

May 24, 1934

M E M O R A N D U M

San Diego River Project, El Capitan Feature  
Rohl-Connolly Co. Equipment at Dam

- |  |                                  |
|--|----------------------------------|
| 1 Pioneer crusher plant                      | 3 Bulldozers                     |
| 1 Concrete plant 1 mixer and<br>300 ton bins | 1 Gallion surfacer               |
| 2 Northwest gas shovels                      | 1 Grader                         |
| 1 Lima gas shovel                            | 1 Kelliper bulldozer ripper      |
| 2 Loraine gas shovels                        | 2 Byron-Jackson 5" pumps         |
| 1 Thew drag line                             | 5 United Iron Works pumps        |
| 1 Air shovel - small                         | 1 Barber Greene loader           |
| 6 Caterpillars                               | Machine shop equipment \$10,000  |
| 1 Cletrac and trail builder                  | Motors and Transformers \$20,000 |
| 3 Ford pickups                               |                                  |
| 1 Chevrolet pickup                           |                                  |
| 2 Ford 1-1/2 ton trucks                      |                                  |
| 3 Auto dump trucks                           |                                  |
| 2 Sterling dump trucks                       |                                  |
| 1 Mack dump truck                            |                                  |
| 5 White dump trucks                          |                                  |
| 3 Flat rack trucks                           |                                  |
| 3 Truck mixers                               |                                  |
| 3 1-R compressors                            |                                  |
| 1 Sullivan stationary                        |                                  |
| 1 Sullivan portable                          |                                  |
| 1 Gardner-Denver                             |                                  |

*Many Trucks Rented -*

HW/p

Harold Wood  
Resident Engineer

September 10, 1934

From : Resident Engineer  
 To : Hydraulic Engineer  
 Subject : San Diego River Project, El Capitan feature  
 Rolled fill - ball-foot rollers

1. Following is description and computations of weight of the ball-foot rollers used on the rolled fill at El Capitan Dam:

Rollers are two section units, each section being 4 feet long and 4 feet in diameter and constructed of 3/4" plate. Unit is surrcanded with channel frame, connecting with drawbars.

Area of 4 ends (for 2 sections)	=	50.28	square feet
Area of 2 cylinders	=	100.56	" "

Total area of plate		150.84	" "
---------------------	--	--------	-----

150.84 square feet 3/4" plate at 30.6#	=	4,616	pounds
240 teeth	"	10	2,400 "
10 linear feet 2 1/2" axle	"	16.7	167 "
56 " " channel frame and drawbars	"	10.5	588 "
Gusset plates and small fittings (estimated)		150	"

Total weight of two sections		7,921	" (x)
------------------------------	--	-------	-------

(x) Probably manufactured for an 8000# tamper.

Harold Wood  
 Resident Engineer

HW/p

CAMP

September 20, 1932

From : R. C. Wueste  
To : Hydraulic Engineer  
Subject : El Capitan Dam - domestic water for Engineer's Office and Contractor's mess.

Records in this office show the results of four bacteriological samples taken from faucet in El Capitan Contractor's mess house and four samples from faucet at City's El Capitan resident engineer's office.

All these samples show gas formation upon incubation in tubes. Samples taken at both points on August 12 and September 14 show B Coli on completed test. The samples show that the water at both the Contractor's mess and the Engineer's house does not conform to drinking water standards and may be dangerous.

It is understood that a 2000 gallon tank for drinking water purposes can be installed above the Engineer's office and can be operated by intermittent filling. Under these conditions this water can be sufficiently sterilized by dosing with calcium hypochlorite. Effective dosage of this water will probably lie somewhere between 5 tenths and 1 part per million of available chlorine contained in the chemical.

There is on hand a supply of calcium hypochlorite in cans which if dissolved in the ratio of one can per five gallons of water would require two ounces of this solution per 2,000 gallons of water to be treated for dosage of 5 tenths parts per million. It would be better to make a weaker solution and use more thereof, allowing it to dribble into the tank during filling to insure better mixing.

It is understood that the water supplied for the Contractor's mess house is obtained by hauling from an open sump upstream from the dam site and allowed to run into a small storage tank which supplies the mess house by gravity. There is good reason to believe that this supply is contaminated. Sterilization by dosing with calcium hypochlorite is recommended.

A method of procedure in this latter case would be the introduction of a proper dosage of calcium hypochlorite solution into each tank load of water at the time of filling at the sump. Efficient mixing would result during transit and release of water into the supply tank. Dosages within the range recommended for the Engineer's supply would probably be sufficient to accomplish the results.

RCW/m  
cc Resident Engineer  
El Capitan Dam (2 copies)

R. C. Wueste

December 7, 1934

From : H. J. Schaper, Asst. Purchasing Agent  
To : F. D. Pyle, Hydraulic Engineer  
Subject : Buildings at El Capitan Dam

We have arranged for the purchase, with the approval of the City Manager, of certain buildings belonging to Kehl-Connolly Company in the camp at El Capitan. The buildings that will be taken over by the City are as follows:

The Bath House, size 20 x 38, and the building known as the Storeroom, size 10 x 12, including all plumbing fixtures and the electric hot water plant contained within the building.

The Camp Boss House, size 12 x 24.

The Mess Hall which is 90 feet long at its greatest length and 72 feet wide at its greatest width. The Mess Hall is to include the large Masden range and the ice box, and all connections of the tanks contained within the building.

The Doctor's office, size 12 x 24, with all partitions contained therein.

The Residence in back of the office, size 28 x 35, with all partitions contained therein, with the exception of the electrical hot water heater.

The Office Building, size 32 x 40, including porch, furniture contained therein to be removed by Kehl-Connolly Company.

The Guest House, size 32 x 47, without the porch, which is 8 feet wide, with the exception of the furniture contained therein and the hot water heater.

NOTE: The only two hot water heaters to be removed are those in the Guest House and Residence in back of the office, all other heating equipment and plumbing equipment contained in all buildings are to be turned over to the City.

The Warehouse and Shop, the exact measurements not known but containing approximately 16,000 board feet of lumber; all electrical material, fixtures, etc. are to remain within the buildings.

H. J. Schaper  
Asst. Purchasing Agent

hjs/gw  
cc/Mr. Buck, Mr. Stanley  
Chief of Police

December 18, 1934

Messrs. H. W. Rohl & T. E. Connolly  
4351 Alhambra Avenue  
Los Angeles, California.

S-145

Subject: San Diego River Project, El Capitan  
Feature, Removal of Materials from  
Camp purchased by City of San Diego.

Gentlemen:

Since the San Diego Police Department has taken over  
your camp buildings and campsite at El Capitan Reservoir Dam,  
it has been deemed proper to issue instructions that nothing  
be removed therefrom, except upon written request from your  
office.

Very truly yours,

Fred D. Pyle  
Hydraulic Engineer

FDP/f

CONSTRUCTION POLICIES and METHODS

From : Harold Wood  
To : Hydraulic Engineer  
Subject : San Diego River Project, El Capitan Feature  
Construction policies, methods

1. Mr. E. M. Moore of Saluda, North Carolina, was introduced to me by Mr. Savage on the morning of January 9, 1932. We visited the site of the El Capitan dam on January 11, and conferred in the forenoon of January 12, before he left for Los Angeles, relative to general and printed data on hydraulic fill dams.

2. Mr. Moore met and conferred with the Kier Brothers and L. Atkinson at the damsite relative to methods used at Saluda dam. This was a repetition of the conversation we had on the morning of January 9.

3. Mr. Moore was much impressed with the very apparent stability of the proposed structure because of the heavy rock fill toes and slope pavings.

4. Mr. Moore when shown the material at the borrow pits expressed himself as of the opinion it was well suited for hydraulic fill.

5. Mr. Moore pointed out the extreme difficulties in connection with the placing of hydraulic fill because of the core wall, also the difficulties of erection of core wall. He was of the opinion and so stated that he did not consider the core wall necessary.

6. He stressed the importance of making tests of the material to determine its suitability for hydraulic fill and more particularly for its imperviousness and suggested the use of the device he perfected for this purpose. (See Engineer News-Record 12-10-31).

7. The principal danger to guard against according to Mr. Moore was getting the outer slopes too steep and placing the hydraulic fill too rapidly. These were the causes in his opinion for failure at one place in the Saluda dam.

8. He also considered it not good practice to place the outlet thru the dam and commented favorably on the proposed tunnel for this purpose.

9. In summing up the information obtained from Mr. Moore the most important thing seems to be the troubles at Saluda Dam. He also stated the methods used at Saluda Dam. This data is available in print and not here described. All material was under the size of an egg according to Mr. Moore.

10. Bibliography: Engineering News-Record, Article by E. M. Moore, December 10, 1931. Article in same publication in 1931 by Chief Engineer of New York State Water Conservation Work. Article in American Society of Civil Engineers Transactions 1924 by J. D. Justin. See list of hydraulic fill dams in book "Hydro-Electric Handbook - Creager and Justin".



February 3, 1932

1083

From : Engineer F. D. Pyle  
To : Hydraulic Engineer  
Subject : San Diego River Project, El Capitan Feature  
Visit by D. W. Albert January 22, 1932

1. On January 22, 1932 Mr. D. W. Albert, in company with Engineer Harold Wood and myself, visited the site of the projected El Capitan Dam.

2. Many phases of the design and construction of the dam were considered and discussed. Mr. Albert's impressions and reactions were as follows:

The stripping of soil and decomposed granite from the dam abutments will be suitable for hydraulic fill.

The decomposed granite from the spillway excavation will be suitable for hydraulic fill.

3. Mr. Albert said that considerable decomposed granite and decomposed granite soil was used in the hydraulic portion of the Henshaw dam and that the Musselback hydraulic fill dam as constructed by him was made entirely of decomposed granite.

He believed it unnecessary to excavate in the river bed except for the cutoff trench and that it was not necessary to strip more than the surface 10 to 15 inches of soil from the remainder of the dam site.

He thought the stripping under abutments could be done by hydraulic methods and that it would not be necessary to move many of the large rocks now on or near the present surface of the ground.

He expects the hydraulic fill material to drain and consolidate rapidly especially where much decomposed granite is used.

He did not see necessity for any rolled earth embankment.

He was favorably impressed with the borrow pit areas and the grade of material in them.

He spoke of the difficulty of constructing hydraulic fill dams with uniform slopes because of the tendency to bulge.

He was opposed to construction of core wall much above the original ground level and did not see the necessity for the up and down stream toe walls.

4. Mr. Albert has been on the construction of the following dams: Lake Francis Dam near Colgate, California, 1900; 80 feet; 285,000 cubic yards. Alamosa Dam, Alamosa, Colorado. Necoxa Dam and 3 small dams, Mexico. Coquitman Dam, British Columbia, 118 feet; 1,000,000 cubic yards. Bear Creek Dam, Sevier Bridge Dam, Utah. Big Meadow Dam, California. Paradise Dam, Chino, California. Yadhin Dam (prospecting for sand for Freeman). Consultant on Calaveras Dam. San Pablo Dam, Upper San Leandro Dam, Musselback Dam on Butte Creek, Henshaw Dam, Santiago Dam, California.

CITY OF SAN DIEGO, CALIFORNIA  
San Diego River Project, El Capitan Reservoir Dam  
Outline of Methods of Construction

1. MATERIALS OF CONSTRUCTION:

The projected El Capitan reservoir dam is to be of hydraulic fill and rock embankment type utilizing materials in the vicinity of the site for the construction of the structure.

Rock embankment material to the extent of about 72 per cent of the total required may be obtained from quarries to be opened up above the dam and/or along the south abutment. The remainder of the rock embankment material may be salvaged from the spillway and tunnel excavation.

The hydraulic fill material may be obtained from three areas designated A, B and C, to the extent of about 1,147,000 cubic yards, or about 78 per cent of total required and shown on Drawing WD-351 sheets 1, 2 and 3.

Area A is located east of Chocolate Creek and north of its junction with the San Diego River. Area B is immediately south of Area A and east of Chocolate Creek. Area C is immediately west of the right abutment of the dam and north of San Diego River.

From areas A and B about 1,060,000 cubic yards is available or about 72 per cent of the total hydraulic fill material required. The remainder can be obtained from area C and vicinity borrow pits, and overburden stripped from the abutments.

Concrete aggregates in quantities required (about 56,000 cubic yards) may not all be available from gravel deposits in the immediate vicinity of the dam but may be hauled from commissioned gravel plants.

Cement, steel, pipe, gates and other materials of construction and accessories may economically be hauled in automobile trucks from A. T. & S. F. railway siding near the mouth of the San Diego River, a distance of about 3<sup>4</sup> miles.

2. METHODS OF TRANSPORTING ROCK AND EARTH:

The hydraulic fill material may be loaded dry from the A, B, C and other borrow pits by power shovels and hauled in trucks.

Roads from A and B area pits should converge at Chocolate Creek near the present road crossing. From the vicinity of this crossing four about six per cent gradient roads may extend along the left abutment along the left bank of the San Diego River reaching the dam at elevations about equidistant apart vertically and commanding about equal volumes of the hydraulic fill respectively.

The hydraulic fill material hauled in trucks may be deposited in a "hog box" or hopper where water may be added to transport the material in flumes or pipes and deliver it in place in the body of the dam.

The roads along the left abutment may serve also the double purpose transporting also the rock embankment material by means of switchback. These operations can be carried on without interference.

The rock should be obtained from the most economical to develop quarries and if from upper elevations along the left abutment may be carried to the lower portions of the embankment while the hydraulic fill material may be sluiced from points

higher up than the top of the rock embankment to allow for the required gradient for the flumes.

Water for hydraulicking may be developed by wells and pumps along the San Diego River above or below the dam and after being used may be recaptured and conserved for repeated use in a sump above the dam.

It is estimated that about 24 cubic feet per second of water will be required to transport the material in the flumes. The majority of this water may be salvaged, thereby requiring only a limited amount of continuous additional water supply from the wells along the river valley.

### 3. CONSTRUCTION OPERATIONS:

Preliminary to putting the present traveled highway thru the river valley adjacent to the stream bed out of commission, a permanent highway may be constructed leaving from the Lakeside-Alpine trunk highway diverging at a point near the head of Chocolate Creek and located along the right bank of Chocolate Creek to and carried around well above the maximum elevations of the projected reservoir following the left bank of the river basin.

Excavation of the cutoff trench and driving the bypass tunnel work may be carried on simultaneously with the installation of the construction roads along the left abutment. The outlet tunnel and its inlet and outlet portals may be completed in advance of holing thru the tunnel. The lining of the tunnel may be carried on simultaneously with the driving if required, or after the tunnel is completed.

The upper toe retaining wall, the cutoff wall and the lower toe retaining wall could be completed leaving opening to pass the flumed stream flow until the outlet tunnel is completed.

Upon completion of the outlet tunnel, the outlet tower may be built up in height sufficiently in advance of the rock fill to allow time for the concrete to set before placing the fill around it.

The core wall will of necessity be advanced at all time ahead of the hydraulic fill.

The rock embankment may be made by end-dumping from motor trucks. Placing can economically be accomplished by caterpillar excavating derrick.

The concreting of the outlet structures and retaining walls and lower portions of the cutoff and corewall may be carried on from a concreting plant near the elevation of this work. For the spillways, adjacent retaining walls, and spillway lining, the concrete plant may be located on the right abutment near the north end of the upstream berm at elevation 650. This berm serving as a road for hauling materials. The siphon spillway tube may be built sufficiently in advance to allow time for the walls to set before the fill at the north end of the dam is placed against them.

#### 4. TIME ELEMENT:

If the contract is awarded so the work can start by April 1932, the tunnel should be completed and in use by September 1, 1932.

Placing hydraulic fill and rock embankment may be accomplished in about 15 months of working time, thereby the structure should be completed on or before November 30, 1933 in ample time to conserve the 1933-34 flood runoff.

HNS/p

San Diego, California

September 20  
19 32

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

Dear Mr. Savage:

With regard to the manner in which reports are to be submitted to the City Council concerning all matters relative to the El Capitan Dam feature, the following procedure is prescribed:

Labor reports are to be submitted weekly directly to the City Council and copies furnished the City Manager.

All other reports relative to El Capitan Dam may be submitted directly to the Council, and copies furnished the City Manager.

All other communications and reports presented to the City Council should be submitted to the City Manager before presentation to the City Council as has been done heretofore.

The City Council will be advised of this procedure and will be requested to refer all matters relating to El Capitan Dam directly to you without the necessity for coming through the Manager's office, since the Manager will be familiar with them through his regular attendance at City Council meetings and conferences.

Very truly yours,

A. V. GOEDDEL (Signature)  
A. V. Goeddel

City Manager

avg/dk

4/19/33  
copy /f

1090

H. W. ROHL & T. E. CONNOLLY  
Contractors  
4351 Alhambra Ave., Los Angeles

March 30, 1933

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

Dear Sir:

Inasmuch as our letters of instructions, orders, etc., are becoming so numerous and delivered through various routes, we respectfully request that some system of numbering same be devised in order that we may be sure none are overlooked and our files are maintained complete.

Very truly yours,

H.W.Rohl & T.E.Connolly

By H. W. ROHL (Signature)



February 8, 1933

Messrs. H. W. Rohl & T. E. Connolly  
Contractors El Capitan Dam  
4351 Alhambra Avenue  
Los Angeles, California.

Subject: San Diego River Project, El Capitan Feature  
Subcontractors.

Gentlemen:

Your attention is invited to paragraph 36 of the contract specifications for the El Capitan dam reading as follows:

36. SUBCONTRACTORS.-The contractor shall not subcontract in excess of 20% of the total amount of the contract, except by express permission in writing of the Engineer. The contractor shall advise the Engineer in advance and in detail of all portions of the work that he contemplates subcontracting. The contractor shall also furnish the City of San Diego the name and address of each subcontractor contracting directly with him, together with a statement showing the character and location of work, time limit, if any, and amount of money involved in each subcontract. Each subcontract shall contain a reference to the agreement between the City of San Diego and the principal contractor, and the terms of that agreement and all parts thereof shall be made a part of such subcontract insofar as applicable to the work covered thereby. Each subcontract shall provide for its annulment at the order of the engineer if, in his opinion, the subcontractor fails to comply with the requirements of the principal contract in so far as the same may be applicable to his work and all work or material furnished by a subcontractor shall be guaranteed by the contractor and the City of San Diego will hold the contractor responsible therefor.

Please immediately furnish the information provided for as above indicated.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer.

HNS/m  
cc H. W. Rohl & T. E. Connolly  
El Capitan Dam  
John M. Martin, Atty.  
City's Resident Engineer

5/1/33  
copy/f

1092  
COPY

April 20, 1933

Messrs. H. W. Rohl & T. E. Connolly  
Contractors El Capitan Dam  
4351 Alhambra Avenue  
Los Angeles, California.

S 1

Subject: San Diego River Project, El Capitan  
Feature, Contract Specifications  
Paragraph 7, "ENGINEER"

Gentlemen:

In response to your oral inquiry and request, no administrative change has been made in the responsibilities and authority of Mr. D. W. Albert since his employment and assignment to the City's El Capitan Dam contract construction work, as indicated in my letter to the Contractor dated February 8, 1933.

Mr. Albert's authority and responsibilities being subject to the provisions of the City's El Capitan Reservoir Dam, Spillway and Outlet Works contract specifications, paragraph 7, "ENGINEER".

Obviously no authority can be given by the Hydraulic Engineer to the City's engineers and/or inspectors connected with the El Capitan Reservoir Dam, Spillway and Outlet Works which would relieve the Hydraulic Engineer of his responsibilities under the contract specifications, or which would relieve the Contractor or his Sureties of any and all responsibilities under the provisions of the City's El Capitan Reservoir Dam, Spillway and Outlet Works contract specifications. At this time attention is particularly invited to paragraph 17, "INSPECTION" and paragraph 30 "REMOVAL AND REBUILDING OF DEFECTIVE WORK".

Very truly yours,

H. N. Savage,  
Hydraulic Engineer.

HNS/p

cc H.W.Rohl & T.E.Connolly  
El Capitan Dam  
Contractor's Resident Representative  
City Attorney  
City's Resident Engineer

May 17, 1933

From : Hydraulic Engineer  
To : Harold Wood  
Subject: San Diego River Project, El Capitan Feature  
Assignment and duties

In accordance with that portion of Resolution No. 60118 of the Council of the City of San Diego, adopted May 13, 1933 reading as follows:

"BE IT FURTHER RESOLVED, that said Hydraulic Engineer be and he is hereby directed to immediately assign an engineer to reside at the dam with complete authority under the terms of the contract to approve or disapprove the work on the structure as it progresses from hour to hour."

and that portion of the contract specifications for the construction of El Capitan Reservoir Dam, Spillway and Outlet Works reading as follows:

"7. ENGINEER.- The word "Engineer" used in these specifications or in the contract means the Hydraulic Engineer in Charge Bureau of Water Development of the City of San Diego. He will be represented by assistants and inspectors authorized to act for him. On all questions concerning the acceptability of material, machinery, the classification of material, the execution of the work, conflicting interests of contractors performing related work, and the determination of costs, the decision of the said engineer shall be final, and binding upon both parties."

you are hereby assigned as my assistant, to reside at the City's El Capitan dam camp, and

You are hereby authorized to represent me and to act for me under the terms of the above mentioned contract specifications, including the approval or disapproval of the work under the contract as it progresses from hour to hour.

H. N. Savage,  
Hydraulic Engineer.

HNS/p

cc H.W.Rohl & T.E.Connolly, Los Angeles  
H.W.Rohl & T.E.Connolly, El Capitan Dam  
Contractor's Resident Representative  
City Attorney  
City Clerk

DEFINITION OF TERMS

July 13, 1934

From : Resident Engineer  
To : Hydraulic Engineer  
Subject : San Diego River Project, El Capitan Feature  
Hydraulic fill, definitions of terms used

1. As requested on July 9, 1934, here is list of definitions of terms used in connection with El Capitan dam construction.

2. These definitions are in most cases the Resident Engineer's understanding of the terms which are more or less common in the minds of most engineers who have to do with the design and construction of hydraulic fill dams.

3. The definitions for hydraulic fill dam and semi-hydraulic fill dam are from Chapter V page 243 "Construction Plant Methods and Costs, The Miami Conservancy District, State of Ohio, by Chas. H. Paul, Chief Engineer."

Beach line: The line of intersection of summit pool and beach or stability section. The shore line of the summit pool.

Barge: A flat bottom straight sided boat, a large punt, a scow.

Beach: The portion of a hydraulic fill dam immediately outside of the puddle core over which the materials are run with water. The top surface of the stability section.

Borrow Pit: An excavation made from which materials are taken for use in building embankment or fill. Troutwine 1902 edition, page 1026 - "A pit dug in order to obtain material for embankment."

Blowout: A condition where the pressure of the puddle core is sufficient to overcome the frictional resistance of the stability section and the core material bursts out thru the stability section material.

Coarse materials: Materials such as sand or gravel larger in size than 0.003 inch or what will be retained on No. 200 sieve.

Colloids: The fine clay particles which will not settle in water but will stay in suspension for months.

Clay: Earthy material ranging in size of particles from 0.0004 inch down, or material which will, when agitated in water, stay in suspension for 15 minutes. See standard hydrometer test for clay determination.

Consolidation tests: Tests made in the laboratory to determine consolidation or reduction in volume of hydraulic fill materials under increasing loads. For details of consolidation tests see Testing Engineer's letter July 5, 1933 to Hydraulic Engineer.

Compression: External squeezing force applied to a sample under test. Expressed in feet of fill.

Consolidation: Reduction in volume resulting from compression of a sample under test. The consolidation is expressed in per cent of reduction of volume to volume of sample before compression. Sometimes refers to settling of suspended fines in the summit pool into the puddle core.

Conveyor Pipe Lines: The discharge pipe lines leading from the mud pump onto the beaches of the hydraulic fill dam.

Cutoff wall: A concrete wall extending into the foundation of the dam and up into or to positive contact with the dam above, to prevent seepage of water.

Cutoff trench: A trench for a cutoff wall.

Clear (puddle): Term used in describing condition of summit pool after the most of the suspended fines have settled to the bottom of the pool leaving the water less muddy looking.

Core drainage: The escapement of water from the puddle core into the stability section materials.

Depth of Summit Pool: Depth of water in the summit pool or difference of elevation of water surface of the summit pool and the silt line.

Drainage: Water flowing thru a structure, usually in waterways provided.

Eddy: A counter current of water.

Fines: Silt and clay or materials passing No. 200 sieve or in size smaller than 0.003 inch.

Fines strata: Strata of fines in the stability section which are continuous with fines of the puddle core.

Gradation tests: Laboratory tests to determine the sizes and percentage by weight of the gravel, sand, silt and clay of the hydraulic fill materials.

Giant: A universally sqiveled nozzle for directing a jet of water. A monitor.

Hydraulic fill: A fill made of materials placed by flowing water.

Hydraulic fill dam: One in which the materials are brought to the dam and laid down in embankment by means of flowing water, and manipulated in such manner as to segregate the fines within predetermined section to form an impervious core.

Hog box: The place into which borrow pit materials are dumped to be acted upon by jets of water from the giants and from which the materials in solution are pumped by the mud pump onto the dam.

Impervious: Hydraulic fill materials are considered impervious when they will pass water at normal temperature, at a velocity less than about 2.0 feet per year on a ratio of unity with a pressure head equivalent to 75 feet of fill of same weight of material as the hydraulic fill materials under consideration.

Impermeable: Having the lack of capacity to hold water in void spaces.

Island: Puddle core material forced up above the surface of the summit pool.

Iron (appearance): Metallic or magnetic iron occurring in the sands of this vicinity give the sand an iron like appearance.

Mud line: The line at the top of mud which will adhere to the sounding rod.

Moisture content: Water held in a material by capillarity. Expressed as a per cent by weight of water to weight of material dry.

Mica: One of the minerals of the component parts of granite.

Monitor: A universally swiveled nozzle for directing a jet of water. A giant.

Mud pump: An open runner type centrifugal pump for pumping hydraulic fill materials when mixed with water.

Make-up water: Water added to the summit pool to make up for losses due to seepage, evaporation, absorption, etc.

Mud-balls: Lumps of borrow pit material which find their way to the beach. Unsegregated borrow pit materials which by action of water and abrasive materials tend to form them into spherical shape or balls.

Observation well: Same as test well. A well with perforated casing constructed in the hydraulic fill in which measurements of the water surface is made.

Puddle core: A predetermined section of an hydraulic fill dam or a semi-hydraulic fill dam in which fines are segregated out to form an impervious core.

Pervious: Permeable: Hydraulic fill materials are considered pervious when they will pass water at normal temperature, at a velocity greater than about 2.0 feet per year on a ratio of unity with a pressure head equivalent to 75 feet of fill of same weight of material as the hydraulic fill materials under consideration. By ratio of unity is meant that  $h/l = 1$  in hydraulic formula  $V = C \times h/l$ .

Permeable: Having a capacity to hold water due to void spaces so small as to prevent hydraulic flow.

Percolation tests: Tests made in the laboratory to determine perviousness of hydraulic fill materials. For details of tests see Testing Engineer's letter 7-5-33 to Hydraulic Engineer

Quicksand: Evenly graded water saturated sand.

Stability Section: Portion of dam outside central puddle core which imparts stability to the structure and confines the puddle core.

Summit pool: The pool in which the fines are segregated to form the puddle core. Sometimes called settling pool.

Semi-hydraulic fill dam: One in which the materials are put into the embankment by some means other than by flowing water, and then worked over or manipulated by means of water in such manner as to separate out and segregate enough of the fines within a predetermined section to form an impervious core.

Silt: Earthy material passing No. 200 sieve and ranging in size down to 0.0004 inch, material next in size larger than clay.

Sand: Granular rock material in size passing 1/4 inch sieve and retained on No. 200 sieve.

Sounding rod: A smooth round wooden stick or rod 1 1/8 inches in diameter and any length up to about 24 feet used for sounding the puddle core material or for feeling out sand strata and general consistency of the puddle core material.

Six-pound weight: Weight used on end of metallic tape for sounding depth of summit pool for determination of silt line. Weight is of cold rolled steel shafting 3 5/8 inches in diameter and 2 inches high with separate top and bottom. Tape attached to 1/2 inch eye bolt screwed into top of disk. Weight weighs about 6 pounds.

Silt line: Material of puddle core which will support the 6-pound weight. Considered as top of puddle core for cross sections and reports.

Sand strata: Strata of sand in the puddle core which are continuous with sands of a stability section of the dam.

Segregation: Separation of materials composing the hydraulic fill such as sands, silts and clays.

Soundings: Depths taken with the 6-pound weight or depth to silt line or difference in elevations of water surface in the summit pool and the silt line.

Sampling: Operations involved in obtaining samples of hydraulic fill materials either in borrow pit from hog box or after placement in hydraulic fill.

Specific gravity: Weight of materials referred to the weight of water as unity.

Seepage: Escaping water which finds its way thru the hydraulic structure.



Sink holes (on beach): Cone shaped depressions found on the beach of stability section of the dam, caused by displacement downward of the stability section material into spaces in the rock embankment material.

Slide (sand): Peninsula or stratum of sand moved down by gravity from the beach toward the puddle core or into the puddle core.

Scow: A barge.

Sampling device: Tools used for extracting samples from different portions of the hydraulic fill or from hydraulic fill materials.

Shear boards: Pieces of 1" lumber about 12" wide by about 12' long to deflect the surface currents on the beaches while material is being deposited by full hydraulic method.

Structure excavation: An excavation made and used for erection of a structure. If materials from such excavation are used in building embankment or fill, then the structure excavation becomes a borrow pit.

Solids: Coarse hydraulic fill material such as silt or sand grains or pieces of gravel or hard lumps of granite.

Settlement: Amount of movement downward of the materials in the dam.

Tepping off: Completion of the topor crest of the dam over the puddle core. Term also used for top course of masonry on a masonry dam.

Under water beaches: Beaches submerged when summit pool is raised.

Voids: Spaces between the solid particles composing the hydraulic fill materials.

Weight: Specific gravity times unit volume. Expressed in pounds.

Waste water: Water wasted out of the summit pool; opposite of make-up water.

**CONTRACTOR'S ORGANIZATION**

San Diego, Calif.  
April 13, 1932.

Mr. H. N. Savage,  
Chief Hydraulic Engineer,  
Division of Water Development,  
City of San Diego, California.

Dear Sir:

Pursuant to your request for statement relative to personnel to be utilized in the construction of the El Capitan Dam:

We have engaged as our engineer on the job Mr. D. W. Albert, an engineer of outstanding experience in hydraulic fill dam construction, and as a general superintendent Mr. Ben F. Wells. There is now on file in your office a complete statement of Mr. Albert's experience. Mr. Ben F. Wells has been general superintendent for H. W. Rohl for many years past.

Very truly yours,

T. E. Connolly (Signature)

H. W. Rohl (Signature)

May 27, 1932

From : R. C. Wueste  
To : Mr. H. H. Esselstyn, City Manager  
Subject : San Diego River Project, El Capitan Dam Construction  
Employments - progress report on certification of  
residence requirements.

1. I have assembled necessary material and made necessary contacts to begin work on lists to be furnished me by Mr. P. J. Baddeley, Contractor's Representative.

2. Contractor has rented office at 650 East F Street. I have established myself in Room 213 Pacific Building. In advance of requirement for, Mr. Baddeley will send out post-card notices to men who have registered with him. Each time a group of cards is mailed, a list of the names will be submitted to me for checking. Men will bring their cards to me for certification as to residence requirements. If OK they will then go to contractors' office for interview. I will keep record of my actions on each card.

3. Please instruct me how card is to be signed. I had in mind "City Manager by R. C. Wueste". A sample of the contractors' cards is attached.

R. C. Wueste

RCW/p

cc Hydraulic Engineer

June 7, 1932

Rohl-Connolly Company  
Contractors, El Capitan Dam  
650 F Street  
San Diego, California.

Subject: El Capitan Reservoir Dam, Spillway and  
Outlet Works Contract, Applications for  
Employment, Investigator as to Residence  
Requirements.

Gentlemen:

Enclosed are copies of City of San Diego Council's Resolu-  
tions No. 58455, 58456 and 58457, all dated June 6, 1932.

Resolution No. 58455 confirms the appointment by the City  
Manager of R. C. Wueste to represent the City Manager as  
special investigator of all applications by Rohl-Connolly  
Company for the El Capitan Dam work.

Resolution No. 58456 repeals Resolution No. 58413 dated  
May 23, 1932, copy of which is also enclosed.

Resolution No. 58457 authorizes the City Manager to inves-  
tigate any applicant on the El Capitan Dam work with respect  
to citizenship qualifications under the terms of the contract  
between the City of San Diego and H. W. Rohl and T. E. Connolly.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer.

F/f  
Encls. Copies  
Resolutions 58413, 58455, 58456, 58457

cc Mr. John M. Martin  
cc Resident Engineer Harold Wood

June 11, 1932.

H. H. Esselstyn, City Manager,  
San Diego, California.

Re: El Capitan Dam.

Dear Sir:

I am in receipt of a letter from Mr. Savage, Hydraulic Engineer, wherein he encloses copies of the City of San Diego Council's Resolutions Nos. 58455, 58456 and 58457, all dated June 6, 1932.

If I correctly understand what has occurred in this connection, it is now necessary for you to personally certify as to citizenship qualifications of any applicant for work on the above job.

If you will at once furnish me with a memorandum showing the names of those persons whom you have thus far interviewed and certified as to citizenship qualifications for work on the above job, I will at once have such list checked with our present payroll.

I am at a little loss to know the present status of those persons relative to whom your designated representative, Mr. Rudolph Charles Wueste has heretofore certified. In other words, is the contractor authorized to continue the employment of workers and/or employ applicants for work under certificates signed by Mr. Wueste pursuant to Resolution No. 58143, adopted May 23, 1932, since the repeal thereof pursuant to Resolution No. 58456 adopted June 6, 1932.

I expect to be in San Diego Monday, but will probably be in court during the major portion of the day.

I will certainly appreciate it if you will do what you can to aid me in clarifying our records in this matter, by at once writing me concerning your views and wishes in this matter.

Very truly yours,

JOHN M. MARTIN (Signature)

JHM-AMR  
cc H. N. Savage

JOHN M. MARTIN  
FRANK L. MARTIN, JR. - JAMES N. FARLEY  
Attorneys at Law  
Los Angeles, Calif.

June 11, 1932.

H. N. Savage, Hydraulic Engineer,  
514 "F" Street,  
San Diego, California.

Re: El Capitan Dam.

Dear Mr. Savage:

I wish to acknowledge receipt of your favor of the 7th enclosing copies of City of San Diego Council's Resolutions Nos. 58455, 58456 and 58457, all dated June 6, 1932.

I enclose herewith copy of my letter of this date to H. H. Esselstyn, City Manager.

It seems to me that the various Resolutions passed by the City Council have somewhat complicated this matter, and I am anxious that no misunderstanding arise as to the status of the men now working on the job who have heretofore been certified by Mr. Wueste, or as to the status of applicants for work who have heretofore been certified by Mr. Wueste.

I expect to be in San Diego Monday, and will endeavor to see you while there.

Very truly yours,

JOHN M. MARTIN (Signature)

JMM-AMR

P.S. Copy of the letter to Mr. Esselstyn referred to above went forward to you in Saturday's mail.

Jun 21, 1932

From : Resident Engineer  
To : Hydraulic Engineer  
Subject : San Diego River Project, El Capitan Feature  
Notice posted for contractor's employees.

1. The following notice dated June 1, 1932 and signed by Kohl-Connolly Co. by the General Superintendent, relative to employees on the El Capitan Dam being required to board and lodge at the contractor's camp, was posted in the mess hall:

NOTICE

Effective Wednesday June 1st, all men employed on the El Capitan Dam Construction job will move into quarters provided for them at the camp.

Board, lodging, blankets, sheets, pillows and pillow cases will be furnished at \$1.75 per day.

It is compulsory that all men move into camp and eat at the cook house.

Men being away from camp for a day or longer will be given credit for meals, otherwise a charge will be made for three meals each day.

All men leaving camp for a day or more will notify the Steward the day before they plan to leave.

Brass check number will be worn in plain view that they may be checked off upon leaving the dining room.

Kohl-Connolly Co.

By General Superintendent

2. The Bureau of Labor Statistics State of California have issued a copy of Act prohibiting coercing of employees to patronize employer. A copy of this act is attached hereto.

3. The notice as posted June 1, 1932 by the contractors appears to be in conflict with the above mentioned act, and is therefore brought to your attention for consideration and action if necessary.

Harold Wood  
Resident Engineer

HW/p  
encl.



Issued by  
BUREAU OF LABOR STATISTICS  
State of California  
603 State Building  
Civic Center, San Francisco

ACT PROHIBITING COERCING OF EMPLOYEES TO PATRONIZE  
EMPLOYER

An act prohibiting employers of labor from coercing employees  
in the purchase of things of value, and prescribing a  
penalty for the violation of the provisions hereof.

(Approved April 26, 1917, Stats. 1917  
p. 207, Chap. 141.)

UNLAWFUL TO FORCE EMPLOYEES TO PATRONIZE EMPLOYER.

SECTION 1. It shall be unlawful for any employer of labor,  
or any officer, agent or employee of any employer of labor to  
make, adopt or enforce any rule or regulation compelling or co-  
ercing any employee to patronize said employer, or any other  
person, firm or corporation, in the purchase of any thing of value;  
provided, however, that nothing herein shall be interpreted as  
prohibiting any employer of labor from prescribing the weight,  
color, quality, texture, style, form and make of uniforms re-  
quired to be worn by their employees.

PENALTY.

SECTION 2. Any person, whether as an individual, or as an  
agent or employee of a firm, or as an officer, agent or employee  
of a corporation, who shall violate any of the provisions of this  
act, shall be guilty of a misdemeanor, and upon conviction thereof  
shall be punished by a fine not exceeding one hundred dollars or  
by imprisonment in the county jail for a term not exceeding six  
months, or by both such fine and imprisonment.

June 23, 1932

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

Subject: El Capitan Dam -Citizenship  
Certificate

Dear Sir:

In conformity with your recent request, I enclose herewith a list of the contractor's employees at El Capitan Dam as of June 18, 1932.

You will note the list shows the address of the employee as well as the occupation.

Due to the uncertainty which has been created through repeal of Resolution No. 58413 by Resolution No. 58480, both of which resolutions have to do with the designation by the City Manager of a man to investigate applicants for work, and authorizing such designated party to certify relative to the citizenship qualifications of such applicant, I will appreciate it very much if you can procure a blanket certificate signed by the City Manager personally in accordance with Resolution No. 58457 covering all persons employed as per enclosed list of June 18, 1932.

I am enclosing three copies of the list of employees, together with an extra copy of this letter. Should you or the City Manager or his investigators desire any information not shown on the enclosed lists, I am sure that Mr. Frank Lee, whose telephone number is Franklin 1448 can furnish such additional information as may be required.

The Council indicated its desire that the contractors employ only those citizens who had resided in the City of San Diego for more than one year. In a great many instances we have been able to carry out the wishes of the Council, and in fact have tried to do so wherever practicable. However, there are no doubt a number of employees on our present payroll who have not been citizens for more than one year, and it is for that reason that I prefer to have Mr. Esselstyn's blanket personal certificate as to the men carried upon our present payroll.

While there is no requirement in our contract that the men employed shall have been citizens for one year, or that their citizenship qualifications shall be

6/23/1932

H. N. Savage #2

certified to, I understand that the representatives of the city prefer that our employees be certified to and that we endeavor to employ only those persons who have been residents of the City of San Diego for one year, and for that reason I am willing to cooperate in every way possible in order that the wishes of the city and its representatives may be complied with.

Very truly yours,

JOHN M. MARTIN (Signature)

JMM-AMR

September 16, 1932

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

Gentlemen:

Pursuant to your instructions the various complaints concerning alleged failure of the contractors at El Capitan Dam to comply with contract provisions governing the employment of citizen labor, have been investigated and the following report is submitted for your careful consideration:

There is indication of apparent discrimination against Negro workmen and there are no Negroes employed at the present time. However, the contractors deem it inadvisable to employ other than white workmen and appear to be justified in giving employment to the men who seem to be best suited to the work at hand, and as long as they give employment to citizens of San Diego, as required in the contract, there is nothing that your honorable body can do to change the situation.

In regard to the complaint concerning the employment of aliens, I can report that the contractors were notified of the fact that three workmen were not citizens of the United States, and that upon receipt of due notice to that effect from this office the contractors promptly discharged said aliens.

Concerning the 330 workmen, more or less, at present employed at the dam, I wish to inform you that approximately 80% are citizens of the City of San Diego. The remainder are those who fall within the exempt classifications, those who were exempted by a previous City Manager, and those whom the contractors consider exempt by reason of previous experience on construction work of this character - men assigned to work where lack of experience might endanger the lives of other workmen.

Complaints concerning reported violations of the State Labor Laws governing overtime, etc., may be founded upon fact and for that reason all data concerning same is being assembled and turned over to the Deputy State Labor Commissioner since your honorable body is not necessarily charged with responsibility for the enforcement of State laws.

With regard to the delay in approving the contractor's claim for payment on account of approximately \$91,000, I can report that same has been approved by reason of the fact that detailed investigation has convinced me that, under the provisions of the contract, the Hydraulic Engineer's approval is all that is required. The claim has therefore been approved for payment.

The Mayor and Council

September 16, 1932

Although a tentatively verbal agreement had apparently been reached with the contractors concerning the enforcement of the citizen-labor provisions of the contract, the contractors have since decided to stand on their rights as defined in the contract and have refused to recognize the City Manager. This, however, need cause no concern since the Hydraulic Engineer, who is mentioned in the contract and who is subordinate to the City Manager, is quite competent to handle the situation and fully equal to the task of enforcing all contract provisions.

Apparent difficulty in enforcing the citizen-labor clause of the contract has been as much the fault of the City as it has of the contractors, since the procedure of the past few months has been cumbersome and impractical. This is no reflection upon the three men who each handled a different phase of the inspection for the City. And in fairness to the contractors it is only just to report that they have agreed now to make time cards available daily to the City's inspector. This will permit an immediate and accurate check on all workmen on the day they are employed or discharged.

In my opinion one inspector working directly under the Hydraulic Engineer can take care of this inspection service for the City.

I recommend that the Hydraulic Engineer be charged with responsibility for the enforcement of the citizen-labor clause in the contract and that weekly reports be submitted to your honorable body through the City Manager. The adoption of such a recommendation will be in strict accord with the contract and the contractors will have no objection whatever thereto.

Respectfully,

A. V. Goeddel

City Manager

AVG/dk

Document No. 278389 filed September 19, 1932

September 19, 1932

Mr. Mayor:

It has been brought to my attention on various occasions during the past two or three months, by those in interest, that there is an apparent discrimination in placing of labor at the El Capitan Dam, and from investigation and from advices it appears that Negro workers and laborers are not being placed on this work. Among our Negro population are many who own property and pay taxes, and as citizens and voters contribute their share to the City's well being. The unemployed among this class are suffering the same hardships as others, and these men and their families and dependents are deserving of consideration, and I know of no reason why these citizens, because of their color or race, should not merit the same privileges and advantages, in work that they are qualified in performing, as others seeking employment.

I feel that this matter is worthy of the personal attention of our City Manager, and I ask that it be referred to him, and that he take such action as may be proper to correct this unfair discrimination, if it exists, and would request that the Manager report back to this Council the results of his investigation at our next meeting.

DAN ROSSI

Referred H.N.Savage September 19, 1932

September 21, 1932

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

Subject: Document No. 278389, Communication from  
Councilman Dan Rossi, employment of  
Negro labor at El Capitan Dam

Gentlemen:

Your reference Document No. 278389, being a communication from Councilman Dan Rossi regarding the employment of Negro labor at El Capitan Reservoir Dam.

It is not seen how the City of San Diego can legally require or do more than to respectfully suggest to the contractor (as has already been repeatedly done by City officials) that employment be given to a relative number of Negro citizens who are also taxpayers in the City of San Diego in advancing the installation of the City's El Capitan Reservoir Dam.

Returned herewith is Document No. 278389.

Very respectfully,

H. N. Savage,  
Hydraulic Engineer.

HNS/f  
Encl. Doc. No. 278389  
cc City Manager

September 22, 1932

From : Hydraulic Engineer  
To : Resident Engineer  
Subject : El Capitan Reservoir Dam installation, Contractor's  
Labor employment, citizenship requirements

1. Complying with the purport of the oral understanding reached at the Contractor's El Capitan Dam office Saturday, September 17, between the City of San Diego Councilmen, Assistant City Attorney and Contractor T. E. Connolly, and

In furtherance of the amplified oral understanding at the Contractor's office Monday, September 19, between Contractor T. E. Connolly and Hydraulic Engineer H. N. Savage, Engineer Fred D. Pyle, Resident Engineer Harold Wood and Contract Construction Cost Accountant E. D. Williams; and

In compliance with the purport of your letter dated September 18, in which you indicate your understanding reached by the two conferences and requirements dictated by the Drawings and Specifications:

"It is required that no labor other than citizens of the City of San Diego shall be employed on all construction work contemplated hereunder."

"25. Character of Workmen.- . . . . None but skilled foreman and workmen shall be employed on work requiring special qualifications, . . . . ."

2. It is deemed required to comply in the fullest manner practicable with the contractor's desire to employ the labor forces he requires from applicants who present themselves at his El Capitan dam office;

3. The contractor to furnish you with a duplicate of the application for employment, showing classification, citizenship and names of two validating references in order that the employee's citizenship may be checked through this office.

4. It is understood that a considerable number of names whose citizenship were determined by Inspector R. C. Wueste are now in the contractor's files and that he avails of this file when employing additional staff.

5. The City Manager has transferred and assigned Mr. Joseph Hammill, sometime Inspector of citizenship requirements, to the City's Department of Public Works.

6. Mr. Thomas Knott is tentatively assigned, reporting to this office, to research and determine citizenship status of employes of the contractors.



Resident Engineer

--2

9/22/32

7. Half of Mr. Knott's time will be reporting to the Department of Public Works and about half reporting citizenship status of the El Capitan dam contractor's staff.

8. Mr. Knott's salary is understood to be \$137.00 and \$30.00 automobile allowance per month.

9. It is my understanding that the status of all the contractor's employes had been definitely analyzed up to September 15 by Messrs. Hammill and Knott.

10. It is my understanding that you and Mr. Knott and the contractor's clerical staff will research and bring up to date the status of the contractor's staff as is of this date. Thereupon you may send duplicate employment cards to this office of employes whose citizenship status requires determination.

11. For obvious reasons all relations between the City's engineering forces and the contractor regarding labor citizenship and skilled foremen and workmen employed on work requiring special qualifications should be handled direct and only from and to my office through and from your office.

H. N. Savage  
Hydraulic Engineer

HNS/f

cc City Manager  
cc Thomas L. Knott

September 29, 1932

From : Hydraulic Engineer  
To : Inspector Thomas L. Knott  
Subject : El Capitan Reservoir Dam, Contractor's  
Labor identification

You may compile and submit weekly reports covering daily number of men employed by the Contractor on the El Capitan Dam work, divided among key men of record; non-residents and residents as per the attached form.

H. N. Savage

HNS/f  
encl.

CITY OF SAN DIEGO  
San Diego, California.

October 8, 1932

Mr. A. V. Goeddel  
City Manager  
San Diego, California

Dear Sir:

Pursuant to resolution from the City Council authorizing the Director of Public Works to investigate an employment agency in Los Angeles sending workers to the El Capitan Dam, beg to advise that I visited the firm of Murray and Reedy in Los Angeles, the company complained of, and find that they sent six miners to El Capitan on September 1st upon request of H. W. Rohl.

I looked over the blackboards, and there was no mention of men being desired for any work in San Diego County. The Superintendent In Charge reported that none of the men sent down had complained that they had not been employed. They are unable to account for the complaint issued to the Council.

Very truly yours,

F. A. Rhodes  
Director of Public Works

FAR/G

APPROVED

A. V. Goeddel  
City Manager

dk

cc: Mr. H. N. Savage

Office of  
City Attorney  
CITY OF SAN DIEGO

San Diego, California  
October 18, 1932

Mr. H. N. Sayage  
Hydraulic Engineer  
City of San Diego, Calif.

Re: Citizenship

Dear Sir:

Answering your letter of October 5, requesting an opinion as to what constitutes a citizen of The City of San Diego, you are hereby advised that all persons who are citizens of the United States and who reside within the City of San Diego are citizens thereof.

The word "reside" is used hereinabove in its legal sense, in which sense the word "domicile" is more frequently used. The question of residence is the principal test of citizenship. The question of residence has always been found to be one of the most intangible and uncertain with which the law has been called upon to deal, since it depends principally upon the intent of the person involved. Among other rules which the California statutes have prescribed for determining "residence" (as used in this sense) or "domicile", are the following:

Section 52, Political Code:

"1. It is the place where one remains when not called elsewhere for labor or other special or temporary purpose, and to which he returns in seasons of repose;

"2. There can be only one residence;

"3. A residence cannot be lost until another is gained.

\* \* \* \* \*

"7. The residence can be changed only by the union of act and intent."

Section 1239 Political Code (Concerning elections:

"1. That place must be considered and held to be the residence of a person in which his habitation is fixed, and to which, whenever he is absent, he has the intention of returning;

\* \* \* \* \*

"3. A person must not be considered to have lost his residence who leaves his home to go into another state, or precinct in this state, for temporary purposes merely, with the intention of returning;

"4. A person must not be considered to have gained a residence in any precinct into which he comes for temporary purposes merely, without the intention of making such precinct his home;

\* \* \* \* \*

"6. If a person remove to another state with the intention of remaining there for an indefinite time, and as a place of present residence, he loses his residence in this state, notwithstanding he entertains an intention of returning at some future period;

"7. The place where a man's family resides must be held to be his residence; but if it be a place for temporary establishment for his family, or for transient objects, it is otherwise;

"8. If a man have a family fixed in one place, and he does business in another, the former must be considered his place of residence; provided, that any man having a family, and who has taken up his abode with the intention of remaining, and whose family does not so reside with him, must be regarded as a resident where he has so taken up his abode.

\* \* \* \* \*

"10. The mere intention to acquire a new residence, without the fact of removal, avails nothing, neither does the fact of removal, without the intention."

It has also been judicially defined as:

"The place where a persons has his home, or his principal home, or where he has his family residence and principal place of business; that residence from which there is no present intention to remove, or to which there is a general intention to return."

I might also say that in determining this question the Courts have always been inclined to lend considerable weight to any direct statement of intent made by the person whose residence or domicile is in question.

While I trust the above may be of some assistance in determining this question, each case must rest squarely upon its own facts, and a circumstance or fact which would be conclusive in one case might have little or no weight in another.

Yours truly,

GILMORE TILLMAN (Signature)

Gilmore Tillman  
Assistant City Attorney

GT:HC

October 5, 1932

From : Hydraulic Engineer  
To : City Attorney  
Subject: El Capitan Reservoir Dam Feature, Contractor  
Employment, Citizens of San Diego.

In the City's Notice Inviting Bids for the construction of the El Capitan Reservoir Dam, Spillway and Outlet Works, Page 6, Paragraph 2 of the Drawings and Specifications, reads as follows:

"It is required that no labor other than citizens of the City of San Diego shall be employed on all construction work contemplated hereunder."

Page 27, Paragraph 25, in part reads as follows:

"None but skilled foremen and workmen shall be employed on work requiring special qualifications."

Your legal opinion is respectfully invited as to what constitutes a citizen of the City of San Diego.

The Western Pipe & Steel Company's attorneys advised that any citizen of the United States coming to San Diego, if unmarried, or if accompanied by his family and not maintaining a family residence elsewhere would upon declaration of citizenship in San Diego automatically legally become such.

H. N. Savage,  
Hydraulic Engineer.

HNS/f

5/4/33  
copy/f

1122

November 15, 1932

Messrs. H. W. Rohl & T. E. Connolly  
4351 Alhambra Avenue  
Los Angeles, California.

Subject: San Diego River Project, El Capitan  
Feature, contract construction.

Gentlemen:

Enclosed is copy of City of San Diego's Resolution  
No. 59271 for your appropriate action in compliance with  
the specific provisions of ARTICLE VI of your contract  
with the City of San Diego for the construction of the  
El Capitan Reservoir Dam, Spillway and Outlet Works.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer.

HNS/p  
Encl.

cc H.W.Rohl & T.E.Connolly  
El Capitan Dam  
cc Contractor's Resident Representative  
cc City's Resident Engineer  
cc City Attorney  
cc John M. Martin, Attorney at Law



December 6, 1932

H. W. Rohl & T. E. Connolly  
Contractors, El Capitan Dam  
Lakeside, California.

Subject: San Diego River Project, El Capitan  
Feature. Employment of other than  
Citizens of San Diego.

Gentlemen:

Enclosed is copy of Resolution No. 59371, requesting  
the Hydraulic Engineer to report why truck drivers, elec-  
tricians and welders from out of town are employed on El  
Capitan Dam.

Your early attention to this matter so that report can  
be made to the Council advising them of your full compliance  
with the last sentence of Article VI of your contract will  
be appreciated.

Very truly yours,

Fred D. Pyle  
Acting Hydraulic Engineer.

FDP/f  
Encl. Res.No.59371

cc H.W.Rohl & T.E.Connolly El Capitan Dam  
Contractor's Resident Representative  
City's Resident Engineer  
Hydraulic Engineer, Washington D.C.

Original mailed to 4351 Alhambra Avenue, Los Angeles.

H. W. ROHL & T. E. CONNOLLY  
CONTRACTORS

December, 8, 1932.

Fred D. Pyle, Acting Hydraulic Engineer,  
524 F St.,  
San Diego,  
Cal.

Dear Sir:

Your letter enclosing copy of Council Resolution  
No. 59371 received.

To the best of our knowledge and belief we are  
fully complying with the last sentence of Article VI of  
our contract. To that end we are daily furnishing you  
with our employment records.

If you would be more specific and name the men  
whose status you question, we could readily clarify the  
matter. You have done so in the past and the men have  
been discharged.

At this time we are employing three welders. All  
claim to be citizens and taxpayers of San Diego. We are  
employing one electrician who has long since been certified  
by the labor representative of the Council and the Hydraulic  
Engineer. There are over fifty truck drivers now employed here  
and our records indicate all of them to be San Diego citizens.  
If you will kindly name the men whose status is in question  
and who have not been certified we will have them prove their  
citizenship to your satisfaction or discharge them.

Yours truly,  
H.W.Rohl & T.E.Connolly.

By T. E. CONNOLLY (Signature)

5/4/33  
copy/f

1125

December 16, 1932

H. W. Rohl & T. E. Connolly  
Contractors, El Capitan Dam  
4351 Alhambra Avenue  
Los Angeles, California.

Subject: El Capitan Dam Contract Construction,  
Employment of Citizens of San Diego.

Gentlemen:

Receipt is acknowledged of your reply dated December 8, 1932 to the City of San Diego's Resolution No. 59371 regarding the employment by you at the El Capitan Dam of other than citizens of San Diego on work for which citizens of San Diego may be qualified and available.

The purport of your reaction and cooperation with the specifications as indicated in your letter is valued.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer.

HNS/p

cc H.W.Rohl & T.E.Connolly  
El Capitan Dam

H. W. ROHL & T. E. CONNOLLY  
CONTRACTORS

January 23, 1933

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

Dear Sir:

Re: El Capitan Reservoir Dam Spillway  
and Outlet Works

In our letter of November 14th we advised you that on occasions when Contractor was not represented on the works in person, instructions should be given to Mr. Ben F. Wells who for the purposes of Paragraph 8 of the General Conditions of the Specifications, was the designated agent of the Contractor.

Kindly be advised that Mr. Ben F. Wells is no longer in the employ of the Contractor and that Mr. O. C. Steves is hereby named as the designated agent of the Contractor on occasions when the Contractor is not represented on the works in person. This designation of Mr. O. C. Steves is strictly limited to the purposes of Paragraph 8 of the General Conditions of the Specifications.

Very truly yours,

H. W. ROHL & T. E. CONNOLLY

BY H. W. ROHL (Signature)

San Diego, California

February 20, 1933

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

Dear Sir:

Presumably pursuant to your recent demand upon the contractors, Rohl and Connolly, there has been filed with the City Clerk a certificate of the Associated Indemnity Corporation, covering the workmen's compensation insurance.

There is inclosed herewith a copy of the certificate for your files.

Yours very truly,

H. B. Daniel

H. B. Daniel  
Deputy City Attorney

No. 3411

ASSOCIATED INDEMNITY CORPORATION

Head Office - San Francisco

- - - - -

CERTIFICATE OF INSURANCE

To City of San Diego,  
Attention: City Clerk,  
Address San Diego, California.

This is to certify that the ASSOCIATED INDEMNITY CORPORATION  
has issued the following described policies of insurance:  
Name of Insured W. H. Rohl and T. E. Connolly and/or H.W. Rohl  
and/or T. E. Connolly and/or Rohl-Connolly

Workmen's Compensation and Employers' Liability

Policy No. EP-12267 Effective October 1, 1932 Expiring Oct. 1, 1933

Public Liability--Limits, One Person \$- - - - - One Accident \$- - - -

Policy No. - - - - - Effective - - - - - Expiring - - - - -

General description of work or operations covered, subject to policy conditions:

Dam Construction, Commissary Work and incidental operations including Drivers, Chauffeurs and their Helpers, Salesmen and Clerical Office Employees.

The ASSOCIATED INDEMNITY CORPORATION has made special provision for prompt notice to you in the event of cancellation of the above described policies prior to their normal expiration, but undertakes no responsibility for any failure to do so.

Date February 14, 1933

ASSOCIATED INDEMNITY CORPORATION

By A. ? L. Inglis

Underwriter

CITY ATTORNEY

CITY OF SAN DIEGO

March 15, 1933.

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

Subject: El Capitan Dam contract employment  
Citizens

Dear Sir:

This is in response to your communication of March 8th, 1933 with which is transmitted copy of your letter to the contractor of February 8th, 1933, and his reply thereto of February 13th, regarding the matter of of subcontracts. It is noted that the contractor definitely represents that there are no sub-contractors on the project.

The information furnished in your communication is scarcely sufficient for me to determine what the legal effect of the situation may be. You advise

- (1) That the contractor is employing automobile trucks from out of the City of San Diego;
- (2) That in one or two cases two brothers are understood to own a single truck and together to drive the truck during two eight-hour shifts;
- (3) In other cases the truck owner is said to drive one shift and employ either a citizen of San Diego or from outside to drive the truck the other shift.
- (4) In other cases an owner of more than one truck is reported to be employing a complement of drivers, some of whom may not be citizens of San Diego.

You then request a legal interpretation of the City's obligations under the citizenship employment clause of the contract.

The contract provides in this respect as follows:

"It is further required, and the contractor hereby expressly agrees, that no labor other than citizens of the City of San Diego shall be employed on all construction work contemplated by this contract."

A reasonable and fair construction of this clause would be that it applies to truck drivers carried on the payrolls of the contractor as such. In other words if the relation of employer and employee or master and servant exists between the contractor and the truck drivers, then the above clause of the contract

would be clearly applicable. However, I am not informed in this regard. If one indulges the inference that the contractor is not carrying the drivers of these trucks on his payrolls as employees,, but is paying a certain price per load for material delivered to the dam embankment, another and somewhat difficult question is presented. The contractor might plausibly and perhaps legitimately claim that he is merely buying dirt delivered at the dam, or buying specific transportation, and is not the employer of the truck drivers in question - hence that he is under no obligation to require the owners and/or drivers of the trucks to be citizens of San Diego.

Assuming, also, that the statement of the contractor to the effect that there are no sub-contractors on the project is true - at least within the meaning of subsection 36, as set forth in your letter of February 8th - the status of the independently owned and driven trucks is not clear. It may well be that the contractor has not let any sub-contract to these truckmen for the hauling of definite quantities of material; and also that they are not his employees in the strict legal sense of the term; but that these independent truckmen are permitted to haul material for the contractor under an agreement to pay a definite price per load, the arrangement to be subject to termination at any time by either party.

If the foregoing case should be correct, I would be inclined to the opinion that the citizenship requirement in the contract does not apply. However, in the absence of more definite and complete information, as above stated, I am unable to reach a positive conclusion.

As to the City's obligation under the citizenship employment clause, it is my view that the burden of proving that the contractor is employing persons other than citizens of San Diego rests upon the City. No specific penalty is provided in the contract, nor is any deduction from payments due the contractor authorized in this respect. Failure to comply with the citizenship provision would constitute a breach of the contract in the same way as failure to comply with other general conditions.

Attention is invited to Specification 25, which reads as follows:

"25. CHARACTER OF WORKMEN. The contractor shall not allow his agents or employees, his subcontractors, or any agent or employee thereof to trespass on premises or lands in the vicinity of the work. None but skilled foreman and workmen shall be employed on work requiring special qualifications, and when required by the engineer, the contractor shall discharge any person who commits trespass or is in the opinion of the engineer disorderly, dangerous, insubordinate, incompetent, or otherwise objectionable. Such discharge shall not be the basis of any claim for compensation or damages against the City of San Diego or any of its officers."

Whether or not under this specifications the Engineer would have the right to and should order the discharge of any non-



citizen is not entirely clear, since the phrase "or otherwise objectionable" in the specification would seem more or less to be limited by the context of the sentence to employees who are objectionable for reasons similar to the ones specifically mentioned, to-wit, disorderly, dangerous, insubordinate, incompetent. However, I am inclined to advise that in any case where you have definite proof that a specific employee (not exempted as a keyman, etc.) is not a citizen of San Diego, you should require the contractor to discharge such employee upon that ground.

Yours very truly,

H. B. Daniel  
Deputy City Attorney.

HBD/S

San Diego, California

March 15, 1933.

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

Subject: El Capitan Dam Contract Employment -  
Citizens

Dear Sir:

This is in response to your communication of March 8th, 1933, with which is transmitted copy of your letter to the contractor of February 8th, 1933, and his reply thereto of February 13th, regarding the matter of sub-contracts. It is noted that the contractor definitely represents that there are no sub-contractors on the project.

The information furnished in your communication is scarcely sufficient for me to determine what the legal effect of the situation may be. You advise

- (1) That the contractor is employing automobile trucks from out of the City of San Diego;
- (2) That in one or two cases two brothers are understood to own a single truck and together to drive the truck during two eight-hour shifts;
- (3) In other cases the truck owner is said to drive one shift and employ either a citizen of San Diego or from outside to drive the truck the other shift.

(4) In other cases an owner of more than one truck is reported to be employing a complement of drivers, some of whom may not be citizens of San Diego.

You then request a legal interpretation of the City's obligations under the citizenship employment clause of the contract.

The contract provides in this respect as follows:

"It is further required, and the contractor hereby expressly agrees, that no labor other than citizens of the City of San Diego shall be employed on all construction work contemplated by this contract."

A reasonable and fair construction of this clause would be that it applies to truck drivers carried on the payrolls of the contractor as such. In other words if the relation of employer and employee or master and servant exists between the contractor and the truck drivers, then the above clause of the contract would be clearly applicable. However, I am not informed in this regard. If one indulges the inference that the contractor is not carrying the drivers of these trucks on his payrolls as employees, but is paying a certain price per load for material delivered to the dam embankment, another and somewhat difficult question is presented. The contractor might plausibly and perhaps legitimately claim that he is merely buying dirt delivered at the dam, or buying specific transportation, and is not the employer of the truck drivers in question - hence that he is under no

obligation to require the owners and/or drivers of the trucks to be citizens of San Diego.

Assuming, also, that the statement of the contractor to the effect that there are no sub-contractors on the project is true - at least within the meaning of subsection 36, as set forth in your letter of February 8th - the status of the independently owned and driven trucks is not clear. It may well be that the contractor has not let any sub-contract to these truckmen for the hauling of definite quantities of material; and also that they are not his employees in the strict legal sense of the term; but that these independent truckmen are permitted to haul material for the contractor under an agreement to pay a definite price per load, the arrangement to be subject to termination at any time by either party.

If the foregoing case should be correct, I would be inclined to the opinion that the citizenship requirement in the contract does not apply. However, in the absence of more definite and complete information, as above stated, I am unable to reach a positive conclusion.

As to the City's obligation under the citizenship employment clause, it is my view that the burden of proving that the contractor is employing persons other than citizens of San Diego rests upon the City. No specific penalty is provided in the contract, nor is any deduction from payments due the contractor authorized in

this respect. Failure to comply with the citizenship provision would constitute a breach of the contract in the same way as failure to comply with other general conditions.

Attention is invited to Specification 25, which reads as follows:

"25. CHARACTER OF WORKMEN. The contractor shall not allow his agents or employees, his subcontractors, or any agent or employee thereof to trespass on premises or lands in the vicinity of the work. None but skilled foreman and workmen shall be employed on work requiring special qualifications, and when required by the engineer, the contractor shall discharge any person who commits trespass or is in the opinion of the engineer disorderly, dangerous, insubordinate, incompetent, or otherwise objectionable. Such discharge shall not be the basis of any claim for compensation or damages against the City of San Diego or any of its officers."

Whether or not under this specification the Engineer would have the right to and should order the discharge of any non-citizen is not entirely clear, since the phrase "or otherwise objectionable" in the specification would seem more or less to be limited by the context of the sentence to employees who are objectionable for reasons similar to the ones specifically mentioned, to-wit, disorderly, dangerous, insubordinate, incompetent. However, I am inclined to advise that in any case where you have definite proof that a specific employee (not exempted as a keyman, etc.) is not a citizen of San Diego, you should require the contractor to discharge such employee upon that ground.

Yours very truly,

H. B. Daniel

Deputy City Attorney.

HBD/S

San Diego, Calif.,  
April 13, 1932.

Mr. H. N. Savage,  
Chief Hydraulic Engineer,  
Division of Water Development,  
City of San Diego, California.

Dear Sir:

Pursuant to your request for statement relative to  
personnel to be utilized in the construction of the  
El Capitan Dam:

We have engaged as our engineer on the job Mr. D. W.  
Albert, an engineer of ourstanding experience in hydraulic  
fill dam construction, and as a general superintendent  
Mr. Ben F. Wells. There is now on file in your office  
a complete statement of Mr. Albert's experience. Mr.  
Ben F. Wells has been general superintendent for H. W.  
Rohl for many years past.

Very truly yours,

T. E. CONNOLLY (Signature)

H. W. ROHL (Signature)

5/3/33  
copy/f

1137

H. W. ROHL & T. E. CONNOLLY  
CONTRACTORS

San Diego, Calif.,  
November 14, 1932.

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

Re: El Capitan Reservoir Dam, Spillway  
and Outlet Works

Dear Sir:

In accordance with the provisions of Paragraph 8 of the General Conditions of the Specifications for the above works, the Contractor hereby requests that all instructions given by the Engineer to the Contractor be given in writing to the Contractor personally.

On occasions when the Contractor is not represented on the works in person such instructions shall be given to Mr. Ben F. Wells who for the purposes of Paragraph 8 of the General Conditions of the Specifications is the designated Agent of the Contractor.

Will you kindly advise the Contractor of the names of those persons who are authorized to represent you on the works and the scope of their authority.

Very truly yours,

H. W. ROHL AND T. E. CONNOLLY

By T. E. CONNOLLY (Signature)

STATE OF CALIFORNIA  
Department of Industrial Relations  
DIVISION OF LABOR STATISTICS AND LAW  
ENFORCEMENT

State Building, San Francisco

T.A. Reardon, State Labor Commissioner

Case No.  
SD 25002-Group  
SF 3106

From Branch Office at  
604 California Theatre Building  
San Diego

February 10, 1934

Hon. City Council  
City of San Diego  
City Hall  
San Diego, California

In re: Complaints against H.W. Rohl and T.E. Connolly,  
El Capitan Dam Contract

Gentlemen:

I am enclosing, herewith, copies of seventeen complaints filed with the State Labor Commissioner by employees of H. W. Rohl and T. E. Connolly, contractors on the El Capitan Reservoir Dam, Spillway and Outlet Works, and against the Rohl-Connolly Company, a corporation, subcontractor.

Following the filing of these complaints charging violations of the provisions of the city charter of the City of San Diego and the State Eight Hour Law on Public Works, the Prevailing Wage Law, and other statutes, all of which are set forth and referred to in the contract, this Division attempted to make investigation of the charges contained in the affidavits and complaints. We were unable to complete these investigations due to the refusal of Mr. T. E. Connolly, representing the contractors, to produce the payroll records. Mr. Connolly testified under oath before the undersigned that "All of the payroll records in question were burned up in a fire."

As, under the provisions of the City Charter, it is the duty of the awarding body to make a complete investigation of all charges and complaints alleging violations of the contract, and to impose the penalties provided for in the contract for any violation of the provisions thereof, we have closed our file on this case and are referring the entire matter to Your Honorable Body for such investigation and action as you see fit to make.

It would appear from an analysis of the complaints made by these employees, whose statements and affidavits are attached hereto, that approximately the sum of \$22,160.00 would be forfeited to the City of San Diego if, in the opinion of Your Honorable Body, the charges made by these employees are true. In such cases it would be the duty of the City Council, as the awarding body, to withhold and deduct the



sum of \$22,160.00 from the moneys due or to become due the contractors, H. W. Rohl and T. E. Connolly, in connection with said contract; or such other amounts as the City Council may find to have been forfeited pursuant to the provisions of the city charter, the state laws, and the contract in question.

In connection with any investigations which you may desire to make, it is respectfully suggested that the testimony of the former city manager, A. V. Gosdell, the hydraulic engineer's staff, the official city labor inspectors, the State Industrial Accident Commission representatives who visited the dam, and the district attorney's office be taken. The complaining workers have all expressed their willingness to appear and testify.

As this investigation is in the nature of a civil proceeding, the contractors should be required to produce their records as they would be required to do in court, but which they have refused to do on demand of this office. It is the opinion of the undersigned that the records have not been destroyed as stated by contractor T. E. Connolly. It is further our opinion that there have been widespread violations of all of the labor provisions of the contract during the entire period of construction of the dam, not only by the contractors themselves but by the subcontractors, for which violations the contractors are also responsible. Not only has there been a careless disregard of the lives and safety of the workers at the dam but also, according to the complainants, a refusal to comply with the prevailing wage rates set forth in the contract. This according to the employees themselves, was accomplished by reporting mechanics on the payrolls as laborers and paying them laborers' wages.

In order to do justice to both the contractors, the workers and the taxpayers of the City of San Diego to whom these forfeitures, if any, belong, it will apparently be necessary for the City Council to subpoena each and every worker employed by the contractors and subcontractors and ascertain exactly what work he performed in order to ascertain the number of violations of the prevailing wage scale. Due to lack of help in this office it has been physically impossible for the undersigned to undertake such a thorough investigation.

It is suggested that, pending the completion of such investigation, in order to protect the City of San Diego, the Auditor be instructed to withhold sufficient moneys to settle the penalties apparently forfeited on the basis of the attached complaints, although these represent only a small fraction of the total violations which these complainants are of the opinion occurred.

Trusting that this matter will receive the earnest consideration of the Council, I am,

Yours respectfully,

FRANK C. MacDONALD  
STATE LABOR COMMISSIONER

SMG:D  
Enclosures  
CC to San Francisco

By Stanley H. Gue (Signature)  
Stanley H. Gue, Deputy

Mr. C. L. Byers, City Attorney - City Auditor and Comptroller

October 22, 1934

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

Subject: San Diego River Project, El Capitan  
Feature, City Labor Inspector's  
Report.

Gentlemen:

Enclosed is City Labor Inspector's report on  
Contractor H. W. Rohl and T. E. Connolly's employes at  
El Capitan Reservoir Dam dated October 20, 1934.

Very respectfully,

Fred D. Pyle  
Hydraulic Engineer

FDP/f  
encl.

cc City Manager

October 20, 1934

From : Labor Inspector  
To : Hydraulic Engineer  
Subject : Labor Report on El Capitan Reservoir Dam

Contractor H. W. Rohl and T. E. Connolly on El Capitan Reservoir Dam are working a crew of one hundred and seventy-five (175) men at present.

Fifteen are key men, twenty-seven are former residents of San Diego now residing in the vicinity of the work and one hundred and thirty three are residents of San Diego.

T. L. Knott

TLK/m

BOND TO RELEASE MONEY WITHHELD ON CLAIM  
(Section 1184d Code of Civil Procedure)

KNOW ALL MEN BY THESE PRESENTS:

That H. W. ROHL and T. E. CONNOLLY, as principal, and

GLENS FALLS INDEMNITY COMPANY,

a corporation, created, organized and existing under and by virtue of the laws of the State of New York, and authorized to transact a surety business in the State of California, as surety, hereby acknowledge themselves bound in the full sum of FOUR THOUSAND and NO/100 DOLLARS (\$4000.00) lawful money of the United States of America, unto the City of San Diego, a municipal corporation, unto the Mayor and members of the Common Council of said City, and unto the Auditor and Comptroller of said City, each and all, both in his and their official and individual capacities, and to the claimants hereinafter named, all herein designated as the obligees of this bond, for the payment of which sum, well and truly to be made, we hereby bind ourselves, our heirs, executors, administrators and assigns, jointly and severally, firmly by these presents.

Dated this 11th day of January, 1935.

The condition of this obligation is such that;

WHEREAS, said H. W. ROHL and T. E. CONNOLLY heretofore entered into a contract with the City of San Diego for the construction of the El Capitan Reservoir Dam, Spillway and Outlet Works in the County of San Diego, State of California, said contract being Document No. 275788, in the office of the City Clerk of said City, and

WHEREAS, Frank Arnett, Jack Bolger, Warran Galyean, H. R. Griffin (claim assigned to Labor Commissioner of the State of California), Fred Hackney, Nelson B. Hazeltine, Jack E. Hamilton James Hansen, L. B. Hayward, Charles S. Heintzen, Louis Herman, Clarence D. Law, Roland Law, G. F. MacKenzie, Claude L. Morris, R. J. Murray, Charles Olak, Floyd Wroten, and S. W. Lawrence, have heretofore filed or caused to be filed claims with said City of San Diego for labor claimed to have been performed in connection with said contract, and

WHEREAS, the above named principal disputes the correctness and validity of each and every of said claims so filed, and has requested said City of San Diego to permit said contractor to whom said contract was awarded to deliver to said City of San Diego a bond, executed by a corporation authorized to issue surety bonds in the State of California, in a penal sum equal to one and one quarter times the amount of said claims, and upon the delivery of said bond to said City of San Diego that the moneys withheld on account of said claims may be released to said contractor, and said City of San Diego has consented to permit said contractor to file said bond, and thereupon to release the moneys so withheld on account of said claims,

NOW, THEREFORE, if the above named principal shall fully protect and defend the obligees herein, and each of them, against any loss by reason of or arising out of the acceptance of this bond, or the release of said moneys, or the payment thereof to said contractor, and shall pay any sum which said claimants may recover on said claims, together with the costs of suit in said actions, not exceeding the penal sum of this bond, then this obligation shall be void; otherwise it shall be and remain in full force and effect.

This bond is given and accepted under and in accordance with the provisions of Section 1184d of the Code of Civil procedure of the State of California and under and in accordance with the provisions of Section 2 of an act entitled "An act to secure the payment of claims of persons employed by contractors upon public works, and the claims of persons who furnish materials, supplies, teams, implements or machinery used or consumed by such contractors in the performance of such works, and prescribing the duties of certain officers with respect thereto," approved May 10, 1919, as amended.

IN WITNESS WHEREOF, We have hereunto set our hands and seals the day and year hereinbefore written.

H. W. ROHL

T. E. CONNOLLY

Principal

GLENS FALLS INDEMNITY COMPANY

HARRY LEONARD

Attorney

(SEAL)

Surety

STATE OF CALIFORNIA }  
County of Los Angeles } ss.

On this 11th day of January, in the year One Thousand Nine Hundred and thirty five, before, DOROTHY E. RUTHERFORD, a Notary Public in and for the said County of Los Angeles, residing therein, duly commissioned and sworn, personally appeared HARRY LEONARD, known to me to be the ATTORNEY of the GLENS FALLS INDEMNITY COMPANY, the Corporation that executed the within instrument, and known to me to be the person who executed the said instrument on behalf of the Corporation therein named and acknowledged to me that such Corporation executed the same.

IN WITNESS WHEREOF I have hereunto set my hand and affixed my official seal in the County of Los Angeles, the day and year in this certificate first above written.

(SEAL)

DOROTHY E. RUTHERFORD  
Notary Public in and for the  
County of Los Angeles,  
State of California.

My commission expires May 15, 1937

I hereby approve the form of the within bond - Jan 12, 1935.

GILMORE TILLMAN  
Asst City Atty

T. B. COSGROVE  
Special Counsel

Approved by a majority of the members of the Council of the City of San Diego, California, this 15th day of January, 1935.

RUTHERFORD B. IRONES

A. W. BENNETT

WILL H. CAMERON

A. S. DAVIS

HARRY WARBURTON

DAN ROSSI

R. I. SCOLLIN  
Members of the Council

ATTEST:

ALLEN H. WRIGHT  
City Clerk

By FRED W. SICK  
Deputy

(SEAL)

I HEREBY CERTIFY that the above and foregoing is a full, true and correct copy of Document No. 290982, filed January 14, 1935 in the office of the City Clerk of the City of San Diego, being Bond of Rohl and Connolly to release money withheld on claim.

ALLEN H. WRIGHT, City Clerk of  
City of San Diego, California

By CLERK M. FOOTE, JR. Deputy

(SEAL)

4/20/33  
copy /f

1145

H. W. ROHL & T. E. CONNOLLY  
CONTRACTORS  
4351 ALHAMBRA AVE., LOS ANGELES

February 13, 1933

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

Subject: San Diego River Project, El  
Capitan Feature.  
Subcontractors.

Dear Sir:

Replying to your letter of February 8th, 1933, we wish  
to advise you that there are no subcontractors on this project.

Very truly yours,

H.W.Rohl & T.E.Connolly

H. W. ROHL (Signature)

PROGRESS ESTIMATES AND PAYMENTS



AUTHORITY FOR ATTORNEY IN FACT  
TO VERIFY AND SIGN ALL MONTHLY ESTIMATES

Date 6/4/1932

We, the undersigned, Contractor for the City of San Diego Bureau of Water Development, on construction work, under Contract No. 274788, do hereby authorize BEN F WELLS GENERAL SUPERINTENDENT to act as our Attorney-in-Fact, to verify and sign all monthly estimates of work accomplished and demands for payment for work accomplished on such contract, the authorization to be effective, retroactive from the date April, 11, 1932 such contract work was started. This authorization effective until City is otherwise notified by Contractor.

H.W. ROHL and T.E. CONNOLLY  
Contractor

By T. E. CONNOLLY

(Seal)

Approved

H. N. SAVAGE  
H. N. Savage

Signature Ben F. Wells.

BEN F. WELLS (Signature)

March 4, 1933

From : Hydraulic Engineer  
To : Resident Engineer  
Subject: San Diego River Project, El Capitan Feature  
Monthly estimate, measurement of hydraulic fill

In preparing monthly estimates for El Capitan Dam contract work no hydraulic fill material shall be included under Schedule Item 5 which has not been sorted and placed by hydraulic means in the hydraulic fill portion of the dam.

H. N. Savage

HNS/p

CITY OF SAN DIEGO

Water Department

Division of Development and Conservation

El Capitan Reservoir Dam, Spillway and Outlet Works

The City of San Diego, California

To H. W. Rohl and T. E. Connolly  
4351 Alhambra Avenue, Los Angeles, California

Contract Document No. 274788 dated April 23, 1932 for construction  
of El Capitan Reservoir Dam, Spillway and Outlet Works

Estimate for December 1934

Estimate No. 32 F I N A L

For work, material or services  
as stated in detail following:

Ordinance	13514	Section	1	0
"	"	"	2	6,168.22
"	"	"	3	0
"	41			0
"	54			0
"	65			0
"	107			0
"	134			0
"	135			0

Balance due this claim

\$6,168.22

I certify that the above bill is correct and just and that payment  
therefor has not been received.

By \_\_\_\_\_ Title \_\_\_\_\_

Field computations by G. W. Converse

Checked by P. Beermann

Field checked by J. W. Williams

I certify that the materials have been received by me in good con-  
dition and in the quantity and quality specified, or the work per-  
formed as stated and that the stipulations of the contract and the  
specifications have been complied with and that there is now due  
upon this claim the amount stated, no part of which has been paid.

Fred D. Pyle, Hydraulic Engineer.

Item No.	Work or Material	Amount
1.	Excavation Class 1 solid rock originating in Structure excavation including placing and sorting in dam. 57,024 cubic yards at \$1.00 per cubic yard	40,000 \$ 57,024.00
2.	Embankment Class 1 rock originating in borrow pit only, including placing and sorting in dam, measured in embankment. 862,598 cubic yards at \$1.00 per cubic yard	500,000 862,598.00
3.	Excavation Class 2, earth, overburden, sand, gravel and other excavation originating in structure excavation, including placing and sorting in hydraulic fill. 224,743 cubic yards at \$0.40 per cubic yard	350,000 89,897.20
4.	Excavation Class 2, earth, overburden, sand, gravel and other excavation originating in structure excavation, including placing and compacting in rolled embankment. 24,374 cubic yards at \$0.35 per cubic yard	8,530.90
5.	Embankment Class 2, clay, earth, sand, gravel and other embankment originating in borrow pit only, including sorting and placing in hydraulic fill, measured in embankment. 1,350,528 cubic yards at \$0.40 per cubic yard	540,211.20
6.	Embankment Class 2, clay, earth, sand, gravel and other embankment originating in borrow pit only, including placing and compacting in rolled embankment, measured in embankment. 138,158 cubic yards at \$0.35 per cubic yard	48,355.30
7.	Excavation Class 3, cutoff trench excavation under dam including placing and sorting in dam. 6,648 cubic yards at \$3.00 per cubic yard	19,944.00
8.	Excavation Class 4 cutoff trench excavation under spillway including placing and sorting in dam. 1,362 cubic yards at \$2.00 per cubic yard	2,724.00
9.	Excavation Class 5 outlet tunnel excavation excepting open cut excavation and including placing and sorting in dam. 14,245 cubic yards at \$5.00 per cubic yard	71,225.00
10.	Excavation Class 1 solid rock originating in structure excavation and wasted. 94,695 cubic yards at \$1.00 per cubic yard	94,695.00
11.	Excavation Class 2, earth, overburden, sand, gravel and other excavation originating in structure excavation and wasted. 517,278 cubic yards at \$0.25 per cubic yard	129,319.50

Item No.	Work or Material	Amount
12.	Excavation Class 3 cutoff trench excavation under dam and wasted. 11,400 cubic yards at \$3.00 per cubic yard	34,200.00
13.	Excavation Class 4 cutoff trench excavation under spillway and wasted. None	0
14.	Excavation Class 5 outlet tunnel excavation excepting open cut excavation but wasted. 21,769 cubic yards at \$5.00 per cubic yard	108,845.00
15.	Rock masonry in place between tunnel plugs - None	0
16.	Backfill 8,212 cubic yards at \$0.50 per cubic yard	4,106.00
17.	Mass concrete Class 1 in overflow spillway outlet tower base and elsewhere 13,618.7 cubic yards at \$4.80 per cubic yard	62,489.76
18.	Concrete Class 2 in spillway, side lining and retaining walls. 2,633.6 cubic yards at \$9.00 per cubic yard	23,702.40
19.	Concrete Class 3 in floor lining of spillway 4,861.4 cubic yards at \$4.80 per cubic yard	23,334.72
20.	Concrete Class 4 in unformed portion of main core wall 6,774.6 cubic yards at \$4.80 per cubic yard	32,518.08
21.	Concrete Class 5 in formed portion of main core wall 1,801.4 cubic yards at \$4.80 per cubic yard	8,646.72
22.	Concrete Class 6 in cutoff walls under spillway 1,362 cubic yards at \$4.80 per cubic yard	6,537.60
23.	Concrete Class 7 in outlet tower. 1,049.3 cubic yards at \$15.00 per cubic yard	15,739.50
24.	Concrete Class 8 in retaining walls at upstream and downstream toes of dam 13,528.6 cubic yards at \$4.80 per cubic yard	64,937.28
25.	Concrete Class 9 in drains at toe of dam 705.5 cubic yards at \$12.00 per cubic yard	8,466.00
26.	Concrete Class 10 in tunnel lining and cut and cover section excepting tunnel floor. 5,534.1 cubic yards at \$12.00 per cubic yard	66,409.20
27.	Concrete Class 11 in floor of tunnel excepting floor of outlet and inlet. 1,052.7 cubic yards at \$4.80 per cubic yard	5,052.96
28.	Concrete Class 12 in floor of tunnel approach and outlet. 147.2 cubic yards at \$4.80 per cubic yard	706.56

Item No.	Work or Material	Amount
29.	Concrete Class 13 in retaining and guide and cutoff walls of tunnel approach and outlet 1,454.1 cubic yards at \$12.00 per cubic yard	17,449.20
30.	Concrete Class 14 in tunnel plugs 391.7 cubic yards at \$4.80 per cubic yard	1,880.16
31.	Concrete Class 15 in place in pipe embedment in tunnel 51.9 cubic yards at \$4.80 per cubic yard	249.12
32.	Cement mortar used in laying up rock including shaping of rock and laying None	0
33.	Cement in place in the work 73,749.5 barrels at \$1.90 per barrel	140,124.05
34.	Reinforcing steel in place in the work 1,713,077 pounds at \$0.03 per pound	51,392.31
35.	Structural steel in place in the work 118,192 pounds at \$0.04 per pound	4,727.68
36.	4" drain tile in place in the work 6,849 linear feet at \$0.40 per linear foot	2,739.60
37.	6" drain tile in place in the work 1,212 linear feet at \$0.50 per linear foot	606.00
38.	8" drain tile in place in the work None	0
39.	12" drain tile in place in the work None	0
40.	2" steel grout and drain pipe in place in the work 8,578 linear feet at \$0.25 per linear foot	2,144.50
41.	4" steel grout pipe and connections in place in rock between tunnel plugs. None	0
42.	Pressure grouting rock masonry in tunnel between plugs None	0
43.	Holes drilled in rock or concrete with concussion drill 12,328 linear feet at \$1.00 per linear foot	12,328.00

## Estimate No. 32 FINAL

Item No.	Work or Material	Amount
44.	Holes drilled in rock or concrete with core recovery drill None	0
45.	Grouting by air pressure, except in Masonry of tunnel plug 24,512 cubic feet at \$1.00 per cubic feet	24,512.00
46.	Copper water stop complete in place 17,393 pounds at \$0.30 per pound	5,217.90
47.	2" inside diameter pipe railing complete in place 166 linear feet at \$0.30 per linear feet	49.80
48.	Cast iron pipe and special castings complete in place 229,261 pounds at \$0.04 per pound	9,170.44
49.	Placing castings and metal work not furnished by contractor, in place in concrete. 76,432 pounds at \$0.05 per pound	<u>3,821.60</u>
		2,666,628.24
Change Order No. 1		
	Increased cost to Contractor resulting from change in location of outlet tower Materials as per attached detail	\$1,400.04
	Labor	<u>250.00</u>
		1,650.04
Change Order No. 2		
	Increased cost to contractor resulting from change in method of construction after August 13, 1934, Council Resolution No. 62005	
	27,823 cubic yards Lakeside material at \$0.35 per cubic yard	9,738.05
Change Order No. 3		
	Increased cost to contractor resulting from modification of top portion of dam	
	14,500 cubic yards rock at \$0.25 per cubic yard	<u>3,625.00</u>
	Total schedule items	\$2,681,641.33

Item No.	Work or Material	Amount
<b>Extra Work Orders</b>		
1.	Chocolate Creek Road, Resolution 58305 Ordinance 13514 Section 3	5,718.30
2.	Joint widening of County Road vicinity El Capitan damsite-El Monte Park, total \$13,182.42; 1/2 to be paid by City of San Diego, Resolution 58204 Ordinance 13514 Section 3	6,591.21
3.	Loading and hauling equipment and materials for month of July 1932; Ordinance 13514 Section 3	56.13
4.	Moving building from vicinity Cape Horn to vicinity El Capitan Dam. Ordinance 41	34.41
5.	Hauling water for City's Engineer camp Ordinance 54 " 107 " 13514 Section 2	113.88 31.36 667.77
6.	Hauling wood for City's Engineer camp "	65 95.09 107 27.57
7.	Repair Chocolate Creek Road "	107 61.73 134 36.69
8.	Work order closed - no work	
9.	Backfill exploratory tunnel 7 "	135 141.66
10.	Backfill exploratory tunnel 8 "	135 342.14
11.	Work order closed - no work	
12.	Work order closed - no work	
13.	Drilling, shooting and removing boulders above and north of excavation slopes of spillway Resolution 60035 Ordinance 13514 Section 2	2,178.45
14.	Installing observation wells Resolution 60036 Ordinance 13514 Section 2	2,708.51
15.	Sprinkling rock embankment Ordinance 13514 Section 2	462.63
16.	Breaking spherical boulders in spillway excavation Month of August Ordinance 13514 Section 2	526.04
17.	Breaking spherical boulders in spillway excavation Month of September Ordinance 13514 Section 2	174.94
18.	Experimental anchors in spillway Ordinance 13514 Section 2	435.39



## Estimate No. 32 FINAL

Item No.	Work or Material	Amount
19.	Increase length of ladder guard legs Ordinance 13514 Section 2	31.30
20.	Breaking spherical boulders in spillway excavation Month of October, Ordinance 13514 Section 2	368.71
21.	Breaking spherical boulders in spillway excavation Month of November, Ordinance 13514 Section 2	28.76
22.	Install and remove wooden bulkhead in adit leading to outlet tower gate, Ordinance 13514 Section 2	28.29
23.	Work Order closed - no work	
24.	Cleaning and painting metal work Ordinance 13514 Section 2	166.05
25.	Construct concrete waterway, Resolution 61140 Ordinance 13514 Section 2	2,036.19
26.	Work order closed - no work	
27.	Breaking spherical boulders in spillway excavation since February 1, 1934, Ordinance 13514 Section 2	178.70
28.	Remove shop facilities, Ordinance 13514 Section 2	<u>150.67</u>
	Sub-total extra work orders	23,392.57
	Plus 15 per cent	<u>3,508.89</u>
	Total extra work orders	\$26,901.46

Ordinance 13514	<u>Section 1</u>	<u>Section 2</u>	<u>Section 3</u>
Gross earnings to date	893,873.43	1,799,431.66	14,220.49
Less retained 25 per cent	223,468.36	449,857.91	3,555.12
Net earnings to date	670,405.07	1,349,573.75	10,665.37
Less previous payments	670,405.07	1,343,405.53	10,665.37
Balance	0	6,168.22	0
Injunction restraining City from payment of hold back (see below)			3,538.98

Ordinance	<u>41</u>	<u>54</u>	<u>65</u>	<u>107</u>	<u>134</u>	<u>135</u>
Gross earnings to date	39.57	130.96	109.35	138.76	42.20	556.37
Less retained 25 per cent	9.89	32.74	27.34	34.69	10.55	139.09
Net earnings to date	29.68	98.22	82.01	104.07	31.65	417.28
Less previous payments	29.68	98.22	82.01	104.07	31.65	417.28

SUMMATION

Gross earnings to date		2,708,542.79
Deduct on account of injunction by Superior Court orders in cases No. 71108 and 71189, restraining City from further payments on El Capitan - El Monte Road Chocolate Creek Road	\$1,894.97 <u>1,644.01</u>	<i>= Hold back (25%)</i>
		<u>3,538.98</u>
		2,705,003.81
Less retained 25 per cent		677,135.70
Net earnings to date		2,027,868.11
Less previous payments		2,021,699.89
Balance due by this claim		6,168.22

Correct as to quantities delivered, prices, deductions and computations.

J. W. Williams

Checked by P. Beermann

BOND FOR CLAIMS TO RELEASE HOLD BACK PAYMENT

BOND

KNOW ALL MEN BY THESE PRESENTS:

That H. W. ROHL and T. E. CONNOLLY, as principal and

GLENS FALLS INDEMNITY COMPANY,

a corporation, created, organized and existing under and by virtue of the laws of the State of New York, and authorized to transact a surety business in the State of California, as surety, hereby acknowledge themselves bound in the full sum of

TWENTY FIVE THOUSAND - - - - - DOLLARS

(\$25,000.00) lawful money of the United States of America, unto the City of San Diego, a municipal corporation, County of San Diego, State of California, and unto the Mayor and the members of the Council of said City, and unto the Auditor and Comptroller of said City, and each and all, both in his and their official and individual capacities, all herein designated as the obligees of this bond, for the payment of which sum, well and truly to be made, we hereby bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

Dated this 12th day of January, 1935.

The condition of this obligation is such that:

WHEREAS, H. W. ROHL and T. E. CONNOLLY heretofore entered into a contract with the City of San Diego for the construction of El Capitan Reservoir Dam, Spillway and Outlet Works in the County of San Diego, being Document No. 275788 in the office of the City Clerk of said City, and

WHEREAS, said contract in Article VI thereof provides in part as follows:

"ARTICLE VI. The Contractor further agrees and covenants that neither the Contractor, nor any subcontractor, doing work or performing labor pursuant to the terms of this contract, who directs or controls the work of any laborer, workman or mechanic upon any of the work provided for in this contract to be done, shall require or permit any such laborer, workman or mechanic to labor more than eight (8) hours during any one calendar day, in violation of the provisions of Section 653c of the Penal Code of the State of California; and that the Contractor shall forfeit as a penalty to the City ten dollars (\$10.00) for each laborer, workman or mechanic employed by the Contractor or by any subcontractor upon any of the work by this contract provided to be done, for each calendar day during which such laborer, workman or mechanic is required or permitted to labor more than eight (8) hours in violation of the provisions of said Section of the Penal Code; and that the Contractor will not

knowingly employ or cause or allow to be employed upon any of the work provided in this contract to be done by any alien, contrary to the provisions of the Public Works Alien Employment Act of the State of California (Statutes 1931, Chapter 398); and that the Contractor shall forfeit as a penalty to the City ten dollars (\$10.00) for each alien knowingly employed upon any of the work provided in this contract to be done, by the Contractor or any subcontractor, contrary to the provisions of said statute, for each calendar day, or portion thereof, during which such alien is permitted or required to labor in violation thereof."

and

WHEREAS, said contract in Article VII thereof provides in part as follows:

"ARTICLE VII. The Contractor further agrees that in the performance of the work contemplated by this contract, he will conform to and abide by all the requirements and provisions of the Charter of The City of San Diego, and of the Public Works Wage Rate Act of the State of California (Statutes of 1931, Chapter 397); and that not less than the prevailing rate of per diem wages hereinafter specified shall be paid to all laborers, workmen and mechanics employed by the Contractor, or any subcontractor, in the performance of the work contemplated by this contract; and that the contractor shall forfeit as a penalty to the City ten dollars (\$10.00) for each laborer, workman or mechanic employed, for each calendar day, or portion thereof, such laborer, workman or mechanic is paid less than the following specified rate for any work done under this contract by the contractor, or by any subcontractor."

and

WHEREAS, the State Labor Commissioner of the State of California did, on or about the 19th day of February, 1934, file with said City of San Diego certain affidavits of the following persons, to-wit: Frant Arnett, Jack Bolger, Warran Calyeon, H. R. Griffin, Fred Hackney, Nelson B. Hazeltine, Jack E. Hamilton, James Hansen, L. B. Hayward, Charles S. Heintzen, Louis Herman, Clarence D. Law, Roland Law, G. F. MacKenzie, Claude L. Morris, R. J. Murray, Charles Olah, and Floyd Wroten, charging that said H. W. Rohl and T. E. Connolly in the performance of said contract had violated Article XII of the City Charter of the City of San Diego, the California State Eight Hour Law on Public Works, the Prevailing Wage Law, and Article VI and Article VII of said contract, for which alleged violations it is claimed by said State Labor Commissioner that penalties should be inflicted by said City and moneys withheld by said City in the sum of \$22,160.00 from the moneys due said contractors under said contract, and

WHEREAS, said contractors dispute the correctness and validity of each and every of said claims, and contend that they have not violated any of the provisions of said Article

XII of the City Charter of the City of San Diego, or of the Prevailing Wage Law, or of the Eight Hour Labor Law, or of Article VI of Article VII of said contract, and

WHEREAS, none of said claims have been adjudicated, either as to the amounts claimed, or as to the claimed violations of said labor laws, or said Article VI or Article VII of said contract, and the City of San Diego, not being informed as to the validity of said claims, has consented to permit said contractors to file this bond in lieu of withholding any moneys due said H. W. Rohl and T. E. Connolly under the terms of said Article VI and Article VII of said contract, and

WHEREAS, said contractors have delivered to said City a bond, under Section 1184d of the Code of Civil Procedure, for the purpose of releasing the moneys withheld by said City on account of the moneys claimed to be due the laborers as set forth in the affidavits of the above mentioned claimants filed by the State Labor Commissioner as aforesaid;

NOW, THEREFORE, if the above named principal shall pay to the City of San Diego the penalties provided for in said Article XII of the City Charter of the City of San Diego, said Eight Hour Law, said Prevailing Wage Law, and said Articles VI and VII of said contract, for each violation of said Article XII of said City Charter, said Eight Hour Law, said Prevailing Wage Law, and said Articles VI and VII of said contract, then this obligation shall be void; otherwise it shall be and remain in full force and effect.

IN WITNESS WHEREOF, we have hereunto set our hands and seals the day and year hereinabove written.

H. W. Rohl and T. E. Connolly

By T. E. Connolly, Attorney in Fact

Principal

GLENS FALLS INDEMNITY COMPANY,

By W. John Petronecelli

Surety

STATE OF CALIFORNIA        )  
COUNTY OF SAN DIEGO        ) SS.

In this 12th day of January, in the year One Thousand  
Nine Hundred and thirty five before me,

Edith B. Benjamin, a  
Notary Public in and for the said County of San Diego, resid-  
ing therein, duly commissioned and sworn, personally appeared

W. John Pedroncelli, known to me to be the ATTORNEY  
of the GLENS FALLS INDEMNITY COMPANY, the Corporation that  
executed the within instrument, and known to me to be the  
person who executed the said instrument on behalf of the  
Corporation therein named and acknowledged to me that such  
Corporation executed the same.

IN WITNESS WHEREOF I have hereunto set my hand and af-  
fixed my official seal in the County of San Diego the day  
and year in this certificate first above written.

Edith B. Benjamin

Notary Public in and for the  
County of San Diego,  
State of California.

My commission expires Nov.23,1937.

I hereby approve the form of the within Bond, this 12th day of January, 1935.

GILMORE TILLMAN  
Asst. City Attorney

T. E. COSGROVE  
Special Counsel

Approved by a majority of the members of the Council of the City of San Diego, California, this 15th day of January, 1935.

RUTHERFORD E. IRONES

A. W. BENNETT

WILL H. CAMERON

A. S. DAVIS

HARRY WARBURTON

DAN ROSSI

R. I. SCOLLIN  
Members of the Council

ATTEST:

ALLEN H. WRIGHT  
City Clerk

By FRED W. SICK  
Deputy

(SEAL)

I HEREBY CERTIFY that the above and foregoing is a full, true and correct copy of Document No. 290981, filed January 14, 1935 in the office of the City Clerk of the City of San Diego, being Bond of Rohl and Connolly re labor claims a/c El Capitan Dam construction.

ALLEN H. WRIGHT, City Clerk  
of City of San Diego, California,

By CLARK M. FOOTE, JR., Deputy

(SEAL)

December 10, 1934

M E M O R A N D U M

Subject: San Diego River Project, El Capitan Feature  
H. W. Rohl & T. E. Connolly contract  
Classification of spillway excavation

All excavation of the spillway at El Capitan reservoir dam having been completed and the work accepted it now appears that:

Because of the amount of Class 1 material in the spillway excavation which when loosened by blasting broke down in such a way that it could not be separated from the Class 2 material (and was accordingly placed in the spoil bank), it is deemed proper to consider that, in addition to the 45,551 cubic yards of Class 1 material removed from the spillway excavation and placed in the rock embankment, there was an additional amount of Class 1 material equal to 11% of the total yardage of the spillway excavation measured in excavation.

It is assumed that the swell on Class 1 material from spillway excavation placed in spoil bank is the same as for Class 2 material from spillway excavation placed in the spoil bank.

(Signed) Fred D. Pyle  
Hydraulic Engineer

FDP/f

Concurred in

(Signed) J. P. Buwalda

" D. W. Albert

" J. W. Williams

" "I concur" Louis C. Hill Dec 19 1934



RELEASE OF CLAIMS

WHEREAS, heretofore, on, to-wit, the 23rd day of April 1932, the undersigned entered into and executed a certain contract with The City of San Diego, California, a municipal corporation, whereby the undersigned, as Contractor, for the consideration therein set forth, agreed to build, erect and construct for the defendant a certain public work commonly known and referred to as the El Capitan Reservoir Dam, Spillway and Outlet Works; that a true copy of said contract is on file in the office of the City Clerk of said City of San Diego, marked Document No. 275788; and

WHEREAS, said work has been completed to the satisfaction of the Hydraulic Engineer in charge thereof on behalf of said City, and said work has been accepted on behalf of said City of San Diego, by its Council, such acceptance being evidenced by resolution of said Council, dated December 4, 1934, numbered 62379; and

WHEREAS, under the terms of said contract (Document No. 275788) and particularly under the provisions of Specification No. 50 thereof, it is provided as follows:

"50. PROGRESS ESTIMATES AND PAYMENTS.- At the end of each calendar month the engineer will make an estimate of the amount earned to that date, under the terms of the contract, for completed work, classified and computed on the basis of the items and unit prices named in the contract. To the estimate made as above set forth will be added the amounts earned for extra work to the date of the progress estimate. From the total thus computed a deduction of twenty-five per cent will be made, and from the remainder a further deduction will be made of all amounts due to the City of San Diego from the contractor for supplies or materials furnished or services rendered and any other amounts that may be due to the City of San Diego as damages for delays or otherwise under the terms of the contract. From the balance thus determined will be deducted the amount of all previous payments and the remainder will be paid to the contractor upon the approval of the accounts. The twenty-five per cent deducted as above set forth shall not become due and payable until the completion of the work to the satisfaction of the Engineer and its acceptance by the City of San Diego, and until release shall have been executed and filed as hereinafter provided, and until five days shall have elapsed after the expiration of the period within which liens may be filed under the provisions of Title 4, Part 3 of the Code of Civil Procedure of the State of California. In case of suspension of the contract, the said twenty-five per cent shall be and become the sole and absolute property of the City of San Diego to the extent necessary to repay to the City of San Diego any excess in the cost of the work above the contract price. When the terms of the contract shall have been fully complied with to the satisfaction of the engineer and when a release of all claims against The

City of San Diego, under or by virtue of the contract, shall have been executed by the contractor, and when five days shall have elapsed after the expiration of the period within which liens may be filed, as hereinabove provided, final payment will be made, at such time and in such manner as provided by law, of any balance due, including the percentage withheld as above stated, or such portion thereof as may be due the contractor."

and

WHEREAS, the contractor has assigned unto Security-First National Bank of Los Angeles, California, all moneys due, or to become due, said contractor under or by virtue of said contract; and

WHEREAS, said City of San Diego and its Hydraulic Engineer has prepared and filed, or is about to file, the final estimate as provided for in said Paragraph 50 of said contract, which said final estimate (inclusive of amounts heretofore deducted from prior estimates) is in the sum of \$683,303.92;

NOW, THEREFORE, in consideration of the payment to said contractor of said sum of \$683,303.92, and in consideration of the payment heretofore of various progress estimates heretofore approved and filed by the Hydraulic Engineer of said City under the terms of said contract, and in further consideration of the acceptance of said work and the payment therefor;

The undersigned, H. W. ROHL and T. E. CONNOLLY, Contractors under said contract (Document No. 275788, and their said assignee, Security-First National Bank of Los Angeles, hereby release said City of San Diego, and any and all officers, agents or employees of said City, from all claims or demands accrued and now existing, or hereafter arising under or by virtue of the terms, or any one or more thereof, either express or implied, of that certain contract dated April 23, 1932, between the City of San Diego, a municipal corporation, and H. W. Rohl and T. E. Connolly, for the construction erection, completion and installation of the El Capitan Reservoir Dam, Spillway and Outlet Works, a copy of which is on file in the office of the City Clerk of said City marked Document 275788.

Dated this 11th day of January 1935.

H. W. ROHL

H. W. Rohl

T. E. CONNOLLY

T. E. Connolly

SECURITY-FIRST NATIONAL BANK OF LOS ANGELES

By C. A. HUDE  
V.P.

By RANDALL BOYD  
Asst. Sec.

STATE OF CALIFORNIA }  
 COUNTY OF LOS ANGELES } ss.

On this 11th day of January A.D. Nineteen Hundred and Thirty-five, before me MARIAN A. MARTIN, a Notary Public in and for said County and State, residing therein, duly commissioned and sworn, personally appeared H. W. ROHL and T. E. CONNOLLY, known to me to be the persons described in and whose names are subscribed to the within instrument, and acknowledged to me that they executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my Official Seal in said county the day and year in this certificate above written.

MARIAN A. MARTIN  
 Notary Public in and for the County  
 of Los Angeles, State of California

My Commission expires June 12, 1936.

STATE OF CALIFORNIA }  
 COUNTY OF LOS ANGELES } ss

On this 11th day of January, A.D. Nineteen Hundred and Thirty-five, before me MARIAN A. MARTIN, a Notary Public in and for said County and State, residing therein, duly commissioned and sworn, personally appeared C. A. RUDE, known to me to be the Vice President and RANDAL BOYD, known to me to be the Assistant Secretary of the SECURITY-FIRST NATIONAL BANK OF LOS ANGELES the Corporation which executed the within and annexed instrument, and acknowledged to me that such Corporation executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal in said county the day and year in this certificate first above written.

MARIAN A. MARTIN  
 Notary Public in and for the County  
 of Los Angeles, State of California

My Commission expires June 12, 1916

(SEAL)

I hereby approve the form of the within Release of Claims this 12 day of January, 1935.

GILMORE TILLMAN  
 Assistant City Attorney

T. B. COSGROVE  
 Special Counsel

I HEREBY CERTIFY that the above and foregoing is a full, true and correct copy of Document No. 290980, filed January 14, 1935 in the office of the City Clerk of City of San Diego, being Release of Claims by Rohl and Connolly on account of El Capitan Dam Contract.

ALLEN H. WRIGHT, City Clerk of  
City of San Diego, California

By Clark M. Foote, Jr.  
Deputy

(SEAL)

EXTRA WORK ORDERS

April 21, 1932

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

Subject: San Diego River Project, El Capitan Feature  
Chocolate Creek Road.

Gentlemen:

Before practically any work can be advanced by the contractor on the City's El Capitan Reservoir Dam, Spillway and Outlet Works, provision must be made for carrying the highway traffic now passing the dam site to State Highway 80 by the construction of a new road along Chocolate Creek by the City of San Diego. The road will be about three miles long and may cost about \$10,000.00.

The grading of the road and the furnishing and placing of materials may be accomplished most economically as extra work under the contract of H. W. Rohl and T. E. Connolly.

Since the cost will exceed \$1,000.00, authorization and approval is required from your Honorable Body for the Hydraulic Engineer to issue required form of work order to the contractor.

Enclosed is form of resolution approving and authorizing the work for your appropriate action.

RECOMMENDATION: It is respectfully recommended that you approve the immediate construction of a road connecting County Road 389 with State Highway 80, in order to carry the traffic now travelling along the San Diego River and passing El Capitan damsite, and that you authorize the Hydraulic Engineer to issue work orders for necessary work and material.

Respectfully,

H. N. Savage,  
Hydraulic Engineer.

HNS/p  
Encl.  
Form of Resolution

April 26, 1932

Messrs. H. W. Rohl and T. E. Connolly  
4351 Alhambra Avenue  
Los Angeles, California.

Subject: San Diego River Project, El Capitan Feature  
Extra Work Order No. 1. Chocolate Creek Road.

Gentlemen:

In accordance with Resolution of the Common Council No. 58305 copy attached, and the provisions of Paragraph 14 of the drawings and specifications for El Capitan Reservoir Dam, Spillway and Outlet Works, authorization is hereby given to you for the following work and the furnishing of the necessary material to be accomplished as extra work within the meaning of the specifications:

Construct in accordance with the instructions of the Hydraulic Engineer a road from State Highway 80 in the southeast quarter of the northeast quarter Section 19, Township 15 south, Range 2 east, S.B.B. & M. to connect with County Road No. 389 near the northwest corner of the northeast quarter of the southeast quarter Section 8, Township 15 south, Range 2 east S.B.B. & M. including grading, culverts and bridges.

Immediately upon the completion of the work please furnish this office itemized statement of cost in accordance with Paragraph 14 of the specifications, which cost is not to include the 15 per cent which will be added by this office before payment is made.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer.

HNS/p  
Encl.

Resolution No. 58305

April 21, 1932

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

Subject: San Diego River Project, El Capitan Feature  
Extra Work Order No. 2. Widen County Road  
El Capitan Damsite-El Monte Park

Gentlemen:

The reach of the present County road No. 389 along the south side of the San Diego River from the vicinity El Capitan damsite to El Monte Park, is inadequate and dangerous for the traffic heretofore imposed upon it and will be prominently more so immediately the general public begin to travel over it to visit and inspect the installation of the El Capitan dam.

This reach of road is also prominently inadequate and equally dangerous for use by the contractors in transporting equipment and materials of construction to the El Capitan damsite.

The City's projected El Capitan pipe line will ultimately have to be located and installed along this same reach of County road. Material changes in the County's road right-of-way alignment and gradients will also have to be made before the City can install its pipe line.

Each of the visiting contractors has considered the reconstruction of an independent road along the north side of the San Diego River between the El Capitan damsite and Lakeside or crossing the river vicinity El Monte Park. Such a road would not only be prominently expensive to the contractor to rehabilitate and maintain but would be quite less satisfactory for their use than would be the present reach of County road along and south side of the San Diego River widened between El Capitan damsite and El Monte Grove.

By the joint expenditure of about \$20,000.00 by the City and the contractor, together with such additional funds as may be provided by the County, it will be possible to widen the present reach of County Road, which work will be a material and prominent advantage to the County of San Diego, to the contractor for his use during the construction of the El Capitan dam, reservoir, spillway and outlet works if the widening is accomplished; and of benefit to the City of San Diego both as a public road and advance its usefulness for a pipe line bench which the City will ultimately have to provide for the installation of its projected El Capitan-Lakeside pipe line, the reach of which between the El Capitan damsite, El Monte Grove and quite farther down toward



To the Honorable, the Mayor and  
Common Council

4/21/32

Lakeside will be to the joint advantage of the City of San Diego and the La Mesa, Lemon Grove and Spring Valley Irrigation District.

The contractor has indicated that he will join the City of San Diego, each to contribute one-half of a total of \$20,000.00 in addition to the amount to be provided by the County.

Since the cost to the City of its portion of the work will exceed \$1,000.00, authorization and approval is required from your Honorable Body for the Hydraulic Engineer to issue required form of work order to the contractor.

Enclosed is form of resolution deemed proper authorizing the betterment work on the about two mile reach of County Road.

RECOMMENDATION: It is respectfully recommended that you approved the work and authorize the Hydraulic Engineer to issue the necessary work order to the contractor for the El Capitan Dam Reservoir, Spillway and Outlet Works, as provided for in the Drawings and Specifications under Paragraph 42, Extra Work and Material for the accomplishment of the City's one-half of the County road widening.

Respectfully,

H. N. Savage,  
Hydraulic Engineer.

HNS/p  
Encl.  
Form of resolution

5/17/34  
copy /f

1172

San Diego, Calif.,  
April 13, 1932.

Mr. H. N. Savage,  
Chief Hydraulic Engineer,  
Division of Water Development,  
City of San Diego, California

Dear Sir:

If awarded the contract for the El Capitan Dam, we will participate under extra work order to the extent of fifty per cent (50%) of a total cost price not to exceed Twenty thousand Dollars (\$20,000.) for the reconstruction of approximately a mile and a half of road from Cape Horn to the dam site.

Yours truly,

T. E. CONNOLLY (Signature)

H. W. ROHL (Signature)

April 26, 1932

Messrs. H. W. Rohl and T. E. Connolly  
4351 Alhambra Avenue  
Los Angeles, California.

Subject: San Diego River Project, El Capitan Feature  
Extra Work Order No. 2. Widen County Road  
El Capitan Damsite-El Monte Park.

Gentlemen:

In accordance with resolution of the Common Council No. 58304 copy attached, and the provisions of Paragraph 14 of the drawings and specifications for El Capitan Reservoir Dam, Spillway and Outlet Works, authorization is hereby given to you for the following work and the furnishing of the necessary materials, to be accomplished as extra work within the meaning of the specifications:

Widen a reach of County Road, in accordance with the instructions of the Hydraulic Engineer, from the vicinity El Capitan Damsite to El Monte Park; including grading, culverts and bridges; one-half of the cost of such work to be born by the contractor and one-half by the City of San Diego. Total cost not to exceed \$20,000.00.

Immediately upon the completion of the work please furnish this office itemized statement of all costs in accordance with Paragraph 14 of the specifications which cost is not to include the 15 per cent which will be added by this office before payment is made.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer.

HNS/p  
Encl.

Resolution No. 58304

April 28, 1932

Messrs. H. W. Rohl and T. E. Connolly  
4351 Alhambra Avenue  
Los Angeles, California.

Subject: San Diego River Project, El Capitan Feature  
Widening County Road El Capitan Damsite-  
El Monte Park, Extra Work Order No. 2.

Gentlemen:

You were given Extra Work Order No. 2 for widening County Road El Capitan Damsite-El Monte Park on April 27, 1932. This work order states the work is to be done in accordance with instructions of the Hydraulic Engineer.

The cost to the City of San Diego must not exceed the \$10,000 fund provided by Resolution No. 58304 of the Common Council.

No specific width of road is required.

Proper signs warning the Public of the work should be erected and maintained.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer.

HNS/f

July 12, 1932

Messrs. H. W. Rohl and T. E. Connolly,  
4351 Alhambra Avenue  
Los Angeles, California.

Subject: San Diego River Project, El Capitan Feature  
Extra Work Order No. 3. Loading and Hauling  
Equipment and Materials for Month of July  
1932.

Gentlemen:

In accordance with Paragraph 14 of the drawings and specifications for El Capitan Reservoir Dam, Spillway and Outlet Works, authorization is hereby given to you for the following work to be accomplished as extra work within the meaning of the specifications:

Loading and hauling equipment and materials  
as directed by the Hydraulic Engineer for the  
month of July 1932.

Immediately upon the completion of the work, please furnish this office itemized statement of all costs in accordance with Paragraph 14 of the specifications which cost is not to include the 15 per cent which will be added by this office before payment is made.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer.

FDP/m

cc Ben Wells  
Harold Wood  
Fred D. Fyle  
F. M. Stanley

August 24, 1932

Messrs. H. W. Rohl and T. E. Connolly  
4351 Alhambra Avenue  
Los Angeles, California.

Subject: San Diego River Project, El Capitan Feature  
Extra Work Order No. 4, moving building from  
vicinity Cape Horn to vicinity El Capitan Dam.

Gentlemen:

In accordance with Paragraph 14 of the drawings and specifications for El Capitan Reservoir Dam, Spillway and Outlet Works, authorization is hereby given to you for the following work to be accomplished as extra work within the meaning of the specifications:

Move building from vicinity of Cape Horn to vicinity of El Capitan Dam and place on timber foundation, work to be performed as required by the Hydraulic Engineer.

Immediately upon the completion of the work, please furnish this office itemized statement of all costs in accordance with Paragraph 14 of the specifications which cost is not to include the 15 per cent which will be added by this office before payment is made.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer.

FDP/p  
cc Ben Wells, Superintendent  
Harold Wood, Resident Engineer  
Fred D. Pyle, Engineer  
F. M. Stanley, Accountant

October 17, 1932

Messrs. H. W. Rohl and  
T. E. Connolly  
4351 Alhambra Avenue  
Los Angeles, California.

Subject: San Diego River Project, El Capitan  
Feature, Extra Work Order No. 5.  
Hauling water for City's Engineering  
Camp.

Gentlemen:

In accordance with Paragraph 14 of the drawings and specifications for El Capitan reservoir dam, spillway and outlet works, authorization is hereby given to you for the following work to be accomplished as extra work within the meaning of the specifications:

Haul water from sources to be designated, and deliver it in City's water tank at the City's engineering camp, all as directed by the Hydraulic Engineer through Resident Engineer Harold Wood.

Immediately upon the completion of the work, please furnish this office itemized statement of all costs in accordance with Paragraph 14 of the specifications, which cost is not to include the 15 per cent which will be added by this office before payment is made.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer.

HNS/p  
cc Ben F. Wells, superintendent  
Harold Wood, Resident Engineer  
Fred D. Fyle, Engineer  
F. M. Stanley, Accountant

November 1, 1932

Messrs. H. W. Rohl and  
T. E. Connolly  
4351 Alhambra Avenue  
Los Angeles, California

Subject: San Diego River Project, El Capitan  
Feature. Extra Work Order No. 6 -  
Haul wood for City's Engineering Camp.

Gentlemen:

In accordance with paragraph 14 of the drawings and specifications for El Capitan reservoir dam, spillway and outlet works, authorization is hereby given to you for the following work to be accomplished as extra work within the meaning of the specifications:

Haul wood from reservoir basin to the City's Engineering Camp, as directed by the Hydraulic Engineer thru the Resident Engineer, Harold Wood.

Immediately upon the completion of the work, please furnish this office itemized statement of all costs in accordance with paragraph 14 of the specifications, which cost is net to include the 15 per cent which will be added by this office before payment is made.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer

INS/p

cc Ben F. Wells, Superintendent  
Harold Wood, Resident Engineer  
Fred D. Pyle, Engineer  
F. M. Stanley, Accountant



December 30, 1932

Messrs. H. W. Rohl & T. E. Connolly  
Contractors, El Capitan Dam,  
4351 Alhambra Avenue,  
Los Angeles, California.

Subject: San Diego River Project, El Capitan  
Feature, Extra Work Order No. 7  
Repair and Maintain Chocolate Creek Road

Gentlemen:

In accordance with paragraph 14 of the drawings and specifications for El Capitan reservoir dam, spillway and outlet works, authorization is hereby given to you for the following work to be accomplished as extra work within the meaning of the specifications:

Repair and maintain Chocolate Creek Road as directed by the Hydraulic Engineer thru the Resident Engineer, Harold Wood.

Immediately upon the completion of the work, please furnish this office itemized statement of all costs in accordance with paragraph 14 of the specifications, which cost is not to include the 15 per cent which will be added by this office before payment is made.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer.

HNS/p

cc H. W. Rohl & T. E. Connolly  
El Capitan Dam  
Contractor's Resident Representative  
City's Resident Engineer  
Accountant Water Department

December 30, 1932

Messrs. H. W. Rohl & T. E. Connolly  
Contractors, El Capitan Dam  
4351 Alhambra Avenue  
Los Angeles, California.

Subject: San Diego River Project, El Capitan Feature  
Extra Work Order No. 8 - Backfill Exploratory  
Tunnel No. 5.

Gentlemen:

In accordance with paragraph 14 of the drawings and specifications for El Capitan reservoir dam, spillway and outlet works, authorization is hereby given to you for the following work to be accomplished as extra work within the meaning of the specifications:

Backfill exploratory tunnel No. 5 with  
earth and decomposed granite, as directed  
by the Hydraulic Engineer thru the  
Resident Engineer, Harold Wood.

Immediately upon the completion of the work, please furnish this office itemized statement of all costs in accordance with paragraph 14 of the specifications, which cost is not to include the 15 per cent which will be added by this office before payment is made.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer.

HNS/p

cc H. W. Rohl & T. E. Connolly  
El Capitan Dam  
Contractor's Resident Representative  
City's Resident Engineer  
Accountant Water Department

January 9, 1933

Messrs. H. W. Rohl and T. E. Connolly  
Contractors El Capitan Dam  
4351 Alhambra Avenue  
Los Angeles, California.

Subject: San Diego River Project, El Capitan  
Feature, Extra Work Order No. 9  
Backfill Exploratory Tunnel No. 7.

Gentlemen:

In accordance with paragraph 14 of the drawings and specifications for El Capitan reservoir dam, spillway and outlet works, authorization is hereby given to you for the following work to be accomplished as extra work within the meaning of the specifications:

Backfill exploratory tunnel No. 7 with earth and decomposed granite, as directed by the Hydraulic Engineer thru the Resident Engineer, Harold Wood.

Immediately upon the completion of the work, please furnish this office itemized statement of all costs in accordance with paragraph 14 of the specifications, which cost is not to include the 15 per cent which will be added by this office before payment is made.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer.

HNS/p

cc H.W.Rohl and T.E.Connolly  
El Capitan Dam  
Contractor's Resident Representative  
City's Resident Engineer  
Accountant Water Department

5/3/33  
copy/f

1182

January 9, 1933

Messrs. H. W. Rohl and T. E. Connolly  
Contractors El Capitan Dam  
4351 Alhambra Avenue  
Los Angeles, California.

Subject: San Diego River Project, El Capitan  
Feature, Extra Work Order No. 10  
Backfill Exploratory Tunnel No. 8.

Gentlemen:

In accordance with paragraph 14 of the drawings and specifications for El Capitan reservoir dam, spillway and outlet works, authorization is hereby given to you for the following work to be accomplished as extra work within the meaning of the specifications:

Backfill exploratory tunnel No. 8 with earth and decomposed granite, as directed by the Hydraulic Engineer thru the Resident Engineer, Harold Wood.

Immediately upon the completion of the work, please furnish this office itemized statement of all costs in accordance with paragraph 14 of the specifications, which cost is not to include the 15 per cent which will be added by this office before payment is made.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer.

HNS/p

cc H.W.Rohl and T.E.Connolly  
El Capitan Dam  
Contractor's Resident Representative  
City's Resident Engineer  
Accountant Water Department

March 22, 1933

Messrs. H. W. Rohl & T. E. Connolly  
Contractors El Capitan Dam  
4351 Alhembra Avenue  
Los Angeles, California.

Subject: San Diego River Project, El Capitan Feature Extra  
Work Order No. 11. Drill, shoot and remove  
boulders above and north of excavation  
slopes of spillway. Month of March 1933.

Gentlemen:

In accordance with paragraph 14 of the contract drawings and specifications for El Capitan reservoir dam, spillway and outlet works, authorization is hereby given to you for the following work to be accomplished as extra work within the meaning of the specifications:

During the month of March 1933, drill and shoot boulders above and north of excavation slopes of El Capitan spillway and move a portion of the boulders and fragments of boulders into spillway excavation as directed by the Hydraulic Engineer through Resident Engineer Harold Wood.

Immediately upon the completion of the work, please furnish this office itemized statement of all costs in accordance with paragraph 14 of the specifications, which cost is not to include the 15 per cent which will be added by this office before payment is made.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer.

HNS/p

cc H.W.Rohl & T.E.Connolly  
El Capitan Dam  
Contractor's Resident Representative  
City's Resident Engineer  
Accountant Water Department

March 31, 1933

Messrs. H. W. Rohl & T.E. Connolly  
Contractors El Capitan Dam  
4351 Alhambra Avenue  
Los Angeles, California.

Subject: San Diego River Project, El Capitan Feature  
Extra Work Order No. 12. Drill, shoot and  
remove boulders above and north of excavation  
slopes of spillway. Month of April 1933.

Gentlemen:

In accordance with paragraph 14 of the contract drawings  
and specifications for El Capitan reservoir dam, spillway and  
outlet works, authorization is hereby given to you for the  
following work to be accomplished as extra work within the  
meaning of the specifications:

During the month of April 1933, drill and shoot  
boulders above and north of excavation slopes of  
El Capitan spillway and move a portion of the  
boulders and fragments of boulders into spillway  
excavation as directed by the Hydraulic Engineer  
through Resident Engineer Harold Wood.

Immediately upon the completion of the work, please furnish  
this office itemized statement of all costs in accordance with  
paragraph 14 of the specifications, which cost is not to include  
the 15 per cent which will be added by this office before payment  
is made.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer.

HNS/p

cc H.W.Rohl & T.E.Connolly  
El Capitan Dam  
Contractor's Resident Representative  
City's Resident Engineer  
Accountant Water Department

April 12, 1933

Messrs. H. W. Rohl & T. E. Connolly  
Contractors El Capitan Dam  
4351 Alhambra Avenue  
Los Angeles, California.

Subject: San Diego River Project, El Capitan  
Feature, drill, shoot and remove  
boulders above and north of excavation  
slopes of spillway.

Gentlemen:

Your attention is invited to Extra Work Order No. 12 authorizing and directing you to drill and shoot boulders above and north of excavation slopes of El Capitan spillway and to move a portion of the boulders and fragments of boulders into spillway excavation.

This work should not be further delayed.

The contractor is being held responsible for the removal at his own cost of any unauthorized material which enters the spillway excavation from outside the neat lines as a result of any over-shooting he may do in performing the work under Extra Work Order No. 12.

Also to any damage which may occur to his excavation equipment.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer.

HNS/p  
cc H.W.Rohl & T.E.Connolly  
El Capitan Dam  
Contractor's Resident Representative  
City's Resident Engineer

H. W. ROHL & T. E. CONNOLLY  
CONTRACTORS

San Diego, Calif.,  
April 22, 1933.

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

Dear Sir:

Referring to extra work order No. 12 and your letters of March 31 and April 12, 1933, pertaining to the drilling, shooting and removal of boulders above and north of excavation slopes of the spillway, not covered by the specifications. We are ready to proceed immediately with this work and will furnish all labor, materials and equipment at cost plus 15 per cent, in accordance with paragraph 14 in the specifications, when proper authorization for such extra work is provided by resolution of the City Council.

In your letter of April 12, you state that we will be held responsible for damages to the work or equipment, so it is evident that you fully realize the serious hazards involved in carrying out this order. You also state that this work is to be done under the direction of and as directed by Resident Engineer Harold Wood.

The contractor will not assume any responsibility for damages or extra costs, present or future, that may result from performing the work required when the methods, material and equipment used are as directed by and under the supervision of the Hydraulic Engineer or his representatives. The deep cut required for the spillway channel, the steep cut slopes shown on your plans and particularly the existence of a fault zone along and aparallel with the northerly side of this spillway channel and underlying the boulders to be removed constitute a serious hazard.

The specific location and depth of drill holes and the placing of the exact quantities and kinds of explosives must be under the immediate direction of your Resident Engineer Harold Wood.

Very truly yours,

H. W. ROHL & T. E. CONNOLLY

By T. E. CONNOLLY (Signature)

TEC/b



April 24, 1933

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

Subject: San Diego River Project, El Capitan Feature  
Drilling, shooting and removing of boulders  
above and north of excavation slopes of  
spillway.

Gentlemen:

It is deemed necessary to drill, shoot and remove certain boulders from the natural slopes above and north of the excavation slopes of the spillway at El Capitan reservoir dam to prevent possible future damage to the spillway structure.

This work is not covered by contract schedule items.

The cost is estimated to be about \$1,500.00.

This work may be accomplished as extra work under the provisions of paragraph 14 of the contract of H. W. Rohl & T.E. Connolly for the construction of El Capitan Reservoir Dam, Spillway and Outlet Works.

Since the estimated cost exceeds \$1,000.00, authorization and approval is required from your Honorable Body for the Hydraulic Engineer to issue required work order to the Contractor.

RECOMMENDATION: It is recommended that the Hydraulic Engineer be authorized to issue extra work order to the Contractor under the provisions of paragraph 14 of the contract specifications for the drilling, shooting and removal of boulders above and north of the excavation slopes of El Capitan reservoir dam spillway.

Respectfully,

H. N. Savage,  
Hydraulic Engineer.

FDP/P

4/29/33  
copy /f

1188

April 25, 1933

Messrs. H. W. Rohl & T. E. Connolly  
4351 Alhambra Avenue  
Los Angeles, California.

S 6

Subject: San Diego River Project, El Capitan Feature  
Extra Work Order No. 13. Drill, shoot and  
remove boulders above and north of  
excavation slopes of spillway.

Gentlemen:

In accordance with Resolution No. 60035 of the Council,  
copy attached, and the provisions of paragraph 14 of the con-  
tract specifications for the construction of El Capitan Reservoir  
Dam, Spillway and Outlet Works, authorization is hereby given  
to you for the following work to be accomplished as extra work  
within the meaning of the specifications:

Drill and shoot boulders above and north of  
excavation slopes of El Capitan spillway and  
move a portion of the boulders and fragments  
of boulders into spillway excavation as directed  
by the Hydraulic Engineer through Resident  
Engineer Harold Wood.

Immediately upon the completion of the work, please furnish  
this office itemized statement of all costs in accordance with  
paragraph 14 of the specifications, which cost is not to in-  
clude the 15 per cent which will be added by this office before  
payment is made.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer.

HNS/P  
encl.

cc H.W.Rohl & T.E.Connolly, El Capitan Dam  
Contractor's Resident Representative  
City's Resident Engineer  
Accountant Water Department

RESOLUTION NO. 60035

WHEREAS, it appears to this Council from a report and recommendation of the Hydraulic Engineer, dated April 24th, 1933, on file in the office of the City Clerk of The City of San Diego, that it is necessary in the construction of El Capitan Reservoir Dam, Spillway and Outlet Works, to require the contractors Rohl & Connolly to perform certain extra work, the estimated cost of which is about fifteen hundred dollars (\$1500.00), not covered by contract schedule items, consisting of the drilling, shooting and removing of certain boulders from the natural slopes above and north of the excavation slopes of the spillway at said El Capitan Reservoir Dam; NOW, THEREFORE,

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

That the extra work described in the communication of the Hydraulic Engineer to this Council, dated April 24th, 1933, on file with the City Clerk, be, and the same is hereby authorized and approved; and that the Hydraulic Engineer be, and he is hereby authorized to require the contractors to drill, shoot and remove certain boulders from the natural slopes above and north of the excavation slopes of the spillway at El Capitan Reservoir Dam, to prevent possible future damage to the spillway structure; said work to be performed as, and paid for as, extra work under paragraph 14 of the contract specifications for the construction of said reservoir dam, spillway and outlet works, and to issue the required form of work order or orders required therefor.

Presented by \_\_\_\_\_

Approved as  
to form by \_\_\_\_\_

I HEREBY CERTIFY the above to be a full, true and correct copy of Resolution No. 60035 of the Council of the City of San Diego, California, as adopted by said Council April 24, 1933.

ALLEN H. WRIGHT  
City Clerk

By CLARK M. FOOTE, JR.  
Deputy

April 26, 1933

Messrs. H. W. Rohl & T. E. Connolly  
4351 Alhambra Avenue  
Los Angeles, California.

S 7

Subject: San Diego River Project, El Capitan Feature  
Drilling, shooting and removing boulders  
above and north of excavation slopes of  
spillway, supplementing Extra Work Order 13.

Gentlemen:

Supplementing Extra Work Order No. 13, dated April 25, 1933, for drilling, shooting and removing boulders above and north of excavation slopes of spillway of El Capitan reservoir dam, you are directed to conduct the work in the following manner:

The boulders numbered by the Resident Engineer shall be drilled with jackhammers, and in general with vertical holes, none of which should extend below the average ground surface around the base of the boulders, except for boulders located within about 25 feet of the edge of the spillway excavation.

The drill holes should be drilled from the top of the boulders, and so far as possible without the use of staging. The number of holes should be such that the powder charge may be most effectively located.

The powder charge should consist of not to exceed two pounds of 40 per cent dynamite to the cubic yard of boulder above the ground.

The large boulders with more than one hole should be shot with a battery and electric exploders. Boulders with single holes may be shot with fuses.

Your shovels and equipment shall be moved back a safe distance by you when shooting is to be done, as has been your usual practice when shooting boulders in the spillway. The shooting should be done between shifts.

In general it is the intention to shoot the boulders as has been done for your own work except that it is not intended to shoot the boulders below the ground surface where they are located more than about 25 feet from the north edge of the spillway excavation.

All work shall be as directed by the Hydraulic Engineer through Resident Engineer Harold Wood, including the moving of boulders and fragments of boulders into the spillway excavation.

Very truly yours,

H. N. Savage  
Hydraulic Engineer

FDF/p  
cc H.W.Rohl & T.E.Connolly, El Capitan Dam  
Contractor's Resident Representative  
City's Resident Engineer

April 24, 1933

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

Subject: San Diego River Project, El Capitan Feature  
Observation wells.

Gentlemen:

Enclosed is copy of letter dated April 7, 1932, from Mr. Geo. W. Hawley, Deputy State Engineer in Charge of Dams, Department of Public Works, State of California, requesting the City of San Diego to install in the hydraulic fill portion of El Capitan Dam seven observation wells for determining the hydraulic gradient of lines of water saturation within the stability sections of the dam.

These wells may be of particular value during construction and observations made may furnish information that will control the remaining progress or rate of construction of the work.

The cost of installing these observation wells is estimated to be about \$350.00 each, or a total of about \$2,500.00.

The installation of these wells is not provided for in the schedule items of the contract specifications. According to the provisions of paragraph 14 of the contract specifications the wells may be installed by the Contractor as extra work, provided the work order is authorized by the Council.

It is essential that these wells be installed at once, and provision made to install additional lengths of pipe to them as the height of the dam increases.

**RECOMMENDATION:** It is recommended that the Hydraulic Engineer be authorized to issue an extra work order to the Contractor under paragraph 14 of the contract specifications for the installation of seven observation wells in the hydraulic fill at El Capitan Dam.

Respectfully,

H. N. Savage,  
Hydraulic Engineer.

HNS/p  
encl. copy letter Geo.W.Hawley  
4-7-33

May 2, 1933

Messrs. H. W. Rohl & T. E. Connolly  
4351 Alhambra Avenue  
Los Angeles, California

9 8

Subject: San Diego River Project, El Capitan  
Feature, Extra Work Order No. 14.  
Install observation wells.

Gentlemen:

In accordance with Resolution No. 60036 of the Council, copy attached, and the provisions of paragraph 14 of the contract specifications for the construction of El Capitan Reservoir Dam, Spillway and Outlet Works, authorization is hereby given to you for the following work and the furnishing of the necessary material to be accomplished as extra work within the meaning of the specifications:

Install seven observation wells in the hydraulic fill portion of El Capitan Dam.

Well casing to consist of 6-inch outside diameter standard screwed casing with driving shoe on each well, casing to weigh 10.5 pounds per foot.

The wells to be installed as soon as practical at such locations, to such depths, in such manner and perforated after installation, all as may be directed by the Hydraulic Engineer through Resident Engineer Harold Wood; and

To be maintained and extended upward from time to time as the dam is constructed.

(About 600 feet of casing will be required to bring the tops of all wells to elevation 640; and about 400 feet additional to extend the casings from time to time to the surface of the hydraulic fill as the height of the dam is increased.)

Immediately upon the completion of the work please furnish this office itemized statement of the cost in accordance with paragraph 14 of the specifications, which cost is not to include the 15 per cent which will be added by this office before payment is made.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer.

HNS/p  
encl.

October 24, 1933

Messrs. H. W. Rohl & T. E. Connolly  
Contractor El Capitan Dam  
4351 Alhambra Avenue  
Los Angeles, California.

S-58

Subject: San Diego River Project, El Capitan Feature  
Observation Wells, Removing Sand.  
(Extra Work Order No. 14).

Gentlemen:

You are hereby requested and directed under Extra Work Order No. 14 to remove the sand and silt which has accumulated in observation wells Nos. 2, 6 and 7 of the El Capitan Reservoir Dam, to the satisfaction of the Engineer.

Very truly yours,

H. N. Savage  
Hydraulic Engineer.

HNS/f

June 12, 1933

Messrs. H. W. Rohl & T. E. Connolly  
Contractors El Capitan Dam  
4351 Alhambra Avenue  
Los Angeles, California.

S-14

Subject: San Diego River Project, El Capitan  
Feature, Extra Work Order No. 15.  
Sprinkling rock embankment

Gentlemen:

Confirming and re-affirming the option proffered to you in my letter dated March 22, 1933, subject: "San Diego River Project, El Capitan Feature, Rock Embankment, removal of earth and disintegrated granite" as follows: "The removal of this material by complete washing into the interstices of the rock embankment will be satisfactory", you are hereby directed and required to accomplish the interlocking continuity of the downstream rock embankment over an area to be designated by the Engineer above elevation 600, about 75 feet wide up and downstream and a reach of about 460 feet from abutment to abutment, by the application of an abundance of water by a sprinkling system, to the top surface portion of the rock embankment in quantity and duration satisfactory to the Engineer.

In accordance with the provisions of paragraph 14 of the contract specifications for the construction of El Capitan Reservoir Dam, Spillway and Outlet Works, authorization is hereby given to you for the following work and the furnishing of the necessary material to be accomplished as extra work within the meaning of the specifications:

Install, operate and remove a sprinkling system over area of the downstream rock embankment to be designated by the Engineer.

All pipe, fittings and sprinklers to be furnished and delivered by the City of San Diego f.o.b. El Capitan Dam; and after use and removal, to be received by the City f.o.b. El Capitan Dam.

The system to be operated as directed by the Engineer.

Immediately upon the completion of the work please furnish this office itemized statement of the cost in accordance with paragraph 14 of the specifications, which cost is not to include the 15 per cent which will be added by this office before payment is made.

Very truly yours,

H. N. Savage  
Hydraulic Engineer



August 9, 1933

Messrs. H. W. Rohl & T. E. Connolly  
Contractors El Capitan Dam  
4351 Alhambra Avenue  
Los Angeles, California.

S-34

Subject: San Diego River Project, El Capitan  
Feature, Extra Work Order No. 16  
Break up spherical nodules in spillway  
excavation, month of August 1933.

Gentlemen:

In accordance with the provisions of paragraph 14 of the contract specifications for the construction of El Capitan Reservoir Dam, Spillway and Outlet Works, authorization is hereby given to you for the following work to be accomplished as extra work within the meaning of the specifications:

During the month of August 1933, drill and shoot such spherical boulders and nodules encountered in spillway excavation as may otherwise be loaded by power shovels without breaking, all to be done as the Resident Engineer may direct.

Immediately upon the completion of the work, please furnish this office itemized statement of all costs in accordance with paragraph 14 of the specifications, which cost is not to include the 15 per cent which will be added by this office before payment is made.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer

FDP/p

September 11, 1933

Messrs. H. W. Rohl & T. E. Connolly  
Contractors El Capitan Dam  
4351 Alhambra Avenue  
Los Angeles, California.

S-42

Subject: San Diego River Project, El Capitan  
Feature, Extra Work Order No. 17.  
Break up spherical nodules in spillway  
excavation, month of September 1933.

Gentlemen:

In accordance with the provisions of paragraph 14 of the contract specifications for the construction of El Capitan Reservoir Dam, Spillway and Outlet Works, authorization is hereby given to you for the following work to be accomplished as extra work within the meaning of the specifications:

During the month of September 1933, drill and shoot such spherical boulders and nodules originating in spillway excavation and deposited in the rock embankment as the Resident Engineer may direct, all to be done as the Resident Engineer may direct.

Immediately upon the completion of the work, please furnish this office itemized statement of all costs in accordance with paragraph 14 of the specifications, which cost is not to include the 15 per cent which will be added by this office before payment is made.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer.

HNS/p

September 11, 1933

Messrs. H. W. Rohl & T. E. Connolly  
Contractors El Capitan Dam  
4351 Alhambra Avenue  
Los Angeles, California.

S-43

Subject: San Diego River Project, El Capitan  
Feature, Extra Work Order No. 18  
Experimental steel anchors in spillway

Gentlemen:

In accordance with the provisions of paragraph 14 of the contract specifications for the construction of El Capitan Reservoir Dam, Spillway and Outlet Works, authorization is hereby given to you for the following work to be accomplished as extra work within the meaning of the specifications:

Drill holes, place experimental steel anchors and made tests; all as the Resident Engineer may direct.

Immediately upon the completion of the work, please furnish this office itemized statement of all costs in accordance with paragraph 14 of the specifications, which cost is not to include the 15 per cent which will be added by this office before payment is made.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer.

FDP/P

September 28, 1933

Messrs. H. W. Rohl & T. E. Connolly  
Contractors El Capitan Dam  
4351 Alhambra Avenue  
Los Angeles, California.

S-49

Subject: San Diego River Project, El Capitan  
Feature, Extra Work Order No. 19  
Increase length of ladder guard legs

Gentlemen:

In accordance with the provisions of paragraph 14 of the contract specifications for the construction of El Capitan Reservoir Dam, Spillway and Outlet Works, authorization is hereby given to you for the following work to be accomplished as extra work within the meaning of the specifications:

Increase the length of the legs of the ladder guards for the outside of the outlet tower in accordance with the instructions of the Engineer.

Immediately upon the completion of the work, please furnish this office itemized statement of all costs in accordance with paragraph 14 of the specifications, which cost is not to include the 15 percent which will be added by this office before payment is made.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer.

PDE/p

cc-H.W.Rohl & T.E.Connolly  
El Capitan Dam  
Contractor's Resident Representative  
City Manager  
City Attorney  
City's Resident Engineer  
Accountant Water Department

October 7, 1933

Messrs. H. W. Rohl & T. E. Connolly  
Contractors El Capitan Dam  
4351 Alhambra Avenue  
Los Angeles, California.

S-51

Subject: San Diego River Project, El Capitan Feature  
Extra Work Order No. 20. Break up  
spherical nodules in spillway excavation,  
month of October 1933.

Gentlemen:

In accordance with the provisions of paragraph 14 of the contract specifications for the construction of El Capitan Reservoir Dam, Spillway and Outlet Works, authorization is hereby given to you for the following work to be accomplished as extra work within the meaning of the specifications:

During the month of October 1933, drill and shoot such spherical boulders and nodules originating in spillway excavation and deposited in the rock embankment as the Resident Engineer may direct, all to be done as the Resident Engineer may direct.

Immediately upon the completion of the work, please furnish this office itemized statement of all costs in accordance with paragraph 14 of the specifications, which cost is not to include the 15 percent which will be added by this office before payment is made.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer

FDP/p  
ccH.W.Rohl & T.E.Connolly  
El Capitan Dam  
Contractor's Resident Representative  
City Manager  
City Attorney  
City's Resident Engineer  
Accountant Water Department

November 8, 1933

Messrs. H. W. Rohl & T. E. Connolly  
Contractors El Capitan Dam  
4351 Alhambra Avenue  
Los Angeles, California.

S-62

Subject: San Diego River Project, El Capitan Feature  
Extra Work Order No. 21. Break up spherical  
nodules in spillway excavation, month of  
November 1933

Gentlemen:

In accordance with the provisions of paragraph 14 of the contract specifications for the construction of El Capitan Reservoir Dam, Spillway and Outlet Works, authorization is hereby given to you for the following work to be accomplished as extra work within the meaning of the specifications:

During the month of November 1933, drill and shoot such spherical boulders and nodules originating in spillway excavation and deposited in the rock embankment as the Resident Engineer may direct.

Immediately upon the completion of the work, please furnish this office itemized statement of all costs in accordance with paragraph 14 of the specifications, which cost is not to include the 15 percent which will be added by this office before payment is made.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer.

FDP/p

cc-H.W.Rohl & T.E.Connolly, El Capitan Dam  
Contractor's Resident Representative

December 1, 1933

Messrs. H. W. Rohl & T. E. Connolly  
Contractors El Capitan Dam  
4351 Alhambra Avenue  
Los Angeles, California.

S-68

Subject: San Diego River Project, El Capitan  
Feature. Extra Work Order No. 22  
Install and remove wooden bulkhead in  
adit leading to 30"x30" outlet tower gate.

Gentlemen:

In accordance with the provisions of paragraph 14 of the contract specifications for the construction of El Capitan Reservoir Dam, Spillway and Outlet Works, authorization is hereby given to you for the following work to be accomplished as extra work within the meaning of the specifications:

Install and remove wooden bulkhead in adit leading to 30"x30" outlet tower gate in accordance with the instructions of the engineer. Bulkhead to be installed immediately and to be removed when directed.

Immediately upon the completion of the work, please furnish this office itemized statement of all costs in accordance with paragraph 14 of the specifications, which cost is not to include the 15 percent which will be added by this office before payment is made.

Very truly yours,

H. N. Savage  
Hydraulic Engineer.

FDP/P

December 11, 1933

Messrs. H. W. Rohl & T. E. Connolly  
Contractors El Capitan Dam  
4351 Alhambra Avenue  
Los Angeles, California.

S-72

Subject: San Diego River Project, El Capitan  
Feature, Extra Work Order No. 23, break  
up spherical nodules in spillway excavation  
month of December 1933.

Gentlemen:

In accordance with the provisions of paragraph 14 of the contract specifications for the construction of El Capitan Reservoir Dam, Spillway and Outlet Works, authorization is hereby given to you for the following work to be accomplished as extra work within the meaning of the specifications:

During the month of December 1933, drill and shoot such spherical boulders and nodules originating in spillway excavation and deposited in the rock embankment as the Resident Engineer may direct, all to be done as the Resident Engineer may direct.

Immediately upon the completion of the work, please furnish this office itemized statement of all costs in accordance with paragraph 14 of the specifications, which cost is not to include the 15 percent which will be added by this office before payment is made.

Very truly yours,

H. N. Savage  
Hydraulic Engineer.

FDR/P



December 12, 1933

Messrs. H. W. Rohl & T. E. Connolly  
Contractors El Capitan Dam  
4351 Alhambra Avenue  
Los Angeles, California.

S-73

Subject: San Diego River Project, El Capitan  
Feature. Extra Work Order No. 24  
Cleaning and painting metal work

Gentlemen:

In accordance with the provisions of paragraph 14 of the contract specifications for the construction of El Capitan Reservoir Dam, Spillway and Outlet Works, authorization is hereby given to you for the following work to be accomplished as extra work within the meaning of the specifications:

Clean and paint metal work furnished by the City of San Diego as directed by the Engineer, with paint furnished by the City of San Diego. The surface of the metal work to be painted shall be thoroughly cleaned and shall be dry when the paint is applied.

Metal appurtenances on and above the outlet tower flood including I-beams under roof; U-supports for sheaves; chain hooks at columns; chain sheaves; operating stands; hand winch; and miscellaneous items, to receive a coat of red lead and oil where required, and two coats of aluminum bronze.

Metal appurtenances below the outlet tower floor, including cast iron vents; 3" I-beams and clevises; 36" and 42" saucer valve covers and chain; 6" nipple for 6" valve; 30" saucer valves and covers; 30" saucer valve chains; 6" valve stem brackets; 30" slide gate stem brackets; 30" slide gate and seat; and miscellaneous items, to be given a coat of Biturine Primer and a coat of Biturine.

Immediately upon the completion of the work, please furnish this office itemized statement of all costs in accordance with the provisions of paragraph 14 of the specifications, which cost is not to include the 15 percent which will be added by this office before payment is made.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer.

November 24, 1933

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

Subject: San Diego River Project, El Capitan Feature,  
La Mesa, Lemon Grove & Spring Valley Irrigation  
District Flume, Provision for, through the Dam.

Gentlemen:

During the continued construction and completion of the El Capitan reservoir dam and the installation of the City's El Capitan-Lakeside eight mile reach of main carrying pipe line, and

Up to the time a material quantity of water is impounded in the El Capitan Reservoir sufficient to justify the abandonment by the La Mesa, Lemon Grove & Spring Valley Irrigation District of that portion of its wooden flume located and being operated through El Capitan reservoir and damsite, there will be necessary requirement for a dependable water-way for the flume through the south abutment end of the El Capitan dam to replace that portion of the undependable wooden flume which will have to be replaced in order to complete the construction of the dam.

The bottom of the District's wooden flume is at elevation 753.5 or 3.5 feet above the level of the spillway crest of the El Capitan reservoir, and 16.5 feet below the top of the finished dam. It is deemed necessary to replace that portion of the wooden flume located through the dam site with a concrete reinforced box of adequate size, and about 125 feet in length, which will be plugged with concrete after the completion of the dam and the abandonment of the District's flume.

The cost of the concrete reinforced box water-way is estimated to be about \$2,500.00.

According to the provisions of paragraph 14 of the contract specifications the water-way may properly be constructed by the contractor as extra work provided the work is authorized by the Council.

**RECOMMENDATION:** It is recommended that the Hydraulic Engineer be authorized to issue an extra work order to the contractor under the provisions of paragraph 14 of the contract specifications for the construction of a concrete reinforced water-way through the south abutment end of El Capitan dam to replace a portion of the La Mesa, Lemon Grove & Spring Valley Irrigation District's old wooden flume.

Respectfully,

H. N. Savage  
Hydraulic Engineer.

January 8, 1934

Messrs. H. W. Rohl & T. E. Connolly  
Contractors El Capitan Dam  
4351 Alhambra Avenue  
Los Angeles, California.

S-31

Subject: San Diego River Project, El Capitan  
Feature, Extra Work Order No. 25.  
Construct concrete reinforced waterway  
thru south abutment El Capitan Dam

Gentlemen:

In accordance with Resolution of the City Council No. 61140, copy attached, and the provisions of paragraph 14 of the contract specifications for the construction of El Capitan Reservoir Dam, Spillway and Outlet Works, authorization is hereby given to you for the following work to be accomplished as extra work within the meaning of the specifications:

Construct a concrete reinforced waterway thru the south abutment of the El Capitan Reservoir Dam, to replace a portion of the La Mesa, Lemon Grove & Spring Valley Irrigation District's old wooden flume as shown on Drawing WD-482, and as directed by the Engineer.

Immediately upon the completion of the work please furnish this office itemized statement of all costs in accordance with paragraph 14 of the specifications, which cost is not to include the 15 percent which will be added by this office before payment is made.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer.

FDE/p

March 28, 1934

Messrs. H. W. Rohl and T. E. Connolly  
Contractors El Capitan Dam  
4351 Alhambra Avenue  
Los Angeles, California

S-100

Subject: San Diego River Project, El  
Capitan Feature, Extra Work  
Order No. 25 amended

Gentlemen:

Enclosed is print of drawing WD-482 edited to  
March 26, 1934 which is to be substituted for the print  
of drawing WD-482 as furnished you with my letter S-81  
dated January 8, 1934, subject: San Diego River Project,  
El Capitan Feature, Extra Work Order No. 25, construct  
concrete reinforced waterway through south abutment of  
El Capitan Dam.

Very truly yours,

H. N. Savage  
Hydraulic Engineer.

FDE/p  
encl.

LA MESA, LEMON GROVE & SPRING VALLEY  
IRRIGATION DISTRICT

La Mesa, California.

April 5, 1934

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

My dear Mr. Savage:

I have just returned from eight  
days absence.

Confirming our conversation of  
March 27th, it is my understanding that at such time  
as the City require the interruption in service of our  
flume line for the purpose of constructing the contem-  
plated concrete bypass (a) that the City will give four  
days notice; (b) that they will compensate the District  
for such pumping as is necessary to maintain the service  
of the lower area of the flume; and (c) that in the event  
of a protracted shut off the City will, at its own expense,  
pump water into the flume at El Capitan in sufficient amount  
to prevent serious damage.

Trusting that this is your under-  
standing of the situation, I am

Yours very truly,

C. HARRITT (Signature)  
C. HARRITT  
General Manager

LA MESA, LEMON GROVE & SPRING  
VALLEY IRRIGATION DISTRICT

CH RD

April 16, 1934

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

Subject: San Diego River Project, El Capitan Feature  
La Mesa, Lemon Grove & Spring Valley Irriga-  
tion District waterway thru El Capitan Dam.

Gentlemen:

On November 29, 1933, in response to my recommendation, you adopted Resolution No. 61140 authorizing the Hydraulic Engineer to issue an extra work order to H. W. Rohl and T. E. Connolly, contractors for the construction of the El Capitan Reservoir Dam, Spillway and Outlet Works, to install a concrete reinforced waterway thru the south abutment of El Capitan Dam to replace a portion of the La Mesa, Lemon Grove & Spring Valley Irrigation District's old wooden flume.

It was expected at that time that the work would be done following a storm period without inconvenience or extra cost to the Irrigation District. However the winter has been exceedingly dry and it has been necessary for the Irrigation District to maintain a flow of water thru the flume at all times.

The contractor is now ready to proceed with the installation of the concrete waterway thru the dam which will require the discontinuance of the water service in the flume for about one week during which time it will be necessary for the district to secure water from its El Monte pumping plant which will involve extra cost of about \$125.00 per day for labor, materials, supplies and power for which the district should be reimbursed.

RECOMMENDATION: It is recommended that \$875.00 be provided from the El Capitan bond fund to reimburse the La Mesa, Lemon Grove & Spring Valley Irrigation District for the necessary actual cost to the District for pumping at its El Monte pumping plant due to the reconstruction of the District's flume thru the El Capitan Dam by the City of San Diego.

Respectfully,

H. N. Savage,  
Hydraulic Engineer.

FDP/p



January 15, 1934

Messrs. H. W. Rohl & T. E. Connolly  
Contractors El Capitan Dam  
4351 Alhambra Avenue  
Los Angeles, California.

S-83

Subject: San Diego River Project, El Capitan  
Feature, Extra Work Order No. 26,  
Break up spherical nodules in spillway  
excavation, month of January 1934.

Gentlemen:

In accordance with the provisions of paragraph 14 of the contract specifications for the construction of El Capitan Reservoir Dam, Spillway and Outlet Works, authorization is hereby given to you for the following work to be accomplished as extra work within the meaning of the specifications:

During the month of January 1934, drill and shoot such spherical boulders and nodules originating in spillway excavation and deposited in the rock embankment as the Resident Engineer may direct, all to be done as the Resident Engineer may direct.

Immediately upon the completion of the work, please furnish this office itemized statement of all costs in accordance with paragraph 14 of the specifications, which cost is not to include the 15 per cent which will be added by this office before payment is made.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer.

FDF/p



May 16, 1934

Messrs. H. W. Rohl & T. E. Connolly  
Contractors El Capitan Dam  
4351 Alhambra Avenue  
Los Angeles, California.

S-109

Subject: San Diego River Project, El Capitan Feature  
Extra Work Order No. 28, remove shop  
facilities so that spillway extension may  
be excavated.

Gentlemen:

In accordance with the provisions of paragraph 14 of the contract specifications for the construction of El Capitan Reservoir Dam, Spillway and Outlet Works, authorization is hereby given to you for the following work to be accomplished as extra work within the meaning of the specifications:

Remove and rebuild the existing concrete wash rack and drain; move and reconstruct with proper water and oil supply lines the steam boiler unit and fuel oil tanks from where they now interfere with the excavation of the El Capitan reservoir dam spillway extension; all to be accomplished as the City's Resident Engineer may direct.

Immediately upon the completion of the work, please furnish this office itemized statement of all costs in accordance with paragraph 14 of the specifications, which cost is not to include the 15 percent which will be added by this office before payment is made.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer.

FDP/p  
cc-City Manager  
City Attorney  
Special Water Counsel  
City's Resident Engineer

8/31/34  
copy /f

1211

August 31, 1934

Messrs. H. W. Rohl & T. E. Connolly  
Contractors El Capitan Dam  
4351 Alhambra Avenue  
Los Angeles, California.

S-123

Subject: San Diego River Project, El Capitan Feature  
Extra Work Order No. 29, haul and weigh  
rock from spillway excavation.

Gentlemen:

In accordance with the provisions of paragraph 14 of the contract specifications for the construction of El Capitan Reservoir Dam, Spillway and Outlet Works, authorization is hereby given to you for the following work to be accomplished as extra work within the meaning of the specifications:

Haul to El Cajon and weigh on public scales five loads of rock from the spillway excavation and return the rock to El Capitan Dam, all as the City's Resident Engineer may direct.

Immediately upon the completion of the work, please furnish this office itemized statement of all costs in accordance with paragraph 14 of the specifications, which cost is not to include the 15 per cent which will be added by this office before payment is made.

Very truly yours,

Fred D. Pyle  
Hydraulic Engineer.

FDP/f

**CONTRACTOR'S COSTS**

July 5, 1932

From : Resident Engineer  
To : Hydraulic Engineer  
Subject : San Diego River Project, El Capitan feature  
City's construction accountant to  
Contractor's Alhambra office.

1. The comprehensive construction costs being kept for the contract work on the El Capitan Dam of the City of San Diego requires certain items of expense not obtainable from the field office of the contractors, such as bond premiums, insurance, equipment service, general office overhead and moving equipment on to the job.

2. In order to secure this data from the contractor's Alhambra office, it is considered necessary for the City's Construction Accountant, Mr. E. D. Williams, to go to Alhambra within the next few days.

3. It is recommended that Mr. E. D. Williams be instructed to travel to Alhambra and secure the above data.

Harold Wood  
Resident Engineer

cc Hydraulic Engineer  
Fred D. Pyle

A.F.E.  
HNS 7/5/32

4-5-35

1214

copy/p

EL CAPITAN RESERVOIR DAM, SPILLWAY AND OUTLET WORKS  
Contractor's cost of construction computed from data  
furnished by H.W.Rohl and T.E.Connolly, Contractors.

	DEBITS			CREDITS
	Labor	Material	Total	
Camp construction	8,667.52	17,607.06	26,274.58	
Job office overhead	28,881.73	12,131.21	41,012.94	1,500.00
Field engineering	3,834.18	1,072.01	4,906.19	
Shops	44,398.29	55,311.98	99,710.27	
Roads	7,661.10	975.09	8,636.19	
Mess hall	42,276.25	56,896.98	99,173.23	147,904.13
Extra work	9,648.45	4,775.18	14,423.63	
Quarry	222,452.76	211,137.00	433,589.76	
Gravel plant	19,358.40	58,897.76	78,256.16	3,446.19
Concrete plant	56,474.09	20,662.77	77,136.86	
Move on job	76.90	4,004.26	4,081.16	
Move off job	1,785.19	2,881.52	4,666.71	
Tunnel	81,343.81	41,933.01	123,276.82	
Hydraulic and rolled fill	131,207.73	183,566.20	314,773.93	
Rock embankment	37,776.80		37,776.80	
Outlet works	9,724.08	3,754.91	13,478.99	
Spillway	123,892.28	56,146.59	180,038.87	
Toe walls	5,405.70	1,234.83	6,640.53	
Core wall	29,493.54	2,464.66	31,958.20	
Drains	294.50	748.68	1,043.18	
Holes and grout	2,068.52	499.79	2,568.31	
Storeroom		34,271.97	34,271.97	
Powder, caps, fuse		88,870.22	88,870.22	2,046.40
Equipment rentals		15,907.10	15,907.10	
Electric power		78,308.67	78,308.67	
Pipe lines		4,268.53	4,268.53	
Gasoline, oil, grease		268,610.32	268,610.32	28,343.23
General overhead		200,073.66	200,073.66	
Cast iron pipe & fittings		7,256.00	7,256.00	
Wylie's right of way		100.00	100.00	
Cement		160,113.29	160,113.29	26,439.00
Reinforcing steel		33,327.17	33,327.17	
Structural steel		3,182.98	3,182.98	
Copper water stop		2,387.95	2,387.95	
Totals	866,721.82	1,633,379.35	2,500,101.17	209,678.95
Compensation Ins.	128,717.73		128,717.73	
Bond Ins. & Int.		43,439.76	43,439.76	
Int. on holdback		56,820.53	56,820.53	
Total Debits	995,439.55	1,733,639.64	2,729,079.19	
Total Credits			209,678.95	
Estimate contractor's cost			2,519,400.24	
Total amount paid on contract			2,705,003.81	
Estimate contractor's profit			\$ 185,603.57 = 6.86%	

No account taken in the above for contractor's equipment used on job.

H. D. Williams  
Cost Accountant

PROGRESS

4-13-33  
copy/p

1216<sup>x</sup>  
COPY

H. W. ROHL & T. E. CONNOLLY  
CONTRACTORS

April 10, 1933

Honorable Mayor and City Council,  
City of San Diego, California.

Gentlemen:                    Re: El Capitan Reservoir Dam  
   Spillway and Outlet Works

Due to the failure of the Engineer to make and sign  
an estimate in accordance with our Contract, we have  
suspended operations on the above job.

Very truly yours,

H. W. Rohl & T. E. Connolly,

By T. E. Connolly (signed)

H. W. Rohl            (signed)

December 22, 1933

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

Subject: San Diego River Project, El Capitan  
Feature, Contractor's Holiday.

Gentlemen:

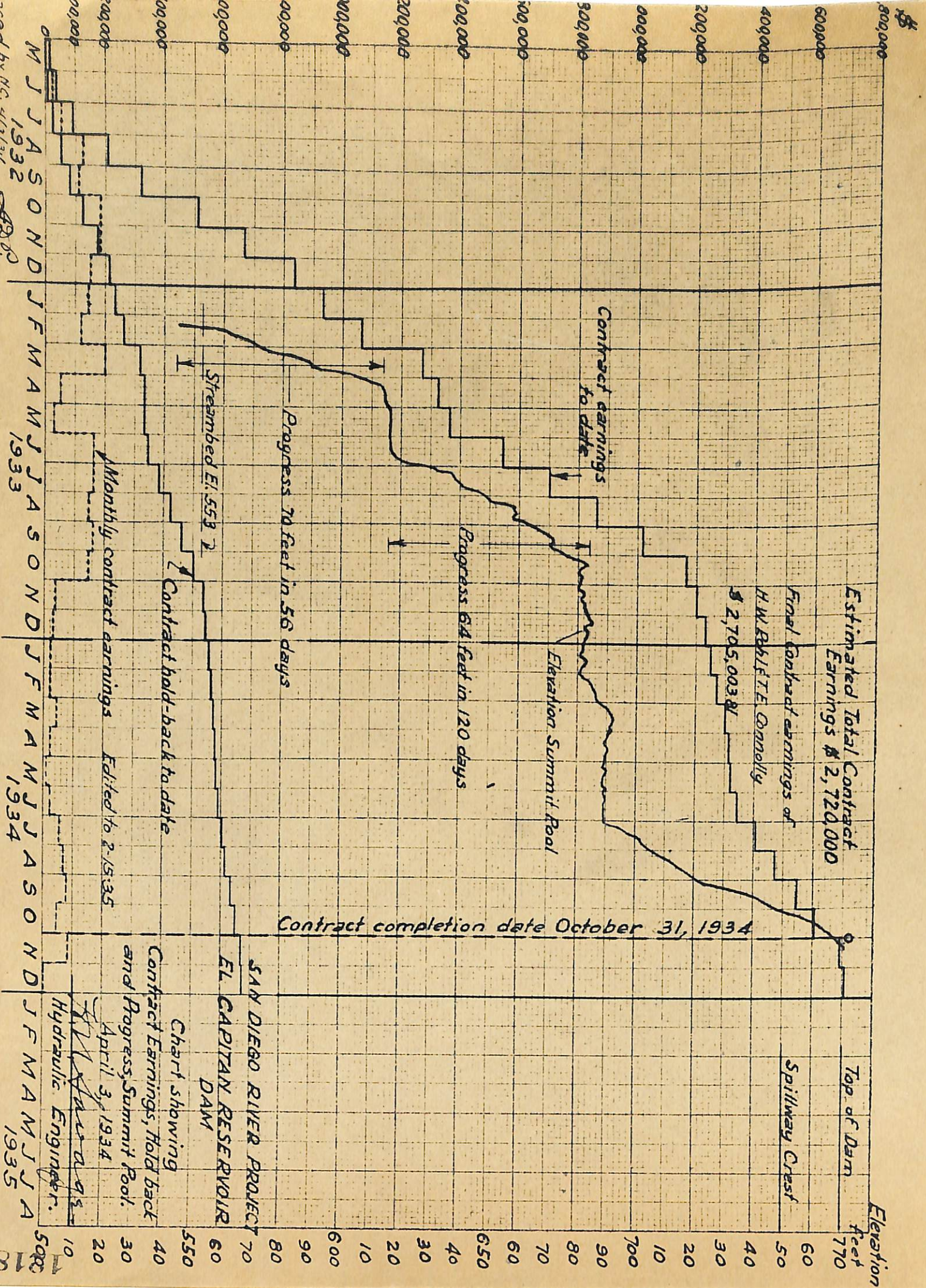
The Contractor for the construction of the El Capitan Reservoir Dam, Spillway and Outlet Works has announced a holiday for his entire operations, effective from December 23, 1933, 4:00 P.M. and continuing to January 2, 1934, 7:00 A.M.

Respectfully,

H. N. Savage  
Hydraulic Engineer.

HNS/f





1932 J A S O N D  
 1933 J F M A M J J A S O N D  
 1934 J F M A M J J A S O N D  
 1935 J F M A M J J A S O N D

500  
 600  
 700  
 800

June 11, 1934

From : Resident Engineer  
To : Hydraulic Engineer  
Subject: San Diego River Project, El Capitan Feature  
Contract construction delays

1. AS requested in letter of the Hydraulic Engineer dated June 6, 1934, here is statement of delays and dates during which time the contractor refrained from doing work on hydraulic fill and consequently delayed the completion of his contract construction of El Capitan Reservoir Dam, Spillway and Outlet Works:

April 10, 22, 1933	"Shut down"	10 days
December 5, 1933 to January 5, 1934	No work on hydraulic fill	30 "
April 20 to May 28, 1934	No work on hydraulic fill except on May 3	37 "
Total delays to date on hydraulic fill for which the City of San Diego is not responsible		77 "

H. L. HARPER (Signature)  
H. L. Harper  
Inspector

HAROLD WOOD (Signature)  
Harold Wood  
Resident Engineer

D. W. ALBERT (Signature)  
D. W. Albert  
Hydraulic Fill Engineer

FRED D. PYLE (Signature)  
Fred D. Pyle  
Engineer

HW/p

MATERIALS - SAMPLING AND TESTING

MATERIALS - SAMPLING AND TESTING

October 10, 1932

From : Hydraulic Engineer  
To : Resident Engineer  
Subject: San Diego River Project, El Capitan Feature  
Installation, Administration.

1. It is desired that all correspondence between field engineers and the City's Testing Engineer pass both ways through the Hydraulic Engineer's office.

2. Copies of correspondence recently received in this office indicate that requisitions for testing materials and reports of results of tests may not in each case be available for Feature Histories unless the foregoing policy is adopted and adhered to.

H. N. Savage

HNS/p  
cc Mr. J. Y. Jewett, Testing Engineer

September 6, 1934

From : Testing Engineer  
To : Hydraulic Engineer  
Subject : Specific gravity of rock samples

Three specimens of rock from El Capitan Dam, brought in August 31st, for determination of specific gravity, give results as follows:-

Lab. No.		
23120	Granite from quarry	2.71
23121	Granite from spillway excavation	2.82
23122	Disintegrated granite from spoilbank in large pieces	2.80
	Pulverized to sand size	2.77

J. Y. Jewett

JYJ/b

February 20, 1935

From : Testing Engineer  
 To : Hydraulic Engineer  
 Subject : Tabulation of samples; El Capitan Dam

The following summary has been prepared on number of samples received at the laboratory from El Capitan Dam, supplementing the statement furnished your office under date of August 23, 1934, and completing the record up to the present date.

	Previous to 7-1-34	Since 7-1-34	Total
Cement	390	112	502
Concrete aggregates	53	43	96
Concrete specimens (x)	72	47	119
Reinforcing steel	58	7	65
Borrow pit	82	6	88
Hydraulic fill - puddle core	2062	155	2217
Hydraulic fill - beach	339	73	412
Hydraulic fill - wells	---	119	119
Rolled fill	---	12	12
Prospective borrow pit	133	---	133
Consolidation and percolation	24	2	26
Miscellaneous	<u>34</u>	<u>5</u>	<u>39</u>
Total	3247	581	3828

(x) These sample numbers represent sets of 3 specimens each; or a total of 357 specimens.

JYJ/b

J. Y. Jewett

**MATERIALS - SAMPLING AND TESTING**

**CONCRETE AND AGGREGATES**



March 11, 1932

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

Sand sample - El Capitan Dam Site

Dear Sir:

Enclosed is report form, showing results obtained from examination of sand sample from vicinity of El Capitan Dam site, forwarded as per letter from your office of March 5.

To make strength tests in comparison with Standard Ottawa testing sand, as referred to in paragraph 70 page 36, of the specifications, a larger sample, of about fifty pounds, will be required. This will provide for a set of compressive tests on specimens of 4" x 8" cylinder form, covering test periods of 7 days, 28 days, and 3 months.

Judging from the results already obtained, this is an excellent grade of sand for concrete work. Presumably further exploration would be desirable, to determine whether this sample is representative of any large body of available material.

Yours very truly,

J. Y. Jewett  
Testing Engineer

JYJ/b  
cc: Two enclosed

March 25, 1932

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

Materials for concrete aggregate  
El Capitan Dam Site

Dear Sir:

Three samples of material for examination as to suitability for concrete aggregate for El Capitan Dam, brought in by Mr. Hill on March 19, have the following listing:

<u>Lab. No.</u>	<u>Job No.</u>	<u>Location</u>
18933	74	Test Pit No. 1 deposit in north bank of river about 1 mile above damsite, taken at 6 ft. depth
18934	75	Test pit No. 5, bar in midstream, same location. Depth of pit 7 feet. Sample taken about midway of depth.
18935	76	Test pit No. 7, same bar, depth of pit 8 feet sample taken about midway of depth.

Enclosed is report sheet showing results obtained from examination of sand portion of these samples, except that results of color test for organic contamination are not noted thereon. On this test (on Nos. 18933 & 34) a moderately heavy color is shown, approaching the stage which would be considered objectionable. If however, the material goes through a washing process before using, this organic content will probably be largely removed.

The material, both for the sand (as given on the report sheet) and for the gravel, shows a surprisingly high specific gravity. On the gravel portion (on a composite of Nos. 18934 & 35) this is 2.83 on portion passing the 2½" screen. On a few cobbles larger than this size, 2.97 was registered. This determination was made by method which gives the so-called "Apparent Specific Gravity", which takes account of the porosity of the material. In this case however, the water absorption on immersion for 24 hours was negligible.

In the matter of examination of gravel for hardness, where a range of sizes is included from ¼" up; the Deval abrasion apparatus with which the laboratory is equipped, does not come into service, as its use calls for a standard charge of eleven pounds, of fifty pieces, of approximately equal size. Therefore, pending the development of a standard abrasion test for gravel, recourse has been had to a process of working the sample over by hand with a hammer (i.e. an ordinary carpenter's hammer).

This process under which the individual pieces are placed on a hard surface and tapped with the hammer, gives a separation into three classes:

- (a) Soft, friable material, easily broken down to sand size by light tapping with the hammer.
- (b) Brittle, but hard grained material, easily broken under moderate blows with the hammer, but with angularity of fracture.
- (c) Hard material, not affected by the above process.

Past experience has shown the more friable material to be largely among the smaller sizes; and with the thought that its presence in these sizes might be less objectionable than in the larger, the sample was separated by screening on a  $3/4$ " screen. Resulting percentages are as follows:

	(a)	(b)	(c)
Portion passing $2\frac{1}{2}$ " screen held on $3/4$ "	11.3	13.7	75.0
" " " " " $1/4$ "	48.4	28.3	23.3
Cobbles held on $2\frac{1}{2}$ "			100.0

This wide range of hardness among the individual pieces (ranging practically from flint to putty by comparison) is characteristic of the gravels of this vicinity. An extensive series of tests carried out some years ago, to determine the relative effect on compressive strength of concrete, by including and removing the friable portions of the aggregate, showed but very little difference in this respect, among the materials ordinarily found in this vicinity. Where the more intangible properties of the effect of abrasion and impact are concerned however, it would seem that this condition of non-uniformity of hardness in the aggregate might be deserving of consideration, aside from the factor of compressive strength.

Judging from examination of the material as above reported, and pending results for compressive strength on the sand, in comparison with standard Ottawa, tests for which are under way; it appears that this deposit contains excellent material for ordinary concrete work. If there are any of the proposed concrete structures, such as conduits, where severe abrasive action might be expected, from the force of running water, it might be desirable to take measures for providing an aggregate of a more uniform grade of hardness for such structures. In this connection however, it may be noted that if the deposit is worked as a whole, and the large cobbles are run through a crusher, this will materially increase the percentage of hard rock in the mixture. In this connection, it may also be noted in passing that apparently these cobbles, in view of their hardness and density may be a difficult material on which to operate a crusher, as compared with ordinary quarry rock.

The several gravel portions (a) (b) and (c) as above listed, will be retained on exhibition in the laboratory if you or members of your office force care to examine them.

As suggested when visiting the location with you on the 21st; since excavation will be required of the material in the bar at the dam site, it would be well to have samples taken from that bar, for examination to see if they correspond in quality with those above discussed.

Yours very truly,

J. Y. Jewett  
Testing Engineer.

JYJ/b  
cc: one enclosed

LABORATORY REPORT ON CONCRETE AGGREGATES

March 25, 1932

Report accompanying letter of even date to Hydraulic Engineer on El Capitan Dam samples

Screen	Gravel portion held on $\frac{1}{4}$ " screen	<u>18933</u>	<u>18934</u>	<u>18935</u>
$1\frac{1}{2}$ inch		91%	30%	68%
$1\frac{1}{4}$ "	Sand portion passing same			
1 "		9%	70%	x32%
$\frac{3}{4}$ "				
$\frac{1}{2}$ "				
$\frac{1}{4}$ "				
Sieve No.		<u>Grading of sand portion</u>		
10		100	100	
20		84	83	
30		54	49	
40		32	23	
50		22	17	
100		15	12	
		5	4	
% silt and clay		2.4	2.2	
% mica		0.4	0.4	
Color test-organic	- see letter			
Hardness			excellent	
Specific gravity		2.77	2.76	

Remarks: Probable contributing feature to high specific gravity, is relatively high magnetic iron content

x Silty material not suitable for concrete aggregate

J. Y. Jewett  
Testing Engineer

3-18-35  
copy/p

March 25, 1932

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

Dear Sir:

Materials for concrete aggregate  
El Capitan Dam Site

Three samples of material for examination as to suitability for concrete aggregate for El Capitan Dam, brought in by Mr. Hill on March 19, have the following listings:

<u>Lab. No.</u>	<u>Job No.</u>	<u>Location</u>
18933	74	Test Pit No. 1. Deposit in N. bank of River, about one mile above dam site. Taken at 6 feet depth
18934	75	Test Pit No. 5. Bar in midstream, same location. Depth of pit 7 feet. Sample taken about midway of depth.
18935	76	Test pit No. 7. Same bar. Depth of pit 8 feet. Sample taken about midway of depth.

Enclosed is report sheet showing results obtained from examination of sand portion of these samples, except that results of color test for organic contamination are not noted thereon. On this test (on Nos. 18933 and 34) a moderately heavy color is shown, approaching the stage which would be considered objectionable. If however, the material goes through a washing process before using, this organic content will probably be largely removed.

The material, both for the sand (as given on the report sheet) and for the gravel, shows a surprisingly high specific gravity. On the gravel portion (on a composite of Nos. 18934 and 35) this is 2.83 on portion passing the 2 1/2" screen. On a few cobbles larger than this size, 2.97 was registered. This determination was made by method which gives the so-called "Apparent Specific Gravity" which takes account of the porosity of the material. In this case however, the water absorption on immersion for 24 hours was negligible.

In the matter of examination of gravel for hardness, where a range of sizes is included from 1/4" up; the Deval abrasion apparatus with which the laboratory is equipped, does not come into service, as its use calls for a standard charge of eleven pounds, of fifty pieces, of approximately equal size. Therefore, pending the development of a standard abrasion test for gravel, recourse has been had to a process of working the sample over by hand with a hammer (i.e. an ordinary carpenter's hammer).

This process, under which the individual pieces are placed on a hard surface and tapped with the hammer, gives a separation into three classes:

Mr. H. N. Savage (2)

- (a) Soft, friable material, easily broken down to sand size by light tapping with the hammer.
- (b) Brittle, but hard grained material, easily broken under moderate blows with the hammer, but with angularity of fracture.
- (c) Hard material, not affected by the above process.

Past experience has shown the more friable material to be largely among the smaller sizes; and with the thought that its presence in these sizes might be less objectionable than in the larger, the sample was separated by screening on a  $3/4$ " screen. Resulting percentages are as follows:

	(a)	(b)	(c)
Portion passing $2\ 1/2$ " screen held on $3/4$ "	11.3	13.7	75.0
Passing $3/4$ " screen, held on $1/4$ "	48.4	28.3	23.3
Cobbles, held on $2\ 1/2$ " screen			100.0

This wide range of hardness among the individual pieces (ranging practically from flint to putty by comparison), is characteristic of the gravels of this vicinity. An extensive series of tests carried out some years ago, to determine the relative effect on compressive strength of concrete, by including and removing the friable portions of the aggregate, showed but very little difference in this respect, among the materials ordinarily found in this vicinity. Where the more intangible properties of the effect of abrasion and impact are concerned however, it would seem that this condition of non-uniformity of hardness in the aggregate might be deserving of consideration, aside from the factor of compressive strength.

Judging from examination of the material as above reported, and pending results for compressive strength on the sand, in comparison with standard Ottawa, tests for which are under way; it appears that this deposit contains excellent material for ordinary concrete work. If there are any of the proposed concrete structures, such as conduits, where severe abrasive action might be expected, from the force of running water, it might be desirable to take measures for providing an aggregate of a more uniform grade of hardness for such structures. In this connection however, it may be noted that if the deposit is worked as a whole, and the large cobbles are run through a crusher, this will materially increase the percentage of hard rock in the mixture. In this connection, it may also be noted in passing, that apparently these cobbles, in view of their hardness and density, may be a difficult material on which to operate a crusher, as compared with ordinary quarry rock.

Mr. H. N. Savage (3)

The several gravel portions (a), (b) and (c), as above listed, will be retained on exhibition in the laboratory, if you, or members of your office force, care to examine them.

As suggested when visiting the location with you on the 21st, since excavation will be required of the material in the bar at the dam site, it would be well to have samples taken from that bar for examination to see if they correspond in quality with those above discussed.

JYJ/b  
cc: one enclosed

Yours very truly,

J. Y. Jewett  
Testing Engineer

	Laboratory Sample No.		
	<u>18933</u>	<u>18934</u>	<u>18935</u>
Gravel portion held on 1/4" screen	91%	30%	68%
Sand portion passing same	9	70	32(x)

Grading of sand Portion

Percentages passing 1/4" screen	100	100
Sieve No. 10	84	83
20	54	49
30	32	23
40	22	17
50	15	12
100	5	4
per cent silt and clay	2.5	2.2
per cent mica	0.4	0.4
Color test - organic - see letter		
Hardness	Excellent	
Specific gravity	2.77	2.76

Remarks: Probable contributing feature to high specific gravity, is relatively high magnetic iron content.

(x) Silty material, not suitable for concrete aggregate

J. Y. Jewett  
Testing Engineer

March 28, 1932

San Diego River Project, El Capitan Feature  
Log of test pit holes sunk in San Diego River Bar  
Located about one mile upstream from El Capitan Dam site.

Test Pit  
No.

1. Depth of pit 12 feet.  
Struck water at 10 feet  
First 5 feet very fine sand  
Strata 1 foot in thickness of coarse sand and gravel  
Remainder of pit rather coarse sand as per sample  
submitted to testing laboratory 3-19-32
2. Depth of pit 12 feet, struck water at 9 feet  
First foot very fine sand  
8 feet of coarse sand with slight gravel content  
Remainder of pit medium coarse sand
3. Depth 6 feet, struck water at 5 feet  
Coarse sand and gravel of about equal proportions to  
bottom of pit
4. Depth 6 feet, struck water at 5 feet  
Material same as encountered in test pit 3
5. Depth 7 feet, struck water at 5.5 feet  
Sand and gravel to bottom of pit as per sample  
submitted to testing laboratory 3-19-32
6. Depth 7 feet, struck water at 5 feet  
First foot coarse sand and gravel  
Remainder of pit medium coarse sand
7. Depth of pit 8 feet, struck water at 6 feet  
Gravel with small sand content to bottom of pit as per  
sample submitted to testing laboratory 3-19-32
8. Depth 5 feet, struck water at 3 feet  
First 1.5 feet largely gravel  
Remainder of pit coarse sand with slight gravel content
9. Depth 13 feet, struck water at 11 feet  
First 9 feet sandy loam  
1 foot strata of coarse sand, 2 feet of silt, coarse  
sand at bottom.



3-18-35  
copy/p

March 30, 1932

San Diego River Project, El Capitan Feature  
Log of Test Pits in Riverbed at El Capitan Dam Site

## Test Pit

No.	Coordinates		
	N	E	
1	3620	5580	Depth 6 feet, water at 5.5 feet, first 4 feet sand and gravel as per sample submitted to testing laboratory 3-28-32. Remainder of pit - silt.
2	3540	5410	Depth 7 feet, water at 6 feet, first 2.5 feet coarse sand and gravel, 0.5 feet silt, 1.0 feet coarse sand, 0.5 feet silt, remainder of pit medium coarse sand.
3	3690	5410	Depth 12 feet, water at 11 feet, first 1.0 feet coarse sand, 0.5 feet silt, 3 feet coarse sand and gravel, 4 feet silt, remainder of pit coarse sand.
4	3600	5290	Depth 8 feet, water at 7 feet, first 3 feet muck, sand and gravel, remainder of pit medium coarse sand with small silt content.
5	3510	5160	Depth 6 feet, water at 6 feet, sand and gravel to bottom of pit as per sample submitted to testing laboratory 3-28-32.
6	3580	5040	Depth 9 feet, water at 8 feet, first 2.5 feet coarse sand and gravel, 1.5 feet silt, 1.5 feet coarse sand, 1.5 feet silt, remainder of pit sand and gravel.
7	3510	4900	Depth of pit 7 feet, water at 6.5 feet, first 4 feet coarse sand and gravel as per sample submitted to testing laboratory 3-28-32, next 2 feet silt, remainder of pit coarse sand.
8	3675	4550	Depth 6 feet, first 3 feet sand and gravel, remainder of pit sandy silt.
9	3770	4260	Depth 8 feet, water at 7 feet, first 2 feet very fine sand, 2 feet medium coarse sand, 1.0 feet sand and gravel, remainder of pit coarse sand.

L. H. Hill

April 1, 1932

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

Materials for concrete aggregate  
El Capitan Dam Site

Dear Sir:

Three samples of material for examination as to suitability for concrete aggregate, additional to samples covered in report of March 25; taken from deposit at dam site, as referred to in last paragraph of said report, were brought in by Mr. Hill on March 28. These have the following listing.

<u>Lab.No.</u>	<u>Job No.</u>	<u>Location</u>
18941	77	Pit No. 1 near upstream toe of dam. 6 ft. depth Sand and gravel 4 ft. Silt 2 ft. Sample taken at 3 feet.
18942	78	Pit No. 5., near dam axis. Depth 7 feet. All sand and gravel. Sample taken at mid depth.
18943	79	Pit No. 7, near west end of bar about 125 feet west of dam axis. Depth 6 feet. 4 feet sand and gravel as per sample. Balance medium coarse sand.
18944	--	Composite (one-third each) of sand from above samples for compressive strength test in comparison with Standard Ottawa.

Enclosed is report sheet showing results obtained from examination of sand portion of these samples, except that results of color test for organic contamination are not noted thereon. On this test a moderately heavy color is shown, similar to that noted on samples from the upstream bar, as reported in said letter of March 25.

Specific gravity is high, and is not materially different from that shown on the upstream deposit. On the gravel portion (on a composite of the three samples) this is 2.8 on portion passing the 2-1/2 inch screen. On the cobbles larger than this size which in this case contained some soft rock, as will be shown in next paragraph, this was 2.9.

The gravel was examined for hardness under the same method as noted on 2nd page of report of March 25. Percentage rating under the classification there given, is as follows:

	(a)	(b)	(c)
Portion passing 2 1/2" screen held on 3/4"	8	24	68
" " " " " " 1/4"	56	31	13
Cobbles held on 2-1/2" " " "	8	12	80

Hydraulic Engineer  
Materials for Concrete  
Aggregates (2)

A marked variation in surface appearance of the gravel pebbles is noted; some of these being exceedingly smooth, while others are deeply pitted. Both conditions seem to prevail among the harder pebbles.

Results for compressive strength on sand mortar at 7 day period, on samples Nos. 18933 and 34 of report of March 25, run considerably higher than the comparative tests on Standard Ottawa. Seven day results on a composite of the three samples included in present report, will be due on April 6, at which time detailed statement of results at that period will be forwarded. The sets made up for these tests include specimens for 28 day and 3 month periods, results of which will be available later. The results already obtained indicate that the relatively high organic content registered under the color test, is not of a nature to seriously affect the strength under compressive test.

Judging from all results thus far available, it seems that the material in both of the deposits examined, is of suitable grade for concrete aggregate; and of relatively high grade, as compared with the general run of gravel deposits in this vicinity.

Yours very truly,

J. Y. Jewett  
Testing Engineer

JYJ/b  
cc: one enclosed

LABORATORY REPORT ON CONCRETE AGGREGATES

April 1, 1932

Report accompanying letter of even date to Hydraulic Engineer on El Capitan Dam Samples

Percentages passing Screen	Laboratory Sample No.		
	<u>19941</u>	<u>19942</u>	<u>19943</u>
2½ inch			
2 " Gravel portion held on 1/4" screen			
1½ " Sand portion passing same	45%	50%	54%
1½ "			
1 "	55%	50%	46%
¾ "	<u>Grading of Sand Portion</u>		
½ "			
¼ "	100	100	100
Sieve No. 10	55	59	58
20	31	26	40
30	20	12	26
40	14	8	18
50	9	5	11
100	3	2	3
% silt and clay	1.8	2.8	2.1
% mica and woody fibre	0.16	0.4	0.26
Color test-organic	see letter		
Hardness	excellent		
Specific gravity	2.78	2.75	2.75

Remarks: Probable contributing feature to high specific gravity, is relatively high magnetic iron content.

J. Y. Jewett  
Testing Engineer

2-14-35  
copy/p

April 6, 1932

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

Sand Tests - El Capitan Dam

Dear Sir:

Compressive strength tests referred to on 2nd page of my letter of April 1, relating to examination of materials for concrete aggregates at El Capitan Dam site; give results at 7 day period, in comparison with standard Ottawa testing sand, as shown below. This is on a mix of proportions 1:3 (by weight) made up into specimens of 4"x8" cylinder form.

	<u>Compressive strength</u> <u>Lbs. per sq.in.</u>		
Lab. Nos.	18933	18934	18944
	2540	3110	3110
	2620	3320	3110
Average	2580	3215	3110
Comparative Percentage	112.7	140.4	135.8

Coarseness of grading, and high specific gravity, show their effect in the above results. By referring to my letter of March 11, showing general results for compressive strength on sand mortars in this vicinity; it will be seen that the above results are well above the general average, and in the case of the last two samples, above the maximum shown there at 7 day period, on 1:3 mix.

As noted in said letter of April 1, results at 28 day and 3 month periods on these sets will be available later.

Yours very truly,

J. Y. Jewett  
Testing Engineer

JYJ/b  
cc H. Wood

July 27, 1932

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

Concrete proportioning El Capitan Dam

Dear Sir:

With reference to your letter of July 22 regarding suitable proportions of the various sizes of aggregate for concrete mixtures at El Capitan Dam; it is noted from Par. 69 p. 36 of the specifications, that, in general, it is intended that the relative volumes of fine and coarse aggregate should be in ratio of one to two. Experience with trial mixtures for maximum density, with sands of the type contemplated by the specifications, bring the sand content to somewhat less than one-third of the total aggregate. This however, produces a harsh working mix; and increase to at least one-third seems to be necessary in the interests of workability. Therefore, it seems that the provisions of said Par. 69 are suitable for basic purposes.

As to relative quantities of the several sizes of coarse aggregate, it is recommended (1) for mass concrete

Pass 2 1/2" screen held on 1 1/2"	36%
" 1 1/2" " " " 3/4"	36%
" 3/4" " " " 3/8"	28%

(2) for reinforced concrete if maximum size of coarse aggregate is 1 1/2", then the following percentages are recommended:

Pass 1 1/2" screen held on 3/4"	57%
" 3/4" " " " 3/8"	43%

If other maximum sizes are required, then computation can be made accordingly.

Yours very truly,

J. Y. Jewett  
Testing Engineer

JYJ/b  
cc one encl.

cc Resident Engineer 7/28/32

2-15-35  
copy/p

April 11, 1934

From : Testing Engineer  
 To : Hydraulic Engineer  
 Subject : Concrete tests El Capitan Dam

Results of compressive strength test (lbs. per square inch) at 3 month period, on the several sets of concrete specimens brought in from El Capitan Dam during year 1933, are as given in table below. This is supplementary to results at 7 and 28 day periods already reported on record sheets furnished by the El Capitan office, giving information as to location and composition of these sets as taken.

Date(1933) Taken	Lab. No.	Job Nos. of set	Proportions of Mix	
			1:2:4	1:2+5
January	2	19446	209-11	x2460
	11	19457	212-14	x2660
	25	19466	215-17	2800
February	14	19478	219-21	x2360
March	1	19509	235-37	3200
	13	19545	250-52	3700
	20	19549	253-55	3570
April	6	19602	274-76	3770
	15	19661	279-81	3990
May	25	19690	282-84	3140
	2	19696	309-11	3320
June	19	19709	319-20	Not made
	26	19711	321-23	2770
	14	19733	343-45	2160
July	17	19734	346-48	2310
	24	19762	361-63	2970
	24	19763	358-60	3280
	28	19766	366-68	+2140
	1	19776	378-80	3180
August	3	19777	381-83	+1980
	14	19798	403- 5	2800
	13	19877	430-32	2510
Sept.	23	19910	436-38	2510
	28	19911	439-41	2220
	4	19957	495-97	2580
October	4	19985	515-17	3520
	17	20031	526-28	2160
	21	20060	540-42	2730
	24	20070	550-52	--2510
	3	20112	573-75	3360
November	10	20124	585-87	3250
	13	20125	588-90	2620
	18	20265	593-95	3060
	1	20316	626-28	2050
December	7	20879	671-73	3360
	20	21382	1428-30	#2820
Average(not	incl.	Nos. 19766, 19777, 20070)		3040
				2360

General averages of the corresponding test results at 7 and 28 day periods, as appearing on the aforesaid record sheets, are as follows:

	Proportions of Mix	
	<u>1:2:4</u>	<u>1:2½:5</u>
7 days	1590	1300
28 days	2490	1980
x	Low strength due to use of mix of semi-liquid consistency in tunnel lining.	
+	Specimens taken from work on which the contractor was allowed to determine the proportions of mix, on tunnel lining.	
-	Broken at 35 days through error.	
#	Special mix of 1:2:5 proportions.	

Combination of the above with summary for the year 1932, as presented under date of April 18, 1933, gives the following averages for the whole period.

	<u>7 days</u>	<u>28 days</u>	<u>3 months</u>
1:2:4 mix	1630	2540	3080
1:2½:5 "	1340	2080	2500

JYJ/b  
 cc-Resident Engineer  
 State Engineer  
 Asst. Deputy State Engineer

J. Y. Jewett



April 18, 1933

From : Testing Engineer

To : Hydraulic Engineer

Subject : Concrete tests, El Capitan Dam

Results of compressive strength test (lbs. per sq. in.) at 3 month period on the several sets of concrete specimens brought in from El Capitan Dam during year 1932 are as given in table below. This is supplementary to results at 7 and 28 day periods already reported on record sheets furnished by the El Capitan office, giving information as to location and composition of these sets as taken.

Date taken Lab. No. of set

Date taken	Lab. No.	of set	Job Nos.	Proportions of Mix
August 16	19149	109-11	2400	1:2:4:5
August 22	19206	113-15	3080	1:2:4
Sept. 6	19210	117-19		
Sept. 13	19266	121-23		
Sept. 17	19272	125-27		
Sept. 20	19282	136-38		
Sept. 29	19302	143-45	2770	
October 29	19303	146-48	3160	
October 6	19317	158-60	2780	
October 6	19318	161-63		
October 14	19330	166-68		
October 19	19333	169-71		
October 28	19347	178-80		
November 3	19352	182-84		
November 16	19366	185-87		
November 27	19374	188-90		
December 30	19425	200-2		
December 9	19438	203-5		
December 19	19443	206-8	2620	
Average				3170
Specimen broken accidentally in handling				#2070
# Low strength due to use of mix of semi-liquid consistency in tunnel lining.				x

General averages of the corresponding test results at 7 and 28 day periods as appearing on the aforesaid record sheets are as follows

7 days	1730
28 days	2160

The above averages compare favorably with other tests made by the laboratory on similar mixes running somewhat higher than general averages on these mixes as shown in annual summary of all tests made by the laboratory to end of 1931. This is in accord with indications shown by preliminary examination of the materials proposed for use as concrete aggregates on the job. For instance, in one of the reports to your office on these materials (date of April, 1932) it was noted that "Judging from all results thus far available, it seems that the material in both of the deposits examined is of suitable grade for concrete aggregates and of relatively high grade, as compared with the general run of gravel deposits in this vicinity."

J.Y.P.  
co-Resident Engineer

J. V. Jewett

August 12, 1932

From : Resident Engineer  
 To : Hydraulic Engineer  
 Subject : San Diego River Project, El Capitan Feature  
 Placing concrete in toe wall footings

1. Placing of concrete for the upstream toe wall footing was begun on August 5, 1932. On August 9 the first concrete was placed in the footing for the downstream toe wall. The mix prescribed for this part of the work, that is, for mass concrete Class 8, is composed of the following by volume: one part cement to  $2\frac{1}{2}$  parts sand and about 5 parts of broken rock and gravel.

2. Under date of July 27 a letter from Mr. J. Y. Jewett gives the following as to relative quantities of the several sizes of coarse aggregate:

Pass $2\frac{1}{2}$ "	screen held on $1\frac{1}{2}$ "	36%
" $1\frac{1}{2}$ "	" " " $\frac{3}{4}$ "	36%
" $\frac{3}{4}$ "	" " " $\frac{3}{8}$ "	28%

3. The concrete is transported from the mixer plant to a position near the footing trench by three cubic yard capacity concrete hopper trucks. Considerable difficulty has been experienced in the proper placing of this material without segregation between the mortar and the rock.

4. On August 5 between the hours of 8 A.M. and 2 P.M. the following proportions by weight were being used:

Cement - 5 sacks	470 pounds
Sand	1320 "
$2\frac{1}{2}$ " rock	910 "
$1\frac{1}{2}$ " "	900 "
$\frac{3}{4}$ " "	698 "

The sand was wet and the control of the water was not satisfactory.

5. After 2 P.M. the mix was proportioned as follows:

Cement - 5 sacks	470 pounds
Dry sand	1340 "
$2\frac{1}{2}$ " rock	890 "
$1\frac{1}{2}$ " "	900 "
$\frac{3}{4}$ " "	715 "

6. On August 9 when the placing of concrete began in the downstream toe wall footing, the following mix was used:

Cement - 5 sacks	470 pounds
Dry sand	1340 "
2 $\frac{1}{2}$ " rock	760 "
1 $\frac{1}{2}$ " "	970 "
3/4" "	770 "

To this was added Celite 9 $\frac{1}{2}$  "

This last proportion of the concrete aggregate gives a good workable mix and seems to have sufficient large size rock, and it has been used up to and including the work of August 11.

7. Practically no control can be made of the water because of the extreme variation in moisture in sand over which we have no control. With the dry sand attempt is made to use about 37.5 gallons of water per batch.

8. The following table gives the proportional parts of the mix, the cubic contents and the weights as used up to and including August 11:

#### Concrete

Mix: 1:2.5:5      For Class 8 - Toe Walls  
As poured August 9, 10 and 11

	Weight in pounds per cubic foot	Total	Volume cubic feet	Proportional parts
Water	62.4	312	5.0	1
Cement	94.0	470	5.0	1
Sand(x)	97.5	1340	13.7	2.74
2 $\frac{1}{2}$ " rock	97.5	760	7.8	1.56
1 $\frac{1}{2}$ " rock	96.0	970	10.1	2.02
3/4" rock	95.5	770	8.1	1.62

(x) Dry from dump

9. The contractor has arranged for the purchase of six agitating type concrete trucks which will be used for transporting the concrete from the mixing plant to cableway transporting buckets, or as in the case of the downstream toe wall, buckets lifted by a crane.

Harold Wood  
Resident Engineer

HW/p

February 25, 1935

From : Testing Engineer  
 To : Hydraulic Engineer  
 Subject : Summary of concrete tests, El Capitan Dam

The following table shows results of compressive strength test (pounds per square inch) at 3 month period on the several sets of concrete specimens brought in from El Capitan during the year 1934 up to December 1 of that year. This is supplementary to results at 7 and 28 day periods already reported on record sheets furnished by the El Capitan office, giving information as to location and composition of these sets as taken.

1934		Lab. No.	Job Nos. (of set)	Proportions of Mix		
Date Taken	1:2:4			1:2:5	1:2:1:5	
Jan.	10	21508	1685-87		2770	
	12	21509	1801-03	2940		
	19	21575	1817-19			2250
Feb.	2	21825	2070-72	2820		
	8	21842	2094-96		2470	
	15	21867	2113-15	3540		
	26	21935	2180-82	3340		
Mar.	19	22190	2423-25	2950		
	20	22191	2426-28		3160	
	29	22275	2478-80		2510	
Apr.	4	22401	2561-63		2580	
	7	22402	2619-21	2920		
	11	22508	2652-54	3270		
May	8	22617	2764-66		2690	
	14	22620	2790-92	2800		
	25	22625	2794-96	3400		
Jul.	19	22918	2956-58	2550		
	21	22919	2967-69	2440		
Aug.	4	23011	3038-40	3050		
Sep.	5	23140	3104-06	2400		
	5	23141	3107-09	2900		
	8	23161	3125-27	2880		
	14	23245	3151-53	3100		
	18	23251	3229-31	2900		
	20	23259	3235-37	3480		
	21	23258	3232-34	3080		
	21	23260	3238-40	3050		
	22	23261	3241-43	2820		
	25	23280	3254-55	x		
	26	23319	3258-60	2620		
	27	23281	3260A-61-62	2320		

-2-

1934 Date taken	Lab. No.	Job Nos. (of set)	Proportions of Mix		
			1:2:4	1:2:5	1:2½:5
Oct. 1	23346	3320-22	3050		
2	23347	3323-25	2880		
4	23351	3326-28	2860		
4	23352	3329-31	3400		
4	23353	332-34	3050		
8	23354	3336-38	2360		
8	23355	3339-41	2460		
11	23356	3344-46	2750		
11	23357	3347-49	2860		
15	23364	3350-52	2680		
16	23365	3356-58	2730		
16	23368	3353-55	2570		
18	23370	3363-65	3120		
19	23369	3366-68	2950		
22	23373	3371-73	2550		
23	23374	3374-76	3080		
26	23378	3377-79	2790		
31	23398	3382-84	2550		
Noc. 2	23399	3390-92	2710		
5	23397	3387-89	2400		
8	23405	3393-95	2790		
8	23410	3396-98	3440		
9	23408	3399-3401	3080		
17	23411	3402-04	2680		
+23	23413	3405-07	2570		
24	23414	3408-10	3200		
30	23418	3412-14	2250		
Average			2750	2700	2250

x No specimen made for this period.  
+ No listing sheet received on this set.

General averages of the corresponding test results at 7 and 28 day periods, as appearing on the aforesaid record sheets, are as follows:-

	7 days	1490	1460	1070
28 days	2380	2250	1850	

Combination of the above with summaries for the years 1932, as presented under date of April 18, 1933 and 1933, as presented under date of April 11, 1934, gives the following averages for the whole period.

			7 days	28 days	3 months
1:2:4	mix	87 sets	1550	2450	2890
1:2:5	"	7 "	1450	2270	2720
1:2½:5	"	14 "	1320	2060	2480

The results for the year 1934, as represented by the general averages, are somewhat lower than for the two preceding years, thus reducing the averages for the whole period to lower figures than those given for the former years in above noted reports of April 18, 1933 and April 11, 1934.

In last paragraph of report of April 18, 1933, reference was made to the possibilities of obtaining a concrete of relatively high strength from the materials available; to which might be added the comment that the cement furnished on this job has been of a type to tend toward producing a higher strength in concrete than the general run of cements available during previous years. This point has been noted and commented on in my annual summaries of cement tests in recent years, showing a marked increase in fineness of grinding, and in accompanying tensile strength in standard mortar tests; yielding results considerably above the minimum limit of the standard specifications, which limits, in turn, have been gradually raised from time to time.

It seems however, that some concessions have been called for in the matter of consistency of mix; not continuous, but with some frequency, in allowing the use of a mix of unduly wet consistency in order to facilitate the placing operations under conditions arising on certain features of the work. For instance, the report of April 11, 1934, notes this condition on several sets taken from tunnel lining operations; also when visiting the work while the Bodenhamer contract on spillway construction was under way, it was noted that concrete was being run from the mixer to the point of deposit, through a long chute, of such slope as to require a relatively wet mix to obtain flowage.

J. Y. Jewett

JYJ/b  
cc-Resident Engineer

**MATERIALS - SAMPLING AND TESTING****CEMENT**

June 8, 1932

Rohl-Connolly Company  
650 F Street,  
San Diego, California.

Subject: El Capitan Reservoir Dam, Spillway  
and Outlet Works, Policies.

Gentlemen:

For the purpose of advancing and expediting in the most economical way the combined interests of the Contractor for the installation of the City's El Capitan Reservoir Dam, Spillway and Outlet Works and the City of San Diego, it is necessary for the City to be informed as much in advance as practicable of the policies, order of work and rate of work the contractor contemplates.

For example, Contractor's requirement for the delivery of cement in order that the City may arrange for the grinding and binning in advance of the quantities required to insure twenty-eight day tests, and thereby escape delay in the Contractor's use thereof.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer.

HNS/f



4/28/33  
copy /f

1250

H. W. ROHL & T. E. CONNOLLY  
CONTRACTORS

June 14, 1932

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

Dear Sir:

Wish to advise there has this date been placed with the California Portland Cement Co., Pacific Mutual Building - Los Angeles, Calif., an order for cement for use at the El Capitan Reservoir Dam. This cement to be ready for delivery as of July 15th.

This order being placed at this time so as to allow the City's Testing Engineer sufficient time to secure average samples and prepare and run 28-day tests before shipments are made.

Very truly yours,

H.W.Rohl -T.E.Connolly

By BEN WELLS (Signature)  
Ben Wells  
General Superintendent

June 11, 1932

Rohl-Connolly Company  
Contractors, El Capitan Dam  
650 F Street  
San Diego, California.

Subject: El Capitan Reservoir Dam, Spillway and  
Outlet Works, Materials of Construction,  
Requirements, Cement, Testing.

Gentlemen:

Supplementing my letter dated June 8, subject, "El Capitan  
Reservoir Dam, Spillway and Outlet Works, Policies";

The City's Testing Engineer, J. Y. Jewett, will require  
about 6 weeks time after notice of your placement of contract  
and order for cement in which to have the cement company  
grind and stock-pile the first 2,000 or 3,000 barrel bin of  
cement for testing, from which bin the Testing Engineer will  
secure average samples and prepare and run 28-day tests be-  
fore approving the shipment or hauling of cement for use on  
the El Capitan job.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer.

HNS/f

cc John M. Martin  
cc Ben F. Wells

December 1, 1932

California Portland Cement Company  
Colton, California.

Attention: Mr. Hanna

Subject: San Diego River Project, El Capitan  
Feature, Cement.

Gentlemen:

For some time past your company has been shipping cement from bins tested by the City of San Diego's representative, to H. W. Rohl and T. E. Connolly, contractors on the City's El Capitan Reservoir Dam.

It is understood that shipments were commenced from a 10,000 barrel tested bin on or about November 18, 1932.

Recently the local representative of the Riverside Cement Company advised that they would commence shipping to Rohl & Connolly on or about December 12, 1932 and requested that a bin of cement be tested for shipping.

Rohl & Connolly's representatives are under the impression that all cement is to come from your plant.

Please advise as to your understanding in the matter.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer.

FDP/81

RIVERSIDE CEMENT COMPANY  
621 SOUTH HOPE STREET  
LOS ANGELES, CALIFORNIA

November 30, 1932

Mr. Fred Pyle,  
San Diego City Water Development Office,  
San Diego, California.

Dear Sir:

Today our Mr. Conley telephoned us to the effect that you wished us to assume the responsibility for the cost of testing such Riverside cement as will be used in the construction of El Capitan Dam.

We understand that samples of the cement have been taken and are now in the hands of your testing engineer. We ask that you take this letter as authorizing the changing the testing costs to us.

Yours truly,

NORMAN MECHELL (Signature)

Vice Pres. & Gen'l Sales Mgr.

NM-MH

4/28/33  
copy /f

1254

January 13, 1933

Messrs. H. W. Rohl and T. E. Connolly  
Contractors El Capitan Dam  
4351 Alhambra Avenue  
Los Angeles, California.

Subject: San Diego River Project  
El Capitan Feature,  
Cement test.

Gentlemen:

Reports indicate that there are now only about 1200 barrels of cement remaining in the last 10,000 barrel bin tested and approved by the City's Testing Engineer at Colton for the El Capitan Dam job, and all of which may be shipped within ten days.

Your attention is invited to paragraph 68 of the contract specifications wherein it is stated "All cement proposed for use will be tested by the engineer and the contractor shall make ample time allowance for such testing in planning deliveries."

Please advise from what source you expect to obtain cement after the present tested bin at Colton is exhausted.

Very truly yours,

H. N. Savage  
Hydraulic Engineer.

HNS/p

cc H.W.Rohl and T.E.Connolly  
El Capitan Dam  
Contractor's Resident Representative  
City's Resident Engineer

El Capitan Dam  
March 11, 1933

From : Resident Engineer  
To : Hydraulic Engineer  
Subject: San Diego River Project, El Capitan Feature  
Cement

1. On September 23, 1932 the resident engineer received copy of a letter addressed to the Testing Engineer J. Y. Jewett, dated September 22, 1932, advising that the resident engineer would receive duplicate copies of the information sent the testing engineer by the resident inspector at the Colton Plant. These duplicate shipment invoices stating the number of barrels in each car shipped and the bin number have been received by the resident engineer since October 8, 1932.
2. The last of the first order of cement placed by the contractor was received on the job on September 24, 1932. On October 8, 1932, the resident engineer received a memorandum from the Testing Engineer, Mr. J. Y. Jewett advising that the total shipments of cement to September 24, 1932, checked with the report of the resident engineer to the Testing Engineer of cement received on the job.
3. On January 13, 1933, the Hydraulic Engineer addressed a letter to the contractor for the El Capitan Dam requesting advice from what source he expected to obtain cement after the present tested bin at Colton was exhausted. A copy of this letter was received by the resident engineer on January 14, 1933. This letter was read to Allen Rowe, Engineer for the contractor at 11:30 A.M. January 14, 1933.
4. On January 17, 1933, Mr. R. Colgate of the contractor's office staff, reported orally to the resident engineer that cement had been ordered from Colton and that samples had been sent to Mr. J. Y. Jewett. I told Mr. Colgate that he should write this in a letter to the Hydraulic Engineer. He promised to do this.
5. On January 19, 1933, Mr. J. Y. Jewett telephoned to the resident engineer that a bin of 1500 barrels of cement at Colton had been sampled on January 16, 1933 and that 7 day test report would be sent out on January 24, 1933.
6. On February 1, 1933 the last cement from bin 9 was hauled by truck directly to the job. On February 6, 1933, the first cement from bin 11 was shipped. Identification of this shipment was verified by the resident engineer by phone to Mr. R. Colgate who reported that he had telephoned directly to Mr. Ingold on February 6, 1933 and that Mr. Ingold had supervised the loading and had forwarded the invoices. The invoice was received from Mr. Ingold by the resident engineer on February 8, 1933.

7. Shipments have been made on February 27 and March 3 from bin 11 and notices of the shipments have been received by the resident engineer.

8. It was not known to the resident engineer until March 10, 1933 that the Hydraulic Engineer had had no reply from the contractor to the letter of the Hydraulic Engineer dated January 13, 1933.

9. This letter is to make of record the method of cement identification used on the El Capitan job.

Harold Wood  
Resident Engineer

4/28/33  
copy /f

1257

San Diego, California  
March 20, 1933

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

Subject: San Diego River Project, El Capitan  
Feature, Cement.

Dear Sir:

Replying to your letter dated January 13, 1933 addressed to H. W. Rohl and T. E. Connolly, Contractors El Capitan Dam, 4351 Alhambra Avenue, Los Angeles, California;

It is my understanding from Contractor H. W. Rohl that he has requisitioned a 3,000 barrel bin of cement from the California Portland Cement Company to be stock piled for testing by the City of San Diego's Testing Engineer.

Very truly yours,

E. ALAN ROWE (Signature)



May 8, 1933

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

Subject: San Diego River Project, El Capitan Feature  
Cement, testing.

Gentlemen:

The contract specifications for the construction of El Capitan Reservoir Dam, Spillway and Outlet Works, in reference to cement, read, in part, as follows:

"68. CEMENT.- . . . . All cement proposed for use will be tested by the Engineer and the Contractor shall make ample time allowance for such testing in planning deliveries. . . . ."

Anticipating the requirements for cement, letters were written to the Contractor under dates of June 8, 1932 and June 11, 1932, copies attached, requesting that the City be informed as much in advance as practicable of the Contractor's policies, order of work and contemplated rate of work in order that the City might arrange for testing the cement and thereby prevent delay to the Contractor.

By letter dated June 14, 1932, copy attached, the Contractor notified the Engineer that on that date an order had been placed with the California Portland Cement Company, Colton, for cement for use in El Capitan Dam, the cement to be ready for delivery as of July 15, 1932, and that the order was being placed to allow the City's Testing Engineer sufficient time to secure samples and prepare and run 28-day tests before shipments were made.

In accordance with the Contractor's letter of June 14, 1932, the cement was tested at the Colton plant of the California Portland Cement Company, found to be satisfactory, and was duly approved and used in the work.

About November 23, 1932, during the Hydraulic Engineer's absence in Washington D.C. on official business, verbal information was received by Testing Engineer J. Y. Jewett and by Engineer Fred D. Pyle, from the Riverside Portland Cement Company that they expected to start shipping on December 12, 1932, cement for use in El Capitan Dam, and suggested that a bin of their cement be tested. This information was taken up verbally by the City's Resident Engineer with Contractor H. W. Rohl who stated that the Contractor's cement was all coming from the California Portland Cement Company at Colton.

Later, the Riverside Portland Cement Company's local

representative verbally reaffirmed the statement to Engineer Fred D. Pyle that his company expected to start shipping cement on December 12, 1932. He was advised by Engineer Pyle that instructions relative to cement shipments, in order that tests might be made, should come from the Contractor. He was advised that the expense of testing the cement was born by the City and that the cement should not be tested by the City unless it was to be used in the work.

Letter dated November 30, 1932, copy attached, was received from the Riverside Portland Cement Company stating that it assumed the responsibility for the cost of testing Riverside cement. In view of the above letter a test was made, unauthorized by the Hydraulic Engineer, of a 4,000-barrel bin of cement at the Riverside Portland Cement Company's plant.

On December 1, 1932, a letter, copy attached, was sent to the California Portland Cement Company, relative to the statements of the agent of the Riverside Portland Cement Company and advising that the Contractor's representatives were under the impression that all cement was to come from the California Portland Cement Company and requesting advice as to their understanding. No reply was received to this letter.

On January 13, 1933, by letter, copy attached, the Contractor was requested to advise as to source they expected to receive cement after the bins of tested cement at the Colton plant of the California Portland Cement Company were exhausted. No reply was received to this letter until March 20, 1933 when by letter signed by E. Alan Rowe, Contractor's representative, the City was advised that the Contractor had requisitioned a 3000-barrel bin of cement from the California Portland Cement Company for testing by the City of San Diego. Copy of this letter is attached.

Samples of this cement were taken so that 7-day tests would be completed on March 29, 1933.

On March 23, 1933, uncertified cement began to arrive on the work from this bin before its release by the City's inspectors, and about 16 barrels of this cement were placed in the core wall of the dam.

On March 24, 1933, the Hydraulic Engineer and the Contractor in conference agreed that in order to avoid a shutdown the uncertified cement could be used at the contractor's risk subject to his removal if not found satisfactory. See copy of attached letter to the City's Testing Engineer dated March 25, 1933.

The 7-day tests of samples which were completed on March 29, and the 28-day tests which were completed in due time, indicated that the cement was acceptable.

Honorable Mayor and Council

-3

5/8/33

In only one instance has the City been properly advised by the Contractor according to the provisions of paragraph 69 of the contract specifications quoted above, viz: by his letter dated June 14, 1932, as to orders placed by him for cement, so that the City could take proper samples and complete necessary tests in advance of shipments. It has been necessary in order not to delay the construction of El Capitan Dam work, to make tests on hearsay and on requests from the cement companies, with the result that a 4000-barrel bin of Riverside Portland Cement was tested by the City and never used in the work.

Had the Contractor complied with the contract specifications by notifying the City as additional bins of cement were required, there would have been no complications.

Respectfully,

H. N. Savage,  
Hydraulic Engineer.

HNS/p  
encls. (8)

Letter to Contractor June 8, 1932  
 " " " June 11, 1932  
 " from " June 14, 1932  
 " " Riverside Portland Cement Company 11-30-32  
 " to California Portland Cement Company 12-1-32  
 " " Contractor 1-13-33  
 " from E. Alan Rowe 3-20-33  
 " to Testing Engineer J. Y. Jewett 3-25-33

4/20/34  
copy /f

1261

H. W. ROHL & T. E. CONNOLLY  
CONTRACTORS

Lakeside, Cal.,  
June, 10, 1933.

Mr. H. N. Savage, Hydraulic Engineer,  
530 F St.,  
San Diego,  
Cal.

Dear Sir:

When the present tested supply of cement for the El Capitan Dam, which cement is in the bin set aside at Colton, is exhausted; additional cement needed will be obtained from the Riverside Portland Cement Co. at Riverside until further notice.

Would you please arrange your necessary sampling and testing accordingly.

Yours very truly,  
H.W.Rohl & T.E.Connolly

by T. E. CONNOLLY (Signature)

June 13, 1933

Messrs. H. W. Rohl & T. E. Connolly  
Contractors El Capitan Dam  
4351 Alhambra Avenue  
Los Angeles, California.

S-15

Subject: San Diego River Project, El Capitan Feature  
Contract Construction; Materials of  
Construction, Cement.

Gentlemen:

Receipt is acknowledged of your letter dated June 10, 1933, in which you state, "when the present tested supply of cement for the El Capitan Dam, which cement is in the bin set aside at Colton, is exhausted; additional cement needed will be obtained from the Riverside Portland Cement Company at Riverside until further notice".

It is my understanding from you orally that you desire to take at this time from the California Portland Cement Company, Colton, from the bin tested many months ago only the remaining about 600 or 700 barrels of cement.

The City's Testing Engineer has been directed to arrange with the Riverside Portland Cement Company to immediately stock a bin of cement for testing in anticipation of your requirement for its shipment.

The courtesy and cooperation of your timely notice is recognized and appreciated.

Very truly yours,

H. N. Savage,  
Hydraulic Engineer

HNS/f

LABORATORY RECORD OF CEMENT TESTS  
SUMMARY

Brand of Cement	Number of barrels in bin	Date Sampled	Number of Samples taken	Average Soundness Test	Average Fineness pass sieve No. 200	Average Setting time			Average Tensile Strength		
						Initial H M	Final H M	7 days	28 days		
Colton	2500	6-7-32	13	O.K.	93.1	4	10	6	15	371	425
"	from mixer	7-10-32	composite	"	91.7	4	15	6	45	358	383
"	10000	7-22-32	50	"	92.3	4	00	6	45	382	429
"	10000	8-11-32	50	"	91.2	4	15	7	15	357	408
"	from mixer	8-29-32	composite	"	91.0	4	30	7	30	360	397
"	10000	9-9-32	50	"	92.4	4	00	7	30	344	404
Riverside	4000	11-26-32	20	"	95.4	3	50	7	15	373	428
Colton	from mixer	11-28-32	composite	"	92.4	4	10	7	30	362	384
"	1500	1-16-33	7	"	91.8	4	30	7	30	343	405
"	3000	3-4-33	15	"	92.3	4	30	7	30	374	439
"	5000	4-13-33	25	"	92.0	4	30	7	30	371	425
Riverside	2000	7-22-33	10	"	90.7	3	30	6	30	347	422
"	4000	9-2-33	20	"	92.5	3	30	6	00	372	438
"	3500	9-15-33	17	"	83.0	3	30	6	00	315	380
"	4000	9-18-33	20	"	91.6	3	45	7	00	386	445
"	3500	10-9-33	18	"	95.0	3	30	6	00	380	438
"	3500	10-16-33	17	"	94.3	3	30	6	00	355	434
"	1300	10-20-33	6	"	94.5	3	30	6	00	382	461
"	1200	10-20-33	5	"	93.7	3	30	6	00	350	459
"	3500	11-3-33	17	"	93.6	3	10	5	50	378	453
"	3500	1-24-34	17	"	94.4	3	15	6	15	390	449
"	1000	4-24-34	6	"	88.8	3	15	6	20	329	408
"	1200	7-13-34	6	"	95.6	3	20	6	30	366	459
Monolith	9000	7-13-34	45	"	90.4	4	30	7	15	357	434
Riverside	3000	8-30-34	15	"	92.8	3	50	7	30	384	443
Monolith	10000	9-28-34	50	"	92.5	4	40	7	30	371	428
Riverside	3000	10-27-34	15	"	92.5	3	30	6	45	385	435
Victor	from mixer	11-30-34	1	"	94.2	3	00	6	00	349	469

MATERIALS - SAMPLING AND TESTING

HYDRAULIC FILL - FRICTION TESTS

July 17, 1934

From : Resident Engineer  
 To : Hydraulic Engineer  
 Subject : San Diego River Project, El Capitan Feature  
 Hydraulic fill, stability section coefficient of friction

*Review  
 Hydraulic  
 file  
 for letter  
 see 1274*

1. As requested by Deputy State Engineer Geo. W. Hawley, tests to determine the coefficient of friction of the materials composing the stability sections of El Capitan Dam have been made.

2. Two sets of tests were made, one on July 10, 1934 using weights up to 100 pounds, and another on July 16, 1934 using weights up to 200 pounds.

3. The procedure was as follows: A cubical pine box of 1 cubic foot capacity, open top and bottom and of 3/4 inch thickness was placed upon the beach of the stability section and the lower edge carefully dug into the beach from the outside until the box settled 3 inches into the beach material. This left the 3 inches of material inside the box undisturbed. The box was then filled to the top with material from the beach for weight. A horizontal pull was applied to the box to cause a shear in the beach material. The pull was applied by a lever and measured by a spring balance. For the tests made on July 16 the same procedure was followed except an additional load of 100 pounds was applied to the top of the box. This test was delayed from July 10 until spring balances with more capacity could be obtained. The tests were made at various locations on the two beaches to get results on various kinds of materials.

4. The following table shows the results of the tests.

LOCATION	ELEVA- TION	PULL TO FRACTURE pounds	PULL TO SLIDE pounds	TOTAL LOAD pounds	COEFFICIENT OF FRICTION
Downstream					
N3400-E4927	702	114	100	95	1.20
N3360-E4930	702	108	90	95	1.14
N3250-E4925	703(x)	108	96	100	1.08
N3800-E4930	706 c	192	168	190	1.00
N3620-E4930	706 ↗	216	192	200	1.08
N3250-E4930	706 e	192	168	200	.96
Upstream					
N3280-E5080	702	120	99	100	1.20
N3700-E5080	702	126	99	100	1.26
N3800-E5075	702	120	102	100	1.20
Average of tests					1.12

- (x) Contains some Lakeside material  
 c Ordinary beach material  
 ↗ contains some hard lumps  
 e Quite sandy.

*Harold Wood*  
 Harold Wood  
 Resident Engineer



8-2-34

From : Testing Engineer  
 To : Hydraulic Engineer  
 Subject : Friction test No. 2 beach sample, El Capitan Dam

This is Job No. 3034 taken at coordinates N 3890 E 5078 elevation of sample 715, or water surface 712.2 laboratory No. 22999. Test was made on August 2 under similar conditions to those reported on Test No. 1 made August 1. Results obtained were as follows, record taken by Paul Beermann.

(a) As brought in from the field	Lateral force pounds	Coefficient of friction
1st yield point	3000	.3
Intermediate lingering point	5000	.5
Maximum obtained after 10 minutes	7270	.73
Weight set back on beam and end point reached at	6800	.68

Time (b) Replaced by hand tamping (c) Replaced, water saturated  
 Minutes-seconds Rate of travel of machine head .05 inch per minute

		Lateral force pounds	Coefficient of friction	Lateral force pounds	Coefficient of friction
0	30	2100		1000	
1	00	2400		1800	
	10	2400	yield point .24		
	30	2600		2500	
	45			2700	yield point .27
2	00	2900		2900	
	30	3200		3100	
3	00	3400		3500	
	30	3600		3700	
4	00	3900		4000	
	30	4000		4400	
5	00	4200		4600	
	30	4400		4900	
6	00	4700		5100	
	30	4800		5400	
7	00	4900		5600	
	30	5000		5800	
8	00	5130			
	30	5300		6100	
9	00	5400		6200	
	30	5500		6300	
10	00	5500		6400	
	30	5600		6500	
11	00	5700		6520	.65
	30	5800		6555	
12	00	5800		6555	
	30	5800	.58	6555	
13	00	5900		6600	
	30	5900	set back	6600	
14	00	5900		6700	end point
	30	5900			

J. Y. Jewett

8-2-34

From : Testing Engineer  
To : Hydraulic Engineer  
Subject : Friction tests, beach samples, El Capitan Dam

This is sample No. 1 of this type, made August 1st, on beach material brought in by the Resident Engineer, in sampling cylinder having short 3" ends with 3" center piece. The bottom end is equipped with a cutting edge, by means of which, with pressure applied at the top, an undisturbed sample of the material in place is taken. This sample was taken at coordinates N 3895 E 5078, elevation 715, elevation of water surface 712.2. Job No. is 3033; laboratory No. 22998.

The area of cross-section of sample is 0.55 square feet. In preparing the sample for test, horizontal pressure was applied through a car spring, amounting to 5000 pounds, considered as equivalent to a fill head of 75 feet, assuming weight of material at 124 pounds per cubic foot. The sample was then placed in the testing machine and lateral pressure applied on top of the center ring.

The sample was first tested (a) as brought in from the field. Second test (b) was made on the material as removed from the cylinder, and replaced by hand tamping. Third test (c) was made on the material as removed from the cylinder, and replaced in a water saturated state.

Record of results, as taken by Paul Beermann during progress of the tests, is as follows. The tests were also witnessed by Resident Engineer Wood, who directed the setting up of the apparatus in which he was assisted by Tom Knott. Rate of speed of the traveling head of the testing machine was not recorded but was in the vicinity of 0.4 inch to 1.0 inch per minute.

	Pounds	Coefficient of friction
(a) First yield point	2930	.29
Final constant force or end point	7565	.76
(b) First yield point	2500	.25
End point	7200	.72
(c) First yield point	2400	.24
End point	3600	.36

J. Y. Jewett

JYJ/p

From : Testing Engineer  
 To : Hydraulic Engineer  
 Subject : Friction Test No. 3, beach material, El Capitan Dam

This is Job No. 3035, laboratory No. 23000 reported as taken at coordinates N 3550 E 5085 at elevation 714. Test was made under same conditions as Nos. 1 and 2, with 5000 pounds horizontal force applied before placing in testing machine. Rate of travel of machine head during test 0.05 inch per minute to yield point and .10 inch per minute beyond except on (a) which was started at the latter rate but which proved to be too fast. Record of results, as taken by Harold Wood during progress of the test is as follows:

Time	(a)		(b)		(c)	
	Minutes	Lateral Coefficient	Lateral Coefficient	Lateral Coefficient	Lateral Coefficient	Lateral Coefficient
Seconds	Force lb. of friction	of friction	force of friction	of friction	force of friction	of friction
0 00	As brought in from field		Sample retamped		Start	Re-filled wet
0 15					600	
0 30			Start		1000	
0 45			400		1400	
1 00	Start					
1 00	1400		800		1700	
1 15	2500	Yield .25	1200		2000	yield .20
1 30	2900	point	1400		2400	point
1 45	3400		1500	yield .15	2700	
2 00	4100		1900	point	3100	
2 15	4600		2100		3500	
30 30 00	5100		2500		3900	
3 45	5500		2800		4200	
3 00	6000		3100		4600	
3 15	6300		3400		5000	
3 30	6700		3700		5200	
3 45	7000		3900		5500	
4 00	7300		4100		5800	
4 15	7500		4400		6100	
4 30	7700		4500		6200	
4 45	7800		4700		6400	
5 00	7900		4900		6700	
5 15	8100		5000		6900	
5 30	8200		5100		7000	
5 45	8300		5200		7200	
6 00	8400		5400		7400	
6 15	8500		5500		7500	
6 30	8500		5600		7600	
6 45	8500		5800		7800	
7 00	8550		5900		7900	
7 15	8550		5900		7950	
7 30	8550		6000		8000	
7 45	8550		6100		8000	
8 00		end point .85	6200		8100	
8 15			6200		8100	
8 30			6300		8100	
8 45			6300		8100	end .81
9 00			6400			point
9 15			6400			
9 30			6400			
9 45			6500			
10 00			6500			
10 15			6600			
10 30			6650			
10 45			6700			
11 00			6800	end poing .68		

8-6-34

From : Testing Engineer  
 To : Hydraulic Engineer  
 Subject : Friction test No. 4, El Capitan Dam

El Capitan Sample No. 3036. Test made by Harold Wood, T. L. Knott and J. Y. Jewett. Reported as taken at coordinates N 5080 E 3950 at elevation 716. Rate of travel of testing machine head .05 inch per minute. Head of fill 50 feet = 3300 pounds = 8-9/16".

Time	As taken from	Dry	Wet
Minutes	beach (Lateral force - pounds)		
Seconds			
0	00	100	400
	15	150	1400
	30	1000	1650
	45	1100	1800 yield
1	00	1500	2000
	15	2000	2200
	30	2200 yield	2400
	45	2400	2500
2	00	2600	2600
	15	2700	2800
	30	2800	2900
	45	2900	3000
3	00	3200	3150
	15	3300	3250
	30	3500	3400
	45	3600	3500
4	00	3800	3600
	15	3900	3700
	30	4000	3800
	45	4200	3900
5	00	4300	4000
	15	4400	4100
	30	4500	4200
	45	4600	4300
6	00	4700	4400
	15	4800	4450
	30	4900	4550
	45	5000	4600
7	00	5100	4700
	15	5150	4800
	30	5200	4800
	45	5250	4900
8	00	5300	4950
	15	5400	5000
	30	5500	5050
	45	5550	5100
9	00	5600	5150
	15	5600	5200
	30	5650	5200
	45	5650	5250
10	00	5650	5250
	15		5300
	30		5300
	45		5300
11	00		5300
	15		5300
	30		5300
	45		5300
12	00		5300

J. Y. Jewett

8-8-34

From : Testing Engineer  
 To : Hydraulic Engineer  
 Subject : Friction Test No. 5 El Capitan Dam

El Capitan Sample No. 3037, coordinates N 3955 E 5080, elevation 716, rate of travel of testing machine head .05 inch per minute, head of fill 50 feet = 3300 pounds

Time Minutes Seconds	As taken from beach Large lumps decom- posed granite and clay	Dry tamped	Wet
1 00			
15	400	200	800
30	1100	1000	1100
45	1200	1200	1200
1 00	1500	1300 yield	1400 yield
15	1700	1500	1600
30	1800	1600	1800
45	2000	1700	2000
2 00	2200	1800	2100
15	2400	1900	2300
30	2500	2000	2400
45	2600	2100	2500
3 00	2800	2200	2600
15	3000	2300	2800
30	3100	2400	2900
45	3250	2500	3000
4 00	3400	2600	3100
15	3500	2700	3200
30	3600	2800	3300
45	3800	2900	3400
5 00	3900	3000	3500
15	4000	3100	3600
30	4100	3150	3650
45	4200	3200	3800
6 00	4250	3300	3850
15	4400	3350	3900
30	4450	3400	3950
45	4600	3500	4000
7 00	4700	3600	4050
15	4750	3650	4150
30	4800	3700	4200
45	4950	3800	4250

Friction test No. 5

--2

Time Minutes Seconds	As taken from beach	Dry tamped	Wet
8	00	5000	4300
	15	5100	4350
	30	5100	4400
	45	5150	4500
9	00	5200	4600
	15	5250	4600
	30	5300	4650
	45	5350	4700
10	00	5400	4700
	15	5450	4750
	30	5500	4800
	45	5600	4800
11	00	5600	4850
	15	5600	4900
	30		4950
	45		5000
12	00		4700
	15		4700
	30		4750
	45		4800
13	00		4800
	15		4850
	30		4900
	45		5000
14	00		5200
	c = .85	c = .73	c = .79

J. Y. Jewett

JYJ/p

8-15-34

From : Testing Engineer  
 To : Hydraulic Engineer  
 Subject : Beach samples; friction tests Nos. 6 and 7  
 El Capitan Dam

These samples are Job Nos. 3065 and 66, brought in August 10. Corresponding Lab. Nos. are 23036 and 37. Location from which taken, as reported by the El Capitan office, shows the same listing for both samples, viz:- coordinates N 3750 E 4925; elev. 718.

Tests were run on these samples by the writer with Tom Knott assisting on August 14th with results as tabulated below. Horizontal set-up was for 3300 pounds equivalent to head of fill of 50 feet. Rate of travel of testing machine head was .05 inch per minute. Listings in table below are: (a) as taken from the beach; (b) replaced by hand tamping; (c) replaced in water saturated state.

Time Minutes Seconds	Lateral force - pounds					
	No. 3065			No. 3066		
	(a)	(b)	(c)	(a)	(b)	(c)
0 00	500	100	200	300	100	200
0 15	1000	500	900	1000	800	1200
0 30	1500	1200	1100	1350	1100	1500
0 45	1700	1300	1400x	1700x	1300	1700x
1 00	1900x	1400x	1700	2100	1400x	1900
1 15	2100	1500	1900	2400	1500	2100
1 30	2300	1600	2100	2700	1750	2300
1 45	2550	1700	2300	3050	2000	2500
2 00	2750	1750	2500	3350	2200	2700
2 15	3000	1850	2700	3600	2350	2800
2 30	3150	1900	2800	3900	2500	2950
2 45	3350	2000	2900	4100	2700	3050
3 00	3600	2100	3000	4450	2850	3150
3 15	3750	2150	3100	4600	3050	3250
3 30	3900	2200	3200	4850	3200	3350
3 45	4100	2300	3300	5100	3300	3450
4 00	4200	2350	3400	5250	3450	3550
4 15	4350	2400	3500	5400	3600	3600
4 30	4500	2500	3600	5500	3750	3700
4 45	3650	2550	3650	5650	3800	3750
5 00	4800	2650	3700	5800	3900	3800
5 15	4900	2700	3750	5900	4000	3850
5 30	5000	2750	3800	6000	4150	3950
5 45	5100	2800	3900	6100	4250	4000
6 00	5200	2850	4000	6200	4350	4100
6 15	5300	2950	4050	6300	4400	4150
6 30	5400	3000	4100	6350	4500	4250
6 45	5450	3050	4100	6450	4600	4300

Time Minutes Seconds	Lateral force - pounds					
	No. 3065			No. 3066		
	(a)	(b)	(c)	(a)	(b)	(c)
6 00	5200	2850	4000	6200	4350	4100
15	5300	2950	4050	6300	4400	4150
30	5400	3000	4100	6350	4500	4250
45	5450	3050	4100	6450	4600	4300
7 00	5550	3100	4150	6500	4650	4400
15	5600	3100	4200	6550	4750	4450
30	5650	3150	4300	6600	4850	4500
45	5700	3200	4350	6650	4900	4550
8 00	5800	3200	4400	6700	5000	4600
15	5850	3250	4500	6750	5050	4650
30	5900	3300	4550	6800	5100	4700
45	5950	3350	4600	6800	5150	4750
9 00	6000	3350	4650	6850	5200	4800
15	6100	3400	4700	6850	5200	4850
30	6150	3450	4750	6850	5250	4950
45	6200	3500	4800		5300	5000
10 00	6200	3550	4800		5300	5050
15	6250	3600	4850		5350	5100
30	6300	3600	4900		5400	5100
45	6300	3650	4900		5400	5150
11 00	6350	3650	4950		5450	5200
15	6400	3700	4950		5500	4250
30	6400	3700	5000		5500	5250
45	6400	3750	5000		5500	5300
12 00		3750	5050			5350
15		3800	5100			5400
30		3800	5100			5400
45		3850	5150			5450
13 00		3900	5150			5500
15		3900	5200			5500
30		3900	5200			5500
45			5200			
x Yield c = .97	.97	.56	.79	1.04	.83	.83

JYJ/p

J. Y. Jewett



August 16, 1934

From : P. Beermann  
 To : Hydraulic Engineer  
 Subject : San Diego River Project, El Capitan Dam  
 Summary of friction tests on beach materials

1. The results of friction tests made on beach materials at El Capitan Dam are as indicated below:

Date of Test report	No.	Location		Elev- ation	Job No.	Lab. No.	Fill equiv- alent to	Coefficient of friction		
		N	E					Orig- inal	Re- tamped	Re- tamped wet
8-1-34	1	3895	5078	715	3033	22998	75'	.76	.72	.36
8-2-34	2	3890	5078	714	3034	22999	75	.68	.58	.65
8-3-34	3	3550	5085	714	3035	23000	75	.85	.68	.81
8-6-34	4	5080	3950	716	3036	23001	50	.85	.67	.77
8-8-34	5	3955	5080	716	3037	23002	50	.85	.73	.79
8-15-34	6	3750	4925	718	3065	23036	50	.97	.56	.79
8-15-34	7	3750	4925	718	3066	23037	50	1.04	.83	.83

Note: Fill equivalent to 75 feet produced by pressure of 5000 pounds on material within 10" I.D. cylinder. Fill equivalent to 50 feet produced by pressure of 3300 pounds.

2. The testing apparatus consists of 3 pieces of 3" length 10" I.D. steel shell machined inside and out. All ends are cut square except one shell has a cutting edge to permit forcing the cylinder into the beach to get a sample of material in its original location. The 3 pieces are held together by a removable galvanized iron sleeve. While the sample is taken and brought to the laboratory to hold the ends of material in, 2" circular oak pistons are inserted and clamped together by means of long bolts straddling the cylinder.

At the laboratory the clamps and sleeve are removed and the cylinder consisting of the 3-10" pieces and containing the sample is set in a steel frame. The oak pistons remain in the ends of the cylinder and by means of a coil spring pressure is applied to the sample set up in the steel frame. The pressure applied is equivalent to the pressure from the height of fill desired. The pressure is applied in a direction parallel to the concentric axis of the shell and only to the sample not to the shell.

The whole frame is then placed on its side on machined blocks fitting under the end pieces of the shell, but nothing under the center piece, into the testing machine, and force from the testing machine is applied to the top of the middle section and perpendicular to the concentric axis of the cylinder by means of a machined and fitted block. One-half of the maximum force required to move the center portion of the sample with relation to the 2 end pieces, divided by the force exerted by the coil spring gives the coefficient of friction of the materials.

PB/P

P. Beermann

August 18, 1934

From : Resident Engineer  
To : Hydraulic Engineer  
Subject : San Diego River Project, El Capitan Feature  
Hydraulic fill, shear tests on beach material

1. During the period August 1 to 10, 1934, tests were made on beach material from El Capitan dam to determine the coefficient of friction. The samples ranged in elevation from 714 to 718.
2. The apparatus used consisted of three 3" lengths of 10" steel casing machined smooth all over. One ring was provided with a cutting edge. The three rings were set one on top of another and clamped by a sheet iron band 8" wide to form a continuous cylinder 9" high. The edges of the center ring were coated with paraffin. This cylinder was forced into the beach material by loading and digging out the material from around the outside face. When the cylinder contained a full sample it was slid onto a smooth steel plate so as not to disturb the contained sample. 2" thick laminated oak plungers were then placed in each end of the cylinder. Oak cleats with  $\frac{3}{8}$ " bolts in each end running between the cleats were drawn up with thumb nuts to hold the plungers against the sample for transporting to the laboratory.
3. At the laboratory channel iron clamps with two  $\frac{3}{4}$ " bolts and a car spring were substituted for the temporary oak cleats and bolt clamp and a pressure corresponding to the head of fill of the material at 120 pounds per cubic foot was applied by the nuts on the two  $\frac{3}{4}$ " bolts. The sheet iron band was removed. The entire apparatus was then placed on its side in an Olsen testing machine. The two outer rings of the group of three forming the cylinder rested on machined saddles on the bed plate of the testing machine and a steel saddle was placed between the movable head of the testing machine and the center ring of the group of three and the loads were applied.
4. In applying the loads the machine head moved at the rate of .05 inch per minute and the load was read at 15 second intervals. The yield point was noted when the center ring shifted eccentrically with reference to the outer rings.
5. The tests were made so the shear force would be applied to the sample in the same direction as the material would tend to move in the dam under the bursting pressures due to the fluid puddle core of the dam.
6. After the above shear test the material was taken from the rings, mixed and tamped into the cylinder composed of the three rings and the test repeated.
7. After the above shear test the material was taken from the rings, mixed with water and placed in the cylinder composed of the three rings and the test was repeated.

-2-

8. The results of the shear tests are here tabulated.

Sample No.	Vertical load in feet of fill 120# per cu.ft.	Coefficient of friction					
		Static			Sliding		
		As from beach	Tamped	Wet	As from beach	Tamped	Wet
3033	75	.29	.35	.24	.76	.72	.36
3034	75	.30	.24	.27	.68	.58	.65
3035	75	.25	.15	.20	.85	.68	.81
3036	50	.33	.20	.27	.86	.67	.80
3037	50	.23	.20	.21	.85	.73	.79
3065	50	.29	.21	.21	.97	.59	.79
3066	550	<u>.26</u>	<u>.21</u>	<u>.26</u>	<u>1.04</u>	<u>.83</u>	<u>.83</u>
Averages		.28	.21	.24	.86	.68	.72

Harold Wood  
Resident Engineer

HW/p

MATERIALS - SAMPLING AND TESTING

HYDRAULIC FILL

CONSOLIDATION AND PERCOLATION TESTS

November 12, 1931

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

Soil Samples from El Capitan  
Dam Site.

Dear Sir:

In accordance with your request, said Site was visited with Mr. Harold Wood on November 2nd, for viewing the areas from which it is expected that material for earth fill may be obtained if a dam of that type is constructed at that location; and for the taking of samples, if such were available, from the banks of gullies or draws cutting across the areas examined.

Six samples were taken, which have the following listing; description of location being as furnished by Mr. Wood. The samples were taken by cutting a section from top to bottom of the bank, the approximate depth of section being as shown in the table.

Sample No.	Lab. No.	Area	Depth (ft.)	Location
1	18742	C	3	N 15°E.-- 80 ft. from 4 foot outcropping boulder, 35 ft. E. of draw, which is 300 ft. ± E. of water tank.
2	18743	C	20	S. 40°W.-- 95 ft. from above boulder on E. or left bank of dry wash. Bank about 1/2 on 1 slope.
3	18744	C	12	N. 15°E.-- 100 ft. from live oak on right bank of River at mouth of gully. Sample from left bank of gully 300 ft. ± W. of outcropping on N. abutment of dam site.
4	18745	A	4	Right side of draw about 23 ft. S. of steel siphon and opposite telephone pole on first rise of hill.
5	18746	A	15	Right bank of Chocolate Creek half way between gate and draw to S. of Area A.

Sample No.	Lab. No	Area	Depth (ft.):	Location
6	18747	A	6	Right bank of draw W. of remains of old barn, about 60 ft. W. of County Road and about 25 ft. E. of River bank.

The material in Area C had the general appearance of being a disintegrated red sandstone. An outcropping in the draw from which sample No. 2 was taken seemed hard enough to be classed as rock rather than soil. The material in Area A had more the appearance of being of disintegrated granite origin.

Examination of the samples was by a method which has been used in the laboratory, from time to time, for such purpose. This method was put forward by the American Society for Testing Materials in 1922 as a "Tentative Method of Mechanical Analysis of Subgrade Soils", sponsored by Committee D-4 of the Society on Road and Paving Materials. After several revisions, it carried in 1925 Serial Designation D-137-25T. This provided for separation of the sample into the following portions:

- Gravel -- Held on  $\frac{1}{2}$  in. sieve.
- Sand -- Pass  $\frac{1}{4}$  in. sieve; held on No. 200.
- Silt -- Pass sieve No. 200; going into settlement in the process prescribed.
- Clay -- Remaining in suspension, and poured off in wash water, in said process.

Briefly noted, the process consists essentially of treating the sample (after removal of gravel and coarse sand by screening) by boiling in distilled water, with subsequent repeated washings with ammoniated water, allowing an eight minute settlement period between washings, and continuing until the wash water runs practically clear. Provision was further made for separation of the clay portion into so-called "Clay" and "Suspension Clay" by treatment in a centrifuge apparatus. This laboratory is not, however, equipped with such apparatus, and this feature of the process has not been carried out here.

Later, the Society discontinued the use of this Standard, and now has no prescribed method of treatment of soils as a substitute. On correspondence with their said Committee D-4, it was learned that the U.S. Bureau of Public Roads is now using a method involving a hydrometer apparatus (designed by G.J. Bouyoucos, and carrying his name) for the separation of the silt and clay portions of soil samples; which they consider preferable to the method above outlined. This laboratory has not yet obtained this apparatus. The former method does, moreover, give a very definite clay separation which it seems should serve acceptably for judging in a general way of the relative merits for hydraulic fill of the deposits at the dam site.

Percentage results obtained on the above samples, in accordance with the above classification, are as follows:

<u>Sample</u>	<u>Gravel</u>	<u>Sand</u>	<u>Silt</u>	<u>Clay</u>
1	None	66.0	14.0	20.0
2	"	66.0	18.0	16.0
3	"	85.2	8.0	6.8
4	"	54.0	26.0	20.0
5	2.4	84.3	10.2	3.1
6	None	62.4	17.6	20.0

Separation of the sand portion is as follows:

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
Pass $\frac{1}{8}$ in. sieve; held on No. 10-	None	None	None	None	None	None
" No. 10 " " " " 50	30.0	26.0	45.2	19.4	48.1	26.2
" " 50 " " " 200	36.0	40.0	40.0	34.6	36.2	36.2

Separation can be further made on intermediate sieves, if desired.

The  $\frac{1}{8}$  inch sieve is of round mesh of that diameter. The finer sieves are of square mesh, with rated size of opening, as per A.S.T.M. Standard Specifications for Sieves for Testing Purposes - Designation E 11-26, as follows:

<u>Number</u>	<u>mm.</u>	<u>in.</u>
10	2.00	0.0787
50	0.297	0.0117
200	0.074	0.0029

A portion of each sample was shaken in water in a stoppered glass cylinder, for observation of relative rate of settlement. This was relatively rapid in all samples, indicating that the clay portion is relatively coarse as to grain size, and that the material is practically free of extremely fine, colloidal particles, such as settle very slowly under similar conditions. The water in Sample No. 2 remained cloudy somewhat longer than the others, but not long enough to indicate a colloidal content.

Additional samples from auger borings taken over the areas in question, as listed in letter from your office dated Nov. 4, were received at the laboratory on the 10th. These will be examined by the same method of treatment as noted above, unless your office desires to recommend some other method as being more suitable.

Yours very truly,

J. Y. Jewett

Testing Engineer.

JYJ/b  
cc: two enclosed.

November 17, 1931

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

Soil Samples from El Capitan  
Sam Site.

Dear Sir:

Soil samples of group referred to in last paragraph of letter to your office of November 12, have been examined, with results in percentage terms as stated below. Examination was by the method outlined in said letter, and as applied to the samples reported on therein.

Sample: Number:	Lab. No.	:Gravel:	Sand :	Silt :	Clay
61	18765	4.0	75.2	11.1	9.7
62	66	None	73.9	15.8	10.3
63	67	0.5	76.0	15.2	8.3
64	68	None	73.4	15.2	11.4
65	69	"	78.7	9.9	11.4

Separation of the sand portion is as follows:

	61	62	63	64	65
Pass 1/4" Sieve: Held on No. 10 -	6.5	8.1	9.0	5.0	8.3
" No. 10 " " " 50 -	38.2	37.1	39.8	37.6	39.9
" " 50 " " " 300 -	30.5	28.7	27.2	30.8	30.5

Samples shaken in water in a glass cylinder, in same manner as referred to in next to last paragraph of said report of November 12, showed similar results to those noted therein, i.e. a relatively rapid rate of settlement, indicating relative coarseness as to grain size of the clay portion.

As a matter of information, it is noted that a sample of the material going into the hydraulic fill of the Henshaw Dam, taken by the writer when visiting that structure in November 1922, gave the following results when analysed under the method used for the samples here concerned.

<u>Gravel</u>	<u>Sand</u>	<u>Silt</u>	<u>Clay</u>
2.6	69.4	14.8	13.2



With separation of the sand portion as follows:

Pass 1/4" Sieve; Held on No. 10 -	3.6
" No.10 " " " " 50 -	31.2
" " 50 " " " " 200 -	34.6

Information relating to the results obtained on this sample was furnished your office in letter of Jan. 5, 1923, which enclosed copy of letter to the Resident Engineer at Henshaw (Mr. C.H. Richards) with regard to the same.

In current issue of Western Construction News (Nov.10,1931) a description of the Santiago Dam, now under construction in Orange County, is noted. No statement is given however of the composition of the rolled earth fill which constitutes the upstream portion of this dam, beyond the general statement that a clay deposit of excellent quality was available for this purpose.

Engineering literature contains numerous articles relating to soils, much of which refers to their bearing value for foundations. I have not attempted to make a search of this literature for information as to the proper composition of soils for hydraulic or rolled earth fill for dams, as I presume your office force has made or is making such study, to the extent required in the present case. Some of the articles dealing with soils that have come especially to my attention from time to time are:

Paper by Glennon Gilboy on "Soil Mechanics Research" -- Proceedings Am. Soc. C.E., October, 1931. Describes methods of making permeability and other test determinations on soil samples.

Paper by same author on "The Compressibility of Sand - Mica Mixtures" -- Proceedings same Society, February, 1928 (not published in Transactions).

Paper by Chas. H. Lee on "Earth as a Basic Material of Construction"-- Civil Engineering (Publication of Am. Soc. C.E.) August, 1931. Describes methods of making laboratory tests of soil samples.

A notable series of eight articles by Prof. Chas. Terzaghi on "Principles of Soil Mechanics" -- Engineering News-Record, Nov. 5 - Dec. 31, 1925 (omitting issue of Dec. 10). Includes detailed discussion of the properties of clays as contrasted with sand; and description of experiments and tests related thereto.

Paper by Chas. H. Paul on "Core studies in the Hydraulic-Fill Dams of the Miami Conservancy District" -- Transactions Am. Soc. C.E., Vol. 85, year 1922, p. 1181.

Paper by Allen Hazen on "Hydraulic-Fill Dams"-- Transactions same Society, Vol. 83, years 1919-20, p. 1713. Brings out prominently the idea of avoiding a semi-liquid state of plasticity in the core deposit, by limiting the proportion of extremely fine clay particles in the material used; this point being especially brought out with reference to the then recent failure of the Calaveras Dam of the Spring Valley Water Co.

I recall that when in the employ of the Metropolitan Water Board of Massachusetts, at Clinton, Mass., in connection with construction of the Wachusett Dam and Aqueduct; the engineers of the Reservoir Dept. carried out some experiments on water percolation through soils of various grades of fineness. This was with reference to the building of the North Dike, an earthen embankment of considerable magnitude, auxiliary to the main dam, which was of masonry construction, and constructed of soil stripped from the reservoir surface. I do not know just where record of these experiments may be found, but presumably in annual reports of the Board about the period of 1898 to 1900. It is recalled also that Mr. F.P. Stearns, Chief Engineer of said Board, who was later a member of the consulting board on the Gatun Dam of the Panama Canal, made use of the results obtained on said North Dike, in the studies made for that structure.

Yours very truly,

J. Y. Jewett

Testing Engineer.

JYJ/b  
cc: two enclosed

February 5, 1932

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

Soil Samples from El Capitan  
Dam Site.

Dear Sir:

Eight soil samples from El Capitan dam site have been examined, with results as stated below. These samples are as listed in letters from your office of Jan. 21 and 26, except that the latter shows a duplication of No. 70, and the three covered therein are listed as Nos. 71-73. The eight samples carry Lab. Nos. 18839-43 (your Nos. 66-70) and 18848-50 (your Nos. 71-73).

The question of reducing samples like those to ultimate grain size is one of some perplexity, especially in the case of material of the disintegrated granite type, such as comprised by Nos. 67, 68, 72, 73. In this case, the samples as received were worked over with a trowel, with moderate pressure, before screening; and the resulting portions held on No. 10 sieve, were found to be of hard, durable grain structure. On the portion passing the No. 10 sieve, the water treatment of the process was allowed to take its course. Treatment of the samples of separation of silt and clay was by the method described in my letter of Nov. 12, 1931. Results obtained in percentage terms are as follows:

Sample: Number:	Lab. : No. :	Gravel: :	Sand : :	Silt : :	Clay :
66	18839	None	90.6	5.4	4.0
67	40	"	98.9	0.8	0.3
68	41	0.7	96.8	1.6	0.9
69	42	None	73.1	10.3	16.6
70	43	"	73.4	10.2	16.4
71	18848	"	79.4	10.5	10.1
72	49	"	98.7	0.5	0.8
73	50	4.2	91.4	2.2	2.2

Separation of the sand portion is as follows:

## Hydraulic Engineer (2)

Sample No.	Pass $\frac{1}{4}$ " Sieve Held on No. 10	Pass No. 10 Sieve Held on No. 50	Pass No 50 Sieve Held on #200
66	15.6	51.3	23.7
67	30.6	55.0	13.3
68	19.5	59.7	17.6
69	5.1	42.2	25.8
70	2.6	39.8	31.0
71	2.6	46.8	30.0
72	36.4	50.4	11.9
73	34.7	43.0	13.7

Samples (of the soil type) shaken in water in a glass cylinder, in same manner as noted in letters of Nov. 12 and 17, 1931, showed similar results to those there noted, i.e., a relatively rapid rate of settlement, indicating relative coarseness as to grain size of the clay portion.

Yours very truly,

J. Y. Jewett

Testing Engineer.

JYJ/b  
cc: two enclosed.

June 30, 1932

From : Hydraulic Engineer  
To : Testing Engineer J. Y. Jewett  
Subject : San Diego River Project, El Capitan Feature  
Clay in upstream toe wall excavation.

1. There has been delivered to you for investigation today a sample of bluish colored clayey material which has been disclosed in detached lenses having a thickness of about 2-foot strata on the westerly side of the south end of the excavation being made for the upstream toe wall of the El Capitan Dam.

2. Please determine and report on the clayey and sandy content of the sample and the relative proportions of each, and the probable plasticity of the mixed material as it exists when supersaturated and superimposed by hydraulic earth and/or puddle rolled earth and rock embankment as to be installed in the El Capitan Dam.

3. Material of this general type has been disclosed to occur in small detached lenses in 7 locations in the foundation plan material over-lying decomposed granite bedrock at the El Capitan dam site. The material in turn occurs superimposed over an about 5 or 6 foot layer of hard cemented gravel containing detached boulders, the cemented gravel strata in turn being superimposed over the decomposed granite of the country's bedrock in the toe wall plan and in the core wall cut-off plan of the Dam.

H. N. Savage,  
Hydraulic Engineer.

July 6, 1932

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

Clayey Material, El Capitan  
Dam Site -- Your letter June 30

Dear Sir:

Listing of samples of said material, brought in by Harold Wood, Resident Engineer, El Capitan Dam; one on June 30, and five on July 5, is as follows:-

<u>Lab. No.</u>	<u>Location</u>
19038 --	Up-stream toe wall excavation
19046	Coordinates: N 3490 - E 5430
47	" 3615 5115
48	" 3590 5030
49	" 3460 5070
50	" 3640 4580

Separation of silt and clay from sand and grave, by the decantation process, with the No. 200 mesh sieve the dividing line, gives percentage results as follows:-

No. 19038	- Sand; Passing Sieve No. 4	- 88%	Silt & Clay	- 12%
19046	" " " "	10- 52	" "	48
47	" " " "	20- 69	" "	31
48	" " " "	4 - 74	" "	16
Do.	Gravel " 1" Screen	10	---	---
49	Sand " Sieve No. 10-	82	Silt & Clay	18
50	" " " " 4-	59	" "	15
Do.	Gravel " 1" Screen	26	--	--

Settlement after shaking in an excess of water, in a stoppered glass cylinder, was relatively rapid on all samples, except No. 19046; which I judge indicates that as between the silt and clay portions the silt content predominates, and that the clay portion is of relatively coarse grained material. On No. 19049 the supernatant water is practically clear, while in the others it

Mr. H.N. Savage (2)

has a slight clayey cloudiness.

On No. 19046, by way of marked contrast, there has been practically no settlement as yet, indicating a much higher clay content, of relatively fine grained material. Also, the sand portion of this sample, has a much higher mica content than the others; making a combination of conditions which would indicate this to be a more unstable material than any of the others.

As per conversation of yesterday, the above serves as a preliminary indication of the properties of the several samples, with more complete examination for separation of the silt and clay portions and determination of the percentages of each to be carried out later.

Yours very truly,

J. Y. Jewett

JYJ/b  
cc: One enclosed.

Testing Engineer

July 9, 1932

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

Clayey Material, El Capitan  
Dam Site

Dear Sir:

Supplementing report of July 6, on the above subject; separation of the silt and clay contents of the samples in question, as referred to in last paragraph of said report, has been carried out, with results as stated below.

These determinations have been made by the method used previously, in examination of soil samples in connection with studies for this structure, as outlined in my letter to your office of November 12, 1931.

Grading of the sand portion of the samples, similar to that shown in previous reports, is also given in the second table below.

Lab. No.	Percentages			
	Gravel	Sand	Silt	Clay
19038	None	88	6.8	5.2
19046	"	52	22.1	25.9
47	"	69	18.9	12.1
48	10	74	9.0	7.0
49	None	82	5.9	12.1
50	26	59	8.6	6.4

Separation of sand portion:-

	Pass $\frac{1}{4}$ " Sieve	Pass No. 10 Sieve	Pass No. 50 Sieve
	Held on No. 10	Held on No. 50	Held on No. 200
19038	4	64	20
19046	None	18	34
47	"	24	45
48	1	24	49
49	None	17	65
50	7	32	20

Yours very truly,

J.Y. Jewett  
Testing Engineer

JYJ/b  
cc : One enclosed.



COPY

CITY OF SAN DIEGO

INTER-DEPARTMENTAL COMMUNICATION

Date Jan. 24, 1933

From           Testing Engineer  
To              Hydraulic Engineer  
Subject         Material for Hydraulic-Fill Dams

1. In my letter of Oct. 20, 1932, notation was made of a paper appearing in the October, 1932, issue of Proceedings, Am. Soc. C.E.; by H.H. Hatch, of the engineering force of the City of Springfield, Mass., carrying title of "Tests for Hydraulic-Fill Dams", and discussing this subject in the light of experience in construction of Cobble Mountain Dam for additional water supply for that city.
2. It is now noted that the January issue of Proceedings of said Society, has a discussion of this paper by Chas. H. Paul; who it appears was a consulting engineer on that project. In view of this relation, and of his eminence as a constructor of dams of this type, his views on the subject should carry considerable weight.
3. With reference to the question which you have brought up recently, as to the advisability of using a relatively coarse grained material at El Capitan, and citing the experience of Thos. H. Means on the "Messeback" dam as a basis therefor; it is of interest to note that Mr. Paul in said discussion refers to the material used at Cobble Mountain as being considerably coarser in grain size than that used in the dams of the Miami Conservancy District constructed by him. He observes that both materials have given satisfactory results, as regards water-tightness, stability, and rate of consolidation. In view however, of the cases where trouble has occurred with the use of materials of excessive fineness, he considers the material used in the Miami Conservancy dams as about the limit in that direction; and, on the other hand, indicates that the material used at Cobble Mountain should be considered about the limit in the other direction. To quote from his statement:-- "but between the wide limits indicated by those two, it is reasonable to assume that core materials will be satisfactory, unless preliminary tests point to the contrary."
4. If information can be obtained as to the gradation of materials used in said Messeback dam, as referred to in your recent conversation; it would be of interest to see how this compares with the limits set forth in the above discussion.
5. To quote further from Mr. Paul, he says:-  
"The author has wisely called attention to the fact that

frequent gradation analyses are necessary to obtain a representative gradation curve at any dam. The hydrometer method, as described, makes this comparatively easy and practicable. His method of plotting these curves is believed to be logical and may well be standardized."

6. We have recently obtained for this laboratory a hydrometer set of the type referred to, for use in determination of the clayey or colloidal content of soil samples, as a substitute for the sedimentation process previously employed.

J. Y. Jewett

JYJ/b  
cc : Resident Engineer.

Feb. 17, 1933

From : Testing Engineer  
To : Hydraulic Engineer  
Subject : Soil Samples, El Capitan Dam.

- Two samples of material from spoil bank at quarry, one each from East and West ends, have been received for examination. These carry Job Nos. 218 & 19. Designation of the samples as between said two locations was not noted when received, and they are listed as Lab. No. 19471, A & B.
- Separated into two portions, ordinarily classed as sand and rock, by screening on  $\frac{1}{4}$ " sieve, gives the following percentages:

	<u>Pass <math>\frac{1}{4}</math>"</u>	<u>Held on <math>\frac{1}{4}</math>"</u>
19471 A -	82	18
B	81	19

- The portion passing  $\frac{1}{4}$ ", treated by the new hydrometer process referred to in last paragraph of my letter of Jan. 24, is separated into sand: silt; and "colloidal" contents, the latter being considered as similar in grain size to that classed as "clay" in previous determinations. The sand includes material passing  $\frac{1}{4}$ " sieve and held on No. 200. The intermediate silt content is that passing the No. 200 sieve and going into settlement in the hydrometer process. Based on this classification, this portion yields the following percentages.

	<u>Sand</u>	<u>Silt</u>	<u>Clay</u>
No. 19471 - A	73	23	4
B	69	23	8

- Detailed mechanical analysis for grading of sizes, both for the separate portions listed above, and for the samples as a whole, is shown on the enclosed report form. It will be noted that the colloidal or clay content, is small, and the silt content relatively large, as compared with other samples which have been under examination for that work. Probably additional samples from different parts of the pile would show considerable variation in composition, and the results here shown should be taken as an indication, rather than an average, of what may be found in the pile.
- A check on the results obtained with the hydrometer apparatus was run on the set of samples on which results were reported to your office under date of July 30, 1932; for comparison with the sedimentation process in use at that time.

Feb. 17, 1933

From : Testing Engineer  
To : Hydraulic Engineer  
Subject : Soil Samples, El Capitan Dam.

The "colloidal" content as determined by this apparatus, shows a close agreement with the "clay" content as obtained under that process; and it appears that the two methods may be considered as practically similar in the results obtained, as relating to the type of soils under consideration.

J. Y. Jewett.

JYJ/b  
cc - Resident Engr.

Note: As a correction on said letter of July 30, 1932, it should be noted that the Lab. sample Nos., as there given, are in error, and should be 19125-28 instead of 19025-28.

5-16-33  
copy/p

February 17, 1933

From : Testing Engineer  
To : Hydraulic Engineer  
Subject : Soil samples, El Capitan Dam.

Two samples of material from spoil bank at quarry, one each from east and west ends, have been received for examination. These carry Job Nos. 218 and 19. Designation of the samples as between said two locations was not noted when received, and they are listed as Laboratory No. 19471, A & B.

Separated into two portions, ordinarily classed as sand and rock, by screening on 1/4" sieve, gives the following percentages:

	Pass 1/4"	Held on 1/4"
19471 A-	82	18
B-	81	19

The portion passing 1/4", treated by the new hydrometer process referred to in last paragraph of my letter of January 24, is separated into sand; silt; and "colloidal" contents, the latter being considered as similar in grain size to that classed as "clay" in previous determinations. The sand includes material passing 1/4" sieve and held on No. 200. The intermediate silt content is that passing the No. 200 sieve and going into settlement in the hydrometer process. Based on this classification, this portion yields the following percentages:

	Sand	Silt	Clay
19471 A-	73	23	4
B-	69	23	8

Detailed mechanical analysis for grading of sizes, both for the separate portions listed above, and for the samples as a whole, is shown on the enclosed report form. It will be noted that the colloidal or clay content, is small, and the silt content relatively large, as compared with other samples which have been under examination for that work. Probably additional samples from different parts of the pile would show considerable variation in composition, and the results here shown should be taken as an indication, rather than an average, of what may be found in the pile.

A check on the results obtained with the hydrometer apparatus was run on the set of samples on which results were reported to your office under date of July 30, 1932; for comparison with the sedimentation process in use at that time. The colloidal content as determined by this apparatus shows a close agreement with the clay content as obtained under that process;

and it appears that the two methods may be considered as practically similar in the results obtained, as relating to the type of soils under consideration.

J. Y. Jewett

JYJ/b  
cc-Resident Engineer

Note: As a correction on said letter of July 30, 1932, it should be noted that the Laboratory sample Nos. as there given are in error, and should be 19125-28 instead of 19025-28.

EL CAPITAN DAM - Soil Samples

Percentages Passing	19471-A			19471-B		
	Part	Part	Whole	Part	Part	Whole
Screen 2½"	100		100	100		100
2	94		99	97		99
1	77		96	86		97
¾"	64		93	77		95
½"	48		91	57		92
¼"		100	82		100	81
Sieve #10		98	80		98	79
20		90	74		88	71
30		75	61		74	60
40		66	54		66	54
50		57	47		59	48
100		40	33		44	36
% silt		23	22		23	25
% colloidal		4	3		8	6

J. Y. Jewett,  
Testing Engineer

5-16-33  
copy/p

March 11, 1933

From : Testing Engineer

To : Hydraulic Engineer

Subject : Soil samples, 2nd series, hydraulic fill, El Capitan Dam

Nine samples from hydraulic fill, El Capitan Dam, constituting the second series taken, were brought in by the Resident Engineer the evening of March 8. These were taken on that date, and are Job Nos. 238-46; Laboratory Nos. 19531-39. Two supplementary samples, from beach material, were brought in March 10. These were taken on that date, and are Job Nos. 247-48; Laboratory Nos. 19540-41. Locations from which taken are as follows:

Sample	Elevation Water surface	Elevation sampled	Coordinates	
			N	E
238	580	565	3800	4950
239	"	565	3800	5000
240	"	569	3800	5075
241	"	567	3600	5075
242	"	565	3600	5000
243	"	566	3600	4950
244	"	566	3400	4950
245	"	566	3400	5000
246	"	566	3400	5075
247	582	585±	3450	5100
248	"	590±	3750	4800

As in report of February 28, (a first series, this series (of nine) is combined in two groups in the statement of results below. One, marked "Center Group" includes samples taken above line of concrete core wall. The other, marked "Outside Group" includes those taken at the given distances from this line. A third group includes two beach samples. The results are classified in table below in same manner as stated in paragraph 2, of said report of February 28.

Lab.No.	Job.No.	Gravel	Sand	Silt	Clay
<u>Center Group</u>					
19532	239	-	43.6	31.9	24.5
19535	242	-	47.2	31.3	21.5
19538	245	-	41.6	38.6	19.8
	Average		44.1	33.9	22.0
<u>Outside Group</u>					
19531	238	-	46.4	29.1	24.5
19533	240	-	58.1	28.1	13.8
19534	241	-	60.4	22.3	17.3
19536	243	-	53.4	27.8	18.8
19537	244	-	52.6	30.6	16.8
19539	246	-	61.2	31.5	7.3
	Average		55.4	28.2	16.4

Lab.No.	Job.No.	Gravel	Sand	Silt	Clay
<u>Beach Samples</u>					
19540	247	3.0	74.9	16.1	6.0
19541	248	<u>4.0</u>	<u>76.6</u>	<u>17.3</u>	<u>2.1</u>
	Average	3.5	75.7	16.7	4.1

Grading in detail, giving the sand separation on the several series, is shown on the attached report form.

With regard to the mica content, an attempt has been made to determine the approximate percentage in the sand portion, as we would do in examining a concrete sand; but without success so far. This feature will require further study.

J. Y. Jewett

JYJ/b





5-15-33  
copy/p

March 16, 1933

From : Testing Engineer  
To : Hydraulic Engineer  
Subject : Tests of hydraulic fill materials, El Capitan Dam

Specific Gravity

Specific gravity determinations have been made on five samples, representing the hydraulic fill material being placed in El Capitan Dam. These are composite samples, covering each of the five groups in which the samples on which results were reported under dates of February 28 and March 11, were arranged. Results of these determinations are as follows (based on dry weight of the materials).

Report of February 28: Inside Group - 2.71  
Outside Group - 2.72

Report of March 11: Center Group - 2.72  
Outside Group - 2.72  
Beach samples - 2.74

Mica Content

Reference was made in last paragraph of said report of March 11, to attempted determination of mica content. With some modification of the process under which an estimate of mica content is obtained in washing a concrete sand, it was found that the sand portion of the above groups contains from 1.5 to 2.0 per cent (by weight) of mica, going off in suspension when agitated in water, and caught on a 200 mesh sieve. This does not include the powdered mica in the fine material passing the No. 200 mesh, nor the heavier flakes which settle out with the coarse sand.

In Gilboy's paper on "Compressibility of Sand-Mica Mixtures referred to in my letter to your office of March 8, he brings out the difficulty of determining the mica content of a soil sample, and states that at present there is no known method of making such determination with exactness. He urges this as one reason why compressibility tests on soil samples are of value, in connection with foundations, earth-fill dams, etc., as an aid in showing its effect in the material, even if its percentage content cannot be determined with exactness.

If, as indicated in said letter of March 8, the mica content in a hydraulic fill material, may be considered, in effect, as an addition to the clay content; then it would seem from the above determinations, that the clay content in the El Capitan material may be considered as increased by some two to three per cent thereby.

Test on Sample at Los Angeles:

As per arrangement in your letter of March 11, to Mr. H. A. Van Norman, General Manager & Chief Engineer of L. A. Department of Water & Power; a sample from the hydraulic fill at El Capitan was taken to Los Angeles for the permeability and consolidation tests therein referred to. This sample (our Lab. No. 19544) was taken on March 13 and brought in during the afternoon of that date. It is reported as a composite sample of puddle zone, from coordinate N 3400 to N 3800, taken at an average depth of ten feet, with elevation of water surface at 587.

The sample was shipped by express that night, and the writer was present while the tests were being placed under way on the afternoon of the 14th, and during the 15th; returning during the evening of the latter day. As noted in conversation at your office on present date, results of the preliminary observations were obtained; and it is expected that full report will be available about the middle or latter part of next week, as it is estimated that the test will be completed on the 22nd.

Enclosed is memorandum of expense incurred on the trip, which it is presumed your office can put in proper form for collection.

J. Y. Jewett

JYJ/b

March 24, 1933

From : Testing Engineer

To : Hydraulic Engineer

Subject : Soil samples, 3rd series, hydraulic fill, El Capitan Dam

Nine samples from hydraulic fill, El Capitan Dam, constituting the third series taken, were received on March, 22nd. These were taken on that date, and are Job Nos. 256-64; Lab. Nos. 19550-58. Locations from which taken are as follows:

Sample No.	Elevation		Coordinates	
	Water Surface	Elevation sampled	N.	E.
256	595	577	3700	4950
257	"	575	3700	5000
258	"	582	3700	5065
259	"	581	3550	5065
260	"	575	3550	5000
261	"	581	3550	4950
262	"	581	3400	4950
263	"	580	3400	5000
264	"	585	3400	5065

As in report on 2nd series, of date of March 11, this series is combined in two groups in statement of results below. One, marked "Center Group" includes samples taken above line of concrete core wall. The other, marked "Outside Group" includes those taken at the given distances from this line. The results are classified in table below in same manner as in previous reports, except that these samples do not show any material to be listed as gravel; and that a column is added for per cent of moisture content in the sample as received; as, with use of new sampling apparatus, it is possible to take samples from the core without intrusion of water from the pool above.

Center Group

Lab.No.	Job No.	Moisture Content	Gradation of solids		
			Sand	Silt	Clay
19551	257	33.3	46.0	31.5	22.5
19554	260	33.3	47.2	29.2	23.6
19557	263	38.8	36.4	38.1	25.5
Average		35.1	43.2	32.9	23.9

Outside Group

Lab. No.	Job No.	Moisture Content	Gradation of solids		
			Sand	Silt	Clay
19550	256	29.6	44.4	29.1	26.5
19552	258	32.0	39.0	38.4	22.6
19553	259	25.9	56.0	25.5	18.5
19555	261	29.2	56.4	26.0	17.6
19556	262	37.0	42.6	32.9	24.5
19558	264	32.0	64.8	27.7	7.5
Average		30.9	50.5	29.9	19.5

Grading in detail, giving the sand separation on the several sieves, is shown on the attached report form.

Specific Gravity:

instead of running specific gravity on composites of the group samples as reported in letter of March 16, one determination was made on a composite of the samples having the larger sand content (Nos. 259, 261 & 264) and one on the other six finer samples. These gave results of 2.74 and 2.76 respectively. The slightly higher result on the finer sample may be due to a larger magnetic iron content, which, as noted previously, is of about No. 100 mesh size. The specific gravity on the material going into this fill as reported herewith and in letter of March 16, is relatively high as compared with the general run of sands in this vicinity, but is in keeping with the results obtained from investigation of the sand and gravel deposits in the River bed for use as concrete aggregates as commented on in reports of March 25 and April 1, 1932.

Nica Content:

Nica content, on a composite of all the samples, determined in same manner as noted in letter of March 16; giving an estimate of flaky portion going off in suspension in wash water, and caught on a No. 200 mesh sieve, is 3.3%.

Per cent of Voids:

Computation of percentage of voids, as per formula on p. 1304 of Hatch's paper in Proceedings, Am. Soc. C. E., October, 1932, based on specific gravity and moisture content as factors; using value of 2.75 for the former, and applying the formula to the extremes of moisture content as shown in the table above, gives a range of 49.0 to 63.5 as relating to this feature. If thought desirable; this formula can be applied to each sample individually, but this would considerably increase the amount of time required for examination of the samples.

It is recommended that consideration be given to the matter of obtaining undisturbed samples of the beach material for similar determinations (per cent of voids and moisture content) in the manner described on same page of Hatch's paper as referred to above.