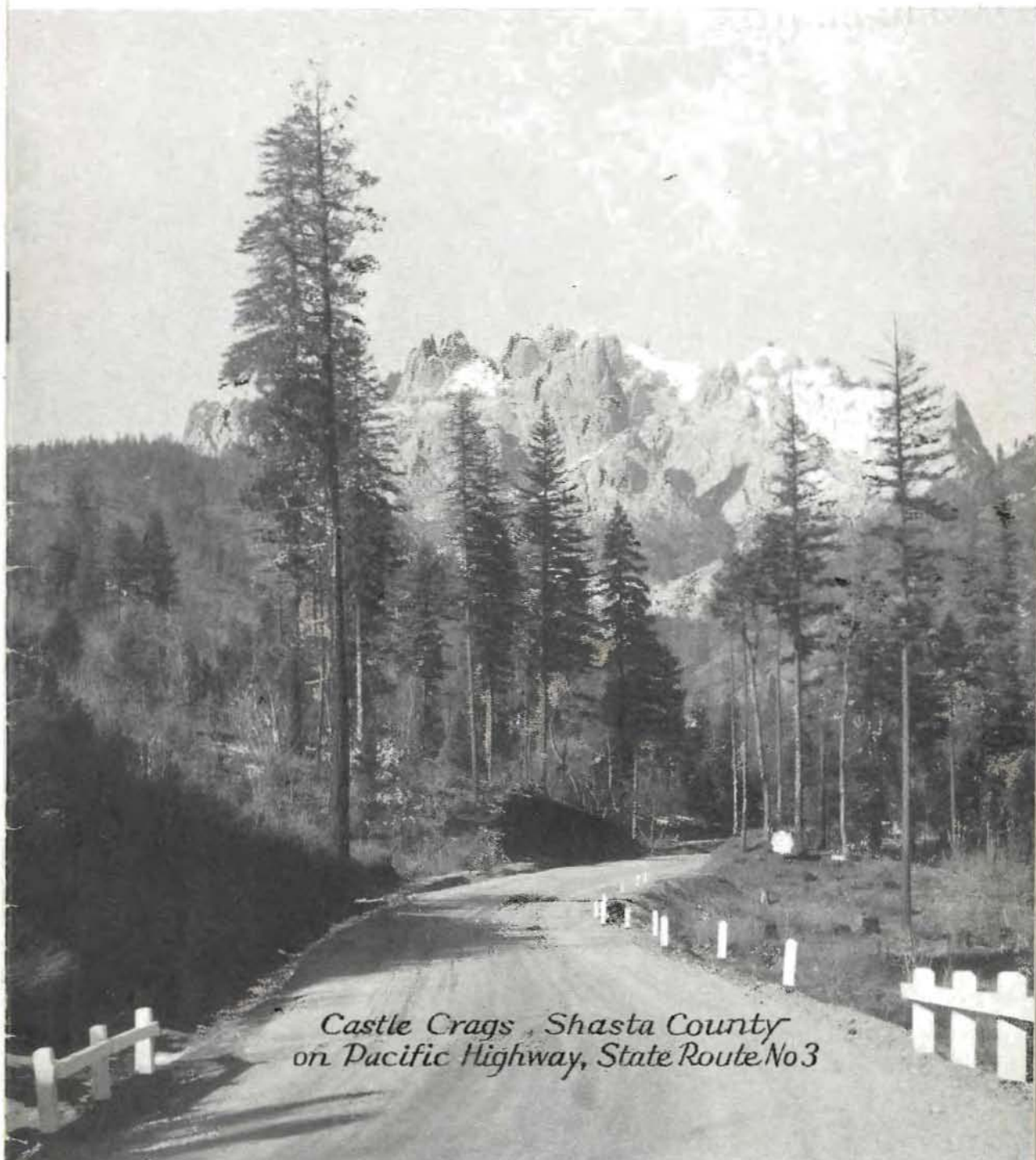


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HIGHWAYS AND PUBLIC WORKS



*Castle Crags, Shasta County
on Pacific Highway, State Route No 3*


Official Journal of the Department of Public Works
MAY ~ 1934



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State Cooperating with 276 Cities in Expending \$5,310,000 Gas Tax Funds

How Highway Routes within Municipalities are Selected for Quarter Cent Revenue Improvement by Agreements with Local Governments in Compliance with Legislative Act

By L. V. CAMPBELL, Engineer of City and Cooperative Projects

LEGISLATION was enacted in 1933 providing for the expenditure of one-quarter cent per gallon of the gasoline tax within municipalities. The act provides that the expenditure in each city shall be made in the proportion that the population in each city bears to the total population in all such cities in the State, the population to be determined by the last Federal census.

The act further provides that the expenditure of the quarter-cent revenue within cities shall be made first upon the State highways or portions thereof within cities for acquisition, construction, maintenance or improvement. In the event the amount of money allocated to any one city is greater than necessary to adequately maintain and improve to adequate standards all State highways within such city, then any surplus amount may be expended on other streets of major importance, as may be agreed upon by the Department of Public Works and the legislative body of such city.

The act also vests in the California Highway Commission jurisdiction and authority with respect to any State highways lying within any municipality, and imposes the duty upon the commission of designating and determining locations and connecting por-

tions either through or around the municipality of all State highways, the natural course of which runs or passes into or through any municipality, unless any such route or routes in a municipality be specifically described by law.

In working out the procedure for the expenditure of the quarter-cent fund, it has been the intention of the Department to cooperate with the cities to the fullest extent.

Since the quarter-cent gas tax allocation was to be expended first upon the State highway routes within a city until they were adequately provided for, one of the first essentials in the administration of the act was the designation of the State highway routes within municipalities. During the many years of activity of the Division of Highways, studies have been made of possible routings into or through cities, connecting with State highways, so that a carefully considered plan was available of

State highway routings through cities as the State highway system existed prior to 1933.

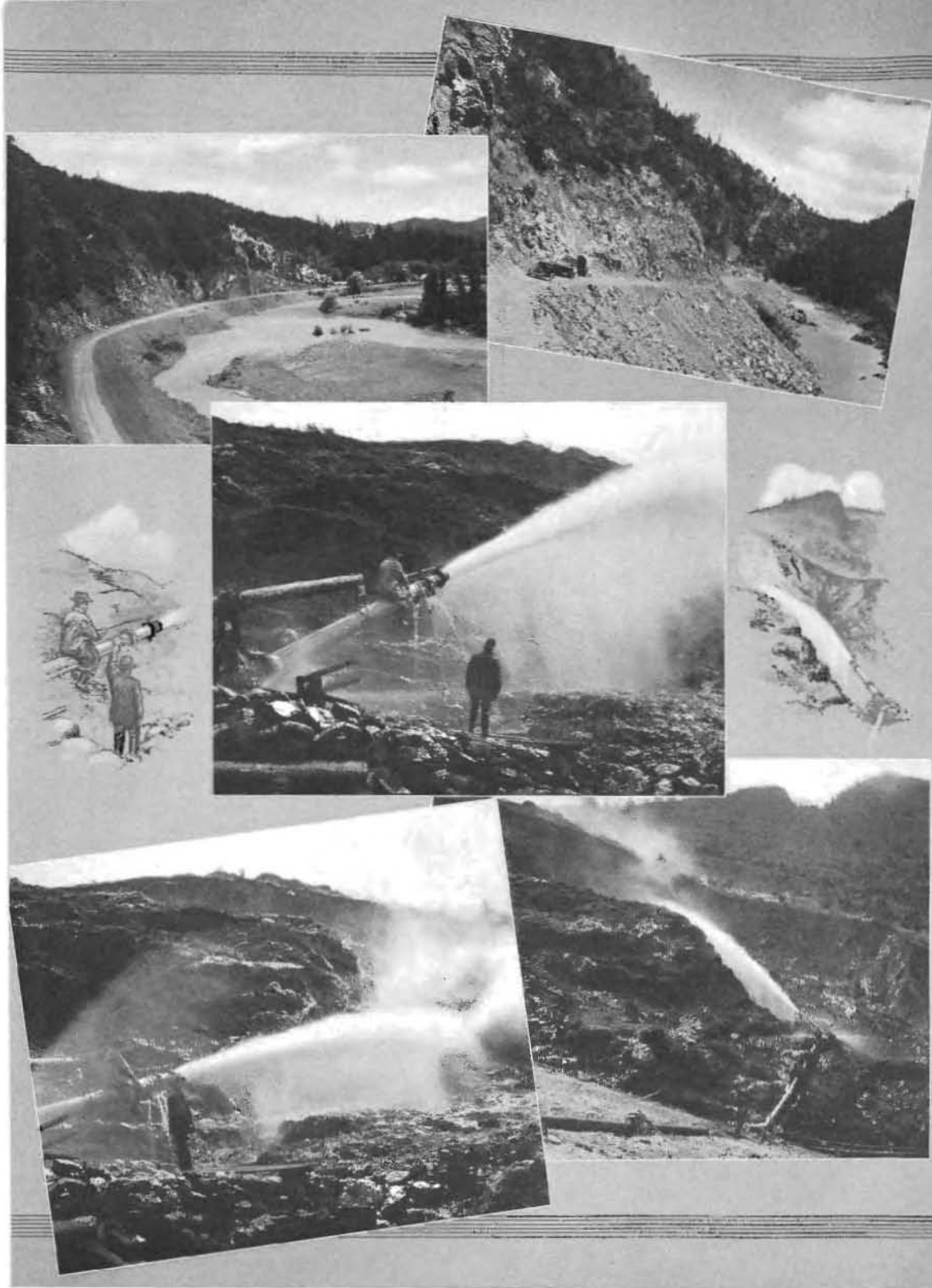
INTENSIVE STUDY MADE

In the same statute the Legislature added 6724 miles of additional State highway, making a large number of additional routes

(Continued on page 10)



L. V. CAMPBELL



HYDRAULIC GIANTS MOVING A MOUNTAIN are shown at work on the realignment of the Redding-Eureka Highway in Trinity County over Oregon Hill between Weaverville and Junction City. The 8-inch giant is hurling 2 tons of water per second at a velocity of 2 miles per minute against bank 425 feet distant moving 5200 cubic yards per day. Lower right photo shows hole washed in 202.5 hours flow. Upper pictures show completed road and construction operations on either side of the mountain.

Washing Away a Mountain in Path of Highway a Record Hydraulic Operation

By F. W. HASELWOOD, District Engineer

WHEN the California Highway Commission on April 29, 1932, settled the long pending uncertainty over the routing of that portion of the Redding to Eureka highway between Douglas City and Junction City in Trinity County by adopting the route through Weaverville rather than down the Trinity River, and later included in the budget for the current biennium \$100,000 to start the work, it passed to the engineering department as knotty a problem in location and construction as ever confronted the Division of Highways.

For, as is known to every motorist who has boiled all of the water out of his radiator, or worn out his brakes, that mountain known as Oregon Hill lies about midway between Weaverville and Junction City, and the climb from either direction is plenty steep and long.

Oregon Hill is about 1200 feet above Weaverville and 1500 feet above the mouth of Oregon Gulch, about a mile east of Junction City where the route again reaches the Trinity River. Oregon Hill offers no support for a highway location except at right angles to the direction it ought to be going.

FIRST HYDRAULIC MINE

Oregon Gulch is a historic name in California. The first hydraulic mining began in Trinity County shortly after the gold rush to Oregon Gulch in the early fifties, and the La Grange Hydraulic Mine was actively operated from 1862 to 1918, during which time over 100,000,000 cubic yards of gravel and overburden were removed. Oregon Gulch is filled to indefinite depths with gravel from this mining, and far below the surface of this debris lies the old town of Oregon City.

The mine gets its name from Baron Le Grange, a Frenchman, who acquired it in 1892. Since any location must cross property owned by the La Grange Placer Mines for about four miles, including the crossing of Oregon Hill, this mine became an important factor in the location problem.

The formation at Oregon Hill has been described geologically as "a great ancient channel of auriferous gravels along the bed

of a river which, millions of years ago, in the geological age known as Cretaceous, flowed southwesterly through what is known as a portion of Trinity County in the Siskiyou Mountains. Later an uplift diverted the stream to a new channel, the modern Trinity River, and left the channel of gravels high in the hills about 1000 feet above the modern stream. Later smaller streams and glaciers cut across this ancient "channel" and with the aid of further upheaval isolated large masses of the deposit in the original stream-bed.

Oregon Hill is one of these masses and originally contained about 200,000,000 cubic yards of gold bearing gravel. About half of this remains.

BEDROCK PLANE TILTED

An important characteristic of the area in the old mine pit as it exists at present is a tilted bedrock plane which forms what is known as the north rim of the mine. This plane dips southerly 22 degrees, and its existence is known for a distance of about 3500 feet, although over half is covered by the broken mass of a large slide.

This material overlying it consists of a blue, partly disintegrated schist of varying degrees of hardness, blue clay and yellow clay. None of this overburden carries gold, and the operation of the mine in the few years preceding its closing in 1918 was unprofitable by reason of immense slides of this overburden which continually buried any gold bearing gravel which laid in the bottom of the ravine near the bedrock of the old channel.

In the selection of a route for a highway over Oregon Hill two alternatives presented themselves, one to use the pass occupied by the present road and to develop on the very broken and unstable country south of the mine, and the other to develop a line along the north rim of the mine through a saddle but 25 feet higher than that through which the existing road passes.

TWO ROUTINGS STUDIED

The first routing encountered extremely broken country on both sides of the hill, many

(Continued on page 28)

Director Kelly Pays Fine Tribute to Headquarters Staff of Highway Division

By **EARL LEE KELLY**, Director of Public Works

AS an organization entrusted with the administration of the expenditure of an average of \$70,000,000 of State funds each biennium the Division of Highways ranks as one of California's major industries. During its steady growth, since the first highway bond issue of 1909, this function of State government has labored consistently to bring this great commonwealth of the Pacific slope to its present position of leadership in road construction methods and its interlacing system of over 14,000 miles of State highways to a place of preeminence among similar systems throughout the Union.

The supervisory unit of this important State organization is the Headquarters Staff and it is through the various departments of this unit that the planning, financing, construction and maintenance of State highways are unified and the system developed as a whole. It is the centralized control exercised by the Headquarters Staff, working in conjunction with the Director of Public Works and the California Highway Commission, which is largely responsible for the uniform development of California's great network of State roads.

It was through the Headquarters Staff that the work of the Division was so coordinated that it has been possible to successfully accomplish the unprecedented highway construction program which has been under way in California since last September.

TRIBUTE OF APPRECIATION

And I want to here pay my tribute of appreciation and gratitude to the devoted loyalty and splendid efficiency of the following gentlemen constituting the Headquarters Staff who have worked day and night, giving unstintedly of time and effort to make possible this record breaking achievement in the history of California highways:

Charles H. Purcell, State Highway Engineer.

George T. McCoy, Assistant State Highway Engineer.

James G. Standley, Principal Assistant Engineer.

Richard H. Wilson, Office Engineer.

Thomas E. Stanton, Materials and Research Engineer.

Fred J. Grumm, Engineer of Surveys and Plans.

Charles S. Pope, Construction Engineer.

Thomas H. Dennis, Maintenance Engineer.

F. W. Panhorst, Acting Bridge Engineer.

L. V. Campbell, Engineer of City and Cooperative Projects.

R. H. Stalnaker, Equipment Engineer.

An adequate conception of the task they have performed in the last nine months is best obtained by a review of the results. Such a review reveals:

WORK ACCOMPLISHED

Two hundred sixty-one contracts awarded in the sum of approximately \$20,530,200; day labor work and convict road construction amounting to \$3,023,700; 18 projects advertised for bids at an estimated cost of \$1,267,000, making a total of \$24,821,500 for construction projects; maintenance work orders reviewed and approved in the sum of \$6,693,700 bringing the total construction and maintenance work to the imposing figure of \$31,515,200 for the nine month period.

The monumental task of putting under way this construction program has required consistent and unceasing effort on the part of members of the entire Division of Highways. It has called forth a spirit of cooperation between the several district offices and the Headquarters Staff as well as between the various departments within the headquarters organization, without which successful accomplishment of the program could not have been attained. The fact that it has been "put over" so successfully is, in itself, an epic on the loyalty of this branch of State service to the citizens of California.

ORIGINAL PROGRAM UPSET

The task was not one which was steadily worked up to a climax, but one that broke with breath-taking suddenness. During the late spring and early summer months of 1933 varied factors of important influence on the

(Continued on page 14)

State Highway Headquarters Staff



C.H. PURCELL
STATE HIGHWAY ENGINEER.



GEORGE T. MCCOY
ASSISTANT STATE HIGHWAY ENGINEER.



JAMES G. STANDLEY
PRINCIPAL ASSISTANT ENGINEER.



FRED J. GRUMM
ENGINEER OF SURVEYS & PLANS.



THOMAS H. DENNIS
MAINTENANCE ENGINEER.



THOMAS E. STANTON
MATERIALS & RESEARCH ENGINEER.



F.W. PANHORST
ACTING BRIDGE ENGINEER.



RICHARD H. WILSON
OFFICE ENGINEER.



L.V. CAMPBELL
ENGINEER OF CITY &
COOPERATIVE PROJECTS.



CHARLES S. POPE
CONSTRUCTION ENGINEER.



R.H. STALNAK
EQUIPMENT ENGINEER.

Gala Celebration Marks Completion of Burney-Fall River Mills Highway

IN a beautiful wooded mountain glade, bisected by the clear, purling waters of Hat Creek in Shasta County, 2500 men, women and children gathered on Sunday, April 29th, to celebrate the completion of the Burney-Fall River Mills sector of the Redding-Alturas State Highway.

They came in automobiles, many of them long distances from Oregon and Nevada, to participate in festivities attending a two day program of dances and outdoor sports, arranged through Secretary Tom Stanley of the Shasta-Cascade Wonderland Association, that culminated in the highway celebration.

They also came to honor Director Earl Lee Kelly of the State Department of Public Works, a citizen of Redding who was introduced by Vice President Harry E. Thompson of the Redding Chamber of Commerce as "one of California's natural resources and northern California's best friend."

YELLOWSTONE CUT-OFF LINK

The delegation from Oregon were particularly interested in the high standard improvements of this portion of California's link in the projected highway known as the Yellowstone Cut-off, that will afford a special short route through their State and Idaho to the Yellowstone National Park.

The people of California, and particularly of Shasta County, were interested in the fact that the tortuous old road, especially between Cassel and Fall River Mills which passed through lava beds and down into miniature craters, had been supplanted by a high standard modern highway providing more varied and spectacular scenery.

The new highway traverses rugged and primitive country, over easy rolling grades with long tangents and long stretches of straightaway mileage without a curve. It passes through a country that boasts one of the largest stands of virgin timber in the United States.

SAVINGS LIQUIDATE COST

The length of the new construction, including bridges, is 19.1 miles. The length via the old road is 23.3 miles, showing a saving in distance of 4.2 miles. The cost of construc-

tion, including the bridges at Hat Creek, Pit River and Fall River was \$696,000. The saving in time for the average driver on the trip between Burney and Fall River Mills is between fifteen and twenty minutes which, translated into car mileage economy savings to motorists will, it is estimated, liquidate the cost of the highway in several years.

The major features of the day's program were the speeches by a group of State officials from California and Oregon, an exciting boxing and wrestling card, an Indian dugout race, the baseball game and the picnic lunches with which all regaled themselves at the noon hour.

Director Earl Lee Kelly and guest of honor representing Governor Rolph, and Dr. Irving E. Vining, representing Governor Meier of Oregon, delivered the principal addresses.

DAM PROSPECTS BRIGHT

Speaking of the prospects for the great Central Valley Water Project, Kelly said:

"No one is in closer touch than I with the work for obtaining Federal funds for the Kennett Dam and other units of the water conservation program. And I say to you that the prospects for successful conclusion of the plans for financing the program are better than they were for the San Francisco-Oakland Bay Bridge a short time before the funds were provided for that great structure."

C. C. Cottrell, Highways Bureau Manager of the California State Automobile Association, San Francisco, outlined plans for the continuation of the Yellowstone Cut-off through to Boise, Idaho, and said it would also provide connections to Banff and the Lake Louise region in Canada.

GREETINGS FROM GOVERNOR

Dr. Irving E. Vining brought the greetings of the Governor of Oregon and of the people of the sister State. He spoke of the highway as helping to unite Oregon and California in a common vantage ground of enjoyment of the wonders of nature in the west. California's spirit of loyalty to its own he declared was well known and admired throughout the east and they recognized the truth



BEAUTIFUL ARBOREAL SETTING of the Burney-Fall River Mills Highway celebration, Director of Public Works Earl Lee Kelly broadcasting and a section of the new highway are pictured above. In the front row of the official group are District Engineer, F. W. Haselwood; Assistant State Highway Engineer, G. T. McCoy; Vice President, H. E. Thompson, Redding Chamber of Commerce; Dr. Irving E. Vining; Earl Lee Kelly; President, E. B. Hall and T. L. Stanley, of Shasta-Cascade Wonderland. Back Row—Geo. Cuning, A. H. Banwell, A. H. Gronwoldt, Senator H. L. Powers, Wm. Boucher, W. G. B. Chase, J. W. Howe, Frank Durkee, B. K. Snyder, C. J. Fulcher, Geo. Grizzle, and W. A. Gates.

Questionnaire Answers Many Inquiries Concerning California Highway System

By C. C. CARLETON, Chief, Division of Contracts and Rights of Way

THE CALIFORNIA Highway Commission and the Department of Public Works are continually receiving inquiries from citizens and various organizations as to the composition and extent of the highway system; how new roads are added; how the gasoline tax revenues are apportioned and may be spent by State, counties and cities; how various official bodies exercise jurisdiction over highway matters and other similar questions.

The last Legislature made many important changes in the laws affecting the State highway system and its financial setup. To supply information in a succinct form in response to numerous inquiries the following questionnaire with answers is published:

Q. How are State highways created?

A. Only by act of the Legislature or by vote of the people on a proposition submitted to them at a state-wide election.

Q. Has the California Highway Commission, itself, authority to create a State highway?

A. No. It is limited to determining the engineering location of a State highway between the key points or the termini designated by the act of the Legislature or the measure voted by the people.

Q. What is the approximate mileage of the State highway system of California at the present time?

A. About 14,000 miles.

Q. How are the State highways of California classified?

A. Primary and secondary.

Q. What governmental agency makes this classification?

A. The Legislature.

Q. What are primary State highways?

A. The Legislature of 1927 declared the main trunk State highways, together with county seat, national park, and certain interstate State highway connections, specifically described in Chapter 794, Statutes of 1927, as primary State highways. The 1933 Legislature designated the San Francisco-Oakland Bay Bridge and approaches thereto

to be a primary State highway. There are now 41 primary State highways designated by the Legislature.

Q. What are secondary State highways?

A. All State highways now or hereafter included within the State highway system other than the 41 primary State highways are and shall be classified as secondary State highways.

Q. What important changes were made in the State highway financial structure by the 1933 Legislature?

A. (a) The Motor Vehicle Fuel License Tax Act of 1923 was amended and the Gasoline Tax Act of 1927 was repealed, resulting in a consolidation act.

1. A three-cent gas tax is imposed on each gallon of motor vehicle fuel.

2. After certain deductions are made, one-third of all moneys in the "Motor Vehicle Fuel Fund" are paid to the respective counties for road purposes.

3. All moneys in the "Motor Vehicle Fuel Fund" remaining after the counties' shares are provided for and the statutory deductions are made are paid into the "State Highway Fund" for State highway purposes.



C. C. CARLETON

Q. What other money is deposited in the "State Highway Fund" besides the State's share of the gas tax?

A. All money made available by any law for State highway purposes (including the State's share of receipts from the motor vehicle license

Expenditures Controlled by Law

(Continued from preceding page)

taxes and the taxation of highway transportation companies) is placed in the "State Highway Fund." The only exception is money which may be placed in the "State Highway General Fund," to wit, any money contributed by any county or city for the construction or maintenance of highways, Federal aid road money, or other funds coming under the control of the Division of Highways which are not otherwise specifically appropriated.

Q. How is the "State Highway Fund" allocated?

A. (a) The Department of Public Works is authorized to expend such proportion thereof as the California Highway Commission determines is necessary for:

1. General administration purposes.
2. Maintenance of all State highways, including all traversable highways on authorized State highway routes.
3. Maintenance of highways in State parks.

(b) The remainder of the money in the "State Highway Fund" is allocated and expended as follows:

1. One-half thereof on primary State highways.
2. The remaining one-half thereof on secondary State highways. (Not to exceed 4 per cent of each one-half can be expended in the northern group of counties and the southern group of counties, respectively, as State aid to joint highway districts within the two respective groups.)
3. The California Highway Commission may, in its discretion, expend not to exceed 50 per cent of the primary highway money on secondary highways, and vice versa, when the allotments would otherwise be larger than necessary to meet traffic requirements.
4. As a further flexible provision, either primary or secondary highway moneys may be expended within municipalities on authorization of the California Highway Commission.

Q. What further expenditure must be made from the "State Highway Fund," which was a new policy adopted by the 1933 Legislature?

A. By the provisions of Chapter 767, Statutes 1933, the Department of Public Works is directed to expend annually from the "State Highway Fund" an amount equal to one-quarter of one cent per gallon tax on motor vehicle fuel, within cities, pro rated according to population, for State highway and city major street purposes within such cities.

Q. Referring to the three-cent gas tax, what general distribution results?

A. Roughly speaking, since certain deductions must first be made as above set forth, the State receives one and three-quarters cents, the counties one cent, and the cities one-quarter of a cent, out of each three cents.

Q. Can the State expend more than the cities' one-quarter cent gas tax within cities?

A. Yes. On State highway links within cities it can spend State highway moneys in addition.

Q. How are primary State highway moneys redivided?

A. The State is divided into two groups of counties by legislative act. The 45 northern counties compose one group. The 13 southern counties compose the other group.

Each group receives the proportion of the money that the number of primary State highways within its own limits bears to the total number of miles of primary State highways designated by law.

Thus: The total mileage of primary State highways used at this time as the basis for computation is 4261.9 miles.

In the 45 northern counties there are 2341.6 miles thereof, or a percentage of 54.9 per cent.

In the 13 southern counties there are 1920.3 miles thereof, or a proportion of 45.1 per cent.

Therefore, the northern group is now receiving 54.9 per cent of the primary road moneys and the southern group, 45.1 per cent.

Q. How are the secondary State highway moneys divided?

A. The law provides that they shall be divided equally between the two groups of counties, each receiving 50 per cent of the funds.

Q. What policy has the Legislature of California followed in recent years?

A. The policy of adding new roads to the State highway system only after engineering and economic studies have been made by the California Highway Commission and the State Department of Public Works.

Q. What mileage of secondary State highways was added to the State highway system by the 1933 Legislature?

A. 213 routes, comprising a total of about 6800 miles.

Q. What other policy has the Legislature been following?

A. Equalizing the mileage in the secondary State highway system between the northern and southern groups of counties, as soon as it can reasonably be accomplished. Thus, the 1933 Legislature took a large stride toward equalizing the mileage north and south. There now remains an advantage of but a few hundred miles in favor of the northern group of counties.

Q. Is the State authorized by law to construct portions of State highway within municipalities?

(Continued on page 27)

Project Agreements Made with Cities

(Continued from page 1)

within cities to be studied and determined upon. The California Highway Commission, in cooperation with the Department of Public Works, made an intensive study of the possible routings in all the cities and finally selected tentative State highway routes within municipalities for designation.

After the routings were selected, the descriptions of the proposed routings were sent to the respective cities, with the request that the city council adopt a resolution concurring in the designation of those streets as the State highway routing through that city. In a number of cases, the route of a highway as described by law did not follow any existing street, and in such cases the commission adopted the policy of designating State highway routes along the most feasible routing, following traversable streets open to traffic and approximately on the route as described by law.

In some instances, cities have requested alterations in the routings tentatively selected, and where it appeared that the change was for the best interests of the traveling public, the change has been made.

CITIES' ADVICE SOUGHT

In programming the expenditure of this money and in selecting the projects for improvement, the advice and cooperation of the city has been sought. A form of project statement has been prepared for use of the cities in submitting their statements of proposed expenditure of the quarter-cent gas tax.

The form contains space for showing the streets or sections selected for maintenance or improvement, the condition of the street, traffic conditions, the work proposed, and the plan of financing, together with a statement of funds available; also a statement as to whether the city desires to handle the work itself or wishes the State to do the work. Upon approval of the project, an agreement is prepared for execution by the city and the State.

The department has adopted a policy of cooperating with cities to the fullest extent possible in the expenditure of this money, and has made the procedure just as simple as possible, with due regard to existing laws.

Wherever necessary to waive formalities in order to accomplish ends promptly, there has been no hesitation in doing so; but there are certain fiscal matters and regulations that are beyond our control.

MAINTENANCE FIRST OBLIGATION

In programming the expenditure of the quarter-cent fund, the law requires that the maintenance of the State highway routes within cities shall be the first obligation against the quarter-cent gas tax revenue accruing to that city. Before any acquisition, improvement or construction projects are considered, the adequate maintenance of State highway routes within the city limits must first be provided for, either from the quarter-cent fund or from other city funds.

Where the State highways within the limits of incorporated cities were being maintained by the State at State expense prior to August 21, 1933, the State has continued to maintain those streets at State expense. In the maintenance of city streets, it is considered that the quarter-cent fund should be expended only for work between the curbs, and it is not considered proper to expend this money for any work back of the curb line, including the maintenance of street lights, whether overhead lights or electroliers.

LIMIT TO EXPENDITURES

Where the State does the maintenance work on a State highway route within a city, not previously maintained at State expense, the State will expend only the amount of the quarter-cent allocation accruing to the city, and can not supply additional money from the State highway fund if the city's quarter-cent fund is insufficient to provide for adequate maintenance. In such case, the standard of maintenance must be limited to the amount of the quarter-cent fund available, unless the city is willing to contribute the additional money required.

Where the city does the work of maintaining the State highway route, it will be reimbursed for only the actual expenditures, not to exceed the total amount of the quarter-cent gas tax accruing to that city.

Based upon estimates of the gas tax revenue as used in the State highway budget, the quarter-cent gas tax allocation will

Fuel Tax Funds Give Financial Relief

(Continued from preceding page)



GAS TAX PAVEMENT recently completed on "L" Street in the city of Sacramento where State Highway Route No. 4 passes the historic Fort Sutter situated in Sutter Park.

amount to \$5,310,000 for the biennium. This amounts to \$1.24 per capita. From present indications, the actual collections will probably be somewhat less than the estimated amount, as the gas tax apportionment so far this biennium has been somewhat less than estimated for the corresponding quarters.

ROUTES TO BE SIGNED

Arrangements are being made for the erection of signs directing traffic along State highway routes within municipalities, as rapidly as the work can be accomplished, so that a stranger will be informed of the best and most direct and feasible route through the city. The larger cities have generally made satisfactory provision for State highway traffic entering the city; however, in some few instances in the more sparsely settled districts, the streets have been far from adequate for the traffic they were called upon to bear. In the smaller communities,

with fewer resources at their command and the relatively large portion of their streets carrying heavy State highway traffic, the financial burden of providing adequate improvement and maintenance was beyond their means.

The allocation of one-quarter cent per gallon tax on gasoline for expenditure within incorporated municipalities will provide the funds for maintenance in all cases, and will at least permit the gradual improvement of the State highway routes within cities until they are adequate for traffic conditions.

Where a city's finances would permit, it has been suggested that they provide for the maintenance of the State highway routes out of their current funds and apply the quarter-cent gas tax allocation toward the improvement of the State highway routes. It is extremely gratifying to note the number of cities that are acting upon that suggestion.

(Continued on page 22)

Engineers Make Ocean Build Mile of Bathing Beach Along Coast Highway

TWO years ago it was decided to widen State Highway No. 60, generally known as the "Roosevelt Highway" or "Coast Boulevard," where it extends northwesterly along the coast from Santa Monica canyon in Los Angeles County. This strip of coastline affords the most convenient series of beaches for a large section of the metropolitan area and has the largest traffic count of any portion of the State highway system.

Beach frontage that had been set aside for State and county park purposes comprised a large part of this section and it was necessary to provide a wide parking area along the beach side of the highway to prevent traffic congestion: Just north of Santa Monica Canyon the ocean had already washed away most of the beach and at high tide the breakers were menacing the existing highway.

It was decided to protect the highway slopes by building up the beach and at the same time provide a good bathing area along the public park frontage by the use of groins or jetties extending out into the sea.

GROIN PLAN ADOPTED

The successful results of this plan are described in an article in *Los Angeles Times* of March 18, 1934, by Real Estate Editor Charles C. Cohan. Answering the question—"What about Los Angeles Beaches when the metropolitan area's population of almost 2,400,000 shall have grown to three or four times that number?" Mr. Cohan writes:

"Don't worry!"—that's engineering science's bold answer to the question's challenge.

"Is more assurance wanted than just that statement? All right—let engineering science take you by the hand and lead you to the shore about three-quarters of a mile north of the mouth of Santa Monica Canyon.

GREAT ACHIEVEMENT

"What do you see? One of the finest stretches of beach you've ever viewed—almost a mile long, almost 200 feet wide * * * room enough there for a good many thousands of men, women and children.

"And so what? Well, twenty months ago

the pounding waves of high tide were washing up against and cutting under the highway there—the famous Coast Highway. There wasn't a vestige of beach along all that 3333-foot stretch of State-owned shore line.

"The State is proud of that highway, knows its tremendous value. S. V. Cortelyou, State Highway District Engineer, boss of the district including Los Angeles County, wanted to save the road, but he didn't defy Old Man Ocean—he just gave him a hint, an affable engineering tip.

FIVE GROINS BUILT

"Engineer Cortelyou had five staunch barriers—their technical name is groins—each built out 200 feet seaward from the shore, each groin 500 feet apart from its neighbor groins.

"Old Man Ocean couldn't batter those groins to bits—they're made of interlocking sheet-steel piling. So very obligingly and steadily he began piling sand against them—a million times more sand against each barrier than there is rice in China. And presto!—there has appeared that fine new beach, a veritable gift from Old Man Ocean who still is extending that beach width, a remarkable demonstration, one of the foremost on record, of what can be done to increase beach space along many a mile of the Los Angeles coastal line.

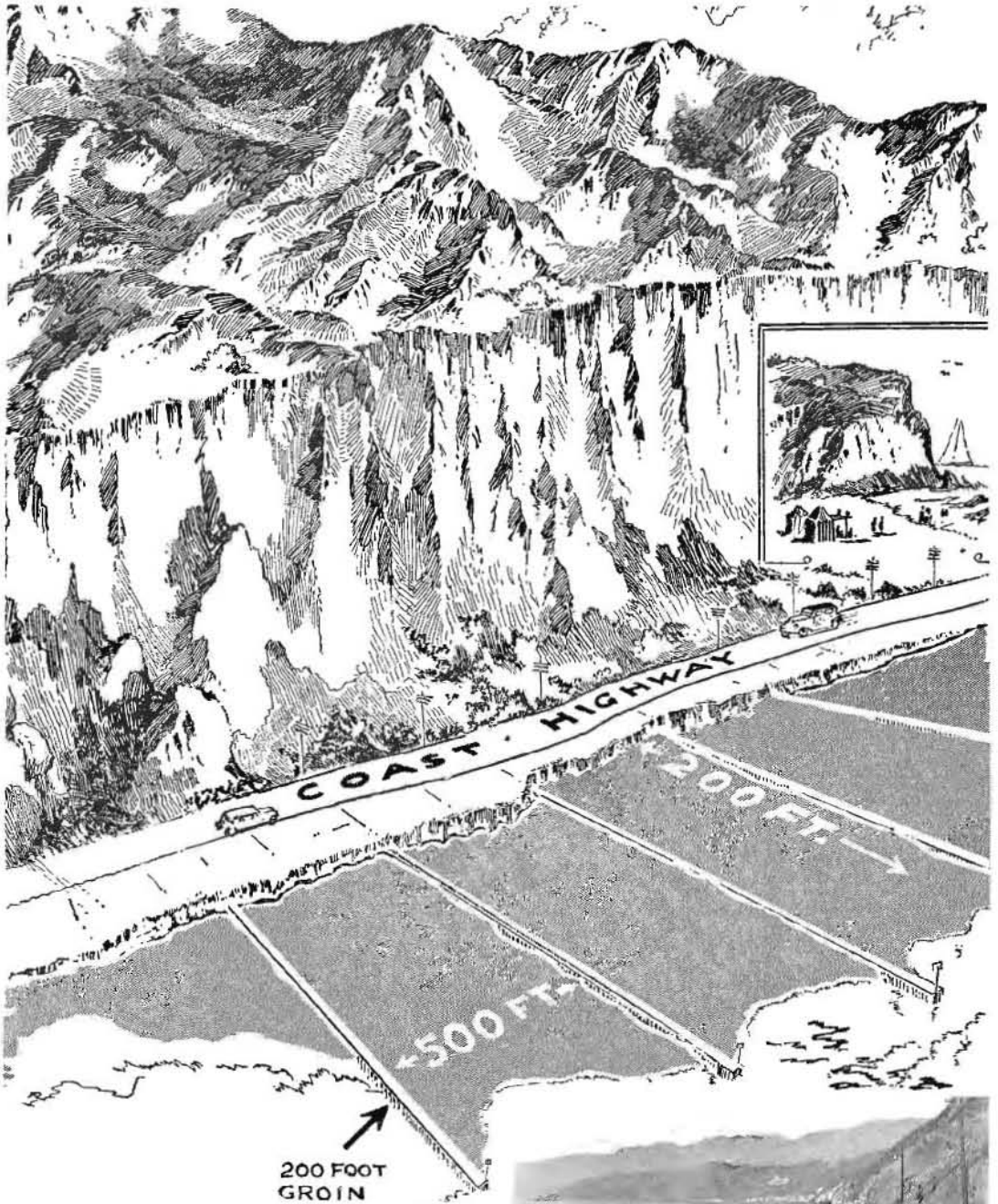
COST ONLY \$30,000

"Oh, yes—and the entire cost of those groins was only about \$30,000. The value of the new strand is inestimable.

"This county has seventy miles of coast line—its rugged portions accentuating its renowned beauty, punctuating interestingly its stretches of delightful silver strand.

"This means a lot of beach. But after all there is only just so much coast line—and it's something that never can be extended, when once all, or as much of it as possible, is put in use for public or private purposes.

"So while there never can be any more beach frontage, Old Man Ocean always will be ready to make beaches much larger, as described—and that's a mighty cheerful thing to know."



OLD OCEAN HARNESSSED by groins has been toiling for State highway engineers building a fine sandy beach along the Santa Monica Coast where no beach existed. In 20 months it has made a beach a mile long and 200 feet wide as shown by shaded portions of the drawing by Artist Phil Leonard of the Los Angeles Times. It provides a public bathing beach as well as a protection to the highway. Photo shows how the waves were gouging out the highway shoulders before groins were installed.



Staff Worked Double Shifts in Crisis

(Continued from page 4)

State highway situation arose on many sides, necessitating continual readjustment of the setup as ordinarily planned for the current biennium.

Early in 1933, the engineering staff had prepared, and the California Highway Commission had presented to Governor Rolph a proposed biennial budget for highway construction, reconstruction and maintenance for the 85th-86th fiscal years.

This budget was based on the orderly improvement of the then existing State highway system of approximately 7350 miles of roads in accordance with the ten-year plan of development. The Legislature then passed a bill incorporating some 6800 additional miles of county roads into the State system, bringing the total mileage of the system to about 14,150 miles.

NEW LAWS ENACTED

At the same time, one-quarter cent of the State's share of the gasoline tax was allotted by the Legislature for use within incorporated cities. Concurrently, a plan for the diversion of a very sizable portion of the gas tax to other than highway purposes was referred to the people for decision at a special election to be held in June. The result of this election is now history, the people voted unmistakably for highway development.

Congress then passed the National Industrial Recovery Act and California was apportioned \$15,607,000 of Federal funds for State highway construction.

It can readily be seen that with these affecting factors rolling up one after the other, a complete revision of the highway setup was necessary and the Headquarters Staff, with the cooperation of the district engineers, labored arduously to prepare an adequate program of construction and maintenance for this doubled highway system on the basis of the total revenues from State and Federal sources.

BUDGET REVISED

The California Highway Commission held innumerable conferences with organizations from many localities and State engineers conferred with city and county officials. The great increase in State road mileage required a complete readjustment and expansion of maintenance activities.

So, with due consideration to the multitudinous factors of a proposed program, the State Highway Engineer prepared, and the Director of Public Works presented to the Commission for approval and adoption a revised budget aimed to provide the most equitable and widely spread development and improvement for the entire State system that was possible.

Activity in the headquarters' office then reached a fever pitch under instructions from Governor Rolph to carry out the President's plea for immediate construction on all public works possible. Plans, specifications and estimates were prepared, and on August 25th, the first advertising day after the several new laws affecting State contracts became effective on August 22d, advertisements were published calling for bids on fifty contracts, estimated to cost approximately \$4,018,000.

This meant the complete preparation of adequate specifications and review and revision of plans necessary for the construction of this large number of projects in a week's time. Even with considerable increase in the personnel of the staff of draftsmen and engineers, the task necessitated working day and night.

OFFICE SHIFTS DOUBLED

But this first advertising drive was merely the beginning. The district offices threw crews into the field to rush surveys and doubled office shifts to prepare preliminary plans for future work. The Bridge Department increased its personnel to the point where two shifts were required because of insufficient office space.

Preliminary reports literally rained into the headquarters office from the districts; specifications and plans were whipped into shape, reviewed and approved by engineers of the Surveys and Plans Department, the Testing Laboratory and the Construction Department; proposal forms were printed, and every week saw the total of projects advertised rise with steady rapidity.

The amount of detail work necessary to the successful carrying out of this program is almost inconceivable: calculations of quantities; computations of estimates; inclusion in specifications of Federal require-

Director Kelly Pays Tribute to Work of Headquarters Staff

(Continued from preceding page)

ments and restrictions on construction methods; masses of typing; endless proof-reading; review of plans submitted by the district offices; detailing of special structures; submission of projects and estimates to Federal officials for approval and a thousand and one other phases of highway construction work necessary to the proper preparation of proposals for contracts.

There were delays not under the control of the department that held up the work: the delay of a suit brought to withhold opening bids on a \$200,000 contract to test the validity of a law passed by the last Legislature; the delay which caused the cancellation of the advertisement of 13 projects and a month's suspension of advertising on all projects in northern California by a restraining order served on the Department of Public Works in connection with the code of Excavating and Dump Truck Contractors; but, withal, the program has been successfully put over without a mistake of sufficient gravity to materially affect a single contract.

This accomplishment has demonstrated the high efficiency of the Division of Highways organization and the healthy spirit of cooperation existing in all departments, particularly among the members of the Headquarters Staff who, in my opinion, constitute the ablest group of State highway engineers in the United States. California is indeed fortunate in having such a body of highly trained, experienced and competent public officials building her highways and may well be proud of them and their achievements.

OREGON BUILDING FIVE BRIDGES ON PACIFIC COAST HIGHWAY

Another scenic link in the International Pacific Highway from Alaska to Argentina is being forged with construction started on the first of five bridges along the Oregon Coast Highway. A report states that work on all five will be started within the next 75 days. Oregon State Highway Commission is being aided in the construction by a Federal appropriation.

Husband: "I say, if worst comes to the worst I suppose we will have to go and live with your parents?"

Wife: "Not a chance. They're already living with their parents."

HIGHWAY DIVISION RECEIVES COMMENDATION FROM CWA

The following letter was received by District Engineer Wallace from John L. Bacon, Director of Civil Works Administration in San Diego County, commending the work of District XI in their handling of CWA projects.

Mr. E. E. Wallace, District Engineer,
Division of Highways,
San Diego, California.

Dear Mr. Wallace:

I want to thank you for your letter of appreciation of March 27th.

It has been a pleasure to work with the Highway Department because everything they have undertaken has always been so well planned and executed that it makes us feel that really work of a valuable nature has been accomplished in every case.

Very truly yours,

(Signed) JOHN L. BACON,
Director, Civil Works Administration,
San Diego County.

Ten Bridges Under Construction on the Roosevelt Highway

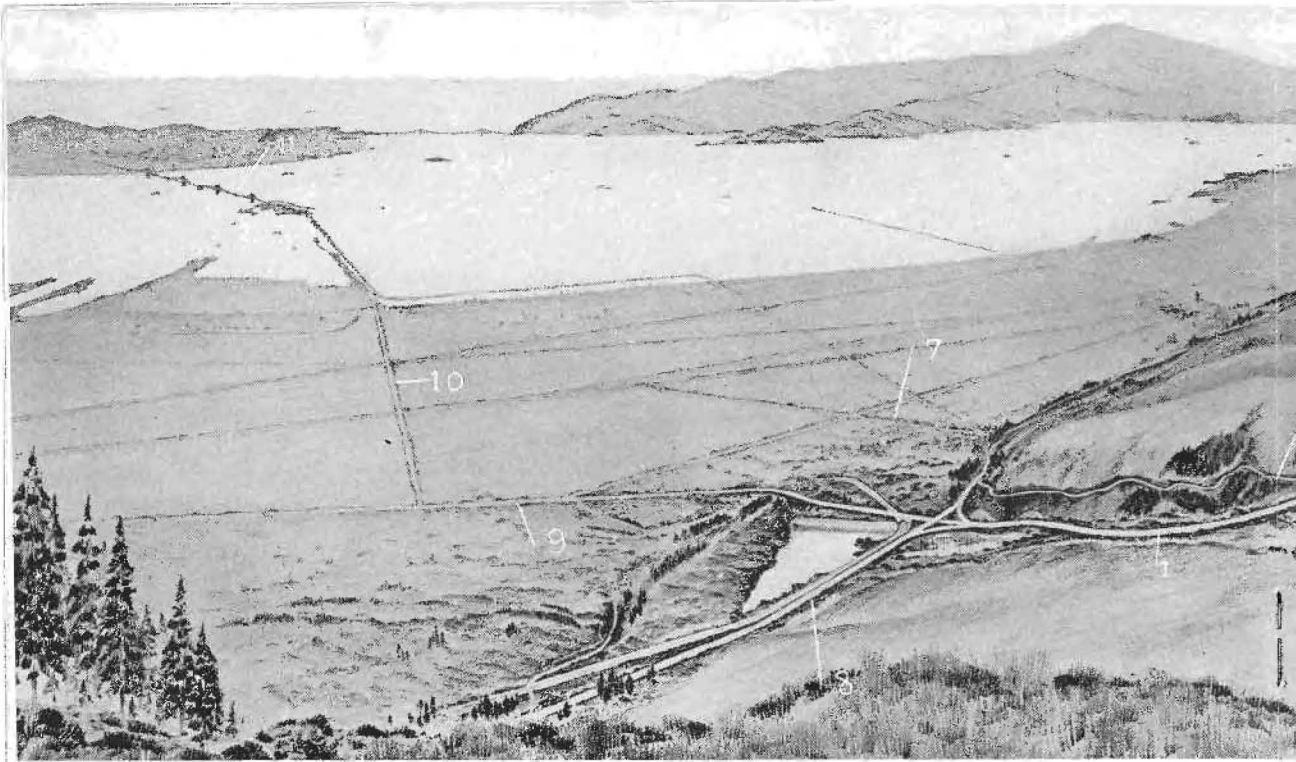
ON THE Roosevelt Highway in Monterey County ten bridges are being built. At Anderson Canyon, Buck Creek and Lime Creek, respectively, 45, 47 and 49 miles south of Monterey, timber bridges, having a 24-foot roadway, are under construction, under the supervision of the Bridge Department.

Another bridge is being laid across Willow Creek, 32 miles north of San Simeon, a timber bridge having a 24-foot roadway.

Across Hot Springs Creek, 47 miles south of Monterey, a timber bridge having a 24-foot roadway is under way.

Dolan Creek, 49 miles south of Monterey, is being spanned by a timber bridge with a 24-foot roadway.

On a four-mile stretch of the highway between 75 and 79 miles north of San Luis Obispo four bridges are needed. At Prewitt Creek, a timber bridge is under construction; at Wild Cattle Creek, a steel and timber bridge; at Mill Creek, a steel bridge and at Kirk Creek, a timber bridge. All of these structures have a 24-foot roadway and are under construction.



1—New tunnel road. 2—West portal of new tunnel. 3—East portal. 4—Old tunnel road. 5—Line of old tunnel. 6—Land. 11—San Francisco-Oakland Bay Land.

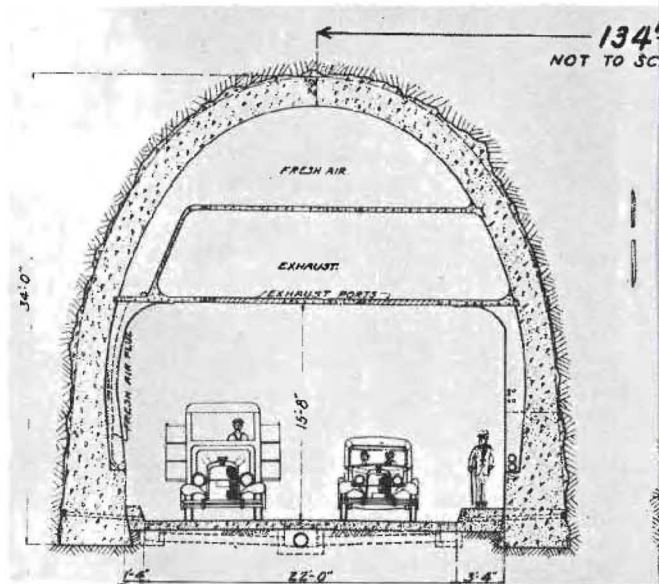
Broadway Low Level Tunnel Project Between

By WALLACE B. BOGGS, District Engineer, Joint Highway District No. 13

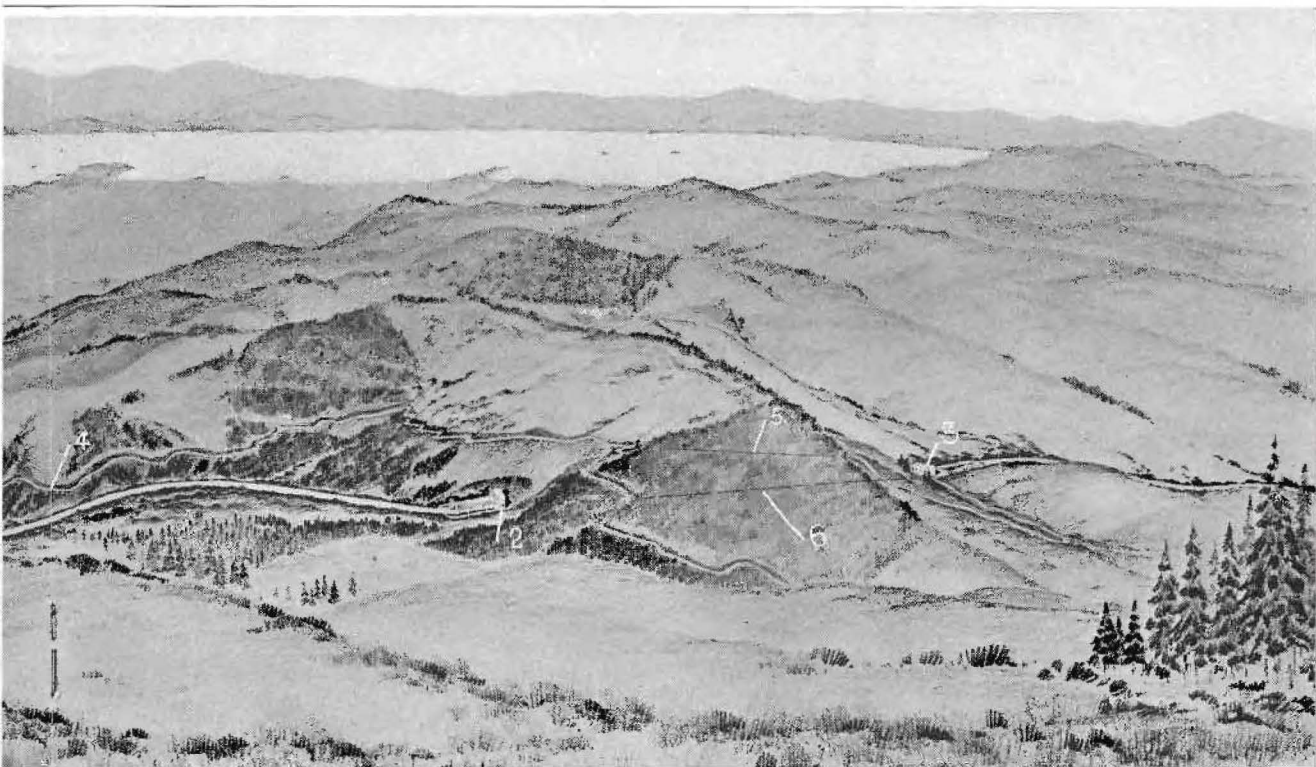
THE BROADWAY low-level tunnel project of Joint Highway District No. 13 is planned to provide a modern highway route from Oakland, Berkeley and other East Bay cities into the Contra Costa County suburban area east of the Berkeley Hills. Ultimately it will be a part of an Oakland-Stockton highway, which will result in a saving of about 10 miles in distance as compared with the present route through Dublin Canyon, Livermore and Tracy.

The project had its inception in 1926, when public demand, aroused by the inadequacy of the existing Tunnel Road and Fish Ranch Road routes, resulted in the preparation of a preliminary report on possible tunnel locations through the Berkeley Hills between Alameda County and Contra Costa County. This report was prepared upon the authorization of the counties of Alameda and Contra Costa, and the city of Oakland, acting jointly.

Following the submission of the report, a joint highway district consisting of Alameda and Contra Costa counties was formed to perform the preliminary work, including a survey for a relocation of the highway between Oakland and Walnut Creek.



The main part of the project is 2.82 miles in length, consisting of Broadway and Keith Avenue in Oakland, up Temescal Canyon and a long emerging north of the Fish Ranch Road in Contra Costa County. The present Tunnel Road about 1500 feet north of the Fish Ranch Road. Each bore accommodating two one-way lanes on a 22-foot wide roadway. The Oakland-Stockton highway providing direct access to the Stockton and Sacramento River of the Berkeley Hills extending into the San Joaquin and Sacramento



1. 6—Line of new tunnel. 7—City of Berkeley. 8—Lake Temescal. 9—Broadway, Oakland. 10—Fortieth Street, Oakland Bay Bridge. 12—Golden Gate Bridge.

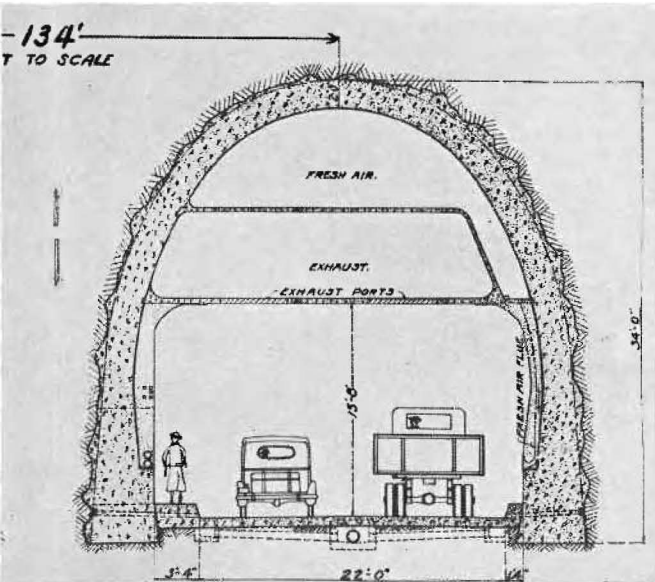
Between Alameda and Contra Costa Counties

STATE COOPERATED

The California Highway Commission, at about the same time, made a preliminary reconnaissance of the proposed Oakland-Stockton route, and the report by the State highway engineers emphasized the importance of this road in providing an adequate and direct easterly outlet from the East Bay cities, and in opening up the suburban areas in Contra Costa County to development.

Action of the State Legislature resulted in the taking into the State highway system of the existing Tunnel Road in Contra Costa County. An agreement for financial aid by the State in the construction of a new tunnel and highway approaches to be built by Joint Highway District No. 13, consisting of Alameda and Contra Costa counties, came as a result of cooperation between the Director of Public Works of the State of California, the California Highway Commission and the officers of Joint Highway District No. 13.

Traffic studies made by the Division of Highways showed a weekly traffic over the present narrow and hazardous route of 30,000 vehicles in 1930, and indicated a probable traffic of 77,000 vehicles weekly in 1940. The completion of the San Francisco-Oakland Bay Bridge in 1937 will probably cause this esti-



consisting of a highway leading from the intersection of Broadway and into the Berkeley Hills, in a double bore tunnel 3168 feet in Contra Costa County the highway extending to a connection with Fish Ranch Road. The tunnel will provide four traffic lanes, a 22-foot roadway. Eventually this project will be a part of the San Francisco-Oakland Bay Bridge for that section east of Sacramento valleys.

(Continued on page 19)

CALIFORNIA HIGHWAYS AND PUBLIC WORKS

Official journal of the Division of Highways of the Department of Public Works, State of California; published for the information of the members of the department and the citizens of California.

Editors of newspapers and others are privileged to use matter contained herein. Cuts will be gladly loaned upon request.

EARL LEE KELLY-----Director
JOHN W. HOWE-----Editor

Address communications to California Highways and Public Works, P. O. Box 1499, Sacramento, California.

Vol. 13 MAY, 1934 No. 5

An Editor's Tribute

Gorgeous mountain scenery meets the eye in mile after mile of the new highway that opens up the San Jacinto Mountains in the Idyllwild region. The scenes are both fearful and wonderful. This road adds something distinctive to the ever-unfolding panorama of California scenery. * * I made this journey, entering from Hemet into the Idyllwild area, turning within three miles of that mountain resort, at about the 5000-foot level, and drove through the magnificent country to the point where the road emerges between Palm Springs and Indio.

On every hand is the gigantic upthrust of volcanic rock, bare, forbidding, but beautiful, with scarcely a tuft of vegetation anywhere. The rocks rise in curious cones and mounds, and in indescribable shapes, all colors of the spectrum, it would seem.

This drive adds another to the many paths to beauty which the State has provided, and brings the thought that California is growing every year in accessible areas, broadening the opportunities for the tourist as well as the old-timers like ourselves, who have been here since the sage and cactus days. Every year sees the inclusion of some hitherto inaccessible portion of the State, linking eternal snows, volcanoes, flowers, fruits and waving fields of grain in a panorama that can not be anything but delightful to the visitor.

California, land of fruits and flowers, is also California of the deepest snows, the most intense cold, the deepest valleys, the highest mountains—and all these are being made approachable to everyone through the gradual widening and broadening of the magnificent California State Highway System.—*J. L. Matthews, Editor Covina Argus, in Indio Date Palm.*

New California Road Map is Published by Division of Highways

THE DIVISION of Highways announces that the 1934 edition of the California road map has been published by Earl Lee Kelly, Director of the Department of Public Works. This new map has been prepared under the direction of C. H. Purell, State Highway Engineer.

The map conforms to standards adopted by the Western Association of State Highway Officials. These standards for the preparation of State road maps control the size of the map, the colors, style of lettering and legends used, so that road maps published by all States which are members of the association are uniform in character.

The size of the map is 28 by 34 inches. It shows the entire State as a unit and is printed in four colors. The roads shown include the primary and secondary routes of the State highway system and the principal county roads. Three different widths have been used in delineating the roads according to their classification as Federal Aid routes, United States highways, State roads or county roads.

All principal towns and cities are shown and the mileage between points is clearly indicated. The type of road surfacing is shown by color, red indicating a high type of improvement, yellow an intermediate type and black a low type.

One of the features of the map which makes it particularly valuable for touring purposes are the notations indicating the United States highways by number.

Printed on the reverse side are large scale maps of the chief metropolitan areas in California, showing the principal arterials and through streets. These local maps show areas in the vicinity of Los Angeles, San Francisco Bay, San Diego, San Jose, San Bernardino, Sacramento, Stockton, Fresno and Bakersfield. There is also a small scale map of the eleven Western States with the United States numbered highways shown thereon.

Copies of this latest California road map may be secured from the Division of Documents, State Capitol Building, Sacramento, at a cost of thirty-five cents.

Lady: "So your married life was very unhappy? What was the trouble? December wedded to May?"
Liza Johnson: "Land sakes no, ma'am, it was Labor Day wedded to de day of rest."—*Fireman's Fund Record.*

Two Parallel Bores to Carry Traffic

(Continued from page 17)

mate for 1940 to be considerably exceeded by affording a short cut from the Stockton area.

STANDARD FOUR-LANE HIGHWAY

The determination of standards for the new route was made after cooperative studies by engineers of the joint highway district and the engineering staff of the State Division of Highways. Fundamentally, these standards provide for a four-lane highway, with adequate shoulder areas, a maximum gradient of 5.1 per cent, and a minimum radius of curvature of 800 feet; the elimination of grade crossings with railroads and other main highways was also determined upon. California highway design standards for structures were made a minimum requirement.

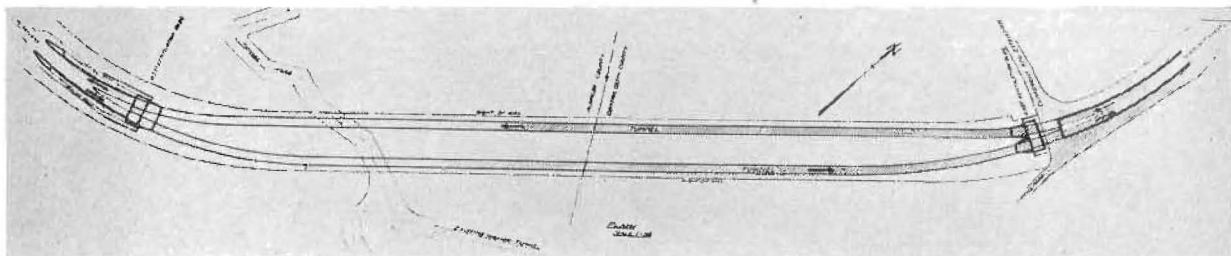
Location surveys were made by the district and the detailed design of structures carried

TWO IMPORTANT CONNECTIONS

This latter unit provides an East Oakland connection and also a new through route from Berkeley to East Oakland and to Southern Alameda County, which will eliminate the necessity of using heavy traffic streets and will effect a saving of about a mile between points in East Oakland and the University of California campus and business sections of Berkeley.

This East Oakland-Berkeley highway crosses the main Tunnel Highway on an overhead structure. The Fish Ranch Road is also carried on an overhead structure over the east portal of the tunnels to connect with the existing Tunnel Road.

The tunnel will consist of two parallel bores, each having a 22-foot roadway and



The tunnel will consist of two parallel bores, each having a 22-foot roadway and 3-foot sidewalk. The bores will be 15 feet apart at the portals but separated by 100 feet through the main portions with cross connections for pedestrian use and ventilation provided by huge fans installed in concrete buildings at each portal.

on during 1932. All rights of way were acquired by the district during that time. Plans and specifications for the project were completed in March, 1933, and received the approval of the Director of Public Works.

The main part of the project is 2.82 miles in length, consisting of a highway leading from the intersection of Broadway and Keith Avenue, in Oakland, northeasterly up Temescal canyon and through a double bore tunnel 3168 feet in length on the center line, emerging north of the Fish Ranch Road in Contra Costa County, the highway extending to a connection with the present Tunnel Road about 1500 feet north of the Fish Ranch Road; there is also an additional unit of 0.91 mile of highway connecting the new road with the Tunnel Road leading to Berkeley, and with Landvale Road in Oakland.

a 3-foot sidewalk. The tunnels are 15 feet apart at the portals, but are separated by 100 feet through the main portions. Three cross-connections for pedestrian use are provided between the two bores. The tunnels will be concrete lined throughout, and mechanically ventilated to keep carbon monoxide pollution within safe limits.

The fans, which are installed in reinforced concrete buildings at each portal, have an input capacity of 1,500,000 cubic feet of fresh air per minute, and will exhaust a similar amount of air, when operated at maximum speeds. Carbon monoxide recorders and detectors will indicate the degree of pollution at all times and serve as a guide to the operation of the fans. Electric illumination and traffic control devices are provided.

(Continued on page 31)

Ground Broken for Monte Rio Bridge Over Russian River to Cost \$100,000

HIGHWAY COMMISSIONER TIMOTHY A. REARDON, officially representing Governor James Rolph, Jr., turned the first shovelful of earth with a golden shovel, when ground was broken for the \$100,000 Russian River Bridge at Monte Rio Sunday, April 29th.

Hundreds of residents of the Redwood Empire, including State, county and city officials, and chamber of commerce leaders, attended the ceremonies, jointly sponsored by the Redwood Empire Association and the Monte Rio Chamber of Commerce at Alberts Grove.

W. C. Healy, president of the Monte Rio Chamber of Commerce, was chairman of the day.

Commissioner Reardon, in turning the first earth for the new highway unit, which is being constructed by Joint Highway District No. 19, read a message from Governor Rolph. "The beginning of construction upon this magnificent steel and reinforced concrete bridge, to cost nearly \$100,000 is indeed cause for rejoicing throughout the entire Russian River district, as well as among thousands of visitors who share the delights of your recreational wonderland," the message read in part.

PAGEANT OF TRANSPORTATION

One of the features of the celebration was the pageant of transportation presented by six Monte Rio girls, pupils of the Analy High School at Sebastopol. They were Dorothy Collier, Ione Bowers, Geraldine Collier, Margaret Hess, Nellie Guidotti and Margaret Lewis. Garbed in colorful costumes the girls showed progress in transportation across the Russian River from the days of the pioneers to the present time.

Supervisor Willard C. Cole, in whose district the new project is being carried out, was the first speaker on the program. He gave a short talk giving in brief a history of Joint Highway District No. 19, of which he is a member.

Ed. Enzenauer, chairman of the board of supervisors, welcomed the visitors and congratulated members of the highway district

for their work in making possible start of the bridge.

PRESIDENT GOLDMAN HEARD

M. Goldman, president of the Redwood Empire Association, delivered an address describing the association's activities and particularly thanked Commissioner Reardon for his support of the \$40,000 appropriation for the bridge from joint State highway district funds.

Senator Herbert W. Slater spoke and introduced Senora Luisa Vallejo Emparan, daughter of General Mariano Guadalupe Vallejo. Senora Emparan sang two Spanish songs and made a short speech of appreciation for the new highway unit, contrasting modes of travel today with those of the days of her father.

Other speakers were George H. Harlan of the Golden Gate Bridge and Highway District; J. B. Piatt, district engineer, who designed and is supervising construction of the bridge; Assemblyman Hubert B. Scudder and Deputy Director of Public Works Morgan Keaton, representing Director Earl Lee Kelly.

DEPUTY DIRECTOR KEATON SPEAKS

Keaton's was one of the principal addresses of the day. He congratulated the Russian River area on its new highway development and predicted a great increase in tourist traffic as a result of the new span.

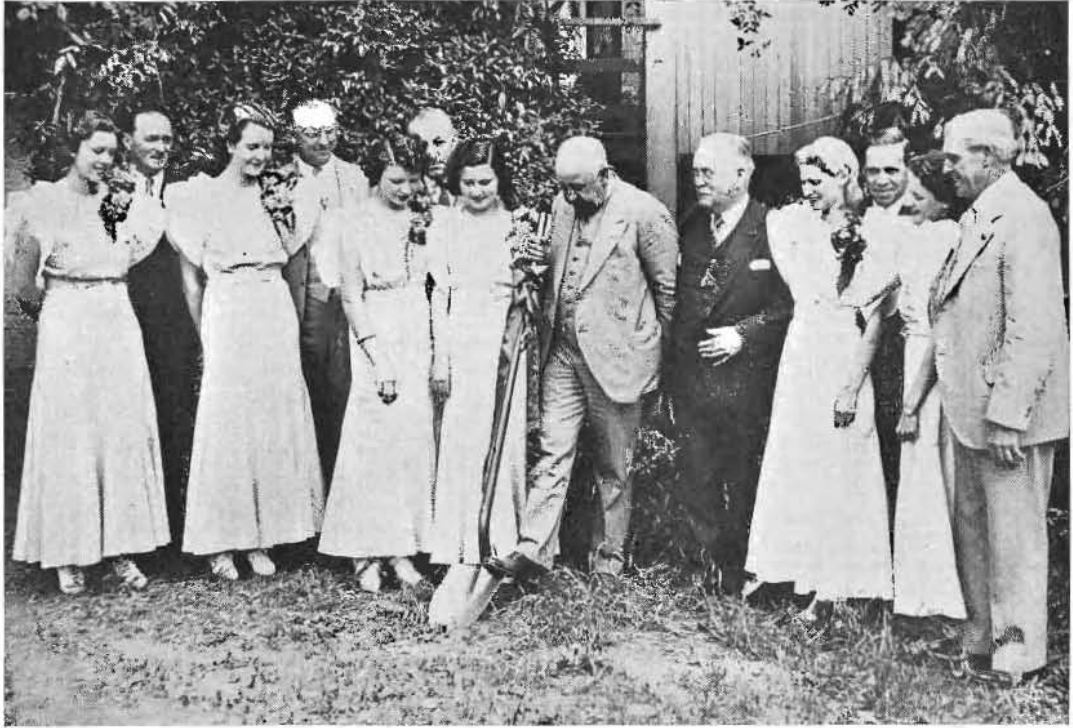
Frank P. Doyle, Supervisors James McSheehy and John Ratto of San Francisco, and L. V. Campbell of the State Division of Highways were introduced during the program.

Music throughout the ceremony was furnished by the Analy High School Band.

The new bridge, which will be of steel and concrete, will be 770 feet in length, replacing the present antiquated 871-foot bridge and eliminating a traffic congestion at a T intersection.

STATE GIVES \$40,000

The existing bridge was built in 1913 and is considered obsolete now. It has been too narrow to accommodate traffic for many years and has become extremely dangerous for



BEGINNING A BRIDGE. Officials in this picture of ground breaking ceremony at Monte Rio are, left to right: President W. C. Healy, Monte Rio Chamber of Commerce; Assemblyman Hubert Scudder; President M. Goldman, Redwood Empire Association; State Highway Commissioner Timothy A. Reardon with the golden shovel; Senator Herbert Slater; Morgan Keaton, Deputy Director State Department of Public Works, and Chairman Ed. Enzenauer, Sonoma County Board of Supervisors, together with "Pageant of Transportation" girls.

pedestrians owing to the fact that it has no sidewalks. The roadway of the new bridge will be 20 feet between curbs with a five-foot sidewalk on either side. It will have a concrete decking sidewalks and railing.

The project is being financed and constructed under the Joint Highway District Act of 1931. The State of California has appropriated \$40,000 towards the project while Sonoma County will pay \$64,750 out of its gas tax money of 1933 to 1935, inclusive. Mendocino County will pay \$250 to make up the balance. Officials of Joint Highway District No. 19 are Supervisors T. J. Ferguson, president; W. C. Cole, C. R. Perkins, Geo. P. Sanborn and James W. Ramage, treasurer.

TURKS STRONG FOR PERMITS

It must take patience to travel in far-off Turkey. The Automobile Club of Southern California notes a report that in order to go from one town to another a traveler must obtain a permit from the mayor and chief of police on which is attached the petitioner's photograph. Anyone going by bus must wait until the driver has a full load. The only other alternative is to pay for the entire bus, it is said.

Safety Congress to Draft Uniform Code

SECRETARY Roper of the Department of Commerce has called a meeting of the National Conference on State and Highway Safety in Washington on May 23-25. Among the recommendations to be offered for adoption is a consolidated manual on traffic signs, signals and markings.

In a statement Secretary Roper said: "Before the ultimate in traffic safety is achieved we must have national uniformity in traffic laws and ordinances. We must have uniform signs and signals and uniform driving practices. * * * The various States and cities must work collectively as well as individually if this uniformity is to be obtained."

Public Safety magazine, in referring to the meeting, says: "It is to be hoped that the conference will urge the adoption of a unified policy in the placement of centralized controlment of road signs, markings and signals in the hands of the State departments."

Quarter-Cent Funds Bring CWA Aid

(Continued from page 11)

By following that plan, there will be a definite improvement to show for the expenditure of the money at the end of the biennium.

276 CITIES PARTICIPATING

There are 276 incorporated municipalities in California that are participating in the distribution of the quarter-cent gas tax allocation. Of this number, State highways pass into or through 248 cities. There are 28 cities where there are no State highway routes within their limits.

There are a total of 989 miles of State highway within incorporated municipalities, and of this amount, 129 miles were being maintained at State expense before the act took effect. The remainder, or 860 miles, represent the additional mileage of State highway within cities, as a result of recent legislation.

At the time the civil works program was undertaken last winter by the Federal government, with a view of providing employment for idle labor, the proportion of the Federal funds allotted to a project which could be used for the cost of administration, rental of equipment, and purchase of materials was limited to such an extent that there was little more than sufficient money to pay the cost of supervision, transportation for the men, and incidental equipment and supplies, so that the work had to be practically hand labor work, with no funds available to purchase materials.

Many of the cities were quick to grasp the possibility of using quarter-cent funds to purchase materials for use with CWA labor. By this means it was possible to undertake many worthwhile projects requiring a considerable proportion of the expenditure for materials and equipment, which could not have been undertaken with CWA labor alone.

This plan of combining quarter-cent funds with CWA labor has materially increased the effectiveness of the CWA labor and has resulted in the accomplishment of worthwhile improvements, of which all parties concerned—the Federal government, the cities, and the State—can well be proud.

It is probably too soon to draw any definite conclusions of the result of the quarter-cent allocation, since it only went into effect August 21, 1933, less than a year ago. The expenditure of the money, however, is resulting in a direct benefit to the motorist, who contributes the tax. In numerous cases, State highway routes within cities are being maintained to a standard heretofore impossible due to the very limited finances of the community; chuck holes are being filled, bumps are being removed; and washboard effects are being eliminated; streets are being paved, resurfaced, and widened; existing shoulders are being oiled, and routes are being marked so that the motorist may pass through a city comfortably and easily.

APPIAN WAY COULD BE BUILT TODAY FOR ONE-TENTH OF COST

"In attempting to obtain a proper and logical perspective on the question of hand labor versus the machine in highway building, we might look at that most famous of highways, the Appian Way, built by Caesar's armies. It is estimated that construction of that road today, using the same methods, would result in a cost of \$300,000 a mile. That naturally includes the primitive method of preparing and transporting the materials as well as their actual placement.

"We can build roads as wide, adapted to the demands of much heavier and faster traffic, and a lot smoother, today at a cost of less than one-tenth of that sum. This, too, in spite of the fact that labor is by no means so inexpensive as in Caesar's time."—A. H. Hinkle, Supt. of Maintenance, Indiana Highway Comm.

INCREASE IN TOURIST TRAVEL TO CALIFORNIA FORECASTED

All indications point to a tremendous revival of motor touring within and to California this year. The Automobile Club of Southern California touring bureau recorded a gain of more than 537 per cent in written inquiries received during March of this year over the same period last year. March correspondence totaled 5331 as against 993 during March, 1933.

Total number of inquiries answered by the club's touring bureau during the first three months of this year was 9543 as compared to 2247 over the same period of 1933, a gain of more than 425 per cent.

Pat was one day employed by an old lady in the country. At dinner she placed a very small portion of honey on his plate.

"Begorrah, ma'am," said Pat, "I see you keep a bee."—*Fireman's Fund Record.*



A hearing on the Central Valley Water Project was held before the Board of Engineers on Rivers and Harbors March 27, 1934, in Washington, D. C., and the report of the Chief of Engineers pursuant thereto was rendered under date of April 6, 1934, and forwarded to the Rivers and Harbors Committee. The report of General Markham, Chief of Engineers, in approving the project recommended Federal participation of \$12,000,000 for the construction of Kennett Dam to the height proposed by the State.

This report was approved by the Rivers and Harbors Committee on April 13, 1934, by resolution unanimously adopted by the members present. At the hearing which preceded the introduction of the resolution the report and the Central Valley Water Project were explained and endorsed by General Markham, Chief of Engineers, U. S. Army. Following are quotations from General Markham's address:

PROJECT HIGHLY PRAISED

"This is as well devised an engineering project as has come to my attention anywhere * * * ever."

"In this majestic project of the State of California we have no shadow of a doubt of the Federal interest * * * perhaps to a degree in excess of the appropriation recommended. The \$12,000,000 estimate is conservative."

The application for a grant and loan for the construction of the project has been referred by the Engineering Department of the PWA to the Federal Power Commission for intensive study of the hydroelectric power features of the project. Application for a license has also been filed with the Federal Power Commission by the executive officer of the Central Valley Project Authority. These matters are being followed as vigorously as possible so that early action may be had on the project.

IRRIGATION DISTRICTS

Information from all parts of the State indicates that nearly all districts which depend for irrigation upon the direct diversion of natural flow from streams will be short of water for the 1934 season and, with few exceptions, storage will also be short.

Districts Securities Commission.

Request was received from the recently organized South Fork Irrigation District, Modoc County, for consent of the Commission to the calling of an election on a \$160,000 bond issue to be used in support of an application to PWA for funds to construct a storage dam.

FLOOD CONTROL AND RECLAMATION

Sacramento Flood Control Project—Bank Protection.

Work under the State-Federal cooperative program for permanent bank protection has continued under the U. S. Engineer Office at Sacramento, in Reclamation District No. 108 and Reclamation District No. 1500.

At the request of the Reclamation Board, work was commenced on April 16th installing an irrigation pipe through the levee of Reclamation District No. 2047 on the property of W. D. De Jarnett, to cost \$1,000.

Mokelumne River.

On March 29, 1934, work under CWA projects No. SJ-50-X, San Joaquin County, and No. Sac-1003-X, Sacramento County, was discontinued upon termination of the program. Valuable work was performed under these projects and it is hoped that it may be continued under the SERA program, particularly in Sacramento County, to clear the by-pass between Reclamation District No. 1002 and the McCormack-Williamson tract.

Flood Measurements and Gages.

During this period no work other than routine maintenance of stations and gages was performed, with the exception of the installation of two automatic recorders in Butte Slough and Butte Creek.

WATER RIGHTS

Supervision of Appropriation of Water.

Thirty-two applications to appropriate water were received during the month of March; 12 applications

(Continued on page 29)

Ventura Overhead Grade Separation Will Eliminate Dangerous Underpass

By F. M. BARNES, Associate Designing Engineer of Bridges

CONSTRUCTION of the Ventura overhead structure separating the grades of the main line of the Southern Pacific Company and the Coast Route of the State highway is now well under way and is expected to be completed this fall. This grade separation, located about three miles north of the city of Ventura and consisting of a steel and concrete structure carrying the highway at an elevated grade over the railroad tracks, is a part of a major project for reconstruction and improvement of the State highway from Ventura northerly to Santa Barbara County.

This highway, known as State Highway Route 2 and as U. S. Highway Route 101, follows in general the alignment of the El Camino Real between San Diego and San Francisco, and in this particular section parallels the beautiful coast line of Santa Barbara and Ventura counties.

INVOLVES NEW SEAWALL

The improvement of the highway was made necessary by the unsatisfactory condition of the present road, its alignment being poor in certain portions and its traffic capacity exceeded throughout. The project as a whole extends for about 12 miles north of the city of Ventura and involves partial major realignment, widening of the Ventura River Bridge, now completed, construction of the Ventura overhead, widening of pavement and shoulders, and the building of approximately one and one-tenth miles of seawall in addition to that now existing. The present seawall, which is to remain in service, was constructed in 1925.

The construction of the Ventura overhead was made imperative both by reason of the realignment of the highway and the dangerous driving conditions presented by the existing underpass, about eight-tenths of a mile south of the new structure. This underpass has outlived its period of usefulness because of its sharp approach curves, dangerously short visibility and narrow width between walls—conditions not in keeping with standards of highway design made necessary by present day speed of travel.

Reconstruction of the existing underpass at approximately its present location would have involved expensive seawall construction and detours which are avoided by the new alignment.

The Ventura overhead structure, a separate contract, is to consist of 13 reinforced concrete girder spans for its approaches and a specially designed steel girder span over the track, the latter being coated with concrete, applied by means of a cement gun, to combat the salt air and to reduce maintenance costs. The piers are to be of reinforced concrete, founded on stiff clay and compacted sand, in which no piling is required.

HIGH AS THREE-STORY BUILDING

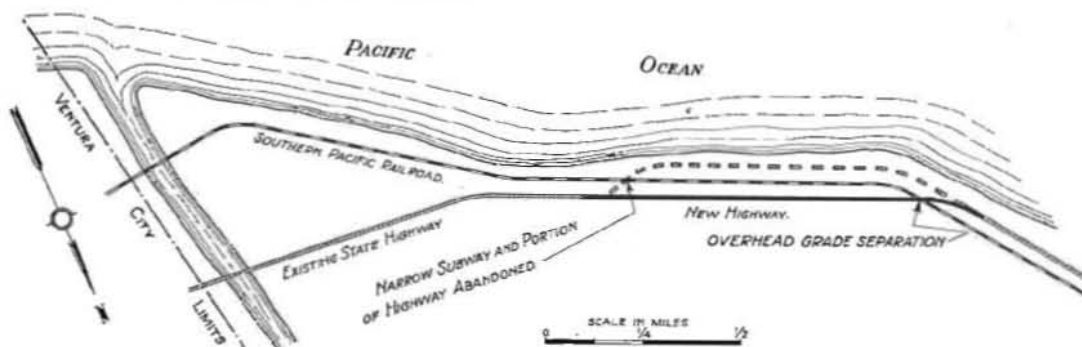
The elevation of the roadway above the foundations at the ends of the structure, rising to the height of a 3-story building, where the supporting columns will be buried in the roadway fills, required the design of special columns and heavy eccentric footings to prevent movement of the ends of the bridge under the action of the unbalanced loads of the fill. The footings for each column will cover an area of 114 square feet, there being a total of three columns in each pier.

The roadway deck is to be of reinforced concrete with railings of the same material, which are at the same time both ornamental and sturdy. Paving of approaches is being done to three-lane width, with wide shoulders, in consequence of which the overhead structure is being constructed with 40-foot roadway and with two 3½-foot sidewalks to afford the same safety and freedom from mental hazard for drivers and pedestrians when crossing the overhead as when traveling on the balance of the roadway.

The overall length of the structure, not including long earth fill approaches on each end, is 570 feet, or over one-tenth of a mile. Construction will involve the use of over 3000 cubic yards of Portland cement concrete, 260 tons of reinforcing steel and 63 tons of structural steel, in addition to cast



OBSOLETE UNDERPASS, of narrow width and poor visibility that will be eliminated by realignment of the Coast Route north of Ventura.



SKETCH MAP showing realignment for Coast Route improvement.



VENTURA OVERHEAD in course of construction. It will separate grades of railroad and highway.

Overhead Structure to Cost \$83,975

(Continued from page 24)

steel, excavation, temporary road surfacing, gunite, etc.

DIFFICULT TRAFFIC PROBLEM

The design and construction were both made more difficult by the very flat angle at which the center lines of the railroad and the highway intersect, as well as by the necessity of maintaining railroad traffic over the existing tracks and highway traffic under the northerly end of the structure at all times during construction. These conditions involved the design of a special type of pier at nearly every point of support, these piers ranging from ones requiring heavy cap beams cantilevering far beyond the last column to ones with long span cap beams and supporting columns considerably outside the limits of the bridge roadway.

The maintenance of highway traffic under the structure necessitates the construction of certain columns up to ground line while traffic is deflected to one side, then back-filling and placing temporary pavement over these column stubs while the opposite columns are constructed, then returning traffic to the original straight alignment and completing the construction of the first columns. Heavy long span formwork is also required over the existing roadway as no supports are being allowed to encroach on the present roadway area.

COLLISION WALLS PROVIDED

Collision walls are to be constructed between columns paralleling the tracks to guard against damage from accidentally projecting loads of girders, poles and similar objects being transported on freight cars.

It was planned to use long retaining walls at each end of the structure in lieu of abutments, the earth fill being allowed to take its natural slope between the end columns. The southerly wall will retain the fill from encroaching on the railroad roadbed, and the northerly wall was to have served the same purpose with respect to the existing road. It was found after construction started that by raising the grade of the existing roadway and by a slight shift of alignment that this northerly retaining wall could be omitted, which is being done at an appreciable reduction of total cost.

The highway alignment at the crossing is

on a long radius curve, which involved superelevation of the bridge roadway. Grades over the structure are easy and there will be ample visibility.

When the structure is completed, the present highway will be left open and will have a full two-lane traffic width for the use of those desiring access to the beach for picnicking and bathing. The span over the railroad track will be sufficiently long and high to allow for a future second track with full clearance for trains.

UNDERPASS ELIMINATED

The present underpass will be closed to traffic in order that the hazard at this point will no longer exist, the connection between the new highway and the old road being by means of earth fill ramps adjacent to the structure.

Provision has been made for widening the structure at a future date when traffic requirements so dictate, but it is expected that widening will not become necessary for many years, at which time it can be done at a net saving to the State over the cost of present construction to a greater width.

This project is financed through the National Industrial Recovery Act and this secures for the State a much needed improvement as well as considerable relief to unemployment in this vicinity. No workman on the job, with the exception of those in supervisory capacities, is working more than thirty hours a week as provided by the Federal act.

The contract for the construction of the overhead was awarded on January 26, 1934, at a total bid price of \$83,975, and the time limit for construction was fixed at 175 working days. It is now expected that construction will be complete on or before September 1, 1934, the date upon which the time limit expires. It is expected that the adjacent section of about eight and one-half miles of new highway will be opened to traffic about January, 1935.

A little girl was explaining to her younger brother that it was wrong to work on Sunday.

"Well, policemen work on Sundays," said the boy.

"Don't they go to heaven?"

"No," she replied; "they don't need policemen up there."—*Boston Transcript*.

Director Delegates to Cities Police Power on Through Highways

(Continued from page 9)

A. Yes. The improvement by the State from State highway funds of portions of State highway within city limits, where the natural course of a State highway or State highway system runs or passes into or through any municipality or contiguous municipalities, is authorized by law. Furthermore, the 1933 Legislature included many miles of city streets in the secondary State highway system.

Q. What system has been evolved to avoid possible conflict between the State and the cities in the administration and allocation of the one-quarter cent gas tax in incorporated cities?

A. A system is followed similar to that employed by the Federal government in its dealings with the State on Federal aid highway work. A city submits a project statement proposing the improvement to be made. If approved by the State Director of Public Works, a formal project agreement is then entered into between the State and the city wherein the work to be done is described, the maintenance provided for, the funds specified, and the delegation of jurisdiction to the city prescribed.

Q. What is meant by the delegation of jurisdiction?

A. The 1933 Legislature authorized the Director of Public Works to delegate to such municipality all or any part of the powers and jurisdiction vested by law in him or the State Department of Public Works over and in respect to all or any section of any such State highway within such municipality.

Q. Why is such delegation of jurisdiction desirable?

A. It enables the State to delegate to the cities certain police powers to regulate traffic, parking, encroachments, permits, et cetera, which are considered to be local in character and convenience, over streets constituting State highway routes.

Q. Can the Director of Public Works delegate to any such municipality the expenditure by the municipality, directly, of its share of the one-quarter cent gas tax?

A. Yes. When and if the Director of Public Works is satisfied that such city is equipped to conduct the proposed work in an efficient and economic manner.

Q. How many cities of California participate in the distribution of the one-quarter cent gas tax?

A. Two hundred seventy-six cities.

"Have any big men ever been born in this town?"
"No, only babies."

Principles Laid Down for Improvement of Highway Roadsides

ROADSIDE improvement does not consist merely in planting shrubs, trees and grass, but to a considerable degree it depends on how intelligently and carefully the road builders preserve and make the best use of what is already growing there, Wilbur H. Simonson, landscape architect of the Bureau of Public Roads, U. S. Department of Agriculture, said in a recent talk before the American Association of Landscape Architects meeting in Washington:

"The first step in the salvaging of existing plant growth is taken when the highway engineer and landscape architect are brought into agreement on the location of the highway and the utilization of its right of way," Mr. Simonson declared. "Thus, the foundation for landscape improvement is laid before the construction of the highway begins rather than after the road surface is completed.

SAVING THE TREES

"Trees and undergrowth that are to be left undisturbed must be indicated before any cutting or planting is undertaken," said Mr. Simonson. "For example, where the highway passes through trees, proper cutting and saving will produce the effect of bringing the woods out to the road rather than stopping at the right of way fences, as often seems to be the case.

"Proper grading should aim to harmonize the cut and fill banks with the surrounding scenery. These construction scars in the landscape should appear to flow into the existing contours of the ground adjacent to the right of way with as little break in curvature as possible.

"Side ditches, in some instances, can meander to avoid existing trees or to follow the curve of a hillside. Ditch banks may be rounded so as to be scarcely noticeable. When grading is done with such ideas in mind, the planting and sodding of slopes is easy."

The above suggestions of Mr. Simonson have long been the accepted practice of the California Division of Highways.

A friend who had just returned from a holiday in Cornwall tells me of a notice posted outside of a village church. It read: Saturday night a concert will be held, to be followed by a pastry supper. On Sunday the vicar will preach, and his subject will be "A Restless Night."

Hydraulicking 6,000,000 Cubic Yards

(Continued from page 3)

hairpin turns were required, the route was on the shady side of the hill through a heavy snow belt, and the formations encountered were structurally weak. It also crossed directly over the remaining mass of gold bearing gravel in Oregon Hill and could not have been maintained when mining is resumed.

The second routing had to pass through the slide on the north rim of the mine, several million cubic yards in extent, and the country offered little support for a location on either side unless a very deep summit were made. These obstacles were insurmountable by ordinary methods of road building.

The existence of a portion of the water system that supplied water for the mining operations led to a study of what could be accomplished in the way of removing the slide and cutting through the summit of Oregon Hill by the hydraulic mining method. Study of operating costs of many hydraulic mines of the early days led to the conclusion that a cut four hundred feet deep, involving the movement of some 15,000,000 cubic yards would be economical. Such a cut would cut two and a half miles from the distance and permit a direct ascent from each side.

SIX MILLION-YARD OPERATION

With the available water supply, however, an annual movement of more than 1,500,000 could not be assured. In the end the line on the north rim of the mine was selected, and ten years would be required to complete the cut. A plan involving removal of about 6,000,000 cubic yards was adopted, and a hydraulicking venture was started on a scale not heretofore used on highway work.

Fortunately for these plans, the La Grange Placer Mines, Ltd., owners of all of the Oregon Hill and Gulch area and the water system and mining equipment, were willing to lease at a nominal rental, and to grant rights to deposit spoil on their lands on either side of Oregon Hill.

The Sweepstakes water system, consisting of 12 miles of flume, ditch and 30-inch hydraulic pipe, collects and conducts water from the East and West Weaver Creek drainage areas. The run-off varies from a few second-feet in the summer to about 75 at the peak, but the capacity of the ditch and flume is about 55 second-feet.

RESERVOIR CONSTRUCTED

Normally, from December to May in seasons of average precipitation and deep snow pack on the peaks, periods of several weeks will yield 50 second-feet and an average of 30 or better may be expected for a five months' period. This, however, is insufficient to operate an 8-inch giant which, with a head of 550 feet, uses water at the rate of 60 cubic feet per second. To regulate the flow, a reservoir of about 600,000 cubic feet capacity was constructed. From this a main pipe line of 30 and 26 inches diameter was laid down a ridge to a point where 18-inch branches take off to the giants.

Two huge hydraulic giants that have served their time loosening and washing gold-bearing gravel to the sluices have been set up, one with an 8-inch nozzle and the other with a 7-inch nozzle, and have been playing intermittently at the base and over the surface of the slide since February 28.

It has been said that water, like fire, out of control, is one of mankind's deadliest enemies, but under control is one of man's most useful servants. Certainly water controlled and directed through one of these hydraulic giants accomplishes phenomenal results, whether in moving gold-bearing gravel to the sluices or opening a way through a hill for a modern highway.

TWO TONS PER SECOND

The 8-inch giant shown in the illustration is discharging 2400 miner's inches, or 60 cubic feet, of water per second. Approximately two tons of water leave the nozzle each second at a velocity of about 200 feet per second. In other words, every second of operation two tons of water strike the bank with a terrific impact and carry away large volumes of material. Much material has been cut and removed by this stream that would have had to be blasted to be removed by any earth-moving equipment.

Owing to the particularly abnormal season, with practically no snow pack on the mountain peaks, the supply of water is disappointing. The first 31 days of operation, with an average daily run of six and one-half hours, resulted in the removal of 162,000 cubic yards. This is at the rate of 800 cubic yards an hour

Oregon Mountain Job May Require Four Years to Complete

(Continued from preceding page)

or 5200 cubic yards per day. The material moved is equal to 10.7 per cent of the volume of water used.

In the language of hydraulic mining, the performance of water is called "duty" and is the number of cubic yards moved by one miner's inch in twenty-four hours. The duty of the water for the first month's operation is 8.5. The duty in the La Grange mine in its days of operation at times was as high as 7.5 which was considered exceptional.

LOW UNIT COSTS

The unit cost for the first month's operation is 4.6 cents per cubic yard. This cost includes about 40 per cent of nonrecurring expense which will eventually be distributed over a much larger volume of material. This brief period of operation indicates that unit costs for the job will be well under 3.5 cents per cubic yard.

During the first month the giant operated 26.4 per cent of the time. In a normal year a giant should be able to operate at least 75 per cent of the working season. With the loss of two operating months this year, it is anticipated that well over 1,000,000 cubic yards will be moved in 1935.

It is probable that operations will continue for four years since the connections on either end can not be financed nor constructed before the expiration of that period.

Some minor hydraulic work has been done on highways in Washington and Florida, and to a limited extent in removing slides and sand cuts in California. Water for all of these operations was pumped, and the discharge nozzle was not over 4 inches.

RECORD-BREAKING OPERATION

This is believed to be the largest hydraulic operation yet undertaken on highway work. Unusual problems call for unique solutions. When mountains get in the way of highways, they must be moved, and, taking the first month's operation as an index, some of the work of the Cretaceous age is about to be undone in the twinkling of an eye, as geologists reckon time, and traffic will flow through Oregon Hill on or near the bed made by a stream millions of years ago.

Inspections Started in 48 Counties on 219 Water Projects

(Continued from page 23)

were denied and 12 were approved. During the month 8 permits were revoked and 17 were passed to license.

During the current field season, which started on April 2d, inspections will be made of 219 projects for the purpose of determining the amount of water beneficially used with a view to the issuance of licenses confirming rights under permits. Projects to be inspected are distributed throughout 48 counties of the State.

SACRAMENTO-SAN JOAQUIN WATER SUPERVISOR

Snow survey data as of April 1st show that the snow pack in the higher elevations was practically the same as that in 1931 on April 1st. At the lower elevations, however, there was much less snow than in 1931. The total seasonal precipitation to April 1st in the major Sacramento and San Joaquin drainages is somewhat better than in 1931. Whether the summer stream flow will be as low as that of 1931 or somewhat better will now be dependent to a great extent upon whether subsequent spring precipitation is below normal or normal. The present outlook for salinity in the Delta is for an encroachment very similar to that of 1924.

From a flow of about 18,000 second-feet during the latter part of March, the flow of Sacramento River at Sacramento increased to 36,000 second-feet for a short peak on April 2d. Subsequently the flow has diminished steadily to a flow on April 16th of 15,000 second-feet. The corresponding flow in the middle of April, 1931, was about 7000 second-feet.

Salinity sampling is being maintained at three points only and the results for tests of samples taken at these points on April 10, 1934, are shown in the following tabulation showing also a comparison with the corresponding salinity in 1933 and 1931.

Salinity—April 10th

Salinity in parts of chlorine per 100,000 parts of water

	1934	1933	1931
Bullshead	320	170	500
Collinsville	3	1	20
Antioch	4	4	9

DAMS

Routine maintenance inspections have been made in many of the foothill and low mountain districts and in the bay area during this period and considerable progress has been made in Lassen County in covering the dams in that territory.

In southern California work continues on the construction of the San Gabriel No. 1 dam and El Capitan dam. Orders authorizing the use of Bouquet Canyon and Pine Canyon dams pending issuance of certificates of approval have been issued and first water was turned into the Bouquet Canyon reservoir.

Highway Bids and Awards

FOR APRIL

ALPINE COUNTY—Between Centerville Bridge and Markleville, about 6.5 miles to be graded and surfaced with bituminous treated crushed gravel or stone (road mix method) and a bridge to be constructed across East Carson River, one 40-foot steel stringer span and six 19-foot timber spans on concrete and timber bents. District X, Route 23, Section C. Morrison, Knudsen Co., Los Angeles, \$209,737; Peninsula Paving Co., San Francisco, \$200,268; Isbell Construction Co., Carson City, Nevada, \$238,578; United Concrete Pipe Corporation, Los Angeles, \$239,376. Contract awarded to Fredrickson & Watson Const. Co. and Fredrickson Bros., Oakland, \$200,012.

HUMBOLDT COUNTY—Between Campbell Creek and Klamath River, treating with fuel oil. District I, Route 84, Sections A, B. Ransome Co., Emeryville, \$7,533; C. F. Fredrickson & Sons, Lower Lake, \$7,133. Contract awarded to Albert Helwig, Sebastopol, \$5,161.

HUMBOLDT AND DEL NORTE COUNTIES—Constructing truck sheds at Orick, Klamath and Crescent City Maintenance Yards. District I, Route 1, Sections Hum-1-J, D. N.-1-A, C. Albert Siemer, San Anselmo, \$12,979; Fred J. Maurer & Sons, Inc.,ureka, \$11,067; Pacific Truck Service, Inc., San Jose, \$11,350. Contract awarded to Theo. Johanns, San Francisco, \$16,890.

KERN COUNTY—Maintenance station buildings at Homestead. District IX, Route 23, Section E. N. F. Barber, Los Angeles, \$4,686; C. I. Sumner, Lone Pine, \$4,961. Contract awarded to D. A. Loomis, Glendale, \$4,672.

KINGS COUNTY—Between Hanford and easterly boundary about 7.5 miles to be graded and paved with asphaltic concrete. District VI, Route 10, Section A. Basch Brothers, Torrance, \$171,193; Union Paving Co., San Francisco, \$169,229; A. J. Raisch Co., San Jose, \$181,193. Contract awarded to Southern California Roads Company, Los Angeles, \$167,952.

LOS ANGELES COUNTY—Between West Channel Road and California Avenue, about 1 mile to be paved with asphalt concrete and Portland cement concrete. District VII, Route 60, Section B, S. Mca. Griffith Co., Los Angeles, \$81,370; Sander Pearson, Santa Monica, \$82,234; United Concrete Pipe Corp., Los Angeles, \$86,738; Dimmitt & Taylor, Los Angeles, \$84,413; P. J. Akmadzich, Los Angeles, \$111,740. Contract awarded to Oswald Bros., Los Angeles, \$75,930.

MONTEREY COUNTY—A timber bridge across Hot Springs Creek, 48 miles south of Monterey, one 76-foot truss span, one 57-foot truss span and fifteen 19-foot stringer spans on concrete pedestals. District V, Route 56, Section D. B. A. Howkins & Co., San Francisco, \$41,353; Alfred H. Vogt Co., Inc., San Francisco, \$41,875; Parish Bros., Hollywood, \$45,505; E. T. Lesure, Oakland, \$42,854; Rocca & Coletti, San Rafael, \$43,543. Contract awarded to M. E. McGowan, Inc., San Francisco, \$36,620.

MONTEREY COUNTY—Timber bridge across Dolan Creek 50 miles south of Monterey, consisting of one 180-foot arch span, nine 19-foot stringer spans and four 38-foot girder spans. District V, Route 56, Section D. Alfred H. Vogt Co., Inc., San Francisco, \$76,872; M. B. McGowan, Inc., San Francisco, \$88,466; Bodenhamer Const. Co., Oakland, \$76,452. Contract awarded to Rocca & Coletti, San Rafael, \$67,881.

NAPA COUNTY—Between Napa and easterly boundary about 28.5 miles to be treated with fuel oil. District IV, Route 6, Sections A, B, C. Granite Construction Co., Watsonville, \$7,918; Ransome Co., Emeryville, \$7,779; E. A. Forde, San Anselmo, \$6,660; L. A. Brisco, Arroyo Grande, \$6,308; Peninsula Paving Co., San Francisco, \$6,475; Lee J. Immel, Berkeley, \$6,327. Contract awarded to Basalt Rock Co., Inc., Napa, \$5,476.

PLACER AND EL DORADO COUNTIES—Treating with road oil and fuel oil between Lincoln and Newcastle, Placerville and Cool, Kyburz and Fred's Place, 2 miles east of Fred's Place and Strawberry. District III, Routes 91, 93, 11, Sections A, A and B, and H. Contract awarded to C. F. Fredrickson & Sons, Lower Lake, \$8,690.

SAN DIEGO COUNTY—Furnishing and applying

heavy fuel oil, Descanso to Morettis, 23.2 miles. District XI, Route 78, Sections A, B, C. Pacific Tank Lines, Inc., Los Angeles, \$9,306; R. E. Hazard Contracting Co., San Diego, \$7,286; L. C. Pulley, C. W. Wood, Long Beach, \$7,444; Gilmore Oil Co., Los Angeles, \$6,395; Square Oil Co., Los Angeles, \$6,296; Paulson & March, Inc., Los Angeles, \$6,454; Morgan Bros., Huntington Park, \$6,811. Contract awarded to Lamb's Transfer Co., Long Beach, \$6,217.

SAN FRANCISCO COUNTY—Between Waterloo Street and Islais Creek Channel, about 0.3 mile in length to be paved with asphaltic concrete. District IV, Route 68, Section S. F. The Fay Improvement Company, San Francisco, \$30,953; Pacific States Construction Co., San Francisco, \$32,615; Chas. L. Harney, San Francisco, \$32,265; Pacific Pavements Co., Ltd., San Francisco, \$40,636; A. J. Raisch, San Francisco, \$32,983. Contract awarded to Eaton & Smith, San Francisco, \$30,555.

SAN FRANCISCO COUNTY—Sloat Boulevard between Great Highway and Nineteenth Avenue about 1.5 miles in length, to be widened and paved with Portland cement concrete and asphaltic concrete. District IV, Route 55, Section S. F. N. M. Ball and Jones & King, Berkeley, \$109,088; A. J. Raisch, San Francisco, \$106,534; The Fay Improvement Company, San Francisco, \$105,506; Peninsula Paving Company, San Francisco, \$115,842; Chas. L. Harney, San Francisco, \$118,750. Contract awarded to Eaton & Smith, San Francisco, \$104,602.

SAN FRANCISCO COUNTY—Between Bayshore Boulevard and Mission Street Viaduct, about 1.3 miles in length to be paved with asphaltic concrete. District IV, Route 2, Section S. F. Jones & King, Hayward, \$62,341; Eaton & Smith, San Francisco, \$60,516; Charles L. Harney, San Francisco, \$61,844; Pacific Pavements Co., Ltd., \$74,062; A. J. Raisch, San Francisco, \$65,373; Pacific States Construction Co., San Francisco, \$58,928. Contract awarded to The Fay Improvement Co., San Francisco, \$56,325.

SAN FRANCISCO COUNTY—Bryant Street between 5th Street and 16th Street, about 0.7 mile in length to be widened and paved with Portland cement concrete and asphaltic concrete. District IV, Route 68, Section S. F. The Fay Improvement Company, San Francisco, \$74,804; Chas. L. Harney, San Francisco, \$87,599; MacDonald & Kahn Co., Ltd., San Francisco, \$78,697; Eaton & Smith, San Francisco, \$80,422. Contract awarded to A. J. Raisch, San Francisco, \$69,461.

SAN FRANCISCO COUNTY—Between Van Ness Avenue and Division Street, about 0.9 mile in length to be paved with asphaltic concrete. District IV, Route 2, Section S. F. A. J. Raisch, San Francisco, \$67,719; Charles L. Harney, San Francisco, \$78,218; MacDonald & Kahn Co., Ltd., San Francisco, \$76,392; Eaton and Smith, San Francisco, \$69,631. Contract awarded to A. J. Raisch, San Francisco, \$67,719.

SAN LUIS OBISPO COUNTY—In the city of Arroyo Grande, about 1036 lineal feet of Portland cement concrete curbs and gutters to be constructed. District V, Route 2, Section Ar. Gd. Theo. M. Malno, San Luis Obispo, \$1,417; Walter B. Roselip, San Luis Obispo, \$1,762. Contract awarded to John Fesler, Santa Maria, \$1,215.

SHASTA COUNTY—Between Redding and Viola, 34.0 miles to be treated with fuel oil. District II, Route 20, Sections C, D, E. C. F. Fredrickson & Sons, Lower Lake, \$15,715; Tiffany Construction Co., San Jose, \$13,313; A. Teichert & Son, Inc., Sacramento, \$15,016. Contract awarded to Tieslau Bros., Inc., Berkeley, \$12,462.

SISKIYOU COUNTY—Between the southerly boundary of Yreka and 1½ miles north, about 2.4 miles to be graded and surfaced with crusher run base and asphaltic concrete. District II, Route 3, Section C, Yre. Hanrahan Company, San Francisco, \$142,060; The United Contracting Co., Portland, \$145,699. Contract awarded to Chas. L. Harney, San Francisco, \$126,325.

SONOMA COUNTY—Furnish and apply light fuel oil to existing roadbed between Duncan Mills and Mendocino County line about 41.9 miles. District IV, Route 56-104, Sections C, D, E, A. Tieslau Brothers,

(Continued on page 32)

State Contributes \$700,000 to Tunnel

(Continued from page 19)

A feature of the construction will be the light transition structures at each portal. Experience at other highway tunnels has shown that the eye does not adjust itself to the difference between the intensity of sunlight and the maximum practical artificial illumination in a tunnel with sufficient rapidity to insure good vision when vehicles are traveling at high speeds.

There has therefore been provided a transition section about 200 feet in length, which consists of an overhead louvre device supported upon the portal approach walls. These overhead louvres prevent direct rays of sunlight from falling upon the roadway area and thus provide a lighting of intermediate intensity as compared with the direct sunlight outside and the artificial illumination inside the tunnel.

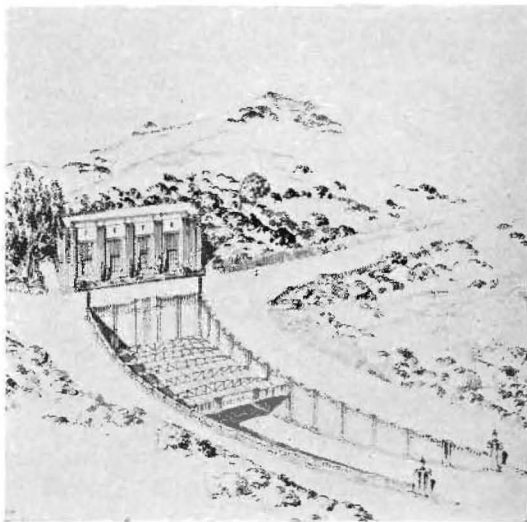
The project involves the use of approximately 120,000 barrels of cement, 2500 tons of reinforcing steel, 1000 tons of structural steel shapes, the construction of about 700,000 square feet of 8-inch oiled macadam pavement, and the handling of over 1,000,000 cubic yards of material in grading and excavation. It is estimated that an average of approximately 900 men will be employed on the project over a period of from 18 months to two years.

STATE A LARGE CONTRIBUTOR

The estimated cost of construction is \$3,752,000. A Federal PWA grant has been obtained by the joint highway district in the amount of \$1,095,000. The balance of funds will be obtained through the sale of the district's bonds and the contributions of the State to the joint highway district.

The State has allocated \$300,000 from its Joint Highway District Fund and a further contribution of \$400,000 over a period of years is to be made by the State towards the project bringing the State aid to a total of \$700,000.

Work is expected to start within a month, and to be completed in from 18 months to two years. The completed project will provide a new, modern highway route into Contra Costa County from Oakland and the East Bay cities. A distance saving of approximately two miles will be effected from the



LIGHT TRANSITION structures at each portal will aid drivers' vision.

point where the new road diverges from Broadway, in Oakland, to where it joins the existing Tunnel Road in Contra Costa County.

Curvature on the new highway will be less than 600 degrees as compared with about 5000 degrees on the present Tunnel Road; the minimum radius of curvature is 800 feet, as against many curves with about 50-foot radius on the old road. Grades are 5.1 per cent maximum on the main highway approach and 4 per cent through the tunnels.

The present tunnel on the old road has only 17 feet clearance between side walls and the highway approaches are on approximately a 6 per cent grade, and have from 20 to 25 feet of paved width with practically no shoulder areas. The new highway will have 40 feet of paved surface and minimum shoulder width of 10 feet on each side.

AVOIDS LOCAL FOG

The Fish Ranch Road, used as an alternate route, has grades up to 16 per cent, is narrow, crooked, and crosses at a summit about 500 feet higher than the new road; it is also subject to a great deal of local fog at the upper elevations.

The new route will connect directly with the business center of Oakland and the dis-

(Continued on page 32)

Oregon Orator Lauds Californians' Spirit of Loyalty to State

(Continued from page 6)

of the slogan, "Once a Californian, always a Californian."

G. T. McCoy, Assistant State Highway Engineer, was introduced as the man behind the guns, in the State highway building program. He said that the district of northern California was the most wonderful in which he had ever worked and declared the purpose of the department to make the road all the way to Redding as fine a highway as the completed section of the cut-off.

MANY OFFICIALS PRESENT

E. B. Hall, president of the Shasta-Cascade Wonderland Association, Klamath Falls, Oregon, congratulated Shasta County and the State on the finishing of the important link in the great projected highway that is of interest to Oregon people.

Other officials present were: F. W. Haselwood, District Engineer, California Division of Highways; George Cuning, director of the Klamath County Chamber of Commerce, Klamath Falls, Oregon; A. H. Banwell, manager of the Medford Chamber of Commerce, Medford, Oregon; A. H. Gronwoldt, vice president of the Shasta-Cascade Wonderland Association, Redding; State Senator Harold L. Powers of Eagleville, California; William Boucher, California State Chamber of Commerce, Sacramento; William G. B. Chase, Klamath County Commissioner, Klamath Falls, Oregon; John W. Howe, Secretary, California Highway Commission, Sacramento; Frank Durkee, legal department, California Highway Commission, Sacramento; B. K. Snyder, director of Shasta-Cascade Wonderland Association, Lakeview, Oregon; Clinton J. Fulcher, director of the Shasta-Cascade Wonderland Association, Lookout, California; George Grizzle, judge of Klamath County Court, Klamath Falls, Oregon; W. A. Gates, director of the Shasta-Cascade Wonderland Association, Medford, Oregon.

The evening before the celebration, Director Earl Lee Kelly was the honor guest at a birthday banquet at the Golden Eagle Hotel in Redding tendered him by his home town friends and attended by guests from other parts of the State and the Oregon official visitors.

Jones picked up the newspaper and was astonished to see an article stating that he had been killed in an accident. He immediately rang up a friend.

"Bill," he asked, "have you seen the article about my death, in the morning paper?"

"Yes," replied Bill, "where are you talking from?"

—*Excavating Engineer.*

Broadway Tunnel to Provide Important Highway Connections

(Continued from page 31)

tance of travel through built-up areas to the business center will be about one-third that of any other main highway into Oakland. Connections with the San Francisco-Oakland Bay Bridge are made by either the Berkeley connection and Ashby Avenue or by Broadway, in Oakland, to the intermediate approach in the vicinity of Thirty-eighth Street.

Adequate and advantageous connecting roadways from the main routing, one to Berkeley and one to East Oakland, constitute important features of the project and extend to a wide area proportionate benefits ascribed to the direct routing. The connection with the Fish Ranch Road at the east portal likewise adds considerable value for local traffic and loop routing.

The work is to be performed by Joint Highway District No. 13 of the State of California. Thos. E. Caldecott, a supervisor of Alameda County, is president of the board of directors; Harry M. Stow, a supervisor of Contra Costa County, is secretary of the board, and Henry L. Hinman of Oakland is the third member of the board and treasurer of the district. Archibald B. Tinning of Martinez is attorney, and Wallace B. Boggs of Oakland is the district engineer.

HIGHWAY BIDS AND AWARDS FOR APRIL

(Continued from page 30)

Inc., Berkeley, \$9,520; Ransome Co., Emeryville, \$6,040; Chas. Kuppinger, Lakeport, \$8,960; Peninsula Paving Co., San Francisco, \$9,400; Helwig Construction Co., Sebastopol, \$9,440; E. A. Forde, San Anselmo, \$8,800. Contract awarded to L. A. Brisco, Arroyo Grande, \$7,800.

TEHAMA COUNTY—Treating with fuel oil between Route 3 and Wells Creek. District II, Route 29, Section D, E. C. F. Fredricksen & Sons, Lower Lake, \$8,585; Tiffany Construction Co., San Jose, \$8,855; Henstreet & Bell, Marysville, \$9,971. Contract awarded to E. A. Forde, San Anselmo, \$8,470.

YOLO, SUTTER, COLUSA, GLENN & BUTTE COUNTIES—Treating with fuel oil. District III, Routes 99, 87, 88, and 21, Section B. A. Telchert & Son, Sacramento, \$10,934; C. F. Fredricksen & Sons, Lower Lake, \$10,938. Contract awarded to E. F. Hilliard, Sacramento, \$10,002.

The strong man, gleaming knife in hand, gazed at the smooth, white body in the water. "I can not do it!" he groaned. "It is not man's work." Tears streamed from his eyes. The woman, with a look of utter scorn, seized the knife—and finished peeling the onion!—*Exhaust.*

STATE OF CALIFORNIA

Department of Public Works

HEADQUARTERS: PUBLIC WORKS BUILDING, ELEVENTH AND P STS., SACRAMENTO

JAMES ROLPH, JR.-----Governor
 EARL LEE KELLY .-----Director
 MORGAN KEATON-----Deputy Director

DIVISION OF HIGHWAYS

CALIFORNIA HIGHWAY COMMISSION

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 TIMOTHY A. REARDON, San Francisco
 PHILIP A. STANTON, Anaheim
 FRANK A. TETLEY, Riverside
 DR. W. W. BARHAM, Yreka
 C. H. PURCELL, State Highway Engineer, Sacramento
 JOHN W. HOWE, Secretary

HEADQUARTERS STAFF, SACRAMENTO

G. T. McCOY, Assistant State Highway Engineer
 J. G. STANDLEY, Principal Assistant Engineer
 R. H. WILSON, Office Engineer
 T. E. STANTON, Materials and Research Engineer
 FRED J. GRUMM, Engineer of Surveys and Plans
 C. S. POPE, Construction Engineer
 T. H. DENNIS, Maintenance Engineer
 F. W. PANHORST (Acting), Bridge Engineer
 L. V. CAMPBELL, Engineer of City and Cooperative Projects
 R. H. STALNAKER, Equipment Engineer
 E. R. HIGGINS, Comptroller

DISTRICT ENGINEERS

J. W. VICKREY, District I, Eureka
 F. W. HASELWOOD, District II, Redding
 CHARLES H. WHITMORE, District III, Marysville
 J. H. SKEGGS, District IV, San Francisco
 L. H. GIBSON, District V, San Luis Obispo
 R. M. GILLIS, District VI, Fresno
 S. V. CORTELYOU, District VII, Los Angeles
 E. Q. SULLIVAN, District VIII, San Bernardino
 S. W. LOWDEN (Acting), District IX, Bishop
 R. E. PIERCE, District X, Stockton
 E. E. WALLACE, District XI, San Diego
 General Headquarters, Public Works Building,
 Eleventh and P Streets, Sacramento, California

DIVISION OF WATER RESOURCES

EDWARD HYATT, State Engineer, Chief of Division
 J. J. HALLEY, Jr., Administrative Assistant
 HAROLD CONKLING, Deputy in Charge Water Rights

A. D. EDMONSTON, Deputy in Charge Water Resources Investigation
 R. L. JONES, Deputy in Charge Flood Control and Reclamation
 GEORGE W. HAWLEY, Deputy in Charge Dams
 SPENCER BURROUGHS, Attorney
 EVERETT N. BRYAN, Hydraulic Engineer, Water Rights
 A. N. BURCH, Irrigation Investigations
 H. M. STAFFORD, Sacramento-San Joaquin Water Supervisor
 GORDAN ZANDER, Adjudication, Water Distribution

DIVISION OF ARCHITECTURE

GEO. B. McDUGALL, State Architect, Chief of Division
 P. T. POAGE, Assistant Chief
 W. K. DANIELS, Administrative Assistant

HEADQUARTERS

H. W. DEHAVEN, Supervising Architectural Draftsman
 C. H. KROMER, Principal Structural Engineer
 CARLETON PIERSON, Supervising Specification Writer
 J. W. DUTTON, Principal Engineer, General Construction
 W. H. ROCKINGHAM, Principal Mechanical and Electrical Engineer

DIVISION OF CONTRACTS AND RIGHTS OF WAY

C. C. CARLETON, Chief
 HUGH K. McKEVITT, Attorney, San Francisco
 FRANK B. DURKEE, General Right of Way Agent
 C. R. MONTGOMERY, General Right of Way Agent

DIVISION OF PORTS



Port of Eureka—William Clark, Sr., Surveyor
 Port of San Jose—Not appointed

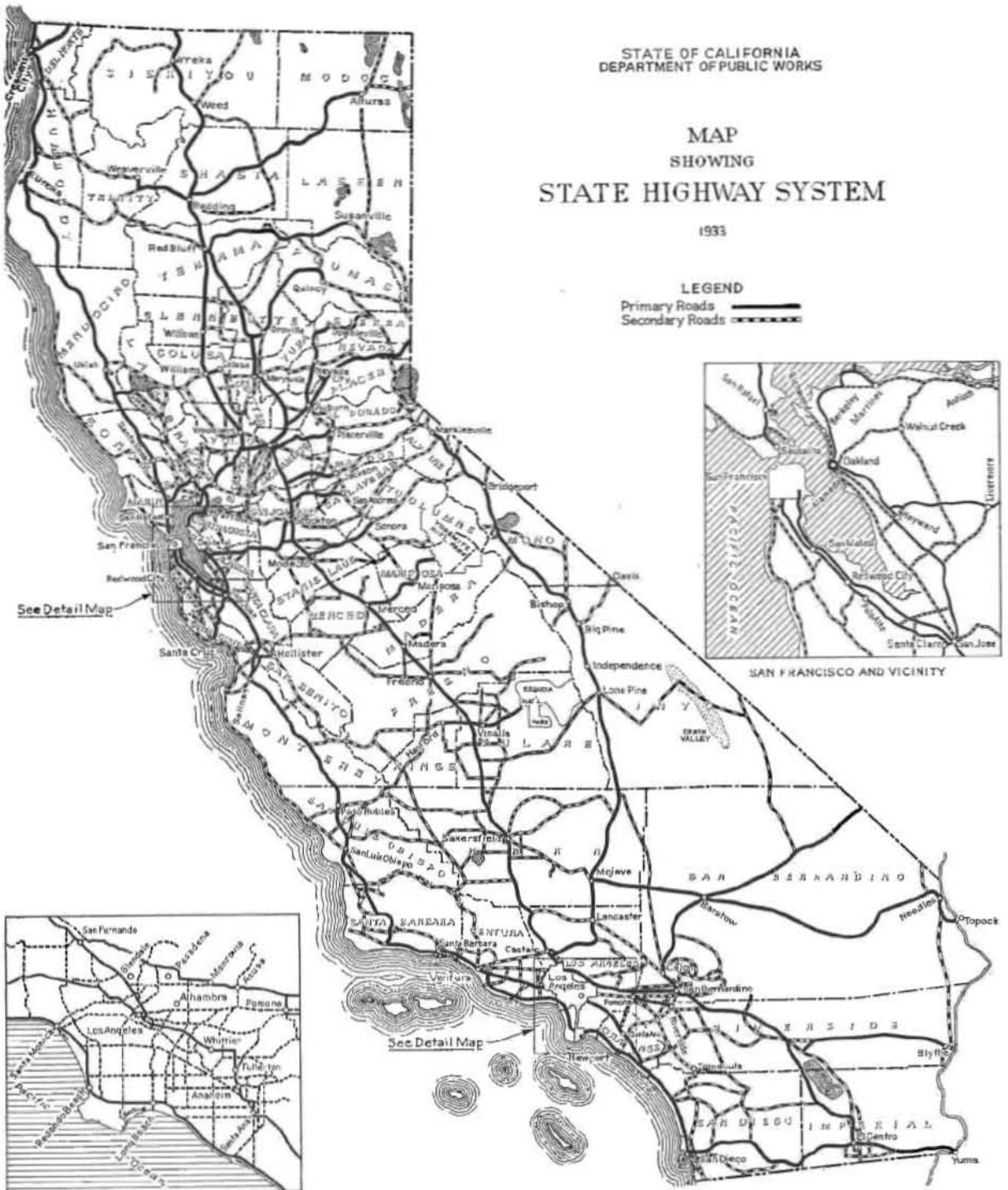
STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

MAP SHOWING STATE HIGHWAY SYSTEM

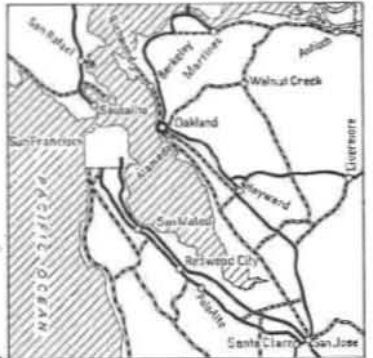
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LEGEND

Primary Roads 
Secondary Roads 



See Detail Map



SAN FRANCISCO AND VICINITY



LOS ANGELES AND VICINITY