

Dear

January 3, 1916.

Mr. W. S. Post,

Enclosed find copy of letter from President
Max Thelen, under date of December 30th, ^[1915 am] which is explanatory.

Ed Fletcher.

F-S

CUYAMACA WATER CO.
FILE No. 142
DO NOT REMOVE
ANY LETTER
FROM THIS FILE.

Form 1204

CLASS OF SERVICE	SYMBOL
Day Message	
Day Letter	Blue
Night Message	Nite
Night Letter	N L

If none of these three symbols appears after the check (number of words) this is a day message. Otherwise its character is indicated by the symbol appearing after the check.

WESTERN UNION TELEGRAM

NEWCOMB CARLTON, PRESIDENT
GEORGE W. E. ATKINS, VICE-PRESIDENT BELVIDERE BROOKS, VICE-PRESIDENT

CLASS OF SERVICE	SYMBOL
Day Message	
Day Letter	Blue
Night Message	Nite
Night Letter	N L

If none of these three symbols appears after the check (number of words) this is a day message. Otherwise its character is indicated by the symbol appearing after the check.

RECEIVED AT

A122GSJ 15

FX LOSANGELES CAL 245P JAN 6 1916

L B MATHEWS

406
CUYAMACA WATER CO 916 8 ST SANDIEGO CAL

ROBINSON WANTS YOU HERE TOMORROW MORNING TO TESTIFY ALSO FAUDE
NOTIFY HIS OFFICE AND RESIDENCE

WILLIAM S POST

RECEIVED
JAN 6 1916

25
CUYAMACA WATER CO.
FILE No. 84
DO NOT REMOVE
ANY LETTER
FROM THIS FILE.

Form 108

THE WESTERN UNION TELEGRAPH COMPANY

INCORPORATED
25,000 OFFICES IN AMERICA. CABLE SERVICE TO ALL THE WORLD

This Company TRANSMITS and DELIVERS messages only on conditions limiting its liability, which have been assented to by the sender of the following message. Errors can be guarded against only by repeating a message back to the sending station for comparison, and the Company will not hold itself liable for errors or delays in transmission or delivery of Unrepeated Messages, beyond the amount of tolls paid thereon, nor in any case beyond the sum of Fifty Dollars, at which, unless otherwise stated below, this message has been valued by the sender thereof, nor in any case where the claim is not presented in writing within sixty days after the message is filed with the Company for transmission. This is an UNREPEATED MESSAGE, and is delivered by request of the sender, under the conditions named above.

THEO. N. VAIL, PRESIDENT

BELVIDERE BROOKS, GENERAL MANAGER

RECEIVED AT

8 PAID N LOS ANGELES CALIF. JAN 6 1916

F.M. FAUDE.

CARE TRAIN NO 74

EE TORO CALIF.

ROBINSON WANTS YOU HERE TOMORROW MORNING TO TESTIFY

WM F POST

230PM

CUYAMACA WATER CO.
FILE No. 84
DO NOT REMOVE
ANY LETTER
FROM THIS FILE.

January 8, 1916.

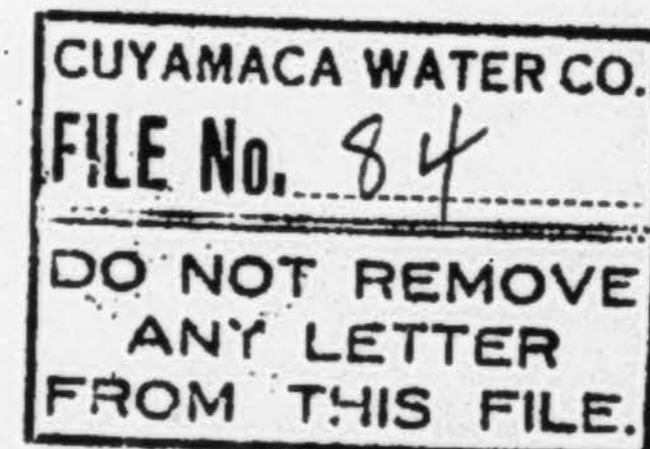
Mr. W. S. Post,
749 Garland Ave.,
Los Angeles, Calif.

My dear Mr. Post:

I will have to change that letter to the
Hon. James E. Thelen in a number of matters, for the hearing
has brought out things which have forced me to change it.

Yours very truly,

F-S



January 14, 1916.

Mr. W S Post,
749 Garland Ave.,
Los Angeles, Cal.

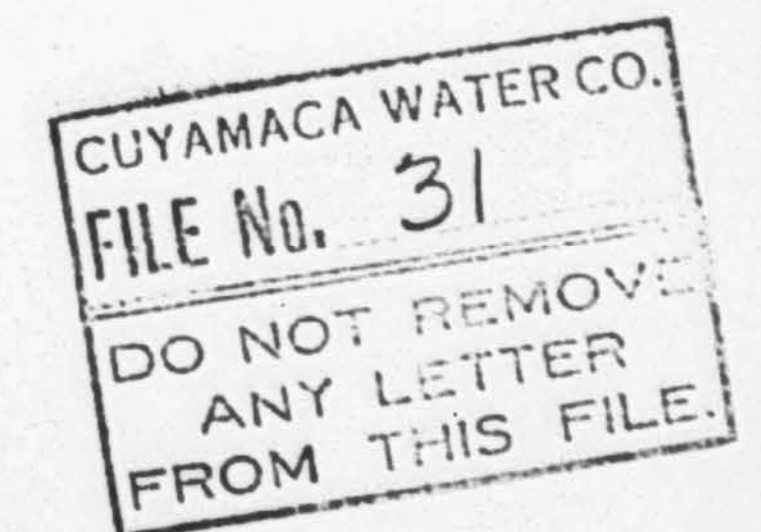
My dear Mr. Post:-

I enclose Cuyamaca check
for \$173.56 to cover your services and
expenses for the month of December, 1915.

Yours very truly,

FMF-K

Enclos.



Jan. 17, 1916.

Mr. W. S. Post,
749 Garland Ave.,
Los Angeles, Calif.

Dear Sir:

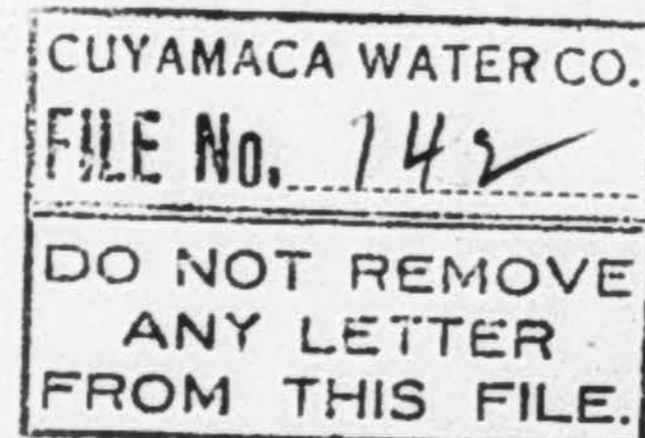
February 25th is the date set by the State Railroad Commission for our hearing for increase in rates. Additional evidence will be necessary, and we must start this thing at once.

Yours very truly,

F-S

See me about this application of N. M. Rose for a position.

E. F.



16-576

DESIGN PATENT No. 40520

J

44GS CA 22

Los Angeles Calif Jan 20th 1916.

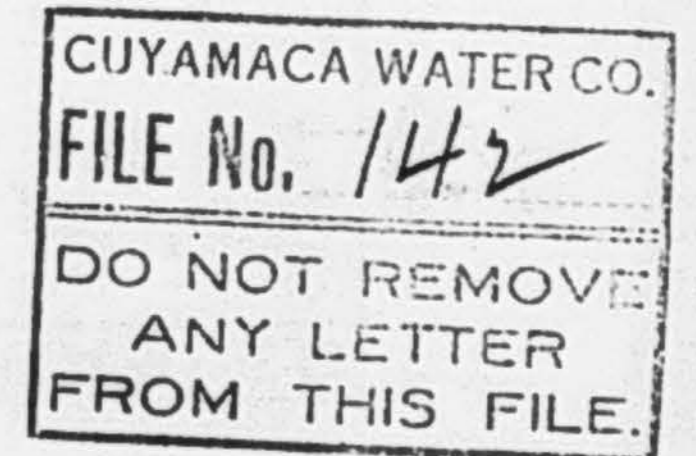
F M Faude

924 8th St San Diego Calif.

Your letter forwarded and lost in mails wire anything to be done here.
I plan to come to San Diego when railroads opens.

William S Post

1132-am



CUYAMACA WATER COMPANY

SUCCESSORS TO

THE SAN DIEGO FLUME COMPANY

OFFICE: FLETCHER BUILDING
916 EIGHTH ST., BET. BROADWAY AND E
P. O. BOX 1412

ED. FLETCHER, MANAGER
F. M. FAUDE, ASST. MANAGER
LOU B. MATHEWS, SECRETARY
C. HARRITT, SUPERINTENDENT

WILLIAM S. POST
ASSOC. MEM. A. S. C. E.
FLETCHER BLDG., 924 8TH ST.
SAN DIEGO, CALIFORNIA

SAN DIEGO, CALIFORNIA.

Jan. 22, 1916.

Mr. Post:

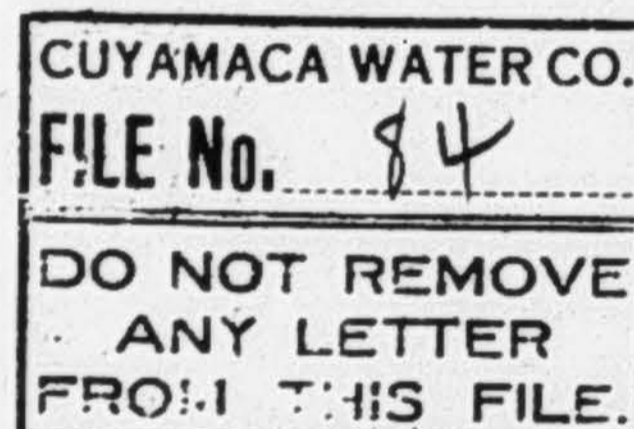
Enclosed herewith find copy of letter from our
attorneys in Washington, Britton & Gray, which is explanatory.

I see a bill has been introduced and referred to the Indian
Office. I sincerely hope it dies there,

Yours very truly,

Ed Fletcher.

F-S



January 24, 1916.

Mr. Ed Fletcher,
Mgr VL&WCo.

Dear Sir:-

Subject: U.S. Carroll Reservoir Application

As O.R.W. Robinson notified you, we have until April
1, 1916 to amend the application for the Carroll Reservoir and
Canal. Now in order to do this, certain decisions will have
to be made.

First, the original application is objected to on
the part of the U. S. Geological Survey Land Committee on the
ground that we state that the Carroll Reservoir, which is
filed in the name of Ed Fletcher, is really part of the Volcan
Land & Water Company system which we admitted in our statement.
We then went on to say that the Volcan System was under option
to the City of San Diego. Now the U. S. Geological Survey
Committee points out that if it really is ~~good~~ to the City,
The City will become the real party in interest and its name
should be substituted as the applicant. It further objects
that as the main use of the rights of way will then be for
municipal instead of irrigation purposes, the application
should be filed under the act of 1901 instead of the act of
1891 which states the main purpose of irrigation.

Now I propose to state that the option is off and
that the project has as its main purpose irrigation and that
the area to be supplied is the San Dieguito Ranch and the
immediate vicinity.

Second, I propose to withdraw the Carroll-University
pipe line survey and replace it with the Carroll-San Dieguito
Ranch pipe line and thereby show that the canal system is pro-
vided for the irrigation of the land stated. If there is no
objection to this program, I will proceed as above.

You will understand that the application calls for
a very small portion of land, a little corner at the Damsite
and about a mile of right-of-way of what is now public land
but on which Mr. Henshaw has also placed a "stone" application.

Also as long as this is on public land outside of the
Forest Reserve, you are permitted to begin work in advance of
the granting of the permit.

Yours very truly,

P-K

William S. Post.

Feb. 29, 1916.

Feb. 16, 1916.

Messrs Post and Faude:

Will you please keep this letter to Mr. Stearns ^[at same date] _{see Stearns} in mind and let us discuss this subject.

Ed Fletcher

EF:B

CUYAMACA WATER CO.
FILE No. 142
DO NOT REMOVE
ANY LETTER
FROM THIS FILE.

Mr. Post:

Go at once to Mrs. Sowell, who will read you a letter in answer to yours of the 27th from Los Angeles.

Ed Fletcher.

F-S

CUYAMACA WATER CO.
FILE No. 84
DO NOT REMOVE
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Feb. 18, 1916.

Mr. Post:

Enclosed find copy of telegram from Eshleman, which is explanatory. See me about it.

Yours very truly,

F-S

CUYAMACA WATER CO.
FILE No. 84
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Feb. 18, 1916.

Mr. Post:

See me immediately about sending the stipulations to Washington. I have them signed up by Murray, and the money as well. I want to send them direct and cut out the Los Angeles Land Office.

Ed Fletcher.

F-S

CUYAMACA WATER CO.
FILE No. 84
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WILLIAM S. POST
ASSOC. MEM. A. S. C. E.
FLETCHER BLDG., 924 6TH ST.
SAN DIEGO, CALIFORNIA

June 2, 1916.

Mr. Ed Fletcher,
Washington, D. C.

Dear Sir:-

Enclosed is a condensed Summary of the Jorgensen report. I have already sent to him the profiles of the lower sites which are 600 feet and 1300 feet respectively below the site where Bartl is working.

The enclosed telegram states that the cost at the lower site is \$60,000 cheaper. Therefore his estimate for this is \$260,800.

Eastwood has also been furnished with this lower profile and I presume will be able to obtain some economy there as well.

Very sincerely yours,

W S Post

WSP:K

Enclos.

CONDENSED SUMMARY OF JORGENSEN REPORT OF MAY 27, 1916.

The complete report is being mailed to Chicago in care of Mr. Hodges.

Several types of masonry dam possible. On account of enormous flood discharge, propose a large spillway and keep the multiple arch dam 9 feet higher than the normal water level.

Estimate of Cost

18,200 cubic yards of concrete at \$15 including forms, etc. -----	\$275,000.
148 tons of high carbon steel at \$100 in place ----	14,800.
Additional cost of spillway (rock taken out used for concrete) -----	15,000.
Excavation for arches and buttresses (sand used for concrete) -----	10,000.
Plastering upstream face with cement gun -----	8,000.
	<u>\$320,800.</u>

Cement is assumed to cost \$3.00 per barrel at the site. Mix is to be 1:2:4 for arches and 1:2-1/2:5 for buttresses. This is contractors price and does not include engineering, interest during construction, or other overhead charges. The cost is somewhat higher than I had expected and I now believe that a constant angle arch can be constructed cheaper at the lower site. I shall make a report on this proposition soon after the receipt of a contour map of the lower site.

Respectfully submitted,

Lars Jorgensen.

September 8, 1916.

Mr. Ed Fletcher,
Mgr V L & W Co.

Dear Sir:-

Regarding a letter from Britton & Gray notifying you of the progress on the Carroll application, I do not know when they became attorneys in this case. I enclose a letter showing when Mr. O. R. W. Robinson became the record attorney before the local land office in Los Angeles. As you see his fee will be \$250 upon the final determination by the Department.

I suggest sending to Britton & Gray the enclosed letter.

Yours very truly,

WSP:K

September 8, 1916

Britton & Gray,
Wilkins Bldg., 1512 H St
Washington, D. C.

Gentlemen:-

I have to acknowledge your notification regarding the progress on the Carroll application. I am greatly obliged for this information, but it also brings up the question of what attorneys are taking care of this matter for me. I can not find that I directly asked you to take care of this matter, but the attorney of record is Mr. O. R. W. Robinson of Los Angeles. Before that time Mr. Oscar Lawler. It may be that they requested you to proceed in the matter at the Washington end.

I think the confusion has arisen from the fact that I am pressing two matters before the Department on different accounts. This particular application is no concern of the Cuyamaca Water Company. I should be glad to hear from you regarding the charges which you may be expecting from me. This is a matter which should not be left indefinite. I am forwarding this letter and your advice to Mr. Robinson for his information and will ask him to advise me further and will write you again after conferring with him.

Yours very truly,

F:K

November 22, 1916

Mr. Ed Fletcher,
Mgr U L & W Co.

Dear Sir:-

Subject: Preliminary Report on Escondido Creek
Development.

Preliminary surveys have just been completed which show that there is a favorable damsite; that the storage capacity with a dam 140 feet high is 11,000 acre feet; that the length of conduit to the north line of the San Dieguito Ranch is 2 miles. The sea level elevation of the bottom of the Damsite is 300. The proposed elevation for diversion is ~~300~~ 360 feet and the elevation of delivery at the northeast corner of the ranch will be 360 feet.

*90 feet
high
capacity
07/1*

The drainage area of Escondido Creek is approximately 30 square miles. The character of the watershed ranges from 300 to 2,000 elevation of the foot hill area around Escondido. This will make a good yield in wet years but very little in dry although the stream is ^{perpetuated} by the return waters of irrigation around Escondido. In a preliminary way, if the storage of 11,000 acre feet is provided, the safe irrigation yield will be from 150 to 200 Miners Inches.

and

The cost has not been estimated in detail but my final report will show the following costs approximately.

Conduit - 2 miles -----	\$30,000
Dam to height of 80 feet providing for a storage of 700 acre feet effective -----	100,000
Total -----	\$130,000

If the dam is raised to 140 feet the cost will probably reach \$150,000 additional.

It is fortunate that the damsite itself is on a 40 acre piece of Government Land and as far as the records show free for filing. The procedure should be as follows:

An application for permit to divert water to the State Water Commission which will secure priority of the water. In order to secure the land, two methods are open to you, either to place scrip on that portion of the 40 acre tract which are not occupied by mining claim; or an application for easement for reservoir purposes may be made to the Department of the Interior.

December 16, 1916.

Mr. Post:

I want a comprehensive report on the Escondido creek.
I return this report. Let me talk this matter over with you.

Ed Fletcher.

F-S

Mr. Ed Fletcher,
page 2.

Such a construction would involve a conflict over riparian rights for all those below the Damsite and would apply principally to such pumping plants as are located at Olivenhain. The principal settlement apparently would need to be made with the Cardiff Water District already organized which contemplates pumping from the gravels at Olivenhain.

Very sincerely yours,

WSP:K

William S. Post

-- Copy --

William S. Post
Assoc. Mem. A. S. C.E.
Fletcher Bldg., 924 8th St.,
San Diego, California.

November 22, 1916.

Mr. Ed Fletcher,
Mgr V L & W Co.

Dear Sir:

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The drainage area of Escondido Creek is approximately 30 square miles. The character of the watershed ranges from 300 to 2,000 elevation of the foot hill area around Escondido. This will make a good yield in wet years but very little in dry although the stream is benefited by the return waters of irrigation around Escondido. In a preliminary way, if the storage of 11,000 acre feet is provided, the safe irrigation yield will be from 150 to 200 Miners Inches.

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Mr. Ed Fletcher
Page 2

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Such a construction would involve a conflict over riparian rights for all those below the Damsite and would apply principally to such pumping plants as are located at Olivenhein. The principal settlement apparently would need to be made with the Cardiff Water District already organized which contemplates pumping from the gravels at Olivenhein.

Very sincerely yours,

(S) William S. Post

WSP:K

-- Copy --

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WSP:K

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Assoc. Mem. A. S. C.E.
Fletcher Bldg., 924 8th St.,
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Very sincerely yours,

(S) William S. Post

WSP:K

WILLIAM S. POST
ASSOC. MEM. A. S. C. E.
FLETCHER BLDG., 924 8TH ST.
SAN DIEGO, CALIFORNIA

January 8, 1917

Mr. Ed Fletcher,
Mgr V L & W Co.

Dear Sir:-

I am just in receipt of the results of the determinations by U. S. Geological Survey for various stations from Mr. McGlashan. They are as follows:

San Luis Rey, Warner Dam, -----	182,000	acre feet.
Santa Ysabel at Sutherland -----	95,100	" "
Santa Ysabel River at Pamo Damsite--	149,000	" "
Santa Maria Creek -----	41,500	" "

Yours very truly,

WSP:K

W S Post

MCFARLAND & IRVING
ATTORNEYS AT LAW
SUITE 3-4-B EVANS BLOCK

RIVERSIDE, CALIFORNIA,
January 9th, 1917.

Mr. W. S. Post,
Fletcher Building,
San Diego, California.

Dear Mr. Post:-

Your letter of the 5th inst., with reference to the Foster and Barnett descriptions, received.

I would suggest that in all descriptions of the meander line of the San Deguito River, where the same constitutes one of the boundary lines of the property over which we acquire floodage rights, and where the same is the common boundary line between properties held under different titles, that you should begin the description of the line as follows:-
"thence along the meander line of the San Deguito River, which line is described as follows: (here describe line,) and which line is, and is intended to be, the boundary line between the lands of the first parties herein and _____, (insert here the name of the owner of the property lying on the other side of the line)."

This I think will prevent any complications or uncertainty as to whether or not we have acquired floodage rights over all the property in the bed of the River.

On page 2 of the Barnett easement, after the words " as per" in the third line, insert the following words, "Decree of the Superior Court of the State of California, in and for the County of San Diego, of record in the office of the recorder of said County, in Book 421 Page 285 of Deeds". This insertion will prevent any uncertainty as to the instrument referred to.

Yours truly,

W. G. Irving

WGI/G

Reports-Muir

C-1

Jan. 23, 1917.

Mr. Post:

Please give me a report immediately as to the cost of the South Coast Land Co's water delivered in their reservoir. McGuire will give you all the data as to the number of men that they have in their employ, the amount of water they are pumping and you can estimate the cost of the system and pumping plant. Please get this out as soon as you can conveniently.

Ed Fletcher.

F-S

WILLIAM S. POST
ASSOC. MEM. A. S. C. E.
FLETCHER BLDG., 924 8TH ST.
SAN DIEGO, CALIFORNIA

January 25, 1917.

Mr. Ed Fletcher,
Mgr V L & W Co.

Dear Sir:-

You have asked me to make a statement regarding the hydraulic situation on the Dinsmore property as affected by the construction of Carroll Dam. The elements to be considered are as follows:

- (a) The character of the underground storage in the gravels.
- (b) The effect of utilization on the Santa Fe Ranch.
- (c) The effect of return waters from irrigation from slopes draining toward the river from the proposed Carroll Canal.
- (d) The yield of watershed below Carroll Dam.
- (e) The waste from Carroll Dam.
- (f) The effect on the water plane on the Santa Fe and Dinsmore Ranches.
- (g) The reduction of flood damage.
- (h) The question of alkali under utilization of lands.

(a) As I look at it, the bottom lands of the Santa Fe Ranch and of the Dinsmore property is an underground gravel basin which is dyked off by the fine sediments which occur between these lands and the ocean. It is clear that there is practically no underground circulation of water through these fine sediments which were originally laid down as mud in still water and form a dam across the entire floor of the valley. Behind this barrier are the sand beds which gradually increase in thickness as they go up the river and as does also the coarseness of the sand grains, until at the site of the Santa Fe pumping plant and above, the depth of the water bearing gravels is over 60 feet. The storage area involved is about 1500 acres. If we choose a practical depth of 20 feet for pumping limit, we have in storage in the underlying gravels about 7500 acre feet of water. There is then provided by Nature directly under the lands to be utilized a storage which is sufficient to provide for the irrigation of 1200 acres

E.F.

This mentions
Pano & Sutherland
Dams - Is there
an objection to
going into that -
Post.

for 4 years even if there were no water received either by rainfall or stream flow on this acreage. This is assuming irrigation depth of 2 feet per year.

Therefore the local storage, in my opinion, is ample for full regulation and about this phase of the matter, I think neither Mr. Dinsmore nor the Santa Fe Ranch proper need have any concern. It remains to consider what will be the inflow into this basin from above and around its rim and to determine whether this will be adequate under all circumstances to sustain the requirements of use from the basin.

(b) As a preliminary, attention should be given for a moment to the effect of pumping, distribution and thorough development of the bottom lands on the Santa Fe Ranch as affecting the Dinsmore property. It will be understood that under ordinary conditions the rate of underflow through the Santa Fe Ranch is very slow, probably not over 2,000 or 3,000 feet per year. Pumping on the Dinsmore property will form a "cone of depression", but only in a remote way would the large storage above be effective because of the fineness of the grains. This I judge will be considerably changed with the actual cropping of the Santa Fe bottoms and their irrigation, because thereby water will be lifted at the upper end of the tract, and as it were, bypassed or accelerated over to the center and lower portion. To this extent it is clear in my mind that the water plane on the Dinsmore property will be maintained even if the Dinsmore lands are developed and irrigated and the "cone of depression", such as would occur without irrigation above, will be greatly lessened. There is nothing very new about this statement of the mechanics of the development. It is a matter of common observation that after irrigation begins, that there is a tendency to excessive accumulation of water at the lower end of the tract, and it is not the danger of water shortage but the danger of alkali which would be uppermost in my mind in consideration of this phase of the problem.

I do not wish you to understand that there will not be an absolute loss of water due to cropping the Santa Fe lands and the Dinsmore lands. Of all water which is pumped or supplied by ditches onto the land and used in irrigation, probably 50% is lost either by plant growth or by evaporation. But I am pointing out the fact that there will be a tendency to advance the waters as they are used from the upper portion of the Ranch to the lower end, and at the lower end I should anticipate no decrease in the water plane.

(c) The plans of the development by the Carroll Canal provide for 600 acres of hillside land and second bottom to be irrigated on the Santa Fe Ranch proper. The assignment of water for this area is 60 Miners Inches or 870 acre feet per year. Of this amount 50% will be return waters, so the estimated return

waters from irrigation on slopes now barren and outside of the gravel area proper is 400 acre feet annually.

(d) The drainage area below Carroll Dam and above the Dinsmore property consists of 35 square miles. It supplies a substantial amount to the Santa Fe and Dinsmore Ranches. It flows directly on the lands and is not subject to any extent to channel losses, as is the case with the main River due to the San Pasqual Valley. It has been measured indirectly for two years and is as found to be as follows. For comparison the flow in acre feet of the Main River at Carroll Reservoir is also given.

<u>Season</u>	<u>Flow at Carroll Reservoir</u>	<u>Local Drainage 35 sq. miles</u>	<u>%</u>
1912-13	2,070	150	7%
1913-14	21,420	5,000	23%

A study has been made of the probable flow or "Runoff" of this 35 square mile area for a period of 22 years (1894-1916) and the average Runoff is found to be 3,200 acre feet, or an amount sufficient in itself to irrigate the Santa Fe and Dinsmore Ranches provided of course that the runoff were uniform.

(e) It will be understood that Carroll Dam as a project has not proposed to fully regulate the flow of the San Dieguito River. The plan is to provide only a sufficient storage for the irrigation of 15,000 acres of land. The necessary storage to secure this involves the wasting of a great deal of water in the wet years. This waste is estimated to be an average of 34,400 acre feet, if Carroll Reservoir is the only reservoir built; or if in addition the projected Pamo and Sutherland Dams are built, this waste is reduced to an average of 18,800 Acre feet.

The total average supply therefore after all structures are completed, will be the sum of this waste plus the yield of the lower 35 square miles or an average supply of 22,000 acre feet. There will continue to be a waste into the Ocean after all structures are built and the Santa Fe and Dinsmore Ranches are cultivated to their limit of an average amount of 20,800 acre feet.

It remains to study the distribution of this average amount and determine the effect of alternating dry and wet years on the water plane of the Ranches. The period from 1895 to 1904 is included in this study because it is the period of greatest drought known in California.

(f) The effect on the water plane of the construction of Carroll Dam. The following table gives the results of this computation. The variations given may be considered as occurring at the middle point of the Santa Fe and Dinsmore Ranches. It also assumes that both ranches were in full cultivation during the period 1894-1916. Allowance is made for a maximum loss by plant transpiration and evaporation of 2,000 acre feet, or about 1.7 feet for 1200 acres. If the direct rainfall of say 12 inches is added to this, the total allowance is about 2½ feet.

The drop in the water plane is computed as below a normal water plane such as exists now in an ordinary year, when there is thorough saturation of the gravels and there has been waste to the ocean. The figures indicate in feet what the deviation is, due to the dry periods, for the conditions stated at the head of the columns.

Table of Estimated Water Plane Deviations

below the normal water plane - for 1200 acres fully developed on Santa Fe and Dinsmore Ranches - and irrigation of 600 acres of the marginal land of the Santa Fe Ranch below the Carroll Canal.

<u>Season</u>	<u>Conditions as heretofore before construction of Dams</u>	<u>After Construction of Carroll Dam alone</u>	<u>After Construction of Sutherland, Pamo and Carroll Dams</u>
1894-95	0.0	0.0	0.0
1895-96	0.0	1.4	1.5
96-97	0.0	0.0	0.4
97-98	0.0	1.4	1.8
98-99	1.9	2.9	3.3
99-00	3.8	4.4	4.5
1900-01	0.0	4.0	4.3
01-02	0.0	5.0	5.4
02-03	0.0	4.2	4.5
03-04	1.9	5.7	6.5
04-05	0.0	1.7	5.1
1905-06	0.0	0.0	0.0
06-07	0.0	0.0	0.0
07-08	0.0	1.0	1.0
08-09	0.0	0.0	0.0
09-10	0.0	0.0	0.0
1910-11	0.0	0.0	0.0
11-12	0.0	0.9	0.9
12-13	0.0	2.3	2.4
13-14	0.0	0.0	0.0
14-15	0.0	0.0	0.0
1915-16	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
Average	.35	1.59	1.85

This table indicates that the effect of the construction of Carroll alone will be to reduce the water plane on the average $1\frac{1}{2}$ feet. The greatest deviation below the normal plane would have occurred in 1903-04 and amounts to 5.7 feet, about 2 feet below where it would have dropped in any case in 1899-1900 without any structures on the river.

When all dams are built, the table shows the average water plane will be $1\frac{1}{2}$ feet below the present, and the greatest deviation would have occurred in 1903-04 and amounts to $6\frac{1}{2}$ feet.

In this connection there should be borne in mind the suggestion in paragraph (b) - the effect of the full irrigation of the Santa Fe Ranch proper - which will be to transfer water more rapidly from the upper portion of the basin to the lower than underflow would carry it. The above calculation is made for a middle point for full development of the ranches, but it must certainly be anticipated that the deviations on the upstream portion of the Santa Fe Ranch will be greater and on the Dinsmore Ranch less than the figures given, on account of the effect discussed in paragraph (b).

(g) Attention is drawn to the regulating effect on floods due to a reservoir such as the Carroll. Elaborate calculations which I have recently made on this effect on the Sweetwater Dam shows the following:

	<u>Maximum Inflow of Sweetwater River into the Reservoir cu.ft. per sec.</u>	<u>Maximum Spill- way Discharge at Dam to Lower River cu. ft. per sec.</u>	<u>Ratio of Reduction</u>
Flood of 1895 (if passing over present Dam)	18,180	9,500	52%
Flood of 1916	41,000	32,100	78%

It is quite certain in my mind that great floods will be reduced by the building of this works to at least one-half of their maximum discharge and in all probability with early opening of sluices that such a flood as 1916 can be reduced to one-fourth of its actual maximum flow, continued of course over a longer period of time.

(h) As far as the true bottom land is concerned - not the second bottom - I should suggest that any development of the lands under the present conditions will eventually develop the problem of alkali and a ground water level which is too near the surface and drainage will have to be resorted to. With the full development of the upper ranch and the side slopes, I still believe that drainage ditches will eventually have to be maintained, but the obvious effect will be to decrease the variations of the water plane which is the true cause of the difficulty. Broadly speaking, the effect of the Carroll Dam will be to decrease the water applied in the winter time to the gravels and increase the amount applied in the summer and this obviously would work to a mean uniform water plane of water table. This will approach the conditions of true subirrigation - a very rare thing - which can be quite definitely maintained by a few drainage ditches, ending in a River protection levee, provided with gates closing inward. I believe a permanent channel can be maintained after the construction of the dam, providing for a maximum flood (as regulated by dam) and permitting permanent agriculture on the bottom.

Very sincerely yours,

WSP:K

{re CARROLL} com

Feb. 1, 1917.

Mr. W. S. Post:

Things are developing fast, and by next Monday I must have the following papers drawn up, OK'd by you and ready for execution:

1. A deed to the San Dieguito Mutual Water Co. covering all the lands to be deeded in the reservoir site, as per our contract, which is:

Same as b-4.

(a) The damsite and an acre of ground for the house of the caretaker; and

(b) All the land up to the 315 contour;

b-4 All the government land that we have acquired;

Henshaw - b-1 { The Tom Carroll and Jim Carroll properties; Henshaw - 40 acres.
C.B. Gould - b-2 The Nulton property;

{ The Eucalyptus Culture Co. property;
The Chapman Estate;
Smith property; and

Fletcher - b-3 x An undivided 3/4 interest in the Xarriessa Hill portion of the Bernardo Rancho.

(c) Floodage rights subject to the conditions in our contracts with the following people: Fenton, Foster, Barnett and an undivided 1/4 interest in the Xarriessa Hill portion of the Bernardo, owned by Merrill.

x - also undivided 3/4 interest in and to the following:

2. A water right agreement to the San Dieguito Mutual Water Co. giving them the right to build Carroll Dam and divert the water, to be signed by Henshaw, affecting the riparian rights from Carroll Dam to the ocean.

You want to give the legal description of all the properties, including Hawkes, Irwin, etc. and include them in this one agreement.

You will also include the property covered by the Santa Ana Sugar Co. contract, the Stevens contract, the South Coast Land Co. contract, and the Frenchman.

Ed Fletcher.

F-S

Farm.

Merrill to be included -

Feb 6th

Beed - ^{all} for land in Res Henshaw.

Assignment & floodage Rights
including Merrill - all Henshaw.

Printed form for Henshaw
Assignment from Fletcher for all Riparian
Assignment from Fletcher for Water Rights
consents.

Assignment Right of Way from
Fletcher.

WILLIAM S. POST
ASSOC. MEM. A. S. C. E.
FLETCHER BLDG., 924 8TH ST.
SAN DIEGO, CALIFORNIA

February 10, 1917.

Mr. Ed Fletcher,
San Diego, Cal.

Dear Sir:-

Attached is draft of the report upon the net safe yield of the Volcan Water System, as prepared by Board of Engineers under instructions in your letter of December 5, 1916. This is a revision of a preliminary draft submitted at the last Board meeting on the 3rd inst., and in our judgment will be accepted in its present form by the Board at its final meeting in the near future. Whatever changes are adopted will be limited to the text of the report and confined to modification of phraseology to suit opinions of individual members. The figures are final.

Very truly yours,

William S. Post.
Francis S. Sellen.

WES:K

2-7

February 20, 1917.

February 12, 1917.

Mr. W. S. Post,
 Office.

Dear Sir:

Enclosed find Mr. Faulkner's letter of February ninth, regarding the Loui Weller property. Please follow his instructions, and bring this to my personal attention so I can familiarize myself with it. Also please give me the legal description of the land for the conduit line thru Mr. Weller's property.

Yours very truly,

Ed Fletcher

EF:B

Mr. Ed Fletcher,
 Mgr V L & W Co.

Dear Sir:-

Cost of Water to Del Mar Water, Light & Power Co.

Referring to your letter of January 23rd, the last published report of Railroad Commission on Del Mar Water, Light & Power Co. is the Annual Company Statements, and dated December 31, 1914, as follows:

Operating Expenses (1914)

Operating Labor & Exp. -----	\$4,808	
Repairs to Operating Capital -----	720	
Distribution Pipes, Labor & Expense----	6	
" " Repairs -----	5	
Collection -----	43	
General Expense -----	766	
Taxes -----	277	\$ 6,626

Other Deductions

Interest Accrued on funded debt -----	\$3,700	
Other Interest deductions -----	5,700	
Rent -----	600	10,000
Total -----		\$16,626

Of the operating expense proper, the principal items are probably about as follows per month:

Electric current -----	\$010	
1 pump man and helper -----	120	
	<u>\$230</u> x 12 =	\$ 2,760
Remainder Repairs & Distribution Expense, say		<u>4,040</u>
Total estimated per year (1916) -----		\$ 6,800

Water Pumped

In Railroad Commission Report, the maximum monthly amount pumped to Del Mar, was for July 1912, 3,550,000 Gals.

In 1916, Sept. to Dec. incl., the average monthly amount was ----- 1,400,000 "

Mr. Ed Fletcher,
Page 2.

This latter figure represents probably the average for the year, or a total of 17,000,000 Gallons.

On this basis the annual costs are as follows:

	<u>Per 1,000 Gals.</u>
Pumping charges and attendance delivered to Reservoir (Excluding fixed charges)	\$ 0.16
Delivered to consumer (Excluding fixed charges) -----	0.40
Same - delivered to consumer including fixed charges -----	1.00

If, as is possible, there is a greater annual use than above indicated, the above figures would be reduced. Further the figures represent and include "free pumping", as I understand it, to the Santa Fe Ranch Reservoir, of a quantity of water about a third of that used at Del Mar, but not to as high an elevation.

Very sincerely yours,

WSP:K

RR. Com. Reports

Jan 1-1911 - Jan 30-1912

Dec 31

Balance sheet. Apr 18-1912

<u>Assets</u>	
Property Assets	\$ 119,019.82
Treasury stock, bonds + investments -	126,000.
	\$ 245,019.82

Liabilities

Capital Stock	100,000
Bonds	100,000
Notes + accts payable.	45,019.82
	\$ 245,019.82

Dec 31-1914

<u>Assets</u>	
Fixed Capital installed prior to Jan 1-1913	165,952.90
" " " since Dec 31-1912	4,333.52
Total Fixed Capital	170,286.42
Corporate Deficit	114,632.74
	284,919.16

Liabilities

Capital Stock	100,000.
Funded deficit -	74,000
Accounts Payable.	106,555.64
Reserves -	4,333.52
	284,919.16

R.R. Com. Reports

Jan 30-1912-1913

Report for year ending Dec 31-1912
Del Mar L & P Co.

Deficit Jan 1-1912 -	22,174.25
Operating Revenue.	1,552.02
" Expenses.	14,834.52
Net operating deficit	13,282.50

Report for year ending Dec 31-1914

Operating Revenue.	4,476.11
" Expenses.	6,625.91 (a)
Net " Loss -	2,149.80
Gross corporate "	2,149.80

Deductions

Interest on accrued unfunded debt	3700.
Other " Interest deductions	5700.
Rent deductions	600.
Total deduction	<u>10,000</u>

Net corporate loss from year	12,149.80
deductions from income	7,581.30 (elect. 1)
Deficit on Dec 31-1913	94,901.64
" " " 1914	114,632.74

(a) Divided into

operat. Labor + exps.	4,808.01
Repairs to Oper. Capital	719.55
Dist Labor + Exps.	6.25
Repairs " "	5.42
Colls + promotion	42.99
General exps.	766.25
Taxes	277.44
	<hr/>
	6,625.91

Excess

1

RR. ^{Law} Decision No 507-
J P Glass vs. Del Mar L P Co -
Vol 2 - Pgs - 335 -

No of Lots in subdivisions 2,100 -

Metered Consumption 1912

No of Taps 41

Total July use - 197,000 Gallons
use per Tap - ~~5,756 Gallons~~
70

Taps for 1 M. I. =

Calculated Max-Requirement

$$\frac{2100}{70} = 30 \text{ M. I.}$$

Rate decided to be 25 cts per 100 Gallons

#266

February 26, 1917.

Mr. Post:

Enclosed find letter from Huber. Mr.

J. W. Taylor wants \$3000 an acre for his land; says he has been offered \$500.

Have you got the Government forty acres straightened up with Wickham? Please give me a report as to the status of this situation, and is it not foolish at the present time to file the application with the State Water Commission, owing to the attitude taken by Taylor? Give me your written opinion in this matter.

I suppose we could get possession of the forty acres and the damsite, and then file a suit to condemn the land to be flooded which Taylor owns, and in this way tie the situation up. What is your opinion?

Ed Fletcher.

FpS

February 28, 1917.

Mr. Ed Fletcher,
Mgr Volcan Land & Water Co.

Dear Sir:-

Memorandum Regarding the Oceanside Map.

This map represents ^{an area} ~~a~~ 5 miles on the side with Oceanside at the northwest corner. The total arable land which is also irrigable, is represented colored green and yellow. The green area shows the arable land which can be served from elevation 160 on the Rancho Hedionda. This is approximately the elevation of the extreme end of the Oceanside Mutual Water Company's conduit at Carlsbad.

The elevation of the City Reservoir in Oceanside from which distribution is made within the town proper is 127 feet above sea. The elevation of the reservoir at which the pumping plant is connected is 217. The water is let down to the lower reservoir which is provided with a float valve presumably a few houses outside on this connecting pipe, but the bulk of the Oceanside service appears to be from elevation 127.

The arable lands which can be served from our conduit, elevation 160, indicated in green on the map are as follows:

Carlsbad Mesa -----	1,030 acres
South Oceanside -----	490 "
Loma Alta Valley, in which the	
Escondido branch runs -----	330 "
City of Oceanside -----	410 "
Total -----	2260 "

The areas colored yellow consist of all the areas which require pumping as far as our water is concerned. They include areas which can be served by the Oceanside Mutual Water Company, the highest point of which is their reservoir back of Oceanside, elevation 218. It includes, in addition, all lands which are sufficiently level for irrigation within the areas of the map. These lands are in scattered bodies and the cost of conveying the water to detached tracts would probably be prohibitory, the only large body to which this would not apply being the Vista lands.

The total area of lands colored yellow is 3,000 acres.

Yours very truly,

WSP:K

OCEANSIDE ARABLE LANDS

(in acres)

	Gravity (Green)	Pumped (Yellow)	Total
Carlsbad	1030	680	1710
South Oceanside	490	290	780
Loma Alta Valley	330		330
Oceanside City	410	330	740
Vista		900	900
Detached Areas		730	730
Totals	2260	2930	5190

Oceanside

Constant 28.36 = 640

Arable Areas

	Yellow	Plummers	Sections	Acres
-166 {	Oceanside			
	with City Limits	13.60	23+24	335
	N of City Limits	.83		19
	Ground S.C. L.G. Res.	2.17	24	49
	Detached area	1.71	29	39
	" "	0.88	19	20
	" "	2.49	17 ✓	56
	" "	3.16	17	71
	" "	2.40	16	53
	" "	15.22	19, 20, 21, 16	344
	" "	3.66	21-22	82
	Vista	39.84		900
	Carlsbad	29.96		677
	S Oceanside ①	1.54		35
	②	7.30		165
	3	2.42	286	55
	4	1.40		31
				<u>2931</u>
	Oceanside Limits			
	Carlsbad -		677 ✓	
	S. Oceanside		286 ✓	
	Oceanside City L.		335	
	Vista		900	
	Detached Areas			

Discharge 3 1/2 Pipe under 16' head

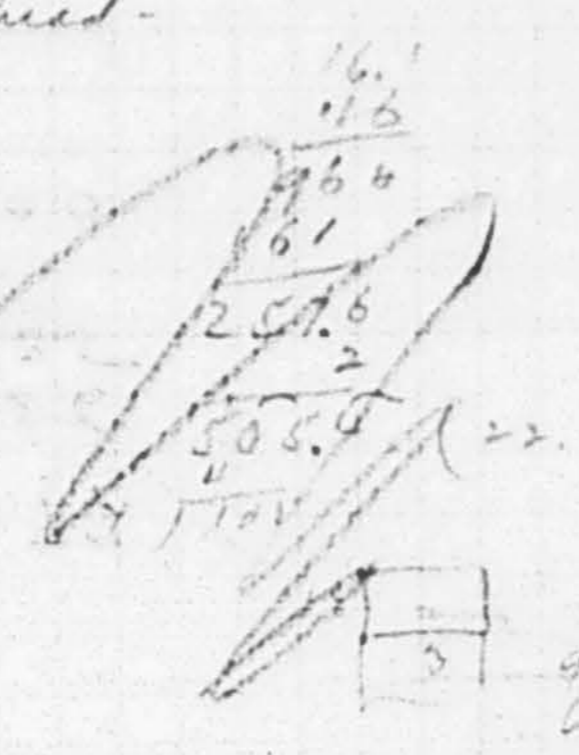
$$v = \sqrt{2gh}$$

$$h = 16'$$

$$v = \sqrt{2 \times 32.2 \times 16}$$

$$v = 32.2$$

$$Q = 22 \times 5 = 110 \text{ cfs}$$



3

645,000
200,000

1290,000,000,000

43.560
7.5

217800
304920

326,700,0

329,000
200,000

65,400,000,000

~~2,790,000,000~~ (Add)
~~4,600,000,000~~

WILLIAM S. POST
ASSOC. MEM. A. S. C. E.
FLETCHER BLDG., 924 8TH ST.
SAN DIEGO, CALIFORNIA

March 2, 1917.

Mr. Ed Fletcher,
Mgr V L & W Co.

Dear Sir:-

Returning Mr. Huber's letter of February 23rd and replying to your request for a report on the Escondido Creek matter, I have the following to say:

I have instructed Mr. Wickham to purchase 40 acres of scrip, the price being now \$15 per acre or \$600. As soon as this has been placed, or even before, the water filing might be made. My advice is that it be made immediately after the scrip has been attached to the land.

As to the J. W. Taylor property, there are two lines which I can suggest, one is to determine whether there is any flaw in the title of Taylor claiming mining rights on an original homestead. I am writing a letter to Wickham to learn whether any scare can be thrown into Taylor along these lines. There is probably nothing to be done in that regard after a patent has been issued.

My other suggestion is that you ask Taylor for a surface easement or floodage right, and having him retain the mining rights to the property. This suggests even a long lease which might serve the same purpose. I suppose the difficulty is in disclosing the fact that you want it for reservoir purposes. Back of all this is the possibility of condemnation, but this depends, as I understand it, on any action by the Legislature. I am inclined to think that the floodage right would be much the simplest as the water in the reservoir

would certainly not have any practical effect on deep mining.
WSP:K
Yours very truly,

WSP

ERNEST SEILER, C. E.
STRUCTURAL ENGINEER

~~MEMBER AMERICAN SOCIETY OF CIVIL ENGINEERS~~

5005 2nd Ave.

Home 799364

LOS ANGELES, CAL. *March 11/17*

Mr. William S. Post
924 8th St.
San Diego, Cal.

Dear Sir:

Supposing that a letter from you
for me got lost, I beg to state, that
since my presence in San Diego
on the 21. & 22. of last month, I didn't
get any news from you, nor
didn't you send me the drawings,
relating to the multiple arch dam,
as you said you would.

Yours very truly
Ernest Seiler

March 13, 1917.

Mr. Post:

Write these people and get a price on wood pipe.

It is very interesting.

Ed Fletcher.

F-S



National Tank & Pipe Company

Manufacturers

Water, Oil, Mining and Cyanide Tanks
Cross Arms and Silos

Water Pipe

OFFICE 275 OAK ST.
FACTORY - KENTON STATION
PORTLAND, ORE.

Portland, Ore., March 10, 1917.

Mr. Ed Fletcher,
San Diego,
Cal.

Dear Sir:-

Have you considered Wood Pipe in connection with your proposed water system?

DO YOU KNOW THAT WOOD PIPE-

- costs very much less than Cast Iron or Steel Pipe?
- delivers water pure, sweet and cool?
- does not tuberculate nor decrease in diameter?
- can be easily tapped for service connections?
- lasts until it is necessary to increase diameters to meet increased population?
- is used in vast quantities by the U. S. Government?
- is used in hundreds of towns and cities with the utmost satisfaction?

Fill out the enclosed form and mail to us for information and quotations.

Consult our engineering department regarding your hydraulic problems and plans.

Yours very truly,
NATIONAL TANK & PIPE COMPANY.
By, *E. Y. Rice*

Our slogan is
"NATIONAL QUALITY"

NATIONAL TANK & PIPE COMPANY

MACHINE BANDED) For (Municipal Water Systems _____
FIR STAVE PIPE) (Irrigation Systems _____
(Power Plants _____)

Sizes - 2 inches to 32 inches inside diameter.

1. Indicate above by X the kind of system you propose to install.
2. Write the size of pipe and the length required under each head as shown below.

HEAD	Size _____	Size _____	Size _____
	Length	Length	Length
50 Ft.	Ft.	Ft.	Ft.
100 Ft.	Ft.	Ft.	Ft.
150 Ft.	Ft.	Ft.	Ft.
200 Ft.	Ft.	Ft.	Ft.
250 Ft.	Ft.	Ft.	Ft.
300 Ft.	Ft.	Ft.	Ft.
350 Ft.	Ft.	Ft.	Ft.
400 Ft.	Ft.	Ft.	Ft.

3. The quantity of water to be delivered through each size _____
4. Will the project be a gravity or pumping system or a combination of both _____
5. If a pumping system name type of pump that you propose to use _____
6. If possible send plans and profiles, or sketch, showing pipe location, elevation at intake, discharge points, etc.
7. Give a list of water supply fittings that you require.
8. Name railway station at which freight is to be delivered _____
9. When do you plan the commencement and completion of the installation _____
10. Do you wish now merely Preliminary Prices to aid you in making approximate estimates or do you intend to place Your Order immediately _____

Name _____

Address _____

→ **PORTLAND CEMENT ASSOCIATION**

DISTRICT OFFICES
ATLANTA
DALLAS
INDIANAPOLIS
KANSAS CITY

116 NEW MONTGOMERY STREET

TELEPHONE SUTTER 2691

SAN FRANCISCO

DISTRICT OFFICES
NEW YORK
PARKERSBURG, W. VA.
PITTSBURGH
SAN FRANCISCO

March 28, 1917

Our file

Replying to yours of

GENERAL OFFICES
CHICAGO

Mr. W. S. Post, Chief Engineer
Volcan Land & Water Company
924 Eighth Street
San Diego, Calif.

Dear Mr. Post:

You will find enclosed herewith a mechanical analysis of the sand samples taken by myself near the proposed dam on the San Dieguito River. You will note that the sand from the approximate location of the damsite is the poorest of those taken and inasmuch as it does not occur in sufficient quantities and would be rather difficult to obtain during certain working periods of the year, I believe that the best proposition is to haul the sand from the vicinity of Holes Nos. 3 and 4, combining the sands from these two locations so as to get minimum voids in the resulting fine aggregate.

You mentioned that you were going to write me within the near future concerning this matter so I will wait for letter from you before taking this matter up further.

Yours truly,

H. C. Hilt

District Engineer

HEH-D

Enclosure

Location from which Samples were taken

Sample No. 1 200 yards west of lower dam site
" No. 2 Hole No. 4 annex 200 yards west of Bates House
" No. 3 In Hole No. 3 in big bend east of Bates House

Mechanical Analysis of Sands

% passing Sieve No.

	8	14	28	35	48	100	200
No. 1	99.4	96.4	91.2	70.6	47.0	14.2	6.4
No. 2	84.4	54.4	27.6	18.0	11.8	5.2	3.6
No. 3	80.2	53.2	26.2	16.6	11.0	4.4	2.6

Briquette Tests

No. 1	7 days 1:3	291#	28 days -	387#
No. 2	7 days	355#	28 days -	405#
No. 3	7 days	393#	28 days -	475#

March 30, 1917.

Mr. H. E. Hilts,
District Engineer,
Portland Cement Association,
116 New Montgomery St.,
San Francisco, Cal.

Dear Sir:-

The question which I wanted to put up to you is this: What is the proper assumption for compressive stress for the aggregate and sand at Carroll Dam? The aggregate may be listed as trap rock and the sand such as you have had in the tests. Now we have two mixes of concrete, 1:2:4 and 1:2½:5. Of this last we have two specifications, one in which the aggregate will pass a 2½ inch ring and the other that there shall be added rock plums to the extent of 20%. The maximum compressive stress for these three classes is probably different. For instance, in building ordinances the various permissible stresses seem to be based on an ultimate compressive stress of 2,000 pounds per square inch. With this as a basis, permissible compressive stress is taken as one-third or 650 pounds true shear at 6% or 120 pounds and shear in conjunction with reinforcement shear about 40 pounds.

What I should like to have is this; an opinion as to the ultimate compressive stress of the materials which we are planning to use

- (a) For 1:2:4 concrete with 2½ inches crest trap rock.
- (b) 1:2½:5 with 2½ inches crest rock.
- (c) 1:2½:5 with 2½ inches rock and 20% rock plums.

The other question is a somewhat disputed point and relates to the allowable shear considered as sliding concrete on concrete. This is stated quite definitely as being one-half of the compressive stress and is so used in the designs. As some of the designers are using a limit of 350 pounds per square inch for compression, this makes their allowance for shear 175 pounds. However when you examine building ordinances, you find that although they use practically double the compressive strength, they still limit the shear to 120 pounds or one-fifth of the compressive strength. I am inclined to feel that there is some authority for limiting our designs to 120 pounds in true shear.

I should be very glad to have your opinion. It is probable that this matter will come up rather insistently in the next few days, and I should be very glad to have as early a reply as possible.

I have yours of March 28th and will adopt the suggestion regarding the use of sand from the vicinity of Holes No. 3 and No. 4 in giving our information to the contractors.

WSP:K

Very truly yours,

2.F.
CITY OF LOS ANGELES
DEPARTMENT OF



PUBLIC SERVICE

TELEPHONES: BDWY 7360, HOME 60961

645 SOUTH OLIVE STREET.

COMMISSIONERS
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Wm. MULHOLLAND, CHIEF ENGINEER.

BUREAU OF POWER & LIGHT
E. F. SCATTERGOOD, CHIEF ELECTRICAL ENGINEER.
L. M. ANDERSON, AUDITOR.

Los Angeles, California,

April 5, 1917.

→ Mr. William S. Post,
Fletcher Building,
San Diego, California.

Dear Mr. Post:-

I am in receipt of a letter concerning contractor or superintendent for the proposed Long Tunnel on the Warner Project, and while I do not have in mind any contractors, my work not throwing me into contact with these firms, I do have in mind a man, whom I believe would prove an admirable superintendent. In fact, I think he is about the best man in the business, or at least, I found him so. He is John Gray. Perhaps you already know him.

He came to our Aqueduct work at its start, was in charge of the North Heading of our 27,670 ft. Elizabeth Lake Tunnel and worked through with us until our Aqueduct Tunnel Work was completed in 1913.

He is a thoroughly practicable man in every way, shape and form. He never has any trouble with his men, and is thoroughly reliable. He was in a few days ago, and at that time was not engaged on any work. He comes in from time to time, and if you are interested and desire it, the next time he is in the office, I will tell him of your proposed work, and suggest that he get in touch with you.

With kindest personal regards, I am,

Sincerely yours,

Wm. Mulholland

Chief Engineer.

BAH/CS

→ PACIFIC COAST STEEL CO.

MANUFACTURERS OF OPEN HEARTH STEEL

PHONES: HOME A-1496 MAIN 8703
1031 UNION OIL BUILDING
LOS ANGELES. CAL..

April 7, 1917

Mr. W. S. Post,
924 - 8th Street,
San Diego, Cal.

Dear Sir:-

We are enclosing some of our pamphlets and literature with reference to the quality of steel bars made by ourselves and other mills on the Pacific Coast.

Because of the excessive demand made at present on all mills in the United States, it will be extremely difficult for you to obtain a steel made by a specification which is not standardized. The requirements according to Santa Fe Railroad's specifications, are severe. This requires a high carbon steel, a high breaking strength and a large elastic limit. We have made steel in accordance with these requirements for the Santa Fe Railroad in several cases. You will readily realize, however, when small quantities are to be delivered, ranging in sizes from 1-1/4" to 3/8", the amount of work done on the large size is not as much as on the small sizes when the parts are being put through the rolls. The resulting physical characteristics vary widely in the test of the 3/8" bars and 1-1/4" bars because of this extra working. The limits given by the Santa Fe specifications are not wide enough to allow this range of size to be made satisfactorily from any single melt from the open hearth furnace, and for this reason mills are refusing to change their standard operations for small tonnages.

Trusting this may be of use to you, we are,

Yours very truly,

PACIFIC COAST STEEL CO.

Per *C. A. G. Heyworth.*

CAGW-MJ

FRANCIS L. SELLEW
MEMBER AMERICAN SOCIETY
CIVIL ENGINEERS

April 18, 1917

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

Dear Sir:-

The writer's attention has been called to a communication of the 10th inst. sent to the Assistant Chief Engineer of the Santa Fe by George L. Davenport, criticising some of the features of my design for a rock fill dam at Carroll. These criticisms will be taken up in detail.

The structure is credited with a factor against sliding on its base of approximately 2½. Particular attention was paid to this factor of the design because in the writer's judgment the failure of most of the rock fills recorded has been due to insufficient cross section and it was decided to give this dam a factor of at least four. The maximum cross section as shown on the drawings has a total area of 17,000 square feet. Allowing this rock fill to weigh 100 pounds per cubic feet, the weight of this mass is 1,700,000 pounds. The vertical component of the water pressure, acting upon the upstream face, is 225,000 pounds, which added to the structures weight gives a total of 1,925,000 pounds equal to 962 tons. The horizontal thrust which this weight must oppose is with a full dam of 234 tons. Therefore the ratio between the thrust of the water and its opposing force is 4.1.

Of rock fill dams that have failed, the Walnut Grove in Arizona had a stability factor of 2.6. The Pecos River in New Mexico 3.35, and the Lower Otay 1.85. Some of the successful rock fill dams were Morena with a factor of over 4; The East Canyon Creek in Utah with 4; the Escondido about 3½; one dam on the Stanislaw River and another on Bishop Creek which were 4 or over. It appears that under ordinary conditions a rock fill dam which has a factor of safety about 3½ is perfectly safe. I therefore feel justified in stating that in the case under discussion, the factor against sliding is ample.

The second criticism is that the masonry face on the upstream side is too steep and not of sufficient thickness to hold back the loose rock fill as a retaining wall when the reservoir is only partially filled. This criticism was made on the preliminary drawings. The drawings upon which bids are asked shows a considerable portion of the upstream face laid as dry rubble to furnish a support for the rubble masonry. It is my impression that these details will cover the criticism of this feature.

A third objection is that the overtopping of the crest of a rock fill dam by flood waters will cause failure. This is not unqualifiedly true. It is a fact well established from experience with such structures that when properly built, they can carry from

Mr. W. S. Post,
Page 2.

one to two feet of water over their tops without serious menace.

In the recent flood in San Diego County, the Escondido Dam and the Morena Dam were both overtopped and yet did not fail. Nevertheless, ample provision has been made for spillway capacity to prevent the overtopping of the proposed rock fill at Carroll. The spillway lip is placed at normal high water level - 315 contour - and the top of the dam is 10 feet above this plane. In addition a syphon spillway capable of discharging 15,000 second feet with a full reservoir is provided. The combination of the syphon spillways and the spillways around the ends of the dam provide for passing the maximum known floods without any danger of overtopping. The syphon spillway is so arranged that it can be placed in operation before the waters reach the lip and its capacity is such that without inflow, the top 25 feet of the reservoir could be drawn down in less than 24 hours.

Should from any cause the spillways be not operated until the water reached elevation 315, it would take a continuous flow of 70,000 second feet, 12 hours, to reach equilibrium where the runoff was equal to the inflow which would occur at a point one foot below the top of the dam. Such a flood as that of January 1916, if occurring on a full reservoir, would have reached within 18 inches of the top of the dam. The floods and the method of caring for them under the rockfill design have been carefully analyzed and the writer is prepared to go into the matter in greater detail if desired.

Further objection is made to the velocity through the syphon spillways stated as 58 feet per second and it is anticipated that this velocity without outlet near the top of the reservoir where stones and sand would collect, ~~and~~ to the floating debris would have great erosive effect on the lining of the conduit and the spillway tower.

Experience has shown that clean water will have no effect upon concrete at velocities above 60 feet per second. On the Strawberry Valley project in Utah a velocity of 40 feet per second over a spillway on an inclination of 42% carrying debris of all kinds has not materially affected the masonry in two years. In the Turlock Dam submerged at times, the sand laden water under velocity of 70 feet per second, there has been little effect in 18 years of use. At the Pathfinder Dam in Wyoming the marks of the forms still showed on the concrete lining of a conduit which has been in use for 6 months under velocities of 70 to 90 feet per second. The writer apprehends no difficulty from erosive action on the syphon spillways and in addition to their immunity from damage by the velocities is a fact that while the lip is at the normal water level, the entrance to the syphon is a point 25 feet lower as shown on the contract drawings. Therefore during

Mr. W. S. Post,
Page 3.

a flood when the floating debris is at the surface, it must take a dive of 25 feet in order to enter the syphon spillways. There is every reason to believe that during flood stages when drift is running, it will pass over the open spillways at either end of the dam and the syphon will be left to discharge practically clear water.

The last criticism of Mr. Davenport is assuming that the syphon might not act at the critical time, the dam would be overtopped and the factor of safety reduced to one. What method was used in determining the mathematical value of this factor of safety under the assumed conditions are unknown to the writer. However it is inconceivable that the syphons could fail to work. As shown above they are protected from drift and as the plans indicate the restricted section is about 4 feet by 9 with a velocity of 60 feet per second. So it is not believed that any floating object which could enter the structure could remain in place long enough to seriously effect its efficiency. There are many syphons spillways in operation in the United States and over 100 ~~in~~ in Italy. They have all, so far as the writer is advised, given eminent satisfaction. Rock fill dams have been successful in various parts of the west, in Italy, in Northern Africa and to the writer's mind, there should be no hesitancy about the safety of the rock fill design. It seems to me that the project must stand or fall upon the question of price alone.

An opportunity to meet Mr. Davenport personally and discuss these matters or any other features which occur to him would be welcome.

Very truly yours,

FLS:K

Francis S. Sellev.
Consulting Engineer.

April 18, 1917

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

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The structure is credited with a factor against sliding on its base of approximately $2\frac{1}{2}$. Particular attention was paid to this factor of the design because in the writer's judgment the failure of most of the rock fills recorded has been due to insufficient cross section and it was decided to give this dam a factor of at least four. The maximum cross section as shown on the drawings has a total area of 17,000 square feet. Allowing this rock fill to weigh 100 pounds per cubic foot, the weight of this mass is 1,700,000 pounds. The vertical component of the water pressure, acting upon the upstream face, is 225,000 pounds, which added to the structure's weight gives a total of 1,925,000 pounds equal to 962 tons. The horizontal thrust which this weight must oppose is with a full dam of 234 tons. Therefore the ratio between the thrust of the water and its opposing force is 4.1.

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Mr. W. S. Post,
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Should from any cause the spillways be not operated until the water reached elevation 515, it would take a continuous flow of 70,000 second feet, 12 hours, to reach equilibrium where the runoff was equal to the inflow which would occur at a point one foot below the top of the dam. Such a flood as that of January 1916, if occurring on a full reservoir, would have reached within 18 inches of the top of the dam. The floods and the method of caring for them under the rockfill design have been carefully analyzed and the writer is prepared to go into the matter in greater detail if desired.

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Experience has shown that clean water will have no effect upon concrete at velocities above 50 feet per second. On the Strawberry Valley project in Utah a velocity of 40 feet per second over a spillway on an inclination of 42% carrying debris of all kinds has not materially affected the masonry in two years. In the Turlock Dam submerged at times, the sand laden water under velocity of 70 feet per second, there has been little effect in 18 years of use. At the Pathfinder Dam in Wyoming the marks of the forms still show on the concrete lining of a conduit which has been in use for 6 months under velocities of 70 to 90 feet per second. The writer apprehends no difficulty from erosive action on the syphon spillways and in addition to their immunity from damage by the velocities is a fact that while the lip is at the normal water level, the entrance to the syphon is a point 25 feet lower as shown on the contract drawings. Therefore during

Mr. W. S. Post,
Page 3.

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An opportunity to meet Mr. Davenport personally and discuss these matters or any other features which occur to him would be welcome.

Very truly yours,

Francis L. Selner

Consulting Engineer.

FLS:K

April 28, 1917

Mr. W S Post,
Office.

Dear Sir:-

Yesterday (the 27th inst.) I visited the lands covered by the Bixler entry up Escondido Creek and found intact both the filing notices, viz., those of Bixler and Taylor - Jannsen.

It is a fact that the posted notice and the recorded notice are not identical, see copies of each attached herewith.

I hand you also pictures of the notices of both the above properly marked in ink on back.

Yours very truly,

Thos. P. Ellis

TPE:K

WILLIAM S. POST
ASSOC. MEM. A. S. C. E.
FLETCHER BLDG., 924 8TH ST.
SAN DIEGO, CALIFORNIA

May 11, 1917.

Mr. Ed. Fletcher,
Cuyamaca Water Co.

Dear Sir:

Replying to your letter asking for the safe yield of Cuyamaca system with El Capitan dam built to 140 ft. height, with sufficient water turned out to supply riparian owners, together with La Mesa Dam 100 feet high.

In the first place we have always avoided making a positive statement about riparian owners which can afterwards be used as testimony against us, and this has been heretofore lumped with other items.

There is no time to make a new study but very fair conclusions can be reached from existing studies. See Exhibit #48--R R Com. April 1915--made before the big flood shows:

1. That a flume with capacity of 31 sec. feet or 1550 M. I. (the present flume) can physically divert in 20 year period an average of 7073 acre feet out of a total of 8584 acre feet, average runoff 1894 to 1915.

2. Of this 7073 Acre feet Cuyamaca Lake and present 65' La Mesa Lake, together with pumping, give a safe yield of 3471 Acre feet or 320 Miners Inches (9 months).

Now for the figure now desired we are adding storage in La Mesa Reservoir between 65' to 100' amounting to 4574 Acre feet. The storage of El Capitan Reservoir for 140' is 51,200 Acre ft.

The effect of La Mesa Dam is to provide storage practically for all the excess water which the flume can divert, as given by Lee, an average of 3607 Acre feet.

Lee has no separate study for El Capitan in this Exhibit but we have in Exhibit VII of U. S. Indian Service (Land office case, City of San Diego successor to Hamilton, applicant) showing a safe yield-----4015 Acre feet.

Or to summarize--

Lee's original safe yield.....	3471	Acre	ft.
Add for La Mesa Dam.....	3607	"	"
Add for El Capitan.....	4015	"	"
Total	11,088		

This is 1000 M. I.--nine months service.

U. S. Indian Service Determination.

In the above mentioned case before the Land Office, there is shown in Exhibit U. S. VI,
Average Runoff of San Diego River at El Capitan Dam.....14,027 Acre feet.
Deduction is made for Cuyamaca Water Co.'s average diversion of 5,600 " "
Average available for El Capitan Dam..... 8,327 " "

Some of this was required to support riparian below but detail amount is not stated in Exhibit. The conclusion is given in Exhibit U. S. VII showing the net available safe yield after deducting riparian owners to be
For present riparian area.....4015 Acre feet.
For fully developed riparian area 2692 " "

Therefore the independent determination of U. S. Indian service would indicate
Average available for Cuyamaca Water Co..5600 A.Ft.
Average additional from El Capitan Reser-4015
voir 9615 A ft.

This is a fair check on the preceeding figures derived from Lee.

From the preceeding it would appear in answer to your question that under the conditions named (present system together enlarged La Mesa dam 100' high and El Capitan 140' high) the domestic safe yield of the Cuyamaca System would be

10,000 Acre ft.
920 (9 months) Miners Inches
9 million gals daily.

Very sincerely yours,

William S. Post

C. D. Butchart Co.
Headgates, Sluice Gates
Hoists and Lifts
Denver, Colo.

May 25, 1917

Mr. W. S. Post,
Chief Engineer, San Dieguito Mutual Water Co.,
San Diego, Cal.

Dear Sir:

Messrs. Bent Bros., of Los Angeles, advise us that while they have the contract for building the Carroll Dam that your Company is to furnish the gates required. The catalogue sent you April 24th will give you a general idea of some of the types of gates and hoists we make, and we believe we could save you money on your requirements in our line as well as furnish reliable equipment.

Yours very truly,

C. D. Butchart Co.

C. D. Butchart
Pres.

N-3

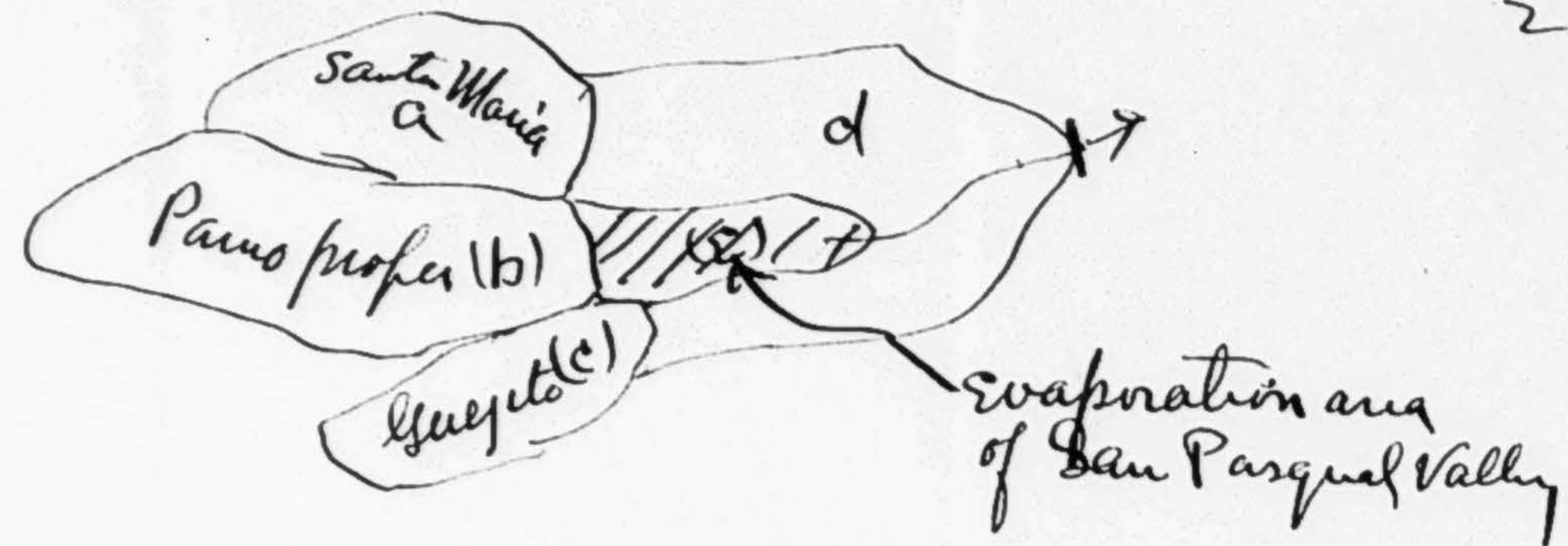
[Re: HALL vs. TRUSSEL, et al (EP)]
(S. Pop) 212

316th Engro,
Lewis Branch,
Tacoma Wash.
Dec. 22-1917.

My dear King:

In the "Shannon" files marked Reports I think you will find what you want. There are cardboard indexes. I am not sure whether the San Dieguito calculations were transferred from the regular series to San Dieguito Mutual W Co. file or not.

I telegraphed Col. Fletcher that I think I used the wastes by Lippincott, but on reflection I am not so sure. I remember making a special study of Pamo - where I listed the drainage areas composing Pamo + Carroll - the study begins with a diagram looking like this.



I summed the probable runoff of each area + subtracted losses in San Pasqual valley etc. Now this was held up when Kellogg was reporting as unsatisfactory & possibly at that time I may have stowed my study somewhere else.

Yours
W. S. Post.

San Diego, Calif.
February 28, 1918

Major Wm. S. Post,
316th Engineers,
Lewis Branch,
Tacoma, Wash.

My dear Will:

Glad to get your very interesting letter of the 24th.

In the first place, my hands have been full: the District Board has 78,000 questionnaires before us, either formally or on appeal. I have 360 lying on my desk at the present time on appeal.

I will read the "Worlds Work" as you suggest.

Yes, we got everything straightened out satisfactorily for the San Dieguito Mutual Water Co. A U.S. Government man and Huber both came down and agreed on 8/10th of an acre foot as the necessary amount of water, per acre in addition to the normal rain fall. The net safe yield of the whole system is a little more than yours, but they did not take into consideration the pumping proposition; that is an auxiliary. It is certainly a credit to you for they backed you up in every way. We let a contract last week for the San Dieguito Dam for \$33,000. including Eastwood's fee. The pipeline will be built practically along the line of your survey by the 1st of June, to Lockwood Mesa. I have two big 75 h.p. caterpillars clearing the brush on the San Dieguito and Lockwood Mesas today. We are forming a district now from La Costa to Del Mar to take over and buy the San Dieguito project. The State engineer has put a valuation of \$67,000. more than we asked for, and we will take bonds in payment. The Vista Oceanside Water Committee are making good and a district of 50,000 acres is being formed between Escondido and Oceanside, down to La Costa. The State Engineer has put a valuation on Henshaw's Warners proposition and after all, it will probably come down the River instead of the tunnel through the hill. Henshaw has agreed to build the whole system and take bonds in payment, and I expect to get the Santa Fe Railroad Company to put in at least \$1,000,000. or \$1,500,000. toward the project. The Santa Fe people are treating me white.

on our
system

Have been fighting our friend Cosgrove in Washington on the El Capitan Bill for a month, but had to come home. Mrs. Fletcher gave me No. 10, a dandy girl. Both are well. I arrived home the day before the baby arrived. We now have four cases of measles at the house including No. 10.

I brought home an appropriation of \$373,000. which I got the Federal Government to sign while in Washington, for the San Diego-El Centro Highway.

Murray Dam is done and is a beaut. The contractors lost \$33,000. Will send you a picture of it shortly. I expect we will let contracts in two or three weeks to build a dam at the diverting dam, holding about ten billion gallons of water. I know you will smile when I tell you that La Mesa and Lemon Grove unanimously stayed with the Cuyamaca Water Company and sent Washington a protest against the City being allowed the El Capitan Bill, and in the face, mind you, of the entire City Council, Deputy City Attorney, City Manager, who appeared at the meeting at La Mesa and protested against the citizens voting favorably to us. So you can see the worm turns once in a while.

We have lost eighteen boys out of our organization and have a service flag of 18, of which you were one of the number-- and the biggest one of the bunch. I sure miss you. Ellis is doing nicely. Murray put Faude off the job and Bartl in his place. I have no comment to make.

We have had good rains. Lake Hodges Dam is up about 70 feet, but we will only be able to catch 60 or 70 feet of water this year. The dam will not be done until next June.

Wire me when you are coming. It means a good ride for you through the country. We will be glad to see you.

Very truly yours,

EF/bm

WESTERN UNION

Form 2

RECEIVERS NO.

TIME FILED

CHECK



TELEGRAM

THEO. N. VAIL, PRESIDENT

Confirmation

SEND the following Telegram, subject to the terms on back hereof, which are hereby agreed to

San Diego, Cal. March 13, 1918

To Maj. Wm. S. Post,

C/o Parley M. Johnson,
749 Garland Ave.
Los Angeles, Calif.

McClure Huber and I want you to make trip with us Lake

Hodges Dam either Thursday or Friday. Can you be ready.

Will telephone.

Ed Fletcher.

ENGINEERING OFFICES OF
J. B. LIPPINCOTT
1104 CENTRAL BUILDING
LOS ANGELES, CALIFORNIA

January 28th, 1920.

Mr. Thos. H. King,
Ed Fletcher Company,
920 Eighth Street,
San Diego, California.

My dear Sir:-

Will you kindly furnish Mr. Lippincott with the area and capacity curves for the Lake Hodges Reservoir as built, and the proposed San Elijo Reservoir, noting on these, if you please, the exact height of the outlet and of the spillway crests.

Very truly yours,

W. S. Foster

WSP:w

MOVEMENT OF UNDERGROUND WATER.

Briefed from various Authorities. A. Taylor.

Table of velocity of water thru sizes of soil ranging from .01 Mil. to 5.0 M. Ref W S & Irr. Paper No 67, pg 27., by Slichter.

Theoretical velocity of Ground Flow

<u>Dia. of grain</u>	<u>Vel., pres gr 100':1 Mi. -- mi per yr</u>	<u>Kind of soil</u>
0.01	.00026	Silt
0.04	.00402	"
0.09	.02066	very fine sand
0.20	.1021	fine sand
0.40	.4081	med. sand
0.70	1.25	course sand
1.00	2.551	fine gravel
4.00	40.81	" "

Velocity determined by Experiment

<u>Place</u>	<u>Authority</u>	<u>Grade</u>	<u>Velocity</u>
Ft. Morgan Garden, Kansas	Prof Carpenter Slichter	7' to 1 Mi	3 ft day & 15' day 2 1/2 " " at 10' below surf 12 " "
Hondo Narrows & San Gabriel Canyon	" "		3 1/2 " " also 4, 5 1/2 & 7' per day.
Mojave River	"		6, 8, 20, 35, 48 & 64' per day.

The Mojave gaging place is 120' wide, greatest depth to bed rock 47 feet, material very coarse granite sand and fine gravel - row of test wells across valley.

Homer Hamlin, W S & Irr. Paper No 112.

Los Angeles River at Los Felis Road Bridge - Huron St. Tests of 1902 silt and sand - velocity 27' per day between 3 & 11' depths, movements away from surface stream.

1 Mile above Huron St.

Silt and sand, velocity 5' per day, depth 1 1/2 to 9 1/2', gravel not very porous.

San Fernando Valley - east bank of Tujunga Wash near junction with Los Angeles River.

8' silt and sand, velocity 17'/day, tests between depths 6 1/2 to 14 1/2'. 8' silt - no flow detected between depths 14 1/2 to 22 1/2'.

West Bank - same.

Sand and gravel, velocity 4 1/2' / day, between depths 6 1/2' and 14 1/2', silt, between depths 14 1/2' and 22 1/2', no flow detected.

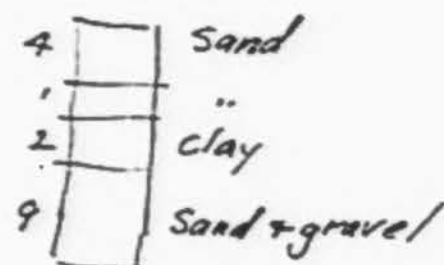
Sta. 5. Los Angeles River - near road from Burbank to Cahuenga Pass.



Velocity 48' / day between depths 26 1/2' & 34 1/2'.
 (Note:) The water from this depth rose to a point 6' above the surface, & it is possible that the high velocity was caused by leakage around the casing, which drew the charged water toward the well.
 Borings were 2' sugar.

Sta. 6. In Tujunga Wash.

Velocity 3 1/2' / day between depths 8 & 16 ft.



Sta. 7. Left Bank Los Angeles River, 1 Mile south of Burbank, mouth of broad sandy wash.

8' coarse sand, velocity 2 1/2' / day, between depths 5 & 8'. The underflow was away from the surface stream.

Sta. 8. Left Bank Los Angeles River, 1 Mile south of Burbank above Station 7.

9' coarse sand, velocity 6.4' / day, between depths 1 & 9 ft.

"These tests indicate that in general the underflow is in the direction of the greatest slope of the water table, although there are marked variations. No relation could be traced between the slope of the water table and the velocity of the under flow." (Probably because conditions of strata materials are so different at the various test places. A.T.)

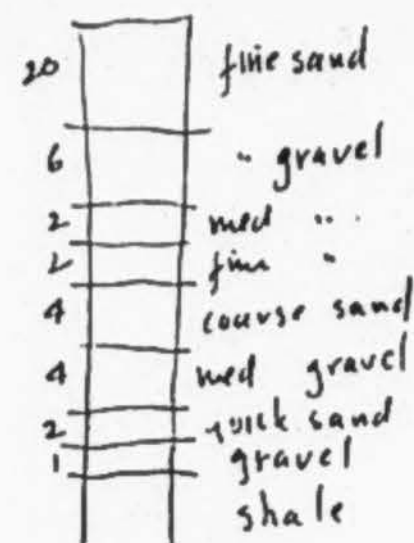
General conclusion:- The underflow tends to follow the most pervious strata, even if the extension of these beds varies considerably from the general slope of the water table. The maximum velocities are also found in such strata.

Los Angeles River, Huron St. Tests 1903.

Tests here showed that the slope of the water table agreed in general with the direction of the underflow.

Sta. 9. Velocity 77' / day, between 15' & 25' depths, flow parrallel with surface stream.

Log Sta. 9.



Velocity 20.8' / day between 22 & 30' depths.
 Sta. 10. different strata.
 Velocity 7' / day between depths 41 & 49' - material, fine sand.

Sta. 11. Velocity 10' / day between depths 41 & 57'. Materials, silt and sand 11' coarse sand 3', cemented sand 2'.
 Velocity 16' / day between depths 41 & 49' 8' of silt and sand.
 Velocity 20' / day between depths 33 & 41' material quick sand.
 No flow between 17' & 33' depths upper quicksand.

Throughout this test Sta. 11. the direction of flow varies in amount up to 60° indicates that the water follows the most open strata.

Sta. 12. 48' / day between depths 27' to 35', material granitic sand the underflow here being apparently thru two porous strata in which the directions of movement diverge 60°.

Sta. 13. 68' / day between depths 38' to 46', fine yellow sand shale 2', coarse sand 6'.
 20' / day between depths 30 & 38' coarse sand and gravel 5', 1.5' fine sand, 1.5' fine yellow sand.

3.4' / day between depths 24' & 30', 6' coarse sand and gravel. Direction not with surface water due to influence of rising water plant caused by Arroya Seco floods.

Sta. 14. 48' / day between depths 44 & 52', gravel and boulders.
 32' day between depths 36 & 44', gravel and boulders.

Sta. 16. Velocity 4' / day between depths 45 & 49 strata of sand, clay and cemented sand. 96' day between depths 25' & 29', sand & gravel.

SUMMARY OF LOS ANGELES TESTS.

Cross-section divided into two sections, the western, which is the deeper and probably the old river channel and the eastern or the thinning edge of the Arroya Seco debris cone.

Western bed - cross-section area 17,000 sq. ft.
 Eastern bed - cross-section area 30,700 sq. ft.

Assuming a velocity of 1' / day in areas where no flow was detected.

The average of all observed velocities in western area - 20.6' / day assuming porosity of 25%.

Western area discharge - 17000 x 20.6 x 25% - 87,550 cu ft/day this should be reduced to correct for obliquity of flow across channel, say 20%.

Hence discharge - 87,550 x .80 - 70,040 cu ft/day.

Average velocity of eastern area 30.9'/day porosity 25%
obliquity of flow 30°, sine of 30° = .50.

hence discharge - 30,700 x 30.9 x .25 x 0.50 = 118,578 cu ft/day.

San Gabriel River, Slichter W S & I Paper No 140.

Above wagon bridge on Whittier Road. "very tight material."

Velocity 48'/day down stream.

4.8'/day 55° from down stream.

Temple Ranch between El Monte and Downey on Bank at headgate
Ranchita Ditch. Velocity 1.2'/day

velocity 5.3'/day at 45° from down stream.

Rio Hondo near Old Mission.

Wells 16' deep, 15'
artesian head above
regular water

Velocity 5.8'/day direction 10° from
surface flow.

Velocity 6.6'/day

Roughly underground velocity of Hondo and San Gabriel is 10'/
day, this probably high.

"A minimum of probably 4'/day."

Mojave Narrows - grade 20' per mile, velocity in central upper
area 50'/day, velocity 10'/day in balance of area, material sand
and gravel.

Long Island between Freeport and Messapeque.

Ground surface slopes in a plane 15'/mile.

Water table slopes in a plane, 10 to 12' per mile.

Material yellow sands and gravel. Depth at 40 to 60 ft. clayey strata.

Velocity 5 to 12'/day between depths 16 to 24' below water plane.

Velocity 1.4'/day between depths 30 to 42'

Velocity 5'/day average for depth of well 22'

velocity 3'/day average for depth of well 40'

A heavy rainfall (3") increased the velocity in one well from
5.2'/day to 6.4'/day, probably due to low barometer and increased
hydraulic head.

ARKANSAS VALLEY IN WESTERN KANSAS.

W S & I Paper No 153 Slichter.

Underflow Arkansas River.

Average velocity 8'/day in general direction of valley the rate
of flow is uniform. Depth of wells about 25'. Materials sand and
gravel. The movement extends several miles north from the river
valley. The slope is 7.5'/mile with river and 8 to 3 ft/mile toward
river.

The underflow has its origin in rainfall. Floods influence the
flow very little and only to an extent of a 1/2 mile from river.

RILISTO RIVER, ARIZONA - G. E. P. SMITH.

Velocity 360'/day - depths average 8 1/2' slope .007, white granular
sand, coarse and clean, porosity 33.7. If reliable - high velocity
due to the steep slope and the cleanness and coarseness of the sands.

Same River at Montijo Cross-section.

Average velocity 146'/day, slope .006, depth 8', sand.

Average velocity 22'/day, slope .0047, depth 22', silt.

RIO GRANDE, W S & I PAPER NO 141, 1905.

SITE OF INTERNATIONAL DAM ABOVE

EL PASO.

Average velocity 2.5'/mile, sand, fine gravel and clay. Slope
3 3/8'/mile, average depth 25 ft.

Original Notes by W. S. Post about October, 1904.

Warners Ranch

Reservoir and Power.

Reservoir.

The choice between the Warners Ranch Dam proper and the one $\frac{1}{4}$ mile below should depend on the determination of Bed Rock. The lower site by aneued is 25 ft. lower than the upper one. Obviously one or the other only should be built, perhaps to a certain height which may be later increased but there seems no occasion for submerging an upper dam by a 200' dam at the lower site.

Experience at the Sweetwater Dam indicates the advisability of building a low dam first preferably of masonry and studying the resulting wastes over the spillway for further increase in height.

Engineering Notes.

Drainage area - 210 sq. miles. If Rainfall 12 inches annual. Runoff say 20 acre ft per sq. mile per year. Hence supply - 4200 acre feet which requires a dam of only 30 feet in height.

If Rainfall were 24 inches the runoff would be 200 acre feet or 42,000 acre feet which calls for a 60 foot dam, say 70 foot for carrying over from one year to another.

And these may be considered the minimum and maximum figures for which storage need be provided, that is height of dam from 30 to 70 feet, storing from 42,00 to 42,000 acre feet.

Supply and Power, 42,000 acre feet will give 57. cub. ft. per sec. - 2850 Miners Inches. This through a fall of 1600 ft. - 11,200 H.P. theoretical.

Power Canal

Elevation at Dam Site	2611.
At Pt. of Filing $\frac{1}{4}$ mile below	2497.
In Section 31 T. 10 S R. 2 E	2200.
In " " T. 10 S R. 1 W.	950.
Escondido Ditch Heading in section 33 T. 10 S R. 1 E.	1500.

The Alignment of the Canal on the south side is preferable from the dam to the S.E. Corner of the Portiero Reservation - 5 miles giving a fall of 400 ft. about.

P. From here the north side is much more favorable 7 or 8 miles a fall of 1200 feet. This line could be built for less money than the upper, and the upper is desirable principally to conserve all the water let out from the dam site.

Escondido Ditch

The Escondido Ditch has a capacity of 1000 inches, and is allowed to take water from the San Luis Rey River from October 1st, to April 1st, only, - that is the winter and flood discharge.

The system which it supplies is limited and it does not always use its capacity. It does not appear then that it will interfere materially with a full use of the power except during the winter months, when it must have 1000 Inches, which to a certain extent will be supplied from the drainage area below the Warner Dam, - 40 sq. miles.

The upper power drop of 400 feet would not be affected at all.

Ed Fletcher Papers

1870-1955

MSS.81

Box: 22 Folder: 1

General Correspondence - Post, William -



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