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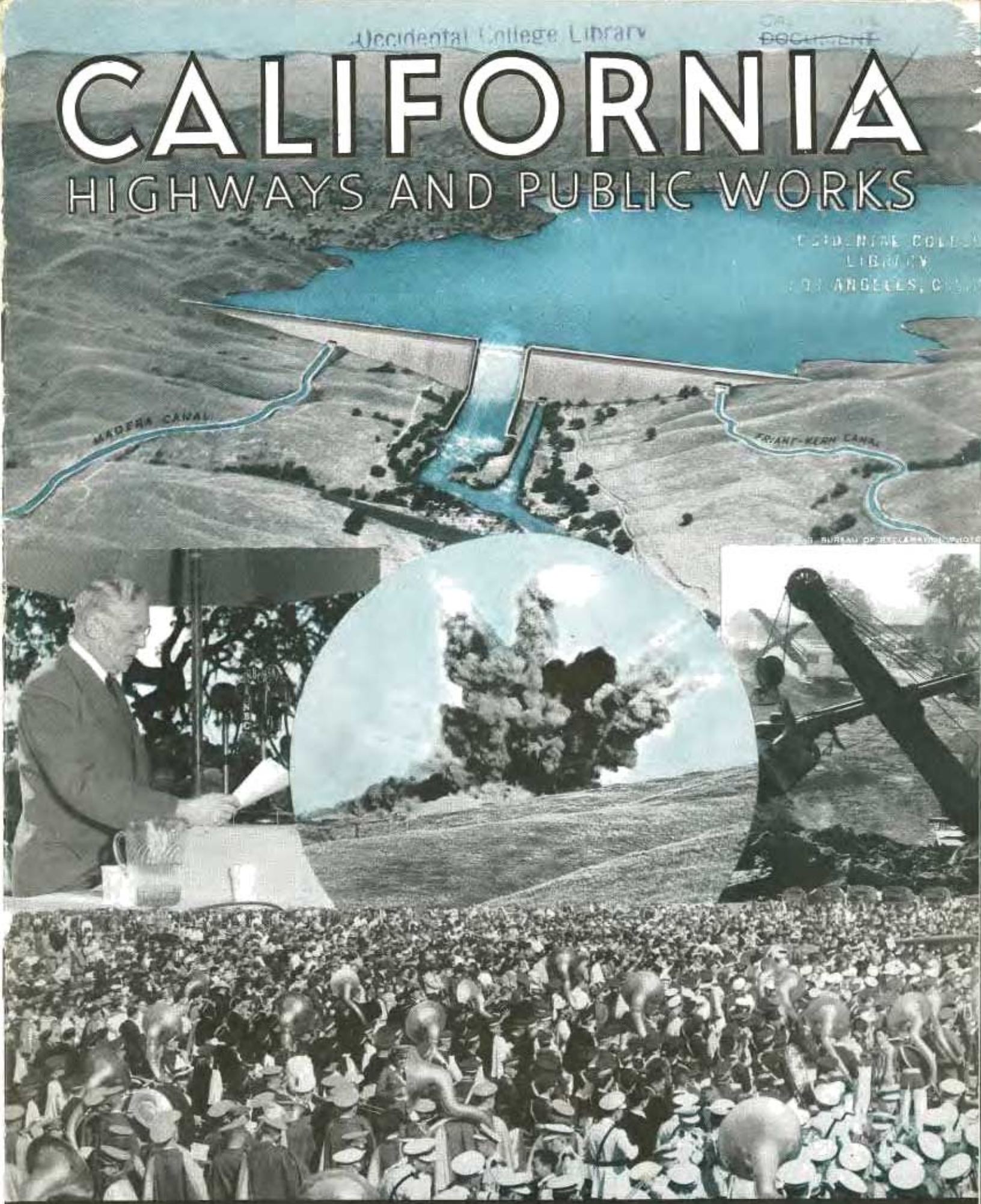

FRIANT DAM, UNIT OF CENTRAL VALLEY PROJECT, AS IT WILL APPEAR WHEN CONSTRUCTED AND SCENES AT EXPLOSION GROUND BREAKING, WITH GOVERNOR CULBERT L. OLSON ADDRESSING 30,000 SPECTATORS.
SEE ARTICLE IN THIS ISSUE.

DECEMBER
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

Published for information of the members of the department and the citizens of California

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Survey Shows Contracts for $75,000,000 Awarded to Date on Central Valley Project

NOT since the beginning of construction work on the Central Valley Project has state-wide interest in its progress been brought into sharper focus than on November 5th when Secretary of the Interior Harold L. Ickes, Governor Culbert L. Olson, Commissioner of Reclamation John C. Page and numerous other State and Federal officials took part in the ground breaking ceremony at Friant Dam Site.

The ceremony marked the beginning of construction on the $16,000,000 Friant Dam, key storage unit of the Central Valley Project in the San Joaquin Valley, on the San Joaquin River twenty miles north of Fresno. When completed this dam will furnish a supplemental water supply to approximately 1,500,000 acres of land in the southern San Joaquin Valley and complement the development at Shasta Dam.

Estimates of the crowd that attended the ceremony ranged from thirty to fifty thousand people and many thousands more listened to a nation-wide broadcast in which Governor Olson and Commissioner Page urged the people of California to take immediate action on developing a comprehensive program of public distribution of the electric energy which will be developed by the project.

Governor Olson told the thousands listening of the plans of his administration to make every effort to secure the passage of legislation which will assist in the public distribution of power and stressed the need for the formation of public districts so the electricity as well as the water can be handled cooperatively and at a minimum cost to the future consumers.

"The degree of success of the Central Valley Project; the final measure of the benefits realized from it by the farmers, will depend upon the cooperation of the communities comprised by the Central Valley," Governor Olson said.

"It is my firm conviction that the lowest costs for the major benefits of the project can be realized only under a comprehensive system of public ownership."

Voicing the same sentiment, Commissioner Page declared:

"It always has been the policy of the Bureau of Reclamation to give preference, in the disposal of power, to public agencies. It is hoped that public outlets will be available for Shasta power. This presents a big opportunity for local and State assistance to the Central Valley Project.

"Possibly new State legislation may be found desirable. I should look with favor upon some legislation, drafted with consideration for the interests of all those involved, which would enable the State, through the existing Water Project Authority, to function in relation to the project in any capacity found mutually desirable by the State and Federal governments."

The State and Federal governments, through Public Works Director Frank W. Clark and Commissioner Page, are working out details which will facilitate the State's participation in this distribution program.

Thus the State and Federal governments have moved a step nearer the solution of the problem of ultimate distribution of the water and power to be developed by the Central Valley Project on which the Federal Government through the United States Bureau of Reclamation is spending $170,000,000.

Public Ownership Imperative Says Governor Olson

It is my firm conviction that the lowest costs for the major benefits of the Central Valley Project can be realized only under a comprehensive system of Public Ownership. Public ownership of every phase of the conservation, diversion, storage and distribution of water; public ownership of every phase of the generation and distribution of electric power.

Your state administration has made, and will continue to make, every possible effort to secure passage of legislation enabling and facilitating public ownership. This will make easier the formation of public utility districts and other cooperative enterprises whereby the farming communities of the Sacramento and the San Joaquin Valleys can ensure getting Central Valley water and Central Valley power at the lowest possible costs.

As is now well known, these lowest costs are not possible under private ownership and exploitation so long as the rate payer has to support: the inflated valuations of utility properties now enjoyed by the private utility companies; their capitalization of the right to exploit the rate payer as a valuable intangible asset; the high interest rates these companies pay for their borrowed capital; the high charges for so-called expert management paid by the private utility companies to their parent holding companies; and the very comfortable dividends these companies pay to their stockholders, most of whom live well removed from these valleys.

The farmer's margin of profit has become so very narrow that he can no longer afford the luxury of the private ownership of his water and power utilities.

From address at Friant Dam Groundbreaking by Governor Culbert L. Olson.

As the year end approaches work is going forward on so many features of the project and announcements of work that will be done in the near future are coming out with such rapidity a general review of just what is taking place on the entire project is in order.

Since work was first started on a Reclamation Bureau warehouse at Friant, February 19, 1937, the Federal Government has awarded contracts totalling approximately $75,000,000. Because of the nature of many of these contracts in which the government agrees to furnish materials, the Federal obligation is far in excess of the amount actually under contract.

The largest single contract let on the project was to Pacific Constructors, Inc., for the excavation and concrete work on Shasta Dam, which is the major unit of the Central Valley Project. The contract was for $35,939,450 and includes the excavation work and building of the dam and power house exclusive of materials and machinery, which will probably cost as much again as this contract.

In a little over a year, Pacific Constructors, Inc., have cut and blasted away more than 3,000,000 cubic yards of rock and earth from the sides of the Sacramento River Canyon 12 miles north of Redding. Less than 800,000 yards of earth remain to be excavated before the grooves cut into the sides of the canyon are down to the foundation rock on which the dam will be anchored.

Next spring, sometime in March, it is anticipated the actual laying of concrete will be started. The government already has awarded to the Permanente Corporation of Oakland a contract of $6,902,000 for the cement and a contract of $4,413,520 to the Columbia Construction Company of Oakland for the aggregates which will go into the dam.

The subcontracts alone awarded for the transportation of aggregates and the equipment for placement of concrete amount to no inconsiderable figure. Aggregates will be transported from pits near Redding over a conveyor belt system, which will be the longest ever constructed, 9.6 miles long which is being built by the Goodyear Tire and Rubber Company at a cost of $1,500,000.

Placement of the concrete will be through a cableway system extending from a head tower that will be 610 feet high from foundation to the airplane beacon on its tip. This tower and three tail towers are being built by the American Bridge Company. Four other tail towers, veterans of construction work at Boulder and Parker Dams are now being assembled.

In all, seven cableway systems will be installed leading from the head tower to the various movable tail towers. About 13,000 feet of three-inch locked coil cable will form a web between these towers over which the crawling cable buckets can cover every part of the dam site.

Pacific Constructors, Inc., also are building the gigantic power house at Shasta Dam which will be the largest single hydroelectric development in the State. However, the United States Bureau of Reclamation has placed a separate contract for the construction of turbines and four generators which will develop 1,500,000 kilowatts of electric energy annually. This contract is for $4,455,527.

Yet to be built is the 200 mile long high power transmission line which will carry this power from the dam down to load center at a sub-station

View of Friant Dam site looking across San Joaquin River toward right abutment. White lines indicate excavation area for dam foundations.

Group picture taken at Friant Dam groundbreaking. Left to right, Frank W. Clark, State Director of Public Works; H. L. Ickes, Secretary of Interior; Governor Culbert L. Olson.

proposed to be built at Antioch. Already completed is the by-pass tunnel under the north abutment of the dam through which the Southern Pacific Company now routes its trains. Built at a cost of $426,475, it will serve to divert water around the dam construction when the new railroad relocation is completed and eventually will be plugged with cement.

Other smaller contracts for warehouses and incidentals amount to $190,000 and the government has spent $777,727 in preliminary work and on its own camp at Shasta Dam and Friant Dam.

But in addition to Shasta Dam itself, the water to be stored in the reservoir behind it will cover up a railroad and highway system necessitating a major rebuilding program there.

The contract for relocation of thirty-five miles of Southern Pacific Railway through the reservoir site, on which work is now well under way, calls for an expenditure of $8,213,206. This does not include materials such as rails and structural steel nor the work which will be done on the Pit River Bridge, which will carry both rail and highway traffic across the Pit River Canyon at an elevation of 500 feet above the river bed. This will be the highest construction railroad and highway bridge in the world.

Substructure contracts for work on this bridge already have been awarded totalling $1,138,288 and bids on the steel superstructure will be opened in Sacramento on January 16, 1940. The contract will call for the furnishing and erecting of 33,000,000 pounds of structural steel, 1,000,000 pounds of cast steel, and the placing of 1,300,000 pounds of reinforcement bars.

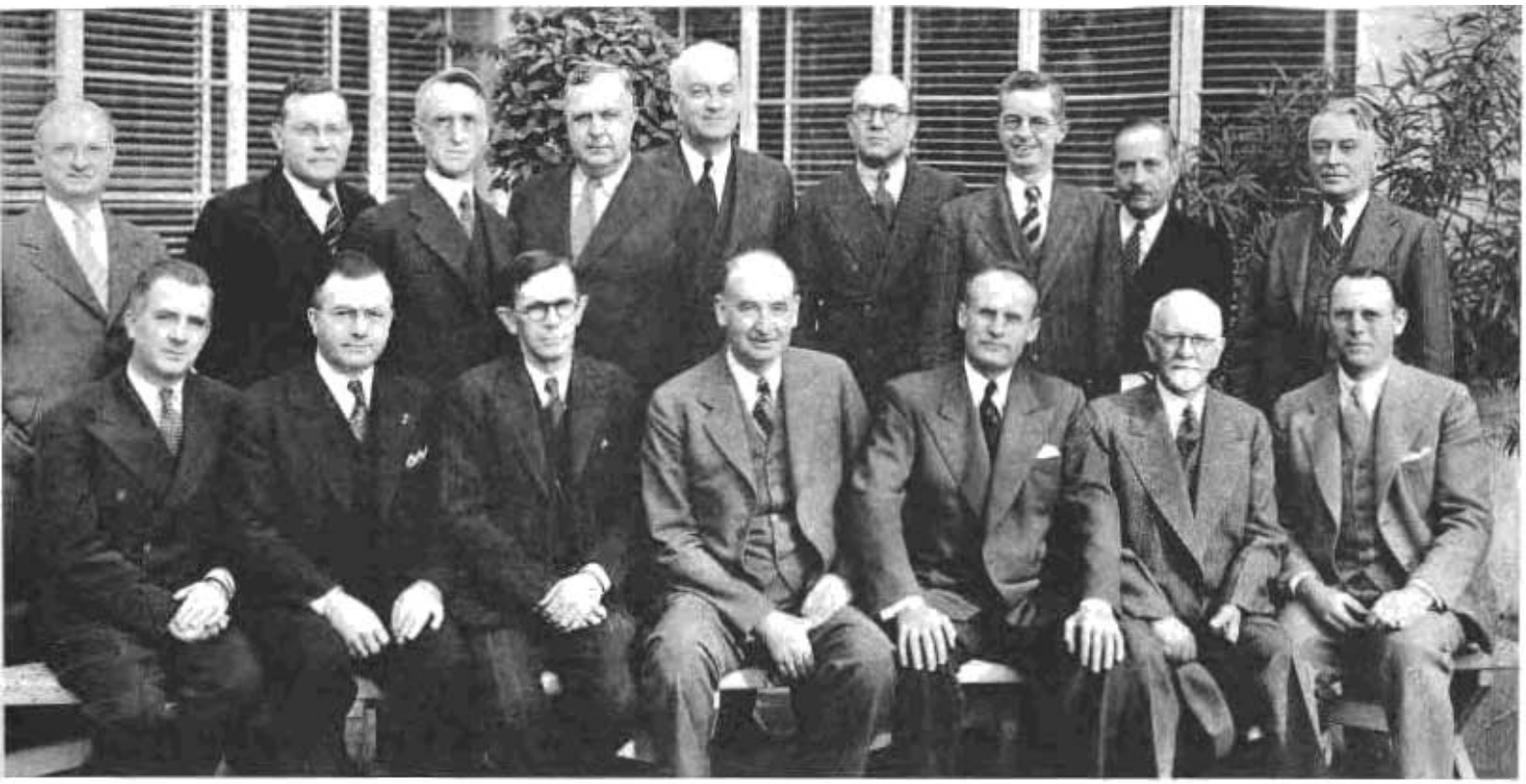
Nearly twenty miles of the Pacific Highway also must be relocated to an elevation above the high-water level of the reservoir and will involve a cost of approximately $3,200,000, not including the State's share in the Pit River Bridge. Contracts for carrying out this work were signed only a month ago between the State and Federal governments.

The present channel of the Sacramento River will be used to carry the water stored in Shasta Dam down to the Delta region. By regulating the flow of that river, it is anticipated flood dangers will be checked during the winter months and an adequate irrigation supply provided at all times during the summer months.

This surplus flow during the low-water months of the summer, in addition to enhancing the navigability of the Sacramento River, will serve to flush from the Delta region the salt water which annually threatens the rich farming lands in that district.

Nearest completed of all the units of the Central Valley Project is the Contra Costa Conduit which extends from the Delta region at Rock Slough to a point near Martinez. Contracts totalling $1,318,428 have been awarded on this work and it is now more than half completed.

Bids were opened in Sacramento December 12th for the construction of the head works, intake, fish screen, the cutting through work which will join the already built sections of the conduit with Rock Slough and for



Members of Governor Olson's Central Valley Project Committee—Seated, left to right, Ray Eberhard; Senator J. C. Garrison; State Engineer Edward Hyatt; former Senator Herbert C. Jones; Director Frank W. Clark of the Public Works Department; Franklin Hichborn; J. C. Youngberg. Standing, left to right, Louis Bartlett; Frank R. Chilton; E. A. Crocker; A. D. Edmonston, Deputy State Engineer; Leo J. Smith; E. A. Rolison; Paul A. McCarthy; J. Rupert Mason and C. C. Carleton, Chief, Division of Contracts and Rights of Way.

a small cut-off dam across Dutch Slough which is designed to prevent salt water encroachment into Rock Slough.

In the Delta Division of the project announcement has been made of the final location of the San Joaquin pumping system and canal which will carry 3000 second feet of fresh delta water up the San Joaquin Valley to Mendota where it will be returned to the San Joaquin River.

As now outlined, the canal will start near Stockton and through a series of pumping plants the water will be lifted 160 feet up to a high-line canal which will follow the foothills around the west side of the San Joaquin Valley.

At Mendota, more than 100 miles up stream from where it originated, it will empty into the San Joaquin River to replace the water that will be stored behind Friant Dam. Through this exchange of water about 1,500,000 acre-feet of new and vitally needed water will be supplied to lands that now have deficient supplies in the South San Joaquin Valley.

Contract for the construction of Friant Dam was let to the Griffith Company and Bent Company, joint low bidders, for $8,715,358. The government will supply cement aggregates, structural and reinforcing steel, pipe and machinery. Already the company has about 400 men employed in preliminary stripping operations and the construction of a camp.

Friant Dam, while smaller than Shasta Dam, still will rate as fifth largest of this type in the United States and its construction calls for the excavation of 770,000 cubic yards of earth and rock; stripping of 600,000 yards of overburden from the sand and gravel deposit; handling of 3,220,000 tons of sand and gravel; manufacture and placement of 1,850,000 cubic yards of concrete in the dam and 57,000 cubic yards of concrete in appurtenant structures; installation of 3,300,000 pounds of reinforcement bars, about 3,800,000 pounds of gates and valves, 3,440,000 pounds of tubing and fittings and 3,000,000 pounds of pipe and miscellaneous metal work.

When completed the dam will be 300 feet high and 3450 feet long and the reservoir behind it will be approximately 15 miles long. Leading from the dam will be two canals, the Madera Canal and Friant-Kern Canal.

The Madera will extend northward 40 miles to the Chowchilla River and supply parts of Fresno and Madera County with water. Bids will be opened for the first unit of this canal in Sacramento December 21. The canal will have an initial capacity of 1000 second feet.

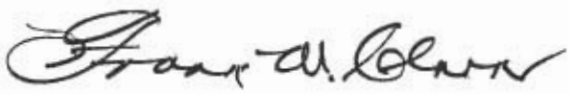
Surveys still are under way on the final location of the Friant-Kern Canal which will extend southward from the dam for 160 miles to a point near Bakersfield. This canal will have an initial capacity of 3500 second feet, and will be a veritable river diverted to a section where many thousands of acres have been abandoned because of lack of water.

In short, the Federal Government's construction program on the Central Valley Project now covers the entire Central Valley. Walker R. Young, supervising engineer in charge of field activities for the Bureau of Reclamation, estimates 3000 people are working on the project and the Federal Government is spending $44 every minute of each twenty-four hours in California.

Holiday Greetings

From FRANK W. CLARK, Director To All the Employees of the Department of Public Works

AS THE FIRST YEAR of Governor Culbert L. Olson's administration nears its close it seems appropriate for me, as Director of Public Works, to extend through our official journal cordial holiday greetings to all who have contributed toward the successful conduct of the activities of the Department of Public Works during 1939. ¶ I deeply appreciate the fidelity of the personnel of the Department in making possible the many accomplishments in State highway and State building construction and the development and protection of the water and power resources of the State during the year now nearly gone. ¶ With full appreciation on my part of all the good work of the past, I desire particularly to stress at this time that the coming year offers opportunity for still greater effective public service. In a large organization such as ours, success, of course, depends upon a loyal, resourceful and enthusiastic group of co-workers. ¶ In any organization there is a tendency upon the part of those filling the more subordinate positions to remain silent even when they could make constructive suggestions and possibly criticism which would be most helpful to the work. ¶ I am certain this particularly applies in all departments of State service. During my several years of executive experience in private business I have seen the value of the "Employee Suggestion System" well demonstrated. ¶ If through this medium private business can be benefited, I see no reason why it would not benefit the public's business. ¶ In view of the fact that it seems quite impossible for all the employees of the Department to meet with me personally, although I would appreciate the opportunity, I am adopting this method of obtaining your ideas. ¶ Therefore, during the year 1940, in order to make our joint endeavors even more worthwhile than ever before, I invite every employee of the Department, regardless of rank, to forward to me personally any sincere suggestion, criticism or comment of any nature that he or she has to offer and believes will result in greater efficiency. ¶ May the Christmas season and the New Year bring happiness to you and yours and with it still greater opportunity to help build and maintain and further expand those facilities, which the Department of Public Works is established to provide for the convenience, safety, and enjoyment of the People.



Traffic Far Outpaces Construction on California Highway System

By FRANK W. CLARK, Director of Public Works

Address Delivered by Director Clark at the Meeting of the State-Wide and Regional Highway Committees of the California State Chamber of Commerce at the Palace Hotel in San Francisco Thursday Morning, November 30, 1939.

YOU are business men, and I am here to talk business, a business that we are in together—you, the motoring public and your State government. It is a billion dollar concern.

California motorists contribute millions in gas tax moneys and motor vehicle fees annually for construction and maintenance of the State Highway System. They are justifiably proud of this system, comprising approximately fourteen thousand miles of good roads and representing an investment for construction and reconstruction alone of some four hundred million dollars.

The State Highway System, of which about one thousand miles are within incorporated cities, serves desert areas where the annual rainfall is less than one inch and coast areas where the rainfall is one hundred inches. It extends from a point below sea level, crossing and recrossing the Sierra Nevada Mountains to elevations of four thousand to ten thousand feet, where the average annual snowfall is 480 inches.

LACK OF FUNDS

California's far flung network of highways has been built with money willingly contributed by the people through bond issues, the gasoline tax and motor vehicle fees, and with Federal Aid moneys.

The main problem of the Highway Division can be simply stated; not so easily solved. We have a lot of work that needs to be done but we do not have the necessary money with which to do it.

The building of the present State Highway System was begun in July, 1912, following approval of an eighteen million dollar bond issue in 1909. Subsequent bond issues of 1915 and 1919 provided $15,000,000 and $40,000,000, respectively, for further development, making the total bond issue appropriation for highways $73,000,000.

In 1913 the first act requiring registration of all motor vehicles was passed by the legislature, the net revenue derived therefrom being divided equally between the State and counties for road purposes. In 1923 the State adopted a two-cent gasoline tax and in 1927 increased the tax to three cents.

ROAD REQUESTS EXCEED REVENUES

In addition to the gasoline tax, the State receives thirty-one and three-fourths per cent of the motor vehicle registration and weight fees as well as certain moneys from the Federal Government for Federal Aid highways, the estimate for this biennium being $8,000,000.

This all totals up to approximately $28,000,000 for this biennium for construction purposes.

One-half of this must be spent in the southern thirteen counties and the other half in the northern forty-five counties. This must again be divided one-half for Primary State Highways and one-half for Secondary.

Cooperation Desired

I appreciate this opportunity to discuss with you the problems of your State Highway Department, which has a good record behind it.

Your assistance and sympathetic cooperation in our endeavor to further increase the operating efficiency of this department is asked for and will be deeply appreciated.

Excerpt from an address delivered by Director Frank W. Clark of the Department of Public Works at the annual meeting of the California State Chamber of Commerce.

I said that we have a lot of work that needs to be done but that we do not have the necessary money with which to do it.

When the Highway Commission was preparing the biennial budget under which we now are operating, it received requests from counties, cities, civic organizations and other groups for highway projects totaling more than 150 million dollars.

Those projects were carefully considered by the groups presenting them before they were submitted for approval. They were considered as number one projects in the localities affected. The present Highway Commission, since it took office on March 1, 1939, has listened to many delegations pleading for relief on their traffic problems. They have individually and collectively toured the State to view these projects at first hand and discuss the problems on the ground with civic-minded people of the many communities of our State. Most of these projects are meritorious, many of them almost emergency situations. The Division of Highways recognizes the need but I do not have to point out to you that 28 million dollars of available funds can not provide for 150 million dollars worth of requested highway work. A similar problem will confront the present Highway Commission when it prepares its budget for the next biennial period.

DUTY TO TAXPAYERS

We are intent on spending the money provided by law in such a manner as to give to the taxpayers and to the traveling public a dollar's worth of service for every dollar collected and spent. That is our duty—our job. That is what we will try to do—with your assistance and cooperation.

I have gone into this so carefully,

not for the pleasure of reciting figures, but in the hope that you will familiarize yourself with these facts and assist the State Highway Department by passing the information on to others who may not know these things. After all, you and I are, or should be, agreed on at least one thing: the orderly improvement and maintenance of our State Highway System so that it will not only be something that we can be proud of but will serve the increasing needs of our traveling public.

That is a large order.

At the inception of the State Highway System in 1909 the legislature provided for 3082 miles and extensions added by the second and third bond issues increased this to 5560 miles. Additions between 1920 and 1931 brought the mileage to 7332. In 1933 about 6700 miles of county roads were added to the State's system, with no additional funds being provided for their maintenance and betterment. Today there are approximately 14,000 miles of State highways, of which about 12,869 are rural roads. More than 10,400 miles of the State Highway System are hard pavement or bituminous treated rock surface.

TRAFFIC OUTPACES CONSTRUCTION

During the 27 years since ground was broken for the first road contract, highway construction standards have made phenomenal and at the same time costly advances. In the early days 15-foot pavements were standard—today two-lane pavements are 22 feet wide, allowing 11 feet for each lane; three-lane pavements are 33 feet wide and on four-lane pavements each traffic way is 23 feet wide.

California today stands at a critical juncture in the development of highways and highway transportation. When we began building a highway system for a small but rapidly increasing number of motor vehicles, we could not perceive the ultimate extent to which that traffic would grow. In the construction of roads and highways, we have not been able to keep pace with the rapid increase in motor vehicle traffic and the steadily growing demand of our agricultural, commercial, transportation and industrial interests for more and better highway facilities. The volume of traffic in California has always been ahead of the road facilities available and funds provided for the purpose.

Twenty-five years ago there were 77,000 motor vehicles in California. As of last October 31, there were 2,716,277 registered vehicles. This bare statement conveys no adequate idea of the basic changes in highway design made necessary by this increase.

Gas Tax is Divided

There is a widespread public impression that the Division of Highways receives all of the revenue from the three-cent gas tax. The State collects a three-cent per gallon tax on the gasoline you buy. Of this, one cent is allocated directly to the counties of the State in accordance with the number of motor vehicles registered in each county. The minimum payment to each county, however, being $30,000 per year. This money is used by the counties on county roads.

Of the remaining two cents, the revenue from one-half cent must be expended within cities, one-half of it on State highways within the city and the other half on streets of major importance. This money may be spent on maintenance or construction.

This leaves one and one-half cents to the Division of Highways. It takes about three-quarters of a cent for administration and maintenance. The remaining three-quarters of a cent is what is left for construction projects.

Excerpt from address by Public Works Director Clark.

BUILDING TEN YEARS BEHIND

It is true that we have splendid highways that are far above the standard of other States; nevertheless we are ten years behind in our construction program. Obsolescence, inadequacy, and depreciation render at least half of the 14,000 miles of the highway system of the State incapable of safely and satisfactorily serving the traffic that they now bear.

There is probably no other public service from which the people derive such direct benefit as they do from good roads, which are so closely interwoven with our ordinary life that few of us really appreciate their importance except when such service is interrupted or inadequate. It is a matter of simple arithmetic that taken as a whole the California Highway System has saved money to the State on a basis of comparison of vehicle operating costs alone, to say nothing of the many other economic benefits.

It is estimated that the average motorist in California pays less than two mills per mile for the benefit of using the highway system.

Today, with a highway system comprising some 14,000 miles, of which 4000 miles are unimproved and approximately 6000 more miles inadequate for the traffic carried, it is vitally essential that all funds available now and for years to come from the gasoline tax and motor vehicle fees be devoted exclusively to the purpose for which they are intended; namely, highway construction and maintenance.

It must be recognized that adoption of higher standards of construction—the expansion of lane widths, the divided type of roadway, the increased width of right of way necessary for this type of construction, and the improvement of our intersections—will further complicate the already acute financial problem.

MANY MILLIONS NEEDED

I will not attempt to go into detail as to specific improvements needed on our highway system. Mr. Purcell, our State Highway Engineer; Mr. Panhorst, our Bridge Engineer; Mr. Dennis, our Maintenance Engineer; and Mr. Grumm, Engineer of Surveys and Plans, will inform you fully in this regard. However, without infringing upon the subjects to which they will address themselves, I may say that our engineers have estimated that with the present annual revenue of the Division of Highways it will require twenty-five years and 503 million dollars for improvement and reconstruction of the State Highway System exclusive of right of way. Replacement of the rural State Highway System alone due to obsolescence and depreciation is falling behind at the rate of 151 miles of road surface and 38 bridges each year.

Our State-wide Planning Survey, in cooperation with the U. S. Bureau of Roads, has shown that 60 per cent of the traffic on the rural State Highway System originates in the

(Continued on page 16)

Monterey Realignment Involves New Bridge and Channel Change

By L. E. McDOUGAL, District Office Engineer

ELIMINATION of one of the last sections of the old fifteen-foot concrete pavement laid in District V in 1919 and 1922 will be accomplished under a contract awarded by Director of Public Works Frank W. Clark for construction of 7.3 miles of highway extending from the southerly border of Monterey County, about 3.8 miles north of the town of San Miguel, to the town of Bradley.

The project involved is on the Coast Highway (U. S. 101), known as El Camino Real, between San Francisco and Los Angeles. It will include under a separate contract the building of a new bridge across the Salinas River near the mouth of the Nacimiento River.

The narrow original pavement has withstood heavy traffic for twenty years although for the past several years maintenance costs have been high and it has been impossible to hold the surface to a smooth riding condition. In 1929 two and one-half-foot rock borders were placed on each side of the pavement, which gave virtually a 20-foot width of traveling surface.

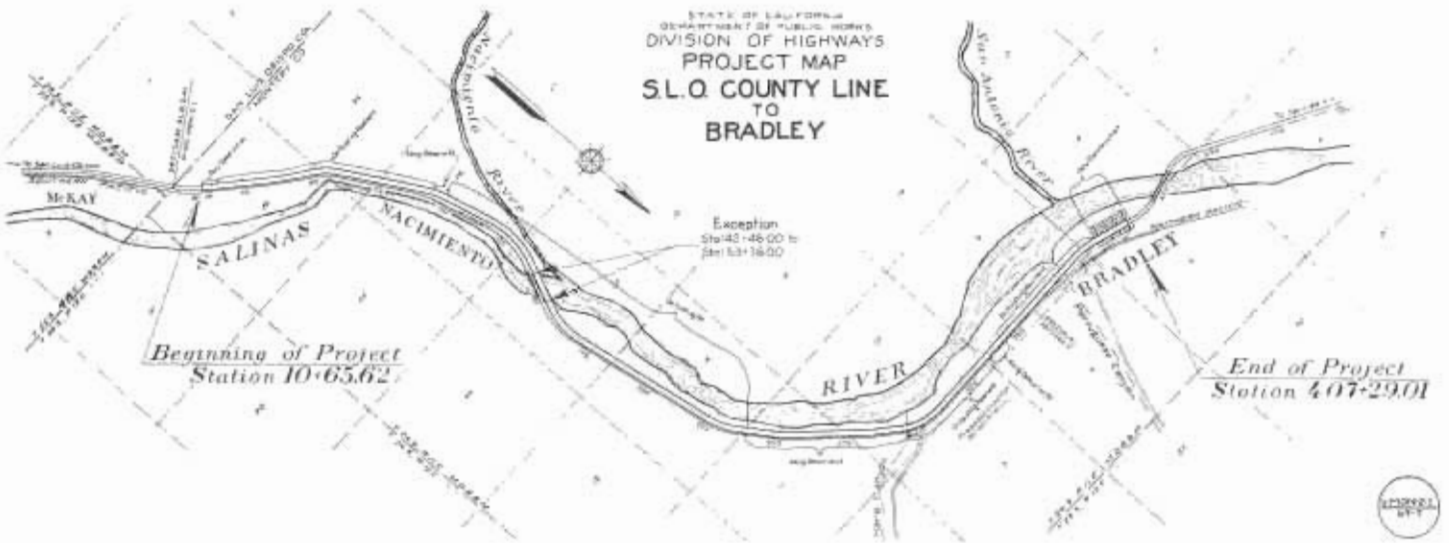
The new alignment, generally, parallels the old highway and the Southern Pacific Railroad right of way throughout its entire length.

WILL MOVE RIVER CHANNEL

The centerline of improvement generally is about 70 feet from the railroad's nearest right of way line, which will permit widening on the railroad side when traffic warrants the construction of further traffic lanes.

Due to the changes in grade and alignment and the necessity for raising grade in places where present grade is entirely too low with respect to the adjacent lands, it was found that there would be a comparatively small portion of this 7.3 miles which could be second-storied. Also, as there were no detour roads available, it would have been necessary to construct a detour practically throughout the length of the project had the centerline followed more closely the existing pavement.

The centerline was therefore shifted over further from the railroad so that traffic may be carried on the old pavement most of the 7.3 miles. At two or three places it will be necessary to construct a detour road, but the total length of such detour road will not exceed 1½ miles. One of these locations will be at a point where the Salinas River has gradually eaten into the bank very close to the present highway and, at that point, the construction centerline is located nearer the railroad. At this location it is proposed to build up the river bank and throw the channel further away from the highway by the installation of 155 jack straws made with 40-pound rail, tied together with ¾-inch cable anchored to concrete deadmen well back in the bank. Where the roadway slopes run close to the river's edge, broken concrete riprap will be placed to protect proposed construction.



ROADBED 40 FEET WIDE

This new highway will have a blanket of select material or imported borrow 6 inches thick practically throughout its entire length and generally for the full width of the roadbed, 38 to 40 feet.

(Continued on page 21)

Construction scenes on realignment of U. S. 101 near Bradley, Monterey County, showing tractor and 28 cubic yard scrapers at work. Center—Narrow old bridge across Salinas River to be replaced and section of existing 15-foot concrete pavement laid in 1919.

Narrow Kingsburg Bridge Will Be Part of New Four-Lane Highway

By C. L. SWEET, Resident Engineer

TWO miles south of Kingsburg in Fresno County, U. S. Highway 99 crosses the Kings River on a reinforced concrete through girder bridge 950 feet long and with a 21-foot roadway. This obsolete structure, the last remaining bridge on this important highway between Sacramento and Los Angeles with such a narrow roadway, is to be part of a new four-lane divided highway. Construction work on a new span now is under way and should be completed about March 1 of next year.

On account of the high speeds and heavy traffic using this highway its narrow width forms a definite hazard and on account of the length of the structure it acts as a bottle neck at times of heavy traffic.

The through girder type of construction makes it impossible to widen the existing bridge. It is in fair structural shape and, except for width, could adequately serve traffic for several years to come. It was built in 1915 by Tulare County.

The budget for the 89-90th fiscal years set up $180,000 for the construction of a new bridge and approaches at this location. After studies of the problem it was decided to build a new two-lane bridge about 60 feet upstream from the existing structure to carry northbound traffic, the existing bridge to continue to carry the southbound traffic, thus providing for a four-lane divided highway. This saves the cost of a temporary detour bridge, which would have been necessary if a modern four-lane bridge had been built on the existing line. At such time in the future as the old bridge becomes inadequate to carry the southbound traffic it can be removed and a new southbound bridge constructed, all traffic being handled over the northbound bridge during period of construction.

The new bridge will be 1024 feet long. This is somewhat longer than the existing highway structure but slightly shorter than the parallel railroad bridge located about 115 feet upstream. The new bridge will have seven 60-foot spans, one 50-foot and one 42-foot span over the main channel and sixteen spans varying from 30 feet to 36 feet in the south approach.

It will be a continuous reinforced concrete girder construction. There are a total of five expansion joints

Constructing reinforced concrete bridge across Kings River near Kingsburg, Fresno County, to carry northbound traffic of proposed 4-lane divided section of U. S. 99.

The new bridge will be 1024 feet long with a 27-foot roadway. The existing bridge will carry southbound traffic.

located every fourth or fifth span at about the quarter point. Each span has four girders. For the 60-foot span the girders are 2 feet 3 inches deep at the center and 6 feet 3 inches at the pier. The roadway elevation is about 298 feet above sea level. High water was recorded in January, 1914, and December, 1937, at elevation 292. The new bridge has slightly more clearance above high water than the existing structure.

The channel spans are carried on reinforced concrete piers supported on timber piles. The bottom of the concrete footings is at elevation 263, about 10 feet below the bed of the stream. The piers are slender concrete walls 31 feet long, 15 inches thick at top of footing and 24 feet thick at the girder seat. The approach spans are supported on reinforced concrete piles, five piles per bent.

The bridge is being constructed under a contract awarded last May to A. Soda and Son of Oakland. The estimated cost of the bridge is $125,000.

The approach roads will be included in a contract now being prepared for advertising for grading and paving the highway from Kings River to Kingsburg, for which an additional $60,000 is set up in the 91st-92nd budget. This will provide a four-lane divided highway from Kingsburg to a point one-half mile south of the bridge.

Surfaced Highways in U. S. Show Total Gain of 15,867 Miles

The total mileage of State highway systems in the United States on January 1, 1939, was 465,237 miles, being approximately 15 per cent of the total road mileage of the United States, according to an official report. The classification of improvements under general heads was as follows: Pavements of all kinds, 133,937 miles—a gain of 10,378 miles; macadam and gravel treated, low cost mix, amounted to 138,987—a gain of 6652 miles; sand clay and macadam and gravel untreated, totalled 102,582 miles, being 163 miles less than the year previous.

Therefore the total surfaced mileage amounted to 375,506 miles—a gain in surfaced mileage of 15,867 miles. Expressed in percentages the surfaced mileages are 82 per cent and the "dustless" or better roads are 59 per cent of the entire state systems.

High Costs of Congestion

Traffic stops and starts cost motorists in the Los Angeles metropolitan area at least $28,224,000 per year in wasted gasoline alone, according to estimates based on surveys announced by the Automobile Club of Southern California.

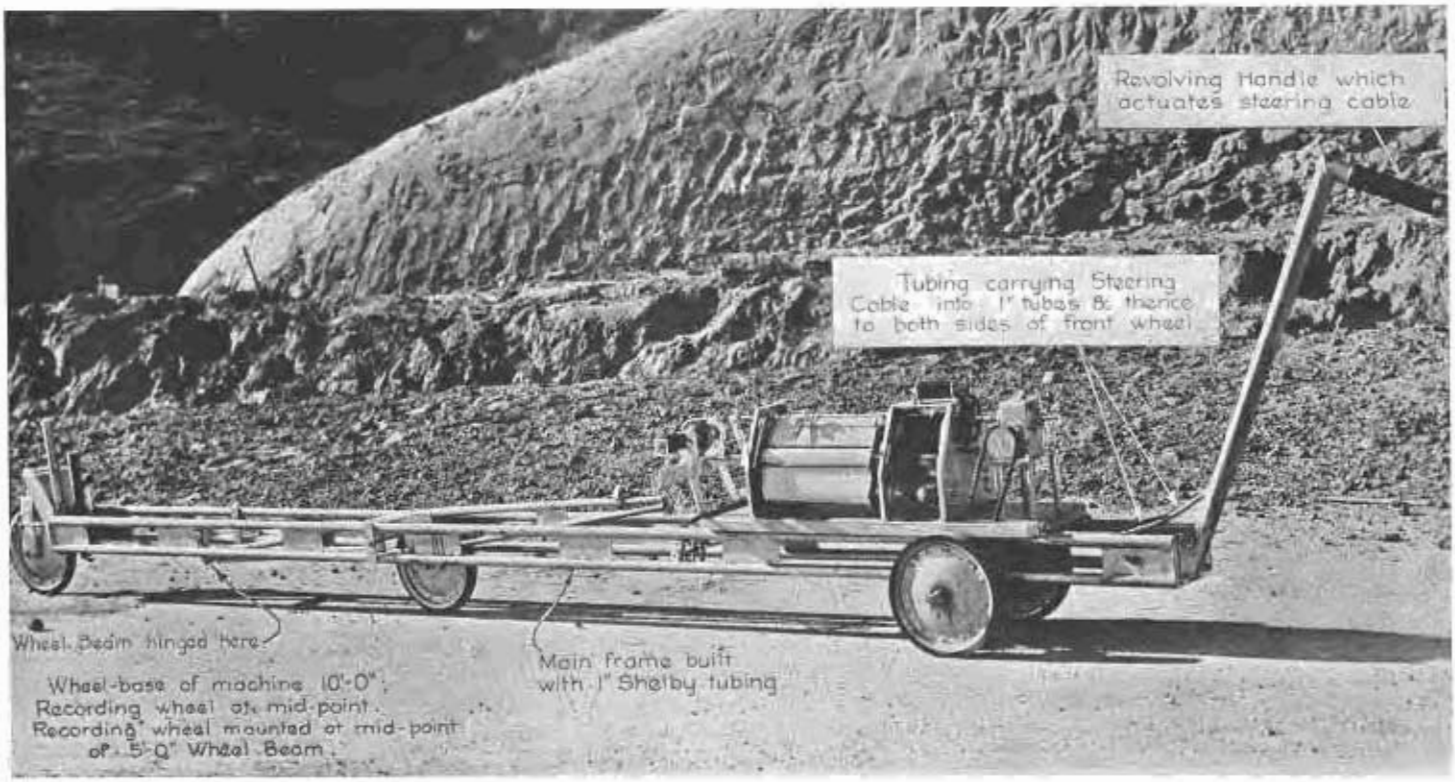
This hidden "stop-and-go tax," averaging more than $28 annually for every car user, indicates clearly that motorists in this area are paying more to drive without nonstop, express motorways than it would cost to build them, says the club statement. A motorways network across the metropolitan area would eliminate most of the stops and starts necessary under present congestion conditions, it is held.

"And that is a sky scraper," announced the guide.

"Oh yeah? Well, let's see it work," replied the wise guy.

New Viagraph Makes Accurate Records of Pavement Roughness

By DOUGLAS H. GREELEY, Assistant District Maintenance Engineer



General view of newly designed Viagraph, a road surface meter machine equipped with recording attachments developed by highway engineers.

THE road surface meter here described is an instrument that will, no doubt, prove of great value. The automobile vialog has been in use many years but its limitations have often created a desire for something more useful—some means of securing a record that more accurately indicates road surface conditions and one that may be retained for future reference.

This need suggested an instrument that would produce a graphical representation, but if built in an automobile the new device would have weaknesses similar to the present vialog; its record would not agree with that of another instrument mounted on a different automobile, or could not be duplicated again if operated on the same automobile by a different driver.

Considerable discussion was had regarding a desirable instrument and finally it was learned that Mr. Claran F. Galloway, C. E., of the Los Angeles County Road Department, had successfully developed a surface meter that fulfilled many of the requirements. This instrument has had several years' service and has proved itself to be a useful one.

Mr. Galloway very kindly consented to allow the Division of Highways to build our machines, one being made in District VI and another in District VII. In addition to this he assisted with ideas during the construction of the one in Los Angeles and instruction regarding its use.

Essentially the road surface meter, which we also refer to as a viagraph, is the same as the original Galloway instrument. Some improvement in design and construction was effected and a totalizer to record the travel of the graph pen has been added. This seemed desirable so that it would be possible to refer to the magnitude of a record in correspondence or reports. In addition an odometer was also added so that engineer's stations or distance might be observed. This instrument has been in use several months and has justified the hopes originally held for it.

The accompanying illustrations of the instrument probably make it unnecessary to describe it further except to convey a few essential details that are not apparent from photographs. The wheel base of the running gear is ten feet, a wheel that actuates the pen being situated at the mid-point, five feet from either axle. A true plane would result in the graph being

a straight line, otherwise the pen is raised or lowered as the instrument is wheeled over an irregular surface.

During operation, the chart paper progresses at the rate of one inch each twenty feet, the pen movement being at a ratio of two to one, i.e., a bump one-quarter inch in height will be drawn one-half inch in height on the chart. As this process continues, the pen's movements, in a positive direction only, are measured by the totalizer and recorded by its dial. This is accomplished by an overriding clutch which allows the negative movement of the pen to occur without measurement. Also during this process the distance is recorded on the odometer dial.

The instrument is operated at a walking speed, steering being accomplished by turning the handle in a manner used for throttle control on a motorcycle. A transmission is provided with a reverse gear which allows doubling back over the same course or an adjacent one on a parallel lane. This eliminates dead heading back to the point of beginning to make the other lane record.

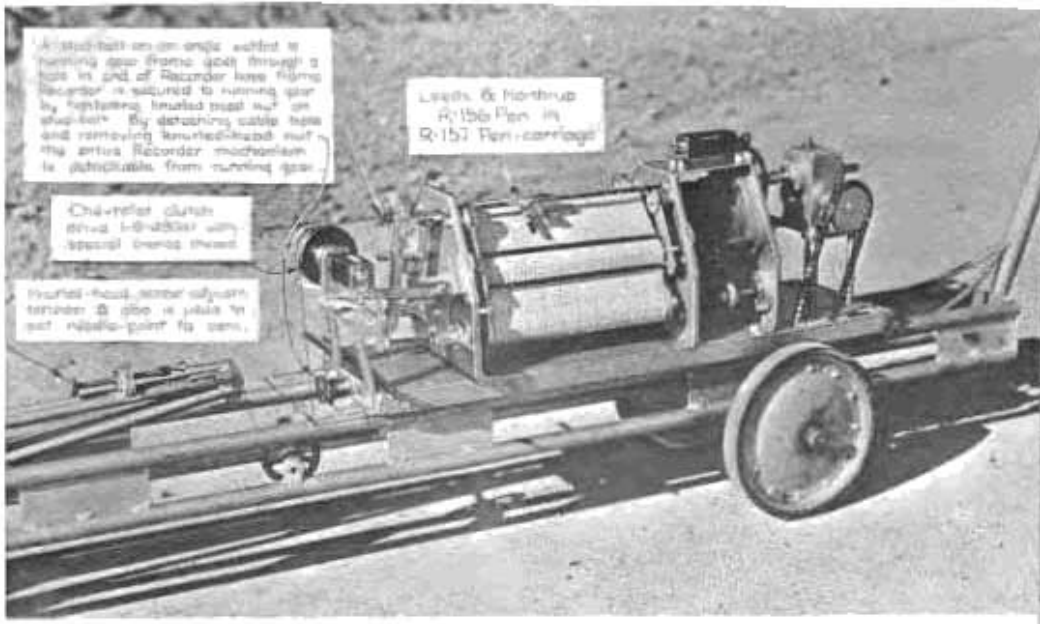
The instrument as it is now being used is the same as it is illustrated except that the solid-tired actuating wheel has been replaced with a pneumatic-tired one. It was found that this functioned better than the solid tire.

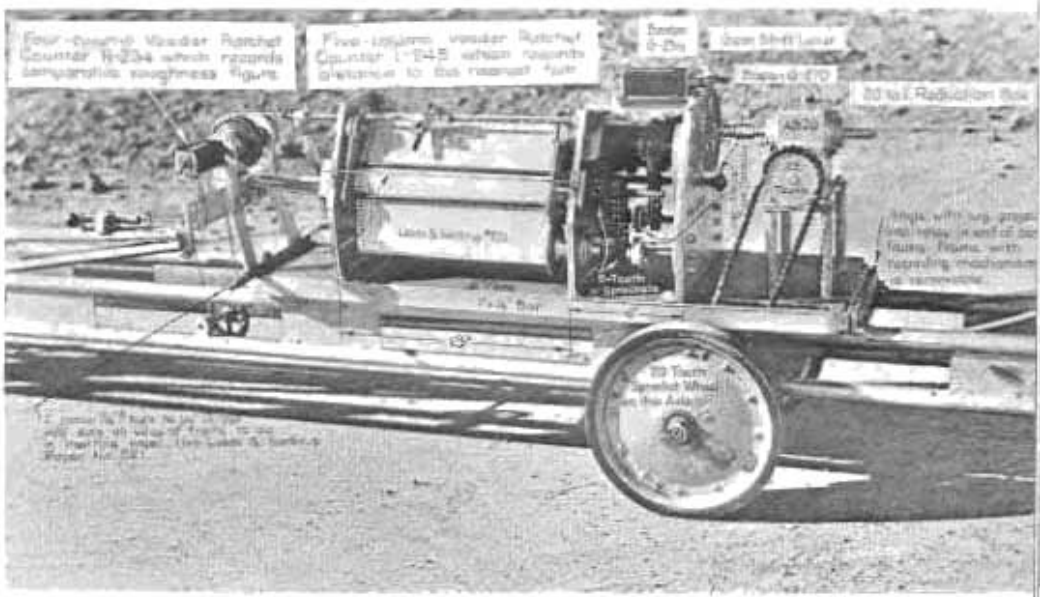
The Maintenance Department in District VII of the Division of Highways office in Los Angeles had long felt the need for a vialog or viagraph that would give consistent results. Many old pavements have been resurfaced in the past without any facility for determining either their roughness before the improvement or their smoothness afterwards, save, of course, the automobile vialog which was not generally available. Much work of this character will be done constantly and it will now be possible to record conditions before and after the improvement.

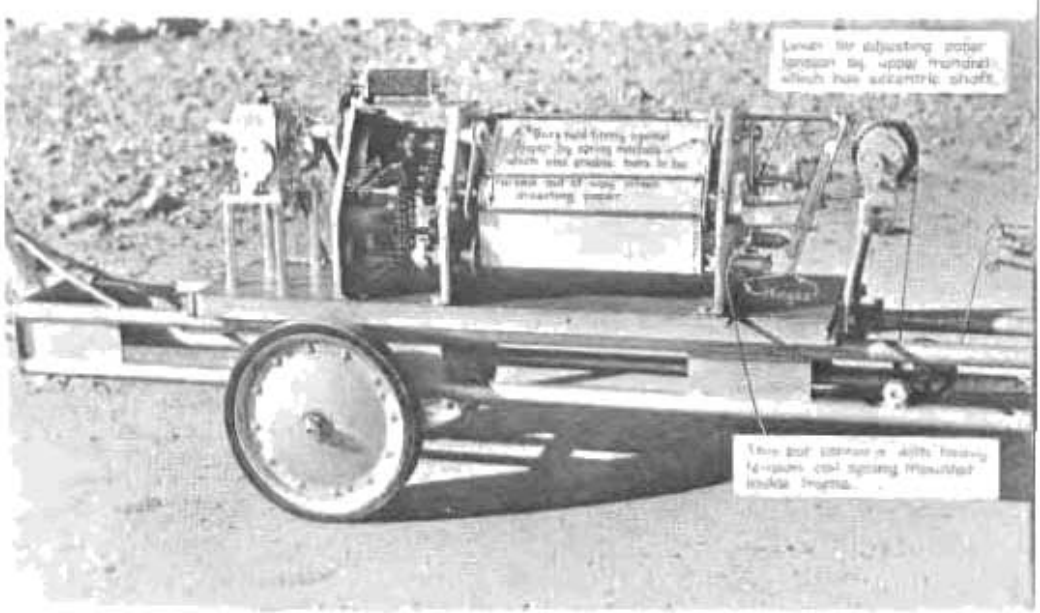
These two records, as well as subsequent ones, may be made on the same chart, as it can be put back in the instrument and rerun repeatedly, using different colored inks if desired.

Aside from the purpose of determining pavement riding qualities—the use the Maintenance Department is primarily interested in—the instrument has other important functions. With it Mr. Galloway of Los Angeles

(Continued on page 24)







Section of new direct 10 mile highway link into Yosemite replacing 13 miles of narrow, tortuous old road.

Realigned South Approach Link To Yosemite Valley Completed

By R. S. BADGER, District Construction Engineer

THOSE who visited Yosemite Park several years ago, driving from Fresno via Lane's Bridge, northeasterly to the southerly park entrance, probably remember the mile after mile of narrow, tortuous roads through which they struggled before being rewarded by a sight of wonderful Yosemite. With the completion of the last unit of highway construction, the road now follows a very direct routing through the foothills and mountains of Madera County. The length of the trip is not only materially decreased but the alignment and grades are of such high standard that the trip is now a real pleasure, rather than an arduous task.

On August 1st Piombo Brothers, contractors, completed the last unit, except for surfacing. While the grading through the rolling granite hills was, in general, not particularly heavy, yet in one cut, 1300 feet long and with a maximum depth of 85 feet, the excavation amounted to 125,000 cubic yards, requiring the use of 115,200 pounds of blasting powder. Through this rugged cut the traveler now passes with little realization of the tremendous task

which its removal presented to the contractor.

Ruddy and Corfield, contractors for the surfacing of this last unit, completed their work on October 31st. With a well-surfaced road the tourist may now enjoy the scenery while traveling, as compared to the nervous exhaustion that attended a trip over the crooked road of the past.

The new road misses some of the historical features of the old, which passed through "Bates' Station," a stage stop of the mining days, and dodged hither and thither around giant granite boulders where many a "hold-up" was staged in the "thrillful" past. However, the new road yet passes through Coarsegold, where miners still use goldpan and rocker to work the streams for the precious yellow metal. It runs thence to Oakhurst, which is the northeasterly terminus of the State construction. The highway beyond Oakhurst passes through Fish Camp, formerly a lumbering region and now a delightful summer resort country. Between Oakhurst and Yosemite a high standard highway was built by the U. S. Bureau of Public Roads for the U. S. Forestry and National Park services.

Formerly we had sidehill roads of

ten to sixteen feet in width, and curves, which would, proverbially, "break a snake's back" and the surface of which was a series of granite boulders covered by a light spread of soil and subject to ruttings and washouts from every shower. Now a smooth, dustless road of easy, pleasing curvature carries the traveler through the picturesque hills of Madera County.

Here the landscape is dotted with oaks; and in the springtime the "Giant Bush Lupines" add a beautiful splash of blue, while the white and lavender blossoms of the Chaparral delicately perfume the air. At the higher altitudes, pines with their fragrance replace the Oaks and Lupines.

At top, section of realigned south approach to Yosemite. Below, cut that required removal of 125,000 cubic yards of rock and scene during construction.

Traffic Far Outpaces Construction on Highway System

(Continued from page 7)

cities or is serving city needs. The development of the main rural highways is therefore of equal interest to both rural and city dwellers.

Our road problem is not solved with the construction of needed mileage. This investment must be preserved and maintained to give adequate service. Maintenance has become a problem not only of caring for the roadway, but in addition rendering many other traffic services. The most expensive of these additional services is the removal of snow on some 3500 miles of State highways.

This snow removal program has has been a gradually increasing undertaking in response to the insistent demands of traffic. Keeping this mileage of road free from snow in the winter also introduces another necessary expense in sanding icy pavements.

Other services such as fire protection of adjoining fields by destroying roadside vegetation, the removal of noxious weeds, the eradication of ground squirrels, are of no direct benefit to the highway user but are legally required and cost money.

Landscaping or roadside beautification is another worthy item in highway construction.

Another very essential service is the constant study of traffic accidents and traffic movements, together with corrective measures contributing to safe and economic travel. Another related and necessary service is the erection and maintenance of proper signs and signals.

There are other items of service to the traveling public; however, suffice to say that to you and me as motorists it is very gratifying to know when traveling at night or in a storm that the road and our safety are constantly cared for by an efficient crew and that we may proceed without misgiving.

Highway transportation in California is still an expanding force. Its potentialities for good have not yet been fully realized. If permitted to develop freely and reasonably, it will provide even in larger measure new benefits to our people. Highways are built to serve the public, not to make a profit for government.

The community benefits immeasurably from the highway and must continue to share the cost, and the ratio of this cost to be borne by the highway user and by the general public should be developed on an impartial and scientific basis. Highways contribute indispensably to education and are one of our State's greatest sources of opportunity and employment. Development of our highway transportation so that it will provide the greatest good to the greatest number requires the adoption of a rational, sound, long-term program of highway development based upon a proper analysis, interpretation and application of the facts now being developed by the State-wide Highway Planning Survey.

Such program naturally must be coordinated with the ability of the taxpayer to pay for highways. Motor vehicle taxes should be reasonable rather than punitive. By the adoption of a constitutional amendment preventing diversion of gas tax moneys, the motorists of California have insured themselves against the expenditure of highway funds for purposes other than that for which they are intended.

As I see it, the principal problems we must tackle are to get motor vehicles into and out of our cities; thoroughly modernize our primary highway system so that it will give key service for national defense as well as ordinary traffic; continue the improvement of the remainder of the highway system, with special attention to elimination of hazards such as grade crossings; develop secondary and feeder county roads; and to proceed as rapidly as possible to make safe for travel approximately 2300 inadequate bridges which, either because they are structurally unsound or because of dangerous approaches or narrow widths, should be replaced.

This can not be done over night. If you can think of a way to hasten the program of construction and repair so necessary and so urgent, I ask you to transmit your recommendations to our legislative body for their consideration. I purposely refrain from making any recommendation to you on the subject. Our job is to spend the money provided by law to the end that we do the greatest good for the greatest number in our State.

In closing may I say to you that at this time the force of the Division of Highways of the Department of Public Works aggregates approximately 5100 persons. This includes maintenance, construction, clerical and engineering personnel. The division appreciates that a great responsibility of trust rests upon it, and maintains, therefore, a careful program of public and employee relations to the end that both the public and the employee will be properly informed of the execution of that trust. All departments and their respective heads are readily accessible to the public.

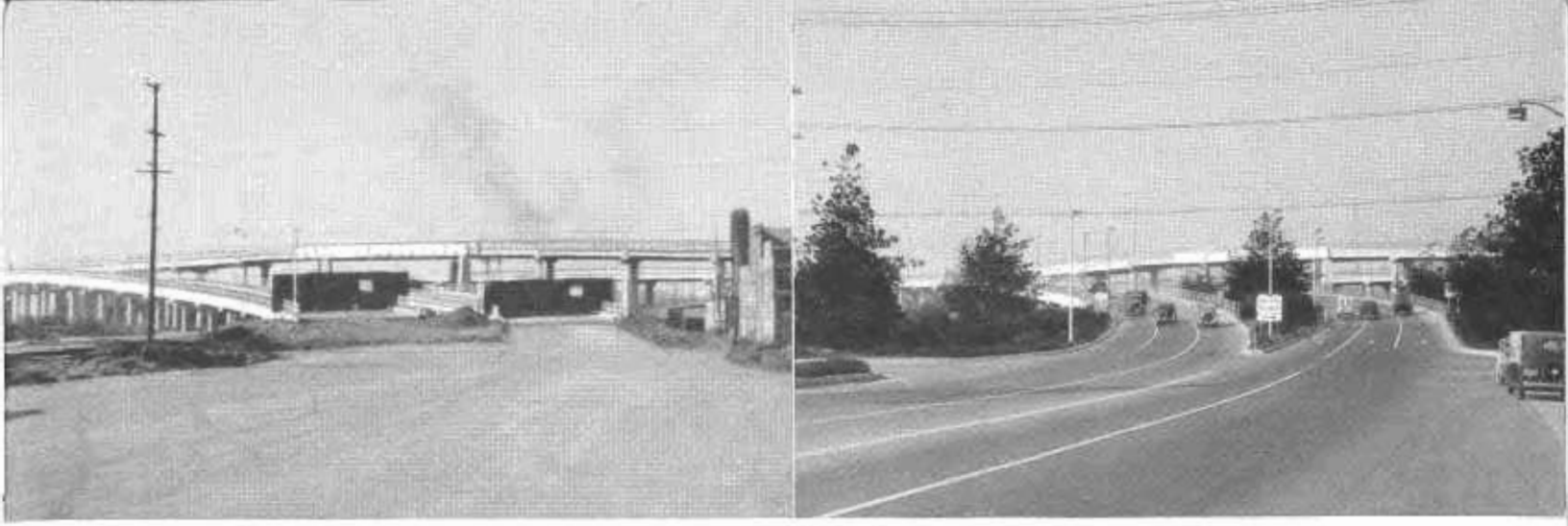
Every effort is made through the medium of a monthly magazine and daily press releases to keep the people informed concerning the expenditure of their gas tax and motor vehicle fee contributions to the highways.

Prior to the construction of new road projects the Division of Highways seeks expression of public opinion on the proposed improvements.

By the very nature of its operations the Maintenance Department of the Division of Highways has the greatest amount of public contact. It is, in itself, a public relations department and every employee has been deeply schooled in courtesy to the motoring public. Maintenance men are constantly on the highways, they are constantly observed by the traveling public, and noted by the adjacent land owners. They daily render aid to motorists in stalled cars.

Public and employee relations of the Division of Highways are zealously guarded and it is honestly felt that few departments of the size of this one have such friendly relations with the public on one side and such high loyalty of its employees on the other side. Altogether, the Division of Highways has made an enviable record and I bespeak your continued cooperation with it in the interest of our State.

I appreciate this opportunity to discuss with you the problems of the Highway Department. Your assistance and sympathetic cooperation in building our highway development program will, I assure you, be deeply appreciated.



Before and after views of Cypress Avenue approach to Bay Bridge distribution structure in Oakland showing effect of appropriate plantings.

Landscaping Bay Bridge Approaches

By H. DANA BOWERS, Landscape Engineer

OF THE 1939 Fiscal Year Federal Aid Landscaping Funds there has been allocated approximately $15,000 to complete the landscaping of the East Shore Highway Approach to the San Francisco-Oakland Bay Bridge, from the east end of the bridge in Oakland to University Avenue in Berkeley, a distance of 4.6 miles.

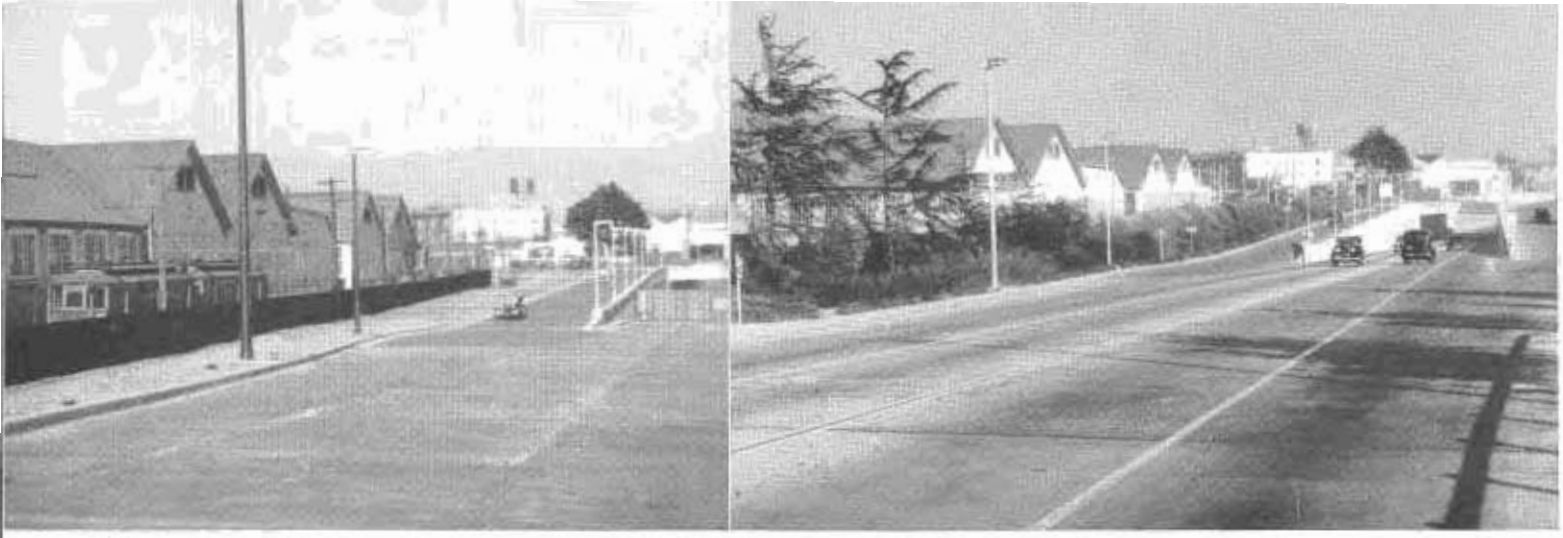
The project now under way is from the Distribution Structure to the Toll Plaza on the south side of the highway. This section was omitted from the original landscaping project by reason of construction of the interurban railroad tracks from Oakland to San Francisco over the bridge.

Upon completion of this section all of the approaches to the Bay Bridge will have been landscaped. These include the Fifth Street Plaza in San Francisco, and the east side of the Distribution Structure in Oakland.

Due to the severe offshore prevailing winds often carrying salt spray completely across the road and the dredged sand and clay fill in which it was necessary to plant, the problems of plant material selection were manifold. The importation of top soil, installation of water lines, construction of curbs, parking areas and drainage control all combined to make this the most costly to date of any of our landscaping projects.

Preparation for landscaping was included in the roadway construction

Screening of unsightly dumps and industrial district by tree plantings is shown on this section of East Shore Highway approach.



Improved roadside appearance provided by tree and shrub plantings that screen buildings on Moss Avenue approach in Oakland.

contract. The preparatory items and their costs were:

Installing Water Line Cross-overs under Pavement	$7,052.37
Imported Topsoil	4,724.25
From 1937 Federal Aid Funds there was allocated:	
Installation of Curbs, Parking Areas and Water Lines (by Contract)	26,828.00
Planting Trees, Shrubs and Ground Cover (Force Account)	59,361.21
From 1939 Federal Aid Funds to complete the project:	
Planting Trees, Shrubs and Ground Cover and Install Water Lines (Force Account)	14,750.00
Total Cost of Project	$112,715.83
Cost Per Mile	$24,250.±

A solid screen planting was made on the east and south sides of the approach to obscure from view the industrial district and interurban railroad tracks immediately adjacent. Groups of Monterey Cypress in the screen planting were placed to break up the formality of the continuous shrub mass and create skyline effects.

All planting was done thickly in order that the plants would afford protection for one another. Shrubs that normally would have been planted from ten to fifteen feet apart were planted from three to five feet apart.

All varieties used are doing exceptionally well to date with the exception of the Melaleuca nesophila at the lighting standards in the center dividing strips. These solitary plantings on the north and south section of the approach have not been able to withstand the burning winds. On the east and west section, however, they have been quite satisfactory as they are not subjected to the severe exposure of the north and south section.

It is interesting to observe on this project how the growth of the plants is affected by the various conditions of exposure. On the east and west section, from the Bridge to the Distribution Structure the road runs with the direction of the prevailing winds. The planting is for the most part in between the highway and the interurban railroad tracks. No wind burn or distortion is noticeable on any of the varieties.

From the Distribution Structure north, the conditions are more drastic, however. The slight protection afforded by Yerba Buena Island and Treasure Island is sharply evident.

Traversing north toward University Avenue a rapid change takes place in the condition of the trees and shrubs. The winds have an unobstructed sweep over the bay in from

Typical planting of entire east shore approach. Group plantings along Berkeley Acquatic Park, with ice plant ground cover on bayside and center strip.

Before—Dredged sand fill between east end of bridge and Toll Plaza. After—Ice plant ground cover on bayside and center strip.

the Golden Gate north of the islands, between approximately Folger Avenue and University Avenue. While the growth has been fair, their form is prostrate and there is some burning from the salt spray and wind.

Plantings against buildings in an area of "dead air" show no wind effects and have made a normal growth.

It is to be observed that under these conditions plants appear to succeed better in front of the windbreaks, rather than in behind, due of course, to the lack of eddies or drafts caused by solid windbreaks.

The following plant varieties and quantities were used on this project:

Acacia longifolia	5,411
Melaleuca nesophila	2,859
Melaleuca armillaris	2,549
Cupressus macrocarpa	596
Leptospermum laevigatum	2,010
Sambucus glauca	356
Myoporum laetum	200
Baccharis pilularis	846
Pyracantha yunnanensis	915
Mesembryanthemum edule	210,000
Mesembryanthemum croceum	105,445

In addition to 15,000 cubic yards of topsoil imported under the construction contract, 7272 cubic yards was imported for the purpose of backfilling planting holes. Thirty-six hundred and twenty-seven cubic yards of stockyard manure was mixed with the top soil and spread over the ground cover areas.

Before planting it was necessary to place all plant material in a semi-exposed location for several months for acclimatization. If this acclimating is not done, even the hardiest varieties taken from the protection of the nursery would burn to the ground immediately under the force of the wind.

On the bay side all planting was confined to ice plant ground cover and notwithstanding the drenching it receives from salt spray it has made a satisfactory cover for which the only maintenance necessary is the trimming along the curbs.

The completed portion of the approach as it now stands is well established and is maintained by a crew of two men plus equipment and water costing some $5,000 per year.

The Fifth Street Plaza approach in San Francisco was planted in May, 1937, at a cost of $16,210.71. Large boxed specimen coniferous material was used to give an immediate effect for the opening of the Bridge.

Here, again, the prevailing winds have had their effect on the plants. It has been necessary to replace the Lawson Cypress with broad-leafed evergreens such as Pittosporum erassifolium, Melaleucas and California Cherry, that are able to adapt themselves to the conditions.

The Coast Redwood, Thuya plicata, Incense Cedar, Blue Mt. Atlas Cedar and Cannart Red Cedar have done well toward the back, where they protect each other. Irish yew, Wissell Cypress, Phitzer Juniper and Japanese Boxwood have made a good showing under exposed conditions.

The lawn area contains 64,000

(Continued on page 24)

Fifth Street Plaza approach in San Francisco where prevailing winds have compelled replanting with evergreen trees and lawn shrubs.

A. A. S. H. O. Urges U. S. to Stop Diverting $150,000,000 Road Fund

By C. H. PURCELL, State Highway Engineer

OF PARTICULAR interest to California are several resolutions adopted by the American Association of State Highway Officials at its twenty-fifth annual convention in Richmond, Virginia.

Should Congress see fit to follow the recommendations of the association relative to more generous distribution of Federal income from highway users, this State may receive more Federal aid for road building in the future.

Calling attention to the fact that surveys reveal that there are one hundred thousand miles of obsolete and inadequate roads and 19,000 bridges which need rebuilding in the United States, a resolution adopted by the convention points out that whereas the annual Federal income from highway users is approximately 350 million dollars, the government now diverts about 150 million dollars for purposes other than highway construction, while at the same time penalizing States for the diversion of highway funds.

The resolution resolves, "That this association urges the Congress to authorize for expenditure through The Public Roads Administration all the Federal income from the highway users for the construction of the Federal Aid System, forest roads, park roads and public land roads."

California Division of Highway engineers who attended the convention supported a resolution which was adopted favoring the building of freeways, provision for which in this State was made in a bill adopted by the last legislature and approved by Governor Olson.

The resolution provided, "That legislation be sought wherever practicable in every State of the Union to give to State highway authorities wherever they are not already in possession of it:

"1. Authority to build limited access highways in suitable locations;

American Association of State Highway Officials

Washington, D. C.

In testimony of our appreciation of the splendid services rendered to the States of the Union while he was president of this Association, we make grateful acknowledgement to

C. H. Purcell

The presidency of this organization comes only to those who have rendered signal service in meeting the problems confronting the development and improvement of our highways. We realize that those who help to solve many public questions are not guided by monetary considerations nor is it possible to estimate the ultimate benefit from such labors. These facts only accentuate the value of the services performed.

To one who gave unstintedly of his time and energy for this Nation wide cause, we heartily give this expression of our confidence and extend to him our well wishes for continued usefulness and highest attainment.

October 10, 1939

Testimonial awarded State Highway Engineer C. H. Purcell by A. A. S. H. O. convention.

"2. Authority to acquire sufficient width of rights of way to protect the public investment in the highways and to reduce hazards;

"3. Authority to make and enforce regulations controlling the uses of private property abutting on State highways."

California's policy of endeavoring to abolish toll roads was supported by the adoption of a resolution reading as follows:

"WHEREAS, This association 25 years ago used its best efforts to free all State highways of tolls and succeeded in having the Congress of the United States write such a requirement into the Federal Aid Act; and

"WHEREAS, This has been of great value and convenience to the traveling public; therefore, be it

"*Resolved*, That this Association reaffirms its action of 25 years ago against tolls on all highways."

The California Division of Highways has been extending its roadside beautification program for several years and the following resolution won the support of the California delegates:

"*Resolved*, That this Association recognizes the great importance of the acquisition of adequate rights of way to preserve the natural beauty of our highways and recommends to the States, the Public Roads Administration, and the Congress suitable

legislation to achieve this important result."

With California launched upon a comprehensive program to relieve congested traffic conditions in metropolitan areas, the following resolution was of interest to the representatives of the Division of Highways from this State:

"WHEREAS, The State Wide Planning Surveys have developed factual information relative to seriously congested traffic conditions in the regional areas adjacent to metropolitan centers; and

"WHEREAS, Such traffic bottlenecks result in great economic loss and within the metropolitan areas seriously retard commerce; therefore, be it

METROPOLITAN AREA CONGESTION

"*Resolved*, That this association recommends an early start toward providing adequate transportation facilities in such regional areas and metropolitan centers and where traffic justifies between such regional areas and metropolitan centers of sufficient capacity to provide for the safe, uninterrupted and rapid flow of traffic; and be it further

"*Resolved*, That this association recommends that the several States and the Federal Government give early consideration to the development of a land policy that will make legally possible the acquisition of necessary rights of way for such adequate transportation facilities, with costs for land being amortized over a long period of years through rental or resale of land taken contiguous to the right of way proper, or other appropriate means."

From Dean of College

New York University,
College of Engineering,
University Heights, N. Y.

Office of the Dean.

Editor California Highways
and Public Works,
Sacramento, California.

Dear Mr. Howe:

I greatly appreciate your kindness in having my name put on your mailing list to receive the current and future copies of your official magazine "California Highways and Public Works." I shall look forward with interest to receiving copies of this magazine.

Yours very truly,

(Signed) THORNDIKE SAVILLE,
Dean.

Monterey Highway Pavement

(Continued from page 8)

On this subbase it is planned to place a 4 inch crusher run base for a width of 23 feet. On this crusher run base will be a plant-mixed surfacing 3 inches thick and 22 feet wide, using a medium curing cutback road oil. This will be followed by an asphalt emulsion and screening seal which should give a very satisfactory surfacing, both from a maintenance and traffic standpoint. The 8 foot shoulders on each side of the pavement will be of imported borrow or select material and the top 3 inches road-mixed with SC-3 oil.

The following statistics may be of interest:

Feature	Present	Proposed
Total number of curves	20	13
Number of curves 1000' radius or less	9	0
Minimum radius	500 feet	2000 feet
Maximum grade	7%	1.89%
Right of Way width	60 feet	130 feet
Minimum sight distance	310 feet	1010 feet

The minimum sight distance of 1010 feet occurs only in one instance, the balance of the roadway having a sight distance of over 1600 feet.

According to early traffic census records, this section of road when built was carrying about 600 cars and 15 trucks per day. In 1925 when the first of the regular State-wide traffic surveys was made, the traffic had increased to a total of about 1500 vehicles of which about 2 per cent were trucks. There has been a steady increase of traffic since that date, and the 1939 count showed 3000 to 3400 total vehicles and 5½ to 9 per cent of this number were trucks.

By way of beautification along this section it is proposed to ballnoze or round off the ends of cuts as well as round the slopes. There will be approximately 20 parking areas, which will be oil surfaced. The cut slopes are generally 1½:1 and provision has been made for blanketing these cut slopes with salvaged top soil on which will be sown at a later date western rye grass, as the material in these cuts generally erodes quite severely.

The present bridge across the Salinas River near the mouth of the Nacimiento, consists of four 150-foot steel truss spans and twenty-seven 19-foot timber trestle spans with a roadway width of only 16 feet 5 inches and a vertical clearance of only 13 feet 11 inches. The condition of the bridge required its being posted for a speed limit of 5 miles per hour for vehicles 10 tons or over in weight. This structure was originally built by the county of Monterey in 1916 and, like the concrete pavement on each side of it, has well served its time.

The new structure will be a reinforced concrete girder bridge consisting of fifteen spans, varying in length

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Signs Appreciated

California Institute of Technology, Pasadena

Department of Public Works,
Sacramento, California.

Gentlemen:

A few weeks ago I came from Bishop to Pasadena over Highway 395 after a heavy desert storm. In places the highway was flooded with deep sand and gravel.

I wish to take this opportunity to congratulate your department for the most efficient and complete manner in which you posted this road with emergency signs. To one who travels this road as often as I do and to be caught at night in a typical desert storm I can not help but express my appreciation to you for what you did to make my trip, as well as all other motorists, a safe one.

With every wish for a continuance of your fine work, I am,

Yours very truly,

WM. W. MICHAEL,
Associate Professor of Civil Engineering.

University Avenue Underpass At Palo Alto Under Construction

By GLENN L. ENKE, Associate Bridge Engineer

PALO ALTO citizens are looking forward to the completion of a new underpass separating the University Avenue crossing of the Southern Pacific Railroad adjacent to State Highway Route 2, in Santa Clara County, more familiarly known as El Camino Real.

University Avenue, in addition to being Palo Alto's main business thoroughfare, serves as a direct connection between Palo Alto and Stanford University. Vehicular traffic counts show heavy traffic flow across the railroad tracks at peak hours of the day, traffic being especially congested during the arrival and departure of daily commuter trains between Palo Alto and San Francisco. Approximately 80 passenger trains travel over this crossing daily, most of which stop on the crossing during loading and unloading of passengers.

The highway underpass, known as University Avenue Underpass at Palo Alto, is now under construction. An excellent model of the structure, as it will appear when completed, was built under the direction of Thelo Perrott, assistant city engineer of Palo Alto, by members of the city fire department, and is shown in the accompanying illustrations.

COST IS $400,000

Bids for the project were opened on November 8, resulting in the award of a contract to Paul Tyler of Oroville. Considerable track work will be performed by the Southern Pacific Company directly chargeable to the project. In addition, the railroad is constructing a new station, baggage room, and parking area at its own expense, while the city plans to widen Alma Street, a commercial thoroughfare paralleling the railroad, and construct additional parking areas.

The combined cost of the various elements involved will approximate $400,000. Necessary right of way was secured by the city of Palo Alto. The project is financed from Federal Grade Separation Funds, including that portion of the railroad work and relocation of city-owned public utilities made necessary by the construction of the subway.

Success of any grade separation project from the public user's standpoint is largely contingent upon two factors: (1) An attractive superstructure; (2) Good riding characteristics. Adequate structural strength and economical design are fundamental requirements.

The entire underpass layout has accordingly been developed with simplicity of outline and proper proportioning of structure as essential requirements. The approach ramps have been carefully designed to provide smooth superelevated transitions between intersections.

RAILROAD TRACKS SHIFTED

Basically, the project provides for separation of highway traffic along University Avenue and train movements along the double track Southern Pacific Railroad at Palo Alto. To fit existing street levels along the Alma Street traffic circles and University Avenue, it was necessary to elevate the railroad five feet and to shift it southward toward El Camino Real approximately 81 feet. The two existing tracks will be moved to the new alignment and a new third track constructed, beginning near the Palo Alto Avenue crossing and ending opposite Addison Avenue in Palo Alto.

University Avenue will be divided into two 25-foot traffic lanes separated by a six-foot landscaped island strip widened at El Camino Real to conform to the existing traffic island at the Stanford University entrance.

Alma Street will be carried over University Avenue on a highway structure providing a 45-foot roadway. One-way access lanes 22 feet wide, separated by landscaped traffic islands, will connect Alma Street with University Avenue. On the southern side of the tracks, a cross-over structure with 26-foot roadway will serve two-directional traffic between University Avenue and the railroad station.

PEDESTRIAN WALKWAYS

Pedestrian walkways and tunnels 8 feet wide will be constructed along both sides of University Avenue with four pedestrian ramps joining these tunnels to the railroad station platform area. Provision is made in the structure proper for a future fourth track, with railroad station facilities laid out to permit its ultimate construction.

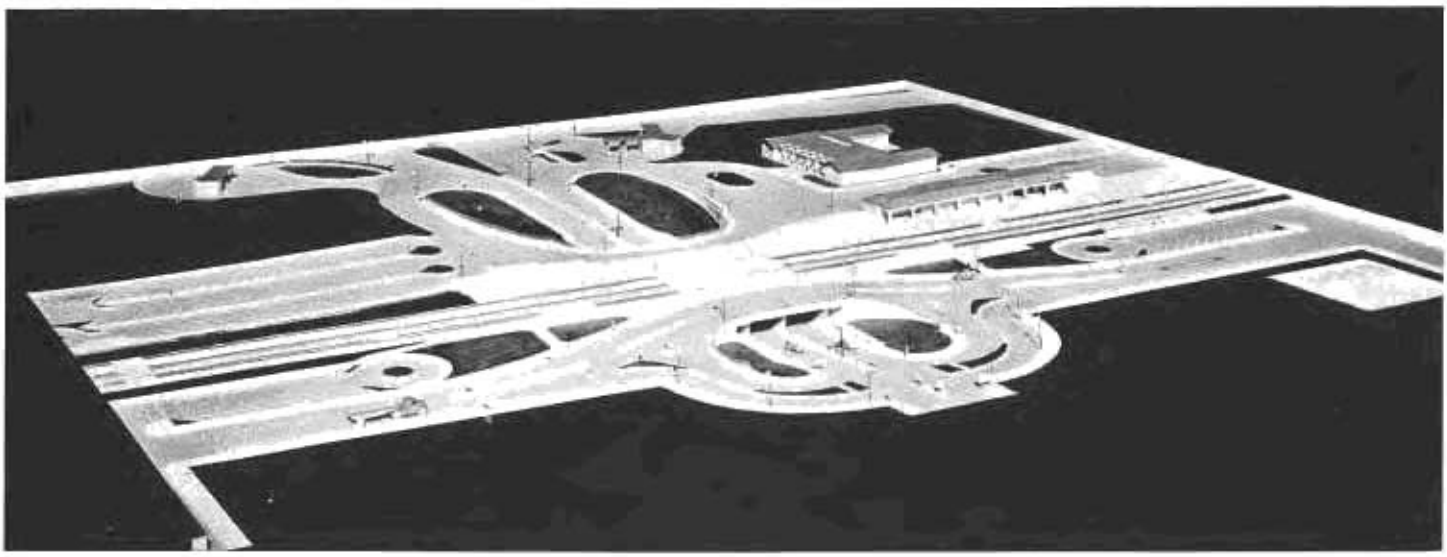
The Southern Pacific Company is building a pedestrian underpass to connect the Alma Street parking area to their new station. Their present freight station is being moved to a new location at California Avenue, approximately two miles to the east.

The highway structures are of continuous concrete slab construction over center piers with ends supported upon abutments of double deck cellular type. The upper decks of these cellular abutments serve as pedestrian tunnels, while the lower halves are available as storage capacity for storm water during extreme rainfall conditions.

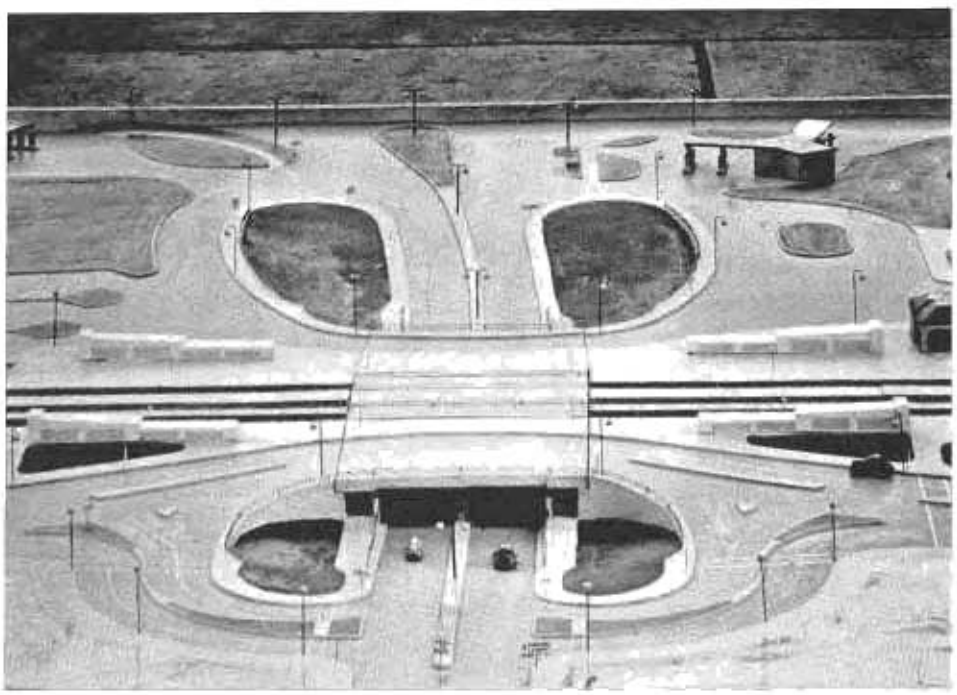
RAILROAD STRUCTURES

The railroad structures consist of continuous steel beam spans supported upon concrete piers and abutments of the same type used for the highway structures. Each track structure is constructed as a unit, using six 30-inch steel beams supporting a $\frac{1}{2}$-inch wrought iron ballast plate and two 15-inch steel channels to confine and support the ballast for the track.

Operation of trains over a ballasted bridge structure creates no more noise than operating over standard roadbed construction. Passage of trains over the structure will be considerably more quiet than if ties had been placed directly upon the steel beams.



Model of University Avenue grade separation project in Palo Alto made by Assistant City Engineer Perrott and members of fire department.



The railroad abutments, piers, and superstructure are completely isolated from the highway and platform structures, which will eliminate the sensation of train vibration to persons standing on the track platforms or sidewalks. This involves the use of 1-inch water-tight expansion joints between all structures to exclude moisture from the pedestrian tunnels. For this purpose, copper strips will be sealed in the concrete adjoining each joint, together with a rubber-type pre-molded expansion joint filler.

FOUNDATION CONDITIONS

Creosoted timber piles will be used to support all railroad and highway structures, and certain portions of the higher retaining walls immediately adjoining. A number of test borings were made and an open test pit dug to determine the true foundation conditions. Analysis of the soil samples indicated that suitable foundation material would not be found above Elevation +35. We have placed all structure footings at Elevation +44, just low enough to clear the low point of the underpass pavement. Ground water is at Elevation +15, and will not interfere with construction.

Comparative cost estimates indicate it more economical to use short piles with footings at the higher elevation than to excavate the additional nine feet and construct abutments capable of resisting greatly increased earth pressures and horizontal tractive forces resulting from train operation. The structures are also designed to resist seismic (earthquake) forces.

Pedestrian ramps are protected from the weather with concrete hoods. Large areas in the sidewalls of these are filled with glass blocks instead of the usual wire-reinforced window sash. A very modern appearance is gained thereby, as well as elimination of maintenance costs.

University Avenue through the depressed portion will be paved with portland cement concrete. The approach streets, ramps, parking areas, and station platforms will be surfaced with an asphalt-type pavement.

All sidewalk handrailing is made up of 4-inch square steel tubular top rails, supported upon 4½-inch square steel posts placed in the concrete sidewalk curbs on 7-foot centers. Vertical baluster bars 1-inch square on 6-inch centers connect between top rails and 3-inch steel channels embedded in the concrete curb. All connections are welded and are so concealed that the railing presents a very smooth appearance. It will be painted an aluminum color.

This type of railing design has an inherent safety feature in that all vertical members disappear from view when observed from an automobile traveling at any speed above two or

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Viagraph Makes Accurate Records of Roughness

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County has definitely established portland cement pavement curling cycles. With this possible, a study of subgrade soil characteristics was made which shows that the 20-foot panels of portand cement pavement gradually curled more and more during the dry period of the year and that immediately after the first rain this curl disappeared, not to return again until the dry season when it started the cycle over again. No doubt there is a definite relationship between this behavior and subgrade soil characteristics.

It has been found that paving crews are always interested in the record the machine supplies. Since it can be used on the current day's run of portland cement pavement before a bump-cutter is employed, better results can be attained in finishing. Poor joints at once become apparent and can be corrected while concrete can still be cut. Bituminous pavement can be checked during the laying of the base and subsequent courses and in the case of blade grader finish work it is easy to determine the difference in grader operators.

Much credit is due Superintendent W. B. Cannon and the District shop organization for their part in constructing this instrument. On account of Mr. Cannon's interest, various refinements and improvements were made possible.

Monterey Highway Pavement

(Continued from page 21)

from 14 feet to 130 feet, and will have a roadway width of 26 feet with a clear walkway on each side through the medium of a widened curb so that pedestrians can obtain a safe standing space while crossing this bridge.

A total of 240 working days have been set up for the completion of the road work, which will bring the completion date to about the middle of August, 1940, and the bridge contract should be completed shortly thereafter.

Hemstreet and Bell of Marysville are the contractors.

Bay Bridge Traffic for November Shows Gain Over Preceding Year

TRAFFIC over the San Francisco-Oakland Bay Bridge for November showed a five per cent gain over the same period a year ago, but a considerable drop from the record shattering figures of October.

A total of 822,494 vehicles crossed the Bay bridge in November, Director of Public Works Frank W. Clark reported to Governor Olson. The water front strike, the close of the Exposition, the holding of the Big Game at Stanford, and the St. Mary's game in October were given as factors which contributed to the lowering of the November total.

Exposition-bound traffic grossed the bridge an approximate total of $930,000. The figures comprise the period from October 27, 1937, when workmen were first able to go by automobile to Treasure Island, until the closing day of the Fair, October 29, 1939.

Approximate figures indicated that the total number of vehicles carried by the bridge to the Exposition during that period was 1,950,000 carrying some 4,900,000 persons, or approximately one-half of the total number of visitors to attend the Fair.

Total vehicular revenues for last month were $350,663.82 compared to November, 1938, income of $410,709.65, while daily traffic averages for the comparable period were 27,416 and 26,108, respectively. Thanksgiving, November 23, was the high point of the month with 36,955 vehicles crossing the span. Total number of vehicles to cross the bridge this year to December 1st was 10,109,019, bringing the total since the opening of the bridge to 29,170,208.

	Auto and Trailer	Motorcycles and Trailers	Buses	Truck and Trailer	Freight Tons
November, 1939	743,127	3,184	16,329	44,220	53,386
November, 1938	709,446	3,671	13,239	41,503	57,961
Total for 1939	9,187,991	39,979	109,307	516,334	665,707
Total since opening	26,895,663	126,878	356,941	1,276,233	1,576,837
Total Vehicles for November, 1939					822,494
Total Vehicles for November, 1938					783,252
Total Vehicles that Crossed the Bridge During 1939					10,109,019
Total Vehicular Traffic since Opening of Bridge in November, 1936					29,170,208

Landscaping Bay Bridge Approaches

(Continued from page 19)

square feet planted to Seaside Bent Grass.

On the east side of the Distribution Structure in Oakland the planting was sponsored by the city of Oakland installed with WPA labor. Many large Monterey Pines 18'-20' in height were moved in to frame the structure approaches. Eucalyptus trees were planted between the distribution lanes and to screen from view the industrial district.

This portion of the Bay Bridge approach is maintained under permit by the city of Oakland.

Roads as Old as History

Building of roads is one of the most ancient basic functions of government. Throughout history it has been one of the first cooperative activities of a community.

In the United States the citizens in most communities joined in building roads long before other services were undertaken.

Roads, until the advent of the motor vehicle, were regarded as a direct responsibility of the community. In the Colonial days, laws were passed requiring all able-bodied men to work a certain number of days each year upon the highways. Property holders were assessed both in money and in labor.

"I say, Mary, isn't it time baby said 'Daddy'?"

"No, Jack, we've decided not to let him know who you are until he gets stronger."

Husband—"I've made up my mind to stay home this evening."

Wife—"But I've made up my face to go out."—*Chicago Times.*

University Ave. Underpass Under Construction

(Continued from page 23)

three miles per hour. The top rail then becomes the only visible part of the railing, appearing as a narrow 4 inch band. This feature results in very little interference to vision of the operator of an automobile, and will enable him to see through the railing while traveling around an approach ramp.

Heavy rainstorms will not handicap use of the structure. Six catch basins in the depressed portion of the roadway will drain storm water into a sump southwest of the structure from which two 1500 gallon per minute capacity pumps will deliver it through a 16-inch steel pipe line into San Francisquito Creek, 2000 feet away.

DRAINAGE SYSTEM

Approach ramp grades on both sides of the track have been carefully designed to exclude adjacent ground and city street drainage from the underpass. Nevertheless, some 200,000 square feet of pavement and platform area will drain into the depressed roadway. Drainage from an area of this type is practically instantaneous and must be handled at once. As the city's storm sewers in the immediate vicinity are inadequate for 3000 gallons per minute discharge, a drain line from the sump into the nearest stream became necessary.

The pump house proper, immediately above the sump, will be placed below ground with its top flush with the station platform. A pump house is always difficult to design architecturally harmonious with the surrounding landscape, and is desirable to submerge below ground where possible. Operation of the pumping plant during a storm is automatic and is controlled by float-actuated switches that start and stop either pump as conditions demand. In addition, there is a safety float switch operating a signal in the fire department which will come into action in event of failure of the pumping equipment to handle the storm water. Access for equipment and machinery is provided in the roof, while ordinary access for inspection is made through one of the pedestrian ramps.

Emblem Plaque of Quarter Century Club.

TWENTY-FOUR HOUR LIGHTING

Twenty-four hour lighting within the underpass and pedestrian tunnels and ramps will be necessary, as the depressed portion under the structure is 179 feet long. Roadway lighting is set flush in the sidewalls on either side of the roadway and will illuminate the entire pavement surface without glare. Street lighting is also provided along University Avenue, all approach ramps, and throughout the station platform. Existing electroliers will be relocated for this purpose, supplementing them with new electroliers of modern design along the 6-foot dividing strip.

All construction operations will be carried on without interference to train schedules or passenger facilities. The present station, baggage room, and news stand will be shifted to a temporary location on Alma Street opposite Lytton Avenue. Work will be prosecuted such that Alma Street will rarely be closed during construction. One-way operation will prevail for a short time toward the conclusion of the work.

The contractor will complete all structures and a sufficient quantity of railroad embankment to enable the railroad to lay its new passenger track. Eastbound trains will then be turned onto this new track and the existing eastbound track shifted to the new location. Westbound trains will then be shifted to the passenger track, and the present westward

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Quarter Century Club Organized in Highway Div.

Some time back this magazine published a series of articles on old-timers of the State Highway Department. These old-timers take pride in their long service and have a growing feeling of comradeship which comes with years of association. Today they have formed themselves into an organization and have adopted as its name The Quarter Century Club. The purpose of the club is purely social—a get-together organization, as it were, where members available can meet occasionally and can break bread and reminisce on the past.

The Highway Department was organized in January, 1912, and while there were twenty-five persons who had served the State twenty-five years by the end of 1937, the Quarter Century Club organization was not completed until 1939 and these twenty-five persons are the charter members. Others become eligible for membership as rapidly as they attain their twenty-five-year service, and today there are more than 50 such persons eligible.

CHARTER MEMBERS

C. N. Ainley
H. F. Allen
F. R. Baker
E. J. Bassett
T. A. Bedford
C. M. Butts
S. V. Cortelyou
S. Crespo
H. C. Darling
A. N. George
L. H. Gibson
Geo. Hanson
F. W. Haselwood
R. M. Haverstick
F. T. Maddocks
Grant P. Merril
C. P. Montgomery
James Moriarty
Myrtle Murray
D. N. Sapp
Leona D. Smith
R. H. Stalnaker
T. E. Stanton
R. A. Tremper
G. R. Winslow

The emblem which the club has adopted and which is pictured above ties in closely with the seal of the Highway Department. It is circular in form and enameled in color and mounted on a plaque; the year in which the club was formed is shown at the top; at the bottom is a blank for the member's name and dates of service if he so desires.

The officers of the club this first year are: President, Thomas E. Stanton; First Vice President, T. A. Bedford; Second Vice President, S. V. Cortelyou; Secretary-Treasurer, George R. Winslow; and Historian, Fred T. Maddocks.

University Ave. Underpass Under Construction

(Continued from page 25)

track removed and stockpiled. The contractor will then complete his work in the area previously occupied by the railroad. Excavation in this area will furnish additional embankment for the new westward track, which will then be laid. As the total embankment requirements exceed available excavation by approximately 28,000 cubic yards, it will be necessary to import additional material from borrow pits.

Relocation of gas, electric, telephone, fire alarm and water services, and storm sewers and sanitary sewers are a necessary part of the construction, and are present in any project within city limits.

The Bridge Department of the California Division of Highways designed the structure and will direct its construction. Mr. G. W. Thompson is Resident Engineer for the State. Maintenance of the structure will be divided between the Southern Pacific Railroad and the city of Palo Alto.

The project will be completed for traffic about the first of the year 1941.

Thanks Highway Men

State Highway Dept.,
Sacramento.

Gentlemen:

I wish to draw to the proper person's attention some very courteous treatment we received from two members of the road division on September 25th.

We were in Red Rock Canyon, just out of Mojave, and in attempting to ford a small stream crossing the highway we became stalled.

Your truck No. 3512 driven by a Mr. Monroe—assisting him was Mr. C. P. Smith—not only pulled us out but pushed us to the nearest garage where we received help and were on our way.

We tried to compensate these two men, they thanked us, but would not accept one penny, stating they were paid by the State and the tax payer was due for what little help they had extended. I want you to know I deeply appreciate this act of courtesy.

Sincerely,

(Signed) H. B. LEARNED.

Major Operations Required for Traffic Relief in Large Cities of U. S.

That the larger cities will require major operations to alleviate critical congestion has been particularly emphasized in the report of the Bureau of Public Roads to Congress on the subject of toll roads. Figures of motor vehicle registrations in cities of over 100,000 population demonstrate the urban conditions which necessitate bold measures for traffic relief.

In the 95 U. S. Cities having populations exceeding 100,000 live 40 million persons owning more than 8 million motor vehicles. These constitute 31 per cent of the total population and 27 per cent of total vehicle registrations. The area of these 95 cities is 4,488 square miles, or fifteen one-hundredths of one per cent of the total national area. The density of motor vehicle registrations is thus approximately 1800 per square mile. Populations per passenger car ranges from 3.2 cars per person to 10.4, with the average being 5.6.

Of the 66,000 miles of streets in these cities, one third are unpaved. Motor vehicles per mile of paved street number 183. If all the motor vehicles registered in our largest cities were driven onto the paved streets of these cities at once (a situation with which city drivers may imagine they are familiar) the space allotted to each car would be less than 29 feet.—*Highway Research Abstracts.*

Mistress—Did Tommy get into any trouble while I was gone?

Maid—No, 'ceptin' he swallowed a bug but I give him some insect powder right away.

Funds Decreased for Highways in 1938 $98,717,000

THE annual report of the American Association of State Highway Officials presented at its recent convention in Richmond, Va., states that the total income or funds available for expenditure through the State highway departments in 1938 amounted to $1,096,908,000. This includes a balance of $234,281,000 as of January 1, 1938, and also $182,355,000 of reserves for debt service.

This is a decrease of $98,717,000 from 1937.

The total income from State revenue sources was $817,343,000. This is a decrease of $18,524,000. The income from gasoline tax was virtually the same in 1938 as in 1937. The auto license fees decreased $20,000,000. The Federal payments to States were $67,109,000 less in 1938 than in 1937.

Itemized by sources of income the receipts are as follows: Motor fuel taxes, $542,638,000; motor license fees, $256,817,000; motor carrier taxes, $6,461,000; tolls on bridges, $4,171,000; State road tax levy (in 5 States) $489,000; appropriations from State general funds (in 6 States) $5,489,000 and miscellaneous State fees, $1,294,000.

The income from other than current State revenue was as follows: Regular Federal payments, $199,066,000; Federal advance, $6,640,000; other Federal funds, such as special grants, $4,400,000; earnings from debt reserve, $6,582,000; from local government units, $15,711,000; issue of bonds or notes, $57,505,000, and miscellaneous, $2,941,000.

Engineer Warren Resigns

Donald R. Warren, Senior Bridge Engineer in the Division of Highways, is resigning to enter private practice.

During the past few years Mr. Warren has been in responsible charge of State bridge construction in the southern half of the State. Prior to this he assisted in the construction of the San Francisco-Oakland Bay Bridge.

Mr. Warren will establish offices in Los Angeles.

Recently completed grade separation structure at Colfax, Placer County, carrying U. S. 40 over main line railroad tracks.

Colfax Grade Crossing Eliminated

FINAL work on the overhead grade separation on the new State highway route through Colfax in Placer County has been completed by construction of a permanent connection from the new highway to the city of Colfax.

The overhead structure and approaches were open to traffic last July but insufficient funds made it necessary to confine the work north of the overhead structure to the building of a temporary connection to the old road. Funds for this work were included in the budget for the current biennium and on August 7 a contract was awarded to A. Teichert & Son, Inc., of Sacramento, calling for road construction between the overhead and six-tenths of a mile north.

The type of work specified was the same as on the earlier project except that a greater amount of salvaged surfacing was used in the base, it having been possible to salvage a large percentage of the surfacing from the old road. This job also calls for the reconstruction of a portion of the old road in order to provide a suitable connection from the new highway to the city of Colfax.

On this connection a 30-foot roadbed was constructed with plant-mix surfacing twenty feet wide and 0.25 of a foot thick on a 21-foot by 0.5 foot base consisting of salvaged surfacing and crusher run base.

The cost of the extension was about $35,000 and it is now open to public traffic.

The new highway route through Colfax is another important improvement on U. S. 40 between Sacramento and Truckee. The overhead will enable through traffic to avoid the existing main line crossing of the Southern Pacific Railroad and the

(Continued on page 28)

Highway Bids and Awards for the Month of November, 1939

ALAMEDA COUNTY—Between Niles and Farwell, about 0.9 miles to be graded and surfaced with plant-mixed surfacing. District IV, Route 107, Section A. The Utah Construction, San Francisco, $88,784; Valley Construction Co., San Jose, $89,995; Eaton & Smith, San Francisco, $112,483. Contract awarded to Piombo Bros. & Co., San Francisco, $67,733.50.

AMADOR COUNTY—Two reinforced concrete slab bridges across Jackson Creek and Jackson Creek overflow about 5 miles S.W. of Ione, with overall lengths of 228 feet and 180 feet, respectively, to be constructed. District X, Route 97, Section A. Campbell Construction Co., Sacramento, $34,340; Caputo & Keeble, San Jose, $34,922; M. J. B. Construction Co., Stockton, $34,958; John Rocca, San Rafael, $35,943; L. D. Tonn, Lodi, $35,455; Elmer J. Warner, Stockton, $36,360; A. A. Tleslau, Berkeley, $36,437; M. A. Jenkins, Sacramento, $36,988; Albert H. Siemer & John Carcano, San Anselmo, $37,312; A. Soda & Son, Oakland, $37,622; Holdener Construction Co., Sacramento, $38,103; Parish Bros., Los Angeles, $40,234; Underground Construction Co., Oakland, $42,844; Valley Construction Co., San Jose, $44,159; Engineers, Ltd., San Francisco, $47,912. Contract awarded to Victor L. & Wm. B. Jacobson, Los Angeles, $33,840.70.

HUMBOLDT COUNTY—Across Klamath River at Orleans, a bridge consisting of a steel suspension span and reinforced concrete approach spans to be constructed and about 0.08 mile of roadway to be graded. District I, Route 46, Sections E, F. Paul J. Tyler, Oroville, $149,652; John Rocca, San Rafael, $152,811; A. Soda & Son, Oakland, $153,674; Fred J. Maurer & Son, Eureka, $153,111; United Concrete Pipe Corp. & Mercer Fraser Co., Los Angeles, $158,057; E. E. Smith, Eureka, $165,152; Hanrahan-Connolly Co., San Francisco, $168,905; Trewhitt-Shields & Fisher, Fresno, $177,221; Pacific Bridge Co., San Francisco, $225,223. Contract awarded to C. W. Caletti & Co., San Rafael, $140,561.

INYO COUNTY—Between 9 miles north of Lone Pine and Independence, about 5.9 miles to be graded and surfaced with plant-mixed surfacing. District IX, Route 23, Section M. Oswald Bros., Los Angeles, $67,500; G. W. Ellis, North Hollywood, $69,774; Valley Construction Co., San Jose, $72,279; Griffith Co., Los Angeles, $76,561; Gibbons & Reed Co., Burbank, $77,138; R. M. Price, Huntington Park, $78,775. Contract awarded to Basich Bros., Torrance, $60,657.30.

LOS ANGELES COUNTY—On Rosemead Blvd., between Garvey Avenue and Ramona Blvd., about 0.7 mile trees, shrubs, and ground cover plants to be furnished and planted. District VII, Route 168, Section C. Twentieth Century Tree Service, Los Angeles, $2,619; Peterson Bros., Inglewood, $4,264. Contract awarded to Jannoch Nurseries, Altadena, $1,713.90.

LOS ANGELES COUNTY—Arroyo Seco Parkway on Grevelia Street in South Pasadena, between Meridian Avenue and Fairview Avenue, about 0.1 mile to be graded and surfaced with plant-mixed surfacing. District VII, Route 205, Section S.Pas. Edward Green, Los Angeles, $3,771; Griffith Co., Los Angeles, $3,835. Contract awarded to J. E. Haddock, Ltd., Pasadena, $3,635.50.

MODOC COUNTY—Between 3.7 miles north of Rush Creek bridge and Pit River, about 9.2 miles to be graded, surfaced with plant-mixed surfacing on crusher run base. District II, Route 28, Section A. The Utah Construction Co., San Francisco, $244,093; Hemstreet & Bell, Marysville, $255,352; Claude C. Wood and Frank B. Marks & Sons, Lodi, $261,352; A. Teichert & Son, Inc., Sacramento, $282,843; Isbell Construction Co., Reno, $291,155. Contract awarded to Harms Bros., & N. M. Ball Sons, Berkeley, $240,832.55.

MONTEREY COUNTY—Across Salinas River at Nacimiento, about 5 miles south of Bradley, a reinforced concrete girder bridge having a total length of 1154 feet to be constructed. District V, Route 2, Section I. J. S. Metzger & Son, Los Angeles, $217,351; John Rocca, San Rafael, $219,675; Joseph Shaw, Oakland, $225,841; A. Soda & Son, Oakland, $234,726; Earl W. Heple, San Jose, $236,204; C. W. Caletti & Co., San Rafael, $257,221; Gibbons & Reed Co., Burbank, $258,146; Sordal and Bishop, Long Beach, $269,630; Carlo Bongiovanni, Hollywood, $281,450; Bates and Rogers Construction Corp., Oakland, $282,698. Contract awarded to Utah Construction Co., San Francisco, $210,775.10.

SAN DIEGO COUNTY—On Rosecrans St. in the city of San Diego between Lytton St. and Canon St., about 1.9 miles in length, to be graded and paved with asphalt concrete. District XI, Route 12. V. R. Dennis Construction Co., San Diego, $185,449; Daley Corp., San Diego, $185,670; R. E. Hazard & Sons, San Diego, $188,952. Contract awarded to Griffith Co., Los Angeles, $179,516.10.

SAN FRANCISCO—Between Lake Street and Golden Gate Bridge Approach, in the city of San Francisco, about 1.4 miles in length, to be landscaped. District IV, Route 56. Albert H. Siemer and Roger F. Sohner, San Anselmo, $41,504. Contract awarded to Leonard Coates Nurseries, Inc., San Jose, $38,844.75.

SAN JOAQUIN COUNTY—Repairing existing fenders, Middle River and Old River Bridges. District X, Route 75, Section A. Frank Legg, San Francisco, $7,221; M. Elton, Sacramento, $8,553; Healy Tibbetts Construction Co., San Francisco, $8,153; Bundesen & Lauritzen, Pittsburg, $8,603. Contract awarded to Pomeroy Sinnock, Stockton, $6,398.60.

SANTA CLARA COUNTY—At University Avenue in Palo Alto, an underpass consisting of reinforced concrete structures and steel beam track spans under the tracks of the Southern Pacific Co. to be constructed. District IV, Feeder road. A. G. Raisch, San Francisco, $347,753; The Utah Construction Co., San Francisco, $285,705; Barrett & Hilp, San Francisco, $285,788; Earl W. Heple, San Jose, $271,362; Joseph Shaw, Oakland, $275,097; Eaton & Smith, San Francisco, $286,131; Engineers, Ltd., San Francisco, $288,965; A. Soda & Son, Oakland, $300,678; John Rocca, San Rafael, $318,707; MacDonald & Kahn, San Francisco, $343,719. Contract awarded to Paul J. Tyler, Oroville, $265,960.40.

SHASTA COUNTY—Between Bass Hill and O'Brien Summit, about 4.1 miles, to be graded, portions to be surfaced with road-mix surfacing on crusher run base, a reinforced concrete viaduct 375 feet long to be constructed. District II, Route 3. Sections B, C. Parish Bros., Hollywood, $333,581; Eaton & Smith, San Francisco, $340,246; Clarence Crow & L. A. & R. S. Crow, Los Angeles, $349,029; Macco Construction Co., Clearwater, $373,677; A. Teichert & Son., Inc., Sacramento, $376,328; United Concrete Pipe Corp., Los Angeles, $386,875; The Utah Construction Co., San Francisco, $417,926. Contract awarded to Granfield, Farrar & Carlin, San Francisco, $326,966.

First in Registration

Improvement of the State Highway System as a whole has not kept abreast of traffic needs and necessary modernization work will require the expenditure of funds beyond what are now provided.

In this connection it is interesting to note that California ranks first among the States in total vehicle registration and forty-fifth in average motor and gasoline receipts per motor vehicle.

Excerpt from address by Public Works Director Clark.

Colfax Grade Crossing Eliminated

(Continued from page 27)

abrupt turns and interference with local traffic in Colfax.

The new route, 1⅛ miles in length, leaves the existing State highway approximately ½ mile south of Colfax and follows along the east side of that city to a connection with the existing State highway north of Colfax, effecting a saving in distance of 0.2 of a mile.

The cost of the overhead, which provides a 26-foot roadway with a 2-foot, 7-inch sidewalk along each side, was $117,882.

The realignment of the highway, which was a Federal Aid project, costing $46,500, provided a graded roadbed 36 feet wide with plant-mixed surfacing 22 feet wide by 0.25 of a foot thick on a crusher run base 23 feet wide by 0.4 of a foot thick.

Scotchman (at riding academy)—"I want to rent a horse."

Groom—"How long?"

Scotchman—"The longest you have. There are four of us going."—*The Watchman-Examiner.*

State of California

CULBERT L. OLSON, Governor

Department of Public Works

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

FRANK W. CLARK, Director of Public Works

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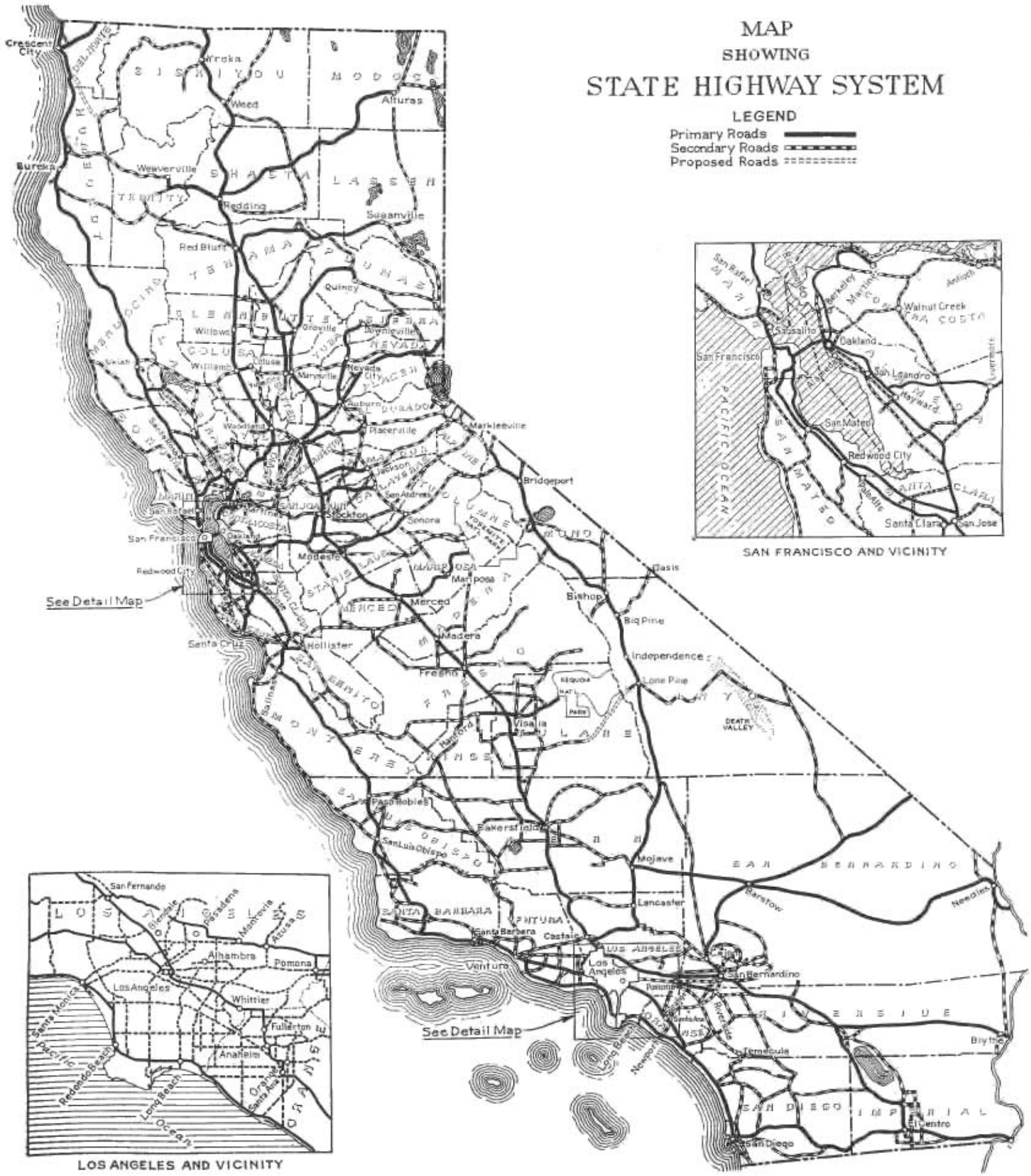
MAP
SHOWING
STATE HIGHWAY SYSTEM

LEGEND
Primary Roads
Secondary Roads
Proposed Roads



SAN FRANCISCO AND VICINITY

LOS ANGELES AND VICINITY