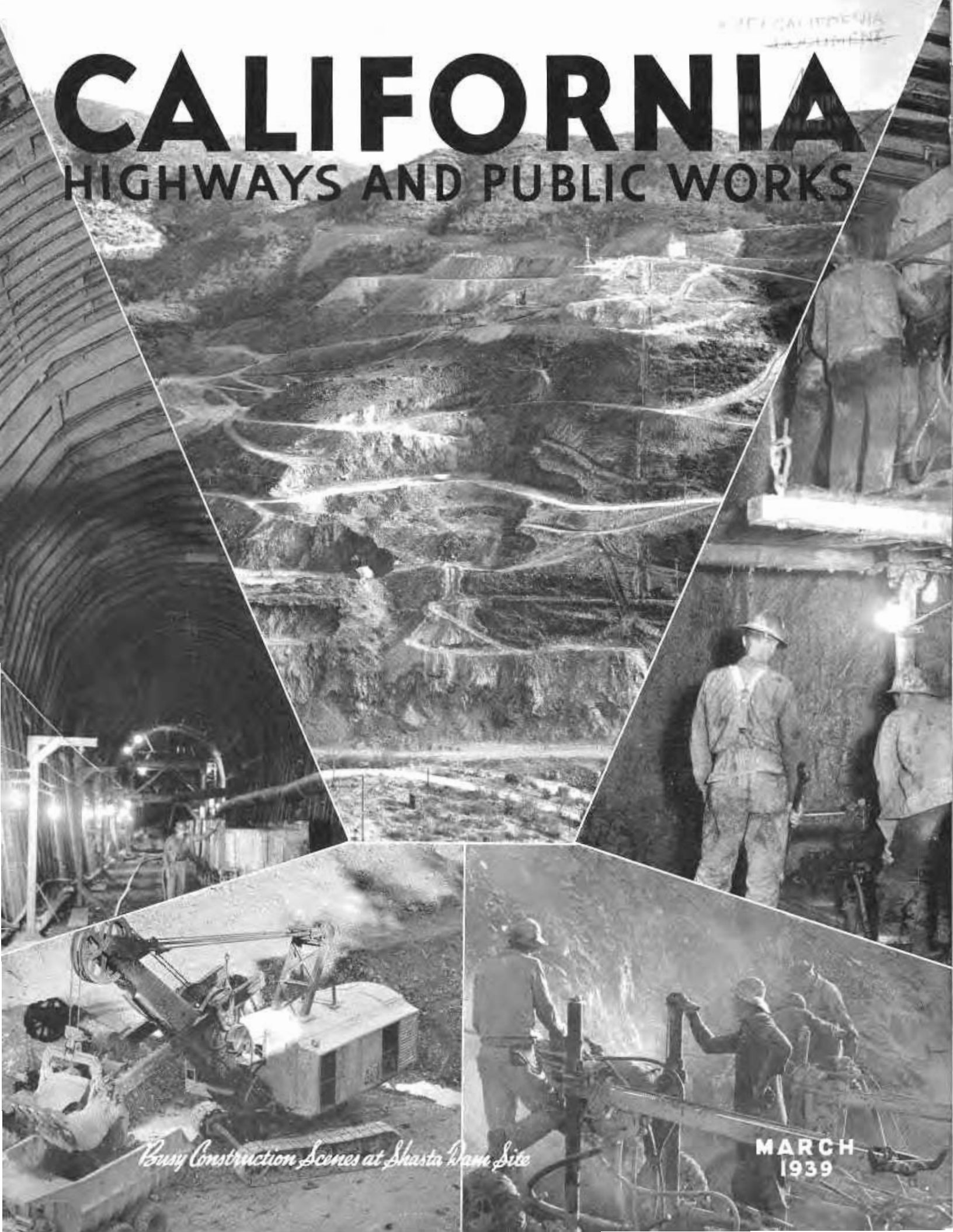


CALIFORNIA

HIGHWAYS AND PUBLIC WORKS



Busy Construction Scenes at Shasta Dam Site

**MARCH
1939**

CALIFORNIA HIGHWAYS AND PUBLIC WORKS

Official Journal of the Division of Highways of the Department of Public Works, State of California

FRANK W. CLARK, Director C. H. PURCELL, State Highway Engineer J. W. HOWE, Editor K. C. ADAMS, Associate Editor

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Governor Olson Acts to Secure State Control and Operation of Shasta Water and Power

WITH characteristic energy and initiative, Governor Culbert L. Olson, signaling the launching of his comprehensive public ownership program, as outlined in his inaugural address, has within the last few weeks concentrated efforts to speed up construction of Central Valley Project.

His endeavors in this direction have met with highly encouraging success and promises of increased cooperation from the Federal Government.

"This great project," declares Governor Olson, "is the answer to over twenty years of untiring endeavors by the people of the Sacramento and San Joaquin valleys and upper San Francisco Bay region to secure a stabilized water supply. Primarily, the project is designed to provide for navigation improvement and flood control, and to furnish vitally needed water supplies for our present agricultural, municipal and industrial developments. But an important by-product will be hydro-electric power. The time has now arrived for the people to prepare plans for receiving and using the water and power to be made available, and these preparations should be started at once in order that the full benefits of the project upon completion may be realized without delay."

Early public distribution of power and water through the medium of the Central Valley Project is one of Governor Olson's most important if not his major governmental objective. Assuming the office of Chief Executive on January 2, Governor Olson lost no time in inaugurating the State Administration's public ownership movement.

At the first meeting of the new California Water Project Authority the Governor through Director of Public Works Frank W. Clark impressed upon the members of this governmental agency his predominant desire to hasten completion of the Central Valley Project and to place the State in a position to en-



GOVERNOR CULBERT L. OLSON

gage in public distribution of power and water at the earliest date.

In line with this policy, the Authority started consideration of a plan to construct at Antioch a steam-electric plant and transmission facilities therefrom, to furnish and distribute power prior to the bringing in of Shasta Dam power.

Governor Olson reiterated his wishes in this regard at the February meeting of the Governor's Council and coincidentally Director Clark announced he had asked the Legislature for a \$250,000 appropriation to be devoted to preliminary studies and surveys for the Antioch project.

At the Council meeting, the Governor also stated that Secretary of the Interior Harold L. Ickes and John C. Page, Commissioner of the U. S. Bureau of Reclamation, have expressed a desire to cooperate in every way with the State in the development, operation and maintenance of the Central Valley Project.

Director Clark revealed that the State will enter into negotiations with Washington for Federal aid for the Antioch project either in the form of a Reconstruction Finance Corporation loan or a P.W.A. grant or both. Director Clark added:

"The State would be justified in providing much more than \$250,000 for preliminary work on the Antioch project alone as it is directly in line with what the Reclamation Bureau desires us to do."

In his inaugural address delivered to the Senate and Assembly in joint session on January 2, Governor Olson said:

"The construction of the great Shasta Dam of the Central Valley Project was instituted as a Federal Government project. The Federal Government looks to this State and to its subdivisions to be prepared to receive the benefits of this project, not only in the equitable distribution of its water, but in the utilization of its hydro-electric power, through public agencies.

"Unless public agencies are pre-

pared with distributive facilities to receive such power upon the completion of this huge project, a monopolistic power trust would be the only entity ready to contract with the Federal Government for the distribution of this power, with the result that the people of this and future generations would be forced to pay unnecessary and exorbitant tolls. It shall be the purpose of this administration to promote the means for public ownership and operation of plants and distributive facilities for the distribution of this electric power for the people at cost."

In furtherance of this policy and his desire to hasten completion of the Central Valley Project, Governor Olson, Director of Public Works Clark, and State Engineer Edward Hyatt recently conferred in San Francisco with Secretary Ickes and Commissioner Page. The Governor submitted to these high Federal officials a program for increased participation by the State in the project. The Governor proposed:

GOVERNOR OLSON'S PROGRAM

1. That negotiations be initiated immediately between designated representatives of the U. S. Department of Interior and of the Water Project Authority of California on a contract between the United States and the Authority providing for (a) the administration, operation and maintenance of the Central Valley Project by the Water Project Authority, (b) the repayment of the reimbursable costs of the project by the Authority to the United States in accordance with the reclamation law, and (c) the securing of water and electric power contracts by the Authority with public and other agencies as security for repayment of reimbursable costs thereof, and execution of such contract at the earliest practicable date.

2. That the State by and through the Water Project Authority prepare plans and construct a steam-electric power plant in the vicinity of Antioch, Contra Costa County, together with the secondary transmission and distribution facilities necessary for the economic disposal of the electric power to public districts.

3. That the State direct and assist in the organization of public districts which will contract with the Water Project Authority for the

purchase of water and power and the enactment of necessary enabling legislation to carry out this program.

4. That the cost of the steam-electric power plant at Antioch and necessary transmission and distribution facilities therefrom be financed by and through the issuance of revenue bonds by the Water Project Authority under the provisions of the Central Valley Project Act coupled with a loan and grant of funds from the Federal Emergency Administration of Public Works, involving an estimated capital ex-



FRANK W. CLARK, Director of Public Works and Chairman of California Water Project Authority

penditure of approximately \$20,000,000.

5. That the United States Bureau of Reclamation expand and speed up its construction schedule for the Central Valley Project, so that the people of California will receive the benefit therefrom by the progressive completion of the entire project at the earliest possible date and early revenues may be obtained for repayment of funds advanced by the Federal government; and that Congressional appropriations for the project be increased for this purpose.

At his conference with Secretary Ickes, the Governor pointed out that

it would be economy to speed up construction. He said that developed lands will continue to be abandoned until water is delivered and that growth in load in the power market will be met by private utilities if the Central Valley Project power program is delayed.

He added that an enlarged construction program would materially help to solve California's serious unemployment problem.

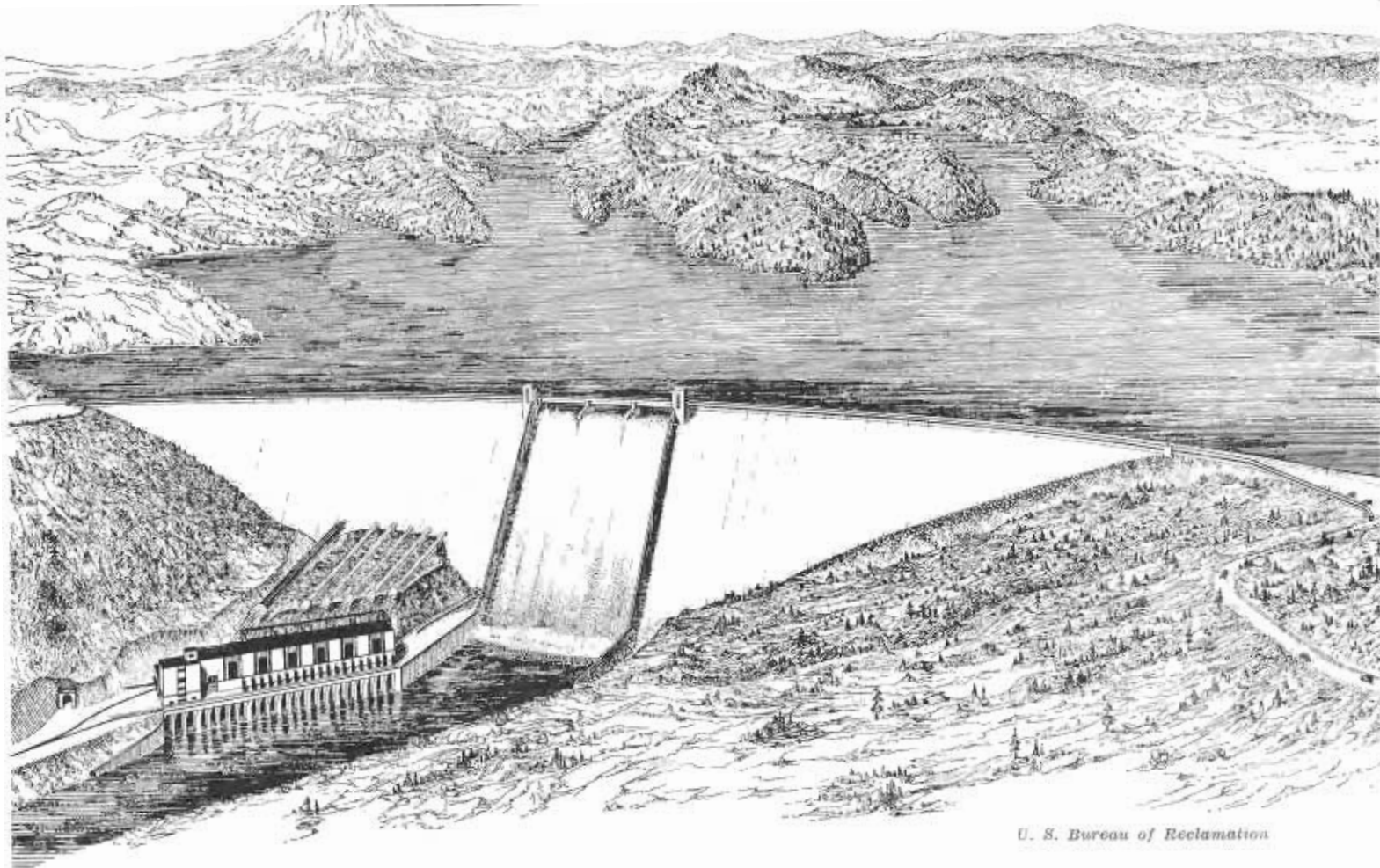
With regard to the disposal of electric power from the Shasta Dam power plant, Governor Olson told Secretary Ickes that he favors the formation of more public districts which would receive and with their own facilities distribute the power from the Central Valley Project to its own people at cost.

He expressed the view that if such public districts are not organized with their own distribution facilities, only one major customer for Central Valley Project power will exist: namely, the Pacific Gas and Electric Company. He said that preliminary organization of public districts should be undertaken as soon as possible.

In connection with the proposal to build a state-owned steam-electric power plant at Antioch, Governor Olson expressed to Secretary Ickes his opinion that the most advantageous and logical plan of procedure looking to disposal of Central Valley Project power to public districts would be to construct at an early date an initial installation of the steam-electric capacity to be required ultimately and a portion of the secondary transmission network and place the same in operation prior to the bringing in of Shasta power. This procedure, the Governor pointed out, would have the advantage of developing the market immediately for Shasta power, which could be initially served by the steam-electric plant and later by hydro-electric power from the project with the steam-electric plant providing the necessary auxiliary support and standby.

IMPORTANT ADVANTAGES

The Governor emphasized that the installation of a steam-electric plant as an initial unit of the electric power facilities of Central Valley Project would have a further important advantage in that it would provide the additional capacity required to meet the growth in load in the northern



U. S. Bureau of Reclamation

Official sketch of Shasta Dam Unit of Central Valley Project, showing the dam, power house, spillway and reservoir lake

California market prior to the bringing in of Shasta power, thus precluding any necessity for the installation of hydro-electric power plants such as proposed by the Pacific Gas and Electric Company on the Feather River in accordance with its application to the Federal Power Commission which is now pending and which is being protested by the Water Project Authority of California.

The Governor said that the construction of the steam-electric plant at Antioch would permit an interconnection with the Hetch Hetchy Project of the City of San Francisco which might hasten municipal distribution of electric power in that city.

As a means of strengthening Governor Olson's public ownership program, the State administration is sponsoring three bills introduced in the legislature amending or affecting the Central Valley Project Act. One measure amends the present act to authorize purchase as well as construction of facilities and provides a method of adding new units. The present law provides that new units may be added to the Central Valley



EDWARD HYATT, State Engineer and Executive Officer of California Water Project Authority

Project but does not set up a procedure for determining upon and including them. The proposed amendment supplies this procedure. Under the existing act, the State is empowered to construct the Central Valley Project but authority is not given to acquire existing facilities by purchase. This authority is added.

TAX PAYMENTS PROVIDED

Another amendment would change the present law by providing that a public agency distributing power may be required to pay equivalent sums in lieu of taxes. Under this amendment, political subdivisions would continue to receive the same amount of tax money as at present with electric power distributed by privately owned public utilities.

Other sections of the bill provide that the Water Project Authority, before constructing facilities, may call an advisory election in any given territory to ascertain whether the people desire public distribution of power; that the Water Project Authority may contract with any State agency for the acquisition of any works and may loan funds to such agency upon security and subject to such terms.

limitations and conditions as the Authority shall determine; limits the amount of revenue bonds which the Authority can issue for units and distribution facilities to such extent as may be determined upon after investigation and report; and revise the procedure for issuing revenue bonds based upon the procedure of the Federal Public Works Administration.

The second of the three measures introduced provides a more expeditious procedure for valuing public utility property for condemnation, and the third amends the Water Conservation District Act of 1923.

CENTRAL VALLEY PROJECT DESCRIBED

The Central Valley Project, to describe it briefly, provides for the coordinated development of the Sacramento and San Joaquin Rivers—

the two largest streams in the State—through a system of physical work to conserve, regulate and distribute the waters of these rivers in order to provide urgently needed water supplies for existing agricultural, industrial and municipal development in the San Joaquin and Sacramento Valleys and upper San Francisco Bay regions. It owes its inception to vital necessity. Its chief function is remedial. Its major objective is the preservation of present developments and production and the maintenance of a highly developed civilization threatened with serious loss and retrogression because of water shortage and inadequate conservation, control and distribution of the available water supply.

The area that will be served by the project, chiefly comprising the great Central valley of California, is about 500 miles long by 40 miles wide. Already highly developed, it contains over three million acres of irrigated land in production and supports a population of about a million inhabitants. It constitutes the heart of the State, both geographically and eco-

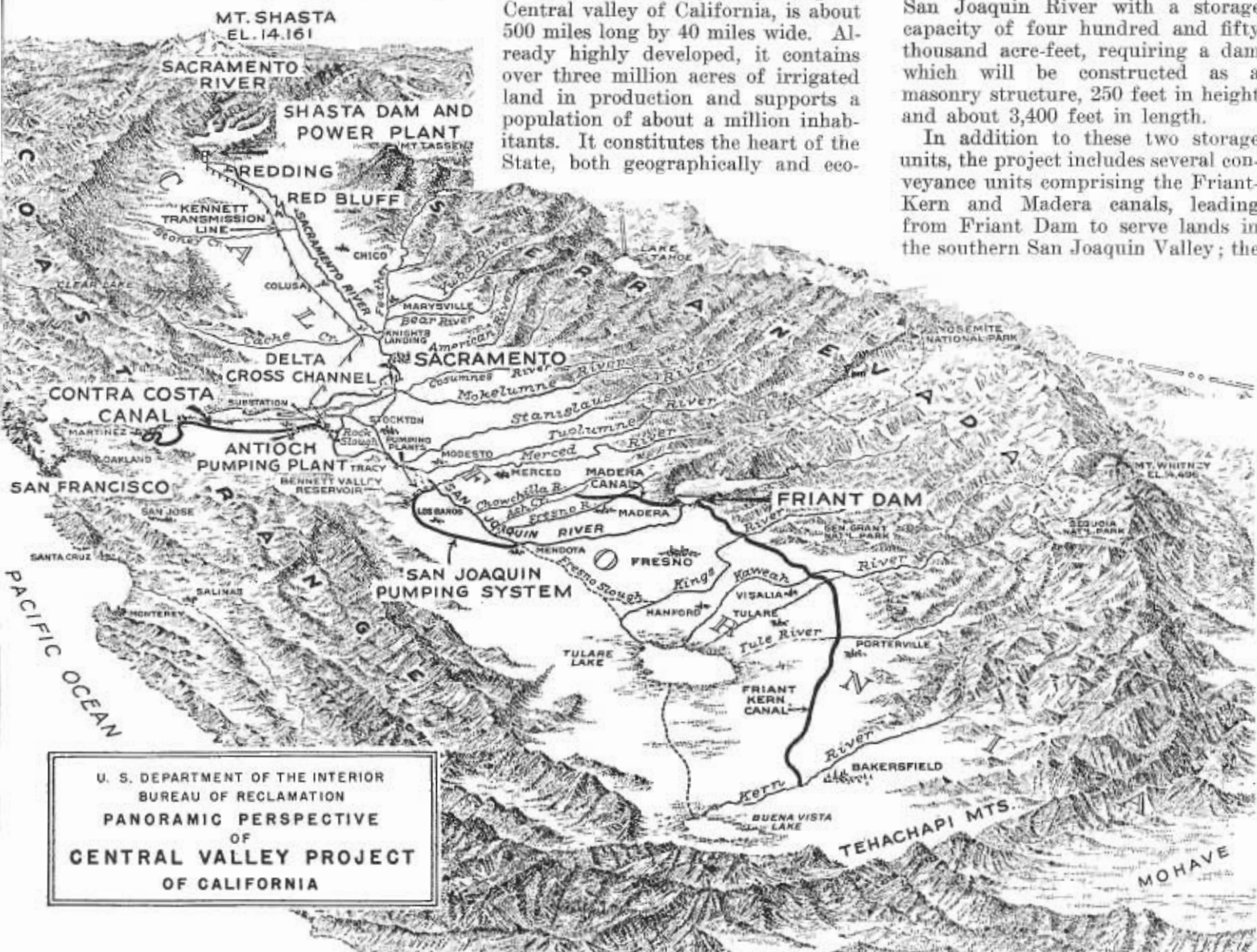
nomically. It is the "back country" of the metropolitan centers of San Francisco and Los Angeles which enjoy a trade valued at three-quarters of a billion annually on commodities moving to and from the Sacramento and San Joaquin Valleys.

SHASTA KEY UNIT

The key unit of the project is Shasta Dam and reservoir on the upper Sacramento River, so designated because practically all regulated water to be furnished by the project will be developed in this storage reservoir. It will have a capacity of four million five hundred thousand acre-feet. The dam will be a massive concrete masonry structure, rising to a height of 500 feet above stream bed.

A second storage unit—Friant Reservoir—will be constructed on the San Joaquin River with a storage capacity of four hundred and fifty thousand acre-feet, requiring a dam which will be constructed as a masonry structure, 250 feet in height and about 3,400 feet in length.

In addition to these two storage units, the project includes several conveyance units comprising the Friant-Kern and Madera canals, leading from Friant Dam to serve lands in the southern San Joaquin Valley; the





Excavating diversion channel at Shasta Dam site for Sacramento River, upper left. Shovel with 5-yard scoop filling 25-yard truck.

San Joaquin pumping system to carry water from the Delta into the San Joaquin Valley for use as a substitute supply for San Joaquin River water now used in the northern San Joaquin Valley, so that the waters of the San Joaquin River can be regulated in and diverted from Friant Reservoir; the Contra Costa conduit, conveying water from the Delta to serve a section of Contra Costa County; and the Delta cross channel to convey regulated water supplies from the Sacramento River across into the San Joaquin delta for use therein and diversion therefrom.

Plans for the Shasta Dam unit of the project also include an hydro-electric power plant with an installed capacity of over 500,000 H.P. at the Shasta Dam, which will be capable of generating one and one-

half billion kilowatt hours yearly on the average. Four units of this plant will be immediately installed with a combined capacity of 300,000 kilowatts. Contracts for the generating equipment have already been let. A main transmission line is planned extending 200 miles southerly from the dam to the vicinity of Antioch and a terminal substation to convey the electric power produced to the market.

SOLVES ALL URGENT PROBLEMS

The project when completed and placed in operation will meet all the urgent problems of water shortage and regulation in California's two great valleys. Crop losses due to dry year deficiencies in the Sacramento Valley will be eliminated. Commercial navigation on the Sacramento River will be restored. Additional

flood protection for lands bordering the upper Sacramento River will be provided. The invasion of salt water into the Delta channels, which for many years has resulted in large losses in crop production and menaced the continued productivity of the Delta land, will be prevented.

The existing deficiencies in available water supplies for industrial, municipal and irrigation uses in Contra Costa County will be fully met. The serious water shortage which has existed for many years and already caused abandonment and loss of between fifty and one hundred thousand acres of highly developed land in the southern San Joaquin Valley will be entirely overcome by the additional water supplies furnished through the canals extending from Friant Reservoir.

(Continued on page 28)

Repairing Flood Damage on All-Year Yosemite Highway

By M. C. FOSGATE, District Construction Engineer

A COMBINATION of warm weather and heavy precipitation in the high Sierra in December, 1937, changed what should have been snow to rain. Water falls that are usually practically dry at that season of the year began to feed into Yosemite Valley more water than has ever been known since the coming of the white man. The floor of the valley was flooded and considerable damage was done to roads and meadows.

The Yosemite drainage area is the main source of the Merced River and this combination of weather produced more runoff than the channel of the Merced should carry. The grade of the river is quite steep, falling 700 feet in 17 miles and the velocity of the water, which attained a maximum

depth of 30 feet in the narrower sections of the river, was very high.

The section of the all-year Yosemite Highway from Briceburg to El Portal, all of which lies on the banks of this river, was badly damaged, so badly, in fact, that for three days it was impassable. Before it could be reopened to traffic it was necessary to cut a new road into the bank in many places and in other places slides were bulldozed out to replace washed out fills. All of this work was of a temporary nature and as soon as surveys and plans could be made, a contract was advertised for replacing this section and protecting it against the recurrence of such major floods.

Originally this road was constructed by prison labor and no attempt was made to protect against

flood damage except in a few particularly bad places. At these locations rubble masonry walls were placed. These walls all stood the test of the flood and remained intact.

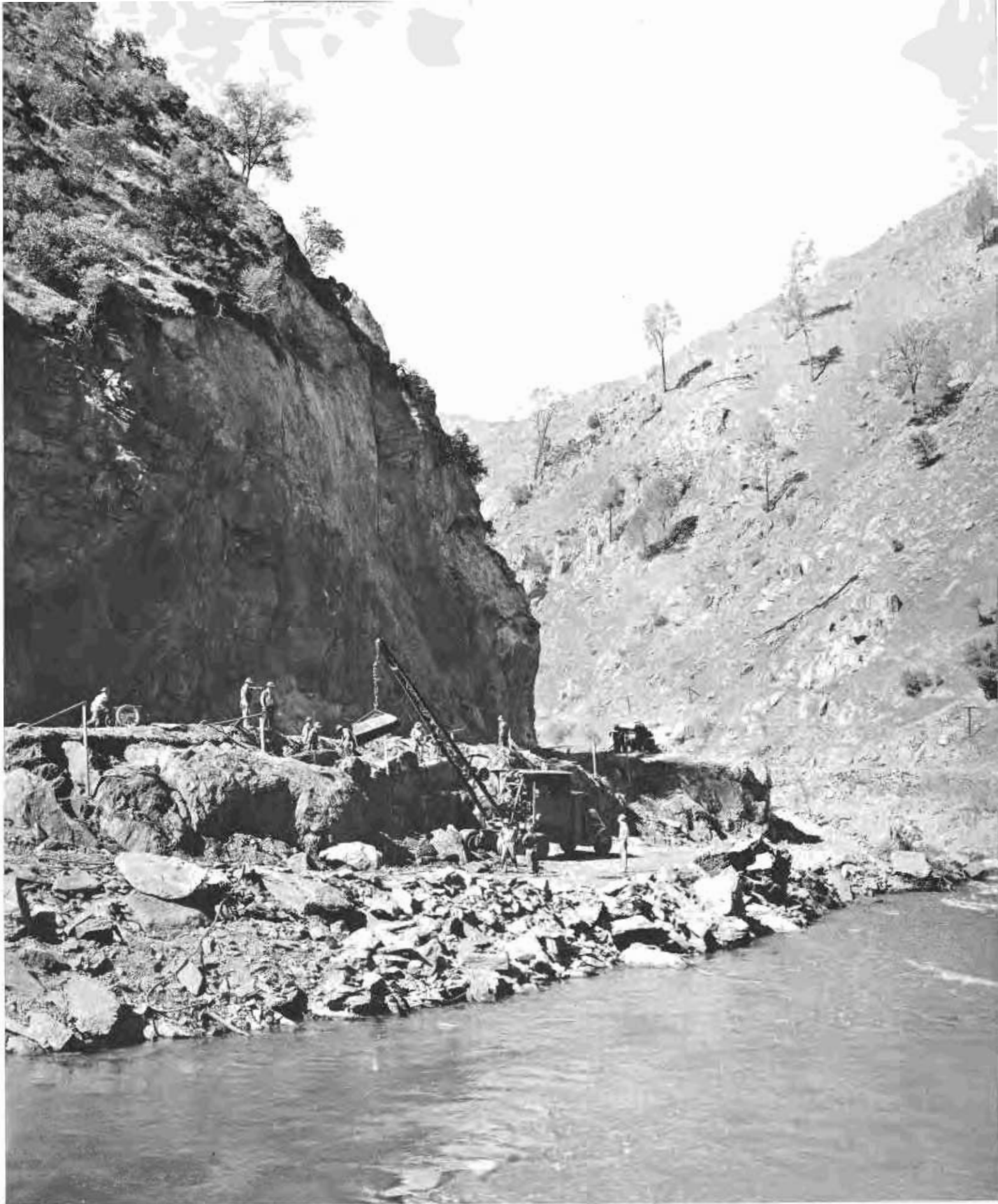
On the opposite side of the river from the highway the Yosemite Valley Railroad, the grade of which is practically the same elevation as the highway, suffered in like proportion and miles of its rails were pulled from the roadbed and literally tied in knots by the rushing water. This railroad has operated since 1907 and this is the first trouble of this kind that it had experienced.

HEWN OUT OF ROCK

The Merced River Canyon is very narrow with the walls of the canyon meeting the river's edge. The slopes



One section of Yosemite All-year Highway showing typical damage done by Merced River flood in 1937.



Yosemite All-year Highway damaged by flood waters of Merced River where State is building heavy rock wall to protect highway.



Section of rock wall flood protection being built on Yosemite Highway—Rock sizes from $\frac{1}{2}$ cubic foot and larger.

average about $1\frac{1}{2}$ to 1 so that in its original construction it was necessary to literally hew out the road, about 60 per cent of which was solid rock, the balance being mostly talus and disintegrated rock.

This road was first opened to traffic in 1926 and immediately became the main artery to Yosemite Valley and has remained so to the present time. Besides the traffic into the valley, there are several mines and one large logging camp which depend on this highway for transportation. Two school buses also use the road, one taking children to the elementary school at El Portal and the other taking high school students from the valley and way points to Mariposa.

For these reasons, it was necessary to reopen the road at the earliest possible time. To do this, traffic was first put under control between Briceburg and El Portal. Later a two-way road was obtained between El Portal and Indian Lodge and since then traffic has been under control between Indian Lodge and Briceburg.

The immediate repairs which were made by the Maintenance Department involved the expenditure of approximately \$3,650 for direct slide removal, \$68,900 for general repairs, \$5,807.32 for traffic control between Briceburg and Indian Lodge, and Federal funds in the amount of \$16,885 for general repairs.

A contract for repairs to this road was awarded to Mittry Brothers Construction Company on August 22, 1938, and on September 20, 1938, operations were started at the east-

erly end of the contract just east of El Portal. The work here consisted of a channel change and 1700 feet of rock embankment. About 200 feet of this embankment was placed where prior to the flood, a gasoline station had been located. All that remained of this station after the flood was a part of the concrete foundation for the gas pumps.

Control Schedule to May 30
From Briceburg

5-Week days	Saturday	Sunday and holidays
8.15 a.m.-----	8.15 a.m.	1.00 a.m.
10.00 a.m.-----	10.00 a.m.	8.15 a.m.
11.00 a.m.-----	11.00 a.m.	10.00 a.m.
3.00 p.m.-----	1.00 p.m.	11.00 a.m.
4.30 p.m.-----	2.00 p.m.	1.00 p.m.
	3.00 p.m.	3.00 p.m.
	4.30 p.m.	4.30 p.m.
	6.00 p.m.	6.00 p.m.

From Indian Lodge

5-Week days	Saturday	Sunday and holidays
7.45 a.m.-----	7.45 a.m.	7.45 a.m.
9.30 a.m.-----	9.30 a.m.	9.30 a.m.
10.30 a.m.-----	10.30 a.m.	10.30 a.m.
2.30 p.m.-----	12.30 p.m.	12.30 p.m.
4.00 p.m.-----	1.30 p.m.	2.30 p.m.
5.30 p.m.-----	2.30 p.m.	4.00 p.m.
	4.00 p.m.	5.30 p.m.
	5.30 p.m.	7.00 p.m.
	7.00 p.m.	

The work, in general, consists of replacing the road to its original condition which includes placing a base course of untreated crushed gravel, where the original was lost, and a penetration oil application with screenings for the wearing surface. The contractor is now erecting a crushing and screening plant for this

work. The major portion of the work, of course, is the protection against flood. This protection consists of three types, rubble masonry wall, rock riprap and rock embankment.

On February 15, 1939, the rubble masonry wall was 90 per cent complete, the riprap was 100 per cent complete, and the rock embankment was approximately 40 per cent complete. The rock embankment makes up the largest part of the protection work. Rubble masonry is placed where satisfactory foundations are available on the outside of the sharper turns of the river and adjacent to restricted river sections. Riprap, while not used extensively, found its place where suitable foundation was not available for walls and where restricted channel did not permit the use of rock embankment.

The rock embankments are being constructed approximately 12 feet wide and on a $1\frac{1}{2}$ to 1 slope. They are built of ledge rock sized from $\frac{1}{2}$ cubic foot to as large as can be handled by the equipment. At least 50 per cent must have a volume of $\frac{1}{2}$ cubic yard or more. This material is dumped over the end of the embankment from trucks and bulldozed into place, supplemented by cable and chokers operated by the power take off on the bulldozer to properly place the larger rocks.

The embankments are placed on foundations made by excavating down to large boulder formation. Where excavation is impractical on account

(Continued on page 19)

\$56,809,000 Cost to Modernize State Highways in District X

By R. E. PIERCE, District Engineer

HIGHWAY DISTRICT X, located as it is in the very center of California, with its headquarters at Stockton, and extending from tidewater on the upper reaches of San Pablo and Suisun bays and the Coast Range, across the great valley and over the high Sierra Nevadas to the eastern boundary of the State, has a wide variety of climate, soil and terrain.

Included within its boundaries are all of the following nine counties: Solano, San Joaquin, Amador, Alpine, Calaveras, Tuolumne, Mariposa, Stanislaus and Merced. Also included is the southern tip of Sacramento County below Walnut Grove.

There are thirty-two incorporated cities in District X.

The status of highways in District X is as follows:

- 54 miles, or 4.1 per cent unimproved roads and unoiled earth roads.
- 335 miles, or 25.6 per cent oiled earth roads inferior as to grade, alignment, width, drainage structures and carrying capacities.
- 175 miles, or 13.5 per cent graveled road with light oiled surfaces expensive to maintain.
- 205 miles, or 15.7 per cent intermediate improved type of surfacing.
- 536 miles, or 41.1 per cent high type paving.

The above 41.1 per cent of highways surfaced with high type paving, does not necessarily mean that they are adequate for present requirements. As a matter of fact, only a very small portion are adequate. On the main travelled routes, additional width is required and on other routes many miles are badly in need of improvement.

Of the above, 1305 miles are outside of incorporated areas, 7.2 miles

are State Park Roads, and 55 miles are inside incorporated municipalities. Of this municipal mileage, 37 miles are high type pavement.

The area served by District X roads includes most of the so-called "Delta" on the lower reaches of the San Joaquin and Sacramento rivers. This area is reputed to include some of the richest land in the world. The area is noted for the production of asparagus, celery and other truck produce. The counties of San Joaquin, Stanislaus and Merced are noted for their productivity, and are largely under irrigation. These conditions lead to the movement of large volumes of produce by truck into local packing or preserving plants; to the Port of Stockton, a recently opened deep water terminal, and to the San Francisco Bay area.

The foothill counties, Amador, Calaveras, Tuolumne and Mariposa, lie along the famous Mother Lode where mining activity has been greatly accelerated by the increased price of gold. This has increased the traffic over Route 65, the Mother Lode Highway and connecting highways.

The main traffic route in the district is Route 4, known as U. S. 99, extending for 102 miles north and south through the district. This route has a relatively heavy volume of traffic, with a maximum count exceeding 10,000 vehicles per day and averaging 6000 to 7000 vehicles per day.

The improvement of portions necessary to bring Route 4 to a four-lane divided highway using the existing pavement for two lanes, new bridges and drainage structures and grade separation structures will require an expenditure of \$6,500,000.

Route 5 (U. S. 50) with 71 miles in District X, extends from the San Francisco Bay area through Stock-

ton to the foothills near Mokelumne Hill, Route 65. From its junction with Route 66 at Mossdale, it carries the combined traffic from the north and south into the San Francisco Bay area. Route 66 is the main connection from Route 4 at Manteca to Route 5, and carries the through bay traffic from Route 4 to Route 5.

Another very important artery is Route 7 (U. S. 40) which forms a part of the main route between San Francisco and Sacramento, and extends north through Sacramento Valley to the Oregon State boundary, including forty-six miles through Solano and part of Napa counties. A much-used route is the Mother Lode Highway, extending from the north boundary of the district near Plymouth to Mariposa, county seat of Mariposa County, a distance of 105 miles. In the Mother Lode country are some of the richest and deepest gold mines of the United States. This route runs through the county seats of all four of the "foothill" counties, and forms a very necessary connection to the primary laterals connecting these county seats with Route 4. This road is only partly built to a satisfactory standard for the traffic it carries.

The West Side Highway, Route 41, extending from Route 5 near Tracy to the southern boundary of the district near Dos Palos, is also of importance to communities lying west of the San Joaquin River. This road was taken into the State System in 1933. This road is largely of narrow concrete pavement in poor condition and should be rebuilt.

The Sierra Nevada Mountains provide a wonderful summer vacation area, also winter sports are enjoyed at several points. The laterals in this area extend easterly from the Mother Lode Highway, the following crossing the summit of the Sierra Nevada:



Top—Underpass below tracks of Hetchy Hetchy Railroad at Big Oak Flat, Tuolumne County, which is below legal clearance. Center—One-way road west of Coulterville in Mariposa County. Bottom—New Hope Landing bridge in San Joaquin County presents traffic hazards.



Route 23, Luther Pass Highway, highest elevation 7800 feet.

Route 34, Carson Pass Highway, highest elevation 8600 feet.

Route 24, Ebbetts Pass Highway, highest elevation 8800 feet.

Route 13, Sonora Pass Highway, highest elevation 9620 feet.

Route 40, Tioga Pass Highway, highest elevation 9940 feet.

Only a limited portion of the above are adequately built to reasonable standards.

In addition, Route 18, connecting with Route 40 at Carl Inn, known as the Big Oak Flat Road, enters the Yosemite Valley from the north. This part of Route 18 and all of Route 40 are of very low standard. Route 18 from Merced via Merced River Canyon is the "All Year Highway" into the Yosemite Valley, and also needs to be improved as to alignment and width.

The Carson Pass Highway and the Ebbetts Pass Highway, both lead into the Lake Tahoe area. The famous Calaveras Big Trees Grove, a State park, is on the Ebbetts Pass Highway.

Another very important lateral is Route 32, known as the Pacheco Pass Route, connecting Route 4 in the San Joaquin Valley with the San Francisco Bay area as well as the coastal area around Monterey and Santa Cruz. This road carries a heavy truck as well as passenger car traffic. On this route there are several narrow bridges in need of widening and several miles have narrow roadbed and shoulders needing reconstruction. Also, a large portion of alignment and grades are inadequate for present traffic.

District X's area of 11,900 square miles is 7.7 per cent of the entire area of the State. Its population of 265,000, according to the 1930 U. S. census, is 4.7 per cent of the State's total.

The motor vehicle registration in the District for 1937 was 115,300 automobiles and 10,600 trucks, or 5 per



Top—Obsolete road approaching Carson Hill on Mother Lode Highway in Calaveras County. Center—Narrow bridge over Mokelumne River, Mother Lode Highway, Amador County. Bottom—Bad approach to Mokelumne Bridge near Clements, San Joaquin County.

cent and 7.2 per cent, respectively, of the State's total registration during that period.

Auto traffic has a yearly total of 6,842 $\frac{1}{2}$ million vehicle-miles in District X, which is 9.5 per cent of the total of 72,245 million vehicle-miles in the State.

The total mileage of the State highways in District X, including through incorporated cities and bridges is 1374, which is 10 per cent of the total State Highway mileage. Of the above mileage 363.5 miles are on the primary system and 1010.5 miles are on the secondary system. The primary system includes those highways that comprise portions of the original trunk highway system and connects the several county seats. The secondary system consists of other highways of the State Highway system. The terms "primary" and "secondary" as referred to the highway system has no reference to the type of surfacing or paving. It is quite possible for a secondary highway to be of higher type paving or surfacing than a primary highway.

There are 305 bridges in the district with a total length of 47,358 feet, or 9.0 miles. Thirteen of these bridges are of a movable span type over navigable streams or arms of San Pablo and Suisun bays and require twenty-eight bridge tenders or operators at all times. The total operation and maintenance cost of these movable span types of bridges amounts to \$60,000 per year. These thirteen movable span bridges in District X are more than the number of movable span bridges in all the other districts combined. In fact, these are 57 per cent of the total of twenty-three movable span bridges in the State highway system.

Two auto ferries, the only ones on the entire State Highway system, are operated across Cache Slough and Steamboat Slough, requiring eight ferrymen and an annual expenditure of \$17,000.

(Continued on page 26)





Recently completed underpass at Livingston, providing a four-lane divided highway beneath Southern Pacific tracks and eliminating a traffic hazard on U. S. 99.

Livingston Underpass Opened

WITH the official opening on February 21 of the \$265,000 underpass at Livingston, Merced County, the last but one of dangerous grade crossings on the Golden State Highway, U. S. 99, between Sacramento and Los Angeles, was eliminated.

The remaining traffic hazard on this route will be removed by a steel-beamed overpass across the Southern Pacific tracks south of Turlock, Stanislaus County. Contract for this improvement already has been let by the State.

Fred W. Panhorst, Bridge Engineer of the Division of Highways, who represented Governor Culbert L. Olson and Director of Public Works Frank W. Clark at the dedication of the Livingston underpass, called attention to the nearness of the highway safety goal on U. S. 99 toward which the Division of Highways has been moving over a period of years in addressing a crowd of 2,500 persons who attended the celebration

marking the formal opening of the Livingston improvement.

In this connection, District Highway Engineer R. E. Pierce announced at the ceremonies that two hazardous curves on the Golden State Highway at Delhi, scenes of numerous accidents, will be realigned this summer.

The Livingston project is 1.9 miles in length and consists of an underpass with a four-lane divided roadway, and realignment of the adjacent highway.

The depressed portion of the underpass is 2000 feet long, there being two 24-foot roadways separated by a 7-foot dividing strip with curbs. Two 3-foot sidewalks provide for pedestrian travel. The cut slopes are paved with concrete.

The overhead structure carrying one track of the Southern Pacific Railroad consists of two steel plate girders each 117 feet 6 inches long, resting on reinforced concrete U-type abutments and a center pier, all supported on timber piles. The center

pier is located between the divided highway lanes.

During construction of the abutments and superstructure, the railroad traffic was routed over a shoo-fly track located about 70 feet away from the permanent track.

Preliminary investigation showed that ground water could be expected to rise to within 16 feet of the rails, whereas the roadway surface at the lowest point is 20 feet below the rails.

In order to provide for the uplifting action of this ground water, the pavement was thickened to a maximum of 3 feet at the low point of the depressed portion. Also along the pavement there is a system of drainage pipes which intercept any excess water and carry it to a sump where it is then pumped into a discharge line. All rainwater which falls within the underpass area is intercepted by catch basins and carried to this same sump.

All water intercepted by the sump is pumped into the discharge line by means of two pumps each capable of

delivering 1000 gallons of water per minute.

Some difficulty was encountered in constructing the sump due to the ground water and behavior of the fine wet sand, which was very compact and resisted the driving of cofferdam piles. The bottom of the sump is 16 feet below the roadway surface.

It was necessary to construct facilities for handling water in an irrigation canal which intersects the depressed portion of the underpass. This was accomplished by constructing an inverted syphon having an invert 17½ feet below the normal grade of the canal, and 9 feet below the roadway surface.

The new highway skirts the town of Livingston. A connection to it was constructed from the town so that traffic entering Livingston from the north will not have to cross the railroad tracks at grade. During construction this connecting road served as a detour.

The new roadway pavement is of reinforced concrete, varying from 23 feet in width to the divided four-lane section. The divided highway is 3000 feet long and is constructed to tie in

with future developments of the adjacent two-lane roadway.

At each end of the dividing strip curb, there is a concrete nose in which an amber flasher light and three ruby reflectors have been placed to warn traffic that it is entering the divided highway. These devices have been supplemented by suitable reflectorized signs.

Addresses, daylight fireworks and selections by the bands of the Livingston High School and the Livingston elementary schools highlighted the dedicatory exercises, which were opened by Warren F. McConnell. With E. G. Adams acting as chairman, short talks were made by Mayor J. B. Lyon, District Highway Engineer Pierce and Mr. Panhorst.

Mr. Panhorst in his address said that press of official business had prevented Director of Public Works Clark from attending the dedication but that the director had sent the following message touching upon features of Governor Olson's State administration program:

"In public utterances, Governor Olson has pledged his administration to work for a reduction of unemploy-

ment, a decent standard of living for all, opportunities for youth, social security, old age retirement and kindred public welfare goals. He has promised that any effort to extend a corrupting tentacle into any department of our State government would be vigorously opposed and those responsible punished.

"He has said that the courageous endeavors of the farmers of California in meeting their problems shall receive every deserving service within the power of his administration to render.

"I take the liberty of quoting from the Governor's inaugural address. The Governor said:

"Let me assure all business men and business organizations that in their transactions with the State they need neither political pull nor political lobbyists in order to obtain a fair hearing and a fair and square deal under the law. Legitimate business, concerned only in honest and efficient administration of the law will have the whole hearted support of my administration."

On the speakers' platform were: Jack Kaufman of Merced, secretary

(Continued on page 19)



Scene at opening of Livingston underpass when large crowd surrounded speakers' stand filling new four-lane approach road.

Prado Dam Project Compels Relocation in Santa Ana Canyon

By A. EVERETT SMITH, Assistant Highway Engineer

THE old route of the Santa Ana Canyon Highway lying between the Orange County line and Corona passes through the reservoir site of the proposed Prado Dam. The Prado Dam project has been studied by Federal engineers for a number of years, and the relocation of the highway has necessarily been delayed, pending the outcome of the final working out of the Prado Dam plans by the Federal Government.

This is a portion of State Highway Sign Route 18 which serves the populous beach communities in going to

congestion causes extreme hazard where poor alignment and gradient are involved.

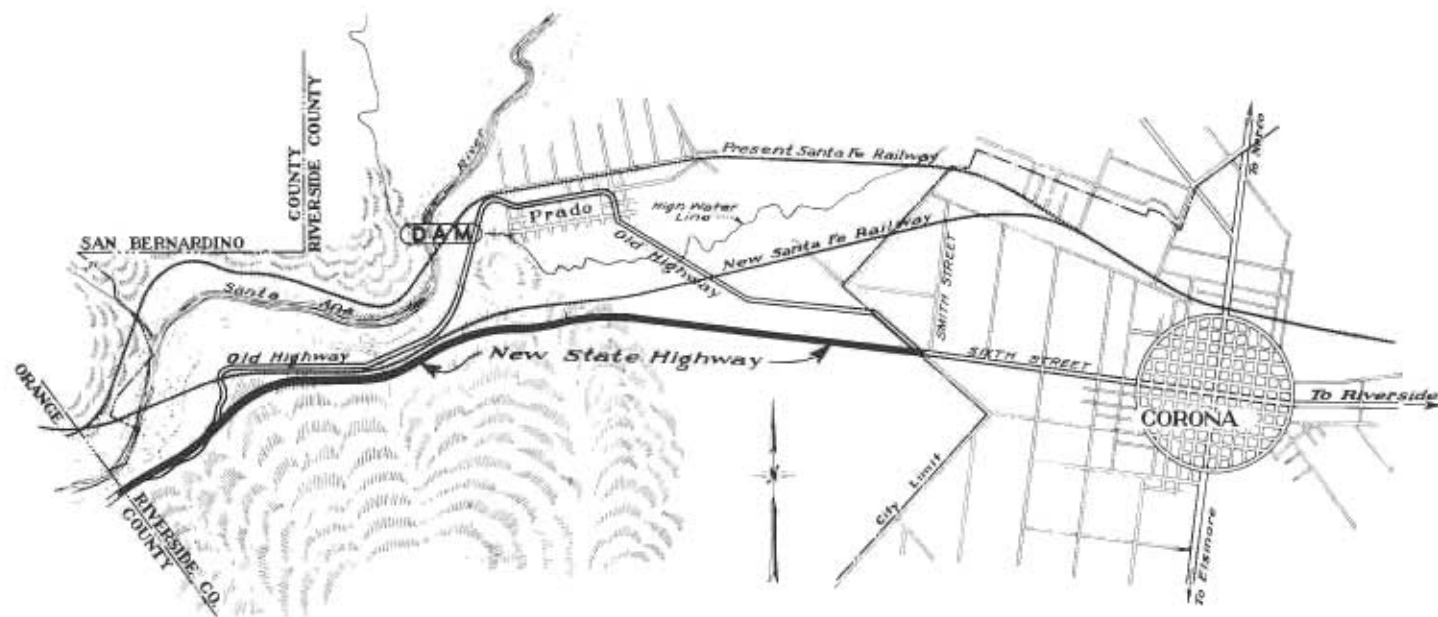
Before this unit of highway could be improved, it was necessary to have definite information as to the location of the dam and the subsequent resulting high water elevation. Due to the location chosen for the dam, the limits of the ultimate lake established by the high water line covers a portion of the existing State highway and Santa Fe Railway.

With the establishment of the location of the dam and the resultant

work has been completed with the exception of placing the surfacing.

On January 10 of this year the Division of Highways awarded a contract to V. R. Dennis Construction Company for the construction of a highway on new location from the Orange County line easterly to Corona. The construction under this project will be to modern standards. The minimum radius of curvature is 1500 feet and the maximum gradient is 3.18 per cent.

All of the project excepting the westerly 0.6 of a mile is to be con-



the mountain resorts of Southern California. People of the inland cities of Riverside and San Bernardino counties also use this route to go to the beaches. There is additional heavy truck and passenger traffic from the Los Angeles Harbor District to inland points in Southern California and to Arizona and Nevada.

As is common with pleasure bound traffic, peak volumes occur on weekends and holidays. The resultant

high water line, steps were taken to relocate the railway and highway facilities.

In August, 1938, a contract was awarded by the Orange County Flood Control District for a project about 1.5 miles in length. The State participated in this project and it embraced placing drainage structures and grading a roadway to a rough grade section for the combined use of the railway and the highway. This

structed to a 68-foot roadbed section on a minimum right of way width of 200 feet. This 68-foot roadbed is designed for a future four-lane highway with a central divisional strip.

In addition to grading, drainage structures are to be placed and the project surfaced throughout, including the portion, previously referred to, that was constructed by the Orange County Flood Control District.

(Continued on page 27)



View of excavation operations under way at Prado Dam site on Santa Ana River compelling relocation of the State highway and the railroad tracks seen in foreground of picture.



A portion of the new highway, grading of which was recently completed. It is located in a more attractive rolling country higher above the river.



Section of recently completed Sepulveda Boulevard unit where it passes the lower San Fernando reservoir of the L. A. water system.

New Sepulveda Link Opened

By RALPH C. MYERS, Assistant District Office Engineer

THE formal acceptance by the State on November 30, 1938, of the 3.66-mile paving contract connecting San Fernando Road, just northerly of San Fernando, with Brand Boulevard, marked the opening to through traffic of a direct route (via Sepulveda Boulevard) between the Ridge Route Alternate and the Los Angeles Harbor and west coast beach cities, including the communities of Santa Monica, Ocean Park, Venice, El Segundo, Manhattan Beach, Hermosa Beach, Redondo Beach, Long Beach, and points southerly.

Traffic from the San Joaquin Valley formerly was required to pass through downtown Los Angeles or the congested Hollywood district in order to reach the harbor or West Los Angeles and the beach cities. Now it can use Sepulveda Boulevard,

which passes in nearly a direct line southerly from San Fernando Road at the "Cascades" across the Santa Monica range of mountains and through West Los Angeles to a junction with the Roosevelt Highway at the Los Angeles Municipal Airport at Mines Field.

The length of this route is about 30 miles, and it passes through the less densely populated areas of Los Angeles and Culver City, making it an ideal high-speed, direct north-and-south highway along the west side of the Los Angeles metropolitan area.

BY-PASSES SAN FERNANDO

The project leaves San Fernando Road near the "Cascades" of the Los Angeles Aqueduct about $1\frac{1}{2}$ miles northwest of the city of San Fernando and extends in general in a southerly direction through rolling country

along the easterly edge of the San Fernando Reservoir and just westerly of San Fernando Mission, connecting with Brand Boulevard, which, in turn, furnishes a direct connection to the West Los Angeles area.

The paving contract on San Fernando Road and Brand Boulevard was completed during 1938 by Matich Bros., Contractors, and was accepted by the Director of Public Works November 30, 1938.

This section was graded to a 40-foot width of roadbed in 1936 under a State contract with Griffith Company, but the placing of pavement was deferred until the necessary funds became available. Surveys and plans for grading this portion were handled by the engineering department of the city of Los Angeles, but the actual grading work was handled by State contract, financed



These two pictures of portions of the recently completed sector of the Sepulveda route from San Fernando through the Santa Monica Mountains to the coast in Los Angeles County show its direct alignment and ample width of roadway. There are only three slight curves in the 3.66 miles of the improvement. Two outside lanes of portland cement concrete pavement are 11 feet wide and separated by a center passing lane of plant mixed surfacing also 11 feet in width.

by U. S. Works Program highways funds.

GRADED BY HAND LABOR

Federal requirements in connection with grading this section provided that grading work be done by hand labor methods. About 350,000 cubic yards of roadway excavation were removed in this manner at a cost of \$488,613.72. The project afforded employment amounting to 486,316 man-hours of labor.

Plans for the paving work were prepared by the city of Los Angeles early in 1938, and a State contract for this work was awarded and work started August 15, 1938.

This portion of Sepulveda Boulevard has been constructed on almost a direct line, there being but three slight curves in the length of 3.66 miles having radii of 1555 feet, 2000 feet and 6700 feet, respectively. Two outside lanes of portland cement concrete pavement have been placed each 11 feet wide as compared with former standard width of 10 feet. The two portland cement concrete pavement lanes are separated by a center passing lane of plant-mixed surfacing which is likewise 11 feet in width. Alignment, grades and pavement all conform to the latest State highway standards of construction.

STAGE CONSTRUCTION PROJECT

Since the Sepulveda Boulevard route was taken into the State Highway System in 1933, several State and city contracts have been completed covering various portions of the route between San Fernando Road and the connection with the Coast or Roosevelt Highway at Mines Field.

The southerly end of the route, from Lincoln Boulevard to Centinela Avenue was graded to a 74-foot width roadbed, constructed on a 100-foot right of way with 40-foot portland cement concrete pavement and wide oiled shoulders, during 1936 and 1937. This section which is 3.1 miles in length was constructed under State contract at a total cost of \$222,235.90.

Another State contract, the 1.6-mile section from Playa Street to Washington Boulevard, was constructed to a width of 74 feet between curbs with a 30-foot portland cement concrete pavement, during 1937 at a cost of \$102,057.58.

A Los Angeles City contract for the 2.1 mile section between Pico Boulevard and Venice Boulevard



under which the city handled the grading and placing of a 40-foot portland cement concrete pavement was completed September 6, 1935, at a cost of \$144,353.33.

THROUGH SANTA MONICA RANGE

Another Los Angeles City contract for the section between Sunset Boulevard and Ventura Boulevard was completed October 29, 1935. This is the section extending through the Santa Monica range of mountains and was improved by the city under a cooperative financing agreement with the State. The work consisted of grading and placing 7.7 miles of 30-foot asphaltic concrete pavement at a total cost of \$300,580.37.

The total amount expended under

city contracts to date is \$444,933.70. Under the three State contracts which have been completed, \$923,113.95 has been expended, making a total of \$1,368,047.65 expended on this route under city and State contracts since it was taken into the State Highway System in 1933.

Although the route is now traversable from one end to the other, there are a number of improvements yet to be made to bring it for its full length up to modern requisite standards of width, alignment, and grade.

ARRANGING DRAINAGE PLAN

A short section of the route between Centinela Avenue and Washington Boulevard, 0.7 mile in length,

(Continued on page 26)

Repairing All-Year Highway Into Yosemite

(Continued from page 8)

of large boulders on the surface, hand work is resorted to. After all earth or sand is removed from these rock surfaces and all small or loose rock is removed, a rock toe wall is constructed as a base for the rock embankment. This toe wall is later grouted to the rock it rests on and to the lower portion of the rock embankment.

As it is believed necessary to keep the face of the embankments as smooth as possible on its surface, it is specified that the outer surface shall not vary more than one foot from the planned slopes. For this reason, it is necessary to follow up the placing of the embankment with a crane, taking off and adding on until as true a surface is obtained as possible. Ledge rock for this work is obtained by widening cuts and by so doing it is possible in most instances to eliminate protection work at these locations.

The approximate quantities of the major items of this contract are:

Rubble masonry, cubic yards.....	11,450
Rock embankment, cubic yards.....	101,317
Roadway excavation, cubic yards.....	233,630
Structure, ditch, channel and trench excavation, cubic yards.....	64,353
Untreated crushed gravel, tons.....	18,750

The total contract items, amount to approximately \$605,529. With a completion date of July 1, 1939.

It is anticipated that in the spring, as soon as the present contract has progressed to a point where it is possible to start surfacing, a contract for plant-mix surfacing for the project will be advertised in an attempt to complete as much of the road as possible before vacation travel starts.

A. N. Lund is Resident Engineer on the contract.

"Do those Englishmen understand American slang?"

"Some of them do. Why do you ask?"

"My daughter is to be married in London to an earl and he has just cabled me to come across."

"I think," said the wife, "that men should wear something to show that they are married."

"Well," replied the husband, "what about their shiny suits?"—*Vancouver Province.*

Motorist Praises Courteous Help on Bay Bridge

February 20, 1939.

California Highways and Public Works, Sacramento, Calif.

While driving to the exposition on Treasure Island yesterday afternoon I had the misfortune to have a blowout while on the Bay Bridge between Yerba Buena Island and Oakland.

On stopping the car, a motorcycle patrol asked if we wanted any help, and then sent for a repair car.

The tire was changed in a few minutes and we continued on our way.

I want to commend whoever is responsible for the courtesy received from the patrol, and the repair men, and also for the very nominal charge made for the service to the car.

Very truly yours,
CARLETON A. CURTIS,
San Francisco.

Livingston Underpass Opened

(Continued from page 13)

of the Merced Chamber of Commerce; Mayor Roy M. Day of Turlock; Desk Officer David C. Peters of the Turlock Police Department; City Councilman Ralph Fay of Stockton; Supervisor Don Castile of Merced County; City Attorney Hugh Griswold of Merced; John R. Graham of Merced; Corwin Radcliffe, Merced; Livingston City Councilmen John Groom, F. M. Eeefield, and Roy W. Crowell; A. E. Todhunter, president of the Livingston Chamber of Commerce; and C. R. Davis and Robert Lee, members of the committee of arrangements.

Following the speech making program an official cut a ribbon stretched across the southerly approach to the underpass and officially declared the highway open. Six

Governor Olson Names Highway Commissioners

REORGANIZATION of the California Highway Commission was effected by Governor Culbert L. Olson on March 3.

The Governor named four new members of the commission on that date and later appointed a new secretary.

In announcing his selections, the Governor said he will appoint a fifth member to succeed Director of Public Works Frank W. Clark, who has been acting as a highway commissioner under temporary appointment.

Larry Barrett of San Francisco succeeds H. R. Judah of Santa Cruz as chairman and on the board with him are Bert L. Vaughn, San Diego and Imperial County hotelman; Amerigo Bozzani, Los Angeles automobile dealer and president of the Italian-American Society, and Iener W. Nielsen, Fresno attorney and business man.

Former Congressman Byron N. Scott of Long Beach was named secretary.

Governor Olson announced that he is of the opinion the commission should be increased from five to eleven members in order to give all sections of the State more adequate representation. In view of the fact that highway commissioners receive no salary, the Governor said he believes the commission's membership can be enlarged without materially adding to the cost of administration of that agency.

little Livingston girls held the ribbon. They were La Verne Roy, Doris Lee, Ella Mae Gant, Bonnie June Ulrich, Mary Ellen Magnuson and Dorris Nobbe.

The Livingston project was financed from Federal Aid Grade Separation Funds except for the portions lying outside the 1500-foot limit, which were financed from the State Highway Fund and regular Federal Aid.

The contractor on this project was Louis Biasotti and Son, of Stockton.

All track work was performed by the Southern Pacific Railroad Company.



View of highway grade separation and divisional islands at intersection of Routes 75 and 206 near Broadway Tunnel in Oakland.

New Channelization Features

By F. M. CARTER, Assistant Maintenance Engineer

THE city of Oakland, California, has utilized a definite channel construction to permit traffic to flow through an intersection that previous to the channelization presented distinct hazards through the numerous movements of traffic. This intersection is just west of the Broadway low-level tunnel, Broadway, State Highway 75 and Landvale Street, State Highway 206.

This design of channelization was the result of the cooperative efforts of the city of Oakland and the State Division of Highways. The intersection originally was a grade separation. With the construction of the Broadway low-level tunnel, the traffic was materially increased and it be-

came necessary to channelize. The work was done under the supervision of City Engineer Walter N. Friekstad, of Oakland.

Assuming that driving accidents are not premeditated acts, but are caused when something unexpected or unlooked for occurs, definite traffic grooves or channels like railroad tracks should reduce the points of unexpectancy and permit the driver to confine his attention to certain definite points of interception.

In the construction of channels to pass traffic through an intersection, the straight through and the right-turn traffic is readily handled. The problem is the traffic turning left. A driver of a vehicle may be expected

to take the easiest and simplest course. A left turn, taking short cuts at an unchannelized intersection, presents the unexpected and confuses the driver of the vehicle passing through the intersection in the proper lane. It is possible, of course, that the straight through or the right turn may take a course that would create an unlooked for condition.

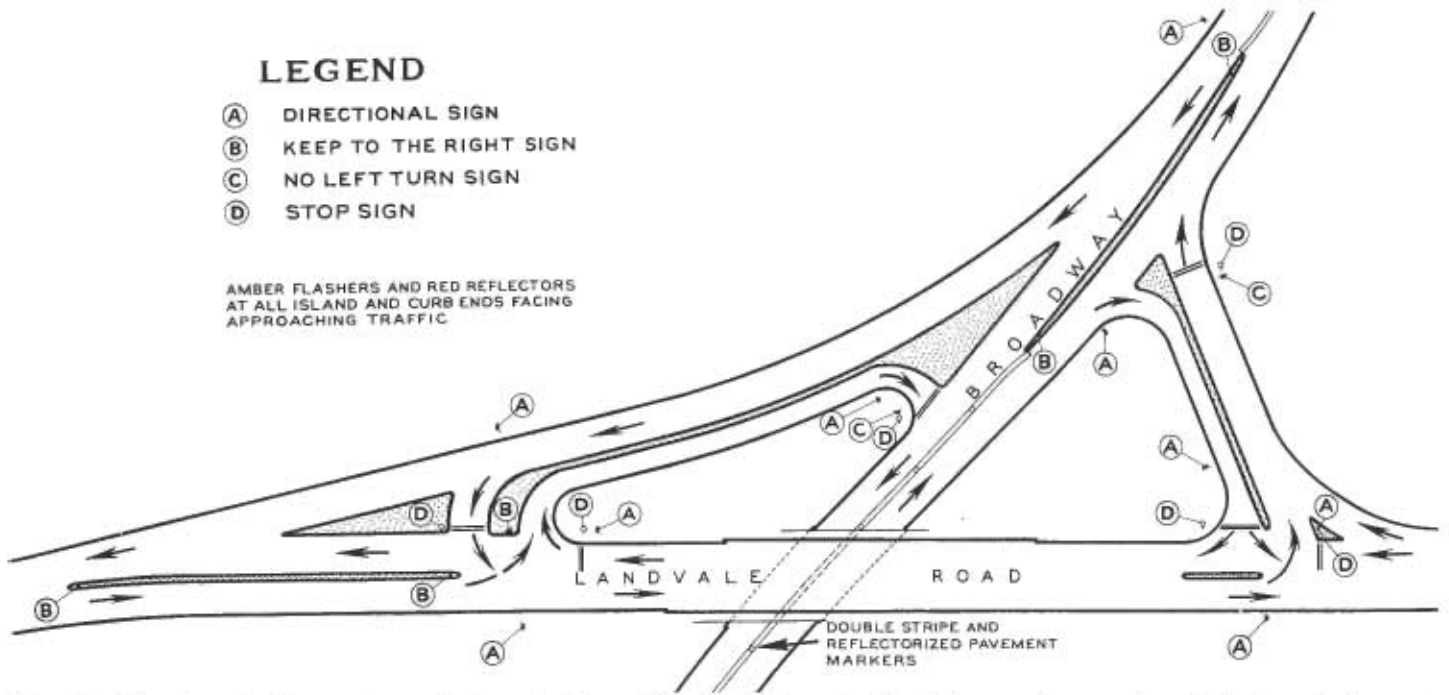
The treatment now commonly applied to overcome these unexpected turns of traffic is to take some means to keep traffic in the proper channels in each direction and to adjust the channels so that traffic will intersect as nearly as practicable at a right

(Continued on page 27)

LEGEND

- (A) DIRECTIONAL SIGN
- (B) KEEP TO THE RIGHT SIGN
- (C) NO LEFT TURN SIGN
- (D) STOP SIGN

AMBER FLASHERS AND RED REFLECTORS
AT ALL ISLAND AND CURB ENDS FACING
APPROACHING TRAFFIC



Plan of traffic channelization and separated grade intersection of two heavy traffic highways where only partial clover leaf connections are possible.



Another view of the channelization islands and continuous dividing strip at the intersection entrance to Landvale Road.

New Bridge Superstructure Placed by Skidding Operation

By O. T. ILLERICH, Associate Bridge Design Engineer

AN INTERESTING method was utilized in the reconstruction of the Bridges Creek bridge located at the heel of a horseshoe bend of the scenic Redwood Highway, State Highway No. 1, through the rugged terrain of Mendocino County, about 21 miles south of Garberville. While traffic continued to pass over it a new concrete slab deck was skidded into place on the permanent alignment.

Route 1 has a steady flow of tourist traffic from May through September and carries a heavy truck traffic due to lack of rail facilities. This traffic, because of its commercial character, had to be maintained without interruption. The steep, heavily wooded, narrow ravine of Bridges Creek made it impractical to construct a temporary detour. The unsound condition of the existing wooden Queen Post trusses built in 1917 with a 19-foot laminated timber deck roadway rendered moving of the

old structure under traffic a definite hazard.

The new design called for a 26-foot wide roadway with a concrete deck slab. The existing alignment of two sharp curves and a short tangent was rounded into a 400-foot radius curve continuous over the length of the structure. This necessitated placing the deck on a super-elevation of 0.128 of a foot per foot of width. The proposed structure also centered at the vertex of a 400-foot sagging vertical curve, thereby obtaining a better alignment with the existing approach grades.

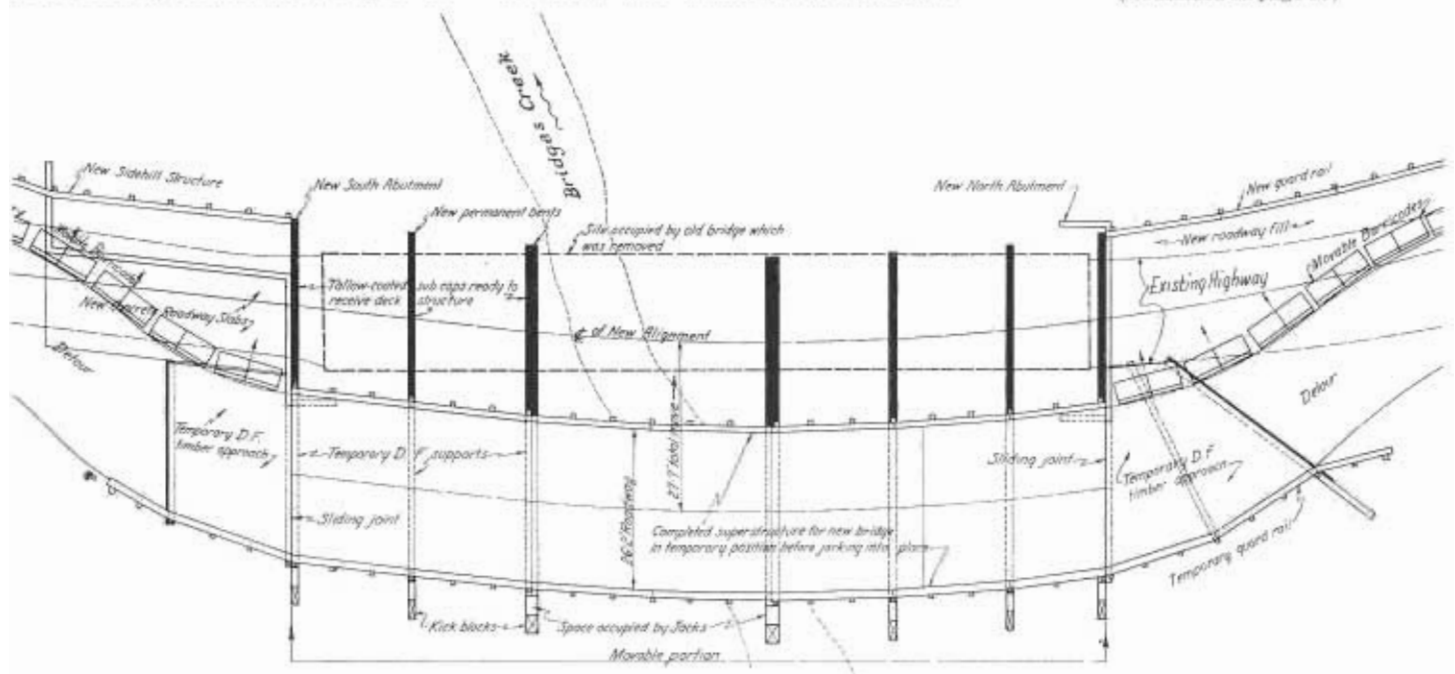
The permanent superstructure for the new bridge was completely constructed above the subcaps in a temporary location on the upstream side of and adjacent to the new alignment, on a similar curve and a continuation of this superelevation, while traffic utilized the existing bridge.

Seven parallel temporary Douglas fir bents were constructed with fixed

subcaps carrying the sliding bridge caps. The contact surfaces were coated with a heavy layer of tallow. The two caps were joined together with 4 x 14-inch timber scabs to prevent the deck from sliding due to traffic impact. Just prior to the jacking operation these were saw cut an inch below the caps to form sliding guides. Later these were replaced in the permanent location with new scabs. Careful allowances had to be made for future settlement from shrinkage on account of the stacking of the large timbers adjacent to the steel and concrete.

The movable portion of the new bridge consisted of two 19-foot redwood timber spans on the south end, one 38-foot steel stringer span in the center, and two 19-foot spans and one 15-foot timber span on the north end, with concrete deck slabs, timber guards and rails. This entire structure had to be moved as a unit.

(Continued on page 28)



Sketch showing how new concrete slab deck was skidded into permanent position.



1—Old wooden Queen Post truss bridge which was replaced by modern deck structure.



2—Constructing temporary supports on which new deck structure was built.



3—Partially completed new deck structure with traffic still using old bridge.



4—View of skidding operation in progress, showing jack operators and signal man. Insert shows jack installation.



5—Picture of sliding deck structure approaching final position on permanent supports.



6—View of completed deck showing pleasing effect of new alignment and ample width of roadway.



THE activities of the Division of Water Resources in connection with the Central Valley Project have included studies of the water entitlements of several canal companies under the provisions of a crop-land water exchange agreement submitted to the State Railroad Commission for approval, for use in connection with studies being made of the operation and power output of Shasta Reservoir.

A supplemental agreement between the United States of America and the Water Project Authority of the State of California was executed during the month and certain activities were resumed or expanded in accordance with its terms. These included field surveys in connection with the preparation of topographic maps along the San Joaquin River from Friant to the San Joaquin delta; the preparation of a report on properties east of the San Joaquin River claiming rights to the use of San Joaquin River waters; the preparation of a report on soil and land classifications of lands adjacent to the San Joaquin River between the Merced River and the San Joaquin delta; the compilation of data and the preparation of reports on hydrographic and hydrologic surveys on the San Joaquin River and its tributaries during the seasons of 1936-37 and 1937-38; and the compilation of data for a report on crops grown and the use of water on lands adjacent to the San Joaquin River between Friant and Gravelly Ford.

IRRIGATION DISTRICTS

Richvale Irrigation District in Butte County has requested approval of a plan to include 5750 acres of rice land within its boundaries.

Pacheco Pass Water District has completed construction of its storage dam on Pacheco Creek and runoff is now being impounded for percolation in the gravel beds to improve the ground water levels.

DIVISION OF WATER RESOURCES

OFFICIAL REPORT

FOR THE MONTH OF

February, 1939

EDWARD HYATT, State Engineer

Newport Mesa Irrigation District has installed modern deep well pumping equipment to replace the old unit that has been in service for a number of years.

SUPERVISION OF DAMS

Many of the dams recently constructed have been put into use during the last month, including Suttentfield, St. Helena No. 2 and Charles Lee Tilden Park Dam. Dam and outlet control works have been completed on the North Fork Dam in San Benito County and the concrete lining of the spillway channel is being rapidly placed, the excavation having been approved. Applications were filed for the approval of the Calaveras Cement Company Dam in Calaveras County, for the repair of the Woodbridge Dam in San Joaquin County and for the enlargement of the Mountain King Dam in Calaveras County. Of these, the application for the Mountain King Dam was approved.

WATER RIGHTS

During January, 20 applications to appropriate water were received, 7 were denied, 22 were approved, 22 permits were revoked and the rights under 8 permits were confirmed by the issuance of licenses. Among the applications approved during the month was one by the Irvine Company of Tustin, involving an appropriation of 13,000 acre-feet by means of storage on San Diego Creek in Orange County at an estimated cost of \$225,000 and two by Washoe County Water Conservation District of Reno, Nevada, involving an appropriation of 60,000 acre-feet per annum by means of storage on Little Truckee River in Nevada County at an estimated cost of \$1,000,000.

COOPERATIVE SNOW SURVEYS

During the last few days of January and the early days of February the first snow surveys of the 1939 season were made at key courses throughout the major drainage basins on the west side of the Sierra. Measurements made before January 27th indicated a very deficient snow pack, with the amount of snow on the ground less than one-half of the normal amount for that time of the year. The situation, however, improved rapidly during the following week when a succession of storms arrived from the north Pacific Ocean, daily bringing snows

to the Sierra. During the past two weeks, however, fair weather has been general throughout California and little snow has fallen since February 10th. Due to this and the evaporation during the bright sunny days, the snow pack is falling farther below normal each day. Additional storms, which under normal conditions we may expect to get during the next six weeks, are greatly needed to build up the snow pack to prevent a water shortage next summer.

SACRAMENTO-SAN JOAQUIN WATER SUPERVISION

During the past month the work on this activity consisted for the most part of routine computations in order to compile the annual mimeographed report. One field trip was made to the various river gaging stations to check the stream flow at this time. The sampling of water in the Delta for salinity is being carried on at all regular stations in order that the record of the seasonal advance and retreat of salinity may be complete.

SPECIAL INVESTIGATIONS

Flood Damage Repairs

During the month Senate Bill No. 421 adding \$795,445.51 to the emergency fund for the restoration of property, levees, flood control works, county roads and bridges damaged by the floods of the 1937-38 winter season, became effective when signed by Governor Olson on February 2d.

Investigations and the preparation of reports on work for which application for the allotment of funds have been made were continued and twelve reports and recommendations were submitted to the Director of Finance. The total amount of outstanding allocations at the end of the month was \$4,055,800. In addition to the work being performed by the Division of Water Resources under these allotments, work which will cost \$3,333,200 is being done by applicants under 127 contracts entered into with the Department of Public Works.

FLOOD CONTROL AND RECLAMATION

Relief Labor Work

Under W.P.A. Project No. 10612, sponsored by this department, the following activity is under way:

In Butte County 57 men are engaged in cleaning the channels of Big Chico Creek.

Highway Bids and Awards for the Month of February, 1939

ALAMEDA, CONTRA COSTA AND SANTA CLARA COUNTIES—Apply diesel oil to roadside vegetation, about 129 miles. District IV, Various locations. Lee J. Immel, Berkeley, \$4,369; Pacific Truck Service, Inc., San Jose, \$3,876; Sheldon Oil Co., Suisun, \$4,675; Garcia Construction Co., Irvington, \$3,927; Hayward Building Material Co., Hayward, \$3,740. Contract awarded to Close Building Supply, Hayward, \$3,553.

CALAVERAS, STANISLAUS, TUOLUMNE AND AMADOR COUNTIES—Furnishing and applying diesel oil to 171.1 miles of roadside. District X, various locations. Oranges Bros., Stockton, \$3,038; Sheldon Oil Co., Suisun, \$2,914; Garcia Construction Co., Irvington, \$3,385. Contract awarded to Pacific Truck Service, Inc., San Jose, \$2,343.60.

HUMBOLDT COUNTY—Across Ohman Creek about 9 miles north of Garberville, a reinforced concrete slab and girder bridge to be constructed and about 0.2 mile to be graded and surfaced with road-mix surfacing and Class "C" seal coat. District I, Route 1, Section B. E. T. Lesure, Oakland, \$31,815; Albert H. Seimer and John Carcano, San Anselmo, \$32,831; Mercer, Fraser Company, Eureka, \$33,416; Valley Construction Co., San Jose, \$33,505; A. Soda and Son, Oakland, \$35,382; Guerin Bros., San Francisco, \$36,561; M. J. Ruddy, Modesto, \$38,832. Contract awarded to E. E. Smith, Eureka, \$30,632.75.

LOS ANGELES COUNTY—North Figueroa Street between Sunset Boulevard and Diamond Street, about 0.4 mile to be graded and paved with asphalt concrete and portland cement concrete, and a reinforced concrete bridge to be constructed. District VII, Route 165, Section L.A. J. E. Haddock Co., Ltd., Pasadena, \$276,898; Bates & Rogers Construction Co., Oakland, \$288,765; John Strona, Pomona, \$289,528; Radich & Brown, Burbank, \$310,905; United Concrete Pipe Corp., Los Angeles, \$317,695; Oswald Bros., Los Angeles, \$317,840; C. O. Sparks & Mundo Engineering Co., Los Angeles, \$338,035; Mitty Bros. Construction Co., Los Angeles, \$350,815. Contract awarded to Griffith Co., Los Angeles, \$275,474.50.

LOS ANGELES COUNTY—An under-grade crossing under the tracks of the A. T. & S. F. Ry. Co. at Chapman Station on Rosemead Boulevard, consisting of steel track spans on reinforced concrete piers and abutments on treated timber pile foundations to be constructed and roadway about 0.3 mile to be graded and paved with portland cement concrete. District VII, Route 168, Section C. Dimmitt & Taylor, Los Angeles, \$119,204; J. E. Haddock, Ltd., Pasadena, \$119,890; Vido Kovacevich, South Gate, \$121,808; C. O. Sparks & Mundo Engineering Co., Los Angeles, \$124,356; Griffith Co., Los Angeles, \$130,477; Oswald Bros., Los Angeles, \$132,631; Oscar Oberg, Los Angeles, \$133,543; Contracting Engineers Co., Los Angeles, \$134,665; Gibbons and Reed Co., Burbank, \$134,728; Byerts & Dunn, Los Angeles, \$144,388; Carlo Bongiovanni, Hollywood, \$146,949. Contract awarded to United Concrete Pipe Corp., Los Angeles, \$117,822.50.

MERCED, MARIPOSA, STANISLAUS COUNTIES—Furnishing and applying diesel oil to 131.4 miles of roadside. District X, various locations. Sheldon Oil Co., Suisun, \$2,614; Oranges Bros., Stockton, \$2,425; Charles Kuppinger, Lakeport, \$2,572; Garcia Construction Co., Irvington, \$2,866. Contract awarded to Pacific Truck Service, Inc., San Jose, \$1,984.50.

ORANGE COUNTY—About 0.3 mile on Glassell Ave., between Fairhaven Ave. and south city limits of Orange, bridge approaches graded and surfaced with asphalt concrete pavement. District VII, Route 181, Section A. C. O. Sparks & Mundo Engineering Co., Los Angeles, \$11,222; Griffith Co., Los Angeles, \$11,455. Contract awarded to Sully Miller Contracting Co., Long Beach, \$8,874.50.

SAN BENITO, MONTEREY, SAN LUIS OBISPO AND SANTA BARBARA COUNTIES—Furnish and apply diesel oil to roadside vegetation for a width of about 9 feet adjacent to right of way lines for a distance of about 202 roadside miles. District V, various locations. Bert Hale, Pismo Beach, \$5,984; L. A. Brisco, Arroyo Grande, \$6,304; Bradley Truck Co., Santa Maria, \$6,176; Western Motor Transfer, Inc., Santa Barbara, \$6,640; Oilfields Trucking Co., Bakersfield, \$7,168. Contract awarded to R. B. Snow, Santa Maria, \$5,856.

SAN BERNARDINO COUNTY—Across Etiwanda Wash, two reinforced single span slab bridges to be constructed, one located near Etiwanda Avenue about 7 miles east of Ontario and the other located at East Avenue 8 miles east of Upland and about 0.4 mile of approaches to be graded and paved with portland cement concrete and asphalt concrete. District VIII, Routes 26 & 9, Section D & A. Match Bros., Elsinore, \$25,612; Contracting Engineers Co., Los Angeles, \$26,395; J. E. Haddock, Ltd., Pasadena, \$27,098; J. S. Metzger & Son, Los Angeles, \$27,913; White & Wilberg, Santa Monica, \$29,345; C. O. Sparks and Mundo Engineering Co., Los Angeles, \$29,555. Contract awarded to Gibbons & Reed Co., Burbank, \$23,678.15.

SAN BERNARDINO COUNTY—Between San Bernardino and Santa Ana River, about 1.1 miles, plant mixed surfacing to be placed and pile and timber bulkheads to be constructed and backfilled with imported borrow. District VIII, Route 26, Section A. Oswald Bros., Los Angeles, \$39,616; Geo. Herz & Co., San Bernardino, \$41,236; J. S. Metzger & Son, Los Angeles, \$44,161; R. M. Price, Huntington Park, \$45,820; Kiss Crane Service, South Gate, \$47,363; Dimmitt & Taylor, Los Angeles, \$47,828; R. E. Campbell, Los Angeles, \$50,287. Contract awarded to V. R. Dennis Construction Co., San Diego, \$39,133.

SAN DIEGO COUNTY—A reinforced concrete overhead structure over the San Diego and Arizona Eastern R. R. at La Mesa, consisting of one 47-foot span, two 30-foot spans and 2 ten-foot cantilevers on concrete piers. District XI, Route 12, Section L.Msa. The Contracting Engineers Co., Los Angeles, \$25,200; Herman H. Peterson, San Diego, \$25,516; V. R. Dennis Construction Co., San Diego, \$26,401; S. A. Cummings, San Diego, \$26,565; The Robertson Co., Los Angeles, \$28,669; Griffith Co., Los Angeles, \$29,114; White & Wilberg, Santa Monica, \$31,831; Vinson & Pringle, Phoenix, Ariz., \$37,240. Contract awarded to Oberg Bros., Los Angeles, \$25,100.

SAN FRANCISCO COUNTY—In San Francisco, between Lake Street and Golden Gate Bridge approach, 3 viaducts, consisting of reinforced concrete girder spans on reinforced concrete bents and abutments. District IV, Route 56. Heafey-Moore Co. & Fredrickson & Watson Construction Co., Oakland, \$235,123; Chas. L. Harney, San Francisco, \$254,737; Eaton & Smith, San Francisco, \$235,217; Clinton Construction Co. of California, San Francisco, \$245,306; Bates & Rogers Construction Corp., Oak-

land, \$252,099; Barret & Hilp, San Francisco, \$255,952; MacDonald & Kahn Co., Ltd., San Francisco, \$262,467; Maceo Construction Co., Clearwater, \$266,411; C. W. Caletti & Co., San Rafael, \$281,626. Contract awarded to Union Paving Co., San Francisco, \$223,359.20.

SAN LUIS OBISPO COUNTY—Across Paso Robles Creek about 6 miles south of Paso Robles, a reinforced concrete girder bridge consisting of two 48-foot 6-inch spans and two 36-foot 6-inch spans on concrete piers and abutments with timber pile foundations. District V, Route 2, Section B. Valley Construction Co., San Jose, \$43,581; A. Soda and Son, Oakland, \$44,958; J. S. Metzger & Son, Los Angeles, \$45,276; Earl W. Heple, San Jose, \$49,119; M. J. Ruddy, Modesto, \$49,479; M. B. McGowan, Inc., San Francisco, \$49,916; Albert H. Siemer and John Carcano, San Anselmo, \$51,790; Gibbons & Reed Co., Burbank, \$52,547; E. T. Lesure, Oakland, \$53,178. Contract awarded to C. W. Caletti & Co., San Rafael, \$42,326.50.

SOLANO, SAN JOAQUIN, CALAVERAS, AMADOR, STANISLAUS, MARIPOSA AND TUOLUMNE COUNTIES—Furnishing and applying diesel oil to 278.5 miles of roadides. District X, Various locations. Pacific Truck Service, Inc., San Jose, \$5,123; Garcia Construction Co., Irvington, \$5,428; Oranges Bros., Stockton, \$5,240. Contract awarded to Sheldon Oil Co., Suisun, \$4,770.50.

SONOMA, MARIN AND NAPA COUNTIES—Apply diesel oil to roadside vegetation, about 206.9 miles. District IV, Various locations. Garcia Construction Co., Irvington, \$7,371; Chas. Kuppinger, Lakeport, \$6,615; E. A. Forde, San Anselmo, \$6,480; Spaletta & Siri, Santa Rosa, \$6,615; Pacific Truck Service, Inc., San Jose, \$6,426; Lee J. Immel, Berkeley, \$7,506; Helwig Construction Co., Sebastopol, \$7,371. Contract awarded to Close Building Supply, Hayward, \$5,643.

SONOMA COUNTY—Between Northwood Park and Guerneville, about 3.2 miles to be graded and surfaced with gravel base and armor coat and two reinforced concrete slab bridges and retaining walls to be constructed. District IV, Route 104, Section A. C. W. Caletti & Co., San Rafael, \$217,195; Poulos, McEwen & M. A. Jenkins, Sacramento, \$214,053; Guerin Bros., San Francisco, \$192,909; Earl W. Heple, San Jose, \$219,561; Chas. L. Harney, San Francisco, \$226,861; A. Teichert & Son, Inc., Sacramento, \$228,643; A. Soda & Son, Oakland, \$241,357. Contract awarded to Heafey Moore Co. & Fredrickson & Watson Construction Co., Oakland, \$184,009.10.

STANISLAUS COUNTY—About 0.4 mile south of Turlock, a steel beam overhead structure with concrete deck across the tracks of the S. P. R. R. to be constructed and about 0.3 mile to be graded and paved with portland cement concrete and asphalt concrete. District X, Route 4, Section A. Earl W. Heple, San Jose, \$284,900; United Concrete Pipe Corp., Los Angeles, \$293,894; A. Teichert & Son, Inc., Sacramento, \$318,834. Contract awarded to Union Paving Co., San Francisco, \$284,162.25.

Don't worry when you stumble—remember, a worm is about the only thing that can't fall down.

We understand that a fireman recently by accident drank some fire extinguisher fluid, and, boy, was he put out!

\$56,809,000 Cost to Modernize Highways in District X

(Continued from page 11)

Snow removal is conducted during normal years on 167 miles, or 12 per cent, of the highways in the district. In addition to which, the spring opening of our mountain roads requires work on 180 more miles of highway. The average yearly cost of this work is \$27,450, or approximately \$790 per mile.

Multiple lane highways account for a very limited percentage of the highways in the district, but traffic is growing on some of the main arteries to such an extent as to demand increasing the number of lanes in the immediate future, especially adjoining municipalities.

We are at present constructing two stretches of divided highways on the main north and south route—U. S. 99; one north of Modesto; the other south of Merced, and the extension of this same type of construction on this main artery should be continued in the future.

There are many bridges, outside of municipalities, that are posted for restricted loading, speed and width, which must be rebuilt or strengthened. The majority of these structures are on county roads that came into the State highway system in 1933, at the time some 6600 miles of roads were turned over to the Division of Highways through legislative action.

The maintenance of these added roads and bridges and also of other inadequate roads in the district is much more expensive than would be the case if they were adequately built, which is not now possible, due to lack of funds.

The average maintenance cost during the past five years for all District X roads amounts to approximately \$750,000 annually. A considerable part of this sum of money could be saved each year if the highways serving the district could be immediately improved to the standard required to adequately meet traffic needs.

While several of the most important railroad grade crossings in the district have been eliminated by separation structures or relocation, many still remain which should be eliminated.

Tourist traffic is a decided asset

to the State, but the mountain roads which were originally built by the counties attracting this traffic are still narrow and crooked and with many steep grades. Safe and adequate highways should be provided for this traffic. The road surfacing is usually of the lower types and requires constant and expensive maintenance.

Snow blocks most of these roads during the winter and those crossing the summits are closed many months at a time as sufficient funds are not available nor are the road surfaces of a type adequate to stand traffic under the extreme winter conditions.

It is becoming more evident that funds are inadequate to keep up with the increasing volume of traffic on the State highways in the district.

To bring the present system up to a standard to adequately care for present conditions, the following expenditures will be required.

54 miles of unimproved earth roads in need of improvement	\$2,611,500
510 miles 2-lane oiled earth or gravel roads in need of reconstruction	16,509,500
205 miles intermediate improved types of surfacing in need of reconstruction	4,959,000
536 miles high type paving portions needing reconstruction	22,979,000
Railroad grade separations and bridges not included above	6,750,000
Acquisition of right of way	3,000,000
Total	\$56,809,000

Based on the average yearly allotment to the district, it will take about seventy years to complete this program, but of course by that time conditions will probably have changed so that a great deal more money will be required.

Assuming sixteen years a reasonable period in which to improve the present roads to adequate standards and not considering added costs for increased requirements, it will call

for an annual expenditure of \$3,500,000. This is about twice the average annual expenditure at present in the district for all items of work—construction, maintenance, surveys and plans, right of way, construction engineering, minor improvements and betterments, administration, cities, etc.

In the meantime, we must concentrate on those highways having the greatest needs, giving full consideration to maintenance cost, traffic and safety requirements.

New Sepulveda Link Opened

(Continued from page 18)

has not yet been constructed due to the fact that it would pass across lands subject to inundation during the rainy season of the year. At present, adjacent paved streets are used to carry traffic around this portion. Before constructing this short section it will be necessary to work out a comprehensive drainage plan for the surrounding area, to be financed in such manner that the cost will be divided in accordance with the benefits to be derived by furnishing proper drainage for this area.

It is contemplated that further improvements in alignment will be made on the section through the Santa Monica Mountains as some of the present curves would be hazardous for the very large volume of traffic which may be ultimately expected to use this thoroughfare.

One of the most important improvements now contemplated is the reconstruction on widened right of way of the portion between Ventura Boulevard and the southerly end of the recently completed paving contract at Brand Boulevard. Surveys for this 8.1 mile section are being carried on by the city of Los Angeles with the intention of constructing it ultimately as a six-lane divided highway.

Sepulveda Boulevard in its present stage of development is capable of carrying a large volume of traffic along the westerly side of the Los Angeles metropolitan district.

New Channelization in the City of Oakland

(Continued from page 20)

angle. An acute angle intersection of two highways having the gore of such an intersection paved or even graded to the approximate level of the intersecting highways, with no channelization but the pavement lane stripes, permits numerous unexpected movements of traffic.

With plenty of space, traffic inclines to roaming. The approaching traffic, proceeding in the proper channel, has no assurance that traffic will follow the course that might be expected to be taken by a careful driver.

Proper channelization will reduce the unexpected movement of traffic by reducing the possible intersection points to a definite number and location.

Every time a new method of traffic movement is utilized, it takes time for the driver to become used to the device. Thus, the design of channelization at intersections should be as simple as possible, but the channelizing should be definite. Traffic will require careful signing to utilize the different lanes.

The most common method of directing traffic into the proper highway is by the use of triangular deflector islands. When the traffic has turned past these deflector islands, the usual method of confining them is by lane striping. The city of Oakland has connected these deflector points by a curb which forms a definite channelization.

CHANNEL CURB USED

Another feature of the Oakland channelization is a pronounced step in the use of a channel curb on the highway in advance of the turning points, to keep approaching traffic separated into the proper lanes.

The accompanying photographs and sketch show how these channels are outlined. The sketch also shows the method of directing traffic.

Safety measures such as curb inserts, flashing yellow lights in the approach points of the islands, and sodium vapor lights at the points of intersection are used.

This channelizing has proved the value of furnishing definitely-separated lanes for traffic.

Golden Gate Exposition Brings Traffic Increase to Bay Bridge

THE highest month in daily average number of vehicles crossing the San Francisco-Oakland Bay Bridge since ferry rates were cut in August, 1937, was recorded for February, it was revealed in a report by Chief Engineer C. H. Purcell filed with Director of Public Works Frank W. Clark.

For the twenty-eight-day month an average of 26,556 vehicles used the bridge, an increase of 448 vehicles over November, highest previous month.

A total of 743,573 vehicles were recorded for February as compared to 593,121 for the same period last year.

The highest day last month was Friday, February 17, immediately preceding the opening of the exposition, when 36,001 vehicles crossed the bridge.

The lowest day since exposition opening was Monday, February 27, with 25,052, and high point since the Treasure Island premiere was Washington's Birthday, February 22, with 35,967 vehicles using the bridge.

To the exposition can also be attributed an increase in freight tonnage to its highest point since the span opened, the report indicated. A total of 67,304 tons were transported across the bridge in February as compared with the previous high of 62,421 tons in January, a 31-day month. Approximately 5,500 tons alone were transported over the bridge on February 16, highest single day.

Of a total of 599,998 visitors who paid admission to the exposition from the opening of Treasure Island on February 18 to the close of the month, the bay bridge carried 214,638.

Traffic has operated smoothly over the span, without congestion of any kind, except on Washington's Birthday, February 22, when vehicles slowing up at the exposition admission gates caused the cars to line up on the bridge for a short period of time.

At all times, however, bridge toll collectors were able to handle traffic speedily and efficiently.

Highway Engineers Honored for Work

Thomas E. Stanton, Jr., engineer in charge of the Testing Laboratories of the Division of Highways, has been notified by the board of directors of the American Concrete Institute, Detroit, that he and his assistant, Lester C. Meder, have been awarded the Wasson medal for noteworthy research during 1938. The award was based on a paper prepared by Stanton and Meder on "Resistance of Cement to Attack by Sea Water and by Alkali Soils," which was published last year in CALIFORNIA HIGHWAYS AND PUBLIC WORKS, official publication of the Department of Public Works.

The Wasson award was founded by the late Leonard C. Wasson of Boston, the second president of the American Concrete Institute, and was first made in 1928. The award will be announced at a dinner of the Institute and the medal forwarded.

Prado Dam Project Compels Relocation

(Continued from page 14)

Surfacing will consist of a 22-foot width of plant-mixed surfacing placed on a blanket of surfacing material obtained from roadway excavation.

The plant-mixed surfacing is to be placed to one side of the center line of the graded section to conform to one-half of the ultimate four-lane, divided highway.

At the easterly terminus of the project to make a satisfactory connection to the wide portion of the highway within the city of Corona, a section of portland cement concrete pavement 48 feet in width will be constructed.

In addition to materially decreasing the maximum grade and eliminating numerous horizontal and vertical curves, the distance between Corona and the Orange County line will be reduced to the motorist by approximately one mile.

Skidded Bridge Superstructure

(Continued from page 22)

It was necessary to build a temporary fixed timber approach span at each end with roadway approaches. On completion, traffic was diverted to the new deck structure.

Fifteen temporary movable barricades were used to guide and protect traffic throughout the construction. These were well adapted for the use intended and found to be quite adequate without additional guard rails or fences. Upon completion of the contract these barricades were turned over to the local Maintenance Department.

The next step was the dismantling of the old bridge, including a log crib at the south end. The permanent abutments, bents, side-hill structure and approaches were then constructed. These redwood bents were built parallel to those carrying the new deck, with their subcaps in alignment with and scabbed to the temporary subcaps.

Twenty-ton capacity ratchet screw jacks, one to each of the seven bents, were then blocked in position at the top of the subcaps. Due to the skew of the bents and curvature of the deck it was necessary to keep close adjustment on the relative positions of the seven sliding caps. This was visually done by attaching ordinary yard sticks to the subcaps.

Jacking operations were started with one man operating each of the seven jacks, guided by a signal man stationed at the middle of the bridge. The proper speed was two ratchet movements per signal.

The entire superstructure was moved 26 feet, 7 inches, in seven hours and the total movement into position on the permanent alignment was completed in 11 hours. The cost of jacking the superstructure into position was considerably under the amount estimated and the rate of progress greatly exceeded all expectations. The ease with which the structure moved was gratifying. Traffic was continuously maintained throughout this operation.

All timber connections in both temporary and permanent bents were made with 4-inch split ring connectors and galvanized hardware. The use of ring connectors throughout the

Motoring Visitors In Twelve Hundred Cars Enter Daily

California is still the Mecca for out-of-state motor tourists.

Despite a general decline in automobile mileage throughout the nation in 1938, foreign passenger cars entered the State at the rate of 1183 vehicles per day bringing in an estimated 1,196,086 visitors.

Official figures from the State border quarantine stations revealed that Southern California again was the favorite entrance point for out-of-state visitors. Out of a total of 20 border stations, the five southland checking points accounted for more than half of entering cars.

State Control of Water and Power

(Continued from page 5)

Originally conceived as a State enterprise, adopted by State legislation and approved by state-wide referendum election in 1933 the Central Valley Project involving an estimated cost of \$170,000,000 is now a fully authorized and approved Federal undertaking with initial funds appropriated therefor and construction already well under way. The project is being constructed by the United States Bureau of Reclamation of the Department of the Interior.

Units under construction include the Shasta Dam and power plant, and certain supplemental works most important of which is the relocation of a portion of the Southern Pacific Railway (Shasta route) to replace the present line which will be submerged by the reservoir; and the Contra Costa conduit. Camp facilities have been constructed at Friant dam.

Funds appropriated by the Federal Government thus far for the project total \$34,600,000 of which about \$8,000,000 has been spent to date.

construction insured positive alignment of the timbers at all times with a minimum of slip and racking.

The construction was begun on May 23d and completed on November 2, 1938, at a total cost of \$25,000 which included the work on the roadway approaches. The contractor was Claude C. Wood of Lodi, California.

Rumsey Bridge Opened to Traffic

COMPLETING another link of a more direct route between Sacramento and Clear Lake via Capay Valley, the new Rumsey bridge constructed across Cache Creek in Yolo County by the Division of Highways was officially opened to traffic on Sunday, February 26.

Dedication of the structure was a feature of the annual Capay Valley Almond Blossom Festival and was witnessed by more than 2000 persons.

As the representative of Governor Culbert L. Olson and Frank W. Clark, Director of Public Works, Fred W. Panhorst, Bridge Engineer of the Division of Highways, was the principal speaker and formally dedicated the bridge. He was introduced by Assemblyman John H. O'Donnell of Woodland. Lindsay Van Tongeren, secretary-manager of the Woodland District Chamber of Commerce, was master of ceremonies.

In addition to the bridge proper, the Rumsey project includes approximately 2500 feet of road approaches, which are constructed to present day standards of alignment. The roadbed is 26 feet in width, 22 feet of which consists of road-mix surface treatment. Due to cold weather, oiling operations on the approaches have not been completed.

The new bridge is of reinforced concrete of rigid frame type. The footings are founded on shale rock. The structure is 375 feet long with two 56-foot, 6-inch spans, two 58-foot spans, two 60-foot spans and two 16-foot cantilever spans. It has a clear roadway width of 26 feet between curbs. Some of the items involved in the construction of this project are as follows:

Roadway excavation, cu. yds.....	15,000
Structure excavation, cu. yds....	4,200
Concrete, cu. yds.....	1,400
Reinforcing steel, lbs.....	260,000

The new bridge replaces a temporary structure built in 1934 and washed out by high water in December, 1937.

Vaudeville Singer: "And for Bonnie Annie Laurie, I'd lay me down and die."

Listener (rising): "Is Miss Laurie in the audience?"

STATE OF CALIFORNIA
Department of Public Works

Headquarters: Public Works Building, Twelfth and N Streets, Sacramento

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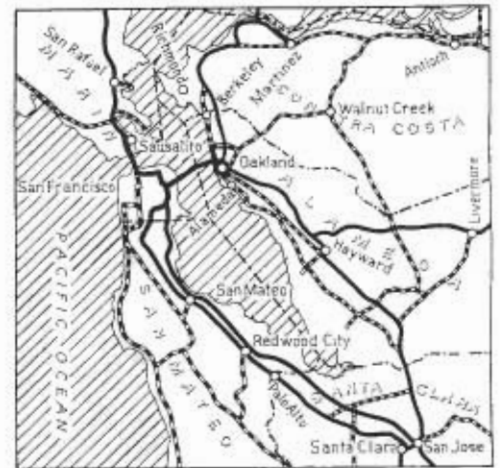
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**MAP
 SHOWING
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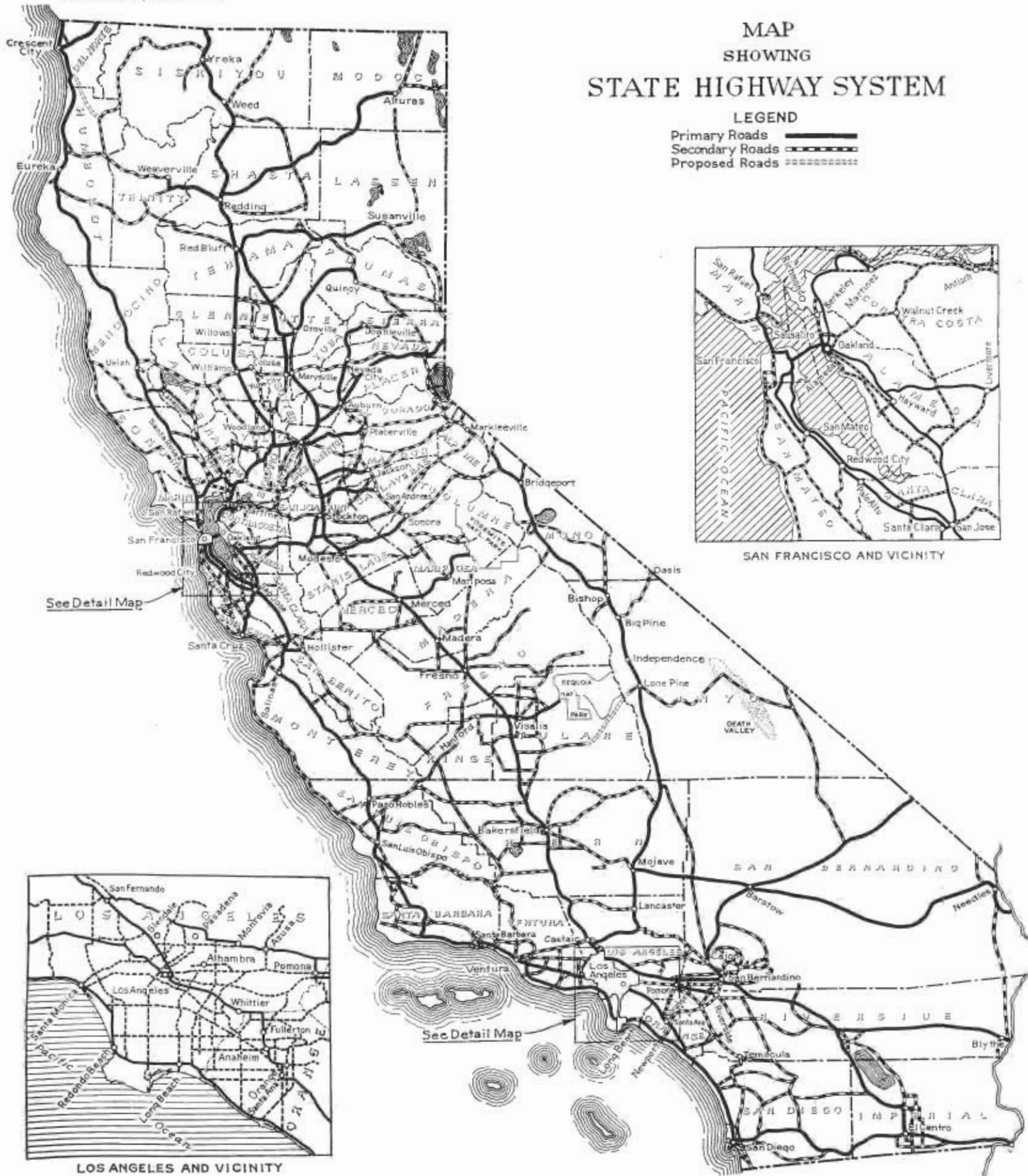
LEGEND
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SAN FRANCISCO AND VICINITY



LOS ANGELES AND VICINITY



See Detail Map

See Detail Map