

May 21, 1921

Mr. M. M. O'Shannessey,
City Engineer,
San Francisco, California.

My dear Mr. O'Shaunessey:

Under separate cover I am sending the following:

1. U. S. Reclamation Service report, net safe yield Cuyamaca System at El Capitan.
2. U. S. Reclamation Service report, net safe yield of Santa Ysabel and San Luis Rey Rivers.
3. Cross-section El Capitan damsite, showing core drillings made by the City.
4. My statement as printed in San Diego papers covering the cost of El Capitan and the pipe line to the city.
5. Map of El Capitan reservoir known as City of San Diego's Exhibit A.
6. Cross-section Mission Gorge damsite.
7. Our engineer's estimate of yardage
8. Capacity of Mission Gorge.
9. Questions of the City Water Commission to the Cuyamaca Water Company.
10. The Cuyamaca Water Company's answer.
11. Contour map of Mission Gorge reservoir.

When you come down we will furnish you with cross-section and estimate of cost of the Sutherland damsite on the Santa Ysable River, also the proposed Fletcher dam at the head of the Cuyamaca flume. We are having a cross-section made of the damsite about 200 yards below the old Mission dam, and this information will be available on your arrival in San Diego.



The Temperature at noon today was _____°

HOTEL DEL CORONADO
W. A. TURQUAND, MANAGER
Coronado Beach, California

Friday P.M.

Colonel. Ed Fletcher
San Diego.

Saw Mr. D. this P.M. for about an hour - He is going north Sunday, & wanted me to wait to go with him -

I think he will come around ok. in a little time -

With best wishes to your family
As yours interesting

Very Sincerely
M. M. O'Shannessey

At our proposed Mission Gorge site, Bent Brothers will contract to build for approximately \$780,000.00 - 220 ft. in height.

Kindly let me know what other information you desire before coming to San Diego.

I want to call your particular attention to the fact that Mission Gorge reservoir only floods 774 acres, and in proportion to the amount of water stored, there is less surface exposed evaporation than any reservoir in the county.

I confirm our verbal agreement to the effect that you are to be paid \$1,000, and your expenses for making the report, all as per our verbal agreement. It is understood that our engineering force will furnish you all the information desired and it means only two days' personal inspection on the ground, as far as your time is concerned.

Yours very sincerely,

EF:KIM



HOTEL DEL CORONADO
W. A. TURQUAND, MANAGER
Coronado Beach, California

Friday PM

McCusker, San Felipe

Dear Sirs - We are sorry to hear that you are leaving - I hope you will have a safe trip - I will be in touch with you -

It is a pleasure to hear from you - I will be in touch with you -

With best wishes to you -

*Very truly yours,
W. A. Turquand*

June 10, 1921.

Mr. M. M. O'Shaunessey,
City Hall,
San Francisco.

My dear Mr. O'Shaunessey:

In the matter of the Mission Gorge site, known as the "King" site, Mr. Eastwood's plan calls for 29,028 cubic yards of 1-2 $\frac{1}{2}$ -5 concrete at \$10.00 a yard	\$290,280.00
11,927 cubic yards of 1-2-4 concrete at \$15 per yd	178,905.00
Designing and erection fee	46,919.00
Total	<u>\$516,104.00</u>

He says, "I will undertake to build this dam at that cost on the basis of cost plus a fixed fee with bonus and penalty clause, as in my contract to build the Little Rock dam.

Jorgensen's estimate for a constant angle single arch type of dam is as follows:

75,500 cubic yards of concrete, of which 7,500 cubic yards are in the tangents. This concrete should have 5 sacks of 1 $\frac{1}{2}$ barrel of cement per cubic yard, except in case the material on the ground is found to be very excellent, then 1.1 barrel per yard may do.

Bent Brothers of Los Angeles have contracted to build Jorgensen's type of dam at \$10.00 per cubic yard. For the Eastwood type they want \$18.00 for the re-inforced concrete, and \$15.50 for the plain. Bent has been on the ground and has agreed to do the excavating for not to exceed \$50,000.00.

Yours very truly,

EF:KLM



Hotel Alexandria
Los Angeles

June 12 1921

Dear Colonel.

I got here OK on my way home. I forgot to ask you to get for me a copy of cross section and test borings of Lower El Capitan Dam site as far as made possible. You will

Very sincerely
Will O'Shaunessey

June 13, 1921.

Mr. M. M. O'Shaughnessy,
City Hall,
San Francisco, California.

My dear Mr. O'Shaughnessy:

Agreeable to our verbal understanding, I am submitting a list of suggestions for your consideration when you make your report to Mr. J. D. Spreckels, as follows:

Leaving out all personalities, the question is - what is the cheapest method of developing an additional supply of water on the San Diego River for the City of San Diego, considering its finances?

The question comes up then, - Shall it be El Capitan, or Mission Gorge, or eliminate El Capitan for the present and build Mission Gorge, and acquire the Cuyamaca System and Mission Gorge.

I enclose printed statement regarding the El Capitan situation, and that, with the information heretofore given you, will probably suffice so far as El Capitan is concerned.

The arguments in favor of Mission Gorge and the acquisition of the Cuyamaca System you are familiar with.

Enclosed find copy of offer of sale of the Cuyamaca System, and terms, to the City, which is explanatory.

Enclosed find copy of the questions asked me by the Water Commission, and a copy of my answer in reply.

I hope you will in your report make the following comparison:

That the net safe yield of the city's system completed, including Barrett dam, according to the public announcement of Mr. Savage is 9.2 million gallons daily, delivered to University Heights reservoir, and the fact is, the system will cost the

City \$9,000,000.00 when completed, or a million dollars per million gallons daily. By acquiring the Cuyamaca System, the cost of it, plus the re-construction of the flume in concrete, plus the construction of the Fletcher and South Fork dams, the total cost is not to exceed \$3,000,000.00. The net safe yield is 6.3 million gallons daily, according to the U. S. Reclamation Service, altho they have not done justice to the El Monte gravels by any means. That means the cost of water is \$500,000 per million gallons daily, with the Cuyamaca System completely developed, or less than one-half the cost of the water developed from the city's system.

In the acquisition of the Cuyamaca System, there is this additional advantage. If an arrangement is made with the Volcan Company within the next few months, tying up the Sutherland damsite, reservoir site and riparian rights, that property can be bought for not to exceed \$1,250,000.00, possibly \$1,000,000.00. The conduit to Fletcher damsite can be built for, roughly, \$500,000. The dam can be built for, foughly, \$600,000. The total cost will not exceed two and one-half or three million dollars. The net safe yield will be 7.6 million gallons daily, and the cost, delivered into the City thru the Cuyamaca System, will not be to exceed \$350,000.00 per million gallons daily, when taking into consideration the 900 ft. power drop and the revenue that will be received therefrom.

It will cost no more to take the Sutherland water into the City from the Fletcher dam, for a large conduit is necessary in any event to carry the water into Murray, and the big advantage is in putting either the Sutherland or the Cuyamaca water, in the winter time, into Lower Otay for storage.

The City is in a precarious condition. It has not over a year's supply of water on hand. If the City acquires the Cuyamaca System without issuing any bonds, the first thing it should do, in my opinion, is to have us bond our system for sufficient money to build the Fletcher dam, double our pumping capacity in El Monte gravels, and in that way be ready to protect the City in case we have two or three more dry years. The City will use, this year, an average of 11 million or 12 million gallons daily. Admiral Welles is authority for the statement that in 5 years there will be 25,000 more people here owing to the activities of the Navy alone. San Diego is growing rapidly. The City water

Department records show 756 new taps during the year 1920. The Gas and Electric Company's records show 2388 new gas, and 3152 new electric connections during that same period. During the year 1920, the daily average consumption of water was 10,160,520 gallons. It is a serious question where the water is to come from for our present and future needs, and immediate action is necessary.

I now refer you to Mission Gorge:

For \$1,500,000.00 or \$2,000,000.00 the damsite, and reservoir lands can be obtained, the dam built and the pipe line built to the lower levels of the City of San Diego at Old Town. This also gives a connection with the Mission Valley pumping plant into University Heights reservoir.

During the period, January 1st to April 1st, 1920, the catchment of the entire city's system was 5.107 billion gallons. If Mission Gorge dam had been built, the catchment for this same period would have been 5.400 billion gallons.

Attached hereto is the net safe yield study of Mission Gorge as prepared by Mr. King, covering the last forty odd years. The fact is, by building in Mission Gorge, you develop a net safe yield of 6 or 7 million gallons daily. You have no riparian owners below to contend with. The cost of water developed is, roughly, \$300,000.00 per million gallons daily net safe yield.

It is within the city's finances to build this immediately, their total bonding margin at the present time being only \$2,190,000.00. The City eliminates endless litigation. It leaves the town of Santee, and all of those valley lands undisturbed and protects their water supply. The main thing is, it means quick action, and a contract should be let this fall, and completed, without fail, so as to catch the rains of the winter season 1922-1923.

I wish to emphasize the following points:

If the program outlined above is carried out, it means:

1. That water delivered to the City can begin immediately from the Cuyamaca System, and in an emergency

6 or 8 million gallons daily can be pumped for a long period of time from the El Monte gravels. The transmission system is in, and one-half the pumping equipment is now in operation. The balance of the pumping equipment can be installed for a sum not to exceed \$10,000.

2. With the ultimate development of the Cuyamaca System, there are large quantities of water-that would be wasted at frequent intervals that can be stored in Lower Otay.

3. Water from the Cuyamaca System can be delivered into the city at an elevation of 570 feet, giving abundant pressure, and eliminating the present expensive pumping system for the higher levels within the city limits.

4. The Cuyamaca System can be fully developed, and water delivered into University Heights reservoir at a cost of approximately 10 cents per thousand gallons, as against the present cost of the city water, which is 22 cents per thousand gallons delivered into University Heights reservoir, as testified to by City Hydraulic Engineer, Mr. Earle. The price of 10 cents includes the total cost of re-building the system.

5. By acquiring the Cuyamaca System, the water from Murray dam would furnish over 200 pounds pressure for fire service, which would be possible in the business district by gravity.

6. The present consumers of the Cuyamaca System are an asset, inasmuch as they are now more than carrying the total maintenance and operation expenses of the entire system.

7. The Cuyamaca System can be fully developed, by units, without any immediate heavy bond issues.

8. The Sutherland development can be carried on in the same manner, by building the pipe line, and later on the Sutherland dam.

9. The power development at the Fletcher site from the Sutherland water and from the Cuyamaca water out of Boulder Creek could be utilized by the City at various creeks, such as the Monte, Mission Valley, or sold to the Gas Company. Personally, I prefer to see the Gas Company get all of the power.

10. The Murray reservoir, with a capacity in excess of 2 billion gallons, is within 8 miles of University Heights reservoir, and for \$40,000 or \$50,000 its capacity can be increased to in excess of 3 billion gallons.

11. \$60,000 will connect Murray dam with the city transmission line, so that 15 million gallons daily may be carried into the City of San Diego or into Lower Otay dam. We have an additional pipe line, known as the 20" concrete pipe line along El Cajon Avenue, which will carry 5 million gallons daily direct to the city.

12. The Cuyamaca flume can be replaced by permanent construction, the Fletcher and South Fork dams built, all for less cost than the cost of the transmission line alone, from El Capitan dam to the city.

13. The city's service is roughly divided into three service areas. The Cuyamaca can, without pumping, supply the high service from Murray dam; the city's system, thru the Bonita pipe line the intermediate service, and the Mission Gorge dam, proposed, the low service.

14. The terms upon which the Cuyamaca System may be acquired, and the amount of money required for its ultimate development, considering that the present consumers are paying in excess of all maintenance and operation charges, will enable the city, within a comparatively short term of years, to pay the entire cost out of the savings in the cost of water, based on the present cost of 22 cents per thousand gallons.

15. San Diego River is the logical source of the additional supply of water which the city must have, and there is not room for two concerns of the magnitude of the City and the Cuyamaca Water Company on this watershed, particularly as the Cuyamaca and my holdings of water rights, riparian rights, et cetera, are both above and below the proposed city development. Particular mention should be made that we own all the riparian rights, including pumping rights below the El Monte pumping plants, and including the town of Lakeside, lands that would be affected by extremely heavy pumping from the El Monte gravels. The San Vicente Creek, also Witch Creek - Ramona - Foster's section debouches into the San Diego River at Lakeside, and furnishes sufficient supply to take care of the riparian owners below, so we are positive no damage would accrue by pumping 4 million gallons daily continuously from the El Monte gravels.

Senate Bill No. 3646, being an Act granting to

the City of San Diego certain lands within the Capitan Grande Indian reservation, provides that the City must supply the riparian owners below. The building of the El Capitan dam vitally affects the El Monte gravels. If the City proceeds with El Capitan at the end of a very bitter fight, it would pay very dearly for its El Capitan damsite and the damages it may do the Cuyamaca System. It is this controversy I wish to avoid if possible. You can help me do it, and I hope your report will be favorable, at least, in this respect.

Will you please make your report to Mr. Spreckels and mail me one or two copies?

I am glad to know that you will have this report out within a week or ten days from date.

Thanking you again for the interest you have taken in this matter, and hoping the time will come when you will prepare the plans, and supervise the construction of some of these dams in San Diego County, I remain

Sincerely yours,

EF:KLM

July 11, 1921.

Mr. M. M. O'Shaughnessy,
City Hall,
San Francisco, Calif.

My dear Mr. O'Shaughnessy:

I thank you for copy of your letter to
Mr. Spreckels under date of June 19th.

Enclosed find check for \$524.95. The other
\$500.00 to come soon.

Am pleased with the interest you have taken
in this matter, and the time you have given it. You
have graphically sized up the situation, in my
opinion, in a way that is convincing. I think your
costs of both Guyamaca and Mission Gorge water are
high, and the city cost low, but this is a matter
of opinion, and I respect your opinion.

I thank you very much for your photograph.
Same is being framed, and will be hung, with a great
deal of pleasure, in my office.

Enclosed find picture showing a string of
Fletchers.

With kindest personal regards, and hoping
to see you in a few days in San Francisco, I am

Yours very truly,

EF:KLM

CITY AND COUNTY OF SAN FRANCISCO

DEPARTMENT OF PUBLIC WORKS
BUREAU OF ENGINEERING

September 17, 1921.

Colonel Ed. Fletcher,
920 Eighth Street,
San Diego, California.

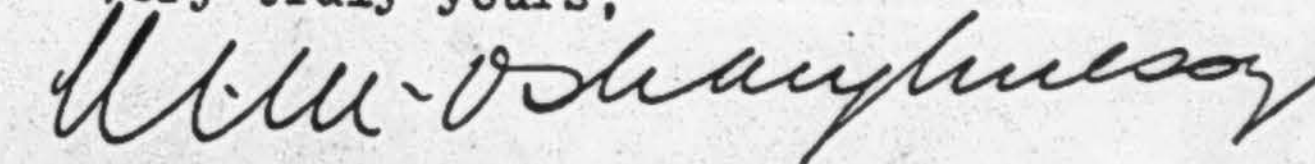
My dear Colonel Fletcher:

I duly received prints
disclosing the exploration of drill hole No. 1,
No. 2, and No. 3, as well as various pits dug on
the hillsides near the axis of the proposed dam
at Gorge Damsite in Mission Canyon, San Diego.

This information is very gratifying and
proves a very satisfactory foundation condition
for the proposed dam at Mission Gorge.

Thanking you for your kindness in send-
ing me this data, I am

Very truly yours,



M. M. O'Shaughnessy
City Engineer.

MMO'S/AO

2-2-21
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M. M. O'SHAUGHNESSY
City Engineer
San Francisco

Colonel Ed. Fletcher - Mission Gorge Dam No. 3 - 2

February 28, 1922

If this recommended section is built straight across the valley a saving of possibly \$40,000. to \$50,000. would result, but the additional safety due to arch action would not exist.

Colonel Ed. Fletcher,
920 Eighth Street,
San Diego, California.

Dear Sir:

In further compliance with your letter of January 24th, 1922, requesting me to make plans for a buttressed arch dam in the Lower Mission Gorge and sending perspective together with the yardage and estimate of cost of the dam to the 310 foot contour and also to a 330 foot contour. I desire to state that I have made an exhaustive study, with the help of one of the most competent designers in the United States, for various economic and acceptable types of dams at Mission Gorge site No. 3.

Special attention was given in an attempt to fit some form of pure arch into this site, but without satisfactory results. Twenty-two different drawings and trials of various arches were made, using various radii, spans and thicknesses, but in no instance was able to find an arch which was not subject to tension of 100 pounds per square inch, or more, at the abutments on the upstream face.

The cost of the gravity types runs up materially more than I had anticipated, but I have checked over my figures and used as small a section as I felt to be safe and consistent with first class engineering practice. The Rock Fill types work out more economically than the Gravity sections, as shown by the cost estimates. A further saving could doubtless be made by moving the rock fill dam bodily down the stream about 200 feet. The contour map is too small to allow of drawing the rock fill dam into this downstream position.

The gravity dam on 500 foot radius is the Otay section, which is heavier than that shown on the 300 foot radius plan. This latter type is recommended.

In my previous preliminary study last June of this problem, I then made a tentative design of the so-called buttressed arch type, thoroughly reinforced,

Barnett
506 744

330 Dam
Fletcher Dam

100-240

122-000 122
75000 " 3

Evaporation
past records

200

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one fold
4423

[Handwritten signatures and initials]
Hem
10-48

If this recommended section is built straight across the valley a saving of possibly \$40,000. to \$50,000. would result, but the additional safety due to arch action would not exist.

Regarding the design of a pure arch dam at this site, the following points should be borne in mind:- The feasibility of employing an arch dam to a given site depends on the height of dam, span at base and at crest, radius of the upstream face; and a logical and safe combination of these three conditions does not exist at this particular site, in my judgment.

I would have been willing in an arch structure to have worked a concrete tension up to 75 pounds per square inch under the maximum load conditions, but I was unable to find an arch in which this low limit of tension was reached without running the corresponding compression working stress up to 1,000 pounds per square inch or over.

I might repeat, as an observed fact, that there never has been to my knowledge a dam built which depends on pure arch action, in which the height, span and upstream radius are comparable to the conditions presented at Mission Gorge site No. 3, and certainly similar conditions have existed at other places where if an arch dam was considered feasible and good practice, that type would have been adopted and built.

The science of designing dams has made considerable advances in certain respects during the past ten years, but unfortunately some engineers have not kept pace with the development of the art. I fully realize there are some engineers who, through lack of a thorough understanding and appreciation of all the factors involved, would not hesitate to build a slender arch dam at this site. No doubt this sort of structure would stand under ordinary static load conditions, but it would be absorbing a portion of the safety factor, and its stability under an additional severe load quickly applied, such as the earthquake which destroyed San Juan Capistrano, is, to say the least, questionable. I do not consider this risky form of design to be good practice or even justifiable under any circumstances where a permanent structure is under consideration and certainly not on the Pacific Coast, where we know that structures are liable to be subject to severe earthquake shocks at any time.

In my previous preliminary study last June of this problem, I then made a tentative design of the so-called buttressed arch type, thoroughly reinforced,

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which could possibly be used at this site. The cost would be somewhat less than that for the gravity design now submitted, but I would not recommend this height of construction for this type at this particular location. The study was made to show the cost estimate of this type of dam submitted by Mr. Eastwood was entirely out of all reason. This particular type of dam was preliminarily adapted to a comparatively low long dam.

I also made a tentative study of an arch of buttressed type of dam, which I had hopes of being able to use in the final design and a considerable amount of time was spent in trying to adapt this type to the conditions prevailing at Mission Gorge Site No. 3, but owing to the large bending and tensile stresses developed by the computations this dam was rejected.

I have made analysis of certain arch rings at different elevations in the design submitted by Mr. Jorgensen for this site, and find, as was to be anticipated, that rather heavy tensile stresses exist on the upstream face at and near the abutments. This design, in my estimation, is a typical example of "using up a portion of the safety factor," in order to get a dam of low first cost. The method of computing the arch stresses which are used is entirely different from that applied by Mr. Jorgensen. It might be well to bear in mind that while this constant angle type of arch dam design has been before the profession for some six or seven years, and the Jorgensen method of analysis is well known, yet we do not see any engineers who have specialized in dam construction recommending its use in important permanent structures 200 or more feet in height. In fact, the only applications in utilizing this type have been made by Mr. Jorgensen in about three or four instances. This condition is significant.

Further regarding the attempts made to secure a design of a pure arch dam in the present instance, the following schemes were used:

1. A single arch dam spanning the entire valley.
2. A single arch dam spanning a portion of the valley and abutting against a gravity section on one or both ends.
3. The same as No. 2 above, with gradually lengthening the gravity portions of the dam and shortening the arch span, and using various radii to suit. Some 8 or

Consulting Engineer.

Colonel Ed. Fletcher - Mission Gorge Damsite No. 3 - 4

10 attempts were made along these lines and various arch thicknesses were also used.

4. Same as No. 3 above, using the so-called "constant angle" type of arch.

5. Building a gravity portion of the dam for the foundation and extending this heavy section to such a height that a multiple arch could be built on top of it for the upper 125 feet. This is feasible but more costly than the straight gravity type.

With the exception of the last mentioned case (5) no arch section was found which was suitable from a standpoint of objectionable tension on the upstream face.

I have a full realization and appreciation of all you have done for the betterment of water supply in San Diego County, against superhuman obstacles that would discourage any other man, and am sure you know that I sincerely sympathize with you in your efforts in this direction.

I believe you also know that one of the first objects of an engineer should be to save money for his client, while building a thoroughly safe structure. Recent catastrophes and the failure of concrete arches in bridges being built in Florida and the theatre building in Washington, are warning beacons against indulging in freak structures.

In conclusion, I must recommend to your consideration the gravity arched cyclopean dam as the correct type for Mission Gorge Site No. 3.

Under separate cover I am enclosing you two sets of blue prints of each of the approved designs.

I do not think you have any conception of the amount of trouble and time we have given to the making of those studies, but I desire to assure you that both myself and my assistant did the very best that was in us in working on this problem.

Very truly yours,

(Signed) M. M. O'SHAUGHNESSY,

M.M.O' Shaughnessy
Consulting Engineer.

MMO'S/AO

ARCHED GRAVITY - CYCLOPEAN CONCRETE TYPE

Upstream Radius = 300 ft.

Great Elev.	Great Elev.
310	330
See Sheets	See Sheets
Nos. 11 & 12	Nos. 9 & 10

Concrete 1:3:5 mix - (45,500) cu. yds. (57,500)		
at \$9.00 per cu. yd.,	\$409,500.	\$517,500.
Concrete 1:3:6 mix - (168,900) (215,100) cu. yds.		
at \$7.75 per cu. yd.	1,309,000.	1,667,000.

COST ESTIMATES FOR DAM

(The 1:3:6 concrete includes
10% Large Rock Plugs) at

Excavation and (36,500) cu. yds. at \$3.00 per cu. yd. (43,800)	MISSION GORGE DAMSITE No. 3	
	February 1922	
	108,900.	122,900.
Reinforced Concrete Outlet Tower (1,190) cu. yds. at \$18.00 per cu. yd. (1,310)	21,400.	23,600.
5-24" Gate Valves (in 3 pairs) and piping for same (in Outlet Tower),	4,000.	4,000.
Concrete lined Outlet Tunnel - 275 ft. at \$42.50 per ft.,	11,700.	
Concrete lined Outlet Tunnel, 300 ft. at \$42.50 per ft.,		12,800.
Independent Spillway - allow	75,000.	75,000.
TOTAL COST,	\$1,939,500.	\$2,429,800.

ROCK FILL - CONCRETE FACE TYPE
ARCHED GRAVITY - CYCLOPEAN CONCRETE TYPE

Upstream Radius = 300 ft.

	Crest Elev. 310 See Sheets Nos. 11 & 12	Crest Elev. 330 See Sheets Nos. 9 & 10
Reinforced Concrete Facing 1:2½:5 mix (1,500) cu.yds. at \$15.00 per cu.yd., (1,500)	500,000.	500,000.
Plain Concrete Cut-off Wall 1:2½:5 mix Concrete 1:2½:5 mix - (45,500) cu. yds. (57,500)	12,000.	12,000.
Face Masonry (3 ft. thick - laid in at \$9.00 per cu.yd., (15,000) cu.yds. at \$35.00 per cu.yd.,	\$409,500. 91,800.	\$517,500. 100,400.
Concrete 1:3:6 mix - (168,900) Hard and Derrick Place (215,100) cu.yds. (104,000)	520,000.	647,500.
at \$7.75 per cu.yd., \$5.00 per cu.yd.	1,309,000.	1,667,000.
Lower Dump FILL (The 1:3:6 concrete includes 10%+ Large Rock Plums)	589,500.	839,300.
Excavation and Stripping (36,300) cu.yds. at \$3.00 per cu.yd., (43,300) Concrete Outlet Tower, (1,190) cu.yds. at \$18.00 per cu.yd.,	108,900.	129,900.
Reinforced Concrete Outlet Tower (1,190) cu.yds. at \$18.00 per cu.yd. (1,310) for same (in Outlet Tower),	21,400.	23,600.
6-24" Gate Valves (in 3 pairs) and piping for same (in Outlet Tower), (600) ft. at \$125.00 per ft.,	4,000.	4,000.
Concrete lined Outlet Tunnel - 275+ ft. at \$42.50 per ft.,	11,700.	100,000.
Concrete lined Outlet Tunnel, 300+ ft. at \$42.50 per ft.,	12,800.	12,800.
Independent Spillway - allow	75,000.	75,000.
TOTAL COST,	\$1,939,500.	\$2,429,800.

ROCK FILL - CONCRETE FACE TYPE

Upstream Radius - 500 ft.

	Crest Elev. 310 See Sheets Nos. 1 & 2	Crest Elev. 330 See Sheets Nos. 3 & 4
Reinforced Concrete Facing 1:2½:5 mix- (1,500) cu.yds. at \$15.00 per cu.yd., (1,500)	\$22,500.	\$22,500.
Plain Concrete Cut-off Wall 1:2½:5 mix- (1,200) cu.yds. at \$10.00 per cu. yd., (1,200)	12,000.	12,000.
Face Masonry (6 ft.+ thick - laid in cement mortar, (15,300) cu.yds. at \$6.00 per cu.yd., (18,400)	91,800.	100,400.
Hand and Derrick Placed Fill (104,000) (129,500) cu.yds. at \$5.00 per cu.yd.,	520,000.	647,500.
Loose Dump Fill (439,700) cu.yds. at \$1.50 per cu.yd., (566,900)	659,500.	850,300.
Excavation and Stripping (63,200) cu.yds. at \$0.75 per cu.yd., (74,800)	47,400.	56,100.
Reinforced Concrete Outlet Tower, (1,190) cu.yds. at \$18.00 per cu.yd., (1,310)	21,400.	23,600.
6 - 24" Gate Valves (in 3 pairs) and piping for same (in Outlet Tower),	4,000.	4,000.
26 foot Diameter Concrete Lined Outlet Tunnel (650) ft. at \$125.00 per ft., (700)	81,250.	87,500.
Independent Spillway - allow	<u>100,000.</u>	<u>100,000.</u>
TOTAL COST,	<u><u>\$1,559,850.</u></u>	<u><u>\$1,913,900.</u></u>

ARCHED GRAVITY - CYCLOPEAN CONCRETE TYPE

Upstream Radius = 500 ft.

	Crest Elev. 310 See Sheets <u>Nos. 5 & 6</u>	Crest Elev. 330 See Sheets <u>Nos. 7 & 8</u>
Concrete 1:2 $\frac{1}{2}$:5 mix - (48,200) cu.yds. (60,000)		
at \$9.00 per cu.yd.,	\$433,800.	\$540,000.
Concrete 1:3:6 mix - (178,900) (223,700) cu.yds.		
at \$7.75 per cu.yd.,	1,386,500.	1,733,700.
(The 1:3:6 concrete includes 10%+ Large Rock Plums).		
Excavation and Stripping (50,600) (57,100) cu.yds. at \$3.00 per cu.yd.,	151,800.	171,300.
Reinforced Concrete Outlet Tower, (1,190) cu.yds. at \$18.00 per cu.yd., (1,310)	21,400.	23,600.
6 - 24" Gate Valves (in 3 pairs) and Piping for same (in Outlet Tower),	4,000.	4,000.
Concrete Lined Outlet Tunnel (350) ft. at \$42.50 per ft., (375)	14,900.	15,900.
Independent Spillway - allow	<u>75,000.</u>	<u>75,000.</u>
TOTAL COST,	<u>\$2,087,400.</u>	<u>\$2,563,500.</u>

#217

WF SAN FRANCISCO CALIF 522P 25

ED FLETCHER

920 NINTH ST SANDIEGO CALIF

MISSION GORGE SITE NUMBER THREE IS THE MOST ECONOMIC DAMSITE ON THE SANDIEGO RIVER THERE WILL BE LESS LOSS OF WATER FROM EVAPORATION AND LESS VALUABLE LANDS DESTROYED BY FLOODING THIS SITE SHOULD BE DESIGNATED BY THE CITY FOR INITIAL CONSTRUCTION ON THE SANDIEGO RIVER

X M O'SHAUGHNESSY CONSULTING ENGINEER.

June 16, 1923.

Mr. M. M. O'Shaughnessy,
City Engineer,
San Francisco, California.

My dear Mr. O'Shaughnessy:

Enclosed find clipping from yesterday's paper which is explanatory. Thanks to you and a few other friends, John D. and Claus and I are working together on everything that is for the best interest of the city. Clause even went so far in his speech as to say that we control the water and it is up to Spreckels interests and the city to cooperate with Fletcher and his associates in development of the water of the county.

I am thinking the Chamber of Commerce may soon ask you to come down and ask you to make a report to them on what is best to be done to develop the San Diego River and other sources of supply. What would you charge per day for coming down here and spending three or four days, or a week going over the whole situation and making a report to the Chamber of Commerce.

The city has hired John R. Freeman of New York for this purpose. What do you think of him and what do you know about him? The Chamber does not seem to be satisfied with

Freeman from what I hear.

Please keep this letter confidential, and I would like to hear from you at an early date.

The government is negotiating with me for water from Mission Gorge, 3 million gallons a day. I have submitted your plan of type of construction to them, also the Jorgenson single arch type. Nothing has been settled as to type but they have made a recommendation to Secretary Denby that a contract be signed for 3 million gallons a day from Mission Gorge No. 3, which I own.

Since I saw you, Charles F. Stern, former state superintendent of banks, now executive vice-president of the First National Bank of Los Angeles has become associated with me and we have purchased the Cuyamaca System together. Both John D. and Claus Spreckels know all about it. In fact I brought Claus and Mr. Stern together and I believe we are going to have some harmony in San Diego than ever before.

I just want to keep you up to date on this Mission Gorge matter and what is going on down here. Please keep my letter confidential and drop me a line and answer my questions; please

With kindest personal regards, I am

Sincerely yours,

EF:KLM

CITY AND COUNTY OF SAN FRANCISCO

DEPARTMENT OF PUBLIC WORKS
BUREAU OF ENGINEERING

June 20, 1923.

Colonel Ed. Fletcher,
Box 1412,
San Diego, California.

My dear Colonel Fletcher:

I will be very glad indeed to see the happy day in San Diego when you and John D. and Claus are all pulling and working together for the interests of the community.

The reports such as you suggest for the Chamber of Commerce on handling the San Diego River will cost \$2,500., to embrace a week's time, going over the San Diego River and other sources of supply.

With regard to John R. Freeman, he was employed by the attorneys of this City when I was City Engineer in 1912 to help fight our case on Hetch Hetchy against nature lovers and other controversialists. He prepared a very good case and made a very good fight for us. He is a fluent writer and a good paper engineer. The Hetch Hetchy Project, as he planned it, has been entirely recast by me. He was going to bring the Eleanor water over by subsurface tunnel to Hetch Hetchy at a cost of \$4,000,000. I brought the same water by surface canal down to Early Intake, including the Eleanor Dam, and hooked it up for a cost of \$1,000,000. He planned our railway to go up the bottom of the riverbed, which would involve 7,000 feet of tunnel, at a cost of \$700,000. and removed from our lumber camp and other activities, and have it subject to slides and disablement from falling debris. This plan I also changed and moved the railway 1500 feet higher up on top of the bench, where it now gives good service. His plan for the power plant at Moccasin Creek was impracticable and was condemned by a Board of Consulting Engineers comprised of Messrs. Baum, Galloway, and Professor Durand of Stanford, and a remodeled plan, which we are now building, has been constructed.

cc J.D.
Claus Spreckels

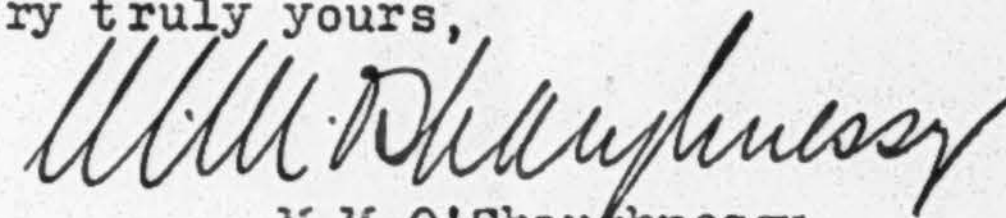
Colonel Ed. Fletcher - 2

Mr. Freeman is a man of tremendous energy and fine analytic powers, and will I believe see the nature of your problem, which is very simple and elementary in San Diego. The time he gives to your problem is very short but I believe he will see the critical features if the facts are presented to him in the proper manner.

I know Mr. Stern personally. He is a man of splendid energy and will be a big addition to you in San Diego.

With kindest personal regards to yourself and your family, I am

Very truly yours,



M.M. O'Shaughnessy
City Engineer.

MMO'S/AO

June 22, 1923.

Mr. M. M. O'Shaughnessy,
City Engineer,
San Francisco, California.

My dear Mr. O'Shaughnessy:

It was mighty nice of you, your letter of June 20th. John D. Spreckels and Claus and I are pulling together. Enclosed find clipping from this morning's Union.

I had an idea just what type of a man Freeman is. I thank you for the information.

I am going to see you in a few days and I only wish that these matters of future water development for San Diego could be put in your hands. I am going to write to John D along these lines and together we ought to put it over.

With kindest personal regards and hoping to see you about the 15th of July on my return from Montana, I am

Sincerely yours,

EF:KLM

Lost Transcontinental Traffic To Be Regained by S. D.

When Mountain Springs Grade Rebuilt, Assurance

Fletcher Urges Unity Of Efforts by Two Southern Counties

By ED FLETCHER

The building of the new Mountain Springs grade, the connecting link between San Diego county and Imperial valley, is assured and bids will be opened Aug. 24. Grades and curves will be reduced to a minimum, with business and pleasure benefiting thereby.

How many know that San Diego county, 50 years ago, when I came, extended to Yuma, embracing all of the territory between, even Riverside? All of Imperial valley was a desert in 1900 when they first commenced bringing water from the Colorado river to the valley. I located on government land, near Holtville, in 1900 and drove in with a mule team, from Flowing Wells, now Niland. The Southern Pacific depot is 90 feet under the Salton sea, at what was Salton. The Colorado river break created the Salton sea and the Southern Pacific railroad had to change its tracks 35 miles around to the north.

In 1903, there were only four or five houses in Imperial and not a house at El Centro. Today, with the All-American canal, with a million or more acres under cultivation, or to be put under cultivation, we find that San Diego is connected via the Mountain Springs grade, with the greatest and richest irrigated empire in the world. Fred Jackson took the chairmanship and we raised nearly \$60,000 and built the original Mountain Springs grade in 1910, on the survey made by Director of Public Works Fred Rhodes.

About that time, Gov. Hunt wired me from Phoenix asking for a convention at Yuma to organize the San Diego-Arizona Highway association and to appoint delegates from San Diego and Imperial county, which I did. Hunt brought down 92 by train to Yuma. From San Diego, owing to no roads, we had to go by way of Los Angeles, via Southern Pacific railroad, to Yuma. The party included Fred Jackson, U. S. Grant, W. B. Gross and myself. We organized the San Diego-Arizona Highway association. I was made president and the first battle was to build a highway bridge at Yuma.

Appropriation Vetoed

The estimated cost was \$75,000. The plan was for the federal government to pay one-third, Arizona one-third and California one-third. The federal government and the two states in four months had appropriated the money conditional on the others paying. Gov. Johnson vetoed the California appropriation on the ground that the bridge would cost \$150,000, on the advice of the state engineer, W. F. McClure. Again San Diego citizens came to the front and we raised \$25,000, \$15,000 from San Diego, \$5000 from Imperial valley and \$5000 from the City of Yuma, to pay California's share. The bridge was built for \$73,800.

Later I had introduced a bill in the legislature for \$25,000, payable to myself, for building the Yuma bridge. Although illegal, it was passed unanimously and the subscribers were refunded their money, excepting those who had donated for the good of the cause in carrying on the good work for a national highway.

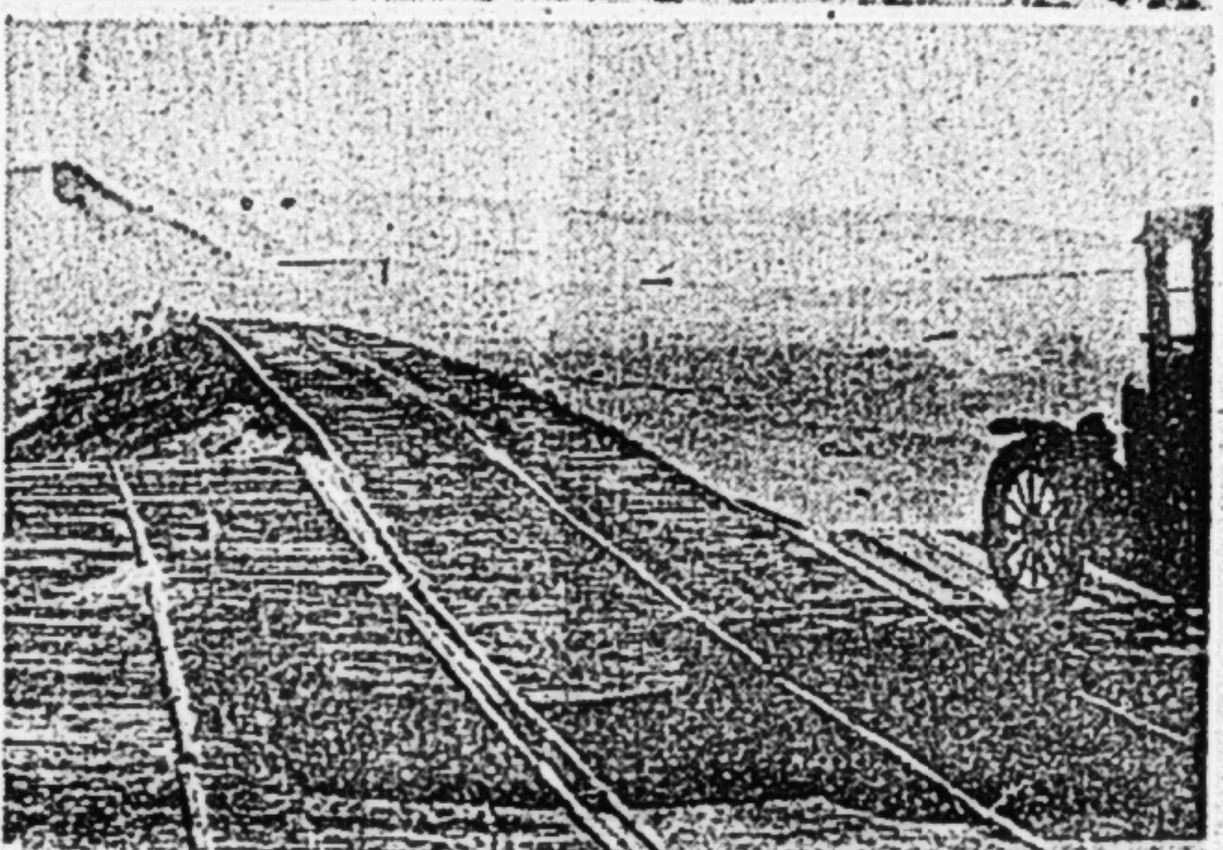
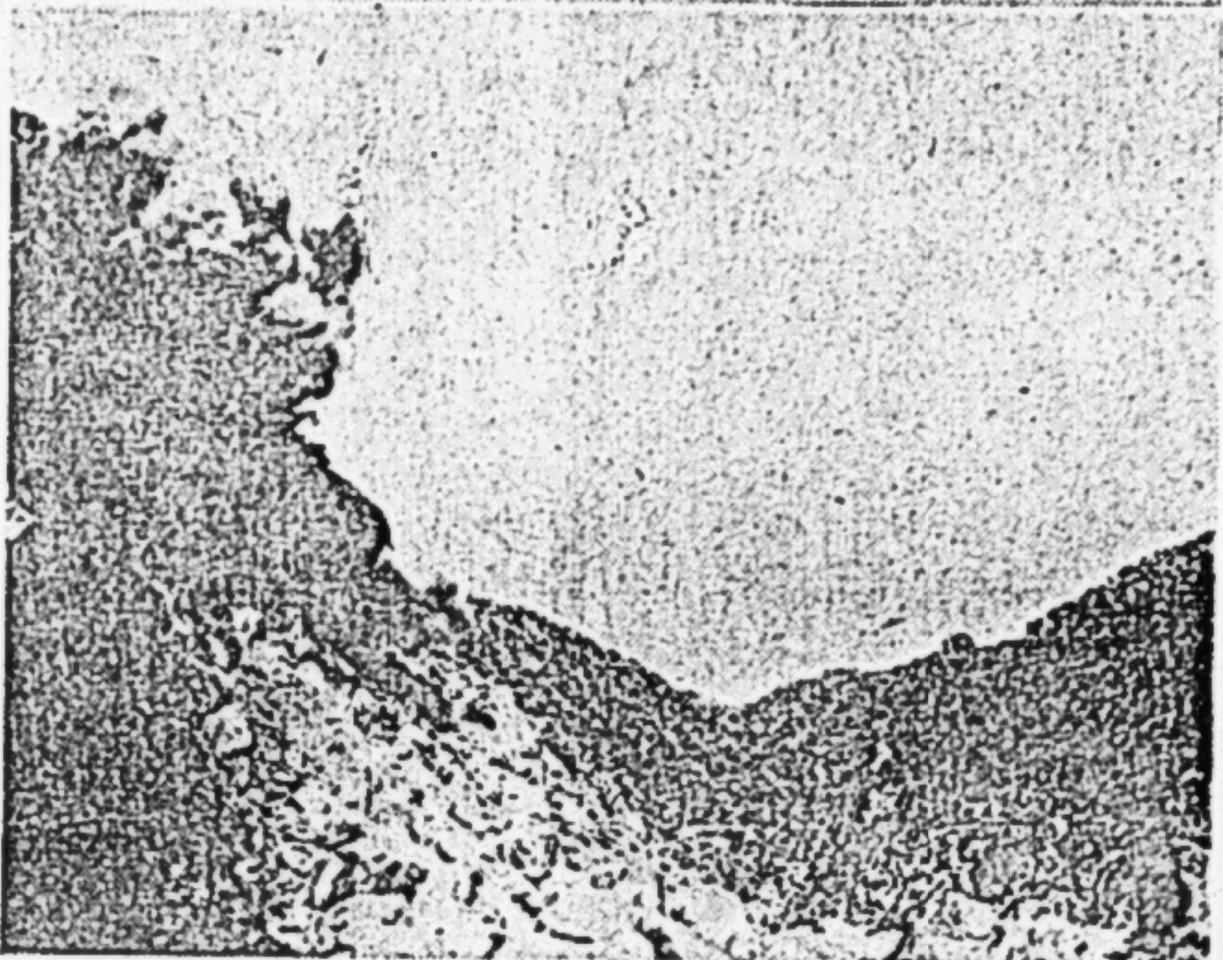
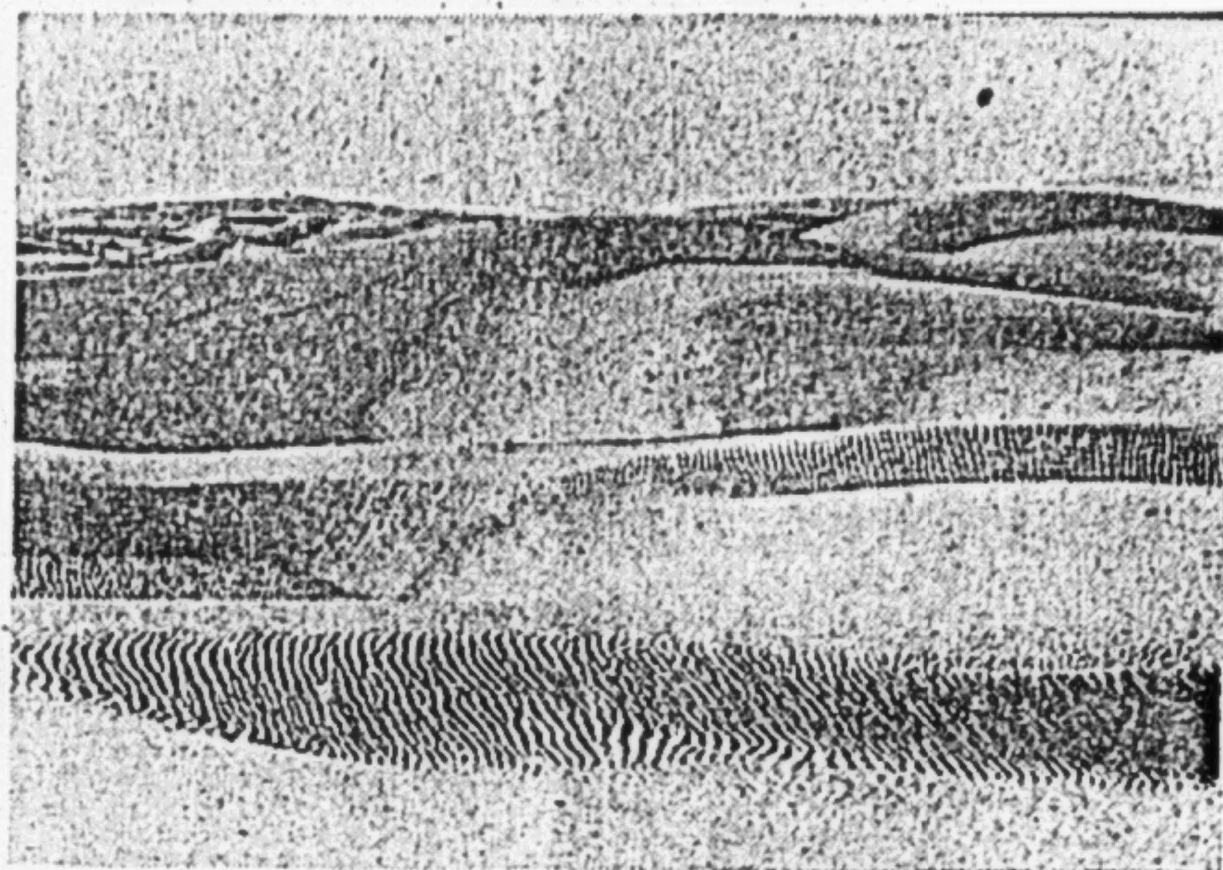
The San Diego Union of Dec. 20, 1912, prints the following: "The chamber of commerce has appointed Ed Fletcher chairman of a special ocean to ocean highway committee to carry on the fight for the El Centro-Holtville route to Phoenix."

California voted \$18,000,000 about that time to connect county seats. Los Angeles was fighting for a highway to go from El Centro to San Bernardino. We were fighting for the route to go from San Diego to El Centro, and while the north passed resolutions we worked. John D. Spreckels, R. W. Scripps and A. G. Spaulding were made commissioners and 1250 miles of road were built in this county, including the dirt road from San Diego to the Imperial county line at Mountain Springs. With the road built to the desert in Imperial county, by private subscriptions from San Diego citizens, we won the state highway from San Diego to El Centro. It was not until 1918 that it was declared a state highway from El Centro to San Bernardino, via Mecca.

Federal Aid Obtained

With the United States government taking an interest in state highways, and through our Washington friends, we were able to get designated the route east from San Diego via Yuma to Phoenix and El Paso as a federal aid project.

I was in Washington on other business, in 1915, when the California highway commission authorized



Highway history is shown in these photographs. Top—Shifting sand hills, 200 feet high, through which the San Diego-Imperial valley highway had to be sliced. Center—First blast in building Mountain Springs grade of 1911, under supervision of Fred Jackson and Col. Ed Fletcher. Bottom—one-way plank road through sand hills, with turn-out every half mile.

me to take up the matter of securing federal aid for the San Diego-El Centro highway. I had the pleasure of fighting successfully for the first money for federal aid for California and was present when the bill was signed by Secretary Houston, in Washington. It included the paving of the road from the summit to Jacumba.

With Los Angeles demanding that the federal aid highway be built by way of Mammoth Wash and Niland following the Southern Pacific to Yuma, this brought on another fight for that route would have been 47 miles longer than the one via Holtville through the shifting sands to Yuma. Few believed that we could maintain a road through those shifting sands. Imperial county supervisors refused to put up a dollar, even for the experiment. I conceived the idea of a wood plank road and representing the chamber of commerce as chairman we raised \$15,000 and shipped 37 carloads of planks to Imperial valley under an arrangement with Ed Boyd, of Holtville, to haul and lay the plank.

J. B. Lippincott told the state highway commission it was the most fantastic and ridiculous plan possible and in no wise feasible but we were able, in Sacramento, to hold the decision in status quo as to route until the demonstration was made. We won and one may see the evidence of the old plank road that we originally built and one later built by the state to one side as one goes through the sandhills to Yuma. It was vital that we save that 47 miles as far as the tourist trade of San Diego is concerned re transcontinental travel.

Dirt Road Surfaced

Being president of the San Diego-Arizona Highway association, I went to Yuma and helped to put over a bond issue for the grading and sur-

facings of a good dirt road on the way to Phoenix from Yuma to the Maricopa line. We succeeded in carrying the bond issue, but the law said the bonds had to be sold for 100 cents on the dollar. The best bid was 91, therefore we had to raise something like \$25,000 as a bonus. Forever to the credit of the business men of San Diego let me say we raised from them, by private subscription, \$13,800 and sent it as a gift to the board of supervisors of Yuma county. Never will I forget the wonderful service rendered by the business men of San Diego in all these financial ventures looking toward a transcontinental highway directly east from San Diego. In every case Spreckels gave 10 percent, likewise George W. Marston, likewise Harry Jones, of the gas company, and the other 20 percent came from the clearing house banks, making 50 percent of the total, while the rest of it was raised by popular subscription.

Later, when Phoenix refused to play ball with us, San Diego, Casa Grande, Gila Bend and Yuma got on their ears. We secured the loan of equipment and built the road from Gila Bend to Casa Grande, saving another 87 miles across the continent as compared to the route via Phoenix. Tucson furnished the gasoline, Casa Grande the oil to keep the tractors going and San Diego gave \$3800 in cash that was raised by private subscription. Today that is a state highway, paved and in an airline to the east.

S. D. Not Getting Share

With the cut-off between Tucson, via Wilcox and Lordsburg, N. M., now under construction, another 80 or 90 miles will be saved in transcontinental travel at the option of the traveler. Our dream has come true. We now have paved highway from the Pacific to the Atlantic, U. S.

Highway 80, and the Broadway America, to Washington, but we realize that San Diego is only getting a percent of the western travel that comes through Yuma. The rest of it goes direct to Los Angeles. Certain interested parties tell the traveler our grades are dangerous. The truck owner says he can haul his produce from Imperial valley to Los Angeles at the same cost and less danger, although the distance is 100 miles farther. The Mountain Springs grade must be rebuilt before travel and shipping will come to San Diego, its home port, more than 100 miles nearer the ocean than Los Angeles.

There has been a growing demand for this improvement by the chambers of commerce of Imperial valley and San Diego. Soon the contract will be let involving an expenditure eventually of more than \$1,000,000. Especially active have been the shippers' committee of the chamber of commerce, Chairman Neil Brown; Frank Forward, Rufus Choate and the state harbor commission, the board of supervisors, the San Diego Highway Development association, Ed Hastings, Roy Richards, John Faddis, Fred Simpson, Ed Boyd, Bert Vaughn, Robert Hays, of El Centro, and many others.

For 30 odd years I have enjoyed working for state and national highways. Few realize the direct benefits from tourist travel. It is our second largest source of revenue in the state of California. We must get back our share of the travel now going to Los Angeles and get it to come via the Mountain Springs grade and San Diego to Los Angeles. It is only 32 miles longer with the added attractions of mountain and sea as compared to desert travel.

It is only through the united efforts of Imperial and San Diego counties, interests of which are mutual, that we can carry on a successful campaign across the continent for the diversion of auto travel over our U. S. Highway 80 and the Broadway of America, for the benefit of all.

Ed Fletcher Papers

1870-1955

MSS.81

Box: 20 Folder: 33

General Correspondence - O'Shaughnessy, M.M.



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