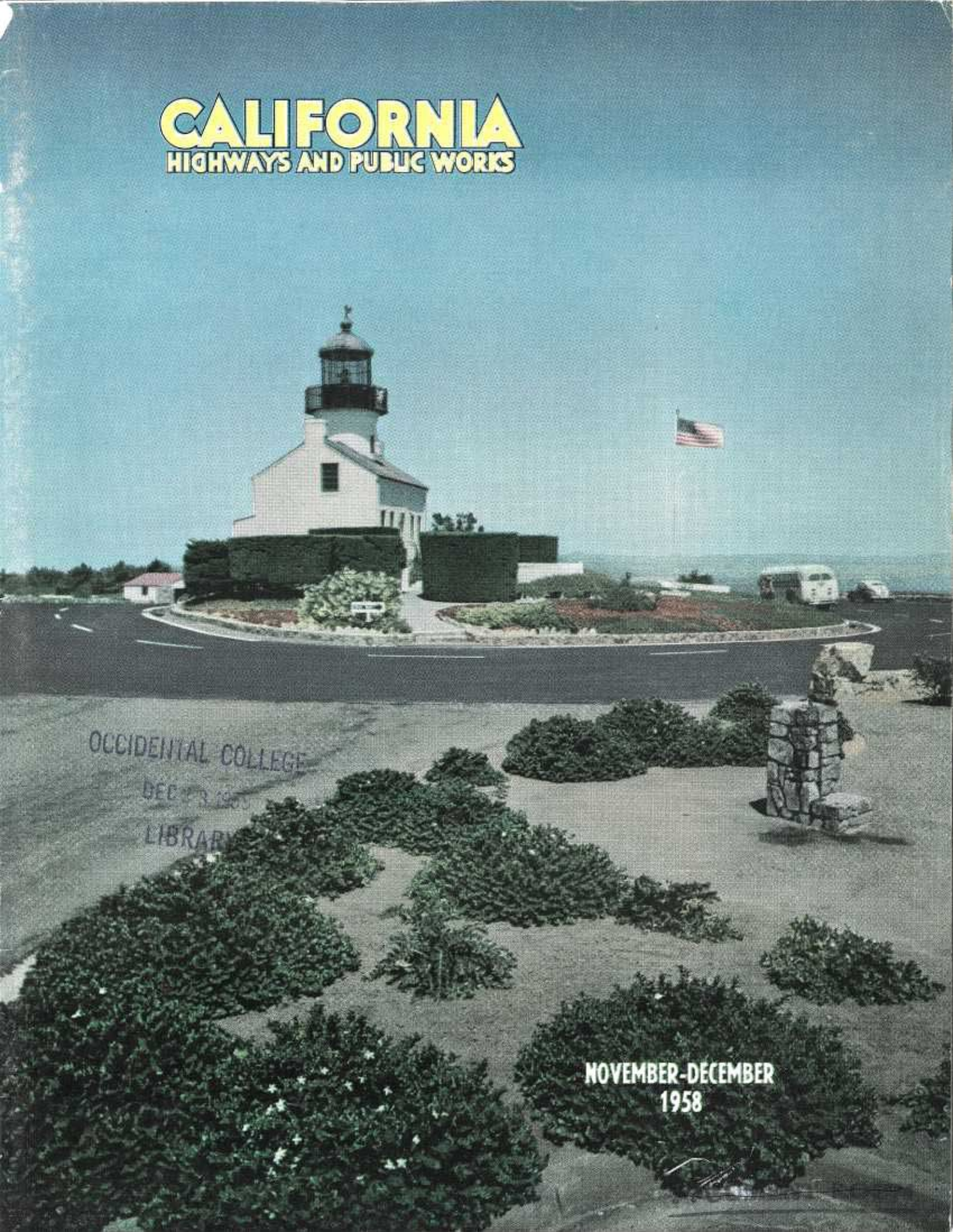
CALIFORNIA
HIGHWAYS AND PUBLIC WORKS



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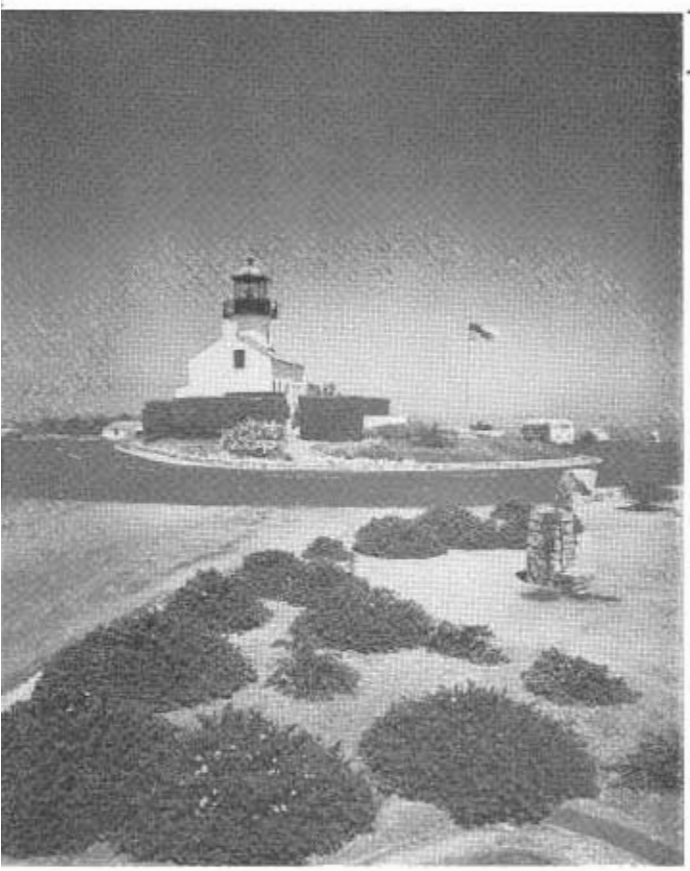

FRONT COVER

Western terminus of US 80 is at this picturesque lighthouse located at the Cabrillo National Monument, Point Loma, San Diego.

—Photo by William R. Chaney

BACK COVER

Grout Bay Public Camp along Sign Route 18 near Big Bear Lake in San Bernardino County is the stopping place for many tourists each year.

—Photo by Robert A. Munroe

Table of Contents on Page 2

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State Roads

Talk Before Engineers in England Tells of State Highway Development

By J. W. VICKREY, Deputy State Highway Engineer

Here is the text of a talk by J. W. Vickrey, Deputy State Highway Engineer, which he delivered before the Pavings Development Group of the Cement and Concrete Association of London November 20th.

It presents a comprehensive treatment of the history of highway development in California and a background of the legal and policy considerations which influence the engineering of California highways.

Vickrey's talk to the group was incidental to a vacation trip around the world.

CALIFORNIA is a land of superlatives, and our highway problem is no exception. A state on wheels, California ranks second in population among the states, with almost 15 million people. More importantly, California ranks first in motor vehicle registrations, having about one vehicle to every two residents. And these vehicles, 13 percent of which are trucks, now run up the staggering total of almost 70 billion vehicle-miles per year on the 136,000 miles of highways, roads, and streets in the State.

These statistics barely indicate the extent to which the State depends on the motor vehicle for its commerce, industry, agriculture, and even its day-to-day living. Los Angeles is world-famous for its dependence on automotive transport. But the picture is very much the same throughout the State, for even with its large population, the area of California is so extensive and its topography is such that there are vast sparsely populated regions; and these, as well as the populous urban areas and the thriving agricultural districts, must rely on motor transport for their existence. This dependence has been greatly accentuated by the fact that California's great growth has taken place during the automobile age and after the period of railroad expansion in the United States, with the result that California, unlike eastern and midwestern states, is without benefit of an extensive network of rail lines. It is fair to say that the sheer force of circumstances has had much to do with California's acknowledged leadership in the development of modern highway facilities.

J. W. VICKREY

Road Development

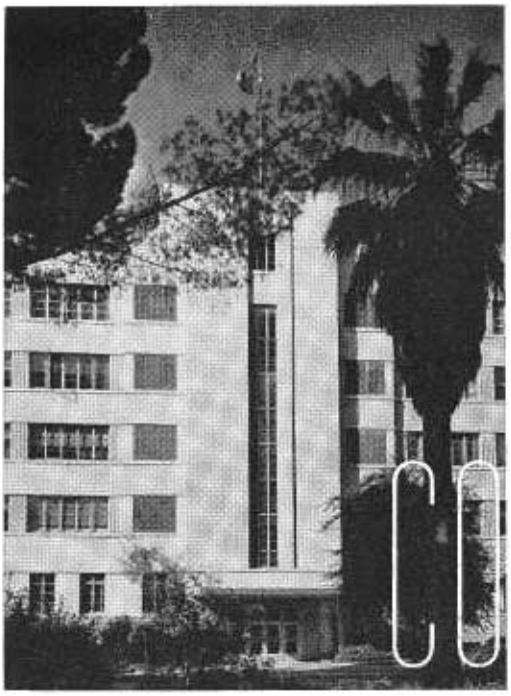
Since our interest here is centered in the modern highway facilities for which the State of California is becoming justly famous, we are led to consider first the development of the system of which these facilities are a part. Responsibility for the establishment of the State Highway System and for the designation of routes in that system resides in the State Legislature. Their action in this matter is most general, consisting of the definition of the termini of each route and possibly a control point or two along the way.

Authority for actual location of a given state highway between termini rests with the California Highway Commission. The commission is empowered to "select, adopt, and determine the location for state highways on routes authorized by law." The function of the commission is to represent the State as a whole, and it is specifically instructed by statute to carry out the declared policy of the Legislature " * * * to provide for advanced planning and continuity of fiscal policy in the construction and improvement of the State Highway System. * * * " The commission is composed of six members chosen for staggered terms by the Governor with the approval of the Senate. The seventh member and ex officio chairman is the Director of the Department of Public Works.

The Department of Public Works is responsible for the actual design and construction of state highways and " * * * is authorized and directed to lay out and construct all state highways between the termini designated by law and on the most direct and practicable locations as determined by the commission." Authority to carry out this work is delegated to the Division of Highways, which is under the direction of the State Highway Engineer, who is appointed by the director but who has civil service status.

Good Roads Movement

Not only the present form of state highway administration but, indeed, the recognition of the interest and responsibility of the State Government in the provision of highways has evolved gradually over the last half-century. In many respects we lagged behind our European colleagues by some 50 years or more. In our early national existence, the states and our National Government participated to a limited extent in the provision of



Public Works Building
Twelfth and N Streets
Sacramento

CONTENTS

highway services. But the issue of states' rights took the National Government out of the scene, and the failure of the turnpike movement, the desire for local autonomy, and finally the coming of railroad transport, caused the states to lose interest in highways. It was not until near the end of the Nineteenth Century that a substantial good roads movement developed throughout the Country and stimulated interest in road improvement.

Reform developed gradually with changing concepts of the highway function and the introduction of improved methods of highway construction. Three general stages through which this renaissance took place were: (1) substitution of money taxes for statute labor; (2) expansion of the taxing and administrative unit; and (3) inauguration of a policy of federal aid to the states.

By 1890, the concept of the general utility of roads was sufficiently advanced to permit state aid for local highways and, as a logical outgrowth, state management of part of the highway network to insure a statewide system. State supervision naturally required definition of that portion of the road plant to be placed under state control and an organization responsible for its administration. A federal policy limiting federal aid funds to those states having adequate state highway departments insured the establishment of such agencies throughout the Country.

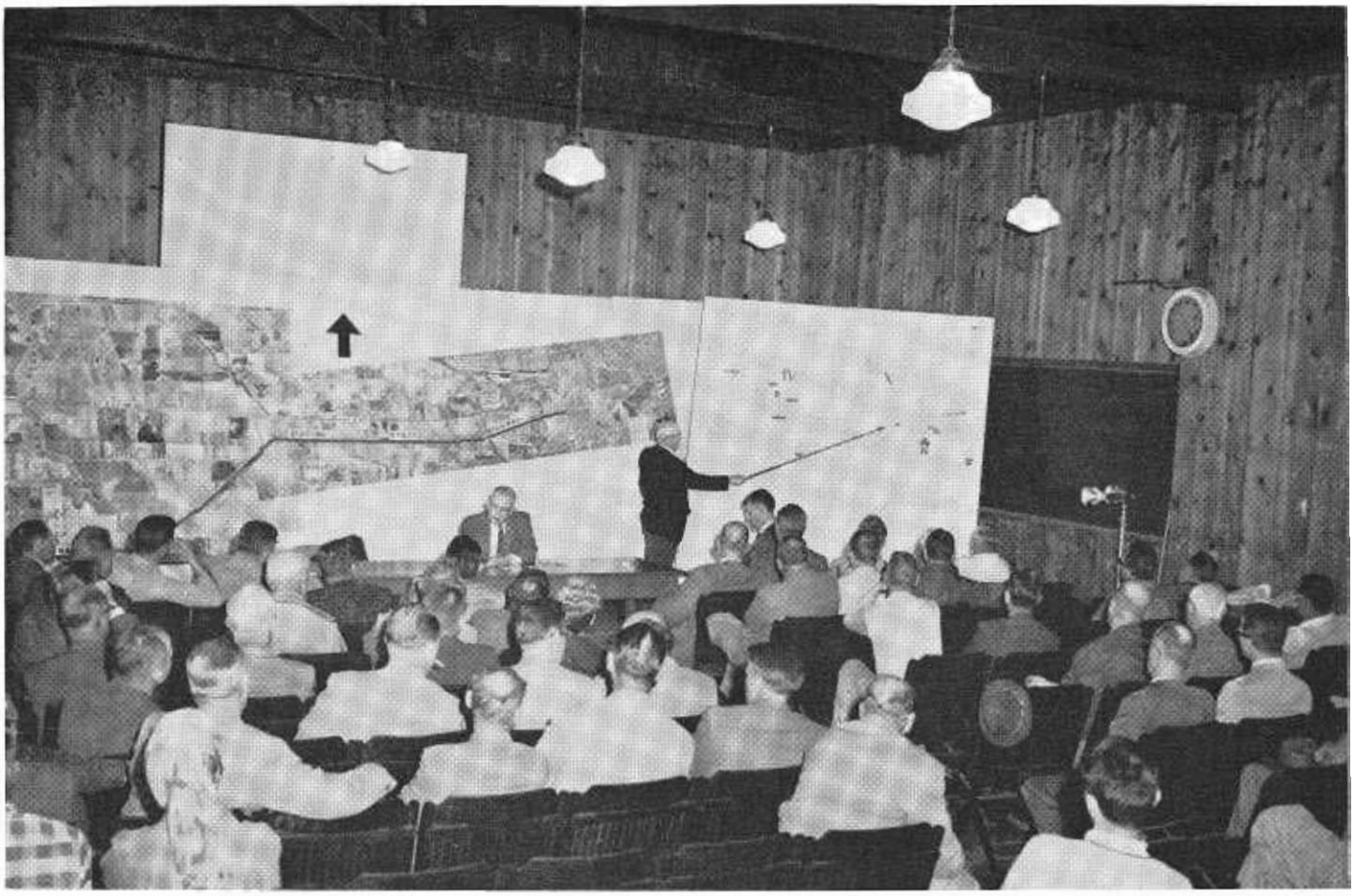
The general principles under which the California State Highway System has developed were laid down by the original Bureau of Highways more than 60 years ago in 1895. These were:

"1. To lay routes out along the lines which the physical features of the State forever fix as the easiest lines of communication.

"2. To traverse the great belts of natural wealth of the State by one or more highways.

"3. To connect all the large centers of population.

"4. To reach each county seat in the State and tie in with the county roads."



" * * Well-publicized public meetings, to which all interested individuals and organizations are invited in order that they may express their views on the engineering studies made by the Division of Highways." Photo shows a typical public meeting, involving a routing discussion in the Stockton area.*

From its inception in 1895 through the adoption by the Legislature of 58 miles of the original Emigrant Trail as a state highway, state highway mileage grew gradually for a number of years. However, the previously modest commitments were substantially increased in 1909 when, in conjunction with a highway bond issue, the mileage of roads under state administration jumped to over 3,300. Subsequent additions, including one of more than 6,000 miles in 1933, have raised the total of authorized routes to 14,314 miles, of which 13,769 miles have been constructed. In addition to the state system, there are over 67,000 miles of county roads, nearly 25,000 miles of city streets and some 30,000 miles of national forest and other public roads, rounding out the total of 136,000 miles.

User Tax Evolves

The same legislative act of 1909 that created the California State Highway System provided for a bond issue of $18 million for construction of the 3,000 miles in this newly designated network. By 1920 an additional $55 million in bonds had been authorized to complete the original system and for the construction of some 2,000 miles which had subsequently been added. The inadequacy of the funds initially provided was attributed to the higher cost of the four-inch concrete pavement which was finally selected instead of the cheaper but inadequate oil and macadam pavements originally contemplated.

Dissatisfaction with the bonding method of financing highways arose soon after passage of the Bond Act of 1919. Realization of the futility of piecemeal financing where the eventual interest costs would more than equal the initial investment; fuller understanding of the magnitude of the highway program and of the enormous cost of maintaining, improving and reconstructing the system already built; a severely limited state tax base and existing heavy demands upon local property, showed clearly the need not only for additional large sums but also, and more important, new sources of revenue.

With recognition that the provision of highways is one of the more important functions of government, ways must still be found to finance their construction and maintenance without placing too great a burden on the general tax base. In the earlier experience in the United States, toll financing of specific highways had been tried and found wanting. But the principle of requiring users to defray the costs of the highway services rendered to them was revived early in the Twentieth Century through the imposition of taxes bearing directly on the ownership and operation of motor vehicles which had no counterpart in the general tax structure.

Motor Fuels Taxed

The first highway-user tax in California was the motor vehicle registration tax adopted in 1905 which, in its inception, was intended purely for regulatory purposes but which has since evolved into an important source of revenue for highways. Now, with a flat fee for all vehicles and a graduated weight tax for commercial vehicles, motor vehicle taxes produce in the neighborhood of $125 million annually in California, more than one-fourth of user tax collections.

But it is difficult to conceive of a successful highway program in any state without heavy reliance on motor fuels taxation. Introduced first in Oregon in 1919, the gasoline tax was adopted by California in 1923 and has become the backbone of the State's highway financing program. Currently, a little over 5 billion gallons of fuel is consumed a year on the State's highways, roads, and streets, with the result that the six-cent tax yields in excess of $300 million, or about 70 percent of user tax collections. The gasoline tax has weathered good times and bad and continues to be one of our notably successful and relatively popular imposts.

Of particular importance to the highway administrator is the reliability and predictability inherent in the motor fuel tax. While the engineer is hard put to predict the amount of traffic on any particular section of road, it is much easier to predict the total vehicle mileage which will be traveled over the entire road plant in the next year or period of years. Thus there is a ready basis for estimation of available funds. Trends in travel and in fuel consumption have proved to be remarkably stable. An additional advantage is that fuel consumption and hence tax revenues for highway needs are roughly correlated since both are directly related to volumes of highway use. It is no wonder that the American highway engineers welcome the dedication of this source of revenue which gives them a firm base upon which to build their future plans.

Urban Highways

Originally, in California, as in the rest of the Nation, state responsibility for and jurisdiction over state routes ended at the limits of cities. In the early days of state highway development such limitations were logical and necessary. Existing city streets were quite adequate for the limited amounts of traffic they were called upon to handle. The real problem at that time was to tie the cities together and to provide the farm-to-market roads so badly needed in rural areas. In order to insure concentration of funds and manpower upon this rural system, state highway department activities were quite naturally restricted to these areas.

Emphasis upon rural highways was evident too in the federal-aid program which, almost from the start, limited the expenditures of federal funds to a selected proportion of interstate and intercounty rural roads. Acknowledgment of the urban transportation problem by the Federal Government did not come until 1941 with the authorization of the use by the states of a small percentage of federal funds in planning urban highway developments. In 1944, specific federal-aid construction funds were set aside for a large-scale co-operative attack by federal, state and local governments upon city traffic problems. Since then, earmarking of federal funds for urban use has continued at an increasing pace. Almost half of all expenditures for the so-called National System of Interstate and Defense Highways will be made in cities.

In California, the development of state interest in urban highways is most clearly illustrated by the evolution of state law regulating the activities of the Division of Highways in cities. It was not until 1925 that the Legislature permitted the division to include in the state system such portions of state highways whose "natural course" ran through municipalities of not over 2,500 people, and then, only upon dedication of the route by the local governing body. A limited program of city-state co-operation was inaugurated in 1931, although the responsibility of the division was severely restricted.

Cities Demand Equity

Beginning in 1933, a dual policy of state participation in urban areas began to emerge. Since 1923, the major source of revenue for state highways had been the motor fuel tax. The cities, particularly the larger ones, with their high volumes of traffic contribute a large proportion of this revenue, and they demanded on grounds of equity that a substantial amount be returned to these urban areas in one way or another. This could be done either through direct apportionment of part of the state gasoline tax to the cities for their use on streets or by direct expenditure by the State on extensions of state highways into cities. Both methods have been and are being used, but with shifting emphasis over the years.

The 1947 legislative act, the so-called "Collier-Burns Highway Act," under which highway expenditures are now made, maintains this dual interest in urban facilities, but the State has assumed full responsibility for the costs of constructing and maintaining state highways in cities. No distinction is made between rural and urban highways within any county insofar as state interest is concerned. While the co-operative program for city streets started in the early thirties has been continued and, in fact, was more than doubled in 1947, the State's program of direct expenditure in cities is of much greater consequence. California has probably gone further than any other state in this direction, and the more impressive freeways for which we are known are actually state highways in urban areas.

Freeway Idea Grows

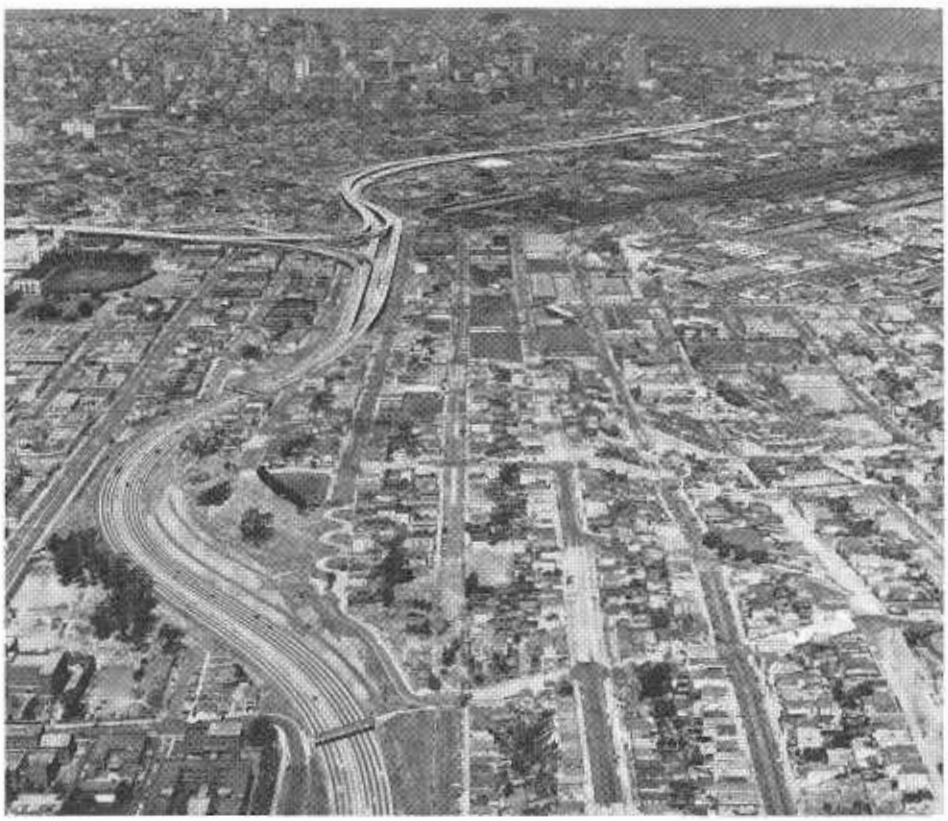
The dominant factor in California highways today is undoubtedly the freeway. Just as concrete pavements held forth the promise 30 years ago for a measure of structural permanence, so today the concept of controlled access provides us with a means to insure the integrity of the highway itself and to protect its basic function, traffic movement, from inevitable decay by encroachment from adjacent uses. In restricting highway use to one of movement only, we are reaffirming the fundamental nature of the road in which "the right of the public in a highway is an easement of passage only —a right of passing and repassing." Certainly, this reaffirmation is not without

its dangers, for although the *function* of the road is movement its *purpose* is the welfare of the community and the State. But be this as it may, one cannot lose sight of the fact that a city freeway is three times safer and will carry three times as much traffic as a non-access-controlled city boulevard.

Under common law, an abutting owner had right of access at any point at which his land adjoined the highway, largely because he or his predecessors had designated that portion of land for highway use and even helped build the road by personal services or tax payments.

The California Freeway Law was enacted in 1939, permitting the Highway Commission to designate state highway routes as freeways and to limit access to routes so designated. Under this new freeway law legal interpretations of inherent access rights had to be adjudicated in costly court proceedings. The principal cases involved claims of decreased property values by restriction or proximity of the freeway, impairment of access or view, cul-de-sac creation, circuity of travel, and diversion of traffic from places of business. The freeway, then, is a legal concept and may apply to any state route regardless of its design characteristics. Thus a freeway may be a two-lane rural highway with access permitted at a relatively large number of points and with side roads intersecting at grade; or it may be an eight-lane divided highway with access and turns permitted only at a limited number of grade-separated interchanges. In urban areas, where our major highway needs are to be found, the vast majority of our new construction projects are either full freeways with complete control of access and turning movements, or expressways permitting a limited number of intersections at grade but so designed as to facilitate conversion to full freeway standards when traffic so requires and finances permit.

The extensive program of freeway construction upon which California has embarked has resulted in an impressive record of accomplishment. To date, over 4,000 miles of freeway routes have been adopted, more than 500 miles of freeways have been con-



" * * The State has assumed full responsibility for the costs of constructing and maintaining state highways in cities * * * California has probably gone further than any other state in this direction, and the more impressive freeways for which we are known are actually state highways in urban areas." UPPER—Aerial view along Blackstone Avenue in Fresno (State Sign Route 41), a major city arterial recently widened by the State. LOWER—Typical state-built freeway development, in San Francisco.*

structed, and in excess of 800 miles of expressways completed. Equally as important, we are developing in California a concept of the role of the freeway in our total transportation structure and are learning more about how these facilities relate to the vast urban complexes which have become the dominant environmental form in our western civilization.

Local Viewpoints Sought

Like the railroad and the streetcar before it, the freeway is shaping our cities and bringing profound change throughout the State. In rural areas we find little country crossroad towns expanding into small cities, and in our metropolitan complexes industrial development and suburban growth gather about the freeways like filings about a magnet. We are no longer merely building roads (although these new facilities have become the backbone of our urban transportation system); we are building the future, for the facilities which we are providing today will in large measure set the pattern of urban development tomorrow.

Aware of this grave responsibility, the California Division of Highways has endeavored to determine the wishes of the communities through which freeway routes are proposed and has strived to maintain a balance between these local interests and the statewide responsibility with which the commission is charged. On the staff level, close liaison is sought with local planning and engineering bodies from the inception of a project. Early in the process, public meetings are held by the Division of Highways to acquaint those interested with the tentative proposals and to gather information from local people which can be used in a final selection of a freeway route. Finally, if it is so desired by the community, the Highway Commission holds one or more public hearings before a decision as to the route location is made. Actual construction of the facility cannot proceed prior to the negotiation of a "freeway agreement" between the community and the division, setting forth the manner in which local traffic and street closures occasioned by the freeway are to be handled.

These considerations of "community values," as they are now called, have recently been written into the law and it is our hope that the localities will take full advantage of its provisions. For it has been our experience that freeway location is expedited and the most satisfactory results obtained in those cities which have long-range master or general plans and have a good idea as to the transportation network which they hope to develop. As the law makes clear, it is up to the communities, not the State, to determine "community values." It is the State's job to provide state highways.

Public Supports Program

I will discuss some of the technical problems of getting the job done—planning, design, right-of-way acquisition, construction, and operation of the freeways. Before doing so, however, I should like to state some of the basic ingredients of the success of our program which may not be immediately evident from a recitation of our laws and practices.

1. Our system of highway financing, while not always adequate to our increasing needs and rising costs, has given us an assured and steady source of income with which we could plan for the future.
2. The State Legislature has delegated to the Highway Commission and to the highway engineers sufficient freedom and flexibility in the budgeting of funds and the precise location of freeways, as well as the more technical details of design and construction, so that an orderly program of highway modernization can be carried out.

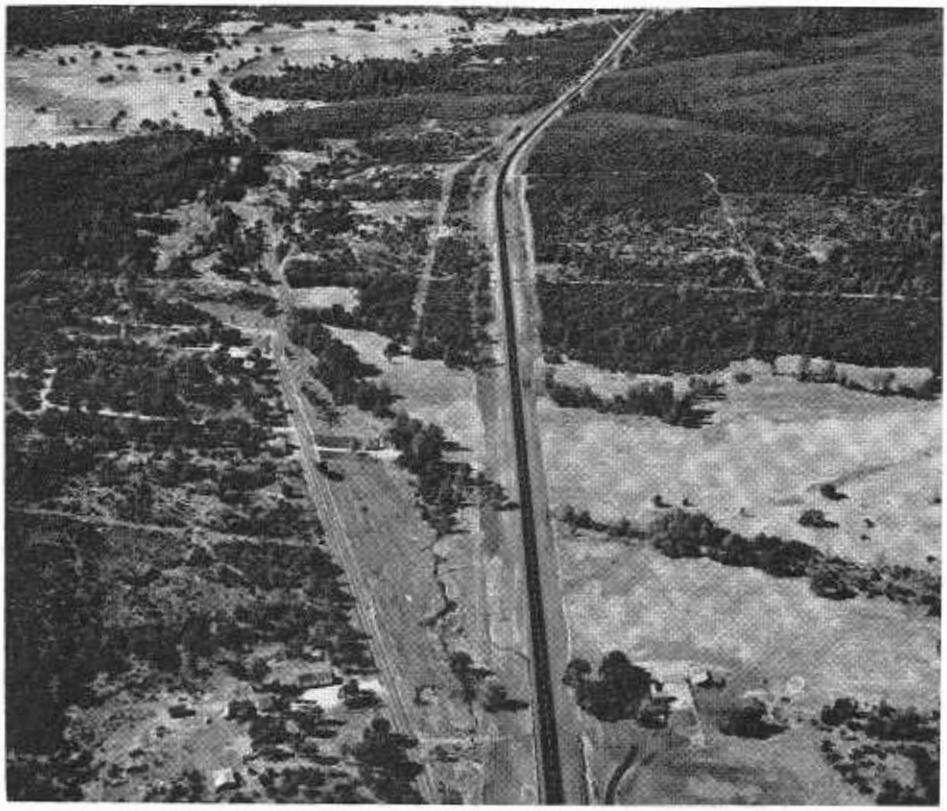
But these things are not accidental. Fortunately, and perhaps naturally, in a state so dependent on highway transport, our Legislature has taken a keen interest in major highway policy issues and has provided for continuing studies of highway problems, studies in which in the department have been most happy to co-operate. At the same time, we have enjoyed the lasting support of many civic groups who have an active interest in the political and economic destinies of the State. We like to think that we have earned this support because we have delivered a satisfactory product. Therefore, I will turn to the technical aspects of producing freeways.

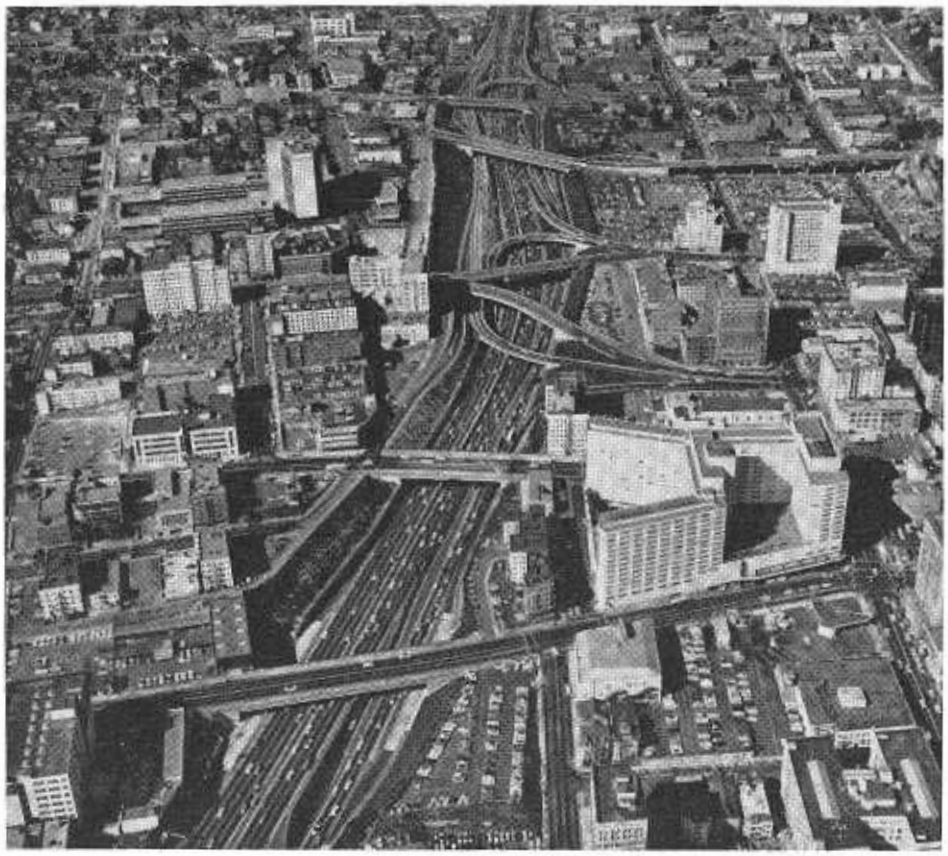
Importance of Planning

The backbone of the engineering phases of highway work such as planning, design, acquisition of rights-of-way, and construction, is the advance planning program. A planning program is simply a time schedule listing specific projects and setting forth the year that construction is planned to begin and the prior year or years over which the necessary rights-of-way are to be acquired. The funds required during each fiscal year for right-of-way and construction are shown.

The importance of a planning program becomes apparent when it is considered that many major freeway projects require a minimum of four to five years from the inception of the project to the date of construction. In some cases it takes a minimum of two years before a freeway can be properly located and design work sufficiently advanced to acquire rights-of-way, and several more years before rights-of-way can be cleared to the point where construction can begin. This is particularly true in metropolitan areas. It cannot be overemphasized that a planning program is essential if engineering work is to be used to the best advantage, construction schedules are to be met, and the segments of the completed freeways are to fall in their proper place.

The most important single factor in the preparation of a planning program is the assurance, within reasonable limits, that specific funds will be available annually. We are fortunate in California, as we have already stated, that a progressive Legislature, by statutory action, has provided that assurance. The second important factor is the comprehensive knowledge of relative conditions along the highway system. This factor is assured by means of a continuing record of traffic volumes, accident incidence, and maintenance costs for the entire highway system, as well as the intimate first-hand knowledge of the highway engineers.





" * * Thus, a freeway may be a two-lane rural highway with access permitted at a relatively large number of points and with side roads intersecting at grade; or it may be an eight-lane divided highway with access and turns permitted only at a limited number of grade-separated interchanges." UPPER—Aerial view of US 50 in the foothills west of Placerville, showing initial two lanes of future four-lane freeway. LOWER—The Harbor Freeway in downtown Los Angeles.*

Project Report Described

Each specific project in the planning program is the subject of a project report. A project report is essentially an engineering report that answers two basic questions: (1) What is wrong with the existing highway? and (2) What is the best and most practical solution to this highway problem? The data in the report are sufficient to establish the necessity, priority, and estimated cost of the proposed future improvement. It also establishes certain major basic features or controls upon which the detailed design will be based. In the case of a freeway, the project report establishes the following:

1. Justification of the project and its priority.
2. Location of the freeway.
3. Basic geometric features, such as design classification, number of lanes, and median width.
4. Location of separation structures and interchange facilities.
5. Estimated cost of right-of-way and construction.

Of these items, the manner of determining a freeway location may be of particular interest. There are three major factors that are considered in establishing the proper routing of a freeway:

1. Cost of right-of-way and construction.
2. Service to traffic that the freeway location will render.
3. Impact of the proposed freeway location on the area through which it passes.

The first two factors are determined through the use of well-established engineering methods. The relative impact that alternate freeway routes may have on an area is difficult to measure in terms that can be directly compared to the cost of the freeway or to traffic service. This is a fertile field for future research, and we have conducted and still are conducting studies in connection with this phase of the whole problem. A measure of the relative effect of alternate freeway locations on an area is obtained through consultation with local technical and planning staffs; through the use of any master plans available;

and through the medium of well-publicized public meetings, previously referred to, to which all interested individuals and organizations are invited in order that they may express their views on the engineering studies made by the Division of Highways. We, as highway engineers, are at times reluctant to allow what may be a nebulous area-impact factor to offset the advantages that a particular freeway location may offer in terms of cost and traffic service; we do recognize, however, that alternate freeway locations will have varying degrees of immediate and long-range impact on a community and that this must be given proper weight in arriving at a conclusion.

After the freeway route has been determined, the locations of interchange and separation structures established, and the basic geometric features set, the project is theoretically advanced to the design stage. Actually, design work in varying degrees has already gone into the determination of all of the features just enumerated.

Design Ideas Change

Design procedures during the past several years have gradually changed from that of providing the most economical roadway—usually governed by terrain, with intersections at grade practically unlimited—to the point where the interchange design is the controlling factor. In present freeway design, particularly in metropolitan areas, the primary design problem is the interchange, and the roadway or freeway connection between interchanges becomes a relatively simple matter. The relative importance of design features has been completely reversed, in that in the highway design of a few years ago the main roadway was of greatest importance and the intersections were incidental.

The design and plans of a highway only a few years ago were relatively simple, and considerable change could readily be made during construction without much concern as to the effect that the change would have on the finished project. In present complicated freeway designs involving interchanges, there are a multitude of ramps, grade separation structures, and drainage structures that are all interrelated, and any change in the location, elevation, or alignment of any portion would have a serious effect on the entire interchange design. Because of this interrelationship and the rigid controls of meeting highly developed city street areas, drainage and other controls, metropolitan freeway design must be detailed and exact and, once the design has been determined, modification of that design can be undertaken only after careful and complete analysis. It was not too long ago that bridges were a relatively minor part of highway construction. Present freeways, requiring bridges not only to cross waterways but also for separation and interchange facilities, as well as for viaducts to reduce right-of-way costs, have placed an increasingly important portion of the necessary design work on bridges.

Photogrammetry Used

In order to meet the expanded highway program that occurred in California at a time when skilled engineering personnel was scarce, it was essential that the lengthy and tedious design processes be streamlined and that the maximum possible use be made of laborsaving devices. This circumstance has led us to the early use of photogrammetric methods to accomplish work that was previously done by field survey parties. Aerial photogrammetry, properly controlled, provides accurate detailed data at relatively low cost and with a minimum expenditure of time and manpower. All aerial photogrammetry in California is done on a competitive bid basis by contractors specializing in this type of work.

The fairly recent development of electronic computers has relieved our engineers of a large portion of the tremendous mass of calculations required in the detailed planning of freeways. We presently have two fair-sized electronic computers that are on an almost full-time basis. Although these and other manpower-saving devices have reduced the time and cost of highway engineering work, probably the most significant result is that trained engineering personnel are being relieved from nontechnical duties and their professional training can be directed towards more important tasks.

Plan and design methods are reviewed periodically, unnecessary processes are eliminated, and design procedures are streamlined. Manuals of design have been prepared and are constantly being revised to reflect improved design standards. Establishment of standards and their incorporation in manual form is one of the basic necessities for the large highway program in California. The use of models, if not indispensable, has at least been of great help in complicated interchange designs, permitting the engineer to clearly visualize what the end product will be. Models can also be of considerable value in showing the interested public the type of highway facility that is planned for construction.

Right-of-Way Acquisition

Within the organization of the California Division of Highways there is a Right-of-Way Department properly staffed to carry out all necessary functions in connection with right-of-way work. After design has progressed sufficiently to determine the right-of-way requirements, the necessary data and information are turned over to the Right-of-Way Department. Each individual piece of property becomes the subject of an appraisal prepared by qualified appraisers. This appraisal establishes the fair market value of the property and forms the basis of negotiations with the property owner. The property owner is offered, initially, the appraised value, no more and no less. No attempt is made to barter on the price to be paid for the property. Changes in the appraised value are made only upon presentation of substantiating evidence. If no agreement can be reached on the fair value of the property to be acquired, then, as a last resort, the matter is brought into court. The effectiveness of this method of right-of-way acquisition may be tested by the fact that only from 2 to 3 percent of right-of-way transactions are processed through eminent domain proceedings.

In 1952, the California Legislature established a revolving fund of $30 million for the advance purchase of proposed highway right-of-way when such right-of-way was in danger of

. . . Continued on page 54

New Director

T. F. Bagshaw Appointed; C. M. Gilliss Goes to L. A.

T. F. BAGSHAW, state public works executive for five years and a city or county official for more than three decades, became Director of the State Department of Public Works and Chairman of the California Highway Commission November 10th.

The assistant director of the department was appointed by Governor Goodwin J. Knight to succeed C. M. Gilliss, who resigned to become Los Angeles County Road Commissioner.

Bagshaw, a veteran public administrator and business executive, also was named to the California Toll Bridge Authority, State Public Works Board, State Allocation Board and numerous other state boards, commissions and councils.

He first became associated with the Department of Public Works and the Highway Commission May 1, 1953, when he was named special assistant to the director. His appointment as assistant director was made in January, 1957. One of Bagshaw's first official acts as director was to appoint John Stanford, management analyst for the department for the past 2½ years, to be the new assistant director of the department. (See page 51 for details about the new assistant director.)

Bagshaw was chairman of the Board of Supervisors of Marin County for the 14 years prior to his initial state appointment.

He was engaged in the import business in San Francisco for many years and after World War II, owned and published the *Marin Journal* in San Rafael.

Bagshaw is a former Mayor of Mill Valley and former director of the Golden Gate Bridge and Highway District. He has been active in the California State Chamber of Commerce, State Supervisors Association, and Redwood Empire Association.

He has served in one or another city, county or state public post ever since he was 21, when he became a member of the Mill Valley City Planning Commission.

He is married and has one daughter and two grandchildren.

Gilliss had been a highway and public works administrator for 11 years, and had been an official of the State Department of Public Works for six years, before he resigned to accept the Los Angeles County Board of Supervisors' appointment as Road Commissioner.

C. M. GILLISS (upper); T. F. BAGSHAW (lower)

In his letter of resignation, Gilliss wrote the Governor:

"I could not refuse the challenging opportunity to reorganize and direct the affairs of the road department of the most populous county in the United States, a county with a larger budget than three-fourths of our states."

Gilliss said "it has been a gratifying experience to work together with the men and women of the Department of Public Works, so many of whom are giving a lot more to public service than is required by the civil service rules."

Gilliss was deputy director of the department when Governor Knight promoted him to director January 1, 1958. He had been an official in the department since 1952, except for a period of nearly a year when he was Legislative Secretary on the Governor's staff.

He went into state service from Riverside County, where he had been assistant road commissioner and highways administrator. In his earlier private business career, he was an accountant, engineer and engineering instructor.

Sections of Freeway Opened on 3 Routes

Newly constructed freeway sections on three of California's most important highway routes were opened to traffic November 24th and 25th.

A 10-mile section of State Sign Route 17 (Nimitz Freeway) between Warm Springs and Beard Road south of Alvarado in Alameda County was opened on the twenty-fourth.

On the twenty-fifth, the parallel Carquinez Bridge and freeway approaches on U. S. Highway 40 south of Vallejo were placed in operation, as was the five-mile Paso Robles Bypass on U. S. Highway 101 in San Luis Obispo County.

Clarence Bovey Retires; M. H. West Appointed

Clarence E. Bovey, Engineer of City and Co-operative Projects, retired on October 31st after more than 44 years of continuous service with the California Division of Highways.

Melbourne H. West, who has been assistant planning survey engineer of the division, has been appointed by State Highway Engineer G. T. McCoy as Bovey's successor.

CLARENCE E. BOVEY

As engineer of city and co-operative projects for the past 5½ years, Bovey was responsible for administering and supervising the apportionment and expenditure of the five-eighth cent per gallon gasoline tax which goes to California's 352 incorporated cities, amounting to about $32,000,000 in the current fiscal year.

M. H. WEST

Bovey's career in state service was the longest of any Division of Highways employee. Most of his service prior to becoming city and co-operative projects engineer was in District X, with headquarters at Stockton.

He was born in Grass Valley and educated in that area and in Sacramento. His first engineering work was on construction of the Sacramento-Walnut Grove branch of the Southern Pacific Railroad. Later he served as chief of the survey party on levee reconstruction.

He joined the Division of Highways in March, 1914, as an engineering draftsman in the Sacramento office, later working as resident engineer on construction projects and then as highway maintenance superintendent.

In 1926 he was appointed maintenance engineer for District X and served in that capacity until 1947, when he was promoted to assistant district engineer in charge of administration. He held that post until his promotion and transfer to Sacramento headquarters office in 1953.

Bovey's work with California cities in connection with expenditure of their share of gasoline tax funds for construction and maintenance of streets not on the State Highway System carried him to every corner of the State and made him widely known among city officials.

He has been active in Methodist church and Masonic lodge circles for many years. In addition to these organizations, he is a member of the Y. M. C. A. in Sacramento, the Commonwealth Club of California and of the American Public Works Association.

Friends and colleagues held a dinner in Bovey's honor at the Elks Club in Sacramento on Friday, November 7th.

West, who will assume Bovey's duties on October 31st, has also been working closely with California city officials, along with those of the various counties, especially during the past three years in connection with statewide studies of street, road and highway needs for reports to the Federal Government and the State Legislature. His most recent assignment has been the co-ordination of studies for the California Freeway System report which was submitted to the Legislature on September 3, 1958. He is currently representing the Division of Highways at regional hearings on this report which are being conducted by the Joint Interim Committee on Highway Problems.

West was born in Illinois, but grew up in Fresno and attended high school there. He was graduated from the University of California in 1928, and immediately began his career with the Division of Highways as a chairman on location surveys in the Fresno district. He worked on highway design and construction in various capacities for the next 12 years, most of them spent in the San Diego district.

His engineering career was interrupted by World War II, beginning in 1940, when he entered active duty as a captain in the Coast Artillery Corps. He was released from active duty in 1945 after service both in the C. A. C. and the General Staff Corps, most of it in the Hawaiian Islands.

Returning to the San Diego district in 1946, West specialized in traffic engineering. He was district traffic engineer from 1948 until his promotion and transfer to the planning survey post in 1955.

West is a member of the Institute of Traffic Engineers and a graduate of the Yale University Bureau of Highway Traffic. He is also an associate member of the Highway Research Board, National Academy of Sciences.

C. E. Waite Heads Streets Conference

C. E. Waite, Deputy State Highway Engineer, will serve as general chairman of the Eleventh California Street and Highway Conference which will be held at Berkeley from January 28th to 30th.

C. E. WAITE

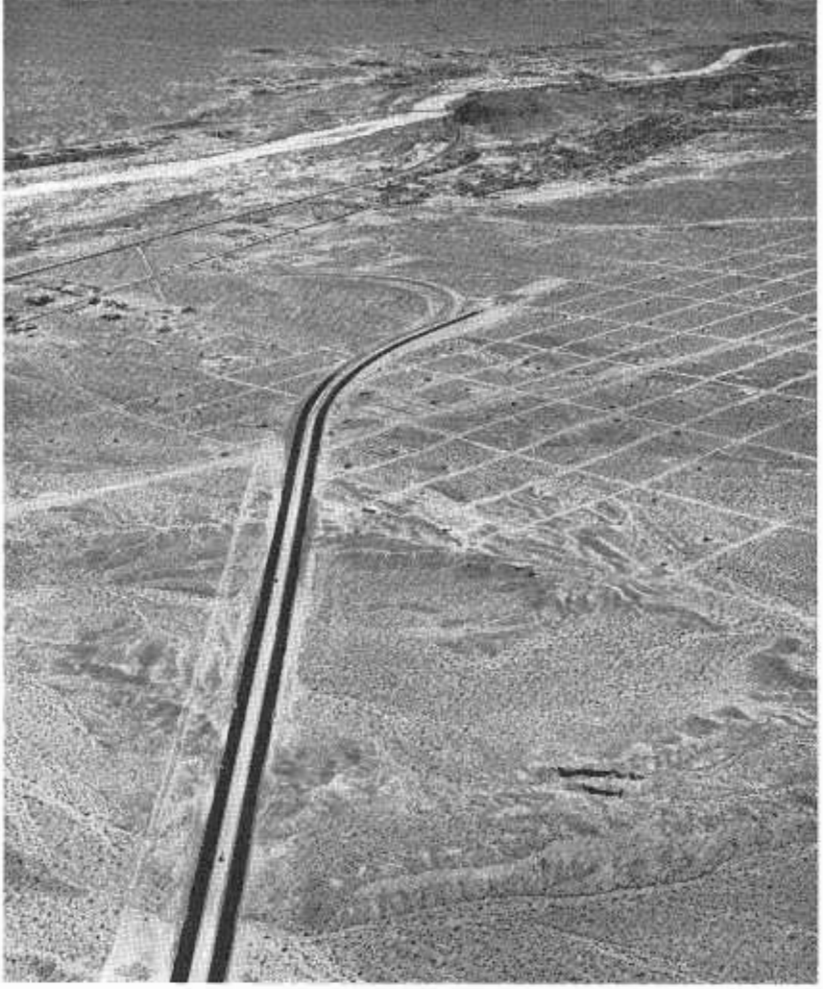
The conference is held annually by the Institute of Transportation and Traffic Engineering of the University of California. It is designed for road officials from all governmental levels and for representatives of public and private organizations interested in highway problems.

The 1959 meeting will present an expanded program to cover the many local problems growing out of stepped-up construction schedules and the phenomenal growth of population and traffic throughout California. The program will include a series of small-group meetings where problems can be presented and discussed by conferees.

More than 500 representatives are expected to attend. The conference has become a principal forum for the discussion of matters ranging from broad plans and policies to specific problems and innovations in engineering, construction and maintenance techniques.

Report From District VIII

By CLYDE V. KANE, District Engineer



THE PROGRESS of freeway development in District VIII is being carried on in extremely diverse areas. In this district, there are 583 miles of routes which have been declared freeways by the California Highway Commission. The San Bernardino and Riverside Freeways embody urban metropolitan construction of the most complex type. On the other hand, virtually trackless desert wastes are crossed by current construction of the new US 66-91 between Victorville and Barstow, which may be opened to traffic by Christmas this year. Another extreme is typified by work now under way on the extension of the State Sign Route 30 freeway from Big Bear Lake to Barton Flats, with a summit elevation of over 8,400 feet at the head of the Santa Ana River watershed. Greatly improved access to the recreational resources and facilities in the San Bernardino National Forest will be provided by this project.

PHOTO AT TOP OF PAGE—*Northern end of the new Victorville-Barstow Freeway under construction. The City of Barstow is in the distance.*

In general, District VIII can be classified into three areas—the metropolitan area, the mountain area, and the desert area. Two prominent passes, familiar to many travelers, connect the metropolitan area with the desert hinterland. Cajon Pass carries US Routes 66, 91, and 395 over a 4,300-foot summit between San Bernardino and Victorville. San Gorgonio Pass carries US Routes 60, 70, and 99 over the 2,600-foot summit in Beaumont.

San Bernardino Freeway

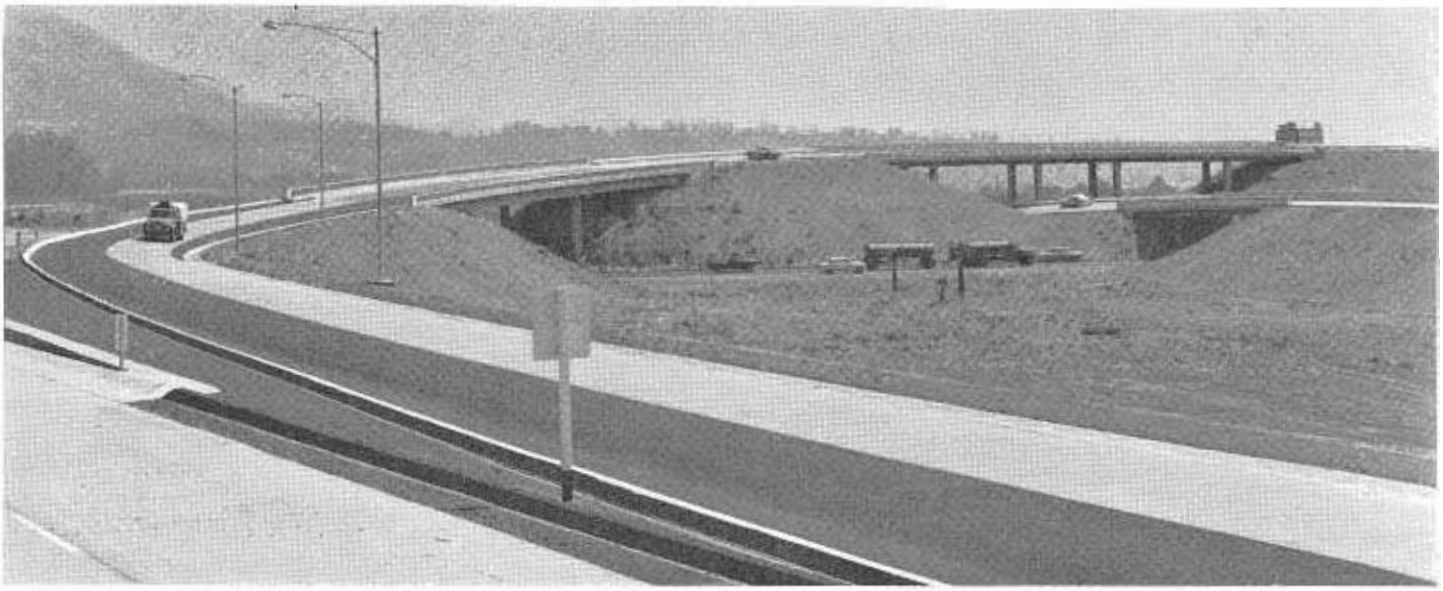
The route officially designated as the San Bernardino Freeway extends eastward from near the Los Angeles Civic Center via US 70-99 to a junction with the Riverside Freeway just east of Colton. From this junction, the San Bernardino Freeway turns north via US 91-395 and terminates at State Sign Route 30 (Highland Avenue) in the northerly part of the City of San Bernardino. North of State Route 30, this freeway has not been officially named.

The final contract on construction of this freeway, a two-mile section in the City of San Bernardino from US 66 to State Route 30, is now under way, with completion estimated in the fall of 1959. Three contracts which will eliminate the remaining six initial stage at-grade intersections on this freeway in the Fontana and Rialto areas, have recently been advertised for bids. Completion of these grade separations and ramps is also estimated for the fall of 1959.

Construction of the 30 miles of the San Bernardino Freeway in this district beginning at the Los Angeles county line has cost a total of $24.8 million to date, including purchase of right-of-way. Additional costs which will be involved in the remaining work now under way to complete it are estimated at $7.3 million.

Riverside Freeway

Two projects which carry the Riverside Freeway (US 91 and State Route 18) through the City of Riverside have been completed. Work is now under way on a 5.6-mile section extending southward from the present terminus at Arlington Avenue to Van



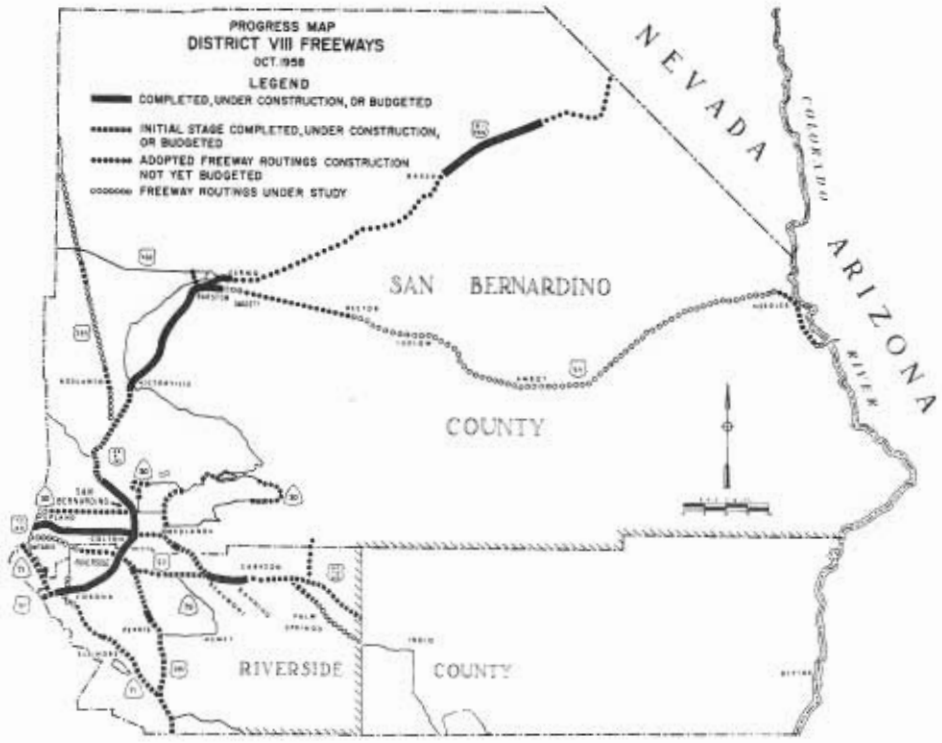
The three-level Colton interchange connects US 70-99 with US 91-395. Lowest level is US 70-99 westbound toward Los Angeles.

Buren Boulevard. This is a $2.2 million job expected to be completed by Winston Bros., Contractors, about March, 1959. Another 3.4-mile section continuing southwestward from Van Buren Boulevard to Pierce Street is expected to be advertised for bids in the near future. Plans for extension of the Riverside Freeway from Pierce Street southwesterly through Corona to the junction with State Sign Route 71 near the Prado Dam are virtually complete and right-of-way is being purchased at the present time throughout this section. Funds are provided in the new 1959-60 budget for construction of this final link.

North of Spruce Street in Riverside, the freeway joins a two-mile section of first stage construction (expressway) which was built along La Cadena Drive in 1950. This will be converted to full freeway standards by construction of grade separations and connecting ramps at Columbia Street and at Center Street. These projects are now in the design stage.

At present, the Riverside Freeway is joined by US 395 north of Center Street. It then veers on new location to the east of the former route through Colton. This portion is under construction by Yeager-Altfillisch-Lowe and Watson and is expected to be completed by November, 1959, at a cost of about $3.8 million. It will join the San Bernardino Freeway at the Colton Interchange.

A total of $16.1 million has been expended for construction and right-of-way on this freeway to date, with an additional $16.6 million estimated for the cost of work now under construction or budgeted for construction.



Escondido Freeway

The Escondido Freeway in District VIII begins at a junction with the Riverside Freeway in the City of Riverside and extends via US 60 east and then via US 395 south to the San Diego county line. About 16 miles of this freeway have been constructed to the initial expressway stage over the Box Springs Grade east of the University of California at Riverside and southward to Nuevo Road, south of March Air Force Base. A military access road project completed in 1956 provided a grade-separated interchange of the freeway and Graham Avenue,

the main entrance to March Field. The Perris Bypass, a 4.7-mile section to full four-lane divided freeway standards, was completed in 1953 between Nuevo Road and State Route 74. A landscaping contract is now under way on this section in co-operation with the City of Perris. Plans are completed for extending this full freeway 1.3 miles to the south and the right-of-way acquisition is completed.

The portion of the Escondido Freeway from the Riverside Freeway east to the University of California, a length of about five miles, is currently in the design stage as a full freeway and the right-of-way is about 90 percent purchased.

All of the remaining portions of this freeway are in various stages of design.

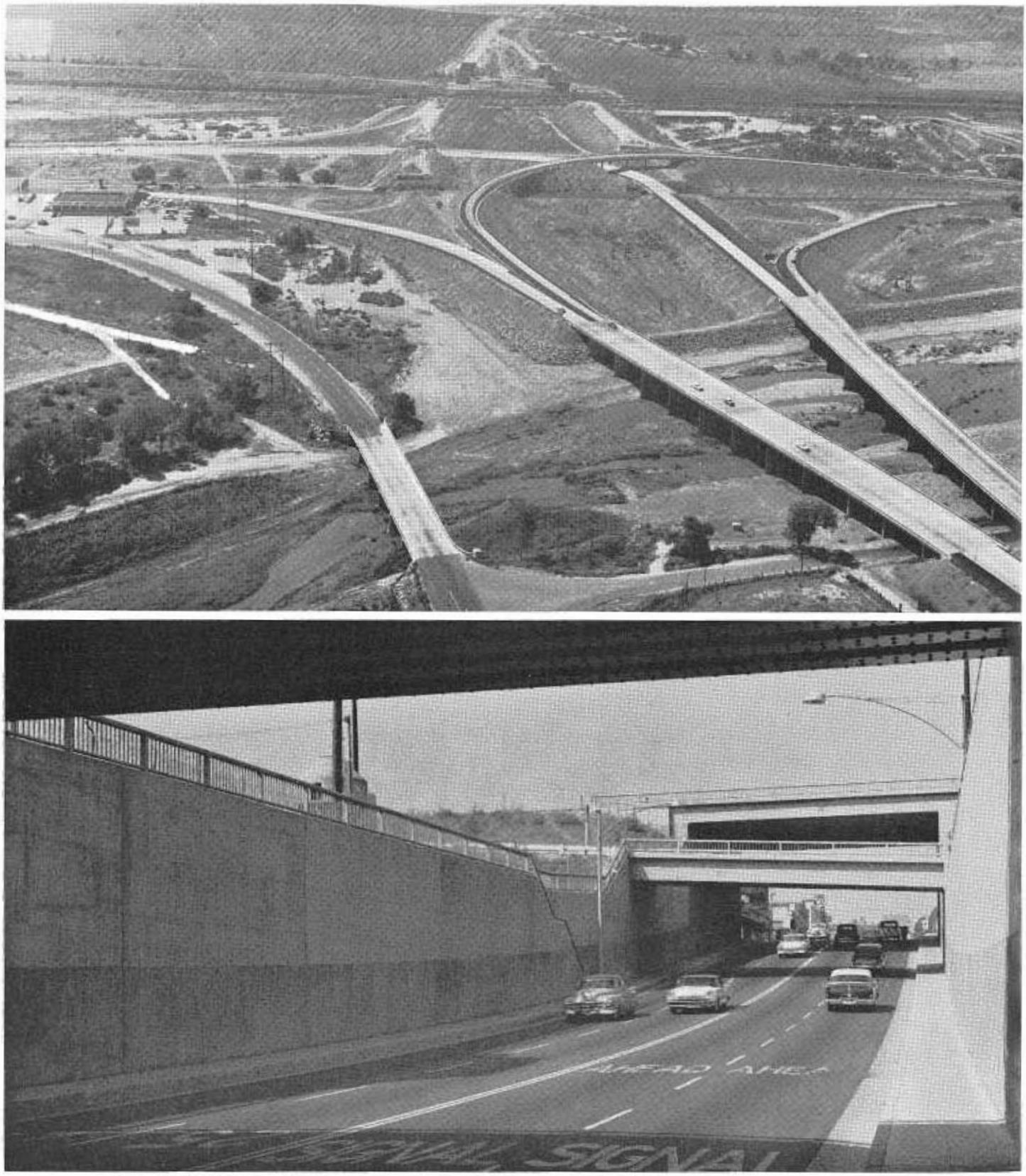
A total of $4,000,000 has been expended to date for construction and right-of-way on the Escondido Freeway.

Corona Freeway

The Corona Freeway was officially named by the California Highway Commission on July 23, 1958. It extends along State Sign Route 71 between the Los Angeles county line and the Escondido Freeway. The route in District VIII has been adopted in several segments beginning in 1947. At present, the only portion for which the general route has not been adopted

The new Riverside Freeway (US 91-Sign Route 18) passes through the downtown area

The Corona Freeway (Sign Route 71) crosses over Main Street in Elsinore



UPPER—This aerial view of the three-level Colton interchange shows the Riverside Freeway (both roadways right foreground) joining the San Bernardino Freeway, which crosses from left to right. LOWER—Eighth Street in Colton passes (back to front) under the San Bernardino Freeway, Ninth Street off-ramp and the Southern Pacific tracks (immediate foreground).

UPPER—The State Street interchange on US 66-91-395 under construction near the north entrance to San Bernardino from Cajon Pass. LOWER—An aerial taken over Barstow showing the construction on the northern end of the Victorville-Barstow Freeway in the distance.

by the California Highway Commission is from the south city limits of Corona to the Riverside Freeway.

Initial stage construction from the San Diego county line to Temecula was completed in 1951. From Temecula to Elsinore construction completed in 1956 provides a combination of full and partial freeway standards which will be brought to full freeway standards as needs develop. Similar construction was completed in May, 1958, on a 9.2-mile section from Elsinore to Alberhill. Design work is under way for the section between Alberhill and Corona.

Initial stage construction from the Riverside Freeway just west of Corona to Pine Avenue, south of Chino, was completed in 1950. A 5.3-mile project has just been started by J. A. Payton, contractor, in the vicinity of Chino. Work was recently completed on a project bringing this freeway from Los Angeles County to a point just south of the county line.

A total of $5.5 million has been expended for construction and right-of-way on the Corona Freeway, with an additional $1.2 million estimated for current construction and right-of-way acquisition.

Interstate Routes

In addition to named freeways, a great deal of other freeway development is being carried forward in District VIII, particularly on the interstate routes.

There are about 442 miles of interstate routes in District VIII, representing a little more than 20 percent of the total interstate mileage in California.

US 70-99

US 70-99 east of the Colton Interchange is under design as an ultimate eight-lane interstate freeway through the Redlands area. The route was adopted by the California Highway Commission on July 24, 1957. Right-of-way is now being purchased in this area, and plans being prepared for the 9.5 miles between the Riverside Freeway and Reservoir Canyon in Redlands.

The portion from Redlands to Yucaipa Boulevard is under design for

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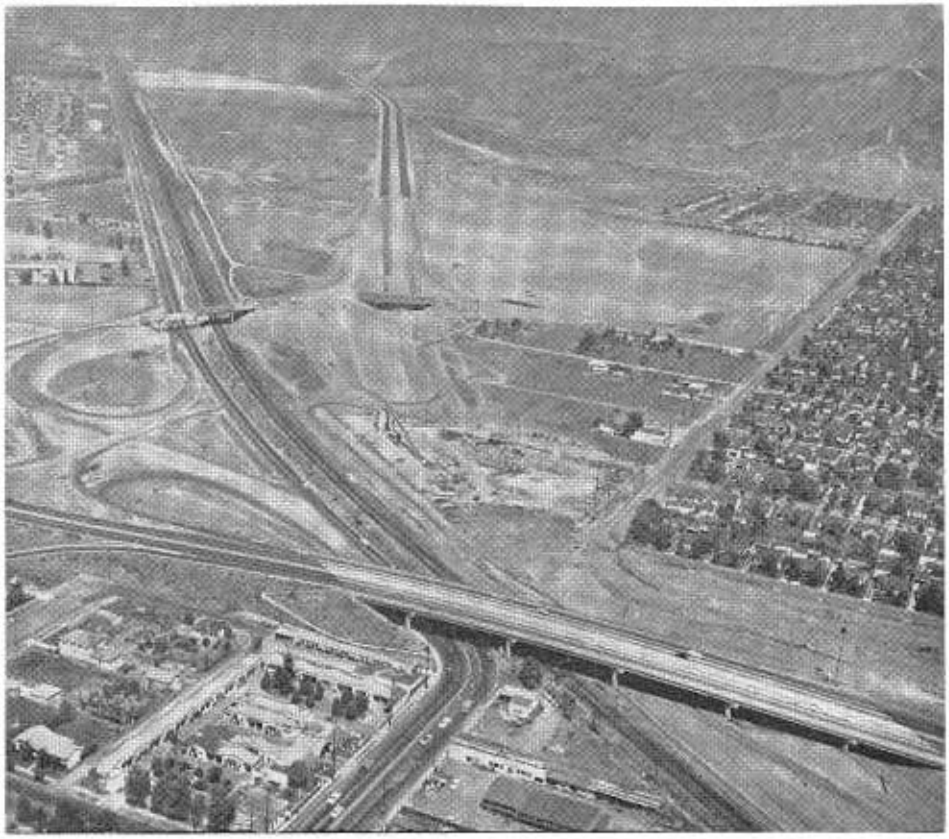

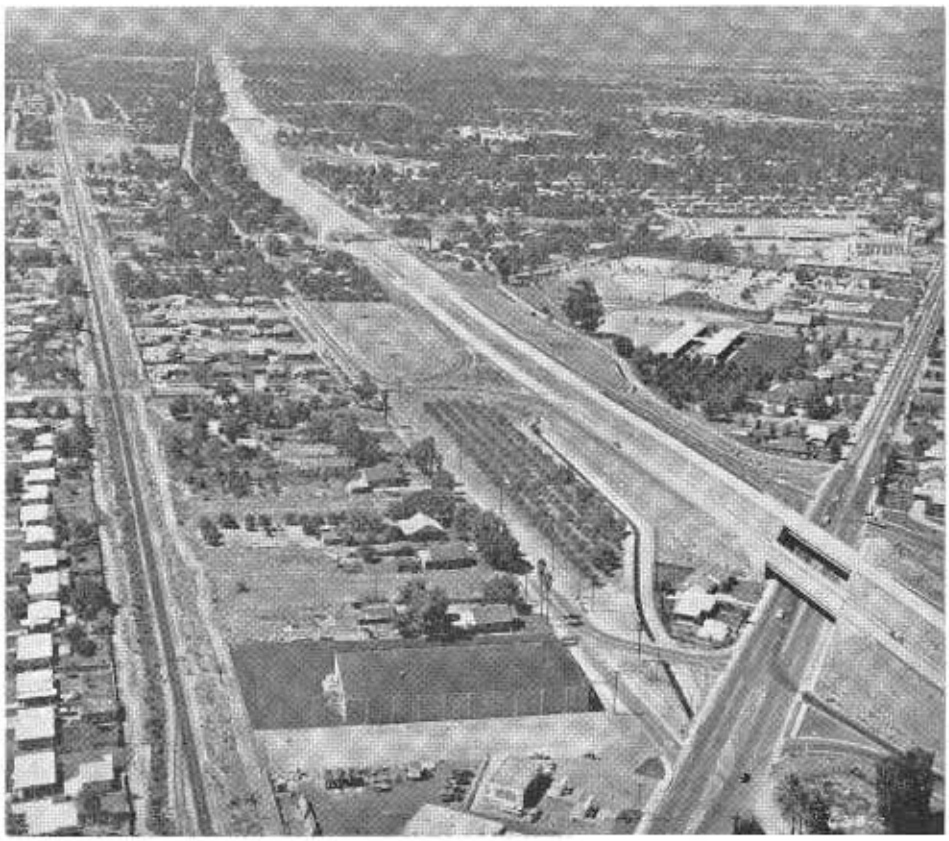

Looking northward toward Cajon Pass from the Highland Avenue (Sign Route 30) separation showing construction of the new US 66-91-395 freeway. LOWER—At present, the southern terminus of the Riverside Freeway is at Arlington Avenue in Riverside; however, construction is under way for another five and one-half miles south.

Why Freeways?

Resigned Department Head Tells Views in Two Talks

By C. M. GILLISS, ex-State Director of Public Works

Two broad, general discussions of California's highway program were given by C. M. Gilliss in late September, a few weeks before he resigned as State Director of Public Works and Chairman of the California Highway Commission to become Road Commissioner of Los Angeles County.

Reproduced below is the text of one of these presentations, the talk he made before the annual joint meeting of the Supervisors' Association of California and the County Engineers' Association at Fresno September 26th. Excerpts from the other discussion are on the next page.

IT HAS been my pleasure and advantage to attend your conventions for more than 10 years, and I have witnessed your eager and earnest efforts to exchange ideas, learn new procedures, and improve the old, so that you may go home and render a greater service to your people.

And through that association, I have also learned that nowhere are the people so directly represented as by their county supervisor. At this level, democracy really is at work.

I firmly believe that the pre-eminence in highways that California enjoys is a result of a job of work which all of us have done together in partnership.

I remember well that you, as county supervisors, deferred consideration of your own critical road needs in order that the more critical main-line system of state highways could be taken care of.

Perpetual Crisis

Yes, we have really been partners. But, why should we invest so much of our capital and energy in a highway system? We do it because ever since California became a state we have faced a perpetual transportation crisis —the population has doubled every 20 years. This continued increase is our greatest asset, but it is also the crux of our vexing highway problem.

Our State grew up after the era of railroad building. One-third of our towns have no railroads.

Eighty-five percent of the people who travel from city to city travel on rubber tires. Eighty-nine percent of all food and farm products reach their first markets by truck. Industry would be crippled without truck transportation. In this traffic jam caused by inadequate roads, there are people and goods urgently needed at their destinations.

Because of all the natural advantages California offers, enough people come each month to stay to establish a brandnew city the size of Reno, Nevada; Biloxi, Mississippi, or Independence, Missouri. And, they bring with them wealth of many kinds. They bring skills and knowledge. They bring private capital for investment. More important, they are, in themselves, a new and ready market for new homes, insurance, automobiles, merchandise and goods of all kinds. This continued healthy growth is one of the principal keys to California's continuing prosperity. It is, therefore, not difficult to recognize the need in California to have good roads for communication for moving people and goods.

Roadside Encroachment

But, why freeways? Why shut the people off from a commercial connection to the roads for which they have paid? Why deny the development of free enterprise on the roadside to serve the traveler? In the past, we have built perfectly good four-lane highways for traffic facilities only to have them become market places and parking places, because stores, motels, service stations, and other business are naturally attracted to the steady stream of potential customers. The resulting conflict of traffic destroys your investment in the road as a mover of people and goods. The conflict of traffic breeds property destruction, injury, and loss of life.

The record clearly shows that one freeway lane carries three times as much traffic as one lane of conventional city street. And, even at higher speeds, is three times safer to travel. Here is another point to ponder—this may be frightening to contemplate, but in our present and future highway program many of our major roads will be located and built for the very last time, because space is running out. In building these major facilities, we cannot make the same mistakes, we cannot afford to jeopardize the investment in the space required by permitting the highway safety and capacity to be undercut by miscellaneous developments along the roadside.

Now on a related subject—I have heard the complaint in your own meetings that highway right-of-way is robbing the county of much-needed tax base—that this fever of building superhighways all over the State is gobbling up the land—eating up the very properties they were intended to serve. But, you and I have seen an amazing thing happen within the last 10 years in California.

Land Values Increased

Where the highway is a freeway with limited access, factories and housing developments, subdivisions and shopping centers, are established farther from the city in distance, yet closer to the city in time. Freeways increase land values over an ever-widening area of countryside.

The State paid $500 an acre for right-of-way for the Eastshore Freeway near Oakland. Land next to that freeway is selling today for $26,000 an acre, 50 times the 1941 price.

The State paid 50 cents a square foot in West Covina two years ago. Three months later, the owner sold the May Company the rest of his property at $1.20 per square foot. Freeway plans more than doubled the value in 12 weeks.

Land price multiplication of 5 or 10 times as a result of freeway completion is common. On US 40 just north of Sacramento, the value per acre jumped from $2,000 in 1952 to $10,500 in 1955. Along the Eastshore Freeway near the new Ford plant, the increase was from $1,200 in 1951 to $5,400 in 1956. Seven miles southeast of downtown Los Angeles on the Santa Ana Freeway, the value of an acre of land jumped from $7,500 in 1948 to $65,000 in 1956.

I believe if we are fair, we will admit that this is what is happening all over in California. That there is a temporary minor shock to the assessment rolls, we cannot deny, but, unlike some other public investments, within 5 to 10 years, freeway valuations are returned to the rolls with interest.

Freeways Are Good Investment

We need to learn that instead of costing money, a good highway makes money. It generates enough revenue to pay for itself. More than that, it actually adds to our wealth by increasing land value, lowering car operating costs, reducing accidents, saving lives, and saving time. Our economists can convince even the skeptics that properly built highways, properly located, are a capital investment like a factory, farm or any other wealth-producing facility.

The Arroyo Seco in Pasadena, California, our first and pioneer freeway, earns an income of over 12 percent.

Earnings for the Los Angeles freeway system, which interchanges at the famous four-level structure, are estimated from 12 percent to more than 30 percent per year. Estimates which consider only vehicle savings begin at 12 percent. Those which would capitalize accident, operating, and time saving would pay off the Los Angeles freeway system in three years.[1]

Speaking still of assessed valuation, one other feature of the freeway should

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[1] Hugo Winter ASCE. Proceedings of the ASCE, *Journal of the Highway Division*, January, 1956, Volume 82, pages 874-10. Automobile Club Southern California. "An Appraisal of Freeways v. Surface Streets in Los Angeles Metropolitan Areas," 1954.

"Let's Take a Trip," Director Advises

Here are excerpts from a talk which C. M. Gilliss, then State Director of Public Works and Chairman of the California Highway Commission, gave before the 56th annual conference of the State Association of County Assessors of California at Santa Rosa September 29th. See the previous page for the beginning of the text of another general discussion he gave on the California highway program in late September.

I have heard the complaint in your own meetings that highway right-of-way is robbing the county of much-needed tax base.

I want to invite you all to take a trip with me—a trip in imagination. Let's begin our make-believe by forgetting we're at this conference and pretending I meet you in your office in the courthouse.

Walk across the park with me, will you, while I go into the post office for just a minute? My car's right around the corner; we'll get in and drive out Main Street by the city hall. That's the old grade school. The new one is going up on that 17 acres where the packinghouse used to be.

Now on out past the county fairground, and a little piece further. There's a turn here I don't want to miss. It's just before you get to the junior college. Here it is. This county road is a pretty drive and takes us by the veterans hospital and over to the state highway.

Guess I'm driving a little too fast. I wasn't really trying to catch up with those bombers up there—looks like they just took off a few minutes ago from the air base.

Well, we're back in Santa Rosa, back at the assessors' conference. It certainly didn't take long over the freeway.

Did you enjoy the trip? Were you comfortable while I let my imagination play? We went by a number of familiar spots, and along familiar streets. You all seemed pretty much at ease until the very end, when I thought I detected a suggestion of uneasiness at mention of the freeway.

I know that some of you are concerned about freeways because the State's purchase of right-of-way for them removes valuable property from the county tax rolls.

That imaginative trip we took had to do with freeways and with a lot of other property that isn't on the tax rolls because it's used in the public service by one or another branch of the government. Remember where we went?

We started at the courthouse, went through a park, into the post office, over city streets, by the city hall, the school and the county fairground, near the junior college, over county roads, by a federal hospital, and over a state highway. We weren't too far from one of Uncle Sam's air bases.

Our trip brought us in contact with a dozen kinds of properties which are off the tax rolls because they are serving the people in one way or another, because they belong to the people's government of local or higher level. I took you traveling to emphasize that freeway right-of-way is just one of the many government properties that are so familiar and so necessary to every citizen today.

McGinness, Everitt Get Appointments

The appointment of Service and Supply Engineer G. G. McGinness as Assistant Office Engineer in charge of the Industry Contact Section of the California Division of Highways has been announced by State Highway Engineer G. T. McCoy.

At the same time McCoy appointed F. L. Everitt as Acting Service and Supply Engineer. Everitt has been McGinness' assistant in the Service and Supply Department since 1953. In his new position he will be in charge of procurement of commodities, supplies and equipment, except automotive and heavy maintenance equipment, used by the Division of Highways.

McGinness, as head of the Industry Contact Section will take over a large portion of the work formerly supervised by E. J. Saldine, who retired on October 1st. In his new position, McGinness will be concerned with determination of prevailing wages for crafts employed on highway contracts, service agreement procedures and establishment of equipment rental rates.

Freeway Model

Construction of Complex Interchange Model Described

By WARREN S. LUDLOW, Bridge Architectural Associate

BRIDGE ENGINEERS designing the first group of structures in the East Los Angeles Freeway Interchange soon realized that a three-dimensional model would be a great aid to them. This traffic interchange of four freeways, ramps and city streets is extremely complex. In a relatively small area, 32 bridges and 20 retaining walls are needed to permit the interlacing of the roadways.

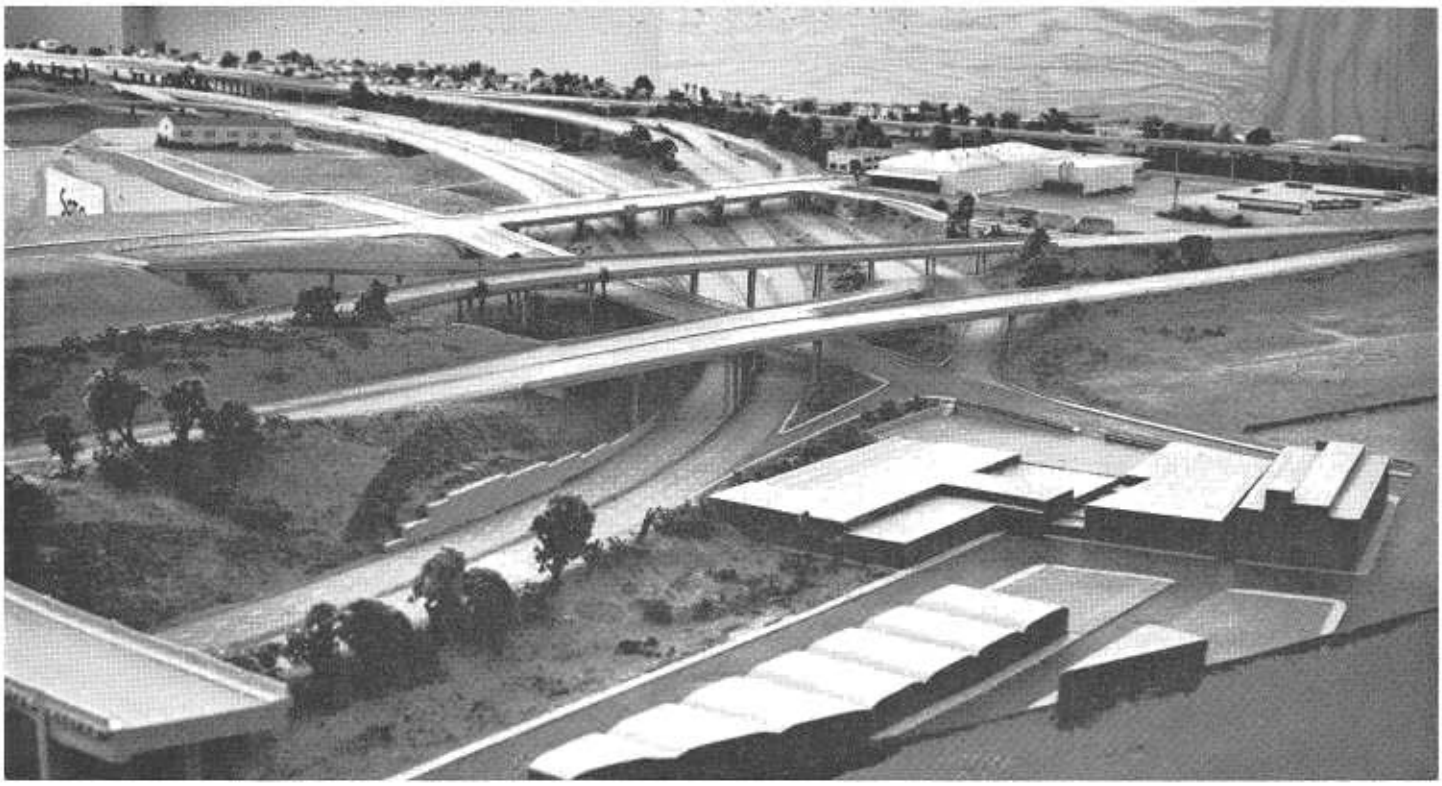
W. J. Jurkovich, Senior Bridge Engineer in charge of the design of the project, pointed out that a model would clarify the apparent chaos of line drawings, would lead to harmony of bridge types, would illustrate structural design problems and be of inestimable value for public display. Other models had already proved useful in similar special problem situations. Work on this model was started in May, 1957, by the Bridge Architectural Design Section.

A scale of $1'' = 50'$ was chosen for several reasons. Study of a $1'' = 400'$ plan revealed that the 50′ scale model would be about as big as working space would permit but would still include significant features at the extreme limits. This scale is commonly used in highway design and gives sufficient size and detail without needless refinements. A double-tapered "L" shape was selected. Each leg measured about 10½ feet long and from 3 to 4 feet wide and the two legs come apart for crating and shipping.

Since the existing Santa Ana Freeway was the core of the interchange we got the "as built" highway and bridge plans and redrew them to model scale. Meanwhile, we were collecting other data. Headquarters Photo Laboratory furnished aerial oblique photos from their files; then supplemented these with more detailed pictures made at our request. District VII supplied geometric design plans to start with and sent design layouts, profiles, contour grading plans, topography, lane striping and sign layouts and a wealth of other data as the model was developed. The Bridge Department Structural Design unit gave us the plans for the new bridges and walls as they were prepared.

Roadways Traced

We built a sturdy frame of 1″ x 4″ pine boards, glued, nailed and well cross-braced to prevent warping, and covered it with ⅜″ plywood for the model base. This was painted with two coats of flat white and sanded. On it we traced the edges of the road-



A photo of the model near completion stage. In the foreground is the three-level structure which will carry the Golden State Freeway across Seventh Street and the Santa Ana Freeway.

ways, their stationing lines and all the contours and topography shown on the geometric sheets. This gave us our plan projection.

Next we started to build up the model in the third dimension. On pine blocks we drew sections of the plan showing roadway widths and stationing, then carefully jigsawed and sanded them to the edge of roadway lines.

Getting the vertical dimensions was not so easy.

Highway profiles are usually exaggerated for clarity but this distortion would look unnatural in a model. So we redrew the profiles to our scale of $1'' = 50'$ and pasted them on the sides of the roadway blocks. Because we found from past models that wood filler, glue and paint would build up the surface, we subtracted 1/32" from all profile measurements. After the blocks were cut to proper height by following the profile lines (allowing for crown slopes and superelevations) we match-marked and glued them into position, leaving gaps for the bridges.

Made to Scale

Now the backbone of the skeleton model—the freeways—was established. More of the framework—the ramps, frontage roads and streets—were fashioned in a similar way, with one exception. The highway plans showed city street grades only within or near the right-of-way. Some grades beyond these limits we obtained from U. S. Coast and Geodetic Survey map contours; other we approximated by scaling from aerial obliques. If we could find some object of known height—such as a door or auto—we could project level lines or perspective lines to establish relative heights. This method was successfully used later on also to obtain the sizes of some of the outstanding landmarks such as a school, a hospital, some stores and several industrial buildings.

Understandably, we gave a great deal of attention to the bridge miniatures and tried to reproduce them accurately in detail consistent with the scale. Plans of the new bridges were rescaled to model size and used as patterns for the balsa wood prototypes. Existing bridges were faithfully

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Design of Interchange Was a Team Effort

By HEINZ HECKEROTH, Project Design Engineer

The design of the future interchange connecting the Santa Ana, Golden State, Pomona and Santa Monica Freeways is the product of the efforts of many people presently and formerly in the Division of Highways district office in Los Angeles. To be known as the East Los Angeles Interchange, it will be located east of the Los Angeles River with its center approximately at Seventh Street and Boyle Avenue. Its geometric layout represents an evolution of thinking and work over a long period of time.

HEINZ HECKEROTH

At its inception, before World War II, the interchange was to have been a simple Y-type connection between the Santa Ana and Santa Monica (Olympic) Freeways. Plans for the Santa Ana Freeway, drawn during the war years, made provision for this type of an interchange. The land at the northeast corner of Soto and Eighth Streets was acquired to protect against building encroachment; and, following the war, in 1957 a bridge was built to provide for the separation of the future westbound Olympic Freeway traffic from that of the Santa Ana Freeway. This bridge is used in the present design.

The interchange pattern might best be described as a direct type, with right-of-way, topographic controls, design standards and estimated future traffic volumes all influencing the ultimate geometric layout. The Santa Ana and Santa Monica-Pomona Freeways and the Santa Ana and Golden State Freeways will cross each other in the form of two distinct crosses, while the Santa Monica and Golden State Freeway connection forms a "Y." Thus, were it not for the fact that these three crossings are so close together, there would actually exist three separate interchanges.

Heavy Industrial Traffic

Further influencing the geometrics is the fact that the Golden State Freeway terminates at the interchange. This freeway is expected to carry large volumes of truck traffic whose origins and destinations are the industrial area lying southerly of the Santa Monica and Santa Ana Freeways. Some of these are expected to use Soto Street, a major traffic arterial, thus requiring surface street connections. An extensive system of existing on- and off-ramps to and from the Santa Ana Freeway has been retained and is being augmented by additional ramps to the new freeways.

The geometric design was the end product of numberless line diagrams (drawings with single lines representing each roadway and ramp) and also 12 design studies at 400 and 100 feet to the inch scale. Five of the most promising of these were estimated as to construction and right-of-way cost and compared before a selection was made. The final selection was based on right-of-way considerations and the alignment of the Santa Monica Freeway at the Los Angeles River.

When the design had been sufficiently advanced the Bridge Department in Sacramento was supplied with alignment and grade data which formed the basis for the bridge structure designs as well as the model work. Electronic data processing equipment was used throughout the design phase to calculate precise alignment, grade (roadway elevations), earthwork (quantities of cut and fill) and the engineer's estimate (units of material and work involved in construction).

Freeways Listed

The five freeways which emerge from or converge on the interchange can readily be identified as follows:

1. The Golden State Freeway leaves the model at the most northerly end near Fourth Street. The bridge over Fourth Street and the portion of freeway, including ramps, southerly to the Hollenbeck Lake-Boyle Avenue Bridge are presently under construction. This part of the Golden State Freeway, when completed early

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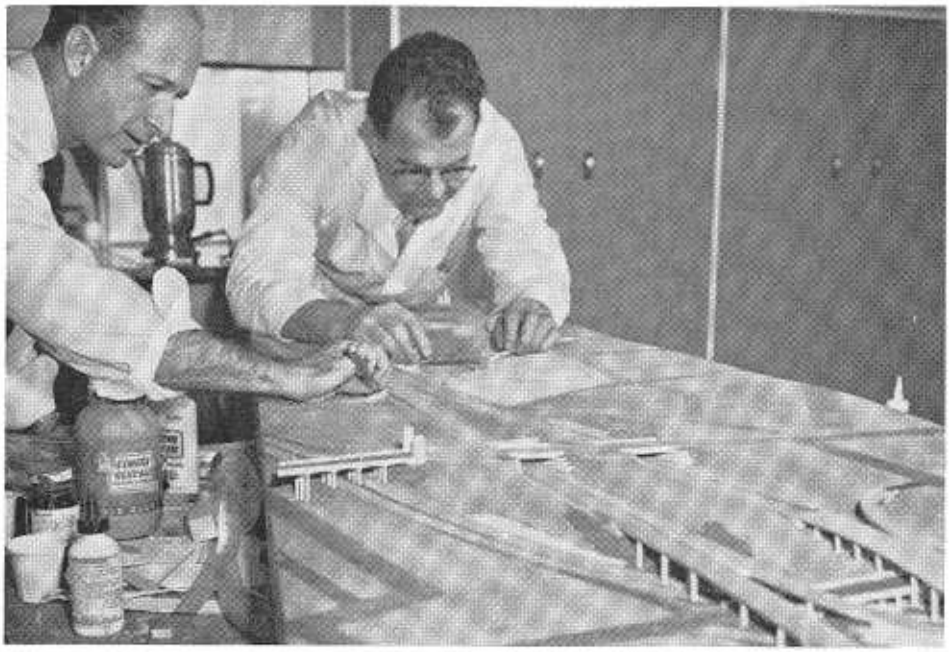

Warren S. Ludlow, author of the article, places fill at the abutment of the Hollenbeck Bridge while Jack Alexander (right) adjusts the old existing wooden arch bridge which spans the lake

FREEWAY MODEL

Continued from page 20 . . .

copied. If you look closely at the model you can recognize the monumental end posts and corbel decorations of the old Sixth Street Viaduct and the wooden truss bridge across Hollenbeck Lake. Each bridge was set loosely in position but not glued until the roadways below were painted and striped. This was done all at one time in the last stage of the work.

With the placement of the bridges the model began to pay dividends in aesthetics and economy of design.

At one location the model showed that the vertical clearance was impaired about one foot. A check verified this and the highway grade lines were corrected accordingly. In other places retaining walls and bridge lengths were adjusted for appearance, ease of construction and savings in cost.

Use Blocks and Putty

To cover the framework of our model and fill it out nicely, we gave it a heavy diet of plywood, blocks and putty. In critical areas where the eye would be sensitive to fit a curve we built the contours on a shapely base. Elsewhere we bulged it with blocks. Over all we shaped it with a water base putty to erase unsightly angularities. With the addition of balsa wood shoulder strips the model was ready for the makeup and costume artists.

This phase of the work really taxed our ingenuity. Materials, shapes and colors had to be chosen to give the appearance of reality. Color contrast was often more effective than a change in shape, and the proper material would frequently suggest realism better than a faithful copy.

From a fabric store we selected cambrics of different weave spacing. When sprayed silver and cut in strips, it made good property line fencing and bridge railings. Our search for scale trees, shrubs and grass took us to hobby shops, nurseries, and stores—cigar, hardware, grocery, dime, sporting goods and plastic supply. Unusual (for intended use) and exotic items interested us. Sponges, weeds, foam plastics, pipe cleaners, feathers, caribou hide, reindeer moss, Japanese seaweed, flock. We tried them all.

We found that Japanese seaweed made a very convincing, delicate evergreen tree. Reindeer moss, trimmed properly, made sycamores, oaks, and poplars. These were given a coat of glue and while wet were rolled in flock to give the foliage the proper coloring indicative of the species desired. Fine sponge rubber tapered conically made another kind of evergreen tree. Ground-up sponge rubber and lichen provided masses of varying sized shrubs. The oleander bushes located in the dividing strips of the freeways were imitated this way.

Oil Paints Best

We found that oil base paints were best for coloring live growth. Plastic sprays and latex paints dried out the materials and caused them to crumble at a touch.

If you want a really good-looking little palm tree, tan a piece of caribou hide, cut it into strips and fasten it to the top of a piece of slightly bent wire. The effect is startlingly realistic.

Only five different house sizes were made, since matching each one of the 800 to 1,000 homes would have been out of the question. They were made of wood or water base putty cast in rubber molds. Groups were painted alike with contrasting roofs and distributed in random colors on the model. We tried to place them according to sizes visible in our aerial views, which we also used to plant the trees and arrange ground cover.

The larger buildings were detailed in wood and placed in proper locations to add authenticity

One particularly interesting landmark which affected the construction of a portion of the model was the *Times-Mirror* Press Building. It was first built exactly as it appears today. However, architectural plans of the

Lou Baker removes several acres of real estate to allow room for making a grade change for a railroad spur and access roads

The completed model showing Hollenbeck Park and the Golden State Freeway in the foreground and the three-level interchange structure in the right background

future addition to the building were sent along with a relocation of the spur track crossing over the freeway. To make these changes we had to rip up buildings and grounds and replace them. On the roof of the revamped building we placed a small-scale helicopter and landscaped the area. The spur relocation affected the curvature of a bridge which had to be redesigned for construction and redone for the model.

Bridge Design Completed

Another outstanding and familiar topographical feature was Hollenbeck Park. Design of the bridge was actually done before the model was started and we had a photo retouch showing the freeway structure across the southern end of the lake with landscaped planter boxes at the base of the columns in the lake. This illustration was to be used by the district in its preliminary presentations to the public. The model bridge was built accordingly and installed, complete with planter boxes, in the plastic surfaced lake. However, subsequent changes due to lake drainage considerations and the addition of a filled service area and road under the bridge necessitated the removal of the planters and the holes in the plastic water had to be filled. The other land features in the park are all faithfully represented—the canoe storage house, baseball diamond, the correct number of palm trees and the old wooden truss previously mentioned.

The tiny route direction signs seen on the model are made to very accurate scale. Each sign had been lettered and drawn to scale for the actual construction plans. Copies were obtained from the signing section, and the reproduction section photostatted and reduced them until they matched the proper dimension on the model scale. These small prints were glued to pins and then mounted on the model where the real signs actually will be placed. The miniature signs are legible and can be read with a magnifying glass.

Model Cars a Problem

In order to give "life" to the model, about 2,000 vehicles were needed to populate the freeways, streets and frontage roads. As we couldn't afford

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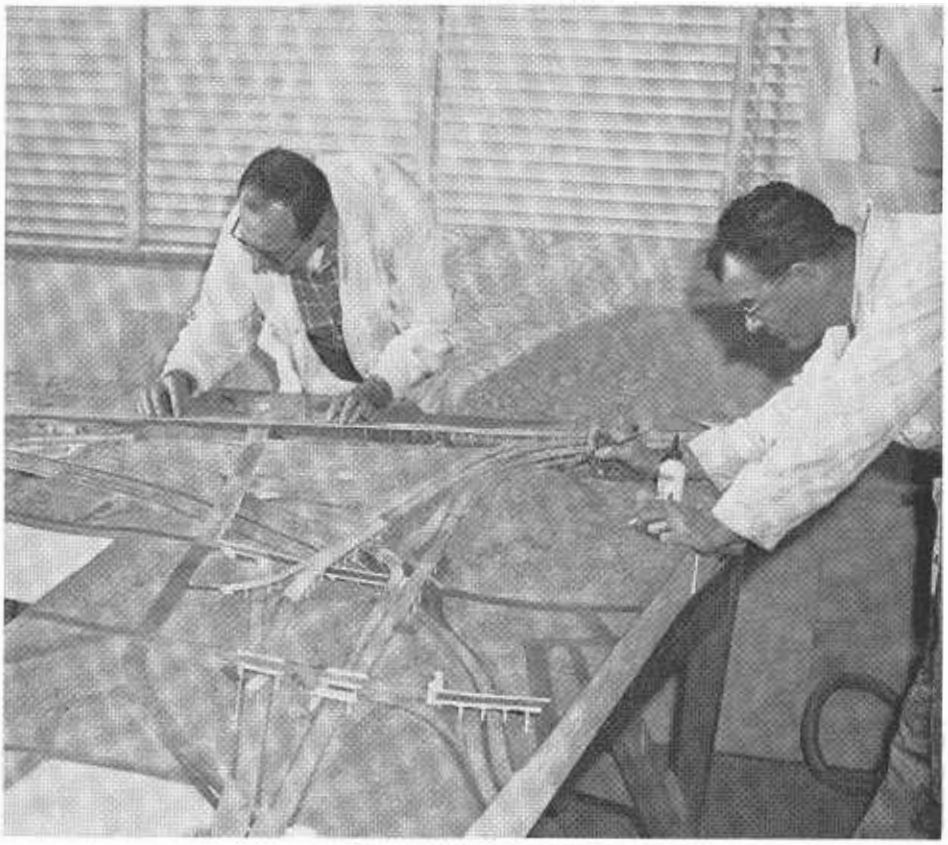
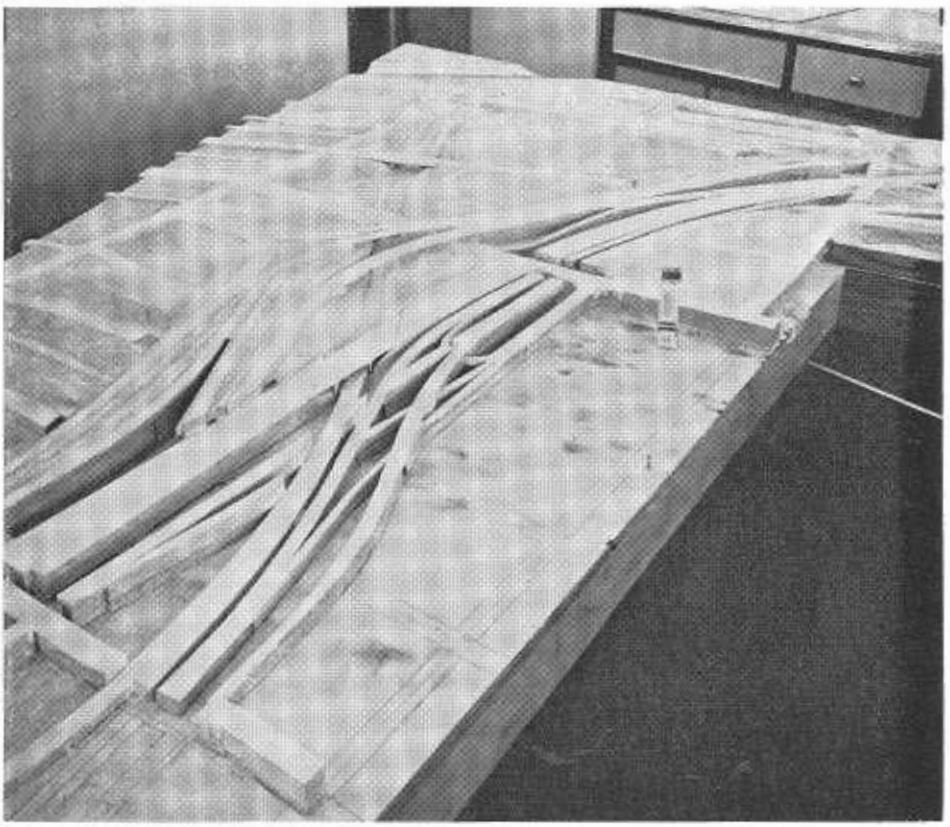




UPPER—Lou Baker (left) places the Santa Monica Viaduct spur into position. Jack Alexander (right) paints columns on the Los Angeles River Bridge and overhead connections. LOWER—A photo of the model taken in the early stages of construction showing preliminary buildup of roadways and ground fill. The package of cigarettes (right middleground) shows the relative size.

Cost Index

Construction Costs Show Leveling-Off Trend During Third Quarter of 1958

By J. P. MURPHY, Assistant State Highway Engineer
H. C. McCARTY, Office Engineer
LLOYD B. REYNOLDS, Assistant Office Engineer

THE CALIFORNIA Highway Construction Cost Index for the third quarter of 1958 continued in a downward course but at a considerably slower rate than has prevailed in several recent quarters. The index now stands at 228.5 (1940 = 100), which is 2.5 index points or 1.1 percent below the second quarter. The present value is the lowest point that has been reached since the first quarter of 1956, and is 9.0 points or 3.8 percent below the third quarter in 1957.

Bidder competition held at a satisfactory level as indicated by the average of 5.5 bidders per project determined for the period. This is the second quarter in which a lowering of the cost index value has occurred while the average number of bidders was low in the range considered as good competition. It appears that the lower price levels may have discouraged some contractors from estimating and bidding projects. A tabulation showing the average number of bidders arranged according to project value brackets is included with this release.

The 187 representative statewide projects for which bids were opened during this quarter and which provide the data for preparation of this quarter's index are distributed as shown in the table on this page.

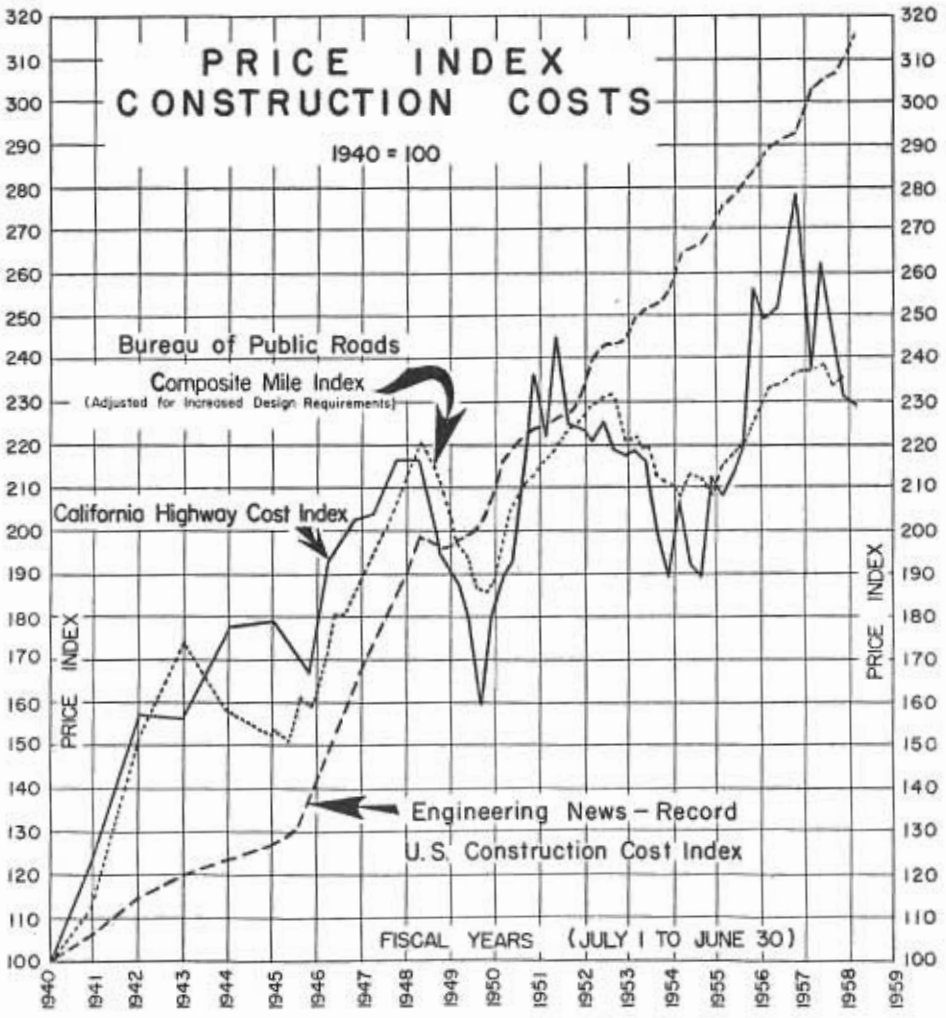
The total value of these projects is $89,241,148.

Three of the seven items used in the preparation of the index reveal lower average prices during this quarter. Roadway excavation exerted the greatest lowering effect and untreated rock base together with structural steel reflected the greatest increase. The following table shows average unit prices for the seven items used in preparing the index.

The average unit price for roadway excavation in this quarter is $0.39, which is $0.09 below the second quarter. Bid prices for excavation on several of the large freeway projects ranged from $0.41 down to $0.22 during the period. While the projects for this quarter were well distributed over the State, there were no projects located in the high, mountainous regions where extremely hard formations are gener-

... Continued on page 48

Range	Number of projects	Value of projects
Under $50,000	69—36.9%	$1,649,285— 1.9%
$50,000 to $100,000	33—17.7%	2,332,442— 2.6%
100,000 to 250,000	31—16.6%	5,303,844— 5.9%
250,000 to 500,000	18— 9.6%	5,886,287— 6.6%
500,000 to 1,000,000	11— 5.9%	8,441,988— 9.5%
1,000,000 to 2,500,000	15— 8.0%	22,119,565—24.8%
2,500,000 to 5,000,000	7— 3.7%	23,758,169—26.6%
Over $5,000,000	3— 1.6%	19,749,568—22.1%



Overhead Signs

Standard Plans Used for Structures

By GEORGE W. SMITH, Senior Bridge Engineer; and R. J. ISRAEL, Supervising Highway Engineer

CALIFORNIA, with one-tenth of the Nation's motor vehicle traffic, has long faced the problem of accommodating high volumes of traffic on a substantial segment of its highway system. This situation has led to pioneering in the development of the modern freeway and in the signing essential to its operation.

The use of upper and lower case letters for guide signs, of proven advantage in recognition and legibility, was begun in California. The California style of lower case lettering was subsequently utilized for directional signing by the major eastern toll roads. This lettering has been adopted nationwide for destinations on the interstate system.

The use of reverse copy (white letters on a dark background) for more effective nighttime legibility was a California development. This also has had nationwide acceptance, particularly in directional signing.

One of the most important developments in the signing field has been the overhead illuminated signing with the necessary sign bridges, cantilevers and other structures to support the sign and the lighting fixtures. California began using overhead signs with the early development of urban freeways and, because of its higher traffic and more extensive mileage of freeways, uses this

This is a sign bridge. In this type the Standard Plans cover structures up to 10 feet high by 130-foot span. Although walkways and safety railing are on this structure, they are hardly perceptible to the motorist.

type of signing to a greater extent than any other state.

Visibility Problem

The two-lane road presents no problem in signing since ground-mounted signs at the edge of the roadway are readily visible to traffic in the adjacent lane. The four-lane divided highway begins to develop a problem since the outside lane of traffic may interfere with sign visibility for traffic on the inside lanes. This situation can be, and is, handled by dual advance information of turnoffs—one sign on the shoulder and one in the median. On four-lane rural freeways a limited number of overhead directional signs are used generally to designate important turnoffs, left-hand off-ramps and to give through-traffic and turnoff information at the direct connections to bypass communities.

When the highway has six or more lanes, the high volumes of traffic, particularly in the peak hours, make signs on the roadside or median relatively ineffective for primary directional information. On such highways, it is necessary to provide advance notice of all turnoffs and indicate the point of turning by the use of overhead illuminated guide signs. Primarily, the advance sign gives notice of the turnoff and assigns traffic to the proper lane by means of a down arrow. At the gore location, traffic is further directed to the turnoff by an appropriate arrow.

To provide 24-hour visibility, overhead signs are lighted through the use of fluorescent lighting. The lighting fixture is mounted below the sign in order to reduce glare and to eliminate the objectionable daytime shadow of the lighting fixture on the sign face. In order to maintain the lighting, to keep the signs clean and to make other necessary repairs or adjustments, it has been found advisable to provide maintenance walkways on the overhead sign structures.

As the development of the directional signs has progressed from small panels fastened to a single post, to large panels with messages that can be read at greater distances to meet the needs of fast-moving traffic, the Bridge Department of the Division of Highways has been called upon to provide adequate structures for the support of these panels. During the early stages of the development of overhead sign structures, their number was few, and plans were prepared for each individual structure. As the number of structures increased, it was realized in the latter part of 1955 that it was an uneconomical use of time to design them on an individual basis.

Standard Plans Developed

In the early part of 1956, the Traffic Department completed a study on the types and sizes of signs that would be required to cover all known conditions. With this information at hand, the Bridge Department undertook to study the possibility of developing a set of standard plans which could be inserted directly into a set of contract plans and which would cover all of the various sizes and types required for various installations. After considerable study, it was concluded that a set of standard plans would be feasible.

In 1956, concurrently with the design of sign structures on an individual basis (which by that time was reaching large proportions), the Bridge Department started the development of "Standard Plans for Overhead Sign Structures." They were completed in early 1957 and their use in contract plans was inaugurated immediately.

They cover four main types of structures: (a) cantilever type, which is erected on a single pole (photo on page 6); (b) butterfly type, which is erected on a single pole and is shown on page 3; (c) sign bridge type which is erected on two posts and spans the highway (photo on page 1). There is also a bridge cantilever type that is erected on two poles, spans the highway and has a cantilever portion which usually extends out over a ramp.

There is also a structure-mounted type of frame which is placed on existing bridge or pedestrian structures that span the highway. The structure-mounted types are only partly worked up as standards. In most instances they have features peculiar to the particular structure on which they are mounted, which makes it difficult to provide an overall standard to cover all of the various cases.

When mounting signs on prestressed concrete structures, particular care is given to providing mounting bolts in the prestressed members at the time they are being cast, or else the frame is so mounted that the prestressed members containing the high tensile steel are not disturbed in any way. Wherever possible, mounting bolts or details are placed in the cast-in-place portion of prestressed structures, generally in the curb or roadway slab.

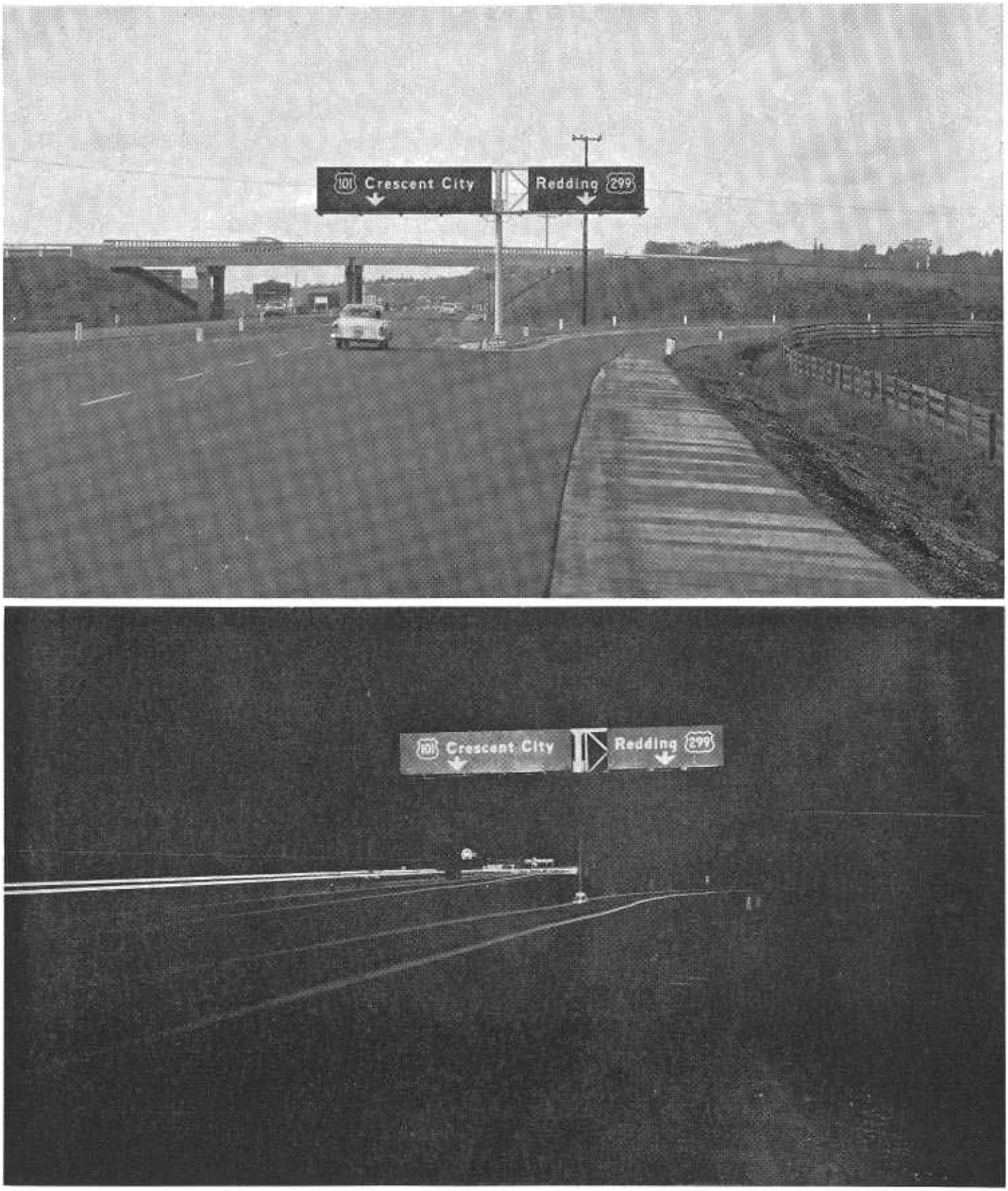
Advantages Cited

Development of the standard plans and their use since the early part of 1957 has been a boon to the Bridge Department in reducing the amount of design work now performed on overhead sign structures. In place of individual plans prepared for each sign structure, standard plans cover practically all of the types that are now being constructed.

Whenever signs are to be included in a highway project, the district office works up a format sheet showing the location, size, and type of all signs, determines the quantities for the various pay items involved, and forwards the data to Headquarters Office along with the contract plans. Headquarters then inserts the standard plans for the sign structures. Since the makeup of the standard plans is of a rather complicated nature, for the first year of their use it was the practice for the Bridge Department to review the contract plans to insure that they were being used in the manner intended. All parties concerned are now familiar with their use and of late this practice has been eliminated. Only those plans are now reviewed which contain special sign structures or those which cover structure-mounted signs.

Present indications are that the standard plans have contributed to more favorable steel prices. The various steel fabricators know exactly what to expect in each project. Except for periodic improvements the details are always the same, and they can tool up to fabricate the structures in the most economical way. Many improvements in details have been supplied by fabricators. A policy has been adopted to make changes about once a year. During the year all changes are accumulated and they are incorporated into the standard plans at one time.

Although there is a relatively small amount of maintenance involved on



UPPER—This is a butterfly type sign structure. Maximum size covered by the Standard Plans for this type is 10 feet high by 60 feet long. LOWER—The same sign taken from the same location showing night visibility.

sign structures, it is still an advantage to the Maintenance Department to know what to expect in the way of details when repairs are required. Primary maintenance consists in replacement of fluorescent tubes in the lighting fixtures, and washing of the sign panels. Sometimes, however, high loads hit the frames and repairs have to be made. An item of convenience which has been added to these structures is the placement of a gutter at the bottom of the sign panel to carry away excess water. It eliminates the necessity for taking special precautions for protecting cars from water that drips off during the washing of panels.

Design Criteria

All elements of sign structures are designed on the basis of a wind pressure of 30 pounds per square foot of actual exposed sign area. On sign bridges, as an alternative to this, the design is also checked on the basis of a wind load of 20 pounds per square foot acting on the total area of the frame, which assumes that at some future time the frame may be fully covered with panel.

While some of the structures might appear rather heavy and it would seem that they would be designed on the basis of dead load, nevertheless, the wind force is the governing factor. For example, the largest butterfly type frame covered by the standard plans is 10′ x 60′. The weight of the frame alone, including all appurtenances, amounts to approximately 4½ tons. A wind load of 30 pounds per square foot would amount to 6 tons if two-thirds of the frame were covered with panel, and 9 tons if the frame were fully covered.

The concrete footings or bases on which the sign structures rest are designed for a foundation load of 1¼ tons per square foot. It has been found that this allowable soil pressure provides a good balance of design. In the majority of cases, although there are foundation materials which would support much heavier unit loads, the design of the bases is not necessarily a function of soil capacity, but concerns the problem of stability.

In February, 1958, the Highway Research Board of the National Academy of Sciences, Committee on Traffic Control Devices, issued Circular No. 355 with recommended criteria for the design of sign structures on a national basis. Their recommendations do not differ materially from California's procedures.

In general, the members of sign frames consist of structural angles of sizes that are usually found in stock.

The poles that support the frames can be fabricated in several ways. The standard plans provide for three alternative methods. This allows a shop to fabricate the poles in the manner most suitable to their method of operation. They can be fabricated from pipe sections, or formed from plates shaped to meet the sections called for on the plans.

The frames and poles are all fabricated by welding. The welding procedure is governed by the latest specifications issued by the American Welding Society.

All fabrication is inspected under the direction of the Materials and Research Laboratory of the California Division of Highways.

Safety Features

In the design of these structures, primary consideration was given to the safety of the traveling public and of the maintenance men responsible for servicing sign panels and the lighting. Today's high-speed traffic makes it imperative that the blocking of lanes for maintenance purposes be eliminated wherever possible.

Prior to the development of the standard plans, the older types of overhead structures were serviced from a maintenance truck placed in the roadway. This has been eliminated by constructing a walkway for the full length of the sign structures. Access to the walkway can be had either by means of a boom from a maintenance truck parked on the shoulder, or by means of a ladder somewhere off the traveled way.

The walkway includes a safety railing. The railing is a requirement of the State Division of Industrial Safety for the protection of workmen. It is constructed so that it can be folded down and not obstruct the motorist's view of the sign message. The same brackets which support the walkway and safety railing are also used for support of the lighting fixtures used for illuminating the sign panels.

Wherever the poles supporting the frames are located in a position vulnerable to traffic, they are protected by a guard rail. Nevertheless, once in a while a pole is hit by a vehicle. There are no known instances of a frame being knocked down and creating a hazard to traffic. Because they are designed to take wind loads, the poles are incidentally made tremendously impact-resistant. This is an important feature from a safety standpoint.

The minimum vertical clearance on all overhead signs is 17′ 0″. This is two feet more than normally provided on highway structures that carry traffic. This is a desirable safety feature since the frames are of much lighter construction and more vulnerable to damage. If the loads will pass the highway structures, they will theoretically pass the sign frames. However, where there are no nearby structures, a frame may be hit by a high load. This may occur when moving farm equipment, or through lack of perception when moving other overheight loads. Fortunately, such mishaps are rare.

Integral Part

The signing of major freeways, particularly the freeway interchanges, is an integral part of planning and design. The horizontal and the vertical alignment are critical factors in sign legibility since traffic at prevailing speeds must view a sign long enough to read and comprehend the message. The location of bridges over the freeway must be worked into the signing plan so that the bridge does not mask an important sign. For these reasons, the overhead signing must be considered and worked into the actual design in the planning and design stages.

Standard metropolitan freeway signing will provide an overhead sign in the gore, generally of the butterfly type, to indicate the turnoff lane on the one side and assign the lane for the next turnoff on the other. In advance of major interchanges, or at other critical locations, advance sign bridges across the entire roadway provide turnoff information with lane assignment and through information, all with the proper route shields. In addition, a third type of illuminated over-

head sign is used between turnoffs to indicate the next three turnoffs and the distances thereto in miles. Where such signs apply only to one direction of traffic, they are usually installed in the shoulder area. However, at some locations, a sign standard may be erected in the median with back-to-back illuminated signs providing this three-exit information for both directions of travel. A drawing of a section of a model which depicts this type of standard freeway signing is shown on this page.

Interstate Signing

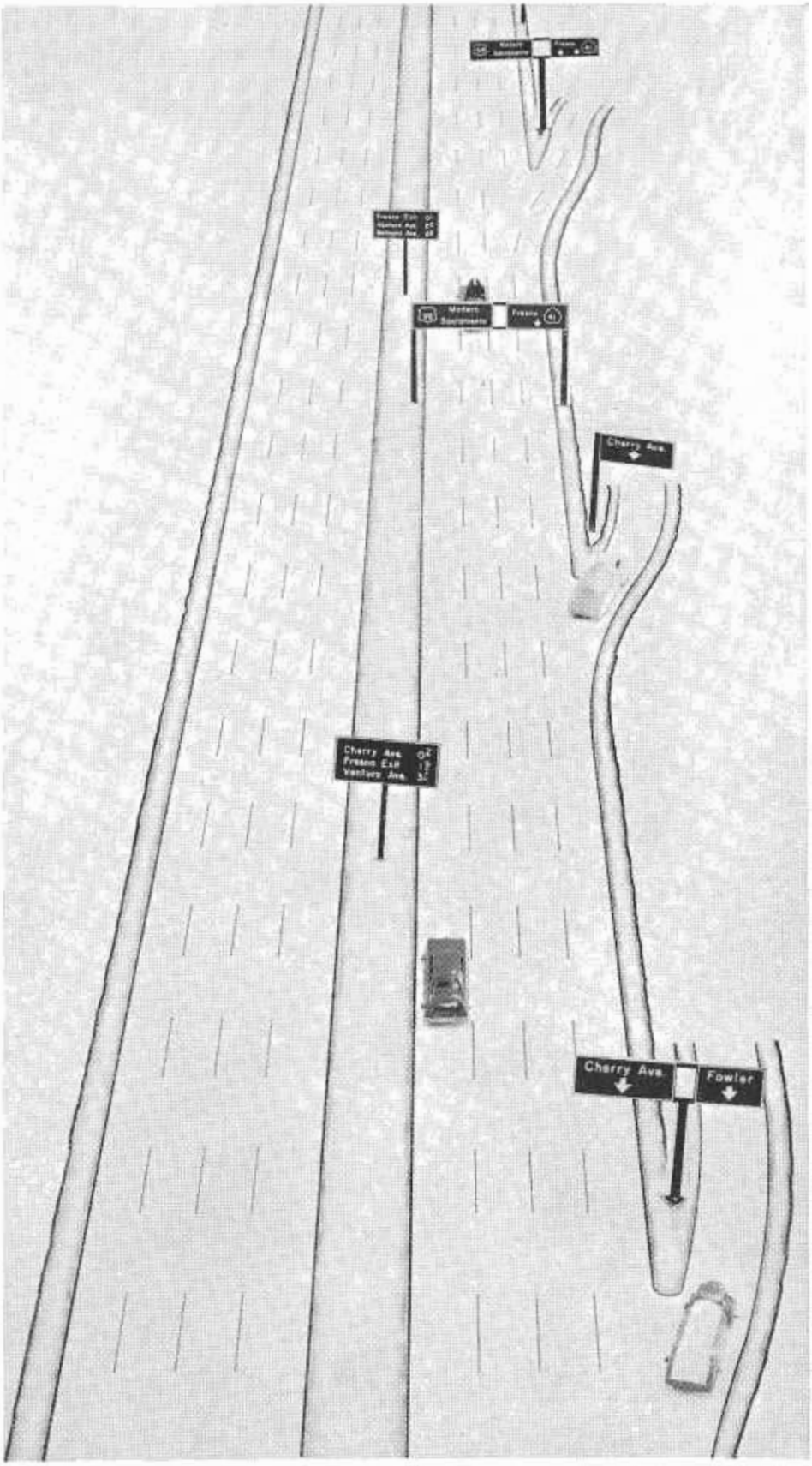
The National System of Interstate Highway, comprising some 2,200 miles of existing and proposed freeways in California, will involve changes in signing. It is the intention that the 41,000-mile national interstate system be signed uniformly, and a signing manual for this system has been developed.

Interstate signing will be different from the latest California standard.

The interstate guide signs will have a green background and wider borders, with rounded corners. The interstate manual reserves upper and lower case lettering for destinations only, so that exist distance, lane assignment, etc. will appear as all capital letters. This will involve the mixing of upper and lower case letters on the same sign. Perhaps the major difference in interstate signing will be the diagonal up arrow at the exit ramp gore where California now employs a down arrow.

Although overhead standards are primarily used for directional signing, important warning signs have recently been approved for installation on sign bridges or butterflies. One such overhead warning sign will inform truckers of the necessity to reduce gear on the steep Grapevine Grade, and other such warning signs are planned for two locations in advance of Department of Agriculture checking stations on freeways near the State's borders.

The total cost of the state highway sign program for the year 1957, including both the cost of installing and maintaining highway signs, was $2,183,000. Total signing costs are on a sharp upward trend, in spite of savings in the individual sign structures, due primarily to the rapid development of multilane freeways and the necessary



Typical schematic signing layout, showing different types of sign structures and placement of messages.

Pictured here is a cantilever type sign structure. This type of sign reaches maximum proportions of 10 feet by 30 feet.

overhead signs to properly direct traffic on such facilities. The substantially increased funds which will be available for the interstate program in 1960 will materially accelerate freeway construction with a comparable acceleration in the signing program.

Summary

Within the present concept of designing supports for overhead signs, it appears that the structures provided are effectively and economically serving their purpose. Certainly, standardization of plans has minimized the amount of engineering manpower required to prepare plans for these structures. Uniformity of details has contributed to lower construction costs.

Placing of adequate sign structures has become an integral part of the modern highway or freeway installation. Present types of installation will not remain static; manufacturers and material suppliers are constantly putting forth new ideas.

The Division of Highways will continue to try to keep abreast of new developments, looking toward the most efficient and economical installations consistent with utility and needs of the traveling public.

Death Notices

August H. Henderson, Deputy Director of Public Works, Sacramento Headquarters, died October 1st.

William O. Toates, Structural Steel Painter Foreman, District IV, died October 26th.

Kenneth M. Garcia, Highway Equipment Operator-laborer, District V, died October 30th.

Richard Hon, Supervising Highway Engineer, District VII, died September 29th.

Albert L. Boren, laborer, San Francisco-Oakland Bay Bridge, died October 29th.

George F. Cruza, Senior Account Clerk, San Francisco-Oakland Bay Bridge, died October 14th.

Drake Boulevard

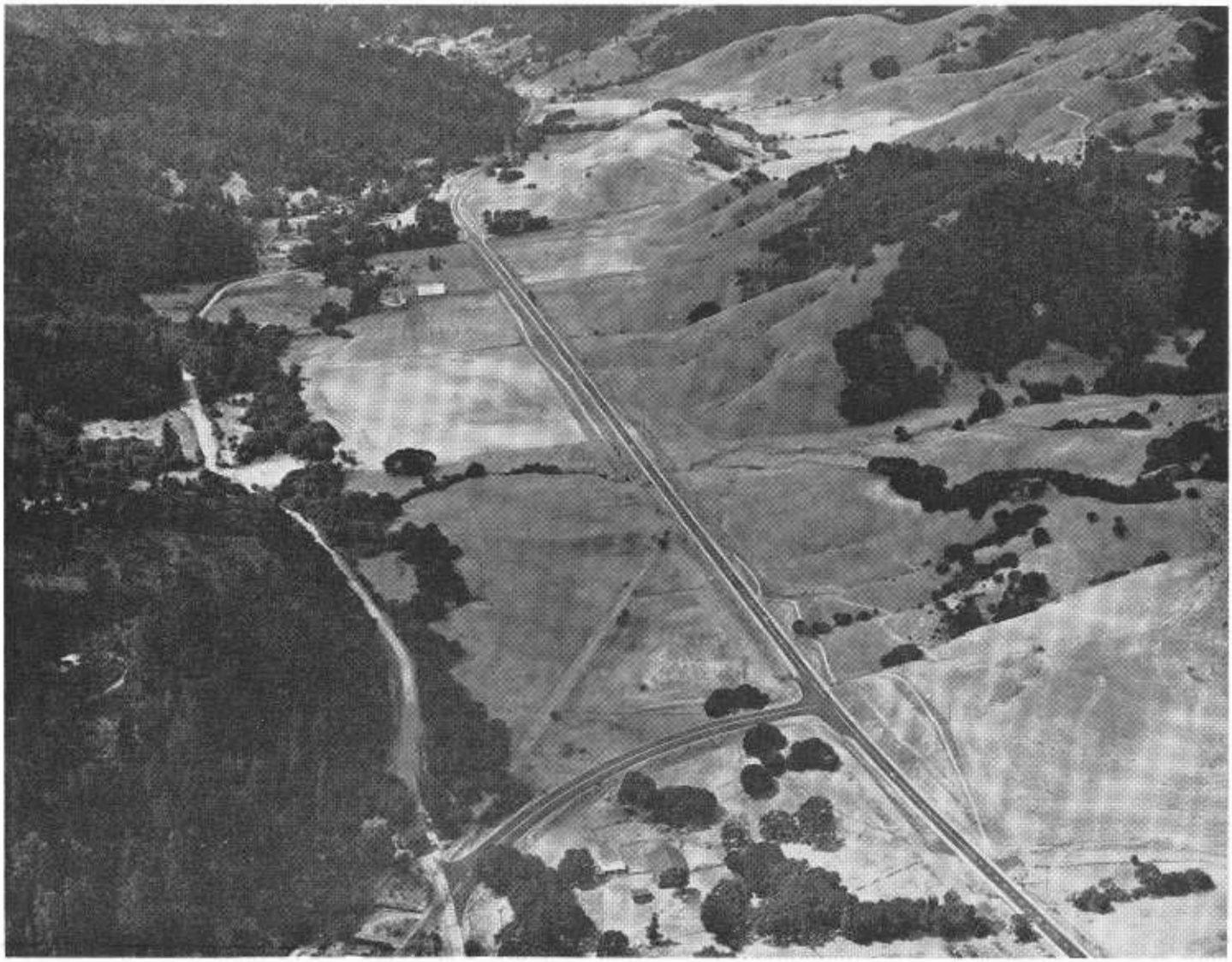
Three-Stage FAS Project Completed in Marin County

By A. P. STOKES, Deputy Director
Marin County Public Works Department

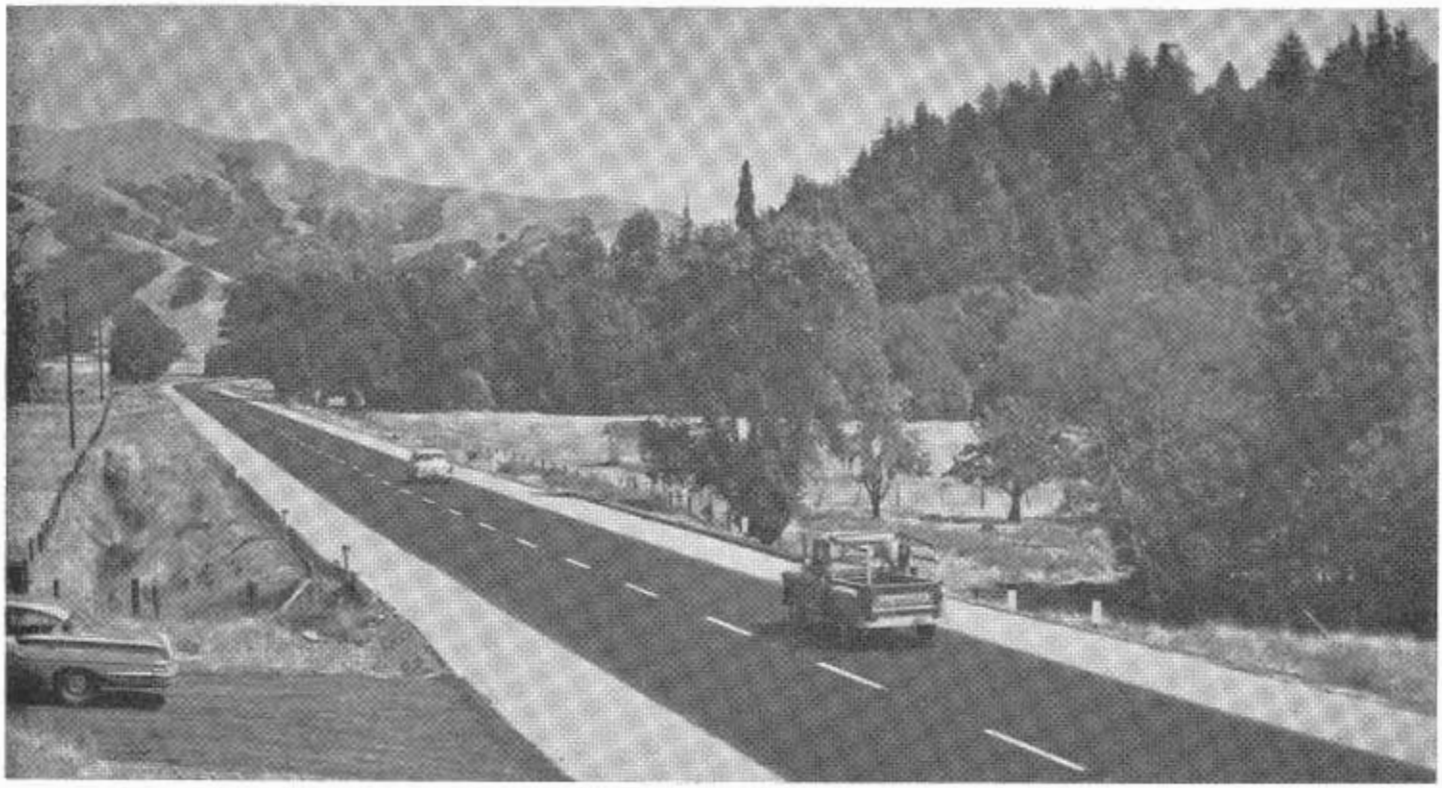
In February, 1955, the Marin County Board of Supervisors authorized the County Director of Public Works to institute a co-operative project with the State Division of Highways and the U. S. Bureau of Public Roads under the Federal-aid Secondary Highway Program for the improvement of Sir Francis Drake Boulevard.

This Marin County primary road is FAS Route 608 and starts at the west end of the new Richmond-San Rafael Bridge and ends at the lighthouse on Point Reyes. After leaving the urban areas of San Anselmo and Fairfax, the route climbs White's Hill and enters San Geronimo Valley.

At the turn of the century, San Geronimo Valley was served by two railroads over which much of early San Francisco's timber, paper and dairy imports were hauled. With the improvement of the automobile, the railroads were abandoned and the last major road improvements were undertaken by bond issue in 1925. However, the development of the valley and west Marin County soon overtaxed the narrow concrete bond issue improvements. With the recreational facilities



Marin County's Federal-aid Secondary Route 608, Sir Francis Drake Boulevard, recently completed under three contracts. Former route may be seen at left. Woodacre connection is in foreground.



New alignment of Marin County's Sir Francis Drake Boulevard between Lagunitas School and 2.7 miles easterly recently completed under the Federal-aid Secondary Highway Program

at Samuel Taylor Park and Tomales Bay State Park generating heavy Sunday peak traffic, combined with the heavy logging and milk transports operating in the area, it was necessary to consider the construction of a pavement of adequate structural strength.

Road Section Relocated

The two-lane highway at this location currently carries about 2,500 vehicles per day, which increases to nearly 6,000 vehicles per day on weekends. The design criteria, proposed, provided for limited access, 40-foot paved width (two driving lanes each 12 feet wide bordered by eight-foot shoulders), minimum 100-foot right-of-way and a design speed of 60 miles per hour. The heavy annual rainfall (76.1 inches in 1955-56 and 71.8 inches in 1957-58) required special attention to adequate subsurface drainage and surface interception. The new alignment provides a modern highway from the westerly slope of White's Hill to the Lagunitas School just east of Forest Knolls, a distance of 2.7 miles. The old traveled way remains to serve as an outer highway, providing the leisurely traveler a quiet, shaded route through stands of fine redwoods.

The first stage of construction consisting of structures, grading and placing of selected material started in May of 1956, and was completed in November, 1956. The contract called for constructing the Woodacre connection but did not include the 10′ x 8′ reinforced concrete box culvert built in stage 2. Three 10′ x 8′ concrete cattle passes were constructed beneath the main line. Traffic was inconvenienced only for a short interval of time at the beginning and end of project where earthwork conform was undertaken.

Rains Hold Up Work

Stage 2 of construction completed the grading and structures, and provided base and surfacing with the exception of the top 1½-inch layer. Heavy rains in December caused the contractor to suspend his work just after oiling the completed base. Paving and finishing followed in May, 1958.

July, 1958, saw the project completed with the final course of plant-mixed surfacing. Striping and signing of the new route was completed by the county maintenance forces.

Net contract payments were $265,954 for the first stage, $130,285 for the second, and $37,539 for the third. The normal federal-aid secondary and state highway matching funds apportionment to Marin County totals approximately $100,000 per annum, making it necessary for the county to utilize stage construction methods or to accumulate these moneys for several years in order to carry out a project of this magnitude. This project being on new alignment was ideally suited to stage construction since the various contractors could complete their work with minimum inconvenience to the traveling public.

Design and construction engineering were performed by the county under Marvin W. Brigham, Director of Public Works. Stage 1 construction was performed by John Delphia; W. S. Kimble, Superintendent; and C. U. Karoly, Resident Engineer. Stage 2 was done by E. A. Forde Co.; William Forde, Superintendent; and A. T. Knutson, Resident Engineer. Final paving was provided by A. G. Raisch Co.; C. E. Harless, Superintendent; and W. Noll, Resident Engineer.

Report From District XI

By JACOB DEKEMA, District Engineer

THE TWO most southern counties of California, San Diego and Imperial, as well as the eastern portion of Riverside County, make up District XI of the Division of Highways. The district's 1,137 miles of state highways are widely although not uniformly distributed over the 13,100 square miles that comprise the district. The district is composed of extreme variations of terrain, including coastal plain, mountainous regions reaching an elevation of 6,500 feet, as well as fertile agricultural valleys and arid desert regions. The planning, engineering and construction problems are therefore greatly diversified. In addition to the wide diversification of terrain, the variations of population and land use are equally extreme, ranging from the metropolitan San Diego area with a population of 770,000 to the uninhabited desert regions of the southern Mojave and Imperial Valley.

PHOTOS AT TOP OF PAGE—Two views of the US 80-Lake Murray Boulevard interchange in the San Diego area. Both look west.

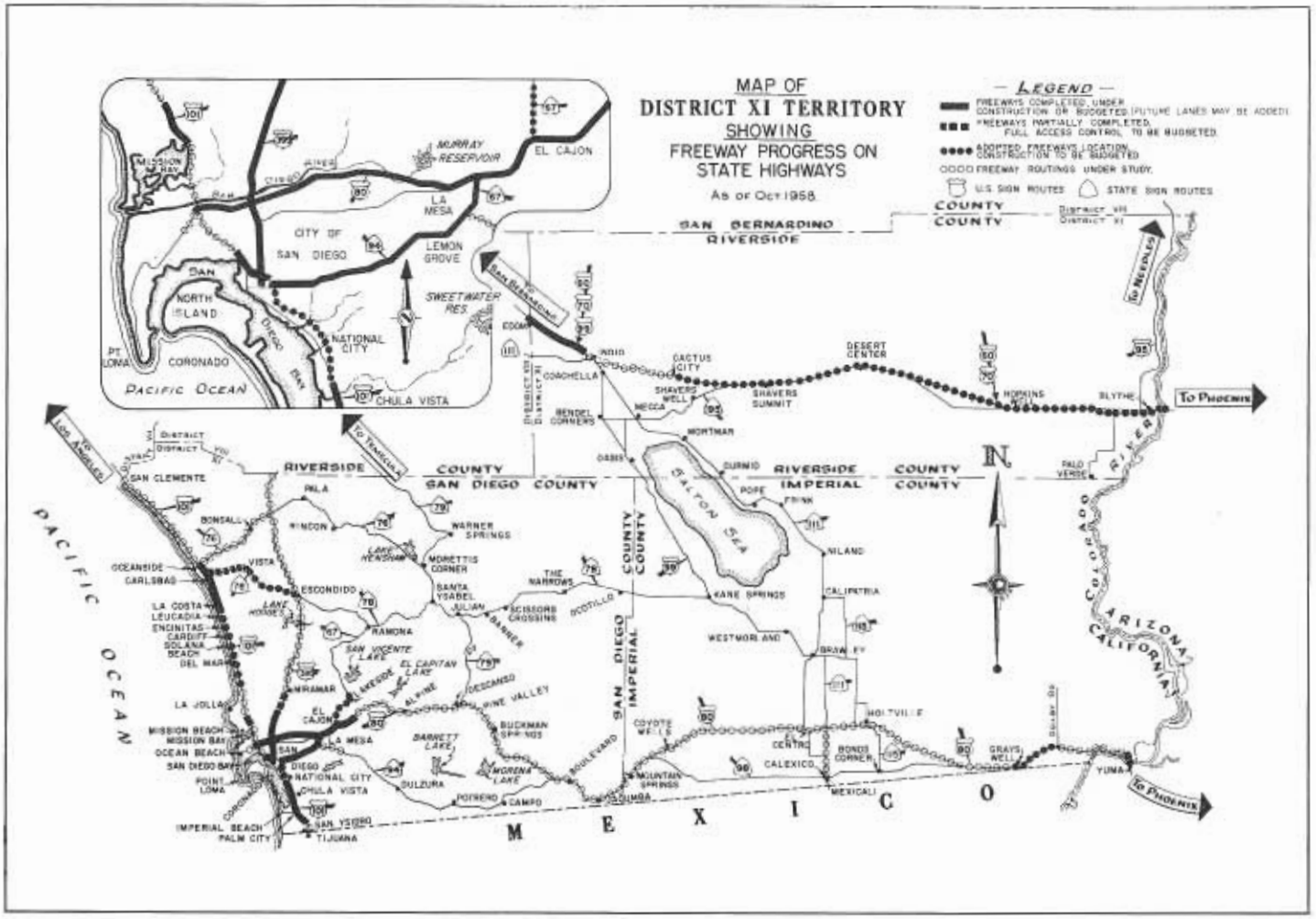
The economy of the San Diego metropolitan area is largely contingent upon an industrial development which has occurred in the past 20 years. Aircraft, missile and electronic research, as well as a recently developed atomic research center, have contributed heavily to making the San Diego area one of the most rapidly expanding metropolitan centers in the United States. Citrus and avocados grown on the coastal plain in conjunction with produce grown in the Imperial Valley east of the Coast Range comprise the bulk of agriculture within the region, while tuna fishing and employment in the numerous large military installations afford a livelihood for another large segment of the population.

The landlocked bays of San Diego, first discovered by Cabrillo 78 years before the Pilgrims landed at Plymouth Rock, are rapidly being converted to an extensive aquatic park for vacationists, and the mountain regions immediately behind the coast provide numerous camping and winter sports resorts.

The subtropical coastal plain with its "shortest thermometer in the world" encourages a large number of annual tourists. Local high spots such as the 200-inch telescope at Mount Palomar, Mission San Diego de Alcala, and a visit to Tijuana in Old Mexico, are invariably on the tourist's itinerary. It has been estimated that 10,000,000 tourists annually cross the international boundary.

Interstate Routes

District XI's unique position in the most southwest corner of United States, coupled with an unusually large number of major military establishments, has resulted in several routes within the district being designated on the National System of Interstate and Defense Highways. The federal legislation of 1956 included US 80, as well as US 101 and US 60-70, as routes scheduled for improvement to interstate freeway stand-



ards. A belt line for the San Diego metropolitan area was added in 1958.

US 101 originates at the international boundary and extends northerly in District XI to the south line of Orange County, while US 80 originates at a junction with US 101 in the vicinity of the district office in "Old Town" San Diego and extends easterly to the state line near Yuma, Arizona.

US 60-70 is also an east-west arterial in the northern portion of the district. It enters from District VIII approximately 12 miles northwest of Indio—a city in Riverside County of 8,000 population—and extends easterly to the Colorado River in the vicinity of Blythe.

US 101 Progress

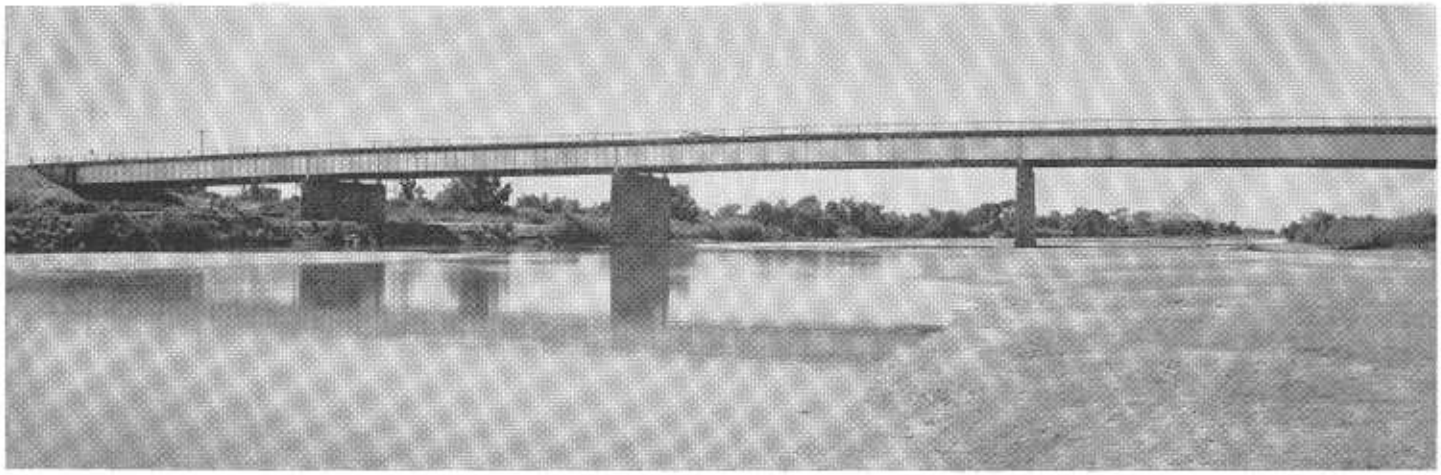
With the recent completion of three traffic interchanges on US 101 between the International Border and National City, eight and one-half miles of US 101 were brought to full freeway standards. The completion of the interchanges at Dairy Mart Road, 27th Street and Palomar Street will go far toward providing safe and expeditious travel between San Diego and the international boundary.

Tijuana, Mexico, just south of the border, has developed a population in excess of 100,000 and is a heavy traffic generator on this southern portion of US 101. Plans are presently being developed in co-operation with the Federal Government's General Services Administration to provide a greatly expanded border crossing station, and it is anticipated that the enlarged facilities will alleviate the present congestion at the border gates.

The relocation of US 101 through the Cities of San Diego and National City is undoubtedly the most ambitious project yet attempted in District XI. Seven million dollars has been expended for rights-of-way, and clearance is already in evidence, making way for the eight-lane development which will skirt the central business districts of the Cities of San Diego and National City.

The most pertinent factor of this segment of US 101 is that its completion will convert the several segments of existing freeways, as well as those under construction, into a fully integrated freeway system. It will be the ultimate connecting link between US 80, US 395, State Sign Route 94, and the City's Wabash Freeway, while also carrying the heavy north-south load of US 101.

While most of the interchanges will be relatively complex, the projected four-level interchange at the intersection of US 395 will probably be the most extensive of all. The top deck of the structure carrying eight lanes of US 101 over the Cabrillo Freeway will tower 72 feet over the lower level, while the ramps providing the turning



This bridge carries US 80 across the Colorado River between Winterhaven in Imperial County and Yuma, Arizona

movements will be sandwiched between.

Another feature of this portion of US 101 is that it will be fully integrated into the one-way-street plans presently being instituted by the City of San Diego. There could hardly be a better example of the benefits to be derived by both the State and municipality than is demonstrated by this project. The many months of liaison and cooperative efforts of both agencies have paid off handsomely in gaining the utmost that could be derived from the proposed construction.

Alternate Structures

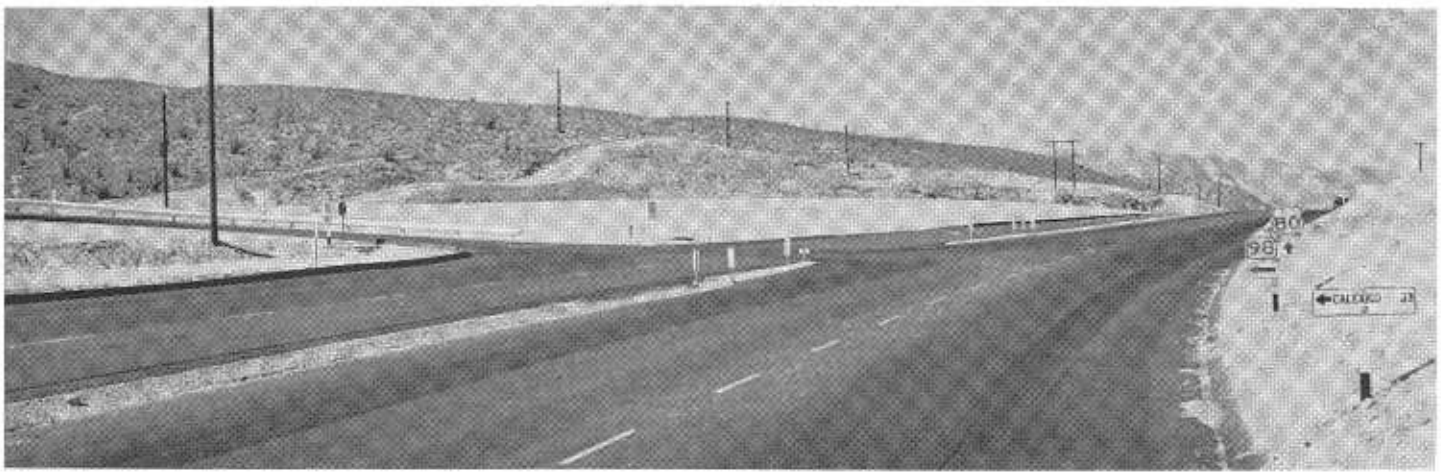
Right-of-way acquisition is nearing completion on the section between Market and Laurel Streets. Thirteen million dollars has been budgeted for the 1959-60 Fiscal Year for this construction. Stage construction involving alternate structures is planned to alleviate traffic problems caused by construction.

The portion of US 101 between Washington Street and Barnett Avenue in San Diego is presently under construction to full freeway standards. The $1,368,476 job converting one mile to freeway standards will be completed by the end of 1958. Progressing northerly to the north end of Mission Bay, the 1.7-mile freeway section constructed in 1954 at a cost of $1,335,000 serves to eliminate a bottleneck at Balboa Boulevard as well as to improve the alignment of US 101 into the mouth of Rose Canyon. This section of US 101 is usually referred to as the "Balboa Avenue Bypass."

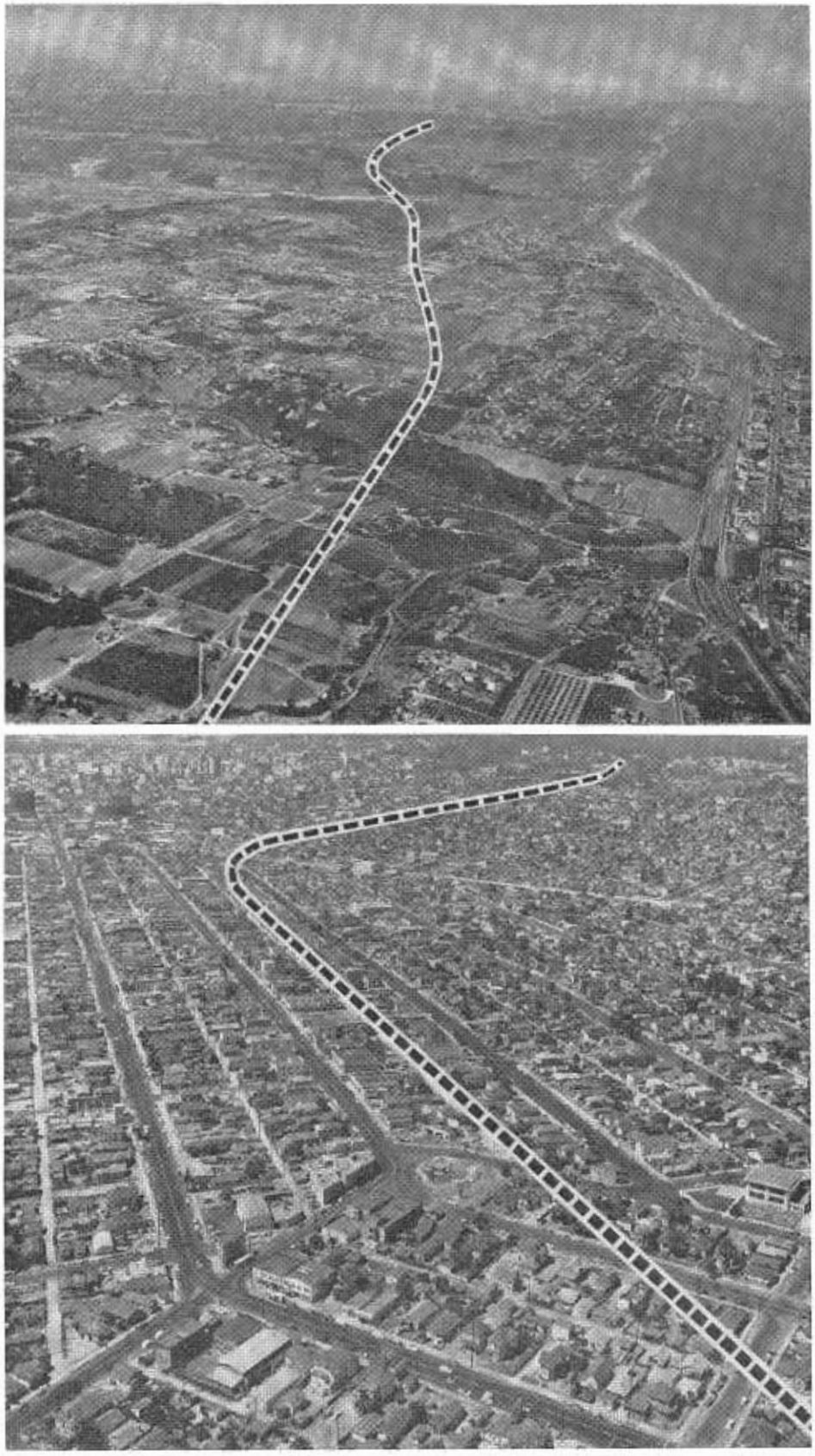
The State Highway Commission recently selected another section of US 101 from the north city limits of San Diego to Carlsbad to be developed to freeway standards. Design is proceeding on this critical section which bypasses several coastal communities.

The section of US 101 from the south city limits of Carlsbad to the Camp Pendleton gate just north of the City of Oceanside presently provides the motorist with full freeway development. The last of the several contracts which totaled approximately seven and a quarter million dollars, was completed in 1955.

US 101 from Oceanside north to the county as well as district line has been fortunate not to have been strangled by commercial ribbon development. Almost the entire alignment lies within the old Rancho Santa Margarita, which was held intact by its owners, the O'Neil family. Since its acquisition by the Federal Government at the beginning of World War II for a Marine training center—Camp



This view westward shows the US 80-Sign Route 98 intersection in southwestern Imperial County



UPPER—The superimposed line on this photo shows the future location of the Coastal Freeway extending south from Leucadia. San Marcos Road crosses the line in the middle foreground. LOWER—A view northwest shows the adopted line for the San Diego Freeway from above 27th Street and National Avenue. The routing in the middleground runs parallel between Logan Street (left) and Kearny Street (right).

Pendleton—the same policy has been adhered to. The present four-lane development, although not to freeway standards, bears witness to one of the basic concepts of modern highway design. That is, by eliminating the conflict caused by turning movements, the relative capacity of the highway is greatly enhanced.

The entire 72 miles of US 101 in District XI will be brought to full freeway standards as rapidly as available funds will permit.

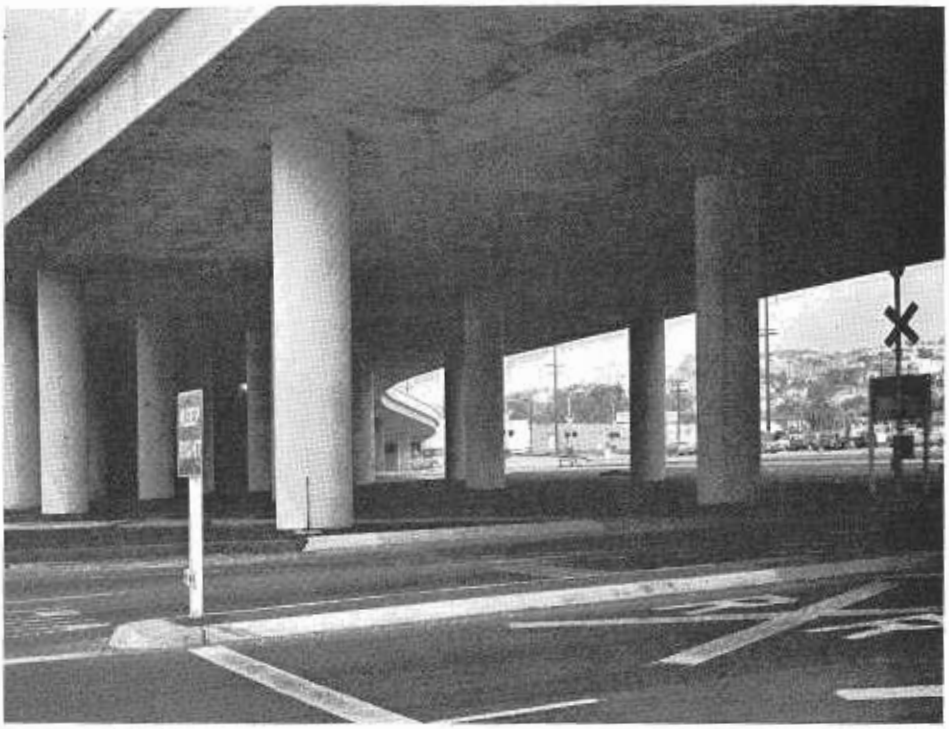
US 80 Improved

US 80 budgetwise occupies the spotlight of the 1958 construction program. With the recent award made to R. E. Hazard and W. F. Maxwell Companies of San Diego, as a joint venture, in the amount of $1,214,000 for 1.3 miles of eight-lane freeway between US 101 and US 395, the western section of US 80 will soon be under construction. The project provides an interchange at Presidio Park. The eastern limits of construction join a mile of eight-lane freeway well advanced in construction at the junction of US 80 and US 395 in the Mission Valley area of San Diego. Five bridges, in addition to minor modifications to those existing, are included with the grading and paving contract which amounts to $3,318,000.

Design plans are completed and early advertising is expected on the segment of US 80 between the US 395 interchange and Fairmount Avenue. Eight lanes will be provided through traffic while high-type interchanges will be provided at Texas Street and Ward Road. The north and south frontage roads will be connected with a bridge just east of US 395. A new bridge projecting northerly across the San Diego River from the Ward Road Interchange will be a portion of the contract. The Fairmount Avenue Interchange now nearing completion serves the eastern section of San Diego, as well as providing a connection to Mission Gorge Road.

The portion of US 80 easterly of Fairmount Avenue traversing the Alvarado Canyon below San Diego State College is expected to be advertised for bid in the near future, for construction of which $4,010,000 has been budgeted. Provision has been made for

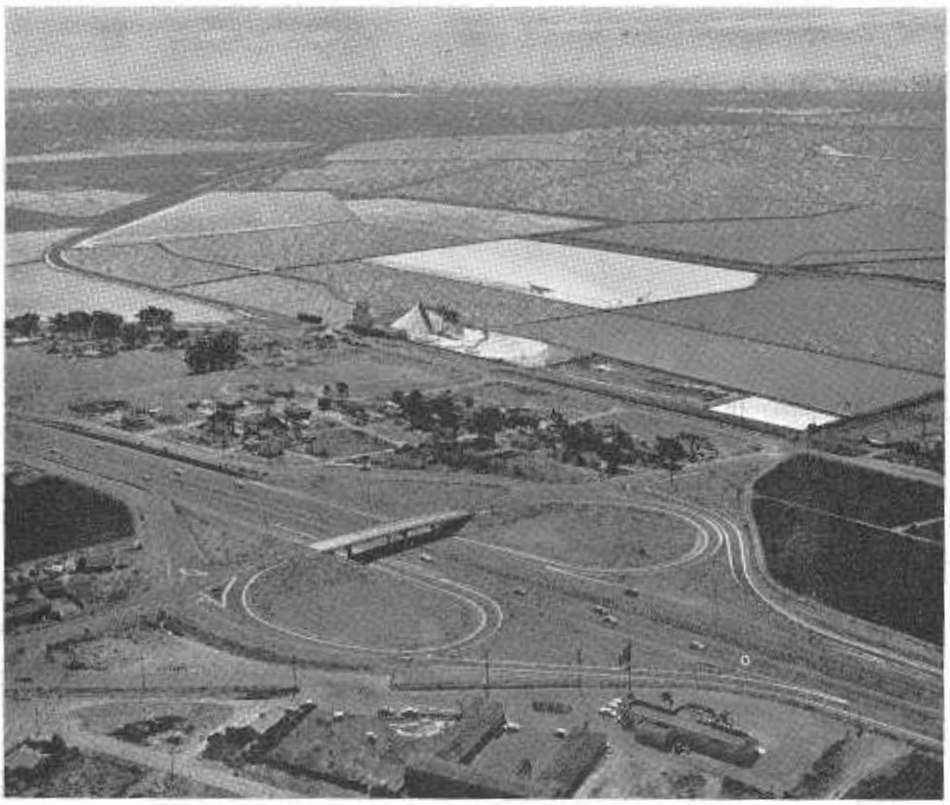
interchanges at Waring Road and College Avenue before the six-lane development connects to a recently completed freeway section at 70th Street (Lake Murray Boulevard). The Baltimore Drive freeway section picking up on the eastern limits of 70th Street extends the six-lane development to the edge of the City of La Mesa, an incorporated area of 25,000 population lying just east of the City of San Diego. A gap of 2.32 miles remains to be developed between Baltimore Drive and La Mesa Boulevard, which marks the beginning of the Grossmont Summit job now under construction. The 1959-60 annual budget recently approved by the State Highway Commission allocates $3,040,000 for the construction of this section of US 80. It is anticipated that completion of the $3,594,000 contract on the Grossmont Summit will be accomplished by the time this article is in print.



This picture was taken under the Washington Street interchange on US 101 in San Diego. The columns have been arranged to provide for a railroad wye as well as the highway.

Interchange Problems

The Grossmont Summit contract is one of the district's more ambitious projects in design and cost. The interchange problems which accrued as a result of the high traffic volumes generated by the El Cajon Valley area as well as the junction of State Sign Route 67 freeway to US 80 at this western portal of the El Cajon Valley, were among the most complex yet faced by the district. At one point there will be 18 lanes side by side to handle traffic destined for El Cajon, La Mesa, San Diego, and way points via State Sign Route 67, to say nothing of accommodating residential communities lying both north and south of the freeway. Two structures will provide the motorist left-turning movements at the routes' junction near La Mesa Boulevard, while overhead bridges at Fuerte Drive and Grossmont Boulevard will serve the residential communities adjacent to the highway. A pedestrian overhead crossing will serve the Grossmont High School, with its 3,000 students. Chase Avenue marks the eastern limits of the going contract and the beginning of the next portion presently in the design stage.



A view westward taken above the US 101-Palomar Street interchange. The diked-off areas in the background are salt drying beds.

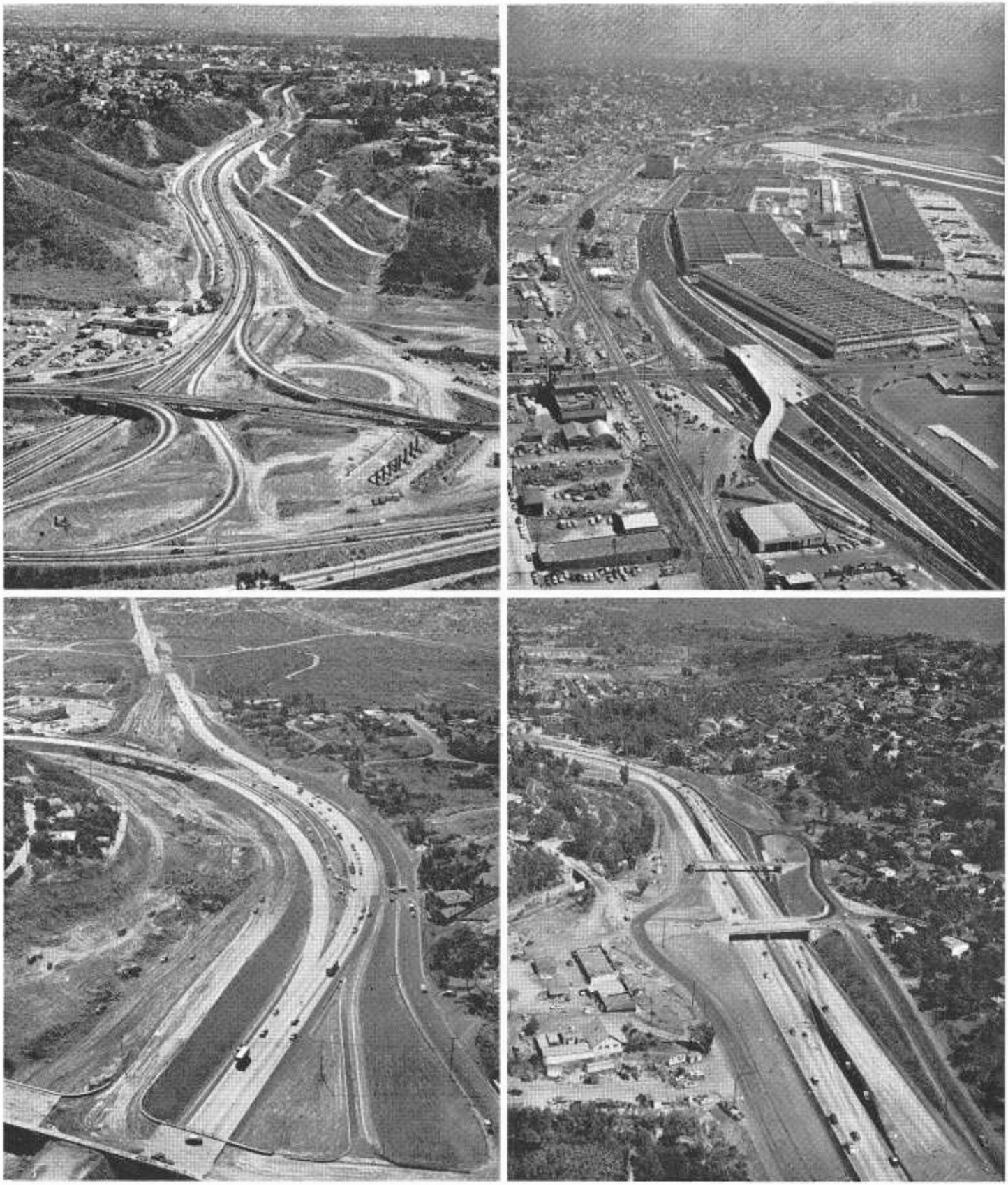
The route sweeps northerly from Chase Avenue, crossing over existing El Cajon Avenue and the railroad on overhead bridges to a diamond-type interchange at West Main Street. Curving easterly again, the six-lane improvement passes over Marshall and

This aerial view northward was taken above US 101 in Rose Canyon two miles north of Balboa Avenue

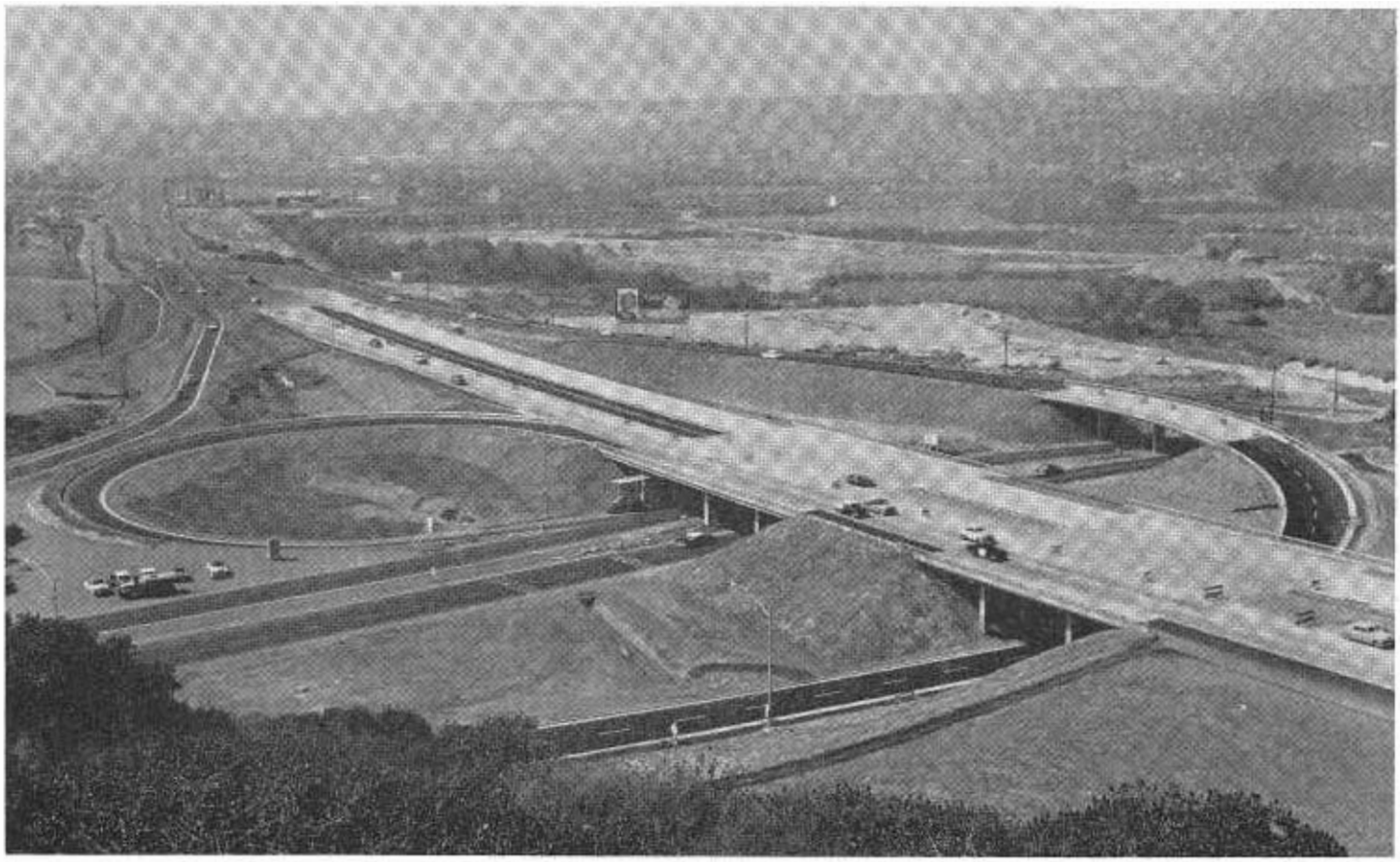
Johnson Streets on grade separation structures with a major interchange at Magnolia Avenue (State Sign Route 67).

The right-of-way program for the Chase to Magnolia Avenues section of US 80 is almost completed and it is expected that construction will be under way in 1959. A $4,000,000 item for this construction is included in the 1959-60 annual budget recently approved by the State Highway Commission. A portion of the fills have already been placed by excess excavation from the Grossmont section.

It is anticipated that four lanes running easterly from Magnolia Avenue will for the time being adequately serve traffic needs across the valley floor to the new freeway's intersection with existing US 80 in the vicinity of Third Avenue on the eastern edge of the City of El Cajon. Diamond-type interchanges are planned for Mollison and Second Streets, while grade separations are scheduled for Ballantyne and First Streets. Grape



UPPER LEFT—When completed, this interchange will connect US 395 and US 80. The City of San Diego is in the background. UPPER RIGHT—A view southward on existing US 101 through San Diego in the vicinity of Washington Street. LOWER LEFT—This interchange under construction will connect US 80 and Sign Route 67 at Grossmont Summit. Furte Drive is in the left foreground. LOWER RIGHT—Looking east on US 80 showing the Grossmont Boulevard separation and pedestrian overcrossing.



This pattern of bridges and ramps is the new US 80-Fairmont Avenue traffic interchange just east of San Diego

Street, near the eastern limits of the project, is the location for a pedestrian overhead crossing to serve schools in the area. Right-of-way acquisition is active on this segment of US 80 and construction is budgeted for the 1959-60 Fiscal Year. A temporary connection from the freeway to the existing highway will be provided near Broadway.

Subdivisions Served

The last section of US 80, where a route adoption has been made by the California Highway Commission and a freeway agreement has been negotiated, is between Third Avenue and Flume Drive. Preliminary engineering on this section points to a one-half-diamond interchange at Third Avenue and at Greenfield. Connecting ramps at Third will serve the east, while the Greenfield ramps will serve traffic of western origin and destination. A grade separation is planned for Broadway to serve the mushrooming subdivision developments, as well as several proposed schools in the area east of the freeway.

To summarize the activity on US 80, the entire metropolitan portion of US 80 from US 101 to Third Street on the east side of the City of El Cajon is either under contract or is at present budgeted for construction. Where the initial construction is not eight lanes in width, sufficient right-of-way has been purchased to permit future widening to eight lanes.

Planning is well advanced on construction to interstate standards of the Highway 80 project easterly to the state line. A public meeting was held on September 11, 1958, in Jacumba to discuss alternate routes of US 80 between Laguna Junction and Coyote Wells. The California Highway Commission took under consideration at its October meeting the matter of a freeway routing on this section. Further public meetings are planned for the near future covering the remaining portions of US 80 not yet routed or designated as freeways by the California Highway Commission.

State Sign Route 94

State Sign Route 94, a 64-mile east-west highway originating within the business district of the City of San Diego, takes a southerly bearing, almost touching the Mexican border before swinging northerly to join US 80 at White Star, approximately 12 miles west of the Imperial county line. This route serves Jamul, Dulzura, Barrett, Potrero, and Campo – small unincorporated towns in the most southern section of San Diego County–in addition to serving as a major artery in the metropolitan freeway system.

The segment which will join the relocation of US 101 through the City of San Diego to the existing freeway terminating at Home Avenue, has just recently been put to contract. With a previous contract for nine bridges nearing completion, the present grading and paving contract in the amount of $1,956,600 will provide a full freeway as far west as 24th and F Streets, only several city blocks from its ulti-

. . . Continued on page 46

San Clemente

San Diego Freeway Reaches Orange County Coast City

By R. M. INNIS, Resident Engineer

THE MOST recent section of the San Diego Freeway to be completed is located in and south of the community of San Clemente, a seaside resort town of 8,000 located in southwest Orange County, just midway between Los Angeles and San Diego. San Clemente was originally founded by Ole Hanson in 1925 on land that once belonged to the Rancho Los Desechos under old Spanish land grant. The city was incorporated in 1928 as a "Spanish Village" and building regulations required that dwellings be constructed in native motif, with plaster exteriors and red tile roofs.

Future development of the City of San Clemente will be enhanced by the current construction activity on the San Diego Freeway from the San Diego county line through Capistrano Beach, San Juan Capistrano and El Toro, and the inclusion in the 1959-60 state highway budget of a project which will complete the freeway development through the community.

All construction on the San Diego Freeway in this area should be finished and ready for travel by 1960 or 1961.

Actual bid opening for the San Diego Freeway in and south of San Clemente took place on April 25, 1957, with award of a contract to J. E. Haddock and Cox Brothers Contractors following on May 9, 1957. Construction crews began operations on May 20,

Looking south along the new freeway through San Clemente. The north connection with present US 101, which passes under the freeway, can be seen in the foreground.

Another view of the San Clemente Freeway looking north showing the end of the freeway and present US 101 extending on through the northern section of the city

1957, with roadway excavation totaling 680,000 cubic yards. The $2,500,000, 2.3-mile job was economically handled because of minimum hauling distances, since materials—58,000 cubic yards—were obtainable in the immediate vicinity. Excess excavation was turned over to District XI for roadway embankment material for future freeway construction in northern San Diego County. The more significant features of freeway construction included: three reinforced concrete overcrossings; one steel girder bridge with single-cast girders measuring 177 feet over existing Highway 101, built of 710,000 pounds of structural steel; and 22,033 feet of storm drain pipe. Twenty-six thousand cubic yards of concrete was used for the 8-inch-thick, six-lane, divided roadway. A constant danger during construction was the presence of a high-pressure coastwise gas main measuring 12¾ inches and operating at a pressure of 400 pounds per square inch. Careful plans and yet more careful engineering prevented damage to the main throughout the construction period.

The San Diego Freeway from its junction with the Santa Ana Freeway at Niguel Road near El Toro south to the limits of San Juan Capistrano is under construction now and is expected to be completed in July, 1959. South through San Juan Capistrano another contract is rapidly nearing completion. These two construction projects will add another 12 miles to the growing mileage of completed portions of the San Diego Freeway in Orange County.

The only remaining gap in the freeway from El Toro to the San Diego county line is between the project nearing completion in San Juan Capistrano and the job recently completed in and south of San Clemente.

The 1959-60 state highway budget adopted by the California Highway Commission in October includes a freeway project which will close this 7.7-mile gap. Estimated cost of this budgeted project is $7,700,000 of which $7,000,000 is financed in the 1959-60 Fiscal Year.

Budget Exceeds $600 Million

Highway Commission Details Record Allocations for 59-60

This general story on the Budget is supplemented by other details appearing on pages 58 to 64.

THE CALIFORNIA Highway Commission has adopted and submitted to Governor Goodwin J. Knight a state highway budget for the 1959-60 Fiscal Year with an overall total of $610,711,862, of which $559,872,403 is for state highways.

The budget is predicated on the assumption that the Legislature will take action to retain highway user taxes at their present levels instead of allowing some of them to drop back on January 1, 1960. Present law provides for the gasoline tax to be changed from 6 cents per gallon to 5½ cents on that date and for other levies to be reduced correspondingly.

The budget provides approximately $491,000,000 for state highway construction purposes, including rights-of-way, said C. M. Gilliss, who was Director of Public Works and Chairman of the Highway Commission when the budget was adopted in October.

The current (1958-59 Fiscal Year) budget as adopted in October, 1957, and augmented by federal legislation in April, 1958, contained a gross total of $517,000,000.

Federal Aid a Key Factor

The principal factor in the 18 percent increase in the 1959-60 budget over the current one is the apportionment of federal aid for Interstate System highways on the basis of each state's actual needs instead of on the previous area - population - post road mileage formula. Congress' decision to follow the needs formula raised California's share of interstate apportionments from less than 6 percent of the national to about 10 percent.

The federal aid apportionment to California for 1959-60 is $302,020,852, of which $252,779,750 is for the Interstate System. The original 1958-59 federal-aid apportionment, based on the old formula, was $163,409,763, of which $115,365,437 was interstate. These were increased last April to $197,077,767 and $126,959,953, respectively.

Major sources of state-collected highway revenue expected in the 1959-60 budget include: $233,070,000 in gasoline taxes (up $3,000,000 from the previous year's estimate); $44,337,000 from motor vehicle fees (down $15,000,000 from the previous year's estimate because of increased budgets of the California Highway Patrol and Department of Motor Vehicles and reduced estimates of new car registrations); $20,000,000 from use fuel (diesel) tax (slightly up from previous year); and $10,000,000 from transportation taxes on for-hire carriers (about the same as the previous year).

Nonstate Highway Items

Of the nearly $51,000,000 in the budget for functions other than state highway work, the major item is $31,558,000 for major city streets other than state highways, based on ⅜ cents per gallon of the gasoline tax. Other nonstate highway items are:

Federal aid for county roads on the federal-aid secondary system, $8,724,389; state funds to counties for use in matching these federal funds, $4,273,060; state funds for matching city and county funds for elimination of railroad grade crossings on local streets and roads (not state highways), $5,000,000; and engineering funds for cities, $1,200,000.

Gilliss explained that the 1⅜ cents per gallon of the gasoline tax and a portion of the motor vehicle fees which are apportioned to the State's 58 counties for local road purposes do not appear in the state highway budget because they are disbursed directly by the State Controller. For the 1959-60 Fiscal Year these state funds for county roads will total an estimated $81,000,000.

State Highway Items

The approximately $491,000,000 in the budget for state highway construction purposes includes:

Major construction and improvement (contracts plus engineering), $356,977,000; rights-of-way, $127,500,000; contingencies (normally available for construction purposes), $6,645,403; resurfacing program, $5,000,000; minor improvements, $800,000.

Proposed expenditures for state highway purposes other than construction include: maintenance, $36,200,000; buildings and plants, $10,000,000; administration, $9,800,000; statewide highway planning survey, $3,000,000; maintenance of San Francisco Bay area state-owned toll bridges, $2,200,000; and honor camps, $1,750,000.

Planting Projects

The 1959-60 state highway budget contains 36 projects for roadside and dividing strip planting, including landscaping. The total outlay for these projects is estimated at $3,965,000, an increase of $785,000 over the planting funds budgeted a year ago.

Two-Year Budgeting

Gilliss pointed out that the 1959-60 budget contains a number of items which are only partly financed in a single fiscal year. This two-year budgeting was provided for by legislation enacted in 1957, and was first used in the 1958-59 state highway budget.

"This procedure has proved successful in placing particularly large and complex projects under contract without tying up heavy amounts of highway funds in a single budget item," he explained. "By financing out of one year's budget only the amount which will be needed for the job in that one year, we make room in the same budget for more projects."

Early Contract Awards

State Highway Engineer G. T. McCoy informed the commission that right-of-way acquisition and plans and specifications had already been completed on some of the projects included in the new budget, and that these projects could be advertised for bids beginning in mid-November

State law permits the awarding of state highway contracts as early as January 1st, six months before the start of the fiscal year, in order to take maximum advantage of favorable construction weather and complete jobs earlier.

Significant features of the 1959-60 state highway budget include:

Los Angeles Area

Los Angeles County projects with a total estimated cost of $105,215,000 are included in the 1959-60 state highway budget. Not all of these new projects are completely financed in the 1959-60 budget, however; some of them are being financed over more than one fiscal year

The budget also contained more than $52,000,000 for the purchase of rights-of-way on Los Angeles County state highway routes, including $15,800,000 for the San Diego Freeway and $15,650,000 for the Santa Monica Freeway.

Major construction emphasis is centered on completing important sections of the Golden State, Santa Monica and San Diego Freeways:

- On the Golden State Freeway the newly budgeted projects, estimated to cost a total of $30,600,000, will extend the freeway as far north as Lankershim Boulevard, completing a freeway bypass of downtown Los Angeles.
- On the Santa Monica Freeway the budgeted projects will provide for construction of freeway viaduct which will link the Santa Ana and Harbor Freeways. Total estimated cost of these Santa Monica Freeway projects is $46,500,000.
- Three projects included in the budget on the San Diego Freeway will provide for a section of freeway and for structures on the freeway route near Long Beach, as well as for structures on the freeway route near Inglewood.

Widening of three sections of the San Bernardino Freeway to six or eight lanes between the Long Beach Freeway and the San Bernardino county line is also included.

In addition, the 1959-60 budget provides funds to complete the financing on several projects including jobs now under construction which will complete the Ventura Freeway in the San Fernando Valley, and extend the Harbor Freeway as far south as 190th Street.

In Ventura County the budget provides for construction of a 4.6-mile section of freeway on US 101 in the City of San Buenaventura.

Orange County

The budget provides for construction of an eight-mile section of freeway through San Clemente to San Juan Capistrano which will close the final freeway gap on US 101 in Orange County. This project, together with other jobs now under construction, will provide 90 miles of continuous full freeway on US 101 from the San Diego county line, through the City of Los Angeles, to the west end of the San Fernando Valley.

San Diego Area

In the San Diego area, the budget provides for construction of the first unit of US 101 freeway through San Diego, and for the conversion to full freeway of the remaining expressway sections on US 80 between San Diego and El Cajon. When the budgeted projects on US 80 are finished, there will be 17 miles of full freeway between Taylor Street in San Diego and Third Street in east El Cajon. Total estimated cost of budgeted San Diego County projects is $23,500,000. In addition the budget contains $11,830,000 for rights-of-way on state highway routes in the county.

San Bernardino-Riverside

Freeway development in the San Bernardino-Riverside area will be continued by several large-scale projects including the extension of the Riverside Freeway through Corona, and construction of a freeway-expressway section east of Redlands at the Yucaipa junction and a six-mile freeway bypass of the City of Beaumont. The latter project will complete continuous multilane divided highway, nearly all freeway or expressway, for 125 miles between Los Angeles and Indio, except for the four-lane undivided section through Redlands.

On major routes north of San Bernardino, the budget contains allocations for construction of a freeway bypass of the City of Barstow, and also for 25 miles of freeway on U. S. Highway 91-466 between Baker and Valley Wells, which will convert the present Baker Grade to a freeway.

San Francisco Bay Region

The 1959-60 budget provides the first construction funds for two long-planned and extensive highway projects in Oakland—the Webster Street Tube parallel to the present Posey Tube between Oakland and Alameda, and the first unit of the MacArthur Freeway on U. S. Highway 50. Financing is also completed on a freeway section of US 40 now under construction in the vicinity of the El Cerrito Overhead.

South of San Francisco, the budgeted projects include widening to eight lanes on a seven-mile section of the Bayshore Freeway in San Mateo County, and freeway jobs in Santa Clara County which will extend the Bayshore Freeway as far south as Sunnyvale. When these budgeted Santa Clara County projects are completed, there will be 40 miles of continuous full freeway on the Bayshore between the San Francisco-Oakland Bay Bridge and Sunnyvale.

In San Francisco the budget contains allocations for 1.2 miles of eight-lane freeway at the approach to the Golden Gate Bridge, and for further

construction on the Southern Freeway west of the James Lick Memorial (Bayshore) Freeway. In addition, financing is completed on the Southern Freeway-James Lick Memorial Freeway Interchange which is now under construction.

North Bay Area

Marin County budgeted projects on the Redwood Highway (US 101) will provide for additional construction to complete the Greenbrae Interchange, and also for construction of two interchanges north of San Rafael. To the north in Sonoma County a project is included which will complete a freeway bypass of Healdsburg. Funds are also allocated for 2.5 miles of freeway construction west of Benicia in Solano County.

Sacramento Region

West of Sacramento on the Winters-Dunnigan Cutoff, two projects will provide 19 miles of new highway, the initial two lanes of a future four-lane freeway on this interstate route. East of Sacramento the budget provides funds for construction of the Nimbus Interchange on U. S. Highway 50.

US Highway 40

Projects west of Sacramento on this important cross-state route include conversion from expressway to six- and eight-lane freeway in Solano County, construction of an interchange at Sign Route 12 near Fairfield, and conversion from expressway to freeway near Davis.

The 1959-60 budget contains three new projects covering 23 miles on U. S. Highway 40 east of Sacramento. Estimated total cost of these jobs is $30,450,000. In addition, the budget also provides funds to complete the financing on four freeway projects which are now under construction on this route.

Two of the new US 40 projects will cover a 13-mile section between east of Gold Run and west of Emigrant Gap, and the third will involve the relocation of US 40 as a freeway over Donner Summit.

When the projects now budgeted or under construction on US 40 are completed, there will be only a single 11-mile gap in continuous full freeway and expressway between Sacramento and the Nevada state line.

US Highway 101

On US 101, the budgeted projects outside metropolitan areas will continue the steady conversion of this route to freeway and expressway standards, both between Los Angeles and San Francisco and on the Redwood Highway. These projects include the freeway section through Ventura, and others west of Santa Barbara, through Pismo Beach in San Luis Obispo County, and through Soledad in Monterey County; an expressway section north of Willits in Mendocino County; and in Humboldt County a stretch of freeway south of Dyerville a parallel bridge over the Eel River south of Scotia, and a section of freeway in the vicinity of Trinidad.

The Pismo Beach job, together with other current projects in San Luis Obispo County, will provide about 70 miles of continuous freeway and expressway from north of the Santa Barbara county line to north of San Miguel.

US Highway 99

On US 99 the major projects outside metropolitan areas are two interchange projects in Kern County; the conversion of 5.3 miles from expressway to freeway in Tulare County; conversion of a section of the Stockton Bypass from expressway to freeway; and two projects in Shasta County, which, with other current jobs, will provide about 30 miles of continuous freeway and expressway in the Sacramento River Canyon between north of Shasta Lake and north of Dunsmuir.

(For list of state highway budget projects by counties see page 58.)

Richard Hon

Supervising Highway Engineer Richard Hon, head of advance planning in District VII and a Highway Division engineer since 1931, died of a heart attack September 29th.

His highway work was in Districts VIII and X before World War II. He was a naval officer from 1941 to 1946, serving at 11th Naval District Headquarters and Port Hueneme and in the 146th Construction Battalion and the Okinawa Campaign in the South Pacific.

Hon was a graduate of the New Mexico School of Mines in 1929 and was a mining engineer as well as a civil engineer. He was born in Sheridan, Wyoming, on May 12, 1907.

He is survived by his wife, Eleanor, two daughters, Sandra and Linda, and a brother and sister.

Senior Road Engineer Ray Collins Leaves

Ray Collins, Senior Engineer with the Division of Highways District VII office in Los Angeles, has retired after 26 years with the State.

Collins was born in Plainville, Kansas. Following grade school and high school training in Fremont, Nebraska, and Chicago, Illinois, he studied engineering at the University of Illinois.

RAY COLLINS

After graduating in 1909, Collins went to work with the U. S. Bureau of Lands in the Philippines as chief of survey party in Moro Province, Zamboanga.

Collins' surveying took him into many remote areas of the archipelago. He worked on uninhabited islands north of Borneo and south of Palawan, five of which had never appeared on a map until he surveyed them.

He returned to the United States and joined the Illinois Highway Department in 1914 but went back to the Philippines the following year as chief of cadastral survey at Cabanatuan outside of Manila. He returned to the United States in 1917 and became general superintendent for a paving firm in Akron, Ohio. He later worked as an engineer in Los Angeles, becoming chief of party for the City of Los Angeles in 1924.

Collins went to work for the State Division of Highways in 1932. He became a senior highway engineer in 1955.

Collins is married and has a son and four grandchildren. He plans to teach in parochial schools after his retirement.

DISTRICT XI

Continued from page 40 . . .

mate terminus with the San Diego Freeway at 18th and F Streets.

The 7.8 miles of full freeway from Home Avenue to Campo Road has been in operation for approximately two years and represents a construction investment of $7,490,000.

State Sign Route 67, which forms the connecting link between State Sign Route 94 and US 80, fulfills the needs of the eastbound motorist desiring to reach the El Cajon Valley. This full freeway section between Campo Road, at the eastern limits of La Mesa, and the Grossmont Summit, was completed in 1957 at a cost of $1,625,000.

Planning studies are under way to develop 4.9 miles of State Sign Route 94 to full freeway standards from Campo Road at Spring Valley to the Sweetwater River Bridge just east of Jamacha Junction. Consideration is also being given to improving several rural segments which are in immediate need of attention because of substandard alignment, grade and sight-distance.

State Sign Route 78

Need for a route to connect the coastal US 101 to the inland US 395 near the center of District XI is met in State Sign Route 78. This artery, in addition to being a coast-to-inland connection between two areas of significant population, also serves the mountain resort areas of Ramona and Julian to ultimately connect to US 99 in the Imperial Valley just north of Kane Springs.

The existing section of Sign Route 78 between Oceanside and Vista is developed to four-lane expressway standards, while the planned freeway section between Vista and Escondido is presently in the design stage. A portion of the right-of-way along this route has been acquired, but no construction has been scheduled to date. The development of the expressway between Oceanside and Vista to freeway standard is also under consideration at the present time; however, construction is anticipated to be quite some time in the future.

US 395

Originating in the business district of the City of San Diego, US 395 extends inland almost due north of the city and serves traffic desiring to reach the eastern metropolitan areas of Los Angeles. While the most southern portion of the route traverses city streets, US 395 acquires freeway character at A Street at the southern tip of 1,400-acre Balboa Park, which is imbedded in the geographical heart of the City of San Diego. The Cabrillo Freeway sweeps with gentle curves through a central valley of the park, providing the motorist with one of the most scenic drives in California. The initial freeway effort in District XI, it still stands as a model of beauty and efficiency. Since the original development which terminated in Mission Valley, the freeway section has been lengthened until it now extends seven miles north to Clairemont Mesa Boulevard. The recently completed interchange at this boulevard was constructed at a cost of $546,314.

Planning is under way to convert US 395 to full freeway standards from Clairemont Mesa Boulevard through the City of Escondido, to the north district and county line. It is considered most fortunate that when the original right-of-way acquisition was made for the existing two-lane development, a major portion of the access rights were acquired at that time.

US 60-70

Traffic originating in the Los Angeles area wishing to go to Phoenix, Arizona, would probably enter District XI at Thousand Palms (Edom) about 12 miles northwest of Indio. From Thousand Palms to Indio, US 60-70 runs coincident with US 99. Branching at Indio, US 60-70—an interstate highway — extends easterly to Blythe on the Colorado River.

A long-standing deficiency on US 60-70-99, the portion from Thousand Palms to the Indio Overhead, a distance of nine miles, is expected to be remedied shortly. Two and a half million dollars has been budgeted to develop this segment of highway to freeway standards. Design plans call for full interchange treatment of Washington and Jefferson Streets along the route.

The segment of US 60-70 from Cactus City, approximately 14 miles east of Indio, extending easterly to Blythe, has a route adopted and declared a freeway by the California Highway Commission, while the segment between the Indio Overhead and Cactus City is in the planning stage, with public meetings anticipated in the near future.

At the Colorado River, the most easterly point of US 60-70, District XI has entered into a co-operative agreement with the Arizona Highway Department for the construction of a new bridge spanning the Colorado River. Plans are being prepared for the bridge and its approaches, for which California's share of $620,000 has been included in the 1958-59 Budget.

State Sign Route 111

Forming the principal north-south routes in the Imperial Valley between US 60-70 and US 80, on either side of the Salton Sea, US 99 and State Sign Route 111 serve one of the richest agricultural areas in the United States. Gradual improvement to freeway standards is contemplated for the future.

State Sign Route 115

Construction is under way at the present time to widen, grade and pave a section of State Route 115 from Sandia Turn to Alamorio. This contract was awarded to R. R. Hensler of Sun Valley, California, with a low bid of $992,000.

Another construction project completed during the 1958-59 Fiscal Year was the section between 0.4 mile north of the Orita Canal and the Standard Canal. Structural failure due to parallel irrigation facilities necessitated the reconstruction of the arterial at a cost of $537,000. Sign Route 115 originates in Calipatria at Sign Route 111 and projects southerly through Holtville on US 80 to terminate at Bonds Corner on Sign Route 98.

State Sign Route 98

Roughly parallel to and originating on US 80 near the Coyote Wells Underpass, State Sign Route 98 swings southeasterly to afford a direct line through Calexico at the international boundary and continues easterly to Midway where it rejoins US 80.

The most westerly section, from the Coyote Wells Underpass to Mount Signal, is sometimes referred to as the

. . . Continued on page 49

This section of Sign Route 18-30 is between Snow Valley and Big Bear Lake

DISTRICT VIII

Continued from page 16 . . .

conversion from four-lane divided expressway to full freeway. Plans for a 2.1-mile section including the Yucaipa Boulevard Interchange are complete and right-of-way is cleared. This project, estimated to cost $1.4 million, will be advertised for bids in the near future, with funds provided in the new budget by the California Highway Commission.

Between Yucaipa Boulevard and Beaumont, design work is under way which will convert the existing expressway to full freeway. Plans for 5.3 miles of full freeway construction between the junction with US 60 west of Beaumont and 22d Street in Banning are nearly complete and $5.8 million is provided in the new 1959-60 Budget for construction of this unit.

Full freeway construction of a 3.5-mile section through the City of Banning was completed in 1956, and this section is now being landscaped with city, state, and federal funds. Between Banning and the vicinity of Whitewater, existing initial stage construction will be converted to full freeway and design work is well advanced. From Whitewater to Thousand Palms, initial four-lane stage construction of 14.4 miles was completed in 1956, including an interchange at Indian Avenue, the county road between Palm Springs and Desert Hot Springs.

US 91

Progress on US 91 was described in an article in the September, 1957, issue of this magazine. Since that time, two public meetings have been held in Yermo for discussion of location of the last remaining link in this route, a 27-mile section between Barstow and Field, including the community of Yermo. The California Highway Commission held a public hearing on this question in Yermo on September 9, 1958, and has just adopted the route at its October meeting.

Construction of 8.6 miles between State Sign Route 30 in San Bernardino and Devore, at the mouth of Cajon Pass, is expected to be completed by the contractors, Matich, Sundt and Bevanda, this winter.

Construction of 29 miles between Victorville and Barstow, now under way by Fredericksen and Kasler, Contractors, is expected to be open to traffic before Christmas this year. If this aim is achieved, the contractors will have saved about five months over the scheduled time for construction.

Design work and plans are now nearly complete on units of US 91 freeway through the City of Barstow and between Baker and Valley Wells, both projects financed for construction by the new budget of the California Highway Commission. The Baker-Valley Wells project will convert the present Baker Grade to a freeway.

US 60

US 60 will join and cross the Riverside Freeway in a cloverleaf traffic interchange which will be a part of the Escondido Freeway previously described. West of this interchange, the US 60 freeway will lie on new location for approximately 4.5 miles through West Riverside. Plans for this project are well advanced and right-of-way is 60 percent purchased.

Initial four-lane stage freeway construction has been in use between West Riverside and Mira Loma since 1946. From this point westerly to the Los Angeles county line, studies are under way for the general route to be adopted.

For the portion east of the Box Springs Interchange, where US 60 leaves the Escondido Freeway (US 395), design work is now under way for initial four-lane stage construction to the vicinity of State Route 79. From State Sign Route 79 to four miles west of Beaumont, a 5.2-mile section of expressway was completed in 1956. The final link, a 4.8-mile section to the west edge of Beaumont has just been placed under contract with Silva and Hill Construction Company for construction as a four-lane expressway to cost about $1.1 million. East of the end of this project, US 60 is coincident with US 70 and US 99 to the district boundary.

US 395

From the southern boundary of Riverside County, US 395 follows the Escondido, Riverside, and San Bernardino Freeways to Cajon Pass. For the portion north of Cajon Pass, planning studies for general route selection are under way. Route adoptions have been culminated on two sections, one in the vicinity of Adelanto and one in the Kramer Hills. These two sections have been constructed to initial stage standards for a total of 9.2 miles.

Other Routes

Freeway planning is progressing on a number of state routes which are not designated as U. S. highways. These include State Sign Routes 18, 30, and 111, and Legislative Route 187 through Morongo Valley.

The general location for the State Sign Route 30 freeway has been adopted from Upland to San Bernardino. A public meeting was held on September 18, 1958, in La Verne to discuss possible locations in the area west of Upland. Initial stage construc-

. . . Continued on page 53

COST INDEX

Continued from page 24 . . .

ally encountered and highest prices are to be expected.

The average price for untreated rock base in the last three quarters was well below the price range previously prevailing. This quarter the price average rose to $2.18 from the previous low of $1.73 and now approximates the alltime average.

The average unit price for asphaltic and bituminous mixes dropped from $5.67 to $5.56 in this quarter. The change is in the range of normally expected fluctuations.

While the average unit price for portland cement concrete pavement is up $0.22 to $13.99 per cubic yard, the price for the quarter is still at a low level when compared to averages prevailing for the last two years.

The average unit price for class "A" portland cement concrete (structures) standing at $53.93 is down $0.51 from the second quarter. It is the lowest average determined since the first quarter of 1956. Expanded use of innovations introduced on structure projects in the immediate past are primarily responsible for reduced bid prices.

The average unit price of $0.126 for bar reinforcing steel is but a slight increase over the second quarter.

The average unit price for structural steel for this quarter amounting to $0.182 is an increase of $0.024 above the previous period. It is again in the range of several past quarters. The low price obtained in the second quarter was forced to that level by bids for the item on one extremely large freeway project.

Past behavior of the index coupled with recent bid prices indicate that a further leveling off will occur in the fourth quarter.

The California Highway Construction Cost Index, the Engineering News-Record Construction Cost Index, and the United States Bureau of Public Roads Composite Mile Index, all reduced to the base 1940 = 100, are shown on the graph on page 24. The latter two indexes are based on nationwide construction costs.

The Engineering News-Record Cost Index, which now stands at 316.6, again shows a rise over the preceding quarter. It is up 6.2 index points or 2 percent from the third quarter. This index is strongly affected by many large projects outside the highway construction field.

The Bureau of Public Roads Composite Mile Index for the second quarter of 1958 at the level of 235.3, which

NUMBER AND SIZE OF PROJECTS, TOTAL BID VALUES AND AVERAGE NUMBER OF BIDDERS

(July 1, 1958, to September 30, 1958)

Project Volume	Up to $50,000	$50,000 to $100,000	$100,000 to $250,000	$250,000 to $500,000	$500,000 to $1,000,000	Over $1,000,000	All Projects
Road Projects							
No. of projects	71	31	31	17	8	4	162
Total value*	$1,614,807	$2,154,898	$5,298,811	$5,741,223	$6,160,918	$5,250,666	$26,221,323
Avg. No. bidders	3.9	5.0	5.5	6.0	8.8	9.8	5.0
Structure Projects							
No. of projects	9	3	2	3	1	4	22
Total value*	$228,089	$238,138	$383,862	$967,980	$588,847	$9,756,508	$12,163,424
Avg. No. bidders	6.0	4.7	14.0	6.7	9.0	9.5	7.4
Combination Projects							
No. of projects					3	17	20
Total value*					$2,473,650	$50,620,130	$53,093,780
Avg. No. bidders					3.3	7.9	7.2
Summary							
No. of projects	80	34	33	20	12	25	204
Total value*	$1,842,896	$2,393,036	$5,682,673	$6,709,203	$9,223,415	$65,627,304	$91,478,527
Avg. No. bidders	4.1	4.9	6.1	6.1	7.3	8.5	5.5

* Bid items only.

Total Average Bidders by Months

	July	Aug.	Sept.	Avg. for three months
1958	5.4	5.5	5.6	5.5
1957	6.1	6.7	5.7	6.2

AVERAGE CONTRACT PRICES

	Roadway excavation, per cu. yd.	Untreated rock base, per ton	Plant mixed surfacing, per ton	Asphalt concrete pavement, per ton	Asphaltic and bituminous mixes, per ton	PCC pavement, per cu. yd.	PCC structures, per cu. yd.	Bar reinforcing steel, per lb.	Structural steel, per lb.
1940	$0.22	$1.54	$2.19	$2.97		$7.68	$18.33	$0.040	$0.083
1941	0.26	2.31	2.84	3.18		7.54	23.31	0.053	0.107
1942	0.35	2.81	4.02	4.16		9.62	29.48	0.073	0.103
1943	0.42	2.26	3.71	4.76		11.48	31.76	0.059	0.080
1944	0.50	2.45	4.10	4.50		10.46	31.99	0.054	0.132
1945	0.51	2.42	4.20	4.88		10.90	37.20	0.059	0.102
1946	0.41	2.45	4.00	4.68		9.48	37.38	0.060	0.099
1947	0.46	2.42	4.32	5.38		12.38	48.44	0.080	0.138
1948	0.55	2.43	4.30	5.38		13.04	49.86	0.092	0.126
1949	0.49	2.67	4.67	4.64		12.28	48.67	0.096	0.117
1950	0.40	2.25	4.26	3.75		11.11	43.45	0.079	0.094
1951	0.49	2.62	4.34	5.00		12.21	47.22	0.102	0.159
1952	0.56	2.99	5.00	4.38		13.42	48.08	0.098	0.150
1953	0.51	2.14[1]	5.31	4.58		12.74	50.59	0.093	0.133
1954	0.45	2.13	4.50	4.86		14.41	48.42	0.094	0.124
1955	0.39	2.22	4.93			13.35	45.72	0.095	0.142
1st Quarter 1956	0.40	2.08	5.40	6.50		14.05	52.51	0.105	0.166
2d Quarter 1956	0.51	2.06	6.27			14.64	57.13	0.113	0.219
3d Quarter 1956	0.52	2.27	6.12			15.57	56.32	0.121	0.178
4th Quarter 1956	0.52	2.21	[2]	[2]	$5.93[2]	14.95	59.63	0.112	0.197
1st Quarter 1957	0.63	2.10			5.94	17.28	61.14	0.129	0.235
2d Quarter 1957	0.63	2.10			6.18	15.59	58.61	0.119	0.204
3d Quarter 1957	0.42	2.34			5.10	14.34	58.68	0.130	0.200
4th Quarter 1957	0.68	1.78			5.45	16.88	59.76	0.129	0.177
1st Quarter 1958	0.52	1.85			5.45	14.96	55.21	0.118	0.192
2d Quarter 1958	0.48	1.73			5.67	13.77	54.44	0.126	0.158
3d Quarter 1958	0.39	2.18			5.56	13.99	53.93	0.126	0.182

[1] The item of crusher run base was used before 1953.
[2] Asphalt concrete pavement combined with plant mix surfacing in fourth quarter, 1956, and will be identified as asphaltic and bituminous mixes in the future.

is the latest available, was up 1.9 index points or 0.8 percent from the first quarter of 1958.

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
1948	216.6
1949	190.7
1950	181.2
(1st Quarter 1950—160.6)	
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

DISTRICT XI

Continued from page 46 . . .

"Yuha Cutoff." Improvements were completed in 1956 on this 22-mile section at a cost of $303,000. Constantly increasing traffic on this, as well as many other farm-to-market facilities in the Imperial Valley, are an indication of the rapidly expanding agricultural economy of this area.

The multitude of construction contracts executed since District XI's inception in 1933 only emphasize the adjacent deficiencies. As in most other portions of the State, the rapid expansion of population has taxed most existing facilities to or beyond the breaking point. Every effort is being made, with the full co-operation of the cities and counties within the area, to keep abreast, if not in front, of the most critical needs of this southern portion of the State. With the construction of the National System of Interstate and Defense Highways getting into high gear, District XI is prepared to solve its share of the future's transportation problems.

Auto Crash Kills A. H. Henderson

A. H. "Gus" Henderson, Deputy Director of Public Works and longtime state official, died in an automobile accident in Sacramento on October 1st. His death ended a career of more than 40 years of state service which began when he went to work as a messenger boy for the Department of Motor Vehicles on January 12, 1918.

Henderson served as Director of Motor Vehicles under Governor Earl Warren from 1948 to 1953. One of his primary concerns as director was to provide adequate quarters for the rapidly growing department. This culminated in construction of a huge office building in Sacramento.

Director of Public Works C. M. Gilliss said Henderson was invaluable to the department because of the variety of his long experience. He cited Henderson's skill in screening huge highway contracts and settling disputes and other problems.

Other state officials joined in paying tribute to the veteran state executive.

Henderson was born September 1, 1902, in Angels Camp, Calaveras County, and attended school in Sacramento and Eureka.

After working as a messenger for the Department of Motor Vehicles, Henderson transferred to the old Bureau of Printing as a driver and messenger in 1919. He became a clerk in the office of the State Architect one year later and remained on that staff until 1932, when he transferred to the Department of Public Works as Disbursing Officer.

From 1933 to 1938 he was chief clerk for the Fresno District of the Division of Highways. He was promoted to Assistant Director of Public Works in 1943 and Deputy Director in 1947.

During World War II Henderson was put in charge of the gasoline rationing program for state vehicles and was commended by Governor Warren for his handling of the task.

Henderson returned to the post as Deputy Director of Public Works in 1955. He was in charge of the relief program for county roads and city streets damaged by floods in 1955 and 1958. His handling of the program won him commendation from the Board of Directors of the County Supervisors Association of California.

Henderson is survived by his wife, Edris, and a half sister, Mrs. Nancy Rhoads.

W. J. Braker Retires; Had 31 Years Service

William J. Braker, engineer with the District III Office of the Division of Highways in Marysville, has retired after 31 years with the State. All of his service was with District III where he started his career in November, 1927.

Braker was born in Allentown, Pennsylvania, but moved to California while he was still a child. He served with the 91st Division in France during World War I as a sergeant in Company B, 316th Engineers.

At the end of the war, Braker returned to work as a chainman, rodman and instrumentman for a private engineering firm. He then tried the field of auto mechanics for approximately five years before he entered state service in District III.

He soon became an expert on concrete and asphaltic paving and was associated with most of the large projects in District III during his period of service. At the time of his retirement he was district representative on the project to build the structures for the South Sacramento Freeway.

Braker plans to retire to his home in Suisun where he will spend much of his time indulging in his favorite sport of fishing for salmon and bass in San Francisco Bay and in the ocean near there.

DESIGN OF INTERCHANGE

Continued from page 20 . . .

in 1960, will connect temporarily into Boyle Avenue where Boyle Avenue leaves the model on the westerly edge.

2. The Santa Ana Freeway (inbound end) leaves the model at about the middle of the westerly edge just north of the Sixth Street Viaduct (Whittier Boulevard). This freeway is existing with no changes in alignment contemplated.

3. The Santa Ana Freeway (outbound end) leaves the model at the extreme easterly end. This also is the present alignment of this freeway. The existing Santa Ana Freeway roadways may be traced through the interchange by referring to two continuous roadways separated by a narrow dividing strip of uniform width.

4. The Santa Monica Freeway leaves at the southwest corner on the Los Angeles River Bridge and Overhead. This bridge, which is presently under construction and expected to be completed in 1959, represents the first construction on the 22-mile-long Santa Monica Freeway. The most northerly and southerly of this complex of roadways over the Los Angeles River and adjacent railroad tracks serve the Santa Fe Avenue on- and off-ramps immediately to the west of the model.

The future Pomona Freeway leaves at the northeasterly corner of the east end of the model. This freeway is still in the planning stage, and the route for this portion of it has not yet been adopted by the California Highway Commission.

Some identifiable north-south traffic arteries include Boyle Avenue, Soto Street and Euclid Avenue; east-west streets are Fourth Street, Whittier Boulevard, Seventh Street and Eighth Street. Some landmarks are Hollenbeck Park and Lake, east of the Golden State Freeway and south of Fourth Street; the *Times-Mirror* Press Telephone Directory Plant on Boyle Avenue in the triangle formed by freeway roadways; the Soto Street Elementary School on Soto Street near Seventh Street; the Los Angeles River channel at the southwest corner; and the Atchison, Topeka & Santa Fe Railroad tracks on the west side of the river and the Union Pacific tracks on the east side.

This closeup of the freeway model gives some idea of how the future East Los Angeles interchange will appear looking west along the Santa Ana Freeway

Probable Traffic Load

All the main interconnecting roadways have been designed for a safe speed of 50 m.p.h. or greater. In addition to providing smooth alignment, it is believed that sufficient lanes have been provided for smooth operation. Each of the following streets is crossed by 23 lanes of traffic: Soto Street, Boyle Avenue and Marietta Street. There are 14 lanes carried on the Los Angeles River Bridge and 18 lanes crossing Euclid Avenue. If you take a section of the model at just the right angle in the vicinity of Fickett Street, east of Soto Street, you would cut through 27 12-foot-wide traffic lanes. Traffic counts projected into the year 1980 indicate that 400,000 vehicles a day will be using this interchange. By comparison the four-level interchange is now being used by 350,000 vehicles daily.

To aid the motorist in his selection of a route, numerous overhead illuminated signs are to be installed. But in view of the necessary complexity of the interchange, the motorist on approaching roadways should have a clear idea in advance of what routes he should follow to reach his destination.

CAMP IRWIN, CALIFORNIA

Editor,
California Highways and
Public Works

SIR: I would like to be put on your mailing list for *California Highways and Public Works* magazine. As post aviation officer I am responsible for keeping our navigation maps up to date and briefing pilots before flights. The new freeways and construction sites make excellent check points for visual navigation.

KENT JONES
1st Lieutenant, U. S. Army

WHY FREEWAYS?

Continued from page 18 . . .

appeal to all of us. Build a conventional highway, and five years from now you will seek a new right-of-way, because of this commercial ribbon development and the resulting congestion. You will take more property from the tax rolls, destroy more homes and factories–but the freeway, once located and built, will carry its designed volume of traffic until you wear it out. Another advantage important to you as a county official–the community and the area may plan for an orderly expansion, secure in the knowledge that the transportation facility is, once and for all, permanently located.

I have one other matter to discuss. In *Look Magazine*, December 10, 1957, there was a shocking story titled, "Highway Robbery in Indiana." *Life Magazine*, August 6, 1957, reported several states in which high-placed officials were in trouble because of misuse or misappropriation of state highway funds. In California, with the largest highway program in the Country, there has never been any such scandal.

For this pre-eminence of our highway program and organization, credit goes to the Governor, the Legislature, groups such as yours, and to the people themselves. We have a Governor who religiously refuses to intrude politics into the important highway program.

We have legislators who established and are maintaining safeguards in the law–who delegated the budgeting of highway projects and the locating of freeway routes to the California Highway Commission to keep these functions as free as possible from politics–who enacted a State Contract Act requiring the award of contracts to the lowest responsible bidders. There is no room here for manipulation or monkey business. The citizens themselves established long ago in our State Constitution a provision that highway funds should not be diverted to other purposes. These things could not have been accomplished without the interest in good government constantly demonstrated by your own powerful association over the years.

I want to appeal to you today to continue your critical interest. In California we have a good organization and a good program, because you, and the citizens you represent, were interested at its inception. But, if we do not have your continuing interest and support, there will be no one to write the laws to set up the safeguards for the forward-looking highway programs of tomorrow, no one to support the Legislature in its desire to keep politics out of the highway program.

When the citizen's home or business is affected by a freeway location, he becomes, as you and I would, quite vocal. Naturally, these few who are disturbed for the benefit of the many, are the loudest voices heard by your legislators. And, so there are proposals which grow in strength at each legislative session; proposals to reorganize the department and the commission; to take back to the Legislature the freeway route locations and the highway project budgeting. The legislators don't want to do it, but they are pledged to represent their constituents, and when the only constituents they hear are asking them to make changes, they will introduce and pass laws to make these changes. That is, unless you as officials and responsible citizens, satisfy yourselves first that the highway program and organization is good. Then tell your legislators you think it is good. Tell them that it is important to the future of highways in California to continue to keep politics out of the highway program. You have demonstrated before how effective your voice can be. The transportation lifelines of this State for 1980 with 31 million in population depend on a revitalization of our partnership which built today's highway plant in California and developed today's program.

Three hundred years ago, a distinguished Englishman of learning, Lord Bacon, said, "There are three things which make the nation great and prosperous: busy workshops, fertile fields, and easy convenience of man and goods from place to place." California has those busy workshops. It has the fertile fields, and with the active support, endorsement, and co-operation that will come from our partnership, we will continue to provide for California easy convenience for man and goods from place to place.

John Stanford Named Assistant Director

John Stanford, Management Analyst for the Department of Public Works for 2½ years, became assistant director of the department November 10th.

He was selected to succeed to the civil service post which T. F. Bagshaw vacated on being named director. (See page 9.)

JOHN STANFORD

Stanford has been in management and administrative positions with the State of California since 1946. He went to the Department of Public Works from the Department of Finance, where he was a management analyst. Before that he was administrative service officer in the State Department of Insurance in San Francisco.

His professional affiliations include the American Records Management Association, American Society for Public Administration, and Society for the Advancement of Management. He is president of the Sacramento chapter of the first and a past president of the Sacramento chapter of the second.

A graduate of the University of California, Stanford received a master's degree in public administration at Syracuse University. He was a captain in the Army Air Corps during World War II.

Stanford is married and has three children. His home is at 5417 Spilman Avenue, Sacramento.

California Wins Eighth ITE Award

California has received the national Institute of Traffic Engineers annual award and certificate in recognition of a "high level of performance in traffic engineering" by the State Division of Highways during 1957.

The certificate was presented by Joseph E. Havenner, President of the I. T. E., at a meeting of the Engineering Division of the Governor's Traffic Safety Conference in Sacramento. State Director of Public Works C. M. Gilliss accepted the award in behalf of Governor Goodwin J. Knight and in turn presented it to George M. Webb, Division of Highways Traffic Engineer, who accepted it in behalf of State Highway Engineer G. T. McCoy.

The award was made to California "for maintaining a high level of performance in traffic engineering as reported to the annual inventory of traffic safety activities."

It was the eighth time since 1948 that the division has been singled out for honors with an I. T. E. award.

U. S. Forest Service Projects Approved

The U. S. Bureau of Public Roads and U. S. Forest Service have approved a 1959-60 forest highway program providing $4,705,000 for construction of six projects in Northern and Central California, State Highway Engineer G. T. McCoy reported.

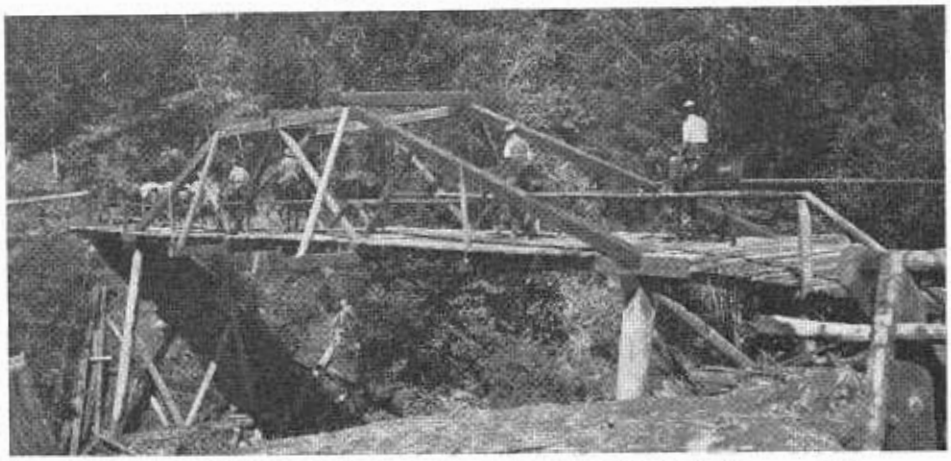
Largest of the projects is a 2.3-mile section of four-lane divided highway on US 50 in El Dorado County, which will connect with a four-lane section recently completed on that route about 17 miles east of Placerville.

Projects on which forest highway funds are expended are programed on the basis of recommendations jointly arrived at by the Bureau of Public Roads, the Forest Service and the State Division of Highways, McCoy explained.

The State provides any necessary rights-of-way and assumes responsibility for maintenance of completed forest highway projects on state highways, and the county does likewise in the case of county roads.

In addition to the six construction projects, the California Forest Highway program for 1959-60 provides $100,000 for minor work on some routes and $100,000 for surveys, making a total of $4,905,000 allocated for the year.

Retired Army Engineer's Letter, Photo Recall North State Bridge Survey of Half Century Ago



The survey party crosses Clear Creek Bridge on the Klamath River Trail. The year: 1909.

Editor,
California Highways and
Public Works

SIR: While checking over some old photograph albums several pictures were noted which it is believed might be of some interest to you, and, perhaps, can give our bridge engineers something to ponder over in their line of work, so, I had some prints made.

The enclosed photographs were taken during the summer of 1909, while I was detailed to compile that portion of the Progressive Military Map of the United States pertaining to Del Norte, Siskiyou, and the northern part of Humboldt Counties. You will note that we had our packtrain with us; the mode in use at that time for carrying supplies along the Klamath River.

It is thought the pictures might be of some use in your historical file.

Sincerely yours,

GEORGE RUHLEN
Colonel, U. S. Army, Ret.

MILWAUKEE, WISCONSIN

To Whom It May Concern:

We have just returned from a two-week vacation which included California. Both of us enjoyed your State very much.

We entered California at the Topaz Station and from there started to climb over the mountains to Yosemite National Park. Going up the east side of the mountain, we had car trouble.

It was early in the morning and no traffic. One of your trucks from the Department of Roads stopped to help us. There wasn't much they could do, but following them was one of your mechanics. They stopped him, and he succeeded in helping us. What de did on our car I could never attempt to do.

After he fixed it I offered him money, but he said: "I have to get on to my job."

I am writing this note to thank you and your department for such wonderful courtesy. I would like to thank him again but I have no way of finding him. I think his name was Jim. All I know is he was working on the east side of the mountains before you enter the park, where they were fixing the road.

Sincerely,

DALE HULSE

(*Editor's Note:* According to J. M. Harris, Equipment Superintendent at Shop 9, Bishop, the Division of Highways employee who assisted Mr. and Mrs. Hulse was James H. Webb, Jr., heavy equipment mechanic.)

DISTRICT VIII

Continued from page 47 . . .

tion on this freeway has been completed as follows:

3.2 miles between Rialto and San Bernardino
15.0 miles between Highland and Running Springs

In addition, five miles are now under construction in mountain terrain east of Barton Flats, as previously mentioned.

Initial construction has been completed on several miles of State Sign Route 18 freeway in the San Bernardino Mountains. For most of the way from the mountains to Long Beach, State Sign Route 18 lies along the San Bernardino and Riverside Freeways.

The freeway location for Legislative Route 187 between US 99 and Morongo Valley was adopted in June, 1958, and design work for this project is now in progress. South of US 99, initial expressway construction on 4.1 miles of the route northwest of Palm Springs (State Sign Route 111) was completed in 1948. Planning studies for general location through the Palm Springs area are under way.

State Publishes New Statistical Abstract

The first issue of the California Statistical Abstract, just published by the State of California, is designed to bring together in one publication principal facts about California and to indicate sources of additional information.

The abstract is patterned after the Statistical Abstract of the United States and covers nearly the same subjects. It has been compiled by the State Interdepartmental Research Coordinating Committee and is sponsored by the Senate Factfinding Committee on Commerce and Economic Development.

Orders for the publication may be sent to: Documents Section, Printing Division, Sacramento, California.

The price is $3.50, postage prepaid within the United States, with 14-cent sales tax added for California addresses.

Retirements of 25 Highway Employees Marked

The Division of Highways has announced that the following employees retired during September and October.

Headquarters

Emil J. Saldine, Principal Highway Engineer, 32 years.

District I

McKinley H. Hudson, Assistant Highway Maintenance Foreman, 34 years; Ferruccio M. Gianoli, Highway Equipment Operator-laborer, 22 years.

District II

Walter H. Yeager, Highway Equipment Operator-Laborer, 24 years.

District III

Alfred J. Bellue, Highway Tree Maintenance Foreman, 25 years; William J. Braker, Assistant Highway Engineer, 30 years; Lauriston H. Frink, Highway Foreman, 29 years.

District IV

Lauriston H. Frink, Highway Foreman, 29 years; Isadore Goldberg, Highway Field Office Assistant, 21 years; James E. Kinyon, Highway Foreman, 33 years; John McGlinchey, Highway Equipment Operator-Laborer, 36 years; Joseph C. Quast, Highway Field Office Assistant, 22 years; Louis A. Stein, Drawbridge Operator, 26 years.

District V

Nathan J. Folks, Highway Equipment Operator-Laborer, 17 years.

District VI

John H. Williams, Highway Foreman, 36 years.

District VII

Ray A. Collins, Senior Highway Engineer, 26 years; Clarence M. Ellinger, Highway Leadingman, 24 years; Herman V. Greenwald, Skilled Laborer, 27 years; Harold H. Hultgren, Senior Delineator, 18 years; Joseph T. Ralston, Highway Equipment Operator-Laborer, 24 years; Alan R. Shira, Highway Foreman, 28 years.

District VIII

Emmett N. Berger, Highway Equipment Operator-Laborer, 21 years; Harry S. Bridgeman, Assistant Highway Engineer, 30 years.

District X

R. R. Westphal, Highway Field Office Assistant, 22 years.

District XI

Frank G. Coppess, Highway Leadingman, 25 years; James N. Parker, Highway Equipment Operator-Laborer, 25 years; Wayne H. Porter, Laborer, 12 years; Herman J. Price, Highway Equipment Operator-Laborer, 17 years.

Vanderlip Promoted By State Chamber

Loran C. Vanderlip, California State Chamber of Commerce official since 1945, has been promoted to a new post, State Legislative Representative of the State Chamber.

He has been Director of the Highway Department of the State Chamber since 1950, and since 1954 has also done part-time legislative work for the chamber. The legislative assignment will now be full time.

Vanderlip was an organizer and first secretary of the Fresno County Junior Chamber of Commerce while he was a student at Fresno State College. He was manager of the Coalinga Chamber of Commerce from 1934 to 1937, and fiscal analyst for the California Taxpayers Association from 1937 to 1945.

Appointed to be new Director of the State Chamber's Highway Department was Chester C. Williams, who has been administrative assistant in the Chamber's Southern California district since March, 1957.

Williams attended Brown Military Institute, Chouinard Art Institute and Valley Junior College. He served in the U. S. Air Force from 1952 to 1956, much of the time in public relations duties.

In 1957, 7,500 pedestrians were killed by autos in the United States.

Continued from page 8 . . .

imminent development. The passage of this law encouraged planning of freeways, the construction of which was some years in the future, with the assurance that funds would be available for the protection of right-of-way against major improvements. It is estimated that, up to the present, well over $150 million in right-of-way costs have been saved by the use of this fund. The fund is operated on a revolving basis whereby, as individual parcels so purchased are actually used for construction, the fund is reimbursed from current allotments and the money is used again for the same purpose.

Economic Studies

Soon after freeways began operating in California, it became apparent that economic studies were desirable for the purpose of factually determining the effect of freeway construction on communities, particularly those bypassed, and on the individual property owners. This information is important for the purpose of dispelling by factual studies the concern that communities may have in regard to the effect of freeway construction on their economy. This information is also important as a means to improve appraisal and negotiation techniques by providing a sound basis on which a determination can be made of a just compensation for the affected property owner.

Recognizing this, a Land Economics Study Section has been established within the Right-of-Way Department. The research and reports made by this section on actual cases of freeway construction through and around municipalities have conclusively proved that there is no foundation to the fear that freeways are detrimental to the community or to the value of adjoining properties. Copies of the reports on this subject are made available to anyone who is interested.

Construction Supervised

No one can question the importance of all of the engineering work leading to the start of freeway construction. However, most of this effort will have gone for nothing if the final highway product toward which all engineering work is directed is not properly constructed. The proper end product can only be assured by rigid but practical control of construction. All highway construction in California is done by contractors on a competitive bid basis. All bidders are prequalified on a financial and experience basis, and completion bonds are required. This procedure and method has produced a strong and able group of contractors that can readily handle the entire highway building program efficiently and expeditiously.

Construction is controlled by the engineers of the department. Construction control may be defined as the inspection and testing necessary to assure compliance with quality specifications, together with workmanship consistent with acceptable standards of practice. This control must be adequate to define the intent of plans and specifications and to clarify misunderstandings. Construction control may be divided into two main classifications: (1) fiscal; and (2) inspection and testing.

Fiscal control must assure that federal, state, and local regulations are complied with; orderly progress and final pay estimates issued promptly; careful and complete records maintained in order to reduce misunderstandings; and that contract modifications due to unanticipated conditions are properly processed.

The inspection and testing phase of construction control involves the greater part of the manpower assigned to construction contracts. Continual visual inspection and testing are required on almost all activities from heavy grading operations through the construction of bridges, drainage structures, pavements, and the final phases of completion. This inspection is maintained on a continuing basis, so that a contractor has reasonable assurance that a product, once placed to the satisfaction of an inspector, will be acceptable. This is contrary to the "post-construction audit" type of specification which checks into the quality of the work after construction, and under which procedure entire portions of work may be removed in order to replace one small section which may prove to be substandard.

The department operates a large research and materials testing laboratory at Sacramento, the state headquarters, and district laboratories are in operation in each of the several district headquarters. All construction materials are pretested, and sufficient check-testing is done to measure the acceptability of all materials going into the work. Research programs are under way continually, looking toward better methods and a better final product. An example of the results of construction control, materials testing, and research, is seen in the Pacific portland cement concrete pavements always referred to in California as concrete. We have only recently experimented with and accepted the construction of concrete pavement in 24-foot widths. The riding qualities have been improved, rate of construction accelerated, and the cost reduced.

Operation Is Co-operative

The operation of freeways in California is a joint responsibility, the Division of Highways being responsible for all signing and traffic control devices, while the policing and actual traffic control insofar as such control is necessary is the job of the California Highway Patrol. The patrol is a separate agency, established for the specific purpose of patrolling the highways, controlling traffic, and enforcing traffic laws.

Due to the relatively high speed of traffic on the freeways, proper signing has taken on added importance. In order to be effective, it is essential that signing be uniform. Signs must be sufficiently large and clear to be easily read and understood by traffic traveling at the prevailing speed on the freeway; the message must be simple, the number of destinations on any one sign being limited to two, if practicable, and not more than three in any event; and signs applicable at all hours are illuminated or reflectorized. Large overhead signs are essential to convey directional messages to motorists on six- and eight-lane freeways in metropolitan areas, primarily due to the fact that vehicles in adjoining lanes interfere with the visibility of ground signs. In many cases these overhead signs require special structures for support, not only for the size but also for per-

sonnel maintaining the signs. The cost of signing, including the supporting structures in the cases of overhead signs, varies considerably; however, an average figure for a metropolitan freeway in California is $40 thousand per mile.

As an aid in efficiently carrying out the task of signing highways, a traffic manual has been prepared, setting forth standards and guides to be used in this and other traffic matters. Like other manuals prepared by the department, its contents are under constant review, with revisions being made as research and experience dictate.

Still Much to Do

I have taken you through the evolution of our freeway program to the present time; but, of course, we are not satisfied. We cannot be, because we have not caught up with the needs as they accumulated during the depression and war, nor the rising costs and skyrocketing traffic demands during the postwar period. We cannot be, because it has been California's experience to double in population every 20 years, and we expect this to happen in the next 20. The result will be two and one-half times as many vehicles in 1980 (17 million) and three times as many vehicle-miles on our highway plant (200 billion).

We could not hope to cope with the future demand without taking the next logical step in the orderly planning and development of our freeway program. This involves the selection of an entire, integrated system of freeways on a statewide basis. In response to a request of the State Legislature, the California Division of Highways recently published a report, *The California Freeway System*, which provides the basis for an the actual selection of such a statewide system. The proposed system blankets the State and consists of more than 12,000 miles, to be developed ultimately to freeway standards. It will cost, at today's prices, more than $10 billion. But, with only 11 percent of the miles in the total road plant, it will in 1980 accommodate 59 percent of all motor vehicle travel in the State. The freeway system will:

1. Connect major centers of population.
2. Connect primary centers of industrial activity and of natural resources with centers of supply of labor and material and with major shipping points.
3. Provide access to important military installations and defense activities.
4. Provide access to major recreational areas.
5. Connect seats of county government.
6. Provide for continuity of travel into, through, and around urban areas from rural freeway approaches.
7. Provide for large traffic movements between population and industry within urban areas.
8. Provide for needed capacity in the traffic corridors.
9. Connect with major highways of adjacent states.
10. Provide an integrated system, with a minimum of stubs and spurs, to permit general traffic circulation.

We believe this system to be technically, financially, and economically feasible. From the standpoint of the highway users, its benefits will more than twice exceed its costs. The report says, regarding the need for such a freeway system in California:

"There is need now, and more is coming rapidly, for a highway system that has the primary purpose of linking the major areas of traffic interest with high-standard facilities that provide for fast, consistently safe, protected through-traffic movement. No longer is it possible to serve such traffic on the same facilities that provide land service to abutting property. Such conflicts of interest produce the slowdowns, the highway accidents and fatalities, and the traffic congestion that blight expansion.

"Practically all of the traffic increase in the future must be carried on single-purpose, through-traffic facilities—relieving the present roads and streets of their existing overloads to permit them to resume their primary function of serving the land and the people directly, acting as distributors for the freeway system and providing the final links between origins and destinations."

Architecture Bids Reach Record High

During September a new high was reached by the State Division of Architecture for total value of projects advertised for bids in a single month. The September total was $22,955,000. The previous high was in June, 1958, with a total of $22,260,000.

The division also awarded 21 contracts totaling $4,453,637 and completed 33 contracts totaling $9,075,868 during September. During the same month a total of 114 public school construction plans totaling $23,555,082 was submitted to the division for approval.

The State Division of Highways reported in September that it had awarded 58 interstate highway projects totaling $201,587,000 since July 1, 1956, when the Federal Aid Highway Act of 1956 became effective. The highway division also reported that two more interstate projects totaling $7,621,000 had been advertised for bids.

During September 68 highway contracts amounting to $31,098,000 were awarded and 58 contracts totaling $27,143,000 were completed. On September 30th, the division had 328 highway contracts under way with a total value of $423,676,000.

By the end of September, 64 bridge projects were under way or pending award with a total value of $73,000,000. Plans were also completed during September for another 16 bridge projects totaling $10,500,000.

TECHNICAL COLLEGE
COVENTRY, ENGLAND

Editor,
California Highways and
Public Works

SIR: Many thanks for continued receipt of your journal which I find most helpful in my lectures on highway engineering. I enclose a copy of our local paper which gives some account of progress on a new motorway between London and the Midlands. Wishing you continued success.

Yours faithfully,

W. F. HALL

Merit Award Board Winners Announced

Employees of the Department of Public Works receiving certificates of commendation and cash awards since the last list was published in the September-October issue of this magazine are:

Mrs. Mildred G. Leight, Architecture, Sacramento, certificate of award and $125 for proposing that the practice of returning bid bonds to nonsuccessful bidders on state jobs be eliminated.

Walter S. Ferguson, Highways, Yuba City, certificate of award and $25 for proposing that Standard Plan A-62 show the pay limits of structure excavation and backfill for pipe flared end sections.

Fred V. Rayburn, Highways, Fresno, certificate of award and $100 for proposing that pilot lights be placed on traffic signal controllers to provide a means of rapid checking the condition and operation of detectors and controllers.

Eugene F. Daggett, Highways, San Francisco, certificate of award and $25 for recommmending a modification of contract special provisions deleting the progress schedule requirement on short-term contracts.

Miss Doris A. Welch, Highways, Eureka, certificate of commendation for a suggestion which resulted in a simplification of accounting procedures.

Mrs. Aurelia B. Rinderneck, Highways, San Diego, certificate of commendation for a suggestion regarding Department of Social Welfare forms.

Mrs. Alida R. Hiltibrand, Architecture, Los Angeles, for recommending a checkout system for paper used in a duplicating machine.

James D. Russey, Highways, Santa Rosa, for recommending that future specifications for automobile heaters provide a three-speed blower.

Willis H. Bartlett, Highways, Redding, for suggesting that shipping tags bearing the district office address be used for shipping construction samples to district laboratories for testing.

BUDAPEST VII, HUNGARY

Editor,
California Highways and
Public Works

SIR: I have always been interested in highways and traffic and had my first opportunity to see an example of your beautiful monthly. I was astonished at the imposing and grandiose system of modern highways all over your Country. Each of them is a proud symbol of American genius.

The magazine is magnificent.

Very truly yours,

RONCZIK SANDOR

NOTE: The magazine is not a monthly, but is published every other month.—*The Editor.*

FREEWAY MODEL

Continued from page 23 . . .

to spend all our time making autos, trucks and busses, we had to devise a production method. We tried rubber latex molds and water putty castings with moderate success. Our final solution was to make hard plastic molds from a series of hand carved cars, coat the cavities with a mold release and pour in a liquid varicolored plastic. When the liquid set up, the cars were removed and rough spots finished. With this system, we could produce about 50 cars an hour. Only a few basic shapes were necessary—a sedan, sports car, jeep, station wagon, pickup truck and a large truck. We obtained variety by using different colored plastics and could even get two-tone effects. The cars were not scattered helter-skelter about but were grouped and placed throughout the model to set off or balance aesthetically with the landscaping and house colors. We discovered that grouping too many of the bright colors distracted attention from the primary interest—the freeways.

The model is a display unit complete with special legs, protective screen and shipping crate. It was constructed for ease of assembly and disassembly in sections with positive holding devices. The division between sections was carefully picked to miss cutting through any bridges. When crated it weighs about 700 pounds. During shipment to Los Angeles it was insured for $20,000, which prompted the van line company to send a representative from San Francisco to Sacramento to observe the packing procedure. A series of photographs showing each step in the disassembly and crating procedure accompanied the model.

After spending about 3,000 manhours during the 14 months we worked on this project, all four of us in the Bridge Architectural Design Section—Louis Baker, Jack Alexander, Fred Gordon, and Warren Ludlow—can assure you that modelmaking of this scope is far beyond the hobby stage. It encompasses much of bridge and highway engineering, landscaping, architecture and skilled craftsmanship. Almost every phase of Division of Highways activity had some influence on the model while it was building. We gratefully acknowledge our appreciation for the co-operation given us by District VII, all the headquarters offices and our own Sacramento and Los Angeles Bridge Department units.

Even though the model is unique, it only portrays the shape of things to come. The completed interchange which many of you will use will be even more spectacular. And this is only one of the devices used by the Division of Highways to plan safer, more efficient and more beautiful freeways and bridges.

Redding Engineer Leaphart Retires

Frank E. Leaphart, Office Engineer of District II, Division of Highways, Redding, retired on October 31st, ending an engineering career which began in 1923 after his graduation from the University of Missouri.

F. E. LEAPHART

Leaphart was born in Brookfield, Missouri, on October 4, 1888. He went from college to the Missouri State Highway Commission as a project highway engineer, serving in that capacity until March, 1943, when he resigned and moved to Alaska to accept a short-term appointment with the Public Roads Administration as resident engineer on the Alaska Military Highway.

His employment with District II began in December, 1943, when he was assigned to the district construction office. He was appointed district office engineer in 1949 and served in that position until his retirement.

Leaphart and his wife, Adele, expect to find a retirement home on the Oregon coast.

Veteran Architecture Engineer Retires

Carl A. Henderlong, Principal Mechanical and Electrical Engineer in the Division of Architecture, retired from state service on December 10th following more than 44 years of service with the Architecture Division.


CARL A. HENDERLONG

Henderlong had been with the Division of Architecture longer than any other present or former employee.

State Architect Anson Boyd said that Henderlong has "an exceptional understanding of the broad engineering aspects of the mechanical, electrical, civil, sanitary, and hydraulic engineering fields" and is recognized as a leader in these fields by his colleagues, other state agencies, and private industrial engineering firms.

"He has shown special ability and sound judgment in engineering design in order to meet financial limitations," Boyd said. "The division sincerely regrets his leaving. It will be a great loss to the state service."

Born in Alameda on October 1, 1896, Henderlong came to Sacramento in 1905. His father, Charles A. Henderlong, was well known as a building contractor. Henderlong's schooling was obtained in Alameda, San Francisco, and Sacramento. His formal education was supplemented with correspondence courses for specialized training.

In point of service, Henderlong is the division's oldest employee. He started with the Division of Architecture as a mechanical draftsman in 1914. At that time, when he was 18 years of age, there were 25 employees working in the division. Today 190 employees are supervised by Henderlong and the division has grown to a statewide organization of over 1,000 employees.

In 1914 an annual construction program of a million dollars was considered very large and an individual project of $30,000 was considered a major project. Today a major project is one costing $2,000,000 or more while the State's annual construction program runs between $80,000,000 and $130,000,000.

Henderlong is a licensed mechanical and electrical engineer and is a member of the Illuminating Engineering Society. He is a member of the Sacramento Consistory of the Scottish Rite and belongs to the Ben Ali Temple of the Shrine. He is also a member of the Elks Club.

Henderlong resides with his wife, Dorothy, at 1000 Entrada Road, Arden Acres. After retirement he expects to pursue his hobbies of golf, fishing, and woodworking, together with performing some private engineering consultation.

The Henderlongs plan to do considerable traveling. They have recently completed tours to South America, the Orient, and Central America, and next year they plan to tour Europe.

Jaywalking was costly in the United States last year—2,600 were killed.

TWENTY-FIVE-YEAR AWARDS

Employees who received twenty-five-year awards since those listed in the September-October, 1958, issue of *California Highways and Public Works*

District I
Anderson, James H.
Geoghegan, Hugh B.
Houx, Elvin

District II
Self, Harris B.

District III
Hillebrand, Francis D.
McKenzie, Mildred M.
Vierra, Daniel M.
White, Guy E.

District IV
Elton, Arthur M.
Hoen, Robert T.
Murray, Leo E.
Murray, Thomas J.
Prielipp, Ernest P.
Scoggins, Lee M.

District V
Hixson, Claude H.

District VI
Gilevich, Michael J.
Jackson, George F.
Stanley, Lyle

District VII
Allen, Harry J.
Carney, Edmund M.
Crooks, Walter E.
Mathieu, August E.
Owens, Edward Douglas
Pettis, Kenneth Bradford

District IX
Houghton, F. Edward
Kispert, Charles T.

District X
Graziani, William B.
Johnson, William A.
Stebbens, Wm. G.

District XI
Coppess, Frank G.
Pine, Arthur
Settle, Edwin R.
Tadlock, Robert M.

Headquarters Office
Carmany, Robert M.
Ritter, John

Bridge Department
Brown, John J.
Neff, John K.
Spicklemire, Nelson E.

Bay Bridge
Gewertz, M. W.

Materials and Research
Humbert, J. E.

Shop 4
Clisbee, Allan

1959-60 State Highway Budget Projects by Counties

County	Route†	Description	Approximate mileage	Estimated cost
Alameda	5, 69 (US 40-50, SR 17)	San Francisco-Oakland Bay Bridge to the East Bay Distribution Structure in Oakland; landscape	1.8	$130,000
Alameda	5 (US 50)	San Pablo Underpass in Oakland and Emeryville; resurface and drainage facilities		25,000
Alameda	5 (US 50)	Greenville to Mountain House Rd.; resurface	6.9	200,000
Alameda	5 (US 50)	East Bay Distribution Structure to Grand Ave. in Oakland (portions); grade, pave and structures for first unit of 8-lane MacArthur Freeway (Financed $10,000,000 in the 1959-60 fiscal year)	2.8	15,000,000
Alameda	5, 69 (US 40, US 50)	West and north of the East Bay Distribution Structure; resurface		72,000
Alameda	69 (SR 17)	Nimitz Freeway—At Farnsworth St.-Halcyon Dr. near San Leandro; overcrossing (Co-operative project; City of San Leandro's share, $100,000 to cover approaches)		*160,000
Alameda, Contra Costa	69, 7 (US 40)	Eastshore Freeway—0.3 mile south of El Cerrito Overhead to 0.2 mile south of Jefferson Ave. in Richmond; grade, pave and structures for 6-lane freeway, which with other current and budgeted projects will complete 75 miles of full freeway from Los Gatos to Vallejo. (Financed $1,300,000 in the 1959-60 fiscal year in addition to $4,300,000 in the 1958:59 fiscal year. Project now under construction)	2.3	5,600,000
Alameda	69 (SR 17)	Nimitz Freeway—0.6 mile south of Tennyson Rd. to 0.3 mile north of Jackson St. in Hayward; planting	1.8	80,000
Alameda	69 (SR 17)	Nimitz Freeway—State Highway Route 228 at Washington Ave. to High St. in Oakland; barrier rail in the dividing strip	6.8	306,000
Alameda, Contra Costa	75 (SR 24)	Broadway Low Level Tunnel; paint interior		55,000
Alameda	226	Webster St. Tube; construct 2-lane tube parallel to the present tube between Oakland and Alameda. (Financed $7,000,000 in the 1959-60 fiscal year)	0.8	18,000,000
Alameda	227	Warren Blvd.—Park Blvd. to south of Lincoln Ave.; landscape	1.4	25,000
Alameda	227	Warren Blvd.—Lincoln Ave. to 0.5 mile south of Carson St.; grade, pave and structures for 4-lane freeway (carried over from the 1958-59 budget). (Co-operative project—Oakland and Alameda County providing $150,000 per year each on Warren Blvd. freeway development)	1.6	*1,273,000
Alameda	228, 5 (US 50, and Nimitz-US 50 freeway connection)	From Sign Route 17 (Nimitz Freeway) to Center St.; landscape	3.8	110,000
Alameda	Various	Rights of way on State Highway Routes (including $13,000,000 for U.S. 50 freeway in and south of Oakland)		15,500,000
Alpine, El Dorado	23 (SR 89)	Picketts to Grass Lake (Luther Pass); grade, pave and structures (relocation). (Connects with Federal Government project now under construction to complete relocation over Luther Pass)	3.9	655,000
Alpine	Various	Rights of way on State Highway Routes		10,000
Amador, Alpine	34 (SR 88)	Summit of Carson Spur to 0.2 mile east of Amador-Alpine county line; grade and pave (construct wider highway on improved alignment)	2.2	430,000
Amador	Various	Rights of way on State Highway Routes		25,000
Butte	3 (US 99E)	The Esplanade—Big Chico Creek to 0.3 mile north of Lindo Channel in and north of Chico; grade, pave, signals and structures (widen to four lanes). (Co-operative project, City of Chico's share, $67,050, Butte County's share $24,750)	1.8	*600,000
Butte	Various	Rights of way on State Highway Routes		300,000
Calaveras	Various	Rights of way on State Highway Routes		80,000
Colusa	7 (US 99W)	North of High School Rd. to north of Gail Ave.; landscape freeway through Arbuckle	0.9	41,000
Colusa	88 (SR 45)	3.6 miles south of Grimes to 0.1 mile south of Leven St. in Grimes; grade, pave and structures (reconstruct and widen)	3.3	200,000
Colusa	Various	Rights of way on State Highway Routes		100,000
Contra Costa	7 (US 40)	Ridge Rd. in San Pablo to Crockett; planting	8.0	50,000
Contra Costa	69	Hoffman Blvd. at intersection with 47th St. in Richmond; traffic signals and channelization (co-operative project; City of Richmond's share, $40,000)		*80,000
Contra Costa, Alameda	69, 7 (US 40)	Eastshore Freeway—0.3 mile south of El Cerrito Overhead to 0.2 mile south of Jefferson Ave. in Richmond; grade, pave and structures for a 6-lane freeway which with other current and budgeted projects will complete 75 miles of full freeway from Los Gatos to Vallejo (financed $1,300,000 in 1959-60 fiscal year in addition to $4,300,000 in 1958-59 fiscal year. Project now under construction)	2.3	5,600,000
Contra Costa	75 (SR 24)	West of Sunnybrook Dr. to Hodges Rd.; planting on the Lafayette Bypass	2.8	50,000
Contra Costa, Alameda	75 (SR 24)	Broadway Low Level Tunnel; paint interior		55,000
Contra Costa	Various	Rights of way on State Highway Routes (including $1,500,000 between Danville and Walnut Creek on State Sign Route 21)		2,961,000
Del Norte	1 (US 101)	De Martins Point to Cushing Creek (portions); grade and pave (curve improvement at De Martins Point and truck passing lane at Cushing Creek)	1.2	250,000
Del Norte	71 (US 101)	Lopez Creek Bridge north of Smith River Reservation; (replace bridge with culvert)		25,000
Del Norte	Various	Rights of way on State Highway Routes		100,000
El Dorado	11, 38 (US 50, SR 89)	Mays to Globins; grade, pave and structures (widen to 4 lanes and reconstruct)	2.4	500,000
El Dorado, Alpine	23 (SR 89)	Picketts to Grass Lake (Luther Pass); grade, pave and structures (relocation) (connects with Federal Government project now under construction to complete relocation over Luther Pass)	3.9	655,000

† Numbers marked SR are State Sign Routes; numbers marked US are US highway routes; numbers not marked are legislative routes. * State's share.

County	Route†	Description	Approximate mileage	Estimated cost
El Dorado	38 (SR 89)	0.2 mile north of Eagle Creek to 0.9 mile north of Eagle Creek near Emerald Bay; remove loose rocks from cut slopes	0.7	$40,000
El Dorado	65 (SR 49)	0.2 mile north of Pilot Hill to 1.0 mile north of Hastings Creek northwest of Coloma; grade and pave (relocation)	1.7	250,000
El Dorado	Various	Rights of way on State Highway Routes		370,000
Fresno	10 (SR 198)	Second St. in Coalinga to Three Corners; grade, pave and structures (reconstruction, including widening to 4 lanes adjacent to Coalinga College)	2.6	251,000
Fresno	41 (SR 180)	Teilman Ave. to Tuolumne St. in Fresno; grade and pave (reconstruct portions of Whites Bridge Ave., Amador St., A and B Sts. to provide one-way street couplet)	1.2	210,000
Fresno, Kings	125 (SR 41)	Hanford-Armona Rd. to Floral Ave. (portions); structures (widen bridges and culverts)		161,000
Fresno	Various	Rights of way on State Highway Routes (including $2,568,000 for U.S. 99 freeway between Tulare County line and Fresno)		2,671,000
Glenn	45	Codora Four Corners to Butte City Bridge; grade, pave and structures (causeway across Sacramento River Overflow Channel)	1.2	1,150,000
Glenn	Various	Rights of way on State Highway Routes		150,000
Humboldt	1 (US 101)	Redwood Freeway—Myers Flat to 1.0 mile south of Dyerville; grade, pave and structures for a 4-lane freeway (financed $4,425,000 in the 1959-60 fiscal year) (preliminary work now in progress under earlier contracts) (connects with first Redwood Freeway unit now nearing completion between Dyerville and Englewood)	7.2	5,690,000
Humboldt	1 (US 101)	0.4 mile south to 0.2 mile north of South Scotia Bridge; grade, pave and structures (parallel bridge and approaches)	0.6	1,300,000
Humboldt	1 (US 101)	Little River to 0.3 mile north of Trinidad, grade, pave and structures for 4-lane freeway	3.7	2,700,000
Humboldt	Various	Rights of way on State Highway Routes		840,000
Imperial	187 (SR 115)	Junction of U. S. 80 to Sandia Turn north of Holtville; grade, pave and structures (relocation)	4.3	680,000
Imperial	Various	Rights of way on State Highway Routes		70,000
Inyo	23 (US 6-395)	Independence to Division Creek; grade and pave (reconstruct and widen, partly on new alignment including some 4-laning)	10.0	585,000
Inyo	Various	Rights of way on State Highway Routes		88,000
Kern	4 (US 99)	Zerker Road to 0.5 mile north of Lerdo Highway; grade, pave and structure (construct interchange at Lerdo Highway)	1.4	1,635,000
Kern	4 (US 99)	0.2 mile north of Perkins Ave. in McFarland to 0.2 mile south of Airport Ave; grade, pave and structures (reconstruction of north-bound lanes and interchange at Pond Ave.	4.2	1,200,000
Kern	33 (US 466)	Calloway Canal Bridge between Wasco and Famoso; structure and approaches (replace bridge)		65,000
Kern	58 (US 466)	Tower Line Rd. to Bear Mountain Ranch east of Bakersfield; grade, pave and structure for 4-lane expressway. (Financed $1,175,000 in 1959-60 fiscal year in addition to $6,150,000 in the 1958-59 fiscal year). (Project scheduled to be advertised for bids soon)	11.4	7,325,000
Kern	58 (US 466)	7.1 miles northwest to Mojave (portions); resurface	6.8	180,000
Kern	135	Central Valley Highway—Poso Creek Bridge north of Wasco—structure and approaches; (replace bridge)		131,000
Kern	58, 141 (SR 178)	Oak St.—Brundage Lane to 24th St.; grade, pave, structures and signals (widen to four lanes)	1.9	920,000
Kern	Various	Rights of way on State Highway Routes (including $2,343,000 for U.S. 99 freeway in and near Bakersfield)		2,824,000
Kings, Fresno	125 (SR 41)	Hanford-Armona Rd. to Floral Ave. (portions); structures (widen bridges and culverts)		161,000
Kings	Various	Rights of way on State Highway Routes (including $730,000 for Sign Route 198 freeway in the Hanford area)		750,000
Lake	89 (SR 29)	From junction of Lower Lake Rd. to Kelseyville; grade, pave and structures for two-lane relocation with access control)	4.0	510,000
Lake	Various	Rights of way on State Highway Routes		135,000
Lassen	Various	Rights of way on State Highway Routes		5,000
Los Angeles	2, 166	Hollywood and Santa Ana Freeways—Benton Way to 0.5 mile east of Lakewood Blvd. (portions); barrier rail in dividing strip	9.8	290,000
Los Angeles	2 (US 101)	Hollywood Freeway—Pilgrimage Bridge to Lankershim Blvd.; landscape	2.3	30,000
Los Angeles	2,159, (US 101)	Hollywood and Ventura Freeways—Moorpark St. to Laurel Canyon Blvd.; landscape	1.7	200,000
Los Angeles	2, 158 (US 101, SR 7)	Hollywood, Ventura and San Diego Freeways— Lankershim Blvd. to San Diego Freeway (portions); grade, pave and structures for 8-lane freeway which with other current projects will complete the Ventura Freeway in the San Fernando Valley; and on the San Diego Freeway—Mulholland Dr. Overcrossing on the future freeway route and Mulholland Dr. relocation. (Financed $1,248,000 in 1959-60 fiscal year in addition to $7,348,000 in the 1958-59 fiscal year. Project now under construction)	4.5	8,596,000
Los Angeles	2, 158 (US 101, SR 7)	Ventura and San Diego Freeways—Sepulveda Blvd. to Encino Ave. on Ventura Freeway, and Valley Vista Blvd. to Burbank Blvd. on San Diego Freeway; landscape	3.5	400,000
Los Angeles	2 (US 101)	Ventura Freeway—Kelvin Ave. to west city limit of Los Angeles; landscape	3.5	75,000
Los Angeles, Ventura	2 (US 101)	Ventura Freeway—Los Angeles city limit to 0.1 mile east of Cheeseboro Rd., and 0.5 mile west of Moorpark Rd. to Conejo Grade Summit; resurface	10.5	730,000
Los Angeles	4, 161, 165, 205 (US 66, US 6-99)	Golden State and Pasadena Freeways—0.6 mile south of Pasadena Ave. to 0.2 mile northwest of Arnold St. on Golden State Freeway, and Bishop Rd. to Ave. 40 on Pasadena Freeway; grade, pave and structures for 8-lane freeway and interchange at the junction of the two freeways. (Financed $8,500,000 in 1959-60 fiscal year). (This project along with other current and budgeted jobs will complete a freeway bypass of downtown Los Angeles on the Golden State Freeway)	1.0	11,000,000
Los Angeles	4 (US 6-99)	Golden State Freeway—Alameda Ave. to Burbank Blvd. in Burbank; landscape	1.3	90,000

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

County	Route†	Description	Approximate mileage	Estimated cost
Los Angeles	4 (US 6-99)	Golden State Freeway—0.25 mile east of Burbank Blvd. to 0.2 mile west of Roscoe Blvd.; grade, pave and structures for 8-lane freeway (financed $1,225,000 in the 1959-60 fiscal year in addition to $6,000,000 in the 1958-59 fiscal year) (co-operative project; U. S. Corps of Engineers' share $3,000,000 for flood control channel; City of Burbank's share $800,000 for extending Burbank Blvd. separation across railroad)	4.6	$7,225,000
Los Angeles	4 (US 6-99)	Golden State Freeway—0.2 mile southeast of Roscoe Blvd. to 0.2 mile northwest of Lankershim Blvd.; grade, pave and structures for 8-lane freeway	1.8	4,700,000
Los Angeles	4 (US 99)	Piru Creek to 8.8 miles north; resurface	8.8	475,000
Los Angeles	9,157 (SR 118)	Foothill Blvd.—Sayre St. to Vaughn St. (portions); grade, pave, traffic signals and structure (widen to four lanes)	2.0	400,000
Los Angeles	26 (US 70-99)	San Bernardino Freeway—0.2 mile east of San Dimas Ave. to San Bernardino County line; grade and pave (widen to six lanes)	5.7	1,500,000
Los Angeles	26 (US 60-70-99)	San Bernardino Freeway—San Gabriel River to West Covina city limit; landscape	2.7	100,000
Los Angeles	26 (US 60-70-99)	San Bernardino Freeway—Rosemead Blvd. to Puente Ave.; grade, pave and structures (widen to 8 lanes)	6.5	2,250,000
Los Angeles	26 (US 60-70-99)	San Bernardino Freeway—Long Beach Freeway to Rosemead Blvd.; grade, pave and structures (widen to eight lanes)	5.3	2,000,000
Los Angeles	59 (SR 138)	Palmdale Blvd.—10th St. east to 23d St. in Palmdale; grade, pave and structures (widen to 4 lanes divided)	1.4	350,000
Los Angeles	60 (US 101 Alt.)	Cabrillo Highway at Crenshaw Blvd. in Torrance; traffic signals, lighting and channelization; (co-operative project; City of Torrance's share, $5,000	0.3	*60,000
Los Angeles	60 (US 101 Alt.)	Cabrillo Highway-Rosecrans Ave. to Imperial Highway; grade and resurface (shoulder improvement, channelization, traffic signal modification)	2.0	250,000
Los Angeles	62 (SR 39)	Azusa Ave. and San Gabriel Ave.—from Paramount Ave. to 0.3 mile north of Sierra Madre Ave.; grade and pave (reconstruct to provide one-way street couplet through Azusa)	2.2	500,000
Los Angeles	77	Valley Blvd.—0.1 mile east of Arden Dr. in El Monte to Mission Dr., grade and pave (reconstruct and widen)	1.2	300,000
Los Angeles	158 (SR 7)	San Diego Freeway—Studebaker Rd. to 0.1 mile east of the Long Beach Freeway (portions); structures, pumping plant, and grading of structure approaches on the route of the San Diego Freeway		8,500,000
Los Angeles	158 (SR 7)	San Diego Freeway—0.1 mile east of Long Beach Freeway to Alameda St.; grade, pave and structures for 8-lane freeway (including portions of interchange at Long Beach Freeway)	1.3	6,500,000
Los Angeles	158 (SR 7)	San Diego Freeway—0.2 mile south of Manchester Ave. to 0.1 mile north of Vesta St. (portions); structures on the route of the San Diego Freeway		2,500,000
Los Angeles	158 (SR 7)	San Diego Freeway—Matteson Ave. to Wilshire Blvd.; landscape	3.5	225,000
Los Angeles	161, 162 (US 6-99, SR 2)	Golden State and Glendale Freeways—0.2 mile southeast of Arnold St. to 0.3 mile northwest of Glendale Blvd on the Golden State Freeway, and 0.3 mile southwest of Riverside Dr. to 0.1 mile northeast of Los Angeles River on the Glendale Freeway; grade, pave and structures for 8-lane freeway and a portion of interchange at the junction of the two freeways (financed $11,000,000 in 1959-60 fiscal year)	3.7	14,900,000
Los Angeles	162 (SR 2)	Glendale Freeway—Fletcher Dr. to Verdugo Rd.; landscape	1.0	125,000
Los Angeles	165 (US 6, SR 11)	Harbor Freeway—0.5 mile south of 190th St. to 0.1 mile north of 124th St.; grade, pave and structures for 8-lane freeway (financed $2,100,000 in 1959-60 fiscal year in addition to $6,000,000 in 1958-59 fiscal year) (project now under construction)	4.9	8,100,000
Los Angeles	165 (US 6, SR 11)	Harbor Freeway—120th St. to 88th Pl.; landscape	2.2	200,000
Los Angeles	167 (SR 15)	Long Beach Freeway—For off-ramp at Long Beach Blvd.; grade and pave	0.5	60,000
Los Angeles	173, 165 (SR 26)	Santa Monica Freeway—Oak St. to Main St.; structure and approaches for 8-lane freeway viaduct including a portion of the Santa Monica-Harbor Freeway Interchange. (Together with other current and budgeted projects will complete the Santa Monica Freeway from the Santa Ana Freeway to the Harbor Freeway) (Financed $7,500,000 in 1959-60 fiscal year)	0.9	12,500,000
Los Angeles	173 (SR 26)	Santa Monica Freeway—0.1 mile west of Main St. to Hooper Ave.; structure and approaches for 8-lane freeway viaduct. (Financed $7,700,000 in 1959-60 fiscal year)	1.3	9,200,000
Los Angeles	173 (SR 26)	Santa Monica Freeway—0.3 mile west of Hooper Ave. to Eighth St.; structure and approaches for 8-lane freeway viaduct. (Financed $9,500,000 in the 1959-60 fiscal year)	1.1	12,500,000
Los Angeles	173, 2, 4 (SR 26, US 101)	Santa Monica, Santa Ana and Golden State Freeways—grade, pave and structures for an interchange at the junction of the three freeways. (Financed $9,700,000 in 1959-60 fiscal year)	2.8	12,300,000
Los Angeles	Various	Rights of way on State Highway Routes (including $15,800,000 for the San Diego Freeway and $15,650,000 for the Santa Monica Freeway)		52,024,000
Madera	4 (US 99)	0.5 mile south to 1.5 miles north of Madera; landscape	3.9	250,000
Madera	4 (US 99)	Berenda to Califa; repave northbound lanes	3.7	369,000
Madera	4 (US 99)	Califa to 0.7 mile south of Merced County line; planting	6.1	35,000
Madera	Various	Rights of way on State Highway Routes		1,492,000
Marin	1 (US 101)	Richardson Bay Bridge to San Quentin Wye (portions); planting	5.0	50,000
Marin	1 (US 101)	Vista Point at Golden Gate Bridge; roadway connections and southbound parking areas		40,000
Marin	1 (US 101)	Greenbrae; structures and approaches to complete interchange	0.8	1,240,000
Marin	1 (US 101)	North city limits of San Rafael to Lucas Valley Rd. (portions); grade, pave and structures (two interchanges, frontage roads, and 1.1 miles of additional southbound lane)	2.4	1,250,000
Marin	Various	Rights of way on State Highway Routes		394,000
Mariposa	18 (SR 140)	El Portal to Yosemite Park boundary; grade and pave (reconstruct and widen)	1.1	180,000
Mariposa	65 (SR 49)	2.0 miles north of Sign Route 140 north of Mariposa to Coulterville (portions); grade and pave (continuing widening and realignment)		50,000

† Numbers marked SR are State Sign Routes; numbers marked US are US highway routes; numbers not marked are legislative routes. * State's share.

County	Route†	Description	Approximate mileage	Estimated cost
Mariposa	Various	Rights of way on State Highway Routes		$20,000
Mendocino	1 (US 101)	1.3 miles south of Robinson Creek to Smith St. in Ukiah (portions); resurface	4.8	500,000
Mendocino	1 (US 101)	0.9 mile south of Irvine Lodge to 0.8 mile north of Sherwood Rd.; grade, pave and structures for 4-lane expressway (which will complete expressway for 11 miles between Reeves Creek and Sherwood Rd.)	5.0	2,800,000
Mendocino	56 (SR 1)	Sansi Cattlepass and Sartori Cattlepass near Navarro River; structures (replace cattlepasses)		25,000
Mendocino	56 (SR 1)	Hardy Creek Bridge north of Westport; replace bridge		50,000
Mendocino	Various	Rights of way on State Highway Routes		653,000
Merced	4 (US 99)	Atwater Freeway—South of Canal Creek to Grove Ave.; planting	4.6	35,000
Merced	122 (SR 140)	V St. to U.S. 99 in Merced; grade and pave (widen and resurface)	0.6	75,000
Merced	Various	Rights of way on State Highway Routes		785,000
Modoc	Various	Rights of way on State Highway Routes		35,000
Mono	23 (US 395)	Bodie Rd. to Point Ranch south of Bridgeport; grade and pave (reconstruction and some realignment)	3.6	250,000
Mono	Various	Rights of way on State Highway Routes		15,000
Monterey	2 (US 101)	Through Chualar; planting	1.5	37,000
Monterey	2 (US 101)	0.3 mile south of Salinas River to 1.2 miles north of Soledad; (grade, pave and structures for 4-lane freeway Soledad Bypass) (This job, together with other current and completed projects, will provide continuous freeway-expressway for 45 miles from King City to Salinas, exept for short sections at Greenfield and Gonzales.)	3.3	2,510,000
Monterey	56 (SR 1)	San Luis Obispo County Line to Rocky Creek, north of Big Sur (portions); replace retaining walls		250,000
Monterey	56 (SR 1)	At Dolan Creek south of Big Sur; grade and pave (replace bridge with culvert on new alignment)	0.5	450,000
Monterey	56 (SR 1)	Carpenter St. to south city limit of Monterey; grade, pave and structures for the Carmel Hill Interchange (carried over from 1958-59 budget)	0.8	1,200,000
Monterey	Various	Rights of way on State Highway Routes (including $2,000,000 for Sign Route 1 freeway in the vicinity of Seaside and Monterey)		2,315,000
Napa	6 (SR 37)	Vichy Springs to junction with Sign Route 128 northeast of Napa (portions); grade, pave and structures (widen). (Cooperative project; Napa County's share, $34,000)		*100,000
Napa	Various	Rights of way on State Highway Routes		488,000
Nevada	15 (SR 20)	Slacks Ravine Bridge, east of Smartville; structure and approaches (reconstruct)		37,000
Nevada, Placer	37 (US 40)	Hampshire Rocks to Soda Springs; grade, pave and structures for 4-lane freeway. (Financed $1,392,000 in 1959-60 fiscal year in addition to $4,000,000 in 1958-59 fiscal year. Project now under construction.)	5.7	5,392,000
Nevada	37 (US 40)	Soda Springs to east end of Donner Lake; grade, pave and structures to relocate as 4-lane freeway over Donner Summit. (Financed $7,500,000 in 1959-60 fiscal year)	10.3	17,500,000
Nevada	37, 38 (US 40)	East end of Donner Lake to near Boca; grade, pave and structures for 4-lane freeway. (Financed $2,641,000 in 1959-60 fiscal year in addition to $5,400,000 in the 1958-59 fiscal year. Project now under construction)	8.7	8,041,000
Nevada	38 (US 40)	Near Boca to near Floriston; grade, pave and structures for 4-lane freeway. (Financed $964,000 in the 1959-60 fiscal year in addition to $6,900,000 in the 1958-59 fiscal year. Project now under construction). (The last four projects, together with the recently completed section between Floriston and the state line, will provide 36 miles of continuous full freeway between Hampshire Rocks and the state line) (When these jobs, along with projects in Placer County, are completed, there will be only a single 11-mile gap in continuous freeway-expressway between Sacramento and the state line)	6.6	7,864,000
Nevada	Various	Rights of way on State Highway Routes		570,000
Orange, San Diego	2 (US 101)	San Diego Freeway—San Mateo Creek to East Avenida Cordoba in and south of San Clemente; landscape	2.2	150,000
Orange	2, 60 (US 101, US 101 Alt)	San Diego Freeway—0.6 mile south of Avenida Cadiz in San Clemente to 1.4 miles south of Sign Route 74 in San Juan Capistrano on U.S. 101; and from U.S. 101 to Serra Junction on U.S. 101 Alt.; grade, pave and structures for 6-lane freeway including an interchange at the U.S. 101-U.S. 101 Alt. junction. (Financed $7,000,000 in the 1959-60 fiscal year.) (This project with other current and completed jobs on the San Diego, Santa Ana, Hollywood and Ventura Freeways to the north will provide 90 miles of continuous full freeway on U.S. 101 from south of San Clemente to Calabasas west of Los Angeles)	7.7	7,700,000
Orange	2 (US 101)	San Diego and Santa Ana Freeways—South of Niguel Rd. near El Toro to Red Hill Ave.; planting	13.5	115,000
Orange	43 (SR 55)	Newport Freeway—19th St. to Palisades Rd. in and near Costa Mesa; grade, structures and traffic signals (construct a future freeway frontage road which, together with the existing State highway, will provide a one-way street couplet)	2.6	450,000
Orange	184	Main St. in Santa Ana—Seventh St. to Santa Ana Freeway; grade, pave and signals (widen to four lanes) (Cooperative project; City of Santa Ana's share, $278,000)	1.1	*135,000
Orange	Various	Rights of way on State Highway Routes (including $2,000,000 for the Newport Freeway between Costa Mesa and the Riverside Freeway and $1,500,000 for the San Diego Freeway)		4,541,000
Placer	3 (US 99E)	Roseville Underpass to Grove St. in Roseville; grade, pave, structure and traffic signals (overcrossing and roadway connections to Church St. plus traffic signals at Main St.)	0.3	120,000
Placer	17 (US 40)	0.5 mile east of Roseville to 1.0 mile east of Newcastle; grade, pave and structures for 4-lane freeway. (Financed $1,994,000 in the 1959-60 fiscal year in addition to $5,500,000 in 1958-59 fiscal year. Project now under construction)	11.1	7,494,000
Placer	37 (US 40)	0.5 mile west of Monte Vista to 0.7 mile east of Baxter; grade, pave and structures for 4-lane freeway. (Financed $5,000,000 in the 1959-60 fiscal year)	5.1	7,300,000

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County	Route†	Description	Approximate mileage	Estimated cost
Placer	37 (US 40)	0.7 mile east of Baxter to one mile west of Emigrant Gap; grade, pave, and structures for 4-lane freeway. (Financed $4,000,000 in the 1959-60 fiscal year.) (With other current and budgeted projects will provide 74 miles of continuous 4-lane freeway and expressway from Sacramento to one mile west of Emigrant Gap.)	7.9	$5,650,000
Placer, Nevada	37 (US 40)	Hampshire Rocks to Soda Springs; grade, pave and structures for 4-lane freeway. (Financed $1,392,000 in the 1959-60 fiscal year in addition to $4,000,000 in 1958-59 fiscal year. Project now under construction.)	5.7	5,392,000
Placer	37 (US 40)	Heather Glenn to Colfax (portions); landscape in vicinity of Weimar Interchange		25,000
Placer	Various	Rights of way on State Highway Routes (including $1,000,000 for U.S. 40 freeway in the vicinity of Emigrant Gap)		1,395,000
Plumas	21 (US 40 Alt)	Chambers Creek and Chipps Creek Bridges in the Feather River Canyon; structures and approaches (replace bridges)		285,000
Plumas	83 (SR 89)	1.0 mile north to 3.0 miles north of Almanor Dam; grade and pave (realignment)	2.0	350,000
Plumas	Various	Rights of way on State Highway Routes		10,000
Riverside	19 (US 60)	University Undercrossing; pumping plant, structure and approaches (construct undercrossing adjacent to University of California campus at Riverside)		230,000
Riverside	19, 26 (US 60-70-99)	U.S. 70-99 in Beaumont to 0.5 mile east of 22d St. in Banning; grade, pave and structures for 6-lane freeway (Beaumont Bypass). (When this is complete there will be 60 miles of multilane divided highway, nearly all freeway or expressway, between Redlands and Indio.)	6.0	6,500,000
Riverside	43 (US 91, SR 18)	Riverside Freeway—0.7 mile west of Corona to Pierce St.; grade, pave and structures for 4-lane freeway through Corona. (Financed $4,284,000 in the 1959-60 fiscal year.)	7.1	7,600,000
Riverside	Various	Rights of way on State Highway Routes		2,985,000
Sacramento	4 (US 99-50)	San Joaquin County Line to Stevenson Ave. south of Sacramento; planting	18.0	220,000
Sacramento	11 (US 50)	Nimbus Interchange; grade, pave and structure	0.7	600,000
Sacramento	232	El Centro Blvd.—Garden Highway near Sacramento to Sutter county line (portions); base and surface (reconstruct)	7.5	450,000
Sacramento	Various	Rights of way on State Highway Routes (including $1,500,000 for U.S. 99E-50 freeway and $500,000 for east-west freeway on U.S. 40-99W and U.S. 50 in Sacramento)		2,425,000
San Benito	Various	Rights of way on State Highway Routes		180,000
San Bernardino	26 (US 70-99)	0.2 mile to 2.4 miles east of Redlands; grade, pave and structures for 4-lane freeway and expressway, including interchange at Yucaipa Blvd.	2.2	1,250,000
San Bernardino	31 (US 91-66)	Victorville to Barstow; planting	31.0	50,000
San Bernardino	31, 58 (US 91-66, US 91-466, and US 66)	From 1.0 mile west of Barstow on U.S. 91-66 to junction with U.S. 91-466 3.0 miles northeast of Barstow, and also to 0.6 mile east of Montara Ave. southeast of Barstow on U.S. 66; grade, surface and structures for 4-lane freeway (Barstow Bypass). (Financed $5,000,000 in 1959-60 fiscal year)	9.9	6,800,000
San Bernardino	31 (US 91-466)	2.0 miles east of Baker to one mile east of Cima Road near Valley Wells; grade, pave and structures for 4-lane freeway, including section over Baker Grade. (Financed $4,800,000 in 1959-60 fiscal year)	24.7	6,800,000
San Bernardino	43 (US 91-395, SR 18)	Warm Creek to Fifth St. in San Bernardino; landscape	1.9	170,000
San Bernardino	43 (SR 18)	5.0 miles north of Big Bear City to 1.0 mile south of forest boundary (portions); grade and pave (curve improvement)		15,000
San Bernardino	145 (US 395)	U.S. 91-66 to U.S. 466 (portions); grade and pave (widening and easing humps and dips)	32.8	300,000
San Bernardino	Various	Rights of way on State Highway Routes (including $1,000,000 for U.S. 70-99 freeway in Redlands)		3,347,000
San Diego	2 (US 101)	Market St. to Laurel St. in San Diego (portions); grade, pave and structures (sections of roadway and structures in the first unit of the future 8-lane cross-town freeway on US 101 through San Diego). (Financed $10,000,000 in the 1959-60 fiscal year)	2.5	13,000,000
San Diego, Orange	2 (US 101)	San Diego Freeway—San Mateo Creek to East Avenida Cordoba in and south of San Clemente; landscape	2.2	150,000
San Diego	12 (US 80)	0.6 mile east of Lake Murray Blvd. to Sign Route 67 east of La Mesa; grade, pave and structures to convert 4-lane expressway to 8-lane freeway	2.4	3,000,000
San Diego	12 (US 80)	0.4 mile west of Chase Ave. to Ballantyne Lane in El Cajon; grade, pave and structures for 6-lane freeway	2.7	4,000,000
San Diego	12 (US 80)	0.2 mile west of Magnolia Ave. to 0.5 mile east of Third St. in El Cajon; grade, pave and structure for 4-lane freeway. (The last three projects, together with other current jobs, will provide 17 miles of continuous full freeway from Taylor St. in San Diego to Third St. in east El Cajon.)	2.5	3,500,000
San Diego	Various	Rights of way on State Highway Routes (including $9,780,000 for U. S. 101 freeway in San Diego)		11,830,000
San Francisco	2 (US 101)	Central Freeway—Mission St. to Turk St.; planting	0.8	125,000
San Francisco	2 (US 101)	Lyon St. to Sign Route 1; grade, pave and structures for 8-lane freeway approach to the Golden Gate Bridge. (Financed $4,400,000 in the 1959-60 fiscal year.)	1.2	5,100,000
San Francisco	68 (US 101, US 101 Byp)	James Lick Memorial Freeway—Third St. to Army St. (portions); barrier rail in dividing strip	2.7	100,000
San Francisco	2 (US 101)	Southern Freeway—Milton St. to James Lick Memorial Freeway Interchange; grade, pave and structures for 8-lane freeway (portions of this section are being graded under a current contract)	1.0	4,850,000
San Francisco	68, 2 (US 101, US 101 Byp)	Southern Freeway—James Lick Memorial Freeway Interchange; structures and approaches. (Financed $1,300,000 in 1959-60 fiscal year in addition to $1,730,000 in 1958-59 fiscal year and $3,000,000 in 1957-58 fiscal year. Project now under construction.) (Co-operative project; City of San Francisco's share $1,970,000.)	0.8	*6,030,000
San Francisco	Various	Rights of way on State Highway Routes (including $1,500,000 for the Southern Freeway in San Francisco)		2,470,000

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County	Route†	Description	Approximate mileage	Estimated cost
San Joaquin	4 (US 99)	Farmington Rd. to Calaveras River (portions); structures and approaches to convert an additional section of the Stockton Bypass from expressway to full freeway	1.6	$1,700,000
San Joaquin	5 (US 50)	East City Limit of Tracy to east of Southern Pacific Overhead; grade, pave and structures (widen overhead and approaches to 4 lanes)	0.2	550,000
San Joaquin	75 (SR 4)	Duck Creek Bridge east of Farmington, structure and approaches (reconstruct)		15,000
San Joaquin	Various	Rights of way on State Highway Routes		750,000
San Luis Obispo	2 (US 101)	Curbaril Ave. to San Jacinto Rd. near Atascadero; landscape	1.7	55,000
San Luis Obispo	2 (US 101)	0.3 mile south of Pismo Overhead to 1.0 mile north of Pismo Beach; grade, pave and structures for 4-lane freeway. (This project, with other current and completed projects, will provide about 70 miles of continuous freeway and expressway between north of the Santa Barbara county line and north of San Miguel.)	2.2	1,700,000
San Luis Obispo	Various	Rights of way on State Highway Routes (including $900,000 for State Sign Route 1 between Morro Bay and San Simeon)		1,290,000
San Mateo	56 (SR 1)	Miramar to Pedro Valley (portions); resurface	2.9	59,000
San Mateo	68 (US 101 Byp)	Bayshore Freeway—north of Harbor Blvd. to Santa Clara county line (portions); landscape interchange areas	1.1	200,000
San Mateo	68 (US 101 Byp)	Bayshore Freeway—Peninsular Ave. Overcrossing to Colma Creek (portions); grade, pave and structures (widen to 8 lanes)	7.0	1,900,000
San Mateo, Santa Clara	68 (US 101 Byp)	Bayshore Freeway—Stierlin Rd. to 0.7 mile north of San Mateo county line; grade, pave and structures for 6-lane freeway (carried over from the 1958-59 budget)	4.4	4,200,000
San Mateo	Various	Rights of way on State Highway Routes (including $1,000,000 for extension of Southern Freeway in Daly City area, and $650,000 for Junipero Serra Freeway)		2,907,000
Santa Barbara	2 (US 101)	Solomon Summit Undercrossing to Lakeview Rd. south of Santa Maria; planting	5.4	67,000
Santa Barbara	2 (US 101)	El Sueno Rd. to 0.5 mile north of Elwood Overhead; grade, pave and structures for 4-lane freeway. (This project, together with other current or completed jobs, will provide continous 4-lane divided highway, nearly all freeway or expressway, for 39 miles between the Hollister Wye at the west city limit of Santa Barbara and the Santa Ynez River Bridge south of Buellton.)	8.4	5,000,000
Santa Barbara	Various	Rights of way on State Highway Routes		855,000
Santa Clara	2 (US 101)	Gilroy to Llagas Creek (portions); resurface	5.6	225,000
Santa Clara	2 (US 101)	El Camino Real—Sign Route 9 in Mountain View to Palo Alto (portions); resurface	6.5	200,000
Santa Clara	2 (US 101)	El Camino Real—Bailey Ave. in Mountain View, signals and channelization. (Co-operative project; City of Mountain View's share $10,000.)		*75,000
Santa Clara	5 (SR 17)	State Highway Route 42 (Saratoga Ave.) in Los Gatos to Bascom Ave. in San Jose; planting	8.8	125,000
Santa Clara	5 (SR 17)	Lexington School, Idylwild, and Summit Roads south of Los Gatos; grade, pave, channelization and flashing signal		85,000
Santa Clara	5 (SR 17)	East city limit of Los Gatos to 0.3 mile south of Stevens Creek Rd.; resurface existing Sign Route 17	4.4	29,000
Santa Clara	5, 42 (SR 17)	Los Gatos Creek in and near Los Gatos; drainage facilities and channel lining		100,000
Santa Clara	5, 42 (SR 17)	At Sign Route 17-Saratoga Ave. Interchange in Los Gatos; landscape	0.3	65,000
Santa Clara	32 (SR 152)	San Felipe to Hollister Wye; base and surface (reconstruct)	2.3	165,000
Santa Clara	5, 68, 69 (SR 17, US 101 Byp)	Bayshore and Nimitz Freeways—First St. in San Jose to 0.3 mile north of Bayshore Highway on Sign Route 17, and Taylor St. to 0.5 mile north of Brokaw Rd. on U. S. 101 Bypass; grade, pave and structures for 4-lane freeway, including an interchange at the junction of the two freeways (carried over from 1958-59 budget). (Financed $4,385,000 in the 1959-60 fiscal year)	3.9	5,100,000
Santa Clara, San Mateo	68 (US 101 Byp)	Bayshore Freeway—Stierlin Rd. to 0.7 mile north of San Mateo county line; grade, pave and structures for 6-lane freeway (carried over from 1958-59 budget)	4.4	4,200,000
Santa Clara	68, 113 (US 101 Byp, SR 9)	Fair Oaks Ave. to 0.3 mile north of Charleston Rd. (portions); grade, pave and structures for 1.1 miles of 4-lane freeway on Sign Route 9 and 4.9 miles of 6-lane freeway on U. S. 101 Byp (Bayshore). (Financed $3,947,000 in 1959-60 fiscal year.) (Interchange now under construction on this section at Bayshore Freeway and Mountain View-Alviso Rd.) (This project and preceding project, together with other current and completed jobs, will provide 40 miles of continuous full freeway on the Bayshore Freeway between the San Francisco-Oakland Bay Bridge and Sunnyvale.)	6.0	5,050,000
Santa Clara	114 (SR 9)	At Homestead Rd. in Cupertino; channelization and signals (co-operative project; City of Cupertino's share, $6,500; Santa Clara County's share, $2,000)		*72,000
Santa Clara	Various	Rights of way on State Highway Routes (including $1,800,000 on the Bayshore Freeway, and $1,500,000 on the Junipero Serra Freeway)		5,345,000
Santa Cruz	5 (SR 17)	0.3 mile north of junction with the new Sign Route 1 in Santa Cruz to Carbonero Creek at Glen Canyon Rd.; grade, pave and structures for 4-lane expressway	3.9	1,880,000
Santa Cruz	56, 5 (SR 1, 17)	East of Parkway to Sign Route 17 in and near Santa Cruz; planting	2.1	75,000
Santa Cruz	56 (SR 1)	Wilder Creek to 4.0 miles south of Davenport; grade, pave and structures (reconstruct and realign). (Co-operative project; Joint Highway District Nine's share, $240,000.)	3.1	*700,000
Santa Cruz	Various	Rights of way on State Highway Routes		245,000
Shasta	3 (US 99)	0.8 mile north of Shotgun Creek to 0.5 mile south of Castella; grade, pave and structures for 4-lane freeway. (Financed $5,000,000 in the 1959-60 fiscal year.)	6.1	8,300,000
Shasta	3 (US 99)	0.5 mile south of Castella to 1.0 mile south of the Siskiyou County line; grade, pave and structures for 4-lane freeway. (Financed $3,500,000 in the 1959-60 fiscal year.)	4.2	5,200,000
Shasta, Siskiyou	3 (US 99)	1.0 mile south of the Siskiyou county line to the Sacramento River Bridge in Dunsmuir; grade, pave and structures for 4-lane freeway. (Financed $960,000 in the 1959-60 fiscal year in addition to $3,600,000 in the 1958-59 fiscal year. Project now under construction.) (The last three projects with other current and completed jobs will provide 30 miles of continuous freeway-expressway in the Sacramento River Canyon between north of Shasta Lake and north of Dunsmuir.)	3.6	4,560,000

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County	Route†	Description	Approximate mileage	Estimated cost
Shasta	Various	Rights of way on State Highway Routes		$750,000
Sierra	25 (SR 49)	North Fork of the Yuba River to 0.25 mile east of Ramshorn Creek (portions); grade and pave (reconstruct as part of a continuing improvement of this route)		80,000
Siskiyou, Shasta	3 (US 99)	1.0 mile south of the Siskiyou County line to the Sacramento River Bridge in Dunsmuir; grade, pave and structures for 4-lane freeway. (Financed $960,000 in the 1959-60 fiscal year in addition to $3,600,000 in the 1958-59 fiscal year. Project now under construction	3.6	4,560,000
Siskiyou	82	Shasta River Bridge east of Yreka; structure and approaches (new bridge)	0.4	155,000
Siskiyou	Various	Rights of way on State Highway Routes		75,000
Solano	7 (US 40)	Interchange at Sign Route 12 west of Fairfield; structure and approaches (carried over from the 1958-59 budget)		2,100,000
Solano	7 (US 40)	Carquinez Bridge to Sign Route 48 (Sears Point Cutoff); planting	5.0	100,000
Solano, Yolo	6 (US 40)	0.2 mile west of the Solano County line to Swingle; grade, pave and structures (convert from expressway to full freeway, including the Davis Interchange)	4.3	2,750,000
Solano	7, 6 (US 40)	0.5 mile west of Gum Grove Rd. northeast of Vacaville to Yolo County line; planting	14.0	85,000
Solano	7 (US 40)	Sign Route 12 at Cordelia to Chadbourne Rd.; grade, pave and structures (convert from 4-lane expressway to 6-lane and 8-lane full freeway)	4.3	4,500,000
Solano	53 (SR 12)	U. S. 40 to Pennsylvania Ave. in and near Fairfield; grade, pave and structures (widen to 4 lanes). (Co-operative project; City of Fairfield's share, $60,000)	0.8	*120,000
Solano	74 (SR 29)	Benicia Rd.—U. S. 40 to 0.4 mile west; resurface and widen to 4 lanes. (Cooperative project; Solano County's share, $45,000)	0.4	*40,000
Solano	74	U. S. 40 to west of the Benicia city limit; grade, pave and structures for 4-lane freeway	2.5	2,150,000
Solano	74, 208 (SR 29, 48)	Junction of Sign Routes 29 and 48; channelization and signals		55,000
Solano	90	0.5 mile north of Sweeney Creek to Yolo county line on the Winters-Dunnigan Cutoff; grade, pave and structures for the initial two lanes of a future 4-lane freeway (including a short section of 4-lane divided)	5.0	1,300,000
Solano	Various	Rights of way on State Highway Routes (including $1,150,000 in the Benicia area)		1,920,000
Sonoma	1 (US 101)	0.6 mile south of Guerneville Road to Lytton; grade, pave and structures for a 4-lane freeway (completes Healdsburg Bypass)	4.1	2,715,000
Sonoma	56 (SR 1)	Salmon Creek Bridge north of Bodega Bay; redeck		30,000
Sonoma	Various	Rights of way on State Highway Routes		1,690,000
Stanislaus	109	McHenry Ave.—Needham St. to Modesto Irrigation District Canal Number 3; grade and pave (widen to 4 lanes). (City of Modesto providing right of way.)	1.7	1,400,000
Stanislaus	Various	Rights of way on State Highway Routes (including $450,000 for U.S. 99 freeway in the Ceres-Modesto area)		660,000
Sutter	3 (US 99E)	Junction with Sign Route 20 in Yuba City to 0.5 mile north of Yuba City city limit; grade and pave (widen to 4 lanes)	0.8	240,000
Sutter	15 (SR 20)	Wadsworth Canal Bridge west of Yuba City; structure and approaches (widen)		185,000
Sutter	87 (US 40 Alt)	0.7 mile north of Robbins to Sutter Causeway; grade and pave (widen and reconstruct)	5.1	400,000
Sutter	Various	Rights of way on State Highway Routes		170,000
Tehama	29 (SR 36)	Dry Creek Bridge southeast of Beegum; structure and approaches (new bridge and realignment)	1.1	220,000
Tehama	83 (SR 89)	Junction with Sign Route 36 to Lassen Park south boundary; grade and pave (widen and resurface)	4.2	121,000
Tehama	Various	Rights of way on State Highway Routes (including $460,000 for U.S. 99 freeway in the Red Bluff area)		675,000
Trinity	29, 35 (SR 36)	Hayfork Creek Bridge east of Wildwood and Dobbins Gulch Bridge northeast of Peanut; structures and approaches (reconstruct)		61,000
Trinity	Various	Rights of way on State Highway Routes		20,000
Tulare	4 (US 99)	Tagus to Visalia Airport Interchange; grade, pave and structures (convert from expressway to full freeway)	5.1	2,270,000
Tulare	Various	Rights of way on State Highway Routes (including $895,000 for Sign Route 198 in the Visalia area)		1,690,000
Tuolumne	Various	Rights of way on State Highway Routes		150,000
Ventura	2 (US 101)	Ventura Freeway—0.25 mile east of Telephone Road to Palm St. in Ventura; grade, pave and structures for 6-lane freeway (first unit of freeway through Ventura). (Financed $6,000,000 in 1959-60 fiscal year.)	4.6	9,300,000
Ventura, Los Angeles	2 (US 101)	Ventura Freeway—Los Angeles city limit to 0.1 mile east of Cheeseboro Rd., and 0.5 mile west of Moorpark Rd. to Conejo Grade Summit; resurface	10.5	730,000
Ventura	151 (SR 150)	Ojai Ave.—West city limit to 0.1 mile east of Shady Lane in Ojai; grade and pave (widen)	2.1	60,000
Ventura	Various	Rights of way on State Highway Routes (including $1,500,000 for Sign Route 126 freeway between Ventura and Santa Paula)		2,535,000
Yolo, Solano	6 (US 40)	0.2 mile west of the Solano county line to Swingle; grade, pave and structures (convert from expressway to full freeway, including the Davis Interchange)	4.3	2,750,000
Yolo	7 (US 99W)	Main St.—Walnut St. to West St. in Woodland; grade and pave (widen to 4 lanes)	0.3	110,000
Yolo	87 (US 40 Alt)	Cache Creek Bridge north of Woodland; structure and approaches (replace bridge)	0.4	180,000
Yolo	90, 6	Solano county line to 2.8 miles north of Madison on the Winters-Dunnigan Cutoff; grade and pave to complete the initial two lanes of a future 4-lane freeway. (Structures and grading now under contract from an allocation in the 1958-59 fiscal year.)	13.7	2,000,000
Yolo	Various	Rights of way on State Highway Routes		630,000
Yuba	Various	Rights of way on State Highway Routes		190,000

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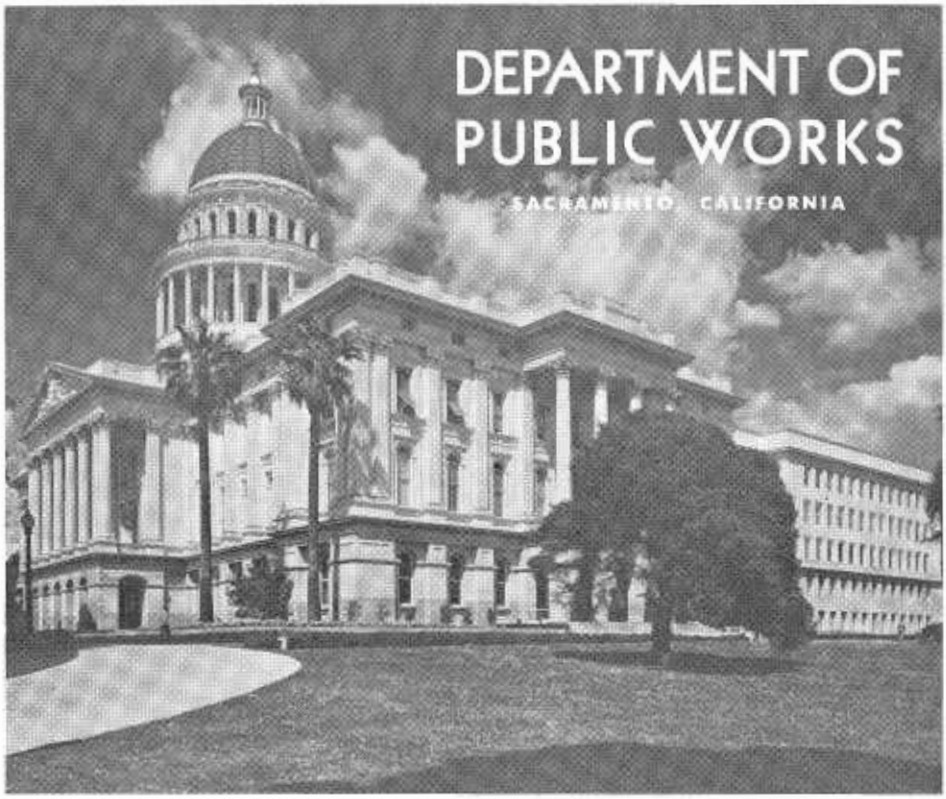
GOODWIN J. KNIGHT
Governor of California



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2