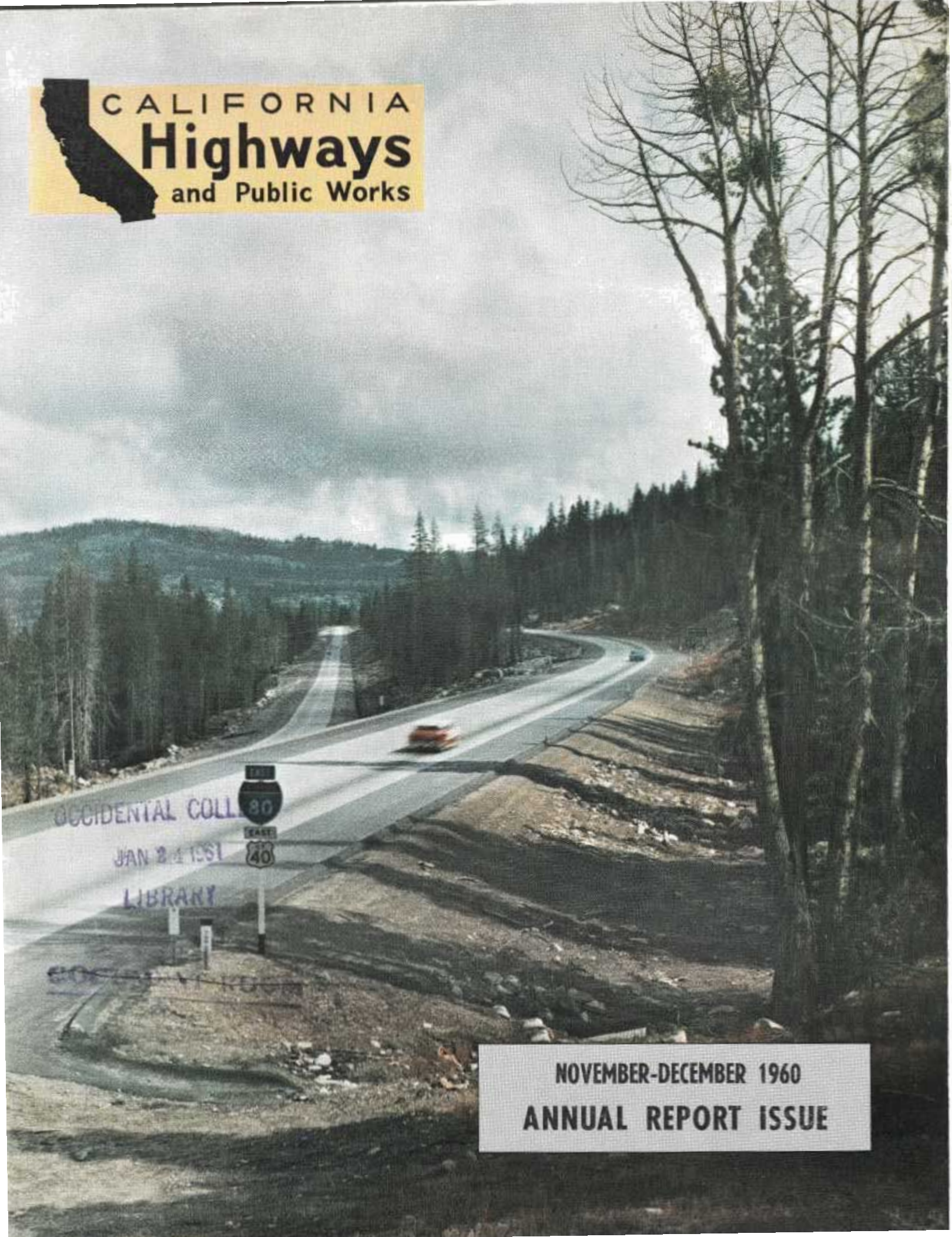
# CALIFORNIA Highways and Public Works






NOVEMBER-DECEMBER 1960

## ANNUAL REPORT ISSUE

December 1, 1960

Edmund G. Brown
Governor, State of California

My Dear Governor:

I take pleasure in submitting to you the 14th Annual Report of the Division of Highways, Department of Public Works, prepared in compliance with Section 143, Streets and Highways Code. This report outlines the developments in California's Highway Program during the Fiscal Year 1959-60. Some of the more recent developments of importance are also included.

The Fiscal Year showed accelerated progress in new construction and improvement of existing highways. As of the end of the Fiscal Year an all-time high had been reached in number and volume of construction projects under way. Construction is expected to continue at a comparable rate during the current and the next Fiscal Year.

An increasing degree of cooperation between the State and local communities is being emphasized in the joint planning of traffic circulation systems and locating freeway routes. In keeping with the policy of the Legislature, the California Highway Commission continues to emphasize long-range planning and fiscal continuity in the budgeting of highway projects.

For the first time the Annual Report appears in California Highways and Public Works, the bi-monthly journal of the Department, instead of the separate publication issued heretofore. This is a significant improvement because it enables us to report to thousands more California citizens and public officials at a substantial reduction in cost to the State. Financial and statistical tables are contained in a separate publication available for those who are interested.

Respectfully,

Robert B. Bradford

ROBERT B. BRADFORD
Director of Public Works

December 1, 1960

Robert B. Bradford
Director of Public Works
State of California

Dear Sir:

Submitted herewith for your approval and transmittal to Governor Edmund G. Brown is the Fourteenth Annual Report of the Division of Highways. The report is prepared in compliance with Section 143 of the Streets and Highways Code. It covers the fiscal year ending June 30, 1960, and some later information is also included.

With this report a new format is being introduced. In the past all narrative and statistical material has been in one publication which was printed in limited quantity for official distribution. A condensed version of the report, designed for the interested citizen, appeared in *California Highways and Public Works* magazine and received wider distribution in reprint form.

The next logical step has been to include the entire text portion of the official report in the magazine, thus enlarging the distribution to include the interested public as well as all employees of the Department of Public Works. Financial statements, apportionment tables and contract statistics will be published in a separate supplement and made available to interested persons.

The report is divided into three sections. The introduction contains general information about the organization, financing, and problems of the highway program in California. The second section is a summary of some of the significant construction which has been completed recently, or is now in progress or budgeted. This is followed by a resume of the activities of the various departments of the Division of Highways during the 1959-60 fiscal year.

Respectfully submitted,

J. C. Womack

J. C. WOMACK
State Highway Engineer
Chief, Division of Highways

# California Highways and Public Works

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

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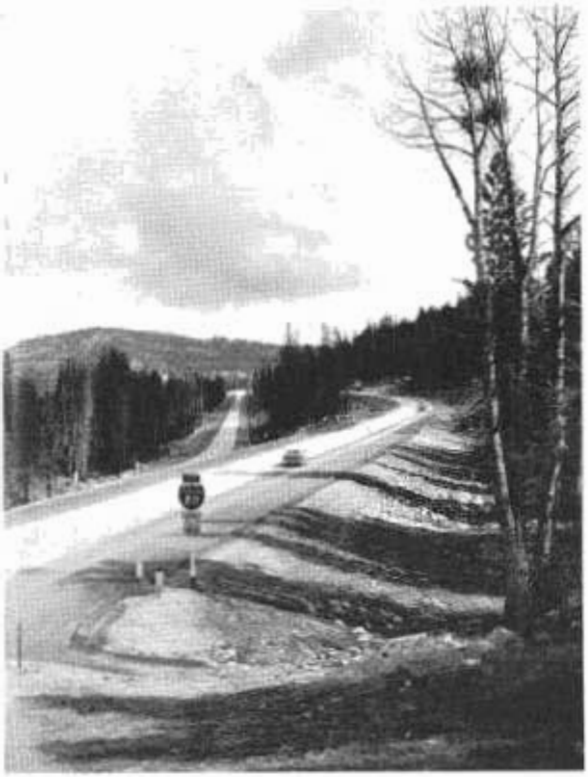
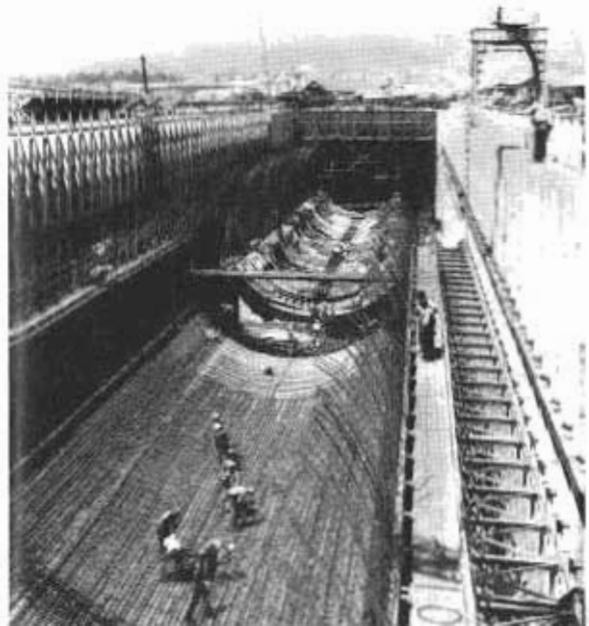


*FRONT COVER—Looking east toward Donner Summit on US 40 (Interstate 80) showing a recently completed section of freeway between Hampshire Rocks and Soda Springs. Note the two roadways at different levels, with a stand of trees in the median. Elevation at this location is about 6,000 feet.*

*BACK COVER—View of the graving dock in Alameda where precast tube segments are cast for the Webster Street Tube, which is under construction to parallel the Posey Tube between Alameda and Oakland. This $17,400,000 project is scheduled for completion late in 1962.*



## CONTENTS

**ANNUAL REPORT ISSUE**



LESTER S. KORITZ, *Editor*

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*Address communications to: EDITOR,*

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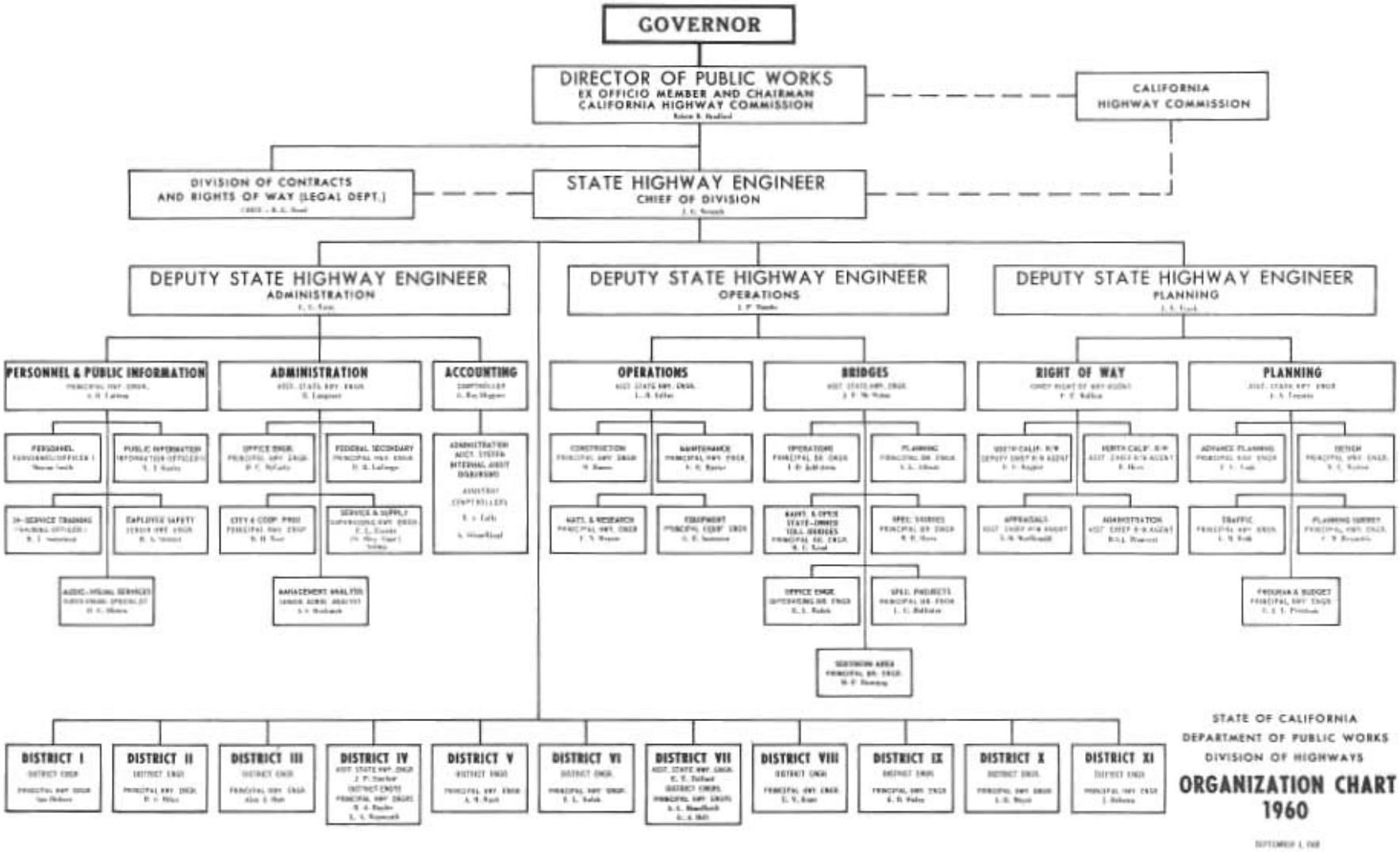



STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

**ORGANIZATION CHART**
**1960**

SEPTEMBER 1, 1960

STATE OF CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

## CALIFORNIA HIGHWAY COMMISSION

ROBERT B. BRADFORD, Chairman, Ex Officio

| *Member* | *Residence* | *Date of original appointment* | *Term expires* |
|---|---|---|---|
| JAMES A. GUTHRIE | San Bernardino | September 14, 1943 | January 15, 1961 |
| CHESTER H. WARLOW | Fresno | September 14, 1943 | January 15, 1961 |
| ROBERT E. MCCLURE | Santa Monica | January 18, 1954 | January 15, 1962 |
| ARTHUR T. LUDDY | Sacramento | February 16, 1959 | January 15, 1963 |
| ROGER S. WOOLLEY | San Diego | March 18, 1959 | January 15, 1963 |
| JOHN J. PURCHIO | Hayward | January 15, 1960 | January 15, 1964 |

Secretary: A. J. COOPER

Assistant Secretary: GEORGE N. COOK

## CALENDAR OF MEETINGS
## CALIFORNIA HIGHWAY COMMISSION

July 1, 1959, to June 30, 1960

* July 22 and 23, 1959 — Los Angeles

* July 24, 1959 — San Diego

* August 26 and 27, 1959 — Sacramento

September 4, 1959 — Los Angeles
(Public hearing on freeway location, road VII-L.A-172-A, MonP,Mtbl, (Pomona Freeway) between Woods Avenue and Potrero Grade Drive.)

* September 22, 23 and 24, 1959 — Sacramento

September 25, 1959 — Livermore
(Public hearing on freeway location, road IV-Ala-108-A between Scotts Corner and US 50 near Livermore.)

* October 27, 28 and 29, 1959 — Sacramento

* November 18 and 19, 1959 — Los Angeles

November 20, 1959 — Los Angeles
(Public hearing on freeway location, road VII-L.A-9-Irw, Azu,H,Gdr,I, between Duarte City Limits at Bradbourne Avenue and Glendora Avenue.)

December 1, 1959 — Turlock
(Public hearing on freeway location, road X-Sta,Mer-4-A,Tur;D, between 3 miles north of Turlock and 3 miles south of Turlock.)

* December 16, 1959 — Sacramento

* January 27, 1960 — Sacramento

* February 17 and 18, 1960 — Sacramento

March 23, 1960 — Pleasanton
(Public hearing on freeway location, road IV-Ala,C.C-107-B,A, between Scotts Corner and about 2 miles north of Dublin.)

March 23 and 24, 1960 — Oakland

* April 27 and 28, 1960 — Sacramento

* May 25, 1960 — Sacramento

May 25, 26 and 27, 1960 — Tour
(May 25—Inspection of US 40 between Sacramento and Nevada State Line.)
May 26—Inspection of U.S. and State Sign Routes in Plumas, Lassen, and Modoc Counties.)
May 27—Inspection of U.S. and State Sign Routes in Modoc, Lassen, Tehama, Butte, and Yuba Counties.)

June 14, 1960 — St. Helena
(Public hearing on freeway location, road IV-Nap-49-B,C, SHla, between 0.5 mile south of Rutherford and Ritchie Creek.)

June 15, 1960 — South San Francisco
(Public hearing on freeway location, road IV-S.M-239-SBr, A,SSF,Clm,DlC, between 0.2 mile south of San Bruno Avenue and Route 56 at Alemany Boulevard.)

* June 23 and 24, 1960 — Sacramento

June 24, 25, 26 and 27, 1960 — Tour
(June 24—Inspection of US 99 in Merced, Madera, and Fresno Counties.)
(June 25—Inspection of State highways in Fresno, Kings, and Tulare Counties.)
(June 26—Inspection of Generals' Highway and State Highway Route 41 to Cedar Grove.)
(June 27—Inspection of State highways in Tulare and Kern Counties.)

* Regular meetings.

*California Highway Commissioners (at upper table), staff members, and officials of the Division of Highways discuss highway problems with city and county representatives and private citizens at regular monthly meetings. Special hearings on freeway route matters are also held frequently.*

## PAST MEMBERS OF THE CALIFORNIA HIGHWAY COMMISSION

| Name | Residence | Date of appointment | Termination of membership |
|---|---|---|---|
| Burton A. Towne* | Lodi | Aug. 2, 1911 | Resigned Jan. 14, 1914 |
| Charles D. Blaney* | Saratoga | Aug. 2, 1911 | Resigned Mar. 1, 1917 |
| N. D. Darlington* | Los Angeles | Aug. 2, 1911 | Resigned Jan. 8, 1923 |
| Charles F. Stern | Eureka | Jan. 15, 1914 | Resigned Dec. 21, 1918 |
| Henry J. Widenmann* | Vallejo | Mar. 1, 1917 | Died Oct. 6, 1918 |
| Charles A. Whitmore* | Visalia | Nov. 29, 1918 | Resigned Jan. 8, 1923 |
| Emmett Phillips* | Sacramento | Dec. 21, 1918 | Died June 18, 1919 |
| George C. Mansfield* | Oroville | June 24, 1919 | Resigned Jan. 9, 1923 |
| Harvey M. Toy* | San Francisco | Jan. 9, 1923 | Resigned Jan. 3, 1927 |
| Louis Everding* | Arcata | Jan. 9, 1923 | Resigned Jan. 17, 1927 |
| Nelson T. Edwards* | Orange | Jan. 10, 1923 | Resigned Jan. 3, 1927 |
| Ralph W. Bull* | Eureka | Jan. 6, 1927 | Resigned Jan. 6, 1931 |
| J. P. Baumgartner* | Santa Ana | Jan. 6, 1927 | Resigned Jan. 6, 1931 |
| M. B. Harris* | Fresno | April 18, 1927 | Resigned Jan. 6, 1931 |
| Joseph N. Schenck | Los Angeles | Aug. 19, 1927 | Resigned Jan. 6, 1931 |
| Fred S. Moody* | San Francisco | Aug. 19, 1927 | Resigned Jan. 6, 1931 |
| Earl Lee Kelly | Redding | Jan. 6, 1931 | Resigned Oct. 18, 1932 |
| Frank A. Tetley* | Riverside | Jan. 6, 1931 | Resigned July 31, 1935 |
| Timothy A. Reardon* | San Francisco | Jan. 6, 1931 | Resigned May 7, 1936 |
| Harry A. Hopkins* | Taft | Jan. 6, 1931 | Resigned Oct. 14, 1937 |
| Philip A. Stanton* | Anaheim | Jan. 6, 1931 | Resigned Mar. 3, 1939 |
| Dr. W. W. Barham | Yreka | Dec. 20, 1932 | Resigned May 21, 1935 |
| Ray Ingels | Ukiah | May 21, 1935 | Resigned Oct. 4, 1935 |
| C. D. Hamilton* | Banning | Aug. 1, 1935 | Died April 24, 1936 |
| H. R. Judah* | Santa Cruz | May 7, 1936 | Resigned Oct. 5, 1937 |
| Paul G. Jasper* | Fortuna | May 7, 1936 | Resigned Mar. 3, 1939 |
| William T. Hart* | Carlsbad | July 7, 1936 | Resigned Mar. 3, 1939 |
| Robert S. Redington | Los Angeles | Oct. 5, 1937 | Resigned Jan. 27, 1939 |
| Frank W. Clark | Los Angeles | Jan. 27, 1939 | Resigned Mar. 10, 1939 |
| Lawrence Barrett | San Francisco | Mar. 3, 1939 | Resigned Jan. 11, 1943 |
| Iener W. Nielsen | Fresno | Mar. 3, 1939 | Resigned Jan. 11, 1943 |
| Amerigo Bozzani | Los Angeles | Mar. 3, 1939 | Resigned Jan. 11, 1943 |
| Bert L. Vaughn | Jacumba | Mar. 3, 1939 | Resigned Jan. 11, 1943 |
| L. G. Hitchcock | Santa Rosa | Mar. 10, 1939 | Resigned Jan. 11, 1943 |
| Gordon H. Garland† | Sacramento | Jan. 11, 1943 | Resigned Sept. 14, 1943 |
| Mrs. Dora Shaw Heffner† | Sacramento | Jan. 11, 1943 | Resigned Sept. 14, 1943 |
| Miss Helen MacGregor† | Sacramento | Jan. 11, 1943 | Resigned Sept. 14, 1943 |
| Verne Scoggins† | Sacramento | Jan. 11, 1943 | Resigned Sept. 14, 1943 |
| William Sweigert† | Sacramento | Jan. 11, 1943 | Resigned Sept. 14, 1943 |
| C. Arnholt Smith | San Diego | Sept. 14, 1943 | Resigned Jan. 1, 1949 |
| C. H. Purcell* | Sacramento | Sept. 14, 1943 | Resigned July 31, 1951 |
| Homer P. Brown* | Placerville | Sept. 14, 1943 | Resigned Oct. 26, 1951 |
| Harrison R. Baker | Pasadena | Sept. 14, 1943 | Jan. 15, 1954 |
| Charles T. Leigh | San Diego | May 11, 1949 | Jan. 15, 1955 |
| F. Walter Sandelin | Ukiah | Sept. 14, 1943 | Jan. 15, 1956 |
| Frank B. Durkee | Sacramento | Aug. 4, 1951 | Resigned Dec. 31, 1957 |
| H. Stephen Chase | San Francisco | Oct. 30, 1951 | Resigned Feb. 25, 1958 |
| Fred A. Speers | Escondido | Jan. 21, 1955 | Jan. 15, 1959 |
| C. M. Gilliss | Sacramento | Jan. 1, 1958 | Resigned Nov. 10, 1958 |
| John O. Bronson | Sacramento | Feb. 26, 1958 | Jan. 15, 1959 |
| T. Fred Bagshaw | Mill Valley | Nov. 10, 1958 | Resigned Jan. 4, 1959 |
| Robert L. Bishop | Santa Rosa | Jan. 15, 1956 | Jan. 15, 1960 |

* Deceased.
† Member of the Interim Commission.

# California Highways–1960

THE NUMBER of cars and trucks in California has doubled in the past 12 years, and motor vehicle registration is still going up rapidly.

Californians are now driving more than 8,000,000 motor vehicles, roughly one car or truck for every two of the State's 15,800,000 citizens.

This big motor vehicle registration, larger than in any other state, reflects one of California's basic needs:

*There must be safe, efficient, and well-planned highways in this State if the freedom of movement long identified with the California way of life is to be preserved.*

The extent to which Californians rely on good roads is indicated by the fact that more than half of our cities and towns have no other type of transportation facility.

Recognizing the importance of adequate highways to serve both present and future generations, Californians have given continuing firm support to an extensive program of state highway improvement.

Through pay-as-you-go highway construction, California has developed a system of highways second to none. This State now has more miles of modern, toll-free multilane divided highway than any other state, about 2,562 miles completed or under construction.

Although great progress has been made, the State's need for bigger and better highways will be felt for many years.

Conservative estimates show that there will be at least twice as many motor vehicles in California in 1980 as there are today. Travel on our roads, streets and highways will be three times greater—climbing from an annual total of some 65 billion miles today to 200 billion miles in just 20 years.

Fortunately, California has already taken positive steps toward meeting this transportation challenge.

This State became the first to have an official long-range master plan for a statewide network of controlled access highways when the 1959 Legislature adopted the plan for the 12,500-mile California Freeway-Expressway System.

The plan calls for $10.5 billion in freeway and expressway construction during the next 20 years. It is the biggest public works program ever undertaken by any state.

This system of access-controlled highways will in 1980 connect all cities of 5,000 or more persons, carry 59 percent of the total motor vehicle travel, and serve every major industrial, agricultural, and recreation region. The system will provide estimated user savings of some $20 billion in 20 years.

Accident rates are lower on access-controlled highways. Thus, substantial safety benefits can also be expected, hundreds of lives will be saved and thousands of injuries prevented.

The plan is geared in 1980 population estimates of 31 million and to anticipated motor vehicle registration of 17,000,000.

Routes in the system have been designated by the Legislature in a general way. In most cases, only the termini have been named in law.

These general legislative descriptions will provide the guidelines for studies and public discussions leading to the adoption of more precise routes and decisions on details of design.

Thanks to the advance planning program which has been in effect in California for many years, routes have already been established by the California Highway Commission for 5,358 miles of freeways and expressways in the system. This total includes freeways and expressways already in operation or under construction and represents about 43 percent of the total freeway-expressway system mileage.

#### Access Control

Although California's 16,000-mile State Highway System includes hundreds of miles of conventional highway, the construction emphasis in recent years has been on modern highways with access control—*full freeways, expressways*, and *two-lane highways with access restrictions* ("two-lane freeways.").

Legally, all three types are "freeways;" that is highways with a varying degree of access control. To the average motorist, however, these highways are entirely different in appearance. (See page 11.)

As the terms are commonly used in California, a full freeway is the most advanced design. It is a divided highway with from four to eight lanes. Access is restricted to strategic locations where traffic may enter and leave the highway safely. There are no left turn movements in front of oncoming cars on freeways, and intersecting roads are taken over or under the highway by means of traffic separation structures. There are 850 miles of freeway in operation in the state and another 315 miles under construction.

An expressway is a four-lane divided highway with most of the features of a full freeway; but cross traffic, and sometimes private access, may be permitted at some locations. Plans are often made for converting expressways to full freeway standards later in keeping with the requirements of traffic. California now has 834 miles of expressway in operation or under construction.

A "two-lane freeway" is usually built in a rural or mountain area where the present traffic load is relatively small. These highways are much like ordinary two-lane facilities, except that access is planned to eliminate potential hazard and congestion. Also, enough width of right-of-way may be acquired for future additional lanes and a dividing strip.

#### Why Build Freeways?

Faced with ever-increasing traffic, California helped pioneer the freeway concept which is now generally ac-

cepted and endorsed throughout the world.

A freeway is the engineer's answer to the challenge of modern-day traffic volumes. One freeway lane will carry three times the traffic which can use a normal city street lane.

The tremendous capacity of our freeways is demonstrated by the fact that at least two freeway sections in Los Angeles are each carrying approximately 200,000 vehicles a day.

Probably the most significant freeway benefit, however, is safety. California's freeways for many years have had a better safety record than all other types of highways in the State.

For the past five years, the fatality rate on freeways has been about one-third the rate on conventional rural highways, and the overall accident rate has been about one-half the conventional highway rate (see chart on page 12).

Freeways promote safety for foot traffic, too. Pedestrians and bicycles are not permitted on freeways, and crossing structures and fencing keep children from darting into the fast moving traffic stream.

Freeways also offer an undiminishing return on the user-tax investment. Their capacity and safety characteristics are permanent. Freeways built 20 years ago in this State still are capable of handling the large traffic volumes for which they were designed, in contrast to the old style boulevards which were quickly choked and congested by unrestricted access.

It costs motorists less money to operate their cars on a freeway. Studies made in Southern California have shown a saving of more than a half-cent a mile on freeways, as compared to ordinary streets, in gasoline and upkeep alone. There are also great savings resulting from travel time reductions and reduced accident exposure.

#### Community Benefits

Experience shows that properly located freeways help local business by removing traffic from overburdened streets, thus easing business district congestion for the local people who do most of the buying. At the same time, freeway connections and interchanges, marked by large directional signs, make it easier to get to the business district.

Records of real estate transactions show that practically all commercial property along or near a freeway increases in value after the freeway is completed. This strengthens the local tax base and usually more than offsets the value of the land used for the freeway itself. Recent studies indicate that freeways also have a positive effect on the value of residential property.

After a freeway is built, residents frequently discover that they may once again drive from one side of their city to the other without encountering frustrating delays due to traffic congestion. They find that freeway crossing structures take them over or under a former traffic barrier.

With a freeway in operation, traffic noise and fumes generated by stop-and-go traffic are reduced because there are no stop signals on a freeway and traffic moves along smoothly.

All these factors—permanent efficiency and safety and a wide range of auxiliary benefits—mean that freeways are making California cities, towns and rural areas better places in which to live.

#### Who Builds Freeways?

California legislators have delegated to the California Highway Commission the authority and responsibility for determining highway routes and allocating construction funds.

This long-standing legislative policy, which includes broad policy guidelines and statutory controls over fund allocation, has assured the continuity of the highway program and fostered the steady and orderly progress which has characterized California highway development.

By freeing the highway organization of political and sectional pressures, it has permitted highway planning and construction to proceed on a basis of statewide need and benefit. It means that our highways are safer, more efficient, and designed to provide the greatest good to the greatest number of Californians.


*Map shows the 11 state highway districts. Circles denote district office locations.*

It is the principal reason for California's position of pre-eminence in highway matters.

### California Highway Commission

The California Highway Commission is a nontechnical board of business and professional men representing the people of the State at large.

Commissioners are appointed by the Governor, and the appointments are confirmed by the State Senate. Ex officio chairman of the seven-man group is the State Director of Public Works who serves at the pleasure of the Governor. The other six members are nonsalaried and serve four-year staggered terms.

In addition to budgeting highway funds and adopting freeway and highway routes, the commission also approves county primary road systems and authorizes the execution of deeds, condemnation proceedings, and right-of-way abandonments and relinquishments.

### Division of Highways

The State Division of Highways, a unit of the Department of Public Works, handles the day-to-day administration of California's highway program, working in conformance with state law and policies of the Highway Commission.

The division is in charge of all state highway planning, design, right-of-way acquisition, construction and maintenance. Its activities cover the entire range of highway work from large scale freeway and bridge construction to small but essential maintenance jobs.

Chief of the Highway Division is the State Highway Engineer. He is assisted by a headquarters staff shown on the accompanying organization chart on page 2.

The State is divided into 11 state highway districts to provide for localized administration of the highway program (see map). These districts have approximately equivalent state highway mileage. The engineer in charge in each district is responsible for all phases of the highway program in his region.

District offices are in these cities:

**District I**
Eureka
430 West Wabash Avenue
Sam Helwer, District Engineer

**District II**
Redding
1657 Riverside Drive
H. S. Miles, District Engineer

**District III**
Marysville
703 B Street
Alan S. Hart, District Engineer

**District IV**
San Francisco
150 Oak Street
J. P. Sinclair, Assistant State Highway Engineer

**District V**
San Luis Obispo
50 Higuera Street
A. M. Nash, District Engineer

**District VI**
Fresno
1352 West Olive Avenue
W. L. Welch, District Engineer

**District VII**
Los Angeles
120 South Spring Street
E. T. Telford, Assistant State Highway Engineer

**District VIII**
San Bernardino
247 Third Street
C. V. Kane, District Engineer

**District IX**
Bishop
South Main Street
E. R. Foley, District Engineer

**District X**
Stockton
1976 East Charter Way
J. G. Meyer, District Engineer

**District XI**
San Diego
4075 Taylor Street
J. Dekema, District Engineer

All of the engineers, maintenance crews, technicians, statisticians and others who work for the Division of Highways are state-paid civil servants. They are dedicated to the service of all the citizens of the State and their constant goal is to provide the best possible value in safe, efficient highways for the taxpayer's dollar.

### Highway Financing

The backbone of California's highway financing structure is the state gasoline tax of six cents a gallon. Four cents is applied to state highways, 1⅜ cents goes for county roads, and ⅜ of a cent for city streets other than state highways.

In addition to the gasoline tax, other sources of highway revenue in California are use (diesel) fuel taxes, transportation taxes, and motor vehicle registration and weight fees. (Revenue sources and distribution for road purposes are indicated in the chart on page 9).

About one-third of the total highway revenue in California comes from federal sources for expenditure on the various federal-aid highway systems of secondary, primary, urban and interstate highways.

The 1959-60 State Highway Budget contained an overall total of $610,712,000 of which $497,000,000 was for state highway construction purposes, including rights-of-way. The totals for the current 1960-61 budget are $569,244,000 and $452,785,000. As adopted by the Highway Commission in October, 1960, the record 1961-62 budget provides a gross total of $633,460,000 of which $509,078,000 is for state highway construction. (See article on 1961-62 budget on page 73.)

According to law, 55 percent of the money available each year for state highway construction and rights-of-way is allocated to the 13 southern counties. The remaining 45 percent goes to the northern 45-county group.

Each county is guaranteed a minimum share of the state highway construction funds in a specified period of years according to statutory formula.

In preparing the annual state highway budget, the Highway Commission must review hundreds of high-priority projects and attempt to choose those which will meet the most acute local and regional needs, comply with federal financing requirements, and at the same time fit logically into the long-range planning program for highway development on a statewide basis.

Thorough study and comparison of all available data, including comprehensive information on traffic volumes, accidents, population changes, road conditions and other factors, are required.

Preparing the annual budget is always extremely difficult as there is never enough money in a given year to do all the work that should be done.

The cities' ⅜ cent share of the gas tax, about $35 million a year, is dis-

tributed by the Division of Highways on a population basis.

The counties' 1⅛ cents share, along with a portion of the motor vehicle fees, amounts to about $92 million a year. These funds are distributed directly to the counties by the State Controller, and their expenditure for road purposes is administered by local board of supervisors.

#### Freeway Route Selection

Another difficult problem facing the Highway Commission and the Division of Highways is the selection of freeway routes. This is especially true when a proposed route passes through a built-up area.

In most cases nearly any route which might be selected will be unsatisfactory to some individuals, even though it offers the best service and the most benefits at a reasonable cost.

Early determination of freeway routes is essential to effective advance planning. Before design studies for any freeway project can proceed, of course, the location of the route must be decided upon.

Early determination of freeway routes also helps local city and regional planners by fixing permanently one of the major transportation elements of the area.

In California, freeway routes are selected according to policies and procedures which have been established and refined over a long period.

Object of these procedures is to insure painstaking study, careful consideration of all data, and complete public discussion of each possible route. California was one of the first states to make formal public hearings a definite step in the route adoption process.

Briefly, the route selection process is as follows:

General termini for state highways are named by the Legislature. Before possible alternate routes between these termini are even laid out, the Division of Highways gets together with city or county planners and traffic engineers to determine the area's needs and general plans. Local government agencies are notified that route studies are commencing. Informal public meetings are often held at this point to explain the problems involved and to obtain preliminary ideas.

Working in close co-operation with local technical staffs, the division conducts extensive traffic, engineering and economic studies. All local master plan information is carefully reviewed.

These studies provide the facts necessary for the projection and evaluation of the various alternate routes which might be considered.

Some alternates may be undesirable because they would adversely affect such "controls" as schools, hospitals, cemeteries, recognized landmarks, or recreational facilities.

Others will be unfeasible for engineering reasons, or because they would cost too much money in relation to the anticipated benefits. Still others will be unsatisfactory because they would give inadequate traffic service.

Finally, after study and restudy, the division boils down the possibilities to what are considered to be the most suitable choices from the standpoint of traffic service, effect on the community, economic influence, construction costs, and right-of-way cost.

These alternate routes are then subjected to intense public review at a series of meetings, both formal and informal, conducted by the Division of Highways.

Often these public discussions reveal a course for further study. Upon completion of such additional investigation, the State Highway Engineer recommends to the Highway Commission the route which appears to offer the best combination of traffic service and community or area benefits. Information on all other routes is also presented to the commission.

The Highway Commission will then take the matter of a routing under consideration.

In particularly difficult cases, the commissioners will decide to get first-hand information from local citizens by calling a public hearing in the area concerned.

In all cases, local governing agencies will be notified that if it is considered necessary or desirable, the Highway Commission will schedule a public hearing on the matter.

Even when no hearing is requested, the commission will announce its intention to adopt a route and withhold action for at least 30 days to allow time for submission of additional data and proposals.

All supplementary information presented at the public hearings, along with the data developed during the comprehensive studies and public meetings conducted by the highway division, is carefully considered in the commission's deliberations.

After the commission adopts a route, there is still another important step. Under California law, the local governing body and the State must enter into a freeway agreement setting forth the local roads and streets to be closed for the freeway. This gives local agencies a voice in design factors such as the location and type of interchanges and traffic separation structures to be provided.

#### Right-of-Way Acquisition

A total of 7,052 right-of-way transactions involving parcel acquisitions were concluded in the 1959-60 fiscal year. Of these, nearly 98 percent were negotiated settlements with property owners. About 2 percent were concluded through court proceedings.

One big reason for the large number of amicable right-of-way transactions is the division's policy of paying fair market value for required property. In dealings with the Division of Highways, owners can expect to receive the same amount for their holdings as they would from any other buyer under normal market conditions.

#### Landscaping and Planting

California's freeways are the scene of a large number of planting and landscaping projects each year. The last four annual budgets adopted by the Highway Commission have provided an aggregate of approximately $15,000,000 for such projects.

Freeway landscaping and planting projects are carefully worked out by the division's staff of landscape architects to serve both functional and beautification purposes.

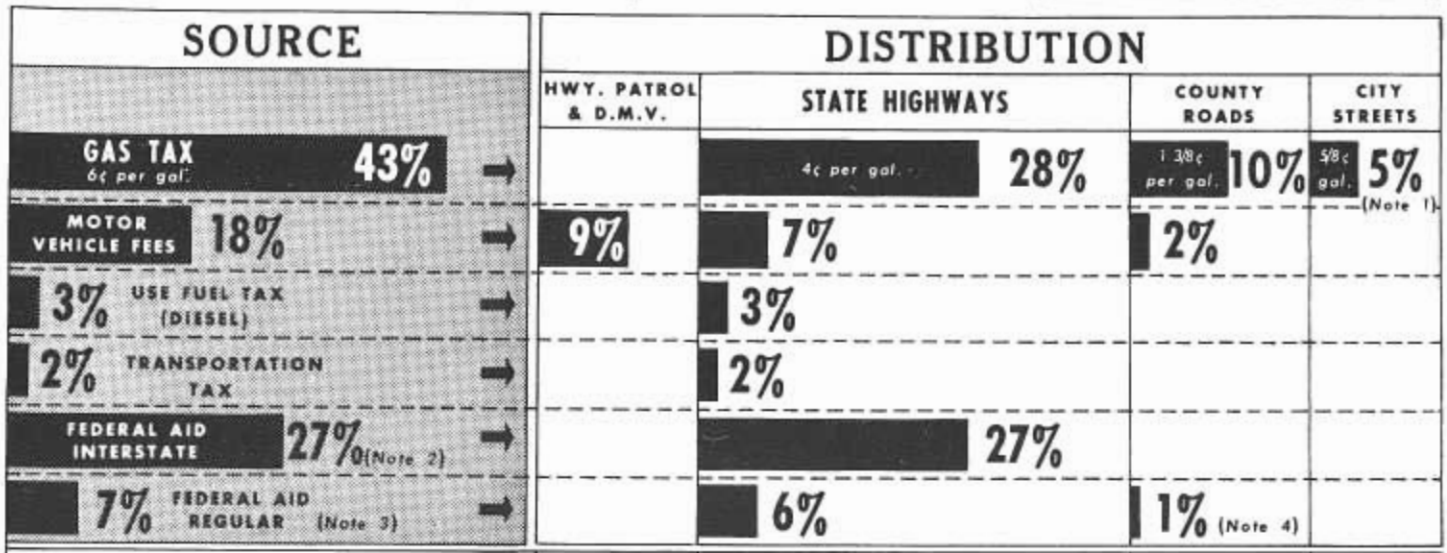
Planting of selected trees, shrubs, and plants not only enhances the appearance of a section of freeway, it also meets functional needs such as screening of headlight glare and noise and the prevention of erosion damage.

Care and control of roadside landscaping and other vegetation is a big

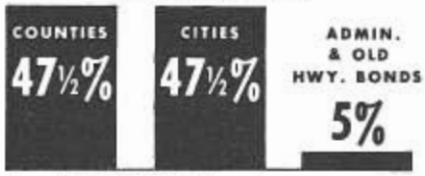
# Highway User Taxes Including Federal Aid

*Percentages based generally on 1961-62 Budget.*

State of California
Department of Public Works
Division of Highways




'IN LIEU' (PROPERTY) TAX ON VALUE OF MOTOR VEHICLES
*(collected by State)*




*For general local government purposes*

*NOTES*

1. *State Highways within cities financed wholly by State and Federal funds.*
2. *Federal Aid Interstate must be matched 9% by State funds from above sources.*
3. *Federal Aid Primary, Secondary, and Urban must be matched 42%, mostly by State funds from above sources.*
4. *Does not include matching funds, up to $100,000 per county per year, from State Highway Fund.*
5. *Does not include $5,000,000 per year State highway matching funds for local railroad grade separations.*

and costly job requiring the services of hundred of landscaping specialists and tree workers. Extensive irrigation systems are required in some sections of the State to sustain roadside landscaping.

The division also carries out weed and fire hazard control programs designed to provide protection for agricultural and forest lands bordering state highways. These programs are often conducted in co-operation with other agencies.

#### Contract Data

During the 1959-60 fiscal year, the Division of Highways opened bids on 550 projects with an estimated construction value of $337,292,500 including construction engineering. Of these 550 projects, contracts were awarded for 510 projects with a value of $321,020,900; bids not in the best interest of the State were rejected on 26 projects. Fourteen other projects were to be awarded after the close of the fiscal year.

Contracts were also awarded during the year for nine projects, valued at $2,145,900, on which bids were received during the previous fiscal year. Informal contracts valued at $342,700 were approved.

The cost of right-of-way acquisition and utility relocation, exclusive of land clearance, overhead, and acquisition for other agencies, amounted to $111,046,982 for the year.

The total of $323,166,800 in contracts awarded during the year was made up of $265,979,000 for construction on state highways, $18,844,900 for work on county roads included in the Federal Aid Secondary System; and $38,342,900 for maintenance and emergency repair, and work for other agencies.

The State Highway System contracts of $265,979,000 consisted of $237,287,000 from the 1959-60 Budget and $28,692 from the 1960-61 Budget and were awarded under statutory provisions which permit the award of contracts as early as January 1, six months before the start of the fiscal year.

The contracted state highway work involved improvement of 1,514 miles of highways and construction of 373 bridges and separation structures.

#### CONSTRUCTION PROGRESS

Recently completed projects around the State have extended freeway system development in metropolitan areas, closed gaps in long stretches of freeway and expressway into cities, and eliminated outmoded sections in rural and scenic regions. Hundreds of important projects are now under construction or budgeted.

#### Southern California

In the Los Angeles Metropolitan area, the construction emphasis continues to be on three key routes in the region's projected freeway system—the Golden State, Santa Monica and San Diego Freeways.

These three interstate highways will provide alternate routes for the millions of motorists who travel the already operating freeways in this area.

A spectacular series of multimillion dollar projects is now in progress on the Golden State Freeway between the Santa Ana Freeway south of the civic center and north of San Fernando.

This work, along with current or completed construction on the Santa Monica Freeway, will complete the long-awaited east loop bypass of the crowded central freeways and the four-level interchange. This interchange, the world's busiest intersection, is now handling some 350,000 vehicles a day.

Now completed, under construction, or budgeted on the San Diego Freeway are 35 miles of eight-lane freeway between the Long Beach area and the San Fernando Valley.

Earlier this year, projects were completed on the Ventura Freeway in the San Fernando Valley and on the San Diego Freeway in Orange County to close the final gaps in 90 miles of continuous freeway from West Los Angeles to the San Diego County line. Construction is now in progress on a new section of freeway on US 101 in Ventura.

A 4.6-mile extension of the Harbor Freeway was recently opened to traffic, and construction is just getting started on another job which will complete this route from the four-level interchange to San Pedro, a distance of 22 miles.

Widening of heavily traveled sections of the San Bernardino Freeway is proceeding, and the Long Beach Freeway is being extended northward from the Santa Ana Freeway to the San Bernardino Freeway.

Work is starting on one project and a second is budgeted to provide another important connecting link between major freeways—the Ventura Freeway extension from the Hollywood Freeway to the Golden State Freeway.

One project is under construction and another budgeted to provide 16 miles of freeway on the Antelope Valley Freeway (US 6) east of Solamint.

In Riverside County construction is proceeding on the 7.7-mile Corona Bypass which connects with 3.4 miles of recently completed freeway in Riverside. Also under construction is 6.1 miles of freeway on US 60-70-99 between Beaumont and Banning. Construction is starting on a section of freeway on US 60 in Riverside.

Work is expected to start soon on two budgeted freeway projects on US 70-99 through Redlands, and a major bypass project is now under construction at Barstow.

Approximately 25 miles of interstate freeway are being built on US 91-466 east of Barstow, and another 27 miles are budgeted.

In the San Diego area the conversion of US Highway 80 from expressway to freeway standards has continued between San Diego and El Cajon, and work has started on the initial units of the future US 101 freeway in San Diego. One freeway project is under construction, and another budgeted on Sign Route 78 west of Escondido. A seven-mile freeway project is now in progress on US Highway 80 in Imperial County.

#### San Francisco Bay Region

The past year has been one of significant accomplishment in the San Francisco Bay area with several long-planned highway improvements completed and work getting started on several others.

Largest project now in progress is the $17,000,000 Webster Street Tube beneath the estuary between Oakland and Alameda. This tube parallels the present Posey Tube (see page 55).

A total of 6.5 miles of eight-lane freeway is now under construction or budgeted on the MacArthur Freeway (US 50) in Oakland, and work started recently on a third two-lane bore at the Caldecott (Broadway) Tunnel on Sign Route 24 at the east city limit of Oakland. Newly budgeted projects on Sign Routes 24 and 21 in Contra Costa County, along with work now in progress on the Benicia-Martinez Bridge and approaches, will provide 30 miles of continuous freeway between Oakland and US 40 at Vallejo. This includes the new freeway bypass of Walnut Creek.

The first unit of San Francisco's Southern Freeway was completed earlier this year, and additional work is continuing or budgeted on this route.

The last remaining gaps in 87 miles of continuous full freeway (Nimitz Freeway and US 40) between Los Gatos and Vallejo were eliminated with the opening this year of new freeway sections in Richmond and between Los Gatos and San Jose.

Construction recently began in Santa Clara County on the final projects to provide 49 miles of continuous freeway on the Bayshore Freeway (US 101 Bypass) between San Jose and San Francisco.

In the North Bay area emphasis continued on the Redwood Highway (US 101) with interchange work completed or underway at Greenbrae and north of San Rafael. Farther north work is starting on a freeway section from Santa Rosa to south of Healdsburg. This project and the new section north of Healdsburg will be part of approximately 20 miles of continuous full freeway on US 101.

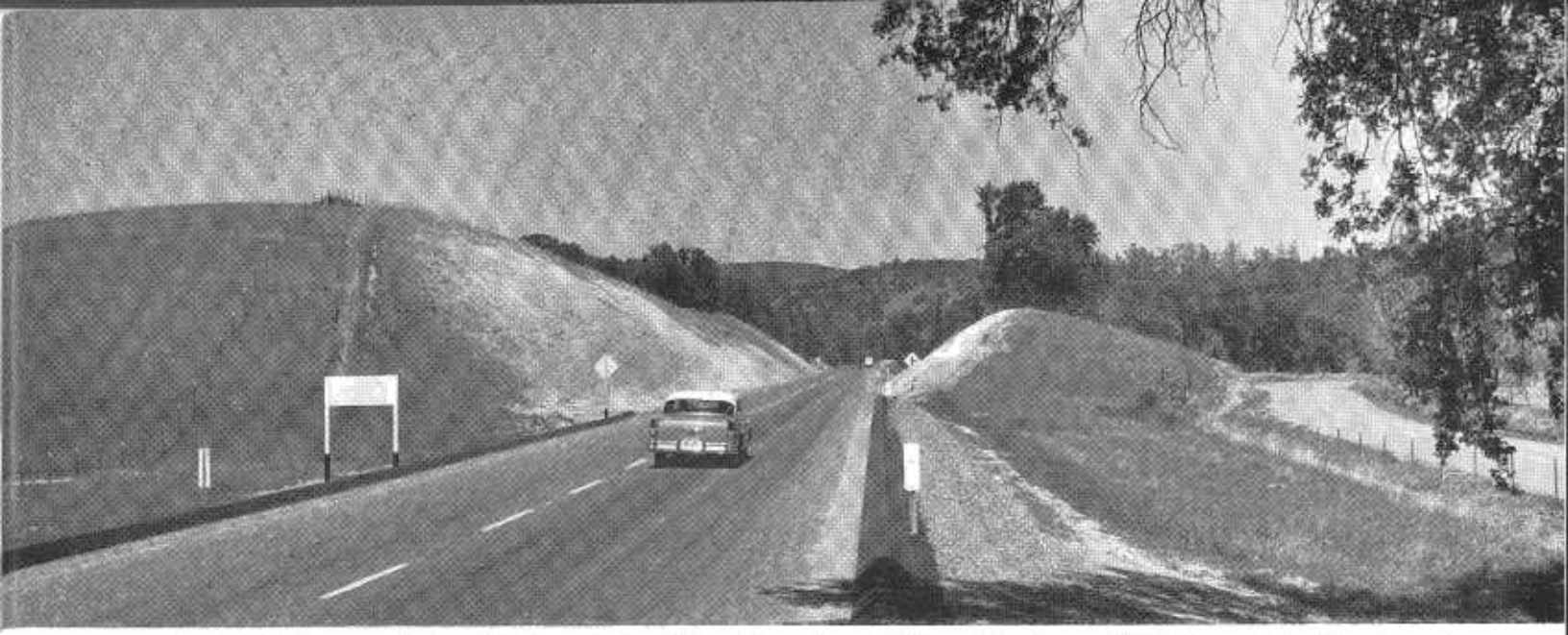
Construction is now in progress on the final Joint Highway District 9 improvement on State Sign Route 1 south of Davenport in Santa Cruz County. Work is also in progress on 3.3 miles of expressway on Sign Route 17 north of Santa Cruz.

#### Central Coast Area

New freeway and expressway sections have been completed or are under construction on US 101 west of Santa Barbara, and funds are budgeted for an additional section of freeway in that city. The Ward Memorial Freeway serving the Goleta Campus of the University of California is also budgeted.

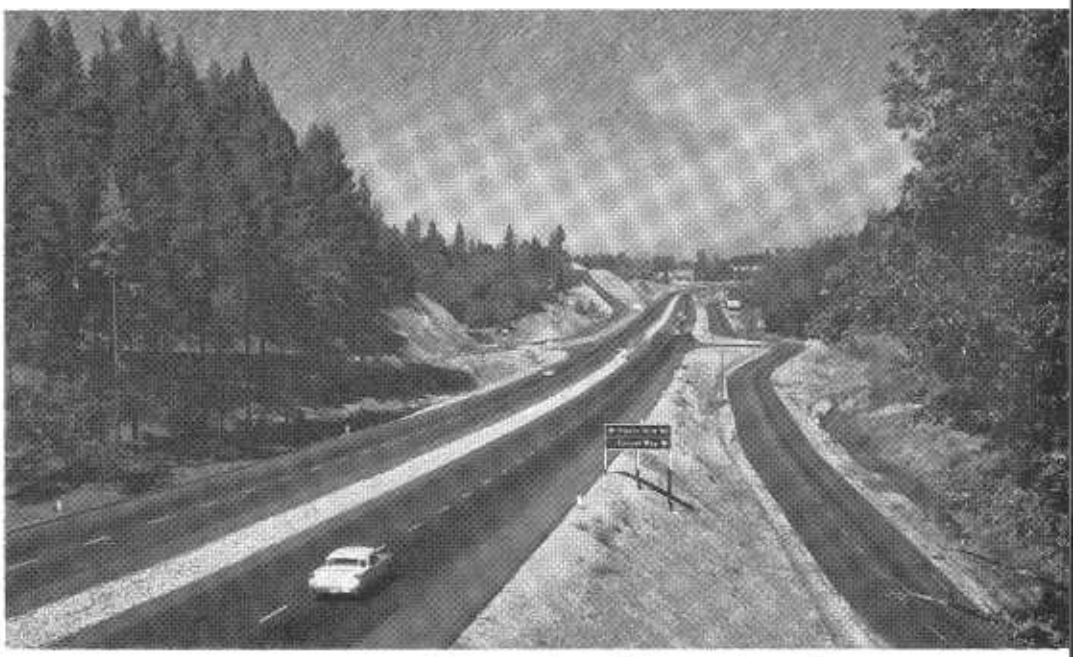
Work is in progress on the Santa Maria Bypass on US 101. This project, together with the current project at Pismo Beach, will eliminate the last gap in 100 miles of continuous freeway from Buellton to San Miguel.

A major improvement is nearing completion on the Orcutt Road (Leg-



*TWO-LANE "FREEWAY"—Access control through fencing and planned intersections makes this highway safer and more efficient than conventional two-lane roads without access restrictions.*


*Pictured here are a full freeway, an expressway, and a modern two-lane highway. Although these highways differ in appearance and design features, all three types are legally "freeways" because there is provision for access control in each case.*



*EXPRESSWAY (Above)—Four-lane divided highway with most full freeway features, but cross traffic may be permitted at some intersections as shown above.*

*FULL FREEWAY (Below)—Crossing structures, interchanges, and complete access control eliminate traditional traffic conflicts and make full freeways safer and more efficient than any other type of highway.*

islative Route 2) south of Santa Maria, and work is continuing on a 12-mile project on State Sign Route 1 north of Cayucos.

Work has just been finished on a major interchange on State Sign Route 1 at Carmel, and extensive landscaping is now underway at this location.

The Soledad Bypass on US 101 in Monterey County was opened earlier this year, and work is in progress on 4.5 miles of freeway bypassing Greenfield. Newly budgeted bypass project at Gonzales will complete freeway and expressway development for 46 miles between King City and Salinas.

On Sign Route 156 a large scale relocation project is under construction at San Juan Bautista.

#### San Joaquin Valley

On US Highway 99 north-south travelers are now using the new eight-lane freeway on the Grapevine Grade in southern Kern County. The only remaining three-lane section on this route was eliminated with the completion of freeway construction north of Fresno.

US 99 freeway and interchange work is also under construction or budgeted in and approaching Bakersfield, near Lerdo, at McFarland, north of Pixley, north of Tulare, south of Fresno, in and north of Merced, at Modesto, at Stockton and at Lodi. Turlock is now the only major city in the San Joaquin Valley where US 99 is not completed, under construction or budgeted as a freeway. The route for the Turlock freeway has been adopted.

Work is in progress on 12 miles of expressway on US 466 east of Bakersfield, and funds are budgeted for additional freeway construction near Keene. Major projects are also underway on Sign Route 198 north of Lemon Cove and on Sign Route 33 near the Kings County line.

#### Progress on US 40

The construction emphasis which has been concentrated on US 40 as an Interstate route reached a climax late in 1959 when several new freeway sections were opened to traffic, in time for the 1960 Winter Olympics at Squaw Valley in February.

Today there are 93 miles of four-lane freeway and expressway on the 120 miles of US 40 between Sacramento and Nevada. The most recently completed section is the 7.8-mile stretch west of Emigrant Gap which was opened in November. Additional construction is now underway on 15.4 miles, including an initial unit of the Donner Summit relocation.

West of Sacramento, projects are under construction or budgeted on US 40 to eliminate the four-lane undivided Yolo Causeway, and to convert sections from expressway to freeway standards in the vicinity of Vacaville, Fairfield, Cordelia and east of Vallejo.

#### Sacramento Valley and US 99

On the north state portion of US 99 the new freeway at Dunsmuir was recently opened to traffic. Work is continuing on two projects farther south which will complete freeway and expressway development for 30 miles in the Sacramento River Canyon. A new freeway section is in operation at Weed and a new bridge over the Yuba River on US 99E at Marysville was completed this summer. A new bridge was also completed on Sign Route 12 at Rio Vista.

The 1961-62 Budget contains funds for US 99 freeway construction north of Red Bluff and between Cottonwood and Anderson.

Major projects on other north valley routes included the current relocation and causeway project on the Willow-Butte City Highway (Legislative Route 45) and construction of a new Bear River Bridge on Sign Route 24 at Rio Oso.

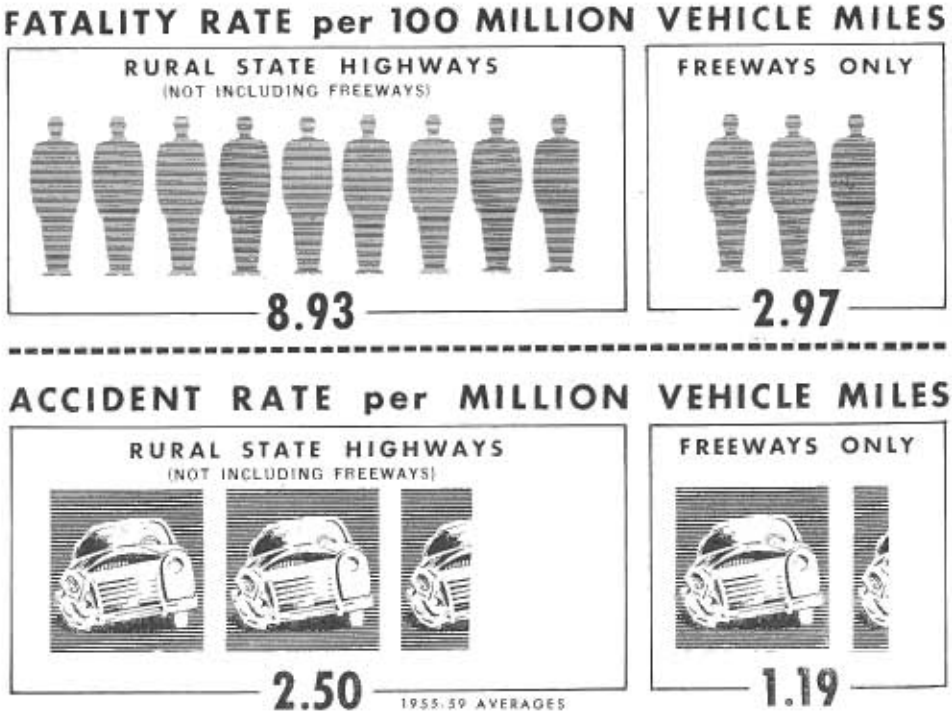
#### Foothill and Mountain Routes

Improvements on highways approaching or crossing the Sierra Nevada and the Cascades have been completed in recent months and additional work is now under construction or budgeted.

Opening of a large scale project in Alpine County completed the relocation over Luther Pass (Sign Route 89) and funds are budgeted for widening and realignment on Sign Route 88 (Carson Pass Highway) east of Pedler Hill.

Work is just getting started on reconstruction and realignment on Sign Route 4 (Ebbetts Pass Highway) between Angels Camp and Murphys.

Realignment is nearing completion on Sign Route 120 west of Yosemite Junction, Tuolumne County. Funds are budgeted for the initial two lanes of a future four-lane expressway on Sign Route 16 between Waites Station and Central House, Amador County, and for four-lane expressway



over Twain Harte Grade on Sign Route 108 east of Sonora.

On U.S. Highway 40 Alternate in Plumas County, a 4.3-mile realignment project is now under construction. Funds are budgeted for two US 40 Alternate freeway projects near Oroville. A new bridge over the West Branch of the Feather River is being built on US 40 Alternate north of Oroville.

Realignment is under way on sections of US 395 in the vicinity of Milford, Lassen County and south of Alturas. Funds are budgeted for two-lane highway on State Sign Route 89 between Dunsmuir and McCloud. East of the Sierra, US 395 is being relocated over Conway Summit in Mono County.

#### North Coast Region

The second unit of the Redwood Parks Freeway on US 101 is now under construction in the vicinity of Myers Flat, Humboldt County, additional freeway is budgeted to the south. Work is nearing completion on the parallel bridge over the Eel River south of Scotia.

Construction is also in progress on the 3.9-mile Fortuna Bypass, and on a new freeway section south of Eureka. Earlier this year a freeway was completed on US 101 between Little River and Trinidad.

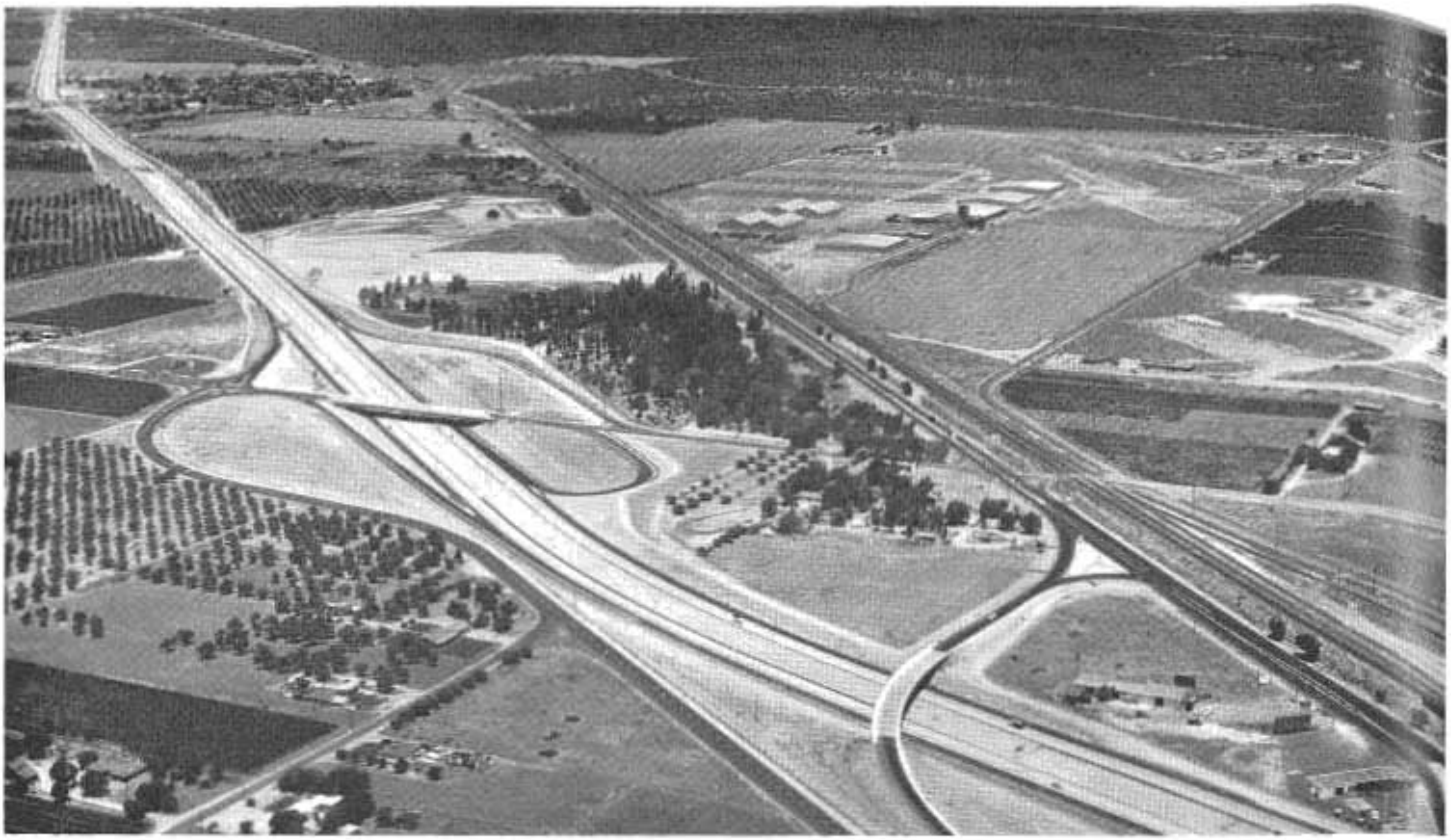
About 15 miles north of Willits, a 4.9-mile freeway project is under construction. Funds are budgeted for an initial unit of future US 101 freeway north of Ukiah.

On U.S. Highway 299 work is continuing on a major improvement in Trinity County, and on the relocation around the future Whiskeytown Dam Reservoir in Shasta County.

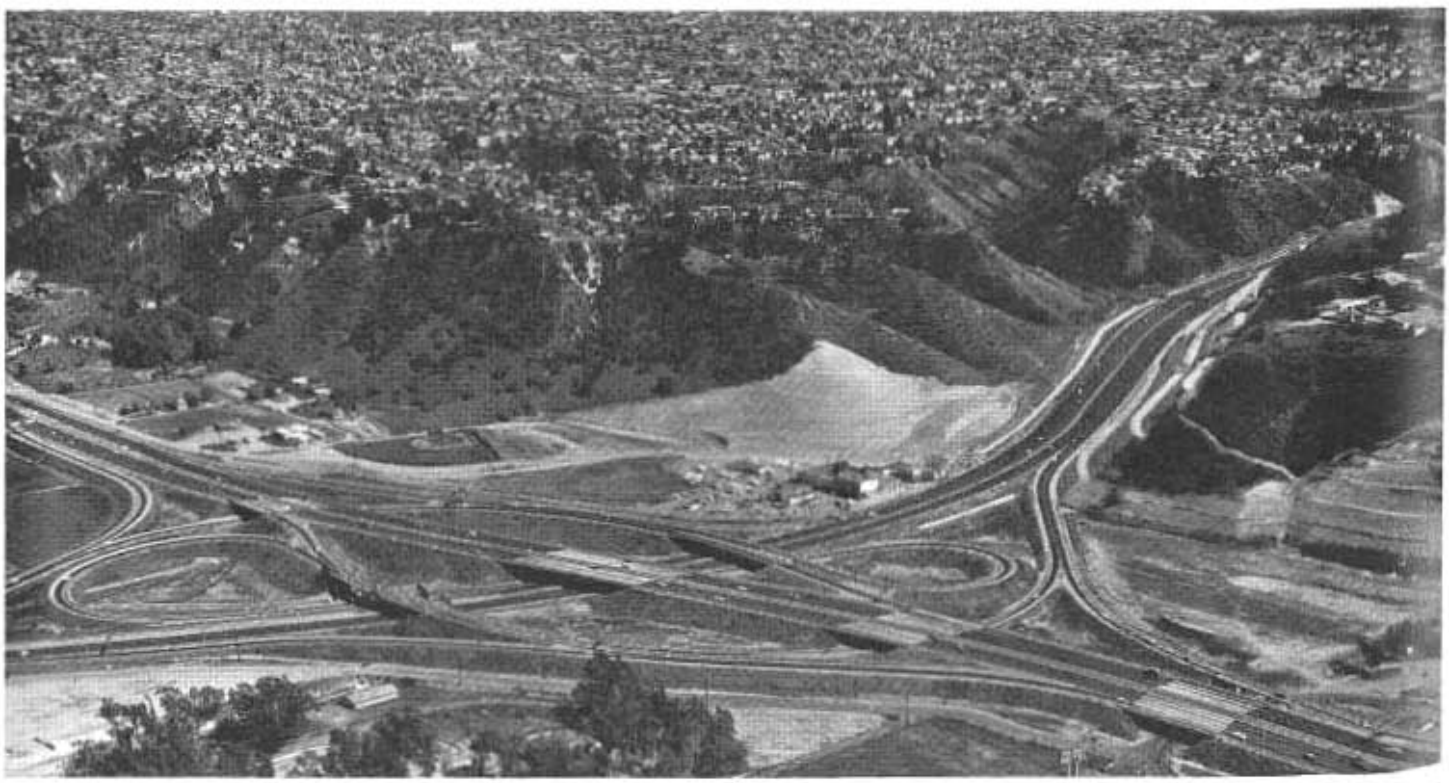
#### Summary

As is evident from the foregoing resume of projects emphasis continues on the interstate system, but with considerable improvement taking place on other state highway routes. It is not possible to detail here the large number of projects providing for realignment, relocation, widening, new bridges and other improvements on many of the cross-state laterals, mountain highways and other routes important to the State's continuing economic growth. There has also been a continuation of projects providing much needed traffic relief on an interim basis, pending future freeway development, such as one-way street couplets, widening of major local streets, and signalization and channelization projects, usually under a cooperative arrangement with the city or county concerned.

*This new bridge over the Sacramento River on State Sign Route 12 at Rio Vista was opened in April, 1960. River traffic passes under the lift-span between the towers (center).*



*The last section of three-lane highway on US 99 was eliminated in 1960 when this new four-lane freeway was opened north of Fresno. Note old highway parallel to railroad at right.*



*Revision of the Mission Valley Interchange at the junction of U.S. Highway 80 and U.S. Highway 395 in San Diego was completed late in 1959. The project involved freeway construction on both routes including the traffic separation structure (center) which carries US 80 over US 395.*

# OPERATIONS

In the California Division of Highways organization, the functions of construction, maintenance, equipment and materials and research are administered under the direction of the Assistant State Highway Engineer–Operations. This section of the report covers the activities in these fields during the 1959-60 fiscal year.

## CONSTRUCTION

The uncertainty about federal financing caused a sharp decrease in the number and value of going contracts during the first few months of the fiscal year. By the end of the year, however, the trend was back toward normal. The accompanying chart shows the total number and value of going contracts each month; the number of new contracts approved by the Attorney General each month; and the number of contracts completed, and accepted by the Director of Public Works. Minor contracts, day labor and bridge contracts are not included in this chart.

Although 29 projects costing more than $5,000,000 each were completed, contracts of less than $500,000 made up 85 percent of the total number completed during the year.

### *Special Projects*

Early in the year, the Construction Department initiated a program of coring pavement sections on highway projects to make sure that plans and specifications are being met.

The Construction Manual was being completely revised. Publication was scheduled for the fall of 1960. At the same time work continued on the Equipment Reference Manual, which now includes 24 reports on construction equipment.

The study of causes of embankment failures was completed and a training film strip prepared. This training aid was shown in the districts beginning in the spring of 1960.

### *Construction Practice*

Several projects included paving by slip-form method. This near-automatic process shows promise of providing superior pavement, although equipment and methods still must be perfected. Approximately 40 miles of pavement, 24 feet wide, have now been constructed by this method.

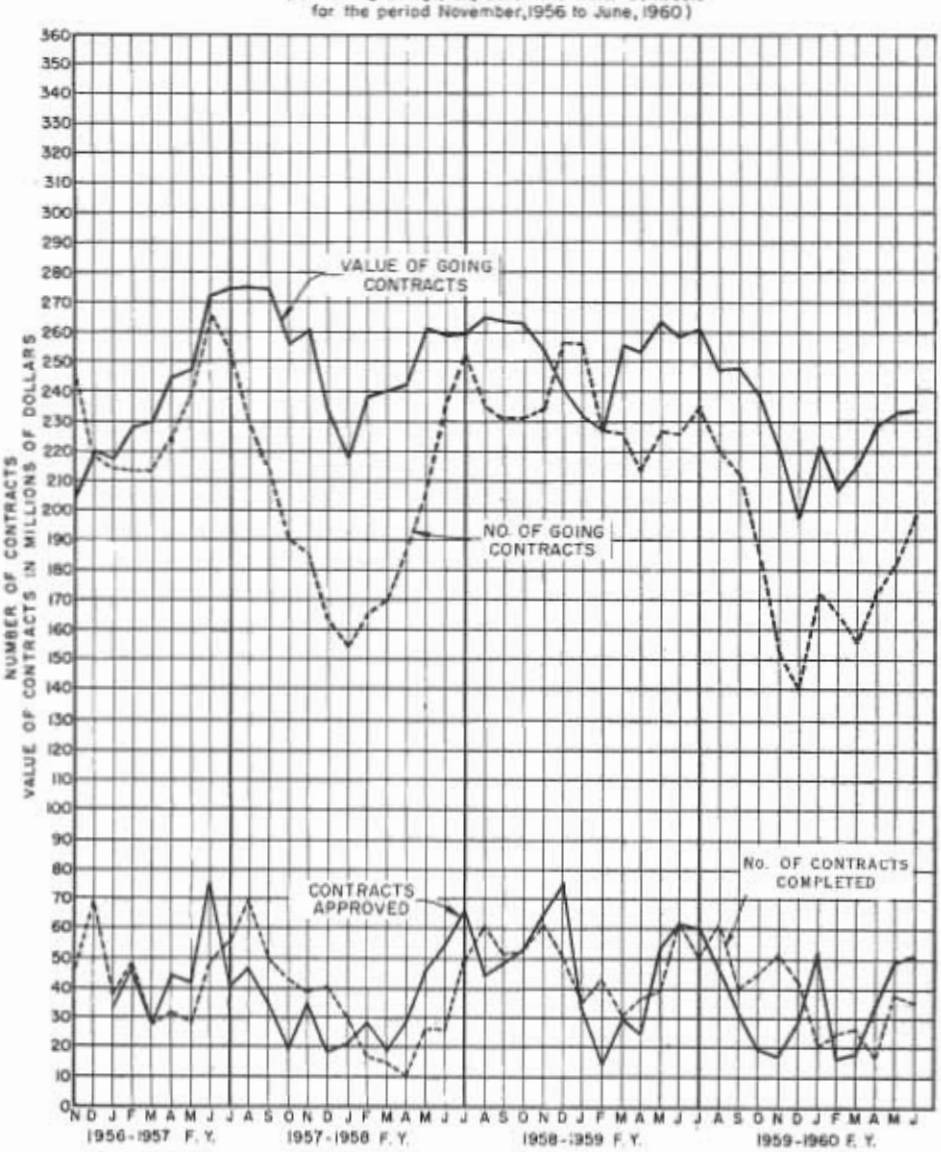
The 1960 Standard Specifications prescribe more exacting tolerances in the construction of the various layers of pavement structure. This in turn has prompted the equipment manufacturers to develop new or modify existing equipment to perform to these standards.

Equipment has been produced which automatically controls the cross-fall on asphalt concrete paving machines. Machines which spread base materials to a predetermined width and thickness have also been developed.

The automatic control on the paver is an adaptation of controls previously

TREND OF HIGHWAY CONTRACTS UNDER CONSTRUCTION

(Excluding Bridge, Day Labor and Minor Contracts for the period November, 1956 to June, 1960)



*Work is now under way or budgeted on a spectacular series of large scale freeway projects on the Golden State Freeway portion of the future east-loop bypass around the central district of Los Angeles. One of these big jobs is this two-mile project in the San Fernando Valley between Roscoe Boulevard and Lankershim Boulevard (foreground) near Sun Valley.*


*The slip-form method of paving (above), in which the usual form construction is not required, was used on several projects during the year. This new highway construction process is still in the developmental stage. About 40 miles of 24-foot pavement have been constructed by this method.*

developed for use on motor graders. The base-spreading machine promises to replace the customary process of windrowing, watering, and blading the material with a motor grader. All that is required with the new procedure is to follow up the spreading machine with rollers.

### *Conservation Camp Projects*

During the year, the Division of Highways and the Department of Corrections carried on joint operation of Conservation Camp No. 37 at Cedar Springs, Los Angeles County; Camp No. 41 near Happy Camp on the Klamath River in Siskiyou County; and Camp No. 42 near Lord Ellis Summit in Humboldt County.

In anticipation of the completion of work being done by Camp No. 37, preliminary studies were started on a site for proposed Camp No. 43 in the Kern River Canyon between Bakersfield and Isabella Reservoir.

Camp 37 forces were engaged in clearing, rough grading, installing culverts and constructing retaining walls on Route 62 between Islip Saddle, on the Angeles Crest Highway, and Crystal Lake. At the end of the year, rough grading had been completed on 5.6 miles of the 6½-mile section to be constructed.

Camp 41 construction work consisted of improving about nine miles of the Klamath River Highway, Sign Route 96, between Swillup Creek and Clear Creek, and about two miles between Wright Ranch and a half mile west of Happy Camp. The work included clearing, grading, placing of drainage facilities and masonry structures.

Camp 42 completed work on 3.8 miles of U.S. Highway 299 between Blue Lake and Berry Summit, and clearing way completed on an additional mile. Stabilization work and grading were in progress on this section.

At the end of the year, there were 71 inmates at the Cedar Springs Camp, 62 at the Clark Creek Camp, and 43 at the camp near Lord Ellis Summit.

# MAINTENANCE

The Division of Highways has maintenance crews at more than 270 locations throughout the State. Their job is to protect the public's investment in the State Highway System and to keep the roads open when possible during storms, floods and other emergencies.

The total expenditure of all state highway maintenance work, including upkeep and repair of the Benicia-Martinez Ferry System, for the year was $34,539,300

### New Routes Maintained

A total of 175.5 miles of former city streets and county roads was taken over for maintenance November 1, 1959. These routes were added to the State Highway System by the 1959 Legislature. The location, mileage and official route designation of these roads follow:

*Lake County:* from near Kelseyville to Lower Lake, 10.6 miles (Lak-243-A). *Humboldt County:* Martins Ferry to Johnsons, 17.4 miles (Hum-46-C). *Siskiyou County:* Hatfield to near Dorris, 19.4 miles (Sis-210-A). *Lassen and Modoc Counties:* Susanville to Adin, 68 miles (Las-20-Susv, C.Las,Mod-216-A,B,A). *Colusa and Glenn Counties:* Colusa to near Butte City, 17.7 miles (Col,Gle-88-Col,C,A), *Sutter County:* Tudor to near Nicolaus, 13.3 miles (Sut-245-A). *San Mateo County:* La Honda Junction to near San Gregorio, 15.2 miles (SM-107-A). *Monterey County:* Del Rey Oaks Connection, 2.1 miles (Mon-169-DRO). *Fresno County:* near Selma to Kings county line, 9.8 miles (Fre-135-A). *Amador County:* Ione cutoff, 2 miles (Ama-97-C).

### Road Closures

During the summer and fall of 1959, forest fires caused several highway closures. A big San Bernardino Mountain fire required the closing of Route 59 north of Lake Arrowhead for eight days. Fire in the Sierra Madre Mountains above Pasadena closed Sign Route 2 for nine days in October. Numerous short road closures resulted from cloudbursts in desert and mountain areas in July and August.

A heavy preseason storm swept over the north and central portions of the State on September 18, 1959. More than nine inches of rain was reported at Big Sur on the Mounterey coast. Snowfall at the higher elevations closed Sonora and Tioga Passes for 24-hour periods and the Lassen Loop portion of Sign Route 89 for three and one-half days. Minor delays and one-way traffic controls were necessary as the result of storm-induced slides on the Redwood Highway (US 101).

Severe dust storms late in October forced the closing of portions of Sign Routes 33 and 80 in the vicinity of Mendota and a section of US 395 north of Mojave.

### Major Slides and Storm Damage

After the intense September storm, precipitation during the subsequent fall period was very light until December. Extensive slide damage and flooding was not experienced again until February 7, 1960, when heavy rain in the northwest portion of the State caused the closure of the Redwood Highway north of Willits for 54 hours. Flooding along the Eel River prompted the Governor to declare that region a disaster area. The Trinity River lateral, the Klamath River Highway, and the Mendocino Coast Road were damaged during this storm period, and at some points two-way traffic was not restored until near the end of February. High water in the Russian River on February 8 forced the closing of Sign Route 12 at Guerneville for 36 hours. About eight miles north of Jenner on Sign Route 1, slipout and slide repairs required


*California's highways are kept in safe and serviceable condition by some 3,600 maintenance employees of the Division of Highways. Maintenance equipment is located at some 270 major road maintenance stations throughout the State, including this new North Hollywood station near the Ventura Freeway.*

the detouring of traffic during working hours.

A slide within the limits of an Interstate Highway Project on US 40 east of Baxter forced the closing of the westbound roadway on January 31, 1960, and necessitated detouring of westbound traffic via Sign Routes 20 and 49 to Auburn. Subsequent earth movement within the slide area undermined the eastbound roadway and required the construction of a temporary detour which served during the Winter Olympics in February.

### *Snow Removal*

Snowfall was comparatively light during the 1959-60 winter season. The snow pack at Donner Summit on US 40 was only nine inches at the end of December. The maximum pack for the entire season at Norden, near the summit, was only 77 inches. Total snowfall for the season in this area was 296 inches.

The 1959-60 closure periods for the mountain pass highways from which snow is not removed in the winter were as follows: Lassen National Park (Sign Route 89), December 12 to June 4; Luther Pass (Sign Route 89), February 2 to March 23; Carson Pass (Sign Route 88), December 23 to May 12; Ebbetts Pass (Sign Route 4), December 13 to May 12; Sonora Pass (Sign Route 108), December 12 to May 12; Tioga Pass (Sign Route 120), December 12 to May 21; Monitor Pass (Sign Route 89), January 15 to April 11.

The Emerald Bay section of Sign Route 89, which is usually closed by snow for several months each year, was kept open most of the winter. There were only three relatively short closure periods, January 11-18, February 8-17, and February 18-20, plus closures of short duration in March.

The Angeles Crest Highway (Sign Route 2) between La Crescenta and Wrightwood was closed by snow at the higher elevations between January 10 and March 26, 1960.

The usual snow removal operations and the application of sand and salt as an aid to winter travel were carried out as required in the relatively mild weather. This function was aided by additional and improved equipment and more sand storage facilities at maintenance stations or strategic roadside locations.

The VIII Winter Olympic Games were held at Squaw Valley adjacent to Sign Route 89 February 18-28, 1960.

Under an agreement with the Olympic Organizing Committee, maintenance crews handled the snow removal on the local road connecting Sign Route 89 with the Olympic Village. The normal complement of snow removal equipment, including rotary plows, push plows and leaders, was available for this special assignment. This operation was favored by mild weather for most of the Olympic Games period.

### *Repair of Traveled Way and Shoulders*

During the summer months, maintenance forces undertook a moderate program of road surface restoration including the reprocessing of asphaltic surfaces, application of leveling blankets, surface planing, seal coat application and restoration of base. Contracts financed from maintenance funds were let for screening seal coats, considered a replacement function. Approximately 60 miles of road surface were treated by the slurry seal coat process.

Maintenance Department personnel continued the review of road surface needs and prepared the annual resurfacing and seal coat program which totaled approximately $5,000,000. Construction funds were used to finance the resulting contracts.

Repair of spalled joints in Portland cement concrete pavements was undertaken using a mixture of epoxy resin and concrete aggregate. In a few instances depressions in the pavement were filled with the mixture. Areas so treated were opened to traffic in about three hours.

During the 1959-60 fiscal year, a total of $1,669,455 in maintenance funds was spent for repair work on roadways and shoulders including work in cities. This includes $1,472,820 (direct field cost or obligation) for restoration of 1,187 miles of traveled way and 1,041 miles of shoulders. Also included in the total is $196,635 for seal coat (screenings contract) on 144 miles of roadway. The restoration program includes penetration treatment, reprocessing, sand and slurry seal coat and base restoration.

During the year limited use was made of the mud jacking principle of pavement restoration. The work was confined for the most part to locations on bridge approaches, and $28,760 was expended for this type of repair.

### *Roadside Cleanup*

Cleaning of litter from roadways and roadsides by both hand methods and mechanical means was continued during the year with an increase in expenditure for this function. Appreciation of the problem and co-operation by the public in the attempt to keep the roadsides clean were evidenced by the use of some 600 50-gallon litter cans positioned throughout the State. About 1,000 signs were in place reading, "Unlawful to dispose of litter or garbage along highway—Maximum penalty $500 fine—and 6 Mos. Imprisonment."

### *Bridge Repair and Maintenance*

Recommendations for repairs and and painting of bridges on the State Highway System were prepared by the Bridge Department. The direct field cost of the repairs undertaken during the fiscal year and considered a maintenance fund obligation was $714,361, including $333,342 under contracts and $381,019 for work performed by state and city forces.

### *Benicia-Martinez Ferry*

Operation of the Benicia-Martinez Ferry was continued through the year with only minor interruptions in service due to mechanical failures. In November the ferry was drydocked for four days to permit annual repair and Coast Guard inspection. During that period foot passengers were carried in a rented boat, on a shortened schedule.

Ferry traffic showed a slight decrease from the previous year with 126,250 vehicles and 164,823 pedestrians transported during the 12-month period.

### *Maintenance of State Highways in Cities*

At the end of the fiscal year, maintenance funds were being expended

*This slide (foreground) threatened to block U.S. Highway 40 near Baxter at a time when heavy traffic was expected for the 1960 Winter Olympics at Squaw Valley. Four lanes had been in operation on a temporary basis with the partly completed freeway carrying eastbound traffic (left) and the old highway handling westbound vehicles. The slide was successfully cleared from the old highway and a detour was constructed around the danger area on the eastbound lanes. The freeway has now been completed on this section.*

on state highways in 333 incorporated cities. The direct field cost for maintenance of state highways in cities for the year was $7,534,366 including $5,951,914 for work by state forces and $1,582,452 for work by city forces.

### *Trees and Vegetation*

All types of natural and planted roadside vegetation within the state highway right-of-way were cared for according to standardized practices. Trees and landscaped areas were maintained by personnel trained for this specialized maintenance activity.

An expanded program of weed spraying and grass mowing served to improve the appearance and safety of roadside areas. Brush was controlled by mowing and selective spraying.

Fire hazard control work was continued on roadsides where extreme or unusual hazard to adjoining property existed. Soil sterilization, discing or blading were the methods employed to develop barren roadside strips to stop or impede the spread of fire.

Noxious weed control along state highways, as in the past, was accomplished largely by crews working under the direction of county agricultural commissioners. Several maintenance fund contracts, serving to re-

duce the overload of work on the permanent tree maintenance crews, were let to firms specializing in the trimming, balancing and removal of roadside trees.

Many mature plantings, which did not have to be watered in previous years, required three or four waterings during the summer of 1959 as the result of light rainfall the previous winter.

Classes of instruction in subjects related to the care of roadside areas and the supervision of the special crews employed for that work were conducted at a number of locations throughout the State by Headquarters Landscape Maintenance representatives.

### *Lighting and Traffic Signals*

As in previous years, the number of illumination units and traffic signals requiring maintenance increased during the fiscal year. Notable increases were in illuminated signs, where the number of fluorescent lamps increased by 1,570 or 27.5 percent for a new total of 7,288, and in all highway illumination type fixtures where the number of lamps increased by 4,370 or 18.4 percent for a new total of 28,029.

At the same time, the number of traffic actuated controllers in traffic signal circuits being maintained by state forces increased by 79 or 6.7 percent for a new total of 1,258, while fixed time controllers decreased by four or 0.6 percent for a new total of 645. This reflected to some extent a shift from fixed time controllers at intersections to the traffic-actuated type; however, the reduction was also partly due to the relinquishment to cities and counties of some fixed-time controller intersections.

Travel time and costs involved in servicing remote installations of lighting, signal or electrical devices have become an item of concern, and have prompted the establishment of additional crew headquarters and shops for this service. Electrical shops capable of complete maintenance of all types of electrical devices in service on highways in their respective areas have been established at Bakersfield and Salinas.

### *Highway Signs*

Expenditure of maintenance funds during the year for maintenance and replacement of existing signs amounted to $601,264.

The following sign work was performed by maintenance crews during the year:

| | |
|---|---|
| New installations (all funds) | 16,091 |
| Replacements | 9,456 |
| Signs washed and cleaned | 50,908 |
| Signs repaired | 39,666 |
| Signs straightened | 12,287 |
| Signs relocated or re-erected | 12,687 |
| Signs removed | 6,497 |
| Sign posts painted | 48,683 |
| Total | 196,275 |

During the year approximately 1,000 of the new type lightweight aluminum signs were erected. These signs consist of a single aluminum sheet or two aluminum sheets with a paper core that can be erected as vertical or horizontal panels depending on size. The light weight of these signs simplifies installation and repair, as lighter and less costly equipment is required.

Several state highway routes were named by the 1957 and 1959 Legislatures, and appropriate signs have now been installed. Signs carrying the various highway names were placed on these routes: Shoreline Highway (Sign Route 1) from north of Sausalito to Leggett, Mendocino County; Redwood Highway (US 101) from the Golden Gate Bridge to Oregon; Cabrillo Highway (Sign Route 1) from Las Cruces, Santa Barbara County, to San Francisco; El Camino Real (US 101) from Mexico to San Francisco; Pacific Coast Highway (US 101 Alt.) from north of San Clemente to north of Oxnard.

During past years, the Maintenance Department at the Sacramento headquarters has processed requisitions and issued purchase orders for the major portion of highway signs. As of May 1, 1960, the function of issuing purchase orders was transferred to the Service and Supply Department. The Maintenance Department continued to review requisitions for all signs until July 1, 1960, at which time the Traffic Department assumed this responsibility in connection with all new signs. The Maintenance Department continued to review requisitions for replacement signs.

### *Striping and Pavement Markings*

Experimentation with a new type traffic striping unit, developed by the Equipment Department, was continued. Thirteen large stripers of the conventional type were still used throughout the State, however, to place the major portion of the striping on approximately 11,150 miles of road. Traffic striping in the larger cities was performed by city forces. The direct field expenditure of maintenance funds for traffic striping and pavement markings, not including work performed by cities, was $1,181,378.

Use of white thermoplastic paint for crosswalks and pavement markings at heavy traffic locations was continued. Observations of earlier applications of this material indicate a probable service life of six to eight times the life of a painted stripe. Similar markings of traffic lacquer have required renewal three or four times a year. Use of thermoplastic product reduces traffic inconvenience and contributes materially to the safety of personnel due to the reduced exposure to traffic hazards at heavily congested intersections.

### *Communications—Radio and Teletype*

The division's statewide radio system was further improved and expanded during the year. New radio facilities were installed at Downieville and Sierraville to provide radio coverage of the Yuba Pass portion of Sign Route 49. A new radio station was also installed on Silver Spear Mountain, Inyo County, to improve radio coverage on US 395 between Bishop and Mojave and on Sign Route 190, in the Death Valley area.

Installation of additional microwave facilities at Marysville, Sacramento, and Banner Mountain, Yuba County, was completed. At the end of the fiscal year work was under way to extend this microwave system to Truckee to provide mobile radio coverage of the future routing of US 40 over Donner Summit. In addition, this link will provide instantaneous

radio contact between the district office at Marysville, and the maintenance stations at Nevada City, Sacramento, Whitmore, Kingvale, and Truckee without interference to the mobile radio system.

The changeover from two-frequency operation to four-frequency operation was complete, thus eliminating considerable interference between districts. Each of the 11 districts now operates on a radio frequency different from an adjoining district. The changeover of the entire radio system from wide-band to narrow-band operation in compliance with Federal Communications Commission regulations was also completed.

At the end of the fiscal year 178 radio stations, 25 microwave stations, and 1,025 mobile radio units were in service.

Operation of a private line teletypewriter system consisting of 18 stations and connecting the districts with offices at Headquarters in Sacramento was continued. During the winter months special teletypewriter receivers are connected to this system to disseminate road and weather information to newspapers, automobile clubs, radio and television stations, wire services, trucking concerns, and other interested parties.

### *Outdoor Advertising*

The administration of the Outdoor Advertising Act has been carried out on the same basis as in the past, being financed entirely from revenue received from licenses and permits.

The 1959 Legislature amended the Act to increase structure and sign permit fees to $2 and 50¢ respectively, effective January 1, 1960; and license fees to $65, effective July 1, 1960, to provide sufficient revenue to restore operations and enforcement to an adequate level.

The number of outdoor advertising operators licensed for 1959-60 was 843, as compared with 820 the previous fiscal year, and 853 in 1957-58.

Gross receipts from permits issued for 989 signs and 30,978 structures in 1959-60 was $85,942, reflecting the increase in permit fees. A total of $79,795 was paid for 539 sign permits and 39,615 structure permits in 1958-59.

### *Permits*

About 12 percent fewer transportation permits were issued in 1959-60, as compared with the previous year, as the result of new permit provisions established by the 1959 Legislature. The new regulations made it possible for transporters of oversize trailer coaches to obtain an annual permit instead of the single trip permits formerly required.

The Los Angeles and San Francisco Districts, in that order, continued to handle the largest volume of extra-legal hauling permits, accounting for some 44 percent of the statewide total. The San Bernardino District replaced the Fresno District in third position for volume.

Military certifications processed during the fiscal year averaged 28 cases per month with emphasis on the missile program and related construction activities.

The encroachment permit function also experienced a slight reduction of some 6 percent, with the two metropolitan districts handling about one-half of the total of all 11 districts.

The number of encroachment permits issued in 1959-60 was 13,415 as compared to 14,269 in 1958-59 and 13,956 in 1957-58. A total of 92,156 transportation permits was issued in 1959-60. For the two preceding fiscal years the totals were 104,353 and 87,009 respectively.

### *Truck Weighing Facilities*

A new truck weighing facility located on US 99 north of the Grapevine Canyon portion of the Ridge Route near the community of Wheeler Ridge was completed during the year. This installation replaced a scale yard maintained for many years near Fort Tejon and removed during recent relocation of the highway.

At the new location a large paved yard area suitably illuminated to permit night operation was also constructed. At designated locations within the yard, personnel of the California Highway Patrol will check the registration certificates and test the brake equipment of trucks. Space was also provided to permit cargo loaded improperly to be unloaded, shifted or transferred to other vehicles. A "return lane" to the platform scale was also delineated, to permit reweighing of trucks prior to release from the yard.

### *Maintenance Stations*

Improvement of existing maintenance station facilities and construction of new yards were continued during the year. The Division of Architecture completed plans and prepared to advertise for the construction of dormitory, warehouse and sand storage buildings at the Whitmore and Kingvale Maintenance Station yards on US 40. The first phase of construction, consisting of fueling

*Division of Highways maintenance crew repairing the pavement base on a section of the Bayshore Freeway in San Mateo County.*

*This new section of eight-lane freeway over the Grapevine Grade on US 99 in Kern County was opened June 28, 1960. The photograph shows a northerly view through the canyon toward the San Joaquin Valley.*

facilities and equipment garages, was started at these yards during the previous fiscal year. The Division of Architecture continued the preparation of plans for a new station at Santa Barbara and began planning new facilities at Lee Vining in Mono County.

Negotations were started for new sites in the mountain communities of Forest Glen, Kyburz, Long Barn, Coulterville, Groveland, Weldon, and Wrightwood. In the valley and coastal areas new sites were considered at Geyserville, Sebastopol, Point Reyes, Esparto, Dixon, Mendota, and Taft. Arrangements were made for a new site at Oceanside.

Plans were developed for new maintenance station facilities at Beecher's Corners, Mountain Pass and Midway Wells. These projects were ready for contract at the end of the fiscal year. Construction drawings were completed for a new station to be built during the following fiscal year in Lassen County near Adin, and for a large sand storage building at Grasshopper Flat on the Susanville-Adin highway and a combination sand storage and warehouse building at the Susanville yard.

New yard facilities were completed at Ramona and a superintendent's office was constructed at Escondido.

Contracts were awarded for new maintenance station facilities at Orleans, Hayfork, South San Francisco, Madera, Merced and North Hollywood. Cottage construction was undertaken at the Gibson, Pulga, Buckhorn, Crestview and Shoshone Maintenance Stations, and a contract was let to build a superintendent's office at the Burney Maintenance yard.

Construction was started on major buildings of the equipment garage or warehouse type at stations located at Napa, Walnut Creek, Fremont, Benton, Fillmore, Moorpark, Torrance, and El Centro.

Expenditures for maintenance stations and radio system structures for the fiscal year totaled $1,872,129 including $214,948 for land acquisition, $1,520,052 for improvements, (does not include funds spent by Division of Architecture), and $137,129 for repair and replacement.

## MATERIALS AND RESEARCH

The principal work of the Materials and Research Department is inspecting and testing materials used in highway construction. The department also carries on research projects for the improved use or testing of materials and conducts special investigations. Some materials testing and inspection is done for other governmental agencies.

Staff engineers represent the Division on 32 national road materials committees of various technical organizations such as the Highway Research Board, American Society for Testing Materials, American Concrete Institute, and the American Association of State Highway Officials. During the past year, 16 technical papers were prepared and presented at meetings of these organizations.

The work of the department is carried on by four operating sections and an administration and service section.

### *Administration and Services*

The Administration and Services Section handles such activities as photography, drafting, training, report review, accounting, shops and other general office functions. It also reviews all district reports pertaining to materials and studies research data developed by other agencies.

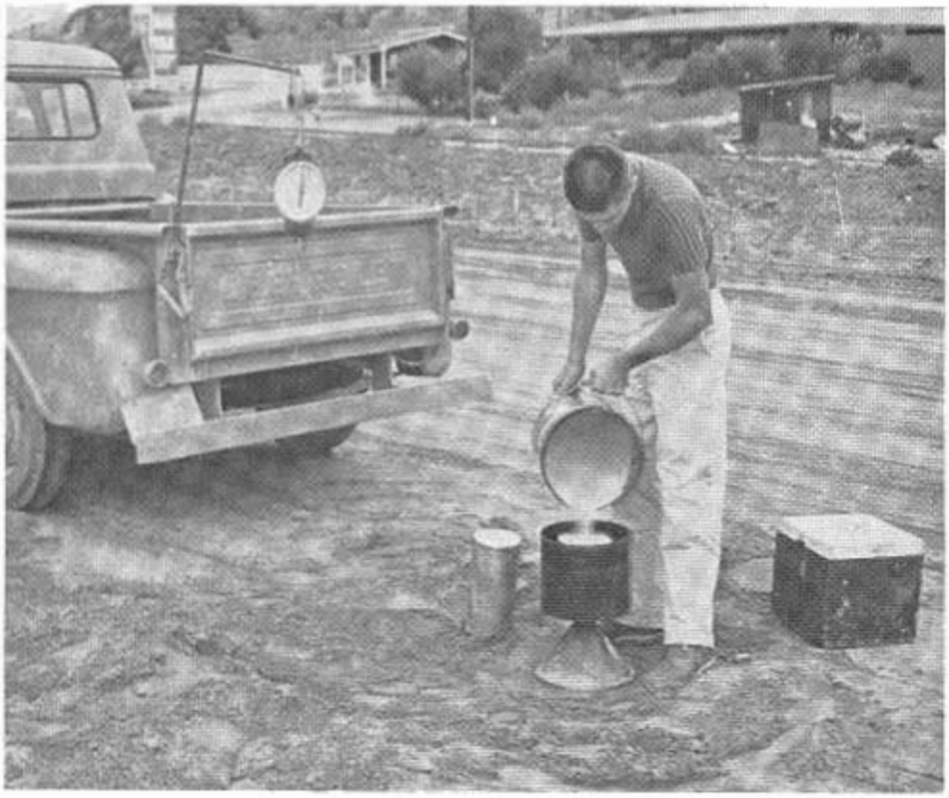
Three training sessions for senior engineers from the construction and design departments were conducted during the year. These one-week courses covered all phases of highway materials testing. The teaching staff comprised personnel from all laboratory sections.

Arrangements were made for tours or study courses for 60 foreign engineers representing 24 countries, as well as for division employees and visiting engineers from other governmental agencies and private engineering firms.

### *Foundation Section*

The building of multilane highways in mountainous terrain presents some of the most challenging problems in modern earth-work construction.

*Drilling operation in Orange County to obtain soil samples for testing purposes.*



*A sand volume test is used in checking compaction qualities on a highway construction project in Southern California.*

Long-radius curves must be carved out of steep hillsides and this puts heavy loads on barely stable slopes. In valley and bay areas, compressible saturated clays and peats in highway foundation areas challenge the ingenuity of the foundation engineer.

The tools of soil mechanics and geology are used to investigate and evaluate foundation conditions for highways. More than 11,000 lineal feet of drilled exploration borings were made during the year at 21 different locations. Geological and soils studies were conducted to gather information needed for cut slope design, foundation stability, landslide analysis, and location of material sites.

Where applicable, geophysical methods were employed to obtain useful subsurface information at low cost. The results of seismic surveys were used more extensively than in past years as a guide for judging the characteristics of excavation materials. During the year, 53 foundation investigation reports were submitted to the districts and the Division of Architecture. In addition, the department drilled more than 7,000 lineal feet of horizontal drains for stabilization of slopes, and cleaned and rehabilitated more than 20,000 lineal feet of existing drains.

Most foundation troubles are associated with water and hydrostatic head; hence, the removal of excess water from foundations and subgrades is one of the prime requisites of a stable highway. Vertical sand drains are installed as a means of stabilizing swampy foundations.

An experimental sand drain installation in a fill at the west approach of a proposed new bridge across the Napa River on Sign Route 48 west of Vallejo will provide needed data on soft foundation soils and the performance of vertical sand drains. Instrumentation for obtaining this data include piezometers, settlement devices, and reference monuments. "Slope Indicators" of the type used in the study of the Palisades landslides were also installed for the purpose of obtaining information on soft-soil deformation under stresses imposed by the weight of the fills.

A large number of settlement devices have been installed on construction projects to determine the required settlement period for embankments at structure approaches, and to provide information on the rate and magnitude of settlement in natural ground under embankments.

For a number of years the Foundation Section has been testing and evaluating various graduations of filter materials. These tests, and field observation of the performance of filter materials, have indicated the need for a cleaner filter material than has been specified in the past, and the 1960 Standard Specifications contain revised grading requirements which should result in a more permeable filter material. Studies of filter material are being continued in order to establish more reliable criteria for design.

Quality tests of all aggregates used in highway construction are performed by the Foundation Section. The new policy of the Bureau of Public Roads, requiring additional testing of materials used on federal-aid projects, has added to the workload of the laboratories. During the month the new policy had been in effect, before the end of the year, more than 500 soil and aggregate samples were received and tested for this single purpose.

An improved portable sand equivalent shaker, developed by the Idaho Department of Highways, was modified for use in the control of aggregate quality. Research is continuing to develop test procedures for evaluating the amount and effect of degradation of mineral aggregates used in highway construction. The section cooperated with the Corps of Engineers and the State Department of Water Resources in studying the effect of various soil samplers on sample disturbance.

New emphasis was placed on a procedure that permits considerable speed-up of compaction testing by allowing the use of wet soil weights instead of dry weights. Use of the "wet weight" method reduces the time needed for field control of compaction. A special program was started to determine the strength of compacted embankments.

### *Pavement Section*

The Pavement Section conducts routine testing and research work in

connection with asphalts, asphalt paving mixtures, base materials, subbases, and special field investigations.

Deflection measuring crews perform tests on many miles of highways for the purpose of determining the support capacity of the existing roadway and, hence, the most economical type of repair. A traveling deflectometer was placed in service during the year.

Field crews cut core samples from selected projects to measure the thickness of the various layers making up the pavement structure.

In conformance with Bureau of Public Roads requirements, an engineering audit of materials and construction was established to insure construction according to plans and specifications. This program, required for all projects which involve some federal financing, has been extended to include wholly state-financed projects. In the first month of operation, 236 lane miles of new construction were examined by coring and sampling.

Research work concerning the resiliency of soils continued. A considerable amount of field work was performed in connection with studies on permeability of asphalt pavements and on skid properties of pavements.

Approximately 6,500 routine tests were performed on base and pavement materials and some 309,000 tons of asphaltic products were checked for compliance with specifications.

### *Structural Materials Section*

The Structural Materials Section inspects, samples, and tests manufactured and fabricated materials for use on contract projects. Since this work is expanding rapidly with the increase in contract work, it has been necessary to establish formal procedures for such inspection work. This was done this past year by issuing Volume III of the Materials Manual.

During the year, inspectors checked and released huge quantities of fabricated and manufactured materials. This includes more than 28,000,000 pounds of structural steel, 99,000,000 pounds of reinforcing steel, 350,000 feet of concrete pipe, more than 1,000,000 feet of guard rail, and about 640,000 feet of corrugated metal pipe.

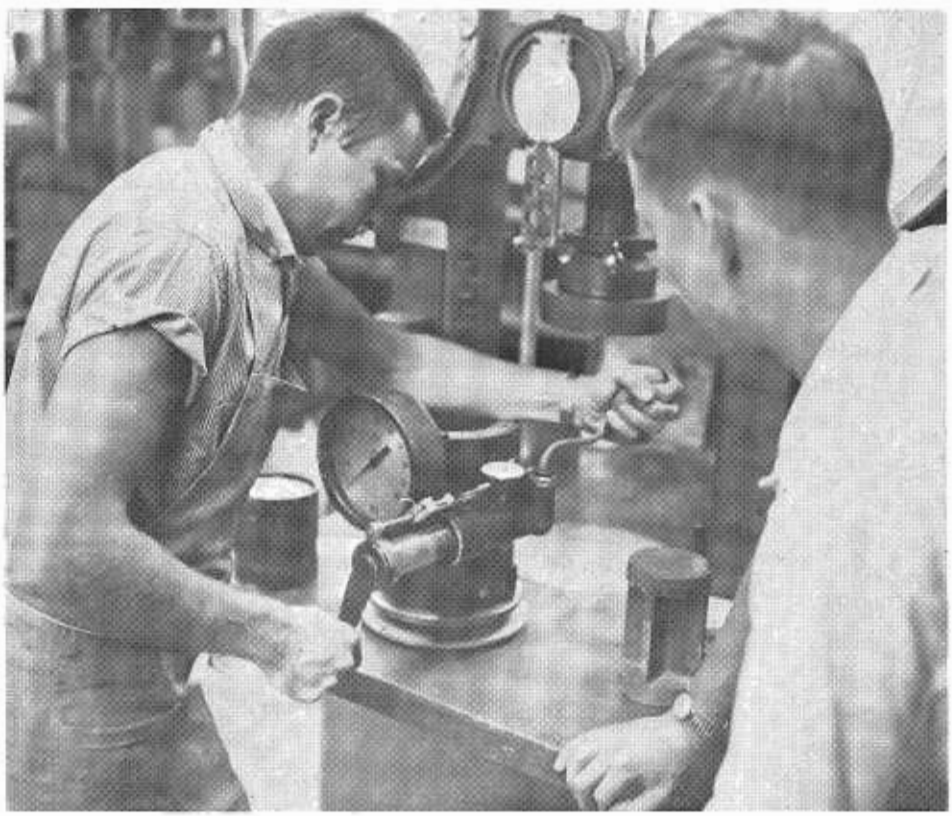
*On-the-job test to determine the unit weight of portland cement concrete.*

Approximately 1,250 tests were made on materials ranging from welded girders to light bulbs. Field investigations, special tests, and research were continued on various structural materials, signals and lighting, commodities, signs, and traffic safety devices.

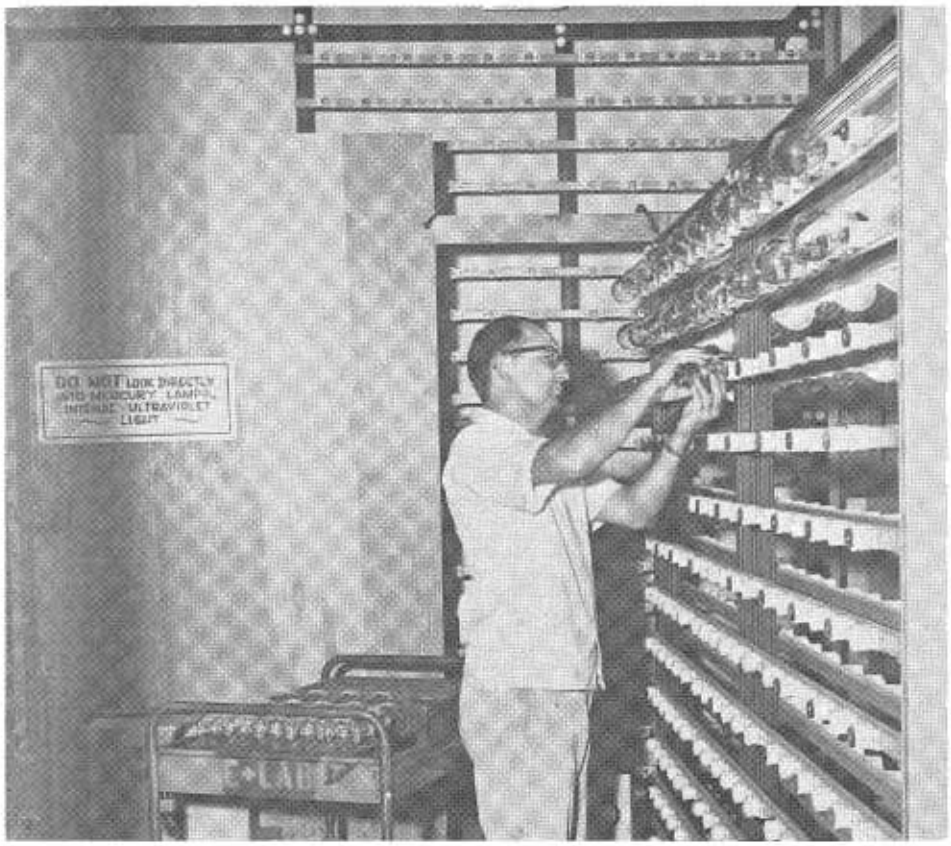
The mechanical and electrical development unit worked on special mechanical devices and instrumentation, particularly for the traveling deflectometer and the profilograph. Several acoustical investigations, were made including a followup investigation of the noise problem at the Hollywood Bowl for comparison with a similar study made in 1954.

The physical testing laboratory completed research aimed at minimizing the possibility of corrosion of post-tensioned steel during the curing process; continued tests to evaluate various types of bearing pads for prestressed girders; and began a testing program on the efficiency of high-tensile bolted connections for sign structures.

The welding laboratory completed development of the Fillet Weld Tee Bend Test, a new procedure for gauging the quality of automatic and semiautomatic fillet welds used in structural steel fabrication. A survey of welding on completed bridge structures was made to accumulate



*These testing laboratory technicians are using the stabilometer, a special device to determine stability of pavements.*



*All materials used in highway construction are subjected to rigid tests to make certain the state's high standards are being met. Even incandescent globes (above) used in signal lamps must undergo the scrutiny of department technicians.*

data for possible revisions and improvements in design and specifications, and a comprehensive manual of instructions for welding inspectors was nearly completed.

The corrosion laboratory, having found a correlation between the service life of metal culverts and environmental factors such as the pH and resistivity of the soil and water, worked out a detailed test procedure for predicting probable metal culvert service life. Used with judgment and due consideration for other factors (such as condition of existing culverts), this method appears to be a useful aid in the selection of culvert types or protective measures against corrosion.

The electrical laboratory evaluated several new types of lighting and signal equipment, and completed preliminary instrumentation for a project in which steel reinforcing bars, with strain gauge and lead wires attached, will be placed in the concrete of an undercrossing. Stresses in the bars will be determined by analyzing data from the instruments located in a trailer at the project. It is expected that this investigation will provide useful data for future use in bridge design.

The commodity test group recommended changes in the specifications and design of median barriers on the basis of laboratory tests and field observations. New test methods and specifications for various types of signs and sign materials were developed. Numerous routine and special tests were performed on commodities and on signs, reflectors and other traffic control and safety items.

### *Technical Section*

The Technical Section comprises units assigned to chemistry, portland cement and portland cement concrete. Each has performed an increased number of routine acceptance tests of construction materials.

The chemical laboratory has prepared specifications for green bridge paints of the color selected by the Bridge Department.

The chemical unit has formulated, furnished and applied epoxy based adhesives and binders in repair work.

Specifications have also been prepared for furnishing and installing plastic reflective pavement markers. These markers are being used in increasing number for lane delineation on pavements. They have the advantage of providing improved night visibility to vehicle operators as compared to the usual reflectorized painted strip.

The cement laboratory has co-operated with the National Bureau of Standards and committees of the American Society for Testing Materials in the improvement of methods of testing portland cement. It has continued work on the development of a simple on-the-job test to determine the quality of sands used in portland cement concrete.

Specifications for concrete pavements now provide for a variation in the percentage of portland cement in order to obtain more nearly constant strength. Cement requirements in paving concrete are determined for each aggregate source.

The concrete unit has conducted extensive investigations on the effect of admixtures on the volume change in concrete.

Both the chemical and concrete units have been evaluating the quality of cement-treated bases and concrete pavements as revealed by core samples taken after completion of construction.

### *District Laboratories*

Each of the 11 state highway districts has a district laboratory. These laboratories do most of the preliminary foundation exploration and locate potential sources of materials. On the bases of exploration and tests, a materials report is prepared which includes recommendations for cut-slopes and special foundation treatments, if required. Recommendations are also made concerning the thickness of layers of materials required for the structural design of the pavement.

Routine check tests are made on samples of materials furnished by contractors to see if they comply with specifications.

The Equipment Department's 12 main shops, with their subshops and resident mechanic's facilities, are the responsibility of the equipment engineer.

The shop organization controls the repair of all equipment, and the design and construction of specialized equipment.

The department headquarters has four branches, administration, operations, research and training, and accounting.

### *Shops*

The chief function of the shops is repair and maintenance. New and unusual equipment is designed and developed. Other equipment, not available on the open market, is constructed. Some equipment has to be specially adapted for highway use.

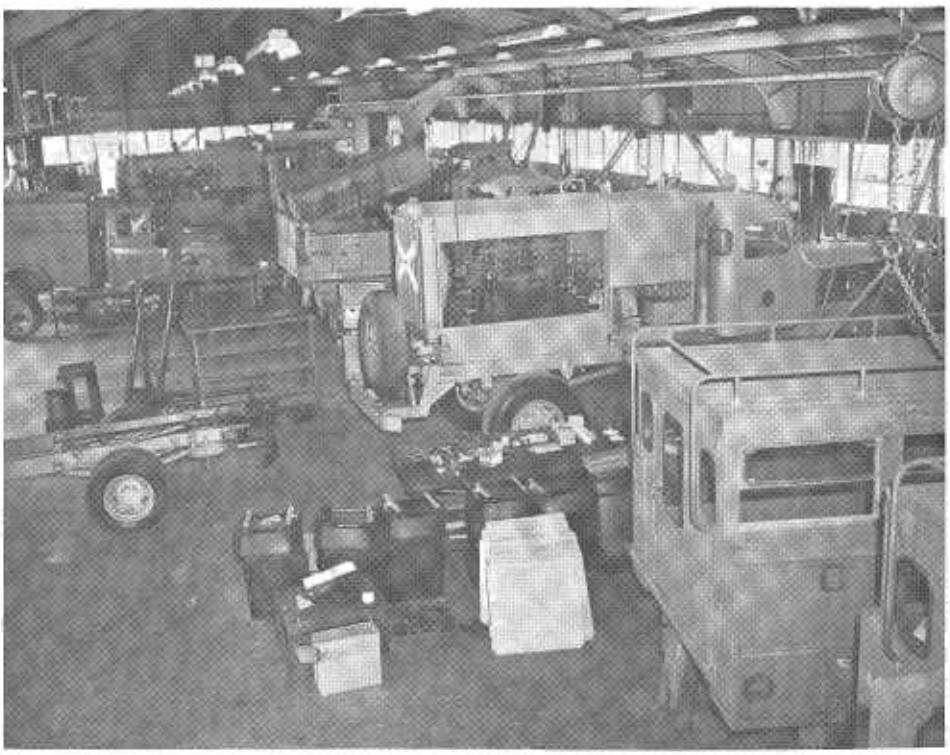
### *Equipment Repairs*

In the past year, equipment repairs cost about $3,600,000. These repairs included everything from brake relining to the complete overhaul of heavy motor graders and rotary snow plows. Heavy repairs are scheduled to avoid conflict with operating work schedules. Thus, most snow removal equipment is overhauled during the summer months, and grading machinery is worked over in the winter. Resident mechanics, assigned to outlying locations, frequently make field repairs, saving the expense of transporting equipment to the main shops.

Special crews repair such items as the machinery on movable bridges and on state-operated ferry boats, and ventilation equipment in tunnels.

### *Equipment Design and Construction*

A new traffic line marker was designed during the year. A pilot model was manufactured at the headquarters shop in Sacramento and is being tried in one of the districts. This new traffic line marker enables the operator to work in the cab of the truck, instead of in a sulky pushed by the truck. Upon completion of the tests, other similar machines will be constructed to replace the sulkies as they wear out.



*The operation and maintenance of the State Highway System requires a wide variety of heavy equipment including these vehicles which are being serviced and repaired at the Equipment Department truck repair shop in Sacramento.*

*Rotary snowplows go into action each winter to clear California's mountain pass highways. The Division of Highways operates three new-type heavy-duty rotaries mounted on motor graders (above) and 53 truck-mounted rotary plows.*

The department also remodels old equipment such as asphalt kettles, certain push-plows, and specialized truck bodies.

### *Surplus Equipment*

Much of the specialized equipment is developed from US Government surplus material obtained through the Bureau of Public Roads. For example, some of the trucks now used to water roadside planting formerly carried aviation gasoline for military aircraft. These tanks were obtained and rebuilt at a fraction of the market cost. Many shop tools have also been obtained in this way.

### *Administration*

The Administration Section handles all of construction, maintenance and repair of shop buildings, purchasing, safety programs, and equipment rentals.

Work has started on new buildings or expansion and modernization of older buildings at six equipment shops —in Sacramento, Redding, Los Angeles, San Jose, El Centro and Indio.

Each shop has a stores department which stocks necessary automotive and heavy equipment parts not readily available from dealers. Parts no longer needed are returned for credit to the various vendors. A statewide catalogue of all critical and excess stocks is maintained as an inventory control device. By means of this catalogue, Shop 11 in San Diego may be able to obtain a hard-to-get item from Shop 10 in Stockton.

### *Operations*

The Operations Section prepares specifications for equipment purchases, recommends the purchase and disposal of equipment, inspects pressure vessels, and maintains lubrication manuals.

During the year, specifications were prepared for the purchase of 145 different equipment units costing about $3,900,000. A total of 940 units was purchased, including 176 passenger cars, 386 truck, and 378 miscellaneous units.

Depreciated and worn out equipment is disposed of at auction or by negotiation with other government agencies. During the year 738 units, with an original capital cost of $2,-173,603, were disposed of for $328,-020, a favorable return of 15.1 percent.

Two staff members are qualified as pressure vessel inspectors licensed by the Division of Industrial Safety. In the past year, they examined and certified for use 1,247 Division operated air pressure vessels.

### *Research and Training*

The Research and Training Section investigates problems involving equipment operation and construction, and the use of fuels and lubricants. Presently under study are a decelerator for motor graders, and methods of reducing transmission problems on heavy equipment. A standardized air cleaner was adopted during the year, and the specifications for lubricants are constantly reviewed.

A 22-month training program on lubrication and preventive maintenance was completed during the year. A total of 2,575 state employees received instruction in 164 separate classes at 80 locations in the state. Maintenance Department employees took part in training sessions on the mechanical features of various equipment units.

### SUMMARY

The following is a summary of operation for the last two 12-month periods ending as indicated below:

| | *June 30, 1959* | *June 30, 1960* |
|---|---|---|
| Equipment repairs | $3,514,245.01 | $3,644,496.54 |
| Miscellaneous expense | 627,153.65 | 582,293.33 |
| Administration and other expense | 918,387.69 | 958,586.96 |
| Depreciation expense | 2,222,288.72 | 2,463,367.02 |
| Total expense | $7,282,075.07 | $7,648,743.85 |
| Total income | $6,841,724.95 | 7,410,123.22 |
| 1959-1960 excess of expense over income | | $238,620.63 |

Inventory: The original investment in equipment is as follows:

| | |
|---|---|
| **TRUCKS AND PASSENGER VEHICLES** | |
| All trucks, ½ ton to 10 ton | $11,214,098.00 |
| Buses, jeeps, and station wagons | 298,330.00 |
| Passenger automobiles | 2,950,540.00 |
| **MAINTENANCE AND CONSTRUCTION EQUIPMENT** | |
| Motor graders | $4,317,373.00 |
| Rotary snowplows (truck mounted) | 1,439,704.00 |
| Rotary snowplows (motor grader mounted) | 131,632.00 |
| Shovels, power | 505,032.00 |
| Loaders | 1,656,523.00 |
| Tractors | 885,613.00 |
| Snowplows, push | 583,397.00 |
| Compressors | 357,705.00 |
| Miscellaneous other equipment: rollers, mixers, trailers, pumps, drills, mowers, etc. | 3,647,837.45 |
| Total | $27,987,784.45 |

# ADMINISTRATION

The Assistant State Highway Engineer, Administration, exercises control over the following functions: Office Engineer; Federal Aid Secondary and County Co-operative Projects; City Co-operative Projects; Service and Supply; and Management Analysis.

## OFFICE ENGINEER

The Office Engineering function includes the review and co-ordination of plans and estimates prior to the award contract; preparation of special provisions, proposal forms and other contract documents; advertisement of projects and supplying plans and proposal forms to prospective bidders; processing contract documents after receipt of bids; continuous review, development and production of standard specifications in final form, in collaboration with other departments of the division; administrative control over project expenditures to insure compliance with the budget; the programing of federal funds and securing of reimbursement for construction and right-of-way expenditures on federal aid projects on the State Highway System; right-of-way engineering, including preparation of condemnation, relinquishment, and abandonment documents and director's deeds for action by the Highway Commission; and industry contacts.

Other functions under the Office Engineer's jurisdiction include reports and statistics, prequalification records; and general files.

### *Budget and Project Control*

Engineering control of the state highway budget entails assuring that provisions and amounts specified in the budget are observed; preparation and processing of contract documents; preparation of financial documents submitted to the Highway Commission; issuance of work orders for all construction; and keeping of contract records.

During the year, 308 financial votes were prepared for commission action, 504 projects were advertised for bids, and 515 projects were determined to be satisfactory for contract awards.

In addition to the major contract work, the financing of 329 minor and informal contracts, having a total value of $744,000, was cleared. A total of 2,706 individual work orders was processed by this section to provide for all activities of the Division of Highways, except those pertaining to maintenance and to city projects financed from the budget provisions for major city streets.

### *Plans and Estimates*

This unit is responsible for the review and co-ordination of plans and specifications prior to advertising projects for bids, and for the accuracy of progress and final contract pay estimates, preparation of various state highway maps, and various related engineering functions.

Plan and estimate review is kept ahead of advertising schedules and a backlog of reviewed projects is maintained so that all funds may be obligated as they become available.

The number of contracts under way varied between 202 and 309 during the fiscal year. Progress pay estimates approximately equal to the number of active contracts are reviewed and checked each month.

### *Specifications*

Specifications were prepared for 550 projects for which bids were received during the 1959-60 fiscal year. Additional specifications were also prepared for future projects to expedite advertisement when funds become available.

The new 1960 Standard Specifications which have been in use since January 1, 1960, are operating satisfactorily.

New Standard Special Provisions are being prepared as new materials and procedures are developed. The most recent major specification change, since the new Standard Specifications were published, is the development of the slip-form method of constructing concrete pavement. Other items of work for which Standard Special Provisions have been prepared include concrete cribbing, metal bin-type retaining walls, roadside signs, cast-in-place concrete pipe, aluminum chain link fence, cable-chain link barrier, blocked-out metal beam barrier, and reflective pavement markers.

### *Reports and Statistics*

Statistical records pertaining to the value of the 519 highway construction contracts awarded during the fiscal year were maintained by the Reports and Statistics Unit. From these records the California Highway Construction Cost Index was prepared quarterly and information furnished regarding construction cost behavior. Weekly and monthly reports were also prepared showing the value and progress of budgeted and other programs, and of other projects for which bids were received. Factors for seven construction items have been determined for use in forecasting future materials requirements.

### *Right-of-Way Engineering*

The Right-of-way Engineering Section works in close co-operation with the Right-of-way Department. It also works closely with the Division of Contracts and Rights-of-way (Legal Division) for advice in preparing complex condemnation resolutions, and in satisfying legal requirements in relinquishing superseded highways, frontage roads, and other local roads.

Right-of-way requirements for the year called for engineering review and preparation of 392 condemnation reslutions involving 2,248 parcels of property. This represents about 5 percent increase in the volume of work.

Of the 392 resolutions, 130 were of a complicated nature involving amendments to previous resolutions in order to provide for such factors as utility replacements and entry permits.

Property no longer required for state highway purposes is transferred

to other ownership, either by abandonments, relinquishment, or director's deeds. To accomplish these transfers of ownership it was necessary to prepare 28 abandonment votes and 123 relinquishment votes for California Highway Commission action. The total length of superseded highways, frontage roads, and other local roads relinquished or abandoned during the fiscal year was 293 miles.

A total of 741 director's deeds was certified for correctness of property descriptions preliminary to processing for Highway Commission action.

### Prequalification of Contractors

Prequalification is required of all contractors who desire to bid on state highway projects estimated to cost more than $15,000. The prequalification rating, representing the maximum bidding capacity for each of the several types of work which a bidder is capable of undertaking, is established from a review of each contractor's statement of experience and financial condition.

During the year, the total number of contractors prequalified to bid on the various types of state highway construction decreased from 1,045 on July 1, 1959, to 987 on July 1, 1960. The combined bidding capacity of these 987 prequalified contractors is $2,363,226,000, which is $248,000,000 more than it was a year ago. In determining this total bidding capacity, a maximum of $20,000,000 for individual ratings is used and ratings in excess of that amount are entered at the $20,000,000 figure, as the bidding capacity of the larger firms is not concentrated in this State.

The following tabulation gives the number of contractors prequalified by the Division of Highways on June 30, 1960, arranged by the several brackets of bid ratings.

| *Rating* | *No. of contractors* |
|---|---|
| $10,000,000 and over | 73 |
| 5,000,000 to $10,000,000 | 131 |
| 2,500,000 to 5,000,000 | 207 |
| 1,500,000 to 2,500,000 | 282 |
| 1,000,000 to 1,500,000 | 371 |
| 500,000 to 1,000,000 | 511 |
| 250,000 to 500,000 | 680 |
| 100,000 to 250,000 | 819 |
| 50,000 to 100,000 | 947 |
| 15,000 to 50,000 | 987 |

### Bids and Bidders

The average number of bidders per project was at a satisfactory level during the year. The highest monthly average of 10.0 was in January 1960. The low of 4.1 was in October 1959. The average for the year was 6.1 bidders.

The contracts awarded during the fiscal year have been arranged in eight value ranges as shown in the following table. Included in the table is the number of projects making up each bracket and the percentage it bears to the total. Similar information is shown regarding the value of the projects in each group. (The "over $5,000,000" category includes two bond-financed Benicia-Martinez Bridge contracts totaling $14,238,400.)

| *Range* | *Number of projects* | *Percent* | *Value of projects* | *Percent* |
|---|---|---|---|---|
| Under $50,000 | 244 | 47.0 | $4,728,015 | 1.8 |
| $50,000 to $100,000 | 65 | 12.5 | 4,579,310 | 1.7 |
| 100,000 to 250,000 | 86 | 16.6 | 13,582,746 | 5.0 |
| 250,000 to 500,000 | 51 | 9.8 | 18,118,004 | 6.7 |
| 500,000 to 1,000,000 | 26 | 5.0 | 18,541,270 | 6.9 |
| 1,000,000 to 2,500,000 | 17 | 3.3 | 26,429,433 | 9.8 |
| 2,500,000 to 5,000,000 | 15 | 2.9 | 58,996,132 | 21.9 |
| Over $5,000,000 | 15 | 2.9 | 124,330,726 | 46.2 |
| Totals | 519 | 100.0 | $269,305,636 | 100.0 |

### Construction Cost Index

The California Highway Construction Cost Index reflects the changes in highway construction costs. The index is founded upon weighted average contract prices for seven principal construction items in place, all referred to the base year of 1940 having a value of 100.

The California Highway Construction Cost Index for the four quarters of the fiscal year showed a variation in costs between a low of 219.8 and a high of 260.3. The year began with an index value of 260.3 in the third quarter of 1959, dropped to 229.1 in the fourth quarter, dropped again to 219.8 in the first quarter of 1960, and then climbed to 251.6 in the second quarter of 1960.

The item of roadway excavation showed the greatest fluctuation, from a low quarterly average of $0.44 to a high quarterly average of $0.71 per cubic yard, an increase of 61 percent. The high price of $0.71 was primarily the result of a bid price of $1.70 per cubic yard on one large US 40 project in a hardrock area of the Sierra-Nevada Mountains during the second quarter of 1960.

The accompanying graph shows a comparison between the California Index, the Bureau of Public Roads Composite Mile Index, and the Engineering News-Record Construction Cost Index. The small fluctuations of the past several years in the Composite Mile Index appear to indicate a continuance of a trend toward stabilization of prices. The Bureau Index, based on a greater number of projects on a nationwide basis, does not reflect the pronounced rises and falls to be found in an index where local conditions are a controlling factor, as in the California Index. The Engineering News-Record Construction Cost Index, which includes many large construction projects other than highway work, continues to show a steady rise throughout, except for the slight sags which occurred in 1948 and during the fourth quarter of 1959.

Continued improvement in construction methods and strong competition have contributed to the reduction in highway construction costs in recent quarters. Actual increases in wages, materials and cost of financing which occurred during the last year were reflected in an upturn of the California Index during the second quarter of 1960, the final quarter of the fiscal year.

**THE CALIFORNIA HIGHWAY CONSTRUCTION COST INDEX**

| *Year* | *Cost index* |
|---|---|
| 1940 | 100.0 |
| 1941 | 125.0 |
| 1942 | 157.5 |
| 1943 | 156.4 |
| 1944 | 177.8 |
| 1945 | 179.5 |
| 1946 | 179.7 |
| 1947 | 203.3 |

| Year | Cost index |
|---|---|
| 1948 | 216.6 |
| 1949 | 190.7 |
| 1950 | 181.2 |
| (1st quarter 1950, 160.0) | |
| 1951 | 225.0 |
| (4th quarter 1951, 245.4) | |
| 1952 | 225.9 |
| 1953 | 215.2 |
| 1954 | 193.5 |
| (2d quarter 1954, 189.0) | |
| 1955 (1st quarter) | 189.3 |
| 1955 (2d quarter) | 212.4 |
| 1955 (3d quarter) | 208.6 |
| 1955 (4th quarter) | 212.6 |
| 1956 (1st quarter) | 219.5 |
| 1956 (2d quarter) | 255.9 |
| 1956 (3d quarter) | 249.1 |
| 1956 (4th quarter) | 252.1 |
| 1957 (1st quarter) | 277.7 |
| 1957 (2d quarter) | 266.9 |
| 1957 (3d quarter) | 237.5 |
| 1957 (4th quarter) | 262.1 |
| 1958 (1st quarter) | 241.8 |
| 1958 (2d quarter) | 231.0 |
| 1958 (3d quarter) | 228.5 |
| 1958 (4th quarter) | 238.5 |
| 1959 (1st quarter) | 216.1 |
| 1959 (2d quarter) | 270.4 |
| 1959 (3d quarter) | 260.3 |
| 1959 (4th quarter) | 229.1 |
| 1960 (1st quarter) | 219.8 |
| 1960 (2d quarter) | 251.6 |

## Progress in Highway Development

In the 13 years following passage of the Collier-Burns Highway Act in 1947, contracts covering a total of 15,113 centerline miles of state highway construction have been placed under way. By fiscal years, this centerline mileage is as follows:

| | Miles |
|---|---|
| 1947-48 | 646 |
| 1948-49 | 657 |
| 1949-50 | 730 |
| 1950-51 | 530 |
| 1951-52 | 502 |
| 1952-53 | 580 |
| 1953-54 | 1,170 |
| 1954-55 | 1,970 |
| 1955-56 | 1,670 |
| 1956-57 | 2,317 |
| 1957-58 | 1,548 |
| 1958-59 | 1,512 |
| 1959-60 | 1,281 |

The above total figures cover work on the State Highway System only. In addition, during the 1959-60 fiscal year, the Department of Public Works awarded contracts for the construction of 233 miles of highways on the Federal-aid Secondary County Road System and work on state park roads.

Of the 15,113 miles of state highway improvements during the last 13 years, 2,201 miles were divided highways of four or more lanes including both freeway and expressway types. The divided highway construction undertaken in each of the 13 years is shown in the following tabulation.

| | Miles | | Miles |
|---|---|---|---|
| 1947-48 | 106 | 1954-55 | 267 |
| 1948-49 | 107 | 1955-56 | 187 |
| 1949-50 | 151 | 1956-57 | 341 |
| 1950-51 | 115 | 1957-58 | 158 |
| 1951-52 | 99 | 1958-59 | 244 |
| 1952-53 | 92 | 1959-60 | 145 |
| 1953-54 | 189 | | |

On June 30, 1960, including projects under construction, there were 1,042 miles of the full freeway type of highway on the state system; that is, divided highways with no cross traffic or left turns at grade.

Various highway and street mileages, with which the Division of Highways is directly or indirectly concerned, are shown in the accompanying table.

| | Miles | Miles |
|---|---|---|
| Total State Highway System (including portions of city streets and FAS System) | | 16,327 |
| Highways proposed for construction where roads do not exist | | 2,298 |
| Constructed state highways | | 14,029 |
| Federal-aid System | | |
| Primary rural (12-31-59) | 8,003 | |
| Primary urban (12-31-59) | 1,359 | |
| Total | | 9,362 |
| Federal-aid Interstate System (included in above) | | 2,175 |
| Federal-aid Secondary System (12-31-59) | | |
| On state highways | 3,414 | |
| On county roads | 7,800 | |
| Total | | 11,214 |
| County primary road system (12-31-59) | 23,526 | |
| Other county roads (12-31-59) | 44,802 | |
| Total county maintained system | | 68,328 |
| City streets (estimated 12-31-59) | | 28,614 |
| City streets on State Highway System | | 1,610 |

The following tabulations give the number of contracts with mileage by types which were put under way between July 1, 1959, and June 30, 1960, and the total mileage in the State Highway System on December 31, 1959, by type of surface both inside and outside of cities.

**CONTRACTS AWARDED BETWEEN JULY 1, 1959 AND JUNE 30, 1960**
**State Highway System**

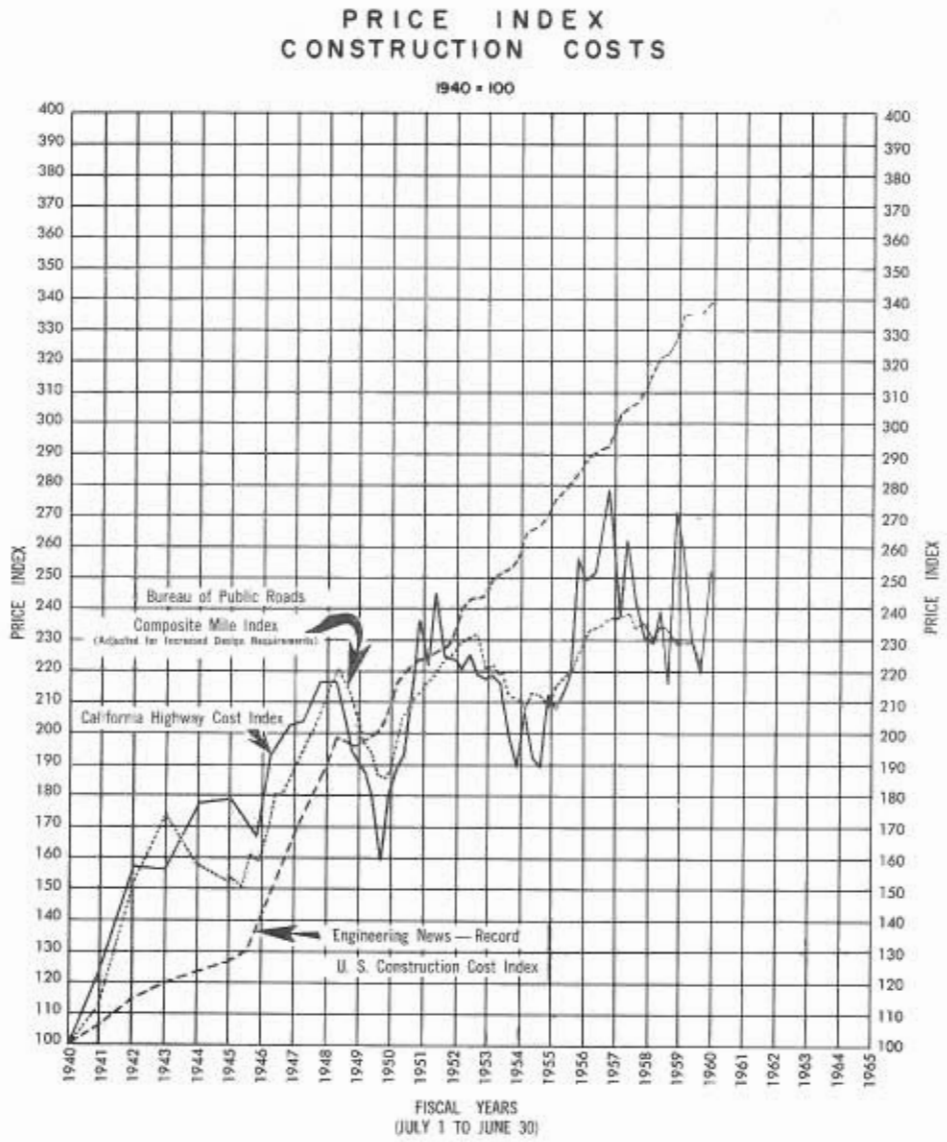
| No. of contracts | | Centerline miles |
|---|---|---|
| 35 | Portland cement concrete | 145.0 |
| 85 | Asphalt concrete | 764.7 |
| 49 | Asphaltic mixes (plant-mix and road-mix) | 131.9 |
| 17 | Seal coat | 239.2 |
| 52 | Traffic signals and lights | — |
| 43 | Bridges | — |
| 154 | Miscellaneous | — |
| 435 | Total | 1,280.8 |

**NOT ON STATE HIGHWAY SYSTEM**
**County Roads—Federal Aid Secondary**

| No. of contracts | | Centerline miles |
|---|---|---|
| 17 | Asphalt concrete | 67.9 |
| 33 | Asphaltic mixes (plant-mix and road-mix) | 113.4 |
| 4 | Seal coat | 20.0 |
| 7 | Grading | 29.9 |
| 10 | Bridges | — |
| 8 | Miscellaneous | — |
| 79 | Total | 231.2 |

**STATE PARKS, ETC.**

| No. of contracts | | Centerline miles |
|---|---|---|
| 1 | Asphaltic mixes (plant-mix and road-mix) | 0.3 |
| 2 | Miscellaneous | — |
| 1 | Grade | 2.0 |
| 1 | Bridge | — |
| 5 | Total | 2.3 |




### *Federal Aid*

A total of $227,708,867 in federal aid funds was apportioned to California for 1960-61 under the Federal-Aid Highway Act of 1958. This included $17,451,261 for primary highways, $9,224,241 for secondary routes, $19,946,525 for urban routes, and $181,086,840 for interstate highways. The federal matching ratio on primary, secondary and urban projects is 58 percent. On interstate projects the federal ratio is 91.6 percent.

At the start of the fiscal year, construction was in progress on 78 contracts with a total cost of approximately $279,907,000, financed with federal-aid primary, urban and interstate funds in the amount of $217,704,000.

Sixty construction contracts involving $22,837,000 of primary funds, $18,794,000 or urban funds and $90,328,000 of interstate funds were completed during 1959-60. These amounts, together with the required state matching funds, bring the combined total cost of such improvements completed during the year to approximately $168,790,000.

Sixty-three contracts were awarded with a total cost of $208,154,000, involving primary, urban and interstate federal aid funds totaling approximately $161,801,000. Forty-five of these contracts provide for improvements on the national system of interstate highways with a total cost of $138,429,000 of which the federal share amounts to $122,974,000.

Right-of-way project agreements with the Bureau of Public Roads increased the total of interstate federal aid funds obligated for participation in right-of-way acquisition costs by $39,045,000 to a total of $230,389,000.

### *Industry Contact*

The Industry Contact Section obtains prevailing wage contract data from contractor and labor organizations; collects information for the establishment of equipment rental rates; represents the division at hearings of the California Public Utilities Commission concerning dump truck rental and asphalt hauling rates; and processes minor contracts.

### *Prevailing Wages*

Prevailing wage and fringe benefit information was furnished for all highway contracts advertised for bid, right-of-way clearance contracts, minor contracts, and service contracts for equipment rental and other services.

All wage and fringe benefit determinations were filed with the Director of the Department of Industrial Relations once each quarter.

### *Force Account Equipment Rental Rates*

A large volume of information on construction equipment is being obtained from the industry. From analysis of these data, a more comprehensive schedule of the rental rates to be paid to contractors for equipment used on force account work will be established.

### *Minor Contracts*

Small projects for which the cost will not exceed $5,000 are handled by the districts. Revised instructions covering the procedure for handling these minor contracts were published during the year.

A total of 329 minor contracts with a value of nearly $600,000 was awarded during the year. The average amount per contract was approximately $1,800.

### *Right-of-Way Clearance Contracts*

As in past years, contracts were awarded for clearing rights-of-way in advance of construction, except where improvements were disposed of through sales.

For altering and moving buildings, relocating irrigation systems and fences, and drilling wells, 17 contracts involving a total cost of $445,000 were awarded.

Contracts for the demolition of buildings totaled 396 with a total cost of $700,000. On 15 of these jobs, the contractors paid the State $14,900 for salvage. Of the total of 413 right-of-way clearance contracts placed under way, 404 had been completed and nine were still active at the end of the year.

Ten informal bid contracts involving $144,000 were awarded during the fiscal year.

### *Service Contracts*

Nearly 4,300 service contracts were processed, involving a total expenditure of $6,000,000.

This type of contract (formerly called service agreement) is used for renting equipment and obtaining certain required services. Its use is confined to work not covered by the State Contract Act and not adaptable to minor contracts, right-of-way clearance contracts or other prescribed procedures.

The principal use of service contracts, involving expenditure of nearly $1,600,000, was for the rental of equipment for highway maintenance, for highway construction by honor camps, and for occasional day labor highway construction projects.

Other uses were for utility services, maintenance and repair of state-owned buildings and grounds, repair to rental properties, maintenance and repair of office machines and engineering equipment, rental of office machines, and rental of field quarters.

STATE OF CALIFORNIA, DIVISION OF HIGHWAYS, STATE HIGHWAY MILEAGE [1]
BY SURFACE TYPES
(By North and South Counties, Inside and Outside Cities)
December 31, 1959

| TYPE | NORTH | | | SOUTH | | | TOTALS | | |
|---|---|---|---|---|---|---|---|---|---|
| | Outside cities | Inside cities | Total | Outside cities | Inside cities | Total | Outside cities | Inside cities | Grand total |
| Portland cement concrete | 583.451 | 149.917 | 733.368 | 604.115 | 325.356 | 929.471 | 1,187.566 | 475.273 | 1,662.839 |
| Asphalt concrete | 150.267 | 140.782 | 291.049 | 135.914 | 178.515 | 314.429 | 286.181 | 319.297 | 605.478 |
| Bituminous macadam | 193.476 | 23.501 | 216.977 | 102.786 | 25.950 | 128.736 | 296.262 | 49.451 | 345.713 |
| Plant mix gravel | 3,055.410 | 282.616 | 3,338.026 | 2,175.157 | 358.409 | 2,533.566 | 5,230.567 | 641.025 | 5,871.592 |
| Road mix gravel | 829.599 | 12.938 | 842.537 | 1,541.303 | 26.632 | 1,567.935 | 2,370.902 | 39.570 | 2,410.472 |
| Oiled gravel | 1,201.366 | 25.029 | 1,226.395 | 152.019 | 2.416 | 154.435 | 1,353.385 | 27.445 | 1,380.830 |
| Gravel | 26.717 | | 26.717 | | | | 26.717 | | 26.717 |
| Oiled earth | 720.061 | 2.213 | 722.274 | 781.823 | 5.168 | 786.991 | 1,501.884 | 7.381 | 1,509.265 |
| Earth | 39.949 | | 39.949 | 23.162 | | 23.162 | 63.111 | | 63.111 |
| Bridges | 68.714 | 31.760 | 100.474 | 32.967 | 17.999 | 50.966 | 101.681 | 49.759 | 151.440 |
| Ferries [2] | 1.067 | 0.450 | 1.517 | | | | 1.067 | 0.450 | 1.517 |
| Unconstructed road | 1,206.482 | 117.303 | 1,323.785 | 759.586 | 214.295 | 973.881 | 1,966.068 | 331.598 | 2,297.666 |
| Totals | 8,076.559 | 786.509 | 8,863.068 | 6,308.832 | 1,154.740 | 7,463.572 | 14,385.391 | 1,941.249 | 16,326.640 |
| Totals—Constructed road | 6,870.077 | 669.206 | 7,539.283 | 5,549.246 | 940.445 | 6,489.691 | 12,419.323 | 1,609.651 | 14,028.974 |

[1] Centerline mileage which does not include nonadd mileage such as frontage roads, connections, etc.
[2] Water portion, only.

The Federal-aid Secondary Roads Unit processes all matters pertaining to the FAS program, acting in liaison between the U.S. Bureau of Public Roads and the counties. The section also administers County Road System records, joint highway district projects, local flood relief projects, and the new program for urban extension of FAS routes.

### *The FAS Program*

One-sixth of California's roads and streets are included in one of the Federal-aid Highway Systems. These are classified into three groups: Interstate, Primary and Secondary. The first two consist entirely of state highways. The third group includes both state highways and the most important local roads and streets.

### *Status of System*

During the year, more than 1,000 miles of roads were added to the Federal-aid Secondary System in California. This increase was divided almost equally between state highways and county roads. Most of the state highway mileage consisted of forest highway routes.

For the past several years, the counties have been urged to formulate long-range FAS construction programs and to expand their FAS systems accordingly. Most of last year's additions to the County FAS System are the result of this advance planning.

The FAS System mileage total at the end of the year was 11,854, including 8,012 miles of county roads and 3,842 miles of state highways. The totals at the end of the previous year were county roads, 7,512 miles, and state highways, 3,319 miles.

During the year, 63 county federal-aid secondary contracts were awarded at a total cost of $17,131,683. These funds were expended on 2,720 miles of road and 399 bridges.

Federal funds for secondary highways, authorized for the 1960-61 fiscal year, were apportioned to the State by the Secretary of Commerce on October 8, 1959. After a deduction of $537,332 for repayable advances made under the previous year's "D" program, California received $9,224,241, of which $8,388,160 was reapportioned to the counties. The State retains 12½ percent of the total allocation for work on FAS state highways and for planning purposes.

California statutes also provide for allocation of up to $100,000 a year to each county for use in matching federal funds. A total of $4,254,200 in state highway funds was made available for this purpose. This enabled most of the counties to match their federal allocation entirely with state funds, on the basis of about 42 percent matching money to 58 percent FAS funds.

### *The Urban Extension Program*

During the year, a new local highway aid program was started. The enabling act, Section 143.3 of the Streets and Highways Code, permits the State Highway Commission to allocate state highway funds to assist local agencies in financing work on FAS routes in urban areas.

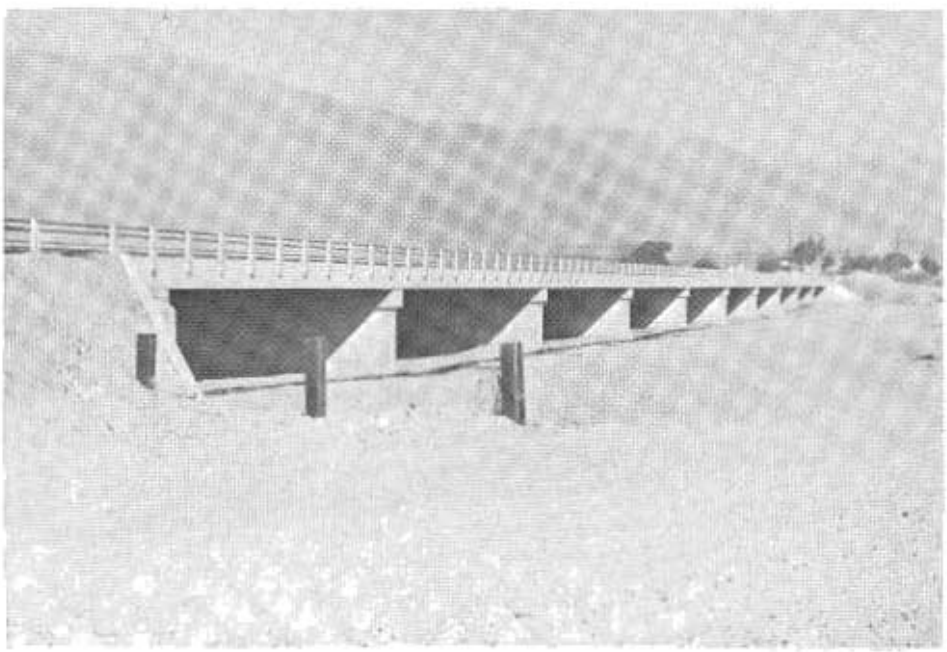
Prior to enactment of this legislation, such streets and roads were somewhat orphaned financially. Federal law confined secondary funds expenditure to rural areas, but compelled extension of the secondary system into urban areas to achieve integration of the federal-aid network. On the other hand, federal-aid urban funds were retained under state law in the State Highway Fund, and hence are not available to the local agencies.

Projects to be financed under the urban extension program are proposed by the cities and counties with requests for fund allocations by the Highway Commission.

The commission will allocate funds for eligible projects, after local proposals have been reviewed and approved by the Division of Highways. The local agency is required to match allocations on a dollar-for-dollar basis. Appropriate design standards must be met, and no more than $500,000 will be allocated for projects in a city or county in any one fiscal year.

Actual construction may be handled by either the State or local agency, according to an agreement.

During the year, a total of $790,250 was allocated for urban extension projects in Alameda, Contra Costa and Los Angeles Counties and in the Cities of Long Beach, Pomona and West Covina.



*This new Sisquoc River Bridge near Garey in Santa Barbara County replaced an older county structure which was damaged by flood waters. The new bridge was constructed out of county and state flood relief funds.*

### Storms of 1960

California's new "stand-by" flood relief law was used to aid local governments in 1960, the first year after its adoption. This Emergency Flood Relief Law was added to the State Government Code (Sections 54150 to 54164) by Chapter 1511, Statutes of 1959.

Patterned after the Flood Relief Law of 1956, the 1959 law establishes procedures to be followed in handling flood relief appropriations. In the past, separate laws have been required to deal with each flood, and this often resulted in an excessive time lag.

When the 1960 floods occurred in northwestern California, however, all that was required was the appropriation of relief funds by the Legislature (Section 12B, 1960 Budget Act).

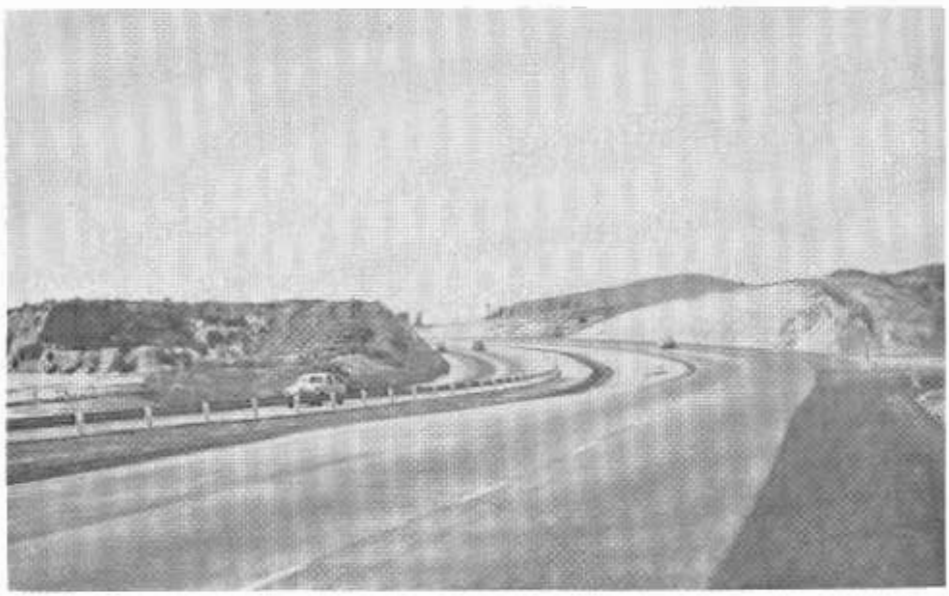
Four counties filed applications for state assistance involving 109 separate locations of damage. Estimated cost of the projects eligible for state allocations was $1,953,150, requiring $1,362,667 in state funds and $590,483 to be paid by the local agency.

### Flood Repairs

While the 1960 flood relief program was still in the preliminary stages, repair work continued on the widespread damage caused by the heavy storms during the spring of 1958. Although practically every part of the State was affected in 1958, individual items of damage were not so large as in the 1955-56 floods, which destroyed many vulnerable bridges. None of the replacement structures was damaged by the 1958 floods.

The Budget Act of 1958 provided $15,000,000 in state funds to help pay the cost of local repairs to public facilities. Federal funds for emergency repair were also made available as the result of the general disaster.

A total of 112 applications for aid were received. At the end of the year, 97 agreements with local agencies were in effect, and 39 cities and 28 counties were receiving assistance for nearly $12,500,000 in damage repairs at 1,500 locations. This involved expenditure of $6,865,210 in state funds, $1,545,275 in federal emergency relief funds, $42,759 in federal civil defense funds, and $3,445,426 in local funds for repair and $567,274 in local funds for betterment.



*This four-lane expressway on Van Buren Boulevard, a Riverside County Road near Perris, was completed in 1960 under the Federal Aid Secondary County Road Program.*

Construction methods used in the 1958 flood program are similar to those developed for the 1956 work. Emergency repairs have been made by local agency forces or under emergency contracts let by local authorities. The remainder of the work has been completed or is being performed under full local control. However, restoration of federal-aid secondary roads is done under Department of Public Works contracts engineered substantially by local personnel.

### Floods of 1955-1956

Most of the repairs authorized under the Flood Relief Law of 1956 have been completed. The remaining unfinished work consists of nine bridges in Humboldt County, which sustained the greatest damage, and two pedestrian bridges in the City of Santa Cruz. As of June 30, 1960, five of these bridges were under construction, plans were approved for two others and plans were being prepared for the remaining four. Considering the remoteness of much of the work, and the demands on local finances and personnel, the overall achievement by the cities and counties involved is commendable.

The combined program for repair and restoration after the 1955-56 storms and floods amounted to more than $21,000,000, distributed as follows: state funds, $13,928,873; federal emergency relief funds, $3,041,116; federal civil defense funds, $1,329,627; local funds for repairs, $1,368,975; local funds for betterment, $1,379,608.

### County Maintained Roads

Annual certification of county maintained road mileage issued to the State Controller in accordance with Section 2121 of the Streets and Highways Code showed an increase of 344.88 miles to a new total of 69,422 miles. County Primary Road System changes, approved by the department in accordance with Section 2004 of the Streets and Highways Code, resulted in a net increase of 21.69 miles, bringing the total to 23,454 miles.

Although the net increases are nominal, there was considerable fluctuation of mileage due to annexations by cities on the one hand and acceptance by the counties of new subdivision streets on the other.

### Joint Highway Districts

The single Joint Highway District still active during the fiscal year was JHD No. 9, covering the Cabrillo Highway, State Sign Route 1, between Santa Cruz and San Francisco. All the construction contemplated by the member counties, Santa Cruz, San Mateo and San Francisco, has been completed and a final report is being prepared.

# CITY AND CO-OPERATIVE PROJECTS

The primary function of the City and Co-operative Projects Engineer is the administration of the gasoline tax funds allocated for use on city streets not on the State Highway System.

### *Allocation of Funds*

Sections 194 and 2107 of the Streets and Highways Code require that five-eighths cent per gallon of the State's 6 cents per gallon gasoline tax is to be spent for city street purposes. These funds are apportioned on the basis of the population of each city.

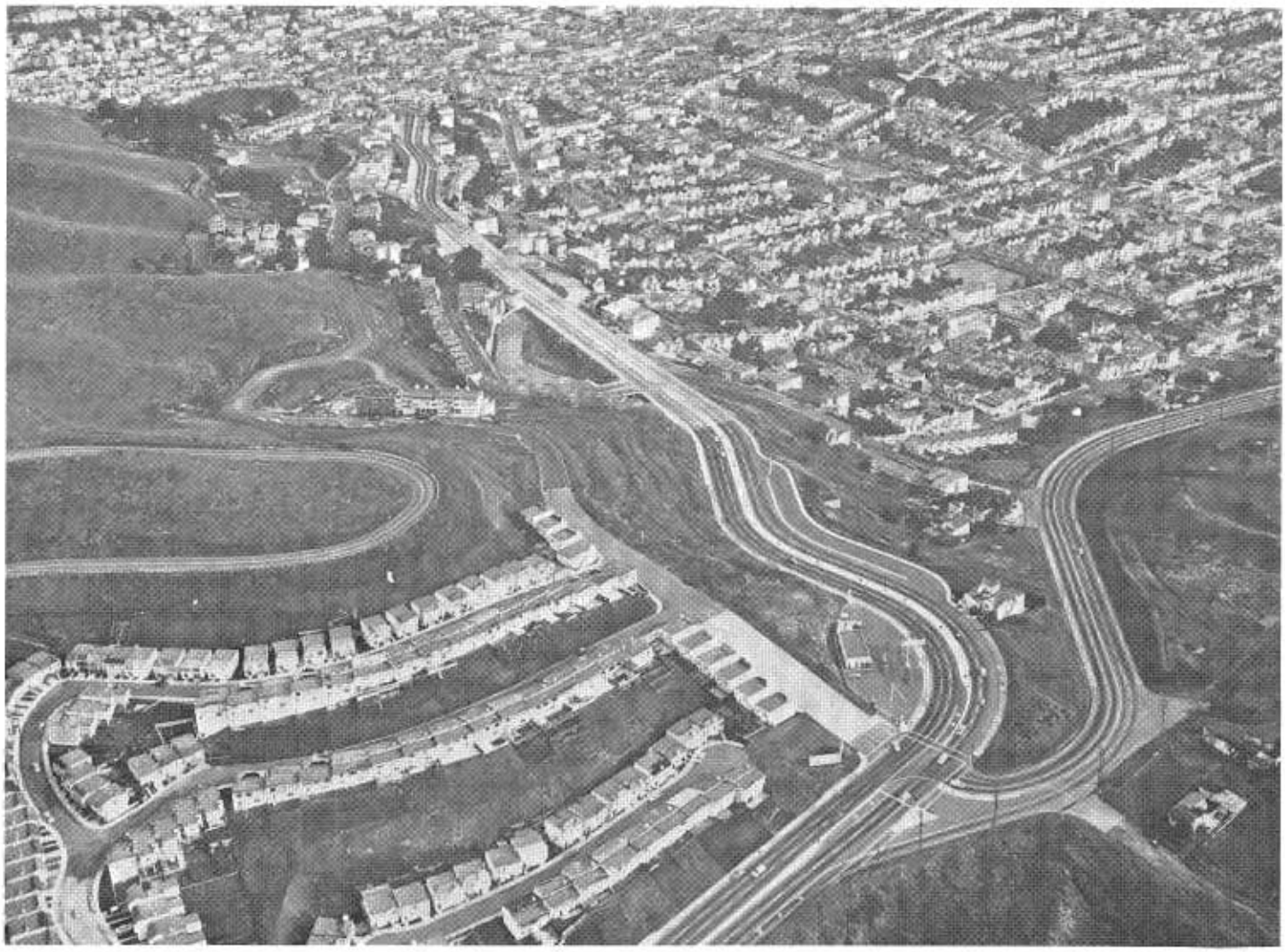
As provided in Section 2107.5 an additional annual apportionment is made to each city for engineering and administrative expenses in respect to city streets. The law sets up a formula for the allocation of these funds on the basis of population varying from $1,000 annually for a city with a population of less than 5,000 to $20,000 annually for a city with a population greater than 500,000. A total of $1,165,000 was apportioned for engineering during the year.

This unit is responsible for the apportionment and payment of these two funds; for the preparation and execution of agreements providing for expenditure of these funds; for the review and approval of major city street systems; for the review and approval of plans and specifications for projects, and the granting of authority to advertise for bids and awards contracts or proceed with the work by day labor.

A total of $32,080,631.81 was apportioned from the ⅜-cent gas tax allocation for expenditure on city streets during the year. In addition, there was on hand an unexpended and unbudgeted amount of $9,021,612.48 and savings on completed projects of $8,001,033.59, making a total of $49,103,277.88 available for budgeting during the year.

### *Budgeted Funds*

The amount budgeted for expenditure during the year from the ⅜-cent funds amounted to $37,877,854.73 leaving an unallocated, unexpended amount of $11,225,423.15 to be carried over and become available for budgeting in the fiscal year beginning July 1, 1960.



*The ⅜-cent gas tax funds were used to finance a large scale improvement on Market Street (above) in southwest San Francisco. The major city street project involved realignment, widening and construction of bridges.*

The amount budgeted for surveys and plans, right-of-way, and construction was $28,472,231.55, and for maintenance $9,405,623.18.

The total amount of gasoline tax provided for maintenance operation was less than the 40 percent of the annual allocation allowed by the law. A number of cities chose not to use gas tax funds for maintenance purposes, but rather to use all available gasoline tax funds for construction.

The funds budgeted for city street engineering and administration amounted to $1,418,088.08 for the year.

The 877 agreements, which were prepared and executed with incorporated cities, set forth all gas tax projects; the type of work to be performed, and the amounts authorized for each project. During the year, 453 sets of plans were reviewed and approved for construction.

### Population Data

Since all funds apportioned to cities are based on population, it is important to keep city population figures up to date. The law provides that the population of inhabited territory annexed to city, or that of a newly incorporated city, shall be determined by multiplying by three the number of registered electors on the effective date of annexation or incorporation. Population of uninhabited areas is determined two years after the date of annexation, by the same formula.

Cities which have a large increase in population may apply to the U.S. Bureau of the Census for a special count. Special census figures must be used in all subsequent allocations of gasoline tax funds.

Under the law which became effective on July 1, 1959, cities may request the State Department of Finance to make an estimate of increased population. If this increase is 5 percent or more, subsequent allocations will be based on the estimate. Ninety-eight estimates on this basis increased the city population figures by 357,004.

*Truxtun Avenue in Bakersfield was completed as a six-lane major city street in May, 1960, at a cost of $156,000 in ½-cent gas tax funds.*

Eleven new cities were incorporated during the fiscal year as follows:

| *Date* | *City* | *County* | *Estimated population* |
|---|---|---|---|
| July 15, 1959 | Del Mar | San Diego | 4,182 |
| July 15, 1959 | Half Moon Bay | San Mateo | 2,262 |
| Aug. 4, 1959 | Rosemead | Los Angeles | 19,602 |
| Dec. 21, 1959 | Grover City | San Luis Obispo | 5,871 |
| Dec. 28, 1959 | Lawndale | Los Angeles | 16,608 |
| Jan. 20, 1960 | Novato | Marin | 14,505 |
| Jan. 28, 1960 | Commerce | Los Angeles | 8,563 |
| Mar. 1, 1960 | Los Alamitos | Orange | 3,000 |
| Mar. 23, 1960 | Mirada Hills | Los Angeles | 24,975 |
| May 25, 1960 | Temple City | Los Angeles | 37,758 |
| May 31, 1960 | Sand City | Monterey | 360 |
| Total | | | 137,688 |

There were 1,128 annexations during the year, accounting for a population gain of 31,884.

Total population of the 366 incorporated cities at the end of the year was 11,214,747, or 71 percent of the estimated 15,830,000 total state population. This was an increase in urban population during the year of 555,503 or 5.2 percent.

These reported population changes are not fully representative of actual population changes. The Streets and Highways Code limited censuses for each city to two per decade after January 1, 1960, and stipulated that no estimates could be made between April 1, 1960, and the release of the 1960 federal census figures.

### Major Street System

According to law, each city must establish a system of major city streets, subject to approval of the Division of Highways. The review and approval of these major city street systems, or changes therein, are made with great care to insure that gasoline tax funds will be spent to provide the greatest possible traffic benefits.

Master plans being developed by many cities and counties provide a definite basis for selection of the major city streets, and also provide a basis for continuity of design.

### Co-operative Relationships

Liaison with cities is maintained through the 11 highway districts. Discussions are continually held with city officials. Manuals of instruction issued by the Division of Highways are distributed to city officials to keep them advised of the latest developments and methods on highway design, construction and maintenance.

### Procurement

During 1959-1960, the Division of Highways purchased through its Service and Supply Department and the Purchasing Division of the Department of Finance $13,638,379.10 of commodities ranging from ordinary office supplies, printing, and specialized engineering equipment, to a wide range of maintenance and construction materials.

These purchases were made by means of 12,080 requisitions through the Purchasing Division at an average rate of 48 requisitions forwarded daily. Purchases for warehouse stock are included in the above figures. In addition, as in the previous year, a considerable number of surplus U.S. government items were obtained through the U.S. Bureau of Public Roads, ranging from canvas to photographic equipment.

The purchases do not include automotive equipment, which is handled by the Equipment Department.

### Warehousing and Distributing

The Service and Supply Warehouses in Sacramento and Los Angeles filled 29,083 requisitions for a total of 95,404 items with a total value of $4,108,762.50. The value of warehouse stock on hand at the end of the year was $2,102,661.22. The average inventory for the fiscal year was $2,160,240.81, showing a stock turnover of 190 percent. A total of 95,404 items were shipped in 12,122 shipments as follows: freight, 5,417; P.P.S., 1,562; parcel post, 552; warehouse truck, 4,589; express, 2.

The catalogue of commodities available from the warehouses lists 4,863 items and is kept current for use of 440 offices which order equipment and supplies. In addition, 1,509 selected sections of the catalogue are distributed to engineers and technicians who do not need the complete catalogue.

### Loans of Steel to Contractors

The steel strike in the winter of 1959 caused many contractors to request that steel be earmarked for them for jobs which would be ready to roll during the early months of 1960; but by the time most of the contracts were activated, the steel market had improved, making it unnecessary to secure the steel from the loan account.

Ninety-eight tons of I-beams previously loaned for temporary detour structures were still in place. Some 90 tons of I-beam were earmarked for jobs which were to be let after the close of the year.

### District Stores

The inventory value of materials carried in district stores as of June 30, 1960, was $1,748,883.38. This is an increase of 8.5 percent over the previous year end inventory and represents principally an increase in stocks of signal, lighting, chemical and fencing items necessary for maintenance purposes.

Many items in district stores were used as state-furnished materials on minor contracts or, if obsolescent, disposed of by sale. It is one of the most important duties of the field co-ordinators to prevent the accumulation of unnecessary and undesirable items in this account, and to help promote the use of materials available without purchasing additional quantities.

### Salvage and Utilization of Materials

Structurally and economically sound materials were salvaged from highway structures and other facilities which were removed during construction operations. These materials are used in new construction and maintenance of existing facilities.

Prior to salvage, materials are inspected by service and supply coordinators to decide their value and whether or not they should be salvaged. Only approved materials, for which a need is foreseen, are salvaged.

Heavy I-beams and timbers were furnished for a structural test bridge on the US 50 Freeway in Oakland. Two hundred tons of I-beams and lift machinery were salvaged from the Rio Vista Bridge for possible use on similar Sacramento River bridges.

Out-dated traffic signal equipment salvage has been very extensive this year, resulting in an increase of the value of the district stores account inventory in spite of the sale of approximately $500,000 to other political subdivisions or use on secondary locations.

### Reproduction, Photography, Records Center

The Headquarters Reproduction Section reproduced 4,500,000 square feet of full-scale blueprints and 4,043,000 single sheet impressions of half-scale plans during the year. Production in the second half of the year was about twice that for the first six months. New equipment was installed to handle the workload increase.

The photography laboratory has continued to provide varied photographic services throughout the Division of Highways. Color prints have been widely used for bridge design purposes and as exhibits at various public meetings.

Approximately 15,000 cubic feet of records were in storage at the Records Center. Sixty-nine tons of records were sold as waste paper in conformance with retention schedules. The Los Angeles Records Center had capacity for 4,200 cubic feet, most of which was in use.

Costs of storage and operation at the Records Center is approximately 98 cents per cubic foot, whereas the accepted figure for filing storage in the office is approximately $20 per cubic foot. The difference represents a continuing savings to the division of $285,300 a year, not including the return from waste paper sales. A further savings difficult to determine results from not buying new file equipment.

### Business Volume

Following is a tabulation of service and supply business for the fiscal year:

| | |
|---|---|
| Direct purchases | $9,523,675.97* |
| Warehouse purchases | 4,114,703.13 |
| Warehouse disbursements | 4,108,762.50 |
| Inventory as of June 30, 1960: | |
| District stores | 1,748,883.38† |
| Warehouse accounts | 2,102,661.22 |
| *Regular purchase orders | 8,124,365.17 |
| Subpurchase orders | 1,399,310.80 |
| | $9,523,675.97 |

† Does not include $73,376.01 in Headquarters radio supplies. (Departmental Communication Engineers—Highway Radio Shop.)

The preceding figures include purchases for 11 districts, Bridge, Bay Bridge, Materials and Research, and Headquarters Office exclusive of purchases for warehouse stock items.

Following is a resume of the allocation and disbursement of funds for acquisition of nonrental equipment during the 1959-1960 fiscal year:

| | |
|---|---|
| Allocated | $1,116,000.00 |
| Funds expended | 874,210.10 |
| Funds reverted | 241,789.90 |

The nonrental inventory as of June 30, 1960, amounted to $11,981,252.83.

## MANAGEMENT ANALYSIS

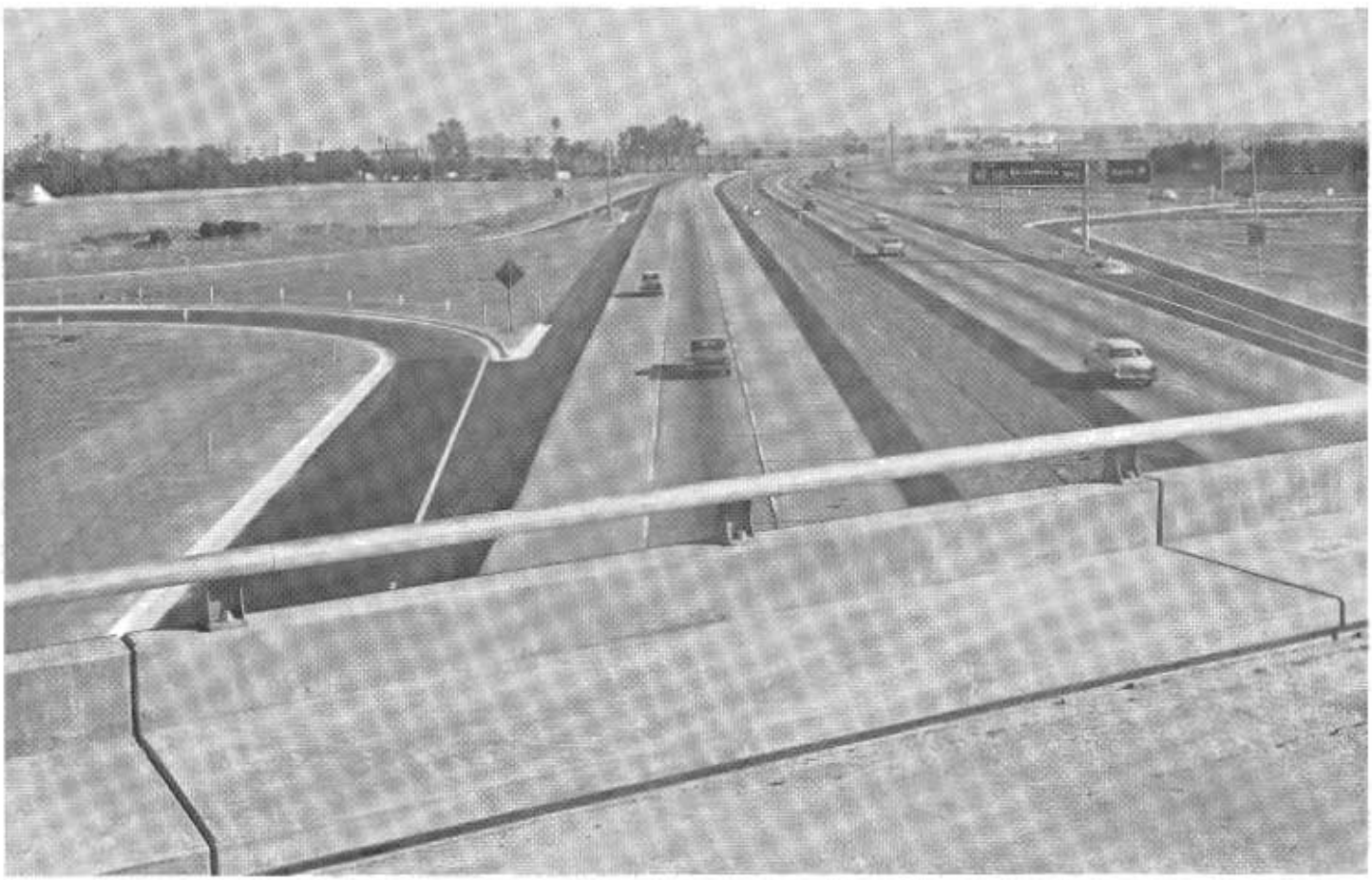
The Management Analysis Section studies management problems, provides advisory services, and assists in the establishment and maintenance of the records-management program.

An inventory of records and a review of procedures in the Headquarters Record Center was completed as a followup to the original program started in 1957. Recordkeeping schedules were updated. This resulted in moving even more office-held files to the records center and the destruction of additional records no longer required. Written procedures were developed for more efficient processing of material to and from the center.

An improved file classification system, with a written manual on procedure and organization, was adopted in District V as the result of a pilot study.

Staff representatives visited each of the districts to review requests for file equipment, to assist with filing problems, and to study records management practices.

A management survey of the Headquarters Equipment Department and four representative district shops was completed. Special attention was paid to shop administrative practices.



*U.S. Highway 40 between San Francisco and Sacramento is rapidly being converted to full freeway standards with several large scale projects now budgeted or under construction. A new six-lane section on this route (above) was completed during the year in the vicinity of Davis.*

# PLANNING

The functions of advance planning, programs and budgets, design, traffic, photogrammetry, and highway planning survey are the responsibility of the Assistant State Highway Engineer, Planning.

## ADVANCE PLANNING

In the past year the Advance Planning and Photogrammetric Sections were combined under the direction of the Principal Highway Engineer—Advance Planning.

The Advance Planning Section processes project reports, co-ordinates the steps involved in route adoptions and freeway declarations, processes freeway agreements, and works with local, state and federal agencies in planning state highways.

### *Project Reports*

A project report is made after an engineering investigation and analysis of a specific project. The report sets forth the reasons for and nature of the highway improvement proposed, and the proposed manner of accomplishment.

Project reports are required for all proposed improvements. They constitute both a starting point and a control mechanism in planning and budgeting and provide information needed to establish basic design features. They are prepared in the districts.

The reports are reviewed at the Sacramento headquarters where analysis by the various departments is coordinated by the Advance Planning Section after field review. The analysis provides the basis for orderly development of surveys and plans.

Aerial mapping continues to be an increasingly valuable tool in the evaluation of topographic controls and in expediting the preparation of project reports.

Approximately 280 project reports were processed during the year.

### *Freeway Routes*

The development of an integrated system of freeways, one of the most important phases of modern highway planning, has been emphasized in California for many years. It involves consideration of community values and potential land uses, as well as traffic needs and benefits.

According to long-established policy of the California Highway Commission, local authorities are advised when freeway route studies are started by the Division of Highways and also kept informed of general features of proposed freeway units prior to route adoption action by the commission.

During the year, 47 formal public meetings were held by the district staffs to discuss state highway routes. There were also many conferences with city and county officials and their technical staffs, as well as several hundred public meetings and map displays of the informational type.

The results of conferences, together with transcripts of public meetings, are made available to the Highway Commission for consideration in route deliberations. The commission itself held seven public hearings during the year, five at the request of local authorities and two on its own initiative.

The mileage of declared freeways was increased by approximately 309 miles during the year through commission action. On June 30, 1959, the total declared freeway mileage was 5,203. The mileage added during the year represented 43 units, 31 of which involved a major route relocation.

### *Freeway Agreements*

The co-operation achieved with cities and counties in working out and concluding freeway agreements has been extremely satisfactory. Agreements for 150 freeway units were received for processing during the year. In some cases, original agreements were replaced by supplemental agreements which incorporated improved design standards or provided for changes in traffic patterns or local planning.

### *Other Studies*

Many proposals, suggestions, resolutions, and inquiries regarding routes, plans and financing were received from official agencies, private organizations and individuals.

Investigation, correspondence, and preparation of reports and replies occupied a great deal of time and frequently required the compilation and careful analysis of statistical and engineering data.

One such study resulted from a request from the Legislative Committee on Transportation and Public Utilities for a report bringing up to date the inventory of needs on the State Highway System.

In connection with this study, it has been the responsibility of the Advance Planning Section to obtain statewide uniformity and adequacy in the design factors, including pavement structure and the proper spacing of interchanges, to be used in the estimate.

### *Interstate Highway System*

A new statewide interstate highway deficiency study was in progress during the year. In connection with this study, the Advance Planning Section was responsible for obtaining prior approval from the U.S. Bureau of Public Roads on such factors as the route locations and basic design features including the number of traffic lanes, median and right-of-way widths, and the location of separation structures, interchanges and frontage roads.

Advance planning is also responsible for obtaining bureau approval on the final locations of all routes on the Interstate Highway System. This is done for each Interstate Section after adoption by the California Highway Commission. At the end of the year, the locations for approximately 1,682 miles, about 77 percent of the Interstate System in California, had been approved. In addition, another 396 miles were being processed for submission to the bureau. The total mileage approved or under consideration at the end of the fiscal year is about

95 percent of the Interstate System in the State.

### *Liaison With Other Agencies*

In addition to work with local jurisdictions, advance planning involves co-operation with other governmental agencies in planning matters involving state highways.

The effect of proposed public works on existing and planned highways is carefully studied. In some cases a planned project will require a relocation or adjustment of a state highway. At such times, the Advance Planning Section negotiates an agreement with the agency involved, establishing the standards for replacement of the highway or other changes. Provision for highway betterments are frequently included in these negotiations at the division's request.

### *National Forest Highways*

The Division of Highways acts jointly with the U. S. Bureau of Public Roads and the U. S. Forest Service in an annual improvement program on California roads designated as Forest Highway Routes. The Forest Highway network in California covers approximately 2,465 miles, about 80 percent of which is on state highway routes.

The California apportionment of Forest Highway funds for the 1959-60 fiscal years was $4,726,004. Including funds remaining from previous apportionments, the distribution of Forest Highway money in the State during the year was as follows: projects on state highways, $3,320,000; projects on county roads, $1,375,000; system surveys, $200,000.

The Bureau of Public Roads plans, designs, advertises and supervises the construction of federally financed Forest Highway projects. On projects on state highways, the Division of Highways works with the bureau in the planning and design phases and also purchases the required rights of way, including clearance of utilities and options on material sites.

### *Photogrammetric Map Aerial Photography and Contracting*

The continued use of aerial photography for advance planning accounts for an average of 15 percent of photogrammetric costs. Current photography is a primary aid in the planning of photogrammetric mapping projects.

Where new highway projects require a different alignment, grade change or extensive widening, nearly all projects are designed from photogrammetric mapping. Photogrammetric mapping is obtained under contract by means of stereoplotting instruments and field surveys as required.

Following is the resume of expenditures for photogrammetric contracting during the fiscal year:

| | *Contracts* | *Highway strip miles* | *Contract amount* |
|---|---|---|---|
| Contour mapping projects for design | 33 | 298 | $360,607 |
| Contour mapping projects for reconnaissance | 8 | 69 | 31,948 |
| Aerial photography contracts | 17 | | 38,416 |
| Aerial photography contracts (blanket) | 6 | | 73,042 |
| Stereoplotter rental contracts | 8 | | 14,990 |
| Total | | | $519,003 |

### *Map Checking*

A continuing program of map checking has proven to be an invaluable aid in obtaining accurate photogrammetric mapping by contract.

*This section of the Golden State Freeway (upper left to lower right) was completed early in 1960, providing a major interchange at the junction with the San Bernardino Freeway near the Los Angeles County Hospital.*

An estimated 320 highway miles of mapping were scanned during the year. The scanning procedure gives an overall picture of a project and isolates the areas that require further field checking. It also eliminates the need for extensive field checking.

Resultant savings in overall checking costs is estimated to be over $20,000 for the year.

### *Geodetic Distance Measurement*

During the fiscal year, the Photogrammetric Section operated instruments for accurate geodetic distance measurement as a service to all the state highway districts.

A Model 3 Geodimeter, measuring distances up to 20 miles, was used to establish a control network for photogrammetric mapping, construction staking and right of way surveys. In March 1960, a Model 4 Geodimeter was obtained for use in measuring shorter distances.

Estimated savings by geodimeter surveys over conventional methods amount to $60,000 for the fiscal year.

Observation data for surveys with the two geodimeter models is as follows (Model 3 figure listed first): Observed miles 964, and 300; number of lines, 297, and 448; average line length, 3.24 miles, and 0.67 mile; estimated highway miles, 550, and 200.

## PROGRAMS AND BUDGETS

The Programs and Budgets Section makes projections on the availability of funds for highway purposes, establishes target figures to be used in planning, develops the statewide long range planning program in co-operation with Planning Survey, prepares budget recommendations for consideration by the California Highway Commission, maintains a constant check on the funds available for highway purposes in a fiscal year budget, recommends action on unbudgeted or minor improvement projects, and administers the annual Buildings and Plants Program.

### *Budget and Revenue*

The responsibility for preparing the annual budget for consideration by the California Highway Commission rests with the Assistant State Highway Engineer, Planning. Engineering control of the State highway budget is performed under the supervision of the Office Engineer.

The revenues which support the activities of the Division of Highways are derived from state and federal sources. State sources, which still comprise the major portion of the revenue, are the gasoline tax, the use fuel tax, motor vehicle fees, and the transportation tax. Federal apportionments for right of way acquisition and construction under way on federal-aid projects during the fiscal year amounted to approximately $302,000,000 or about 48 percent of the total revenue.

The division's revenues closely accord with the volume and type of highway traffic. Long-established and continuous records of this traffic throughout the State are used as a guide in estimating probable revenues for planning purposes. For budgeting, estimates of probable revenues are determined after consultation with other governmental departments and agencies with functions related to State highway income, particularly the Department of Finance, and Motor Vehicles, and the Board of Equalization.

During the 1959-60 fiscal year, the state highway budget was adjusted periodically to conform to current requirements as well as to reconcile differences between estimated and actual revenues and expenditures.

*Recently completed six-lane freeway on U.S. Highway 40 in Richmond which eliminated final gap in continuous full freeway between Los Gatos and Vallejo.*

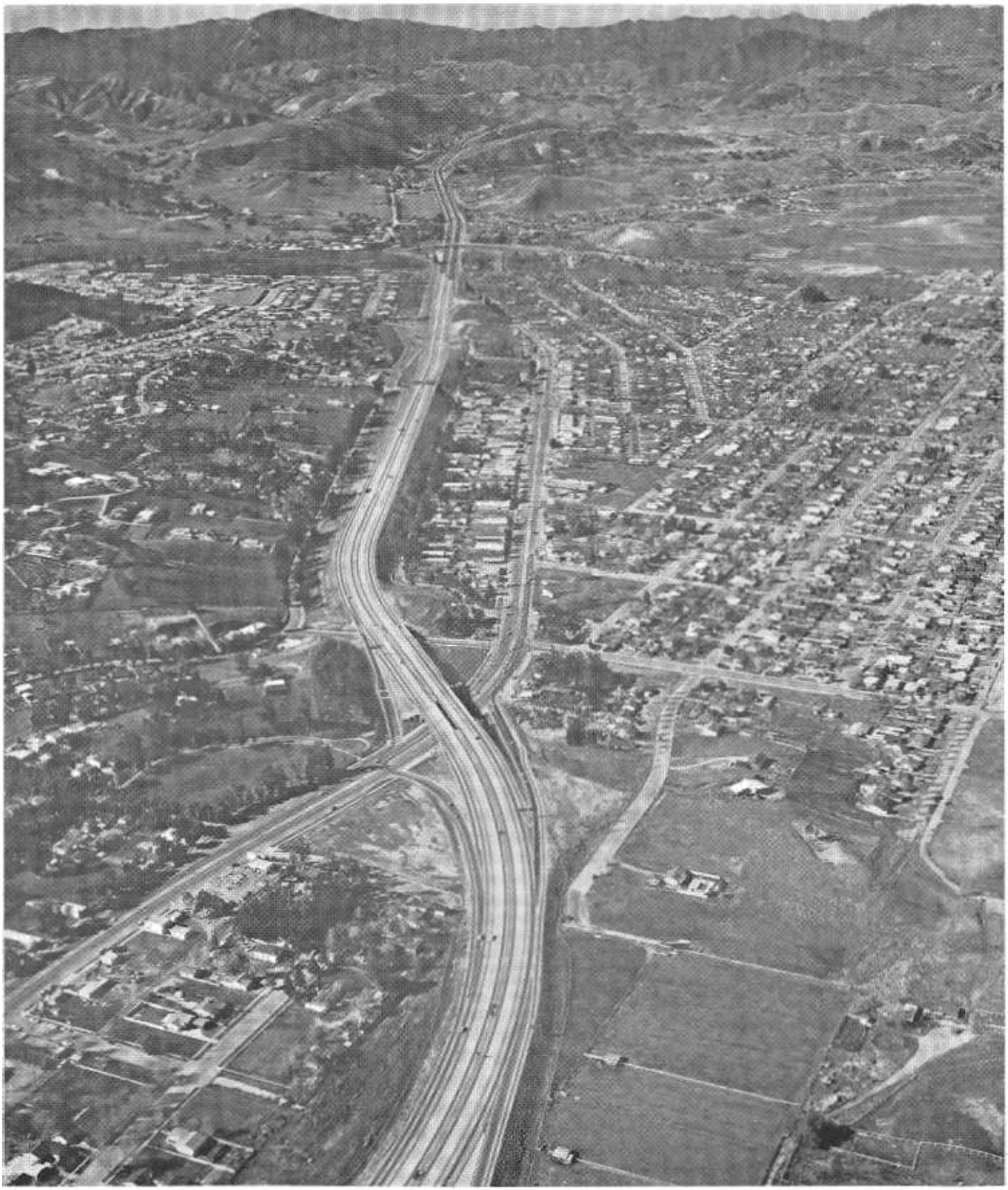
### *Expediting and Co-ordinating*

The establishment of the expediting and co-ordinating function has resulted in a close liaison between the districts and headquarters departments. Frequent reviews of the status of the various proposed construction projects helped to eliminate delays in completion of plans, right of way acquisition or utility relocations.

Statistical records are being maintained to show the complete status of a highway construction project from initial planning studies to the call for bids.

### *Buildings and Plants*

During the fiscal year progress was made on the construction of annex buildings at the district offices in Los Angeles, Redding, San Bernardino and San Diego. Plans were being developed by the Division of Architecture for annex buildings in San Francisco and at headquarters office in Sacramento, as well as for several maintenance stations.



*Ventura Freeway in the San Fernando Valley section of Los Angeles, a portion of 90 miles of continuous full freeway on US 101 between the west city limit of Los Angeles and south of San Clemente in Orange County. Interchange in center connects freeway with Ventura Boulevard, the former highway route.*

In the 1959-60 fiscal year, the number of individual projects for which contract plans were processed dropped to 355 from the record peak of 414 for the preceding fiscal year. Despite this decrease, the growing emphasis on freeway improvements, and the complexities of freeway design, brought a further increase in the work load.

### Geometric Design

The Geometric Design Unit processed 544 interchange and grade intersection designs, 422 bridge site plans and the contract plans for 355 projects. With the increasing emphasis on freeway construction, the complexity of plans has increased. This is reflected in the augmented volume of plans reviewed—5,600 plan sheets in 1959-60 compared to 3,700 the previous year.

A master plan for weigh scale installations on the State Highway System was established in collaboration with the Maintenance Department and the California Highway Patrol. Revised design standards were developed for yard installations and for enlarged brake and certification inspection facilities.

Revised design controls for bus stops at interchange areas on freeways were developed. A number of these facilities were constructed during the past year.

### Structural Design

Structural typical cross sections representing 147 proposed projects were reviewed during the design stage. This review included consideration of costs, the availability of materials, materials specifications, foundation and slope design, construction practices and future maintenance requirements.

Since the Structural Unit review provides one of the final opportunities for headquarters inspection of district proposals prior to submission of plans, the scope of this review has been expanded. This procedure has resulted in early elimination or solution of many problems formerly encountered during the final stage of project design. At the same time, the review of all preliminary reports, materials reports and special provisions continues to be a function of this section.

Studies were continued on the actual service performance of various modified structural designs in order to provide factual data for the evaluation of current standards and policies. Features under observation include thickened asphalt concrete pavement sections, variable joint arrangements in PCC pavement, subsurface drainage, and cut slope and benching details.

Representatives of the Structural Design Unit participated with personnel from other headquarters departments in continuing studies relating to foundation stabilization, embankment protection, slope design and drainage.

Special projects included participation in the development of standard specifications and standard special provisions and in estimates for completion of the Interstate Highway System and the state highway inventory.

### Electronic Computations and Special Studies

An improved method for submitting terrain notes for computing earthwork quantities with the electronic computer was introduced. This method consists of using a print of spot elevations along the centerline. Its greatest advantage is that it facilitates key punching. When contour maps are used instead, the elevations and offset distances are recorded directly on strips of transparent paper or film printed with a grid. The notes are written in when the grid transparency is overlaid on the contour map.

The section on Surveys for the Planning Manual of Instructions was written and reviewed in Headquarters. It is scheduled to be submitted to the districts for comments before publication.

### Drainage and Co-operative Agreements

With the increase in freeway construction, drainage problems have become more complex. In urban areas long sections of depressed freeway are more frequently required, and this has meant increases in the use of multiple pumping installations.

Where urban freeway construction will necessitate modifications in existing drainage facilities or street patterns, the changes have been successfully arranged through co-operative projects of mutual benefit to the State and the local community. This approach has also led to economies through the proper timing of local projects in relation to highway construction. In such instances, the division helped pay the cost of changes or betterments which could be incorporated in the future highway improvement.

During the fiscal year, 91 agreements of all types were executed with various agencies. These covered drainage improvements, separation structures, intersection revisions and modifications of street patterns, and construction of future utility crossings.

### Erosion Control and Roadside Development

Because of their specialized nature, plans for functional planting and landscaping projects continue to be prepared in the Headquarters Roadside Development Unit. During the fiscal year, plans and specifications for 29 such projects were completed. Specifications for erosion control work to be included in construction projects are prepared in the various districts and are reviewed by this unit.

All typical cross sections for proposed projects are referred to this unit for recommendation as to erosion control or preparatory planting items which should be included in the construction contract. It is generally more economical to include in the construction contract certain types of erosion control and such preparatory planting items as deep scarification, spreading topsoil, and installing water lines under roadways.

During the fiscal year, 40 functional planting or landscape projects valued at $3,980,000 were financed.

Following is a partial list of the items and quantities used on these functional planting and landscape projects: 3,675 tons straw, 147,203 pounds seed, 954 tons commercial fertilizer, 362,255 assorted trees and shrubs, and 9,865,680 assorted ground cover plants and cuttings.

### *Traffic Counts and Accident Studies*

In 1959, motor vehicle travel on the State Highway System, urban and rural, exceeded 30 billion vehicle miles, an increase of approximately 5 percent over 1958.

Motor vehicle travel on rural state highways, based on the annual and monthly traffic counts, was estimated to be 17.5 billion vehicle miles in 1959, a slight increase over 1958. The increase would have been greater if a number of high volume "rural" highways in suburban areas had not been reclassified as "urban."

Traffic on the 746 miles of rural and urban full freeways in operation during 1959 averaged 36,000 vehicles per day. Highest volumes were recorded on the Hollywood and Harbor Freeways in Los Angeles. The average weekday traffic on the section of the Hollywood Freeway just west of the four-level structure was 204,000 vehicles, while the section of the Harbor Freeway immediately south of the four-level structure carried 202,000 vehicles per day. The four-level structure in Los Angeles, the world's busiest intersection, carries a weekday volume of approximately 352,000 vehicles.

The 1959 fatality rate on rural State highways, was 7.78 deaths per 100 million vehicle miles of travel. This is a slight decrease from last year's rate of 7.86, and marks the lowest fatality rate ever recorded on rural state highways in California.

The 1959 fatality rate on freeways, rural and urban combined, remained unchanged from 1958 at 2.83 deaths per 100 million vehicle miles of travel.

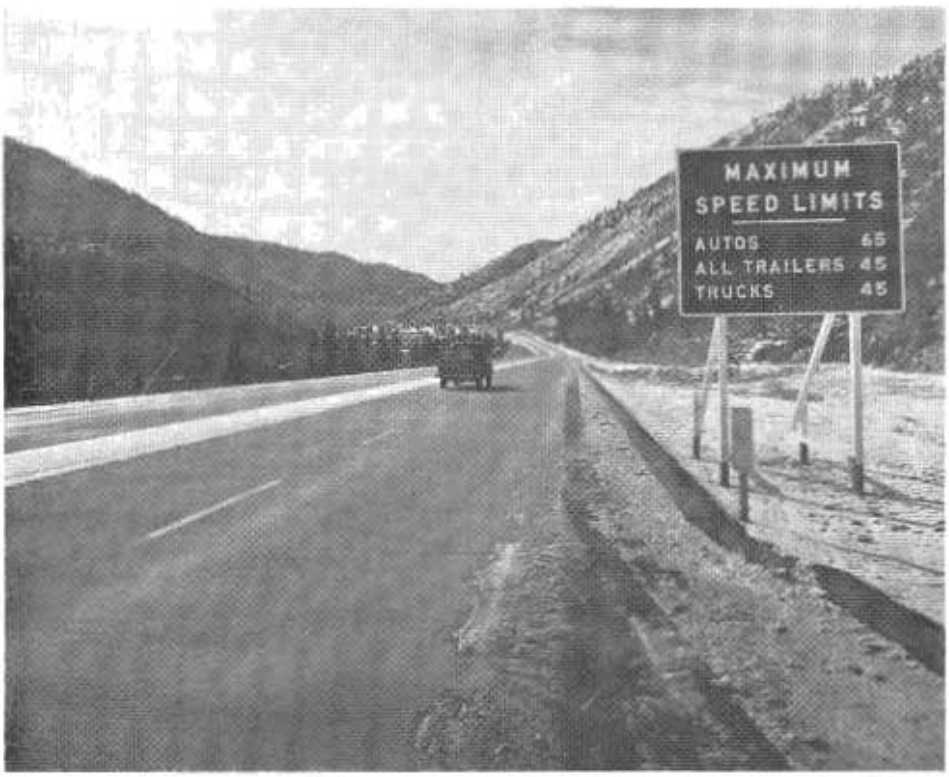
### *Geometric Standards and Traffic Service*

A study on the operation of freeway bus loading facilities at cloverleaf interchanges was completed during the past fiscal year.

In conjunction with the Planning Survey Section, new techniques for forecasting traffic in metropolitan


*This experimental electro-luminescent overhead sign is being tested on U.S. Highway 99E just northeast of Sacramento. New equipment of this type is tried to determine its suitability for highway use under actual operating conditions.*


*This large overhead sign is typical of those now in use on new freeways throughout the State. Note the "up arrow" to direct movements off the freeway.*




*New speed limit signs were installed near state boundaries to inform motorists of maximum limits on California highways. This sign is on U.S. Highway 40 near the Nevada border.*

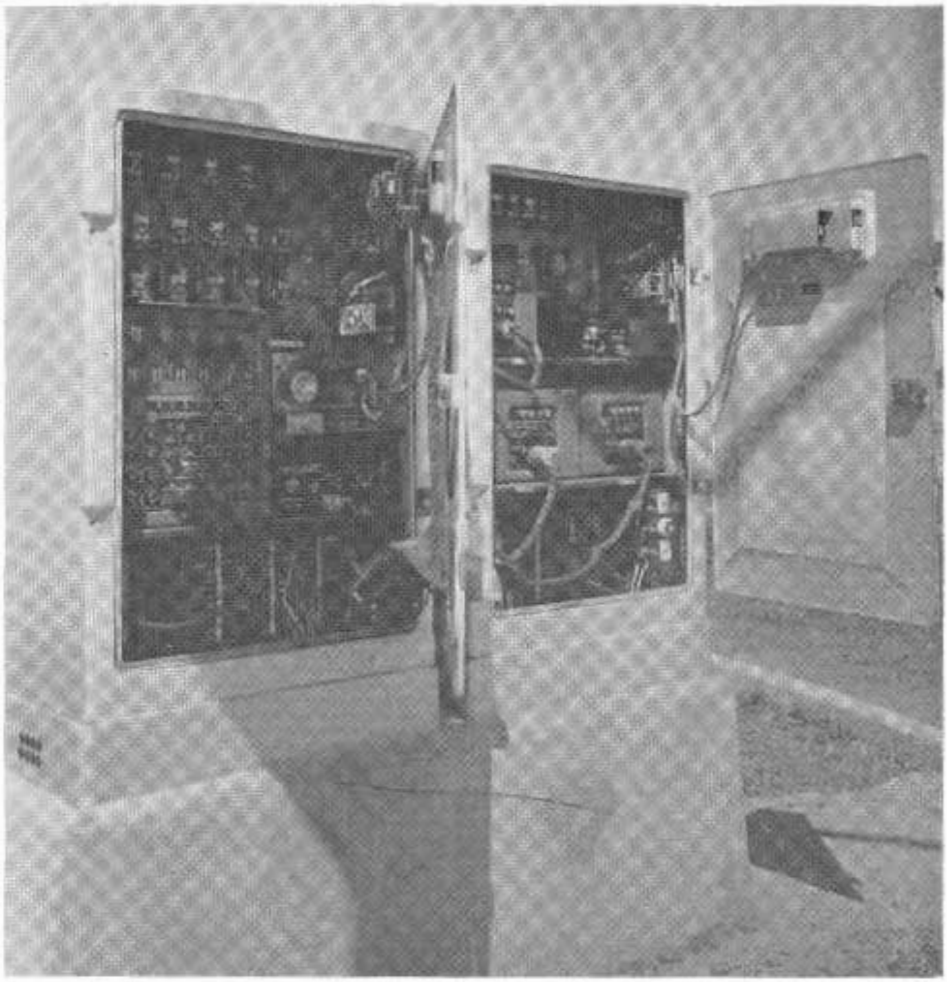
areas were developed and investigated. This included methods of obtaining travel data from land use characteristics, trip distribution by use of traffic models developed from origin and destination studies, and the determination of trip paths between areas by use of electronic computers.

Origin and destination surveys were made at eight locations during the year.

### *Traffic Signals and Illumination*

During the 1959-60 fiscal year, there were 90 new traffic signal installations, and 85 existing signal systems were modernized. Of the new installations, 72 were the traffic-actuated type and 18 were of the pretimed type. A total of 3,556 lighting standards and 384 illuminated traffic guide signs were installed. The total cost of the electrical work was $5,651,505, not including the cost of steel sign structures.

A total of 169 traffic reports reviewing conditions at approximately



*Traffic signal control units of this type are used to control multi-phase signals at many rural intersections.*

321 intersections were analyzed to determine the need for the installation of traffic signals or safety lighting.

Research projects under way included studies of a new-type electroluminescent highway directional sign and two new types of vehicle detectors.

A new internally illuminated changeable message sign was developed, primarily for use at truck-weighing stations.

### *Traffic Regulation and Control*

The 1959 Legislature enacted a law establishing an absolute maximum speed limit of 65 miles per hour on all streets and highways in California. The new statute includes the provision for downward speed zoning in five-mile increments between 60 and 25 miles per hour on the basis of an engineering and traffic study. Other changes involve elimination of mandatory speed zones on state highways, in business and residential districts, and a statement of legislative intent that physical conditions such as width, curvature, grade and surface conditions, or other conditions readily apparent to the driver, would not require special downward zoning.

Traffic studies were conducted throughout the State to determine those sections of highway where, due to roadside development and traffic conflict, a 65-mile-per-hour limit was not considered to be reasonable and safe. As a result of these studies, a total of 620 restricted speed zone orders were issued, resulting in 761 additional miles of restricted speed zoning on state highways. Existing speed limits were also revised on considerable mileage. A total of 3,307 new speed limit signs were installed at a cost of about $84,000 as a result of the new speed limit provisions.

After investigation and study, the following traffic-control measures were taken: 113 city and county ordinances or resolutions regulating traffic or parking were approved; 44 orders regulating traffic and parking were issued; and a total of 40,409 new highway signs were approved and installed, including 4,346 warning signs, 8,782 regulatory signs, 12,675 guide signs, and 14,606 construction and miscellaneous signs.

During the year, a new edition of the Planning Manual, "Traffic," was published. This revision included legislative changes enacted by the 1959 Legislature, and the latest methods and policies pertaining to traffic engineering. The manual was distributed to city and county highway and traffic officials in an effort to promote greater uniformity in the use of traffic-control devices throughout the State.

A new edition of the "School Crossing Protection" pamphlet was published on January 1, 1960, and distributed to school superintendents and other interested officials. A new edition of the "Uniform Sign Chart" was also published.

Much time and effort have been spent in preparation and review of a tentative illustrated text for the new "Manual on Uniform Traffic Control Devices for Streets and Highways" to be published by the U.S. Bureau of Public Roads.

A study, made with the co-operation of the Materials and Research Department, involved the testing of delineator spacings on various radius curve. This study resulted in the adoption, nationally, of a new formula for spacing of delineators on horizontal curves.

Other studies undertaken during the year included several concerned with further development of standards for interstate highway signs. One of these studies involved the development of a standard green color for use on illuminated guide signs, and another dealt with night time readability of various reflective signs in order to determine the effectiveness and proper size and stroke of letters. Standard rules for placement of interstate shields, when used in combination with other shields, were set forth.

# HIGHWAY PLANNING SURVEY

The Planning Survey Department is divided into two main operating units, Collateral Engineering and Statistical —Financial. Engineering and economic investigations assigned to the Highway Planning Survey usually cover more than one district or are statewide in nature. Many such studies are undertaken at the request of the U.S. Bureau of Public Roads. Most studies are financed partly by federal funds amounting to a maximum 1½ percent of the total annual federal-aid apportionment to California.

Within the Statistical Unit there is an Electronic Data Processing and Machine Methodology Section which provides data processing services for Planning Survey and other departments, as well as for other divisions of the Department of Public Works.

The Planning Library is also attached to Planning Survey.

### *Collateral Engineering Studies*

The 1959 Legislature adopted Senate Concurrent Resolution 62 requesting an analysis and updating of city street and county road deficiency reports along with estimates of future needs. The resolution also requested a report on the advisability of an increase in the gasoline tax and on the relative distribution of any such additional tax to cities and counties. The report was to be submitted to the appropriate legislative committees by August 1960.

The Legislature appointed a committee of 14 members representing the cities, counties, and others interested in transportation problems, to act in an advisory capacity to the Department of Public Works. The committee held monthly meetings with the staff during the period of the study, and individual committee members also participated in field area meetings. The advice and assistance of the committee proved invaluable in conducting the study.

County road and city street deficiency reports prepared under the provisions of Section 2156 of the Streets and Highways Code were found inadequate for the purpose of the S.C.R. 62 study. It was considered necessary that the cities and counties prepare new reports.

The advisory committee, meeting jointly with the department, developed the methodology, controls, and procedures necessary to initiate the study. The committee decided that the deficiencies evaluated must be valid, practical projects that would be done; that the cities and counties should lay out integrated systems classified as major or primary routes, collector routes, existing local streets, and future local streets; that the estimated deficiencies be based on traffic requirements to 1980; that the deficient projects be phased into five-year periods to 1980; and that the city and county reports be submitted by May 1, 1960.

Standards, forms and instructions in use under Section 2156 were reviewed and modified by the advisory committee. On October 5, 1959, the final standards, forms and instructions were forwarded to the cities and counties through the district offices.

To promote uniformity, area meetings were held throughout the State by the highway district personnel assigned to the study. The meetings were attended by the engineers and officials who would be preparing the city and county deficiency reports, representatives from the Division's Sacramento headquarters, from the U.S. Bureau of Public Roads, and members of the advisory committee.

Purpose of the study was explained at these sessions and the need for uniform application of engineering judgment in evaluating valid deficiencies was emphasized. Local officials were informed that district personnel would be available to furnish technical assistance.

Close co-operation between the districts and the cities and counties was necessary because of the short time limit and to permit analysis and review of the work as it progressed. The study covered approximately 70,000 miles of county roads and 30,000 miles of city streets.

City and county reports, along with the district's comments, were received during May 1960 and reviewed for uniformity on a statewide basis. The audited amounts in the reports were tabulated and text and tables prepared for the department's report. The copy for the report was submitted to the printer on July 1, 1960.

Throughout the study, city and county interest and co-operation was excellent, and both state and local agencies benefited through greater understanding of each other's problems.

### *Interstate System Estimate*

Federal law requires a revised estimate of the total cost to complete the Interstate Highway System in each of the states, with the objective of establishing factors for apportionment of Interstate funds for the fiscal years 1963 through 1966. The completed estimate was to be submitted to the United States Bureau of Public Roads, Washington, D.C., by August 1, 1960.

The Engineering Unit of Highway Planning Survey was assigned the responsibility for overall co-ordination of the work on the Interstate System estimate in co-operation with the U.S. Bureau of Public Roads. The work covers all of the 2,183 miles of Interstate routes in California and includes project cost estimates on all sections not completed to standards required for estimated 1975 traffic.

Preliminary work on developing traffic data and strip maps was started in January 1960. Copies of the manual of instructions were received in February. At the end of the fiscal year, work had progressed through the traffic estimate, geometric planning, interchange and lane justification, and cost estimates of right-of-way and construction.

The work was being done in close co-operation with the B. P. R. Traffic estimates, maps, locations, geometric design, right-of-way, and construction costs were prepared by District personnel in each of the eight districts involved in the Interstate program. The Headquarters, Bridge, Design, and Right of Way Departments also handled various phases of the project.

This estimate, known as the 104(b)5 estimate, supersedes the estimate prepared in 1957 which was known as

the 108(d) Interstate estimate. The manual of instructions covering this latest estimate requires much more checking and documentation than was required for any previous estimate.

### *State Highway Inventory*

In accordance with a request by the Senate Fact Finding Committee on Transportation and Public Utilities, an inventory of needs on the State Highway System was prepared for submission to the committee by September 15, 1960.

State highway needs were last reported in 1958 in connection with Senate Concurrent Resolution No. 26. The Legislature, in acting on the S. C. R. 26 report, passed Senate Bill 480 which added approximately 1,600 miles to the State Highway System and established the California Freeway-Expressway System. The committee considered it advisable to update the 1958 state highway needs inventory to conform with a similar inventory for city streets and county roads requested in S. C. R. 62.

The detailed work in preparing the estimate was assigned to the various departments in the districts with final review by Planning Survey. The interstate estimate, prepared for submission to the Bureau of Public Roads, will be incorporated in this state highway inventory.

Planning Survey also prepared data for submission to the Bureau of Public Roads to support an application for additional mileage to be added to the Federal Aid Primary System in California.

### *Statistical Studies*

The Division of Highways is participating in the long-term Los Angeles Regional Transportation Study. The areas included in the study are Ventura, Los Angeles, and Orange Counties, and the western regions of San Bernardino and Riverside Counties.

The purpose of the study is to establish travel patterns for use in determining the present and future transportation needs of the five-county area. These patterns will be derived from data on present and projected land use, population, employment, motor vehicle registration, and other economic and social factors affecting travel.

The magnitude and complexity of this study require the close co-opera-

*Members of the technical advisory committee of city and county officials who assisted in the preparation of the S.C.R. 62 Report on county road and city street deficiencies. The report was presented to the Legislature in September, 1960.*

tion of local and state governments. In recognition of the importance of the problems of co-operation among the various governmental units, and also to provide general guidance for the technical staff, an advisory committee was established. The 12-man committee is made up of officials from county traffic, planning and engineering departments, and representatives from an automobile club and transit and traffic research groups.

In addition to this committee, an advisory planning group, composed of all planning directors in the five counties and representatives of the various cities, was also established. This group will assist in obtaining the detailed information on land use.

The Automotive Safety Foundation will provide technical advice particularly in connection with the development of land use and trip distribution models. This agency has taken part in similar programs in major cities throughout the nation.

The study will be conducted by District VII of the Division of Highways, with the responsibility for data processing and study methodology assigned to Planning Survey.

In addition to the establishment of a working organization and general planning for land use and traffic distribution models, the initial phases of the study have also included two major data collection projects. These projects were both initiated in June 1960. They are a Home Interview Origin and Destination Survey for about 3,000 dwellings, and a Special Survey for about 2,500 "For Hire Trucks."

### *Fuel Consumption Study*

A special fuel consumption study, based on records kept by personnel of the Division of Highways, has been undertaken at the request of the Bureau of Public Roads. About one-fifth of the division's employees are keeping records of gasoline purchased and miles driven in their private vehicles for a one-month period. One-quarter of this sample will keep records in each of four different months during the year.

### *Electronic Computer Service*

The Electronic Computer Review Committee was organized late in 1958 to guide the development of applications and use of electronic computers for engineering problems. The committee is composed of representatives from the construction, design, planning, bridge, and planning survey departments.

Programs and applications developed by other states are obtained and studied. Suggestions and ideas for new programs or changes in existing programs are reviewed. Evaluation of benefits, costs of development, and priorities are considered by the committee before making recommendations.

The committee also keeps departments informed of new ideas and developments before programing is started, and co-ordinates development so as to obtain programs of maximum utility.

The District Engineers have been encouraged to appoint co-ordinators to expedite processing of engineering calculations. The Planning Survey staff assists and trains these district co-ordinators and others when they visit the machine room in Sacramento.

Electronic computer service has grown considerably and was used to process approximately 1,500,000 traverse courses, 3,600 miles of earthwork quantity data, and 122,000 profile grade and superelevation hinge points during the year.

A refined earthwork computation program was completed and testing was undertaken in two districts. This program will automatically detect cut or fill conditions at cross section hinge points and then automatically apply stake slope calculation data.

The revised traverse computation program, released in the prior year, has been used extensively. It allows rotation of bearings, curve alignment calculations, output of descriptive data, interdependency within the same traverse problem and between traverse and curve alignment problems, and also interdependency regardless of the number of possible solutions.

A profile grade and grid program also introduced last year, has been well received by the districts. This program combines profile grid data, superelevation data, and template data to compute roadbed template elevations.

Due to the need for more flexible and more complicated computation services, at reasonable time schedules, additional tabulating equipment and computer facilities have been authorized.

### *Other Studies and Services*

The annual loadometer survey and a special rural origin and destination survey on U.S. Highway 50 near Tracy were completed during the year.

The mechanical routing program for freeway studies, under development in the previous year, was completed. The first practical use of this program has been undertaken in connection with study of traffic data for Sacramento.

A special analysis was completed during the year in conjunction with the Materials and Research Department for methods of acceptance sampling of reflector buttons used in signs from private manufacturers.

Other statistical and data processing work was performed for the Accounting, Personnel, Construction, Bridge, and Traffic Departments.

### *Financial Analysis*

Three continuing studies have been carried on in co-operation with the Bureau of Public Roads: local road finance reports, highway investment and road life studies, and the status of highways with related mileage reports.

The local road finance report is an annual report of the highway transactions of local units of government. It is one of a series of annual reports required by the bureau.

The continuing road life study covers some 12,000 miles of rural state highways with new construction added annually. Tabulations of mileage and investment are prepared as requested.

The status of highways provides logs of the State Highway System and the Federal Aid System and various tabulations of mileage for the bureau and the division.

# BRIDGES

The Bridge Department of the Division of Highways is under the administration of the Assistant State Highway Engineer–Bridges and is responsible for the design, construction and maintenance of all bridges and structures on the State Highway System. As provided by law, the department also assists other state agencies and local governments upon request.

A branch office of the Bridge Department is located in Los Angeles to maintain liaison with southern area districts, make preliminary site surveys, and supervise construction and maintenance of structures within these districts. All other functions, including all design work, are handled in the Headquarters Office in Sacramento.

For purposes of administration, the Bridge Department is divided into five sections. These are planning, operations, special studies, office, and special projects. The maintenance and operation of State-owned toll bridges are also under the administration of the Assistant State Highway Engineer –Bridges.

The 1959-60 state highway construction budget included $105,642,000 worth of structure work in 104 projects, a 50 percent increase over the preceding year. Most of this was new construction, although some was for widening or strengthening existing structures. Miscellaneous projects including flood damage repair, federal aid secondary projects, maintenance, and work for other agencies financed and contracted during the 1959-60 fiscal year amounted to $25,020,000 for a grand total of $130,662,000.

### *Manual of Design Practice*

Over the years the Bridge Department has prepared individual papers on the design of different types of structures as a means of training employees. These individual chapters have now been compiled into a 633-page textbook. This text, the "Manual of Bridge Design Practice," was copyrighted, and printed by the State Printing Office.

At the end of the year, approximately 60 Bridge Department employees were participating in the two-year inservice training rotation program, and 39 men had completed the program, which first started in 1957.

## BRIDGE PLANNING

### *Advance Planning*

The Advance Planning Section has the primary responsibility of expediting all phases of bridge planning. Eighty-eight district project reports and 85 supplemental project reports were reviewed, and 420 bridge preliminary reports were prepared.

Plans, specifications and estimates for approximately 90 percent of the 1960-61 bridge construction program were completed by June 30, the end of the preceding fiscal year, and for some $34,000,000 worth of work remaining from the 1959-60 Budget.

### *Design*

Plans, specifications and estimates were completed during the past fiscal year for structures estimated to cost approximately $113,667,000. This includes regularly budgeted state highway projects; Federal Aid Secondary System projects; structures in flood damage, paint, repair, and miscellaneous projects; and unfinanced projects prepared for future state highway budgets.

The largest single project was the San Pedro-Terminal Island Suspension Bridge, estimated to cost $13,760,000. The bridge will be 6,010 feet long, including the suspension span over the main channel of Los Angeles Harbor. The suspended span will be 1,500 feet long, providing minimum clearance of 185 feet at mean high water for a 500-

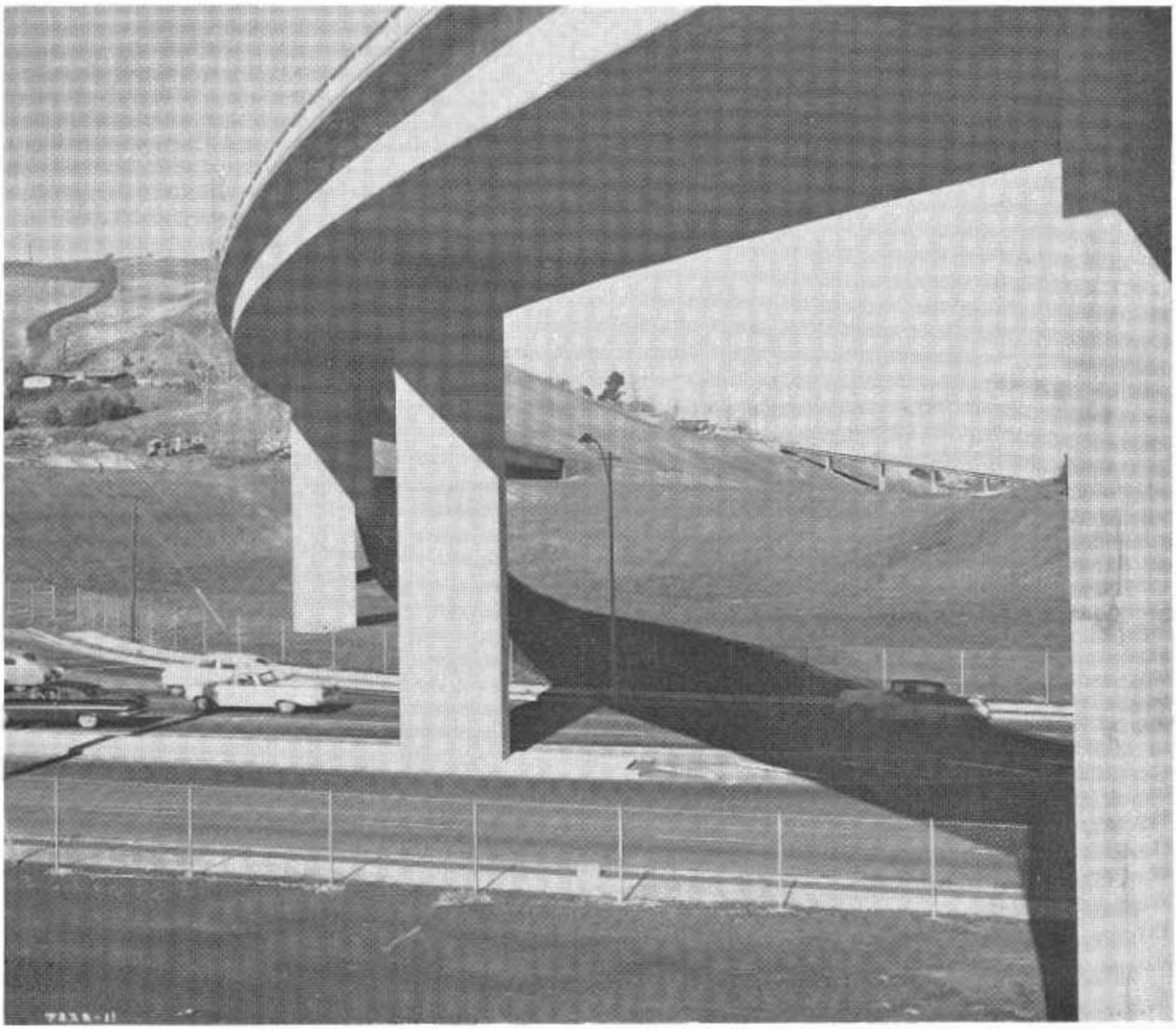
*This structure across the South Fork of the Eel River on US 101 (Redwood Highway) in Humboldt County was among bridges judged most beautiful in national competition sponsored by the American Institute of Steel Construction.*

foot central navigating channel and 165 feet minimum clearance at the towers. The 368-foot towers will be flanked by two 506-foot side spans. The remainder of the bridge will be made up of steel girder approach spans. The 52-foot roadway will provide for four traffic lanes. When completed the bridge will be operated as a toll bridge.

An interesting bridge design is the Sign Route 24 separation on the recently completed Walnut Creek Bypass. This structure is 1,220 feet long with a 37-foot roadway which carries two lanes of traffic over another roadway and over the Walnut Creek Channel. Physical limitations required long spans and shallow depth which could only be met with continuous prestressed concrete. The continuous spans are 160, 214, 160 feet, the longest prestressed spans so far designed by the Bridge Department.

Plans were completed for the remaining $12,000,000 unit of the $31,000,000 Santa Monica Freeway Viaduct between the Los Angeles River and Hoover Street. An unusual feature of this job is the type of foundations used. Bridge foundations consist of a large reinforced concrete footing, founded on piles or soil with columns extending up to the bridge superstructure. Because of the favorable soil conditions at this site, it was possible to eliminate the footing and to merely drill an extension of the column into the ground. It is estimated that this type of foundation resulted in a saving in excess of $3,000,000. (See Foundation Section.)

In Alameda County plans were completed for the new parallel Caldecott Tunnel (formerly Broadway



*Sign Route 24 separation structure on the recently completed Walnut Creek Bypass. This graceful structure has the longest continuous prestressed concrete spans thus far designed by the Bridge Department.*

Tunnel) located approximately 100 feet north of the present tunnel. The new tunnel, in conjunction with the existing, will provide for four lanes in one direction and two lanes in the opposite direction during hours of peak traffic. The new bore will be approximately 3,300 feet long with a roadway width of 28 feet. It will be fully lighted and ventilated. Estimated cost is approximately $12,000,000.

Plans were also completed for the bridge across South Fork Eel River on the Redwood Highway (US 101) at Myers Flat, Humboldt County. Estimated to cost $1,000,000, the structure will have four spans, two side spans 175 feet long and two 235-foot center spans.

### *Architectural Bridge Design*

Along with its primary function of reviewing all bridge engineering designs for aesthetic qualities, the Bridge Architectural Design Section produced 47 architectural renderings, 41 photo retouches and 9 models. These were used not only for design purposes, but also for district public meetings, press releases, exhibits and legal proceedings.

An aerial oblique photo retouch of a proposed freeway and interchange in Riverside County was accepted as an exhibit in a superior court trial. The retouch was used to help explain freeway drainage plans to a jury. This is the first photo retouch made by this section for legal purposes.

A model of the proposed US 101, US 395 and State Sign Route 94 Interchange in San Diego was constructed to help the designers visualize and unify the architecture of the 36 structures to be built within a one-half square mile. Four-level and three-level structures were included. The model will also be used in explaining interchange features to San Diego residents and other interested citizens and as an aid during construction and later landscaping.

Two California entries received awards in the annual American Institute of Steel Construction judging of beautiful bridges. The prize winning structures are the South Fork Eel River Bridge on US 101 at Dyerville and the Marsh Road Overcrossing on the Bayshore Freeway (US 101 Bypass) in San Mateo County.

### *Foundation Section*

The Foundation Section has had an interesting project involving the evaluation of load test data from 48 inches cast-in-drilled-hole piles installed in granular sediments on the Santa Monica Viaduct in Los Angeles.

The test loads were applied by jacking against two reaction piles and a reinforced concrete beam engineered for this purpose. (See photos on page 54.)

Twice the design load, or a total of 900 tons, was applied to the pile for a period of 60 hours by a battery of 100-ton hydraulic jacks operated from a central hand-operated pumping unit.

The pile settlement was measured by Ames dials and leveling beams reading to a thousandth of an inch. The permanent settlement recorded at the completion of the test was just under one-half inch.

The results of these tests indicate that the calculated theoretical load carrying capacities of these piles in granular sediments closely approximate the actual test load.

No new equipment was purchased during the year, but improvements were made on old equipment in an effort to make it safer or more efficient. One such improvement was the installation of safety holders for casing driving hammers on all drilling machines, permitting easier handling with less hazard to personnel.

Normal drilling operations included foundation exploration for more than 400 bridge structures and a total of 23,691 feet of retaining walls.

### *Bridge Construction Costs*

Bridge construction costs, as measured by the Bridge Department Index (base year 1939-40 = 100), began the year with an index value of 260 and moved successively to quarterly values of 262, 253, 237, and 245. The period was characterized by especially keen competition among contractors and by a 6 percent reduction in the level of construction costs.

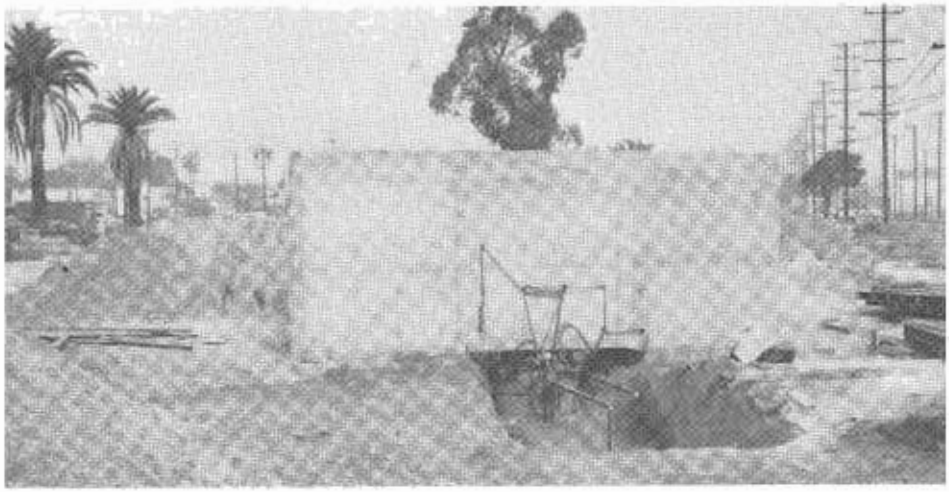
## BRIDGE OPERATIONS

Sixty-seven bridge contracts were completed during the year at an approximate total cost of $34,262,000, which includes $8,842,000 in road work. In the same period approximately $37,342,000 worth of structure work was completed in 68 district contracts for an overall total of $71,604,000 on 135 projects involving more than 397 individual structures. This compares with 440 structures constructed in the preceding year. The reductions resulted from uncertainty about federal financing during a part of 1959. At the end of the fiscal year, 121 bridge construction contracts in progress amounted to $158,264,000, including projects financed from various fiscal year budgets and work being performed on Federal Aid Secondary Projects and for other state agencies. This also includes funds for the Benicia-Martinez Bridge and the West Branch Feather River Bridge.

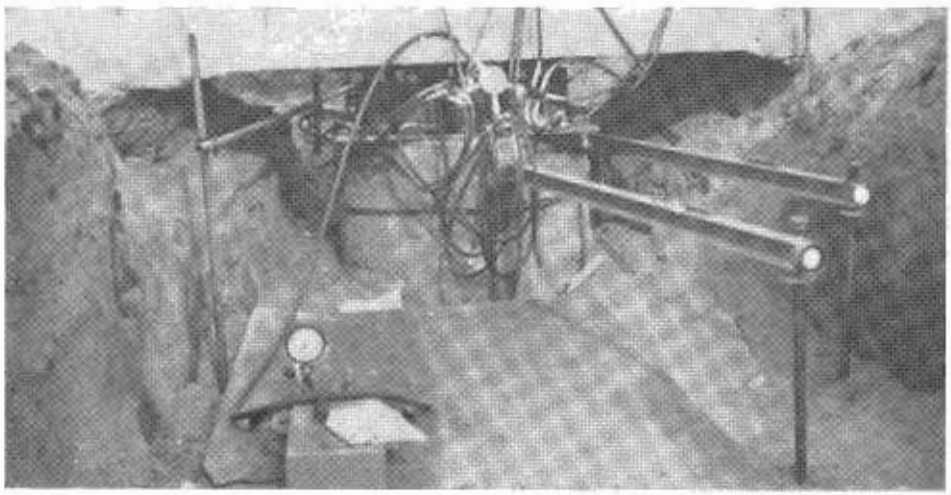
Construction was started on the combination highway and railroad bridge across the West Branch Feather River. This two-deck structure is a part of the relocation of US 40 Alternate and the Western Pacific Railroad around the proposed Oroville Dam and Reservoir. The bridge will have four main truss spans, with a combined length of 1,820 feet and of highway approach spans 911 feet long, for a total length of 2,731 feet. A four-lane highway will be carried on the top deck and a single-track railroad on the lower deck.

### *Metropolitan Area Freeway Structures*

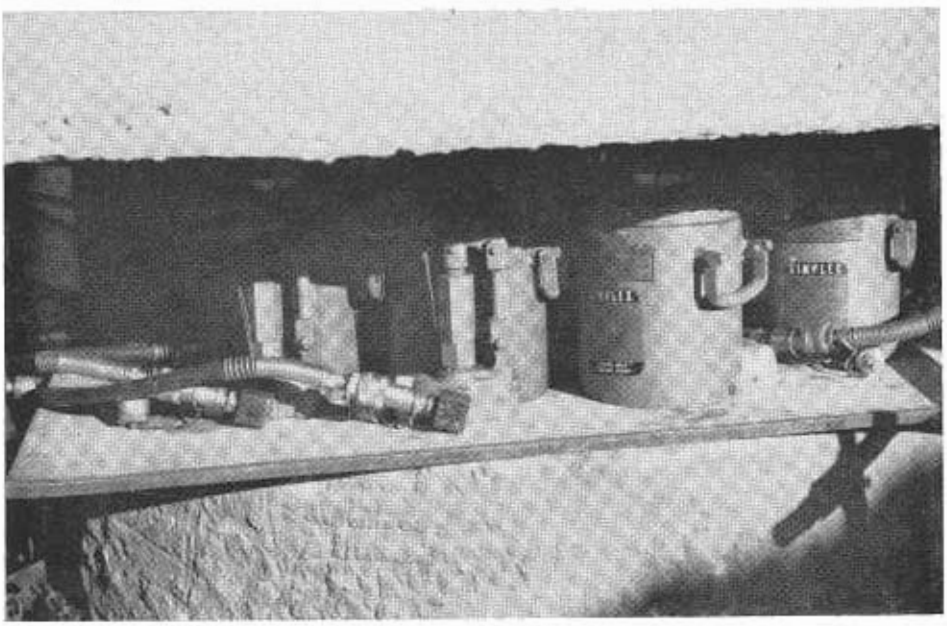
In San Francisco construction was completed on the Route 2/68 Separation, part of a major interchange at the junction of the James Lick Memorial (Bayshore) Freeway and Alemany Boulevard (Southern Freeway). Final construction cost was approximately $6,200,000. The interchange facilitates traffic movements between the freeways and is designed to provide for future extension of the



*The Bridge Department tested the load carrying capacities of cast-in-drilled-hole piles on the Santa Monica Freeway in Los Angeles. A specially engineered concrete beam (above) was used in the test.*



*Test holes were applied by jacking against reaction piles and the concrete beam.*



*A total load of 900 tons was applied to the pile by a battery of 100-ton hydraulic jacks (above) operated from a central pumping unit.*

Southern Freeway to the east. The bridge work consisted of constructing four bridges, widening a bridge and extending two pedestrian undercrossings. The main interchange structures are of reinforced concrete box girder construction, except one 115-foot suspended span which is precast, prestressed concrete girders, supported on box girder cantilevers. The precast members were built so as to simulate box girder construction for aesthetics.

The Walnut Creek Bypass Freeway was completed, involving construction of 16 structures at a cost of $3,357,000. This facility takes Sign Route 21 (Interstate 680) around the congested city streets of Walnut Creek, connecting it with Sign Route 24 to the west by means of a major three-level direct interchange.

At the end of the year, work was nearly completed on four structures, included in the project providing the final US 40 freeway link through El Cerrito and Richmond.

Construction was well under way on the first two units of the MacArthur Freeway (US 50) in Oakland with a call for bids issued for the third unit. Approximate construction cost of the nine structures in the first two units is $4,245,000. Estimated cost of the 14 structures in the third unit is over $2,000,000.

In Los Angeles, the Santa Monica Freeway, the Los Angeles River Bridge and Overhead and the interchange at the Harbor Freeway were completed, and two contracts comprising 2.3 miles of the Santa Monica Viaduct, linking the Harbor Freeway with the Santa Ana-Golden State-Pomona Freeways, were under construction. Thirty-one structures were included in projects completed on the Ventura Freeway through the San Fernando Valley.

The Mulholland Drive Overcrossing, spanning the future San Diego Freeway, was completed. This is a curved soffit box-girder with a center span of 235 feet, the longest of this type ever built in the West.

In the San Bernardino-Riverside area, completion of six interchange structures on the San Bernardino Freeway between Ontario and Colton

marked completion of construction necessary to convert this highway from expressway to full freeway standards, between Los Angeles and San Bernardino.

Late in the year, work was started on the four-level structure interchange which will be the hub of the San Diego Freeway system.

### *Webster Street Tube*

Work started on the Webster Street Tube under the Oakland Inner Harbor between Oakland and Alameda. The contract cost is $16,641,000, the largest contract ever awarded for California highway work. Right-of-way costs exceed $3,000,000 and supplemental railroad work is estimated at $180,000. The total cost of the entire project will exceed $20,000,000.

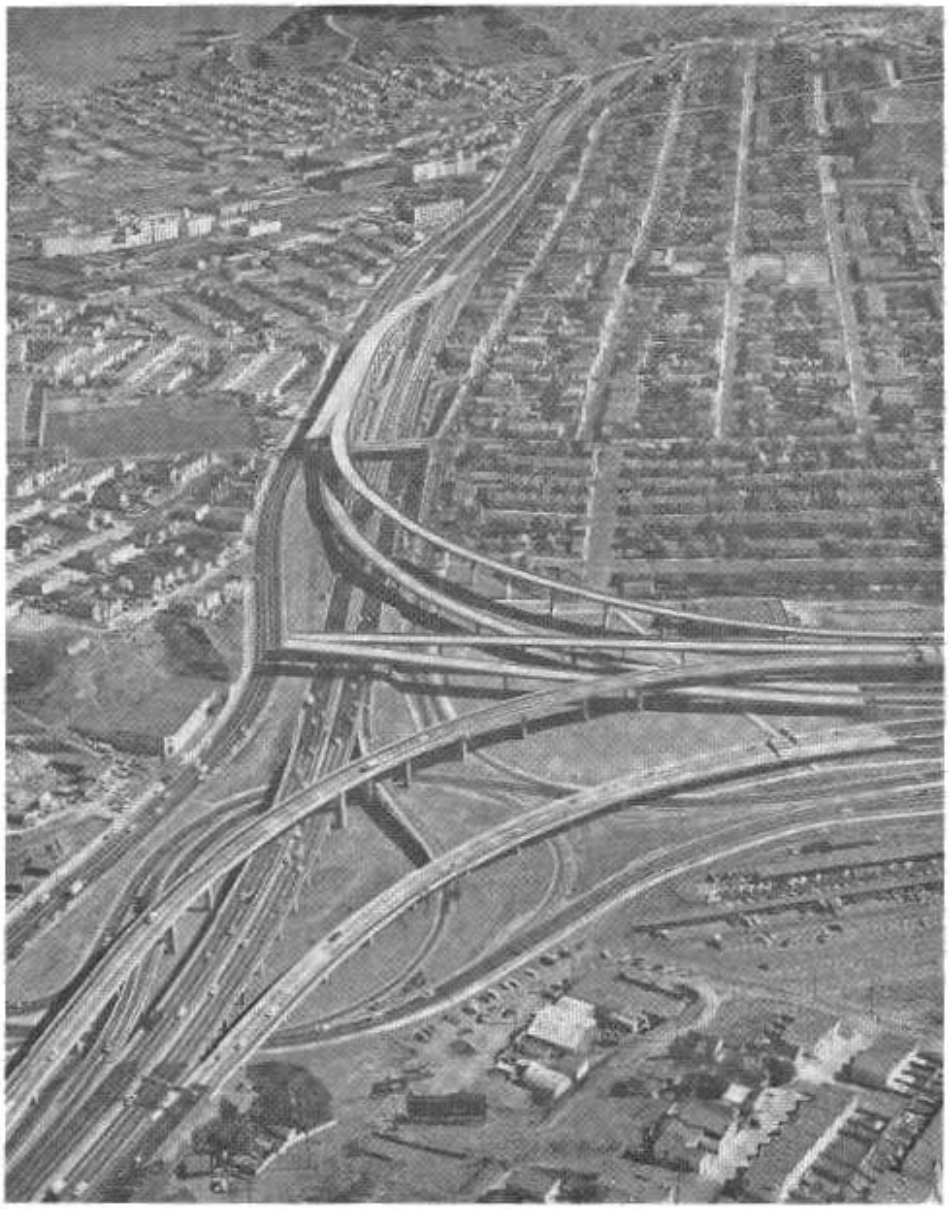
The new tube parallels the present Posey Tube, which is one block to the east. After the Webster Street Tube is opened to traffic in the fall of 1962, the old and the new tubes will operate as a divided highway with each carrying two lanes of one-way traffic. All controls will be located in the Oakland Portal Building of the Posey Tube.

The new tube will have ceramic tile ceilings and walls down to the roadway level and two lines of continuous fluorescent light. The roadway will be 24 feet wide with a sidewalk on one side for pedestrians and tube personnel. The portal to portal length of the structure will be 3,350 feet. The minimum structure depth will be 40 feet below mean lower low water under the 700-foot wide Oakland Inner Harbor ship channel.

The tube itself will be made up of 12 precast segments, 37 feet in diameter and 200 feet long, with one cast-in-place section 783 feet long. The precast segments will be fabricated in a graving dock constructed by the contractor, launched, floated to the site, and lowered into position in a predredged trench.

### *Federal Aid Secondary Bridges*

The Bridge Department assists, and advises the counties in all matters pertaining to bridges on county roads included in the Federal Aid Secondary System.



*Recently completed interchange at the junction of the James Lick (Bayshore) Memorial Freeway and the Southern Freeway in San Francisco. Stub-ends on structures will connect with future easterly extension of Southern Freeway.*

During the fiscal year, 12 bridge contracts were awarded for the construction of 12 bridges and one highway separation structure at a total contract cost of over $2,300,000. There were also 13 major structures, costing $600,000, in 10 road contracts. This construction in 20 different counties was under the general supervision of state personnel. County engineering staffs designed and prepared plans for 15 of these projects and furnished the construction engineering for 19 projects.

Under the provisions of the Flood Relief Law of 1956 and the Budget Act of 1958, plans were reviewed and approved for the repair or reconstruction of flood-damaged county bridges having a total estimated construction cost of more than $1,000,000. County personnel designed and supervised construction of all these county contracts with state advice and assistance as required.

### *Bridge Maintenance*

Bridge maintenance involves keeping the 6,518 bridges on the State Highway System in a safe and serviceable condition. Periodic field investigations are made; plans are pre-

pared for needed repairs and minor improvements; capacity ratings are reviewed and kept up-to-date; and replacements of structurally critical bridges are scheduled as necessary.

Bridge maintenance work and repairs, not including painting, cost about $450,000 during the year. Additional minor improvements, together with major repairs financed from construction funds, cost $150,000.

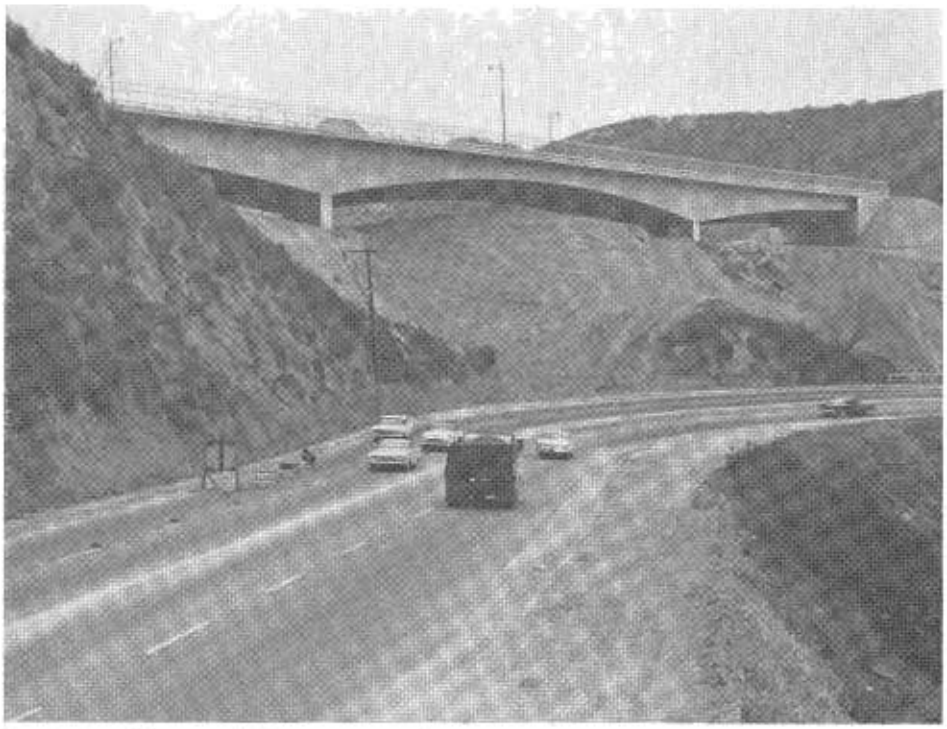
A flash flood on August 17, 1959, washed out four spans of a timber bridge across Crestview Wash on U.S. Highway 66 west of Needles. The approach roadway fills were also damaged at 12 other bridges in the area. Traffic was routed over a local county road until a short detour could be constructed around the Crestview Wash Bridge, and the approach fills restored at the other bridges. The four spans at Crestview Wash were replaced under contract.

A fire destroyed a two-span, timber bridge across Coral Wash on U.S. Highway 99 adjacent to the Salton Sea. A local detour was constructed by maintenance forces and the damaged structure was later replaced with a concrete bridge built under contract.

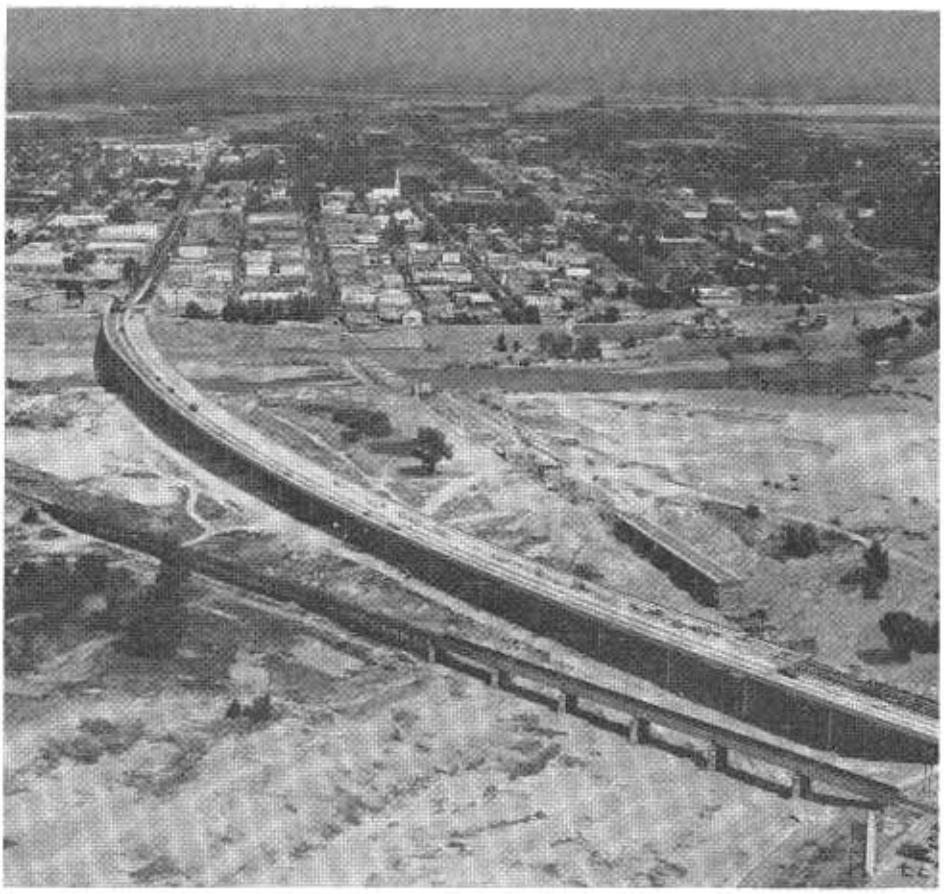
Flood waters of Hayfork Creek washed out an abutment of a bridge on State Sign Route 36 at Wildwood in Trinity County, causing the collapse of a 30-foot end span. The damaged span was removed and replaced with one of temporary construction. A new abutment and a permanent span will be constructed under contract.

Engineering investigations were made as required by law and at the request of the local authorities to determine safe load capacities on 99 city and county bridges. Ten public hearings were held in connection with the posting of weight limits on 15 of these bridges.

New construction made possible the dropping from the posted bridge list of two structures with load postings and four bridges with speed postings. On June 30, 1960, there were six structures on state highways posted for reduced loads and 38 for reduced speeds.



*This bridge will carry Mullholland Drive over the future San Diego Freeway through the Santa Monica Mountains in Los Angeles. The earth embankment below the bridge will be removed to make way for the freeway.*



*A new bridge over the Yuba River on US 99E at Marysville was completed earlier this year. This aerial photograph shows the structure while construction was still in progress. Note old bridge (right) being removed.*

The accompanying list of bridges shows all structures on the State Highway System, including the San Francisco Bay Bridge and the Carquinez Bridge, but excluding the Richmond-San Rafael Bridge. Structures having assorted types and lengths of spans are shown by number and length on the basis of the main span, but areas have been segregated and appear under the various type headings. Areas of bridges are based upon the clear width of roadway between curbs plus the clear sidewalk width.

### *Bridge Maintenance Painting*

Six maintenance painting contracts were awarded involving 13 structural steel bridges. Total allotment for these contracts was $212,292. Painting was completed on 67 new bridges with over 2¾ million square feet of surface area.

Co-operative studies on experimental paint coatings by the Bridge Department and the Materials and Research Laboratory resulted in several revisions in standard paint formulations. Laboratory and field tests are continuing in an effort to gain information toward further prolonging paint system service-life.

A notable change in color of steel bridge finishing coat paint was made this year. Henceforth, steel bridges on state highways will be finished in new green colors, except for those in desert areas and some railroad bridges. Two new formulas were developed, one for the moist coastal atmosphere and one for the drier interior sections of the State. Nine bridges were being painted with the new colors in 1960.

Painting inspectors made about 700 inspections of bridge paint condition during the winter season. These inspections covered approximately 68 percent of the 1,021 state highway bridges which contain steel members.

### *Special Studies*

The Special Studies Section provides engineering service on problems not included in established procedure for bridge production. Studies of a continuing nature are conducted in co-operation with interested and regulatory agencies. Topographic and hydrographic maps are filed and maintained for general usage, including determination of drainage areas and channel slopes for estimating flood flows. A library of engineering data is maintained.

Both independent and co-operative studies were conducted in the fields of hydrology, hydraulics, drainage, bridge pier scour, and bank protection. Technical information for legal actions was provided for the Division of Contracts and Rights-of-Way.

Technical papers were prepared on the riding qualities of bridge approaches and freeways in the Los Angeles area and on rules of law and terminology applicable in highway drainage matters.

Representatives of the Bridge Department serve on special committees studying such problems as land subsidence in the San Joaquin Valley and landslides at Pacific Palisades.

The Task Force Committee for the Palisades Landslide Study, which includes representatives from the Cities of Los Angeles, and Santa Monica

**BRIDGES ON THE STATE HIGHWAY SYSTEM SEGREGATED AS TO NUMBER, LENGTH AND AREA BY STRUCTURE TYPE**

**(As of June 30, 1960)**

| Structure type | Number | | Length (feet) | Area (square feet) |
|---|---|---|---|---|
| | 1960 | 1959 | 1960 | 1960 |
| Concrete Arch | 242 | 248 | 40,001 | 901,322 |
| Concrete girder | 1,649 | 1,549 | 334,267 | 19,148,076 |
| Concrete slab | 2,234 | 2,185 | 134,402 | 5,523,767 |
| Masonry arch | 33 | 32 | 962 | 21,735 |
| Subtotal concrete and masonry | 4,158 | 4,014 | 509,632 | 25,594,840 |
| Steel arch | 5 | 5 | 1,708 | 26,760 |
| Steel plate girder | 322 | 279 | 171,150 | 5,698,357 |
| Steel stringer | 287 | 294 | 62,846 | 3,676,025 |
| Steel deck truss | 29 | 29 | 23,610 | 1,181,869 |
| Steel pony truss | 34 | 38 | 11,039 | 181,254 |
| Steel through truss | 69 | 70 | 116,965 | 1,512,874 |
| Suspension | 2 | 2 | 15,097 | 884,145 |
| CMP multiplate & arch | 65 | 63 | 1,330 | 45,094 |
| Subtotal steel | 813 | 780 | 403,745 | 13,206,378 |
| Timber arch | 3 | 3 | 859 | 6,352 |
| Timber stringer | 669 | 676 | 48,314 | 2,320,269 |
| Timber deck truss | 10 | 11 | 2,753 | 34,869 |
| Timber pony truss | 3 | 3 | 376 | 5,802 |
| Timber through truss | 1 | 1 | 79 | 1,722 |
| Subtotal timber | 686 | 694 | 52,381 | 2,369,014 |
| Total bridges | 5,657 | 5,488 | 965,758 (183 miles) | 41,170,232 (945 acres) |
| Underpasses | 185 | 182 | | |
| Overheads* | 215 | 201 | | |
| Combined bridge & overheads* | 42 | 38 | | |
| State highway separations* | 214 | 196 | | |
| Road undercrossings* | 738 | 660 | | |
| Road overcrossings | 561 | 487 | | |
| Pedestrian undercrossings* | 158 | 151 | | |
| Pedestrian overcrossings | 67 | 64 | | |
| Cattlepasses* | 92 | 74 | | |
| Tunnels | 20 | 21 | 14,199 | |
| Retaining walls | 6 | 7 | 4,707 | |
| Miscellaneous | 22 | 20 | 1,909 | 20,266 |
| Total structures | 6,518 | 6,269 | 986,573 | 41,190,498 |
| Drainage pumping plants | 178 | 171 | | |
| Railroad grade crossings | 720 | 755 | | |

* Separations so noted are listed under structure type above.
NOTES: One underpass, 17 overheads, 1 tunnel, and 1 bridge and overhead also serve as State highways separation.

and Los Angeles County, submitted a comprehensive report to the Legislature in January 1960. Recommendations were based on information obtained in a series of field tests and in research on past slides.

### *Culvert and Hydrological Studies*

Several continuing studies are in progress including a culvert pipe cost study based on contract prices; observation to test criteria used for design of reinforced concrete pipe; and research and analysis on bridge scour and culvert design.

A statistical method for depicting culvert distortion, employing the use of ogives, was useful in evaluating recorded data.

Hydrological studies to determine design recommendations for flow in channels and to provide a basis for estimating flow from areas to be drained by culverts on the future Westside Freeway in San Joaquin Valley were continued.

Studies of existing underpass drainage facilities have been made for the purpose of relating the pumping capacity and storage volume to flow entering the underpass.

## BRIDGE OFFICE ENGINEERING

Bridge Office Engineering includes the administration and management of the various service units in the Bridge Department such as accounting, personnel, supply, equipment, files, mail handling and distribution, and maintenance and preparation of various records and reports.

A major function is the negotiation and preparation of maintenance and construction agreements with railroads in connection with construction of railroad grade crossings and grade separations.

### *Railroad Grade Separations*

Forty-eight contracts involving railroad structures were awarded during the year, including 45 grade separation structures, two widenings, and one sidewalk addition.

Railroads contributed to the construction costs on nine of the separation structure projects, either in lump sum or on a percentage basis. A private business firm and a city also shared in the cost of structures. The Department of Water Resources is financing the West Branch Feather River Bridge, a highway-railroad structure.

### *Local Roads and Streets*

The Public Utilities Commission issued a 1959-60 priority list containing 19 proposed separation structure projects to eliminate railroad grade crossings on county roads and city streets. According to state law, $5,000,000 in state highway funds is set aside by the Highway Commission each year to pay half of the cost of such separation projects, after deducting the railroad contribution.

As of June 30, 1960, allocations in the amount of $4,990,788.85 had been made by the Highway Commission from the 1959-60 fiscal year funds for seven of the 19 projects on the PUC list.

During the fiscal year, six applications were made to the State Reclamation Board for reconstruction of existing structures and construction of new structures.

## SPECIAL PROJECTS

### *Carquinez Bridge*

All phases of the construction work on the Carquinez Bridge have now been completed. The new parallel bridge was opened to traffic November 25, 1958. The widened and improved old structure, with new approach connections, was opened April 29, 1959.

Traffic on the Carquinez Bridge has exceeded preconstruction estimates made by bonding consultants. If this rate continues, it will be possible to pay off the bonds before the originally scheduled 1982 retirement date.

During its first year of operation as a toll facility, 11,907,018 vehicles used the parallel bridges, an increase of 15.5 percent over the previous year's traffic on the old bridge. Traffic counts were also up during the first part of 1960.

### *Benicia-Martinez Bridge*

On July 22 and 23, 1959, bids were received for the substructure and the superstructure contracts for the main bridge between Benicia and Martinez.

This 6,215-foot structure will consist of a series of deck trusses and approach span girders. The deck trusses are from 330 to 528 feet long and the approach girder spans vary in length from 90 to 197 feet.

The roadway will provide for four traffic lanes with a 10-foot painted division strip down the center which can be used for emergency parking. Vertical clearance to be provided at the navigation channel is 138 feet above mean sea level. This is the same clearance as provided by the adjacent railroad lift bridge in its raised position.

By June 30, 1960, the construction progress on the bridge was considered satisfactory in view of the fact that both contracts had been delayed for more than three months due to the steel strike in the summer of 1959. The bridge is scheduled to be opened in July or August 1962.

At the end of the year, the foundation work included construction of the approach span piers and work to various stages of completion on four of the water piers.

Nine of the water piers are being constructed by precasting the cellular concrete footing blocks 44 feet wide by 86 feet long and 25 feet deep on shore, floating them into place and while anchored in position lowering six-foot diameter steel caissons through openings in the footing. The caissons are sunk into bedrock, which in most cases is about 120 feet below the water surface, by a huge rotary drill and

an air lift pump. Once the caissons have been drilled into bedrocks, they are filled with concrete, after which the load of the footing block is transferred to the caissons. After completing the concrete anchorage of the footing block to the caissons and placing the reinforced concrete top slab, the footing is ready for the start of construction of the pier shaft. The reinforced concrete pier shafts vary in height from 70 to 120 feet and are constructed by the slip form method.

This method of constructing deep water piers by floating the box footing into place and sinking large concrete filled steel caissons through them represents a revolutionary and progressive change over previous methods. It should prove economical and time-saving on future bridge construction projects where appropriate foundation conditions exist.

### *San Pedro–Terminal Island Bridge*

The 1959 Legislature provided for the financing of the San Pedro-Terminal Island Bridge and highway facility. The funds will be from revenue bonds, state highway funds, and gas tax money available to the City and the County of Los Angeles. The bonds will be retired, and other funds repaid, through toll collections.

One small contract had been awarded in connection with the project at the end of the fiscal year. This job involved grading for relocation of a short section of railroad track.

Four other contracts were to follow for construction of the bridge substructure, the superstructure, the toll plaza and approach roadways, and for the installation of toll collection equipment.

## STATE-OWNED TOLL BRIDGES— OPERATION AND MAINTENANCE

### *San Francisco-Oakland Bay Bridge*

A record total of 38,440,097 vehicles crossed the San Francisco-Oakland Bay Bridge during the year. This is a gain of 3.29 percent over the previous year. The daily average for the year was 105,315.

The month of highest average daily traffic was June 1960, with a new high record of 110,411 vehicles per day. The previous high was in June 1959, when the daily average was 107,386 vehicles. A new single-day traffic record was established on September 4, 1959, with a total of 126,865 vehicles for the day. The preceding high was 123,488 vehicles on June 19, 1959.

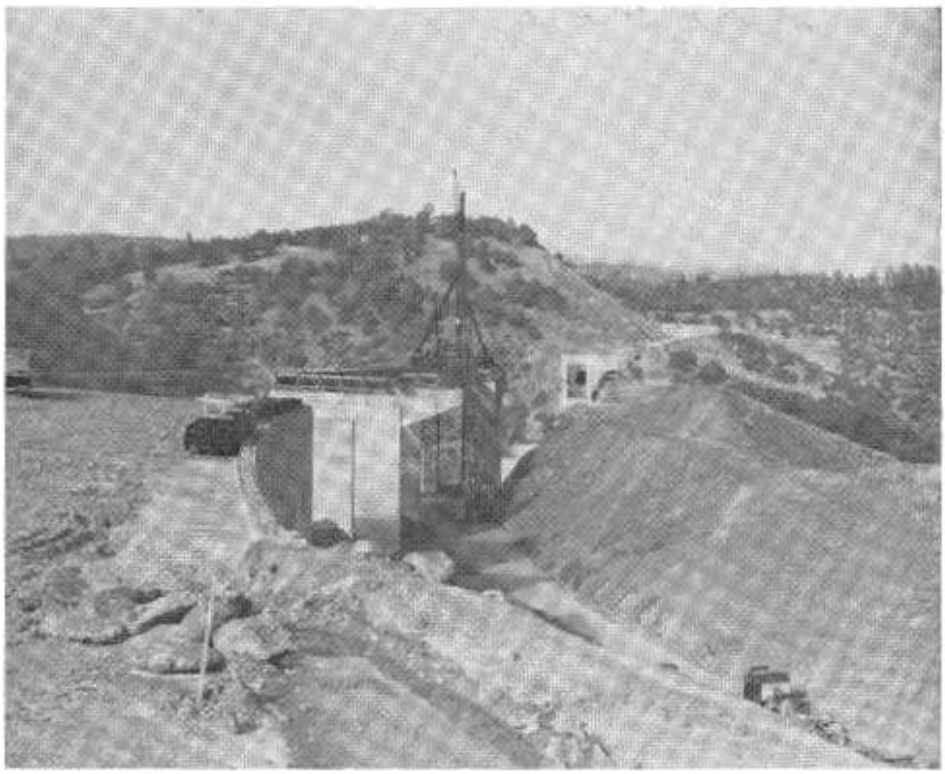
The revenue derived from vehicular tolls, rent, interest, and miscellaneous services was $13,041,644.41. This was an increase of $652,094.34 over the revenue of the previous year.

In accordance with the action by the Toll Bridge Authority new truck tolls went into effect on May 1, 1960. Truck tolls were changed from a gross weight to an axle basis, with tolls established in multiples of 25 cents for all trucks. In each axle group, this change resulted in increases in tolls for some trucks and decreases for others, with an overall result of a small drop in revenue. This should soon be offset by normal increases in traffic.

Adoption of the axle-count method of assessing truck tolls resulted in greatly improved service to commercial haulers and eliminated the long lines of trucks which were frequently waiting at the toll plaza under the weight basis of toll assessment.

### *Improvements to Bridge Facilities*

The remodeling of the Transbay Transit Terminal to convert it from train to bus operation was continued by the Division of San Francisco Bay Toll Crossings. Work also proceeded on revising the connecting ramps at the San Francisco end of the bridge and the south side of the Oakland approach. Train tracks were removed and replaced with precast concrete deck sections between San Francisco and the west end of Yerba Buena Island. One lane of new construction



*New bridge now under construction over West Branch Feather River north of Oroville. The combination highway-railroad bridge is being built as part of the relocation of U.S. Highway 40 Alternate around the reservoir to be formed by the future Oroville Dam.*

on the lower deck was opened to traffic on May 17, 1960, so that at the end of the year there were two lanes in use in each direction on the lower deck between San Francisco and the island.

### *Bridge Maintenance*

As in previous years, this item consisted primarily of painting. At the end of the year, the bridge painting crew consisted of two foremen, six leadmen, 60 painters, two laborers, and four highway equipment operator-laborers. Painting operations had to be temporarily suspended at various locations at times to avoid conflict with the remodeling program.

Two new truss web scaffolds, for use on the 288-foot spans east of Pier E11, were purchased and installed.

Construction of a lower-deck traveler in the 288-foot spans from Pier E11 to Pier E23 was completed. This work consisted of installing two rails, each 3,500 feet long, below the lower deck and providing a traveling scaffold which is suspended from the rails.

Workmen erected the steel rails, a section at a time, from walkways cantilevered out from the traveler itself. As each new section of rails was bolted in place, the traveler moved out on it, placing the cantilevered walkways in position to erect the next section. Thus, the traveler moved out over open water like a giant spider, leaving a freshly spun web of steel rails behind it.

The traveler provides the painters with a 19- by 73-foot platform for use as a scaffold. The extremities of the traveler are cantilevered wings that can be folded back to allow it to pass the bridge piers. When the wings are extended, the painters can reach the widest parts of the bridge.

The traveler is driven by a pair of trolleys powered with compressed air supplied by a compressor on the Oakland shore and delivered by a pipeline running along the lower deck of the bridge.

The new rails contain 141 tons of structural steel and form a portion of a trackwork system which will, when completed, run under the entire length of the upper and lower deck roadways.

Only 6,000 feet of the 41,000-foot system remain to be constructed. A total of six traveling scaffolds have been added by the Division of Highways since the bridge was completed. These scaffolds greatly reduce the number of man-hours a paint crew would spend rigging conventional hanging scaffolds. They also provide a much safer work area for the men.

Just before the end of the fiscal year, work was begun at the West Bay paint yard, improving the facilities and constructing a new concrete building. This work is being done under a contract by the Division of Architecture. Planning was also begun on improvements at the toll plaza warehouse, with the objective of moving the East Bay paint crew headquarters from 34th and Wood Streets, Oakland, to the toll plaza location.

The total amount expended on general paint maintenance for the Bay Bridge was $720,360.17.

### *Emergency Roadside Service*

The emergency fleet for roadside service consists of five tow trucks, four special bridge service pickup trucks operated in periods of peak traffic, and a fire truck. The continued increase in traffic volume, plus the increased number of automobiles diverted to the lower deck to relieve congestion on the upper deck, required a high level of emergency roadside service.

### *Toll Collection*

Two different types of automatic toll collection machines were used on a trial basis for most of the year. The experiment indicated that permanent use of the machines was not advisable. The equipment did not increase lane capacity. Some additional traffic hazards resulted, due to last-second lane changes by persons who did not have the right change. The machines could not handle passes and commute tickets. For reasons such as these, the machines were removed in May 1960.

### *San Mateo–Hayward and Dumbarton Bridges*

The total traffic on the San Mateo-Hayward Bridge for the year was 3,653,761 vehicles, and the toll revenue amounted to $1,426,821.05. For the same period, the traffic on the Dumbarton Bridge was 2,109,059 vehicles, with a corresponding toll revenue of $868,801.70. These figures, compared to those of the preceding fiscal year, indicate an increase in traffic of 274,207 vehicles on the San Mateo-Hayward Bridge and an increase of 338,071 vehicles on the Dumbarton Bridge.

No changes in toll rates were made during the fiscal year.

The lift span operation was continued on both bridges as required by federal law. During the year there were 1,875 lifts of the San Mateo-Hayward Bridge and 954 lifts of the Dumbarton Bridge.

### *Improvements to Bridge Facilities*

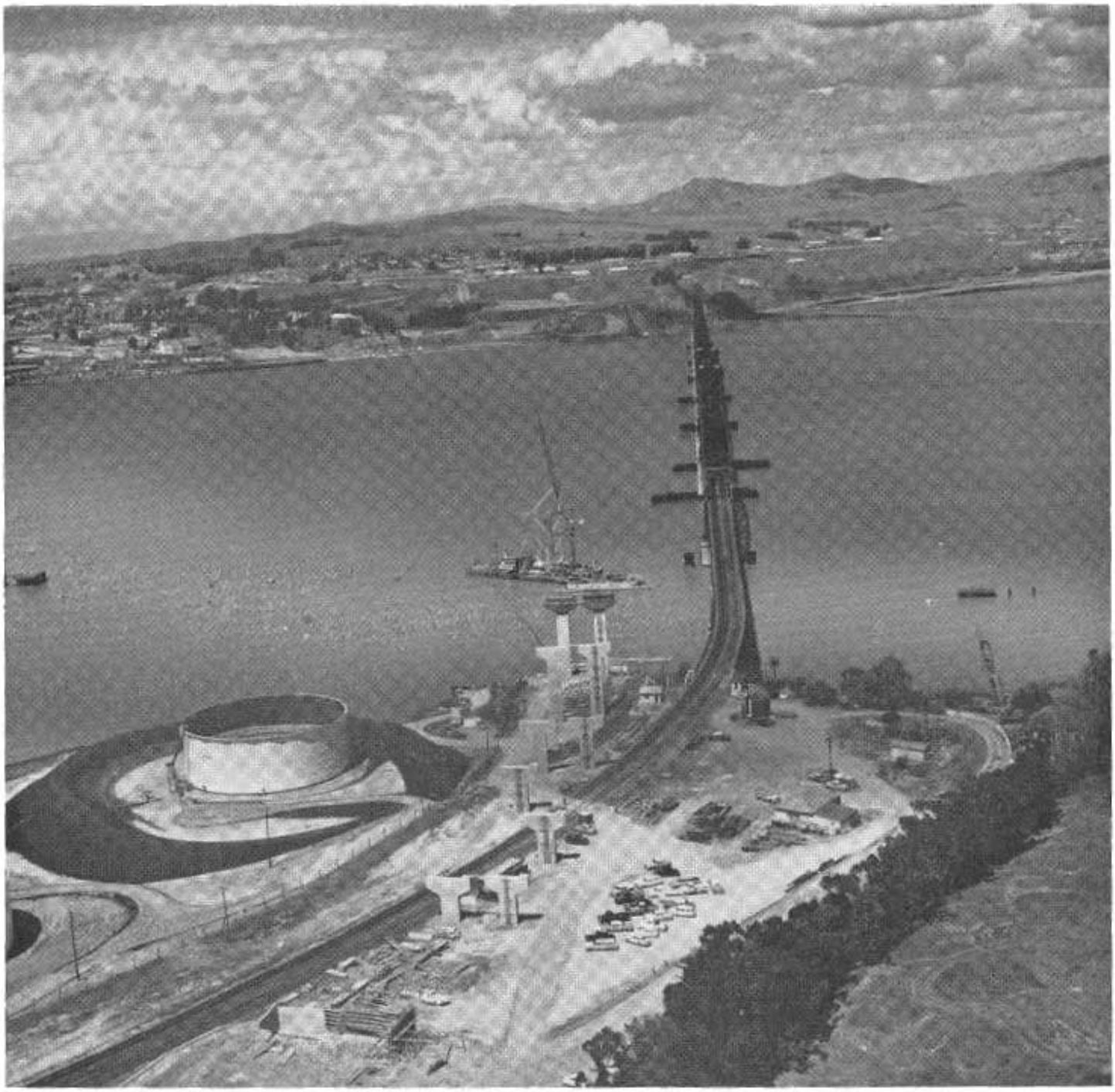
The Division of San Francisco Bay Toll Crossings started construction operations which will ultimately result in expanding the traffic capacity of the San Mateo-Hayward Bridge. The extent of this work to date consists of dredging an access channel and depositing fill material at the west end of the bridge.

New electronic toll registration equipment was installed at the San Mateo-Hayward Bridge toll plaza.

Construction of embankments at the new Dumbarton Bridge toll plaza site was completed in June. This was the first of two projects required to complete the toll plaza, which is due to be finished in late 1961. A temporary toll plaza was also completed in June. This facility provides for two lanes in the most heavily-traveled direction during peak periods and materially reduces traffic congestion.

### *Rehabilitation*

The program of structure rehabilitation provided for through the bond resolution was completed August 31, 1959. The cost of this work, plus the cost of minor rehabilitation work on the bridge approaches, amounted to about $3,300,000. The unused balance of about $200,000 in the Rehabilitation Fund was made available for partial financing of improvements of the Dumbarton Bridge approach roads. As of the end of the fiscal year, plans



*Construction is continuing on the new Carquinez Strait toll bridge between Benicia and Martinez. This photograph, taken in April, shows the nearly completed concrete approach piers on the Martinez side. The large floating derrick in the water is used to set steel caissons in place.*

had been completed for this work and the job was ready for advertising.

### Maintenance

Maintenance costs of the San Mateo-Hayward and Dumbarton Bridges were paid from the State Highway Fund, in accordance with state law and the bond resolution. The principal maintenance item, painting, was continued throughout the year on the Dumbarton Bridge.

Construction of two timber pile dolphins at the navigable channel of the San Mateo-Hayward Bridge was completed in December, 1959. This work was necessary to provide immediate protection for the bridge substructure, after the easterly fender structure was demolished when struck by a ship. These dolphins were designed as an integral part of the fender reconstruction, which was completed in March. A claim was filed against the responsible party for reimbursement of the repair costs incurred.

### Richmond–San Rafael Bridge

The number of vehicles which crossed the Richmond-San Rafael

*Photo-sketch of the future San Pedro-Terminal Island Bridge over the main channel of Los Angeles Harbor. Plans call for the bridge to be financed partly by Toll Bridge Authority revenue bonds.*

Bridge during the year was 3,218,713, and revenue was $2,750,853.50. These figures represent increases of 9.53 percent and 9.14 percent, respectively, over the preceding year.

At the end of the fiscal year, the toll collection staff consisted of one toll lieutenant, four toll sergeants, and 19 toll collectors.

### Bridge Maintenance

The principal item in this category was the preventive paint maintenance program. The paint crew consisted of two structural steel painter foremen, two leadmen, and an average of 26 painters and two laborers. Electrical installations were maintained by a crew of four men, and roadway maintenance and roadway service was provided by five highway equipment operator-laborers under the supervision of a highway leadingman.

A contract to restore pier backfill material to the planned constructed limits was completed during February, 1960. Principal work was on Pier 30, a four-bell pier. Three other piers received rock backfill to bring the protective blanket to the desired elevations. This work cost $17,006.55.

The radio transmitter and aerial were moved from the Richmond Maintenance Building to a hill adjacent to the toll plaza. This move will afford better directional cover of the entire bridge for radio transmission and receiver reception.

Twenty-five thousand descriptive folders with a map of principal destination points in the area were obtained to enable toll collectors to issue them to patrons asking directions. This courtesy should help eliminate delays.

### Carquinez Bridges

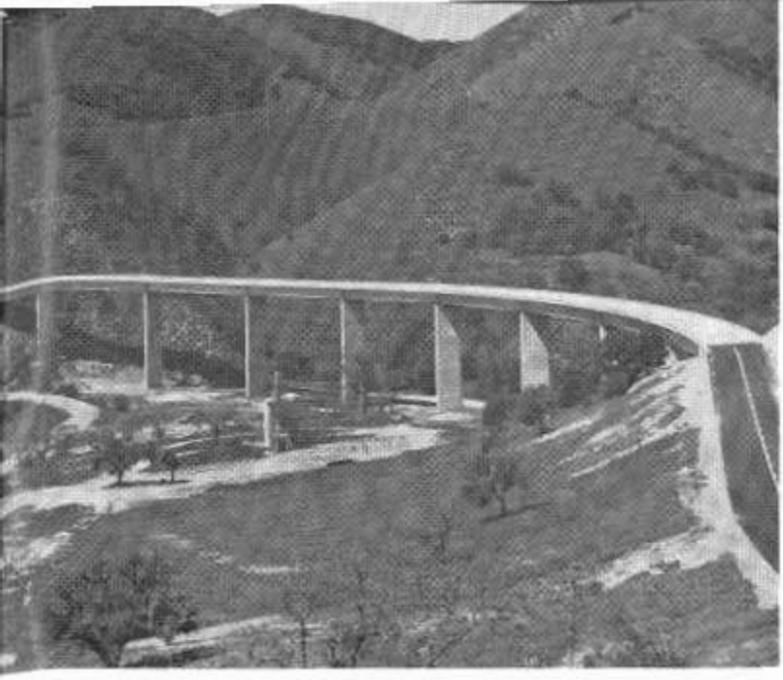
A total of 12,321,713 vehicles used the Carquinez Bridges during the year and a total of $4,346,641.75 was collected.

By action of the California Toll Bridge Authority, the toll schedule was amended, effective May 1, 1960, to extend the commutation book privilege to all Class 1 vehicles including certain types of pickup trucks. At the end of the fiscal year, the toll collection staff consisted of one toll captain, two toll lieutenants, four toll sergeants, and 40 toll collectors.

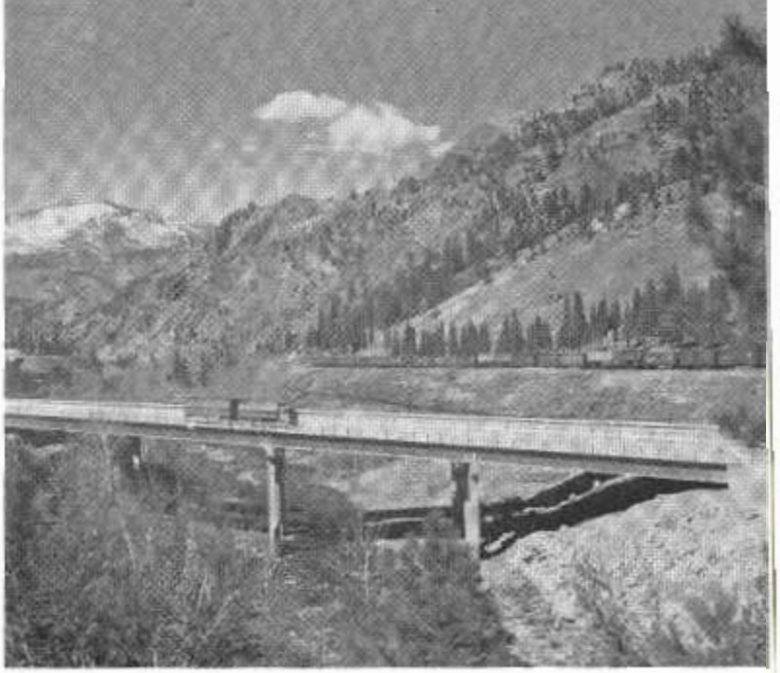
### Bridge Maintenance

The major maintenance consisted of cleaning and painting the west bridge. During the year additional rigging equipment was obtained which permitted more efficient use of manpower by providing easier access to the bridge. At the end of the fiscal year the paint crew consisted of one structural steel painter foreman, a leadman, 14 painters, and a laborer.

Miscellaneous maintenance to the bridge, buildings, and toll facilities was performed by the roadway maintenance and roadside service organization. This organization also provided emergency road service to the traveling public within the toll crossing limits and maintained a fog and navigation watch to make sure that the warning and safety devices were functioning properly. This organization consisted of four highway equipment operator-laborers and a laborer, under the supervision of a highway leadingman.



*The Huasna River Bridge on Sign Route 166 some 10 miles northeast of Santa Maria received first prize in Class II which includes bridges with fixed spans costing more than $500,000.*



*The Truckee River Bridge on US 40 13 miles northeast of Truckee received an honorable mention award in Class III which includes bridges with fixed spans costing less than $500,000.*

# Prize Winners

## *Four State-designed Bridges Receive A.I.S.C. Awards*

Four California bridges, all designed by the State Division of Highways, have been chosen as among the 15 most beautiful bridges opened to traffic in 1959 in the annual Aesthetic Prize Bridge Competition sponsored by the American Institute of Steel Construction, national association representing the fabricated structural steel industry.

A fifth California bridge, designed by a private engineering firm for the Port of Long Beach, was also among the prize winners.

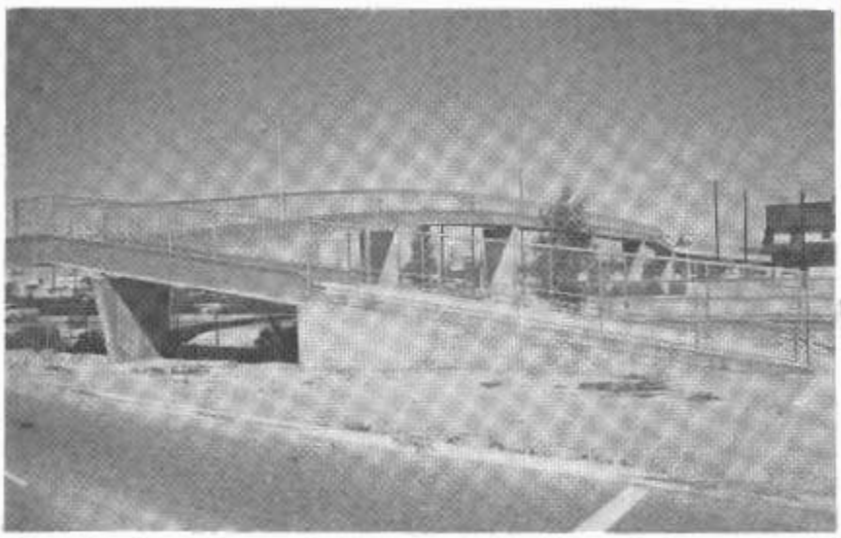
The Huasna River Bridge on Route 166, 10 miles northeast of Santa Maria, was chosen top award winner for Class II, bridges with fixed spans under 400 feet and costing more than $500,000.

The bridge "exemplifies a simple, direct statement of structure and design," according to the judges. "Here the designer utilizes simple form to obtain an overall pleasing effect." The judges also commented favorably on the rail design that is an integral part of the deck.

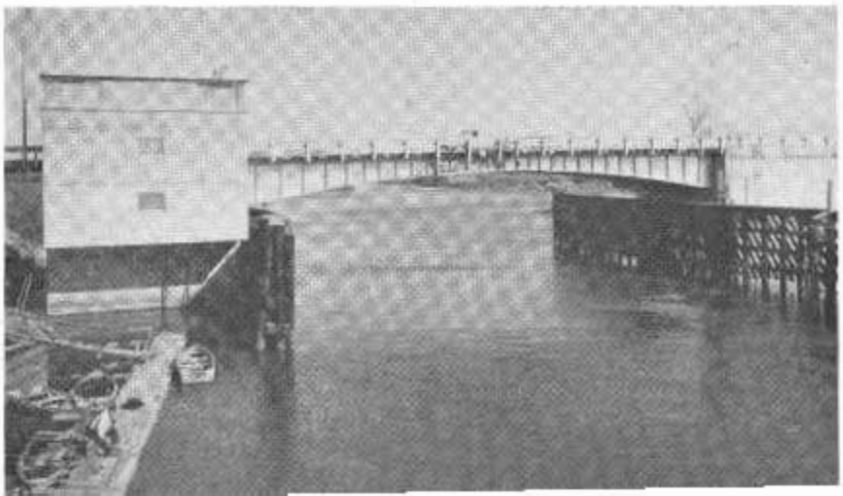
The Truckee River Bridge, 13 miles northeast of Truckee, was chosen for honorable mention in Class II, for bridges with spans under 400 feet costing under $500,000. "This is a straight-forward expression," said the judges. "Its simplicity is at home in its surroundings. The structural pattern does not offend the landscape."

The Kern Avenue Pedestrian Overcrossing, MacFarland, was also chosen for honorable mention in Class III. The judges praised the structural elements that "provide a pleasant rhythm with the landscape."

The Grant Line Canal Bridge was the only honorable mention in Class IV, movable bridges. The judges said it showed "an expressive use of material."



*ABOVE—Another Class III honorable mention award winner is the Kern Avenue Pedestrian Overcorssing across US 99 at McFarland. BELOW—The Grant Line Canal Bridge won an honorable mention award in the movable bridges class. It is located between Stockton and Tracy on Federal Aid Secondary Highway 907 (Tracy Road).*



# PERSONNEL AND PUBLIC INFORMATION

The functions of personnel, training and safety, and public information are grouped administratively under the direction of the Engineer in Charge of Personnel and Public Information. Activities in these fields for the 1959-60 fiscal year are covered in the following section.

## PERSONNEL

### *Personnel Management*

During this year, position classification studies resulted in the establishment of 12 new civil service classes, and in the modification of specifications for 17 job classes.

Five new classes were established in connection with the increased use of electronic data processing programs. New supervisory classes were established for better organization in the photographic section and the outdoor advertising inspection unit.

The study of the use of engineering technicians continued, with definitions developed to meet both operating and training employee development needs.

During the annual performance evaluation period in February, the personnel and training officers conducted seminars on the rating of employees with all supervisory personnel in three districts. In May, the division co-operated with seven other state agencies in a pilot study on proposed new method of performance evaluation which embodies greater emphasis on employee development, as well as improvement of performance on the job. Preliminary reports indicate a favorable reaction from employees.

Standardization of personnel programs and procedures throughout the division has received continued emphasis through training programs and visits to the districts by representatives of the headquarters personnel office.

### *Recruiting*

The major recruitment emphasis this year was again on the entering professional engineer level, junior civil engineer, with about 75 being employed from this year's graduating class. Summer use of engineering students was continued. A few new engineering student trainees were hired. Most of the students from the previous summer returned for additional work and training.

The continuous testing program for junior right-of-way agents was augmented, with satisfactory results. Newly developed performance testing for equipment operators has increased the caliber of eligibles on these employment lists.

### *Staffing Statistics*

The total number of employees in the division increased from 13,828 on July 1, 1959, to 14,057 on July 1, 1960, including 6,948 in engineering work, 3,634 in maintenance, 488 in right-of-way, 474 in equipment, and 2,513 in accounting, clerical and miscellaneous jobs.

Ninety employees were presented with 25-year service awards and pins during the year, and 127 employees retired.

Twenty-two employees were dismissed in disciplinary actions, of whom 5 had permanent status and 17 temporary status. Forty-nine employees were suspended for various causes. Nineteen probationary employees were rejected.

### *Foreign Visitors*

During this year, tours for 99 representatives of 29 countries were arranged in various departments and districts, most of them assigned to the division by the U.S. Bureau of Public Roads and other agencies.

## TRAINING

The personnel management policy of the State of California and of the Department of Public Works states with respect to training:

"Training. A planned program is required to develop the employee knowledges and skills necessary to meet the needs of the agency and of state service, and to keep abreast of constant advances in science and technology. Particular attention must be given to developing the managerial talent necessary to cope with the increasingly complex functions of state government."

During the year, training programs were conducted in the major areas of orientation, supervision and management, professional and technical engineering and right-of-way, maintenance, and clerical. There were 164,046 hours of formal training: 102,163 on state time, and 61,883 on the employees' own time.

### *Supervision and Management*

In connection with the work improvement program, 3,450 supervisors received special training. There were estimated savings of more than $263,000 as a result of adopted work improvement suggestions.

Eight division employees, representing top management, took part in the annual Interagency Management Conference sponsored by the Governor.

Other supervisory training programs included performance report training for 556 supervisors; a trial run for a new system of individual development plans; participation in the State Personnel Board "Training the Trainers" course; an experimental supervisory development plan in which employees rated supervisors; and supervisory workshops and seminars. Total training time for all supervisory and management training was 25,030 man-hours.

### *Professional and Technical*

Several formalized professional and technical training programs were conducted during the year.

A 12-hour course in drainage design in highway practice, given through the University of California's Institute of Transportation and Traffic Engineering, was attended by 582 persons on their own time.

Advanced transistor electronics was covered in a course attended by 128 persons. The course included 48 hours of demonstration and lecture, plus laboratory assignments.

All senior right-of-way agents were trained as instructors for workshop sessions dealing with right-of-way negotiations. Junior, assistant and associate agents participate in these monthly meetings at which methods and case studies are considered.

During the first two years of employment, junior civil engineers are given training assignments in design, construction, surveys, and other aspects of highway engineering. This rotation program continued during the year.

The professional and technical courses (excluding rotation) and other formal programs accounted for 75,547 man-hours, of which 20,555 were on the employees' own time.

Ninety-seven persons took part at state expense in short courses presented by various schools, including courses in real estate appraisal and condemnation, traffic engineering, motor vehicle maintenance and supervision and asphalt paving.

The various sections and units of the division sponsored 59,128 hours of training, 49,904 hours on employee-time. Among these was a comprehensive correspondence course in bridge design which was completed by 112 bridge engineers. The course required about 200 hours for each participant.

## EMPLOYEE SAFETY

The preparation, organization, and supervision of the statewide highway employee accident prevention program seeks to promote accident prevention methods, to prevent industrial accidents and injuries, and to prevent accidents involving state owned motor vehicles.

Full-time safety supervisors are assigned in 10 of the 11 districts. A part-time employee handles the job in one district. Part-time safety supervisors also serve in the bridge, service and supply, toll bridge, laboratory, and equipment departments.

The safety supervisors advise personnel regarding accident prevention practices, recommend protective devices, and conduct inspections to see that there is compliance with rules relative to good health, safety, and fire prevention.

The various districts and departments have a safety committee which meets monthly and reviews accident reports to determine appropriate action to prevent recurrence.

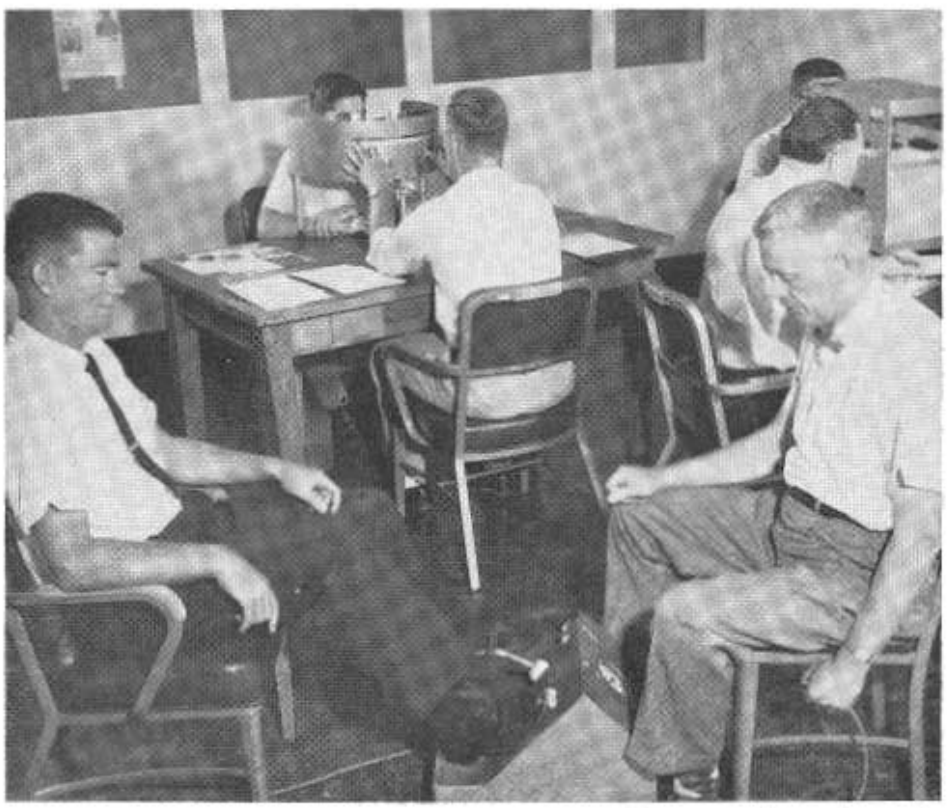
Minutes and statistical information from these meetings are submitted to the Headquarters Safety Section each month where they are consolidated and presented to the Division Safety Committee.

The Division Safety Committee acts on matters presented by the districts and considers other subjects relative to the program at regular monthly meetings.

### *Occupational Accidents*

All accidents involving division personnel or equipment are coded, and monthly and annual statistical reports prepared. Standard methods of recording and measuring work injury experience, as approved by the American Standards Association, are used for coding. Frequency and severity rates are compiled and used to indicate the effectiveness of the safety program. The division's accident frequency rate has been going down each year since 1940 when the rate was 49.85. In 1959 the frequency was 12.51. The number of employees has increased from 5,500 in 1941 to 13,343 in 1959.

The reduction in accident frequency has been paralleled by a comparable reduction in compensation cost. In 1950 compensation cost was 58 cents for $100 of payroll; in 1959 it was 37 cents with a payroll amounting to $88,706,717.



*The Employee Safety Section is conducting an extensive driver training program for employees who operate state automobiles in connection with their jobs. Special equipment is used to test reaction time (left), check peripheral vision (center), and to determine depth perception.*

Motor vehicle accidents involving state cars are also coded and analyzed. For several years defensive driving techniques have been promoted, and special equipment has been used to determine visual limitations and reaction time. Information thus determined is called to the attention of the employee to indicate any restrictions or limitations for which he should compensate in his daily driving.

In 1959 division cars traveled 68,219,191 miles. The accident frequency rate was 0.65. The division has achieved consistently lower frequency rates since 1950.

### *Driver Training*

All state agencies have been instructed by Governor Brown to start courses in defensive driving. Every employee who drives a state car is required to take the course.

The course consists of a three-hour lecture, psychophysical tests consisting of a check of peripheral vision, color vision, judgment of distance, visual acuity, and reaction time, and an actual road test in which the skill, habits, and attitudes of the driver are observed.

After June 30, 1961, no employee may drive a state car who has not had this training. The program is now well under way with three representatives of the Safety Section in headquarters co-ordinating the training in various districts and departments.

### *Fire Control*

Fire control demonstrations were held during the year covering the use of fire extinguishers for various types of fires. Employees actually practice putting out fires with the different extinguishers during these sessions. The testing of water- and foam-type extinguishers, which started in 1959, was completed.

### *Employee Suggestion Program*

During the year, 530 suggestions were referred to the Division of Highways for investigation and report under the Merit Award Program. Fifty-four were adopted with 49 employees being given cash awards and 30 receiving certificates of commendation. Seventy-three Work Improvement Program suggestions were reviewed, and 48 cash awards and 19 certificates were authorized.

## AUDIO-VISUAL

The Audio-Visual Section assists all headquarters departments, as well as the various districts, in producing graphic or sound recording aids for personnel training or public information uses.

A large collection of colored slides covering statewide highway scenes and a wide variety of technical engineering and construction operations is kept up to date. Audio-Visual equipment is available for use by headquarters or district personnel in training or public presentations.

The Audio-Visual Section is staffed to produce any type of graphic material from newspaper maps to complicated or technical art reproductions. It also produces and conducts experiments for new methods of transparency projection material, from slides, sound-filmstrips, and motion pictures, to animation and combination slides.

# PUBLIC INFORMATION

Public interest in various aspects of the state highway program continued at a high level throughout the fiscal year, with particular emphasis focused on the relationship of urban freeways to overall metropolitan transportation planning. More time and attention was devoted to this subject than to any other at statewide meetings and conferences on highway matters. One such conference was called by the Governor for the purpose of bringing community planning officials and highway engineers together.

The Division of Highways co-operated with the California Highway Patrol in publicizing the maximum 65-mile-an-hour speed limit which became effective January 1. A news release was published by many newspapers in the State, accompanied by an appropriate photograph in mat form. The picture showed a maximum speed limit sign near the Nevada state line on U.S. Highway 40. The change in the law necessitated creation of numerous new speed zones in locations where the former 55-mile prima facie limit applied, and press releases concerning them were issued by the districts.

In July 1959, when advertising of projects was curtailed because of federal financing problems, and again several months later, when nearly full-scale advertising was resumed, many inquiries were received from the press and trade publications as to the effects on California's highway program. This was in addition to basic information on the matter disseminated in press releases.

### State Fair Exhibit

After a lapse of some years the division resumed placing an exhibit at the California State Fair. The 1959 exhibit, "Freeways for You—Now and in 1980," was arranged in a 12- by 20-foot booth in the Industrial Building and drew the attention of thousands. It featured models of depressed and elevated urban freeways. A map of the California Freeway and Expressway System was displayed.

### Magazine Publication

The bimonthly magazine *California Highways and Public Works*, while devoted almost entirely in recent years to the activities of the Division of Highways, has always been edited in the Department of Public Works office. In September 1959, responsibility for the magazine was assigned by the Director of Public Works to the State Highway Engineer, and the public information staff in the director's office was consolidated with that of the Division of Highways.

### Publications

The Public Information Section became responsible for the dissemination of publications, as defined by the State Administrative Manual, to depository libraries. These include reports to the Legislature and other material reproduced by means other than printing, but do not include typewritten reprints or material intended only for use within the agency. The State Printing Office distributes printed material.

Public information material issued in published form included, in addition to regional material prepared by the various districts:

"California Highways—1959," a 16-page reprint from *California Highways and Public Works* magazine constituting a popularized, nontechnical version of the division's annual report.

"Freeway Facts," an illustrated booklet containing basic information about freeways and route adoption procedures, widely used at district public meetings.

Reprints of articles and district roundups published in *California Highways and Public Works* were used as information mailing pieces to answer a wide range of inquiries.

"Clip Sheet" for employee publications issued by all districts and some headquarters departments. The *Clip Sheet*, issued monthly, provides information of interest and value to division employees, intended for use in the employee publications as desired by the respective editors.

### Route Considerations

News releases on routings considered and acted on by the California Highway Commission totaled 97 during the year, of which 41 were accompanied by maps specially prepared for newspaper reproduction. Due advance publicity was given seven public hearings scheduled and held by the commission, as well as two which were scheduled for the following fiscal year.

### Other News Releases and Media Contacts

The quantity and scope of news releases issued by the division, particularly by the district offices, continued the increase shown in previous years. At the same time, releases from headquarters covered the full range of division activities and Highway Commission actions of interest to the public.

In all, more than 1,500 separate news releases were issued during the year, including more than 1,100 by the various districts. Maps or other illustrations, usually in mat form, accompanied a number of these releases.

A large number of photographs of highway projects were supplied to newspapers, magazines and other publications on request, particularly on major freeway work in the metropolitan areas and on rural projects of significant size.

### Other Contacts and Appearances

Considerable information on the highway program was issued through telephone calls, office interviews, and appearances by division personnel on radio and television programs.

Division personnel also continued to appear on invitation before local civic organizations and service clubs. Many of the speakers illustrated their talks with 35 mm. slides showing local and statewide highway developments.

# RIGHT-OF-WAY

The Right-of-Way Department acquires the right-of-way needed for state highways; manages such property in the preconstruction period; and arranges for the removal or relocation of utilities and improvements.

There was an average of 466 individuals working in right-of-way classifications during the 1959-60 fiscal year.

### Program

During 1959-60, the Right-of-Way Department completed 7,792 property transactions involving a total expenditure of $129,646,470.28. Of these transactions, 7,052 were parcels, or separate ownerships, of real property acquired for highway rights-of-way, and 571 involved utility relocations. The remaining 169 transactions consisted of acquisition for other uses and for other state agencies.

Total expenditures were distributed as follows:

| | |
|---|---|
| Highway right-of-way | $102,994,975.94 |
| Utility relocation | 8,052,005.87 |
| Acquisition other than highway right-of-way | 7,739,941.74 |
| Overhead (all functions) | 10,859,546.73 |
| Total | $129,646,470.28 |

### Condemnation Record

The firm policy in all highway right-of-way acquisitions in California is to give property owners ample time to consider a settlement offer and to make necessary preparations for readjustment. No condemnation actions are initiated until it is clear that reasonable time for deliberation and decision has been afforded.

Equal emphasis is given to thorough appraisals and negotiations to make sure that fair market value is paid for all properties acquired.

One very clear indication of the acceptance of these policies is provided by the acquisition figures for the year. Of the 7,052 parcels acquired, only 159 or 2.3 percent were secured through contested eminent domain proceedings.

Amicable settlements were achieved in the remaining negotiations, even though title questions or other circumstances may have required initiation of the condemnation procedure.

### Average Cost Per Parcel

An interesting commentary on California's economic expansion over the last 15 years is reflected in the following tabulation of land unit cost increase measured by related dollar volume:

| Year | Average cost per parcel | Percentage of increase over 1945 |
|---|---|---|
| 1945 | $2,370.51 | .... |
| 1950 | 6,915.81 | 192 |
| 1955 | 9,789.57 | 313 |
| 1960 | 15,689.16 | 562 |

While decreased buying power of the dollar must be considered, plus the fact that recent years have seen increasing freeway development in built-up areas, the increase in market value is largely attributable to conversion of land uses to higher functions, with higher potential return on investments.

### Property Management

Property management includes the leasing of property held during the period between acquisition and clearance for construction; disposing of improvements; and the selling of "excess" properties acquired to reduce or eliminate payment of excessive damages.

Excess parcels are acquired in cases where severance damage to the remainder of a parcel would represent 70 percent or more of the fair market value. During the past several years, it has been to the advantage of both the State and the property owner to acquire the entire parcel when these conditions exist; and upon completion of highway construction, to dispose of the excess through the usual sealed bid procedure.

There were 7,689 parcels under lease at the start of the year, and 7,943 when the year ended. Sales of excess property, including improvements, totaled 3,835. Leases and sales during the 1959-60 fiscal year produced a gross return to the State Highway Fund of $12,018,516.52.

### Public Land, Revolving Fund, Utilities

Right-of-way and material sites on United States public lands are acquired under various federal statutes. While cash payment is not usually required, processing is lengthy and complicated.

During the year, 4,392 acres of right-of-way, together with material sites totalling 11,722 acres, were transferred from federal to state jurisdiction. Land value of the right-of-way, if obtained from private ownership, would range from $100 in remote areas to upward of $20,000 per acre for urban properties.

The 11,722 acres of material sites constitute a potential source of up to 100,000,000 cubic yards of road building materials. Corresponding market value of these materials could approximate $10,000,000.

### Highway Right-of-Way Acquisition Fund

The 1952 Legislature established the special revolving fund for the advance purchase of right of-way. The fund permits acquisition of essential right-of-way on which costly improvements are planned, facilitating orderly development and resulting in large savings.

The California Highway Commission had authorized the expenditure of $43,288,021 for acquisition of rights-of-way for future needs by the end of the year. Estimated cost to the State would have been $258,339,184 for this property if planned development had gone ahead.

An essential adjunct to acquisition and clearance of rights-of-way is the relocation of utilities. Five hundred seventy-one utility agreements were entered into during the year. Under the terms of these and prior agreements, reimbursement to affected utility companies for necessary relocation work totaled $8,052.006. In addition, obligations amounting to $13,140,583, were incurred.

### Personnel

The division's extensive land acquisition program requires personnel experienced in land valuation and nego-

tiation. It has been demonstrated during past years that the only means of acquiring such personnel is by a continuous personnel-development program.

Two programs have been developed and used, specialized training and inservice training. During the year, 51 employees completed 4,410 hours of formal instruction in colleges and universities. Approximately 20,000 hours of inservice instruction were received by some 350 agents, an increase of about 17 percent over the previous year.

Employees are also encouraged to participate in the activities of various professional associations including the American Right-of-Way Association, bar associations, and appraisal societies.

This program has been successful in developing skilled right-of-way agents. However, the demand for trained personnel by other public and private agencies has resulted in excessive turnover in personnel. During the year the termination figure was more than 14 percent of the total staff. This high termination rate, plus the impossibility of recruiting experienced personnel, is a continuing serious problem.

*Recently realigned four-lane section climbing out of the main wash of Red Rock Canyon on U.S. Highway 6 about 25 miles north of Mojave, Kern County.*

### *Land Economic Studies*

During the past year, research into several areas of major significance to right-of-way representatives was continued by the Land Economic Studies Section.

One study covered "remainder parcels," the property remaining after a portion of a land parcel has been acquired for a freeway. These remainder parcels, when sold or developed, are excellent indicators of freeway benefits or damages. They are being painstakingly studied and documented to provide a sound case study basis for future right-of-way appraisals. (Twenty-three freeway projects involving more than 3,300 parcels had been analyzed by the end of the year.)

Another study involved freeway effects upon abutting residential properties located in one of the older sections of a major metropolitan complex. The study can be expected to provide information on the effects of freeways on the values of older residences, and on possible land use changes following freeway development.

During the year, several other surveys were completed. Chief among these was a locational aid analysis, which involved investigation of what happened to people, homes and businesses displaced by a freeway. Where people resettled, the effects of relocations upon community taxes, and the probable effect of the freeway on the study community were some of the elements which received careful consideration. Other locational aid surveys and analyses, dealing with route location problems, were conducted in Sacramento, Pasadena, Pomona, Seaside, and Turlock.

Motel and service station location in relation to a freeway was investigated. Traditional locational theory for these land uses was carefully reviewed in the light of current freeway developments and industry trends. The initial summation was published in the May-June 1960 issue of *California Highways and Public Works* under the title "Motels—How Important are Accessibility and Visibility to Business Success?" Immediately after publication, the report was almost wholly reprinted in a leading trade publication.

Requests for California land economic study data, advice, and assistance have continued in about the same volume as in previous years. Approximately 3,500 reprints of land economic summation reports were sent upon request to university and college faculty members, government agencies, businessmen, students, home owners, etc., in 35 states and three foreign countries.

# LEGAL

The Division of Contracts and Rights-of-Way is the Legal Division of the Department of Public Works and renders a variety of legal services to the Department and its Division of Highways.

The following tables indicate the volume of work performed by the Legal Division, involving court appearances and hearings before various administrative agencies for the past fiscal year:

### Condemnation Proceedings

| | |
|---|---|
| Suits filed | 298 |
| *Parcels involved | 1,776 |
| Defendants involved | 5,965 |
| Suits closed | 358 |
| Trials | 123 |
| Uncontested judgments | 113 |
| Suits pending 6-30-60 | 417 |
| Parcels pending 6-30-60 | 2,294 |

* (The parcel count differs from that of the Right of Way Department's computations which are based upon appraisal parcels. The above computation is based upon a count of parcels in the condemnation resolution).

### Appellate Cases

During the fiscal year many appellate court briefs were prepared by the division and appeals argued. Decisions have been rendered in *Griffith* v. *Department of Public Works*, 52 Cal. (2d) 848; *Yarrow* v. *State of California*, 53 A.C. 433; *People* v. *Avon*, 54 A.C. 210; *Vinnicombe* v. *State of California*, 172 Cal. App. (2d) 54; *People* v. *Murray*, 172 Cal. App. (2d) 219; *People* v. *Bowman*, 173 Cal. App. (2d) 416; *Redwood* v. *State of California*, 177 A.C.A. 569; *People* v. *Murata*, 179 A.C.A. 587; *People* v. *City of Los Angeles*, 179 A.C.A. 629; *People* v. *Chastain*, 180 A.C.A. 836; *People* v. *Nogarr*, 181 A.C.A. 369; and *People* v. *Symons*, 182 A.C.A. 6.

Also, amicus curiae briefs were filed by the Department of Public Works in the condemnation cases of *County of Marin* v. *Superior Court*, 53 A.C. 868; and *Covina Union High School District* v. *Jobe*, 174 Cal. App. (2d) 340.

Several other cases are pending before the Supreme Court and the district courts of appeal, either awaiting argument or decision.

An important decision was rendered by the California Supreme Court in the case of *People* v. *Avon*. There, the defendants' property fronted upon Azusa Avenue in the City of Azusa. The State proposed to make Azusa Avenue a one-way street, starting just north of the defendants' property. A street to the west of the property was made a one-way street and connected to Azusa Avenue just north of the property. A divider strip was placed on Azusa Avenue to separate the traffic. The defendants claimed that the construction was an interference with their access and that as a result they had lost business and customers. In addition, they claimed losses arising from the construction of the improvement in that they claimed that the State would not construct the improvement in the time and manner proposed by the State.

The Supreme Court held that there was no interference with access and that in the interests of safety and traffic control it is often necessary to make changes in the existing streets, such as divider strips, one-way streets, etc. The court ruled that a property owner does not have an absolute right to the street in front of his property in its existing condition, and that there is no liability by the State where the property owner retains a reasonable means of ingress and egress from his property. The court also held that the construction of the improvement to be considered in awarding damages was that proposed by the Division of Highways, and that any temporary interference with access where necessary is permissible without compensation having to be paid to the property owner.

Another important decision was handed down in the case of *County of Marin* v. *Superior Court*. A municipal water district desired to construct a dam and reservoir which would have inundated two portions of county roads which were part of the Federal Aid Secondary System. The superior court granted the water district's motion for an order authorizing it to take possession of the roads and to commence construction. The county petitioned for prohibition and certiorari to the State Supreme Court to restrain the Superior Court of Marin County from proceeding with the eminent domain proceedings. Because of the issues involved, the Department of Public Works filed an amicus curiae brief on behalf of the County of Marin.

The Supreme Court concluded that property of a county already appropriated to a public use, such as the county roads in question, was exempt from condemnation by a municipal water district. Due to the emphasis placed upon the question by the department's brief, the court examined the impact of the Federal Highway Act and state legislation pursuant thereto upon the statutory authority of the trial court in a condemnation proceeding to regulate and determine the place and manner of removing or relocating federal aid highways. The court was explicit in holding that the Federal Highway Act precludes a municipal water district and the superior court from selecting routes and adopting specifications relating to the relocation of county roads in the Federal Aid Secondary System.

Another decision was rendered by the California Supreme Court in the case of *Griffith* v. *Department of Public Works*, 52 Cal. (2d) 848; 345 P. (2d) 469. The State, in building a freeway through the City of Los Angeles, had commenced condemnation of the interests of the city and plaintiff in the portion of Griffith Park through which the freeway was constructed. The State was in possession and the freeway virtually completed. The plaintiff, as taxpayer and owner of a contingent future interest in part of Griffith Park, sought to prevent state freeway construction therein on the ground that the land had been granted to the City of Los Angeles for public park purposes only. Plaintiff appealed to the Supreme Court. The judgment of the trial court was affirmed. The Supreme Court held that an injunction will not issue to prohibit a completed act such as the building of a freeway.

### Other Litigation

At the start of the fiscal year there were 438 cases pending, and another

514 were filed during the year for a total of 952 in process. There were 426 cases closed during the year, leaving 526 cases pending on June 30, 1960.

Some of these cases involved claims for damage to state highway facilities, such as bridges, signals, guardrails, or damage to state vehicles, or unlawful detainer actions. During the fiscal year collections by the Legal Division amounted to $168,227.98. This is an increase of over $100,000 above what was collected during the preceding fiscal year. A substantial portion of this increase was due to the collection by the State of the damage to the Antioch Bridge on December 31, 1958, caused when the steamship collided with the bridge.

The case total also includes many matters where the department is represented, as a defendant, such as inverse condemnation proceedings for damage to property by reason of the state highway operations as alleged; suits by contractors for additional compensation on construction contracts, and suits filed because of alleged dangerous or defective condition of state highways.

In still other types of suits, such as stop notice actions, the department has filed interpleader actions in which it has taken a neutral position between the contractor and the claimants.

### Board of Control and Other Claims

| | *Number of claims* | *Amounts* |
|---|---|---|
| Pending July 1, 1959 | 103 | $6,787,481.33 |
| Filed | 128 | 4,124,008.02 |
| Totals | 231 | $10,911,489.35 |
| Disposed of | 150 | 7,761,696.77 |
| Pending June 30, 1960 | 81 | $3,149,792.58 |

The principal types of Board of Control claims as listed above are for negligence, breach of contract, and inverse condemnation.

Other claims filed with the department's employees and the Governor numbered 32.

Contractors' claims before the State Highway Engineer's Board of Review for additional compensation have increased notably. These claims have required considerable work, both in the studying and handling of the claims as well as resulting litigation.

The "house counsel work" of the division has also shown a decided increase. This work consists largely of legal opinions directed toward preventing litigation rather than engaging in litigation after damage has occurred. This included 13 contested hearings before the State Personnel Board.

*This new section of freeway eliminated the final gap in continuous freeway on Sign Route 17 through San Jose. Photo shows traffic separation structures which take the Nimitz Freeway over the former Bayshore Highway (center) and the new Bayshore Freeway lanes.*

# ACCOUNTING

Administration of all accounting and internal audit activities of the Division of Highways is under the direction of the Comptroller of the Department of Public Works and his staff.

### *Cash Resources and Obligations*

On June 30, 1960, cash and securities on hand amounted to $165,389,672, with $135,566,488 of the amount being invested in United States government obligations. On the same date, there were outstanding budgetary obligations of $280,037,081, of which $31,776,593 were advance obligations against revenues of the 1960-61 fiscal year.

### *Revenues and Expenditures*

Revenues budgeted for the 1959-60 fiscal year amounted to $652,699,954, of which $210,439,576 remained to be collected on June 30, 1960. Collection of the revenue not received, which consists of $195,334,076 of federal aid and $15,105,500 of contributions from state and local agencies and other sources, will be made as work against which the amounts apply is completed. Revenues budgeted for the prior fiscal year amounted to $534,469,148.

Expenditures and obligations incurred during the fiscal year ended June 30, 1960, amounted to $580,464,870 as compared to $517,636,201 for the prior fiscal year.

### *Accounting System and Procedures*

The following new accounting procedures and systems and changes in existing procedures were put into effect during the year because of new legislation, to accommodate increased or special activities or to provide more effective control over operation, as follows:

(1) A system of accounts was instituted to provide for recording transactions relating to the Highway Properties Rental Fund, created by Chapter 2157, Statutes of 1959. This chapter requires the segregation in a special fund, for ultimate distribution to the state and local agencies, of all rents collected on right-of-way properties acquired for future needs, except properties acquired for the National Interstate Highway System and toll bridges.

(2) An overall revision of the system of control accounts in use was made to bring the system into conformity with the new state uniform system of accounts prescribed by the Department of Finance.

(3) Accounting procedures were established in connection with the granting of state aid for local agency streets and roads in urban areas qualifying as extensions of the Federal Aid Secondary System, under Section 143.3 of the Streets and Highways Code, which was added by Chapter 1719, Statutes of 1959.

(4) A new allotment and work authorization numbering system, with corresponding changes in budgetary procedures and the system of control accounts, was instituted, effective July 1, 1960, in order to meet the requirements of electronic data processing equipment and to provide for logical expansion in connection with budgetary and other changes necessitated by new statutes.

(5) The procedure relating to new traffic striping and pavement markings and the installation of warning and regulatory signs was changed to provide for separate budgeting and accounting of such work as construction items. This change was required by amendment of Section 27 of the Streets and Highways Code by Chapter 113, Statutes of 1959, redefining work classified as maintenance.

(6) Further investigation of the possibilities of use of electronic data processing equipment to facilitate and expand the accounting and reporting procedures was made during the year. In the 1960-61 fiscal year a pilot test will be made in District X for a short period to work out the mechanical and procedural problems involved. It is tentatively planned to convert to punchcard accounting on a statewide basis by July 1, 1961.

# 1961-62 Budget

*Total of $633,460,812 Includes $509,078,312 for Construction*

THE CALIFORNIA HIGHWAY COMMISSION has adopted a record $633,460,812 state highway budget for the 1961-62 fiscal year.

The budget contains $509,078,312 for state highway construction purposes, including rights-of-way.

The previous budget, adopted in October 1959 for 1960-61, contained a gross total of $569,244,000 of which $452,785,000 was for construction purposes. The corresponding 1959-60 totals were $610,712,000 and $497,000,000.

State Director of Public Works Robert B. Bradford, commission chairman, said the record budget reflects increases in federal highway apportionments and in estimated revenue from state sources.

The total 1961-62 federal highway apportionment to California is $273,570,812, including $220,070,812 for work on interstate highways. The 1960-61 apportionment was $227,708,867 of which $181,086,840 was for the Interstate System.

Estimated revenue from state sources is up about $18,000,000 from the previous year as a result of the State's constantly increasing motor vehicle registration and use.

#### Projects Carefully Selected

Bradford said the projects in this record budget were carefully selected to meet urgent local and regional needs and to fit into long range plans for orderly statewide highway development. The budget provides for construction of 240 miles of multilane freeway and expressway, plus 42 miles of two-lane access-controlled highway and many additional miles of conventional highway and other improvements.

"These budgeted improvements," Bradford said, "will provide direct benefits to California citizens all over the State.

"Newly budgeted freeway sections in our cities," he said, "will reduce the traffic load on local streets, making things easier for the shopping housewife and her commuter husband, and safer for their children going to school.

"When this year's program is completed, transportation will also be more efficient for farmers, businessmen and manufacturers, and it will be safer and less difficult to drive to some of our major recreation areas," he said.

Bradford pointed out, however, that no single fiscal year budget could possibly take care of all of the State's critical highway deficiencies.

"Inevitably, many greatly needed improvements could not be financed this year. For example, the list of urgent projects submitted to the Highway Commission recently by the California State Chamber of Commerce would cost several billion dollars to construct. We are satisfied, however, that this is the best possible budget within the limit of available funds," he said.

#### Major Sources Listed

Major sources of state-collected highway revenue expected for 1961-62 include $263,967,000 in gasoline taxes (up about $10,500,000 from the previous year's estimate); $56,596,000 in motor vehicle fees (up $3,500,000); $24,800,000 from the use (diesel) fuel tax (up $2,500,000); and $13,200,000 from transportation taxes on for-hire carriers (up $1,700,000).

The budget contains $56,105,500 for functions other than state highway work.

The largest item in this category is $35,501,000 for major city streets other than state highways, based on five-eighths cent per gallon of the state gasoline tax. Other nonstate highway items are:

Federal aid for county roads on the Federal Aid Secondary System, $8,312,500; state funds to counties for use in matching these federal funds, $4,500,000; state funds to help finance railroad grade separation projects on local streets and roads (not state highways), $5,000,000; engineering funds to cities, $1,500,000; and state funds to pay part of the cost of urban extensions of FAS county roads, $1,292,000.

Bradford pointed out that California's 58 counties receive 1⅜ cents per gallon from the State's 6 cents per gallon gasoline tax, plus a portion of the motor vehicle fees.

#### Funds Disbursed Directly

These funds are disbursed directly by the State Controller and are not listed in the State Highway Budget. For the 1961-62 fiscal year, these state funds for county roads will total an estimated $91,750,000. Another $1,100,000 per year from the gas tax is earmarked by law for airports and small craft harbors.

The $509,078,312 in the budget for highway construction purposes includes:

Major construction and improvement (contracts plus engineering), $348,072,000; rights-of-way, $145,926,000; contingencies (normally available for construction purposes), $7,280,312; resurfacing program, $5,000,000; signs and striping, $2,000,000; and minor improvements, $800,000.

Proposed expenditures for state highway purposes other than construction include: maintenance, $41,500,000; buildings and plants, $9,000,000; administration, $10,900,000; statewide highway planning survey, $2,000,000; maintenance of state toll bridges, $3,000,000; and honor camps, $1,750,000.

The 1961-62 budget contains 28 landscaping and planting projects for which a total of $3,317,000 is budgeted. Another $2,051,000 is included for 10 projects to install median barrier on heavily traveled metropolitan area freeways, mostly in the Los Angeles region.

# 1961-62 State Highway Budget Projects by Counties

NOTE 1: Construction contracts may be awarded beginning January 1, 1961. Right-of-way funds may not be expended until July 1, 1961 (start of fiscal year).
NOTE 2: Projects which overlap county lines are listed under both counties.

| County | Route† | Description | Approx. mileage | Estimated cost |
|---|---|---|---|---|
| Alameda | US 50 | MacArthur Freeway—Park Blvd. to Buell St. in Oakland; grade, pave and structures for 8-lane freeway (This project, together with work now under way or budgeted, will complete MacArthur Freeway for 6.5 miles from East Bay Distribution Structure to Buell St.) | 3.0 | $8,700,000 |
| Alameda | US 50 | MacArthur Freeway—Kuhnle Ave. to east city limit of Oakland near Durant Ave.; grade, pave, and structures for 8-lane freeway | 3.5 | 8,000,000 |
| Alameda | SR 17 | Nimitz Freeway—0.7 mile south of Central Ave. in Fremont to 1.1 miles north of Thorton Ave. in Newark; landscape | 2.3 | 120,000 |
| Alameda | HR 107 | Niles-Centerville Rd.—Main St. to SR 9 in Fremont; grade and pave to reconstruct | 2.5 | 95,000 |
| Alameda | SR 21 | SR 9-21 north of Mission San Jose to HR 107 at Scott's Corner near Sunol; grade, pave and structure for 4-lane freeway | 4.7 | 6,200,000 |
| Alameda | HR 226 | Existing Posey Tube between Oakland and Alameda; dredging and backfill | | 300,000 |
| Alameda | HR 227 | Warren Freeway—Lincoln Ave. to Redwood Rd. in Oakland; landscape | 1.0 | 50,000 |
| Alameda | HR 227 | Warren Freeway—Moraga Ave. Interchange in Oakland; grade, pave and structure for interchange | 0.4 | 500,000 |
| Alameda | FAS 1030 | Redwood Rd. between Castro Valley Blvd. and Grove Way northeast of Hayward; grade and surface to widen to four lanes (Urban extension of FAS County Rd.; county's share $183,000) | 0.8 | 183,000 (State's share) |
| Alameda | Various | Rights of way including $5,380,000 for US 50 freeway in and south of Oakland, $2,800,000 for Grove-Shafter freeway in Oakland | | 9,850,000 |
| Alpine | Various | Rights of way | | 45,000 |
| Amador | SR 88 | 2 miles east of Peddler Hill to 2.5 miles east of Corral Flat; grade and pave to reconstruct, widen and realign for access-controlled 2-lane highway | 5.9 | 1,000,000 |
| Amador | SR 16 | 0.3 mile west of junction with SR 104 (Waites Station) to 0.2 mile east of Junction with SR 49 (Central House); grade and pave to reconstruct, widen and realign for initial 2 lanes of future 4-lane expressway | 2.3 | 410,000 |
| Amador | Various | Rights of way | | 150,000 |
| Butte | US 40 Alt. | Oroville to 0.7 mile east of Wick's Corner; grade, pave and structures for 4-lane freeway | 6.8 | 4,650,000 |
| Butte | US 40 Alt. | 1.0 mile north of Adelaide to Oroville; grade, pave and structures for 4-lane freeway. (This project and previously listed job will provide 8.6 miles of freeway connecting with relocated US 40 Alt. at Wick's Corner) | 1.8 | 1,280,000 |
| Butte | Various | Rights of way including $650,000 for future US 99E freeway in vicinity of Chico | | 900,000 |
| Calaveras | Various | Rights of way | | 215,000 |
| Colusa | US 99W | South city limit of Williams to Maxwell; resurface | 9.2 | 200,000 |
| Colusa | SR 20 | Colusa Basin Bridge west of Colusa; replace narrow bridge and construct approaches | 1.5 | 530,000 |
| Colusa | SR 20 | 10th St. to Bridge St. in Colusa; resurface | 0.8 | 45,000 |
| Colusa, Yolo | SR 45 | 3.5 miles south to 4.5 miles north of Yolo-Colusa County line; grade and pave for reconstruction, widening and some realignment | 8.0 | 700,000 |
| Colusa | Various | Rights of way | | 190,000 |
| Contra Costa | US 40 | At Carquinez Bridge-Crockett Interchange; landscape | 0.3 | 39,000 |
| Contra Costa | SR 24 | East portal of Caldecott Tunnel to 0.4 mile west of Orinda Highway; grade, pave and structures for 8-lane freeway | 2.0 | 7,500,000 |
| Contra Costa | SR 24 | Monument to north of Concord Ave. in and near Concord; grade, pave and structures for 4-lane freeway | 2.0 | 2,300,000 |
| Contra Costa | SR 21 | Monument to Arnold Industrial Highway; grade, pave and structures for 4-lane freeway. (This project, together with two previously listed and current Benicia-Martinez Bridge and approach construction, will complete freeway development for about 30 miles from Caldecott Tunnel in Oakland to US 40 at Vallejo) | 4.2 | 4,410,000 |
| Contra Costa | FAS 1326 | Willow Pass Rd. between Pacheco Blvd. and newly budgeted Sign Route 21 freeway near Concord; grade and surface for 4-lane divided highway (urban extension of FAS County Rd.; county's share $35,000) | 0.4 | $35,000 (State's share) |
| Contra Costa | Various | Rights of way including $920,000 for SR 21 freeway south of Walnut Creek | | 2,045,000 |
| Del Norte | US 199 | 8.8 miles south to 1.1 miles south of Oregon border; grade and pave south approach and pave north approach to Oregon Mountain Tunnel | 4.2 | 2,955,000 |
| El Dorado | SR 49 | 0.7 mile south to 0.9 mile north of Hastings Creek Bridge; grade, pave and structure to realign (includes bridge replacement) | 1.6 | 335,000 |
| El Dorado | HR 93 | Top of Morgan Grade to Cool (portions); grade and pave to realign | | 50,000 |
| El Dorado | Various | Rights of way including $500,000 for US 50 freeway west of Pollock Pines | | 855,000 |
| Fresno | US 99 | 0.3 mile north of Chestnut Ave. to San Joaquin St. in and south of Fresno; grade, pave and structures for 6-lane freeway | 5.5 | 6,600,000 |

† Numbers marked SR are State Sign Routes; numbers marked US are US Highway routes; numbers not marked are legislative routes.

| County | Route† | Description | Approx. mileage | Estimated cost |
|---|---|---|---|---|
| Fresno | FAS 815 | Jensen Ave., between Lyon Ave. and West Ave. in Sanger; grade and surface to construct 4-lane highway (urban extension of FAS County Road; Sanger's share, $39,500) | 0.5 | 39,500 (State's share) |
| Fresno | FAS 1211 | Belmont Ave. between Fisher Ave. and Chestnut Ave. in East Fresno; grade and surface to construct 4-lane divided highway (urban extension of FAS County Road; City of Fresno's share, $83,000; Fresno County, $85,000) | 1.9 | 168,000 (State's share) |
| Fresno | Various | Rights of way including $3,455,000 on US 99 between Tulare County line and Fresno | | 3,964,000 |
| Glenn | Various | Rights of way | | 480,000 |
| Humboldt | US 101 | Maple Hills Rd. Bridge to Myers Flat; grade, pave and structures for 4-lane freeway. (Eel River Bridge and some grading already in progress on this section) (connects with 11.5 miles of freeway to the north) | 5.6 | 6,169,000 |
| Humboldt | US 299 | 12.5 miles east of Blue Lake to 0.4 mile east of Green Point; base and pave on section graded by Honor Camp crew | 2.5 | 165,000 |
| Humboldt | SR 36 | South Fork Van Duzen River Bridge east of Bridgeville; replace bridge and construct approaches | 0.2 | 120,000 |
| Humboldt | SR 36 | Between 5.5 miles and 5.9 miles east of Bridgeville; grade and pave to widen | 0.4 | 75,000 |
| Humboldt | SR 96 | 3.8 miles to 18.7 miles north of Willow Creek (portions); replace timber cribs | | 70,000 |
| Humboldt | Various | Rights of way | | 305,000 |
| Imperial | US 80 and US 99 | At Trifolium and Tamarack Canals on US 99 northwest of Brawley, and at Lowline Canal on US 80 east of Holtville; replace bridges | | 150,000 |
| Imperial | SR 115 | Standard Canal to SR 111 at Calipatria; grade and pave to reconstruct and widen | 7.2 | 650,000 |
| Imperial | Various | Rights of way | | 650,000 |
| Inyo | US 395 | 1.9 miles south of Keough's Hot Springs to 4.1 miles south of Bishop; grade and pave to relocate as 2- and 4-lane expressway | 5.4 | 500,000 |
| Inyo | Various | Rights of way | | 10,000 |
| Kern | US 99 | 2.3 miles south of Reserve Rd. to future junction with Westside Freeway; grade, pave and structures to convert from expressway to 4-lane freeway (connects with new Grapevine Grade freeway) | 4.8 | 1,100,000 |
| Kern | US 99 | Future Westside Freeway junction to SR 33-166; construct frontage roads to convert to 4-lane freeway | 2.8 | 55,000 |
| Kern | US 99 | 0.1 mile south of Ming Ave. to Norris Rd. in and near Bakersfield; grade, pave and structures for 6-lane freeway (two bridges now under construction on this section of Bakersfield Bypass) | 5.7 | 7,500,000 |
| Kern | US 99 | 0.8 mile south of Sherwood Ave. to 0.4 mile south of Pond Rd. in and near McFarland; grade, pave and structures to convert from expressway to 4-lane freeway | 3.4 | 1,500,000 |
| Kern | HR 142 | Woody to Greenhorn Summit (portions); grade and pave to widen | | 50,000 |
| Kern | US 466 | 0.1 mile east of Caliente Rd. to 0.5 mile east of Keene; grade, pave and structures for 4-lane freeway | 5.7 | 4,750,000 |
| Kern | FAS 882 | H St. between Brundage Lane and Truxtun Ave. in Bakersfield; grade and surface to widen to 4 lanes (urban extension of FAS County Rd.; city's share, $94,150) | 1.3 | 94,150 (State's share) |
| Kern | FAS 887 | Union Ave. between Irene St. and Panorama Dr. north of Bakersfield; grade and surface for 6-lane divided highway (urban extension of FAS County Rd.; city's share, $77,500) | 0.8 | 77,500 (State's share) |
| Kern | Various | Rights of way including $1,895,000 on US 99 in Bakersfield area | | 3,910,000 |
| Kings | Various | Rights of way including $444,000 on SR 198 in Lemoore-Hanford area | | 492,000 |
| Lake | SR 53 | 0.4 mile south of Harris Creek to Lower Lake; grade and pave to construct 2-lane access controlled highway (eliminates last substandard section between Napa County line and Sign Route 20, a distance of 28 miles) | 4.7 | 900,000 |
| Lake | Various | Rights of way | | 50,000 |
| Lassen | Various | Rights of way | | 120,000 |
| Los Angeles | US 101 | Ventura Freeway—Hollywood Freeway to Reseda Blvd. (portions); median barrier | 2.4 | 55,000 |
| Los Angeles | US 101 | Hollywood Freeway—Benton Way to Ventura Freeway (portions); median barrier | 6.3 | 318,000 |
| Los Angeles | US 101 | Ventura Freeway—0.5 mile east to 0.5 mile west of Las Virgenes Rd. west of Calabasas; interchange structure, approaches and frontage roads | 1.0 | 380,000 |
| Los Angeles | HR 2 | Whittier Blvd.—Santa Gertrudes Ave.-Russell St. to Washington Blvd. in Whittier; traffic signal modifications at 13 intersections (Co-operative project—city's share, approximately $80,000) | | 90,000 (State's share) |
| Los Angeles | HR 2 | Whittier Blvd.—Atlantic Blvd. to Downey Rd.; lighting, channelization and traffic signal modifications at 8 intersections (Co-operative project—Los Angeles county's share about $37,000) | | 60,000 (State's share) |
| Los Angeles | US 99 | Golden State Freeway—Cypress Ave. to Roscoe Blvd.; landscape | 3.5 | 180,000 |
| Los Angeles | US 99 | Golden State Freeway—Roscoe Blvd. to Lankershim Blvd.; landscape | 1.7 | 110,000 |
| Los Angeles | US 6, 99 | Golden State Freeway—Glendale Blvd. to Burbank Blvd. in Burbank; median barrier | 6.1 | 143,000 |
| Los Angeles | US 6, 99 | Golden State Freeway—0.1 mile west of Lankershim Blvd. to Osborne St. near Sun Valley; grade, pave and structures for 8-lane freeway (together with other current projects, will complete east-loop bypass portion of Golden State Freeway between the Santa Ana Freeway southeast of Los Angeles civic center and US 6 north of San Fernando, a distance of 29 miles) | 2.4 | 6,200,000 |
| Los Angeles | US 66 | Foothill Blvd.—0.1 mile west of Mountain Ave. in Monrovia to Georgia Ave. in Azusa (portions); widen to 4-lane divided and modify traffic signals | 3.2 | 200,000 |

† Numbers marked SR are State Sign Routes; numbers marked US are US Highway routes; numbers not marked are legislative routes.

| County | Route† | Description | Approx. mileage | Estimated cost |
|---|---|---|---|---|
| Los Angeles | US 6 | Antelope Valley Freeway—Sierra Highway at Soledad Canyon Rd. to Sierra Highway at Red Rover Mine Rd. southwest of Palmdale; grade, pave and structures for 4-lane freeway. (Grading in progress on a portion of this stretch under current contract) | 16.0 | 8,000,000 |
| Los Angeles | US 60, 70, 99 | San Bernardino Freeway—Arroyo Ave. in West Covina to Puente Ave. in Baldwin Park; median barrier | 9.5 | 220,000 |
| Los Angeles, San Bernardino | US 70, 99 | San Bernardino Freeway—0.1 mile west of Los Angeles County line to 0.6 mile east of Vineyard Ave. near Ontario; grade, pave and structures to widen to 6 lanes | 6.8 | 950,000 |
| Los Angeles | US 60, 70, 99 | San Bernardino Freeway—At Orange Ave.-Pacific Ave. and Sunset Ave.-Irwindale Ave. Interchanges in West Covina; landscape | | 65,000 |
| Los Angeles | US 60, 70, 99 | San Bernardino Freeway—Evergreen Ave. in Los Angeles to 0.1 mile east of Long Beach Freeway in Monterey Park (portions); median barrier | 2.0 | 115,000 |
| Los Angeles | US 60, 70, 99 | San Bernardino Freeway—Long Beach Freeway in Monterey Park to Wescott Ave. in Baldwin Park (portions); landscape | | 375,000 |
| Los Angeles | US 101 Alt. | Pacific Coast Highway—0.1 mile east to 0.3 mile east of Sunset Blvd.; embankment protection work | 0.2 | 200,000 |
| Los Angeles | SR 2 | Angeles Crest Highway—La Canada Bridge to Angeles Forest Highway in Pasadena (portions); grade and pave to construct passing lanes | 1.0 | 75,000 |
| Los Angeles | SR 39 | San Gabriel Canyon Rd—North city limit of Azusa to end of constructed road near Crystal Lake (portions); grade, pave and structures for widening and realignment | 1.6 | 750,000 |
| Los Angeles | SR 39 | San Gabriel Canyon Rd.—West Fork of San Gabriel River Bridge; replace bridge and construct approaches | | 150,000 |
| Los Angeles | HR 77 | Valley Blvd.—Mission Dr. in Rosemead to Cabrillo Ave. in Alhambra; traffic signal modifications at 27 intersections. (Co-operative project—Local agencies' share, $41,000) | | 45,000 (State's share) |
| Los Angeles | HR 158 | San Diego Freeway—California Ave. in Signal Hill to Long Beach Freeway near Long Beach; grade, pave and structures for 8-lane freeway | 1.8 | 8,000,000 |
| Los Angeles | HR 158 | San Diego Freeway—174th St. (SR 14) in Torrance to 0.3 mile west of Hawthorne Ave. (SR 107) in Lawndale; grade, pave and structures for 8-lane freeway | 1.2 | 3,400,000 |
| Los Angeles | HR 158 | San Diego Freeway—Hawthorne Ave. (SR 107) in Lawndale to 135th St. in Hawthorne; grade, pave and structures for 8-lane freeway | 2.1 | 4,000,000 |
| Los Angeles | HR 158 | San Diego Freeway—0.1 mile south of 135th St. in Hawthorne to Lennox Blvd. in Los Angeles; grade, pave and structures for 8-lane freeway | 2.1 | 5,600,000 |
| Los Angeles | HR 158 | San Diego Freeway—0.1 mile south of Lennox Blvd. to 0.2 mile northwest of La Tijera Blvd. near Inglewood; grade, pave and structures for 8-lane freeway | 2.9 | $7,300,000 |
| Los Angeles | HR 158 | San Diego Freeway—La Tijera Blvd. to 0.4 mile north of Jefferson Blvd.; grade, pave and structures for 8-lane freeway (this project and five previously listed, along with other current and budgeted work, will complete the San Diego Freeway from California Ave. at Signal Hill to Burbank Blvd. north of the Ventura Freeway, a distance of about 35 miles) | 1.8 | 4,300,000 |
| Los Angeles | SR 7 | San Diego Freeway—Venice Blvd. to Wilshire Blvd. in Los Angeles; median barrier | 3.6 | 84,000 |
| Los Angeles | SR 134 | Ventura Freeway—Hollywood Freeway to Buena Vista St. in Burbank; grade, pave and structures for 8-lane freeway (together with current freeway project to the east, this will complete Ventura Freeway between Golden State and Hollywood Freeways) | 3.0 | 7,700,000 |
| Los Angeles | US 6, 101 | Harbor Freeway—124th St. to 4-level interchange; and Santa Ana Freeway—Rosecrans Ave. to Lakewood Blvd. and Alameda St. to 4-level interchange; median barrier | 14.7 | 503,000 |
| Los Angeles | SR 35 | Norwalk Blvd.—0.2 mile south of Lakeland Rd. in Norwalk to Washington Blvd. near Santa Fe Springs; widen to 4 lanes and install traffic signals (Cooperative project—local agencies' share, $50,000) | 3.0 | 325,000 (State's share) |
| Los Angeles | SR 35 | Workman Mill Rd. to San Gabriel River Parkway; grade, pave and structures; rerouting the highway through a railroad underpass to eliminate a crossing at grade and construction of the Peck Rd. Interchange on the route of future San Gabriel River Freeway) | 1.3 | 800,000 |
| Los Angeles | SR 26 | Olympic Blvd. in Beverly Hills area—Centinela Ave. in Los Angeles to Los Angeles St.; traffic signal modifications at 67 intersections. (Cooperative project—Local agencies' share, $78,000) | | 81,000 (State's share) |
| Los Angeles | SR 26 | Santa Monica Freeway—Lincoln Blvd. in Santa Monica to Sawtelle Blvd. in Los Angeles (portions); structures for future 8-lane freeway | | 2,000,000 |
| Los Angeles | SR 26 | Santa Monica Freeway—0.1 mile west of Sawtelle Blvd. to 0.2 mile east of Overland Ave. in Los Angeles (portions); structures for future 8-lane freeway | | 3,300,000 |
| Los Angeles | SR 26 | Santa Monica Freeway—0.4 mile west to 0.2 mile east of Motor Ave. (portions); structures and embankment for railroad relocation | | 900,000 |
| Los Angeles | SR 26 | Santa Monica Freeway—Motor Ave. to 0.2 mile east; construct retaining wall | | 60,000 |
| Los Angeles | SR 26 | Santa Monica Freeway—0.1 mile west of Fairfax Ave. to Hoover St. (portions); grade, pave and structures for future freeway (short section of freeway and structures) | 0.4 | 3,600,000 |
| Los Angeles | SR 26, US 101 US 99 | At East Los Angeles Interchange; landscape | | 395,000 |
| Los Angeles, Orange | US 101 | Santa Ana Freeway—Rosecrans Ave. in Norwalk to Magnolia Ave. in Anaheim; median barrier | 5.1 | 278,000 |
| Los Angeles | SR 14 | Artesia St.—Long Beach Blvd. in Long Beach to Downey Ave. in Bellflower; traffic signal modifications at 9 intersections (Cooperative project—local agencies' share, $51,000) | | 55,000 (State's share) |

† Numbers marked SR are State Sign Routes; numbers marked US are US Highway routes; numbers not marked are legislative routes.

| County | Route† | Description | Approx. mileage | Estimated cost |
|---|---|---|---|---|
| Los Angeles | Various | Rights of way including $4,000,000 on Foothill Freeway between Arcadia and Glendora, $10,000,000 on San Gabriel River Freeway, $8,800,000 on Pomona Freeway and $18,000,000 on Santa Monica Freeway | | 55,233,000 |
| Madera | SR 152 | Ash Slough Bridge west of Califa; replace bridge and construct approaches | 0.7 | 300,000 |
| Madera | SR 41 | Deadwood Creek Bridge near Coarsegold; replace bridge with culvert | | 23,000 |
| Madera | Various | Rights of way | | 350,000 |
| Marin | US 101 | Vista Point at Golden Gate Bridge; grade and pave parking area and landscape | | 200,000 |
| Marin | US 101 | North end of Golden Gate Bridge to 0.1 mile south of Waldo Tunnel; median barrier | 0.8 | 175,000 |
| Marin | US 101 | Auburn St. Railroad Crossing; reconstruct undercrossing on Auburn St. and grade and pave frontage roads along US 101 south of San Rafael | 0.4 | 85,000 |
| Marin | US 101 | 0.1 mile south of Waldo Undercrossing to 0.2 mile north of Freitas Parkway (portions); landscaping in Corte Madera, Larkspur, and San Rafael | | 80,000 |
| Marin | US 101 | Gallinas Creek north of San Rafael; bridge widening and channel lining | | 125,000 |
| Marin, Sonoma | US 101 | Atherton Ave. north of Novato to Petaluma Creek (portions); drainage facilities and resurfacing | | 135,000 |
| Marin | HR 52 | 0.4 mile east of Strawberry Drive to US 101 at Alto; grade and pave to widen to 4-lanes divided | 0.9 | 400,000 |
| Marin | SR 1 | Stinson Beach to Bolinas Rd. (portions); drainage facilities and resurfacing | | 100,000 |
| Marin | Various | Rights of way including $1,075,000 for US 101 freeway north of San Rafael | | 1,225,000 |
| Mariposa, Tuolumne | SR 120 | 0.1 mile west to 0.1 mile east of Mariposa-Tuolumne County line; grade and pave to reconstruct, widen, and realign for initial 2 lanes of future 4-lane expressway | 2.3 | $450,000 |
| Mariposa | SR 49 | Bear Valley to Coulterville (portions); grade and pave to reconstruct and widen | 4.0 | 100,000 |
| Mariposa | Various | Rights of way | | 105,000 |
| Mendocino | US 101 | Ford Rd. to 0.5 mile south of Forsythe Creek north of Ukiah (portions); structures and approaches for first unit of future 4-lane freeway | | 1,750,000 |
| Mendocino | SR 1 & SR 20 | Fort Bragg to Willits on SR 20 and Westport to Leggett on SR 1; replace culverts at various locations | | 60,000 |
| Mendocino | SR 1 | Glennan Gulch north of Gualala; reconstruction and culvert | 0.8 | 260,000 |
| Mendocino | SR 1 | Henry Gulch; reconstruct and culvert | 0.4 | 85,000 |
| Mendocino | Various | Rights of way including $910,000 for future US 101 freeway in vicinity of Ukiah | | 1,200,000 |
| Merced | Various | Rights of way | | 590,000 |
| Modoc | Various | Rights of way | | 50,000 |
| Mono | US 395 | Through Bridgeport; grade, pave and structures for reconstruction and drainage improvement | 0.7 | 170,000 |
| Mono | SR 89 | Alpine County line to US 395; drainage facilities and resurfacing | 8.0 | 250,000 |
| Mono | Various | Rights of way | | 105,000 |
| Monterey | US 101 | Camphora Overcrossing to 1.4 miles south of Gonzales; functional planting | 4.0 | 50,000 |
| Monterey | US 101 | 2.2 miles south to 2.3 miles north of Gonzales; grade, pave and structures for 4-lane freeway. (Closes last gap in 46 miles of continuous freeway and expressway between King City and Salinas) | 6.1 | 2,450,000 |
| Monterey | SR 1 | Villa Creek Bridge about 7 miles north of San Luis Obispo County line; new bridge and approaches | 0.2 | 370,000 |
| Monterey | SR 1 | Fremont St. in Monterey to Fort Ord; grade, pave and structures for 4-lane freeway | 3.7 | 5,800,000 |
| Monterey | Various | Rights of way | | 1,035,000 |
| Napa | SR 12, 37, 29 | 0.5 mile south of Imola Ave. to 0.1 mile north of Old Sonoma Rd. at Napa; grade, pave and structures for 4-lane freeway (Cooperative project—County's share $60,090) | 1.0 | 970,000 (State's share) |
| Napa | Various | Rights of way | | 460,000 |
| Nevada, Placer | SR 49 | Bear River Bridge north of Auburn; replace bridge and construct approaches | 0.8 | 300,000 |
| Nevada | SR 49 | 1.5 miles north of South Fork Yuba River to North San Juan (portions); grade and pave to realign | | 50,000 |
| Nevada | US 40 | 0.5 mile west to 2.6 miles east of Soda Springs; structures and grading for future Donner Summit freeway. (Second of three units required to complete freeway; first unit under construction) | 3.7 | 2,700,000 |
| Nevada | Various | Rights of way including $435,000 for SR 20 between Yuba County line and Grass Valley | | 765,000 |
| Orange | US 101 | San Diego Freeway-Avenida Allessandro in San Clemente to 1.5 miles north of US 101 Alt. and US 101 Alt. connection; functional planting | 7.1 | 152,000 |
| Orange | US 101 | San Diego Freeway—4.3 miles south of Niguel Rd. near El Toro; truck scales | | 210,000 |
| Orange | US 101 | Santa Ana Freeway—Magnolia Ave. to South St. in vicinity of Anaheim and Fullerton; median barrier | 3.7 | 160,000 |
| Orange, Los Angeles | US 101 | Santa Ana Freeway—Rosecrans Ave. in Norwalk to Magnolia Ave. in Anaheim; median barrier | 5.1 | 278,000 |
| Orange | US 101, SR 22 | Santa Ana, Garden Grove, and Route 19 Interchange in and near Orange and Santa Ana; grade, pave and structures on Santa Ana Freeway from 0.2 mile north of Santa Ana River to 0.1 mile south of Santiago Creek, and on Garden Grove Freeway from 0.2 mile west of Placentia Ave. to 0.3 mile east of Main St. (Project will provide interchange at future freeway junction) | 3.2 | 13,700,000 |
| Orange | US 91 | Riverside Freeway—Lemon St. to east of Placentia Ave. in Fullerton and Anaheim; landscape | 2.1 | 64,000 |
| Orange | HR 176 | Route 176 Freeway—Yorba Linda Rd. to Orangethorpe Ave. near Yorba Linda; grade, pave and structures to construct initial 2 lanes of future 4-lane freeway | 2.3 | 1,360,000 |
| Orange | SR 22 | Garden Grove Blvd.—Century Blvd. to Harbor Blvd. in Garden Grove; grade and pave to widen to 4 lanes and install lighting and traffic signals (Cooperative project—Garden Grove's share, $10,000) | 1.5 | 250,000 (State's share) |

† Numbers marked SR are State Sign Routes; numbers marked US are US Highway routes; numbers not marked are legislative routes.

| County | Route† | Description | Approx. mileage | Estimated cost |
|---|---|---|---|---|
| Orange | FAS 742 | Harbor Blvd. between Westminster Ave. and Chapman Ave. in Garden Grove; grade and surface to widen to 4 lanes divided (urban extension of FAS County Rd.; city's share, $250,000) | 2.2 | 250,000 (State's share) |
| Orange | Various | Rights of way including $1,000,000 on Rte. 19 Freeway and $3,000,000 on Garden Grove Freeway | | 6,100,000 |
| Placer | US 40 | East Roseville Overcrossing to east of Penryn Rd. Overcrossing; functional planting | 7.5 | 40,000 |
| Placer | US 40 | 0.2 mile south to 0.2 mile north of Colfax-Grass Valley Highway; landscaping | 0.4 | 5,000 |
| Placer | SR 28 | Top of Dollar Grade to Nevada State line near Brockway; grade and pave to widen | 8.1 | 1,200,000 |
| Placer, Nevada | SR 49 | Bear River Bridge north of Auburn; replace bridge and construct approaches | 0.8 | 300,000 |
| Placer | Various | Rights of way | | 345,000 |
| Plumas | SR 89 | 2 miles north of Canyon Dam to 1.3 miles north of Almanor Inn; grade and pave for 2-lane access controlled highway | 6.5 | 665,000 |
| Plumas | Various | Rights of way | | 15,000 |
| Riverside | US 60 | Sunnyslope to Orange St. in Riverside; grade, pave and structures for 4-lane freeway | 5.7 | 5,530,000 |
| Riverside | US 60, 70, 99 | At Twentynine Palms Highway about 2 miles east of Whitewater; structure and approaches for interchange | 1.3 | 1,150,000 |
| Riverside | US 91, 395 | Riverside Freeway—0.3 mile south of Arlington Ave. to San Bernardino County line (portions); landscape | 2.7 | 150,000 |
| Riverside | SR 74 | West boundary of San Bernardino National Forest to Keene Camp (portions); grade and pave for widening and curve improvement | 0.4 | 35,000 |
| Riverside | US 395 | At SR 74 about 3 miles southeast of Perris; structure and approaches for Ethanac Overhead and Interchange | 1.0 | 900,000 |
| Riverside | SR 74 | Grand Ave. to Adam Ave. about 1.0 mile west of Elsinore (portions); grade and pave for widening and some realignment | 3.1 | 100,000 |
| Riverside | SR 111 | 0.6 mile west of Chino Creek to San Rafael Dr. in Palm Springs; grade and pave to construct 4-lane expressway | 0.9 | 210,000 |
| Riverside | SR 111 | 0.3 mile west of Indio west city limit to Arabia St.; grade and pave for widening and channelization | 0.9 | 57,000 |
| Riverside | Various | Rights of way | | 1,900,000 |
| Sacramento | US 40 | On 16th, 29th and 30th Sts.; curb and gutter corrections | | 75,000 |
| Sacramento | US 40 | Capitol Mall—4th St. to 10th St.; grade and pave for widening to provide for center landscaping and turn lanes | 0.5 | 550,000 |
| Sacramento | Various | Rights of way including $3,030,000 for east-west and north-south freeways in Sacramento, and $1,400,000 for US 50 freeway east of Sacramento | | 4,830,000 |
| San Benito | SR 156 | 0.5 mile east of San Juan Bautista to 0.4 mile west of the San Benito River; grade and pave to construct initial 2 lanes of future 4 lane expressway | 5.1 | 530,000 |
| San Benito | Various | Rights of way | | 350,000 |
| San Bernardino, Los Angeles | US 70, 99 | San Bernardino Freeway—0.1 mile west of Los Angeles County line to 0.6 mile east of Vineyard Ave. near Ontario; grade, pave and structures to widen to 6 lanes | 6.8 | 950,000 |
| San Bernardino | US 70, 99 | At 16th St. about 2 miles east of Redlands; structures and approaches for 16th St. Overcrossing | | 250,000 |
| San Bernardino | US 66, 91 | Barstow Freeway—Mojave Drive Interchange in Victorville; grade, pave and structure to construct interchange | 0.6 | 380,000 |
| San Bernardino | US 91, 466 | 1.0 mile east of Cima Rd. to Nevada line; grade, pave and structures for additional 2 lanes to provide 4-lane freeway (Connects with similar 25-mile freeway project now in progress to the west) | 23.2 | 7,000,000 |
| San Bernardino | US 66, 91, 395 | Court St. to 0.4 mile north of 27th St. in San Bernardino; landscape | 3.1 | 235,000 |
| San Bernardino | SR 30 | Big Bear Dam to 1.2 miles east; grade and pave to widen | 1.2 | 80,000 |
| San Bernardino | SR 18, 30 | 1.5 miles east of Lakeview Point to Big Bear Dam (portions); grade and pave to widen to 4 lanes | 2.0 | 500,000 |
| San Bernardino | SR 18 | 1.0 mile east of Victorville to US 91-66; grade, pave and structures for 4-lane highway and 4-lane expressway | 2.7 | 1,150,000 |
| San Bernardino | US 66 | 16 miles west of Amboy to 26 miles west of Needles (portions); reconstruct shoulders and resurface | | 700,000 |
| San Bernardino | SR 30 | 7.0 to 6.4 miles southwest of Running Springs; grade and pave for passing lanes | 0.5 | 100,000 |
| San Bernardino | FAS 712 | Waterman Ave. between Dumas St. and Mill St. southeast of San Bernardino; grade and surface for 4-lane divided highway (urban extension of FAS County Rd.; county's share, $181,000) | 1.0 | 181,000 (State's share) |
| San Bernardino | Various | Rights of way | | 3,801,000 |
| San Diego | US 101 | 0.1 mile north to 0.5 mile north of south city limit of National City; grading (construct fill for interchange) | 0.4 | 300,000 |
| San Diego | US 101 | Division St. to Market St. (portions); grading, paving and structures on future north-south freeway route (crossing and interchange structures and approaches) | 3.2 | 6,600,000 |
| San Diego | US 101 | 0.1 mile south of Sorrento Rd. to 0.5 mile north of Skyline Dr. in and north of San Diego (portions); grading (construct fill for future freeway) | 4.2 | 2,500,000 |
| San Diego | US 80 | Chase Ave. to Flume Dr. in and near El Cajon (portions); resurface existing highway including some widening | | 150,000 |
| San Diego | SR 78 | 1.0 mile west of Vista to Rancho Santa Fe Rd.; grade, pave and structures for 4-lane freeway. (Connects with 5.4 miles of 4-lane expressway now under construction to the east) | 5.1 | 4,200,000 |
| San Diego | SR 94 | Granada Ave. to Avocado Blvd. near Spring Valley; grade and pave to widen | 1.1 | 80,000 |
| San Diego | SR 94 | Merritt Dr. to Rogers Rd. near Spring Valley; grade and pave to widen | 0.8 | 80,000 |

† Numbers marked SR are State Sign Routes; numbers marked US are US Highway routes; numbers not marked are legislative routes.

| County | Route† | Description | Approx. mileage | Estimated cost |
|---|---|---|---|---|
| San Diego | Various | Rights of way including $6,200,000 for US 101 freeway in National City and San Diego, $2,500,000 for US 101 freeway between Del Mar and Carlsbad, $1,500,000 on US 80 in and east of El Cajon, $1,000,000 on SR 67 in and north of El Cajon, and .800,000 on SR 94 in Spring Valley area | | 13,950,000 |
| San Francisco | US 101 | Golden Gate Ave. to Lombard St. in San Francisco; resurfacing Van Ness Ave. | 1.5 | 150,000 |
| San Francisco | US 101 | Southern Freeway—Orizaba Ave. to 0.4 mile north of Ocean Ave.; grade, pave and structures for 6-lane freeway | 1.8 | 4,600,000 |
| San Francisco | HR 253 | Southern Freeway Extension—James Lick (Bayshore) Freeway to 3 blocks north of Oakdale Ave.; grade, pave and structures for 6-lane freeway (city to buy rights of way) | 0.7 | 5,500,000 |
| San Francisco | Various | Rights of way | | 1,905,000 |
| San Joaquin | US 99 | 2.5 miles south of Lodi to 1.0 mile north of Mokelumne River; grade, pave and structures for 4-lane freeway (Lodi Bypass) | 5.2 | 3,000,000 |
| San Joaquin | Various | Rights of way including $800,000 for Tracy Bypass on Interstate 5W | | 2,040,000 |
| San Luis Obispo | US 101 | Through Arroyo Grande; landscape | 1.4 | 50,000 |
| San Luis Obispo | US 101 | Pismo Beach Overhead to 0.3 mile north of North Pismo Separation; landscape | 1.9 | 80,000 |
| San Luis Obispo | US 101 | Los Osos Road Interchange, 1.5 miles south of San Luis Obispo; grade, pave and structure for interchange | 0.8 | 460,000 |
| San Luis Obispo | SR 166 | US 101 to 0.9 mile west of Huasna River; grade and pave to construct access-controlled 2-lane highway | 6.6 | 1,300,000 |
| San Luis Obispo | US 466 | 0.1 mile west of San Gabriel Rd. in Atascadero to US 101; grade and pave to widen and reconstruct | 1.8 | 290,000 |
| San Luis Obispo | HR 125 | Highway Route 137 to 1.0 mile east of Huer Huero Creek near Creston; grade, pave and structures for new Huer Huero Creek Bridge and approaches | 1.1 | 230,000 |
| San Luis Obispo | Various | Rights of way | | 1,605,000 |
| San Mateo | US 101 | Taylor Blvd. to Santa Helena Ave. in Millbrae; grade and pave to reconstruct | 0.8 | 245,000 |
| San Mateo | SR 1 | Tunitas Creek Bridge south of Half Moon Bay; replace bridge and construct approaches | 1.0 | 550,000 |
| San Mateo | US 101 Byp. | Bayshore Freeway—0.1 mile south of Spruce Ave. in Redwood City to 0.1 mile north of University Ave. in Menlo Park (portions); landscape | 4.1 | 150,000 |
| San Mateo, Santa Clara | US 101 Byp. | Bayshore Freeway—0.1 mile south of University Ave. to Matadero Creek in and near Palo Alto; landscape | 1.9 | 175,000 |
| San Mateo | HR 105 | West Hillsdale Blvd. Extension to San Mateo-Hayward Bridge (19th Ave. Freeway); grade, pave and structures for 6-lane freeway (freeway construction from West Hillsdale Blvd. Extension to S. Delaware St.; grading only from S. Delaware St. to bridge) | 4.9 | 4,800,000 |
| San Mateo, Santa Cruz | SR 1 | Davenport to Princeton (portions); base and resurface | | 210,000 |
| San Mateo | Various | Rights of way including $3,600,000 for Junipero Serra Freeway; $900,000 for SR 1 freeway through Pacifica; and $1,200,000 for HR 214 from Five Points in Redwood City to Bayshore Freeway at Harbor Blvd. | | 7,515,000 |
| Santa Barbara | US 101 | 0.2 mile east of Bath St. to 0.6 mile west of Los Olivos St. in Santa Barbara; grade, pave and structures for 4-lane freeway | 2.5 | 4,600,000 |
| Santa Barbara | US 101 | Winchester Creek to 0.2 mile west of Las Varas Creek west of Santa Barbara; functional planting | 3.9 | 66,000 |
| Santa Barbara | US 101 | 0.6 mile west of Refugio to 0.4 mile west of Tajiguas; functional planting | 2.1 | $35,000 |
| Santa Barbara | HR 2 | Orcutt Highway—Norris St. in Orcutt to Mooncrest Lane; functional planting | 0.9 | 12,000 |
| Santa Barbara | HR 150 | Cliff Drive—La Marina in Santa Barbara to US 101 at Las Positas; grade and pave to construct 4-lane and 2-lane highway | 3.6 | 950,000 |
| Santa Barbara | HR 236 | Ward Memorial Freeway—Goleta Campus of University of California to US 101 near Goleta; grade, pave and structures for 4-lane freeway | 2.6 | 2,850,000 |
| Santa Barbara | Various | Rights of way | | 1,480,000 |
| Santa Clara | US 101 | El Camino Real—Matadero Creek to University Ave. in Palo Alto; grade and pave to widen from four to six lanes | 2.7 | 850,000 (State's share) |
| Santa Clara | US 101 | Madrone Underpass in Morgan Hill to Metcalf Rd. near San Jose; resurface | 8.0 | 220,000 |
| Santa Clara | SR 17, US 101 Bypass | Nimitz Freeway—between Bascom Ave. and 0.5 mile north of Bayshore Highway; and Bayshore Freeway—between 0.3 mile west of Brokaw Rd. and Coyote Creek in and near San Jose; landscape at Bayshore-Nimitz Freeway Interchange | 6.0 | 300,000 |
| Santa Clara | SR 152 | Highway Route 22 near San Pelipe to Bell's Station (portions); drainage facilities and resurfacing | 5.0 | 200,000 |
| Santa Clara | SR 5 | Saratoga Gap to 3.1 miles north; reconstruct shoulders and resurface | 3.1 | 90,000 |
| Santa Clara, San Mateo | US 101 Byp. | Bayshore Freeway—0.1 mile south of University Ave. to Matadero Creek in and near Palo Alto; landscape | 1.9 | 175,000 |
| Santa Clara | US 101 Byp. | Tully Rd. Interchange south of San Jose; grade, pave and structure for interchange | | 850,000 |
| Santa Clara | SR 9 | 0.2 mile east of San Jose-Alviso Rd. in Alviso to Nimitz Freeway; grade and pave to widen and realign and construction of new Coyote Creek Bridge | 2.3 | 360,000 |
| Santa Clara | FAS 998 | Curtner and Stone Aves. between the Southern Pacific railroad and US 101; grade, surface and structure for 4-lane divided highway. (Urban extension of FAS County Rd.; county's share, $230,500) | 0.8 | 230,500 (State's share |
| Santa Clara | Various | Rights of way including $2,350,000 for Junipero Serra Freeway | | 4,690,000 |
| Santa Cruz | SR 1 | 41st Ave. Interchange south of Santa Cruz; grade, pave and structure for interchange | 1.5 | 580,000 |
| Santa Cruz, San Mateo | SR 1 | Davenport to Princeton (portions); base and resurface | | 210,000 |
| Santa Cruz | HR 67 | Chittenden Pass Rd.—1.9 to 3.5 miles east of Watsonville; grade and pave to realign | 1.0 | 250,000 |

† Numbers marked SR are State Sign Routes; numbers marked US are US Highway routes; numbers not marked are legislative routes.

| County | Route† | Description | Approx. mileage | Estimated cost |
|---|---|---|---|---|
| Santa Cruz | Various | Rights of way | | 435,000 |
| Shasta | US 99 | Cottonwood to 0.1 mile north of Bruce Dr. in Anderson; grade and pave for 4-lane freeway by constructing 2 additional lanes | 3.8 | 725,000 |
| Shasta | Various | Rights of way including $1,500,000 for future US 99 Freeway from between south of Anderson and north of Redding | | 2,430,000 |
| Sierra | SR 49 | 0.2 mile east of North Fork of Yuba River to 0.25 mile east of Ramshorn Creek (portions); pave previously graded sections | 3.1 | 130,000 |
| Sierra | SR 49 | Bassetts to Yuba Pass (portions); grade and pave to widen | | 50,000 |
| Sierra | SR 49 | Between Sierraville and Loyalton (portions); reconstruct base and resurface | | 100,000 |
| Sierra | Various | Rights of way | | 140,000 |
| Siskiyou | SR 89 | McCloud to junction with US 99; grade and pave for 2-lane access-controlled highway | 10.4 | 1,440,000 |
| Siskiyou | Various | Rights of way | | 420,000 |
| Solano | US 40 | 1.9 miles southwest of Vacaville to 1.2 miles northeast of Vacaville-Dunnigan Cutoff; grade, pave and structures to convert from expressway to six-lane freeway | 5.1 | 5,400,000 |
| Solano | Various | Rights of way | | 1,025,000 |
| Sonoma | US 101 | Lytton to Cloverdale (portions); grade and pave to reconstruct | | 200,000 |
| Sonoma, Marin | US 101 | Atherton Ave. north of Novato to Petaluma Creek (portions); drainage facilities and resurfacing | | 135,000 |
| Sonoma | SR 1 | 7.6 miles to 8.1 miles north of Jenner; grade and pave to reconstruct | 0.5 | 150,000 |
| Sonoma | SR 12 | 0.3 mile west of Duncans Mills west of Monte Rio to 0.3 mile east of Austin Creek; grade, pave and structures for realignment | 1.9 | 600,000 |
| Sonoma | Various | Rights of way including $1,300,000 for US 101 freeway in and north of Santa Rosa, and $1,930,000 for SR 12 between Sebastopol and Kenwood | | 3,870,000 |
| Stanislaus | US 99 | 1.6 miles south of Modesto (Hatch Rd.) to 2.4 miles north of Modesto (Shoemake Ave.); grading and structures for future 6-lane freeway through Modesto | 5.7 | 6,800,000 |
| Stanislaus | SR 33 | Through Patterson; grade and pave to widen to 4 lanes | 1.2 | 150,000 (State's share) |
| Stanislaus | Various | Rights of way | | 1,100,000 |
| Sutter | SR 24 | 0.2 mile south of Cornelius Ave. to Rio Oso; grade and pave to reconstruct and realign | 2.7 | 500,000 |
| Sutter | Various | Rights of way | | 440,000 |
| Tehama | US 99 | 0.2 mile north of Red Bluff to Shasta County line; grade, pave and structures to provide 4-lane freeway by constructing additional 2 lanes | 12.2 | 5,100,000 |
| Tehama | SR 36 | 0.3 mile west of Palmer Gulch to 0.1 mile east of Dales (portions); bridge replacements and approaches at DeHaven, Sheep, Supan and Palmer Gulches northeast of Red Bluff | 1.6 | 327,000 |
| Tehama | Various | Rights of way | | 210,000 |
| Tulare | FAS 1142 | El Monte Way, between east Tulare St. and Crawford Ave. in Dinuba; grade and surface to construct 4-lane highway (urban extension of FAS County Rd.; Dinuba's share, $33,350) | 0.4 | 33,350 (State's share) |
| Tulare | Various | Rights of way including $3,087,000 on SR 198 in Visalia area | | 3,734,000 |
| Tuolumne | SR 108 | 6.5 miles east of Sonora to 0.8 mile east of Hunts Camp; grade and pave for 4-lane expressway on Twain Harte Grade | 3.5 | 1,150,000 |
| Tuolumne, Mariposa | SR 120 | 0.1 mile west to 0.1 mile east of Mariposa-Tuolumne County line; grade and pave to reconstruct, widen and realign for initial 2 lanes of future 4-lane expressway | 2.3 | 450,000 |
| Tuolumne | Various | Rights of way | | 470,000 |
| Ventura | US 101, SR 23 | Ventura Freeway—0.5 mile east to 0.5 mile west of Moorpark Rd., and on Moorpark Rd. (SR 23) from Ventura Freeway to Olson Rd. near Newbury Park; grade, pave and structures to provide interchange on Ventura Freeway and 4-lane divided highway on Moorpark Rd. | 4.5 | 1,340,000 |
| Ventura | US 101 | Ventura Freeway—Borchard Road Interchange and frontage roads between 0.4 mile east and 0.5 mile west of Borchard Rd. west of Newbury Park; grade, pave and structure for interchange | 0.9 | 550,000 |
| Ventura | SR 126 | US 101 at Ventura to 0.1 mile east of SR 118; grade, pave and structures for 4-lane freeway | 5.5 | 3,600,000 |
| Ventura | HR 153, US 101 Alt. | Hueneme and Saviers Rds.—Fourth St., in Port Hueneme to US 101 Alt., and on US 101 Alt. from Saviers Rd. to 0.2 mile southeast; grade, pave, structures, signals and channelization (mainly widening to 4 lanes on Hueneme and Saviers Rds.) | 4.1 | 835,000 |
| Ventura | SR 23 | Triunfo Creek Bridge on Decker Rd. south of US 101; replace bridge and construct approaches | 0.2 | 75,000 |
| Ventura | Various | Rights of way including $1,000,000 for SR 126 freeway | | 3,157,000 |
| Yolo | US 40 | Richards Blvd. Interchange at Davis; landscaping | | 100,000 |
| Yolo, Colusa | SR 45 | 3.5 miles south to 4.5 miles north of Yolo-Colusa County line; grade and pave for reconstruction and widening with some realignment | 8.0 | 700,000 |
| Yolo | SR 16 | Rumsey to Esparto (portions); widen three bridges | | 95,000 |
| Yolo | HR 90 | 6.8 miles north of Madison to US 99W on Dunnigan-Vacaville Cutoff; reinforce base and resurface | 5.6 | 127,000 |
| Yolo | Various | Rights of way | | 600,000 |
| Yuba | US 99E | Power Line Rd. in Olivehurst to Yuba River; functional planting | 3.5 | 19,000 |
| Yuba | US 99E | Yuba River to Second St. in Marysville; landscaping at new Yuba River Bridge | | 20,000 |
| Yuba | SR 20 | Dry Creek to Parks Bar Bridge east of Marysville; grade and pave to reconstruct and widen | 4.0 | 190,000 |
| Yuba | Various | Rights of way | | 20,000 |

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*PHOTO ABOVE—Now open to traffic is the new freeway bypass on U.S. Highway 101 at Healdsburg. This photograph, taken while construction was in progress, shows the previously completed Russian River Bridge and the bypass route (left) west of the city. PHOTO BELOW—Landscaping on a section of the Nimitz Freeway (Sign Route 17) in Oakland. In planning landscaping on metropolitan area freeways, Division of Highways landscape architects must select trees and shrubs which present a pleasing appearance, require low cost maintenance, and also serve functional purposes such as erosion control and the screening of headlight glare and traffic noise.*