1026	400				
102600	40,200	29,500	28,300	5,600	1000
being total length of line Monseratte Rancho to El Salto Reservoir					
1st Section- Sta 1026-00 to Sta 367 or Pumping Plant A					
65900	33800	15100	10400	5600	1000

**.OCEANSIDE WATER SYSTEM.
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Sta.	Concrete Pipe	Reinforced Concrete	Steel Riveted Pipe (low pressure)	Steel Riveted (high pressure)	Tunnel
0-12			1200		
12-35		2300			
35-42	700				
42-104		6200			
104-136	3200				
136-153		1700			
153-155	200				
155-166		1100			
166-258			9200		
258-261		300			
261-267	600				
267-279		1200	3300		
279-312					
312-320		800			
320-325	500				
325-333		800			
333-343	1000				
343-365			2200		
365-368	300				
368-379			1100		
379-388	900				
388-392		400			
392-406			1400		
406-428				2200	
428-440			1200		
440-444		400			
444-446	200				
446-450		400			
450-451	100				
451-452		200			
453-463			1000		
463-476				1300	
476-481			500		
481-483		200			
483-486	300				
486-491		500			
491-496	500				
496-535		3900			
535-539	400				
539-553		1400			
553-560			700		
560-562		200			
562-566	400				
566-572		600			
572-578			600		
578-580		200			

Sta.	Concrete Pipe	Reinforced Concrete Pipe	Steel Riveted (low pressure)	Steel Riveted (high pressure)	Tunnel
580-585	500				
585-587		200			
587-590	300				
590-593		300			
593-609	1600				
609-613		400			
613-619			600		
619-623		400			
623-672	4900				
672-675		300			
675-677			200		
677-681				400	
681-683			200		
683-685		200			
685-736	5100				
736-739		300			
739-768	2900				1000
768-778					
778-797	1900				
797-802		500			
802-857	5500				
857-866		900			
866-872			600		
872-882				1000	
882-885			300		
885-887		200			
887-904	1700				
904-905		100			
905-907			200		
907-909		200			
909-912	300				
912-914		200			
914-917			300		
917-919		200			
919-938	1900				
938-943		500			
943-946			300		
946-953				700	
953-954			100		
954-956		200			
956-967	1100				
967-969		200			
969-980			1100		
980-984		400			
984-987	300				
987-992		500			
992-1017	2500				
1017-1022		500			
1022-1026	400				
102600	40,200	29,500	25,300	5,600	1000
being total length of line Monseratte Rancho to El Salto Reservoir					
1st Section- Sta 1026-00 to Sta 367 or Pumping Plant A					
65900	33800	15100	10400	5600	1000

Sta	Concrete pipe	Reinforced Concrete pipe	Steel Pipe	Steel	Tunnel
0 to 623	11,700	24,000	23,000	3,500	0
623 to 1026	28,600	5,500	3,300	2,100	1000

Sta 623+00 is near south line of Guajome Rancho.

R E P O R T O N
OCEANSIDE WATER SYSTEM

By William S. Post,

June 18, 1912.

PURPOSE

This report is made by instruction of Mr. Wm. G. Henshaw in order to determine the feasibility and cost of constructing a water system for the Oceanside region. If undertaken, it is understood to be because it is both self supporting and also settles riparian objection to the principal purpose of the Volcan Land & Water Company to divert waters out of the watershed at Warners Dam.

This report is also expected to contain the position of the Oceanside people and Riparian owners relative to this proposition.

RESULT OF CONFERENCES

Mr. Fletcher, the City Trustees and riparian owners have met a number of times in the last two weeks. The position of Oceanside briefly stated is that, provided the City and the neighboring mesas of South Oceanside and Carlsbad are supplied with water and in addition the lower valley of the San Luis Rey River, they will have no objection to the Warners

diversion but on the construction of works to secure this development will consent to the diversion at Warner's and use their good offices to secure the consent of outstanding riparian owners. Hunsaker & Britt are employed as attorneys by the City of Oceanside to advise them, and Mr/ F. C. Finkle is their consulting engineer. Mr. Britt also says he represents riparian owners, but apparently there is no pooling of the issue and neither he nor the City of Oceanside can as yet deliver the entire outstanding consent, if the plans here outlined are carried out. It is a matter which early in the negotiations will demand attention.

Mr. Fletcher in the last conference, June 16th, summarized the subject under consideration somewhat as follows:

Attention is being given to definite plans to be submitted to Mr. Finkle to deliver 1000 inches of water on the bench lands between Monserrate and the Mission Valley, together with the mesas of Oceanside, South Oceanside and Carlsbad. This plan will include the storage of a definite number of acre feet of flood water, supplemented by pumping from gravels. This water will be delivered at the 200 ft. elevation at Oceanside, and will be available for lands on the south side of the river, along the line of the conduit. The rates to be determined by the California Railway Commission.

It further seemed the opinion of the City that the Pipe Line Company should furnish water to Oceanside at rates not over its present cost of pumping, and also in a general way that

this development will be acceded to by outstanding riparian owners, provided that the works are built and everyone protected by ample guarantees.

It should be clearly understood that the interest of Oceanside is non-riparian, it is correlative in the legal sense to the Escondido diversion and to the projected Warner's diversion. Further that a successful resort to injunction against the Warner's diversion would incidentally end forever the chances of Oceanside development. This has frequently happened in California.

It is then plainly a practical business matter to settle by mutual concession and compromise.

RIPARIAN OWNERS

At the outset it must be understood that among these are joint owners in certain ditches which have established rights to flood water. It adds perhaps little to the subject that the ditches are uneconomical and confined virtually to one application of water in May or June, after which the owners, either use pumping plants or receive no water. Other riparian owners who use pumping plants only for the irrigation of water will obviously not be affected except by a lowered water plane. These plans are expected to forestall this, by more extensive use of water applied upon bench lands immediately above. If due to local conditions or an error in the predictions made, ~~XXXXXXXXXX~~ a lowered plane does result. It is a matter not of complete loss of water supply, but of increased cost of pumping.

Water Supply of San Luis Rey below Warner's Dam.

The results of measurements this past season are as follows:

Total acre feet 1911-12

At Warner's Dam	12,880
" Pala	19,290
" Oceanside	22,500 (run-off to the sea)

On the face of the returns between March 1 and June 1 about 10,000 acre feet more than was necessary to surcharge the gravels came down the river, as surface flow. Further an additional amount sufficient to resaturate the gravels from the water plane say of Sept. 1 to the present surface was delivered. This can be more closely ascertained after our summer measurements of wells are made but a preliminary statement would make this between 10,000 to 30,000 acre feet.

It has been demonstrated often and is virtually admitted by everyone that the rate of underflow or ground water flow is very slow, 3 to 10 miles a year. It has only more recently come to be understood that the same fact makes the sand plains of such a river as the San Luis Rey reservoirs of water to the extent of 40% of the mass of gravels. Once determine the extent and depth of the gravels and the line of permanent and temporary saturation, the amount of stored water can be computed as well as the ore in sight in a mine. Add to this the fact of evaporation from swamp areas and all lands moist within 3 feet of the surface is nearly equal to that of a lake area we can account in a balance sheet for all water delivered. Below 3 feet the water is protected from evaporation. The average depth of the gravels may be conservatively taken as 15 feet. The effective preserved water is then roughly 12 feet.

U.S.P. says

16000 ac. ft. between Pal and Occamids

= 5,200,000,000 gallons

Using only that area between Pala and the sea subject to direct overflow we find 3500 acres. There is then 3500 acres x 12 x 40% or 16,000 acre-feet at least in storage in this region. Gravel lands when irrigated are known to require a very large amount of water and this is because 50% or more returns immediately to the gravels and is again available for pumping. This factor is important as regards the permanency of the water plane for lands directly in the bottoms.

Another deduction from the slow rate of underflow is that it is unwise to attempt to draw too much water from a single pumping plant. The rate of approach being slow the pumping cone formed becomes too depressed. The Monserrate pumping plant delivers about 350 miners inches and in doing so lowers the immediate water plane about 15 feet. It is better to have 2 pumping plants 3 miles apart each drawing 250 miners inches out of gravel storage than to attempt to pump 500 inches. The last will probably fail, not because of lack of total volume of water, but because of its slow approach.

The plan here proposed contemplates the ultimate use of 1000 inches of water during the irrigating season and perhaps one-fourth during the remainder of the year, or a continuous flow of 700 inches. This calls for 11,000 acrefeet in the year. There is no question that this amount is obtainable from the region between Pala and the Mission Valley after the Warners Dam is built if suitable works are installed.

Proposed Water System.

It is obvious that a gradual increase of the works as a part of a perfected plan is most desirable, keeping step with the market. It is proposed therefore to divide the steps as follows:

Construction "A". To erect a pumping plant below Bonsall with a capacity of 250 Miners inches. The water to be lifted 110 feet into a pipe line. This pipe line to be 38" diameter and to be constructed of cement pipe on hydraulic grade, together with riveted steel siphons. Its capacity from the first should be 1000 miners inches. This will be 12 miles long to El Salto reservoir, with a small branchline to the City of Oceanside.

At the same time the Construction of El Salto Reservoir should commence. It should be built to a height of 85 feet when it would have a capacity of 250 miners inches continuous flow a quantity 7 times in excess of the present use of Oceanside. Evaporation would be compensated by the immediate run-off of its drainage area which is 15 sq. miles. It will be supplied at first by continuous operation of the pumping plant which alone would limit the available supply to about 100 inches for Oceanside southward.

Construction "B". The cement pipe would now be extended back to Keys Canyon and a branch to the Moosa Canyon Falls. This would supply gravity water to the pipe line. A diverting dam should be built in each canyon to be enlarged in the future to about 80 feet in height. The diverting dams would be intended at first to equalize flood rushes to a certain extent and gain the maximum transfer to El Salto reservoir in the winter

months. It is probable that these basins will yield 500 miners inches for three months in the winter and either relieve the operation of the pumping plant or supplement it.

Construction "C" Extension of the cement pipe line up stream from Keys Canyon to a point above the Montsarrata Narrows. Take the gravity of flow of the San Luis Rey River to the extent that it is available. Install a pumping plant above Monserrate with a capacity of 350 miners inches, for use in the summer months. The Moosa & Keys Canyon diverting dams should be enlarged into reservoirs and held as a direct reserve for the period of maximum demand, which now can rise to 1000 inches. El Salto reservoir would now receive its maximum capacity.

Construction "D" would look directly to the question of abnormally dry years. It would add to the storage already provided in Moosa, Keys Canyon and El Salto, storage in the side canyon of the Monserrate ranch, and also in one or both of the side canyons immediately east of the Monserrate ranch.

These proposed reservoirs are all near the site in the Monserrate Harrows, selected by Mr. Finkle as the most promising for a large dam across the river and solving the problem.

I agreed that this was a complete solution, and am now making the survey. On reflection, however, I believe, that it has certain practical difficulties, because of cost, danger of abnormal floods, silting and riparian rights.

My general recommendation is always to chose the reservoir off the main stream where there is torrential flow. I believe full investigation will ^{still} maintain me in this view.

LANDS TO BE SERVED

SUMMARY OF DATA

	ACRES
1. San Luis Rey Valley	
Arable bottom land	
South Side	3000
North Side	2000
Arable Bench Land	
South side	2200
North Side	2400
Waste Lands- Rough	
or actual River bed	<u>3600</u>
Total riparian below pipe line	13,200
Of this riparian consent is held by	
Volcan Land & Water Co. for	5,900
2. Non Riparian Lands	
City of Oceanside	1,000
South Oceanside	1,000
Carlsbad	<u>1,000</u>

The ultimate development dependent on the proposed system may be taken in a preliminary way as follows:

SAN LUIS REY VALLEY:

Riparian bottom lands, say one-half of total	2500 acres
Bench lands, all south side	2200 "
OCEANSIDE and SOUTH, non-riparian Bench lands	<u>3000</u> "
Total	7700 "

These will call for water as follows:

SAN LUIS REY BOTTOM LANDS	600 Miners Inches
" " " BENCH LANDS	250 " "
OCEANSIDE and SOUTH	<u>300</u> " "
Total	1150 " "

These irrigation figures being a maximum and extending only through about seven months, and the last item being tributary to El Salto Reservoir, the assumed sizes of conduit, etc., are believed sufficient to secure the result.

DETAILS OF COST.

Construction A

Pumping plant near Russell, 1200 120 ft.
 walls, delivery pipe, complete
 capacity 200 horse power

\$ 20,000

Pipe line, 1st Section

Cast Pipe	12000	ft.	@	\$1.50	
Reinf.	12000	ft.	@	1.00	
Riveted Pipe Light	12000	ft.	@	1.50	
Riveted Pipe Heavy	12000	ft.	@	1.50	
Tunnel	12000	ft.	@	1.50	

20,000
 12,000
 18,000
 18,000
 18,000

El Salto Reservoir

Concrete	4000	sq. ft.	@	\$7.	
Stairing					
Gates and Valves	4000	sq. ft.	@	2.50	
Lanes					
Land					

28,000
 2,000
 10,000
 10,000

12" Branch to Casanville
 10,000 120 ft.

\$2.

20,000

69,500

Total

100,150

Construction B

Horse Canyon
 Riveted Pipe Light 25000 ft. @ \$1.50

\$ 40,000

Horse Diverting Dam

20,000

Main Pipe extended upstream

Cast Pipe	7000	ft.	@	\$1.50	
Reinf.	7000	ft.	@	1.00	
Riveted Light	24700	ft.	@	1.50	

10,500
 7,000
 36,750

Lays Canyon Branch

Riveted Pipe	10000	ft.	@	\$2.50	
Diverting Dam					

25,000

Total

120,750

Construction C

50" main supply pipe extended downstream

Cast Pipe	700	ft.	@	\$1.50	
Reinf.	6410	ft.	@	1.00	
Riveted Light	1200	ft.	@	2.50	

1,050
 6,410
 3,000

Concrete Pumping Plant

10,000

Total

20,460

General construction which may be covered

Land Improvements	\$ 25,000
Site Office Improvements	25,000
Improvements to existing buildings	25,000
Improvements above the surface	25,000
Total	\$100,000

Operating Costs

Construction A — 500 Acres Under Interest and Depreciation 10% (\$25,000)	\$ 25,000
Operating pumping plant	15,000
Site Management	5,000
Total	\$ 45,000

Cost per annual acre \$ 100.00
1000 acres. 1.00 per acre.

Construction A & B — 500 Acres Under Interest and Depreciation 10% (\$25,000)	\$ 45,470
Operating pumping plant	20,000
Site Management	20,000
Total	\$ 85,470

Cost per annual A.C. — 500 Acres \$170
1000 acres. 1.00 per acre.

Construction A, B & C — 1000 to 1500 A.C. Interest and Depreciation 10% (\$25,000)	\$ 45,100
Operating pumping plant	20,000
Site Management	20,000
Total	\$ 85,100

Cost per annual A.C. — 500 Acres \$70.2 to \$5.5
1000 acres. 1.0 to 1.55 per acre.

ALTERNATIVE SETTLEMENT OF EXISTING DITCHES:

Heretofore we have assumed that this pipe line will settle outstanding riparian rights by furnishing the water where required. But there are two groups of owners, who, unfortunately, for the economic development of the region hold rights to surplus waters in ditches. These are the Libbey ditch, and the ditch of the San Luis Rey Irrigation Company. The fact appears to be that the secure one good application of water, usually in the month of May. After May they resort, like others, to pumping plants. The maximum capacity of the Libbey ditch is 125 inches and of the San Luis Rey Irrigation Company's ditch is 150 miners inches. This is equivalent to 330 acre-feet if continued for one month.

For these owners the following alternative solution is proposed: Impound in the natural basin on Guajome Ranch, flood water of the San Luis Rey River equal in volume to that which is now diverted in these ditches. The Libbey ditch would be connected by syphon with the San Luis Rey's Company's ditch and the latter's head works brought up stream and connected with the basin on Guajome ranch.

A survey has just been made and the following preliminary plan is suggested:

Headworks: Maximum capacity of flood water 1000 miners inches.

Guajome Reservoir: Capacity 1000 acre-feet, equivalent to 750 miners inches for 1 month, or 60 miners inches continuous flow.

The cost is estimated as follows:

Permanent Diversion Dam in Southwest Corner of Sec. 36, 10 ft. high - - - - -	\$14,000.00
Diverting Ditch, 1000 inch Capacity, 1-1/2 miles long - - - - -	4,500.00
Reservoir at Guajome Lake, 125,000 yards at 20 cts. - - - - -	25,000.00
Connection with head of San Luis Rey Irrigation Company Ditch, 1/2 mile long - - - - -	1,500.00
Pipe to Libbey Ditch, 1000 ft. long - - - - -	1,000.00
	<hr/>
Total	\$46,000.00

ELECTRICAL CENTRAL STATION FOR PUMPING:

A mechanical engineer advises me that there is no doubt of the economy of installing a central station at either Oceanside or at Vista if freight rates are obtained, for the pumping provided for in these plans. The economy thus secured could also be made a consideration with individual pumping plant owners.

MARKET:

The provision here made for Oceanside and Southward may be considered as eventually a domestic supply. The first use of course will be for small farms with increasingly intensive cultivation, as in vegetable gardens, until full settlement has taken place. It is doubtful whether the settlement upon small farms using irrigating water would be attractive at a retail rate of over five cents a thousand gallons. A distinction should be made between the furnishing of water wholesale to towns and the retail rate paid by consumers. Comparing this with other beach districts, the situation seems to warrant a rate of from 7 cents to 10 cents per thousand gallons wholesale, for which a town might properly charge 25 cents, to cover the cost of its distribution. It is noted in an appended sheet that the wholesale cost at present, to the City of Oceanside is about 7 cents per thousand gallons.

COST OF DISTRIBUTION

The usual experience has been that a charge of \$25 per acre will represent the cost of distribution of water from a reservoir to lands by pipes.

The following is an estimate of the distribution cost from El Salto Reservoir to the Catsbad mesa which is representative of the conditions of South Oceanside.

5 miles 12" Cement pipe	a \$ 1600	\$ 8,000
1 mile 12" Riveted pipe	a \$ 5000	<u>5,000</u>
		\$13,000

This will convey 50 miners inches. Therefore the first cost of distribution will be \$260 per inch or about \$26 per acre.

APPENDIX A.

Oceanside Pumping Plant.

		Gallons	
1905	Dec.	8,550,888	
1906	June	4,723,808	
	July	5,968,488	
	Aug.	7,675,692	
	Sept.	5,358,923	
1908	Sept.	6,884,700	
	Dec.	2,298,875	
1909	Feb.	2,188,825	
1910	June 30 - Dec.31	46,512,000	
1911	Jan.1 - June 30	42,674,000	
	June 30 -Dec.31	<u>45,543,000</u>	88,217,000
1912	Jan.	5,577,500	
	Feb.	6,985,500	
	Mar.	4,549,000	
	Apr.	-4,965,000	

Annual Operating Cost.

Actual Operating expenses (from City Record)	\$3500.00
Interest and depreciation on plant 10%	
(Estimated by W S. Post)	<u>\$2500.00</u>
	\$6000.00

Probable cost wholesale at City Reservoir
7 cents per thousand gallons.

EXHIBIT "B".

TE: Mr. Lee made the underflow investigations for the Los Angeles Aqueduct, and is an authority on the subject.

Los Angeles, Calif.

June 7, 1912.

Mr. W. S. Post,

749 Garland Ave.,

Los Angeles, Calif.

Dear Sir:

My recent visit to the San Luis Rey River and examination of the surface and underground water conditions of that stream were necessarily very incomplete on account of the limited time at my disposal. There is also much information which I lack which I could obtain by a conversation with you. However there are some features of the problem which you are attacking, upon which I may be able to offer suggestions which will be of value to you.

In traveling up the river I was greatly impressed by the zone of rank vegetation and swamp land on either bank of the stream which widens out to a distance of about 2000 feet in several localities. Judging from my past experience in the measurement of soil evaporation and transpiration, I should say that the annual loss by evaporation from the river bottoms between Pala and the ocean amounts to a continuous flow of between 5 and 10 sec. ft. The diversion of all water from the channel at the lower end of Warner ranch to some point without the drainage area, together with the surface or ground storage of water supplied by tributary streams below and artificial distribution of that water to irrigated lands along the lower river bottom would to a great extent eliminate this needless loss. According to testimony given a few days ago by F. C. Finkle, before the California State Railroad Commission, the value of a miner's inch of water in the vicinity of Los Angeles is \$2000. At this rate the saving of seven and one half sec. ft. would mean the creating of water rights valued at \$750,000. With careful study I believe that a practical scheme could be worked out for irrigating more lands than are now under cultivation along the San Luis Rey and at the same time allow your proposed diversion to be made. The verdure along the river bottom would of course disappear to a certain extent but the practical benefit to mankind would far exceed the aesthetic value of the natural vegetation.

The gravel accumulation above Pala has great value as a storage site for flood waters. Its efficiency could be very

greatly increased by spreading the flood waters from Pauma Creek and other streams near by, retarding their velocity and allowing the waters to percolate into the porous formation instead of flowing directly into the channel of the San Luis Rey. This method of storage is being used successfully on several streams of Southern California which I have visited.

The wells which Mr. Case is measuring are most of them equipped with wind mills or power pumps, and some of them are near irrigation ditches. This gives rise to local variations in the ground water surface which will lead to confusion and error in drawing final conclusions from the data. I would suggest that the Company establish their own wells and locate them where they will be most free from disturbing local conditions. Two inch holes drilled with a spoon augur and cased with light galvanized sheet metal, perforated, are very effective. Their first cost is small and very little attention is needed to keep them in good condition.

I do not feel that I have yet sufficiently covered the ground to be able to recommend a general plan of gathering the field data necessary to a solution of your problem, but I shall be glad at any time to make further examination with this end in view. I am enclosing a bill for the time which I have spent upon this matter, as you suggest.

Yours very truly,

(Signed) Charles H. Lee

619 Federal Building,
Los Angeles, Cal.

C.M. Libby
So. T. & Co. (Mort.)

C.M. Libby

So. T. & T. Co. (Mort.)
Clarence M. Libby

Clarence M. Libby
So. T. & T. Co. (Mort.)

4 Clarence M. Libby
So. T. & T. Co. (Mort.)

3

3 3

Lot 2

Rosa Marron

Lot K.

Lot 1 Rosa Marron

Highway

N 86° 03' E

Will S. Kelly

P.C.R. 183+115 190+00

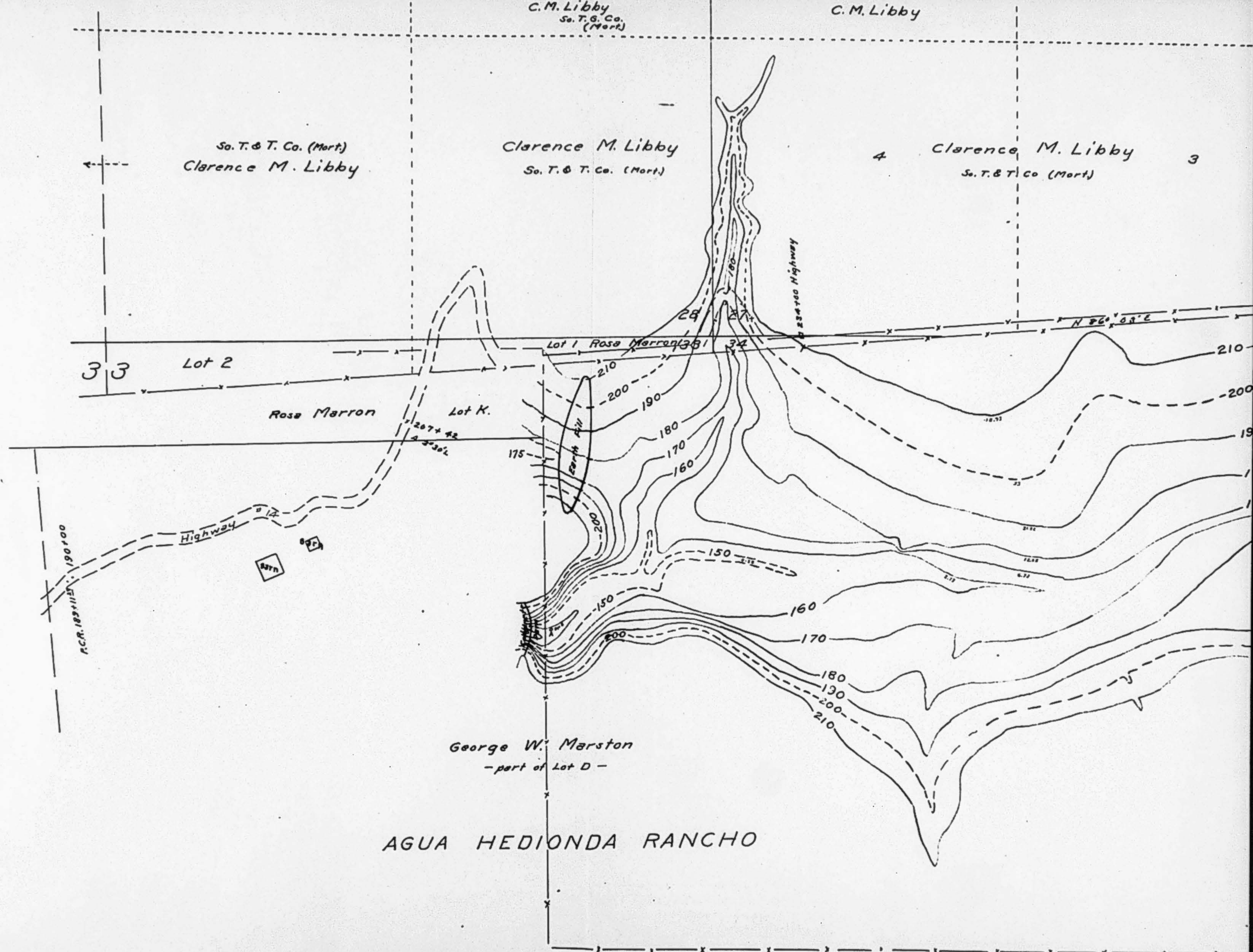
Highway

Barn

George W. Marston
- part of Lot D -

AGUA HEDIONDA RANCHO

Will S. Kelly
- part of Lot D -



C. M. Libby

Chester Gunn

J.A. Harding (undiv. 1/2 Int.)

J.C. Boyd " " "

4 Clarence M. Libby
S. T. & T. Co (Mort)

3

2 Eliza A. Gunn

1

25500 (Highway)

Round Stakes
256 + 63.75 @ 27° 14'

Chester & Mrs. E.A. Gunn
- Part of Lot D - A.H. Rancho.

Ht. of Dam 85 ft.

Material Concrete

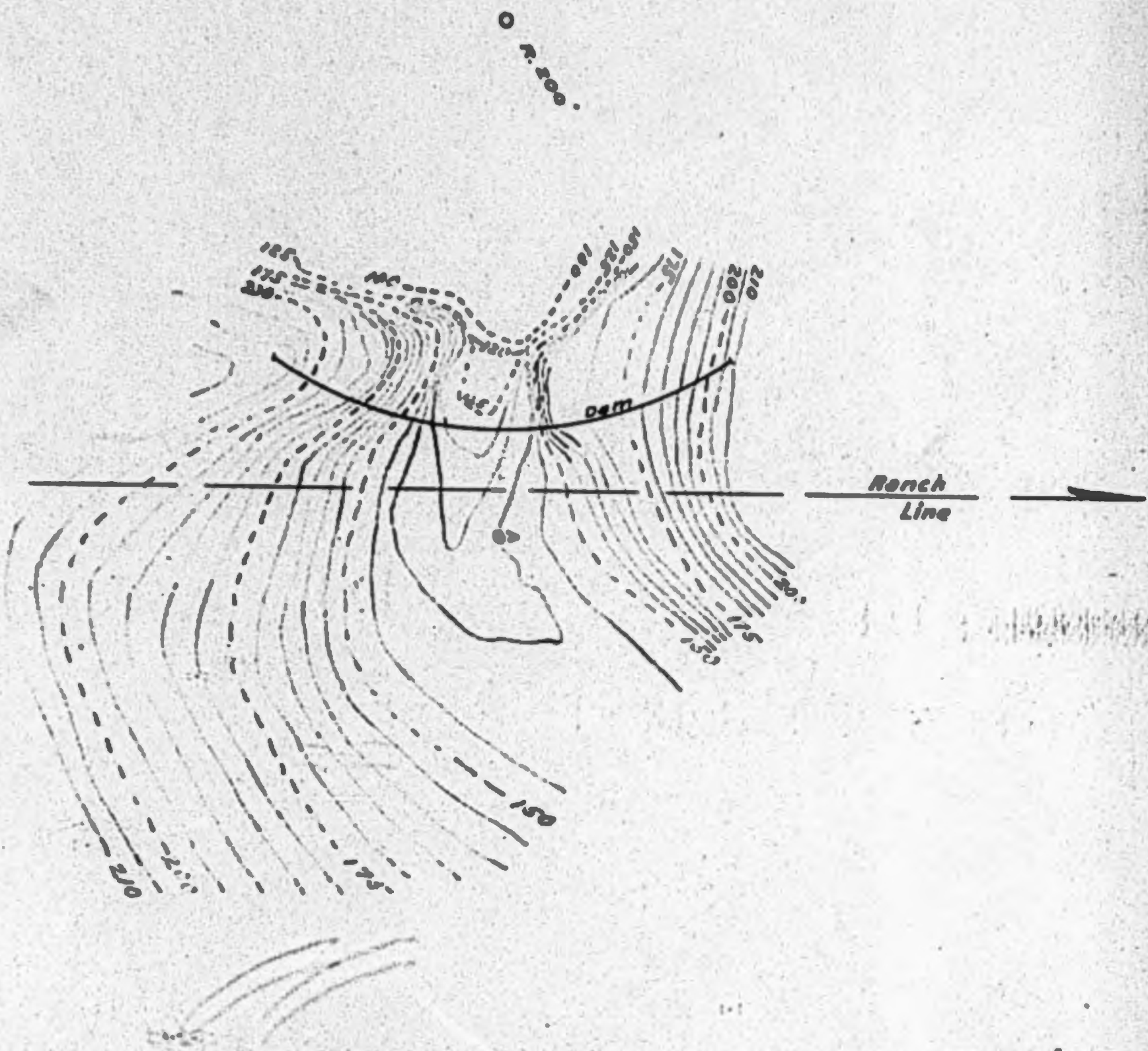
Contour	Depth	Acres Flooded	Acre Feet
130	0	0	0
140	10	0.3	1.5
150	20	1.9	12.5
160	30	10.0	72
170	40	24.7	245.5
180	50	46.0	599
190	60	79.0	1224
200	70	121.2	2225
210	80	179.7	3729.5

Will S. Kelly
- Part of Lot D -

VOLCAN LAND & WATER CO.
Oceanside Water System
EL SALTO RESERVOIR
Scale 1" = 400'

June 1912
by R.A. Hamilton
W.S. Post Engr

1.001



VOLCAN LAND & WATER CO.
 Oceanside Water System
EL SALTO DAM
 Scale 1" = 100'

June 1912
 by R.A. Hamilton
 W.S. Post. Engr.

1.002

Ed Fletcher Papers

1870-1955

MSS.81

Box: 40 Folder: 11

**Business Records - Reports - Post, W.S - "Report:
San Luis Rey Water Development for lands adjacent
to Oceanside, South Oceanside and Carlsbad"**



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