show that no unsatisfactory material was forced into the impervious core section. The fact of the slide, however, abundantly exemplified the justified unanimous fears of the engineers who had considered the situation the day before. Happily no detrimental quantity of sand was carried into the impervious core section.

Notwithstanding the specific requirements of letter S-93, the contractor has continued to deliver and saturate in the hog box and carry to the two beaches material exclusively from local borrow pits and vicinity.

On reporting the slide situation to the City Attorney's office March 8, A.M. I was advised that it was planned to have a conference between the City's Attorney, Special Water Counsel T. B. Cosgrove and the contractor's Attorney John M. Martin in Los Angeles to perfect an arrangement for continuing the work.

I initiated a considerable conference with the City Attorney in his office March 8 P.M. and persuaded him to accompany me to the El Capitan Dam this morning (March 9, 1934) in order that he might visualize on the ground the conditions and gain a first-hand impression of the physical and hydraulic conditions as they now exist.

We found the contractor continuing to heighten the beaches, despite the definite instructions to him to refrain from doing so (letter S-93), and that another short reach slide had occurred about 8:00 o'clock last night from about the center reach of the upstream beach out into the impervious core section, which preliminary subsurface investigations indicated may have carried with it a considerable portion of sand. Samples are being obtained today by the core recovering method, with which you are familiar, and analyses will determine the location, area and depth of sand forced into the impervious core section.

The contractor's Consulting Engineer J. B. Lippincott was at the dam today and emphatically advised me that the local material was entirely satisfactory and that under no condition was the contractor under any obligation to import any clay and demanded that policies and methods utilizing material from local borrow pits and vicinity for the contractor's consideration be immediately developed and submitted to him by the Hydraulic Engineer.

It was deemed proper and advisable to invite Mr. Lippincott's attention to the letter to the contractor dated March 6, 1934 (S-93) and several previous letters, and to the contract specifications with especial reference to paragraphs 53, 62 and 63.

Very truly yours,
H. N. Savage
Hydraulic Engineer

HNS/f
encl. letter S-93

original mailed to Los Angeles
copy " " Sonora

3-1-35
copy/p

2011

March 21, 1934

Mr. T. B. Cosgrove
Special Water Counsel
City of San Diego
Sonora Inn
Sonora, California

Subject: San Diego River Project, El Capitan Feature, hydraulic fill section

My dear Mr. Cosgrove:

Contractor H. W. Rohl and T. E. Connolly have again inadvertently introduced a material quantity of sand lenses and sand strata into the impervious core section of the hydraulic fill area of the El Capitan Dam.

It is the unanimous opinion of the City's Engineers and the State's Engineers who have inspected the core recovered samples of material from the impervious core section that there are sufficient fines in the impervious core section if properly mixed with the sand lenses and strata to provide a satisfactory and positively safe impervious core section.

The contractor has been directed to remedy the conditions due to the presence of sand lenses and strata. He has assembled and installed an agitator with a perpendicular arm about 24 feet in length to be power rotated and is now experimenting.

Enclosed is copy of letter to the contractor dated March 21, 1934 (S-98) directing him to refrain from placing any additional material in the hydraulic fill area of the El Capitan dam until he has corrected the condition that exists in a large portion of the impervious puddle core section due to the existence of sand strata resulting from his methods of construction.

Your visit and inspection Saturday noon, March 24, 1934 will be timely and your constructive cooperation will be valued, and doubtless of material value to the interests of the City of San Diego.

Provided you do not leave Modesto until Friday night, it is my impression that you will only have about fifteen minutes in which to transfer in Los Angeles from the Southern Pacific Station to the Santa Fe Station, which may be possible if your Southern Pacific train is on time, which I understand it sometimes is.

If you desire, I could conveniently have the City of San Diego's automobile meet you at the Southern Pacific Station in Los Angeles on your arrival so if the train was late you could be assured prompt transportation to San Diego.

Very truly yours,

H. N. Savage
Hydraulic Engineer

HNS/f
cc Los Angeles office

2-28-35
copy/p

2012

April 2, 1934

Mr. T. B. Cosgrove
Attorney at Law
c/o Sonora Inn
Sonora, California

Subject: San Diego River Project, El Capitan Feature, hydraulic fill impervious core section, sand lenses and strata recovery

My dear Mr. Cosgrove:

The contractor, H. W. Rohl and T. E. Connolly's core re-mixing machine (repeatedly modified and strengthened) is being operated fore and aft across the left and/or south 200 feet reach of the total about 850 feet north and south length of the summit pool of the El Capitan Dam. The maximum depth reached by the machine is 21 feet, which samples indicate may be to the base of the deepest sand strata.

After the machine has been three times over the same cross section lane, samples of the core material from in place are being taken. Visually the samples look promising. The first laboratory analysis reports of the re-mixed material are expected today.

The elevation of the surface of the water in the summit pool has been lowered from 691.7 to 690.2.

In addition to the major sand deposit lenses and strata in the impervious core section adjacent to the left and;or south reach of the summit pool, there is a considerable deposit reach of sand strata about midway the length of the summit pool, and another major deposit reach of sand strata at the right and/or northerly end of the summit pool.

It is indicated that re-mixing will be necessary throughout a total reach of about 450 feet, out of the total about 850 feet length of the summit pool.

The drill steel arms on the rotator were not enduring. The paddles now installed promise relative durability.

The enclosed photographs may assist in refreshing your mind as to the vicinity and the machine as modified.

Provided the analysis of samples from the material remaining in place after the re-mixing discloses a satisfactory imperviousness, it is now estimated that it will take the contractor approaching three weeks more to complete the subsurface re-mixing.

Very truly yours,
H. N. Savage

HNS/f
encls. photoprints EC-647,8, 651
cc-1030 Rowan Building, Los Angeles

2-5-35
copy/p

2013

April 3, 1934

Mr. T. B. Cosgrove
Attorney at Law
c/o Sonora Inn
Sonora, California

Subject: San Diego River Project
El Capitan Feature, Graph

My dear Mr. Cosgrove:

Enclosed is graph of Contractor H. W. Rohl and T. E. Connolly's construction progress on the El Capitan Reservoir Dam, Spillway and Outlet Works, showing:

Successive elevations of the summit pool;
Monthly contract earnings to March 1, 1934;
Contract 25% hold-back to March 1, 1934;
Estimated total contract earnings when finished; and
Contract completion date, October 31, 1934.

It is indicated that it will be necessary for the Contractor to materially speed up the work in order to complete October 31, 1934.

E. Alan Rowe, the Contractor's Resident Engineer, suffered a broken leg midway between the knee and ankle while directing the operation of the subsurface mixing machine April 2, 1934, 6:30 P.M.

Engineer Rowe has been largely responsible for the design of the core sample recovering gadget which you saw in very satisfactory operation; also in accomplishing the design of the core re-mixing machine which it is indicated is working efficiently. Analyses of core samples are now being determined.

Very truly yours,

H. N. Savage,
Hydraulic Engineer.

HNS/f
encl. graph. "Chart showing Contract Earnings, Hold-back and Progress Summit "Pool" 4/3/34
cc 1030 Rowan Building
Los Angeles, California

2-28-35
copy/p

2014

May 1, 1934

Mr. T. B. Cosgrove
Special Water Counsel
City of San Diego
c/o Sonora Inn
Sonora, California

Subject: San Diego River Project, El Capitan Dam, Contract construction

My dear Mr. Cosgrove:

Enclosed is copy of letter dated April 30, 1934 just received from H. W. Rohl and T. E. Connolly, contractor for the construction of the City of San Diego's El Capitan reservoir dam, spillway and outlet works, also copies of all letters to or from the contractor referred to by the contractor in his letter dated April 30, 1934.

Mr. Connolly was formally notified by me this morning, before receiving the above communication, and in the presence of Deputy City Attorney H. B. Daniel and Assistant Hydraulic Engineer Fred D. Pyle, that the condition of the impervious puddle core section of the El Capitan Dam indicated by comprehensive analysis of samples, does not justify its approval by the Hydraulic Engineer; and, that

Provided the contractor will furthermore run his core mixing rotator machine effectively in depth to elevation 672 as required and for the entire length of the summit pool from abutment to abutment, and on both sides of the central alignment of the structure to the satisfaction of the City's Hydraulic Fill Engineer;

The Hydraulic Engineer will approve the work for payment subject to the State Engineer's deeming the structure to be safe.

A preliminary draft of a reply to the contractor regarding his policies and methods of constructing the works called for by the contract drawings and specifications will be progressed and copy sent to you for editing, amplifying and/or deleting before passing it to the contractor.

Duplicate original of this letter with enclosures has been sent to the City Attorney.

Very truly yours,

H. N. Savage
Hydraulic Engineer

HNS/f
encls.

2-5-35
copy/p

2015

January 14, 1935

Mr. T. B. Cosgrove
Special Water Counsel
1030 Rowan Building
Los Angeles, California

Subject: San Diego River Project,
El Capitan Feature, H. W. Rohl
and T. E. Connolly, Contract

My dear Mr. Cosgrove:

Enclosed for your information and files is copy of final estimate for H. W. Rohl and T. E. Connolly, Contractor, El Capitan Reservoir Dam, Spillway and Outlet Works.

You have my sincere appreciation for the work performed by you in connection with the construction of El Capitan Reservoir Dam, and the acceptance by the Contractor of the final estimate.

The tunnel plug was completed except for grouting on December 23, 1934. The tunnel inner lining will probably not be completed until the middle of February.

There are now about 161,000,000 gallons of water in storage in El Capitan Reservoir.

Sincerely yours,

Fred D. Pyle
Hydraulic Engineer.

FDP/f
encl.

CONSULTANTS

D. C. HENNY

10/6/33
copy /f

2017

C O P Y

WESTERN UNION TELEGRAM

SAN DIEGO CALIF MAY FIFTEEN

D. C. HENNY
HYDRAULIC ENGINEER
PORTLAND OREGON

CAN YOU ACCEPT EMPLOYMENT BY CITY OF SAN DIEGO IMMEDIATELY FOR PURPOSE ONLY OF FURNISHING TO CITY COUNCIL REPORT ON PROGRESS OF CONSTRUCTION WORK ON EL CAPITAN DAM TO DATE DEALING WITH QUESTION OF SAFETY OF STRUCTURE COMPLIANCE WITH PLANS AND SPECIFICATIONS COSTS TO DATE AS COMPARED WITH BID SCHEDULES AND DEALING WITH ALL DISPUTES AND CONTROVERSIES EXISTING BETWEEN CONTRACTORS AND CITY ENGINEERING FORCES SUCH EMPLOYMENT NOT TO EXTEND BEYOND TIME TIME NECESSARY TO ENABLE YOU TO FURNISH COUNCIL INDICATED REPORT AND YOUR COMPENSATION NOT TO EXCEED ONE HUNDRED DOLLARS PER DAY TOGETHER WITH TRAVELING EXPENSES AND LIVING EXPENSES FROM PORTLAND TO SAN DIEGO AND RETURN PLEASE WIRE

ALLEN H. WRIGHT CITY CLERK

10/6/33
copy /f

2018

5/17/33

From : City Clerk

To : Hydraulic Engineer

Subject: El Capitan Dam

1 Herewith I am sending you copy of telegram just received from D.C.Henny of Portland, Oregon, whom the council has invited to come here for special work in connection with controversies between contractors and your office.

2 It is the wish of the mayor and the councilmen that you have prepared for Mr.Henny's use the categorical statement which he requests in his wire.

ALLEN H. WRIGHT (Signature)

Allen H.Wright,
City Clerk

10/6/33
copy /f

2019

C O P Y

POSTAL TELEGRAPH TELEGRAM

PORTLAND ORE MAY 17 1025A

ALLEN H WRIGHT

CITY CLERK SAN DIEGO CALIF

ARRIVE FRIDAY NOON IF MAKE LOS ANGELES RAIL CONNECTION STOP WIRED STATE ENGINEER SUGGESTING HE SEND STATE INSPECTOR TO GIVE INFORMATION STOP TRUST CITY ENGINEERS WILL HAVE PREPARED ON MY ARRIVAL COMPLETE CATEGORICAL STATEMENT OF ITEMS REGARDED AS VIOLATIONS OF PLANS AND SPECIFICATIONS BY CONTRACTORS EL CAPITAN DAM

D C HENNY

3/5/34
copy/f

2020

W E S T E R N U N I O N

MAY 17 1933

EDWARD HYATT
STATE ENGINEER
401 PUBLIC WORKS BUILDING
SACRAMENTO CALIFORNIA

CITY'S CONSULTING ENGINEER HENNY REPORTS

THAT HE HAS SUGGESTED YOU

SEND STATE INSPECTOR TO SAN DIEGO

FOR CONFERENCE EL CAPITAN YOUR

PERSONAL PRESENCE DEEMED ESSENTIAL

H. N. SAVAGE

3/5/34
copy /f

2021

POSTAL TELEGRAPH

1933 MAY 18 AM 11 41

S106 23=SC SACRAMENTO CALIF 18 1114A

H N SAVAGE, HYDRAULIC ENGINEER CITY OF SAN DIEGO
524 F ST SAN DIEGO CALIF=

REFER YOUR TELEGRAM SEVENTEENTH STOP AM LEAVING STATE
CONSEQUENTLY REGRET MY INABILITY TO ATTEND CONFERENCE STOP HAVE
DIRECTED HAWLEY TO MEET WITH YOU=

EDWARD HYATT

10/6/33
copy /f

2022

May 19, 1933

TO THE HONORABLE, THE MAYOR AND COUNCIL
OF THE CITY OF SAN DIEGO, CALIFORNIA.

Subject: San Diego River Project, El Capitan Feature
Statement of Contractor's non-compliance
with contract specifications.

Gentlemen:

The following statement is submitted in accordance with that portion of telegram received by the City of San Diego's City Clerk from the City's Consulting Engineer, Mr. D.C.Henny.

> "Trust City Engineers will have prepared on my arrival complete categorical statement of items regarded as violations of plans and specifications by contractors El Capitan Dam."

For some time past H. W. Rohl & T. E. Connolly, Contractors for the construction of El Capitan Reservoir Dam, Spillway and Outlet Works have not conducted portions of the work in accordance with certain specific requirements of the contract specifications and they have not complied with instructions and directions issued in accordance with the contract specifications by the Resident Engineer and by the Hydraulic Engineer set forth as follows:

(a) The Contractor has disregarded instructions relating to stripping overburden from the abutments of the dam and excavation of cutoff trench.

(b) The Contractor has placed in the hydraulic fill material from portions of borrow pit "A" contrary to specific and definite instructions.

(c) The Contractor, in placing material in the hydraulic fill, has not maintained the required ratio of spillway excavation material to the borrow pit material.

(d) The Contractor has persisted, contrary to written instructions, in placing material in the hydraulic fill portion of the dam without sorting and placing by hydraulic means as required by the contract specifications.

(e) The Contractor has not sufficiently washed the hydraulic fill material which has resulted in the leaving of much fine material in the beach section which should be in the puddle core.

(f) The Contractor has not properly removed the earthy material and decomposed granite from the top of the lift of the

downstream rock embankment at elevation about 600, before placing the next lift of rock embankment thereon.

(g) The Contractor has not properly faced, hand-placed, bedded and chinked the rock in the exposed surface of the rock embankment as required by the specifications.

(h) The Contractor has not properly placed portions of the lining in the by-pass tunnel with the result that there are many unfilled spaces back of the lining and a portion of the lining may not be the required thickness over the timbers.

(i) The Contractor has not complied with contract specifications requiring him to notify the City in ample time to allow for testing of cement.

In letter of April 8, 1933, the Hydraulic Engineer invited the attention of the City Attorney to the Contractor's non-compliance with contract specifications and to pertinent references thereto, and requested immediate legal opinion as to how the Hydraulic Engineer should proceed in order to secure compliance with the contract specifications. No opinion has yet been received.

Respectfully,

H. N. Savage,
Hydraulic Engineer

HNS/P

6-3-33
copy/p

2024

COPY

C O N T R A C T

Pursuant to the terms of Resolution No. 60120 and Resolution No. 60140, the following agreement is entered into this 22d day of May, 1933, by and between THE CITY OF SAN DIEGO, represented by a majority of the members of the City Council and the City Manager, party of the first part, and MR. D. C. HENNY, party of the second part, WITNESSETH:

That party of the first part for and in consideration of the things to be done by Mr. D. C. Henny, as hereinafter set forth and as set forth in Resolutions numbered 60120 and 60140 agrees to pay said Second Party the sum of One Hundred Dollars ($100.00) per day, together with traveling expenses and living expenses from Portland, Oregon, to San Diego, and return; provided, however, his compensation in no event shall exceed One Thousand Dollars ($1000.00).

Party of the second part for and in consideration of the sums of money herein mentioned to be paid by party of the first part, agrees to immediately commence an investigation concerning conditions surrounding the construction of El Capitan Dam, and will, as soon as possible, submit a report to the party of the first part completely covering and dealing with the progress of the construction work on the El Capitan Dam to date, dealing with the question of safety of structure, compliance with plans and specifications, costs to date as compared with bid schedule contained in the contract between H. W. Rohl and T. E. Connolly and The City of San Diego, dealing with the sufficiency or insufficiency of the plans and specifications for the spillway and spillway extension, covering the question of the necessity for additional spillway extension, and dealing in general with all disputes and controversies, known or unknown, that to date exist between the contractors and the City engineering forces.

It is the intent and purpose of the parties to this agreement that a report be furnished containing facts sufficient to fully inform the Council with respect to the things herein mentioned, as well as any other information which party of the second part deems advisable to submit. It is important to the Council that they have expert engineering advice concerning the rate of progress of the work, concerning whether or not the plans and specifications of the contract are being complied with by both parties, and concerning the reasons for the various delays which have heretofore occurred, and concerning the proper method of procedure for The City of San Diego in supervision engineering and construction of the El Capitan Dam spillway and outlet works.

Said party of the second part further agrees that he will use all due diligence in preparing the report herein indicated, and shall furnish same to this Council as soon as possible.

THE CITY OF SAN DIEGO

By (Signed) John F. Forward Jr

(Signed) Wayne A. Hood

(Sighed) Harry Warburton

(Signed) Chas. E. Anderson

Members of the Council

(SEAL)

ATTEST:

ALLEN H. WRIGHT
City Clerk

By (Signed) Fred W. Sick
Deputy

(Signed) A. V. Goeddel
City Manager

Party of the First Part

(Signed) D. C. Henny

Party of the Second Part

I hereby approve the form of the foregoing Contract this 22d day of May, 1933.

(Signed) C. L. Cyers
City Attorney

2/5/35
copy/f

May 23, 1933

From : Engineer Fred D. Pyle

To : Hydraulic Engineer

Subject: San Diego River Project, El Capitan Feature Conference May 20, 1933.

At 9:15 A.M. May 20, 1933 a conference was attended at El Capitan Dam by City's Consulting Engineer D. C. Henny; and

City's Hydraulic Engineer H. N. Savage, Engineer Fred D. Pyle, Resident Engineer Harold Wood, Engineer Hydraulic Fill D. W. Albert; and

State Deputy Engineer in Charge of Dams Geo. W. Hawley, and Senior Engineer of Dam Inspection Gerald McKinlay, representing the State Engineer's office; and

H. W. Rohl, Contractor, Alan E. Rowe, Contractor's Engineer, and O. C. Steves, Contractor's Superintendent.

Reasonable agreement was reached as to relative condition at the top of the present rock embankment, elevation 634, as compared with the condition of the former top of the downstream rock embankment at elevation about 600 before it was covered with rock. It was indicated that most of the borrow pit material had been removed before the rock had been placed on the top of the embankment at elevation 600, but that there was also considerable quarry waste, much of which was earthy material and disintegrated granite remaining when the rock was placed over it. Mr. Henny could see nothing seriously objectionable. He indicated that with wet weather conditions of the past several weeks, and the load of the superimposed rock embankment, the rock would settle into the material objected to by the Hydraulic Engineer, which would result in closer contact of the large rock and materially increase the frictional resistance against sliding.

Mr. Henny asked if the rock embankment was level across the dam. He indicated it should have a slope toward the hydraulic fill portion much the same as used in placing concrete pours in the latest concrete dams, which indicates that he does consider that the embankment must be able to withstand pressures from the hydraulic fill portion of the dam and be able to withstand frictional resistance. He suggested that the contractor might be prevailed upon to construct rock embankment with slope toward the axis of the dam without additional cost.

Mr. Rowe and Mr. Steves contended that much material was removed from the rock embankment at elevation about 600 after the Hydraulic Engineer's letter dated March 22, 1933, was received. Mr. Henny stated that if conditions were not satisfactory at the time the rock was being dumped, the contractor

should have been stopped by the inspectors. Mr. Rowe and Mr. Steves said that no one said anything and they thought everything was all right until they received the Hydraulic Engineer's letter dated March 30, by which time a very large portion had been covered up.

The Hydraulic Engineer left the conference at about 10:30 A.M. and returned to San Diego.

Mr. Hawley said he did not consider the condition at elevation 600 as affecting the safety of the dam sufficiently to cause any concern to the State. Mr. McKinlay was sure no unusual amount of material had been left on the embankment, but stated, on cross examination, that he did not see the dam between March 14 and March 31, 1933.

He discussed the conditions as to scarifying and the attempts of the Contractor to create additional bond by shooting on the tops of lifts at lower levels. Mr. Steves stated that the Contractor had been instructed to place considerable tunnel muck and core wall excavation in the lower lifts which material contributed to the condition on the tops of the lifts. The conference was advised that the Hydraulic Engineer did not consider that as much care was necessary below elevation 600 on the downstream rock embankment and elevation 625 on the upstream embankment as was deemed necessary in placing rock embankment above these elevations.

Conditions were examined at the 616 foot level and at the 600 foot level. Also the location of the stall designated by the Hydraulic Engineer's letter dated May 10, 1933 to the Contractor for excavation by the Contractor to disclose the conditions on the 600 foot level, in accordance with the City Council's Resolution No. 60012, and the preparatory work started by the power shovel May 12, which work was discontinued on the visit of four members of the Council, the City Attorney and Mr. M. M. O'Shaughnessy, Consulting Engineer for the City of San Francisco.

Mr. Hawley stated that the State would require a formal application which would have to be carefully considered before the rock on the 600 foot level could be removed, and even then there was doubt if permission would be granted to remove it, because of the possibility of puddle core escaping and difficulties in replacing rock embankment in as good condition as at present. Mr. Hawley's attention was invited to the water level as shown in the observation wells installed in the hydraulic fill portion of the dam, which level indicated that the water under beaches, except for the two wells at the extreme inner edge of the beach, was from five to fifteen feet below elevation 600.

After a full explanation on summit pool elevation 616, distance from the nearest edge of the summit pool to the nearest edge of the rock embankment at elevation 600 - about 240 feet, and the method of excavating the stall and of

removing earthy material and decomposed granite, and replacing the rock from additional stall space as determined upon by Consulting Engineer L. C. Hill and the Hydraulic Engineer May 10, 1933, Mr. Hawley tentatively agreed that the State would have no objections to the removal of the rock.

After lunch at the Contractor's camp, Contractor H. W. Rohl was absent from the conference.

The conference group then went to the quarry. Mr. Henny said that if the Hydraulic Engineer did not want the overburden to enter the dam he should have required the Contractor to strip the quarry in advance, but if the Contractor was permitted to shoot down the overburden, the Contractor could not be prevented from placing a reasonable amount of the earthy material and decomposed granite in the dam. Mr. Henny stated that he thought the rock was of excellent quality and a reasonable amount of overburden was not objectionable as it would fill the voids and increase the weight of the rock embankment which was desirable.

The conference group then went to the puddle core area at elevation 640 north abutment. Mr. Henny considered that one road below the stripping was sufficient to catch the escaping material from stripping operations above and the ravelings. He stated that some ravelings and rock could go into the puddle core area without endangering the dam, provided there was not a continuity of such material extending through the puddle core. He expressed himself that there was no requirement for stripping to the top of the puddle core area in advance of the work.

The group then went to the top of the spillway excavation where Mr. Henny was much concerned as to the footings for the spillway crest and anchorage for the spillway lining. He also suggested that a model of the spillway be made and that it might show the necessity for division walls from the overflow crest to a line opposite the west end of the spillway crest. Mr. Henny advised the construction of a model of the spillway and the making of tests to determine what changes in design should be made. He was told that the spillway plans had been approved by the State to elevation 575, and that there were no questions involved in this part of the spillway, except as foundations might be disclosed as excavation progressed.

Mr. Hawley and Mr. McKinlay then left the conference at 2 P.M.

The remainder of the conference group then went to the top of the upstream rock embankment, examined the quantity of earthy material and disintegrated granite on the embankment and the reasonable effectiveness of scarifying, bulldozing and washing with monitors of the easterly portion of this area which work appeared to meet Mr. Henny's approval. Mr. Rowe and Mr. Steves said that where bulldozers were pushing rock over this area for surfacing the dam, they would re-wash

the area before placing rock on it.

The rock surfacing was examined on the upstream side of the dam. Mr. Henny was of the opinion that it was hand-placed and chinked and was about all that could be expected under the specifications. He stated that ti would not be sufficient to withstand wave action on a one on two slope where it should be laid with larger rock and chinked sufficiently to bond together. Mr. Henny also stated that the rock embankment might be thickened near the top of the dam to advantage to withstand wave action.

The group, except for Mr. Rowe and Mr. Steves, then went into exploratory tunnel #3, which goes through the location of the spillway channel a few feet above the floor of the channel.

The entire group then went to borrow pit "A" where the removal of unapproved material by the Contractor was discussed. It was conseded by all that the Contractor had taken unauthorized material three times, but Mr. Rowe and Mr. Steves said that at the time most of the material was taken it was when the night shovel operator made a mistake.

The depth of the disintegrated granite in the borrow pit was pointed out by Mr. Henny and he advised that undoubtedly the Hydraulic Engineer had authority to direct the depth to which the material should be excavated and the leaving of the suitable material for topping off the upper portion of the dam.

The economics of the use of borrow pit and spillway material were discussed. Mr. Rowe said he had tried since last Fall to secure information as to the amount of spillway excavation so that the Contractor could know how much material would be available from the spillway and how much would be required from the borrow pits, but alleged that the Contractor received no definite information until March 1933.

In discussing the time that the Contractor placed hydraulic fill material so fast, the dump of unwashed material extended 94 feet into the hydraulic fill space from the downstream rock embankment and 48 feet from the upstream rock embankment, Mr. Rowe acknowledged that the condition was not desirable, and Mr. Steves said he had bet Mr. Rohl he could smother the monitors.

The organization was then discussed, Mr. Rowe and Mr. Steves claiming they could not obtain definite instructions from the Resident Engineer or from the Inspectors.

The conference ended at 5 P.M.

During the day it was noted that one power shovel was operating in the quarry loading rock for surfacing rock embankment; one drag line was stripping on the south abutment; concrete was being placed in the north end of the core wall; one monitor was working part time washing material from stripping downstream rock embankment; a crew was placing rock on exposed

surface of the upstream rock embankment and the last of the seven observation wells was completed about 10 A.M.

Also it was noted that during the past thirty days much progress had been made by the Contractor in construction of Contractor's construction roads; excavation and concreting of cutoff wall trench; stripping of abutments, and shooting of boulders in the spillway.

Fred D. Pyle
Engineer

FDP/p

2/5/35
copy /f

2031

May 23, 1933

From : P. Beermann

To : Hydraulic Engineer

Subject: San Diego River Project, El Capitan Feature
Conference with D. C. Henny, Consulting Engineer,
May 23, 1933.

Mr. Henny inquired about the sliding resistance of the El Capitan Dam at elevation 600 downstream from the core wall. He wanted to know what the respective unit weights of rock in place is and the weight of hydraulic fill material. He also inquired whether or not tests had been made which would show the sliding resistance of the hydraulic fill beach material and if there was available the unit weight of hydraulic fill core material. With the exception of specific gravity and void content of the hydraulic fill core material from which could be figured the weight, the data requested is not as yet available.

Mr. Henny thought that the addition of fine decomposed granite into the voids of the rock directly above elevation 600 and on the downstream side of the dam would increase the weight of the rock blanket. I indicated that previous to the California State Engineer's approval, there had been shown fine material sluiced into the rock embankment adjacent to the toes but the addition of such fine material to the rock embankment had been disapproved by the State Engineer.

Mr. Henny then asked to re-figure the resistance to sliding of the downstream portion of the dam above elevation 600 and using as the best guess the unit weights of material and assuming sliding coefficient as suggested. He referred to Mr. Allen Hazen's paper on Calaveras Dam as published in the Transactions of the American Society 1919-20.

Mr. Henny asked to have the minimum thickness section of concrete of the tunnel concrete lining given him.

He also wanted to know what might be the stresses induced in the tunnel concrete due to full hydrostatic head. It was pointed out to him that drainage had been provided and that voids and space behind the timbering could be grouted.

He was concerned about the sliding of the ogee spillway section on its base. He thought that the contact between the ogee section and the decomposed granite would provide very little frictional resistance. It was pointed out to him that the section shown on the contract specification drawings was only a typical section and that the base of the ogee could be

sloped towards the upstream end of the ogee section to counteract any aliding tendency.

Mr. Henny indicated that it might be necessary to place guide walls in the spillway to direct the water toward the downstream end.

He asked if no model had been made of the spillway, and he was shown the 1/4-inch to the foot model made in this office some time ago.

Mr. Henny apparently was not concerned about the layer of decomposed granite material above the rock material at elevation 600 on the downstream side of the dam.

He asked that I accompany Mr. Fred D. Pyle and himself to the office of Testing Engineer J. Y. Jewett where he discussed with Mr. Jewett various tests which had been made and inquired about frictional resistance tests and permeability tests. He suggested to Mr. Jewett it might be advisable to test for the percentage of colloidal material, and he expressed the thought that the fact the pool of the dam was relatively clear was not an indication of lack of colloidal material.

He ascertained directly from Mr. Jewett the void content of the puddle core material.

He was much concerned with the amount of side or horizontal pressure from the puddle core.

After some discussion, Mr. Henny left for El Capitan Dam at 2:30 P.M. accompanied by Engineer Fred D. Pyle, Testing Engineer J. Y. Jewett, Contractor's Engineer E. Alan Rowe, and Mrs. D. C. Henny.

P. Beermann

PB/P

2/5/35
copy/f

2033

May 23, 1933

From : Engineer Fred D. Pyle

To : Hydraulic Engineer

Subject: San Diego River Project, El Capitan Feature
Conference May 21, 1933

On May 21, 1933, a conference was held at El Capitan Dam at which were present Consulting Engineer D. C. Henny, Engineer Fred D. Pyle, Resident Engineer Harold Wood, Engineer Hydraulic Fill D. W. Albert, for the City of San Diego; and Alan Rowe, Engineer, and O. C. Steves, Superintendent, for the Contractor.

The Hydraulic Engineer's letter to the Mayor and Council, dated May 8, 1933, relative to cement testing, was read by Mr. Henny, who could see no delinquency on the part of the Contractor except that out of courtesy he might have replied to the Hydraulic Engineer's letter dated January 13, 1933. Mr. Rowe explained the situation, stating that at one time it was probably the intention of the California Portland Cement Company (Colton) to pass some of the cement business to the Riverside Portland Cement Company, but this had not been agreeable to the Contractor.

The completion of the top portion of the dam was discussed and Mr. Henny was of the opinion that sandy material was better than clayey material for the portion above elevation 750, as sandy material would not crack like clayey material, and if any water did pass thru the sandy material it would be absorbed by the beach on the lower side of the puddle core.

Mr. Henny also urged the completion of the dam at the earliest practicable date, both to reduce hazard from flood, and to store flood waters. He was advised that the tunnel and dam as now constructed would take care of a flood as large as that which occurred in 1916 which reached a maximum of 38,000 cubic feet per second; that when the summit pool approached elevation 636, or 20 feet above its present elevation, the tunnel and the storage to that level would handle a flood of 48,200 cubic feet per second, which the State expected might occur once in 100 years; and that when the summit pool reached elevation 690, a flood of 102,500 cubic feet per second, which might occur once in 1000 years, could be handled.

Mr. Henny was also advised that to complete the dam in time to store the 1933-34 winter season runoff, would require raising the dam about 150 feet from its present height of 67 feet above streambed, or a total height of 217 feet above streambed.

A close inspection could not be made of the unsatisfactory placing of concrete in the roof of the by-pass tunnel. Mr. Henny believed the tunnel plug should be located in the immediate vicinity of the axis of the dam, stating that it was very doubtful if grouting and drainage would be sufficient to prevent hydrostatic pressure coming on the tunnel lining which might be disastrous.

The conference ended about noon.

Fred D. Pyle
Engineer

FDP/p

5-26-33
copy/p

San Diego, Cal., May 25, 1933

To the Mayor and Council of

The City of San Diego, California.

Subject: Features of El Capitan
Design and Construction.

Gentlemen:

Your honorable body has requested me to report on the following features of El Capitan Dam Design and Construction.

(a) Safety of Structure

(b) Sufficiency of Spillway Plans and Specifications

(c) Progress of Work

(d) Compliance with Plans and Specifications

(e) Disputes between City Engineering Forces and Contractors

(f) Costs to Date as Compared with Contract Bid Schedule

(g) Delays and Reasons Therefor

(h) Proper Method of Procedure for The City of San Diego in Supervision of El Capitan Storage Works.

In response to your request, I arrived in San Diego on the afternoon of May 19th, and have made as thorough an investigation as the nature of my assignment appeared to warrant, and sufficient to permit me to draw conclusions as hereinafter set forth.

It should be stated that the dam is now 50% complete, and that the elevations reached are approximately as follows:

At Upstream Slope	625 ft.	95 ft.	above	rock	base	145 ft.	below	top	of	dam	
Puddle Core	606 ft.	76 "	"	"	"	164 "	"	"	"	"	
At Downstream Slope	634 ft.	104 "	"	"	"	136 "	"	"	"	"	

The Outlet tunnel is complete, except that there remains to be done about 287 feet of concrete lining, where hard rock exists, considerable patching of concrete lining and the necessary pressure grouting of rock behind lining and drilling of drainage holes.

The spillway excavation is only in its initial stages.

(a) Safety of Structure.

This subject may be logically divided into matters relating to the dam proper, to the outlet works, and to the spillway.

Dam Proper.

The safety of the dam proper if thoroughly protected from overflow by an adequate spillway depends upon its dimensions considering foundation, the character of materials employed, and the proper disposition of the materials.

As to dimensions, the design is satisfactory.

although some changes may be found desirable. The character of materials employed is excellent. The core material, upon which tightness depends, is of such consistency, fineness and freedom of slippery colloidal matter as to favor relatively rapid consolidation. The sand and gravel in the beaches adjoining the core pond have the necessary drainage properties. The coarser material and the loose rock fill on the outer slopes is hard, durable, and of the proper size.

In general, the material has been well placed and the specifications have been reasonably followed. Infractions which have been charged will be discussed under the head of "Disputes."

On the whole, so far as I am able to judge from evidence before me, the work is done in a way which sheds credit on both engineers and contractors, and there is so far assurance that an entirely satisfactory and safe structure will result.

Outlet Works.

This part of the work, consisting of a tunnel now used for by-passing river water, a gate tower, a tunnel plug with imbedded outlet pipes, and pipes in tunnel downstream from plug with control gates, is so far as constructed well executed barring minor items to be mentioned later. some changes in the design may be found essential to safety.

Spillway.

The spillway lip and the upper part of the spillway discharge channel as now designed have satisfactory capacity, judging from elaborate flood studies which have been made by your engineers, the contractor's engineers, and the State engineer, all being in substantial accord.

(b) Sufficiency of Spillway plans and Specifications

The lower spillway channel has not yet been designed. It presents a difficult problem, as it involves the safe release of an enormous flood discharge, which after passing the spillway lip reaches river bottom elevation at velocities approximating one hundred feet a second. Hydraulic analysis and confirmatory model tests which are essential to safe and economical design still remain to be made.

All that can be reported now is that even considering the decomposed condition of the granite on which most of the structure must be founded, there is no reason why an entirely safe design, satisfactory to the State Engineer, cannot be worked out within the next few months, if the work is promptly and energetically carried through.

A reliable estimate of cost, which is liable to seriously exceed estimates so far made must await the completion of the above described work.

(c) Progress of Work

Until the general work of dam building was stopped on April 10th of this year, the work was carried forward with sufficient rapidity so that every reason existed to believe that the entire work, dam and appurtenances, could be readily completed by January 1, 1934, or ten months before the specified date of completion. About one and one-half months have now been lost by partial stoppage. However, if the construction work can be promptly resumed, and if lacking plans can be completed in time to avoid delays in construction, it is still possible that a safe height of dam can be reached above spillway lip elevation to protect the dam from overflow, allowing finishing work to carry over into next year.

The importance of accomplishing the above result, in view of potential loss of life and infliction of damage as a result of overflow cannot be over-emphasized, no matter how infrequently the occurrence of a flood capable of producing such results may be argued on the basis of stream flow data available. The only remedy is prompt prosecution of the work, or else virtual cessation of dam construction to minimize possible damage, and completion of the work next year.

(d) Compliance with Plans and Specifications.

The preparation of specifications for a dam, and

especially for a hydraulic fill dam, is a subject, well known by engineers to be frought with great difficulty, because foundation conditions, the nature of the material necessary to be used, and interference from river flow, can only be partially known. For this reason all hydraulic fill dams and many other types of dam built by the U. S. Reclamation Service have been constructed by government forces and without the intervention of contractors. The behavior of hydraulicking material cannot be fully predicted, and it is with our present knowledge as yet impracticable to draw specifications for such work in definite detail, so that much must be left to the judgment of the engineers.

The contractor is thus unavoidably placed in a difficult position, as he can only surmise what the judgment of the engineer may be, and thus there is opened an unusually rich field for disputes and for the exercise of good judgment and the fostering of effective cooperation on both sides.

Such disputes as to non-compliance with specifications have, therefore, naturally arisen in this case, and will be discussed in order to avoid duplication, together with misunderstanding in other directions, under the following head of "Disputes."

(e) Disputes between City Engineering Forces and Contractors.

At my request the City Hydraulic Engineer, under

date of May 19th, 1933, has furnished a list of what are referred to by him as cases of non-compliance with instructions and directions issued in accordance with the Contract Specifications by the Resident Engineer and by the Hydraulic Engineer. The list consists of nine items. All of these have been examined and full opportunity has been afforded Engineers and Contractors in each other's presence to explain and refute allegations made, with representatives of the State present. The exact truth may not be fully ascertainable, yet study of statements on both sides, and of the material results still visible in the structure, are judged to afford sufficient information for reporting on the items listed by the Hydraulic Engineer as instances of noncompliance with specifications and instructions, as follows:

(A) "The Contractor has disregarded instructions relating to stripping overburden from the abutments of the dam and excavation of cutoff trench."

It is agreed by your engineers that whatever injurious results have so far ensured, they are immaterial, and do not affect the safety of the structure. The work of stripping done during the present shut-down of the hydraulicking work is understood to be satisfactory to your engineers, and no difficulty as to this item is anticipated in the future.

(B) "The Contractor has placed, in the hydraulic fill material from portions of borrow pit "A" contrary to specific and definite instructions."

This item refers to the excavation derived from the

extreme south end of the pit, where the loam and sandy clay merges into nearly pure sand. It is a clear case of misunderstanding by foremen of orders, and was corrected by the contractor as soon as his attention was directed to it. The dispute, which involves but a few hundred cubic yards, goes to indicate the close watch exercised by the City's inspector, the more so as the material itself is entirely acceptable for placement in the dam, and the only reason for the order forbidding its use is one of economy, inasmuch as similar or equally good material can under bid prices be obtained, at least for the present, at smaller cost to the City.

(C) "The Contractors, in placing material in the hydraulic fill, has not maintained the required ratio of spillway excavation material to the borrow pit material."

Complaints of this kind are almost unavoidable. The inspector is intent on ideal work. The contractor is faced with accidents to shovels in the various pits. Generally it is possible to meet such conditions by changing the place of dumping the various classes of materials and the position of the monitors. At times even this is not practicable. The question resolves itself into one of permissible tolerance of departure from exact requirements. With an inspector of wide experience, left to his own judgment and authorized to give orders meeting sudden changes, such disputes will

be generally avoided. The best evidence to date is that the quality of the work has not materially suffered so far. Close watch and exercise of good judgment hereafter, however, where requirements as the dam goes up are becoming more severe and more difficult to meet, are essential for securing satisfactory high quality of the work.

(D) "The Contractor has persisted, contrary to written instructions, in placing material in the hydraulic fill portion of the dam without sorting and placing by hydraulic means as required by the contract specifications."

In reading the specifications, it will strike every engineer with experience in hydraulicking, that the requirements are not at all times completely attainable with the semi-hydraulic process here specified and employed. Occasionally material is brought to the dam and dumped from trucks which is not readily turned over by water jets. The evidence available is to the effect that when difficulties of this kind were encountered prompt change was ordered by the inspector and made by the contractor. If any not fully washed material of this kind remains in the dam its proportion to the mass is probably negligible.

(E) "The Contractor has not sufficiently washed the hydraulic fill material which has resulted in the leaving of much fine material in the beach section which should be in the puddle core."

My comment on Complaint "D" applies with equal force

to complaint "E". It is physically impossible to prevent some small amount of fine material from being restrained in the interstices of the beach sand. It is generally intended that fine material unavoidably lodged in the spaces between sand particles shall nevertheless leave the material in a condition of easy self-drainage.

In order to test the results in this respect, of the work so far done, and to allay the suspicions of the engineers, seven holes were put down in the up and down stream beaches. The position of the water in these holes was measured and found to drop off in a direction away from the water in the central pond in a highly satisfactory manner.

This work, therefore, may be regarded as having been done in reasonable compliance with the specifications.

(F) "The Contractor has not properly removed the earthy material and decomposed granite from the top of the lift of the downstream rock embankment at elevation about 600, before placing the next lift of rock embankment thereon."

This complaint has perhaps attracted more attention than any other.

It is of undeniable importance that along any horizontal or downsloping plane from the puddle core to the outer slopes there shall not exist any condition which facilitates sliding. It is upon the friction which opposes the forces tending to produce sliding that the stability of the dam largely depends.

The facts, as they are brought out by the testimony from both sides and within each other's hearing, is that no 2-1/2 feet layer of earth exists anywhere at elevation 600 on the downstream rock fill, as is understood to have at times been alleged.

Unavoidable accumulation of fine material on top of the rock dump appears to have been removed by a bull-dozer until this powerful tool began to scrape the surface of big rocks, and could go no further. After that a powerful scarifier was run over the surface to break up the smooth places between rock points, and not until then new rock was permitted to come to rest on the underlying mass. Such treatment precludes the existence of any layer of earth through the loose rock fill of the dam.

There can be little question but in spite of all work which can be done the contact between successive layers is in loose rock the weaker plane of potential sliding as it is in concrete.

It is quite possible that the work done by the contractor might in places have been further improved upon, and engineers may well differ in their judgment as to how far work intended to insure best contact should be carried.

Looked at from the practical point of view, it is found that assuming the factor of safety against sliding due to the puddle pond pressure during construction has as regards the downstream fill a value of 2, which may not be far from the truth when the dam is up and the

pressure may be greatest, then if an actual 2-1/2 feet thick layer of earth did exist as first alleged, the safety factor might be reduced to 1.96. In any event the dispute is of small importance, because the weight which would rest on the earth layer in question, did it exist, is but 90 tons per lineal foot of dam as compared with the 1000 ton weight of upstream mass resting on gravel beach, the frictional resistance of which is not affected. It is my considered opinion moreover, based on my investigation, that no such extended layer exists, and that whatever reduction may have resulted in the factor of safety is negligible. Nevertheless, construction should be carried on with great care, so that even a small reduction of resistance will be avoided so far as reasonably possible.

It may here be mentioned that a slight upward sloping of the rock layer surface in a downstream direction can probably be secured at no extra cost, and will completely compensate for unavoidable imperfection in the contact between loose rock layers. If still further safety is desired, the contractor may be required to wash sandy material into the loose rock interspaces, so as to secure greater weight, and hence increased friction resistance to sliding. Such additional work, however, will involve increase in cost.

Lest misunderstanding arise from the mention of 2 as a factor of safety, it must be stated in the first

place that data now available as to weight of loose rock and beach sand in place, as to horizontal pressure exerted by core material and as to coefficients of friction, are as yet insufficient to permit determination of existing factors of safety with accuracy.

It must, in the second place, be specially emphasized that the factor of safety of 2, mentioned, is that which may temporarily prevail on the downstream side as against 1.75 on the upstream side during the construction of the dam. These factors of safety are estimated and their sufficiency must be made certain by close watch and careful measurement of slope movements so that accidents may be avoided such as were suffered in the cases of the Calaveras Dam near Oakland, and the Necaxa Dam in Central Mexico. In those cases a great part of the dam material when the work was 90% complete was pressed out into the reservoir under the force of puddle core pressure.

It should finally be stated that the factors so far discussed must be considered in no sense a measure of the safety of the dam after completion, which may be ascertained later when more data are at hand as to weights and friction, but which in any case are now known to be far greater than those in effect during the construction period.

(G) "The Contractor has not properly faced, hand-placed, bedded and chinked the rock in the exposed surface of the rock embankment as required by the specifications."

The specifications made in advance could not definitely

state what degree of perfection would be deemed essential, dependent as this is on the character of the best rock available.

The work as done, namely, the placement of heavy blocks of rock with smaller rocks filling a large part of the intervening spaces and the dropping into place by hand of smaller rocks so as to produce a reasonably smooth surface, will be admitted by most engineers to be amply sufficient for the purposes of resisting displacement and erosion by waves at the lower levels of reservoir water for which the wind fetch and the height of waves are small. It appears to me that eventhough literal compliance with the specification has not been secured, good judgment has been exercised by the engineers in permitting the character of slope construction in evidence on the upper slope. With increasing height, however, an ever more rigid interpretation of specifications must be enforced.

(H) "The Contractor has not properly placed portions of the lining in the by-pass tunnel with the result that there are many unfilled spaces back of the lining and a portion of the lining may not be the required thickness over the timbers."

This charge is true as to a part of the work, and is admitted by the contractor, who explains the deficiency by the urgency existing to put this tunnel into earliest service for diverting the river. It is understood that existing deficiencies will be made good by the contractor.

(I) "The Contractor has not complied with contract specifications requiring him to notify the City in ample time to allow for testing of cement."

This charge, upon investigation, appears to be due to a misunderstanding as to the source from which the cement was to be derived. The past difficulty has now been entirely cleared up.

Commenting in general on complaints as submitted, they do not indicate either appreciable lowering of the quality of the work or definite unwillingness of the contractor to comply with reasonable orders. They, however, do indicate an unfortunate lack of mutual understanding and hearty cooperation between engineers and contractor. Such cooperation is highly desirable for best results, but should never deteriorate into a lowering of necessary standards.

(f) Costs to date as Compared with Contract Bid Schedule.

This question is answered in detail in the Appendix 2, where schedule quantities originally estimated, now estimated, and the part performed up to May 1st, are placed side by side, as also the amounts in dollars figured for each schedule item on the basis of bid prices.

The total cost of schedule items, as originally estimated, is $2,333,000, and as now estimated is $2,687,000, all expressed to the nearest thousand dol-

lars. The increase in total estimates is mainly due to increases in excavation and embankment yardage and in the amount of cement. There are counter balancing reductions, the ultimate result being a cost increase of $355,000.

Judging by mere cost, the entire work may be considered as 50% complete.

The present estimate of cost of the entire El Capitan project may, on the basis of figures furnished by the City Hydraulic Engineer, be grouped as per Column 3 of the following table, Column 2 being the original estimate. Column 4 gives the cash so far paid out on account of each general item as listed, and Column 5 states the cash required to complete items as per City Hydraulic Engineer's estimate.

Cost Figures Obtained from Hydraulic Engineer's Office as of April 30th, 1933.

(1)	(2)	(3)	(4)	(5)
Items	Original Estimated Cost	Present Estimated Cost	Cash Expended to May 1.	Cash Required to Complete.
Dam Contract Items	$2,333,000	$2,688,000	$ 992,000	$1,696,000
Contract Extras	200,000	25,000	2,000	23,000
Total Ultimate Contract Payments	2,533,000	2,713,000	994,000	1,719,000
Sundries other than to Dam Contractors	40,000	52,000	34,000	18,000
Engineering and Legal Expenses	150,000	127,000	56,000	71,000
Total	2,723,000	2,892,000	1,084,000	1,808,000
Rights of Way, Reservoir and Dam,	82,000	82,000	47,000	35,000
Total required for storage,	2,805,000	2,974,000	1,131,000	1,843,000
Roads,	161,000	108,000	0	108,000
Pipe Line,	460,000	460,000	0	460,000
	$3,426,000	$3,542,000	$1,131,000	$2,411,000

Commenting upon the Hydraulic Engineer's figures, as above grouped, it is desirable to call attention to probable items of additional cost.

Mention has been previously made of incompleteness of

present plans of the spillway discharge channel. After considering the tentative plans so far prepared, it appears certain that the final plans will involve larger quantities of excavation and concrete than have been included in the above estimates. The need of a stronger rock protection near the top of the dam than is shown in Contract drawings has likewise been mentioned. This together with the more serious additions for spillway construction, in regard to which a reliable estimate must await completion of plans and model tests, will make a total which can now only be surmised, but which for present purposes is arbitrarily placed at $250,000.

As regard Contract Extras, originally estimated as per Column 2 at $200,000, or about 9% of total contract items, and now placed at $25,000, or about 2% of the work still remaining to be done, it does not appear safe to cut the Percentage estimate at this time down ffom 9% to 2%, even though the most serious cause of extras, namely, amounts involved in reaching a proper foundation, is now largely past. This item should be materially raised, say to 6% of still required expenditure, or approximately $100,000.

As to other items, I am not sufficiently informed to be able to suggest amendments. However, a total addition to the cost as now estimated of $350,000 may be deemed prudent for present purposes. This addition would bring the total estimated cost of storage up to $3,324,000, and the estimated grand total for the entire

project, including roads and pipe line, to $3,892,000. Of this amount $1,131,000 is reported to have been paid, leaving a probable need of further expenditures for storage of $2,193,000, and for completion of the entire project of $2,761,000, all of which estimates are subject to correction upon completion of plans.

It is evident from the figures submitted that the cost of storage by itself was originally estimated by your Engineers at $2,805,000, that this estimate was recently raised to $2,974,000, an increase of $169,000, and a further surmised increase of $350,000 may have to be faced, the two increases aggregating $519,000.

It is important to compare these amounts, uncertain as they may as yet be, with the total funds made available by the City's contract with the Reconstruction Finance Corporation, amounting to $2,350,000, with some adjustment for interest. Comparison shows that the completion of the reservoir and dam may leave a surplus of $157,000, while on the other hand for the completion of the entire project there may be a shortage of $411,000. In that connection it is understood to be the established policy of your Body to complete the reservoir first, as regards which there is available a margin of over $150,000, but the additional fact must be realized that no benefit can accrue to the City until the project is finished in its entirety.

Inquiry into city finances has developed the fact that there is available to the City $318,000 cash and

$289,000 face value of bonds in the Sutherland Dam Bond Fund, also $135,000 cash in the Acquisition and Investigation Bond Fund. My information is that transfer of any of these assets to the El Capitan Dam Bond Fund can only be authorized at an election by a two-thirds majority vote. These broad facts may enable you to judge at a glance the financial situation as regards completing any part or all of the El Capitan project.

It may be understood that the additions to the Hydraulic Engineer's estimates are admittedly arbitrary, but may be the best information available at the present time. The desirability for early more accurate determination by completion of plans is obvious.

(g) Delays.

The only material delay has its superficial cause in the partial shut-down of the work by the contractor on April 10th, which has now lasted nearly seven weeks. Its deeper cause must be found in unfortunate misunderstandings between engineers and contractor, and postponement of approval of the contractor's estimate.

In the foregoing part it is believed that enough has been said about the causes of misunderstandings in so far as they can be fairly commented on in this report.

(h) Proper Method of Procedure for The City of San Diego in the Supervision, Engineering and the Construction of

The requirements of an organization for the purpose of constructing a safe and economical dam is not fundamentally different from those of any other large construction operation. It is commonplace to state that integrity, ability, experience, fairness and tact are all essential, that where responsibility is imposed it should be accompanied by commensurate authority, that conflict of authority must by every means be avoided, and that contractional rights of contractors must be respected. This is said without prejudice as regards the present organization. Indeed, it cannot have been intended by you, nor would it be good ethics for me, to deal with personalities, especially since the principal engineers of the City as well as the contractor have been known to me for a great many years, and cordial relations have always subsisted between us. It is hoped, therefore, that the above statement of the principles involved will be judged by you to be a sufficient answer to your question.

Acknowledgement

In closing it is a pleasure to me to express my appreciation for the willing and genereus aid extended by all city officials in this investigation.

Respectfully submitted,

D. C. Henny.
Consulting Engineer.

7-17-33
P

COPY
2056

SAN DIEGO RIVER PROJECT, EL CAPITAN FEATURE

Resident Engineer Harold Wood's reactions to Report of D. C. Henny, Consulting Engineer Portland, Oregon, dated May 25, 1933.

Mr. D. C. Henny, Consulting Engineer, Portland, Oregon, accompanied by two ladies, arrived, unannounced direct from Los Angeles, opposite the City of San Diego's El Capitan Dam Engineer's Camp garage building No. 9 about 1 P.M. May 9, 1933, and inquired for the whereabouts of Alan Rowe, who had been the El Capitan Dam Contractor's resident Hydraulic Fill Engineer, and was advised that Mr. Rowe might be at the contractor's office.

Mr. Rowe had arrived on the El Capitan job in the contractor's private automobile about 9 A.M. but had not, in my knowledge, been on the job for several days previous but had as I understand, been in Los Angeles.

Alan Rowe has for several years been associated with J. B. Lippincott, Consulting Engineer of Los Angeles, who is understood to be Consulting Engineer for Contractor H. W. Rohl.

A few minutes later Mr. Henny arrived in front of the contractor's office, accompanied by Mr. Rowe, obviously unexpectedly, and there found Hydraulic Engineer H. N. Savage, who cordially welcomed Mr. Henny as a friend of long standing and as professional colleague throughout a long period of joint Federal Government Reclamation Service official employment, and proffered to Mr. Henny the services of the City's Resident Engineer, Harold Wood, and transportation to take him over El Capitan dam work. The contractor's Engineer, Mr. Rowe, insisted that he should take Mr. Henny over the work and they immediately started out in Contractor Rohl's private automobile which was parked conveniently alongside. Mr. Henny had advised the Hydraulic Engineer that he was scheduled to visit the Tia Juana River Rodriguez Dam, and return to San Diego for over night.

By Resolution No. 60118, dated May 15, 1933, the Council of the City of San Diego directed the Hydraulic Engineer to countermand orders and directions given by him to the contractors for the construction of El Capitan Reservoir Dam, Spillway and Outlet Works in letters dated March 22, March 30, April 20 and May 11, 1933, subject: "San Diego River Project, El Capitan Feature, Rock Embankment, removal of earth and disintegrated granite."

By Resolution No. 60120, dated May 15, 1933, the Council of the City of San Diego directed the City Clerk to communicate with Mr. D. C. Henny, Consulting Engineer of Portland, Oregon, which was accomplished by the following telegram:

"D C HENNY
HYDRAULIC ENGINEER
PORTLAND OREGON

CAN YOU ACCEPT EMPLOYMENT BY CITY OF SAN DIEGO IMMEDIATELY FOR PURPOSE ONLY OF FURNISHING TO CITY COUNCIL REPORT ON PROGRESS OF CONSTRUCTION WORK ON EL CAPITAN DAM TO DATE DEALING WITH QUESTION OF SAFETY OF STRUCTURE COMPLIANCE WITH PLANS AND SPECIFICATIONS COSTS TO DATE AS COMPARED WITH BID SCHEDULES AND DEALING WITH ALL DISPUTES AND CONTROVERSIES EXISTING BETWEEN CONTRACTORS AND CITY ENGINEERING FORCES SUCH EMPLOYMENT NOT TO EXTEND BEYOND TIME NECESSARY TO ENABLE YOU TO FURNISH COUNCIL INDICATED REPORT AND YOUR COMPENSATION NOT TO EXCEED ONE HUNDRED DOLLARS PER DAY TOGETHER WITH TRAVELING EXPENSES AND LIVING EXPENSES FROM PORTLAND TO SANDIEGO AND RETURN PLEASE WIRE

ALLEN H WRIGHT CITY CLERK"

By Resolution No. 60140, dated May 16, 1933, as follows:

"RESOLUTION NO. 60140

WHEREAS, under date of May 15th Resolution No. 60120 was duly and regularly passed and adopted tendering employment to Mr. D. C. Henny for the purposes therein set forth; and

WHEREAS, under date of May 16th Mr. D. C. Henny accepted employment on the terms stated in said resolution, NOW, THEREFORE,

BE IT RESOLVED By the Council of The City of San Diego as follows:

That Mr. D. C. Henny be, and he is hereby employed by The City of San Diego for the purpose only of furnishing to the City Council a report on the progress of the construction of work on El Capitan Dam to date, dealing with the question of safety of structure, compliance with plans and specifications, costs to date as compared with bid schedule, and dealing with the adequacy of the plans and specifications for the spillway and spillway extension, and dealing with all disputes and controversies, known and unknown, that to date exist between the contractors and the City engineering forces; that

his employment shall not be deemed to extend beyond the necessary time to enable him to furnish this Council a report as indicated; and his compensation shall not exceed one hundred dollars ($100.00) per day, together with traveling expenses and living expenses from Portland, Oregon, to San Diego, and return; that said report shall be furnished as soon as possible, and shall be completed in not to exceed ten (10) days after this offer has been accepted.

BE IT FURTHER RESOLVED that the City Manager and a majority of the members of the Council of said City be, and they are hereby authorized and directed to execute a contract between The City of San Diego and Mr. D. C. Henny, upon the terms herein contained."

the Council of the City of San Diego employed Mr. D. C. Henny.

Following is copy of telegram, dated May 17, from Mr. D. C. Henny to Allen H. Wright, City Clerk, San Diego, California:

"ARRIVE FRIDAY NOON IF MAKE LOSANGELES RAIL CONNECTION STOP WIRED STATE ENGINEER SUGGESTING HE SEND STATE INSPECTOR TO GIVE INFORMATION STOP TRUST CITY ENGINEERS WILL HAVE PREPARED ON MY ARRIVAL COMPLETE CATEGORICAL STATEMENT OF ITEMS REGARDED AS VIOLATIONS OF PLANS AND SPECIFICATIONS BY CONTRACTORS EL CAPITAN DAM."

Mr. Henny arrived at the San Diego City Clerk's office May 19, at about 2 P.M. A categorical statement of material and obvious violations by the contractors of the contract specifications for the construction of El Capitan Reservoir Dam, Spillway and Outlet Works had been assembled in the Hydraulic Engineer's office and was presented to the City Clerk and Mr. Henny by the City's Engineer F. D. Pyle. This statement was as follows:

"May 19, 1933

TO THE HONORABLE, THE MAYOR AND COUNCIL
OF THE CITY OF SAN DIEGO, CALIFORNIA.

Subject: San Diego River Project, El Capitan Feature, Statement of Contractor's non-compliance with contract specifications.

Gentlemen:

The following statement is submitted in accordance with that portion of telegram received by the City of San Diego's City Clerk from the City's Consulting Engineer, Mr. D. C. Henny:

"Trust City Engineers will have prepared on my arrival complete categorical statement of items regarded as violations of plans and specifications by contractors El Capitan Dam."

For some time past H. W. Rohl & T. E. Connolly, Contractors for the construction of El Capitan Reservoir Dam, Spillway and Outlet Works have not conducted portions of the work in accordance with certain specific requirements of the contract specifications and they have not complied with instructions and directions issued in accordance with the contract specifications by the Resident Engineer and by the Hydraulic Engineer set forth as follows:

(a) The Contractor has disregarded instructions relating to stripping overburden from the abutments of the dam and excavation of cutoff trench.

(b) The Contractor has placed in the hydraulic fill material from portions of borrow pit "A" contrary to specific and definite instructions.

(c) The Contractor, in placing material in the hydraulic fill, has not maintained the required ratio of spillway excavation material to the borrow pit material.

(d) The Contractor has persisted, contrary to written instructions, in placing material in the hydraulic fill portion of the dam without sorting and placing by hydraulic means as required by the contract specifications.

(e) The Contractor has not sufficiently washed the hydraulic fill material which has resulted in the leaving of much fine material in the beach section which should be in the puddle core.

(f) The Contractor has not properly removed the earthy material and decomposed granite from the top of the lift of the downstream rock embankment at elevation about 600, before placing the next lift of rock embankment thereon.

(g) The Contractor has not properly faced, hand-placed, bedded and chinked the rock in the exposed surface of the rock embankment as required by the specifications.

(h) The Contractor has not properly placed portions of the lining in the by-pass tunnel with the result that there are many unfilled spaces back of the lining and a portion of the lining may not be the required thickness over the timbers.

(i) The Contractor has not complied with contract specifications requiring him to notify the City in ample time to allow for testing of cement.

In letter of April 8, 1933, the Hydraulic Engineer invited the attention of the City Attorney to the Contractor's non-compliance with contract specifications and to pertinent references thereto, and requested immediate legal opinion as to how the Hydraulic Engineer should proceed in order to secure compliance with the contract specifications. No opinion has yet been received.

Respectfully,

H. N. Savage,
Hydraulic Engineer."

The City's Hydraulic Engineer H. N. Savage, Engineer F. D. Pyle, Resident Engineer Harold Wood, Hydraulic Fill Engineer D. W. Albert, Deputy State Engineer George W. Hawley and State Senior Inspector of Dams Gerald McKinlay, Mr. D. C. Henny; Contractor H. W. Rohl, his Engineer E. Alan Rowe, and Superintendent O. C. Steves, assembled at El Capitan Dam about 9 A.M. May 20, 1933.

The Hydraulic Engineer introduced to Mr. Henny the City's Resident Engineer Harold Wood and the City's Hydraulic Fill Engineer D. W. Albert. The City's Engineer Mr. F. D. Pyle and Mr. Henny had been well acquainted over a long period of years. The Hydraulic Engineer advised Mr. Henny that he and each of the City's three other engineers would be available to Mr. Henny for inspection of the work and conferences to the fullest extent desired by Mr. Henny, and that transportation would be provided upon requisition from Mr. Henny.

In response to the Hydraulic Engineer's inquiry, Mr. Henny advised him that it would not be necessary for him to remain and participate in the inspection of the contract work, or in conference thereon, and, consequently, Mr. Savage left the dam after 10 A.M.

Mr. Henny inquired of those remaining present, regarding the condition of the rock embankment and hydraulic fill.

An inspection was made of the quarry.

An inspection was made of the puddle core area adjacent to the north abutment about elevation 640.

Deputy State Engineer Hawley and Inspector McKinlay terminated their inspection and conferences with Mr. Henny and left the dam at 2 P.M.

Neither Mr. Hawley nor Mr. McKinlay had been on the job between March 14, 1933 and March 31, 1933 - during this time the contractor had been resisting the contract specifications requirements and ignored the Hydraulic Engineer's directions dated March 22, 1933, to remove the layer of earth and disintegrated granite from the top of the downstream rock embankment area about 75 feet by 530 feet and had completed the

placing of rock embankment on the area by March 31, 1933.

Mr. Henny, accompanied by the City's Engineers Pyle, Wood and Albert, and the Contractor Rohl and his Engineer Rowe and Superintendent Steves went to the top of the upstream rock embankment, elevation about 625 and from there to the upstream hydraulic fill beach area and from there to the spillway cut.

Mr. Henny, Engineers Pyle and Wood inspected the City's exploration tunnel No. 3 as driven into the right abutment under the spillway cut which extends about half the width of the spillway channel.

Mr. Henny, together with Engineers Pyle, Wood and Albert, Contractor's Engineer Rowe and Superintendent Steves traveled to and inspected borrow pit "A".

Mr. Henny's inspections and conferences at the dam May 20, 1933 ended about 5 P.M.

On May 21, Mr. Henny arrived at El Capitan Dam work about 9:50 A.M. in Contractor Rohl's private automobile accompanied by Contractor's Engineer Rowe and City's Engineer Pyle. Inspection was made and conference was held at which there was present City's Engineers Pyle, Wood, Albert and Contractor T. E. Connolly and Contractor's Engineer Rowe and Superintendent Steves.

The entire party inspected the outlet (by-pass) tunnel from inlet portal down as far westerly as backwater at the lower end of the unlined section near the exit end. The City's Resident Engineer Wood advised Mr. Henny of the contractor's persistent resistance to the general and specific requirements of the contract specifications and the written directions of the City's Hydraulic Engineer. Mr. Henny asked Engineer Wood how much authority he had and was told he had all the authority provided for in contract specifications paragraph 7, but subordinate to the Hydraulic Engineer.

An inspection was made over the lower end of the spillway and river channel below. Mr. Henny left about 3:30 P.M.

Mr. Henny was proffered for his inspection and research information the City's records, based upon inspectors' daily written reports; the Resident Engineer's inspections on the work and official daily diary records including Engineer Pyle's very frequent inspections and conferences with the Resident Engineer on all parts of the work; the Hydraulic Engineer's very frequent, comprehensive, administrative inspections and instructions; the reports of tests of all samples of materials of construction and official progress records. These observations are all recorded in a judicial and non-partisan manner by the City's Engineers.

The Hydraulic Engineer's instructions, repeated every few days to his engineering staff of City employees at El Capitan

dam work has been not to require other than reasonable compliance on the part of the contractor with the requirements of the contract drawings and specifications, and, never to require or prescribe any requirements of the contractor which are not fully and definitely provided for in the contract drawings and specifications.

THE CITY'S RESIDENT ENGINEER'S REACTIONS TO D.C.HENNY'S REPORT.

After reviewing Mr. Henny's report dated May 25, 1933, on features of El Capitan Reservoir Dam, Spillway and Outlet Works, as presented by him to the Mayor and Council on the afternoon of May 25, 1933, following are statements of fact given in order of paragraphs of Mr. Henny's report. Items (g) and (h) listed in the contents of Mr. Henny's report are not mentioned in the Resolution engaging the services of Mr. Henny.

(a) SAFETY OF STRUCTURE.

OUTLET WORKS. . . . . "Some changes in the design may be fouhd essential to safety."

The El Capitan Reservoir Dam, Spillway and Outlet Works, as shown on the contract drawings and specifications, had the general and responsible approval of the late John R. Freeman, Consulting Engineer, and of his very experienced colleague, D. W. Albert, C.E., and the unanimous approval of the City's Hydraulic Engineer H. N. Savage; the City's Consulting Geologist C. F. Tolman; the City's Consulting Hydraulic Engineer C. D. Marx; the Deputy State Engineer George W. Hawley; the State Geologist Chester Marliave; the State's Consulting Engineer L. C. Hill, and the State Engineer Edward Hyatt.

The State Engineer has formally approved the design as to safety - see letter dated August 29, 1932.

(b) SUFFICIENCY OF SPILLWAY PLAND AND SPECIFICATIONS

The State Engineer has formally approved the design of the El Capitan reservoir spillway as to safety by his letter dated August 29, 1932.

It is not indicated nor expected that the schedule items and quantity of excavation and concrete reinforced lining of the spillway as provided for in the contract drawings and specifications and items of work included in and covered by the contract will necessarily be materially exceeded by the construction of the spillway to satisfy the requirements of the State Engineer.

(c) PROGRESS OF WORK.

Time has not necessarily been lost by the contractor to the

extent of about 1 and 1/2 months as stated in the Henny report. The Contractor utilized the time in making necessary extensive repairs to his construction equipment and using a part thereof in advancing portions of the work necessary to the construction of the dam. Power shovels April 11 to May 20, 1933 have been operated about 22 per cent of the time and under repairs about 30 per cent of the time. Construction roads had to be built; stripping abutments of overburden material was progressed and the core wall constructed in advance of placing hydraulic fill have been under way almost continuously since April 10, 1933. The contractor's work could have proceeded at all times, and work has been rather diligently pursued along lines other than dumping rock on rock embankment and hydraulic fill operations.

(d) COMPLIANCE WITH PLANS AND SPECIFICATIONS.

The City's Engineer Hydraulic Fill, D. W. Albert, has been connected with the construction of eighteen hydraulic fill dams of considerable size. He was employed by Contractor Kohl and Connolly precedent to the execution of the contract between the City of San Diego and the contractor, and for a considerable period of months thereafter was Resident Engineer on the work and reported to the contractor. The contractor, therefore, was acquainted with Mr. Albert and his judgment, particularly on this part of the work, and did not have to "surmise" anything.

(e) DISPUTES BETWEEN CITY ENGINEERING FORCES AND CONTRACTORS.

(A) "The Contractor has disregarded instructions relating to stripping overburden from the abutments of the dam and excavation of cutoff trench."

The contractor's refusal to comply with practically universal practice and with specific instructions in the matter of stripping overburden from the abutments of this dam in advance as directed by the Engineer, has reduced the maximum integrity of the structure and is not immaterial nor is there any justification for the assumption by Mr. Henny that "no difficulty as to this item is anticipated in the future" as the contractor has stated he would comply with these directions only as the dam was raised.

(B) "The Contractor has placed, in the hydraulic fill material from portions of borrow pit "A", contrary to specific and definite instructions."

The Hydraulic Engineer's letter, dated February 4, 1933, to the contractor gave him definite instructions limiting the material to be taken by him from borrow pit "A". Stakes were set on the ground in advance. The contractor's non-compliance with specific written instructions was not due to a "misunderstanding" but was a deliberate non-compliance with specific written instructions and was continued by the contractor for two days after three repated oral instructions were given by

the City's Hydraulic Fill Engineer to Contractor Rohl at borrow pit "A". About 30 per cent of the material from this borrow pit has been from outside of authorized lines prescribed in writing.

(C) "The Contractor, in placing material in the hydraulic fill, has not maintained the required ratio of spillway excavation material to the borrow pit material."

While minor and occasional departures from specific proportions have not been resisted by the City's engineers, presistent major departures have been of necessity resisted for reasons of maximum safety of structure provided for in the contract specifications, and also to resist unnecessary increased cost of the work to the City.

(D) "The Contractor has persisted, contrary to written instructions in placing material in the hydraulic fill portion of the dam without sorting and placing by hydraulic means as required by the contract specifications."

The City's Hydraulic Fill Engineer D. W. Albert is the widest practically experienced in the world on this type of dam structure, having been employed also repeatedly as a contractor's superintendent of construction. The City's Resident Engineer and Hydraulic Engineer have collaborated in supporting the Hydraulic Fill Engineer in requiring only reasonable compliance with the contract specifications for reasons of safety of structure and in resisting any unnecessary extra cost to the City. Mr. Henny's statement that "If any not fully washed material of this kind remain in the dam its proportion to the mass is probably negligible" is not justified by the facts but was obviously contrary thereto.

(E) "The Contractor has not sufficiently washed the hydraulic fill material which has resulted in the leaving of much fine material in the beach section which should be in the puddle core."

The written directions of the Hydraulic Engineer were given to secure better washing and sorting. On April 7, 1933 the Deputy State Engineer, Geo. W. Hawley, critically commented on the excessive quantity of clayey material and fines being left on the beaches outside the puddle core area after repeated directions by the City's Engineers. On April 10 the Contractor suspended portions of his work, including hydraulic placing of earth material in the dam.

(F) "The Contractor has not properly removed the earthy material and decomposed granite from the top of the lift of the downstream rock embankment at elevation about 600, before placing the next lift of rock embankment thereon."

Mr. Henny recognizes the importance of friction and avoidance of conditions favoring sliding along horizontal planes in

the rock embankment as an outstanding requirement in this type of dam. His further statement that "no 2-1/2 foot layer of earth exists anywhere at elevation 600 on the downstream rock fill, as is understood to have at times been alleged" may have be based on a pronounced misunderstanding on his part of the facts. The City's engineers have never indicated that there was remaining under the rock embankment above elevation 600 as placed by the contractor a 2-1/2 foot layer of earth, but have unanimously insistently and justifiably alleged that before partial removal by dragline, bulldozer and grader, a layer of about 2-1/2 feet of earthy and disintegrated granite fine material had been accumulating on top of the rock embankment as it was used by the contractor as a roadway. The partial removal, down to the tops of the higher projections of the rock, under this deposit of earth was admitted by the Engineers but its complete and properly required removal was not accomplished but was resisted by the Contractor. Successive scarifying and hydraulic monitor sluicing could effectively and economically have removed earthy and disintegrated granite fine material from the top surface or deck of rock embankment lifts either by removing it from the embankment or by washing it down into the spaces between the rock. The contractor did not accomplish this at elevation about 600 as was done by him on higher lifts in a satisfactory way and at little cost to himself.

Mr. Henny's successive conclusion that "nevertheless, construction should be carried on with great care, so that even a small reduction of resistance will be avoided so far as reasonably possible" is prominently proper and only what the City's engineers have been endeavoring to secure and neglect on the part of the contractor to accomplish such reasonable frictional provision was the cause of the Engineer'd demand for the removal by the Contractor to a reasonable extent of the remaining objectionable earthy material at about elevation 600.

It is an obvious fact that the safety of the dam has been reduced, as stated by Mr. Henny.

No reason whatsoever is seen why as Mr. Henny states reasonable compliance on the part of the contractor with the requirements of the contract specifications should entail cost to the City of San Diego.

(G) "The Contractor has not properly faced, hand-placed, bedded and chinked the rock in the exposed surface of the rock embankment as required by the specifications."

The specifications definitely state that "the exposed surface of rock embankment shall consist of sound, hard, durable rock carefully selected, faced, hand-placed, bedded and chinked . . .". Rock merely thrown or dropped is not satisfactory and not in compliance with the obvious requirements of the specifications. Mr. Henny's conclusions that literal compliance with the specifications has not been secured and that "more rigid interpretations of the specifications must be enforced" is obviously proper.

(H) "The Contractor has not properly placed portions of the lining in the by-pass tunnel with the result that there are many unfilled spaces back of the lining and a portion of the lining may not be the required thickness over the timbers."

The contractor improperly delayed the outlet by-pass tunnel driving work by about two months. Every tolerance was extended by the Engineer to the Contractor in his tunnel concrete lining so that flood water might discharge safely thru the tunnel. The concrete tunnel lining has not yet been completed even where partly lined nor for about 260 feet where no tunnel lining has been placed. The contractor was specifically instructed as the work progressed to drill holes in the tunnel roof to disclose thickness of concrete tunnel lining, which he has not done.

(I) "The Contractor has not complied with contract specifications requiring him to notify the City in ample time to allow for testing of cement."

The City has no knowledge of the Contractor's cement purchase or of his requirements for the shipment of cement nor has the City any method of obtaining advice regarding the Contractor's cement purchase and requirements other than from him.

Mr. Henny's reaction to the City's statement of items of violation of specifications discloses a lack of knowledge on his part of the facts and a failure to recognize that the contractor, after requesting the Engineer to issue directions in writing, has disregarded the written directions.

(f) COST TO DATE AS COMPARED WITH CONTRACT BID SCHEDULE (Page 15)

It is not understood why Mr. Henny, in paragraph 2 on page 19 of his report should add $169,000 being increase to Engineer's original estimate of cost of storage and recent estimate of cost of storage, to the differences between schedule item bid of $2,333,000 and present estimate of $2,688,000 - columns 2 and 3 respectively, page 17 - or $350,000, making aggregate increase of $519,000.

Also it is not understood how Mr. Henny can justify his statement on page 18 and 19 of his report that $250,000 additional for spillway and $100,000 for extras under the contract will be required. There were no changes made since the Hydraulic Engineer estimated the cost on April 20, 1933 as reported to the Reconstruction Finance Corporation, copy of which was furnished by the Hydraulic Engineer to Mr. Henny.

(g) DELAYS.

The contractor partially suspended his work on April 10, 1933 but continued to operate with a somewhat reduced force and accomplished necessary road construction, partial stripping of abutments, excavation for and construction of core wall. The maximum force was 114 men on one day between May 11 to 20, 1933.

(h) PROPER METHOD OF PROCEDURE FOR THE CITY OF SAN DIEGO IN THE SUPERVISION, ENGINEERING AND CONSTRUCTION OF EL CAPITAN STORAGE WORKS.

Mr. Henny's report does not make a definite recommendation as to bettering the contractor's compliance with the specification requirement of the contract, but follow a middle partisan to the Contractor course in the controversy between the contractors and the City's engineers regarding compliance by the contractor with the specific provision and requirements of the contract drawings and specifications.

The Resident Engineer conferred with Mr. Henny, relative to the construction work on May 20 and 21, 1933, only a total of about 15 minutes time. Only about 2 minutes of this time pertained to contract specification requirements.

The dates and duration of these conferences relative to the work were as follows:

May 20, 1933, about 10 A.M. on top of the downstream rock embankment the Resident Engineer outlined the fact and condition of the material on top the downstream rock embankment at elevations about 600 and 615 and the contractor's inadequate removal thereof and treatment of the top of this rock embankment. I answered questions relative to conditions on top of lifts of upstream rock embankment. This took possibly 10 minutes in all.

May 20, 1933, about 1:45 P.M. on the north abutment at about elevation 640 and within the puddle area the Resident Engineer outlined the abutment foundation stripping of overburden requirements. This required about 1 minute.

May 20, 1933, about 3 P.M. while Mr. Henny, Mr. Pyle and I were inspecting the exploration tunnel #3 under the spillway, I answered Mr. Henny's questions relative to spillway design, foundation conditions and inspections made by State Geologist, Chester Marliave. The duration of these several conversations might have abeen about 2 minutes.

On May 21, 1933 about 11:30 A.M. while inspecting the outlet by-pass tunnel, I outlined to Mr. Henny the method of timbering and concrete lining the tunnel and indicated the location of the dam axis if it be projected to an intersection with the tunnel. The duration of these several conversations might have been about 2 minutes.

On May 21, 1933, about 1 P.M. I pointed out to Mr. Henny the location of the three cross sections taken of the San Diego river channel along a reach of about one-half mile below the dam. This required about 20 seconds of my time.

Harold Wood,
Resident Engineer.

HW/m

2/5/35
copy/f

May 29, 1933

From : Engineer Fred D. Pyle

To : Hydraulic Engineer

Subject: San Diego River Project, El Capitan Feature Conference May 23, 1933.

At 1:00 P.M. May 23, 1933, a conference was held at the City's testing laboratory in Balboa Park, attended by the City's Consulting Engineer D. C. Henny of Portland, Oregon; Engineer Fred D. Pyle; Testing Engineer J. Y. Jewett; Assistant Engineer P. Beermann; Contractor's Engineer E. Alan Rowe.

Gradation analysis of puddle core and beach materials for El Capitan Dam were discussed, also the weights per cubic foot of puddle core, beach and rock embankment, and the determination and effect of colloids.

The group, except for Mr. Beermann, then went to El Capitan dam where they were met by the City's Resident Engineer Harold Wood, Engineer Hydraulic Fill D. W. Albert, Contractor T. E. Connolly and Contractor's Superintendent O. C. Steves.

Examination similar to the one made on May 21, 1933 was made of the tunnel.

The spillway extension and river channel were examined by Mr. Henny, accompanied by Messrs. Pyle, Wood and Rowe. Mr. Henny stated that the spillway channel should not only be extended somewhat past Station 15+50, but there should be a cutoff wall into bed rock and wing walls extending out 100 feet or more on each side. Mr. Henny gave very little consideration to the effect of 20 feet of back water on the lower portion of the spillway.

In examining the river channel Mr. Henny was of the opinion that the coefficient of n = .035 used in determining the flood flows in the river channel from cross sections was altogether too high and that .025 would be nearer the proper value east of the road crossing near the City's engineers camp and might be proper below that point.

He called attention to the extensive spillway at the Bull Run Dam of the City of Portland, Oregon, water supply, stating it was doubtful if the standing wave could be limited to the lined section of the spillway extension.

The conference ended about 5:30 P.M.

Fred D. Pyle
Engineer

FDP/f

2/1/35
copy/f

May 31, 1933

From : Engineer Fred D. Pyle

To : Hydraulic Engineer

Subject: San Diego River Project, El Capitan Feature
Itinerary of D. C. Henny, Consulting Engineer of Portland, Oregon, in connection with El Capitan Dam

May 9, 1933. Mr. D. C. Henny, wife and daughter visited El Capitan Dam, Mr. Henny stopping at the City's engineering camp and asking for Mr. E. Alan Rowe. Arrived at contractor's camp about 1:30 P.M. where accidentally met Hydraulic Engineer H. N. Savage and Engineer Fred D. Pyle; then went over the work at the dam for about an hour with E. Alan Rowe in the contractor's automobile after Mr. Savage's offer to furnish transportation and escort.

After leaving El Capitan Mr. Henny went to Rodriguez Dam, returning to the Maryland Hotel about 7:00 P.M. He left the Maryland Hotel for the U. S. Grant Hotel about 8:00 P.M. and had not returned at 9:30 P.M. Mr. Henny checked out before 10:00 A.M. the next morning.

May 19, 1933 Mr. and Mrs. Henny arrived about noon from Los Angeles, with Deputy State Engineer Geo. W. Hawley and Senior Engineer of Dam Inspection Gerald McKinlay in the State's automobile assigned to Mr. McKinlay, and registered at the Sanford Hotel.

Mr. Henny arrived at the City Clerk's office about 2:00 P.M. and had a short conference with City Clerk Allen Wright, Engineer Fred D. Pyle, then with City Attorney C. L. Byers, Mr. Wright and Mr. Pyle where he read and signed contract for employment as Consulting Engineer, which contract apparently included something relative to El Capitan spillway, which item was not included in Resolution 60120. He telephoned Contractor H. W. Rohl and asked for a conference at El Capitan Dam May 20. He requested separate conveyance for the following day to El Capitan Dam. He was left in conference with City Attorney Byers.

May 20, 1933 Mr. Henny went to El Capitan Dam in the City's Nash car with Lawrence Burk as driver. He returned in the City's Chevrolet with Engineer Pyle. At the dam Mr. Henny had only a few minutes conference with the Hydraulic Engineer. (See report Engineer Fred D. Pyle to Hydraulic Engineer dated May 23, 1933, on conference May 20.)

May 21, 1933 Mr. Henny went to El Capitan Dam accompanied by E. Alan Rowe and Fred D. Pyle, in the contractor's automobile. (see report Engineer Pyle to Hydraulic Engineer dated May 23, on conference of May 21.) Mr. and Mrs. Henny spent several hours

with Mr. Pyle and his family in the late afternoon. Mr. and Mrs. Henny were invited to dine with Mr. and Mrs. Hawks.

May 22, 1933. Mr. Henny spent most of the day in conference room 213 at 524 F Street. Mr. Henny was introduced to Special Counsel T. B. Cosgrove by Mr. Savage. There were a few minutes of pleasantries and general conversation, but El Capitan dam was not discussed. Mr. and Mrs. Henny invited Mr. and Mrs. C. P. Williams to dine with them.

May 23, 1933. Mr. Henny returned from the City Attorney's office about 11 A.M. and entered into discussion of weights of puddle beach and rock embankment materials and factors of safety against sliding.

In the afternoon, accompanied by E. Alan Rowe, Fred D. Pyle and P. Beermann, went to the City's testing laboratory in the City's Nash car, and later the party accompanied by Testing Engineer J. Y. Jewett, and with the exception of Mr. Beermann, went to El Capitan Dam. (See report P. Beermann to Hydraulic Engineer dated May 23, 1933; and report Fred D. Pyle to Hydraulic Engineer dated May 29, 1933, subject: conference May 23, 1933.)

May 24, 1933. Mr. Henny in conference room 213 about 4:00 P.M. to 5:00 P.M. where he read two letters from Consulting Engineer L. C. Hill to the Hydraulic Engineer relative to effect of earthy material and disintegrated granite on the downstream rock embankment of El Capitan Dam about elevation 600 on safety of the dam.

Gerald McKinlay stopped in the office about 1:45 P.M. of May 24 looking for Mr. Henny with whom he said he had an appointment.

May 25, 1933. Mr. Henny was not seen by Engineer Pyle until 3:22 P.M. when he appeared with Mr. Cosgrove and Mr. Byers before the Council, delivered his report to the Council, which was read by the City Clerk. Mr. Henny took but a very small part in the general discussion which followed and withdrew before the meeting adjourned.

Mr. and Mrs. Henny attended the Ladies' Night Meeting of the San Diego Section of the American Society of Civil Engineers. Mr. J. B. Lippincott was also present and said that he had been in San Diego several days.

May 26, 1933. Mr. Henny paid his respects to the Hydraulic Engineer a few minutes in the afternoon (after 1:15 P.M.) before leaving the City.

Enclosed is list of correspondence and other material delivered by me to Mr. Henny in a ring binder in City Clerk's Wright's office on May 19, 1933 and which it is presumed Mr. Henny took with him when leaving San Diego.

Fred D. Pyle
Engineer.

FDP/P
encl.

2/4/35
copy/f

May 31, 1933

M E M O R A N D U M

Subject: San Diego River Project, El Capitan Feature

List of correspondence, resolutions and other material delivered in ring binder to Consulting Engineer D.C.Henny by Engineer Fred D. Pyle in City Clerk's office in the presence of City Clerk Allen Wright on May 19, 1933.

GENERAL LETTERS AND RESOLUTIONS:

Resolution No. 60118
" " 60119
" " 60120
" " 60140

Letter 4-8-33 Hydraulic Engineer to City Attorney
Compliance with contract specifications (9 encls.)

" 4-8-33 Engineer Fred D. Pyle to Hydraulic Engineer
Inspection April 6, 1933

" 4-22-33 Hydraulic Engineer to Mayor and Council
Design, and materials, construction methods and requirements, safety of dams, economics.(12 encls.)

" 4-20-33 Hydraulic Engineer to Contractor (S-1)
Contract specifications paragraph 7, "ENGINEER"

Notice Inviting Bids, Proposal, Drawings and Specifications

EXCAVATION:

Letter 4-21-33 Hydraulic Engineer to Contractor (S-3)
Stripping of abutments

" 4-7-33 Hydraulic Engineer to Contractor
Stripping abutment of cutoff trench material

" 3-30-33 Hydraulic Engineer to Contractor
Excavation classification

" 3-30-33 Hydraulic Engineer to Contractor
Excavation - spillway

" 3-22-33 Hydraulic Engineer to Contractor
stripping of abutments

" 3-14-33 Resident Engineer to Contractor
Excavation of cutoff trench under dam, disposition of material

" 12-21-32 Hydraulic Engineer to Contractor
Stripping

Letter	11-14-32	Hydraulic Engineer to Contractor Stripping and excavation for embankment

HYDRAULIC FILL:

Letter	4-21-33	Hydraulic Engineer to Contractor (S-5) Hydraulic fill
"	4-8-33	Hydraulic Engineer to Contractor Hydraulic fill, excavation, spillway
"	4-7-33	Hydraulic Engineer to Contractor Hydraulic fill material
"	3-29-33	Hydraulic Engineer to Contractor Hydraulic fill
"	3-12-33	Resident Engineer and Engineer Hydraulic Fill to Contractor Hydraulic fill, contract construction
"	3-1-33	Hydraulic Engineer to Contractor Contract construction hydraulic fill portion
"	2-25-33	Hydraulic Engineer to Contractor Hydraulic fill
"	2-22-33	Hydraulic Engineer to Contractor Contract construction hydraulic fill
"	2-21-33	Engineer Hydraulic Fill to Cnntractor Hydraulic fill
"	2-10-33	Hydraulic Engineer to Contractor Contract construction policies, methods, requirement

ROCK EMBANKMENT:

Letter	5-11-33	Hydraulic Engineer to Contractor (S-10) Rock embankment, removal of earthy material and disintegrated granite
"	4-21-33	Hydraulic Engineer to Contractor (S-4) Rock embankment foundation
"	4-20-33	Hydraulic Engineer to Contractor Rock embankment, removal of earth and disintegrated granite
"	3-30-33	do
"	3-22-33	do
"	3-22-33	Hydraulic Engineer to Contractor Rock embankment, placing rock surface

TUNNEL LINING:

Letter 4-7-33 Hydraulic Engineer to Contractor
Outlet tunnel lining

" 1-3-33 Hydraulic Engineer to Contractor
Drilling holes in tunnel lining for inspection

" 11-16-32 Hydraulic Engineer to Contractor
Tunnel lining, thickness of concrete over timber

LETTER: 5-19-33 HYDRAULIC ENGINEER TO MAYOR AND COUNCIL

Statement of Contractor's non-compliance with contract specifications.

Fred D. Pyle
Engineer

FDP/p

P.S. There was shown to Mr. Henny from time to time during his stay in San Diego, prints of many El Capitan supplementary drawings including El Capitan spillway, outlet tower, tunnel section, also the following:

Letter 5-2-33 Hydraulic Engineer to City Attorney
Reconstruction Finance Corporation

" 5-5-33 Hydraulic Engineer to Mayor and Council
Spillway extension Resolution 60011

Various reports of Testing Engineer J. Y. Jewett on
Tests of puddle core and beach materials

Preliminary studies of spillway extension designs and river stages below spillway

April 1933 report to R.F.C.

April 1933 progress estimate of contractor's earnings

Statement of estimated schedule quantities to complete El Capitan Dam as of 4-30-33

F.D.P.

2/4/35
copy/f

June 13, 1933

From : Engineer Fred D. Pyle

To : Hydraulic Engineer

Subject: San Diego River Project, El Capitan Feature
Time spent with Consulting Engineer D. C. Henny

May 19, 1933: about 2 P.M. about 5 minutes, City Clerk's office.

Present: D. C. Henny, Allen H. Wright City Clerk, Engineer Fred D. Pyle.

General discussion only. Delivered letter dated May 19, 1933, Hydraulic Engineer to Mayor and Council; subject: Statement of contractor's non-compliance with the contract specifications, and correspondence, resolutions and other material as listed in Memorandum dated May 31, 1933.

Time spent on specifications - none.

May 19, 1933: about 2 P.M. about 10 minutes, City Attorney's office.

Present: D. C. Henny, City Attorney C. L. Byers, City Clerk Allen H. Wright, Engineer Fred D. Pyle.

Mr. Henny read and signed contract for employment after commenting that something relative to El Capitan spillway had been added which was not in Resolution No. 60120.

Expressed a desire to discuss questions between the contractor and the engineer only when representatives of both present. Arranged over telephone with H. W. Rohl for conference at the dam on May 20, and thru City Clerk Wright for his own individual transportation to El Capitan dam for May 20.

Time spent on specifications - none.

May 20, 1933: 9:15 A.M. to 5 P.M. Conference on the work at El Capitan Dam. (see report dated May 23, 1933).

Mr. Henny's attention was called from time to time to specification requirements and a number of excerpts were called to his attention or read to him, generally those referred to in Hydraulic Engineer's letter of April 8, 1933 to the City Attorney, on compliance with contract specifications. At no time did Mr. Henny ask for the reading of any portions of the specifications or for statements as to specification requirements.

At no time did the contractor or his representatives call attention to the contract specifications. Mr. Henny asked for and briefly examined the contract drawings especially of the tunnel, spillway and cross section of the dam.

Time spent on specifications at Mr. Henny's request - none; at request of others - about 15 minutes; at various times during the day.

May 20, 1933: 5 P.M. to 6 P.M. Return trip to San Diego, D. C. Henny and Engineer Fred D. Pyle.

Work at dam not discussed.

May 21, 1933: 9 A.M. to 1 P.M. D. C. Henny, Engineer E. Alan Rowe, Engineer Fred D. Pyle to El Capitan Dam and return in contractor's automobile. (See report dated 5-23-33).

Mr. Henny's attention was called from time to time to portions of the contract specifications referred to in Hydraulic Engineer's letter 4-8-33 to the City Attorney on compliance with contract specifications and in addition to requirements as to testing cement and drilling holes for inspection of concrete, paragraphs 68 and 122.

At no time did Mr. Henny ask for information from contract specifications.

Time on specifications at Mr. Henny's request - none; at request of others - about 15 minutes at various times during the day.

May 21, 1933: 3 P.M. to 5 P.M. Mr. and Mrs. Henny visited the Pyle family.

Work at the dam not discussed.

May 22, 1933: 10 A.M. to 12 M. 2 P.M. to 4:30 P.M. Conference room (213) 524 F Street. D. C. Henny, Fred D. Pyle(75% of time).

Discussed supplementary drawings, spillway, outlet tower and tunnel; estimates of funds to complete; Reconstruction Finance Corporation monthly reports; design of spillway overflow crest, spillway divide walls, spillway extension, location of outlet tower, location of tunnel plug; sources of funds for completion of project.

Practically no discussion of non-compliance of contractor with contract specifications.

May 23, 1933: 11 A.M. to noon, room 212 - 524 F Street. Participating: D. C. Henny, Assistant Engineer P. Beermann, Engineer Fred D. Pyle.

Discussion of weights of puddle, beach and rock embankment materials and factors of safety against sliding.

Time on specifications - none.

May 23, 1933: 1 P.M. to 6:30 P.M. to City's testing laboratory and to dam. D. C. Henny, E. Alan Rowe, Fred D. Pyle and others. (See report dated May 29, 1933).

Examined tunnel, spillway extension and river channel.

Very limited if any reference to specifications.

May 24, 1933: 4:00 P.M. to 5 P.M. Conference room (213) 524 F Street. D. C. Henny, Fred D. Pyle.

General discussion, data furnished to Mr. Henny as to estimates of contractor's earnings, tunnel lengths and portions lined, elevations of various portions of the work, comparison of yardage estimate of 4-30-33 with schedule quantities, causes of contractor's delays.

No references to contract specifications.

May 25, 1933: 3:22 P.M. Council chamber.

Mr. Henny delivered his report which was read by the City Clerk.

At no time did Mr. Henny ask me or those we were with to read, explain or state what was in the contract specifications.

At no time did the Contractor or his representatives state that the Hydraulic Engineer was requiring work in excess of the contract specifications requirements.

Fred D. Pyle
Engineer

FDP/P

7-31-33
copy/p

COPY
2077

Resident Engineer's Office
El Capitan Dam

July 12, 1933

From : Hydraulic Fill Engineer

To : Hydraulic Engineer

Subject : San Diego River Project, El Capitan Feature, time spent and conversation with Consulting Engineer D. C. Henny

1. At about 9 A.M. May 20, 1933, I was present at a meeting, held on top of the downstream rock embankment elevation 634, El Capitan Dam. Those present were Consulting Engineer D. C. Henny; Engineer Fred D. Pyle; Resident Engineer Harold Wood; Deputy State Engineer G. W. Hawley; Senior Inspector of Dams Gerald McKinlay; Contractor H. W. Rohl; Contractor's Engineer E. Alan Rowe and Contractor's Superintendent O. C. Steves.

2. A general discussion of conditions of top of rock embankment at elevation 600 took place. I did not enter into the discussion other than to concur with Engineer Pyle and Resident Engineer Wood in that the earthy material, lying on top of the downstream rock embankment at elevation 600 had not been removed in a satisfactory manner. Time spent by the group at the above point - about one hour. I carried on no conversation with Mr. Henny.

3. From this point, the group went to the north abutment, where Mr. Henny inspected the core wall and core wall excavation. Mr. Henny asking how the ravelings from the slopes of the core wall excavation were being taken care of, I told him that the loose material, or ravelings, were cleaned off by hand just before the water in the summit pool was raised. Duration of my conversation with Mr. Henny at this point - less than one minute.

4. The group then went to the upstream beach where Mr. Henny looked at the beach material. Time spent at this point - about thirty minutes. Duration of my direct conference with Consulting Engineer Henny at this point - none.

5. From this point the group went to the downstream rock embankment at elevation 600. I did not hear Mr. Henny make any comment at this point. From there the group went to the Contractor's mess hall.

6. After lunch the group went to the quarry, where Mr. Henny walked around over the quarry floor. Time spent at this point - about thirty minutes. Duration of my direct conferance with Consulting Engineer Henny - none.

7. From the quarry, the group went to the spillway. Mr. Hawley and Mr. McKinlay left the group at this time. Mr. Henny examined the material in the north side of the spillway excavation. Time spent at this point - about thirty minutes. Duration of my direct conference with Consulting Engineer Henny at this point - none.

8. The group then went to the outlet tunnel. I had no conversation with Mr. Henny at this point.

9. The group then went to borrow pit "A". I explained why the sandy material along the east side of Chocolate Creek was not wanted in the hydraulic fill. He said that the reason on this material had been used was due to a misunderstanding on the part of the shovel operators. Time spent here - about ten minutes. Duration of my direct conference with Consulting Engineer Henny at this point - less than two minutes.

10. From the above location, the group went to the lip of the spillway where Consulting Engineer Henny, Engineer Pyle and Resident Engineer Wood went into the prospect tunnel, driven under the spillway floor at about elevation 750. The group then left the damsite.

11. On May 21, 1933, at about 9 A.M. Resident Engineer Wood and I met Consulting Engineer D. C. Henny; Engineer Fred D. Pyle and Contractor's Engineer E. Alan Rowe at the upper toe of the dam. Later, all went into the outlet tunnel. Time spent in the outlet tunnel - about one hour. I had no conversation with Consulting Engineer Henny at this time.

12. I did not hear Consulting Engineer Henny mention plans and specifications nor contractor's compliance therewith at any time during the two partial days that he was on the El Capitan Dam.

D. W. Albert
Hydraulic Fill Engineer

DWA/p

COPY

2079

July 28, 1933

M E M O R A N D U M

Subject: San Diego River Project, El Capitan Feature
Hydraulic Engineer's Participation in
Connection with Report dated May 25, 1933
by D. C. Henny, Consulting Engineer of
Portland Oregon, to the City of San Diego
re El Capitan Contract Construction Matters.

On May 17, 1933, a letter was received in this office from the City Clerk, dated May 17, 1933, reading as follows:

"1. Herewith I am sending you copy of telegram just received from D. C. Henny of Portland, Oregon, whom the council has invited to come here for special work in connection with controversies between contractors and your office.

"2. It is the wish of the mayor and the councilmen that you have prepared for Mr. Henny's use the categorical statement which he requests in his wire."

The copy of telegram enclosed by the City Clerk read as follows:

"ARRIVE FRIDAY NOON IF MAKE LOS ANGELES RAIL CONNECTION STOP WIRED STATE ENGINEER SUGGESTING HE SEND STATE INSPECTOR TO GIVE INFORMATION STOP TRUST CITY ENGINEERS WILL HAVE PREPARED ON MY ARRIVAL COMPLETE CATEGORICAL STATEMENT OF ITEMS REGARDED AS VIOLATIONS OF PLANS AND SPECIFICATIONS BY CONTRACTORS EL CAPITAN DAM."

Knowing personally that neither State Senior Inspector of Dams, Gerald McKinley, nor Deputy State Engineer George W. Hawley had been on the El Capitan dam job between March 14 and March 31, 1933, the period during which the Contractor had persistently and knowingly resisted compliance with the contract specification requirements, and with the Hydraulic Engineer's formal and repeated admonitions in writing to remove an existing layer of earthy material from the surface and/or deck of the downstream lift of rock embankment of the dam at about elevation 600, and having an area of about 75 feet by 530 feet, before proceeding to place a lift of rock embankment upon the layer of earthy material up to March 31, 1933 and to a depth of 15 to 34 feet.

Realizing the importance to the City of San Diego of protecting the lives of a large population and property of great value exposed to death and destruction in the event of a major disaster to the El Capitan dam due to faulty construction, and the dutiful importance of securing the construction of the

El Capitan Dam with the safety required and specifically provided for in the contract drawings and specifications, I deemed it advisable, after receiving the City Clerk's letter and enclosure (copy of Mr. Henny's telegram) to telegraph State Engineer Edward Hyatt on May 17, 1933 as follows:

"CITY'S CONSULTING ENGINEER HENNY REPORTS THAT HE HAS SUGGESTED YOU SEND STATE INSPECTOR TO SAN DIEGO FOR CONFERENCE EL CAPITAN. YOUR PERSONAL PRESENCE DEEMED ESSENTIAL.""

To which State Engineer Edward Hyatt replied by telegram dated May 18, 1933 as follows:

"REFER YOUR TELEGRAM SEVENTEENTH STOP AM LEAVING STATE CONSEQUENTLY REGRET MY INABILITY TO ATTEND CONFERENCE STOP HAVE DIRECTED HAWLEY TO MEET WITH YOU."

In response to paragraph 2 of the City Clerk's letter dated May 17, 1933, there was accomplished a categorical statement of nine of the outstanding evasions, resistances and non-compliances by the Contractor with the specific requirements of the contract specifications essential to the proper safety of the dam addressed to the Honorable, the Mayor and Council dated May 19, 1933, subject: "San Diego River Project, El Capitan Feature, Statement of Contractor's non-compliance with contract specifications", copy as attached, was handed by Engineer Fred D. Pyle on May 19, 1933 to Consulting Engineer Henny.

In furtherance of a logical interpretation of the reasons for Consulting Engineer Henny's employment by the City and in compliance with the City Clerk's advice later, and orally, that Mr. Henny desired to have a representative of the City's El Capitan Dam engineers together with the Contractor, meet with him at the El Capitan Dam May 20, 1933 at 9:00 o'clock A.M. and that Mr. Henny requested personal exclusive transportation from the City of San Diego to El Capitan Dam May 20, 1933 A.M., which transportation was provided.

The City's Hydraulic Engineer H. N. Savage, Engineer Fred D. Pyle, Resident Engineer Harold Wood and Hydraulic Fill Engineer D. W. Albert met with Mr. Henny at the El Capitan Dam at 9:00 o'clock A.M. on May 20, 1933. Deputy State Engineer George W. Hawley and State Senior Inspector of Dams Gerald McKinley, Contractor H. W. Rohl, his Hydraulic Fill Engineer B. Allan Rowe and his Superintendent O. C. Steves were also present.

I introduced to Mr. Henny the City's El Capitan Dam Resident Engineer Harold Wood, but with the impression that they were already acquainted.

I also introduced Hydraulic Fill Engineer D. W. Albert, whose previous hydraulic fill dam construction work at both San Pablo Dam

and San Leandro Dam, vicinity Berkeley and Oakland, I knew Mr. Henny had personally visited during construction operations, and presumably already knew Mr. Albert.

Engineer Fred D. Pyle had to my knowledge been acquainted professionally, officially and socially with Mr. Henny over a long period of years.

I specifically notified Mr. Henny that we four City's engineers would each and all be available upon his request for inspections and conferences with him regarding the work.

In addition, I also proffered to Mr. Henny independent office room, together with technical, clerical and stenographic assistance to the extent he might desire in my San Diego offices.

Upon being advised by Mr. Henny that it would not be necessary for me to remain at the dam and participate in the inspection of the contract work or in conference thereon, I left the party about 10:00 o'clock A.M. and returned to San Diego.

Mr. Henny, without further conference with me, again visited the Dam Sunday, May 21, 1933, accompanied by Contractor's Hydraulic Fill Engineer E. Allan Rowe in the Contractor's private automobile and the City's Engineer Fred D. Pyle.

The City Attorney accompanied Mr. Henny to the Hydraulic Engineer's office Monday A.M. May 22, 1933, but did not remain for any conference.

Mr. Henny, on arrival was assigned office room No. 213 in the Hydraulic Engineer's offices and was again proffered the full assistance of the Hydraulic Engineer, Engineer Fred D. Pyle, Designing Engineer Paul Beermann, Draftsman Norman Coote and a competent stenographer, but no conference whatever was had between Consulting Engineer Henny and the Hydraulic Engineer regarding the Contractor's El Capitan Dam construction work.

Realizing the great importance to each the City and the Contractor of a comprehensive and accurate report, I suggested to Mr. Henny that he have a conference with both City Attorney C. L. Byers and Special Water Counsel T. B. Cosgrove before releasing his report, but again no conference was had at this time between Mr. Henny and the Hydraulic Engineer regarding the Contractor's non-compliance with the specific requirements of the contract drawings and specifications.

May 22, 1933, afternoon, a conference lasting only a few minutes was had in the Hydraulic Engineer's office between Mr. Henny and the City's Special Water Counsel T. B. Cosgrove. Pleasantries only were exchanged but no discussion was had regarding the contract construction of the El Capitan Dam.

May 23, 1933, Mr. Henny arrived in the Hydraulic Engineer's offices, Room 213 about 11:00 o'clock A.M. At this time I had no conference with Mr. Henny regarding the contract construction of the El Capitan Dam work.

In the afternoon of May 23, 1933, Consulting Engineer Henny, Engineer Fred D. Pyle, Designing Engineer Paul Beermann and the Contractor's Engineer E. Allan Howe visited the City's Testing Laboratory, and accompanied by Testing Engineer J. Y. Jewett, the party, with the exception of Mr. Beermann, traveled to the El Capitan Dam.

I did not see Mr. Henny May 24, 1933, and gained the impression that he did not visit the Hydraulic Engineer's offices room 213.

Mr. Henny's report was passed to the City Clerk May 25, 1933 about 3:22 P.M. and read at a meeting in the Council Chamber attended by the Mayor, the Councilmen, the Water Commissioners, City Attorney C. L. Byers, Special Water Counsel T. B. Cosgrove, Engineer Fred D. Pyle and Hydraulic Engineer H. N. Savage.

I was informed that Mr. Henny and the Contractor's Consulting Engineer J. B. Lippincott, who was reported to have been in the City continuously for nearly the duration of Mr. Henny's visit and inspection, both attended a meeting of the local section of the American Society of Civil Engineers on the evening of May 25, 1933.

Just before noon May 25, 1933, the City Attorney telephoned, asking the Hydraulic Engineer for a date for Mr. Henny to pay his parting respects before leaving San Diego at 2:15 P.M., which was arranged for and accomplished at 1:30 P.M.

On Mr. Henny's arrival, I specifically expressed to him the hope that he had succeeded in getting all the cooperation and information he desired of any and every kind from the Hydraulic Engineer's staff--Engineer Pyle, Designing Engineer Beermann, Resident Engineer Wood, Hydraulic Fill Engineer Albert--and from the Hydraulic Engineer's files, office and field; and

Specifically expressed to Mr. Henny the fact that he had seen fit to refrain from any inspection of the work and from any conferences whatsoever with the Hydraulic Engineer in Charge, or from asking him any questions regarding the Contractor's conduct of the work or his lack of compliance with the specific requirements of the contract drawings and specifications, to which Mr. Henny specifically replied that he had obtained the majority of his information regarding the El Capitan contract work from J. B. Lippincott of Los Angeles, whom he declared to be a man of prominent integrity and to have comprehensive knowledge of the El Capitan work and whom he had known even longer than he had me, although our acquaintence had extended throughout almost forty years, during which time and about 1900,

Mr. Henny had been the administrative and executive officer for the contractor on the contract construction of a main wooden stave pipe line for the Southern California Mountain Water Company from Lower Otay reservoir designed to terminate at University Heights reservoir, which had been designed by and constructed under my responsible supervision as Consulting and Executive Engineer for the Water Company.

Subsequently, I had initiated and accomplished the employment by the Federal Government of Mr. Henny's professional services as a Consulting Engineer in the United States Reclamation Service soon after 1904, and subsequently recommended his advancement also to Supervising Engineer in charge of the Northwestern Division of the Service.

Furthermore, as Consulting Engineer at Large and Supervising Engineer of the Northern Division of the Reclamation Service, I served with Mr. Henny on consulting boards, and frequently requisitioned his services as a Consulting Engineer on boards of engineers reporting on the feasibility of projects, the design, construction and operation of twelve irrigation projects and principal features in the Northern Division of the Reclamation Service under my personal supervision as Consulting and Supervising Engineer.

H. N. Savage
Hydraulic Engineer

HNS/f

CONSULTANTS

L. C. HILL

2-11-35
copy/p

December 23, 1932

From : Engineer Fred D. Pyle

To : Hydraulic Engineer

Subject : San Diego River Project, El Capitan Feature, Excavation and embankment classification and Determination of pay quantities Consideration and comments of L. C. Hill

On December 19 Mr. L. C. Hill, Consulting Engineer of Los Angeles, accompanied by the Hydraulic Engineer and myself, visited El Capitan Reservoir Dam. He was taken to the quarry from which the rock for the rock embankment is being secured by the contractors.

Mr. Hill viewed the results of the activities in the vicinity of the concrete core wall and puddle core. His attention was specifically called to a small lens of brownish gravel and sand which the State Engineer's representativies have inadvertently and erroneously sometimes referred to as "cemented gravel" because of its being comparatively water tight. This gravel is not "cemented". The City's engineering and inspection forces have yet to see any of this material, when excavated, where the pieces of gravel stuck together in lumps because of cementing material.

Mr. Hill's attention was also called to the mixture of decomposed granite of various degrees of hardness with granite boulders or nodules where uncovered by excavation operations for the core wall in the south abutment of the dam.

Mr. Hill entered the intake end of the diverting tunnel going thru and out at the exit end of the tunnel. Concrete lining was being placed by pneumatic gun in a 60-foot section of the tunnel. A completed 60-foot section of lined section from which the forms had been removed was in evidence.

At the exit portal of the tunnel Mr. Hill examined quite closely at this time and again later in the day the material exposed in making the portal cut. On a portion of this surface there were two white paint lines - the lower representing the division between class 1 and class 2 material as indicated and established by the City's engineers previous to November 3, 1932, and the upper line as indicated and established by the City's engineers November 3, 1932.

Mr. Hill examined the contractor's concrete aggregate plant and remarked on the lack of fines and the difficulties met at Hoover dam in placing concrete with pneumatic guns where there was a lack of fines.

Mr. Hill read the contract specifications cofering the work listed under items 1, 2, 3, 9, 10, 12 and 14. He also read or had read to him paragraphs 51, 54, 55, 59 and 61 of the contract specifications and examined Drawing WD-383 of the contract drawings. He had read to him that portion of report of Engineer Fred D. Pyle to Hydraulic Engineer dated November 9, 1932, on classification of material excavated which pertained to schedule items 1, 2, 9, 10, 11, 12 and 14. Also the first 1 1/2 pages of report of Engineer Pyle

to Hydraulic Engineer dated November 14, 1932 on effect on Progress Estimate No. 6 of taking spoil bank swell into account. Also the summary and comparisons on the last page of this report. He was furnished to read at his convenience Engineer Pyle's file on excavation and embankment classification and determination of pay quantities. It is understood that he has a copy of the drawings and specifications for the El Capitan dam.

Mr. Hill pointed out that paragraphs 51, 54 and 55 would have been clearer and more definite in their meaning if excavation and embankment had been treated entirely separate instead of together, that this was probably not serious but may be made much of by attorneys attempting to establish in the mind of a judge that the specifications were confusing.

The following items of differences between the contractor's statements of work performed and the City's estimates were considered at some length but not always to a definite conclusion as Mr. Hill desired to give further consideration to the specifications and to the correspondence and reports.

CLASS 1 vs. CLASS 2

Mr. Hill expressed the opinion that the City had been most liberal in determination of Class 1. He believed that much of the material included in Class 1 could be worked down with a pick and was softer than "ledge rock in place that cannot be loosened except by wedging, barring or blasring." He advised the excavation of a demonstration tunnel in the material considered as Class 1 in the tunnel exit portal.

SWELL OF MATERIAL

Mr. Hill expressed the opinion that the contractor is not entitled to more than the quantity excavated measured in excavation - tunnel, core wall, tunnel portals, etc. - except when the percentage wasted is so large that it would be indicated that certain schedule items became negative.

He also indicated his belief that in making deduction for over all dam embankment quantities it was proper to take into account swell of the material taken from excavation other than borrow pits or quarry and placed in the dam.

He stated that it would be very advisable for the City to reach a definite agreement with the contractor as to the amount of swell and indicated that 27.5% for Class 1, tunnel and core trench material, was very reasonable.

CUTOFF TRENCH

Mr. Hill pointed out that in the construction of many earth and hydraulic fill dams, even where there is no concrete cutoff wall extending into the foundation of the dam, there is often an excavation 20 to 40 feet wide and of varying depths, known as cutoff trench. Also that since the City had staked a 36-foot wide trench about 10 feet deep across the base of the dam, the City's position in allowing a smaller quantity for trench excavation Item 12, in view of lack of definite instructions or agreement with the contractor, would be difficult for the City to maintain.

He said that Chief Engineer E. C. Eaton of the Los Angeles County Flood Control District, had stated in the County's specifications that no excavation outside of a certain depth and width would be construed as cutoff trench.

ADDITIONAL STRIPPING BASE OF DAM

Mr. Hill stated that owing to the nature of the stripping required for dams in general and to the specific requirement in paragraph 59 of the contract specifications that "this area (under the embankment) shall then be stripped and excavated to such lines and grades as directed by the engineer", the City was under no obligations to the contractor except to pay for the excavation under the various schedule items and classifications.

Thru an oversight Mr. Hill's attention was not called to the contractor's written acceptance of the Hydraulic Engineer's letter dated July 14 calling the contractor's attention to the additional excavation made necessary by the California State Engineer's requirement and the assumption on the part of the Hydraulic Engineer that it would be agreeable to the contractor to accomplish the excavation at the unit price stated in the contract.

MEASUREMENT OF TUNNEL LINING

Mr. Hill was asked as to his views on the deduction of timber sets in determining concrete tunnel lining quantities. He advised that in the absence of specific specifications otherwise, it was not customary to make deduction for the timber sets projecting in the tunnel lining. Before reaching a definite conclusion he desired more time to compare El Capitan dam specifications with other specifications.

Fred D. Pyle
Engineer

FDP/p

2-9-35
copy/p

2088

QUINTON, CODE AND HILL-LEEDS AND BARNARD

Los Angeles, California

January 6, 1933

Mr. H. N. Savage
Hydraulic Engineer
San Diego, Calif.

My dear Mr. Savage:

Taking up Mr. Pyle's memorandum to you, dated December 23, 1934:

1st pa ge, 3rd paragraph - regarding the small lens of brownish gravel and sand: there was no question that the particular samples showed me were not, and never had been, in recent years at least, consolidated enough to be called cemented gravel. However, the sample shown was very small and might, or might not, be representative of the test of the excavation.

1st page, last paragraph - It was not at Hoover Dam that I remarked on the lack of fines, etc., but that makes no difference.

2nd page, next to last paragraph - This is not very clear. As I understand it, the contractor's bid, for example, for excavation of the tunnel provides that the excavated material can be wasted or put in the dam at the option of the City. For this he is to be paid a certain amount per cubic yard measured in place. In order to estimate how much material is brought from the outside, for which the contractor should be paid, you have set up a certain method of payment and have in this method made no allowance for the swell of the material as it is put into the dam embankment. I suggested that the sooner you got an agreement with the contractor as to the amount of swell to allow for the material put in the embankment, the less trouble you would have.

Practically all the test of it is in accordance with my understanding of our conversation.

As I told Mr. Pyle, I would have to rule against you in taking out the amount of concrete displaced by the timber in the tunnel unless your specifications clearly provide for such deduction. The Owyhee specifications specifically provide for such deduction.

I find I have no copy of your specifications and would be pleased to have one.

Very truly yours,

Louis C. Hill

LCH/AM

2-9-35
copy/p

QUINTON, CODE AND HILL-LEEDS AND BARNARD

Los Angeles, California

January 6, 1933

Mr. Fred D. Pyle
Engineer Water Department
San Diego, California

My dear Mr. Pyle:

I am returning to you herewith the file which you loaned me the day I came away. I notice that the contractors did not agree with all of your estimate. I am wondering how your final conference came out in regard to the assumption of swell which we figured you would be safe in assuming as anywhere between 20 and 30%; that is you would be better off to agree on something than to try and make any allowance based on your specifications.

I have read over your notes on the result of our trip to El Capitan Dam, and agree with practically everything you said as being a fair representation of our conversation. I call attention to one thing: the place where they were having trouble with lack of fines was not Hoover Dam. It doesn't make any difference where it was, but if I said Hoover Dam in talking to you, I didn't mean it. I have found places enough where lack of fines caused lots of trouble. In fact, at one place, I had them put in material that looked almost like dust it was so fine, in order to make a concrete that would hold water. There was no dirt in it; that is, no soil, but it was extremely fine.

I hope everything is going along smoothly.

Very truly yours,

Louis C. Hill

LCH/AM
incls.

2-11-35
copy/p

January 25, 1933

Mr. Louis C. Hill
Consulting Engineer
712 Standard Oil Building
Los Angeles, California

Subject: City of San Diego Municipal
El Capitan Dam, Administration

Dear Mr. Hill:

Supplementing and confirming my conference by telephone with you this morning regarding your participation as witness in a legal injunction case initiated by local Attorney C. C. Crouch, Esq., in his own behalf as a citizen and taxpayer of the municipality of San Diego which is being constructed by the City of San Diego for the accomplishment of additional water supply for municipal purposes;

Enclosed is copy of the City Attorney's official request for and confirmation of your employment as specifically set forth therein.

Under separate cover I am forwarding to you by mail excerpts from Attorney Crouch's list of claims.

Previous to the public advertisement by the City of San Diego for proposals for contractors for constructing the El Capitan Dam, Attorney Crouch appeared in behalf of two potential bidders and indicated about 79 modifications he, in behalf of his potential clients, desired to have made in the specifications before the advertisement for proposals was published.

Very truly yours,

H. N. Savage
Hydraulic Engineer

HNS/f
encl.
copy letter City Attorney 1/25/33
cc City Attorney

2-11-35
copy/p

2091

Office of

City Attorney

Jan. 25, 1933.

From : City Attorney

To : Hydraulic Engineer

Subject : El Capitan Dam, Spillway and Outlet Works
Crouch litigation. Expert witness

Confirming our telephone communication this morning regarding making arrangements with Mr. Louis Hill to act as an expert witness on behalf of the City at the trial of the Crouch cases, set for Tuesday, January 31st, the City Attorney has instructed me to say that it will be satisfactory for you to make definite arrangements with Mr. Hill for him to be here on Monday, January 30th, for the purpose of conference prior to trial, and that the fee of $100.00 per day plus expenses required by Mr. Hill for attendance in this matter will be satisfactory.

H. B. Daniel
Deputy City Attorney

HBD/S

2-11-35
copy/p

2092

February 15, 1933

From : Hydraulic Engineer

To : City Attorney

Subject : San Diego River Project, El Capitan Dam, Electors Authorization, drawings and specifications, Attorney C. C. Crouch et al claims

Recognizing the potential and anticipating prominently material and possibly serious legal complications which might develop in connection with the Attorney C. C. Crouch et al claims; and also

With H. W. Rohl and T. E. Connolly Contractors' indicated claims in the making and pyramiding; and

In my best constructive cooperation with your office, Mr. L. C. Hill, Mem.Am.Soc.C.E., Consulting Engineer of Los Angeles was invited to review the El Capitan construction work as being progressed under the drawings and specifications, and regarding which Mr. Crouch had initiated some seventy-nine adverse criticisms before the contract was awarded.

Mr. Hill's personality, education, training and experience is comprehensive and outstanding in the United States - employed by the U. S. Federal Government successively and continuously since 1903 as District, Supervising and Consulting Engineer respectively, to the U. S. Reclamation Service and to the Bureau of Reclamation, and in connection with

Roosevelt Dam, Salt River, Phoenix, Arizona
Laguna Dam, Colorado River, Yuma, Arizona
Gibraltar Dam, San Ynez River, Santa Barbara, California
Hoover Dam, Colorado River, and to follow
Parker Dam, Colorado River, construction by
U. S. Bureau of Reclamation for and at the cost of
The Metropolitan Water District of Southern California
International Water Commission, United States-Mexico,
Rio Grande, Colorado and Tijuana Rivers water
resources and the allocation thereof
Chatsworth and Bouquet Canyon Dams, City of Los Angeles
San Gabriel Dams Nos. 1 and 2, Los Angeles County Flood Control
Pine Canyon Dam, City of Pasadena

I have indicated mya approval of Mr. Hill's statement for services in preparation for and connection with the Crouch et al vs. City of San Diego El Capitan law suit as per his two statements for your further appropriate attention and advancement.

Mr. Hill's visits to the El Capitan dam work and his studies and application of the contract drawings and specifications have incidentally and timely as the work has progressed founded him on the fundamentals to inevitably be involved in the contractor's obvious claims in the making.

H. N. Savage,

HNS/f
encls.(bills $484.80;$210.00)

Hydraulic Engineer

9/6/33
copy/f

April 24, 1933

Mr. L. C. Hill
Consulting Engineer
712 Standard Oil Building
Los Angeles, California.

Subject: San Diego River Project, El Capitan Feature, Consulting Engineer.

My dear Mr. Hill:

The City's Special Water Counsel, T. B. Cosgrove, was pronounced in his declarations that there should be an outside engineer of prominent education, training, broad successful experience, prestige and standing employed by the City to observe the conditions at El Capitan Dam and to collaborate in directing the work under the contract specifications and qualify as a witness regarding the facts disclosed as the work proceeds.

The State Engineer in conference at Sacramento October 5, 1931, also indicated a request that the City should retain and employ an outside consulting engineer.

Provided your services are agreeably and conveniently available, I shall recommend your employment by the City of San Diego as Consulting Engineer as requirement therefor develops, and incident to the present question of whether or not rock embankment has been placed in accordance with the contract specifications.

Very truly yours,

H. N. Savage,
Hydraulic Engineer.

HNS/f

5/2/33
copy/f

2094

COPY

May 1, 1933

TO THE HONORABLE, THE MAYOR AND COUNCIL
OF THE CITY OF SAN DIEGO, CALIFORNIA.

Subject: San Diego River Project, El Capitan Feature
Inspection of decomposed granite not removed
from top of rock embankment. Resolution 60012.

Gentlemen

The City Attorney and Special Counsel have requested the appointment of a consulting engineer of outstanding and successful practice in the design and building of dams to make inspection of the rock embankment at El Capitan reservoir dam, as the Contractor proceeds to remove earthy material and decomposed granite in accordance with my letters to the Contractor dated March 22, 1933, March 30, 1933 and April 20, 1933, and Resolution No. 60012, and to determine whether or not the placing of rock embankment had been in accordance with contract specifications and the Hydraulic Engineer's responsibilities.

Your attention is invited to the qualifications of Mr.L.C.Hill, consulting engineer of Los Angeles:

Mr. Hill's personality, education, training and experience is comprehensive and outstanding. He has been employed by the U. S. Federal Government successively and continuously since 1903 as District, Supervising and Consulting Engineer respectively, to the U. S. Reclamation Service and to the Bureau of Reclamation, and in connection with:

Roosevelt Dam, Salt River, Phoenix, Arizona
Laguna Dam, Colorado River, Yuma, Arizona
Gibraltar Dam, San Ynez River, Santa Barbara, California
Hoover Dam, Colorado River, and to follow
Parker Dam, Colorado River, construction by the
U. S. Bureau of Reclamation for and at the cost
of The Metropolitan Water District of Southern
California
International Water Commission, United States-Mexico,
Rio Grande, Colorado and Tijuana Rivers water
resources and the allocation thereof
Chatsworth and Bouquet Canyon Dams, City of Los Angeles
San Gabriel Dams Nos. 1 and 2, Los Angeles County
Flood Control
Pine Canyon Dam, City of Pasadena

Mr. Hill has twice been employed by the City of San Diego on other work and was employed by the State Engineer to review the designs of El Capitan Reservoir Dam before their approval by the State Engineer.

RECOMMENDATION: It is respectfully recommended that Mr. L. C. Hill be immediately employed as Consulting Engineer.

Respectfully,

H. N. Savage,
Hydraulic Engineer.

HNS/p

9/6/33
copy/f

May 22, 1933

Mr. Louis C. Hill
Consulting Engineer
712 Standard Oil Building
Los Angeles, California.

Subject: San Diego River Project, El Capitan Reservoir Dam, Spillway and Outlet Works, Contract Construction.

My dear Mr. Hill:

Receipt is acknowledged of and you have my high appreciation and valuation for your letters dated May 16, 1933 and May 19, 1933 regarding the Contractor's methods in carrying on the work covered by his contract with the City of San Diego for the construction of the El Capitan Reservoir Dam, Spillway and Outlet Works.

Following your official visit and review of the Contractor's work Wednesday, May 10, 1933, and collaboration in formulating Hydraulic Engineer's letter S-10 dated May 11, 1933 to the Contractor following out the purport of the Municipal Councilmen's Resolution No. 60012 dated April 21, 1933, copy of which was exhibited to you;

M. M. O'Shaughnessy, Consulting Engineer to the City of San Francisco, arrived in San Diego Thursday, May 11, 1933 and accompanied by the Mayor and a number of the Councilmen and Water Commissioners, but not by any of the City's Engineers, visited and went over the El Capitan Dam work Friday morning, May 12, at which time the Contractor had advanced a power shovel from the right abutment along the 10-foot wide terrace about half way across the embankment toward the location of the "stall" when the Council are understood, upon assurances from Mr. O'Shaughnessy of the safety of the Contractor's method of construction of the dam, irrespective of the horizontal layer of earth at about elevation 600, which he could not have seen or known much, if anything about, to have countermanded the Hydraulic Engineer's letter S-10 requesting the removal of the rock embankment in the "stall" to disclose the earth layer, whereupon the Contractor discontinued the work.

At an executive session in the Mayor's San Diego office Saturday A.M. May 13, Mr. O'Shaughnessy emphatically reiterated his assurances of the safety of the dam and the Mayor and a majority of the Councilmen voted to direct the Hydraulic Engineer to withdraw his several letters dated March 22, March 30, April 20 and May 11, (S-10) 1933 requesting the Contractor to refrain from placing rock embankment above elevation about 600 before removing the earthy material and decomposed granite placed by him for his convenience in operating trucks and tractors.

At the next regular meeting of the Mayor and Council, Monday, May 15, Resolution No. 60120, previously unknown to me, was formally enacted initiating the employment of D. C. Henny as a Consultant which was consummated and Mr. Henny arrived in San Diego Friday, May 19.

Deputy State Engineer George W. Hawley and Senior Inspector of Dams Gerald McKinlay visited the Dam Saturday May 20 with Mr. Henny.

Mr. Henny's oral inquiries May 20 indicated paramount consideration of the safety of the structure as being constructed by the Contractor. Little reference is understood to have been made to the Contractor's failure to comply with the contract specification requirements.

Mr. Henny is also giving much attention to the designs of the dam, spillway and outlet works.

Your employment as Consultant for May 10 was formally authorized by the Council by Resolution No. 60122.

Very truly yours,

H. N. Savage
Hydraulic Engineer.

HNS/f

2-9-35
copy/p

2098

September 26, 1933

Mr. Louis C. Hill
Consulting Engineer
712 Standard Oil Building
Los Angeles, California

Subject: San Diego River Project, El Capitan Feature, Contract Construction Policies and Methods required

My dear Mr. Hill:

Another visit, inspection and conference on the ground at the City's El Capitan Dam contract construction job is desired at your earliest convenience.

Another single day would suffice.

The three outstanding problems presenting are:

The necessity for maximum separation of clay and fines from the borrow pit earth material for the hydraulic fill portion of the structure;

Classification of material being excavated from the spillway; and

The Contractor's obligation or opposition to accomplish the excavation and lining of the reach of spillway discharge channel as required by the State Engineer.

Very truly yours,

H. N. Savage,
Hydraulic Engineer.

HNS/f

San Diego, California
October 7, 1933

Mr. H. N. Savage, Hydraulic Engineer
City of San Diego
San Diego, California.

Subject: Spillway Model.

Dear Sir:

I inspected the model of the spillway for El Capitan dam today and observed the action of the water with full flow passing over the weir.

The side spillway portion was operating as expected.

The design of the channel from a point about 2 feet upstream from the downstream end of the weir to the end could probably be materially improved with a considerable saving in cost.

I suggest you delegate some trained engineer in your office to have direct charge of the tests. He should take cross sections of the flow at short intervals along the line of the side channel and the discharge channel with conditions:

(a) As they now exist

(b) After making temporary changes in the channel with boards and sheet iron forms

(c) After developing by these tests the shape which seems to give the best results, make the permanent model to conform to this shape. Then make cross sections of the water as before in (a) and (b) and study the results with a view to further improvement.

Very truly yours,

Louis C. Hill
Consulting Engineer

LCH/f

11-7-33
Copy/c

COPY 2100

San Diego, California
October 7, 1933

Mr. H. N. Savage, Hydraulic Engineer
City of San Diego
San Diego, California

Sir:

At the time of my last visit to El Capitan dam among other things there was brought to our attention the condition of the puddle core due to an apparent lack of sufficient fines in the hydraulic fill material brought in from the borrow pits upstream from the damsite.

It was recognized at that time that it would require some 30,000 cubic yards of material carrying upwards of 60 per cent silt and clay to bring the puddle core up to a safe level. It was recommended that a search be made at once to find suitable material.

Most of yesterday was spent on the dam and in the office at El Capitan with Mr. Hawley, Mr. McKinlay, Mr. Pyle, Mr. Wood and Mr. Albert going over the information so far obtained, and discussing the method to be followed in bringing the hydraulic fill up to elevation 750.

Above that elevation and perhaps sooner, it was understood that some change would probably have to be made in the method of placing.

All agreed it is imperative that at least 30,000 cubic yards of material containing about 60 per cent silt and clay must at once be obtained at some place other than the present borrow pits and washed into, or dumped into the present puddle

core without at the same time raising the level of the present beaches appreciably.

After this is done, based on the results of operations for the past two months, the present borrow pits will apparently furnish enough suitable puddle material to maintain the proper balance between the beaches and the puddle core at least for some time.

Since it is probable as in the past that the elevation of the puddle core will occasionally fall below the safe level of 6 to 8 feet below the beaches due to unforseen conditions, at least 10,000 cubic yards more or a total of at least 40,000 yards of the richer material should be hauled from the new pits and 10,000 cubic yards more or less of this stored conveniently to be drawn upon from time to time so the puddle core may be maintained at its proper level.

Today we were furnished the results of some recent tests made of the material in the beaches and from the pits which if corroborated by check tests started today may alter the conclusion that the present borrow pits with occasional help of the imported fatter material will supply enough silt and clay to bring the puddle core up to elevation 750.

METHOD OF PLACING

Unless the new tests of the beach material show a high silt content there seems to be no good reason to require the contractor to pass to the full hydraulic method much below elevation 740 to 750.

If, however, it is discovered that the beaches carry a high percentage of silt and the contractor finds it impracticable to maintain the proper level of the puddle core without importing more material, the contractor should be notified to make the change to the full hydraulic method. It seems almost certain he must make the change when the dam reaches elevation 740 to 750.

On account of the construction difficulties the contractor will encounter as the dam grows narrower if he continues to use the semi-hydraulic system, he may prefer to change to full hydraulic method earlier.

TOP WIDTH OF DAM

In order to have a homogeneous structure it will be necessary to carry the hydraulic fill practically to the top of the dam. In order to do this and to maintain suitable rock protection on both sides of the dam the top width should be increased to about 40 feet and suitable changes made in the front and back slopes to permit of this change. The location of the center line of the changed top should be such as to bring the center of the puddle core to the center of the earth fill.

PUDDLE CORE

All tests so far made of the material forming this core show extremely low permeability.

It is accordingly recommended that the thickness of this core be decreased gradually as the top of the dam is approached and after passing elevation 750, which is spillway level, the core to be made as thin as is practicably possible.

Very truly yours,

Louis C. Hill
Consulting Engineer

LCH/f

3-5-35
copy/p

QUINTON, CODE, AND HILL - LEEDS AND BARNARD
ENGINEERS CONSOLIDATED
Los Angeles, California

Enroute Kansas City

Nov. 20, 1933

Mr. H. N. Savage
Hydraulic Engineer City of San Diego
San Diego, California

Dear Mr. Savage:

I want to change my tentative verbal recommendation regarding the extension of the puddle core above elevation 750.

I believe if the puddle core is carried up (or squeezed up as Mr. Albert described it) so its top is at 751 say, there will be no leakage over this puddle core even if water passed over the spillway lip for several weeks. The top of the puddle core should be bisected by the concrete cutoff walls now in place.

The top width of dam should be about 30'±.

The top width of the puddle core as thin as can be made.

It should be made thinner quite rapidly so as to get back to sdeisnged section as rapidly as Mr. Albert thinks practicable, and thereafter reduced still well below the designed width or thickness so as to reach 750 elevation with a thickness as small as Mr. Albert feels he can produce a reasonably tight puddle core.

Yours

Louis C. Hill

12/11/33
copy /f

2105

COPY

December 11, 1933

Mr. Louis C. Hill
Consulting Engineer
c/o U. S. Engineers Office
Portland, Oregon.

Subject: San Diego River Project, El Capitan Feature, Contract Construction, Hydraulic Fill Material, and Placing.

Dear Mr. Hill:

Notwithstanding the purport of our letter drafted at El Capitan November 19, 1933, S-63, copy enclosed, regarding hydraulic fill material requirements for the El Capitan Dam impervious core section, the Contractor, after installing complete full hydraulic placing equipment, proceeded to and did haul material exclusively from borrow pit "A", passed it through a hog box and deposited it in the El Capitan dam hydraulic section in quantity as follows:

November	27, 1933	- 540	cubic	yards
"	28	192	"	"
"	29	1,676	"	"
"	30	0		
December	1	4,659	"	"
"	2	4,512	"	"
"	3	0		
"	4	4,389	"	"
"	5	491	"	"
		16,459	"	"

The Contractor's official representative on the job was notified by me orally that the Contractor's policy was unsatisfactory, and following his non-compliance a stop order letter dated December 4, 1933 (S-70) copy enclosed, was issued.

Work of placing hydraulic fill material stopped at 9:30 A.M. December 5, 1933.

Following the placing of the 16,450 cubic yards of material exclusively from borrow pit "A", core recovering soundings were taken and disclosed that lenses of sand, of material thickness, resulted in the impervious core section.

Furthermore, it is indicated that strata of sand, of material thickness, positively extend practically and/or entirely across the impervious core section.

Deputy State Engineer George W. Hawley, accompanied by State's Consulting Engineer Fred C. Herrmann visited the work December 7, 1933 and emphasized the State's requirement to have elaborate core recovering soundings made to determine the exact extent of lenses and/or stratas of sand in the impervious core section areas.

After returning to Los Angeles, Mr. Hawley amplified the State's requirement as indicated when he and Mr. Herrmann were on the job and expressed an insistent requirement for a very comprehensive in area and in cross section research with core recovering soundings and analyses.

The soundings are double-shifted and Testing Engineer Jewett's staff has also been double-shifted with the expectation that sufficient samples will be obtained and analyzed by about noon Friday, December 15, 1933 to disclose the controlling facts and factors as basis by the City and the State of policies and methods necessary to secure a safe dam.

Provided it will be agreeably convenient for you to do so, I will arrange for some of the City's engineers to meet you at Sacramento on your return from Portland for a conference at Sacramento with the State Engineer and his Consultants.

On receipt of this letter, please advise by telegram your probable date and hour of arrival at Sacramento, to be followed later by a telegram indicating your exact schedule to which the City's engineers will endeavor to accommodate themselves.

The State Engineer specifically suggested your presence at El Capitan December 7, and has since expressed a desire that you sit in at the next conference if agreeably convenient for you to do so.

Very truly yours,

H. N. Savage
Hydraulic Engineer

HNS/f
Encls.
Letters S-63 and S-70

2-9-35
copy/p

December 21, 1933

Mr. Louis C. Hill, Consulting Engineer
712 Standard Oil Building
Los Angeles, California

Subject: San Diego River Project, El Capitan Dam, Hydraulic Fill Section

Dear Mr. Hill:

Enclosed is copy of Drawing WD-483, edited to 12-18-33, on which there is shown in red, comprehensive outline of the strata of sand in the impervious section of the hydraulic fill material of the El Capitan Dam as observed by Mr. D.W.Albert.

Also enclosed is copy of my letter to the Contractor dated December 21, 1933, S-77, offering no objection to his proposed endeavors to remove the sand strata, but not approving his indicated policy of piling the excavated material on the beaches and hydraulicking it back into the impervious core section.

The Contractor was notified yesterday orally that I could not approve any additional placement of material in the impervious core section until core recovering borings had disclosed the suitability of the material left behind after he had carried out his sand excavation experiments.

Very truly yours,

H. N. Savage
Hydraulic Engineer

HNS/f
encls.

3-6-35
copy/p

January 15, 1934

Mr. L. C. Hill, Consulting Engineer
712 Standard Oil Building
Los Angeles, California

Subject: San Diego River Project, El Capitan Feature
Impervious core section, removal of sand strata

My dear Mr. Hill:

The contractor on the construction of the City of San Diego's El Capitan Reservoir Dam, about 10 A.M. January 5, 1934, commenced removing material from the puddle core area of the dam between N 3675 and N 3775 with two 3/4 cubic yard clamshell buckets operated by two draglines, one on each the upstream and downstream beaches, in an effort to remove sand lenses and strata which were found in the puddle core following the discontinuation of hydraulic placing on December 5, 1933. Due to lack of boom length a strip about 15 feet wide along the axis of the dam could not be reached by the clamshell buckets. The material removed from the puddle core area was deposited on the beaches.

Because of the tendency of the material deposited on the narrow upstream beach to slide back into the pool, the upstream dragline discontinued work at 2:20 P.M. January 5, 1934.

About 6 A.M. January 6, after a short extension boom on the dragline on the downstream beach failed, clamshell operations were abandoned.

During the forenoon of January 6, about fifteen small charges of cynamite were exploded in the bottom of the summit pool where the clamshell buckets had been working. Nothing was accomplished.

During the evening of January 6, the material deposited on the beaches by the clamshell buckets was hydraulicked back into the pool with a monitor.

On January 8, the contractor rigged up a slack line between two draglines, one on the outer limits of the upstream beach used as anchorage and one on the outer limits of the downstream beach used to operate a dragline bucket operating on the slack line. Excavation operations were commenced about 11 P.M. January 8 at coordinate about N 3200. The material was deposited on the downstream beach.

By 7 A.M. January 10, the excavation had proceeded northerly to N 3400 and by 7 A.M. January 12 to N 3650.

Alan Rowe arrived on the work the evening of January 11.

During the morning of January 12, the contractor discontinued slack line operations, removed his equipment from the beaches and

commenced washing the material on the beach back into the puddle core. While this was being done the work was visited by Deputy State Engineer George W. Hawley, Assistant Deputy State Engineer W. H. Holmes and Engineer Fred D. Pyle. In the presence of these men and Resident Engineer Harold Wood and Hydraulic Fill Engineer D. W. Albert, Contractor T. E. Connolly stated that he had not asked for approval of the puddle core as he realized there was considerable sand in it, that he was washing back the material from the west beach into the pool before it would dry and bake so that it would be difficult to wash. That he intended to place a dragline on the top of the upstream rock embankment elevation about 700 and operate a dragline bucket on a slack line to again remove material from the puddle core. This material would be deposited on the upstream beach inside the upstream rock embankment from where he intended to wash the fine material back into the puddle core, leaving the coarser materials on the beach. He expected to raise the water considerably when this work was undertaken. He said by having the slack line and operating equipment at a higher elevation he would be able to control the location and the depth of cutting of the dragline bucket to better advantage than he could when the equipment was on the beaches.

Soundings and gradation tests indicate that, while some sand has been removed, there are still extensive lenses and strata of sand in the puddle core.

The results thus far indicate that the contractor has not developed a satisfactory method for removing the sand lenses and strata from the puddle core section of the dam.

Enclosed is print of Drawing WD-483, on which is indicated by red shading the extent of sand strata as determined by the taking and analyzing of about 1000 samples.

Also enclosed are prints of three drawings showing cross sections of the puddle core area, on which are indicated by red shading the sand strata and the analysis of the samples taken.

Very truly yours,

H. N. Savage
Hydraulic Engineer

FDP/pf
encls.
Prints WD-483; 3 unnumbered
cc-State Engineer
Senior Inspector of Dams
T. B. Cosgrove
Resident Engineer

3-5-35
copy/p

2110

QUINTON, CODE AND HILL - LEEDS AND BARNARD
Engineers Consolidated
Los Angeles, California

January 25, 1934

Mr. H. N. Savage
Hydraulic Engineer
City Hall
San Diego, California

Dear Mr. Savage:

At the request of your office, I arrived in San Diego so as to be available very early Monday morning, January 22. Mr. Pyle and I visited you at your house for a few moments and the proceeded to El Capitan Dam.

The contractor is working now with a slack drag-line dumping the material on the east side up close to the rock, washing it with a giant so that the fines run back a long channel into the puddle core, and the sand is taken out by a dragline operating a clamshell, deposited in trucks, and hauled away from the immediate location of the dam. He has finished possibly two-thirds to three-quarters of the work necessary. Judging by the records now available for some nine sections, there were six of them perfect, one of them very good, one of them fair, and one a sand tongue extended past the middle. The location of these tongues being known when the operations are carried on from the west side, it will be very easy to run the bucket further over to the east past the middle line and drag out these sand tongues.

Up to date, I would say that the job was being carried on in excellent shape and that the results are better than could have been anticipated. Doing this work, it has been necessary to excavate into the old puddle, with the result that the puddle core is now some feet lower than it was before this operation began, and it will be necessary to refill this area in addition to that which was originally necessary to bring up the level of the puddle core to within a few feet of the level of the water in the pool.

So far, we have none of us been able to think of but two methods of doing this without causing practically the same trouble with sand as they are now trying to remedy. The first method, and the most obvious one, is to obtain material of high silt and fine sand content, haul it in and wash it into the pool, probably by the semi-hydraulic method, after depositing the material close to the beach line. The second method, suggested by Mr. Pyle, is to excavate the beach down to a point about four or five feet above the satisfactory puddle core. When this is done, there then seems to be enough fines in the selected portions of the borrow pits east of the dam so that the fines necessary can be obtained from this material to make the puddle core, provided the beaches are kept washed as they were when using the full hydraulic method.

It would appear offhand as though this latter method would be the cheaper one for the contractor and that the results would be equally as good as the method first suggested. The contractor himself may have some method equally satisfactory which has not occurred to us and which would produce as good results. Offhand, my recollection is that we figured 25,000 yards ± must be removed from the beaches in order to lower them to an elevation some four or five feet above the top of the puddle core.

We have found, then, on this trip that if the contractor continues with the same method he is now following, he will be able, without question, to produce a first class job so that the dam will be perfectly safe when the puddle core is properly backfilled; that there are two methods by which he can backfill or do the equivalent, and it is possible the contractor may suggest another.

On our return from the dam Mr. Pyle and I visited you again and verbally told this story. I also want to again state what we told you at the time, that the contractor and Mr. Alan Rowe were very cooperative and seemed as anxious to do a good job as you are to have it done.

Very truly yours

A.F.E.-H. N. Savage
1/27/34

Louis C. Hill

LCH/AM

5/11/34
copy /f

2112

QUINTON, CODE AND HILL - LEEDS AND BARNARD
ENGINEERS CONSOLIDATED
Los Angeles, California

March 21, 1934

Mr. H. N. Savage
Hydraulic Engineer
524 F Street
San Diego, Calif.

Dear Mr. Savage:

At your request I met you in San Diego Monday, March 19, 1934, and proceeded with you to El Capitan Dam. No material was then being placed in the dam.

The information furnished us by your engineers shows that since the date of my last visit on February 7, 1934 there has been no substantial change in the average distance between the surface of the water in the pool and the point to which the 6-pound weight would sink. In other words, there has been no substantial, if any lessening in the depth of the pool. The depth of the water above the core, as measured with the 6-pound weight, is about twice as much as it should be even with the present width of the pool.

Moreover, there have been slides from the beaches, largely due to the excessive depth of the pool, which have carried sand into the puddle core, which probably reduces its water tightness. The contractor was building a machine with which he hopes to so mix this sand with the fines of the puddle core so as to remedy this condition. The contractor has recently been moving sand from the beaches and placing it against the rock fill.

I had a long conversation with Mr. Allan Rowe, the contractor's engineers He stated that his measurements, as he remembered, indicated a decrease in the depth of the pool since Feb. 8, 1934 of about 2 feet. Your engineer's reports to me do not confirm this and are probably more nearly accurate. Mr. Rowe stated that the present method of building the dam did not meet with his approval and there was no disagreement between the City's engineers and the contractor's engineers. He also felt it would be cheaper and better for both parties and the safety of the dam would be increased by having the puddle core brought up to the proper height with material containing more fines from some other pits.

) Do not give publicity under any event H. N. Savage

Before the contractor is permitted to resume placing any material in the dam the sand lenses now existing in the puddle core should be broken up and mixed with the fines so as to restore its imperviousness. After this has been done and after the puddle core is brought up to the proper height with other more suitable material, the contractor should be permitted to again use the material from the local borrow pits, provided the contractor is then able to produce with this material a satisfactory core and to maintain a suitable and proper depth of water in the pool. Only in case the contractor is unable to produce a satisfactory core and to keep the proper depth of pool using local material, should he be required to bring in material from outside to produce such a core. The State, your engineers, and the writer made these recommendations about five months ago. The contractor ignored your orders.

In my opinion the core constitutes too high a percentage of the cross section of the dam even at its present elevation. There is not sufficient sand and rock, especially upstream from the core, to provide a sufficient factor of safety against a slide occurring, in view of the fact that the high percentage of fines in the beaches will greatly reduce the friction factor. You have already contemplated reducing the thickness of this core by at least 20 per cent as quickly as practicable. I believe a careful study should be made by you to determine the least thickness of the puddle core which will insure reasonable tightness. In the interest of safety against slides, I recommend that you gradually reduce your core thickness and at the same time swing the core downstream until it is in the center line of the dam by the time the dam is at elevation 750±.

Yours very truly,

LOUIS C. HILL (Signature)

LOUIS C. HILL

LCH/LH

2-28-35
copy/p

March 23, 1934

Mr. L. C. Hill, Consulting Engineer
712 Standard Oil Building
Los Angeles, California

Subject: San Diego River Project, El Capitan Feature
Hydraulic fill area

My dear Mr. Hill:

The contractor has so far only succeeded in successively demonstrating that his "agitator gadget" is not strong enough to withstand the resistance encountered in the impervious core section material of the El Capitan dam hydraulic fill area. He is now assembling a much stronger design, and expresses hope.

The contractor unexpectedly resumed hydraulic fill operations March 20, P.M. bringing in about 2000 cubic yards of material from the upstream end of borrow pit "A" which he saturated in the hog box and delivered about 1000 cubic yards practically the entire length of the two beaches, and this notwithstanding previous official letters dated March 13, 1934 and March 17, 1934, to correct the sand strata condition "before depositing other material on that portion of the impervious puddle core section where sand strata exist."

It was, therefore, deemed necessary to send the contractor a definite stop order, letter S-98, dated March 21, 1934, copy enclosed.

Very truly yours,

H. N. Savage
Hydraulic Engineer

HNS/f
encl. S-98

2-9-35
copy/p

QUINTON, CODE AND HILL-LEEDS AND BARNARD

Los Angeles, California

June 7, 1934

Mr. H. N. Savage
Hydraulic Engineer
524 F Street
San Diego, Calif.

Dear Mr. Savage:

I have just received your letter of June 6 enclosing the correspondence between you and the contractor. The principal thing is that the contractor is going ahead and following your directions. Who pays for it afterwards is a minor matter so far as the safety of the dam is concerned, and that is about all you really and truly are interested in.

Thank you very much for sending me this information.

Very truly yours,

Louis C. Hill

LCH/LH

Fred D. Pyle

July 9, 1934

Mr. Louis C. Hill, Consulting Engineer
Hotel Vancouver
Vancouver, B.C.
Canada

Subject: El Capitan Reservoir Dam,
Consultation.

Dear Mr. Hill:

You have no doubt learned before this that Mr. Savage passed away on Sunday, June 24, 1934. He had been gradually failing during the previous two months and the last three days had been given considerable oxygen. He literally "died in the harness" as he conducted business in the usual manner up to the evening before he died, when he asked me to arrange a conference for Sunday at his home with T. E. Connolly, Harold Wood and D. W. Albert.

City Manager F. M. Lockwood by letter dated June 30, 1934 copy enclosed, appointed me Hydraulic Engineer effective July 1, 1934, and I am carrying on.

The Contractor for the El Capitan Dam about April 20, 1934 claimed to have corrected the sand strata which occurred in the summit pool on March 21, 1934.

The Contractor was verbally advised by Mr. Savage on May 1, 1934 that the conditions were not satisfactory and on May 12, 1934 by letter S-108, copy enclosed, was definitely advised as to the requirements. The requirements of letter S-108 were complied with June 15, 1934.

On June 14, 1934 at a conference at El Capitan Dam between the City's Engineers, Deputy State Engineer Geo. W. Hawley, State Consulting Engineer Fred C. Herrmann and Assistant Deputy State Engineer W. H. Holmes, Contractor Connolly asked permission to import Lindo Lake material and place the first portion directly into the summit pool in order to accomplish its up-building. Before being permitted to do this, the Contractor

was required to comply with letter S-113 dated June 15, 1934, copy enclosed.

By June 24, 1934, 8400 cubic yards of Lindo Lake material had been placed in the summit pool, reducing the depth of the pool to about 5 feet, and the construction of the hydraulic fill portion of the dam was again undertaken at the rate of about 5000 cubic yards of material a day from local borrow pits.

Since June 25, 1934, the surface of the summit pool has been raised about 10 feet, that is to elevation 700, and the summit pool is now about 9 feet deep.

Application was made to the State Engineer for modifying the dimensions of the top of the dam and for narrowing the impervious puddle core section as indicated on drawing WD-501, approved by the State Engineer, print enclosed.

The hydraulic fill portion of the dam is fast approaching certain critical conditions; and

It will be advisable to anticipate how high the hydraulic fill may be properly carried before changing to rolled fill; and

The requirements for importation of fines from time to time is becoming a major problem.

It appears, therefore, advisable that we have the benefit of a general inspection by you at the earliest practicable date of conditions at El Capitan Dam, and I shall appreciate being advised by wire as to your availability.

Very truly yours,

Fred D. Pyle,
Hydraulic Engineer.

FDP/f

cc Los Angeles office

Encls.
Letter from City Manager - 6/30/34
S-108
S-113
WD-501

(Fred D. Pyle)

NOTES ON VISIT TO EL CAPITAN DAM
August 7, 1934.

When I was there on August 7, 1934, I spent two hours or more talking to Mr. Albert about the proposed change from the hydraulic fill to the rolled fill and listed his recommendations. As written they are:

1. To change the rolled fill, first lower the water surface in the pool and probably or possible, also remove two to four feet of the slimes.

NOTE: This means if they have not settled in the meantime or i if the turning in of the Lakeside material has not improved conditions.

2. Deposit highest clay content from local borrow pits, 35% or 40% clay, next to the edge of the pool of the clay core then exposed.

3. Dry pulverize this material so placed and blade it on the clay core in the dry state until such time as all visible moisture is absorbed.

4. This new material will gradually break off and sink into the soft core, foring the lighter fluid mark up.

5. The fresh material will cause the mud to raise and in some cases perhaps overflow on the beach.

NOTE: The overflow should be prevented if possible. Of course it ma y sometimes occur so suddenly when a considerable portion of the bladed in material drops down and squeezes the soft mud up higher than is anticipated.

6. As the core is thus brought up the beaches must be brought up on upstream side by aa impervious rolled fill and on the downstream side by permeable disintegrated granite roll fill.

NOTE: Both the upstream and downstream beaches should be filled with a more or less permeable material, in my opinion, untio a point approaching elevation 740 is reached.

7. After the soft core ceases to rise and form a new core, material must be brought in from some source containing higher percentage of fines, say Lakeside, and deposited along the edge and bladed into the core. Water may be needed to work this into a core.

8. The core will then gradually be raised until a fill can be made across the top above elevation 753.

9. Keep the beaches higher than the soft core.

10. Special treatment must be given each abutment.

11. Special care must be exercised when the rolled fill covers the core.

Under the heading of "How to Start" - he says:-

1. Very slowly lower the water surface of the pool, say 6 inches per day at first, reducing to say 3 inches per day, depending on how the beaches drain. If this is not done the beaches will probably slide toward the core and these slides may go clear across the pool.

Before finishing with the Lakeside material, the top of the core should be brought up with Lakeside, to at least 753. The disadvantage of building up the core further than 753 is due to the additional pressure that would be exerted tending to force the beaches either upstream or downstream. If the core were brought up to 770 from 750 or from 50 feet above 700 to 70 feet, the pressures would about double.

Mr. Albert expects the present core to push up 15 feet plus or minus, above the point of starting, before it will be necessary to bring in Lakeside, only provided that the material he can dump in from the sides is a sufficiently good material so that even if it slides off into the pool the resultant core will be practically water-tight.

He thought that it might take as much as two weeks to actually change to a rolled fill after work was started, due to the slow draining of the beaches, and the necessity of having everything in proper shape when you start.

The water surface in the pool on August 7 was 714.5, the accompanying small sketch shows the conditions as they are now and as it is proposed they will be after the rolled fill is finished. The present soft core is represented by number one; the crowding in of the sides of the fill will raise the present core as illustrated under number two; on top of this will be placed the puddle core from Lakeside going to 753 and on top of this the rolled fill, through which perhaps a thin cut will be made into which will be made into which will be inserted Lakeside material. This is represented by number four.

As I stated before, Mr. Holmes prefers that the hydraulic fill be used as long as practicable. I agree with him in that it should be, as long as practicable, but I feel that from 720 to 725 is about as long as is practicable under the present conditions.

2. He also wanted to narrow up the puddle core rapidly.

3. Wanted coarse material from the borrow pits to mix in the hog box with the Lakeside to stiffen up and improve the core.

4. He wanted to bulldoze beach material into edge of core to narrow up core and then if slides occur to use the mixing machine of the contractors to break up the continuous streaks of sand in the core. I think that Mr. Albert's method is far preferable.

In regard to the beaches, it seems to me that any material up to elevation up to say 740, suitable to make a pervious permanent stable beach, should be used rather than one more watertight which would dissolve or go to pieces if it became wet. This applies to elevations from say 740 to 750.

I would be glad to hear from you in regard to your reaction. I also would be glad to hear from you as to what you have done about improving the condition of the core by pumping Lakeside directly into the pool or by passing it through the hog box by the suitable mixture with the coarser material from the pits.

Louis C. Hill

8/23/34
copy /f

2121

COPY

QUINTON, CODE AND HILL-LEEDS AND BARNARD
Suite 712 Standard Oil Building
Los Angeles, California

August 10, 1934

Mr. Fred D. Pyle,
Hydraulic Engineer, City of San Diego,
San Diego, California.

Dear Mr. Pyle:

At your request I have spent two days at the El Capitan Dam conferring with you and your engineers, and the State Engineer, Mr. Holmes, and spent a short time talking to the contractor.

The contractor and Mr. Albert are very anxious to begin the roll fill method as soon as possible. Regarding the details as to how it should be done, the contractor differs somewhat and as to the time of starting, the State represented by Mr. Holmes, the contractor, Mr. Albert, and you and I, differ. The contractor would like to start at once, in fact he would like to have started months before, he says. Mr. Albert thinks he has gone about as far as it is reasonably safe to go with the present type of material and the length of beaches, taking all conditions into consideration, and that the change should be made to rolled fill at an early date. You and I both have studied over all that has been said and all the facts so far as known and found by general observation as the work has progressed, and feel that the starting of the roll fill method should be as soon as you can conveniently arrange the necessary details with the contractor on the advice of your attorney if necessary. At any rate, that the change should be made when the elevation of the water surface in the pool reaches somewhere between 720 and 725.

According to Mr. Albert, if his method is followed the core will gradually squeeze up 10 feet or 15 feet above the elevation of the pool at the time the rolled fill is started, provided, of course, that enough material be brought in from Lakeside so that the material in the pool below the surface of the water is suitable as a core and will consolidate as the water is reduced and as the fill is brought in from the sides.

In every report, conversation or agreement that has been made up to date since last October when the question as to the core material arose, all of us agreed, I understand, that it was necessary to bring in from some outside source, like Lakeside for example, larger amounts of fines to produce a suitable mix to form the core. That there has been up till very recently, no actual gain of the core on the water surface and that the recent apparent gain was with a very

pool quality of material. I accordingly recommended to you verbally again that the material from Lakeside be put into the pool either by passing it through the hog box and mixing it with, say two loads of D. G. to one load of Lakeside, so as to not to get too much in the beaches, or put directly into the pool, but there should be no longer delay in doing this, at least to find out what the results would be.

Mr. Holmes feels that you ought to carry the hydraulic method as far as possible, but I don't think that his objections were based so much on the hydraulic method, as that he wanted a core of practically continuous character extending up above spillway level which is the same idea that we all had.

Very truly yours,

LOUIS C. HILL (Signature)

LOUIS C. HILL

LCH:GS

Notes to Mr. Pyle on trip to
El Capitan Dam

(Received 8/17/34)
F.D.P.

I again recommend that after the core has squeezed in as the rolled fill rises and has reached a reasonable width, say 10 to 15 feet, and has become a fairly dense consistency, that there should be placed on top of this, material direct from Lakeside and so worked as to make a compact water-tight flexible core, to at least elevation 753. Above this 753 point a further study is probably necessary. If the top of this core be placed at 753 or say 750, instead of at 770, the horizontal pressure tending to force the beaches downstream or upstream, would be that due to a 70-foot head in one case and if the core is carried to the top, against a 50-foot head in the other case, or a difference of nearly 100% in the force and in the factor of safety, which by the way, is about as little as is possible without failure. You will, of course, have to obtain the permission of the State to make this change.

You have talked to Mr. Herman and Mr. Hawley, as well as to Mr. Holmes, so that you ought to be more familiar with the State's views than I am, but I gathered from talking to all of you, including Mr. Holmes, that the State would be entirely agreeable, except perhaps Mr. Holmes, to making the change from the full hydraulic method to the rolled fill method providing the core were brought up to 753. My recommendations then at the present time, which may be subject to some change after I have talked the matter over further, are as follows:

(a) Get the beaches, the rock fill and the core in good shape, make the general plans showing the proposed core in stages 1, 2, 3 and 4 as described below:

1. Present core
2. During time you are squeezing the sides in
3. The addition of Lakeside material
4. Simply a possibility showing the rolled fill on top with possibly a core running down through this fill. Possibly this is not necessary or desirable even.

After making the rough plans showing what it is proposed to do, that you take up the matter with the City Council, your attorney and the State. If your attorney says you have authority to ma ke the changes, you don't have to bother the City Council. By the time you get the elevation of the waterin the pool to 720 or 725, you will be through with all these preliminaries and can go to work with the rolled fill. If you are going to have trouble in getting the proper authority to go on with the rolled fill, every effort should be made to expedite any agfeement and to talk over the situation with Connolly if you can, before even talking

it over except in a general way, with your attorney. You will then have something that you can talk to your attorney directly about, if the contractor, for example is willing to go on without any further question at all and change from one to the other, without bringing in a claim for extras, that is one thing. If, however, you have to go through each detail and pass on each detail of your change in plan (which is really not a change in plan, I understand, the only change being that possibly you might have changed from hydraulic to rolled fill or higher or lower elevation) that should be settled as quickly as possible.

I talked to Mr. Martin, Attorney for the contractor, a little yesterday and suggested to him that in making this change that it would be a good deal better for you and the contractor to talk things over and find out just what you wanted to do and if there were any objections by the contractor, that you could agree on what these objections were, if any, before you had any formal conferences.

Louis C. Hill

3-1-35
copy/p

QUINTON, CODE AND HILL-LEEDS AND BARNARD

Engineers Consolidated, Los Angeles

Enroute Kansas City

August 23, 1934

Mr. Fred D. Pyle
Hydraulic Engineer
City of San Diego
San Diego, California.

Dear Mr. Pyle:

I have been thinking about the upstream dry fill at El Capitan Dam and feel that great care should be used not to make this fill so impermeable that it will not drain as the reservoir is drawn down. If the core is relatively impervious compared to that portion of the fill above the core, that portion of the dry fill below water surface for a considerable time will be saturated, and if the reservoir level is drawn down rapidly the saturation line in the upstream portion of the dry fill will remain high and tend to cause slides into the reservoir, while if fairly pervious the fill will drain towards the reservoir as its surface falls, and greatly reduce the tendency to sliding.

This is entirely independent of the tendency toward sliding due to the liquid pressure produced by the saturated core.

I, therefore, recommend you do not make that part of the dry fill upstream from the core as impermeable as possible, but do make it a first class rolled fill of material which will permit slow drainage. This applies to elevations below 750 or thereabouts. Above 750 make this portion of the fill water tight and no core will ever be needed above 753.

Pleawe have sent to my office by September 10, saturation lines at various sections across the beaches.

Please have carbon copy of this letter sent to my office.

Louis C. Hill

9/28/34
copy /f

COPY

2126

QUINTON, CODE AND HILL - LEEDS AND BARNARD
Engineers Consolidated
Los Angeles, California

September 27, 1934

Mr. F. D. Pyle
City of San Diego
San Diego, California.

Dear Mr. Pyle:

I put in a call for you this morning, but learned that you were at El Capitan Dam, and I knew that it would be difficult to talk there, so I asked them to have you call me up when you got back. In the meantime, I am going to write a note on paragraph (c) of your letter of September 24, 1934.

For your information, and so you won't have to look it up, paragraph (c) states:

> "The addition of water in the puddle core should be discontinued except in the vicinity of the abutment and the puddle core constructed in such manner that saturated material will not exist above elevation 753."

That is just exactly as we stated it, as I remember, at the time. However, since talking with Mr. Holmes this morning, he tells me that no change whatever has been made in the manner of handling the dam, except that they have reduced the rate of building up the fill.

It has occurred to me that with the amount of water that was still in the core trench, it will be impossible to reach a condition where at 753 the core is not saturated without removing some of this water. Assume for a moment there are but four feet of water now in the pool and that the amount of moisture from material brought in either from Lakeside or from the local pits is 20% and that the total amount of moisture that this material can absorb is about 35%, which is a large figure. Then, but 15% of the weight of the material, or perhaps approximately twice that in volume can be absorbed by this core material. If the depth to water was two feet, the top of the core material is at 745, by the time the core material has reached 753, or 8 feet more, it will have absorbed but about 2 to 2-1/2 feet of water. It is very doubtful, however, if the core material does not on the average contain more moisture than 20% and that hence the moisture remaining by the time 753 is reached will not be considerably in excess of that necessary to saturate it. I haven't the data before me, but my remembrance of what was said is that there was about four feet of water in the pool and if the moisture contained in the core material

before placing is on the average greater than mentioned above, when 753 is reached the core material is not only going to be saturated but there is going to be a lot of free water standing in the pool.

Therefore, I suggest that you make a careful estimate of how much water is going to actually be absorbed before 753 is reached and remove the excess. There would only be about 15 days before 753 would be reached.

I have made some rather careful studies and they have been corroborated by Baumann going at it in a different way, and I find that it is perfectly safe to build the dam clear to the top in the way that we suggest at the rate at which you are now building, so that the upper part of the pool has a chance to settle and squeeze the water out. Some of this excess water which now stands on the top is water unquestionably which was squeezed out of the puddle core as it settled until consolidated. If you take out some water and then find that the content of the puddle core is not sufficiently saturated, there is nothing to prevent later putting a little more water on this core. However, Mr. Holmes is worrying a good deal over it, and I think you had better cut down the water now, and if necessary later add some more.

Very truly yours,

LOUIS C. HILL (Signature)

LCH/LH

P.S. Since writing this I have talked to you over the phone and you have informed me that some of the excess water is being drawn off. I am glad this has been done. I am going to talk to Mr. Hawley and Mr. Holmes in the morning.

Have just talked to Haines of Cement Gun Co. He says can make gunite to develope 3000 lbs in 28 days. Better if you want it. Will give you more information in morning.

L. C. Hill (Signature)

9-29-34
Copy/m

2128

Quinton, Code and Hill-Leeds and Barnard
Members American Society of Civil Engineers
Suite 712 Standard Oil Building
Tenth Street at Hope Street
Los Angeles, California

COPY

September 28, 1934

Mr. F. D. Pyle
Water Department
San Diego, Calif.

Dear Mr. Pyle:

I have just had a long talk over the telephone with Hawley, and he is still worried over the possibility of a slide. He is not as much worried if you keep the rock fill up to the top of the rolled fill, and when I told him that as you were already doing it there wasn't any particular use of prodding the contractor, as he, Hawley, told that he thought the contractor was putting in rock now as fast as he could. I feel certain however that you must require the contractor to keep his rock fill up with his earth fill.

Hawley also told me that they were able to shove a rod down 25 feet without any particular trouble into the puddle core, and that the upper 20 feet at least was mush - soft fluid-like material. Hawley also felt that there was water leaking into the pool from all around so that it actually wasn't lowering, although a little was being taken out at one end when he was there, so I am suggesting to you and recommending most strenuously that you have the water in the pool drained out, if necessary until it isn't over a foot deep and perhaps even shallower. You see, every factor that is omitted up to date operates against the safety of the structure. The lagging behind of the rock fill is especially bad.

As soon as you are able to get the information that we have requested, if you will let me know a day or so ahead, I will plan to come down and spend at least one day on the job. I would rather be down without the State the first day, if I can so arrange it with you.

I would like to receive as soon as possible the measurements showing the movement of the embankment, settlement downward and outward. I called Mr. Hawley's attention to the fact that although your movement outward was greater than your settlement downward that was also true at Bouquet Canyon, at least it was true at the time I received my last report.

Kindly write me and furnish as much information as you can, so that it will reach me early in the week.

Very truly yours,

LOUIS C. HILL (Signed)

LOUIS C. HILL

LCH/LH
Dictated but
not read.

2-20-35
copy/p

2130

October 9, 1934

Mr. F. D. Pyle, Hydraulic Engineer
City of San Diego
San Diego, California

Dear Mr. Pyle:

On August 16, Mr. P. Beermann wrote to you on the subject of the El Capitan dam summary of friction tests on beach materials, with results which show well above those which we have recently obtained at Glasgow and at the University of Colorado, with the exception of the top line taken on Aug. 1, 1934 of .36 when it is retamped wet. I would like to have rather a detailed statement as to exactly how this was obtained, as our results are quite different.

The first three tests are under a head of 75 feet and range 0.76 0.68, 0.85. When they were retamped they ran 0.72, 0.38 and 0.68, and when they were retamped wet they ran 0.36, 0.65 and 0.81. Under a 50 foot head the coefficients in the original shape were 0.85, 0.85 0.97, and 1.04 and retamped they were 0.67, 0.73, 0.56 and 0.83. When retamped wet they ran 0.77, 0.79, 0.79 and 0.83.

As I said in the letter that I started to write you the other day, these results are so much higher than we have obtained that I would like a little more information. It reads all right in the letter and the method of making the test seems to be all right and one that has been practically adopted at other places, but I would like a little more detailed description because of the great differences in the values obtained in the laboratories.

Friday I spent the morning with Mr. Jewett going over various phases of the work. Among others was the determination of the weight per cubic foot of the disintegrated granite material which appeared to have such unusual weight per cubic foot in place. Some of the weights given me at the dam ran from 150 to 154 pounds per cubic foot. Mr. Jewett has found that this material has a specific gravity of 2.72, or a theoretical weight per cubic foot solid of 169.7 pounds. Of the tests made, take Sample Job. No. 2966. The maximum weight per cubic foot in place, even under 220 ft. head of pressure, was 133 lbs., at which time the voids were but 34-1/2% by volume. The method of obtaining the results seems to be reasonable and the method employed in the field seems to be reasonable, but the results obtained in the field seem out of line with others that I had obtained on various kinds of material, and certainly are widely different from results obtained in the laboratory. I therefore think that you had better go back somewhere and check up again to find out what was the trouble with the field measurements.

In telephoning you Saturday morning, I suggested that you have Mr. Wood check all measurements that enter into it to be sure that no error has crept in. I haven't endeavored to go through and check the arithmetic so far, but I hardly think that Jewett would have made any mistakes of that kind, especially as I understand that Wood was there part of the time. I'll be glad to hear from you in regard to this. Check up the volumes of the containers to get the weight of the dry sand used; check the moisture in the sand, etc. Send me the complete data on one test at least.

Very truly yours,
Louis C. Hill

LCH/AM

2-20-35
copy/p

2131

October 16, 1934

Mr. Louis C. Hill, Consulting Engineer
712 Standard Oil Building
Los Angeles, California.

Subject: San Diego River Project, El Capitan Feature, friction tests on beach material

Dear Mr. Hill:

Receipt is acknowledged of your letter dated October 9, 1934 relating to friction tests made of the beach material, El Capitan reservoir dam.

The three sections of cylinder containing the material to be tested are placed in the testing machine as indicated in letter of August 16, 1934 by P. Beermann, referred to by you. The testing machine force is applied to the center section at a uniform rate and increasing force is required to keep the center piece moving. The final constant force required to keep the center piece moving is taken for computations to determine the friction coefficient.

It is believed that at the beginning of the application of the force the material within the cylinder is compressed transversely on account of the shape of the cylinder and therefore the constant force is used for computations.

In retamping the material, after the previous test, is completely removed from the cylinder and mixed with water to a plastic consistency. It is then replaced in the cylinder in layers of about 2 inches which are tamped lightly with a 2 inch tamper. The spring pressure is applied and the apparatus laid in the testing machine and tested as before.

The first wet sample showing a coefficient of 0.36 was tamped more than the other samples, but no reason is known why the coefficient was less than on the other tests. Published results indicate that coefficients were determined at other places as follows:

Cobble Mountain Dam	
Under the same pressure	c = .79
" 200 pounds per square inch	.75
" 400 pounds per square inch	.73
" pressure greater than 100' fill	.51 - .60
Tieton Dam	
San Pablo Dam-Beach material	
Blue shale	.45
Monterey brown shale	.49
Worn brown shale and small stones from dam	.54

There appears to be a lack of standards to follow in making friction tests and it would be interesing to knew how much variation there would be between the various tests if they were made on identical materials. Enclosed herewith is copy of tests made on September 24, 1934 to determine the weight and moisture contents of rolled fill. Mr. Harold Wood checked a later test and could find nothing wrong.

Very truly yours,
Fred D. Pyle
Hydraulic Engineer

FDP/f
encl.

2-9-35
copy/p

QUINTON, CODE AND HILL-LEEDS AND BARNARD

Los Angeles, California

October 18, 1934

Mr. F. D. Pyle
Hydraulic Engineer
524 F Street
San Diego, Calif.

Dear Mr. Pyle:

I have read over with much interest your letter of October 16 including the test made by Mr. Wood on the weight of material in the dam. Theoretically, based on a specific gravity of 2.72 and with a moisture content of 8 per cent by weight, the weight of the material should be about 150 lbs. per cubic foot. I did not know that the material was as dry as it is. The one containing but 6.7 moisture, if the excess moisture had been squeezed out, should have run about 152, which is what is shown by the test.

Movement of the Points Established
on Both Faces of the Fill

We are plotting the total each time, that is, the total movement either east or west and the total movement up or down. Your list contains of course a number of erross in subtraction, because I suppose the data is all obtained by the actual total movement in either direction. They still show very small movements, probably the daily changes within the limits of measurement, and the changes over two or three weeks being exceedingly small. Of course, the fresh rock put on the fill shows greater movement than the lower settlement, even if the weight is greater down below.

As I said in a previous letter, I will be in Portland all next week and on my return I will be greatly interested in seeing what changes have occurred in the movement.

Tunnel Lining

In your specifications for the tunnel lining I hope you prescribe the building of the forms for the concrete at a rate so that the forms are never ahead of the concrete at the end of a days work more than a comparatively few inches, until of course you are up so high that this can no longer be done. I hope you are fortunate enough to get a good contractor and a good price.

Very truly yours,

LCH/LH

Louis C. Hill

2-9-35
copy/p

2133

November 9, 1934

Mr. L. C. Hill, Consulting Engineer
712 Standard Oil Building
Los Angeles, California

Subject: San Diego River Project, El Capitan Feature, Embankment

Dear Mr. Hill:

Receipt is acknowledged of your letter dated November 4, enroute near Albuquerque.

The H. W. Rohl & T. E. Connolly letter dated October 31, 1934 that you mention refers to a modification of the dimensions of the top portion of the El Capitan Dam and not to the change in methods of construction.

The Contractor appears to be keeping the way open for a claim for increase cost per cubic yard for the additional material required in raising the top of the embankment 4 feet, and in thickening the upstream rock embankment, especially from elevation 750 to the top.

Excellent progress has been made during the past few days by the Contractor in completing the top of the dam from south abutment to N 3900.

It is not believed necessary, in view of the very moderate and uniform settlement of the dam, to secure samples from the puddle core section before the fall of 1935. Three or more tests should then be made to determine the condition of the material between the top of the puddle core and the top of the dam, where certain conditions may develop in the event of excessive settlement or shrinkage of the puddle core.

Rohl & Connolly are making reasonable progress on the spillway lining and the lower portion of the tunnel plug.

Very truly yours,

Fred D. Pyle
Hydraulic Engineer

FDP/f

CONSULTANTS

C. F. TOLMAN and C. D. MARX

2-20-35
copy/p

2135

STANFORD UNIVERSITY

Department of Geology

December 7, 1931

Mr. H. N. Savage, Hydraulic Engineer in Charge
Department of Water Development
524 F Street
San Diego, California

My dear Mr. Savage:

In a conference between the engineers and geologists of the State, your consultants, yourself and staff, and the members of the Common Council of the City of San Diego on December 5, 1931, I made a statement to the effect that loose soils and pervious loose disintegrated material and pervious sands of the stream channel should be removed from the dam site before depositing the materials for the rock and hydraulic fill dam.

Mr. Pyle and yourself asked me in regard to the removal of the sands in the stream channel. I wish to put in writing now my definite answer to this question given you at that time.

All the loose pervious sands and gravels in the stream channel above the core wall (upstream) should be removed. The sands and gravels below the core wall might very well act as a drain and could well be left in place. Professor C. D. Marx concurs with me in this recommendation.

Very respectfully yours,

C. F. Tolman

CFT:as

JOHN M. MARTIN FRANK L. MARTIN JR.
JAMES N. FARLEY

Attorneys at Law
Suite 1224-650 South Spring St.,
Los Angeles, Calif.

Telephone Vandike 0447

October 17, 1933

Mr. C. F. Tolman
P. O. Box 830
Stanford University
Palo Alto, California

Re: El Capitan Dam

Dear Mr. Tolman:

I am attorney for the Rohl-Connolly Company which Company is now building the El Capitan Dam for the City of San Diego.

There has arisen a substantial question relative to the classification of spillway excavation. I have suggested to the Rohl-Connolly Company that they arrange, if possible, to obtain your services in connection with this matter.

I feel that it will be possible for the Rohl-Connolly Company to arrive at an amicable settlement of the issues now involved relative to the proper classification of the spillway excavation.

It is my understanding that in addition to Mr. Louis Hill, who is acting as consulting engineer for the City, that the City has recently retained Mr. Buwalda as consulting geologist in connection with this job.

I will appreciate it if you will advise me at once as to whether you are in a position to act as consultant for Rohl-Connolly Company in this matter.

While it is the desire of Rohl-Connolly Company to obtain your services and have you make a trip to the dam at the earliest possible date, I feel sure that the matter can wait a reasonable time in the event your other work is such that you would not be immediately available in this matter.

If you find that you are in position to accept employment in this matter, I would appreciate your advising me as to the earliest date you could make a trip to El Capitan Dam, in order that I may in turn arrange with either Mr. Rohl or Mr. Connolly to be personally present and meet you at the dam.

Awaiting your early reply, I am,

Very truly yours,

John M. Martin

JMM-AMR
"Air Mail"

2-6-35
copy/p

STANFORD UNIVERSITY

Department of Geology

Stanford University
California
October 18, 1933

Mr. H. N. Savage,
Hydraulic Engineer in Charge
Water Development Department
524 F Street
San Diego, California

My dear Mr. Savage:

I am enclosing herewith a copy of a letter from Mr. John M. Martin, attorney for the Rohl-Connolly Company, contractors building El Capitan dam.

I informed Mr. Martin, in discussing this matter over the telephone, that I feared I would not be able to take up this work, as I had acted as consultant for the City of San Diego, and, in any case, would not consider the matter until after consulting with you.

It appears that Mr. Martin wants an independent report on the classification of materials excavated in the spillway. It may be that both the Rohl-Connolly Company and the City of San Diego would welcome an independent report on the same, or it may be that, inasmuch as I was formerly connected with the work, you would prefer that I do not make the examination. I leave the matter in your hands, only requesting that you reply promptly so that I may inform Mr. Martin as to the matter.

Sincerely yours,

C. F. Tolman

CFT:as

2-6-35
copy/p

October 22, 1933

From : Hydraulic Engineer

To : City Attorney

Subject : San Diego River Project, El Capitan Feature, Contract construction, classification of excavation materials

Enclosed is copy of letter from Dr. C. F. Tolman, Consulting Geologist of Stanford University, Palo Alto, California, who has professionally and repeatedly served the City of San Diego and reported on the geology of the San Diego River and other adjacent drainage basins with especial reference to the construction of dams for the impounding of water by the Municipality.

It is assumed that you will deem it of controlling importance for the City of San Diego to continue to avail of the professional services of Dr. Tolman and also to have Dr. Tolman and Dr. John P. Buwalda, Consulting Geologist, visit the El Capitan Dam work in the immediate futuue, with especial reference to the contract classification of material being excavated by the contractor for the El Capitan dam from the spillway.

Enclosed also is copy of letter addressed by Attorney John M. Martin to Dr. Tolman which accompanied Dr. Tolman's letter to me.

In view of the rapid progress of excavation from the spillway bowl and its indicated completion in the near future, I am of the opinion that the Geologists should immediately visit, inspect and report on the geological formation, with especial reference to its classifications under the contract provisions.

H. N. Savage
Hydraulic Engineer

HNS/f
encl.
Dr. Tolman's letter 10/18/33
Attorney Martin's letter 10/17/33

cc Special Water Counsel

2-6-35
copy/p

OFFICE OF CITY ATTORNEY

San Diego, Calif.

October 26, 1933

H. N. Savage,
Hydraulic Engineer
San Diego, California

In Re: San Diego River Project
Classification of Materials

Dear Sir:

With reference to your communication of October 22nd concerning the contemplated employment of Dr. C. F. Tolman, I agree with you that it probably would be to the benefit of the City to obtain his services in connection with any controversy over classification of spillway materials.

Also, I am of the opinion that Dr. John P. Buwalda, when employed, should immediately visit, inspect and report on the geological formation with special reference to spillway classification under the contract specifications.

Yours very truly,

C. L. Byers
City Attorney

CLB/M

2-6-35
copy/p

2140

October 28, 1933

Dr. C. F. Tolman
Consulting Geologist
Stanford University, California

Subject: San Diego River Project, El Capitan Feature, Consulting Geological Research and Report

My dear Dr. Tolman:

Receipt is acknowledged of and you have my appreciation for your letter dated October 18, 1933, in which you indicate your reaction to Attorney John M. Martin's letter to you dated October 17, 1933, copy of which you transmitted with your letter to me.

You have my appreciation for your valuable geological research and reports for the City of San Diego in connection with its tributary water resources and their development, particularly featuring the construction of the El Capitan Dam, which is now about three-fourths completed by Contractor H. W. Rohl and T. E. Connolly.

City Attorney C. L. Byers and myself recognize the value of your geological work and we are joining in a requisition to the Mayor and Councilmen for your further immediate service as Consulting Geologist in viewing and reporting on the geological features of the contract work at El Capitan Dam as it has so far progressed and as indicated likely to continue.

Very truly yours,

H. N. Savage
Hydraulic Engineer

HNS/f

2-6-35
copy/p

October 31, 1933

Dr. C. F. Tolman
Consulting Geologist
Stanford, University, California

Subject: San Diego River Project, El Capitan Feature
Consulting geological research and report

My dear Dr. Tolman:

The Honorable, the Mayor and Councilmen of the City of San Diego on October 30, 1933 in support of my recommendation, directed the City Attorney to prepare an ordinance providing for your services as Consulting Geologist to the City of San Diego.

The City Attorney has this day (October 31, 1933) drafted the necessary ordinance for formal enactment by the Honorable, the Mayor and Councilmen, which it is expected will be accomplished Monday, November 6, 1933.

Thereupon, I shall telegraph you with the hope that it will be possible for you to immediately travel to San Diego and look over the work.

The outstanding requirements for your professional services just at this time are inspection and classification of the geological formation of the spillway excavation as the work has been and is now being carried on at the City's El Capitan reservoir feature by the Contractor.

Incidentally, you probably will alsobbe interested in the material - clay and silt - hydraulically entering into the impervious core section of the El Capitan Dam.

The major portion of one day in San Diego at this time may enable you to comprehensively inspect the geological features of the spillway excavation and the hydraulic fill embankment, both now quite fully exposed and disclosed.

In case you are air minded, the air lines schedules with Pacific Greyhound Bus connections from Palo Alto via either through airplanes to San Diego or via connecting change at Los Angeles offer rapid transportation.

While the round trip railway rate is relatively low, material time can be saved by air travel and the round trip airplane rate is also well within bounds.

It is expected that you will develop transportation itinerary to suit yourself.

It is indicated that the City will want you to make a number of inspections and reports on the El Capitan dam feature work as it continues on to completion.

Anticipating the pleasure and profit of renewing and increasing acquaintance with you professionally and socially, I am

Very truly yours,
H.N.Savage, Hydraulic Engineer

HNS/f

2-6-35
copy/p

STANFORD UNIVERSITY

2142

November 6, 1933

Mr. H. N. Savage, Hydraulic Engineer
Division of Development Conservation
Water Department
524 F Street
San Diego, California.

My dear Mr. Savage:

On my return Sunday to my office I found on my desk your two letters of October 28th and 31st. These were in reply to my letter of October 18th with which I sent you copy of a letter from Mr. John M. Martin in which he requested my services in connection with the classification of materials excavated in the spillway.

I did not care to take up a controversial matter in regard to a project on which I had submitted a report, and especially in this case because of my long connection with the City of San Diego. For this reason I wrote you, asking if you and the authorities of the City had any objection to my rendering a report on this question. I asked if you and the City of San Diego as well as the contractors would welcome an independent report on the same.

I then received your kind letter of October 28th in which you express your appreciation for my services and reports made for the City of San Diego and recognition of the value of my geological work. You state you are "joining in a requisition to the Mayor and Councilmen for your further immediate service as Consulting Geologist in viewing and reporting on the geological features of the contract work at El Capitan Dam as it has so far progressed and as indicated likely to continue."

Your letter of October 31st informs me that the City Attorney on October 31, 1933, drafted an ordinance providing for my services as Consulting Geologist and that this ordinance is expected to be passed by the Honorable, the Mayor and Councilmen, on November 6th, whereupon I will be notified by telegram with the hope that I may travel immediately to San Diego and look over the work.

I note that you state "The outstanding requirements for your professional services just at this time are inspection and classification of the geological formation of the spillway excavation as the work has been and is now being carried on at the City's El Capitan reservoir feature by the Contractor."

I interpret the above paragraph as meaning that I shall inspect and classify the materials from the spillway excavation. This is the problem put up to me by Mr. Martin, and in fiew of Mr. Martin's request, it is evident that I cannot under-

take this work unless it be as an independent investigation the results of which are available to both Mr. Martin and yourself.

If some way of working this matter out appears feasible to you, I shall be glad to do this work, but it must be under the conditions outlined in the preceding paragraph. I shall, of course, at all times be glad to assist you in any way permitted by prior commitments.

Should these arrangements be satisfactory to you, I can leave on the plane Thursday, arriving in San Diego Thursday afternoon. I can then spend Friday making the studies you request and return to Palo Alto Friday evening or Saturday morning.

I am sending a copy of this letter to Mr. Martin in order that there may be no misunderstanding of my position.

I beg to send you my kindest personal regards and assure you that I appreciate your expression of the value of my work for the City of San Diego.

Very sincerely yours,

C. F. Tolman

CFT:as
cc - J. M. Martin

2-6-35
copy/p

November 7, 1933

From : Hydraulic Engineer

To : City Attorney

Subject : San Diego River Project, El Capitan Feature
Consulting Geological Research and Report

Enclosed for your reaction is copy of letter dated November 6, 1933 from Consulting Geologist C. F. Tolman, in connection with the San Diego River Project, El Capitan Dam contract work.

Also enclosed is copy of my letter dated October 31, 1933 to Dr. C. F. Tolman, subject "San Diego River Project, El Capitan Feature, Consulting Geological Research and Report".

Copy of my letter to Dr. C. F. Tolman dated October 28, 1933 has already been sent to you.

H. N. Savage
Hydraulic Engineer

F/f
encls. (2)

2-5-35
copy/p

November 17, 1933

Dr. C. F. Tolman
Consulting Geologist
Stanford University, California

Subject: San Diego River Project, El Capitan Feature, Contract Construction Geology

Dear Dr. Tolman:

The City of San Diego's City Attorneys have pointed out that no authority has been provided by the City's Mayor and Councilmen for submitting to arbitration the geological analysis of the materials being encountered by the contractor in excavation incident to the construction of the City's El Capitan Reservoir Dam, Spillway and Outlet Works by Contractor H. W. Rohl and T. E. Connolly.

It has been interpreted from your letter dated November 6, 1933, that your report if made as your letter outlined might be considered as the findings of an arbitrator and at least by inference binding on the City but not binding the Contractor to its acceptance.

Had your employment as Consulting Geologist been again accomplished by the City of San Diego as it has in the past three instances, your report when filed would have been public property and available to all parties concerned and/or interested, including the Contractor for the El Capitan dam job.

Very truly yours,

H. N. Savage,
Hydraulic Engineer.

HNS/f

2-5-35
copy/p

STANFORD UNIVERSITY

November 20, 1933

Mr. H. N. Savage,
Hydraulic Engineer
524 F Street
San Diego, California

My dear Mr. Savage:

Your letter of November 17th at hand. I beg to state that I had no intention to force arbitrarion as to the character of materials being encountered by the contractors in the excavation incident to the construction of El Capitan dam, spillway and outlet works. I realize that any such arbitration must be initiated by yourself and the contractors.

My position is as follows: On account of my connection with and my reports on the El Capitan dam site, I did not feel at liberty to take a position as Consulting Geologist for the contractors without your consent. Also, inasmuch as I had been offered an opportunity by the contractors to report on the character of material excavated in the spillway, I feel that a later employment by the City on this matter could not be accepted by me unless the report was made available to the contractors.

I regret, therefore, that under the circumstances it has not been possible to arrange for further work for you in regard to this matter. I appreciate your kind offer and if I can serve you in the future in any way which appears to me compatible with professional ethics, I shall be very glad to do so.

Very sincerely yours,

C. F. Tolman

CFT:as

2-5-35
copy/p

August 10, 1934

Dr. C. F. Tolman
Consulting Geologist
Stanford University, California

Subject: San Diego River Project, El Capitan Feature, Consultation

Dear Dr. Tolman:

The City of San Diego has requirement for consulting service to examine the materials excavated from the spillway and foundation of the El Capitan reservoir dam and to advise the Hydraulic Engineer and the City Attorney as to proper classification of the materials under the contract specifications governing the payments made and to be made; and

To appear in court as a witness in the event the Contractor is not satisfied with the estimates made by the Hydraulic Engineer.

The inspection of the work should be made at an early date, perhaps August 18, 19 or 20, 1934. The court appearances, if any, may be as early as October 1934, with some possibility of delays.

Please advise at your earliest practical convenience if you would be available for participation in the above mentioned work and as to the time when you could make the first inspection.

It is assumed that compensation will be made at the same daily rate as paid by the City heretofore, and without retainer.

Very truly yours,

Fred D. Pyle
Hydraulic Engineer.

FDP/f

8/14/34
copy /f

2148

COPY

STANFORD UNIVERSITY

DEPARTMENT OF GEOLOGY

STANFORD UNIVERSITY, CALIFORNIA

August 12, 1934

Mr. Fred D. Pyle, Hydraulic Engineer,
City of San Diego,
Water Department,
San Diego, California

Dear Mr. Pyle:

I regret greatly that I do not feel at liberty to accept consulting service to examine and classify materials excavated at El Capitan dam site and reservoir and appear in court as witness in regard to these matters. I beg to call to your attention the correspondence between Mr. Savage and myself including Mr. Savage's letters dated October 28, 1933, October 31st, and November 17th, 1933 and my letters dated October 18th, November 6th, and November 20, 1933, in regard to this matter.

The situation in brief is as follows: Mr. John M. Martin, Attorney for the contractors asked me to advise him in regard to the character of material excavated in the spillway. In view of a controversy between the contractors and the City I told him that as a consultant for the City of San Diego I did not feel at liberty to take the possible case against the City.

I informed Mr. Savage of this matter and told him that if the City of San Diego desired an independent report which would be available both to the City and to the contractors, I would be glad to make such a report, but in no case would I accept employment by parties involving a controversy with the City nor could I, in view of Mr. Martin's kind offer, take employment in a law suit against him. I have recently been approached again informally be representatives of the contractors and have again stated that I cannot take up this work.

I assure you that if I can help the City in any other matter, I shall be pleased to do so. I cherish my former connections with the City of San Diego and with your Water Department.

Very sincerely yours,

C. F. TOLMAN (Signature)

CFT:as

C. F. Tolman