

# CALIFORNIA

HIGHWAYS AND PUBLIC WORKS

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# California Highways and Public Works

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

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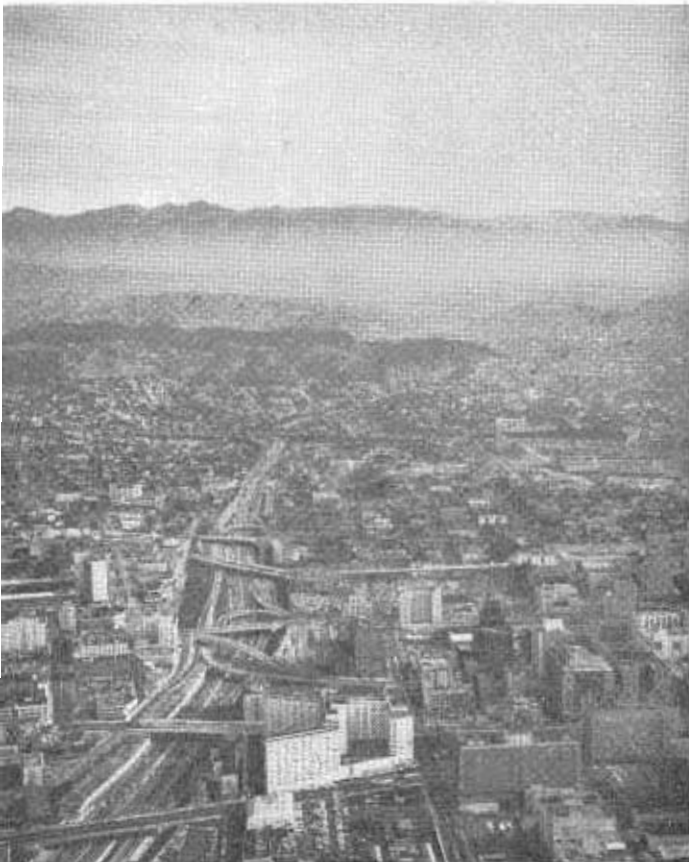
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## FRONT COVER

From above downtown Los Angeles, aerial camera looks north along Harbor Freeway and the many crossing bridges. Four-level structure called "hub of Los Angeles' metropolitan freeway system" is in center.

—Photo by Merritt R. Nickerson



## BACK COVER

Aerial view from above northern city limits of Los Angeles, looking south along Golden State Freeway. Traffic interchange at junction of US 6 and US 99 is in foreground, San Fernando Valley in background.

—Photo by Merritt R. Nickerson

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# Budget Nears

Highway Commission  
Sets 1958-59 Figures

*This general story on the Budget is supplemented by other details appearing on pages 43 to 51.*

## Half Billion

THE CALIFORNIA Highway Commission submitted to Governor Goodwin J. Knight in November a State Highway Budget totaling \$483,571,763 for the 1958-59 Fiscal Year.

The budget contains \$435,525,268 for all state highway functions, including approximately \$338,000,000 for highway construction purposes. All of California's 58 counties share in the budget.

The construction items include: major construction and improvement (contracts plus construction engineering), \$221,829,000; rights of way, \$103,342,268; contingencies (normally allocated later for construction purposes), \$6,000,000; resurfacing program, \$5,000,000; minor improvements, \$800,000.

For comparison, the current 1957-58 State Highway Budget as adopted in October, 1956, contained a total of \$464,000,000 of which \$421,000,000 was for state highway functions, including approximately \$350,000,000 for construction purposes (including rights of way).

### Major Revenue Sources

Major sources of *estimated* state-collected revenue in the 1958-59 State Highway Budget include: \$230,771,000 from gasoline taxes (up \$13,000,000 from the previous year's estimate); \$59,169,000 from motor vehicle fees (down \$9,000,000 from the previous year's estimate partly because of increased budgets of the California Highway Patrol and Department of Motor Vehicles); which are financed by highway user taxes; use fuel (diesel) taxes, \$19,000,000 (slightly up from previous year); and \$9,936,000 from transportation taxes (down \$6,500,000 from previous year due to a

50 percent statutory reduction in the gross receipts levy on "for-hire" carriers).

Federal aid for state highways, including interstate routes, shows an increase of nearly \$20,000,000 over the previous year, with an apportionment of \$153,647,762 for 1958-59. In addition, \$9,762,001 has been apportioned by the U. S. Government for federal aid secondary roads in California, of which \$9,615,571 will be available for expenditure on county roads. The 1957 Legislature increased from 87½ percent to 98½ percent the counties' share of the federal aid secondary money apportioned to California, as well as increasing from a maximum of \$100,000 to \$200,000 per county annually the state funds available to counties for use in matching federal aid.

### Effect of New Laws

As a result of statutes enacted by the 1957 Legislature, the 1958-59 Highway Budget contains two new expenditure categories, it was pointed out by State Director of Public Works Frank B. Durkee, chairman of the commission.

These items include \$5,000,000 earmarked for state matching of the funds to be provided by cities and counties for elimination of railroad grade crossings on local streets and roads (not state highways); and \$2,000,000 for maintenance of San Francisco Bay area state-owned toll bridges.

Proposed expenditures for state highway purposes in the 1958-59 Fiscal Year, in addition to the \$338,000,000 for construction and rights-of-way include: maintenance, \$32,500,000; preliminary engineering (planning and design), \$30,500,000; statewide highway planning survey, \$3,000,000; administration, \$9,300,000; honor camps, \$1,-

750,000; and buildings and plants, \$14,500,000 (including construction of maintenance facilities and shops throughout the state and district office annexes in San Francisco, San Bernardino, San Diego, Redding and Bishop).

### Nonstate Highway Items

The nonstate highway items in the budget include, in addition to the grade crossing funds and the federal funds for county roads on the federal aid secondary system:

Major city streets (five-eighths cent per gallon of the gasoline tax), \$31,142,000; city engineering work, \$1,200,000; and state funds to counties for use in matching federal funds on federal aid secondary projects, \$6,002,924.

State Highway Engineer G. T. McCoy informed the commission that plans, specifications and right-of-way acquisition had already been completed on some of the projects included in the 1958-59 Budget, and that these projects could be advertised for bids beginning within the next few weeks.

State law permits the awarding of state highway contracts as early as January 1st, six months before the start of the fiscal year. This provision enables the Division of Highways to make maximum use of favorable construction weather, which means earlier opening of road improvements to traffic.

### Two-year Financing

For the first time, the 1958-59 Budget contains items which are only partly financed in a single fiscal year.

Durkee explained that some construction contracts are so large and complex that they require considerably more than a year to complete. In some of these instances, the new



Public Works Building  
Twelfth and N Streets  
Sacramento

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## BUDGET

budget contains only the amount which will be needed during the first fiscal year, with the balance of the project to be financed in the succeeding (1959-60) fiscal year. This procedure is provided for by legislation enacted in 1957. The construction contract awarded in such cases will be for the entire project, however.

This method, Durkee pointed out, will avoid the tying up of large amounts of highway funds in a single budget item where the expenditure will extend over a considerably longer period than one year, and therefore permits the inclusion of more projects in the budget than would otherwise be the case.

For example, the 1958-59 Budget includes a four-mile eight-lane freeway project on the Ventura Freeway (US 101) in the San Fernando Valley for which a total construction expenditure of \$11,100,000 is estimated. Only \$6,248,000 of this amount is financed in the 1958-59 Budget, however.

### Landscaping Projects

The budget contain 32 projects of a landscaping nature, totaling an estimated \$3,180,000. Most of these projects provide for roadside planting on recently completed sections of freeway.

"The 1958-59 highway budget," Durkee said, "represents one more step in a continuing, carefully planned and co-ordinated effort to meet the tremendous traffic needs of a growing state.

"It is of course impossible," he added, "to include every needed project in a single budget. Many projects with a high local and statewide priority, in terms of relief from congestion and hazard, have had to be deferred by the commission for future allocation of funds. The commission's goal in adopting each successive budget is to distribute construction and right-of-way funds, in line with geographical controls laid down by the Legislature, where they will accomplish the greatest good both for the community concerned and for the people of the State as a whole.

... Continued on page 44



# U.S. Congress

## House Committeemen Visit California, Seek Advice

THE COMMITTEE ON PUBLIC WORKS OF the United States House of Representatives came to California in late October to inspect and study the State Highway System which one of the committee's ranking members said "is giving the taxpayer the most miles of highway for the dollars expended."

J. Harry McGregor of Ohio, a member of Congress since 1940 and a leading advocate of the federal highway program, told the California Highway Commissioners that he and his fellow committeemen "look forward to receiving your recommendations to improve the law on the interstate highways."

"I wish you fellows would help us," Representative McGregor told the commissioners at a luncheon meeting in Martinez preceding a committee hearing, only formal session held by the members of Congress during a 10-

day visit about the State. "California has helped us a great deal already. A number of things I put in the 1954 Federal Highway Act came from your California law."

All of the commission members welcomed the house committeemen to California and accompanied them on a highway tour from San Francisco through the East Bay, across the Carquinez Bridge, to Benicia and then to Martinez. All remained with the members of Congress for their hearing, at which officials of the State Department of Public Works presented recommendations and suggestions for which the committeemen asked.

### State's Views Told

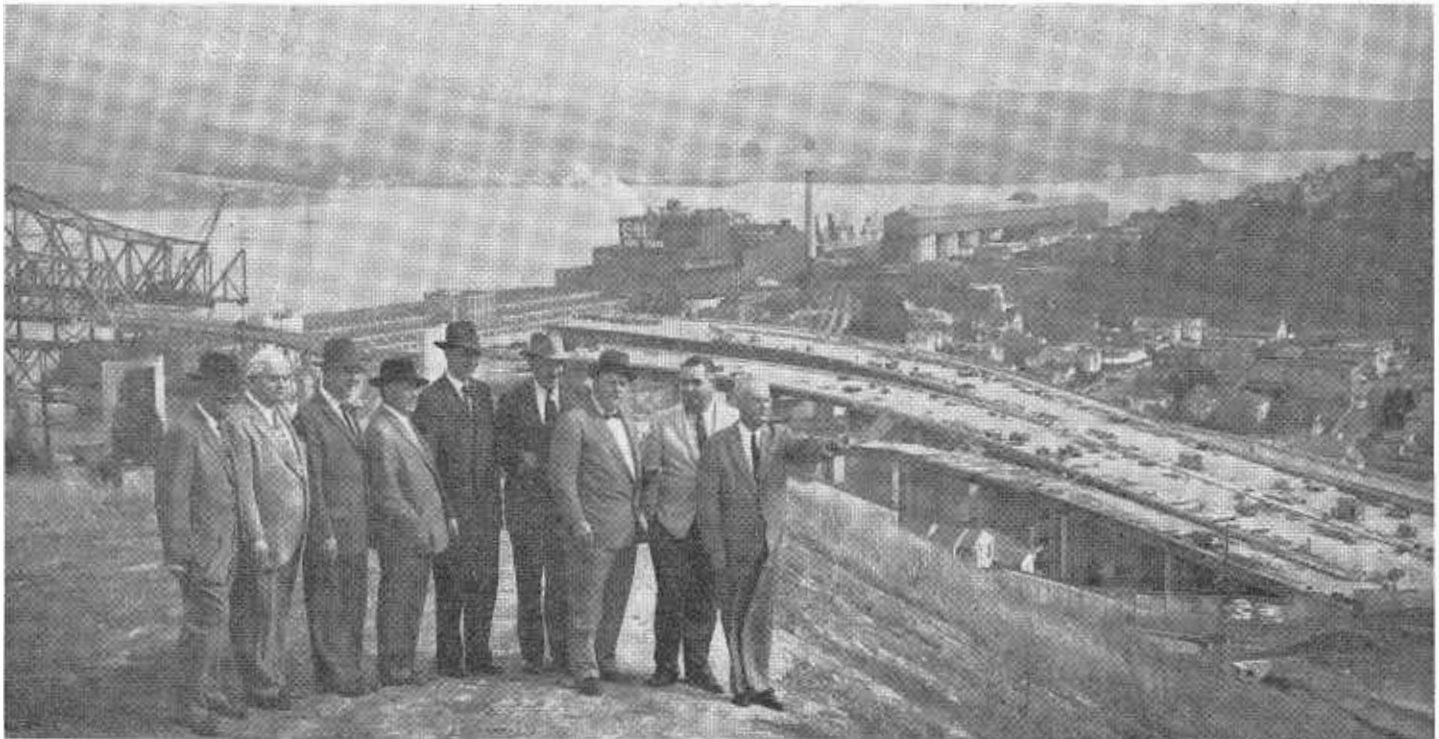
Frank B. Durkee, Director of Public Works and Chairman of the Highway Commission, George T. McCoy, State Highway Engineer, and J. W.

Vickrey, Deputy State Highway Engineer, presented the California views on the Federal Interstate Highway System to the committeemen at their hearing.

They recommended confirmation of the section of the Federal Highway Act of 1956 which provided that future apportionment of federal funds to the states will be on a basis of need, rather than on the previously authorized formula based on a combination of state area, population and post road mileage.

The 1956 law provided that the apportionment on a basis of need should be started with the 1960 Fiscal Year, after the Congress approves estimates of need submitted by the Bureau of Public Roads. These estimates will be presented to Congress next January.

Representative John F. Baldwin, Jr., of Martinez, who was acting as chair-



State Senator Luther E. Gibson (extreme left) was one of the hosts to members of the House Public Works Committee when they inspected work on the new Carquinez Bridge (background) and saw the "big cut" being made nearby for the US 40 freeway. Committeemen are: (left to right) John C. Kluczynski, Hubert B. Scudder, J. Harry McGregor, John F. Baldwin, Jr., Russell V. Mack, Edwin B. Dooley, Frank Ellis Smith and Emmet F. Byrne, who is pointing to huge excavation.

man of the subcommittee for the purpose of the hearing in his home state and home city, joined Representative McGregor in asking the California officials questions about their proposals.

"If Congress apportions the money on the basis of need," Representative Baldwin asked McCoy during the State Highway Engineer's testimony, "would California have enough matching money?"

"Yes," was McCoy's unqualified answer.

#### Needs Basis Asked

The Californians presented details of federal apportionments to California and the State's provision of millions in matching funds for the first three years of the interstate program. They said that all of the federal funds made available to date have been obligated and that California is in a position to use all available federal funds as rapidly as they can be apportioned.

The figures "clearly indicate," the California report said, "that unless future apportionments are made on a needs basis in conformance with the 1956 act as enacted, California's planning program, which currently contemplates completion of its portion of the National Interstate System within the period prescribed by the act, will of necessity require drastic modification."

House committeemen who were on the highway tour and at the hearing were, beside McGregor and Baldwin:

Representatives Emmet F. Byrne of Illinois, Edwin B. Dooley of New York, John C. Kluczynski of Illinois, Russell V. Mack of Washington, Hubert B. Scudder of California, and Frank Ellis Smith of Mississippi. Representative Smith was chairman of the subcommittee for the California trip.

#### New Formula Ready

Representative John McFall, California member of the committee, met the group the day after the Martinez hearing and showed them public works of interest in and about Stockton, his home city.

Most of the committeemen spent the next week continuing their inspections of highways and other public works in other California areas. Representative Kenneth Gray, com-

mittee member from Illinois, joined his fellows in Southern California.

Also joining the committeemen in Southern California were Bertram D. Tallamy, Federal Highway Administrator, and Frank C. Turner, Deputy Commissioner and Chief Engineer, U. S. Bureau of Public Roads.

Administrator Tallamy told newsmen in San Diego that California's share of the new federal highway program would be nearly twice what it is now under the estimates of need to be presented to Congress in January.

The members of the house committee and the federal highway officials were greeted by civic leaders in San Diego, Riverside County, Los Angeles, Santa Barbara and Monterey County.

Although they held no formal hearing in Los Angeles, they were presented with recommendations about the federal highway program by the Los Angeles Metropolitan Traffic Association. The association, in a resolution printed in full below, joined the California public works officials in recommending the needs basis for apportionment of federal highway funds.

Here is the text of the resolution:

WHEREAS, Under the provisions of Federal Highway Act of 1956, the apportionment of funds to the several states to construct the National System of Interstate and Defense Highways is made as follows: one-half in the ratio which the population of each state bears to the total population of all the states as shown by the latest available federal census, provided that no state shall receive less than three-fourths of 1 per centum of the money so apportioned, and one-half in the manner now provided by law for the apportionment of funds for the Federal-Aid Primary System which is based one-third on area, one-third on population and one-third on post road or rural delivery mileage; and

WHEREAS, California's gas tax payments to the Federal Treasury approximate 10 percent of the Nation's total, but under above formula we receive back only 5.7 percent; and

WHEREAS, The Federal Highway Act of 1956 provides that apportionment of funds to the several states for the Fiscal Year 1960 through 1969 inclusive, shall be in the ratio which the estimated cost of completing the interstate system in each state bears to the sum of estimated cost of completing the system in all of the states (this formula is referred to as the "Needs Formula"); and

WHEREAS, The act further provides that the Secretary of Commerce shall submit to

the Senate and House of Representatives within 10 days subsequent to January 2, 1958, a detailed estimate of the cost of completing interstate system; and

WHEREAS, It is necessary that Congress by concurrent resolution give approval of such estimate of costs before the Secretary of Commerce may make use of the approved needs formula in making apportionment for subsequent years; and

WHEREAS, The acute highway problems in California demand a larger allocation of these federal funds so as to allow freeways to be built more quickly to handle the greater traffic loads brought on by our tremendous population increases—constant migrations from other states—with attendant increase in motor vehicles of 348,254 in 1956 over 1955—equal to 29,000 additional cars every month on our highways—and to alleviate the presently congested freeways and lessen the number of accidents; now, therefore, be it

Resolved, That the Los Angeles Metropolitan Traffic Association hereby petitions Congress to enact at the 1958 Session the necessary concurrent resolution authorizing the Secretary of Commerce to apportion funds among the several states for the construction and completion of the National System of Interstate and Defense Highways in the ratio which the estimated cost of completing the system in each state bears to the sum of the estimated cost of completing the system in all of the states as provided in subsection (d) of Section 108 of the Federal-Aid Highway Act of 1956.

## Sierra Highways Closed

Carson Pass Highway (State Sign Route 88) and Ebbetts Pass Highway (State Sign Route 4) were closed to through traffic for the 1957-58 winter season on November 14th.

The Carson Pass Highway is kept open during the winter season only as far as Peddler Hill in Amador County. The Ebbetts Pass Highway is kept open to Camp Connell in Calaveras County.

Two other highways across the Sierra Nevada, Sonora Pass and Tioga Pass, were closed to through traffic earlier.

The Sonora Pass Highway (State Sign Route 108) was initially closed at Kennedy Meadows Road, but the closure point was expected to be moved westward to Strawberry, in Tuolumne County, after the next snowstorm.

The Tioga Pass Road (State Sign Route 120) was closed by the National Park Service at the entrance to Yosemite National Park.



# Plan and Design

Eight Years History of  
Long Beach Freeway Told

By E. G. HANSON, Assistant District Engineer

WHEN GOVERNOR Goodwin J. Knight, on October 29, 1954, attended the ribbon-cutting ceremony celebrating the completion of the southerly seven-mile section of the Long Beach Freeway from Pacific Coast Highway to Atlantic Avenue, he emphasized in his remarks the fact that this freeway was a co-operative project in every sense of the word. He called attention to the fact that due to the whole-hearted co-operation between engineers and officials of all levels of government (federal, state, county and city), and of railroads, utilities, industries and businesses, unusual progress had been made in the development of this freeway. As Governor Knight pointed out, there was no organized opposition to this freeway from any source. It was a freeway that everybody wanted!

The original concept of the Long Beach Freeway project, when it was known locally as the proposed "Los Angeles River Freeway," was that it extend from Pacific Coast Highway, Route 60 in the City of Long Beach, northerly to a junction with the Santa Ana Freeway in the East Los Angeles manufacturing district. This \$48,000,000 freeway unit, 16.5 miles in length, is the subject of the present story.

If consideration is given to the time of inception of the idea that there should be a major traffic arterial connecting the City of Long Beach with the City of Los Angeles by following along the general route of the Los Angeles River between these two cities, then the Long Beach Freeway is undoubtedly the oldest freeway in the Los Angeles metropolitan area which the State Division of Highways has had the responsibility for constructing.

## Origins in 1913

The effective efforts of the Los Angeles County Regional Planning Commission were much in evidence in

EDITOR'S NOTE: *One article usually suffices to tell the story of an important freeway from inception to completion. But there was so much to be said about the \$48,000,000 Long Beach Freeway that it is being presented in two articles. The first article, herewith, tells of planning and design activities and was written by the Supervising Highway Engineer in charge of designing the freeway for the past eight years. The second article, to appear next summer after completion of the freeway, will deal with construction.*

the early stages of inception, promotion and development of the Long Beach Freeway. This organization was very active during the period when Arthur H. Adams (now retired) was

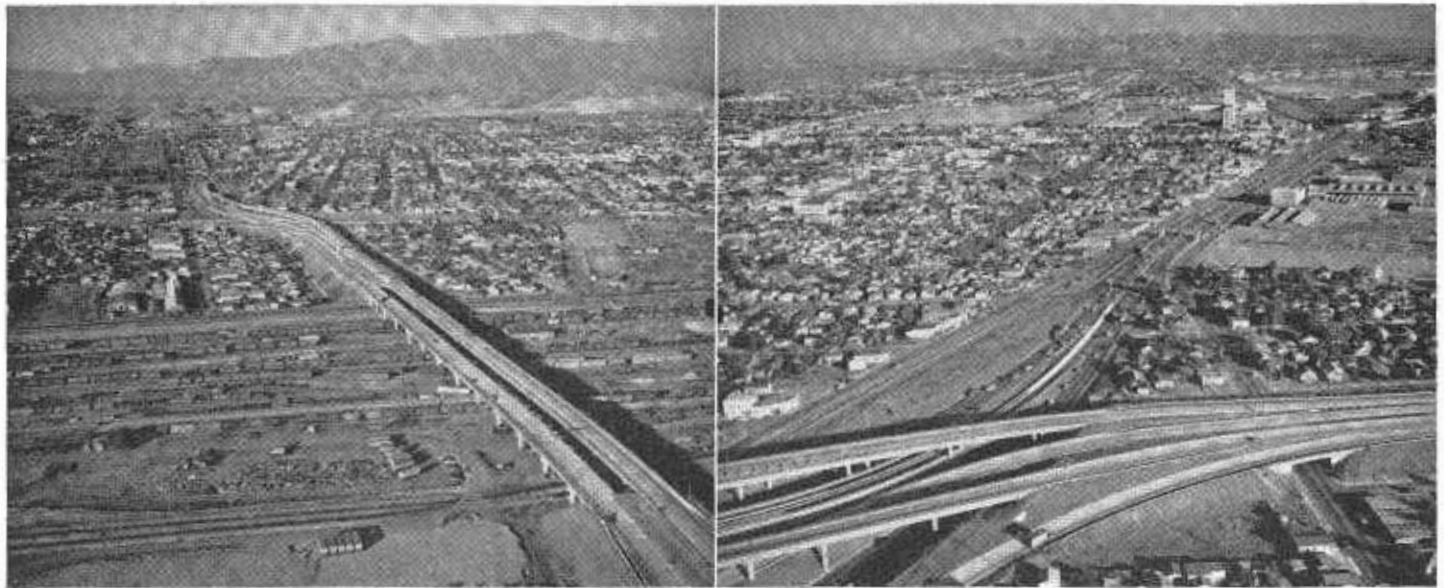
its Director of Planning. Writing about the Long Beach Freeway in 1951, Adams said:

"The idea of there being a major highway or highways along the Los Angeles River channel originated about 1913 when the United States Government, as an argument to convince the officials of Long Beach that they should allow their city to be bisected by a flood control channel, published a picture of the proposed channel with broad highways shown on each bank of the channel. This plan was apparently forgotten by the government engineers when the channel was constructed, much to the embarrassment of local officials and residents.

"Later when a considerable section of the channel was paved with a heavy reinforced concrete slab, many of us thought that here was an ideal place for a highway as the channel carries a decreasing amount of water except during severe storms. It was thought that the usual small flow of water could be controlled in a narrow, open conduit thus leaving the balance of the wide area for the carrying of traffic directly from Long Beach to the business district of Los Angeles.



Here is a view looking southerly along Long Beach Freeway showing the interchange with Santa Ana Freeway and in the background the crossing over freight classification yard of Union Pacific Railroad.



LEFT—Looking northerly along the Long Beach Freeway, showing in the foreground the freight classification yard of the Union Pacific Railroad and in the center the interchange with the Santa Ana Freeway, the same interchange as shown at right. RIGHT—View looking southeasterly along the Santa Ana Freeway showing in the foreground the interchange with the Long Beach Freeway, the \$48,000,000 highway discussed in this article on planning and design.

"When I came to the Regional Planning Commission in 1938, after having served as City Engineer for a number of years in Long Beach, I started a study of this possibility. We found that it was impractical primarily because the flood control officials would not allow the carrying capacity of the channel to be reduced to the extent required for the construction of the interchange ramps required to effectively handle the traffic. We then prepared a plan which provided for the use of both banks of the channel for highway purposes extending from the San Fernando Valley to the Long Beach Harbor.

"In 1941 many conferences relative to the plan were held with the district engineer, the City Engineer of Long Beach, the flood control engineer, the Corps of Engineers of the U. S. Army, and officials of the City of Los Angeles. All of these engineers and officials seemed pleased with the plan and accordingly a report was prepared by this department in July of 1941, and presented to the Los Angeles County Board of Supervisors at a hearing held on November 4, 1941. On December 4, 1941, I presented the plan to the Long Beach City Planning Commission and obtained their approval.

"In 1942, we continued to discuss the plan with various civic groups to promote the idea and at the same time continued the preparation of more detailed plans for the project. About this time the City Engineer of Long Beach was making plans for a major highway called Pico Avenue to extend along the west bank of the channel within the city, using plans which we had prepared in planning underpasses for several bridges over the flood control channel.

#### Master Plan Drawn

"In 1943 we completed a master plan of freeways for the entire county. This plan was shown in a commission report entitled *Freeways for the Region*. The plan called for a freeway, following the route of Pico Avenue through the Long Beach area from the harbor to its northerly limits and thence along the westerly bank of the Los Angeles River channel crossing to the easterly bank in the vicinity of the confluence of the Los Angeles and Rio Hondo Rivers and extending northerly to a connection with the Santa Ana Freeway."

The City of Long Beach had been actively engaged in promoting a traffic arterial along the Los Angeles River for a number of years, and had secured much right-of-way in the city adjacent to the Los Angeles River for future highway purposes. This, as Arthur Adams wrote, was originally known as the Pico Avenue project. In going forward with this development, the city in 1947 constructed a bridge across the projected highway for Willow Street and a second bridge for Long Beach Boulevard. At Willow Street provision was made for a six-lane divided highway under the bridge whereas at Long Beach Boulevard provision was made for an eight-lane facility. These bridges built by the City of Long Beach and financed with city funds became a part of the Long Beach Freeway.

The Los Angeles County Road Department, in 1950, completed con-

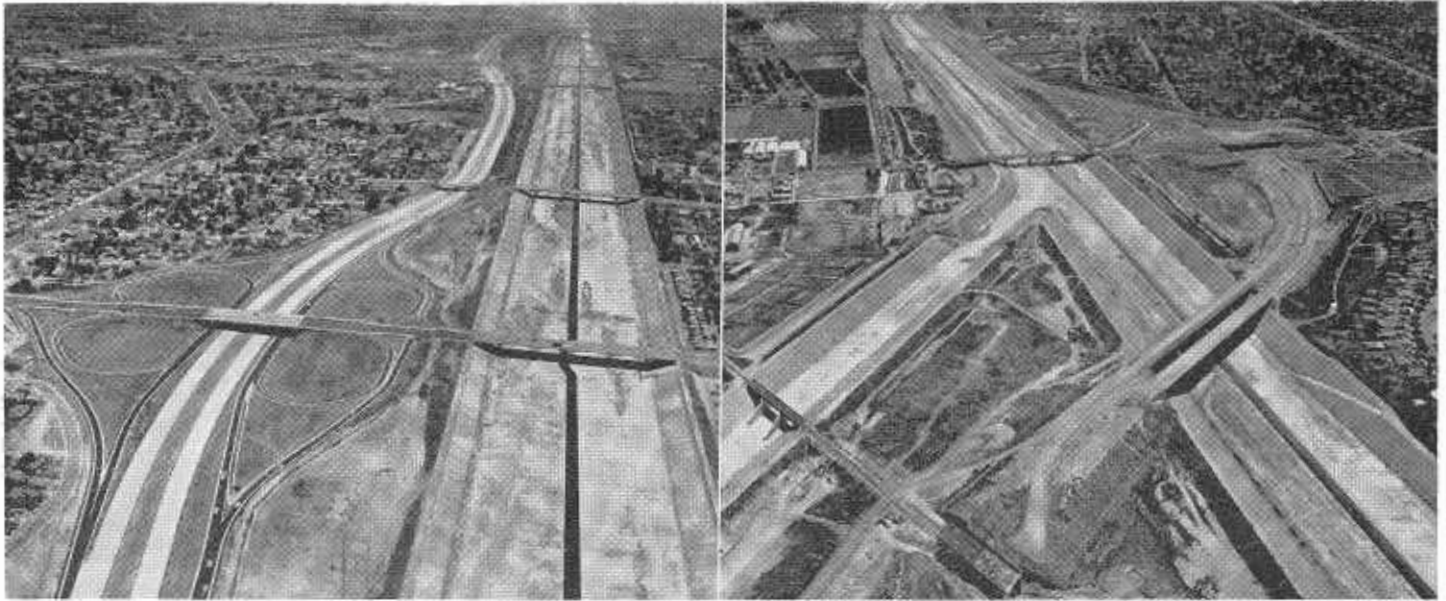
struction of the bridge across the Los Angeles River and over the freeway for Belhart Street. This was financed by Los Angeles County.

Under a legislative enactment approved by the Governor on June 23, 1947, the portion of the so-called River Freeway between Route 60 and the Santa Ana Freeway was taken into the State Highway System. Following this action, District VII proceeded with the preparation of a project report prior to entering into freeway agreements with four cities—Long Beach, Compton, Lynwood and South Gate—and Los Angeles County. The project report was submitted July 11, 1949, and approved by the Division of Highways at Sacramento November 22, 1949. In the design of the freeway no substantial changes were made from the general features recommended in the project report. However, additional interchanges were provided at Del Amo Boulevard and Olive Street. In the 16.5-mile stretch of freeway, 15 interchanges and 10 separations of streets were provided.

#### Designed for 60 mph

The freeway is designed for a safe speed of 60 miles per hour. Between Route 60 and the future San Diego Freeway, six lanes have been provided with a curbed median 16 feet in width.





LEFT—View looking southerly along the Long Beach Freeway showing the cloverleaf interchange with Florence Avenue. RIGHT—Another southerly view along the Long Beach Freeway shows construction in progress at the crossing with the Los Angeles River at right. The Rio Hondo Channel is shown at the left.

Northerly of the San Diego Freeway to the Santa Ana Freeway, the section consists of three lanes in each direction, separated by an uncurbed median of 40 feet. Concrete pavement was used on main freeway lanes. At some future time it is proposed to place two additional lanes in this median area, which will provide an ultimate eight-lane freeway northerly from the San Diego Freeway. The maximum grade on the freeway is three percent (3%).

Under the terms of freeway agreements, grade separation bridges and traffic interchange facilities were provided at Pacific Coast Highway (Route 60), Willow Street, Belhart Street, Del Amo Boulevard, Long Beach Boulevard, Artesia Avenue (Route 175), Atlantic Avenue (Route 167), Olive Street, Rosecrans Avenue, Imperial Highway, Firestone Boulevard (Route 174), Florence Avenue, Atlantic-Bandini Boulevards, Washington Boulevard and a branch connection with the Santa Ana Freeway. Structures were completed across the Santa Ana Freeway and over Olympic Boulevard in anticipation at some future time of the northerly extension of the Long Beach Freeway to connect with the San Bernardino Freeway and Huntington Drive.

A freeway location such as this adjacent to a river presents problems. The bridges constructed by Los Angeles County at Belhart Street and by the city at Long Beach Boulevard were too close to the Los Angeles River to allow for the design of complete traffic interchange facilities at these locations.

Where complete traffic interchange facilities are being provided, the freeway location has been curved outward

from the normal location adjacent to the Los Angeles River bank to provide room for interchange roadways. This type of location which restricts traffic interchange design is satisfactory initially, but since the freeway is adjacent to the river it will not be practicable, except at excessive cost, to provide additional traffic interchange facilities should such be required by future increased traffic demands.



The completed cloverleaf interchange with Artesia Avenue is shown center right in this view looking northeasterly, while in the left background may be seen construction in progress north of Atlantic Avenue.

### **Design Started in 1950**

By reason of the limited number of traffic interchanges, it is believed that this freeway will operate in a most effective and efficient manner.

Design on the freeway was initiated in the early part of 1950, and the first contract in the amount of \$1,507,000 was awarded May 31, 1951, to the Griffith Company covering the 2.5-mile reach between Pacific Coast Highway (Route 60) and 223d Street. Subsequently, the district proceeded with design and construction on the balance of the freeway to the Santa Ana Freeway, and to date nine bridge contracts, 10 road contracts, two illumination contracts and two erosion control contracts, costing approximately \$28,000,000, have been completed or are under way. Nine of the contracts were financed in part with federal aid funds administered by the U. S. Bureau of Public Roads.

State contracts have been awarded to the following: Griffith Company, one contract; J. E. Haddock, Ltd., two contracts; Ukropina, Polich & Kral, seven contracts; Webb and White, three contracts; Oberg Bros., two contracts; R. M. Price Company, one contract; J. A. Thompson & Son, one contract; Webb, White & W. J. Distelli, one contract; N. M. Saliba Company, one contract; Jannoch Nurseries, one contract; Westates Electrical Construction Company, one contract; Fishbach & Moore, one contract; Henry C. Sotto Corporation, one contract.

The United States Corps of Engineers included in its channel contracts the construction of the substructure for a bridge across the Los Angeles River north of Imperial Highway and the construction of a railroad bridge across the Long Beach Freeway north of Rosecrans Avenue. By reason of this co-operation, a considerable saving in state highway funds was realized. The U. S. Government also contributed funds to cover a portion of the construction cost of the Dominguez grade separations of the Union Pacific Railroad and Pacific Electric Railway tracks which eliminated necessity for future construction revisions when its channel work was undertaken.

### **Co-operative Agreements**

The Los Angeles County Flood Control District constructed a lined channel between the Los Angeles River south of Southern Avenue in Compton and Jaboneria Road northwesterly of Firestone Boulevard. In its contract it included a covered channel under Firestone Boulevard and a covered channel under the Long Beach Freeway. Portions of the covered channel were financed by the State under the terms of a co-operative agreement.

The City of South Gate under terms of another co-operative agreement constructed a frontage road on the easterly side of the freeway southwesterly from Southern Avenue.

The Los Angeles County Road Department has constructed bridges across the Los Angeles River and the Long Beach Freeway on Compton Boulevard. At the present time the Los Angeles County Road Department is constructing bridges across the Long Beach Freeway and the Los Angeles River for Olive Street. The above bridges across the freeway and certain incidental approach work was financed by the State under the terms of co-operative agreements with the County of Los Angeles. The county, under terms of a co-operative agreement, financed cost of extending the Rosecrans Avenue bridges across the Los Angeles River channel.

A total of 11 co-operative agreements have been entered into: three with Los Angeles County Road Department, three with the City of Long Beach, three with the U. S. Corps of Engineers, one with the Los Angeles County Flood Control District, and one with the City of Southgate.

### **All Usual Problems**

At the present time all construction work on the Long Beach Freeway between Route 60 and the Santa Ana Freeway is either completed or under contract. In the future the traffic interchange facility at Del Amo Boulevard will be completed. There is also a future interchange to be built between the Long Beach and San Diego Freeways when this latter freeway is placed under construction.

The design and construction of the Long Beach Freeway has involved all the usual problems which are encountered on freeway projects. The route traverses sections of the cities of Long Beach, Compton, Lynwood, Southgate, and county territory. It also passes through an installation of the United States Air Force known as the Cheli Air Force Depot.

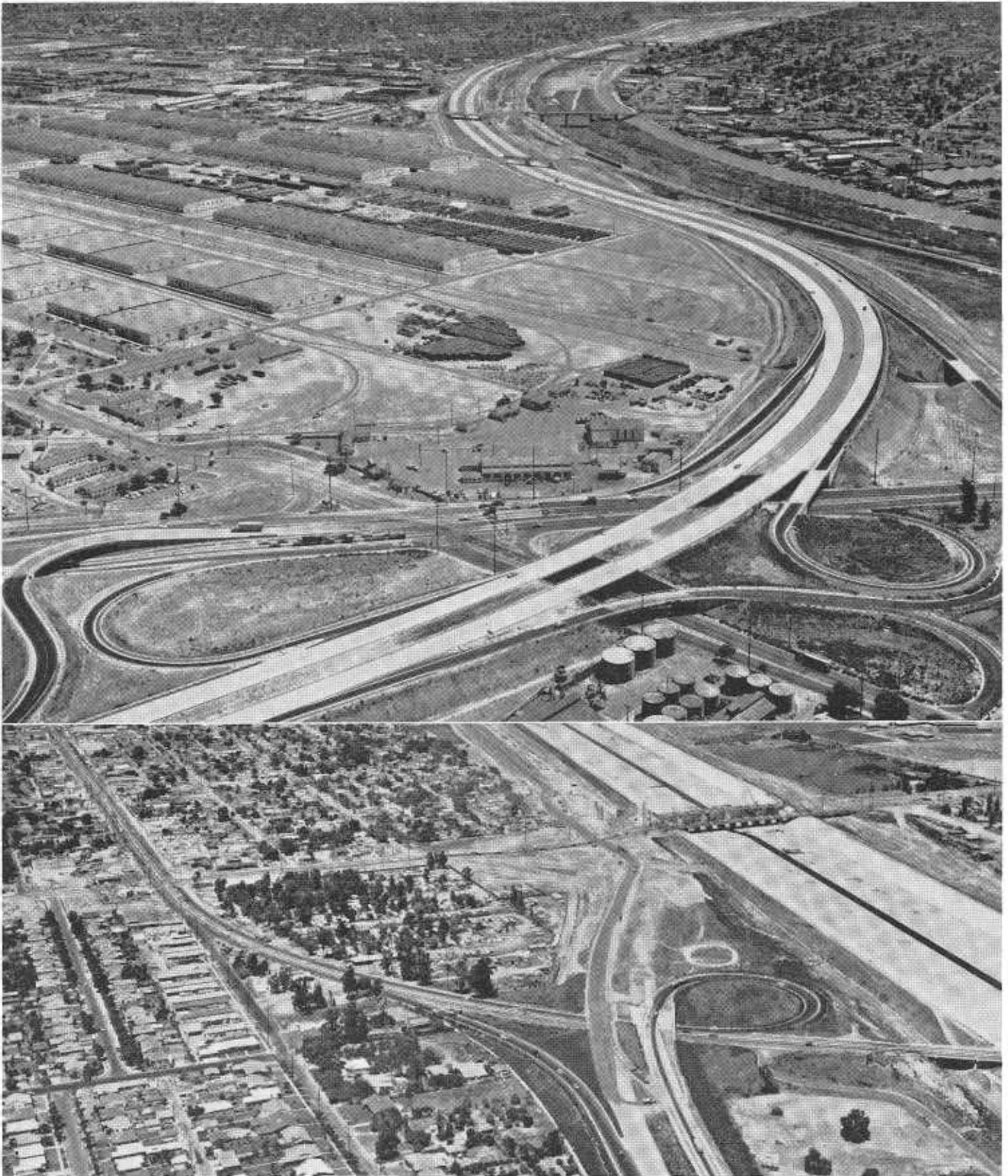
The freeway has required the relocation of a portion of the railroad lines of the Los Angeles Junction Railway. It crosses the freight classification yards of the Atchison, Topeka and Santa Fe Railway and the Union Pacific Railroad on viaducts each almost 1,000 feet in length. There are three railroad grade separations on the Pacific Electric Railway, two on the Union Pacific Railroad, one on the Southern Pacific Railroad and one on the Atchison, Topeka and Santa Fe Railway. In connection with design and construction, it was necessary to revise sanitary sewer lines of the cities served and of the Los Angeles County Sanitation District as well as to alter numerous city streets and county roads.

Two privately owned dumps were removed. The refuse was placed in the loops of interchange roadways and in other adjacent state-owned right-of-way not utilized as freeway or roadway. One of the dumps required the removal and disposal of 300,000 cubic yards of refuse material. A second commercial dump required removal of 30,000 cubic yards. After award of contracts, additional refuse material sites were encountered concerning which there existed no previous information, and these were removed under change orders issued during construction.

### **Big Saving Realized**

During the early stages of design the Los Angeles County Flood Control District presented a proposal that the State occupy a portion of its right-of-way between Olive Street and Imperial Highway. This right-of-way was not required by the county because of narrowing the channel of the Los Angeles River. There was some hesitancy on the part of the State as to whether our construction program could be co-ordinated with that of





UPPER—This view south along the Long Beach Freeway shows in the foreground the interchange with Atlantic Boulevard and Bandini Boulevard. LOWER—Here the camera looks in the opposite direction, northerly along Long Beach Freeway. Construction work is seen in progress north of Atlantic Avenue.

the flood control district so that cooperation would be practicable. Since a saving of several hundred thousand dollars could be realized by such cooperation, the chance was taken that construction programs of county and State could be co-ordinated. Fortunately, the last section of the river channel affecting the freeway was completed in December, 1956, and thus there was no interference with the State's schedule. In some instances it was found that the Los Angeles County Flood Control District easements were restricted to flood control purposes and it was then necessary for the State to acquire rights from the underlying fee owners.

The acquisition and clearing of rights-of-way on this project were major problems. Some 1,200 parcels of right-of-way were obtained, and in carrying out clearing operations 66 buildings were demolished and 691 were removed. The cost of right-of-way acquisition was approximately \$20,000,000.

The section between Florence Avenue and Atlantic Boulevard traversed some of the most intensively developed industrial property in Southern California. In order to conserve industrial property, right-of-way in this area for the freeway was held as close to the river and to the Los Angeles Bureau of Power and Light right-of-way as practicable. It was also necessary to hold the taking from the Cheli Air Force Depot to a minimum.

#### **Free Circulation**

Right-of-way equivalent in area was obtained easterly of Eastern Avenue to replace the rights-of-way taken by the freeway from the Air Force Depot. A grade separation structure under Eastern Avenue was constructed so that free circulation could be maintained between the two sectors of the Air Force Depot property.

It is to be noted that some 3,000,000 yards of imported borrow was required to be hauled in from outside sources for building freeway embankments. In addition, 1,250,000 cubic yards of material was obtained by making the freeway excavation between Hubbard Street and Dozier Avenue on the future alignment and

grade of the northerly extension of the Long Beach Freeway. Therefore, in excess of 4,000,000 yards of material was hauled in from sources beyond the limits of the job to complete the freeway embankments.

Securing this quantity of imported borrow in a highly urbanized area presented major problems. However, the State made arrangements to secure material from designated optional sites in compliance with established practice.

The necessity for a large quantity of imported borrow for this freeway and for the future San Diego Freeway led the district to make an exhaustive and systematic search for possible sites. As a result of the investigations, a borrow site was purchased at Del Amo Boulevard and Wilmington Avenue comprising some 150 acres. The material from this site is being removed to a fixed grading plan and after removal of some 8,000,000 yards of imported borrow the site will be disposed of for industrial or other purposes.

#### **Water Permits Secured**

The freeway is adjacent to or crosses the rights-of-way of the Southern California Edison Company and of the Los Angeles City Department of Power and Light, which necessitated certain revisions of their facilities.

At various locations it was necessary to secure permits from the Los Angeles County Flood Control District to permit the State to discharge water into the flood control channel as well as to secure permits to cross the Los Angeles River flood control channel.

In connection with the freeway, pumping plants were installed by the State Division of Highways at the Dominguez Crossing of the Union Pacific and Pacific Electric Railway at Olive Street, at the Pacific Electric Railway Undercrossing north of Rosecrans Boulevard at Firestone Boulevard at Clara Street, at Florence Avenue and at Slauson Avenue. These pumping plants were designed by the State Bridge Department. The City of Long Beach designed and constructed

pumping plants at Pacific Coast Highway, Willow Street and Long Beach Boulevard. These city-designed plants were financed in part by the State. The city had previously constructed a pumping plant north of Artesia Avenue with provisions that the future freeway drainage would discharge thereinto.

The contribution by the State for the various city pumping plants was based upon the ratio of water discharged from the freeway into the plants to the full capacity of the pumping installations.

#### **\$48,000,000 Budgeted**

The financing of the Long Beach Freeway presented fiscal problems of no small magnitude. During the past eight years the California Highway Commission has budgeted a total of approximately \$48,000,000 for right-of-way acquisition and for construction on the Long Beach Freeway.

The foregoing story is about the main stem of the Long Beach Freeway, extending for 16.5 miles from Pacific Coast Highway to the Santa Ana Freeway. Of this mileage, 10.5 miles have been completed and opened to public traffic, and six miles are currently under construction with estimated date of completion being early summer, 1958.

It would be amiss to conclude this article without some mention of the two important extensions of this freeway northerly and southerly. Southerly of Pacific Coast Highway, beyond the south terminus of State Highway Route 167, the City of Long Beach is carrying out as a city-financed project, design and construction for extension of this freeway to the Long Beach Harbor area, and also westerly to a connection with Terminal Island. Construction for one-half mile, including the Anaheim Street interchange, was completed in 1953. South of Anaheim Street several bridges and other construction are now in progress, looking toward extension of this freeway into the Long Beach Harbor area. The total estimated cost of the work proposed to be done by the City of Long Beach with city funds is in the neighborhood of \$15,000,000.

... Continued on page 42



# Kern County

Federal Aid Secondary  
Project Is Completed

By CLINTON D. BEERY, Office Engineer, Kern County  
Department of Highways and Bridges

THE RAPID development of agriculture and industry in the County of Kern creates an ever increasing demand on the county's Department of Highways and Bridges for more and better highways. With over 3,000 miles of roads now in its system—varying from mountain trails to metropolitan streets and including divided highways with limited access and interchanges—the county welcomes federal and state financial assistance for projects such as the one which is the subject of this article.

#### Federal Aid Secondary

Local people know this project 885(1) as "Alfred Harrell Highway," "Hart Park Road," "China Grade Loop" or just "the road down the bluff." Actually they are all correct because in operation it is an interchange connecting several major county highways.

At the southwest end, it connects to Panorama Drive and Mount Vernon Avenue, two of Kern County's major streets in the Bakersfield area—both four lanes divided. The residential areas and the Bakersfield City College at the top of the bluff create a tremendous flow of traffic.

#### East End Connection

At the east end, it connects to the Alfred Harrell Highway (Hart Park Road) which is now a two-lane road far overcrowded with traffic going to or coming from the county's recreational facilities along the Kern River. Plans are now under way to improve Alfred Harrell Highway to freeway standards on eastward to Hart Memorial Park then southeasterly as a limited access highway to connect to State Route 178.

At the northwest end, this project connects to China Grade Loop which crosses the river and passes through one of Kern County's largest heavy industrial areas. Studies for the im-

provement of China Grade Loop are getting under way.

Studies for the possibility of this interchange started early in 1955 as a county project. The county engineers were convinced that it was both warranted and practical so they began designing it. They decided the best design would be to use the existing two-lane road (to be improved later) as a two-lane one-way roadway up the bluff and to put the downhill movement on new alignment. After an extensive survey, the staff decided upon an alignment which utilized the maximum grade considered practical (8 percent) down the side of the 400-foot bluff to keep the length to a

minimum. This design required side-hill cuts of up to 100 feet and sidehill fills of up to 42 feet. It was designed so that only one separation structure would be required, and it would be at the foot of the bluff.

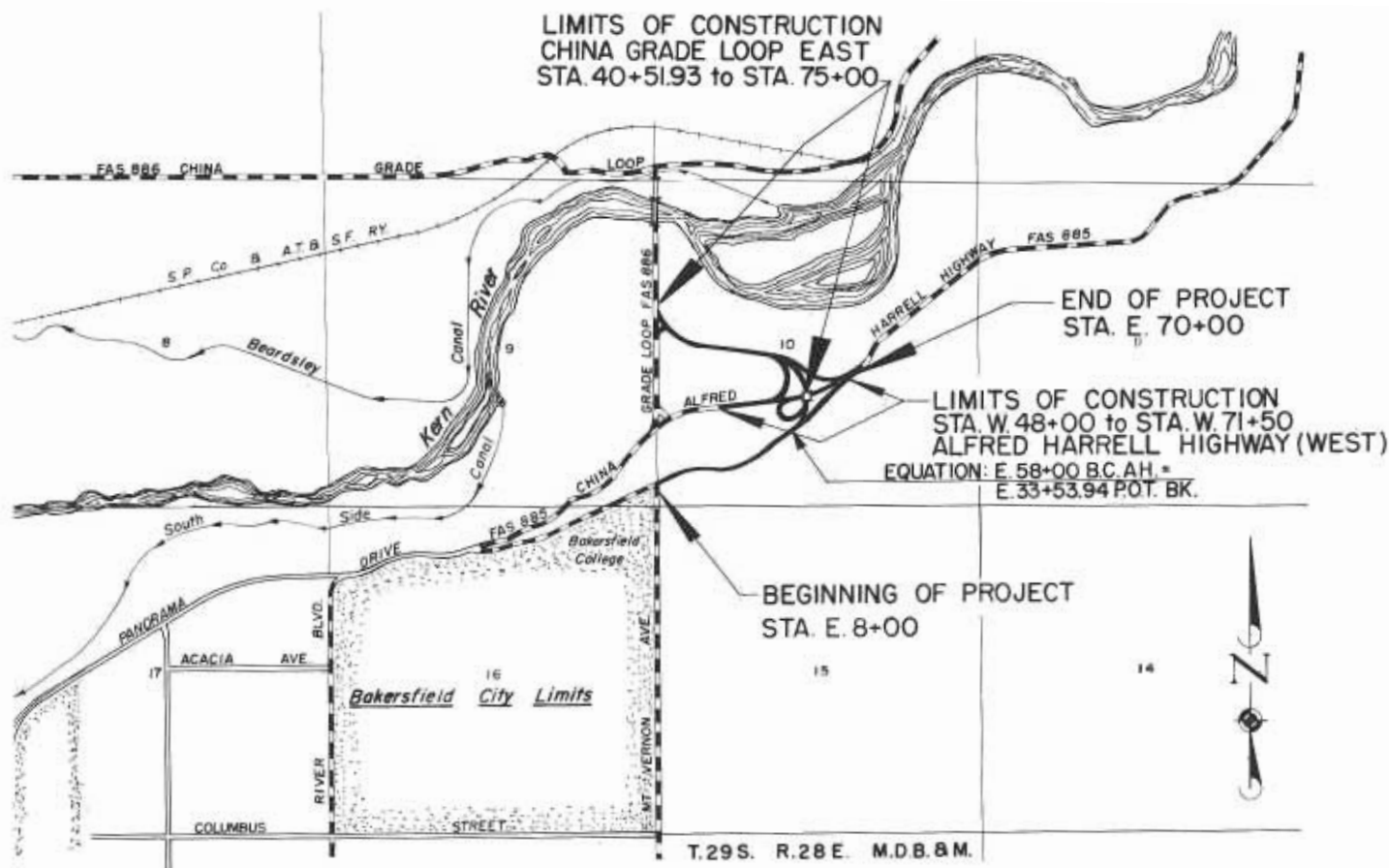
#### Project Gets Approval

Request was made to the board of supervisors for permission to acquire access rights so the interchange could be built as a full freeway. The request was granted and the right-of-way agent began negotiations for purchase of the necessary land.

As design progressed, work was also being done to get the interchange into the Federal Aid Secondary System. A



Interchange constructed with federal, state and county funds, seen from above the Alfred Harrell Highway with Bakersfield in distant left, Panorama Drive and Bakersfield College at left



field review was made in December, 1955, by the California Division of Highways and the United States Bureau of Public Roads. The California Highway Commission approved the project on September 25, 1956, and the United States Bureau of Public Roads approved the project on November 5, 1956.

The county engineers consulted with the Bridge Department of the California Division of Highways and decided to make the structure which separates the two major traffic movements a rigid frame bridge with a clear span of 55 feet and a clear width of 40 feet. The structure had to be placed where the deck was on a 550-foot radius, a 6 percent downgrade and a 12 percent superelevation.

On March 1, 1956, county forces with county owned and rented equipment moved in and started benching on the side of a bluff that stood on almost a 1:1 side slope for about 300 feet of its 400-foot height. They moved about 140,000 cubic yards of

roadway excavation to build the two-lane roadway down the bluff and to make the fills at the bottom. The roadbed was constructed to within 0.1 foot of subgrade. Excess material was stockpiled at the bottom of the bluff, compacted slightly and dressed up so it would not be unsightly. This excess material will be used later to build the Alfred Harrell Highway on to the east.

The plans for the base and surfacing were completed and the bridge was designed and detailed by the road commissioner's engineering staff. This project was submitted to bids by the State Department of Public Works as is required of all federal aid secondary projects, although construction engineering is usually, as in this case, performed by county personnel.

#### Completed in October

A contract was awarded to Griffith Company on March 5, 1957, for \$178,-375. Mr. Bruce McDonald was project superintendent for Griffith Company. The work required by the

contract was completed on October 24, 1957.

The only difficulty encountered during construction was the placing of bridge deck and that because of its being on a 6 percent downgrade and on a 12 percent superelevation.

The County of Kern has expended \$166,400 toward this project for rights-of-way, county force account, design engineering, construction engineering, and the county's share of the work done by contract. State and federal funds bring the total expenditures to approximately \$300,000.

About a mile west of this interchange, another of the county's federal aid secondary projects is in progress. It is a divided highway with limited access about two miles in length spanning two canals and the Kern River. The southbound lanes and an interchange were completed last year. The other half is scheduled for completion in May, 1958.

Other federal aid secondary projects in Kern County in some phase

... Continued on page 18



# Sierra Progress

*Work Continues on US 40  
And 50 Through Mountains*

By P. R. LOWDEN, Assistant District Engineer, Operations, District III

THE ENDING of the 1957 construction season in high Sierra area of District III shows considerable progress has been made in the improvement of two major transcontinental routes through these rugged mountains. The major emphasis has been on the transforming of Highway US 40 to a four-lane freeway. Traffic pressure on this route has been growing annually and the number of motor vehicles anticipated for the scheduled 1960 Winter Olympics at Squaw Valley can be handled with ease only by the type of highway currently under construction.

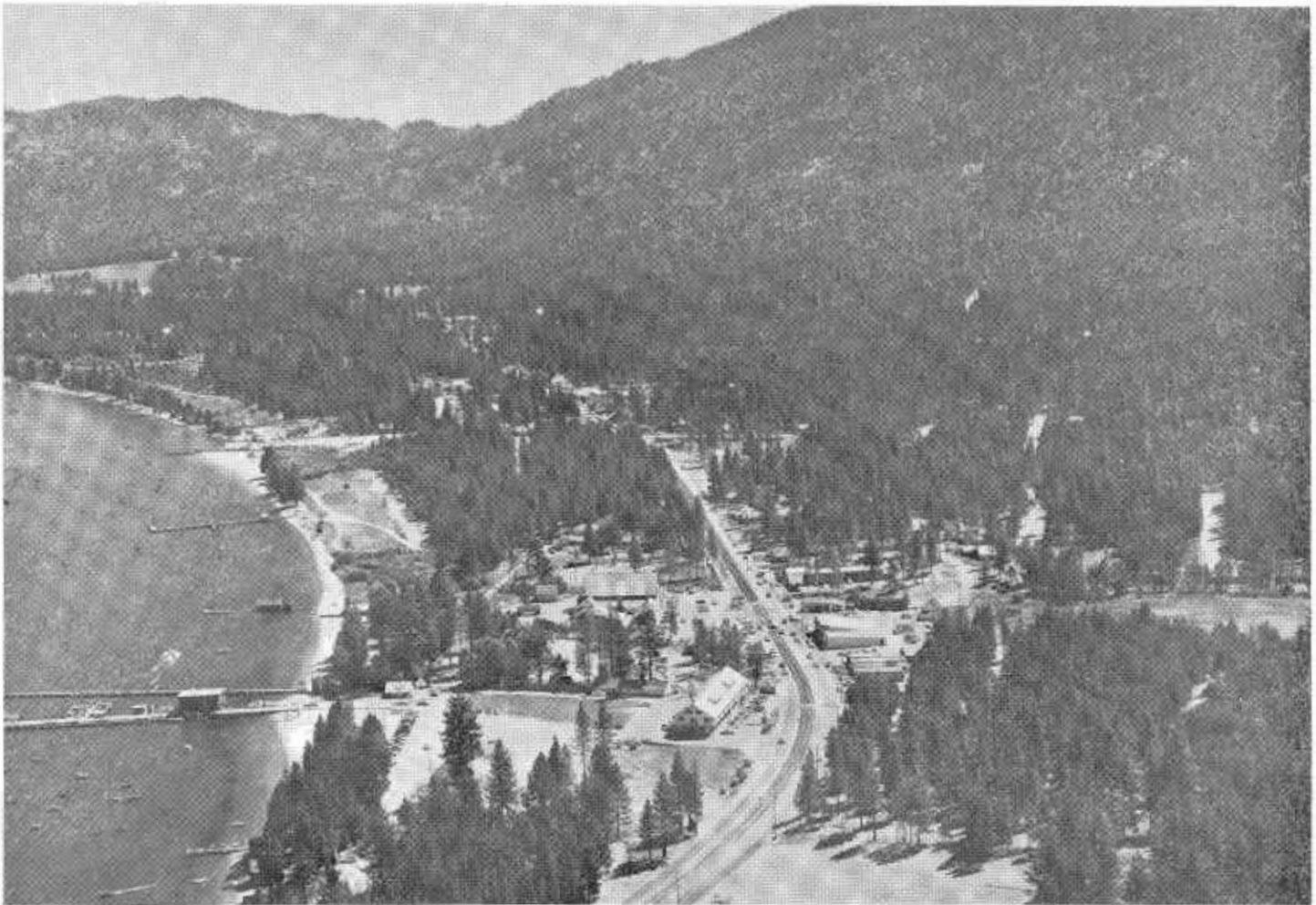
Work on Highway US 50 was planned to ease the most pressing present deficiencies. Much of this work is now completed, or will be in the very near future.

#### US 40

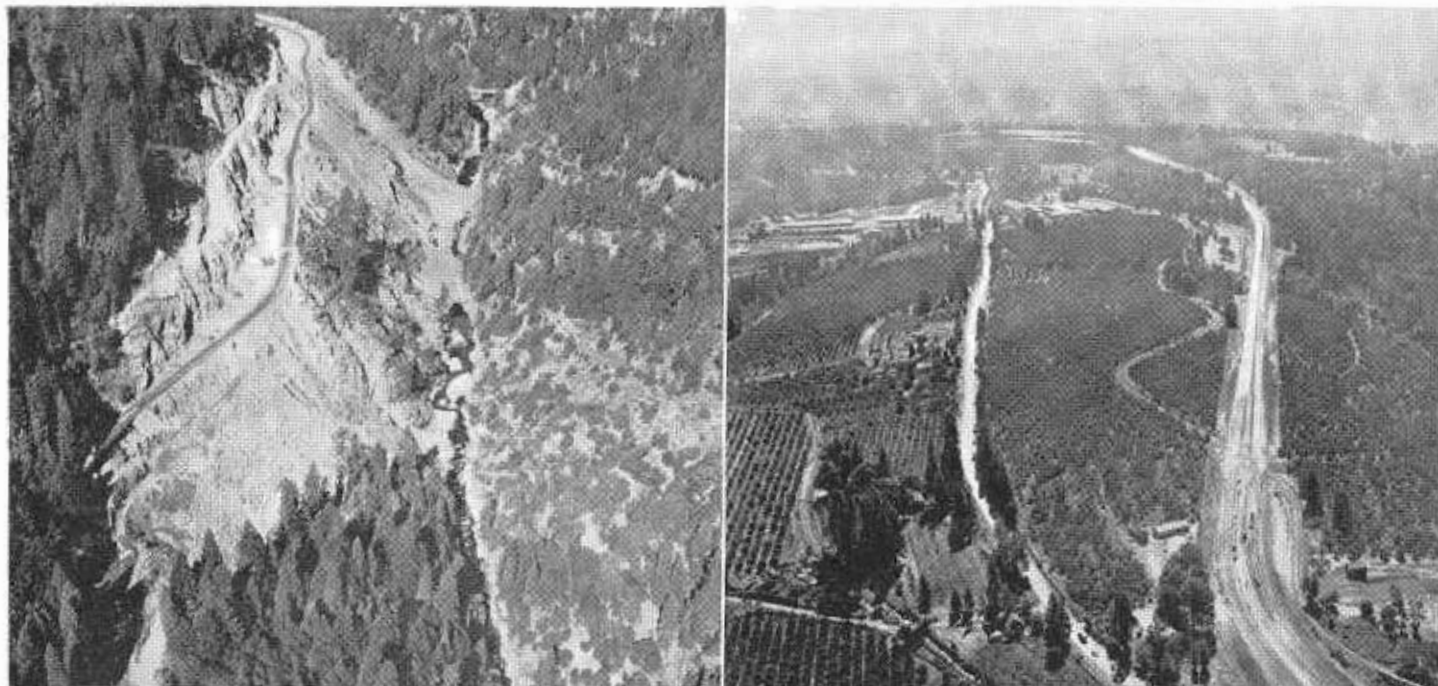
The interchanges at Canterbury Road and Dead Mans Slough on the North Sacramento Freeway were improved at a cost of about \$228,000. The work was done by the Brighton Sand and Gravel Company of Sacramento. Gordon Labrie was the resident engineer.

The interior take-off ramp of the South Roseville Overcrossing to Roseville and US 99E was lengthened and the signing improved under a contract to Granite Construction Company of Watsonville. The work cost about \$28,000 and was handled by James W. Hunter as resident engineer.

Continuing easterly, the first major project along US 40 coming under this year's program is the construction on new alignment of a four-lane freeway from one mile east of Newcastle to Elm Avenue in Auburn. The project is currently 75 percent complete



*Aerial view of US 50 construction on south shore of Lake Tahoe, looking east. Traffic congestion results from paving work, under way when photo was taken.*



LEFT—Aerial view of construction on US 50 between Pacific House and Riverton. The view is from the east end of the project, RIGHT—Another aerial photograph, this one showing construction on US 50 bypassing Camino, which is in upper left. Photo taken one month before paving completed.

and is ahead of schedule. It is hoped the base and surfacing work will be finished before the winter storms force a shut-down of operations. Lack of steel on a prior contract for the railroad viaduct near the west city limits of Auburn will prevent the completion of the contract before next fall. H. Earl Parker, Incorporated, and Baldwin Contracting Company of Marysville have the contract for the work which will cost approximately \$2,500,000. A. N. Regalia is project engineer, Al Vercruyssen is general superintendent and George White is superintendent for the joint venture contractors and Linward O. Kendall is representing the Division of Highways as resident engineer.

#### **New Alignment**

A six-mile section from Heather Glen to Colfax is being graded and surfaced with plant-mixed surfacing as a four-lane expressway at an approximate cost of \$3,842,000. This improvement is generally on new alignment and when joined to the project east of Colfax will provide about 12 miles of new freeway in this area. The project, being constructed by McCammon-Wunderlich Company and Wunderlich Construction Company

of Palo Alto under Superintendent John New, is 70 percent complete and is expected to be placed in use in July next year. Favorable weather will enable the contractor to finish at an earlier date. The key to completion is work on structures that were held up by a shortage of steel. The Palo Alto firm moved on this job prior to the formal approval of the contract and had completed 10 percent of the work before such approval was received. Roy T. Phillips, Jr., is representing the Division of Highways as resident engineer.

Just east of Colfax, and extending to the Southern Pacific Railroad Overhead at Magra, Frederickson and Watson and Ransome Company of Oakland are working on six miles of new four-lane freeway that will cost about \$4,050,000. Karl Poss is handling the job for the contractors. The project requires 2,310,000 cubic yards of excavation and 21,537,000 station yards of overhaul. The placing of a steel plate girder 102 feet long in the alteration of the railroad bridge at Magra is one of the remaining large jobs. The work on this section is approximately 55 percent complete and Resident Engineer Harold J. Lopez

hopes to have the road in service by early August next year.

The paving on this section, as it will be for the remainder of the distance to the state line, will be portland cement concrete.

#### **Traffic Accommodated**

A detour is being built from Monte Vista to Alta Road following the alignment of a county road to accommodate traffic during future freeway construction in this area. The contractor on the Colfax to Magra improvement is also doing this work. The \$315,000 project is currently 90 percent complete and it is anticipated all work on it will be finished prior to winter. The detour will enable the future freeway contractor to carry on his operation without traffic interference and prevent delays to the motoring public on this major transcontinental route. The Division of Highways is represented on the detour project by Darrel L. McWhirk as resident engineer.

Another detour for future freeway construction is being constructed in the Truckee River Canyon east of Truckee between Boca and Floriston to carry Highway 40 traffic during the construction of a section of free-





*Traffic is shown passing through the construction area in this photograph of US Highway 40 work between Truckee and the Nevada state line*



LEFT—Construction between Weimar and Gold Run. RIGHT—Cut and fill construction near Cape Horn required transfer of large quantities of earth.

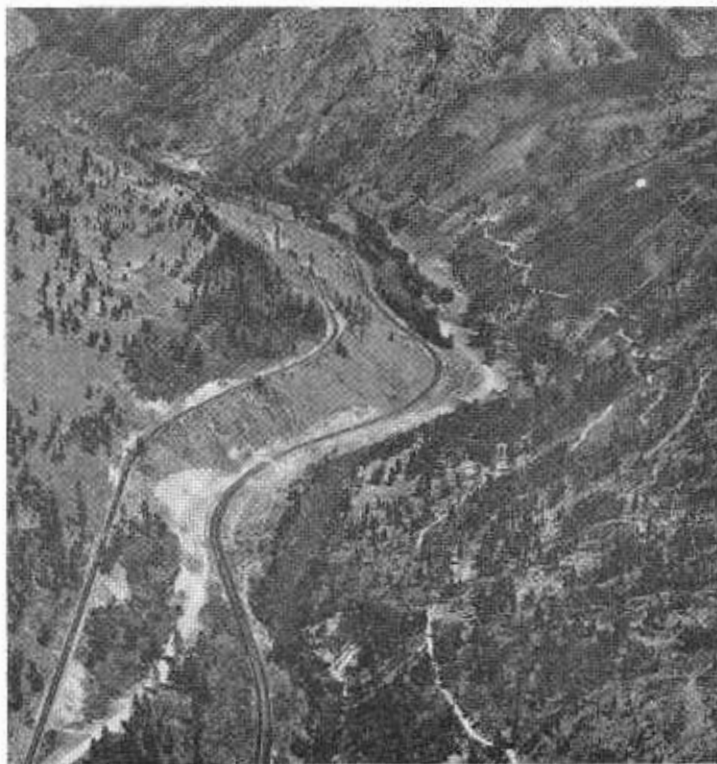
way in this rugged terrain. The work is about 75 percent complete, with two bridges over the Truckee River being the two large items yet to be finished. H. Earl Parker, Incorporated, is the contracting firm for this project which will cost about \$564,000, and they are attempting to complete all work by mid-December. Sam Cot-

trell is the resident engineer and L. H. Roper is the superintendent for the Marysville contracting firm.

#### Detour Not Practicable

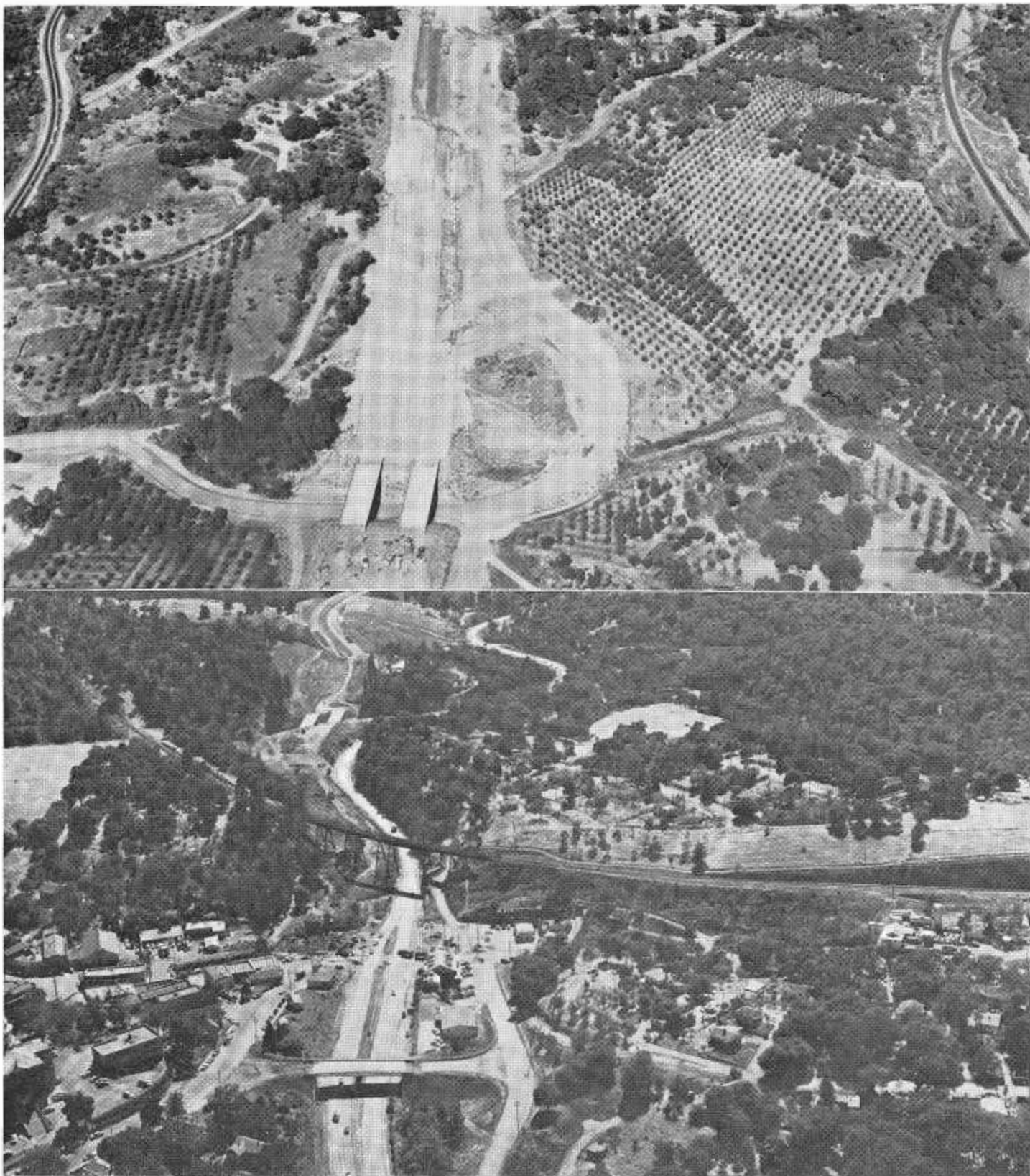
The most difficult construction project on the route this year was from Floriston to the California-Nevada state line. The conversion of this

5.4-mile section to a four-lane freeway along the existing alignment posed a major traffic problem. A detour was not practicable and it was necessary to carry US 40 traffic through construction. Careful scheduling on the part of the contractor and Resident Engineer John C. Petersen made it possible to complete the excavation of



LEFT—Aerial view of construction in the Truckee River Canyon between Truckee and the state line. Present highway is on the left; railroad in center; service trail at right. ABOVE—Closeup of freeway construction between Weimar and Gold Run showing equipment at work on a giant fill.





UPPER—Scene between Auburn and Newcastle. LOWER—Realignment of US Highway 40 in the Auburn area is shown in this view, looking west from Auburn.

over 1,000,000 cubic yards involving some 40,000,000 station yards of overhaul with delay to traffic limited to

30 to 40 minutes except for several isolated instances. This \$5,400,000 project, being constructed by Gib-

bons and Reed of Salt Lake City, Utah, will be about 70 percent completed when the severe Sierran winter

forces a halt of work. The superintendent for the Utah firm is Ed Jolley. This section is scheduled for completion early in September of next year.

The Floriston job also saw, for the first time, the passing out of information in pamphlet forms explaining the reason for the delay to the motorist. This effort has been very well received.

#### US 50

A critical deficiency on Highway 50 created by industrial and military installation growth east and south of Sacramento was alleviated by the conversion of Highway US 50 to four lanes from the Brighton Underpass near Sacramento to Alder Creek, near Folsom. This work was on an interim basis pending the construction of a four-lane freeway on new alignment. The work has been nearly completed by the contractor, A. Teichert and Son, Incorporated, of Sacramento. The cost of the work is about \$1,040,000. During this construction, it was necessary to move the intersection with Citrus Road approximately 1,800 feet to accommodate the realignment of that road by Sacramento County.

The superintendent for the contractor was Bob Brock, and Vincent Barsi served as resident engineer for the Division of Highways.

Just west of Placerville, the intersection of Highway 50 and El Dorado Road was improved by channelization at a cost of \$38,700. The work was done by S. G. Voudouris of Sacramento. The resident engineer was Dean Kelly.

#### Drainage Problem

A stretch of four-lane expressway was completed from Five Mile Terrace, east of Placerville, to 0.7 mile east of Camino. This 3.7 miles of improved roadway bypasses the Town of Camino. The principal structure on the new road is the grade separation of Highway 50 and Snow Road. The plant-mixed surfacing on this project was placed using bottom dump trucks and the method proved quite satisfactory. Drainage correction proved quite a problem in one location and required the placing of over 2,200

feet of perforated metal pipe. The work was done by John Delphia and Fred J. Early, Jr., Company of Patterson at an approximate final cost of \$1,025,000. The contractor's forces, under Superintendent Earl Barnard, completed the project about one month ahead of the planned schedule. The Division of Highways was represented by Resident Engineer Dean Kelly.

The Bureau of Public Roads is converting a 1.15-mile section of Highway 50 from Pacific House to River-ton to a modern four-lane mountain highway. The removal of 525,000 cubic yards of material on the existing alignment in this rugged area required long night closures during the spring and summer this year. These controls were lifted in early September, and random half-hour stoppages were substituted. The contractor, Clyde W. Wood, Incorporated, of Hollywood, hopes to finish the project before winter storms force a stoppage of work. The cost of the work will be about \$1,260,000. The contractor's forces are headed by Superintendent Andy Weesner. Howard M. Christensen is the resident engineer for the bureau.

#### Turnout Lanes

The improvement of traffic safety in the vicinity of Echo Summit was accomplished during the summer by the installation of metal guard railing at nine locations from near Camp Sacramento to one mile east of Echo Summit. In this same general area, eight truck turnout lanes were constructed to facilitate the passing of slowly moving vehicles on the grades in this section. The guard railing was erected by the Wulfert Company of San Leandro under a contract that cost \$10,450. Harms Brothers Construction Company of Sacramento did the work on the truck turnouts for \$148,000. Dean Kelly represented the Division of Highways as resident engineer on both projects.

The final project on Highway 50 was the improvement of the route from the junction with State Sign Route 89 at Tahoe Valley to the California-Nevada state line. From the

junction to Al Tahoe, the existing route was paved with plant-mixed surfacing to provide a 28-foot traveled way, and from Al Tahoe to the state line a 64-foot all-paved street section was constructed. The project also provided for the improvement of drainage and installation of curbs.

#### Local Co-operation

No detours were available and it was necessary to carry some 20,000 vehicles per day through construction—it being necessary to have the highway torn up during the summer tourist season which coincides with the short construction season available in this mountain area.

Good co-operation on the part of the local chamber of commerce, the local business interests and the contractor made possible the completion of the work with remarkably few complaints.

Baun Construction Company of Fresno, Walter Baun, Superintendent, had the contract for the work that cost approximately \$340,000. The Division of Highways was represented by Resident Engineer Leon Hawkes.

The completion of the work under way on these two routes, continues the development which ultimately will give the motoring public two outstanding mountain highways over the towering Sierra Nevada Mountains. Truly, California has the "men to match her mountains."

## KERN COUNTY

*Continued from page 12...*

of design or construction include 13 miles of highways.

Kern County's governing body, the board of supervisors, realizes the need for improvement of the county's highways, and gives full support to the County Department of Highways and Bridges. They feel that gasoline tax money is not enough to carry on a comprehensive highway improvement program so they supplement it with a property tax of \$0.23 per \$100 assessed valuation. The budget for the Department of Highways and Bridges for the Fiscal Year 1957-1958 is \$4,932,000 exclusive of federal and state matching funds, which total \$605,571.



# Apportionment

\$15,581,474 in State and U. S. Funds Go to 57 Counties

**A**PPORTIONMENT of \$15,581,474 in state and federal funds to California counties for construction on county roads on the Federal Aid Secondary System was announced by the State Department of Public Works in November.

The allocation for the 1958-59 Fiscal Year, a record high, includes \$9,615,571 from the Federal Government and \$5,965,903 in state highway matching funds. The 1957-58 apportionment was \$8,916,082 federal and \$5,659,303 state funds, for a total of \$14,575,385.

The federal funds are apportioned to the various counties according to the formula used by the Federal Government in distributing federal aid secondary funds to the states—one-third on the basis of area, one-third on rural population and one-third on mileage of certain classes of rural mail routes.

The money from state sources is for the use of the counties in matching the federal funds on the basis of approximately 58 percent federal to 42 percent local funds. According to state law, \$200,000 is the maximum amount which may be made available to a county in a single year for use in matching its federal allocation.

## Federal Money Matched

This \$200,000 ceiling will permit 50 of the 57 eligible counties to match all of their federal allocation out of funds provided by the State, except for a small amount of county funds required for contingencies and engineering. The City and County of San Francisco is not eligible to participate in the federal aid secondary road program because it is entirely urban.

Seven counties receive such large federal apportionments that they will need to use some county funds, in addition to the \$200,000 in state funds, to meet federal matching requirements.

These counties are Fresno, Kern, Los Angeles, Riverside, San Bernardino, San Diego and Tulare.

County roads on which federal aid secondary funds may be spent are those roads which have been designated by the county, with the approval of the California Highway Commission and the U. S. Bureau of Public Roads, as constituting the county's federal aid secondary system.

For the most part, these roads are next in importance to state highways in terms of traffic volume and economic service to the locality, and are often referred to as "feeder roads" or "farm to market roads."

## Two New Laws

The largest federal aid secondary allocation for 1958-59 will go to San Bernardino County—\$694,703 federal and \$200,000 state funds. The smallest allocations will be to Alpine, Amador, Del Norte and Sierra Counties. Each will receive \$48,078 federal, and \$34,332 state funds.

Two laws governing the distribution of federal aid secondary and state matching funds were enacted by the 1957 Legislature. These statutes were first applied in connection with the 1957-58 apportionment, and both have meant increased funds for county roads and a corresponding decrease in the amount available for state highway purposes.

One of the new laws raised from 87½ percent to 98½ percent the proportion of the federal money which must be made available for expenditure on county federal aid secondary roads. The remaining 1½ percent is required by federal law to be expended for long-range planning purposes under the direction of the Division of Highways. Under previous law, the State used 11 percent of the federal grant to improve state highways included in the federal aid secondary.

The other legislative change increased to \$200,000 a year the maxi-

## AMOUNTS BY COUNTY

County	FAS funds	State matching funds
Alameda	\$144,169	\$102,950
Alpine	48,078	34,332
Amador	48,078	34,332
Butte	165,680	118,310
Calaveras	58,405	41,706
Colusa	59,068	42,180
Contra Costa	186,867	133,440
Del Norte	48,078	34,332
El Dorado	83,337	59,510
Fresno	483,303	200,000
Glenn	73,621	52,572
Humboldt	212,601	151,816
Imperial	190,872	136,300
Inyo	249,917	172,036
Kern	446,247	200,000
Kings	111,246	79,440
Lake	63,945	45,662
Lassen	148,103	105,759
Los Angeles	496,539	200,000
Madera	131,284	93,749
Marin	58,796	41,986
Mariposa	64,419	46,001
Mendocino	184,814	131,974
Merced	187,394	133,817
Modoc	113,993	81,401
Mono	85,515	61,065
Monterey	233,023	166,399
Napa	95,530	68,217
Nevada	58,614	41,856
Orange	174,006	124,256
Placer	122,632	87,570
Plumas	91,080	65,039
Riverside	367,890	200,000
Sacramento	220,855	157,710
San Benito	65,736	46,941
San Bernardino	694,703	200,000
San Diego	350,583	200,000
San Joaquin	225,086	160,732
San Luis Obispo	168,838	120,565
San Mateo	67,024	47,861
Santa Barbara	163,645	116,857
Santa Clara	212,695	151,883
Santa Cruz	82,919	59,212
Shasta	178,546	127,498
Sierra	48,078	34,332
Siskiyou	228,738	163,339
Solano	94,793	67,691
Sonoma	235,103	167,885
Stanislaus	233,338	166,624
Sutter	65,867	47,035
Tehama	121,012	86,413
Trinity	95,194	67,977
Tulare	382,287	200,000
Tuolumne	83,744	59,801
Ventura	178,311	127,330
Yolo	88,178	62,967
Yuba	52,154	37,243

imum amount from state highway funds which may be provided to any one county for use in matching its federal allocation. The previous maximum was \$100,000.

# Barrier Breaking

Varied Highway Opening  
Stunts Used in California

By C. A. MAGHETTI, Secretary, California Highway Commission

A WIDE variety of methods has been used over the State for ceremonies to celebrate the completion of highway projects. A ribbon cutting, once the standard way of breaking a barrier and opening a road to traffic, serves the purpose now only when the sponsors of the celebration do not work out a special scheme to suit the particular time and place.

Three different types of highway openings which occurred in recent weeks are reported in the following paragraphs. Still other kinds of barrier breaking celebrations, one involving a log cutting and another the shearing of a rope of grapes, are described elsewhere in this issue of *California Highways and Public Works*.

A lumbering road roller broke the barrier at one celebration reported below; the second featured costumes of 100 years ago and a stage coach of the same period; the third would have been the conventional ribbon cutting except that only one end of the ribbon was in California while the other was in Nevada.

## Roller Used

In the ceremony for the completion of a widening project from two to four lanes on Folsom Boulevard, US Highway 50, a few miles above Perkins, the big roller was brought into play. The driver was Lieutenant Governor Harold J. Powers who smashed the wooden barrier that opened two more lanes to public use.

Music for the occasion was furnished by the Mather Air Force Band. Some 200 persons were present.

The Sacramento Chamber of Commerce sponsored the program. Distinguished members of the military were introduced including two generals from Mather Air Force Base and numerous officers of lesser rank, Lieutenant Governor Powers, Frank B. Durkee, Director of Public Works and Chairman of the Highway Commis-



Lieutenant Governor Harold J. Powers operates the control that drives a lumbering roller against a road barrier as he participates in the ceremonies opening widened US Highway 50

sion, the mayor of Sacramento, and members of the city council. Chamber of commerce officials were also present.

A celebration luncheon was held at the Mather Officers Club followed by short talks in which the excellent cooperation between the military, state, county, and city officials was freely voiced.

## Traffic Eased

The construction of 13.9 miles of four-lane highway from Brighton, near the city limits of Sacramento, to 0.5 mile east of Alder Creek on Highway US 50 is an interim project intended to ease the traffic pressure generated by the industrial and aviation growth southeast of Sacramento.

The contract provided for the widening of the existing road to 44 feet from Brighton to approximately one mile east of Citrus Road to provide four 11-foot undivided lanes. From

the point east of Citrus Road to Alder Creek two new lanes were constructed to provide a divided roadway in this area. The entire length of the roadway was paved with plant-mixed surfacing.

Traffic channelization, road connections and approaches, drainage and traffic control facilities were included in the work to be done. The realignment of Citrus Road by Sacramento County forces made necessary the moving of this intersection approximately 1,800 feet westerly.

Work on the project was started May 7, 1957, by A. Teichert and Son of Sacramento. The expected final cost of the project will be \$1,040,000.

## Costumes Worn

The dress of early miners lent a touch of California history to the scene on the occasion of the dedication of a new 3½-mile section of expressway a short distance east of Plac-



erville, the community which shared much in the gold rush history of early days.

In keeping with the spirit of the occasion State Senator Swift Berry, appropriately garbed, "chairmanned" the program. He welcomed the spectators and then presented the speakers.

The project is on US 50 in El Dorado County between 0.3 mile west of Five Miles Terrace and 0.7 mile east of Camino. It is 3.67 miles long and is a four-lane divided expressway. The cost is expected to total \$1,025,000. Work was begun November 28, 1956, by the contracting firm of John Delphia and Fred J. Early, Jr., and completed in 147 working days.

#### Famous Road

Senator Berry, whose intense interest in the development of Highway 50 has earned him the phrase "Swiftly for Fifty," in his opening remarks related some of the history connected with this famous road which had such an important part in history.

The cutting of the ribbon to officially open the highway to public use was done by T. Fred Bagshaw, Assistant Director of Public Works. Hold-

ing the ribbon at each end were Senator Berry and Assemblyman Francis Lindsay. In keeping with the historical aspect of the occasion, an early day stagecoach, drawn by four horses, was halted at the ribbon barrier on its way to Placerville and Sacramento. It was then permitted to continue on its way. The coach is the property of Placerville Parlor, Native Sons of the Golden West, and was loaned for the celebration.

Another historic feature was enacted by the arrival of a pony rider carrying the mail. Here again the transfer was made at the ribbon barrier to a new rider and a fresh horse.

#### Follows Original Road

Highway 50 traverses pretty much the original road over the high Sierra. It was rated as the most important road in California in the golden days. From 1860 to 1866 there were constant streams of from one- to eight-span teams moving in each direction and from four to six stagecoaches in and out of Hangtown loaded with gold and passengers.

Further history reveals that more than 65,000 tons of freight passed

through Placerville daily. Due to the heavy use of this road it had to be rebuilt and was extended to Virginia City in Nevada. When completed it was declared to be the finest road anywhere. It was 116 miles in length and cost \$500,000 to construct. Much more was expended in its upkeep and betterment. Tolls were instituted and travel with freight and stagecoaches was of such volume from 1861 to 1868 that the sum of \$6,000,000 was collected.

The first overland mail from the East over "50" arrived in Placerville at 10 o'clock on the night of June 19, 1858. From then on the routing was used continuously until 1896 when the State signed an indenture to make it the first state road in California.

#### Governor Does Honors

A marked improvement in traffic conditions between Hawthorne, Nevada, and Mono Lake, Inyo County, was made possible following a two-state ribbon-cutting ceremony with Governor Charles H. Russell of Nevada doing the honors.

The ceremony took place at the state line with officials from California



LEFT—Governor Charles H. Russell of Nevada and Assemblyman Francis C. Lindsay of California, representing Governor Goodwin J. Knight, cut the ribbon which opens a modernized Pole Line Road to traffic. RIGHT—An old stagecoach is poised to be first over the road after the ribbon is cut by Assistant Public Works Director T. Fred Bagshaw (second from right). The ceremonial ribbon is held by State Senator Swift Berry and Secretary C. A. Maghetti of the California Highway Commission (both holding left end of ribbon) and Assemblyman Francis Lindsay, who is holding the right end of ribbon.

and Nevada participating. Assemblyman Francis Lindsay represented Governor Goodwin Knight. He was accompanied by State Senator Harold T. Johnson.

The dedication ceremonies brought to an end an effort to secure funds which began more than 10 years ago. It was a determined effort on the part of Hawthorne residents and those of central Mono County to bring to a completion this important interstate link.

The program began with a luncheon at Mono Inn, near Lee Vining on the California side. Following the lunch a long caravan formed and proceeded to the dedication site.

The Hawthorne High School Band in natty uniforms furnished the music. Governor Russell snipped the ribbon and the autoists continued on to Hawthorne where a buffet-style supper, followed by speeches, concluded the program.

#### Advantages Seen

The "Pole Line Road," as it is frequently known, has a history extending 25 years into the past. It began with several efforts, all of them stemming from Hawthorne, and reading westward to Mono County; but it was not until the second world war when the Navy, which has a large installation at Hawthorne, required the use of additional electrical energy that a powerline was constructed to Mill Creek in Mono County. Far-seeing residents in the area were quick to see the advantage of using the wagon road which was formed alongside of the poles to select it as the site of a new highway to Mono County.

Mono County residents then began the effort to have the line taken into the California Highway System. A period of 10 years elapsed before this was made possible and the funds voted to complete the job.

#### Road Modernized

The dirt road was taken into the State Highway System by legislative action in 1953, after which state highway engineers went to work on the project of modernizing it.

A 28-foot roadbed following the old road was built and finished in three stages. The first stage was the grading

## John W. Spargo

John W. Spargo, Assistant Highway Engineer for the Division of Highways, was injured fatally while working as concrete plant inspector on the Highway 40 freeway project near Pinole on September 4, 1957.

John Spargo was born June 9, 1922, in San Francisco. His father and grandfather were in the contracting business for many years in and around San Francisco.

He graduated from Balboa High School in 1941, and then attended San Francisco City College for two years. He served in the Army Air Corps as a bombardier during World War II, and graduated from the University of California in 1952.

He began work in District IV in February, 1952. After one year in the Design Department he transferred to construction, and had held various jobs of increasing responsibility until his death.

Surviving are his widow, Lois C. Spargo, two children, John and Dorothy; his parents, and a brother and sister.

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and penetration treatment of the section from 10.5 miles east of the junction of US 395 to the Nevada state line. This was completed in October, 1955, at a cost of \$179,256 by Payne Construction Company and Marchio, Baker, Trewhitt Company, Inc., of Oakland.

The second stage was to grade and treat the section from the junction of US 395 to 10.5 miles east. This contract was let in 1956 to I. L. Croft & Sons, Inc., of Saugus, at a cost of \$129,778.

The final achievement in making a modern highway out of the original Pole Line Road was the paving of the entire 21 miles from the junction of US 395 to the Nevada state line. This cost \$262,000. The contractor was Basich Bros. Construction Company and N. L. Basich of South San Gabriel.

## James L. McWaters

James L. McWaters, Planning Engineer in the Planning Department of District IV, Division of Highways, died on August 24, 1957, at his home in Albany after a short illness.

"Mac," as he was known by his friends, had 33 years' service with the State, all with the Division of Highways. From 1924 to 1929 he was assigned to the District I office, which was in Willits at that time. In 1929 he was transferred to District X office, which was then located in Sacramento. During his 16 years' service in District X, "Mac," as an assistant highway engineer, acted as surveyor, construction inspector, design squad leader and at the time of his transfer to District IV, in 1945, he was assistant chief draftsman.

In District IV, McWaters began as a design squad leader and was ultimately promoted to design engineer, in which capacity he was instrumental in developing plans for many of the metropolitan freeways in the San Francisco area. Early in 1956 he was transferred to the Planning Department as one of the planning engineers. At the time of his death he was a senior highway engineer and was on the eligible list for supervising highway engineer.

McWaters was a member of Albany Lodge No. 686, F. and A. M., California State Employees Association and the Quarter Century Club.

He is survived by his wife, Inez, of Albany, a daughter, Mrs. Vavian Mackenzie of El Cerrito, two grandsons, two sisters and a brother.

RIVERA, CALIFORNIA

*Editor, California Highways  
and Public Works*

DEAR SIR: As instructor of a class in highway engineering at the University of Southern California I have recommended *California Highways and Public Works* magazine to my students as a valuable source of information on current developments and general interest on the subject of highway engineering.

WILLIAM E. LEWIS



# Fresno Freeway

11-year Study Brings  
\$11,000,000 Bypass

**E**LEVEN YEARS of engineering studies and construction were climaxed with the October opening of the Fresno Freeway, an \$11,000,000 six-mile section of full freeway which provides a US 99 bypass of downtown Fresno.

The cutting of a grapevine barrier stretched across the road was a feature of the dedication of the freeway at a ceremony sponsored by the Fresno City and County Chamber of Commerce.

Frank B. Durkee, Director of Public Works, cut the vines with a long handled pair of pruning shears and dedicated the freeway "to the service of the people of California and to safe and efficient movement of traffic through Fresno."

## Warlow, Scott Praised

The 200 people attending the ceremony heard Durkee praise the long time devotion to the bypass planning shown by Chester H. Warlow, member of the California Highway Commission and retired Fresno banker and attorney, and by Earl T. Scott, retired District Engineer of District VI of the Division of Highways.

Warlow, also a speaker at the ceremony and at a subsequent luncheon, recalled his long interest in highway problems in California and particularly in the Fresno area. He was President of the Fresno Chamber of Commerce in 1928 and has been a member of the California Highway Commission for 14 years.

"It was about 1930," Warlow remembered, "that we in the Fresno community asked the State to widen Broadway to take care of the through traffic. That was done, but it became obvious after some years went by that new construction would be needed—that a freeway would be required.

"This is one of the finest freeways in any central valley city. It will take care of the traffic for a long, long time."

## Other Guests

Durkee said the full freeway around which the dedication centered "is the kind of bypass we should have, and I hope we will have, from one end of the State to the other."

Leon S. Peters, President of the Fresno City and County Chamber of

Commerce, introduced the speakers and other guests at the grapevine ceremony near the Neilsen Avenue Undercrossing of the freeway and at the later luncheon program. Those introduced included state legislators, Highway Division engineers, and city and county officials.



UPPER—Left to right at the grape rope cutting ceremony at which the Fresno Freeway was officially dedicated are: City Commissioner Hattie May Hammet, Chairman Norman S. Foley of Fresno County Board of Supervisors, Mrs. Lynn Roth (Mrs. Fresno County), Retired District Engineer Earl Scott, Supervisor Sid Cruff, Supervisor Sloan McCormick, Public Works Director Frank B. Durkee with shears to cut the barrier, California Highway Commissioner Chester H. Warlow, Supervisor Bert DeLotto, President Leon S. Peters of Fresno Chamber of Commerce, Assemblyman William Hansen of Fresno, Chairman Carl E. Weaver of the chamber's freeway committee, District Engineer William Welch, and Assemblyman Wallace D. Henderson of Fresno. LOWER—Commissioner Warlow's automobile leads the parade of first cars to use the bypass.

#### Governor's Message

Governor Goodwin J. Knight sent the following message through Director Durkee:

"The last section of freeway through Fresno is indeed cause for a celebration. This long-awaited improvement will relieve congestion on Broadway and the other important Fresno city streets.

"Now this principal city, in the greatest agricultural county in the Nation, can proceed with community planning and the development of community services with the assurance that the highway facility is permanently located.

"I regret that I cannot be with you. Please extend my best wishes and heartiest congratulations to the citizens of Fresno on this important occasion."

The celebration heralded the opening of a section of the freeway between Santa Clara and San Joaquin streets, the last to be constructed of the six-mile stretch between Church Avenue on the south and Marks Avenue on the north.

#### Separate Contracts

The work was done under five separate contracts. The first of these, between Church Avenue on the south and San Benito Avenue at Broadway, included the Monterey Street Overpass across the tracks of the Southern Pacific Railroad and a future connection to the present freeway. The work began in September, 1947, and was completed by the Guy F. Atkinson Company in April, 1949, at a cost of \$1,400,000.

Thomas Construction Company was the low bidder at \$200,000 for work between Cherry Avenue and Santa Clara Street, completed in January, 1954.

On the third contract, between West Avenue and Marks Avenue, Guy F. Atkinson was again the successful bidder. This section was awarded on June 28, 1954, and was completed in March, 1956.

One year later on June 20, 1955, Richardson and Underdown were awarded the section between San Joaquin Street and West Avenue. This work was completed in February, 1957, at a cost of \$1,300,000.

The final section, between Santa Clara and San Joaquin Streets was awarded to C. K. Moseman Company in February, 1956, and completed October 21, 1957, at a cost of \$1,700,000.



*The fresh whiteness of the newly completed Fresno Freeway makes it prominent at the left of this aerial photograph looking north over the city. Bypassed area downtown is to the right.*

For the entire six-mile project, the right-of-way costs were \$5,000,000 and construction costs \$6,000,000, making a total cost of \$11,000,000, or an average of almost \$2,000,000 per mile.

The freeway has 23 bridges, seven pumping plants, two storm water retention basins and three storm water drainage fields, one of which has an area of approximately two acres and required a mile of 36-inch-diameter storm drain pipe to drain one section of the depressed freeway.

#### Church Moved

One of the principal items of interest in the first contract was the moving of the Lutheran Cross Church, a brick and timber frame building, approximately 63 feet in height and 130 feet long, weighing 1,800 tons, which was moved 900 feet to a new location.

The length of depressed freeway required considerable changes to the city's sewer system and involved a cost therefor of \$150,000.

Due to the great length of depressed section through West Fresno, 19 acres of land were required for the purpose

of storing some 600,000 cubic yards of excess earth removed from the freeway. It is proposed that this material will be used on the future southerly extension of the freeway.

#### Signals Eliminated

The new alignment passes through a corner of the city's 160-acre Roeding Park and in so doing, cut through a portion of Lake Washington, thus requiring the reconstruction and addition of an equivalent amount of lake area adjacent to the freeway.

The new freeway will save considerable time for motorists traveling through Fresno, as well as those destined for points in Fresno. On the old route, U. S. Highway 99 motorists encountered 16 traffic signals and under normal conditions, 13 minutes were required to travel between Church Avenue and Marks Avenue. With the completion of the freeway, there are no signals between Church Avenue and Madera and motorists going through Fresno are able to travel the six-mile section of full freeway in less than half the time previously required.



# Editor Retires

High Tribute Paid  
Kenneth C. Adams

High tribute was paid to Kenneth C. Adams, information officer for the State Department of Public Works and editor of *California Highways and Public Works*, on the occasion of his retirement from state service.

Federal and state officials, headed by Chief Justice Earl Warren, Governor Goodwin J. Knight and Public Works Director Frank B. Durkee, lauded the "lovable character" and "professional superiority" that Adams displayed in a newspaper and public relations career which extended over a half century.

Adams reached the compulsory retirement age of 70 on October 6th and was retired on the last day of October. He had been with the Department of Public Works for 22 years and had served as editor of *California Highways and Public Works* for the past 13 years.

All members of the California Highway Commission, Director Durkee, the heads of the divisions of the Department of Public Works, and senior officials of the department joined with others of Adams' friends in honoring him at a retirement party October 22d at the University Club in Sacramento.

#### Governor's Commendation

Messages from former Governor Warren and Governor Knight were read. An official State of California tribute to Adams, signed by the Governor, was presented to Adams. It said in part:

"Few men serving the people of California have earned the sincere respect of those engaged in chronicling the day-to-day events in State Government that has been accorded to Kenneth C. Adams. His professional abilities, acquired over many years in the newspaper business and related fields, have been employed to outstanding advantage in the Department of Public Works which he joined in 1935.

"During the intervening period of intense development of state public



KENNETH C. ADAMS

works facilities, Mr. Adams has played an important role in informing the press and public of developments as they occurred. One vehicle for this was the magazine *California Highways and Public Works*, which Mr. Adams edited with distinction. Through its pages he earned plaudits here and abroad for his valuable contribution to highway progress.

"During a long career which began in 1906 as a reporter for the *Sacramento Bee* assigned to covering the State Legislature, Mr. Adams has pursued many interests and engaged in many activities. \* \* \* California Governors and United States Senators have been his friends and confidants. \* \* \* His writings have dealt with a wide variety of subjects, ranging from politics to a history of the California Missions."

The Governor's scroll concluded with a commendation for Adams "for his outstanding service to the people of California."

#### Extolled by Speakers

The Highway Commissioners, Durkee, State Highway Engineer George T. McCoy, State Architect Anson Boyd, and Deputy State Printer Ralph Titus were the principal speakers. All extolled the retiring editor and recalled highlights of his long career and his heroism in World War I.

Every speaker emphasized the important contributions that Adams made to highway progress in California.

"Adams built the magazine up during his editorship so that it has become widely recognized as one of the outstanding publications of its kind in the United States," Durkee said. "The magazine has been highly commended in this country and abroad for the valuable contribution it has made to highway progress."

Born in Colorado, Adams came to California with his family in 1892 and studied in California schools, including the University of California. His first newspaper work was covering the State Legislature for the *Sacramento Bee* in 1906 and 1907; he covered the 1909 Session for the *United Press*.

#### Years of Work

The *United Press* sent Adams as a correspondent to Central and South America in 1910. He served as UP bureau manager for Ohio later in 1910 and had the same job for the UP in Indiana in 1911. Adams was city editor of the *Sacramento Union* in 1911 and 1912 and in the latter year resigned to direct California publicity for Woodrow Wilson's campaign.

Adams was political editor of the *San Francisco Chronicle* in 1913 to 1915 and political writer for the *San Francisco Examiner* for the next two

... Continued on page 26

# TWENTY-FIVE-YEAR AWARDS

Employees who have received twenty-five-year awards since those listed in the May-June, 1957, issue of *California Highways and Public Works*.

## District I

Curry, Douglass  
Hitchcock, Lawrence C.  
Spinney, Lester L.

## District II

Brown, Walter W.  
Cox, John Q.  
Leal, Anthony T.

## District III

Bellue, Alfred J.  
Etzler, Martin C.  
Lathrop, Alfred B.  
Schott, Howard F.

## District IV

Abert, Fernand A.  
Boese, Edwin H.  
Bunyard, Francis M.  
Kerner, Albert J.  
Lund, Thomas B.  
Moore, Earl J.  
Richardson, Robert L.  
Rogers, Frank Edward  
Silverfoote, Ed W.  
Stein, Louis A.

## District V

Binsacca, Silvio D.  
Davis, Lawrence P.  
Hudson, Glen H.  
Mason, Esker L.  
Saunders, Wilfred A.  
Wofford, George

## District VI

Marshall, Gilbert J.  
McQuone, Tarney H.  
Taylor, Jim U.

## District VII

Bowers, Deane  
Cannon, James C.  
Collins, Ray A.  
Compagnon, Henry  
Gates, Stillman A.  
Killingsworth, Mode E.  
Nauslar, Jack L.  
Potter, Lee Roy  
Rime, John L.  
Robinson, Van D.

Titus, George W.  
Verdugo, Rafael L.  
Walker, Willys G.

## District VIII

Cleaver, Lawrence  
Isherwood, Harry  
Paul, Charles B.  
Winter, Sidney J.

## District IX

Bellatti, Joseph A.  
Dorville, Tom  
Hawkins, Earl D.  
Jarvis, Joseph R.  
Keller, James  
Radley, Albert H.

## District XI

Elder, Dick  
Ellis, Gordon W.  
Lain, Joe H.

## Bay Bridge

Anderson, Alison M.  
Cruza, George F.  
Gilzean, J. Albert  
Levy, Edwin F.

## Materials and Research Department

Drew, Eldridge D.

## Bridge Department

Hathaway, Richard L.  
Woodbridge, C. J.

## Headquarters Office

Fountain, Duane G.  
Lapham, Eileen C.

## Shop 10

Parnau, Helen

## EDITOR RETIRES

Continued from page 25 . . .

years. He enlisted in the Army in 1917, served in field intelligence, and was commissioned overseas after having resigned his first commission in order to get an overseas assignment.

World War I service won him the Purple Heart, French Croix de Guerre, Belgian Croix de Guerre, and two citations from General Pershing.

After the war, Adams remained in Europe and worked for two years as a European correspondent of the *Chicago Tribune* under the late Floyd Gibbons. He returned to California in 1920 and directed publicity that year for Senator Hiram Johnson. In 1921, he went back to the San Francisco *Chronicle* as political editor.

### Editor Since 1944

Adams opened his own public relations business in San Francisco in 1922. He continued in business for himself for years, except for 1926-27, when he was managing editor of the *Sacramento Union*. During 1930-33 he was with the San Francisco Newspaper Publishers Association.

From the time Adams went with the Department of Public Works in 1935 until 1944, he was associate editor of *California Highways and Public Works*. He edited the magazine from 1944 until his retirement. A special edition he edited in 1950, on the occasion of the State's Centennial, has become a collectors' item.

Adams is author of a history of the California Missions, first published serially in the state magazine, and later published in book form. He also has written short stories and articles for magazines.

Adams expects to move to San Francisco to make his home there. He has lived in Sacramento for years.

## Highway Funds to Cities Allocated for Quarter

The Department of Public Works allocated \$7,770,320 during October to the 349 incorporated cities in California under provisions of Section 2107 of the Streets and Highways Code.

This quarterly allocation is \$904,471 or 13 percent more than the July apportionment.

This year's October distribution is also \$291,035 or 3.9 percent more than the October, 1956, allocation.

During the month of October, the department also allocated \$1,069,500 to the cities under the provisions of Section 2107.5 of the code for engineering on city streets.



# Now Multilane

US 101 Is Improved  
From S. F. to Santa Rosa

By L. A. WEYMOUTH, District Engineer, District IV

THE CUTTING of a bright red ribbon climaxed the development of a multilane divided highway facility on US 101, extending from San Francisco to Santa Rosa. With the opening of this new 5.1-mile freeway on new location, extending from Wilfred to a connection with the expressway through Santa Rosa, the last of the two-lane highway between San Francisco and Santa Rosa was eliminated and will be reverted to use as a local facility.

Improvements to multilane standards along this 45-mile portion of US 101 have been almost continuously under way since 1946. Most of the way, improvement has been to four- and six-lane freeway standards.

From the Golden Gate Bridge to Manzanita at the south end of the Richardson Bay Bridge, a full freeway was placed in service in March of 1956 and by that fall the new Richardson Bay Bridge was completed and opened to traffic. The next 2.5 miles to north of Alto were also completed to freeway standards during the past summer.

From Alto to north of Greenbrae, a 3.5-mile full freeway project is nearing completion and from Greenbrae to the completed freeway at San Rafael, a 1.4-mile freeway is now under construction. The viaduct and approaches in San Rafael, as well as an expressway or four-lane highway facility from Forbes Overhead northerly through to Petaluma, have been in service for some years.

#### Five Projects

Since early summer of 1953, full freeway construction has been under way on new location between south of Petaluma and the expressway in Santa Rosa, a distance of 18.5 miles. There have been five construction projects between these limits and these have accounted for expenditure

of approximately \$10,000,000 for construction alone.

The first two projects provided for abutment fills and a bridge over Petaluma Creek near the south limits of Petaluma. The third project, which was commonly referred to as the "Petaluma Bypass" was started in June, 1954, and completed in December, 1956. It provided a complete freeway facility over the 5.5 miles from south of Petaluma to Denman Flat. The work on the northerly 2.5 miles of the contract was for grading only.

A fourth contract, between Denman Flat to three miles north of Cotati at Wilfred, extended the freeway a distance of 6.7 miles, and graded the next 1.0 miles to the north. This project was officially opened to traffic on July 2, 1957.

The last project to be constructed (which was the cause for the celebration) developed the remaining 5.1 miles to the connection with the existing Santa Rosa expressway and was started on July 5, 1956. This project, like the others, consists of an initial four-lane freeway with provisions for an additional two lanes when required. Interchanges are located at Baker Avenue, Hearn Avenue, Todd Avenue and Wilfred Avenue.

The opening ceremonies took place September 25th at the south end of the project between Cotati and Wilfred.

#### "A Fine Example"

Following the invocation by Dr. Percy Hall, and a precision drill by the National Champion "Champions," from Santa Rosa, the master of ceremonies, Frank McLaurin, introduced Mayor Kenneth Mitchell of Santa Rosa, who expressed Santa Rosa's approval of the new freeway.

Mayor Mitchell introduced a delegation from the City of Oakland, including Mayor Rishell, who spoke briefly representing Oakland's interest

in this important highway link. H. C. Quistgard, President of the Santa Rosa Chamber of Commerce, introduced E. D. Maloney, President of the San Francisco Chamber of Commerce, who brought greetings from San Francisco and pointed to the freeway as "a fine example of the progress needed in California."

Charles Reinking, President of the Golden Gate Bridge Authority, paid tribute to the Highway Commission and the Division of Highways for their handling of the "difficult work in building freeways" and also expressed approval of this latest link between the Redwood Empire and the Bay area.

Leigh Shoemaker, of the Sonoma County Board of Supervisors, told of Sonoma County's pride in the link unifying the county and tying it to its neighbors in the south.

Representing the Governor and the Highway Commission was Commissioner Robert L. Bishop, who stated that this was "another victory in the State's race against growth and time." Bishop presented B. W. Booker, Assistant State Highway Engineer, who represented State Highway Engineer G. T. McCoy.

Booker congratulated the contractor, Guy F. Atkinson; the resident engineer, Phillip Auchard; and also the Bridge Department representative, D. T. Morton, for a "job well done, well within the time limit." Booker said that plans for the continuation of the freeway northerly of Santa Rosa are well advanced.

Guy F. Atkinson, the contractor, also spoke briefly before the ribbon was cut.

Following the opening, the official guests formed a car caravan that toured the project and then proceeded to the Santa Rosa Fairgrounds for a barbecue sponsored by the Santa Rosa Chamber of Commerce.

# Legal Opinion

Highway Commission's  
Procedure Approved

By ROBERT F. CARLSON, Attorney, Division of Contracts and Rights of Way

THE OFFICE of the California Attorney General has approved the legality of the present procedure of the California Highway Commission in the adoption of freeway routes. Deputy Attorney General Raymond H. Williamson wrote the informal opinion in a letter of September 24, 1957, to Assemblyman Louis Francis.

The commission, by resolution adopted on July 15, 1948, (see story in the March-April, 1952, issue of *California Highways and Public Works*) formally established the basis for its present procedure and policies. An expanded restatement of the procedure and policy was adopted on February 18, 1955 (and published in the March-April, 1955, issue of *California Highways and Public Works*).

The commission presently is considering further refinement of the resolution better to insure the accomplishment of its objectives.

Briefly, the commission resolution provides that when sufficient engineering and economic studies have been made to permit intelligent discussion as to the location of a freeway, the State Highway Engineer or his representative will confer with the appropriate governmental agency involved and will hold public meetings to acquaint interested persons with the available alternatives and to obtain comments thereon. After considering all the information received, the State Highway Engineer then submits a report to the commission covering the results of such meetings, together with a recommendation as to the proposed route of the new freeway which, in his judgment, will serve the best interests of the State. A public hearing is then held by the commission itself, through one or more of its members, unless the local legislative agency requests no hearings, although the commission may of its own motion decide to hold such a hearing. The reso-

lution further provides that due public notice of the time and place will be given and "all persons and organizations, and official bodies interested in the matter will be given opportunity to be heard."

#### "Townhouse Meetings"

The Attorney General, in referring to these public meetings, describes them as similar to the old and historic "townhouse meetings," having a two-fold purpose—first, to advise and to obtain the co-operation of local public officials and persons affected by the freeway route; second, to obtain information to assist the commission in solving the freeway location problem. The Federal Highway Act of 1956, Section 116(c), also contains a requirement for public hearings as to any project involving federal-aid funds. The present procedure has been determined by the Federal Government to satisfy the requirements of federal law.

Although no particular rules apply to the conduct of the hearing before the commission and its staff, the Attorney General ruled that the informal hearing or meeting provided for in the resolution is legally adequate.

The opinion said the requirements and procedures of a formal hearing, e.g., statement of issues the reception and ruling on evidence, and the administering of an oath are not necessary, provided of course, that the hearing is conducted fairly and all interested persons are allowed to present their views.

#### More Like Legislative

The right of interested persons or agencies to appear by counsel is said to be inherent in the resolution of the commission. But this right to appear by counsel does not give the right to cross-examine witnesses the Attorney General wrote, the reason being that

because of the many miles of freeway routes being selected by the Highway Commission, hearings would go on interminably were every interested person afforded the right of cross-examination.

Because of the fact that the commission's determination of freeway routes partakes more of legislative than judicial attributes, the opinion said there does not exist the requirement or necessity for the issuance of subpoenas to compel the attendance of witnesses or to require the production of certain documents at the hearing or to take depositions prior to the public hearing. However, the resolution of the commission does not forbid the present practice of permitting expert witnesses to appear and to be heard. This also includes the current practice of receiving pertinent affidavits for consideration by both the State Highway Engineer and the commission. The opinion notes that the more formal type of hearing required by the Administrative Procedure Act is neither applicable to the Highway Commission nor practicable under the circumstances.

The Attorney General by this opinion has determined that the present informal procedure employed by the commission does not partake of the normal attributes of an administrative hearing.

Because of its dominant characteristic of informality, the old and historic "townhouse meeting" has once again become a means by which one person, a neighborhood and a community can, by open discussion, aid the Highway Commission in solving a modern-day problem of freeway location.

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A new maintenance station has been completed at Bridgeville, on State Sign Route 36, in Humboldt County, at a cost of \$26,000.



## FREEWAY APPROACH TO BRIDGE OPENED IN MARIN COUNTY

The four-lane freeway approach to the Marin County end of the Richmond-San Rafael Bridge on Sign Route 17 was opened to traffic in November.

This project covers full freeway construction from the bridge for about one mile west and provides traffic interchanges at Point San Quentin and at Sir Francis Drake Boulevard East.

### Extension Begun

Extension of the freeway westerly for 1½ miles to a connection with US 101 at the San Quentin Wye south of San Rafael has already begun and will be continued next summer.

B. W. Booker, Assistant State Highway Engineer, explained that grading work for the westerly extension was carried out as part of the contract for the newly opened section while the budget recently adopted by the California Highway Commission for the 1958-59 Fiscal Year contains an allocation of \$850,000 for completion of the project. Plans and right-of-way acquisition for the westerly 1½ miles are nearing completion, and bids can be called for late next spring.

### Route 17 Extended

The new bridge and approaches have extended Sign Route 17 from the East Bay area to US 101. When the budgeted extension of the freeway approach on the Marin County side has been completed, motorists using the new transbay connection will have a complete freeway and expressway ride from Richmond to any point along US 101 from San Francisco to north of Santa Rosa.

Both the freeway section just opened and its westerly extension have been designed for future widening to six lanes when traffic warrants it and funds are available.

The contractor on the project just opened was Ball and Simpson of Berkeley. Total construction cost approximated \$1,200,000.



This aerial view of the four-lane freeway approach to the Marin County end of the Richmond-San Rafael Bridge was taken just a few days before the section of Sign Route 17 was opened to traffic. In the background may be seen the year-old bridge to which leads the \$1,200,000 new section of state highway.

# New Subdivisions

Relationship With  
Freeways Considered

By J. A. LEGARRA, Planning Engineer, California Division of Highways

**F**REEWAYS, as you know, are having a marked effect on urban and suburban development, and the active co-operation of the State and the local agencies is essential if the freeway is to do its best job. The relationship of state highways to new subdivisions is only one segment of the overall problem of planning. Before we enter into this specific feature, we first should consider the overall transportation picture and how this segment fits into the general relationship.

It is state highways which are to be developed as freeways with which we are primarily concerned, and our discussion will be confined to the relationship of the freeway and new subdivisions.

Freeways have access restricted and provide safe and efficient transportation between strategically located centers. At these centers, which are points of entry and exit, the traffic is transferred from the freeway to street or other type of facilities which act as distributors and routes for travel of an intermediate nature. Points of interchange or entry and exit to the freeway should be connected to major thoroughfares. These streets act primarily as traffic carriers and secondarily as a means of access. Finally, there must be constructed the street whose primary purpose is to provide access and not to act as a through traffic carrier. This access type of street may serve either residential or commercial and industrial development. In the case of residential streets, they are planned and constructed to serve their primary purpose of providing access to homes, and in many cases their layout is such as to actually discourage use by either large volumes, or fast-moving traffic.

#### Co-operation Necessary

In order to develop a combined pattern of highway traffic to provide maximum overall transportation serv-

*This is the text of an address on "State Highways in Relation to New Subdivisions" which Mr. Legarra gave before the Twenty-seventh Annual Conference of the California Planning Commissioners' Association at Carmel in October.*

ice, the co-operation of the Federal Government, the State, the county,

and the city is necessary. Each segment of the road building governmental agency should fulfill its responsibility and so plan its part of the overall transportation project so that each part can be combined into a smoothly operating unit. It is impossible to properly plan a particular freeway without taking into account its effect on other freeways and the effect of other freeways on it. I believe that this also applies to the planning of an individual subdivision in



Various aspects of sound zoning and subdivision planning are illustrated in this view of the East Washington Street Interchange area on US 101 near Petaluma. Not only do the homes nearest the freeway back onto it, but the subdivider has also enhanced the residential-access feature of his streets by providing turnaround areas. The author also points out that the freeway serves as a buffer between residential and industrial zones while permitting safe, free-flowing circulation between them by means of the overcrossing structure and interchange ramps.



relation to a state highway, for each subdivision is seldom an independent unit. Not only must there be planning within the subdivision, but there must be planning between the subdivisions and their relationship to the state highways.

Subdivisions should be planned to provide through routes, both parallel and at right angles to the state highway route. One important thing that we have learned is that there must be connecting through secondary facilities to provide adequate access between neighborhoods, residential areas, shopping centers, and industrial areas. The problem has risen or will arise in probably every county of the State where subdivisions have developed without an overall plan and have resulted in local major thoroughfares that lack continuity. This results in a misuse of the street and highway system available and is detrimental to the entire area.

The effect of the freeway on the adjacent area and, vice versa, the effect of the area and the street layout on the freeway, probably decreases in some relation to distance. The local circulation immediately adjacent to the freeway is, therefore, the most important part of the state highway-subdivision relationship. As part of

the freeway construction, it is often necessary to construct frontage roads, and in the past there has been a tendency to depend too much on these frontage roads for local circulation. Actually, local circulation could better be provided by constructing *major* thoroughfares a short distance from the freeway. In the first place, use of roads fronting on the freeway is inefficient in that they can attract traffic only from one side of the roadway. In the second place, it is difficult, if not impossible, to provide continuity through the interchange areas.

#### Good Design Standards

In general, it is most economical to carry the local road either over or under the freeway. Normally good design standards require approximately 600 feet from the center of the freeway for the crossroad to get back to existing ground elevation. Because of this requirements, frontage roads immediately adjacent to the freeway must wind in and out at the interchange areas. It is also generally necessary to have an intersection at grade between the frontage road and the local crossroad in the immediate area where the local road returns to existing ground level. By constructing a major thoroughfare parallel to the

freeway and some reasonable distance from it, it is possible to provide a straight, highly desirable local thoroughfare and to utilize the area required by the interchange to provide an attractive access street pattern.

It appears that the preferable and most efficient design for subdivision layout is to have the residential or commercial areas back up to the freeway. This allows an additional tier of lots, either residential or commercial, to front on the same street and in most cases should provide the maximum use of land area. I believe there is no question as to the desirability of having commercial or industrial developments back up to the freeway. However, there has arisen in the past a question of the desirability of residence backing up to the freeway. The Land Economics Section of Headquarters Right-of-Way Department of the California Division of Highways recently completed an extensive study on the freeway influence on the market value of residences which back up to the freeway or are immediately adjacent to the freeway. (*California Highways and Public Works*, March-April, 1957.) They have found that there has been, for all practical purposes, no detrimental effect on the value of the house con-

... Continued on page 42



LEFT—Subdivision layout which provides for residences backing up to the freeway is described as more efficient than having homes face the freeway. The view is north along the Eastshore Freeway in Hayward, with the Jackson Street Interchange in the foreground. RIGHT—Aerial view of the Bayshore Freeway-Third Avenue Interchange area in San Mateo shows how a major artery (Norfolk Street) makes for good local traffic movement in a subdivision.

# State's Highways

Planning California's  
Freeways of Tomorrow

By FRANK B. DURKEE, State Director of Public Works and  
Chairman of the California Highway Commission

CALIFORNIA is the acknowledged leader among the states in construction of multilane divided highways. As we approach the end of 1957, we can point with pride to a total of nearly 1,800 miles of these modern facilities now serving the highway-using public, with another 375 miles under construction or advertised for bids. Still another 250 miles have been financed, either in the 1957-58 Fiscal Year State Highway Budget or in the 1958-59 Budget which was adopted by the California Highway Commission in October and on which a start has already been made in the form of call for bids.

Most of this modern mileage consists of full freeways or expressways. The percentage of full freeways—divided highways with access controlled and with no left turn or crossing movements at grade—is constantly increasing, not only in the congested metropolitan centers but also on the long stretches of rural highway. California now has about 450 miles of full freeway in operation, carrying an average daily traffic of 45,000 vehicles a day. The freeways have a record twice as safe as conventional highways for overall accidents and more than three times as safe for fatalities in terms of vehicle miles traveled.

These are the modern freeways in operation or soon to be in operation. They did not spring into existence overnight. They had to be planned—first of all, they had to be located.

That is why a more significant mileage figure than any of the foregoing is 4,131. This is the total number of miles of state highway for which routes have been adopted and which have been declared as freeways by the Highway Commission since the enactment of the freeway law in 1939.

*This article is reprinted from "California—Magazine of the Pacific," publication of the California State Chamber of Commerce, for which it was specially written by Director Durkee.*

## Freeways Total 30 Percent

The 4,131 miles of adopted freeway routes represent 30 percent of our entire 14,000-mile State Highway System. They are the tangible, documentary expression of the policy laid down by the Legislature in establishing the present commission setup in 1943:

"It is hereby declared to be the policy of the Legislature to provide for advance planning and continuity of fiscal policy in the construction and improvement of the State Highway System and in the administration of expenditures from the State Highway Fund."

In other words, the advance determination of freeway routes by the Highway Commission is assurance to the people of California that their wishes for an orderly, long-range highway planning program are being carried out. It is this planning program which has given California motorists the freeways they are already using and those they are currently building.

The adoption of a freeway route by the California Highway Commission is a major milestone in many respects.

It is the end of a long and painstaking and often soul-searching process which began, years ago, with congestion, accidents and the manifest need for a highway improvement which would be a reasonably permanent, not an interim, solution. This process has then continued through a period of

engineering and economic studies, public discussion, careful review and final decision.

## Important Duties

In my opinion, the selection of routes is one of the most important of the various duties assigned by the Legislature to the Highway Commission—fully as important, from the long-range point of view, as adopting the annual State Highway Budget.

Budgeting for state highways is governed in large measure by statutory controls and by priority of needs. The commission has some latitude within the controls, however, and the financing need which is not met this year can be considered again next year.

A decision on a freeway route, on the other hand, has far-reaching permanent implications. Every effort must be made to locate the route in the best possible place.

The "best possible place" means the best from all points of view. It means not only the best route for traffic service, but also from the standpoint of the economic and general welfare of the community or area concerned. The choice of a freeway route by the Highway Commission represents the distillation of many ingredients, in which engineering facts are the predominant—but not the only—element. Economic studies are extremely important, as is the long-range local planning being done by the community.

## Three Accomplishments

In finally adopting a freeway route, the commission in effect has done three things:

1. It has protected the right-of-way from indiscriminate development which leads to congestion and hazard, and has insured that the future highway to be built on the adopted loca-

tion will give safe, efficient service for many years to come.

2. It has enabled the Division of Highways to proceed with detailed planning and design leading to acquisition of rights-of-way and eventual construction as financing is made available.

3. It has established a major element in the overall transportation pattern—and therefore the economic and growth pattern—of the community concerned.

For these reasons the commission is careful never to adopt a freeway route without being certain that the location has met the test of full public scrutiny as well as official and professional approval. In particular, the commission examines the studies which have been made concerning the economic effects of the route recommended by the State Highway Engineer as well as the comparable data for any alternative routes. The commission may, and frequently does, ask the Division of Highways for additional studies of alternate route possibilities even beyond those requested by local officials and groups.

#### **Agreements Worked Out**

Once the route has been adopted, the next step is the freeway agreement, which is worked out by the Division of Highways and the city or county (or both) involved. This agreement spells out the location of crossings and interchanges and such other details as local street and road adjustments and connections to the freeway.

An important point is sometimes overlooked or misunderstood. The Division of Highways does not select the route; that is the sole responsibility of the commission. The commission, on the other hand, does not design the freeway or determine the type and positioning of crossings and interchanges; that is worked out by the Division of Highways and participated in by the local governmental authority as part of the freeway agreement. The commission is of course interested in the working out of a satisfactory freeway agreement, since construction cannot proceed until the agreement has been executed.

The route adoption procedure which thus sets the pace for the expanding freeway program has now stood the test of nearly a decade since it was formalized by the commission in 1948. It need not be restated here, for the Highway Section of the California State Chamber of Commerce has been an informed and valued consultant in its development and improvement over the years.

Since July, 1948, the commission has held a total of 68 public hearings in connection with its consideration of freeway routings. Most of these were held at the request of local governmental authorities, and some were held on the commission's own initiative.

The number of commission hearings has been markedly reduced since the adoption early in 1955 of a revised route adoption procedure. This procedure was worked out with the assistance and co-operation of a special committee from the California State Chamber of Commerce. Its salient feature provides for public meetings for explanation and discussion of route proposals before a route recommendation is submitted to the commission by the State Highway Engineer.

In the less than 2½ years since this revised procedure went into effect, the Division of Highways has held a total of 183 public meetings on route matters, all of them in the community or area concerned.

At some of the meetings there have been marked differences of opinion; at others complete harmony on the part of all concerned. But whether in storm or calm, they have all pursued one steady course: the presentation of factual data in an objective manner, the invitation to every interested person to place his views on record, the seeking out of all pertinent information from whatever source—all for the purpose of producing a complete transcript and record which the commission can and does study before taking final action to adopt a route.

It was inevitable, as the pace of advance route determination was stepped up beginning in 1953 to keep ahead of an accelerated construction program, that expressions of dissatisfaction with some of the route proposals should in-

crease. Some of these complaints found their way into proposals to the State Legislature which, had they been enacted into law, would have drastically reduced the authority of the commission to determine freeway routings.

#### **State C. of C. Support**

In the vanguard of far-sighted friends of the California highway program who appeared in opposition to such proposals was the California State Chamber of Commerce. Its support of the existing statutory procedures and policies governing route determination was gratifying and constructive.

The route adoption policy which has been so carefully nurtured and developed in the past decade was subsequently supported by the Legislature by the adoption of Senate Concurrent Resolution No. 90. This resolution commended the commission for "the written policy resolution on route adoptions which it has developed over recent years." It also urged the commission to make no change in its policy which would reduce the requirements for public hearings or "other protections afforded the public in the matter of route adoptions or freeway locations."

Since the unbroken trend has been, and still is, in the direction of more public discussion of freeway route proposals rather than less, the people of California and particularly of the communities interested in freeway routes have every assurance that this instruction from the Legislature will be complied with in spirit as well as to the letter.

California's continuing achievement in freeway construction, the product of an orderly long-range planning program, still hinges on advance route determination. It is this long-range planning program which provided a backlog of projects ready for construction when additional funds were made available by the State Legislature in 1953 and by the Federal Government in 1956. Before the freeways can be built, the routes must be selected. In the selection of routes, every individual must be heard, every need considered so that the eventual decision is the best possible solution for the California of today and tomorrow.



# OPERATIONS AND ACTIVITIES OF MATERIALS AND RESEARCH DEPARTMENT

## PART IV—STRUCTURAL MATERIALS SECTION

By JOHN L. BEATON, Supervising Highway Engineer

IN THE May-June, 1957, issue of *California Highways and Public Works*, F. N. Hveem, Materials and Research Engineer, presented a general review of the scope of laboratory activities, setting forth some of the problems and responsibilities delegated to materials engineers and also the progression of growth and development of the laboratory from its early day inception to the large and nationally recognized organization which now comprises the Materials and Research Department of the California Division of Highways.

This fourth article of the series will be devoted to the activities and operation of the Structural Materials Section which constitutes one of the five major subdivisions of the Materials and Research Department.

### Multiple Responsibilities

The Structural Materials Section is responsible for manufactured structural members of metal, wood, or concrete materials including plant and factory production of finished materials. In order to dispatch this responsibility, the section is organized: (1) to give maximum service to the operating highway departments and districts; (2) to provide special service on request to the engineering departments of other state agencies and governmental subdivisions at the federal, county, and city levels; and (3) to co-operate to the maximum degree with the industries who supply manufactured and prefabricated materials to the various highway contracts.

In order to outline the extent of this service, the following article will be broken down to describe the activities of each of the functional units within the section. The fundamental organization is shown in the chart.

### Many Items Covered

Over half of the personnel and effort of the Structural Materials Sec-

tion is devoted to the inspection for compliance with contract or purchase specification of materials and components that are manufactured in an industrial plant to be furnished for the construction of highways. Products will vary from reflector buttons, for use on a guide post, to bridge trusses to be erected across the Carquinez Straits.

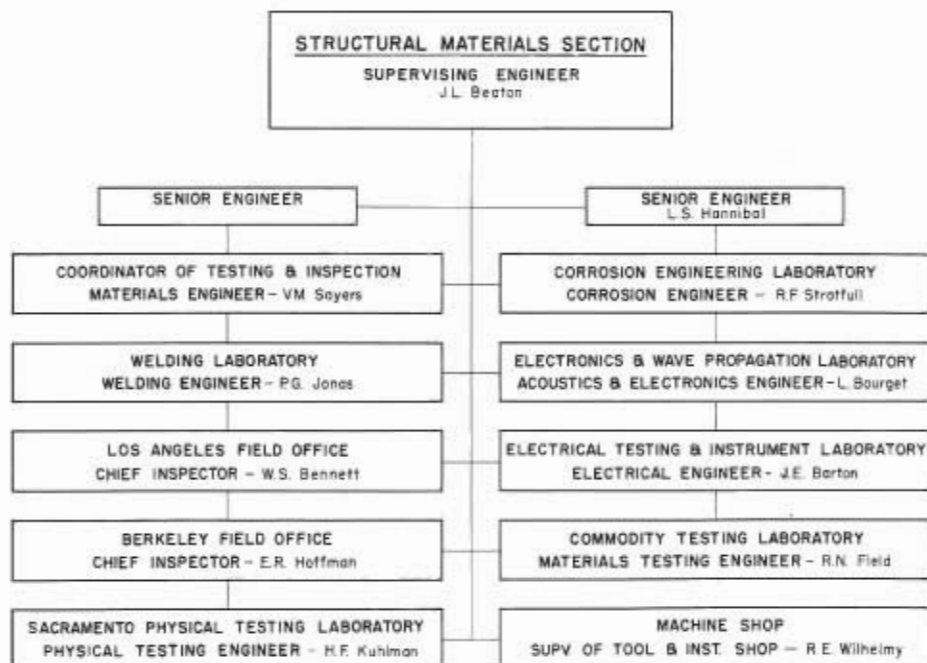
The items covered by such inspection are structural steel, precast prestressed concrete, reinforcing steel; miscellaneous iron and steel; frames, covers, and grates; steel, timber and concrete piles; concrete and corrugated metal pipe culverts; water and sewer pipe; structural timber, fencing, raised traffic bars, electric signal and lighting systems, sight posts and clearance markers, precast concrete monuments and barrier posts, bridge and guard railing, highway signs and reflector buttons, service and supply commodities, and the sampling of bituminous and paint products, and any

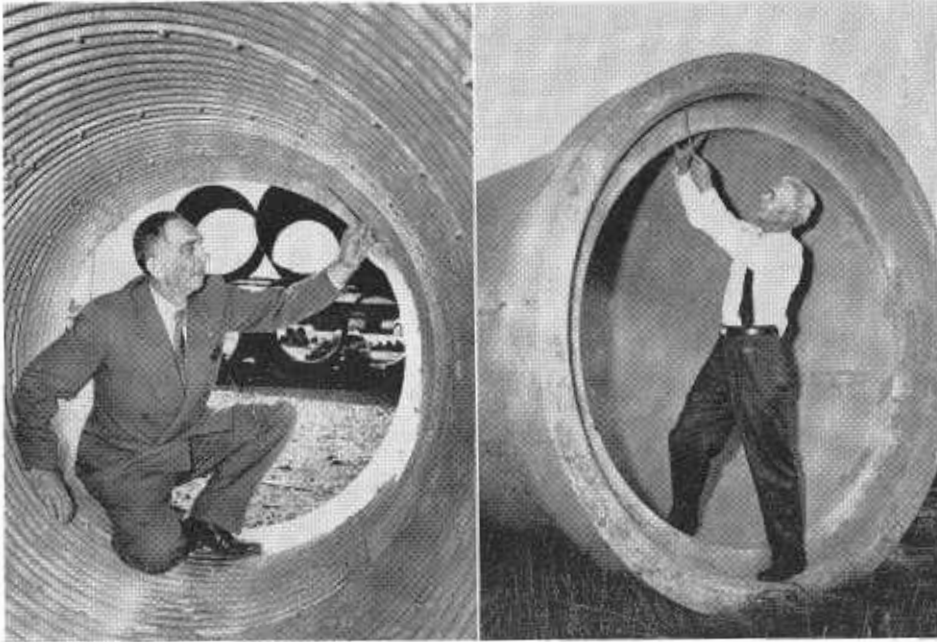
other special materials which are fabricated or manufactured before delivery to the job.

### Maintains Branch Office

The majority of such products originate in the two large manufacturing areas of California; the San Francisco Bay area and Los Angeles, for this reason, Headquarters Laboratory maintains a branch inspection office in each of these areas. This results in small, efficiently managed offices consisting of a group of men in each area who are highly skilled, well experienced and closely acquainted with the major manufacturers and fabricators of the State of California. The employee turnover rate of zero in these offices indicates the high morale and the interest these men have in their service to the Division of Highways.

The primary function of these offices is to assure compliance with specifications of materials delivered from their area to the various contract proj-





Figures 1 (LEFT) and 2. This is the manner in which corrugated metal pipe and reinforced concrete culvert pipe must undergo inspection by experts before shipment to the construction site is approved.

ects throughout the State. However, they also play the following secondary role which in the long range picture is of equal importance.

#### Access to Knowledge

In order to efficiently conduct the prime duty of inspection, it is necessary and desirable that friendly industrial relations be developed and maintained. As a direct result of this relationship, the branch office personnel has access to a vast amount of industrial knowledge and know-how regarding materials and manufacturing processes not necessarily connected with regular highway material production nor ordinarily available to the average engineer. Consequently a valuable secondary operation of investigation and dissemination of information is naturally established and is used extensively to keep headquarters advised of new materials and methods of manufacture or fabrication which might have practical application to Division of Highways' work, or might result in necessary revisions in our contract specifications.

In addition to the large volume of manufactured material emanating from the two major manufacturing areas in California, much material also originates from other outlying cities and

towns throughout the State and from plants elsewhere in the United States.

#### Work Volume Growing

When such material originates within the State but outside the San Francisco Bay, Los Angeles, or the Sacramento areas, the work is assigned to the nearest district materials engineer. The volume of this work in the districts has been growing so steadily that, with the exception of Districts IV and VII, most of the districts have at least one materials engineer assigned especially to this task. These men have proven highly competent and conscientious in this work and, with the exception of complex welded structural steel or prestressed concrete fabrication, little assistance is needed from Sacramento except in the matter of standardization and co-ordination.

Inspection of materials for our use originating outside the State of California is handled by service agreement through commercial inspection agencies. Most of such out-of-state work is confined to material that must conform to specific chemical or mechanical tests and needs but a general degree of co-ordination to assure proper control. However, in some cases such as structural steel fabrication it is necessary that a careful control of stand-

ards be exercised from Sacramento Headquarters so that out-of-state fabricators and inspectors can be as familiar with the requirements of the Division of Highways as are the fabricators within California.

#### Precise Co-ordination Needed

All inspection of manufactured material, whether within the State or out, requires a precise degree of co-ordination from the contractor's notification of material sources to the assignments of inspection. The management of this activity depends on the resident engineers making sure that the notices of material sources are complete and are forwarded as soon as possible.

The co-ordination of such work is handled by a materials engineer assisted by a clerical staff in Sacramento.

It is the policy of the Division of Highways to provide continuous inspection at the source of supply. This involves a prior discussion between the inspector and the manufacturer or fabricator concerning the requirements of our specifications as well as intermittent inspection during the actual manufacture and final inspection at the end of production which also covers the shipping method. When complex fabrication is involved, such conferences may also include the design and construction engineer, and the inspection is continuous throughout the project.

#### Supplier Must Understand

In order to implement this program, it is required that the contractor notify his resident engineer as soon as possible of his source of materials. This information is immediately transmitted to the laboratory and the assignments made as expeditiously as possible so that the assigned inspector can be assured that the supplier knows and understands the requirements of the specifications before actually starting work.

Within the State of California alone, this section inspects and maintains co-operation at the production level with approximately 800 manufacturing or fabricating companies. Such industries range from a one-man concrete monument plant to enormous corporate entities such as the steel

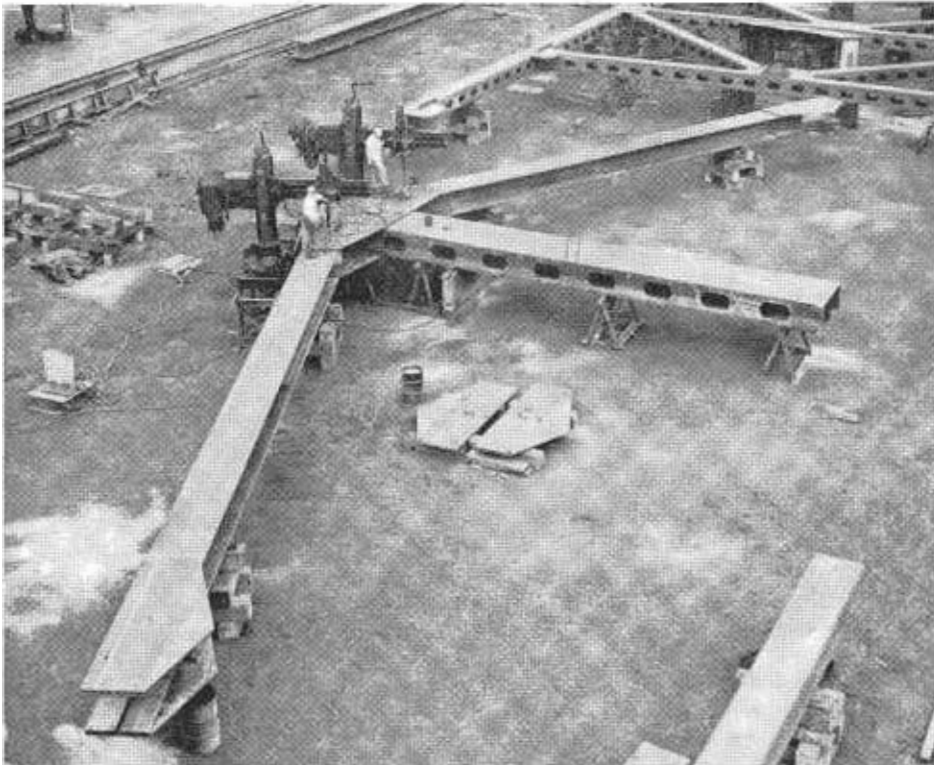


Figure 3. Inspection of structural steel fabrication includes shop assembly and matchmarking, the work which is under way in these photographs of trusses destined for use in the Carquinez Bridge.

mills which supply structural steel for our bridges and buildings. The scope of this activity is illustrated by Figures 1, 2, and 3.

In addition to the administrative coordination office, there are four laboratories in the Sacramento Office of the Structural Materials Section which are directly keyed to the inspection program and provide a testing service to the field inspectors.

#### Physical Testing Laboratory

The physical testing laboratory performs the mechanical tests and such physical tests as cannot be performed in the field on the samples of various manufactured materials submitted for proposed use on contract work.

The samples are submitted by the branch office inspectors of this section, by district materials engineers, and by various resident engineers. The samples submitted by the resident engineers cover those materials which are, either inadvertently or sometimes purposely, sent to a project without source inspection. This is done purposely only when the economy of the inspection dictates it.

This laboratory utilizes the services of four engineering assistants with a

testing engineer in charge. It is equipped with a 440,000-pound universal testing machine, a 60,000-pound universal testing machine, a 5,000-pound universal testing machine, Brinell and Rockwell hardness testers, an impact testing machine, and the various special jigs and appurtenances involved in such testing, such as stress-strain recorders, SR4 gauges, extensometers, etc. A 200,000-pound universal testing machine is located in the Los Angeles Branch Laboratory.

Figure 4 illustrates the testing of a prestressing wire strand in the 440,000-pound universal testing machine.

#### Requires Experience

This testing of structural materials which involves a wide variety of procedures and equipment, requires extensive experience and training, mechanical ability, and exercise of good judgment; the need for versatility adds interest to the work.

The duties of this unit are not by any means confined to the performance of established routine tests. New developments in materials or construction methods constantly challenge the ingenuity of the testing engineers, for

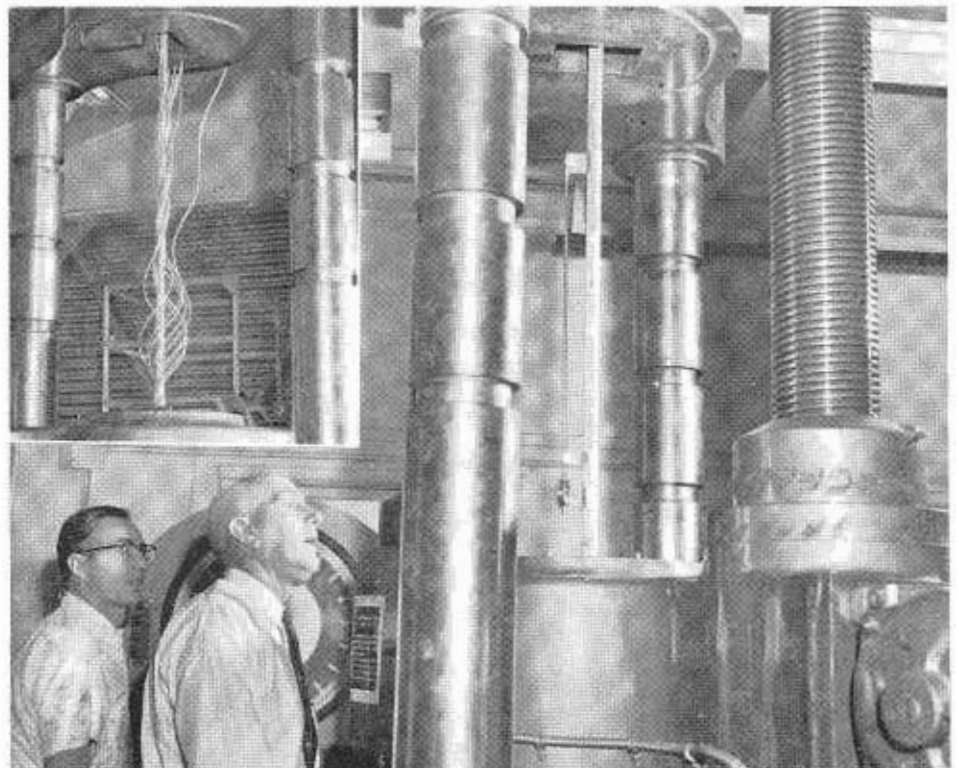


Figure 4. Stress and strain measurements being made of a wire strand. INSET—Closeup of strand after being loaded to failure in testing machine.



they must find ways to evaluate new products, to develop more workable and effective specifications, and to deal with the problems continually proposed by changing construction techniques.

Probably the most interesting of these problems at present are those raised by prestressed concrete construction. The bridge designers have adopted a policy of an open design insofar as the materials and details of the prestressing units themselves are concerned. Thus, the field is wide open for various imaginative fabricators who provide the industry with a healthy atmosphere of progress. At the same time it is necessary that each proposal be investigated with great care since each structure involves a high degree of responsibility concerning public safety.

#### Speed Necessary

Other problems are raised during the shop fabrication stage of such prestressed concrete units. One of the most important factors in shop production is the speed with which the forms can be stripped and the beams stressed; therefore, the pressure for higher production speed is constant at all times. This necessitates high early

strength concrete which is usually obtained by use of an increased cement content and steam-accelerated curing. No complete data has come to our attention concerning the upper limits of either of these items; therefore, it is necessary that investigations to establish safe and practical limits be performed. This study is under way.

#### New Laboratory

The bridge design engineers in the California Division of Highways have long held the forefront in the use of welded steel bridges. The rapid progress and expansion of this type of fabrication has made it necessary to establish a relatively new laboratory unit within the Structural Materials Section so as to develop standards for such fabrication and its inspection and testing; to test and evaluate new welding electrodes; to perform research and special investigation on the weldability of new steel alloys; and to advise and work with the bridge and other structural construction and design engineers on special welding fabrication and erection problems. Such advisory work is also extended to the Division of Architecture and other governmental subdivisions.

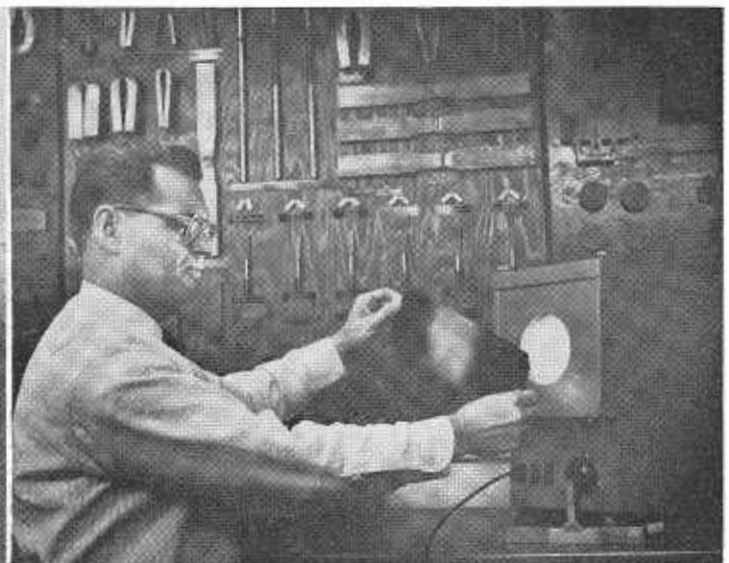
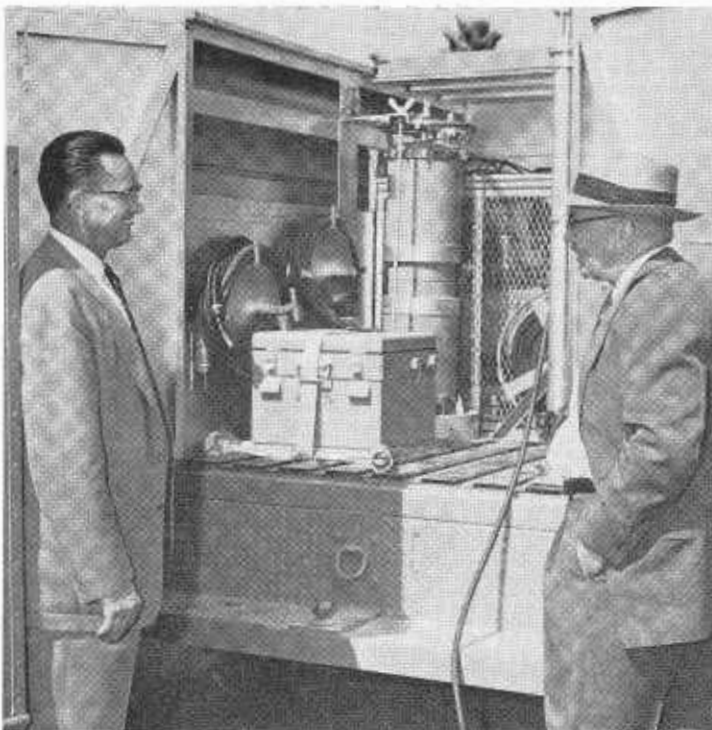


FIGURE 5

A great deal of close co-operation and co-ordination with the Bridge Department, with the structural fabrication industry, and the steel manufacturing industry has been necessary so that the Division of Highways can take advantage of the economies inherent in welded construction.

#### Steel Research

A current example of such work and of the problems that are involved is the design and fabrication of the structural steel for the Carquinez



LEFT—Figure 6. Interior view of a mobile radiographic truck showing the position of portable X-ray equipment. Gamma ray isotopes enclosed in lead cameras occupy the space to right. ABOVE—Figure 7. A skilled engineer's examination of radiographs of welded joints discloses possible internal defects in the weld. Radiographic inspection work of this sort enables the Materials and Research Department to make great savings in time and money.

Bridge superstructure. During the planning phases of this bridge, one of the major steel companies offered a new type of constructional steel called T-1, the use of which indicated savings amounting to about \$800,000. Special studies by this laboratory into the metallurgical and mechanical properties and weldability of this steel indicated its suitability for bridge construction use. The bridge was therefore so designed and at present is being fabricated in the East under the direct inspection supervision of this welding laboratory, with detail inspection being provided by a commercial laboratory. *Figure 5* shows a metallurgist studying the microstructure of a metal specimen during this study.

The Welding and Metallurgical Laboratory is equipped with a metallographic microscope designed for visual magnification of 1,500 power and photographic magnification of 2,000 power, a 175-kilovolt portable

X-ray machine, a 20-curie cesium isotope, and a 1-curie cobalt isotope (both of the latter contained in lead projectors for portable usage), bending jigs, and a simple photo-elastic polariscope.

The X-ray and isotopic equipment is interchangeable for use either in the laboratory or in the portable traveling radiographic unit, shown in *Figure 6*. This traveling radiographic unit is available for contract projects to qualify welders and perform radiographic inspection of major welding.

*Figure 7* shows the welding engineer studying a radiograph of a welded joint of a bridge under fabrication.

#### Special Studies

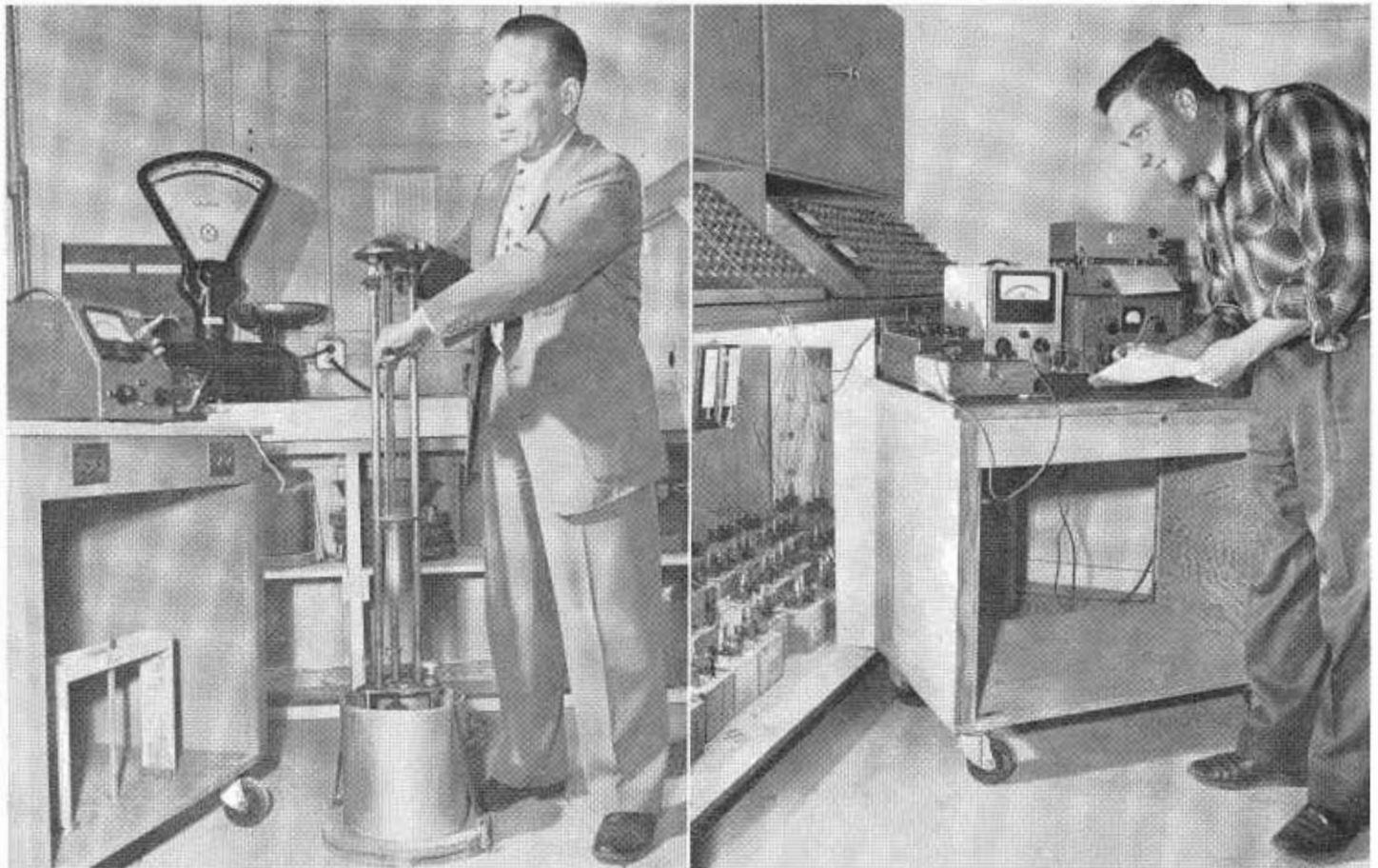
A special studies group is included within the Structural Materials Section which, as shown by the organization chart, contains the Electrical Laboratory, Electronics and Wave Propagation Laboratory, Corrosion Laboratory, and Commodities Testing Laboratory.

This group, while somewhat involved in the day-to-day contract inspection and testing activities, is primarily engaged in research and special investigations of a variety of the highway components.

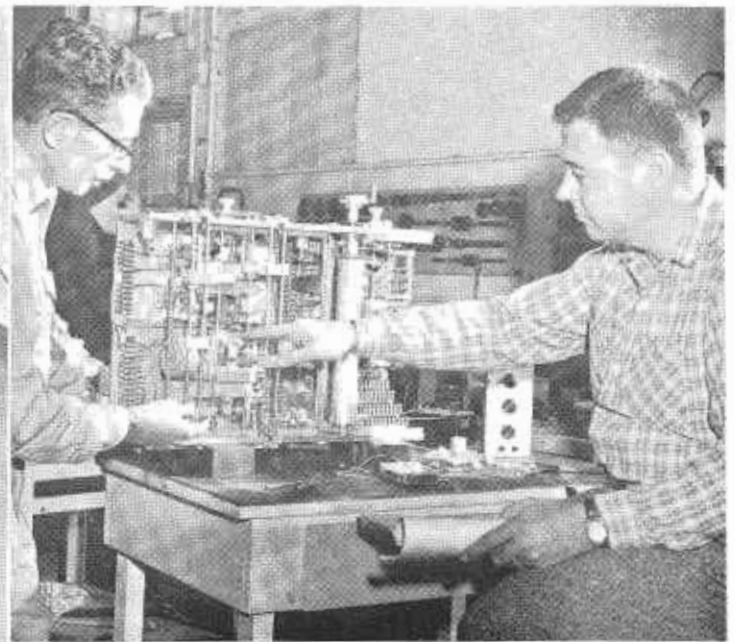
The special studies group is unique in the varieties of diverse abilities found among the technicians and engineers comprising this particular branch of the Structural Materials Section. A keen interest in the various projects, unhampered originality, enthusiastic teamwork, and ample confidence in being able to attain creditable results make every new assignment an interesting challenge, whether it be glare on a new type of traffic sign or strain gauge deflections of prestressed concrete bridges which occur under the effects of moving loads.

#### Needs Occur

Engineering development or special instrumentation needs often occur which may be either mechanical-electrical or purely mechanical or



LEFT—*Figure 8*. Experimental model of electronic compaction control equipment. RIGHT—*Figure 9*. Experimental study concerning rate of corrosion.



LEFT—Figure 10. Tensile testing of fabric material in an electrohydraulic tensile tester. ABOVE—Figure 11. Testing engineer and instrument maker are shown making final adjustments on a new type recorder designed and manufactured by the Materials and Research Department of the Division of Highways. Such combinations of precise machines and trained personnel have developed many special pieces of laboratory equipment.

electrical in nature. Within the special studies group various individuals are available who can design and construct many of these special items. In most instances such equipment is requested and used by laboratory sections other than the Structural Materials Section. A typical example of a recently developed item is a truck-mounted recording profilograph, employed in studies of irregularities of paved surfaces. This unit continuously records pavement irregularities electronically with an accuracy of 0.1 inch.

Equipment now in development includes a hand-operated pavement profilograph; a precision recording deflectometer mounted on a loaded 15-ton trailer, which employs an automatic Benkelman arm that can indicate the exact amount of deflection of roadways under load; a temperature cycling refrigeration unit to accelerate freeze and thaw studies of concrete pavement employed in the Donner Summit realignment of Highway 40; sand trapping and measuring devices for the Indio Desert; and a small steam plant to experiment with the steam curing of concrete.

All of the above items are to be used by various sections of the department so as to conduct needed research or investigational projects.

#### Some Work Minor

The Electrical Laboratory's work with direct contract items is relatively minor, consisting primarily of testing electrical wire for compliance with specifications, and other electrical components which readily lend themselves to laboratory testing. Due to the fact that most highway electrical projects involve so many small items, economy often dictates that such products be inspected or sampled for testing after arrival on the job, so much of this work is allocated to the district materials or resident engineers. The Electrical Laboratory also encompasses the field of illumination and reflection; thus, considerable time is devoted to the Service and Supply Department in testing light bulbs for traffic signals or reflective materials for highway signs.

This laboratory has constructed an Ulbricht spherical photometer which has received constant use in performing tests for the \$40,000 worth of

lamps purchased by the Division of Highways each year. This photometer is a 60-inch hollow sphere which is used to determine photometrically the lumen output of various incandescent and mercury vapor light bulbs. A series of standard lamps certified by the National Bureau of Standards and the Electrical Testing Laboratory are available for calibration purposes, and lamps under test can be accurately evaluated in relation to these calibrated bulbs.

Reflective buttons and sheets are examined photometrically for reflective properties in a 100-foot black walled light tunnel. Calibrating equipment consists of eight photometric cells, and a D. C. microvolt amplifier. A resistance decade box is available to give very precise evaluations.

#### Other Research

The most interesting and valuable work performed by the Electrical Laboratory consists of providing or developing electrical instrumentation installations and standardizing such equipment for special projects and research activities which may be conducted in this or other sections of the



Materials and Research Department, or in other departments or districts of the Division of Highways.

Studies may involve the use of a spectrum brightness spot meter to measure the glare effects from a new model of street or highway luminaire; or analysis of smooth riding qualities of a pavement. A study of the latter was recently performed by mounting a series of impulse accelerometers on a passenger in a car. The riding vibration signals were transmitted to a carrier multichannel amplifier and recorded on a Visicorder multipoint oscillograph. These data will be used in the development of smoothness of pavement specifications. This laboratory has also developed the use of multipoint temperature recorders to record pavement, earth, and air temperatures under desert conditions at Inyo, or arctic temperatures at Donner Summit during a midwinter blizzard.

These are only a few of approximately 30 major projects which the Electrical Laboratory has handled during the last 18 months. Several investigations conducted by this group have been previously discussed.

#### Equipment Calibrated

A catalog of the various electrical instruments and measuring apparatus necessary to the functioning of the Electrical Laboratory is too extensive to be listed. Wherever possible, basic equipment is calibrated by the Bureau of Standards or some other recognized laboratory, such that these items can be employed as reference standards. Loadometer cells, A. C. and D. C. voltmeters and ammeters, thermocouples, and similar equipment have been calibrated in this manner.

The laboratory possesses four portable motor generator units for performing field experiments where regular sources of power are not available. A combination instrument and dark-room trailer is also available. This trailer is equipped with a 10-channel impedance bridge, carrier oscillator and 12-channel oscillograph, which permits a variety of dynamic deflection and stress measurements to be taken on pavement or bridge structures under moving loads.

#### Problems Encountered

The Electronics and Wave Propagation Laboratory was established to handle a number of special electronic and sonic problems which have been encountered during the recent years of highway construction. Traffic noise and other acoustical studies represent one phase of work and the microseismic investigation of compacted soils represents a second.

A number of instances have occurred in which the laboratory has been called upon to make acoustical studies of buildings or schools, usually adjacent to new freeways or highways, or traffic noise investigations in critical localities such as adjacent to the Hollywood Bowl. Then, at the other extreme, the fact that seismic shock waves have been employed in subsurface exploration and can indicate varying densities, has raised the question of whether microseismic shock wave techniques could be employed as a rapid indication of the relative compactions of road fills during construction.

#### Major Objection

As a matter of clarification regarding the latter, the established methods of sampling compacted soils for density and moisture have one major objection. The technique is slow and time-consuming, and it is difficult to do more than spot check a large fill at more than a few random points. Any device which would augment the above established method and permit a rapid but thorough check control would be more than welcome on all projects where the advances in construction equipment have made commonplace the placement of thousands of yards of earth daily.

Over the years a great number of different test methods have been investigated by various highway agencies both in California and other states, but most of the so-called shortcut methods have failed to give dependable data which can be integrated with the established highway engineering practices. Microseismic techniques are comparable to typical seismic subsurface exploration, and on this basis have some promise of disclosing surface and subsurface densities.

From the practical standpoint, much of the equipment which can be used for acoustical or traffic noise investigation can be employed in microseismic investigations. This microseismic project is still in the early experimental stages. Some rather unanticipated results have been obtained, but the design bears promise of pointing the way to a fast supplementary means of controlling compaction under the present-day high pressure methods of earth moving. *Figure 8* shows the electronics engineer experimenting with an early model of such equipment.

The Electronics Laboratory is well equipped with several high gain amplifiers, various accelerometer transducers, an accurately timed oscilloscope, a sound level meter, an audio oscillator, a phase angle meter, a communications receiver which has been employed for Bureau of Standards frequency transmissions, and a series of other electronic instruments, reference loudspeakers, and associated sonic and acoustical equipment.

#### Laboratory Established

The placing of metals in soils, waters, or other aggressive electrolytes continually reminds man that metals, through corrosion, have a tendency to return to their most basic form.

With the ever accelerating rate of construction of highways, the corrosion of even a small percentage of the buried metals, such as culverts, utility lines, and reinforcing steel, can be a relatively large economic burden.

Due to growing necessity, a corrosion laboratory was established in 1952. The function of this unit is to furnish technical recommendations to the various districts and departments and to perform research and investigational studies concerning the corrosion of metals embedded in electrolytes such as soils, waters, or moist concrete.

The scope of the work may entail recommendations which vary from the particular type of culvert to be placed in an aggressive soil to a detailed study of the corrosion of reinforcing steel in a multimillion dollar bridge.

### Corrosion Studies

Several of the major investigations of this department have been of special interest. One of these studies is the continuing investigation of the corrosion of reinforcing steel in the San Mateo-Hayward Bridge. The primary causes of corrosion of reinforcing steel were determined by both laboratory (Figure 9) and field studies. As a result a new means of detecting the corrosion of reinforcing steel by nondestructive testing methods has been developed. The corrosion unit is currently engaged in research leading to the control of such corrosion of reinforcing steel by cathodic protection.

Another major project of this laboratory was an evaluation of the corrosion of metal culverts in the north coastal area of the State. A corrosion area map was developed of the area which indicated the major zones of destruction and relative rates of attack. One of the more predominate facts brought out in the culvert investigation for this general area was that the accelerated rate of attack was related to the presence of bacteria which reduced organic vegetable matter. The concept of bacteria relating to corrosion clarified numerous questions which could not be satisfied by the general theory of "salt air" from the ocean. An additional benefit from this study was the development of objective means of measuring the potential corrosiveness of any proposed culvert site.

### Other Studies

Some of the studies under consideration include the following: the possibility of environmental conditions which may cause corrosion of high tensile steel in prestressed concrete; the corrosion resistance of special structural steels; the corrosion resistance of various metals used in chain link fences exposed to marine environments; the corrosion of underground utility piping; evaluation of several types of commercially available electrical conduit; and the corrosion of metal culverts.

The Corrosion Laboratory is well equipped to accurately measure soil pH, soil resistivities and potentials, to make corrosion studies of under-

ground piping systems, or to perform numerous investigations of the electrochemical corrosion of steel and other metals.

### Commodity Testing

The commodity test unit was established to examine miscellaneous items which are not readily processable in the physical testing laboratory. Commodity unit personnel are no longer surprised at the unusual items which find their way into the commodities laboratory for testing. Ball point pens, hard hats, fabrics, paper, garden hose, plastic pipe, seat belts, and furniture have all appeared in this laboratory at one time or another for test of tensile strength, bursting strength, crushing strength, folding endurance, fading, or other characteristics applicable to the anticipated use of the item. Much of this testing is performed either for the Service and Supply Department or the State Bureau of Purchases. Frequently A. S. T. M. or federal specifications have not yet been determined for these items, so this section must develop their own procedure, devising test methods, and adapting existing equipment for new uses.

The commodities testing laboratory is equipped with a constant humidity cabinet, a Fade-Ometer for testing the fading of colored fabrics under ultraviolet light, and electro-hydraulic fabric tensile tester (Figure 10), a hydroelectric pump assembly for testing plastic pipe and hose, an M. I. T. folding endurance tester, and numerous other testing or measuring devices.

One of the major projects conducted by the commodity test group is a long-range study of the durability of various highway signs exposed to weather and to vandalism, and the use of plastics in lieu of metal for guide posts and signs. The objective of this study is to find materials which will stand salt atmosphere, desert heat, sandstorms and winter blizzards; will not collect dust or oil films; will not be damaged by impact from cars, rocks, or bullets, and can be repaired or replaced easily. A simple solution? The laboratory has been working on this project for 30 years and may continue to do so far as long as man drives automobiles. However, some of the new plastic materials are showing

results that may well end this eternal search.

### Machine Shop

A machine shop is a necessary adjunct to any laboratory whether it is engaged solely in routine testing work, special investigation, or research. The laboratories of the Materials and Research Department, being engaged in all three functions, find the services of a well-equipped machine shop to be absolutely essential for their normal operation. The services of the machine shop are used to prepare test specimens, to maintain and to repair special testing equipment, and to manufacture and fabricate various new devices proposed for advanced test methods.

Machinery used to equip this machine shop has been especially selected to give a high degree of precision to the testing equipment being built, and the machinists and instrument makers manning this shop are highly trained in their specialized work. It is this combination of precise machines and highly trained personnel working with the engineers (Figure 11) that has developed such testing equipment as the stabilometer, cohesiometer, kneading compactor, resiliometer, special fatigue machines, sample splitters, sample washers, pencil testing machines, traveling load deflectometers, profilograph, sand volume apparatus, numerous extensometers and micrometers and dynamometers, and many other special pieces of equipment, either completely new in design or otherwise unobtainable on the commercial market. All equipment available through purchase is so obtained. It is only equipment not available commercially that is designed and built in the laboratory machine shop.

### Test Specimens Prepared

The shop prepares test specimens of steel and other metal materials for tensile, compression, cold bend, side bend, and other special tests such as impact and hardness tests, and also prepares metal specimens for chemical tests. In addition to the repair and necessary revisions to the special testing equipment of the laboratories of the Materials and Research Department, the

... Continued on page 42

## NEW SUBDIVISIONS

*Continued from page 31 . . .*

structed immediately adjacent to the freeway. As a matter of fact, there are many persons who prefer a house adjacent to the freeway. In some cases, resale statistics have revealed that residences adjoining a freeway can attain a higher price range than comparable residences away from the freeway.

As an integral part of the geometric layout of the street system and the freeway interchange ramp system, we must be very careful to provide a sufficient number of lanes to absorb and distribute the anticipated traffic flow. This is equally applicable to local traffic problems as well as to the problem of freeway-local traffic. If, in the design of the subdivision, large volumes of traffic are funneled into a single street facility and then brought to the freeway, it is imperative that an adequate number of lanes be provided, both to prevent the backing up of traffic wanting to get onto the freeway and also to prevent the backing up of traffic on the freeway wanting to get off to the city streets. Geometrically speaking, we must have a freeway interchange-city street pattern that provides for efficient use of the land and distribution of traffic. Both the freeway ramps and city streets must have sufficient capacity to adequately care for the anticipated volume.

### Drainage Problems

In the relationship between state highways and new subdivisions, we not only have traffic problems; but there is also the matter of co-ordinating drainage. Here again, as in the geometric street layout, co-operation and joint planning on drainage problems will provide a more satisfactory solution at a saving, both to the State and the local agency. It has always been the policy of the State Division of Highways to work with the local agencies in the solving of drainage problems, and in the past we have entered into a large number of co-operative agreements which have resulted in a solution that has been beneficial to all concerned. Again, it is a matter of providing an overall drainage plan with each governmental agency co-

## Division Reports Daily On Road Conditions

The Division of Highways is again issuing its seasonal daily road condition report.

The report is issued daily through the winter until the reopening of highway routes through the Sierra in the spring.

Duplicated copies of the report are available to the public at the Public Works Building in Sacramento and are also distributed to various departments of State Government.

Widest dissemination of the road condition report is via a statewide teletype circuit from the Highway Division headquarters to news services, newspapers, radio and television stations, automobile associations and others who pass the information on to the public.

The Highway Division has more than 800 vehicles equipped with two-way radio forwarding information and is using an expanded network of non-mobile relay stations.

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operating and working to provide its part and its fair share of the cost. Where it is anticipated that mutual drainage difficulties will arise in the development of the land, these should be brought to the attention of the appropriate district office of the State Division of Highways at the earliest possible time so that planning to handle these problems can be initiated at an early date. Other areas of co-operation are in the development of suitable landscaping of the freeway, which will conform aesthetically with the requirements of the adjacent area and provide buffer areas between the freeway traffic and the subdivisions.

In summary, I wish to emphasize that the problem of state highways in relation to new subdivisions is not a problem only of the State Division of Highways or only of the local agency controlling the development of the subdivisions, but is a problem of joint responsibility. The fullest co-operation on the part of both agencies is necessary in order to develop the full potential of the area.

## OPERATIONS AND ACTIVITIES

*Continued from page 41 . . .*

personnel of the machine shop also give the same service to the laboratories of the various districts.

It can best be summarized that the Structural Materials Section of the Materials and Research Department, like the other four major sections, is organized: (1) to give the designer and the specification writer the latest information on available materials and the methods of manufacture and production; (2) to give the construction engineer assurance that the materials and manufactured items received from the industrial plants will comply with the specifications; and (3) to assure the administrator that by proper research the Division of Highways will always be in a position to take advantage of the technological advances in industry that might pertain to highway construction.

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## PLAN AND DESIGN

*Continued from page 10 . . .*

The northerly proposed extension of the Long Beach Freeway, five miles in length from the Santa Ana Freeway to Huntington Drive, was officially made a part of the State Highway System by legislative enactment in 1951. At that time the project was known locally as the "Concord Freeway" and was so shown on official maps of local governmental agencies. This name was officially changed to the "Long Beach Freeway" by vote of the California Highway Commission in November, 1954.

Design work, preparation of contract plans for construction, and some right-of-way acquisition are now being carried out on the northerly extension of the Long Beach Freeway. The California Highway Commission in adopting the budget for the 1958-59 Fiscal Year, at its October meeting, provided an item of \$6,150,000 for constructing 3.6 miles of this freeway from the Santa Ana Freeway northerly to an interchange connection with the San Bernardino Freeway. This construction is expected to be under way during the summer of 1958.



# Trans-Sierra

Mountain Work on US 40  
Will Total \$34,650,000

FIVE major freeway construction projects on the trans-Sierra portion of US 40, totaling 36 miles in length and estimated to cost \$34,650,000, are contained in the state highway budget for the 1958-59 Fiscal Year submitted to Governor Goodwin J. Knight by the California Highway Commission.

The five major trans-Sierra projects budgeted will connect with and extend freeway work now under contract on US 40 in Placer, Nevada and Sierra Counties involving four contracts totaling 20 miles of highway and an aggregate construction cost of approximately \$15,900,000.

When both the projects now under construction and those newly budgeted have been completed, there will be a total of about 83 miles of freeway or expressway in operation on the 117-mile length of US 40 between Sacramento and the Nevada state line, it was pointed out by State Director of Public Works Frank B. Durkee, Chairman of the Highway Commission.

## On Interstate System

This multilane divided mileage will include 56 continuous miles of freeway and expressway between Sacramento and east of Gold Run, and nearly 21 continuous miles between the east end of Donner Lake and the Nevada line. The remaining six miles of freeway will be slightly west of Donner Summit, between Hampshire Rocks and Soda Springs.

Durkee explained that US 40 is a portion of the national system of interstate highways and that the present

emphasis on its development as a freeway is in line with the goals of the accelerated national program. He also noted that projects included in the 1958-59 Budget are intended, weather permitting, to be opened to traffic by the end of 1959, in time for the winter Olympic games scheduled for Squaw Valley in February, 1960.

Of the five projects on US 40 contained in the new state highway budget, four are being financed only in part in the 1958-59 Fiscal Year. In these cases the contracts for the entire project will be awarded at one time, however, with the remaining cost to be charged against the budget for the succeeding fiscal year. This method of getting large-scale projects started without tying up large amounts of highway funds is being used in the 1958-59 Budget for the first time.

## East of Sacramento

The current status of freeway and expressway development on US 40 east of Sacramento is now as follows:

Sacramento to one-half mile east of Roseville, 17 miles, freeway completed.

One-half mile east of Roseville to one mile east of Newcastle, 11 miles, \$7,800,000 freeway project included in 1958-59 Budget (\$5,500,000 financed in 1958-59 Fiscal Year).

Newcastle to Auburn, 3½ miles, \$2,578,000 freeway project under construction (some structures and grading completed under previous contract).

Auburn to Heather Glen, 11 miles, expressway completed.

Heather Glen to Colfax and Colfax to Magra (west of Gold Run), 12 miles, two expressway projects totaling \$7,875,000 under construction.

Magra to one-half mile west of Monte Vista (east of Gold Run), four miles, \$3,000,000 freeway project included in 1958-59 Budget.

One-half mile west of Monte Vista to Hampshire Rocks, 22 miles, freeway route adopted and rights-of-way being acquired. (Detour nearly completed near Monte Vista at cost of \$315,000).

Hampshire Rocks to Soda Springs, six miles, \$5,600,000 freeway project included in 1958-59 Budget (\$4,000,000 financed in 1958-59 Fiscal Year).

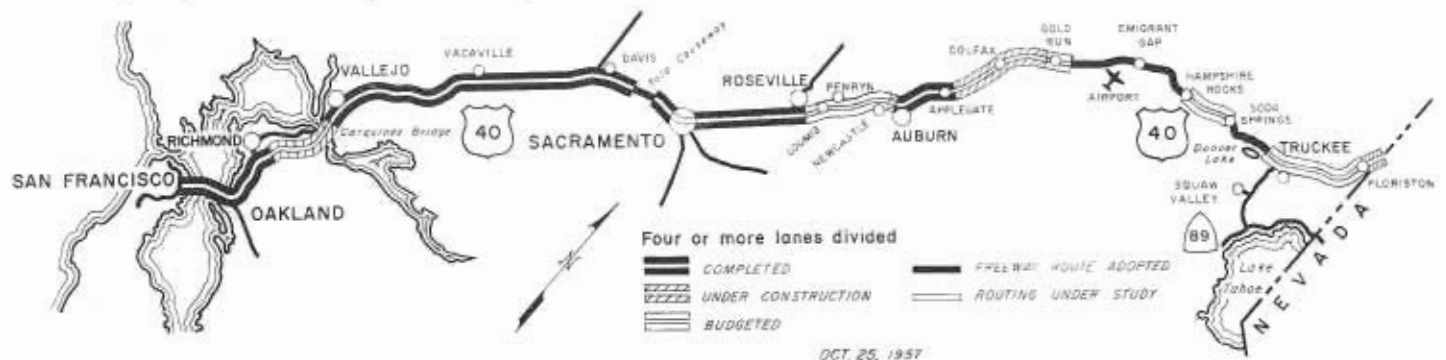
Soda Springs to east end of Donner Lake, 10 miles, freeway route adopted.

East end of Donner Lake to near Boca, nine miles, \$8,800,000 freeway project included in 1958-59 Budget (\$5,400,000 financed in 1958-59 Fiscal Year).

Near Boca to near Floriston, 6½ miles, \$9,450,000 freeway project included in 1958-59 budget (\$5,373,000 financed in 1958-59 Fiscal Year). (Detour now under construction at cost of \$565,000.)

Floriston to Nevada state line, five miles, \$5,420,000 freeway project under construction.

Another project in the 1958-59 Budget provides for the widening of State Sign Route 89 for 8.3 miles between Squaw Valley Road and the Donner Creek underpass near the junction of US 40 at an estimated construction cost of \$1,700,000.



## BUDGET

Continued from page 2 . . .

"The commission must, of necessity, consider each annual budget as a part of a continuous, long-range plan for financing the development of the state highway system."

Significant features of the 1958-59 State Highway Budget include:

### Los Angeles Area

In the Los Angeles metropolitan area, completion of the Ventura Freeway in the San Fernando Valley west of the Hollywood Freeway; extension of the Golden State Freeway northwesterly through and beyond Burbank, and its further construction in the area east of downtown Los Angeles; extensions of the San Diego Freeway southerly through Culver City; the Harbor Freeway southerly to 190th Street; and the Long Beach Freeway northerly to the San Bernardino Freeway; widening of the Santa Ana Freeway from Norwalk to Buena Park; and extensive right-of-way acquisition on these and other freeway routes, with particular emphasis on the Santa Monica Freeway, the San Diego Freeway, and the Golden State Freeway.

### Orange County

On the Orange County portion of US 101, the budget provides for construction of an eight-mile section north of San Juan Capistrano which, with other projects under construction or budgeted, will provide 80 miles of continuous full freeway from the west end of San Fernando Valley, through the City of Los Angeles to San Juan Capistrano.

### San Diego Area

In the San Diego area, emphasis is on the continued conversion of US 80 from expressway to full freeway in the San Diego-La Mesa area by construction of interchanges, and on the westerly extension of the Sign Route 94 freeway toward downtown San Diego.

### San Bernardino-Riverside Area

Freeway development in the San Bernardino-Riverside area will be carried on by several projects, including the extension of the Riverside Freeway westerly toward Corona and a

section north of Riverside connecting with the San Bernardino Freeway at the new interchange east of Colton. At the same time, the budget provides for completing the conversion of the San Bernardino Freeway to full freeway between Ontario and Colton by the construction of separations and interchanges.

On major routes east of Riverside, expressway and freeway construction is provided for west of Beaumont and west of Indio. The latter project will

### TYPICAL GOALS

Typical of achievements to be realized by completion of projects included in the 1958-59 Budget are:

More than 80 percent of US 40 between San Francisco and the Nevada state line will be divided, multilane freeway or expressway.

More than 95 percent of US 99 between Sacramento and Los Angeles will be multilaned and divided roadway.

The Hollywood-Santa Ana Freeway will extend unbroken from the San Fernando Valley through downtown Los Angeles to San Juan Capistrano, a distance of 80 miles.

There will be a continuous stretch of full freeway from Los Gatos, through San Jose and Oakland to north of Vallejo, a distance of 75 miles.

US 101 will have a section of continuous freeway or divided highway 50 miles long from the Golden Gate Bridge to north of Santa Rosa.

complete 41 miles of continuous multilane expressway and freeway between Banning and Indio.

### San Francisco Bay Region

In the San Francisco Bay area, the budget contains a project for the final link of the Eastshore Freeway between San Francisco and Vallejo, the section in the vicinity of the El Cerrito Overhead. This, along with other projects in operation, under construction or newly budgeted, will provide more than 75 miles of continuous full freeway from Los Gatos, through San Jose and Oakland, to beyond Vallejo.

The major freeway project in San Francisco involves the interchange for

the James Lick (Bayshore) and Southern Freeways.

### North Bay Area

The start of freeway construction on the Black Point Cutoff in Marin and Sonoma Counties is another major Bay area project. Further construction on the Greenbrae interchange on the Redwood Highway in Marin County will mean continuous full freeway from the Golden Gate Bridge to San Rafael, and continuous divided highway to north of Santa Rosa.

### Santa Clara County

Several projects are concentrated in Santa Clara County, including the extension of the Sign Route 17 freeway north from Bascom Avenue in San Jose to an interchange with and north of the Bayshore Freeway; extension of the Bayshore Freeway from Palo Alto to Stevens Creek and in the San Jose area; and an interchange on the Bayshore Freeway at Mountain View-Alviso Road.

### Sacramento Region

In the Sacramento area, structures for the South Sacramento Freeway are provided for in the new budget, along with completion of the new Sacramento River Bridge at Rio Vista.

Freeway projects totaling 36 miles on US 40 east of Sacramento are contained in the budget, including an 11-mile section between Roseville and Newcastle and two other projects which will mean continuous freeway and expressway for 56 miles between North Sacramento and east of Gold Run. Other projects, east of Donner Summit, will provide continuous freeway between the east end of Donner Lake and the Nevada state line.

### Projects on US 99

On US 99 the major projects outside metropolitan areas are the freeway unit between north of Fresno and Herndon, which will mean continuous multilane divided highway between the San Fernando area and near Sacramento, except for undivided sections through Modesto, Merced, Turlock, and Lodi.

Another major project on US 99 is the freeway section through Dunsuir in Siskiyou County.

## US 101 Projects

On US 101, budgeted projects will continue the steady conversion of the route to freeway standards, both between Los Angeles and San Francisco and on the Redwood Highway. These projects include sections north of Buellton, through Arroyo Grande, and between Soledad and Gonzales; and in the Healdsburg area, in northern Mendocino County (near Tan Oak Park), and three sections in Humboldt County—one north of Fortuna, one north of Arcata, and one in the Patricks Point-Big Lagoon area.

### Current Budget Reviewed

The Highway Commissioners, as a preliminary to adopting the 1958-59 Budget, reviewed the current (1957-58) budget in view of rising costs and revenue receipts less than originally estimated.

This review resulted in the decision to carry over 16 1957-58 projects to the 1958-59 Budget. The only effect of this action will be to delay briefly the call for bids of these projects.

The commission also approved a recommendation of State Highway Engineer McCoy that 10 1957-58 projects be deferred for later reconsideration because of various reasons.

These changes in the 1957-58 Budget were based on a new estimate of highway user tax income for the 1957-58 Fiscal Year which the Department of Finance furnished the Department of Public Works on October 16th.

The changes in the current budget are subject to the approval of the State Director of Finance and are being forwarded to him as required by statute.

### 16 Items Carried Over

The 16 1957-58 projects carried over to the 1958-59 Budget are identified in the list of budget items by counties printed elsewhere in this issue of *California Highways and Public Works*.

The 10 projects which were deferred for later reconsideration, and the reasons cited by the State Highway Division in recommending that they not be budgeted now, are:

Amador and Alpine Counties—Sign Route 88, from Carson Spur to 0.2

## QUICK ACTION

Three days after the 1958-59 Budget was adopted by the California Highway Commission, Director of Public Works Frank B. Durkee authorized the first advertisement of bids for a project financed by it—a \$5,600,000 job on US 40 in Placer and Nevada Counties.

The work consists of grading and paving 6 miles of four-lane divided freeway between Hampshire Rocks and 0.5 mile west of Soda Springs and constructing seven structures. The structures to be built are: two parallel bridges over the South Fork of the Yuba River, another bridge over the same river, two parallel structures to be part of the Troy Undercrossing, and two parallel structures to be part of the Kingvale Undercrossing.

This job is one of five extensive freeway construction projects on US 40 which were approved last week by the California Highway Commission. The commissioners budgeted \$4,000,000 for this Hampshire Rocks-Soda Springs job, leaving a balance of \$1,600,000 to be financed from the 1959-60 Budget.

Highway officials also plan an early call for bids on other US 40 projects included in the 1958-59 Budget to enable contractors to inspect the terrain before heavy Sierra snows cover the ground.

Construction will start some time next spring, depending on when weather and snow conditions allow contractors to use heavy equipment in the area.

mile east of Amador county line, grade and surface (realignment), \$400,000. (Deferred pending completion of federal forest highway project on same route, now advertised for bids.)

Riverside and San Bernardino Counties—Route 187, from US 60-70-99 to Morongo Valley, grade and surface (widen), \$270,000. (Route location being restudied.)

San Luis Obispo and Santa Barbara Counties—Sign Route 166 (Cuyama

Road), one mile west of Huasna River to 0.7 mile west of Buckhorn Creek, grade, surface, and structures (relocation around Vaquero Reservoir), \$1,165,000. (Negotiations still pending with Santa Maria Valley Water Conservation District and Bureau of Reclamation.)

### Santa Clara County

Santa Clara County—Sign Route 152, San Felipe Road to Hollister Wye, surface, \$90,000. (Two other projects in same general area on this route in 1958-59 Budget.)

Solano County—Sign Route 21, from new Sign Route 21 to 1.25 miles north of Benicia Arsenal, structures and approaches, \$375,000. (Negotiations still pending with U. S. Army for rights-of-way.)

Solano County—Route 90 (Vacaville-Dunnigan Cutoff), 0.3 mile north of Sweeney Creek to Yolo county line, grade, surface and structures (initial two lanes of future four-lane freeway), \$1,070,000. (Project for grading and structures on this route north of the Yolo county line retained in the 1957-58 Budget; to be advertised for bids in November.)

Stanislaus County—US 99, Modesto Freeway, Whitmore Road to Pecos Avenue, grade, pave and structures, \$1,300,000. (Now considered less urgent because of relief provided by new four-lane divided section on south approach to Modesto.)

Tuolumne County—Sign Routes 49, 108, and 120 from seven miles east of Stanislaus county line to Montezuma Road, grade and surface (initial two lanes of a future four-lane expressway), \$943,351. (Portion of original \$1,500,000 budget item now under contract; partial deferment.)

Yolo County—US 40, Solano county line to Swingle (portion) structure (Davis Interchange), \$320,000. (To be included in future large-scale project for conversion of long section of US 40 to full freeway on Interstate System.)

Yuba County—Sign Route 20, west approach to Parks Bar Bridge, grade and surface (realignment), \$100,000. (Project in same area on Sign Route 20 included in 1958-59 Budget.)



# 1958-59 State Highway Budget Projects by Counties

County	Route†	Description	Approximate mileage	Estimated cost *State's share
Alameda	5 (SR 9)	Castro St.-Tennyson Rd. Intersection in Hayward; channelization and signals (\$92,000 project; City of Hayward's share \$7,000)		*\$85,000
Alameda	69 (SR 17)	Eldridge Ave. Pedestrian Overcrossing on Eastshore Freeway in Hayward; structure		50,000
Alameda	69 (SR 17)	Eastshore Freeway—Sixth St. in Oakland to Distribution Structure; landscape	2.0	40,000
Alameda, Contra Costa	69, 7 (US 40)	Eastshore Freeway—0.3 mile south of El Cerrito Overhead to 0.2 mile south of Jefferson St. in Richmond; grade, pave and structures for 6-lane freeway which, with other current and budgeted projects, will complete 75 miles of continuous full freeway from Los Gatos to Vallejo (\$4,300,000 financed in 1958-59 Fiscal Year)	2.6	6,250,000
Alameda	69 (US 40)	Eastshore Freeway— Distribution Structure to El Cerrito Overhead; landscape	3.8	235,000
Alameda	226	Webster St. Tube (portions); site preparation		750,000
Alameda	226	Doolittle Dr. and Davis St. in San Leandro; channelization and signals \$47,000 project; (City of San Leandro's share \$10,000)		*37,000
Alameda	227	Warren Blvd. (Mountain Blvd.)—from Tunnel Rd. to Park Blvd.; landscape	2.0	123,000
Alameda	227	Warren Blvd. (Mountain Blvd.)—Lincoln Ave. to Carson St. (portions); grade, surface and structures for 4-lane freeway		*600,000
Alameda	228, 5 (portion US 50)	From Eastshore Freeway near San Lorenzo to east of Center St. in Castro Valley; landscape	3.8	25,000
Alameda	Various	Rights of Way on State Highway Routes (including \$10,800,000 for US 50 freeway in Oakland)		14,840,000
Alpine	Various	Rights of Way on State Highway Routes		25,000
Amador	Various	Rights of Way on State Highway Routes		45,000
Butte	3 (US 99E)	11th St. to Memorial Way in Chico; structures, signals and channelization (cooperative project for one-way street couplet; City of Chico's share \$25,000)	0.8	*150,000
Butte	Various	Rights of Way on State Highway Routes		150,000
Calaveras	24 (SR 4)	Murphys to Big Trees (portions); grade and surface (widening and realignment) (carried over from 1957-58 budget)	5.9	555,000
Calaveras	24 (SR 4)	Camp Connell to 11 miles easterly (portions); base and surface (reconstruct)	1.0	25,000
Calaveras	Various	Rights of Way on State Highway Routes		100,000
Colusa	15 (SR 20)	10 to 11 miles west of Williams (portions); drainage improvement		20,000
Contra Costa	7 (new US 40)	From San Pablo Ave. in Richmond to Ridge Rd. in San Pablo; landscape	1.6	89,000
Contra Costa	7 (new US 40)	From south of Hilltop Dr. in Richmond to North of Hercules; illuminated signs		153,000
Contra Costa	7 (present US 40)	From junction of SSR 4 to 4.4 miles north of Hercules; resurface	4.6	63,000
Contra Costa, Alameda	69, 7 (US 40)	Eastshore Freeway—0.3 mile south of El Cerrito Overhead to 0.2 mile south of Jefferson St. in Richmond; grade, pave and structures for 6-lane freeway which, with other current and budgeted projects, will complete 75 miles of continuous full freeway from Los Gatos to Vallejo (\$4,300,000 financed in 1958-59 Fiscal Year)	2.6	6,250,000
Contra Costa	75 (SR 24)	Hodges Rd. to Grant Lane (east of Lafayette); landscape	0.5	76,000
Contra Costa	75 (SR 4)	Empire Ave. to Birch St. in Brentwood (portion); resurface and widen (carried over from 1957-58 budget)	6.6	222,000
Contra Costa	75 (SR 24)	South City Limit of Concord to Willow Pass Rd.; grade and surface (widen) (\$48,000 project; City of Concord's share \$13,000)	0.2	*35,000
Contra Costa	75, 106 (SR 4)	Junction of SR 4 and 24 to Willow Pass Rd. (portions); resurface	0.4	34,000
Contra Costa	107 (SR 21)	3 locations between Alameda County Line and Walnut Creek; drainage improvement		50,000
Contra Costa	Various	Rights of Way on State Highway Routes (including \$1,100,000 between Danville and Walnut Creek on SR 21)		3,011,000
Del Norte	1 (US 101)	0.7 mile south of Elk Valley Rd. to 0.4 mile north of Northcrest Dr.; grade, surface and structures for one-way street couplet in Crescent City	2.3	590,000
Del Norte	Various	Rights of Way on State Highway Routes		50,000
El Dorado	93	Top of Morgan Grade to Georgetown (portions); grade and surface (reconstruction)		50,000
El Dorado	Various	Rights of Way on State Highway Routes		70,000
Fresno	4 (US 99)	South Ave. to Calwa Overhead; resurface southbound lanes (and northbound lanes through Fowler)	6.3	180,000
Fresno	4 (US 99)	California Ave. to West Ave.; landscape	3.4	200,000
Fresno	4 (US 99)	Princeton Ave. to Herndon; grade, pave and structures for 4-lane freeway	6.7	4,120,000
Fresno	41 (SR 180)	0.7 mile east of Reed Ave. to 2.3 miles east of Friant-Kern Canal; grade, surface and structure (relocate portions) (carried over from 1957-58 budget)	1.4	250,000
Fresno	76 (SR 168)	On Shaw Ave., from Blackstone Ave. to 0.2 mile east of Chestnut Ave.; grade and surface (widen to 6 lanes divided) (\$655,800 project, City of Fresno's share \$26,000, Fresno County's share \$9,800)	3.0	*\$620,000
Fresno	4, 41, 125 (US 99)	Reconstruct portions of Santa Clara, Mono, Merced, San Joaquin, C and E Sts. in Fresno as freeway connections; grade and surface	1.2	100,000
Fresno	Various	Rights of Way on State Highway Routes		200,000
Glenn	88 (SR 45)	2.1 miles north of Glenn to 4.7 miles north of Glenn; grade and surface (Sidds Landing Levee Reconstruction)	2.6	100,000
Humboldt	1 (US 101)	Myers Flat to 1 mile south of Dyerville; culvert, clear and grub for future freeway construction	7.2	730,000
Humboldt	1 (US 101)	Fortuna to 0.8 mile north of Fernbridge; grade and surface to complete 4-lane freeway (other grading and structures now under contract)	3.2	1,500,000
Humboldt	1 (US 101)	1 mile south to 0.3 mile north of Mad River; grade, surface and structures for 4-lane expressway (parallel Mad River Bridge already under contract)	1.5	920,000
Humboldt	1 (US 101)	Patricks Point to 0.25 mile north of Big Lagoon; structures and surface for 4-lane expressway (grading already under contract)	3.6	870,000

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1958-59 STATE HIGHWAY BUDGET BY COUNTIES—Continued

County	Route†	Description	Approximate mileage	Estimated cost *State's share
Humboldt	20 (US 299)	0.1 mile west of Essex Gulch Rd. to 0.2 mile east of Fieldbrook Rd.; grade and surface (realignment)	0.8	\$100,000
Humboldt	20 (US 299)	Lupton Creek (14 miles east of Blue Lake); concrete arch culvert		200,000
Humboldt	Various	Rights of Way on State Highway Routes		455,000
Imperial	187 (SR 115)	Sandia to Alamorio; grade, pave and structures (widen) (carried over from 1957-58 budget)	10.5	1,485,000
Imperial	Various	Rights of Way on State Highway Routes		273,000
Inyo	23 (US 6-395)	Olancha to 2.7 miles north of Cottonwood Creek (portions); surface	11.0	325,000
Inyo, San Bernardino	127 (SR 127)	2 miles south of Inyo-San Bernardino County line to 10 miles north of Shoshone (portions); grade and surface (realignment, including portions through Ibex Pass)	4.0	295,000
Inyo	Various	Rights of Way on State Highway Routes		25,000
Kern	4 (US 99)	2 miles north of Grapevine Station to Sandrini Rd.; grade and pave (reconstruct south-bound lanes)	12.3	1,035,000
Kern	4, 142 (US 99)	Garces Circle; landscape		10,000
Kern	4 (US 99)	Through Delano; landscape	4.0	40,000
Kern	58 (US 466)	Tower Line Rd. to Bear Mountain Ranch; grade, pave and structures; 4-lane expressway (\$6,150,000 financed in 1958-59 budget)	11.4	7,300,000
Kern	Various	Rights of Way on State Highway Routes (including \$1,250,000 for US 99 between Fort Tejon and 2 miles north of Grapevine Station)		2,740,000
Kings	Various	Rights of Way on State Highway Routes		105,000
Lake	Various	Rights of Way on State Highway Routes		120,000
Lassen	73 (US 395)	Ravendale to Madeline; resurface (carried over from 1957-58 budget)	21.0	480,000
Los Angeles	2 (US 101)	Santa Ana-Hollywood Freeway—Camulos St. to Santa Monica Blvd.; surface median areas and install planter boxes	4.0	106,000
Los Angeles	2 (US 101)	Hollywood Freeway (portions); landscape		40,000
Los Angeles	2 (US 101)	Hollywood Freeway—Lankershim Blvd. to Moorpark St.; landscape	1.0	62,000
Los Angeles	2 (US 101)	Ventura Freeway—Laurel Canyon Blvd. to San Diego Freeway; grade, pave and structures for 8-lane freeway (with next item, will complete Ventura Freeway in San Fernando Valley westerly of Hollywood Freeway extension) (\$6,248,000 financed in 1958-59 Fiscal Year)	4.1	11,100,000
Los Angeles	2 (US 101)	Ventura Freeway—Encino Ave. to 0.3 mile east of Kelvin Ave.; grade, pave and structures for 8-lane freeway (see above item) (\$6,000,000 financed in 1958-59 Fiscal Year)	3.9	7,300,000
Los Angeles	4 (US 6-99)	Golden State Freeway—Mission Rd. to 0.1 mile north of Pasadena Ave.; grade, pave and structures for 8-lane freeway (northerly extension of previously budgeted freeway project)	1.1	4,600,000
Los Angeles	4, 161 (US 6-99)	Golden State Freeway—Glendale Blvd. to Los Angeles River and freeway connection to San Fernando Rd.; landscape	4.0	245,000
Los Angeles	4 (US 6-99)	Golden State Freeway—Los Angeles River to Ash Ave. in Burbank; landscape	1.4	84,000
Los Angeles	4 (US 6-99)	Golden State Freeway—0.25 mile east of Burbank Blvd. to 0.2 mile west of Roscoe Blvd.; grade, pave and structures for 8-lane freeway (extending Golden State Freeway through and beyond Burbank) (\$6,000,000 financed in 1958-59 Fiscal Year) (cooperative project; U. S. Corps of Engineers' share \$3,000,000 for flood control channel; City of Burbank's share \$800,000 for extending Burbank Blvd. separation across railroad tracks)	3.9	*7,648,000
Los Angeles	23 (US 6)	Sierra Highway—0.3 mile south of Avenue "S" in Palmdale to 0.4 mile north of Avenue "P" in Lancaster (portions); grade and surface (widen to 4 lanes)	9.0	700,000
Los Angeles	26 (US 60-70-99)	San Bernardino Freeway—through West Covina; landscape	4.0	80,000
Los Angeles	26 (US 60-70-99)	San Bernardino Freeway—east city limit of Baldwin Park to Rivergrade Rd. (portions); grade and surface ramps and frontage road		60,000
Los Angeles	26 (US 60-70-99)	San Bernardino Freeway—San Gabriel River to Rio Hondo Wash; landscape	2.6	170,000
Los Angeles	59 (SR 138)	US 6 to 10th Place east in Palmdale; grade, surface and signals	0.3	100,000
Los Angeles	60 (US 101 Alt.)	Alamitos Bay Bridge; bridge and approaches	0.2	385,000
Los Angeles	158 (SR 7)	San Diego Freeway—Jefferson Blvd. to 0.3 mile north of Venice Blvd.; grade, pave and structures for 8-lane freeway (\$6,000,000 financed in 1958-59 Fiscal Year)	2.5	7,500,000
Los Angeles	158 (SR 7)	San Diego Freeway—Mulholland Dr. relocation; grade, pave and structures for future freeway construction		1,100,000
Los Angeles	161 (US 6-99)	Golden State Freeway—Arnold St. to Fletcher Dr.; grade and surface for frontage road construction (Riverside Dr.)	1.2	700,000
Los Angeles	165 (US 6-SR 11)	Harbor Freeway—0.5 mile south of 190th St. to 0.1 mile north of 124th St.; grade, pave and structures for 8-lane freeway (\$6,000,000 financed in 1958-59 Fiscal Year)	4.9	8,700,000
Los Angeles	165 (US 6-SR 11)	Harbor Freeway—near Fifth St.; ramp structure		110,000
Los Angeles	167 (SR 15)	Long Beach Freeway—at Del Amo Blvd.; grade and pave ramp (to complete interchange)		180,000
Los Angeles	167, 166, 26 (SR 15)	Long Beach Freeway—0.1 mile south of Santa Ana Freeway to 0.2 mile north of San Bernardino Freeway; grade, pave and structures for 6-lane freeway (co-operative project; Los Angeles County Flood Control District's share \$1,000,000 for storm drain)	3.6	*6,150,000
Los Angeles	167, 166 (SR 15)	Long Beach Freeway—Sheila Ave. to Olympic Blvd.; landscape	1.1	85,000
Los Angeles	174 (US 101)	Santa Ana Freeway—Rosecrans Ave. to 0.1 mile east of Marquardt Ave. and 0.2 mile west of Valley View Ave. to 0.2 mile east of Coyote Creek; grade, pave and structures (widen freeway to 6 lanes)	2.9	1,420,000

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1958-59 STATE HIGHWAY BUDGET BY COUNTIES—Continued

County	Route†	Description	Approximate mileage	Estimated cost *State's share
Los Angeles	174, 175 (US 101)	Santa Ana Freeway—Marquardt Ave. to 0.1 mile west of Valley View Ave. and on Artesia Ave. from 0.2 mile east of Marquardt Ave. to 0.1 mile west of Valley View Ave.; drainage structures (co-operative project; Los Angeles County Flood Control District's share \$630,000)	0.7	*\$220,000
Los Angeles	Various	Rights of Way on State Highway Routes (including \$13,600,000 on the Santa Monica Freeway, \$13,200,000 on the San Diego Freeway and \$10,000,000 on the Golden State Freeway)		52,235,000
Madera	Various	Rights of Way on State Highway Routes		180,000
Marin	1 (US 101)	Truck scale at Gallinas Creek; relocate		60,000
Marin	1 (US 101)	Manuel Freitas Parkway to Miller Creek (portions); grade and surface (reconstruct southbound lanes)	1.6	47,000
Marin	1 (US 101)	Puerto Suelo Hill; grade and surface (truck lane)	1.1	125,000
Marin	1 (US 101)	Greenbrae Interchange (portion); structure and approaches (northbound lanes)	0.7	1,800,000
Marin, Sonoma	8 (SR 37)	US 101 to 0.5 mile west of SR 48 junction; grade, pave and structures for 4-lane freeway (Petaluma Creek Bridge under construction)	6.1	2,444,000
Marin	69 (SR 17)	US 101 to Sir Francis Drake Blvd. east; grade, surface and structure (4-lane freeway approach to Richmond-San Rafael Bridge)	1.5	850,000
Marin	Various	Rights of Way on State Highway Routes		264,000
Mariposa	65 (SR 49)	2 miles north of SR 140 to Coulterville (portions); grade and surface (continuing widening and realignment)		50,000
Mariposa	Various	Rights of Way on State Highway Routes		35,000
Mendocino	1 (US 101)	0.2 mile north of Farmhouse Inn to 1 mile north of Tan Oak Park; grade, surface and structures for 4-lane expressway	2.8	2,300,000
Mendocino	56 (SR 1)	Pudding Creek; bridge and approaches	0.6	325,000
Mendocino	56 (SR 1)	Wages Creek; redeck bridge		25,000
Mendocino	Various	Rights of Way on State Highway Routes		275,000
Merced	122 (SR 140)	Junction SR 33 in Gustine to 5 miles east (portion); grade and surface (widen) (carried over from 1957-58 Budget)	3.0	160,000
Merced	Various	Rights of Way on State Highway Routes (including \$600,000 for US 99 freeway in Merced area)		810,000
Modoc	Various	Rights of Way on State Highway Routes		50,000
Mono	23 (US 395)	Mono Inn to foot of Conway Grade; grade and surface (relocation)	4.5	550,000
Mono	Various	Rights of Way on State Highway Routes		15,000
Monterey	2 (US 101)	0.8 mile north of Soledad to 1 mile south of Gonzales; grade, pave and structures for 4-lane expressway	5.6	1,780,000
Monterey	56 (SR 1)	Carpenter St. to south city limit of Monterey; grade, surface and structures for 4-lane freeway (Carmel Hill Interchange)	0.8	1,200,000
Monterey	119 (SR 25)	SR 198 junction to San Benito County line (portions); grade and surface (resurfacing)	5.5	65,000
Monterey	Various	Rights of Way on State Highway Routes		395,000
Napa	49 (SR 29)	0.9 mile south to 2 miles north of Yountville; grade, pave and structures (initial 2 lanes of future 4-lane expressway)	2.9	735,000
Napa	102 (SR 128)	Junction SR 29 at Rutherford to Junction SR 37 (portions); grade and surface (widening)		50,000
Napa	Various	Rights of Way on State Highway Routes		572,000
Nevada	17 (SR 49)	Placer County line to 1.5 miles south of Rattlesnake Creek; grade, surface and structures (initial 2-lanes of future 4-lane expressway)	7.3	1,750,000
Nevada	37, 38 (US 40)	Near east end of Donner Lake (1.3 miles west of Truckee Wye) to near Boca; grade, pave and structures for 4-lane freeway (\$5,400,000 financed in 1958-59 Fiscal Year)	8.7	8,800,000
Nevada	38 (US 40)	Near Boca to near Floriston; grade, pave and structures for 4-lane freeway (detour under construction) (\$5,373,000 financed in 1958-59 Fiscal Year)	6.6	9,450,000
Nevada, Placer	38 (SR 89)	0.2 mile south of Squaw Valley Rd. to Donner Creek Underpass; grade, surface and structures (widening) (carried over from 1957-58 Budget)	8.3	1,700,000
Nevada	Various	Rights of Way on State Highway Routes		581,000
Orange	2 (US 101)	San Diego Freeway—0.1 mile south of Trabuco Creek to 0.4 mile north of El Toro-Niguel Roads; grade, pave and structures for 4-lane freeway (connects two freeway projects now under construction)	7.9	5,530,000
Orange	2, 174 (US 101)	Santa Ana Freeway—Lewis St. to Main St. in Santa Ana; landscape	2.8	56,000
Orange, Los Angeles	179 (SR 22)	On Garden Grove Blvd., from 0.1 mile west of Los Cerritos Channel to Knott St.; grade, pave and structures (widen to 4 lanes divided)	5.5	1,900,000
Orange	Various	Rights of Way on State Highway Routes (including \$1,300,000 for SR 55 freeway)		3,696,000
Placer	17 (US 40)	½ mile east of Roseville to 1 mile east of Newcastle; grade, pave and structures for 4-lane freeway (\$5,500,000 financed in 1958-59 Fiscal Year) (with next item, will provide 56 miles of continuous freeway and expressway from North Sacramento to east of Gold Run)	11.1	7,800,000
Placer	37 (US 40)	Magra Overhead to ½ mile west of Monte Vista; grade, pave and structures for 4-lane freeway (see above item)	3.9	3,000,000
Placer, Nevada	37 (US 40)	Hampshire Rocks to ½ mile west of Soda Springs; grade, surface and structures for 4-lane freeway (\$4,000,000 financed in 1958-59 Fiscal Year) (carried over from 1957-58 Budget)	5.7	5,600,000
Placer	Various	Rights of Way on State Highway Routes		350,000
Plumas	21 (US 40 Alt.)	1 mile east of Quincy to Cemetery Hill, and Deleker Overhead; grade and surface for truck lanes, and remove structure	0.8	56,000
Plumas	Various	Rights of Way on State Highway Routes		30,000
Riverside	19 (US 60)	Eighth St. Underpass in Riverside; structures and approaches (cooperative project; City of Riverside's share \$800,000; A.T.&S.F. Railroad's share \$304,420; U.P. Railroad's share \$250,000; S.P. Railroad's share consolidation and rearranging tracks; rights of way furnished by State \$900,000)	0.4	*250,000

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1958-59 STATE HIGHWAY BUDGET BY COUNTIES—Continued

County	Route†	Description	Approximate mileage	Estimated cost *State's share
Riverside	19 (US 60)	4 miles west of US 70-99 junction to US 70-99 junction (near Beaumont); grade, surface and structures for 4-lane expressway (carried over from 1957-58 Budget)	4.3	\$1,400,000
Riverside	26 (US 60-70-99)	20th St. to east city limit of Banning; landscape	2.4	42,000
Riverside	26 (US 60-70-99)	0.5 mile north of Indio Overhead to Thousand Palms; grade, pave and structures for 4-lane freeway (completes expressway and freeway for 41 miles from Banning to near Indio)	8.2	2,350,000
Riverside	43 (US 91, SR 18)	Riverside Freeway—Pierce St. to Van Buren St. in Riverside; grade, pave and structures for 4-lane freeway (extends freeway southwesterly toward Corona)	3.0	2,000,000
Riverside	43 (US 91, SR 18)	Riverside Freeway—Arlington Ave. to Russell St.; landscape	4.0	245,000
Riverside	64 (US 60-70)	Colorado River Bridge and approaches (near Blythe); cooperative project with Arizona (deferred from 1957-58 Budget)	1.4	*620,000
Riverside	78 (US 395)	Johnson St. in Perris to Nuevo Rd.; landscape	1.1	23,000
Riverside	Various	Rights of Way on State Highway Routes (including \$1,200,000 on US 60-70-99 in Beaumont area)		2,855,000
Sacramento	3 (US 40-99E)	At Watt Ave. Interchange; grade and surface (revise ramp connections)		170,000
Sacramento	3 (US 40-99E)	Near Antelope Rd.; truck scales		140,000
Sacramento, Placer	3, 17 (US 40-99E)	Howe Ave. to East Roseville Overcrossing; landscape	13.6	152,000
Sacramento	4 (US 50-99)	1.8 miles south of Florin Rd. to Broadway in Sacramento; structures for future freeway construction		2,250,000
Sacramento	11 (SR 24)	1.8 miles north of Rio Vista Bridge to Walnut Grove (portions); base and surface (reconstruct)	9.2	150,000
Sacramento, Solano	53 (SR 12)	Fifth St. in Rio Vista to 0.2 mile west of SSR 24; grade and surface and superstructure; (4-lane west approach and superstructure for new Sacramento River Bridge) (substructure now under contract)	0.6	2,730,000
Sacramento	Various	Rights of Way on State Highway Routes		1,130,000
San Benito	Various	Rights of Way on State Highway Routes		115,000
San Bernardino	26 (US 70-99)	San Bernardino Freeway—at Vineyard, San Bernardino and Mountain Aves. in Ontario area; grade and surface additional interchange ramps	0.6	300,000
San Bernardino	26 (US 70-99)	San Bernardino Freeway—Archibald Ave. to Colton (portions); structures and approaches (to complete conversion of expressway to full freeway)	2.8	3,500,000
San Bernardino	26 (US 70-99)	San Bernardino Freeway—Cypress Ave. to Warm Creek (through Colton); landscape	2.1	126,000
San Bernardino	26 (US 70-99)	San Bernardino Freeway—Los Angeles County Line to Grove St. (portions) (in Ontario area); landscape	4.9	75,000
San Bernardino	43 (US 91-395, SR 18)	Riverside County Line to US 70-99; grade, pave and structures for 4-lane freeway	4.1	5,350,000
San Bernardino	43 (SR 18)	8 miles north of Big Bear City to 1 mile south of Forest Boundary (portions); grade and surface (widen and curve improvement)		15,000
San Bernardino	77 (SR 71)	Pipe Line Ave. to 0.4 mile south of Riverside Dr. (near Pomona); grade and surface (widen to connect with 4-lane expressway under construction south of Pomona)	2.0	50,000
San Bernardino, Inyo	127 (SR 127)	2 miles south of Inyo-San Bernardino County Line to 10 miles north of Shoshone (portions); grade and surface (realignment including portion through Ibex Pass)	4.0	295,000
San Bernardino	Various	Rights of Way on State Highway Routes (including \$800,000 on US 70-99 in Redlands area and \$600,000 on routes in Barstow area)		3,382,000
San Diego	12 (US 80)	0.1 mile east to 1.2 miles east of Taylor St.; grade, pave and structures to convert 4-lane divided highway to 8-lane full freeway (this and next two projects complete conversion to full freeway from east of Taylor St. to Fletcher Parkway)	1.0	1,500,000
San Diego	12 (US 80)	Cabrillo Freeway to Fairmount Ave.; grade, pave and structures to convert 4-lane expressway to 8-lane full freeway	3.5	4,900,000
San Diego	12 (US 80)	0.3 mile east of Fairmount Ave. to 0.6 mile west of Lake Murray Blvd.; grade, pave and structures to convert 4-lane expressway to 6 and 8-lane full freeway	2.4	3,040,000
San Diego	200 (SR 94)	24th St. to Home Ave.; grade, pave and structures for 8-lane freeway (major structures already advertised for bids; remainder of project carried over from 1957-58 Budget)	1.7	2,700,000
San Diego	Various	Rights of Way on State Highway Routes (including \$3,350,000 for US 101 freeway in San Diego and \$2,500,000 for further conversion of US 80 to full freeway in San Diego and La Mesa)		7,592,000
San Francisco	68 (US 40, 50, 101)	James Lick Memorial Freeway (Bayshore)—Fifth to 17th St.; landscape	1.0	75,000
San Francisco	68, 2 (US 101)	Southern Freeway—James Lick Memorial Freeway interchange; structure and approaches (\$4,730,000 financed in 1958-59 Fiscal Year)		6,900,000
San Francisco	Various	Rights of Way on State Highway Routes (including \$1,400,000 on Southern Freeway)		2,456,000
San Joaquin	4 (US 99)	Iathrop Rd. to Mariposa Rd. (south of Stockton); landscape	8.7	49,000
San Joaquin	4 (US 50-99)	Lodi to 0.5 mile north of Jahant Rd.; landscape	4.8	25,000
San Joaquin	5 (US 50)	East city limit of Tracy to Grant Line Rd.; grade, and surface (widen existing highway to 4 lanes) (carried over from 1957-58 Budget)	3.3	540,000
San Joaquin	5 (US 50)	On Charter Way, from Wilson Way to D St.; traffic signals, lighting, channelization and landscape		70,000
San Joaquin	24	Victor Rd., from Lodi to Junction SR 88; resurface	5.2	285,000
San Joaquin	Various	Rights of Way on State Highway Routes		330,000
San Luis Obispo	2 (US 101)	Through Arroyo Grande; grade, surface and structures for 4-lane freeway	1.3	1,250,000
San Luis Obispo	2 (US 101)	0.6 mile south of San Miguel to 1.6 miles north of San Miguel; surface (repair existing highway)	2.2	25,000
San Luis Obispo	2 (US 101)	0.2 mile south of Camp Fremont to Cuesta Overhead; base and surface (reconstruct) (carried over from 1957-58 budget)	3.2	710,000

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1958-59 STATE HIGHWAY BUDGET BY COUNTIES—Continued

County	Route†	Description	Approximate mileage	Estimated cost *State's share
San Luis Obispo	56 (SR 1)	0.7 mile west of Pennington Creek to Morro Bay; grade, surface and structure (2.8 miles of 4-lane expressway; 2.8 miles initial 2 lanes of future 4-lane expressway)	5.6	\$1,400,000
San Luis Obispo	Various	Rights of Way on State Highway Routes		975,000
San Mateo	2 (US 101)	El Camino Real—Garcia Rd. to Millbrae Ave.; grade and surface (widen to 6 lanes) (cooperative project; City of Millbrae to provide curbs, gutters and parking lanes)	0.6	*150,000
San Mateo	56 (SR 1)	Whitehouse Creek to 1 mile south of Pigeon Point; grade and surface (initial 2 lanes of future 4-lane expressway; \$900,000 project; Joint Highway District No. 9's share \$240,000)	2.9	*660,000
San Mateo, San Francisco	68 (US 101 Bypass)	Bayshore Freeway—Butler Rd. in South San Francisco to Third St. in San Francisco; landscape (including new section across Candlestick Cove)	4.0	246,000
San Mateo	68 (US 101 Bypass)	Bayshore Freeway—Third Ave. Interchange in San Mateo; bus stop lane		60,000
San Mateo	68 (US 101 Bypass)	Bayshore Freeway—Norfolk St. connection to E. Hillsdale Blvd.; grade and surface (revise interchange)		76,000
San Mateo	68 (US 101 Bypass)	Bayshore Freeway—Peninsular Ave. to 16th Ave. in San Mateo; landscape	2.4	65,000
San Mateo	Various	Rights of Way on State Highway Routes		1,513,000
Santa Barbara	2, 150, 80 (US 101)	East of Los Olivos St. to west of El Sueno Dr.; landscape	3.4	210,000
Santa Barbara	2 (US 101)	Buellton to 1 mile south of Zaca; grade and surface for 4-lane expressway	5.1	1,200,000
Santa Barbara	56 (SR 1)	El Jaro Creek (south of Lompoc); bridge and approaches	0.1	105,000
Santa Barbara	80	Intersection of Salinas and Mason Sts. to US 101 at Milpas St. in Santa Barbara (portions); resurface (newly adopted route)	0.4	60,000
Santa Barbara	150	Cliff Dr. in Santa Barbara, from Leadbetter Rd. to La Marina; landscape	0.5	50,000
Santa Barbara	Various	Rights of Way on State Highway Routes (including \$1,400,000 for US 101 freeway in Santa Barbara)		2,520,000
Santa Clara	2 (US 101)	Intersection of Alma Ave. and US 101 in San Jose; signals and channelization \$90,000 project; City of San Jose's share \$15,000	0.4	*75,000
Santa Clara	2 (US 101)	At Cottle Rd. in San Jose; signals and channelization (\$66,700 project; City of San Jose's share \$6,700)	0.3	*60,000
Santa Clara	2 (US 101)	El Camino Real—San Tomas Aquino Creek in Santa Clara to SR 9 in Sunnyvale; grade and surface (widen to 4 lanes) (carried over from 1957-58 Budget)	3.8	1,170,000
Santa Clara	5, 68, 69 (SR 17-US 101 Bypass)	Bayshore and Eastshore Freeways—First St. in San Jose to 0.3 mile north of Bayshore Highway on SR 17 and Taylor St. to 0.5 mile north of Brokaw Rd. on US 101 Bypass; grade, pave and structures for 4-lane freeway (including Bayshore-Eastshore Interchange)	3.9	5,100,000
Santa Clara	5 (SR 17)	Bascom Ave in San Jose to N. Fourth St.; grade, pave and structures for 4-lane freeway (with other current and budgeted projects, provides continuous 4-lane freeway from Los Gatos through Oakland to Vallejo)	2.5	3,310,000
Santa Clara	32 (SR 152)	Liagas Creek (east of Gilroy); bridge and approaches	0.6	110,000
Santa Clara	32 (SR 152)	Ferguson Rd. (east of Gilroy) to Bloomfield Ave.; base and surface (reconstruct)	2.0	90,000
Santa Clara	68 (US 101 Bypass)	Bayshore Freeway—Stevens Creek to San Mateo County Line; grade, pave and structures for 6-lane freeway (extending Bayshore Freeway southerly to Stevens Creek) (\$3,265,000 financed in 1958-59 Fiscal Year)	4.4	5,150,000
Santa Clara	68, 113 (US 101 Bypass)	Bayshore Freeway—Interchange at Mountain View-Alviso Rd.; structure and approaches	0.9	1,290,000
Santa Clara	113 (portion SR 9)	On Mountain View-Alviso Rd., from 0.2 mile east of Bayshore Highway to 0.2 mile east of Lawrence Station Rd.; grade and surface (widen)	2.5	202,000
Santa Clara	115	Alum Rock Ave., from N. 34th St. to 0.2 mile east of Capitol Ave. (portions); signals, channelization and bridge (\$270,000 project; City of San Jose's share \$20,000; Santa Clara County's share \$20,000)	0.7	*230,000
Santa Clara	Various	Rights of Way on State Highway Routes (including \$2,300,000 for US 101 Bypass, Bayshore Freeway)		3,058,000
Santa Cruz, Santa Clara	116, 42 (SR 9)	18 locations between Big Basin area and Saratoga area; replace culverts		40,000
Santa Cruz	Various	Rights of Way on State Highway Routes		452,000
Shasta	3 (US 99)	Parkview Ave. to Sulphur Creek in Redding; grade and surface (for one-way street couplet) (carried over from 1957-58 budget)	1.1	283,000
Shasta, Siskiyou	3 (US 99)	1 mile south of Siskiyou County Line to Sacramento River Bridge in Dunsmuir; grade, surface and structures for 4-lane freeway (\$3,600,000 financed in 1958-59 Fiscal Year)	3.6	4,600,000
Shasta	20 (US 299)	Court St. to California St. in Redding; structure and approaches (new 4-lane railroad overhead)	0.2	389,000
Shasta	20 (US 299)	Trinity County Line to foot of Buckhorn Grade (portions); grade and surface (for truck lanes)	1.4	60,000
Shasta	20 (SR 44)	West Branch Churn Creek and Churn Creek; bridges and approaches	0.4	164,000
Shasta	28 (US 299)	1.2 miles west of Hatchet Mountain Summit to Summit (portions); drainage improvement	0.3	32,000
Shasta	83 (US 89)	Hat Creek; bridge and approaches	0.1	66,000
Shasta, Siskiyou	83 (SR 89)	Dry Creek, East Fork Elk Creek, West Fork Elk Creek, East Branch Mud Creek, Mud Creek; bridges and approaches		178,000
Shasta	Various	Rights of Way on State Highway Routes		410,000
Sierra	25 (SR 49)	North Fork Yuba River to 0.25 mile east of Ramshorn Creek (portions); grade, surface and structure (continuing widening project)		120,000
Siskiyou, Shasta	3 (US 99)	1 mile south of Siskiyou County Line to Sacramento River Bridge in Dunsmuir; grade, surface and structures for 4-lane freeway (\$3,600,000 financed in 1958-59 Fiscal Year)	3.6	4,600,000
Siskiyou	72 (US 97)	Juniper Station to 0.1 mile north of Dorris; resurface	17.2	500,000

† Numbers marked SR are State Sign Routes; numbers marked US are U. S. highway routes; numbers not marked are legislative routes.

1958-59 STATE HIGHWAY BUDGET BY COUNTIES—Continued

County	Route†	Description	Approximate mileage	Estimated cost *State's share
Siskiyou	Various	Rights of Way on State Highway Routes		\$150,000
Solano	7 (US 40)	Interchange at SR 12 (west of Fairfield); structure and approaches (carried over from 1957-58 Budget)		1,860,000
Solano	7 (US 40)	Ulatis Creek in Vacaville to Nut Tree; resurface (improve curve)	0.7	50,000
Solano	7, 53 (US 40)	Octo Inn; drainage improvement		55,000
Solano, Sacramento	53 (SR 12)	Fifth St. in Rio Vista to 0.2 miles west of SSR 24; grade and surface and superstructure; (4-lane west approach and superstructure for new Sacramento River Bridge) (Sub-structure now under contract)	0.6	2,730,000
Solano	Various	Rights of Way for State Highway Routes		740,000
Sonoma	1 (US 101)	1.1 miles south of Petaluma Creek Bridge to Denman Flat; landscape	5.8	30,000
Sonoma	1 (US 101)	Asti to 2.0 miles south of Cloverdale; resurface	2.1	75,000
Sonoma	1 (US 101)	Grant School to 0.1 mile south of Guerneville Rd. (portions); grade, surface and structures for 4-lane freeway	1.4	2,480,000
Sonoma, Marin	8 (SR 37)	US 101 to 0.5 mile west of SR 48 Junction; grade, pave and structures for 4-lane freeway (Petaluma Creek Bridge under construction)	6.1	2,444,000
Sonoma	208 (SR 48)	SR 37 Junction to Sonoma Creek Bridge; resurface	2.1	62,000
Sonoma	Various	Rights of Way on State Highway Routes (including \$730,000 on US 101 between Santa Rosa area and north of Healdsburg)		1,005,000
Stanislaus	66	3.4 miles east of San Joaquin County Line to Junction SR 120 in Oakdale; resurface	1.7	40,000
Stanislaus	Various	Rights of Way on State Highway Routes (including \$900,000 for US 99 freeway in Ceres-Modesto area)		1,050,000
Sutter, Yuba	232	Rio Oso to 1.6 miles south of Junction of US 99E; grade and surface (widen)	8.3	255,000
Sutter	Various	Rights of Way on State Highway Routes		100,000
Tehama	Various	Rights of Way on State Highway Routes		78,000
Trinity	20 (US 299)	0.2 mile west of Douglas City to Trinity River Bridge; grade and surface (west approach to bridge)	0.3	60,000
Trinity	Various	Rights of Way on State Highway Routes		20,000
Tulare	127 (SR 190)	Hospital Rd. to Worth Rd.; grade and surface (relocation west of Success Reservoir)	2.8	*200,000
Tulare	129 (SR 65)	Linda Vista Ave. to Route 134 at Hermosa St. in Lindsay; grade, surface and structure (initial 2-lanes of future 4-lane expressway)	7.9	1,100,000
Tulare	Various	Rights of Way on State Highway Routes		1,675,000
Tuolumne	Various	Rights of Way on State Highway Routes		195,000
Ventura	138 (US 399)	Maricopa Rd. (north of Ojai); redeck 5 bridges and construct 5 bridges		275,000
Ventura	151 (SR 150)	Near Chismahoo Creek to 0.4 mile east of Santa Ana Creek; grade, surface and structures (relocation around Casitas Reservoir)	5.0	*760,000
Ventura	155 (SR 23)	Moorpark Rd., from near Read Rd. to near Tierra Rejada Rd.; grade, surface and drainage correction	1.5	55,000
Ventura	Various	Rights of Way on State Highway Routes (including \$2,880,000 for US 101 freeway in and near Ventura)		3,711,000
Yolo	50 (SR 16)	West end of "I" St. Bridge to Third and C Sts. in Broderick; structure, grade and surface; (revise approach)	0.2	500,000
Yolo	Various	Rights of Way on State Highway Routes		245,000
Yuba	3 (US 99E)	0.2 mile south of Yuba River to Second St. in Marysville; structures, grade and surface (new 4-lane bridge and approaches)	0.8	3,700,000
Yuba	15 (SR 20)	Dry Creek to Parks Bar Bridge (portions); grade and surface (widening)		75,000
Yuba, Sutter	232	Rio Oso to 1.6 miles south of Junction of US 99E; grade and surface (widen)	8.3	255,000
Yuba	Various	Rights of Way on State Highway Routes		155,000

† Numbers marked SR are State Sign Routes; numbers marked US are U. S. highway routes; numbers not marked are legislative routes.

## Good Drivers May Get 5-year License; Must Apply in 30 Days

A large number of good, experienced California drivers who otherwise would be entitled to quick renewal of their driver licenses for a full five years are having to run the full gamut of written and road tests to obtain three-year licenses.

Why?

Because State Department of Motor Vehicles officials explain they have failed to observe the requirements of a new driver license law that went into effect in September.

The law, called variously the "birthday anniversary" and the "reward for

good driving" act, stipulates that drivers who permit their licenses to lapse for more than 30 days must take a complete examination, including driving test, when applying for renewal.

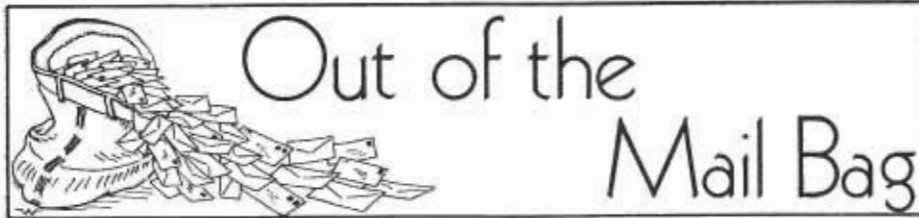
And it further provides that unless application for renewal is made within 30 days after expiration of old licenses, the term of the new license shall be limited to three years. This, despite the fact that the driver might have had a perfect driving record, a circumstance which would have entitled him to a five-year license, had

he renewed within 30 days after his old license expired.

Department of Motor Vehicles field offices throughout the State report an unusually heavy volume of license renewals that require the giving of road tests to drivers who, had they applied before the 30-day expiration deadline, would have been entitled to new licenses merely upon passing the law and vision examinations.

"It is to the advantage of every driver to examine his license and apply for renewal within 30 days of the date it expires," the officials reminded.





CITY OF PETALUMA, CALIFORNIA

Editor, *California Highways and Public Works*

DEAR SIR: This is in the nature of a fan letter about the wonderful freeway, now nearing completion, between Petaluma and Santa Rosa, a portion of which has been open to travel for some weeks.

I know that I express the feeling of many others when I say that we in this area are *enthusiastic* about it; not only because of its engineering perfection, with its resulting safety to motorists, or because of the contrast between it and the old two-lane congested highway, but also because of the sheer beauty of the line of travel.

Every consideration seems to have been given to planning the route to show our scenery to the very best advantage. The view of Mt. St. Helena is really breathtaking, and the elevated roadway, circling the hills, presents a new and lovely picture of our country.

Very sincerely,

(MRS.) GLADYS R. WALLIN  
City Clerk

SAN JOSE, CALIFORNIA

Editor, *California Highways and Public Works*

SIR: By all means, *please* continue sending us *California Highways and Public Works* magazine.

There is a tendency among us poor mortals not to appreciate anything that is *free*, but your publication is certainly an exception.

My two girls, now 13, almost literally cut their teeth on *Highways* from the time they were babies, and it is our bible and reference book for vacations and holiday travel, now.

Thank you for another year of informative reading.

Sincerely,

MRS. LEONARD HOLQUIST

ALHAMBRA, CALIFORNIA

Editor, *California Highways and Public Works*

SIR: Having been actively engaged in traffic safety work (in Chicago) since 1905, may I recommend that you give this important part of civic work some space as it's a terrible situation to think that we in California kill about 10 persons every day by motor traffic.

My experience in investigating thousands of accidents for over 50 years proves to me that almost all accidents except those caused by mechanical defects are due to the fact that either the motorists or the victims did not have their mind on what they were doing, and in some accidents both of them had something else on their mind. My motto is "When you are driving *think* of driving."

I recommend that on our beautiful highways we have billboards with some catchy slogan like my motto mentioned above or words to that effect. If we would save one life by such movement, it would be worth it.

Cordially,

FRANK J. TOMIEZAK

CALIFORNIA GARDEN CLUBS, INC.

MR. GEORGE T. MCCOY  
State Highway Engineer

DEAR MR. MCCOY: By direction of Mrs. C. C. Henry, President of California Garden Clubs, Incorporated, the assembled officers, the board of directors, with the specific approval of our members at large who attended Garden Club Day at the State Fair on September 5th, I have been commissioned to commend you and your department for your Anti-Litterbug Program.

As you may know, we have a membership of well over 14,000, who are not only garden minded, but are civic

## That English Picture

The September-October issue of *California Highways and Public Works* included on page 61 a photograph of the Great North Road at Stamford, Lines, England, which was reproduced from a newspaper clipping sent in by a reader in Birmingham, England, Ernest V. Beavis.

The photograph and caption were published exactly as they appeared in the clipping from an English newspaper.

Reader Beavis' letter to the editor, explaining the English authorship of the photo caption, unfortunately was separated from the photograph itself and appeared on page 55 of the magazine.

This note of explanation is published to make it clear that the criticism of Britain's roads which appeared in the caption was that of an English newspaper and not that of *California Highways and Public Works*.—*The Editor*.

minded as well. These fine Californians are scattered throughout our State. Many of them drove to Sacramento for our first quarterly board meeting of the 1957-1958 term, and to attend Garden Club Day at the Fair. They were so impressed with the Litterbug Trash Cans that they saw along the highways, and with the sensible "one-fourth mile" turnout signs, that they wanted you and your associates to know that at least 14,000 people and their families approve of your efforts.

Congratulations! We, of California Garden Clubs, Incorporated, who pioneered the Anti-Litterbug Campaign, are behind you 100 percent!

Yours very truly,

MURIEL L. MERRELL  
State Chairman of Resolutions

With the exception of the gasoline rationing period during World War II, between 30,000 and 40,000 persons have been killed on the highways every year for the last 22 years, according to the National Safety Council.

## NEW SIGN ROUTE 36 ELIMINATES 11 FORDS THROUGH CREEK WATERS

Eleven fords, impassable in the wettest seasons, were eliminated from State Sign Route 36 by construction of 5.7 miles of new state highway in Tehama County.

Completion of the construction was celebrated in October by the cutting of a log barrier (instead of the usual ribbon), by speeches and by a banquet. The celebrations were sponsored jointly by the Red Bluff Chamber of Commerce and the Fortuna Chamber of Commerce.

The Tehama and Humboldt Counties celebrants were joined by state legislators, Deputy Director of Public Works C. M. (Max) Gilliss, and State Division of Highways engineers.

They gathered in a light rain to hear dedication talks and to see the barrier log cut by a portable power saw operated by Walter Stoll and Erle Gans, workers for the past 30 years in the Red Bluff chamber's program for the improvement of "Greater Highway 36" west of Red Bluff, connecting U. S. Highways 99 and 101.

### Several Speakers

James Froome, Jr., Chairman of the Highway Committee of the Red Bluff Chamber, was the master of ceremonies at the log cutting. Speakers were: Lynn Raymond, Chairman of the Tehama County Board of Supervisors; Deputy Director Gilliss; J. W. Trask, Assistant State Highway Engineer, Sacramento; H. S. Miles, District Engineer of District II, Division of Highways, Redding; A. B. Hood, Vice President and General Manager of the Ralph L. Smith Lumber Company; Sheriff Albert Nichols of Humboldt County, and Richard Rodrique, President, Fortuna Chamber of Commerce.

The highway project completed has its westerly end approximately 4.5 miles east of Beegum and the easterly end about 32 miles west of Red Bluff. State Sign Route 36, on which the new work was done, extends from a junction with Route 101 near Fortuna through Red Bluff to Susanville.



Eleven fords like this one (UPPER) on State Sign Route 36 west of Red Bluff were replaced by culverts (LOWER) in a highway improvement program which was celebrated by a log barrier cutting ceremony attended by (CENTER, left to right): District II Highway Engineer H. S. Miles, Assistant State Highway Engineer J. W. Trask, Chairman Lynn Raymond of the Tehama County Board of Supervisors, State Senator Louis G. Sutton, Miss Judy Adams (Miss Tehama County), Pioneer Erle Gans operating the power saw, Deputy Public Works Director C. M. (Max) Gilliss, Master of Ceremonies James Froome, Jr., Thomas McGlynn, Red Bluff Chamber of Commerce leader; Lumberman A. B. Hood, and Sheriff Albert Nichols of Humboldt County. Other leaders of both Tehama and Humboldt Counties were at the opening festivities.

The portion of State Sign Route 36 west of Red Bluff is a lightly traveled road through agricultural country concerned principally with sheep raising. The lumber industry is a valuable potential for this region, with private holdings partially developed and with vast lumber resources in the Trinity National Forest which are relatively undeveloped.

The road was originally constructed with a nine-foot roadbed width which has gradually been widened by maintenance to widths varying from 10 to 22 feet. Stretches still consist of untreated earth. Development of timber resources has been hampered by the difficulty of hauling over roads of steep grades and sharp curves.

#### Old Road Primitive

Previous to construction, the project just completed was one of the worst sections along the highway running through a tortuous canyon known both as Budden Canyon and Button Canyon. The road crossed the creek 11 times by fords which were impassable in heavy rain seasons.

The alignment and grade of the highway were primitive. There were numerous curves of 25-foot radius, reversing curves and short sections of steep grade.

The newly constructed road has a two-lane roadbed 28 feet in width with no sharp curves and a maximum grade of 6 percent. The surface consists of a prime and seal coat over a one-half foot depth of crushed stone base.

The total cost of the project, including construction and right-of-way, was approximately \$770,000. Tehama County and the Ralph L. Smith Lumber Company each contributed \$25,000 toward the cost of the project.

Work on the project was begun January 1, 1957, and completed about November 15th. The contractor was Jesse H. Harrison of San Ardo.

The project connects in the westerly end with a section 3.1 miles in length constructed in 1954 to approximately the same standard. The two, totaling in length 8.8 miles, eliminate one of the worst stretches between Beegum and Red Bluff.

## Wm. N. Cotter

William Nestor Cotter, Division of Highways, District IV, died at the University of California Hospital on September 4, 1957, after a prolonged illness. He was 35 years of age.

A native of San Francisco, Cotter attended local grade and high school, and entered the University of Notre Dame, Indiana, while in the Navy V-12 program in 1942. He also served as radar technician in the Pacific Theater during World War II. After working for a brief period during 1947 for the Division of Highways, he returned to Notre Dame for another year's study before returning to the Division of Highways as a junior civil engineer in 1950. He worked for a short period with the State Harbor Commission as an engineer in San Francisco.

Cotter served in many capacities for District IV Construction Department, principally in the field, where he did survey work, inspection work, and acted as an assistant resident engineer. He was also instrumental in assisting in the preparation of the District IV Construction Department Supplemental Construction Manual during a brief period of assignment in the District IV office.

His wife, Anita; two daughters, Susan and Carolyn; a brother, John and his parents, Mr. and Mrs. William Cotter, survive him.

## Statewide Traffic Up, Division Survey Shows

Traffic counts taken by the Division of Highways for the first 10 months of 1957 show a 6.2 percent increase in traffic throughout the State of California over the corresponding period for 1956.

The greatest increase occurred in District VIII (San Bernardino and parts of Riverside and Kern Counties) where traffic volumes went up 12.1 percent. The only district to show a decrease was District I (Del Norte, Mendocino, Humboldt, Lake and part of Trinity Counties) where traffic dropped off 1.7 percent.

## Roy Spencer Akers

A recently retired member of the Division of Highways, District X, Roy Spencer Akers, 67, died September 30th after a prolonged illness.

Akers was a former employee of the Right of Way Department of District X, Stockton, and retired last year as an Associate Right of Way Agent. He was in state service 29 years. Prior to his employment by the Division of Highways in 1927, he was employed by the Southern Pacific Railroad and various gold dredging companies.

His employment with District X began when the district was created and covered every feature of work in the Right of Way Department, from design and appraisal to that dealing with final acquisition.

He was a member of Capitol Lodge of Odd Fellows, Sacramento, Lebanon Rebekah Lodge, Morning Star Lodge of Masons, the California State Employees Association, and the Quarter Century Club of Stockton.

Surviving are his wife, Ruth; a daughter, Mrs. Dale S. Rose; two sons, Everett S. Akers of Stockton and Marion A. Akers of Auburn; a brother, Ernest C. Akers of Sacramento; two sisters, Isyl Hildebrand of Roseville and Lois Allen of Sacramento; and six grandchildren.

## R. L. Bishop Speaks On Public Right to Know

Robert L. Bishop, Member of the California Highway Commission, was a speaker at the fall meeting of the Western Interstate Committee on Highway Police Problems in San Francisco in November.

He and other officials and legislators from 11 western states discuss the relationships between local governments and the public in the selection of highway routes.

"The public has a right to know what is planned and to have all the facts and to be heard," Bishop declared. "There must be public information hearings at all stages, with advance notices of these meetings given the public through the newspapers and radio."



# Traffic Control

*How Construction Delays  
Work Out on Major Road*

By JOHN C. PETERSEN, Resident Engineer

**A**N ARTICLE in the May-June issue of this magazine entitled "Unusual Project" indicated the concern the Division of Highways felt about the expected delaying of traffic for as long as two hours on a major transcontinental highway. As was pointed out, there was an unprecedented amount of advance publicity centering about the traffic schedule and listing the periods during which the road would be open. The project is the construction of a four-lane freeway through a five-mile portion of the Truckee River Canyon on US 40. The existing highway meanders along the new alignment and grade, thereby causing interference between the contractor's operations and public traffic throughout the project in almost every phase of the work.

This conflict was realized by the Design Department, and the grading operations were divided into seven separate stages, each of which had to be completed prior to commencing the next. The primary purpose of the stages was to provide a 24-foot roadway for traffic at all times, but the roadway thus formed may or may not have been the ultimate grade. Actually, on one short section, five separate stages are required before the roadbed is complete!

In view of the relatively large amount of excavation (1,020,000 cubic yards) and overhaul (40,200,000 station yards) it was obvious that a traffic control of some type was needed. Glen Nielson, District Manager for Gibbons and Reed Company, the contractor, pointed out that he did not plan on using the two-hour delays set up in the contract, but would prefer to pass traffic through the project with a maximum one-half hour delay at various locations. This has been carried out quite successfully.

## **Maximum 42 Minutes**

The contract allowed the contractor to close the highway to public traffic for two-hour periods, but then he was required to keep the roadway open for the ensuing three hours. Inasmuch as the vast majority of the excavation could not be accomplished without using the traveled way for a haul road, and since much of the work consisted of pushing material from above onto the roadway to be picked up, following the schedule would have meant only 40 percent work time for the contractor. Time checks revealed that after closing the roadway for 30 minutes an average of 12 minutes was required for all the waiting vehicles to pass the flagman. Therefore two traffic delay zones were established and traffic passed through these zones every 40 minutes, there being a 20-minute difference in the release times. Thus, a vehicle proceeding east, for example, would be held at the west end of the project for a maximum of 30 minutes (allowing 10 minutes for the preceding group to pass the flagman), and then proceed to about the center of the job and wait again for about 12 minutes (allowing eight minutes for travel time) making a maximum delay of about 42 minutes.

As soon as the excavation on the easterly portion of the project was completed, that traffic control zone was dropped, and a 45-minute schedule used for the westerly control zone.

Actually, only five times has the road been closed longer than 1½ hours (due to blasting), which indicates how the contractor has maintained the rigid schedules. Of course, changing from the two-hour delay periods to the 40- and 45-minute schedules increased the available working time from 40 percent to an average of 65 to 70 percent, resulting in saving to the contractor and the State also, not

to mention the saving in time to the public due to the fact that the delays will be ended months sooner.

Use of a rigid schedule for the traffic releases proved to be highly beneficial. Typed schedules were distributed to the foremen, blademen, and water truck drivers so that they would know when to clean off the roadway and cease operations. Water truck drivers with this information knew when to sprinkle for dust control. The other truck drivers also were informed because their units, being overwidth and overweight and usually with spilling loads, were not allowed to intermingle with public traffic. Bus arrivals were compared with working schedules and, where possible, schedules were changed by five minutes or so to allow for passage.

## **Minimize Disaster Threat**

Many motorists waiting at the west end of the project were curious as to the reason the tankers and explosives trucks pulled to the left at the head of the line and were allowed to move ahead first. There was a potentially hazardous situation due to a long steep grade and reversing curves just west of the traffic control zone and, therefore, drivers were asked to pull their vehicles as close together as possible so that the standing line would not back up into the curve any more often than necessary. Due to the fact that the vehicles were so close together that they were unable to pull out, and also the fact that traffic is put into two lanes, tankers carrying flammable liquids and munitions trucks were separated so as to minimize the threat of a major disaster in case of fire or explosion.

Portable chemical toilets were placed near the waiting lines. To date over 250,000 of the pamphlets described in the previous article have been distributed. The public has been

very appreciative of both the restrooms and the pamphlets, and very few have shown any resentment at the delay. Possibly the reason for the lack of resentment can best be illustrated by the following quotes from a letter received:

"Recently my family and I traveled to the midwest and were delayed on Highway 40 near the Nevada state line. The flagman very courteously told us the estimated length of time of the delay and gave us a brochure explaining the reason. This is the first time any explanation was given and certainly it was appreciated.

"In traveling through other states delays were experienced but no explanation was offered as to 'why' or how long it would be.

"Thanks again for your consideration for the traveling public."

The grading will be completed this year and the public will experience a return to "the good old days" as they travel five miles of gravel surface. An attempt will be made, of course, to stabilize the gravel with asphalt, but it is not considered practical to pave the entire job with the quality of surfacing that would be required to sustain the heavy truck traffic for the few months of winter shutdown.

In summary, the use of the shorter interval of 45 minutes as opposed to the two-hour closures, not only made for better public relations, but also enabled the contractor to complete the grading operations this year. The brochures distributed to the tourist traffic undoubtedly are scattered all over the world, as many persons asked for extra copies to mail to friends. The restrooms have caused many a favorable comment, and the litter cans strategically placed near the waiting lines have helped in keeping the areas clean and lessened the fire hazard.

## Highway Conference Called at UCLA

The Tenth Annual California Street and Highway Conference will be held January 29th to 31st on the Los Angeles Campus of the University of California.

The conference, presented annually by University Extension and the university's Institute of Transportation and Traffic Engineering, is held alter-

## DEATH ENDS HALF CENTURY HIGHWAY WORK

An engineering career of nearly a half century, almost all of it devoted to highways in Southern California, came to a close November 7th with the death of Ernest E. East.

The 77-year-old recently retired Chief Engineer of the Automobile Club of Southern California was one of the first engineers hired by the California Highway Commission and one of the first 20 employees of District VII. He worked for the State of California from 1912, four years after graduating in engineering at Purdue University, until 1919, when he joined the engineering staff of the Automobile Club of Southern California.

A traffic survey of the Los Angeles metropolitan area which East did for the automobile club in 1937 is still studied by highway engineers. It and other of East's activities of some years ago led many Southern Californians to call East "the Father of the Freeways."

In the 1937 report, East proposed "a network of motorways to serve the entire metropolitan area on a right-of-way not less than 360 feet wide through residential territory and not less than 100 feet wide through business districts." He suggested that these "motorways" accommodate four to six lanes of traffic divided by a barrier.

## Commission Assigns Names to 3 Freeways

The California Highway Commission has assigned names to three freeway routes in Orange County, one of them involving a partial revision of a previous designation.

The names and routes designated are:

**Newport Freeway**—The adopted freeway route for State Sign Route 55, extending from Newport Beach to a connection with the Riverside Freeway (State Sign Route 18-US Highway 91) near Olive.

**Garden Grove Freeway**—The adopted freeway route for State Sign Route 22, extending from a junction with the proposed San Diego Freeway northeast of Long Beach to a junction with the proposed Newport Freeway east of Santa Ana.

**Riverside Freeway**—State Sign Route 18-US Highway 91 from a junction

with the San Bernardino Freeway east of Colton to a junction with the adopted freeway route of State Sign Route 14 near Olive, and then west along the Sign Route 14 freeway route to a junction with the Santa Ana Freeway at Buena Park.

The previously designated Riverside Freeway route followed State Sign Route 18-US Highway 91 and a portion of the State Sign Route 55 freeway route from east of Colton to a junction with the Santa Ana Freeway near Tustin. The State Sign Route 55 portion of this route has now been included in the Newport Freeway designation.

The commission's action in naming the three freeway routes was taken pursuant to a resolution from the Orange County Board of Supervisors and a subsequent study and report by two of the commission members, Vice Chairman James A. Guthrie of San Bernardino and Robert E. McClure of Santa Monica.

nately at the Berkeley and Los Angeles campuses.

Chairman for the 1958 conference is Lewis F. Arnold, Engineer of Administration, City of Los Angeles. Vice chairmen are Marshall M. Wallace, County Surveyor and Road Commissioner, Sonoma County, and Edwin T. Telford, Assistant State Highway Engineer.

All California applicants not licensed as drivers before September 11, 1957, must prove the ability to read and understand simple English used in highway traffic and directional signs.

**GOODWIN J. KNIGHT**  
Governor of California

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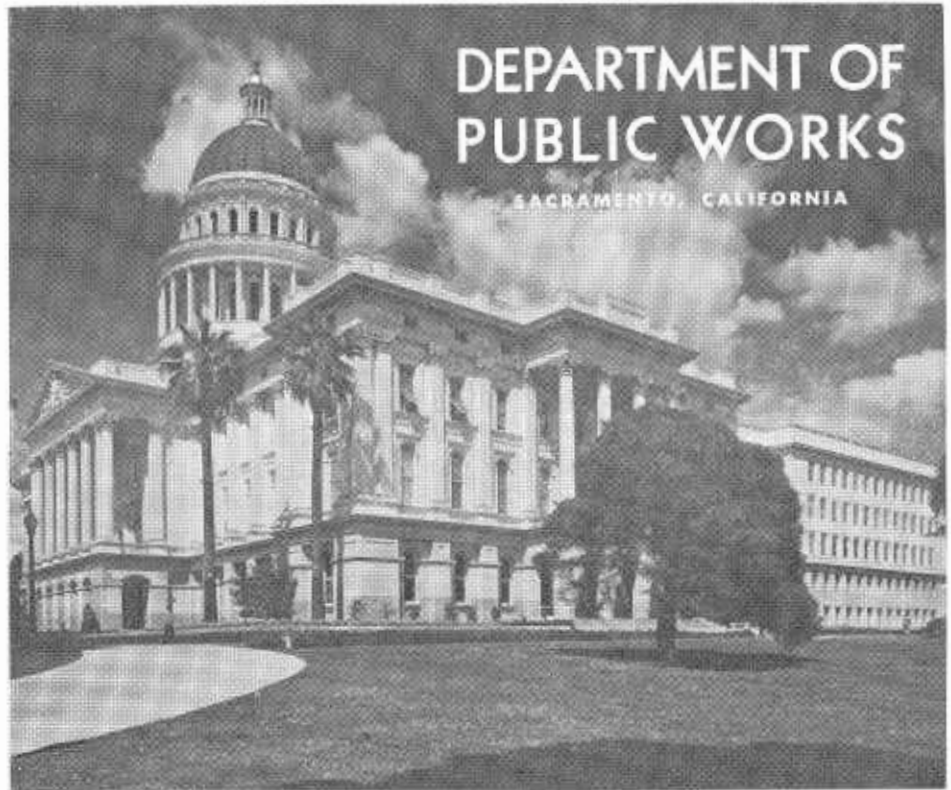
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