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# California Highways and Public Works

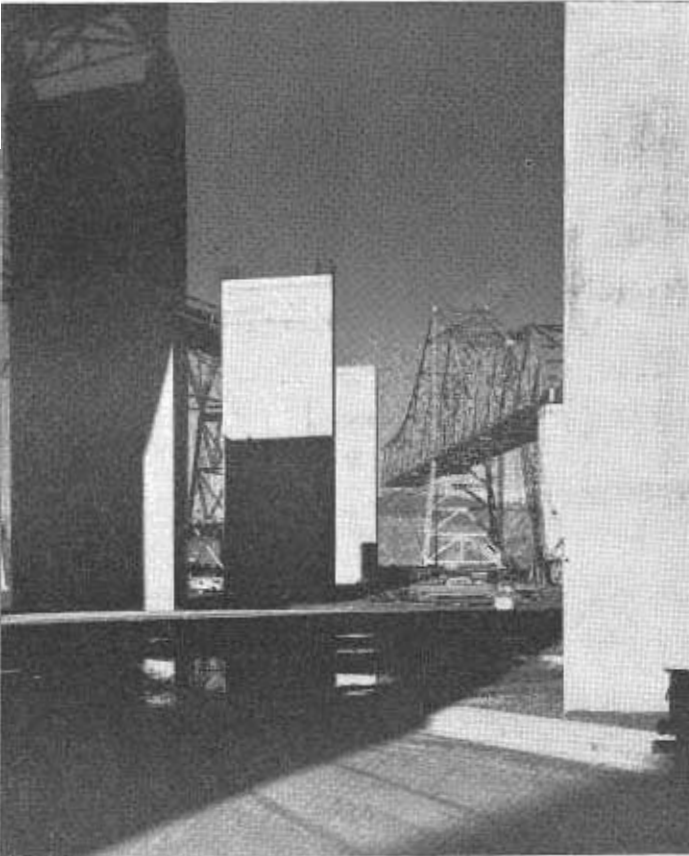
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## FRONT COVER

The steel superstructure of the new parallel Carquinez Bridge is viewed through the concrete piers of the south approach. The curved ramp of the old bridge can be seen behind the piers to the right.

—Photo by Bill Ruland



## BACK COVER

The San Francisco-Oakland Bay Bridge, shown here in a view from Yerba Buena Island looking toward Oakland, was cited as one of the seven "civil engineering wonders of the U. S."

—Photo by William Chaney

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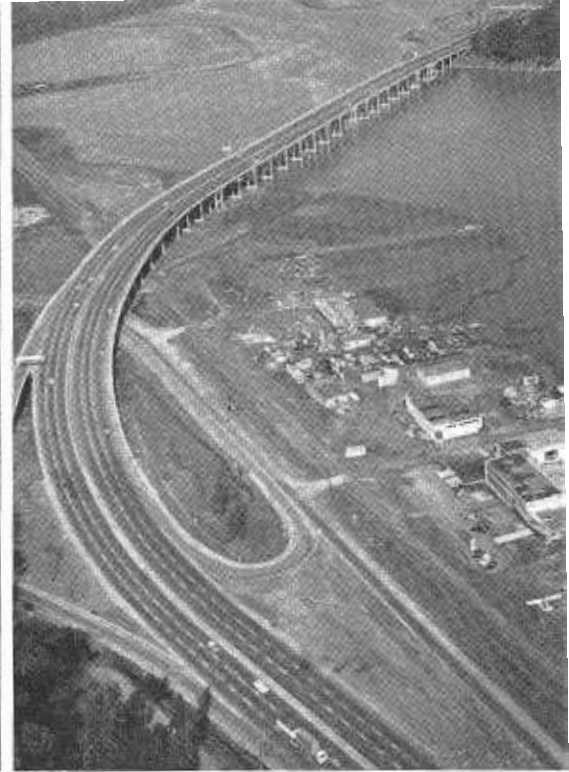
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*Address communications to*

**CALIFORNIA HIGHWAYS AND PUBLIC WORKS**

P. O. Box 1499

SACRAMENTO, CALIFORNIA



# Report From

*Pushed Toward Completion  
Bay Area Freeway Network*

# District IV

By B. W. BOOKER  
Assistant State Highway Engineer

THE POPULATION of the nine counties in District IV (Sonoma, Napa, Marin, San Francisco, Contra Costa, Alameda, San Mateo, Santa Clara and Santa Cruz) has increased from 2,500,000 in 1947 to 3,200,000 in 1957. It is expected that by 1970 the population of the area will increase to nearly 5,000,000. During the past 10 years automobile registration has increased over 80 percent. The ratio of persons per vehicle has been steadily declining to a present 2.3 persons per vehicle within the metropolitan area and less within the rural areas.

Many new areas, both residential and commercial have been developed; new cities have been formed and

others will be required in the future. The growth in population and automobiles in the nine counties has introduced many problems, not the least of which is transportation.

The task of providing a transportation system to serve the needs of the dynamic increases in population and area development is a tremendous one. It requires the development of all forms of transportation which contribute to the solution of the problem.

It is the State Highway's responsibility to provide the network of freeways and major highways which are an essential component of the integrated transportation system required to serve this area.

District IV freeway system planning has been based on comprehensive traffic information as well as collection of planning data, future population projection and probable land use changes. This has been done through public meetings, by discus-

sions with those engaged in planning, public works, and pertinent operations in the cities and counties, as well as with the utility and industrial organizations and others who are similarly engaged in area development.

#### **Progress Cited**

Since funds for the expanded program of street and highway development were made available in 1947, we have made substantial progress. It may be too easy to forget the previous traffic conditions existing along our conventional highway and city street routes prior to improvements as freeways. There may be a tendency to neglect to appraise the situation which would have prevailed if the tremendous increases in traffic still had to be served by conventional facilities along these routes. In spite of this progress there is a great deal left to be accomplished. In District IV, there are a

... Continued on page 2

*Photos at Top of Page. LEFT—A newly completed section of the Bayshore Freeway in southern San Mateo County. CENTER—A freeway section of U. S. 40 recently opened to traffic in Contra Costa County. RIGHT—The Richardson Bay Bridge on U. S. 101 in Marin County.*



Public Works Building  
Twelfth and N Streets  
Sacramento

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## DISTRICT IV

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total of 1,381 miles of state highway. Of this, approximately 1,000 miles are to be developed as freeways and routings for 537 miles have been adopted. Since 1947, 242 miles of freeway have been constructed, another 47 miles are under construction and 30 miles are scheduled for construction in the 1958-59 Fiscal Year.

The decade has witnessed the virtual completion of a basic network of the freeway system extending from the metropolitan Bay area in all directions. By the end of 1958, continuous freeways and expressways will be in service or under construction extending from Los Gatos to San Jose then via the Eastshore through Oakland to Sacramento; from Oakland to Tracy; from San Francisco to Moffett Field south of Palo Alto; and from San Francisco to Santa Rosa (with the exception of the portion through Novato). Other important routes are being progressively planned and constructed.

We are well advanced in development of the first stage of our planned construction along the heaviest routes of travel. Other areas must be afforded relief from present inadequacies and provision must be made for traffic demands of the future. One freeway alone could never serve heavily developed areas near large centers of population. Other freeways radiating from the metropolitan hubs to areas not served by present freeways must be provided if present unsatisfactory conditions of traffic congestion are to be eliminated.

As is proper, the rights of the individual must be weighed along with the need of the many, and the highlight of the present picture of highways development is the democratic processes of discussion and deliberation by all parties concerned with the purpose of obtaining agreement upon the routes which will provide the greatest public benefit with the least private injury.

Let us review the accomplishments of the past year, as they fit into the existing pattern and as they project into the plans for the future.

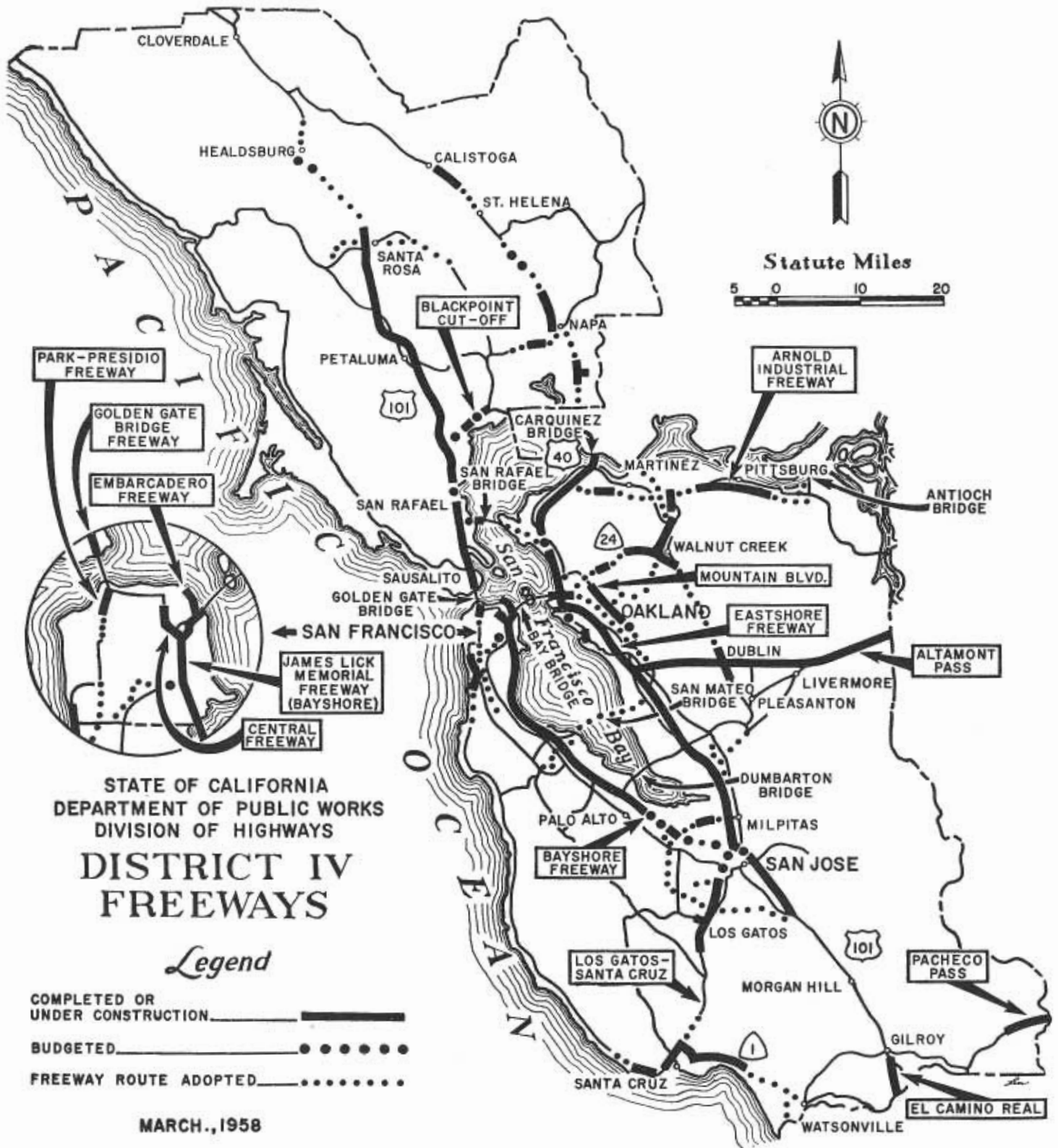


**US 101 and US 101 Bypass**

Development to higher standards and extension of the freeway portions is continuing along these major north-south routes in District IV which extend from San Francisco to the north boundary of the district at the Mendocino county line, and to the south boundary of the district at the San Benito county line.

At the present time, the main activities, construction-wise, are concentrated along the US 101 Bypass (Bayshore Freeway) south of San Francisco from San Carlos to Palo

At the present time, the main activities, construction-wise, are concentrated along the US 101 Bypass (Bayshore Freeway) south of San Francisco from San Carlos to Palo





The double-deck Cypress Street structure on the Eastshore Freeway in Oakland. The southbound off-ramp to 14th Street is at the lower left.

Alto and further extensions are budgeted for 1958-59. The completion of these going jobs early this year will provide a continuous freeway for the 35 miles between the San Francisco-Oakland Bay Bridge approach (US 40) and Palo Alto.

Continued development of the freeway south to San Jose is assured with projects included in the 1958-59 Fiscal Year Budget. In this budget are projects extending from Palo Alto to the completed interim interchange at Moffett Field, as well as an interchange at the Mountain View-Alviso Road intersection and the extension of the freeway north of San Jose from Taylor Street to Brokaw Road. From

Taylor Street south, there is now in existence a four-lane facility to the San Benito county line, portions of which are expressways.

Also being continued is the improvement of US 101 north of San Francisco. Major projects budgeted for this next year along this section amount to \$4,617,000. The entire portion between the Golden Gate Bridge and just north of Santa Rosa is now in service as a four-lane, or better, divided facility. Most of it is now a freeway or expressway. Freeway construction is now under way immediately south of San Rafael and other projects, which will be started soon,

will further improve sections of this highway.

#### **US 101-101 Bypass in San Francisco**

In San Francisco, US 101 follows the routing of the Southern Freeway to its connection with the James Lick Freeway (Bayshore) at the Alemany interchange. It then proceeds along James Lick Freeway to the Central Freeway connection at 13th Street and along the Central Freeway to Van Ness Avenue and to the Golden Gate Bridge and points north.

US 101 Bypass is that portion of the James Lick (Bayshore) Freeway southerly of the Alemany interchange to the peninsula and points south.



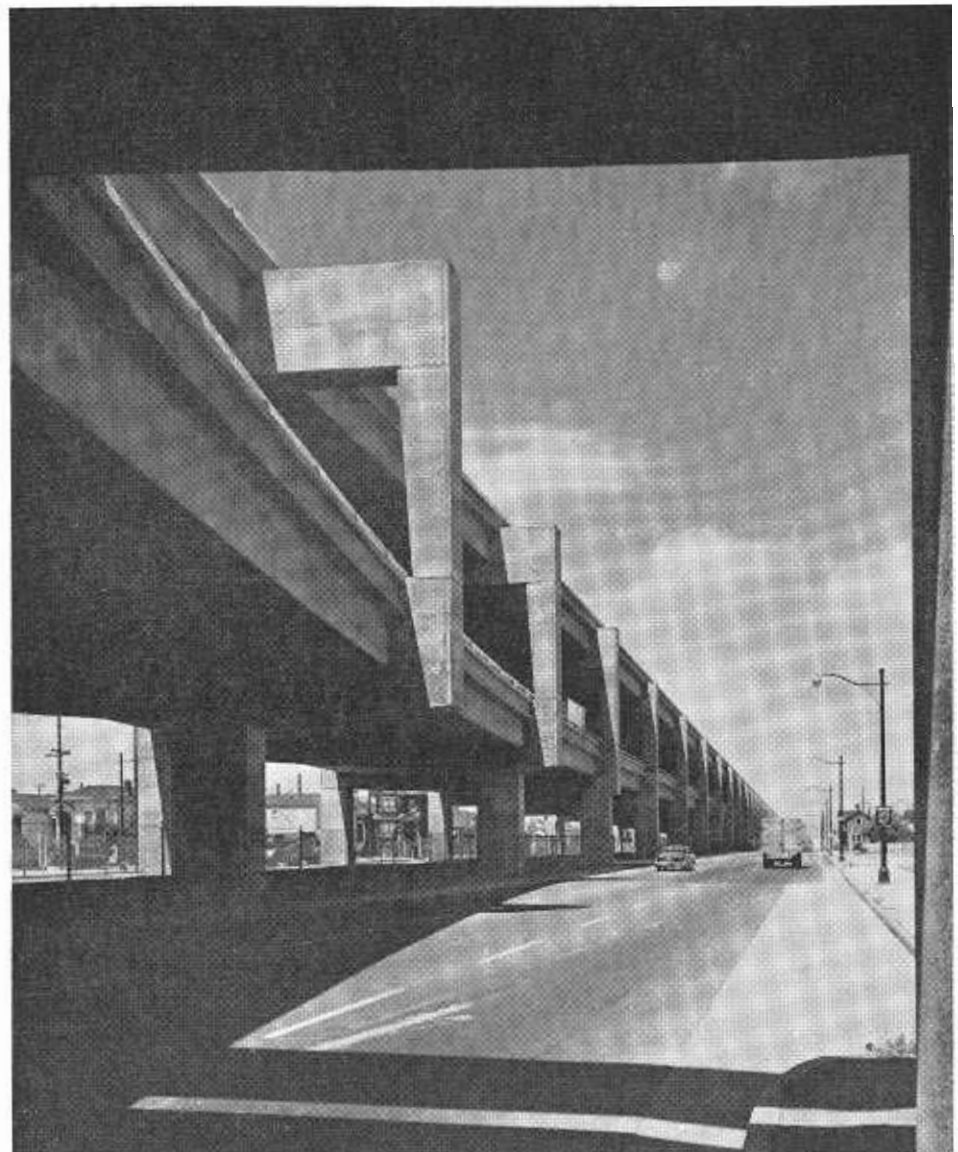
Much of these freeways through the City of San Francisco have now been completed or are under construction or budgeted. The James Lick (Bayshore) Freeway is completed from the Central Freeway to the south city limits of San Francisco.

Northerly, the Central Freeway is completed to South Van Ness Avenue. This portion of the Central Freeway was opened to traffic in 1955 as a single-level elevated structure and, along with the elevated portion of the James Lick (Bayshore) Freeway, is often referred to as the "Skyway." The remainder of James Lick Freeway from the Central Freeway at 13th Street to the San Francisco-Oakland Bay Bridge is a part of US 40 and will be covered under that route.

Under construction at this time is a 1.3-mile-long extension of the Central Freeway from South Van Ness Avenue to Turk Street. Completion of this \$7,725,000 project is expected during the summer of 1959. This portion of the skyway will be a two-level elevated viaduct with the three southbound lanes carried above the three northbound lanes and both directions of travel will be elevated over the city streets, leaving them clear to handle the cross traffic movements. Shoulders for emergency parking aside of the through traffic lanes are being constructed on each level of this facility. Contractor on this project is the Peter Kiewit Sons Company.

As a portion of the future Golden Gate Freeway, design is underway for a 1.3-mile-long project extending between the Park Presidio Freeway and the Marina approach to the Golden Gate Bridge. This project will widen the present freeway to eight lanes and revise the interchange at the junction of US 101 and State Sign Route 1. Estimated construction cost is \$5,700,000.

Within San Francisco the James Lick (Bayshore) Freeway is now complete. Continuation of landscaping, ground cover and erosion control work along this freeway will proceed. Funds totaling \$75,000 for this work between Fifth Street and 17th Street are included in the 1958-59 Fiscal Year Construction Program. During the past year a double steel post guard



*The double-deck Cypress Street traffic viaduct on the Eastshore Freeway through Oakland. Note the local service roads on each side.*

rail was constructed in the median separating opposing traffic between 17th Street and Army Street with guide posts southerly to Third Street. This work approximated \$46,900 in cost and was done by J. Henry Harris, contractor. Results of this installation in minimizing the number of and severity of spectacular accidents through this section are being carefully observed.

With completion of the James Lick Memorial Freeway (Bayshore) in San Francisco, and as the major traffic distribution units of the Embarcadero and Central Freeways are now under construction, planning has been advancing toward other segments of the

much-needed integrated San Francisco Freeway System.

Planning studies on the Southern Freeway have been completed and a route adopted for an eight-lane freeway following generally along the old Southern Pacific Railroad locations and Alemany Boulevard between Orizaba Avenue, near the south city limits of San Francisco, and the James Lick Memorial Freeway (Bayshore). Route location west of Orizaba Avenue is dependent on future location of the Junipero Serra Freeway. Studies and hearings for that freeway have been under way for some time.

Rights-of-way acquisition is well advanced with \$8,685,000 appropriated



in the 1957-58 Fiscal Year. An additional \$1,400,000 has been budgeted for rights-of-way in 1958-59. Overall construction costs on the entire 4.3 miles of this freeway are estimated at \$18,000,000.

Early construction of the first unit of this freeway is assured—\$4,730,000 of the estimated \$6,900,000 construction cost of the first unit is included in the 1958-59 Fiscal Year construction budget. The remaining cost is to be financed in the 1959-60 Budget. This first unit consists principally of an interchange with the James Lick Freeway (Bayshore) at Alemany Boulevard together with freeway construction for approximately 0.5 mile to the west where it will reconnect to Alemany Boulevard. Grading will be continued to Trumbull Street. The City of San Francisco has plans for the easterly extension of this freeway from James Lick to connect with Southern Crossing Freeway approach, planning for which is now being made by the Division of Bay Toll Crossings. Neither of the latter two extensions are presently a part of the State Highway System.

#### **San Francisco to Palo Alto**

Recently completed at the south city limits of San Francisco between Third Street and Butler Road in San Mateo County, was the last contract for freeway construction over the "open water fill" project across an arm of the bay between Candlestick Point and Sierra Point. As a direct result of this relocation, there is an estimated 20 minutes saving in travel time through this area during peak hours and a saving of 0.4 mile in distance. Construction work was performed by a total of seven contracts amounting to \$7,710,000. Contractor on the final project, involving drainage and paving, was L. C. Smith and construction cost of this project was \$1,563,000.

Funds in the amount of \$246,000 are budgeted this next year for landscaping on this freeway, between Third Street and Butler Road.

From the south end of the open water project at South San Francisco to Bransten Road, just north of Redwood City, the freeway has been completed and in operation for some time. This work started in 1946 and

was finished with the completion of the southernmost contract in 1955.

The remaining eight miles from Bransten Road to the Santa Clara county line has been under construction as four separate projects. The first of these was the Willow Road interchange which was finished in 1956. This project was selected for first construction to eliminate a very congested intersection as early as possible and prior to the time when the freeway could be constructed in its entirety to this point.

The second contract to be completed extends from Willow Road to 0.5 mile south of the Santa Clara county line and includes frontage roads on both sides southerly to Embarcadero Road in Palo Alto. It is expected to be finished during March, 1958. Included in this project is a major interchange at University Avenue. Construction cost on this 2.2-mile section approximates \$1,900,000. Work was performed by Charles L. Harney, Inc.

The third contract is scheduled for completion by April. This two-mile project extends to north of Marsh Road including an interchange there. Charles L. Harney is the contractor on this \$1,770,000 project. Provided in this contract, as well as in the other three, will be an initial six-lane, ultimate eight-lane freeway.

Construction is well under way on the remaining project which will link the above projects and the completed freeway to the north. This project is a 3.8-mile relocation from Bransten Road to 0.4 mile north of Marsh Road. The \$5,550,000 contract is being performed as a joint venture by Piombo Construction Co., M & K Corporation, and Connolly and Pacific Co. The expected date of completion is the summer of 1958. Full use of the 35-mile continuous freeway facility will then be in effect between Palo Alto and the San Francisco-Oakland Bay Bridge.

Additional improvements are contemplated during this next year on already completed portions of the freeway. These include, in addition to the landscaping project on the "open water fill," a bus stop at the Third Avenue Interchange in San Mateo, a revision of the East Hillsdale Boule-

vard Interchange, and landscaping improvements between Peninsular Avenue and 16th Avenue in San Mateo.

#### **Palo Alto to North of San Jose**

Improvement is being continued this year throughout most of this section. Included in the 1958-59 budget is \$11,540,000 for several major projects.

In the budgeted items is the extension of the freeway through Palo Alto to Stevens Creek near Moffett Field. This project will complete the freeway southerly to the completed Moffett Boulevard Interchange. Design of this 4.4-mile connecting link was based on the need for initial six lanes with provision made for eight lanes in the future when needed. Budgeted this fiscal year are funds in the amount of \$3,265,000 for this \$5,150,000 project. Construction is expected to start in the summer of 1958.

Completed in January of this year was the 1.1-mile section of freeway and interchange near Moffett Field at a cost of \$1,031,000. Four lanes of this ultimate eight-lane freeway were constructed at this time along with a full four-quadrant cloverleaf with bus stop facilities at Moffett Boulevard. Contractor for this work was the firm of L. C. Smith Co.

By early summer, 1958, an interchange will be under construction at the intersection of the Mountain View-Alviso Road. Funds in the amount of \$1,290,000 are included in the 1958-59 budget for this purpose.

Design studies are well advanced on the remaining sections of freeway to Brokaw Road, just north of San Jose, that the not already financed and which will eventually provide a continuous freeway to south of San Jose. It is anticipated that further improvements of this major freeway will be continued as rapidly as availability of funds and priority of other worthwhile projects will permit.

#### **San Jose to San Benito County Line**

Completed in 1957 was a four-lane, future six-lane freeway in the City of San Jose extending from north of Taylor Street to Santa Clara Street. This project eliminated the last of the



three-lane portions on the route. Contractor on this 1.6-mile-long freeway was Lew Jones and Leo F. Piazza. Construction cost was \$1,681,000.

Budgeted in 1958-59 Fiscal Year is \$5,100,000 for a four-lane, future six-lane freeway from 0.5 mile north of Brokaw Road to Taylor Street. A major interchange at the intersection of the Eastshore and Bayshore Freeways is included in this project as well as the extension of Sign Route 17 from this interchange to First Street in San Jose where it connects with another budgeted project completing the Sign Route 17 Los Gatos-San Jose Freeway development in this area.

South of Santa Clara Street to Ford Road, an expressway has been in operation since 1947. Eventually it is expected that intersections at grade will be replaced by interchanges and planning has proceeded accordingly.

From Ford Road to south of Gilroy, the last of the three-lane width through this area was eliminated by expanding to a four-lane section, between Ford Road and Llagas Creek in 1956. Location studies are still under way for a freeway routing.

South of Gilroy to the San Benito county line, 5.8 miles of four-lane expressway (future six-lane freeway) have been in operation since early 1951.

#### **El Camino Real—San Francisco to San Jose**

As the work of extending the US 101 Bypass (Bayshore) Freeway toward San Jose progresses, improvement of portions of El Camino Real (US 101) has also been under way. At numerous locations along this route, traffic signals, channelizations, and widening to four- and six-lane, divided or undivided, conventional city street boulevard standards have been constructed.

Completed in 1957 in the City of San Mateo was a 2.9-mile-long widening project extending between 31st Avenue and Poplar Avenue which widened the street to six lanes. This \$505,000 project was performed as a co-operative project between the City of San Mateo and the State, with the city providing an estimated \$112,000 of the funds required. Contractor on this project was Lowrie Paving Co. and Lord & Bishop.

Budgeted this next year (1958-59) is \$1,455,000 for additional work along this route which will be accomplished in four contracts. The major project among these covers the 3.8 miles between San Tomas Aquino Creek in the City of Santa Clara and State Sign Route 9 in Sunnyvale at an estimated cost of \$1,170,000. Work will consist of the grading and surfacing necessary to widen the highway to

four lanes. It is anticipated that a start will be made on this work in the near future.

Additional widening work will be performed in the City of Millbrae where the highway will be expanded to six lanes at a cost of \$150,000 for a distance of 0.6 of a mile. The city is contemplating additional work in conjunction with this project, including curbs, gutters, and parking lanes.

The other two contracts will involve signals and channelizations in San Jose, one of which will be at the intersection of Alma Avenue and the other at Cottle Road. Both of these are co-operative projects with the City of San Jose, and the city will provide \$21,700 toward the expected cost of \$156,700 for these projects.

#### **US 101—Golden Gate Bridge to Mendocino**

Continued progress was made in 1957 toward the completion of US 101 as a freeway. Funds are provided in the 1958-59 budget for additional work on this route.

Work was completed early in 1956 over the Waldo approach from the northern end of the Golden Gate Bridge to just south of the Richardson Bay Bridge. This improvement converted the inadequate four-lane undivided facility to a full six-lane freeway. It was dedicated and opened to



LEFT—This section of U. S. 40 in Contra Costa County was opened to traffic in February. The scene is looking northeast toward Oleum in the left background. RIGHT—Another photo of U. S. 40 Freeway in Contra Costa County looking south toward Richmond. The interchange nearest the camera is San Pablo Dam Road.

traffic on March 20, 1956. Construction and rights-of-way were financed jointly by the Golden Gate Bridge and Highway District and the Division of Highways.

Proceeding northerly and extending for a distance of 5.8 miles between Manzanita to just south of the Greenbrae intersection, freeway construction is now complete. Included in this section is the new six-lane bridge over Richardson Bay which was opened to traffic in the fall of 1956.

Other recent additions to the freeway include the portion completed and opened to traffic in the summer of 1957. This is the \$1,480,000 project between the Richardson Bay Bridge and 0.3 mile north of Alto. Dan Caputo Company and Dan Caputo & Edward Keeble were the contractors on this initial six-lane, ultimate eight-lane section of freeway.

North and immediately adjacent to the above project, the freeway was also extended in 1957 to 0.6 mile north of the Greenbrae Intersection, a distance of 3.5 miles. Peter Kiewit Sons Company was the contractor on this \$2,924,000 project.

Budgeted this year at the Greenbrae Intersection is the third construction stage of this important interchange. Funds are provided in the amount of \$1,800,000 for the northbound bridge which, when finished, will complete the traffic separation at this point. The existing bridge at this location is now being used for one-way traffic, northbound, and this traffic presently continues to pass through the traffic signals at the junction of Sir Francis Drake Boulevard. After completion of the interchange, the existing bridge will serve as a part of the off-ramp and the signals will be utilized to control local traffic at the intersection only.

Under way at this time and expected to be completed in the spring of 1959 is a project extending 1.4 miles from the Greenbrae Interchange to 0.5 mile north of the California Park Overhead. This is the last link for freeway construction on this route south of San Rafael. Work consists of grading, paving and structures for a six-lane freeway at an estimated cost of \$1,919,000. Twin three-lane bridges will replace the existing wooden struc-

ture over the Northwestern Pacific Railroad at California Park. Contractor on this work is the Frederickson and Watson Construction Co.

From 0.5 mile north of California Park to the north city limits of San Rafael, the freeway has been completed and in use for some time. Northerly of this point, as far as the entrance to Terra Linda, the highway has been declared a freeway and although left turns are physically prohibited, it has not been constructed to full freeway standards whereby access from immediate properties are controlled. Two hundred thirty-two thousand dollars is budgeted in the 1958-59 Fiscal Year for three more projects along US 101 in Marin County. These are \$125,000 for the addition of a southbound truck lane over Puerto Suelo Hill, just north of San Rafael which will minimize congestion on through lanes due to slow moving vehicles on this sustained grade; \$60,000 for the relocation of a truck scale at Gallinas Creek; and \$47,000 for a reconstruction of the southbound lanes between Manuel Freitas Parkway and Miller Creek.

Completed in 1957 was a new Forbes Station Overhead Bridge. New twin bridges for an initial six-lane, future eight-lane freeway over the Northwestern Pacific Railroad were constructed. Contractor on this \$500,000 project was Charles L. Harney, Inc.

From Forbes Overhead to south of Petaluma, a distance of 18.9 miles, the existing facility is an expressway except within the Town of Novato. Planning studies are now well advanced for the future development of this entire distance into full freeway standards with no at-grade intersections.

Now complete as a freeway is the 18.5-mile length extending from south of Petaluma to the south city limits of Santa Rosa. Construction was performed on five contracts, the first of which was a bridge at Petaluma Creek and abutment fills.

Within the above section, work was finished in December, 1956, on the 8.6-mile Petaluma Bypass between 1.4 miles south of Petaluma Creek and Railroad Avenue north of Petaluma.

The project provided a complete freeway to Denman Flat and grading to Railroad Avenue. Work was performed by Parish Bros. & Carl N. Swenson Co., Inc., at a cost of \$3,709,000. Thirty thousand dollars is included in the 1958-59 budget for landscaping on the 5.8-mile portion south of Denman Flat.

Two additional projects were completed in 1957 on this section of freeway. The first of these projects extended from Denman Flat to three miles north of Cotati at Wilfred, a distance of 7.9 miles. Work was performed by Parish Bros., Inc., and Parish Bros. & Carl N. Swenson Company, Inc., at an estimated construction cost of \$2,700,000.

The other contract extended the freeway from three miles north of Cotati to a connection with the existing expressway through Santa Rosa. Construction cost was \$2,869,000 and Guy F. Atkinson was the contractor on this 5.1-mile-long project.

North of Santa Rosa to the Mendocino county line the highway is not as yet constructed as a freeway. Route adoption for the future freeway location has been accomplished as far north at Lytton and a 1.4-mile portion of this section is budgeted for construction this year. This project will provide a four-lane freeway between Grant School, south of Healdsburg, and the Guerneville Road at an estimated cost of \$2,480,000.

Design for the other portions of the freeway northerly of Santa Rosa to Lytton is under way and is well advanced. Initial construction as a four-lane facility, partially expressway, and partially full freeway, is planned.

From Lytton to the Mendocino county line, studies for future freeway development are under way.

#### **Embarcadero Freeway**

Work was completed in 1957 on the first two contracts of this multi-lane, elevated freeway which distributes traffic to and from downtown San Francisco. Freeway service is now provided from the on and off ramps at Beale and Main Streets, near Mission Street, to the Skyway as well as to the San Francisco-Oakland Bay Bridge.





*Construction on the new parallel Carquinez Bridge looking north from above the Big Cut. Crockett Interchange is in the foreground.*



Construction was started on the first of these contracts in May of 1955 by MacDonald, Young and Nelson, Inc., and Morrison-Knudsen. Construction cost of this 0.9-mile-long single- and double-decked project was \$5,407,000. Second stage construction was performed by Charles L. Harney, Inc., at a cost of \$1,921,000. This project provided a two-lane single-level structure for Oakland-bound traffic and the extension of the freeway to Howard Street as a four- and six-lane, two-level structure.

Under construction at this time is the third link in this freeway system extending it 1.2 miles from Howard Street, past the Ferry Building to Broadway and Sansome Streets. Completion of this \$7,800,000 contract is expected during the summer of 1959. Charles L. Harney, Inc., is also the contractor on this two-level freeway. Extensive reconstruction work is required along this latest project including the relocation of portions of both the State Belt and Southern Pacific Railroad tracks and channelization of the Embarcadero alongside the freeway.

#### **Western and Park Presidio Freeways**

Preliminary studies are under way for the proposed Western Freeway from the intersection of Junipero Serra Boulevard, near Alemany Boulevard, north and east to a junction with the Central Freeway in the vicinity of Oak and Octavia Streets. Studies also include locations for a connection of the Park Presidio Freeway to the Golden Gate Bridge. A recent report of consultants hired by the City of San Francisco confirms the need for the freeways and a future report by them will discuss the routings.

#### **Junipero Serra Freeway**

In July, 1956, Joint Highway District 10 was dissolved and the Legislature designated the constructed portion of this route as State Highway Route 237. The Highway Commission adopted the existing facility from State Sign Route 1 in Daly City to Crystal Springs Road in San Bruno, and declared it to be a freeway. Subsequently, a portion of this four-lane divided expressway was repaved in 1957 and the major intersection at

Hickey Boulevard was signalized and channelized. Construction cost was \$195,000. Lowrie Paving Company was the contractor. It is anticipated that this route will be developed to full freeway standards in the future and planning is advancing accordingly.

In February, 1957, the Legislature designated Route 239 as being from a point on Route 56 (SSR 1) near Daly City to Route 2 (US 101) near San Jose. A short section along Moorpark Avenue in San Jose from Saratoga Avenue to new Sign Route 17 was adopted in November, 1957.

In addition to the short section above, the location for another portion of Route 239 was adopted by the Highway Commission on November 25, 1957. This portion extends between US 101 south of Ford Road and the new Sign Route 17, near Vasona Junction. Design studies are under way.

On the remainder of this new route, many meetings have been held with local authorities and the public concerning various possible locations and at the time of this writing, analysis of the results of the various meetings and studies is in progress.

#### **Skyline Freeway-Sign Route 5**

In December, 1954, a 2.3-mile portion of expressway on Skyline Boulevard between Edgemar Road and Alemany Boulevard was placed in service.

Continuation of the expressway northerly of Alemany Boulevard 1.3 miles to the south city limits of San Francisco was completed in March, 1956. Concurrently, the City of San Francisco completed the 1.0-mile portion north of the city limits to Lake Merced Boulevard, also as an expressway.

#### **Sign Route 1 Freeway**

Scheduled for completion in March, 1958, is the \$1,378,000 link between Edgemar on the coast route (Sign Route 1) and Skyline Boulevard at Edgemar Road. This 2.2-mile link included grading, surfacing and structures to provide a four-lane expressway. Contractor was the McCammon-Wunderlich Co. and the Wunderlich Contracting Co.

This project replaces the two-lane coastal road along the bluffs north

of Edgemar which has been subjected in the past to numerous closures due to wet weather slides. Maintenance problems encountered have been difficult and costly and are being eliminated by this project.

Improvement of other portions of this highway to multilane standards at some time in the future is contemplated and in various stages of planning. The routing for a portion of this work, extending from a connection with the expressway now under construction at Manor Drive in Edgemar to Pedro Valley, was adopted as a freeway by the Highway Commission in January, 1958.

#### **19th Avenue Freeway-San Mateo**

Planning studies are complete for the 19th Avenue Freeway in the City of San Mateo. In March, 1957, the State Highway Commission adopted the route for this freeway extending from Sign Route 5 (Skyline Boulevard) west of San Mateo, to the Alameda county line at the San Mateo Bridge, a total distance of 7.2 miles. Design studies on this four-lane facility are well advanced and rights-of-way acquisitions are in progress. A freeway routing was previously adopted from the county line to the Eastshore Freeway by action of the Highway Commission in August, 1952.

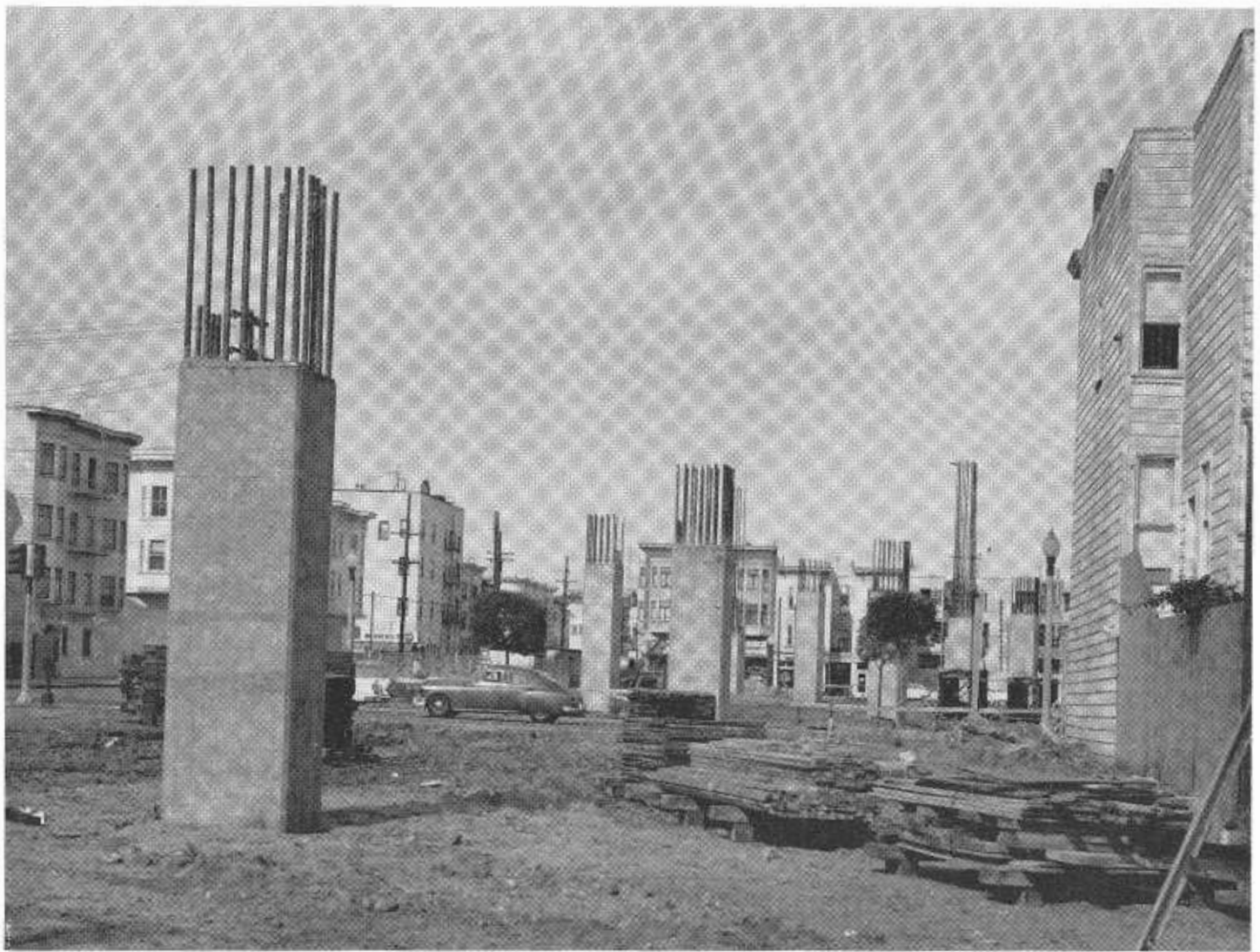
#### **US 40—San Francisco to East Bay**

US 40 starts at the James Lick Skyway and Central Freeway Interchange (US 101) at 13th Street in San Francisco and proceeds across the Bay Bridge (US 40 and 50) and northerly via the Eastshore Freeway to the El Cerrito Overhead thence through Richmond and northerly.

From US 101 to the Eastshore Freeway, the freeway has been completed including connections to the Embarcadero Freeway just west of the Bay Bridge. The portion in San Francisco is referred to as the James Lick Skyway.

Faster service during peak hours has been obtained at the toll plaza on the east approach to the Bay Bridge as a result of the increased number of toll booths and drivers-side toll collections. Cost of this construction, amounting to \$2,200,000, was financed by toll bridge funds and included widening and sur-





Construction on the Central Freeway (U. S. 101) in San Francisco. The piers will support a double-deck traffic structure. Right-of-way needed is reduced to a minimum by double-deck design.

facing the toll plaza area and construction of new toll collection booths. Construction was completed in March of 1957.

From the distribution structure to south of the El Cerrito Overhead, US 40 is also SSR 17. This portion is complete and is an eight-lane freeway. The last portion of this freeway was completed in November of 1956 and extended 1.9 miles from south of University Avenue to the El Cerrito Overhead. Funds are included in the 1958-59 Budget in the amount of \$235,000 for landscaping work along this section.

Completion of a freeway routing for US 40 mostly on new alignment between the El Cerrito Overhead and the Solano county line is now contemplated in the foreseeable future. This

13.6-mile freeway is now in use, under construction, or budgeted for its entire length. There remains only the 1.8-mile section from south of El Cerrito Overhead to south of Jefferson Avenue in Richmond. The design for this remaining portion is completed. The project includes an additional structure at El Cerrito Overhead and diamond interchanges at Central Avenue and Carlson Boulevard. Funds are budgeted in the amount of \$4,300,000 in the 1958-59 Fiscal Year for this \$6,250,000 project. Construction is expected to be under way in the spring of 1958.

Immediately to the north of the above budgeted project, the six-lane freeway extending to just south of Hilltop Drive has been completed and

open to traffic since early 1957. Construction work on this 4.8-mile project was done by the combine of Fredrickson and Watson Construction Co. and M & K Corporation at a cost of \$5,621,000.

On February 6, 1958, the 4.9-mile project, from Hilltop Drive to Hercules was opened to northbound traffic and subsequently southbound traffic has also been routed over this completed section. In keeping with the Division of Highways policy of opening completed portions of improvements to serve traffic as soon as possible, a temporary connection from the freeway to the old highway just south of Rodeo was constructed in order to effect this early service. Contractors on this \$7,383,000 job were McCammon-

Wunderlich & Wunderlich Contracting Co.

North of the Arnold Industrial Freeway (Sign Route 4) the freeway is being financed by special toll bridge bonds as an approach to the new Carquinez Bridge. These projects will result in an initial six-lane, future eight-lane, freeway. A new bridge is being constructed easterly of and parallel to the existing bridge across the Carquinez Strait. The new bridge will carry four lanes of northbound traffic. The existing bridge will carry three southbound lanes and can be widened in the future to four lanes when justified. Completion of all work and opening to traffic is expected by the end of 1958.

The toll financed projects in this district, including the bridge, a portion of which is in District X, are as follows:

<b>Contracts Under Way</b>	<i>Estimated completion cost</i>
(1) N. of N.C.L., Hercules to Crockett Road—2.9 miles — The project contains the largest highway cut in U. S.: 9,500,000 cubic yards; 3,000 feet long, 1,370 feet wide at top and 350 feet deep. Contractors—Ferry Bros., John M. Ferry, Peter L. Ferry, L. A. and R. S. Crow.	\$7,591,453
(2) Carquinez Bridge superstructure	9,972,565

<b>Contracts Completed</b>	<i>Estimated construction cost</i>
(1) Crockett Interchange and approach ramps ————— Contractors—Peter Kiewit Sons Co.	\$5,089,573
(2) Carquinez Bridge substructure ————— Contractors—Mason & Hanger, Silas Mason Co., Inc., and F. S. Rolandi, Jr.	5,942,364

In addition to the foregoing there are two contracts for mechanical, electrical and toll plaza equipment amounting to approximately \$500,000. Prior to completion of the project an additional contract for the Crockett approach ramp connection and modification of the present bridge amounting to approximately \$600,000 will be required.

#### **US 50—Bay Bridge to San Joaquin County**

The entire 15.3 miles of the future MacArthur Freeway routing between the distribution structure and Castro Valley has now been adopted by the California Highway Commission. Design studies are under way for this development, being more advanced on the western extremities from the distribution structure to Park Boulevard within which limits will be the first construction projects. A total of \$28,655,000 has been expended or budgeted for rights-of-way acquisition on

this route including \$10,800,000 in the 1958-59 Fiscal Year. Design studies are being based on the need for eight lanes on the freeway proper, both initially and ultimately.

Now in full service is the combined freeway-expressway between Castro Valley and the City of Tracy on US 50. Completion of the last section in the fall of 1957 provided a 51-mile-long uninterrupted, combined freeway and expressway facility, between Oakland and Tracy via portions of the Eastshore Freeway (SSR 17), and the Route 228 connection at Castro Valley and US 50.

The project completed this last fall was the last link extending between 0.3 mile west of Center Street in Castro Valley and the previously completed freeway, 2.3 miles west of Dublin. Contractor on this \$4,528,000 project was the Peter Kiewit Sons Company. Constructed was an initial four-lane, ultimate six-lane, freeway which eliminated the last of the former hazardous two- and three-lane road over Boehmer Hill.

Additional funds are budgeted in the amount of \$25,000 for landscaping work this year, a portion of which is on US 50. This project will extend from the Eastshore Freeway via Route 228 to east of Center Street in Castro Valley, a distance of 3.8 miles. In addition, planning and design is now



Central Freeway (U. S. 101) in San Francisco showing ramps under construction





New expressway is being constructed on State Sign Route 1 between Pacifica and Skyline Boulevard just south of San Francisco. Note the old highway on the left which is benched into the bluffs to the north.

under way for the future development of portions of this freeway which were constructed on an initial expressway basis to full freeways eliminating intersections at grade and with access at grade-separated interchange points only.

#### State Sign Route 17

Studies are under way and in various stages for the future freeway development of Sign Route 17 between Santa Cruz and Los Gatos. Design studies for a four-six-lane freeway are well advanced on the 6.2-mile portion between the junction of Sign Routes 1 and 17 in Santa Cruz and north of Granite Creek. North of Granite Creek Road to Los Gatos the route now is a four-lane conventional highway.

A source of serious congestion was eliminated with the opening to traffic in November, 1956, of the 2.1-mile-

long Los Gatos business district bypass and a 0.6-mile connection between the freeway easterly to a junction with San Jose Avenue at Charles Street was completed in 1957. The contractor on this portion of the work was the Lew Jones Construction Company and Leo F. Piazza Paving Company. The cost of this connection was \$294,000. Work was done as a co-operative project with the City of Los Gatos participating to the extent of \$80,000.

Construction on the 8.8-mile relocation project extending between the junction of the Saratoga-Los Gatos Highway in Los Gatos and Bascom Avenue in San Jose, started in July of 1957 and is expected to be finished early in 1959. This four-lane, future six-lane, freeway on relocation is expected to cost approximately \$5,836,000. Alignment of this section lies approximately midway between the

Santa Clara-Los Gatos Road and the San Jose-Los Gatos Road (existing Sign Route 17). The contractors are Gordon H. Ball, Ball and Simpson, and Lew Jones.

#### Eastshore Freeway from San Jose North

Completion of the 33.7-mile freeway between Bascom Avenue in San Jose and the south city limits of Oakland is contemplated in the near future. There remains to be finished only two budgeted projects (1958-59) through the city areas of San Jose, and one project under construction north of Warm Springs to place this entire facility in full use.

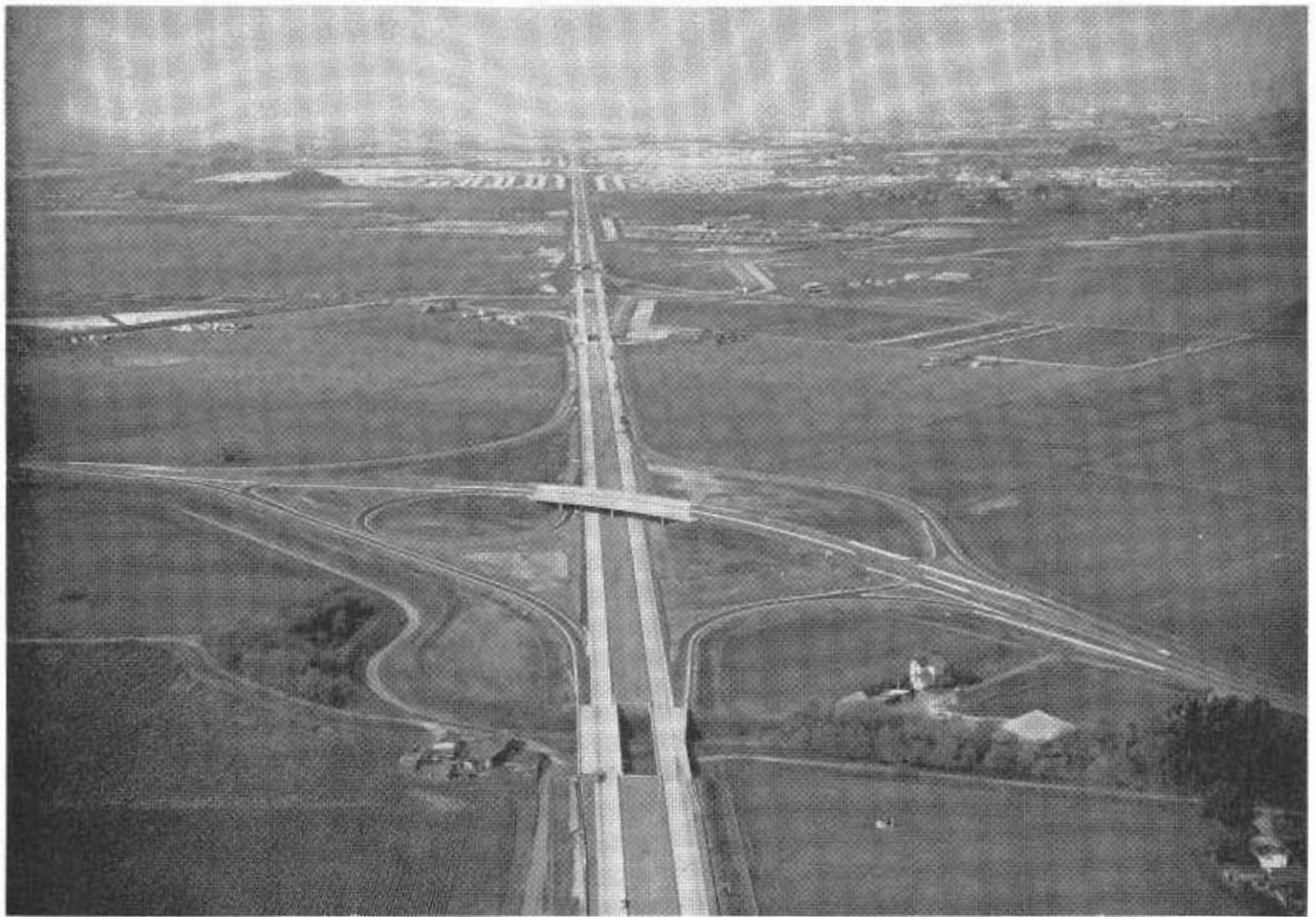
One of the projects budgeted will provide a major interchange at the intersection of the Bayshore Freeway (US 101 Bypass) and the Eastshore Freeway (SSR 17). This 3.9-mile-long construction project will extend from 0.5 mile north of Brokaw Road to Taylor Street on the Bayshore Freeway and from First Street to 0.3 mile north of the existing Bayshore Highway on Sign Route 17. Funds are provided in the amount of \$5,100,000 and it is expected that work will be under way by early summer. Initial construction will be four-lane divided with the future addition of two lanes contemplated when needed.

Also included in the 1958-59 budget are funds amounting to \$3,310,000 for completing the freeway connection in San Jose between the foregoing construction and the project now under way south of Bascom Avenue. This 2.5-mile project will be from North Fourth Street to Bascom Avenue, and will complete a four-lane divided highway through the City of San Jose.

North of the Bayshore Freeway, the freeway has been opened for some time as far as Warm Springs Junction and also from Jackson Street in Hayward to Oakland. The 5.8-mile section extending south from Jackson Street in Hayward to Beard Road was completed in 1957 reducing the gap to one project. Estimated construction cost of this initial four-lane, ultimate six-lane facility is estimated at \$4,620,000. Contractors were Gordon H. Ball and Ball and Simpson.

Immediately to the south of the above project, the freeway is being





*The Eastshore Freeway (Sign Route 17) looking north from the Alvarado-Niles Road Interchange*

continued to Warm Springs Junction and a junction with the completed freeway by the contractors Gordon H. Ball and Ball and Simpson. This project when finished will complete the freeway between San Jose and Oakland and is scheduled to be opened in the fall of 1958. Four lanes are being constructed with provision made for the addition of two more lanes when required. Construction costs on this final link are estimated as \$6,764,000.

Other recent construction along this freeway has included the widening from four to six lanes between the Route 228 connection at Hayward and High Street in Oakland. The additional lanes were required to handle the increased flow of traffic resulting from the completion in 1956, of the four-lane freeway connection tying US 50 and Foothill Boulevard into the

Eastshore Freeway at Lewelling Boulevard.

#### **Eastshore Freeway—Oakland to US 40**

At the end of this year, or by early 1959, the last undeveloped portion of the Eastshore Freeway in Oakland will be completed to freeway standards and opened to traffic. From the south city limits of Oakland to the distribution structure, near the east approach to the San Francisco-Oakland Bay Bridge, the freeway is complete except for one short stretch now under construction extending north from Fallon Street to Market Street in Oakland. Contractors on this 1.6-mile project are Johnson-Drake and Piper, Inc., and it is expected that they will complete their work late this year. Construction cost of this eight-lane elevated freeway is expected to be \$5,234,000. This project will provide

46 miles of continuous freeway between San Jose and the El Cerrito Overhead.

North of this overhead structure at Market Street, completed in 1955, to the distribution structure, two contracts were completed in 1957, providing 2.1 miles of elevated, double-decked freeway structure through this commercial and industrial area of Oakland along Cypress Street. Opposing traffic travels on separate levels of this viaduct. Four lanes are provided for each direction of travel, and in addition, the former highway (Cypress Street) has been reconstructed at surface level along both sides of the freeway, thereby supplying a divided arterial street for use of local traffic. Work on both contracts was performed by the firm of Grove, Shepard, Wilson and Kruge of California, Inc., at an estimated cost of \$8,551,000



for construction. Landscaping of the entire portion of this freeway between Sixth Street and the distribution structure is contemplated and \$40,000 is included in the 1958-59 budget for such work.

North of the distribution structure to the El Cerrito Overhead, Sign Route 17 is combined with US 40 and extends along the east side of the Bay. This section is also in service as a full eight-lane freeway.

#### Connection With US 101 in San Rafael

During 1957, State Sign Route 17 was extended to connect Eastshore Freeway (US 40) with US 101 south of San Rafael at the San Quentin Wye via the new Richmond-San Rafael Bridge. The double-deck six-lane bridge is now complete and both three-lane decks are open to traffic. The bridge was constructed by the Division of Bay Toll Crossings through bond financing. Freeway approaches have been and are being constructed at the San Rafael end by the Division of Highways with gas tax funds.

Completed by the Division of Bay Toll Crossings are the east approaches of the bridge extending to Marine Street in Richmond, all to modern, multilane expressway standards. The route for the future connection between these approaches and the Eastshore Freeway, near the El Cerrito

Overhead, has been adopted in its entirety by the Highway Commission and traverses generally along Hoffman Boulevard. Preliminary design is under way for this future freeway. It is planned that initial construction will be six lanes between the above limits with provisions for eight lanes in the future between 32d Street and Marine Street. Miscellaneous interim projects including channelization of various intersections and drainage improvements have been completed along the present Hoffman Boulevard routing to allow more efficient interim use of the existing facilities.

The west approach of the Richmond-San Rafael Bridge is now in operation as a part of the future freeway that will eventually connect the bridge to US 101 at the San Quentin Wye in San Rafael. This Division of Highways work was completed in 1957. The contractor was Ball and Simpson and the project included grading work over the entire distance from the bridge to US 101 and paving and structures to Sir Francis Drake Boulevard. Construction cost of this 2.1-mile, four-lane project approximated \$1,216,000.

Included in the 1958-59 budget are funds in the amount of \$850,000 to complete this freeway to US 101, a distance of 1.5 miles. This portion of the freeway will also be constructed as a four-lane facility.

#### Sign Routes 9 and 21

Planning of this future Interstate Freeway is in various stages. From Warm Springs to Mission San Jose, preliminary planning is now completed and after public meetings were held, the route for the freeway was adopted on new location. Design is now in progress.

From Mission San Jose, for 4.9 miles, across Mission Pass to Sunol, the route was adopted and declared a freeway on January 18, 1956. Location will be along the general location of the existing highway with substantial reductions in grade over Mission Pass. Design studies are now well advanced.

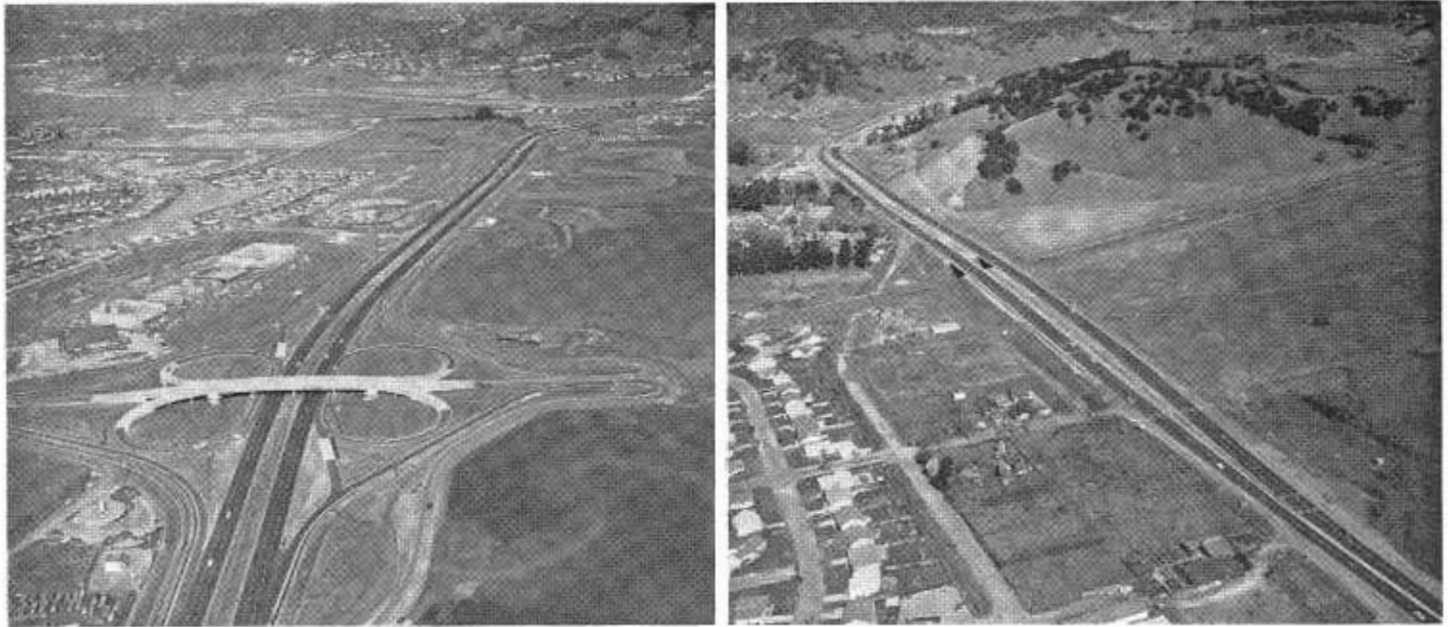
From Sunol to US 50 at Dublin, preliminary route location studies are now in progress. Public meetings and hearings will be held in the local area prior to recommendation for route adoption.

From US 50 to the Contra Costa county line, a distance of 1.8 miles, the initial two lanes of a future freeway and an interchange at US 50 were constructed in 1955. North of this project to Walnut Creek a new routing for the freeway has been adopted and preliminary design studies are under way.

Included in the 1958-59 budget is \$1,100,000 for rights-of-way acquisition between Danville and Walnut Creek.



LEFT—Beard Road Interchange on the Eastshore Freeway. The section under construction will complete the freeway south of Oakland. RIGHT—Eastshore Freeway, looking north from Warm Springs.



LEFT—The completed Corte Madera Interchange on U. S. 101 in Marin County. The interchange at Greenbrae can be seen at the upper right. RIGHT—Also on U. S. 101 in Marin County, the Forbes Overhead twin structures at the northwestern Pacific Railroad in the center.

From Rudgear Road south of Walnut Creek to a junction with Sign Route 24 near Oakland Boulevard and thence to the recently completed freeway north of Walnut Creek, the freeway is now under construction by Charles L. Harney. This 4.2-mile project, started in June of 1957, will also provide a part of Sign Route 24 from Walnut Creek to the completed freeway east of Lafayette. Cost of the project is estimated at \$8,547,000 for construction.

Northerly of Walnut Creek from Oakland Boulevard to 0.3 mile north of Monument, a \$2,900,000 unit of the freeway was placed in service in January of 1957. This 2.8-mile section was built by Stolte, Inc., and Gallagher & Burk, Inc.

Preliminary studies have been completed and design is well advanced for the freeway extension from Monument to the future Martinez-Benicia Bridge and the bridge itself. The financing of the bridge and immediate approaches in conjunction with the Carquinez Toll Bridge project was authorized by the Legislature in 1952.

South of Escobar Street in Martinez, the proposed facility will be financed from regular state highway funds. The route for this facility between Monument north of Walnut Creek and the Solano county line was adopted

by the Highway Commission in March of 1956.

This future interstate freeway will cross Arnold Industrial Freeway a short distance easterly of the existing Pacheco Highway intersection and lies just east of the extensive Shell Oil Company development in Martinez. It will cross the strait via a new high level bridge immediately west of the existing Southern Pacific Railroad Bridge.

#### State Sign Route 24

Hearing proceedings preliminary to freeway route adoptions are presently under way covering the future location for the Sign Route 24 freeway extending from the Eastshore Freeway in Oakland to east of the Contra Costa county line and the Broadway Tunnel.

Extending east from the East Portal of the Broadway Tunnel to Orinda, design is well advanced on a future eight-lane freeway. As an interim measure an additional lane between Orinda and the Broadway Tunnel was constructed in 1956. This lane enables slow moving vehicles to stay to the right over this sustained grade, thus permitting the normal two westbound lanes to serve faster traffic more safely and effectively.

In April, 1955, the Orinda Interchange was completed and has re-

sulted in the elimination of a serious bottleneck and accident site. East of this interchange, design is complete and rights-of-way acquired for an initial six-lane, ultimate eight-lane freeway extending to the completed Lafayette Bypass.

Elimination of the severest congestion on this highway was removed with the construction of the 2.6-mile section of freeway, bypassing Lafayette. Completed in 1957, the project extends between west of Sunnybrook Drive and west of Pleasant Hill Road. Work was performed by the contractor, Gordon H. Ball, at a cost of \$3,300,000. Realignment of this portion of the road leaves the present highway as a high standard, uncongested local arterial servicing the rapidly growing community of Lafayette. A landscaping project will be started this year between Hodges Road and Grant Lane east of Lafayette. Cost is expected to approximate \$76,000.

Immediately to the east of this bypass is the completed interchange at Pleasant Hill Road. This two-quadrant cloverleaf was completed in December, 1956, and serves as a connection between the state freeway and Pleasant Hill Road, an important county expressway. In the future it will also be a connection to the Shepherd Canyon Freeway, Route 235



from Oakland. Work was performed by Stolte, Inc., and Gallagher & Burk, Inc., at a cost of \$1,300,000.

Now under way is the interchange at Walnut Creek which will connect this portion of the freeway to the completed section of SSR 21 and 24 to the north as well as providing a new connection to SSR 21 to the south. This project and the other work as far north as the Monument Intersection is covered under SSR 21.

#### Shepherd Canyon Freeway

Preliminary studies were completed in 1956 covering the location for this future freeway. On December 19, 1956, after various public meetings and a hearing before the Highway Commission, the last gap in the route was adopted and declared a freeway. This future facility will consist of initially four lanes, future six lanes, and starting at the Mountain Boulevard Freeway in Oakland, will traverse Shepherd Canyon and tunnel some 1,400 feet through the Oakland hills. It will span the Redwood Canyon in Contra Costa County and traverse the range of hills easterly thereof entering and crossing the Moraga Valley just north of the present town site. It traverses close to St. Mary's College and terminates at a junction with Sign Route 24 at Pleasant Hill

Road. Design studies are in the preliminary stages.

#### Sign Routes 24 and 4—Monument to County Line

Design is nearly completed for extending the freeway now terminating at Monument through Concord to a connection with the Arnold Industrial Freeway. Two lanes of this future freeway were constructed in 1947 between Concord and Arnold Industrial. An interim project is budgeted this year on Amador Avenue in Concord between the South City Limits and the Willow Pass Road. This co-operative project with the City of Concord will widen the existing highway at a cost of \$48,000, the State's share being \$35,000.

Further east, a four-lane expressway has been completed between Willow Pass Road and A Street in Antioch. Provisions have been made for the future development of this portion into a full freeway. Route adoption and freeway declaration has been accomplished as far east as Nerolly Road, formerly referred to as Bridgehead Avenue, which is directly south of the Antioch Bridge.

Recently adopted and declared to be a freeway was that portion of Sign Route 24 north of the above freeway location at Nerolly Road to the An-

tioch Bridge. Design is nearly completed. East of this point on SSR 4, location studies are under way to the San Joaquin county line. Preliminary public meetings have been held and after studies have been completed further public meetings and hearings will be held toward adoption of a routing.

#### Arnold Industrial Freeway

From Hercules to a junction with Sign Route 24 north of Concord at Willow Pass Road, planning is in various stages. A short relocation is being provided at the Hercules end in conjunction with the US 40 freeway relocation. Preliminary studies are now under way for the determination of future freeway development along the entire route.

#### Warren Boulevard (Mountain Boulevard)

This improvement in the City of Oakland, when completed, will provide 5.6 miles of freeway from Sign Route 24 near Lake Temescal following the general route of Mountain Boulevard to a connection with the future MacArthur Freeway near Mills College (Calaveras Street.)

Joint Highway District No. 26 originally formed to develop this route was dissolved in July of 1954 but the County of Alameda and the City of Oakland have agreed to continue to



LEFT—The U. S. 101-Sign Route 17 junction in San Rafael. Construction is also under way on the California Park Overhead. RIGHT—The recently completed Alto Interchange and Freeway on U. S. 101 in Marin County.

finance a total of \$300,000 per year, matching a like contribution by the State, toward the continued improvement of this freeway through the Oakland hills.

One project was finished in October, 1956, supplementing the previously completed 2.3-mile portion which extends from north of Broadway Terrace to south of the Moraga-Thornhill intersection. Charles L. Harney completed work on the second section (1.3 miles in length) between Thornhill Drive and Ascot Drive at a cost of \$1,300,000. Construction was for four lanes with provision made for six lanes in the future. Included in this contract was the Park Boulevard interchange which is designed as a future connection to the Shepherd Canyon Freeway (Route 235) through the Oakland hills into the Moraga Valley in Contra Costa County.

Included in the 1958-1959 Budget is the amount of \$123,000 for landscaping work on the portion of this freeway between Tunnel Road and Park Boulevard.

The 1.4-mile extension of the freeway from Park Boulevard to 0.6 mile south of Lincoln Avenue, also to be four lanes initially is now under contract at an estimated cost of \$1,290,000. Contractor is Gallagher & Burk, Inc., and it is expected that work will be finished this spring.

The Lincoln Avenue separation was constructed in 1955 under a separate contract for \$130,000.

A major project for construction on this route is budgeted for this year. This latest project will extend from Lincoln Avenue separation south to Anderson Avenue, a distance of 1.1 miles, and is estimated to cost approximately \$1,400,000. Continuation of construction of this freeway to the south is contemplated as rapidly as availability of state, county and city contributions will permit.

#### Route 226—Oakland to Alameda

Further progress has been made toward the alleviation of the Oakland-Alameda traffic problem this last year with first steps toward the future construction of another tube connecting these cities along Webster Street. Rights-of-way requirements at the southern portal necessitated negotia-



UPPER—Freeway construction on the Bayshore Freeway looking north from the San Mateo-Santa Clara County line. LOWER—Construction on the Bayshore Freeway in Redwood City. The present highway is on the right. The Whipple Avenue Interchange is on the new freeway to the left.

tions with the Federal Government, which are now complete, and funds in the amount of \$750,000 have been allocated in the 1958-59 budget for site preparation.

Another project on this route will be performed at Doolittle Drive and Davis Street in San Leandro. Budgeted

at this location is \$37,000 in state funds for this co-operative project which will provide channelization and signals.

Various other improvements have been made along this route including traffic signals and channelizations as well as a new bridge at Bay Farm Island.



#### OTHER SOUTHERN COUNTY FREEWAYS

Design studies for the development of a cross-county freeway from Sign Route 17 north of Los Gatos to the Bayshore Freeway near Mountain View are now in progress. A new routing for this future freeway location was adopted on October 18, 1956, by the Highway Commission extending from Bayshore Freeway north of Moffett Field to the existing Sign Route 9 north of Azule, and generally following Stevens Creek. In addition, the routing was extended southerly following along the Southern Pacific Railroad to new State Sign Route 17 near Vasona Junction. This routing was adopted by the California Highway Commission on November 25, 1957.

#### Mountain View-Milpitas Area

Studies are now in progress toward future route adoption proceedings for the westerly extension of Sign Route 9 from its present junction with the Bayshore Freeway at the Mountain View-Alviso Road intersection to the cross-county freeway mentioned above.

A freeway routing along the Mountain View-Alviso Road from Bayshore Freeway to the Eastshore Freeway at Milpitas was adopted on December 15, 1954, and design is in progress. Between Lawrence Station Road east of Bayshore Freeway and 0.2 miles east of the San Jose-Alviso Road, a bypass of the Town of Alviso was completed in 1957. This 2.1-mile bypass is the initial construction of two lanes of a future freeway on new alignment and above flood and tidewater level. The project is through a section of the Santa Clara Valley, subject to continuous area subsidence resulting in continuous maintenance problems during wet weather. Construction cost of this project was \$981,000. Contractor was the Frederickson and Watson Construction Co.

Budgeted in this fiscal year is \$202,000 for widening on the route from 0.2 mile east of Lawrence Station Road to 0.2 mile east of Bayshore Highway. This two-lane project is 2.5 miles long and should be under way in the early spring.

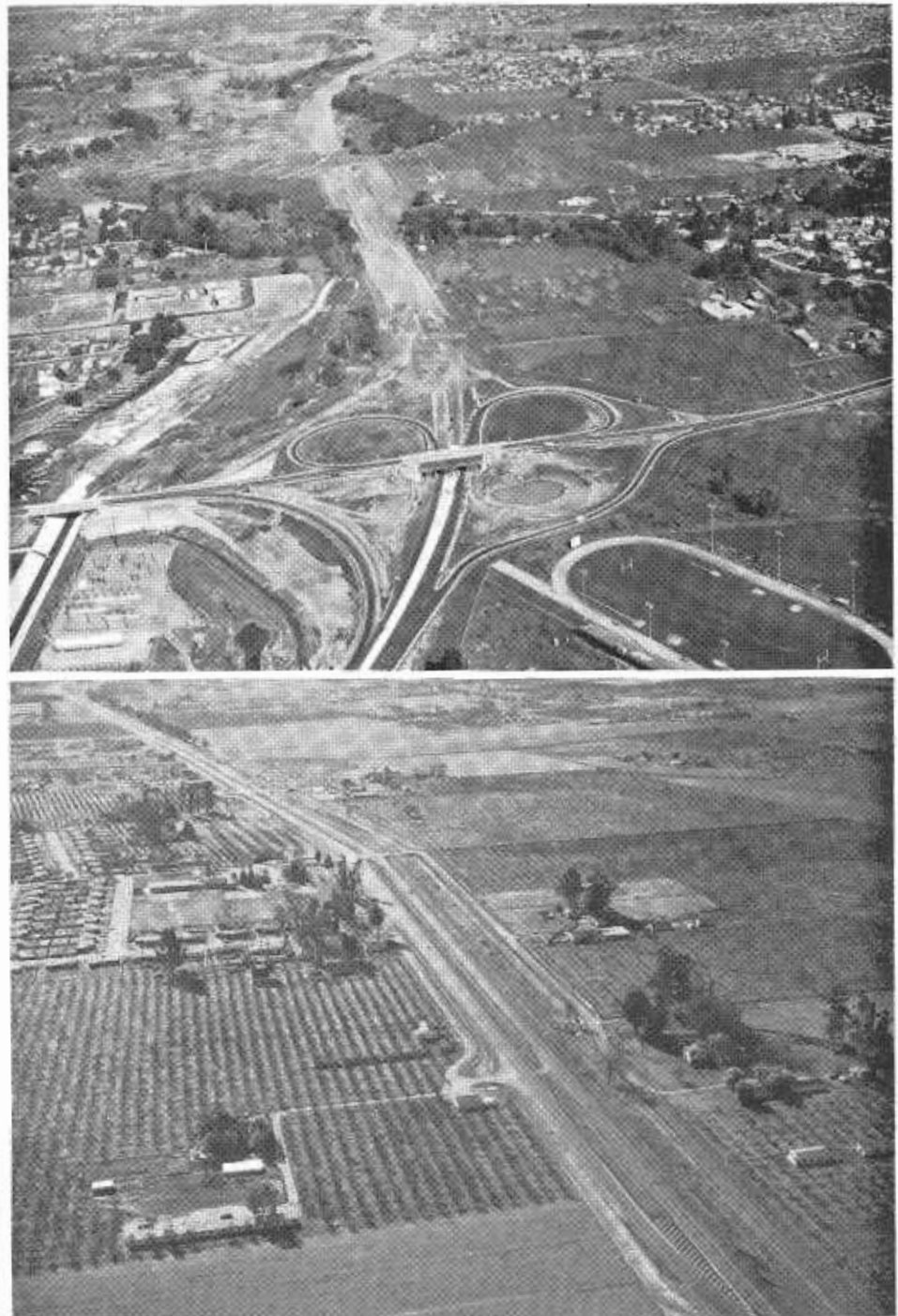
#### Pacheco Pass

In use for many years has been the 2.5-mile portion of four-lane freeway over Pacheco Pass on Sign Route 152.

This four-lane section was constructed in 1951 as a part of the 5.3-mile freeway route, adopted on May 18, 1949, which extends between one mile east of Bell's Station and the Merced county line. The remaining 2.8 miles of this section was constructed as a two-lane facility in 1939.

#### Santa Cruz Area

In Santa Cruz a new freeway entrance to the city was completed in December, 1956, from existing Sign Route 17 at the north city limits to Mission Street. This project facilitates a much-needed traffic distribution in the Santa Cruz recreational area. An-



UPPER—The new freeway under construction between San Jose and Los Gatos (Sign Route 17). Saratoga Avenue Interchange in Los Gatos is in the foreground. LOWER—Sign Route 29 north of Napa. Construction of an additional two lanes converted this section into a four-lane expressway between Union Station and Orchard Avenue.

## STATUS OF DISTRICT IV FREEWAY PROJECTS

MARCH 1958

Description	Total miles	Completed projects		Under contract		Budgeted		Right of way expended and budgeted
		Miles	Construction cost	Miles	Construction cost	Miles	Construction cost	
Bayshore and James Lick Freeway; Bay Bridge to Ford Road south of San Jose	56.6	35.9	\$48,970,000	5.8	\$7,399,000	7.6	\$8,376,000	\$36,699,000
Central Freeway; James Lick Freeway to Turk Street	1.8	1.0	4,122,000	0.8	7,725,000			8,537,000
Embarcadero Freeway; Bay Bridge to Broadway	1.5	0.4	7,328,000	1.1	7,634,000			11,337,000
Golden Gate Freeway; Lyon Street to Route 56	1.1							123,000
Park Presidio Freeway; Golden Gate Bridge to Fulton Street	2.1	1.2	1,448,000					3,000
Southern Freeway; Route 56 near south city limits of San Francisco to Route 68 (Bayshore)	4.7						4,730,000	15,625,000
Coast and Skyline Blvd. Freeway; Edgemar to Lake Merced Blvd. in San Francisco	5.4	3.9	1,376,000	1.5	1,378,000			781,000
Redwood Freeway; Golden Gate Bridge to Lytton	66.6	49.1	*32,342,000	1.4	1,919,000	2.1	4,435,000	9,153,000
Sonoma Valley Freeway; Route 104 to 0.6 mile south of Kenwood	17.7							300,000
Napa-Ignacio Freeway; from Redwood Freeway at Ignacio to Napa (ptns)	13.4	0.8	1,607,000	0.3	2,433,000	6.1	2,444,000	792,000
San Quentin Freeway; Route 1 to Richmond-San Rafael Bridge	2.4	1.0	1,216,000			1.4	850,000	1,092,000
Napa Valley and Napa-Vallejo Freeway; Solano County line to Calistoga	31.8	19.3	3,264,000			2.9	735,000	302,000
Richmond-Carquinez Freeway; El Cerrito O.H. to Carquinez Bridge	13.6	4.7	†17,045,000	6.6	‡25,467,000	2.3	4,453,000	7,542,000
Arnold Industrial Freeway; Hercules to Bridgehead Ave. Monument-Martinez Freeway; Monument to Solano County line	32.0	14.7	4,728,000				76,000	1,603,000
Mt. Diablo Freeway; US 50 in Oakland to Arnold Industrial Freeway near Concord	7.4							868,000
Shepherd Canyon Freeway; Warren Blvd. Freeway to Mt. Diablo Freeway	19.8	9.8	9,217,000	2.4	6,200,000			12,469,000
Warren (Mountain) Blvd. Freeway; Mt. Diablo Freeway near Lake Temescal to San Leandro	10.3							271,000
MacArthur Freeway; Distribution Structure to Route 228	9.3	2.4	\$3,175,000	1.3	\$1,292,000	1.1	\$723,000	3,689,000
Bay Farm Island Bridge and approaches	15.3							28,655,000
Webster Street Tube (ptn)	0.6	0.6	2,187,000					2,252,000
Eastshore Freeway; Richmond-San Rafael Bridge to Bayshore Freeway at San Jose	0.8						750,000	
Route 107; US 50 to Walnut Creek (ptns)	52.7	35.2	52,191,000	10.6	11,999,000		325,000	25,528,000
Altamont Pass; San Lorenzo to San Joaquin County line	10.1	2.1	550,000	1.4	2,347,000			4,464,000
Routes 5 and 108; Warm Springs to Scott's Corner	33.6	33.6	14,327,000					6,466,000
Pacheco Pass; 1 mile east of Bell's Station to Merced County line	9.7							101,000
El Camino Real; Ford Road south of San Jose to San Benito County line (ptns)	5.3	5.3	1,286,000					12,000
Watsonville to 4 miles south of Davenport	5.8	5.8	1,095,000					546,000
Santa Cruz to San Jose (ptns)	21.0	8.4	4,110,000	4.6	2,221,000			2,885,000
19th Avenue Freeway; San Mateo-Hayward Bridge to Route 55	19.9	4.2	3,376,000	8.8	5,836,000	3.4	4,910,000	8,932,000
Route 114; Route 5 to Route 68 at Mountain View	8.0							1,325,000
Mountain View-Alviso Freeway; Bayshore Freeway to Eastshore Freeway	13.4							126,000
Junipero Serra Freeway; Route 2 south of San Jose to Route 5	8.0	2.1	980,000			2.5	202,000	397,000
Junipero Serra Freeway; Route 5 to Saratoga Avenue	10.0							
Junipero Serra Freeway; Route 5 to Saratoga Avenue	1.9							
<b>TOTALS</b>	<b>513.6</b>	<b>241.5</b>	<b>\$215,940,000</b>	<b>46.6</b>	<b>\$83,850,000</b>	<b>29.4</b>	<b>\$33,009,000</b>	<b>\$192,875,000</b>

\* Includes total of \$5,000,000 by Golden Gate Bridge and Highway District.

† \$11,033,000 Toll Bridge Funds in this amount.

‡ \$18,084,000 Toll Bridge Funds in this amount.

§ Includes City of Oakland and Alameda County contributions.

other project, under construction, extends from the junction of Sign Routes 1 and 17 to 0.3 mile east of Morrissey Avenue. When completed in the fall of 1958, a circumferential freeway around Santa Cruz will provide area wide distribution. Contractor

on this 2.1-mile initial four-lane, future six-lane, project is Dan Caputo and Dan Caputo & Edward Keeble. Construction cost is estimated to be \$1,830,000.

Also under way on State Sign Route 1 is the first project on the northerly

side of the city that will eventually provide a four-lane expressway. The first two lanes of this expressway on new alignment are being constructed between 0.2 mile east of Swift Street in Santa Cruz and Wilder Creek,

... Continued on page 54





# Right-of-Way

*District VII Program  
Moves Ahead Steadily*

By HAROLD W. LEONARD  
Metropolitan District Right-of-Way Agent

# Clearance

THE DIVISION OF HIGHWAYS has received from time to time laudatory press coverage on the progress in the construction of the freeway system in the rapidly growing Los Angeles metropolitan area. Without the freeways traffic would be hopelessly snarled on the conventional city streets. While the motoring public comprehends the magnitude of the freeway system and fully appreciates the inherent functional beauty in the design of the freeways and bridges by the engineers, other than knowing that the properties in the rights-of-way had to be appraised and acquired, few probably have given much thought to the fact that after the acquisition of these rights-of-way they had to be cleared and made available for construction.

The clearance of rights-of-way in the Los Angeles area is a program of considerable magnitude. Tenants occupying buildings must be evicted and

the buildings sold to be removed from the site or contracts awarded for their demolition. Utility facilities, both overhead and underground, have to be removed and relocated. These utilities include telephone, electric, gas, water, and sewer lines. Also oil and irrigation pipelines and canals. The work also includes the reconstruction and the moving and relocating of buildings. The work functions involved are performed by various subsections within the Right-of-Way Department.

#### **Bond Required**

The building sales section appraises the salvage value, advertises and conducts the sale of buildings to be removed. The buildings sold by this section are those which conform to the present building codes and are suitable for relocation in another area. The sale is conducted on the premises and is by auction or sealed bid. The notice of sale states that the sale is for cash within five

days and specifies the amount of deposit required at time of sale on each item. The successful bidder is required to supply a bond in the amount of \$1,000, guaranteeing the removal of the improvements in the time specified, and the cleaning of the site. It is the buyer's responsibility to ascertain if the building is movable and whether or not the city or county authorities will permit the building to be relocated in a particular neighborhood and to secure all permits. In clearing industrial sites, equipment, acquired as a part of the realty by reason of having been designed for industrial purposes and installed for use in a fixed location, is sold separately. After the equipment has been removed the building is sold or demolished under contract. This procedure results in greater return to the State by dealing directly with the two separate types of buyers. With modern house moving equipment brick and concrete block buildings, as well



as wood frame structures, are moved successfully, the width of the streets over which they are to be moved being practically the only limitation. Many fine homes have been saved by moving them to a new location. Usually after the rehabilitation they are in better condition and appearance than they were prior to moving and are a credit to their new neighborhood. While the salvage and sale of these buildings is a byproduct to the main right-of-way function of acquiring rights-of-way it is still big business. In the past five years over 6,000 buildings were sold to be moved for a return of approximately 8½ million dollars. In the light of the steady stream of buildings being removed from the freeway rights-of-way a number of people have entered into the buying and selling of these buildings as their business even to the extent of establishing used house lots where buildings are stored, displayed, and resold.

#### Some Buildings Destroyed

Buildings not salable are turned over to the demolition section for their advertising and awarding of contracts for their demolition. Proposals to bid are also mailed to approximately 60 contractors on our mailing list. Bids, to be acceptable, must be submitted by a licensed contractor and the State License Board further requires that the contractor have a C-21 class license for house moving and building wrecking. Some buildings contain salvage value material, such as used brick, large timbers, steel beams, or corrugated metal. Where this occurs the proposal will provide for a plus bid where the contractor pays the State to remove the building. The demand for used brick in contemporary construction has resulted in many old brick buildings being removed without cost to the State, the salvage value of the brick offsetting the labor expended in the demolition of the building. The bricks are easily separated from the lime mortar used in old construction and are slid down chutes to trucks with minimum breakage. The contractor must furnish a faithful performance bond and the site must be clean before the work is accepted and the bond released. The methods used in demolishing improve-



A 3,700-pound weight on the end of a long crane boom demolishes a concrete building to make way for a new freeway through downtown Los Angeles

ments vary with the type of construction. Hand labor is usually used in the wrecking of old brick buildings and corrugated metal buildings. Some frame buildings, wherein there is considerable salvage of heavy timbers, are also torn down by hand; however, manual labor is generally too costly to be practical as a method of removal. Concrete and concrete brick buildings are demolished by suspending a heavy iron ball from the boom of a large crane and swinging it against the building, knocking out huge chunks of concrete which are then pulverized by dropping the ball on them. The debris is picked up with a power scoop, loaded into a truck, and hauled away. Wood frame and wood frame-stucco buildings are usually demolished by

biting off large chunks of the buildings with a large crane and clam shell and loading directly into trucks. This giant termite chews up a normal sized house in a very few minutes. The burning of combustible material is not permitted on the premises and all debris must be hauled to a dump. In the past five years approximately 650 demolition contracts were awarded in the district at a cost of over \$600,000 to the State. There were about 30 contracts where the salvage exceeded the cost of removal wherein the State received approximately \$15,000.

#### Agreements With Owners

Where the right-of-way takes a portion of the property and the taking affects the improvements, agreements





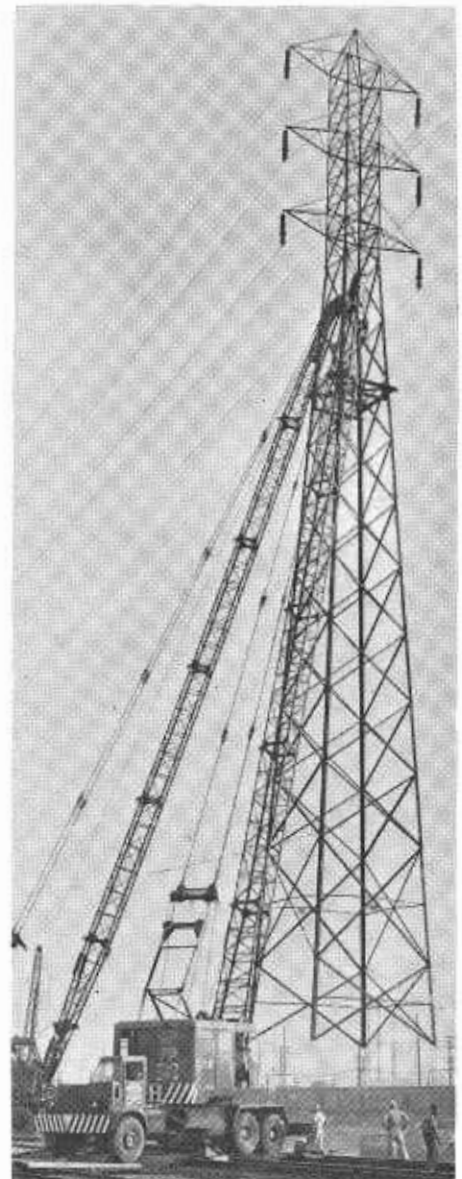
A fire station in the City of Los Angeles is relocated to clear right-of-way for the Hollywood Freeway. LEFT—Shows the building blocked up just before being moved. RIGHT—Shows the same building after it had been re-established and placed in use by the Los Angeles Fire Department in its new location.

are entered into with the property owners wherein he will cut off the building and reconstruct or move the building back clear of the right-of-way. Estimates for the work are secured and the agreed amount is included in the agreement and paid after the right-of-way has been cleared. Sometimes an owner prefers that the State handle the relocation or reconstruction of the improvements and the agreement will so specify. In these cases the relocation section prepares the plans and specifications, advertises for bids, awards the contract and inspects the work. This work includes relocating irrigation and oil pipelines, replacing water wells, cutting off and constructing new fronts on commercial buildings, moving buildings back and resetting them. Pipelines bisected by a freeway are sometimes relocated to pass overhead on a bridge structure or on a separate structure designed to carry the pipelines only. Sometimes special concrete boxes with pipe racks are constructed to carry the pipes under the freeways. This work is performed with the least amount of interrupted use of the facilities as possible. As part consideration for the right-of-way through the Sawtelle Veterans Hospital the relocation section designed and constructed two new residences for resident physicians. At the Point Mugu Naval Air Missile Test Center this section relocated and constructed a large electric switch station

outside the freeway right-of-way. Another interesting job was that of raising a two-story brick fire station about 15 feet, turning it through 90 degrees and relocating it a block away. Being of brick construction the raising and moving had to be done very evenly and carefully so as not to cause any jars or strains. The building was raised on hydraulic jacks and rolled on railroad rails. Sometimes a building has to be moved twice for one project like the railroad station at Camarillo. It first had to be moved out of the right-of-way area to a temporary location until the construction was completed, then moved and reset in its permanent location in an area that had been used for a temporary detour during construction. This relocation phase of the clearance work involved an expenditure of nearly two million dollars during the past five years. In addition this section prepared plans and specifications for a large volume of work performed by the highway construction contractor.

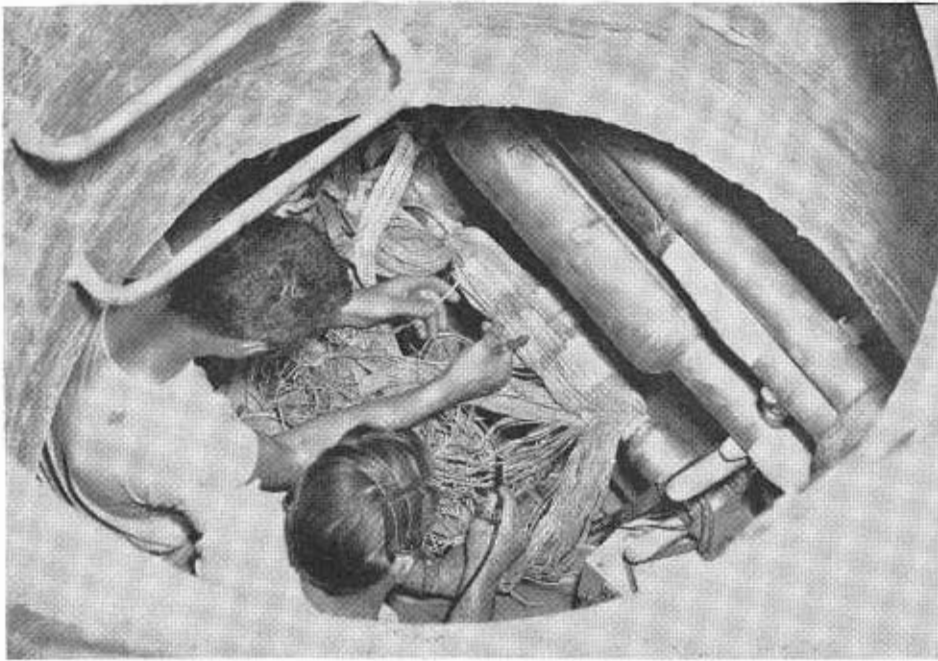
#### Close Liaison Essential

The highway program requires close liaison between the Division of Highways and the various public utility companies. The work of relocation of public utilities, both publicly and pri-

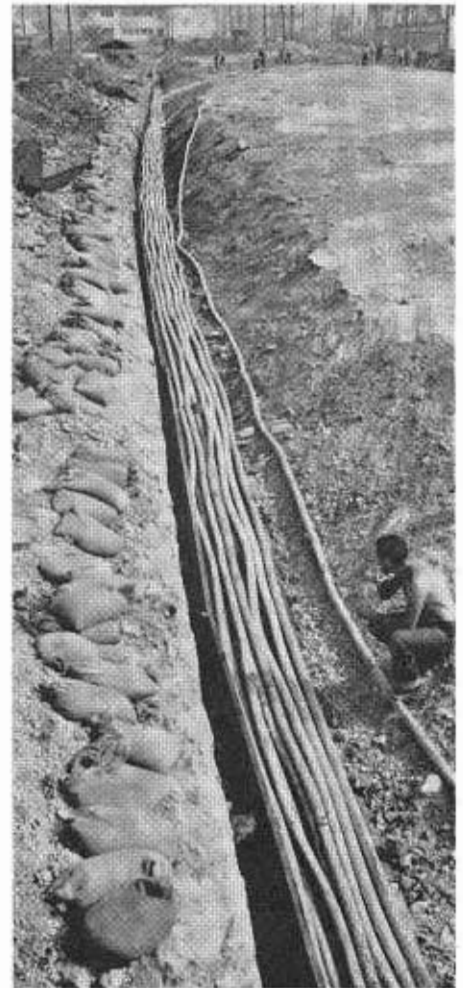


A high voltage line tower is being raised to put an additional section underneath to allow sufficient clearance for freeway construction.





ABOVE—Skilled workmen splice one of the more complex telephone cables. RIGHT—Shows temporary relocation of telephone cables during the construction of the Hollywood Freeway at Vermont Avenue.



vately owned, is handled by the utilities section of the Right-of-Way Department. It is their responsibility to determine, in accordance with the Collier-Burns Act and other state laws, when the State will pay for the cost of utility relocation, when it will share in the cost of relocation, and when said relocation is the financial responsibility of the utility company alone. In cases that the State is to pay for the relocation or a share of the cost, relocation agreements must be made with companies, and in all cases relocation plans must be approved by the Division of Highways. Almost without exception the relocation work is actually done by the utility company being affected and the design of the freeways is planned to affect utilities as little as possible. The wholehearted co-operation of the utility companies with the Division of Highways has resulted in satisfactory solutions to the utility relocation problems.

#### Telephone Cables Moved

Telephone lines present a very complicated relocation problem. Within the City of Los Angeles the largest telephone cables used are cables which have 2,100 pairs of telephone lines within them. If these lines must be relocated outside the right-of-way area

needed for construction it necessitates a splicing of the telephone cables. On the surface this does not sound like much of a project, but a double splice is required to lengthen the cable. This means that each pair of wires on each end of this extension must be matched with pairs in the original cable so as to result in a continuous line for each pair. If this were not done there would be a scramble of some 2,000 telephones in the city. To complete such a splice requires a period of time of approximately four months. In order to preclude the splicing of such a cable on the Golden State Freeway the bridge at North Broadway has been so designed that the underground ducts and cables can be raised out of the way until the bridge is partially constructed, then lowered to cells within the bridge structure and construction of the bridge completed.

#### Power Lines Raised

High-tension electrical wires and towers are frequently disturbed by freeway projects. Recently it was necessary for towers belonging to the City of Los Angeles Department of Water and Power to be raised 25 feet to provide adequate clearance for the freeway project. The city department engineered the construction of a tower

extension which was attached to the bottom legs of the tower. The power lines were slackened to allow the tower to be raised and the tower was then picked up with a crane having an extra long boom and raised 25 feet. The placement of the crane was so critical in this lift that it took approximately three hours to get the crane strategically located to the precise point necessary for the lift.

Railroads are another utility that frequently need relocation. Sometimes a main line must be moved for construction purposes but more often it is only necessary to construct shooflys around proposed grade separations. On the Glendale Freeway, presently under construction, one of the main lines of the Southern Pacific had to be relocated to provide room for footings for a bridge. In Ventura County over a mile of main line track of the Southern Pacific was relocated

... Continued on page 56



# Petaluma Creek

High-level Bridge Will  
Replace Old Drawspan

By M. H. JACOBS, Resident Engineer and BILL ZENONI, Assistant Highway Engineer

ON SEPTEMBER 13, 1948, the California Highway Commission adopted State Route 8 in Marin and Sonoma Counties between State Route 1 and the junction of Routes 8 and 208, as a freeway.

The existing Route 8 was originally constructed in 1916-1917 with a variable depth gravel base, and was surfaced in 1923 with an 18-foot-wide by 6-inch-thick asphaltic concrete pavement. In 1943, the roadbed was widened to 22 feet by a 0.20-foot plant-mixed surface over the existing pavement.

A contract completed in January, 1951, realigned the original road at Black Point, eliminating sharp curvature and providing improved approaches to the existing Petaluma Creek Drawbridge. Also under the same contract, excavations and embankments were constructed to provide for future expansion of the existing two-lane facility to a four-lane divided freeway. The embankments were constructed with a surcharge to allow for consolidation and settlement in this tideland area.

## Original Trestle Replaced

The existing Petaluma Creek Drawbridge was originally constructed in 1917 under Contract No. 163. It is of interest to note that Ben C. Gerwick, Sr., one of the present contractors, was the resident engineer for the State on this project at the time. The existing structure consisted of two 80-foot spans of steel trusses encased in concrete, one 150-foot single-leaf bascule span, and 43 27-foot timber trestle spans. Over the years repairs and changes have been made including the replacement of the original trestle deck to a steel I-beam and reinforced concrete slab. It has become necessary to replace the structure mainly due to its substandard 21-foot clearance between curbs and its trestle timber piles which are near the end of their useful life.



Looking east over the Petaluma Creek project. The partially completed fill in the foreground will be finished after two lanes of the new bridge are opened to traffic.

On January 23, 1957, a contract was awarded to Ben C. Gerwick, Inc., and J. H. Pomeroy & Co., Inc., of San Francisco for the construction of a new high-level fixed bridge across Petaluma Creek at Black Point with necessary approaches. The low bid was \$2,309,498.

## Ship Channel Widened

The new structure will be 2,200 feet long and 75 feet above mean sea level. It was necessary at the east end to construct an extra long structure with a low abutment since the original ground is a virtual mudflat and cannot sustain a fill of over a few feet. A 140-foot-wide ship channel, complete with protective fenders, will be provided with 70-foot minimum vertical clearance. This clearance is in line with previously established clearance on the US 101 bridges over Peta-

luma Creek at Petaluma, constructed in 1955.

The bridge has a total of 29 spans: 24 of precast prestressed girders, 4 feet 6 inches deep and 80 feet long; 4 of precast reinforced girders for tower bents, 25 feet long; and one of 160-foot steel plate girders for the crossing of the ship channel. All girders are supported on five-foot by five-foot reinforced concrete caps, two four-foot round columns struttred at midheight, five-foot by six-foot reinforced concrete pile caps and from five to eight 200-ton pilings. The west abutment is supported on 10-inch H-piles driven through holes drilled into a 60-foot fill. The next four bents are supported on spread footings founded in good conglomerate. From here on heavy pile sections are used since the bedrock drops off very rapidly.



### Earthquake Resistant

An unusual feature of design is the use of tower bents which are used to resist longitudinal seismic forces. Since most of the structure is over water in marshy tideland it would have been very expensive to design each bent to resist these forces. The tower bent is actually two bents spaced 25 feet apart and tied together with struts and a monolithic footing. Three to four spans on either side are tied to it and all move as one unit. Adjacent units are isolated by using expansion rocker bearings.

Foundations presented a problem to both design and construction. Bedrock is easily reached anywhere on the west shore but drops off rapidly toward the east where at the ship channel it is 80 feet below sea level and at the east abutment it has reached a low of 200 feet. Piling necessarily had to be extremely long and at the same time stout enough to withstand column action in the soft bay mud. A column consisting of a 14-inch-wide flange beam weighing 184 pounds per lineal foot section was designed and an option was provided for protection above the mud line using either a prestress pile or concrete encasement of a full-length steel pile. The contractor chose the prestress option. The section was 26 inches square with a 12-inch void; it was limited to 70 feet in length and had to have at least six feet of a steel pile stub protruding from the concrete to insure adequate penetration of the bedrock. Any length of steel pile could be welded to the stub as needed. Thirty-four high tensile strength strands are used with a working load of 394,000 pounds and seven-sack concrete was used to insure quick stripping and early driving. For those piles driven on land, steel sections up to 135 feet were welded together in jigs on the ground and then driven in place. The prestress section was trucked direct to the driving site and was picked off by the driver and an auxiliary crane and positioned in the leads. After being lined up with the bottom section and plumbed, it was worked on by three welders who, in two hours time, completed a full beveled butt weld splice on it. X-rays were used to spot check the welds. The longest pile driven was 205 feet.

### Barges Carry Piles

For the water work all piles were cased and spliced in the Ben C. Gerwick Petaluma Yard and were brought to the site in barges. The longest of these piles was 137 feet and weighed 28 tons. It required great care and skill to handle such large sections; however, once set into position and plumbed they could be held true while driving. A pile hammer with a rated energy of 36,000 foot-pounds was used to drive the 26-inch piles. Difficult driving was done on these large sections to get the ultimate 200-ton bearing capacity.

The use of prestressed girders at this site is ideal. Falsework for any type of cast-in-place concrete would be expensive since it would have to be high above the water and penetrate deep into the bay mud. Maintenance cost becomes an important factor in considering the use of structural steel in this salt water location. The site is within a 15-mile radius of three of the leading bay area manufacturers of precast, prestressed concrete products. The girders used are the new state standard "T" section with a 4½-foot depth. They were constructed in the

contractor's Petaluma Yard and were barged or trucked to the job.

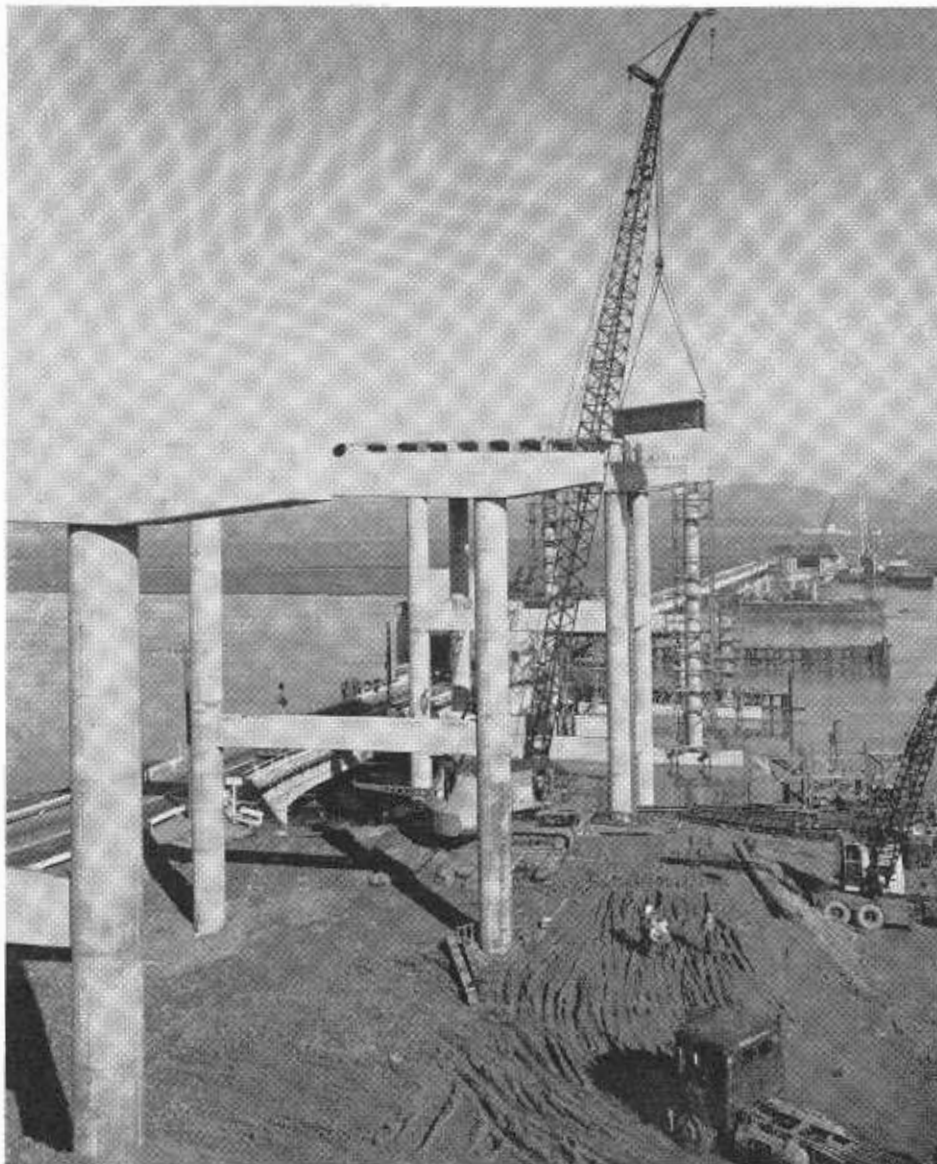
### Prestressed Girders Cast

Four new special prestressing beds were built side by side which can handle any unit up to 105 feet in length. This side-by-side setup was used rather than the conventional continuous line so that a steel gantry straddling the beds can be used to place reinforcing steel, lift forms, pour concrete, transport steam curing hoods, and transport completed girders into adjacent storage area or direct to the barges. The girders were cast in all-metal forms which were continuous over the full length of the girder and were hinged at the bottom for quick forming and stripping. All prestressing was done by the pretensioning of 36 7/16-inch, seven-wire strands to a working load of 532,000 pounds. The strand is taken from reels, cut roughly to length, then placed in anchorages and each is preloaded to 1,000 pounds with a portable dynamometer. In this manner all start out with the same tension. Hydraulic jacks then pull half of the strands in the bottom of the beam



This photo of the new construction shows 80-foot, precast, prestressed girders in place on the west approach to the new bridge





This view, taken from the west abutment fill, shows a crane with a 120-foot boom setting one of the 12-ton, 25-foot-long girders in place

to full tensioning load. The remaining 18 strands follow a  $2\frac{1}{2}$ -foot parabolic path. These are first partially tensioned in a straight line by the jacks and then "hogged" down into final position by strand "hold-downs" located at the center and quarter points of the girder. The additional elongation caused by the hogging brings the strand tension to full load. The contractor has developed a very efficient organization for this type of construction. Using an eight-sack dry concrete and 150-degree steam curing for a period of 20 hours he is producing an average of seven girders on the four beds in a 40-hour workweek.

After all the girders have been set at the bridge cast in place closures will be made between girder diaphragms and the "T" beam flanges which form the deck. A two-inch plant-mix surfacing course will be added to smooth out any irregularities and the structure will be ready for traffic.

#### Future Freeway Construction

Construction of the new approaches required a 70,000-cubic-yard, 60-foot-high abutment fill on the west end of the structure. Material was obtained from a 100-foot sliver cut adjacent to the existing traveled way which

changes the old alignment, moving it south, and provides a 3 percent grade up to the bridge abutment. The roadway section on this contract was constructed only half of the ultimate width and will carry only two lanes of traffic when the bridge is first put into operation. This split was necessary in order to keep the fill slope from encroaching on the existing approach to the drawbridge. Included in the 1958-59 Fiscal Year construction program is the development to four-lane freeway standards of the 6.1 miles between State Route 1 (US 101) and the Junction of Routes 8 and 208 (Sign Routes 37 and 48) at Sears Point. By this time, traffic will have been routed off the existing drawbridge onto the new structure and work can begin on widening the present fill to its ultimate width. By the fall of 1959 a four-lane freeway should be completed over the seven miles to Sears Point.

All cut slopes on the present contract were made at 1:1 and fill slopes at 2:1 except for the north slope of the abutment fill which has a  $1:\frac{1}{4}$  slope to prevent crowding the existing traveled way.

As a guide to costs on the project a few of the major unit prices are as follows:

Roadway excavation	—	\$0.50 per c. y.
Class "A" concrete (bridge)	—	66.18 per c. y.
Furnish precast prestressed girders	—	2,305.00 ea.
Erect precast prestressed girders	—	200.00 ea.
Furnish 200-ton bearing piles	—	18.00 per l. f.
Drive 200-ton bearing piles	—	700.00 ea.

Superintendent for Ben C. Gerwick, Inc., and J. H. Pomeroy & Co., Inc., was John Ford, assisted by Chuck Lochtefeld.

The contract is under the administration of the Bridge Department of the Division of Highways, F. W. Panhorst, Assistant State Highway Engineer—Bridges; I. O. Jahlstrom, Operations Engineer. Design was by Carl F. Stewart of the Bridge Department and Chief Designer George D. Gilbert.

American motorists traveled more than half a trillion miles in 1957.



# Strength and Beauty

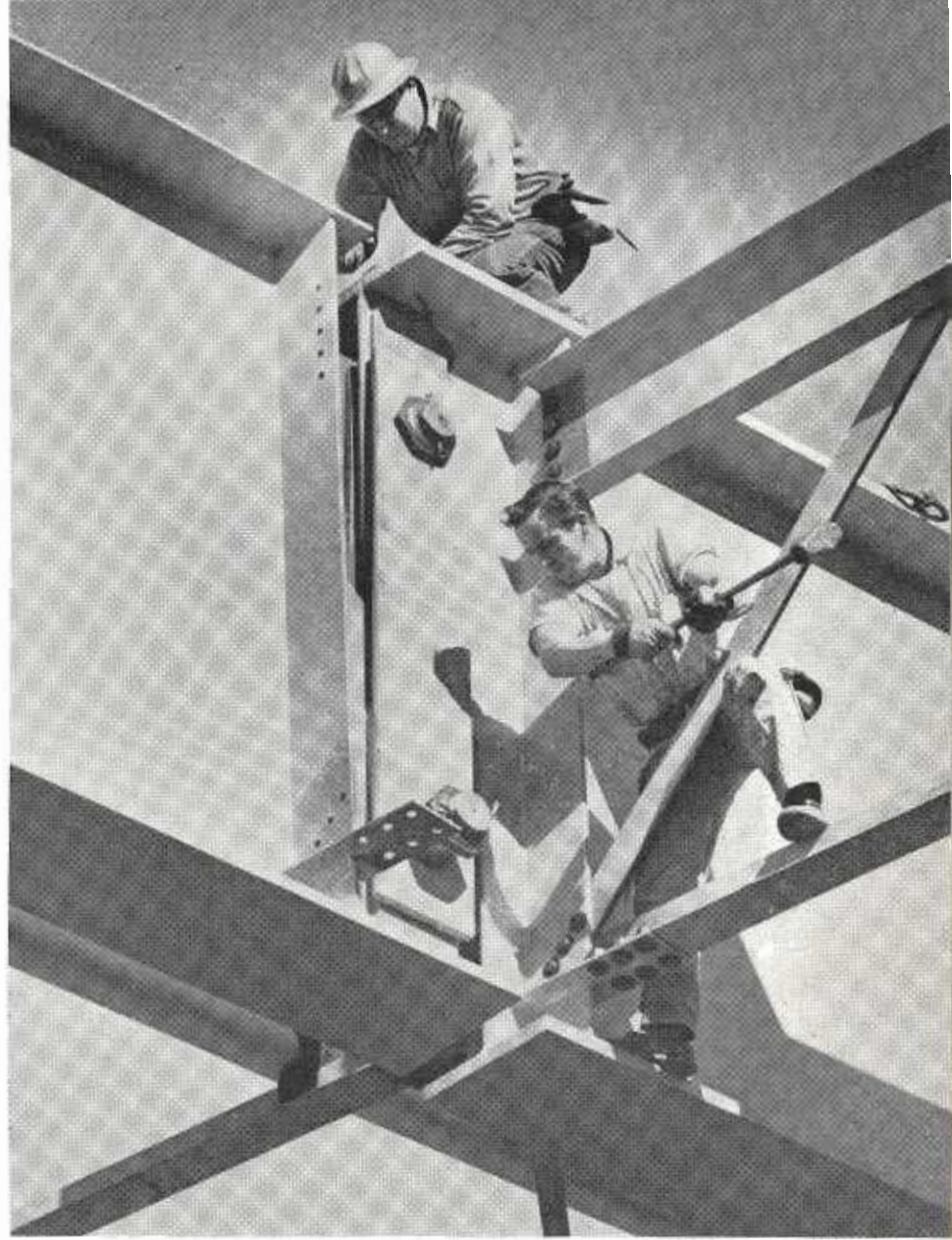
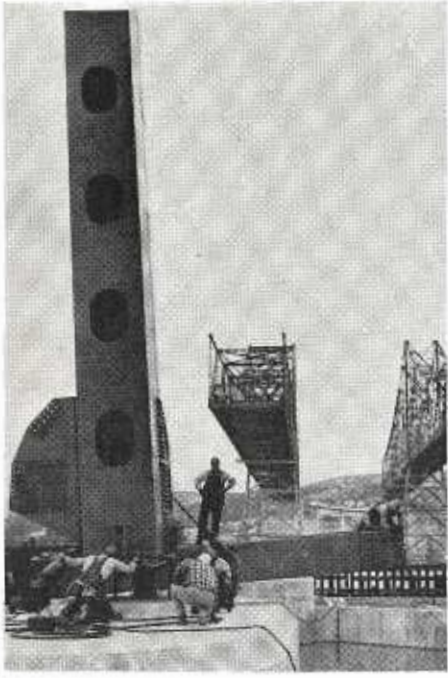
*Man, in assembling his materials to build the things that serve him, is guided by basic geometric patterns which lend his creations beauty as well as strength. Captured in these photos of construction now under way on the Santa Ana Freeway and the new Carquinez Bridge, is some of the harmony of perspective and design inherent in the science of engineering.*

*Freeway*

*photos below and extreme right by John Malmin, Los Angeles Times; bridge photo upper center by American Bridge Division.*









# Conejo Grade

Ventura Freeway Construction  
Extended Over Conejo Summit

By K. D. LEWIS, Resident Engineer

**S**OUTHLANDERS and visiting tourists will soon be using a link of the Ventura Freeway that was once traveled by coach, oxen, dog and goat teams of the Old West as they came east from Santa Barbara, Ventura, Camarillo, Hueneme or west from Los Angeles, Agoura and Thousand Oaks.



K. D. LEWIS

Old rancho lands that once covered thousands of acres in any direction, as the crow chose to fly, now resound to the blast of tons of dynamite and the scrape of metallic earth-moving monsters as they plow a multilane furrow through the hard-rock passes of the Conejo Grade just outside of the town of Camarillo. The old ribbonlike roadways that connected the summit of the Conejo Pass to the fertile valley around Camarillo is now a relic of the past, a scarcely visible cowpath tortuously winding around massive fills that will provide the concrete pavement of the

super state highway now under construction. The five miles of freeway under construction by the State Division of Highways west from Conejo Summit to Fifth Street in Camarillo will cost close to \$4,000,000 and is under contract to J. E. Haddock, Limited. The estimated completion date is October, 1958.

#### Improved in 1937

The Conejo Grade highway was first realigned to three-lane standards in 1937, supplanting the old two-lane sharply curving Conejo Grade road in use since 1914. The 1937 road building specifications—adequate for those days—called for an overall graded width of 46 feet, with two 10-foot strips of pavement and a 10-foot center lane for passing. The entire project cost \$570,000. By way of contrast, the new Ventura Freeway through Conejo Pass is being built to modern standards, with four 12-foot pavement lanes and a 22-foot center dividing strip. The plans provide for a two-quadrant cloverleaf traffic interchange at Camarillo County Park Road, a three-

quadrant interchange at Calleguas Road, and a bridge over Conejo Creek. Neighboring farm areas will have the use of four miles of new access roads. The job starts at the Conejo Grade summit and proceeds down the northern slope of Conejo Mountain, more or less paralleling the existing alignment, to the Pleasant Valley plain, where it ends just easterly of the Calleguas Creek Bridge and makes connection with the previously completed (1953-1954) Ventura Freeway through Camarillo.

#### Historic Area

The urbanite traveler is hardly aware of the history of the countryside through which he passes in his busy schedule, whether he commutes from Ventura to Thousand Oaks or from Woodland Hills to Newbury Park or simply passes through. He will be curious to learn that there was, years ago, a gold rush in this area, when seekers in rigs and afoot flocked to the Russell Ranch to establish claims on sites that were said to be rich in gold deposits, but which



LEFT—A drill operator works away at a large rock left over from primary blasting in order to reduce it to pieces small enough for equipment to handle.  
RIGHT—A crew is engaged in secondary blasting operations on a rock not broken up small enough by the primary blast.



proved to be empty despite samples showing plenty of "color." He is not likely to know that west from Agoura

A unique breed of "sidewalk superintendent" was encountered by the construction crews working on the Conejo Summit job in the form of rare California condors whose native habitat is the area through which the work is going on.

The California condor or vulture is a large, carrion-eating bird with a wing span of up to 10 feet and a body weight of approximately 20 pounds. It has a life expectancy of from 80 to 100 years and is considered as a form of life surviving from the Pleistocene Age.

Once numerous, the birds are now protected in a Los Padres National Forest Sanctuary, where they live and nest in rocky fissures. The great, orange-headed birds are excellent flyers and range as far as the foothills of the Sierras and the coastal islands of the Pacific. They were once seen as far north as the Columbia River and their skeletal remains have been found as far east as Florida. The total condor population today may reach 60 birds of which only 8 to 12 are mating pairs, since long inbreeding has resulted in a high incidence of sterility. According to Ed N. Harrison, an authority on the condor, the bird is gradually disappearing because of the inability to reproduce in number and because of encroaching civilization.

Modern agriculture and farming methods have reduced the condor's supply of food which consists chiefly of the carcasses of cattle, sheep, ground squirrels, deer and horses. The condor has also been known to feed on whale meat, mussels, fish and even house cats.

The principal roosts of the condor in Ventura County are located in Big Sespe Canyon, at Sulphur Peak and in Hopper Canyon. Some also roost in Santa Paula and Piru Canyons. They range over the wild areas of Ventura County and are seen around the Conejo Summit area.

to the outskirts of Thousand Oaks he is speeding through Russell Valley, which takes its name from the pioneer



An aerial view looking east along Ventura Freeway construction on Conejo Grade. The partially completed undercrossing in the center of the picture will serve Camarillo Grove Park.

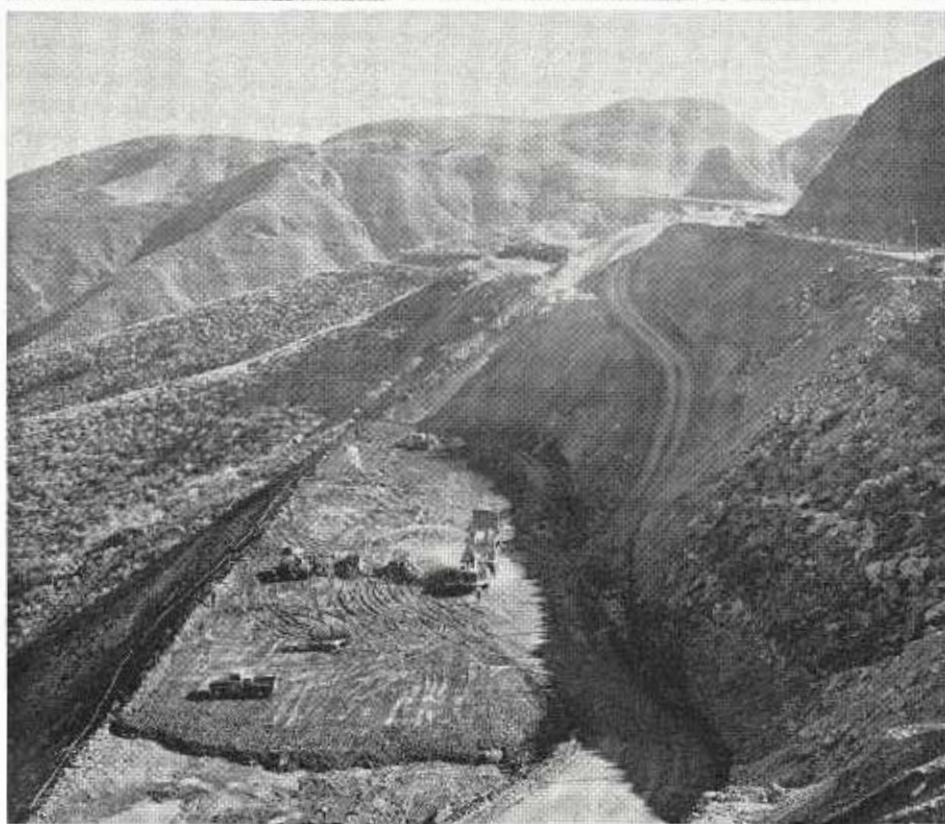
family whose members still work the land there and remember when the rare California condor fed in numbers on cow carcasses on the range.

#### Missions Established

This sometimes mountainous country of sunny skies and equable temperatures is rich in history and tradition which began with the visit of the Portuguese navigator, Juan Rodriguez

Cabrillo, to the shores of California at Point Mugu, just a few miles seaward from Camarillo and Ventura, in 1542. Another explorer, the Spaniard Gaspar de Portolá, on his way with an expeditionary force from San Diego to Monterey, coming along El Camino Real, visited the area around Ventura in 1769. The missionaries then followed under the indefatigable Majorcan Fra Junipero Serra, who established Mis-





UPPER—Heavy equipment moves blasted material from a cut. LOWER—Grading operations in progress near the summit. The embankment under construction in the foreground will contain a total of half a million cubic yards of material when completed.

sion San Buenaventura in 1782 on the present site of the city of Ventura (shortened from San Buenaventura, meaning "Good Fortune"). In the pioneer years following, Spanish cattle barons founded vast estates on the fertile grasslands of present Ventura County, which was originally a land grant shared by two rancho inter-

ests, the brothers Pico and Ygnacio Rodriguez, and José Polanco.

The later tumultuous years saw California become a Mexican possession, then a territory of the United States, then a state, and so the rancho days gave way to modern times and beginning in 1860 the cattle kingdoms were divided and subdivided. The pastoral

period, beautiful as it was, had come to an end.

#### Good Ranching Area

The scenic route along the Ventura Freeway from the recently completed portion through Woodland Hills is a panorama of plains and mountains, ranch and stock ranges, dotted with the California evergreen live oak and the white oak, gnarled trees sometimes two and three hundred years old. The purple looming mountains, stolid boulder-faced crags, stand ageless sentries over the Russell and Conejo Valleys and eventually give way to the far-flung plains west of the Conejo Grade. Ranching varies from stock or beef-raising to horse pasture, lemon, avocado and walnut groves, lima bean acreage, truck-gardening, dairying. Four miles south from the Ventura Freeway along Triunfo Road near Thousand Oaks is gemlike Lake Sherwood, a cottage-fringed manmade lake. Traveling west there is the small town of Thousand Oaks, a rapidly growing community of 1,500, site of Jungleland, a menagerie of trained animals that perform daily before visiting sightseers and before Hollywood cameras. Ten miles away, in Newbury Park, an old hostelry stands fully restored, looking much as it did in 1876, when it was built by James Hammel as a coach stage stop and hotel. The Seventh Day Adventist boarding academy—a 700-acre farm—for boys and girls stands in the foothills at the top of Conejo Grade. South and across the freeway is the Borchard Ranch, 400 acres of grain, walnuts, peppers, Angus and Hereford cattle, established in circa 1879. Down the grade and into the Camarillo plain is the 232-acre Hartman lemon and avocado ranch, acreage purchased from the Camarillo holdings.

#### Freeway Construction Started

Construction on the Conejo Grade portion of the Ventura Freeway was formally begun with a bid opening on April 11, 1957, and an award of contract on April 29, 1957. Actual construction got under way on May 8th of that year.

The design and preparation of plans for the freeway were executed in the

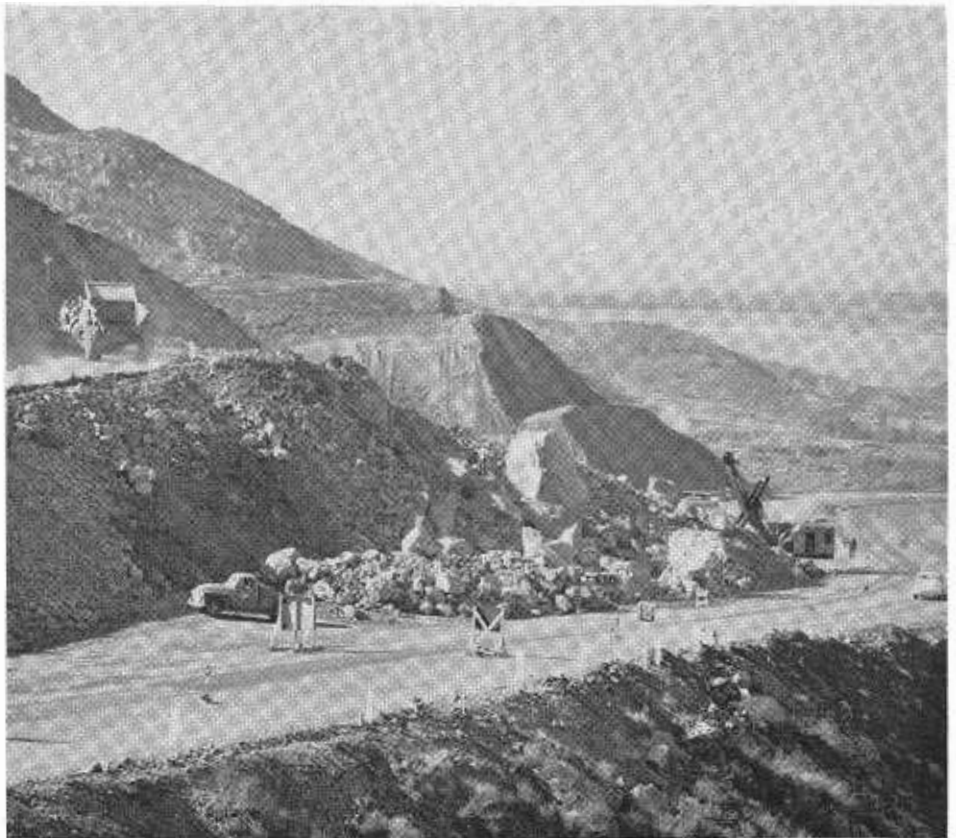


Los Angeles office of the State Division of Highways under Assistant District Engineer Ralph V. Chase, with E. H. McBroom, Senior Highway Engineer, in direct charge. The plans provide for 5.0 miles of full freeway of which 2.2 miles are of six-lane and 2.8 miles are of four-lane (ultimate six-lane) width. 1.2 miles of the four-lane full freeway is accomplished by adding frontage roads and closing off access to existing four-lane divided expressway. The 2.2 miles of six-lane freeway is on a 7 percent grade and replaces the previously existing three-lane highway. With the exception of increasing the minimum radius of curvature from 1,200 feet to 1,500 feet, the alignment remains approximately the same.

The State is represented on construction by K. D. Lewis, Resident Engineer, who is responsible to District Construction Engineer H. E. Belford, Assistant District Engineer Frank B. Cressy, and A. L. Himelhoch, District Engineer—Operations. The contractor is J. E. Haddock, Limited, with Superintendent Neal Saul in charge. Counting all hands, some 120 state and contractor's men are actively engaged on the project.

#### Large Fills Needed

Excavation and embankment operations on the Conejo Grade job have been on a major scale. Near the summit of the grade, the top fill required 230,000 cubic yards of material, a second fill below it required 490,000 cubic yards. In all, the job calls for 1,225,000 cubic yards of roadway excavation to be moved into roadway embankment. Heavy duty machinery used in the earthwork includes Northwest shovels Model 6 and 80, 10-ton rock trucks, heavy track laying tractors equipped with new heavy-duty rippers (an important factor reducing the use of blasting powder), and DW-21 scrapers for dirt and rubble work. A breakdown of major quantities on the job indicates the following: 22,500,000 station yards overhaul in connection with placement of material in the fills; 92,000 cubic yards of imported subbase material from Conejo Creek; 70,000 tons of treated base material in the roadbed section obtained from local commercial rock



UPPER—Section of a cut taken just after a blast. The larger boulders will have to undergo secondary blasting operations before they can be hauled away. LOWER—A tractor clears boulders from the roadway shortly after a blast.



producing plants on the Ventura River; 25,000 cubic yards of Class B concrete pavement; and 25,000 cubic yards of plant-mixed resurfacing and plant-mix shoulder dikes throughout the length of construction.

Water for compaction and dust control are obtained by an electric turbine-driven water pump from a drilled well in the Camarillo Oak Park ravine up a 1,000-foot embankment to a 25,000-gallon storage tank, whence the water is piped to fill locations.

#### Traffic Problems

Considered to be one of the heavier grading contracts to be let in District VII for some time, construction on the Conejo has been complicated

by the traffic problem, inasmuch as there are no practicable detours in the vicinity and public traffic must be carried through construction with a minimum of inconvenience and delay. Traffic has been routed through the rough grading operations along two lanes of existing pavement or two lanes of paved detour signed for a 35-mile speed limit. Passing lanes are permitted at safe locations within the area. Some delays of short duration have resulted as a consequence of blasting, but the overall flow of traffic has not been seriously impeded or the public subjected to any undue hazard. Advance notice of blasting operations are relayed to all state, county and local agencies concerned.

Construction on the Conejo Grade has been spectacular because of the precipitous, rugged terrain and the extensive dynamiting through a series of volcanic flows ranging from well-weathered basalt to a resistant volcanic breccia. Two types of powder have been used with excellent results. These are the stick and the bag, the latter of which requires a stick powder primer. Up to five tons of powder is used in some shots. The biggest shot to date, occurring on January 8, 1958, was a 14,500-pound charge that brought down 18,000 cubic yards of fractured rock. In blast preparation, drillers penetrate to a depth up to 50 feet, boring holes of a two-, three- or six-inch diameter, using air-driven waterless equipment including jackhammers, Airtrack drills, and the wheel-mounted drills. In an eight-hour shift, the Drillmaster can bore 200 feet and the Airtrack 500 feet.

#### Extensive Blasting

As of this writing, 325,000 pounds of powder has been exploded of a total anticipated amount of 450,000 to 500,000 pounds, a figure considerably under the 850,000 pounds estimated before drilling started. The economy of the blasting operation is explained by the efficiency of the new giant ripper and the scientific methods of the powder crew, who drill and space their holes for carefully timed charges that disintegrate the maximum amount of material in the minimum space of the desired area.

The conclusion of the Conejo Grade construction project this fall means completion of another link in the development of U. S. Highway 101, to expressway and freeway standards throughout its entire length. This unit will close the gap in the 38 miles of freeway and expressway between the Santa Clara River in Ventura County and Woodland Hills approaching the San Fernando Valley section of the City of Los Angeles. Freeway construction by the State Division of Highways is a continuing program carried out as expeditiously as funds can be made available.

During February, 1958, the Division of Highways awarded 17 contracts totaling \$4,419,000. Another 20 contracts totaling \$19,064,100 were completed.



Looking west from the top of Conejo Grade showing construction in progress on the Ventura Freeway. Traffic through the construction area is being handled on a temporary detour.



# Guided Tour

Governor Meets Editors  
In San Fernando Area

**G**OVERNOR GOODWIN J. KNIGHT led San Fernando Valley newspaper publishers and editors on a tour of San Fernando Valley freeways in late January.

The trip to see recently completed construction, construction in progress, and clearing of right of way was under the auspices of the Valley-wide Committee on Streets and Highways.

C. M. Gilliss, State Director of Public Works and Chairman of the California Highway Commission, and Robert E. McClure of Santa Monica, commission member, accompanied Governor Knight on the inspection.

Members of the Valley-wide Committee on Streets and Highways who were on the tour were: Frank W. Pine, Vice Chairman; John Cawfield,

John J. Tuttle, DeWitt McCann, John Haas and Earl M. Watson.

Newspaper executives and staff members who were a part of the nearly two-hour automobile trip were: Russell A. Quisenberry, publisher, *Valley Times*; Gordon MacLean, publisher, West Valley Newspapers; Lamont Odett, publisher, San Fernando *Sun*; Walter L. Scratch, assistant to the editor, *Hollywood Citizen-News*; Ferdinand Mendenhall, publisher, *Van Nuys News & Green Sheet*; Sue Ressler, editor, Valley Publications; Glen Ingles, managing editor, West Valley Newspapers; Charles S. Ryan, *Valley News & Green Sheet*; Art Ryon and Bill Murphy, *Los Angeles Times*; Charles Ridgway, *Los Angeles Mirror-News*; Charles L. Page and Bob Lind-

sey, *Los Angeles Herald-Express*; and Ralph Samuels, *Valley News*.

## Begin Inspection

The caravan entered the Hollywood Freeway at Cahuenga Pass and saw widening and reconstruction in progress by the Tomei Construction Co. between Highland Avenue and Lankershim Boulevard. This work, for which the contract allotment was \$1,192,600, was scheduled for completion in early March.

The Governor's car and the following automobiles were next led over a Griffith Co. contract on Hollywood Freeway Extension from Lankershim Boulevard to Moorpark Street, which was completed and opened to two-way traffic a few days after the tour.



Governor's party halts on contractor's haul road to inspect work. The road is normally traveled by heavy equipment used in construction of the Ventura Freeway-San Diego Freeway interchange.



Contract allotment for this one-mile length of eight-lane freeway was \$2,324,800.

Beyond Moorpark Street, the visitors saw the progress of construction on a \$4,466,400 contract—also to the Griffith Co.—for 1.3 miles of Ventura Freeway westerly to Laurel Canyon Boulevard. This work is expected to be completed during December, 1958.

From Laurel Canyon Boulevard westerly for 4.1 miles to Sepulveda Boulevard right-of-way has been cleared in anticipation of starting construction this spring. This section of Ventura Freeway is estimated to cost \$11,100,000, of which \$6,248,000 is financed in the 1958-59 Fiscal Year budget and the remainder is to be financed in 1959-60.

Then the caravan went under a new bridge over Ventura Boulevard west of Sepulveda Boulevard, turned right and traveled over construction in progress on an Oberg Bros. \$7,733,000 contract at the intersection of the San Diego and Ventura Freeways. This will complete in July, 1958, 1.3 miles of San Diego Freeway from Valley Vista Boulevard to Burbank Boulevard and three miles of Ventura Freeway from Sepulveda Boulevard to Encino Avenue.

Governor Knight and the rest of the party saw right-of-way clearing, substantially completed, for the Ventura Freeway between Encino Avenue and Kelvin Avenue. Construction cost for this 3.9 miles is estimated at \$7,300,000. Bids for this work are expected to be called for in late spring. The 1958-59 Fiscal Year Budget provides \$6,000,000 of the construction cost; the remainder is to be financed in Fiscal Year 1959-60.

E. T. Telford, Assistant State Highway Engineer, explained the freeway progress in San Fernando Valley and the background of progress in District VII of the Division of Highways. He said:

"In the San Fernando Valley between July 1, 1953, and July 1, 1957, there was expended approximately \$50,000,000 for right-of-way. In addition, the 1957-58 Fiscal Year Budget has provided about \$9,000,000 for this purpose, and in the 1958-59 Fiscal Year beginning July 1st next we have



Governor Knight looks over construction plans with other members of the party; left to right, Frank Pine, vice chairman of the Valley Wide Committee; Russell Quisenberry, publisher of the Valley News; Knight; and Robert E. McClure, member of the California Highway Commission

nearly \$13,000,000 provided for anticipated right-of-way expenditures. This gives us a total of nearly \$72,000,000 either expended or budgeted for right-of-way on freeways in the San Fernando Valley since July 1, 1953.

"As to construction, we have either completed or under construction work with a total value of \$35,000,000, and projects with a total estimated cost of \$27,148,000 which will be placed under contract this year. In order to accomplish this, the department has taken advantage of a recent act of the Legislature which makes it possible to obligate funds in succeeding fiscal years for projects on which contract time will run beyond the fiscal year in which the work goes to contract. It is presently estimated that projects in the San Fernando Valley going under contract this year will obligate the 1959-60 Fiscal Year to the extent of approximately \$7,800,000. It is in this manner that we have been able to arrange for the earlier starting of several very important projects.

#### Roadside Development Planned

"In addition to the major projects, funds have been provided for planting the slopes of recently completed

projects. This matter of planting and landscaping has been the subject of a great deal of consideration. It is expensive, both to install and to maintain, but it is important for two reasons: one, it of course prevents the erosion of cut and fill slopes; and two, it tends to preserve the appearance of the neighborhood. It is becoming of continually greater importance that we make every effort to have our planting consistent with the type of development in the neighborhood, but limited to those types of planting which will require the least maintenance.

"Now, as to the future, it appears that it will require approximately \$98,000,000 to complete the presently adopted freeway routes in the San Fernando Valley. This estimate is split \$23,500,000 for right-of-way and \$74,500,000 for construction. Of the total of \$74,500,000 for construction, \$7,800,000 is presently obligated from the 1959-60 Fiscal Year Budget for projects to be placed under contract in the 1958-59 Fiscal Year. Thus we can see that projects which will be placed under construction after the 1958-59 Fiscal Year have an estimated total construction cost of approximately \$67,000,000."



# Oakland Progress

*Construction Moves Ahead  
On Bancroft Avenue Freeway*

By JAMES E. McCARTY and WELTON E. FOLLETT  
Supervising City Engineers, City of Oakland

THE CITY OF OAKLAND is currently engaged in a co-operative project constructing Bancroft Avenue Parkway with financing from State Gas Tax Major City Street Funds and Gas Tax Funds from the County of Alameda. This street will extend from Bancroft Avenue at 107th Avenue to East 14th Street at 46th Avenue, with another connection to the East Shore Freeway via 42d Avenue. The improvement will cost approximately \$4,500,000 for right-of-way and construction and is slated for completion sometime in 1962 if present financing is continued.

The project will convert Bancroft Avenue from a rundown noncontinuous street and railroad right-of-way to a major intercity thoroughfare and railroad parkway. This transformation involves problems which have been overcome by engineering planning of city, county, state, railroad, utility and contracting agencies. Many of the problems are unique, but basically the major concern was to convert this disconnected dedication into a useful arterial serving both rail and automotive vehicles without materially changing the general residential character of the neighborhood.

#### **Needed Relief Provided**

The need for this arterial was foreseen as early as 1927 when the major street plan of the City of Oakland was formulated. Uncontrolled subdivision in East Oakland in the early history of the city had left a large area with no provision for the important east-west movement. The development of Bancroft Avenue will serve this area and provide the much needed relief of Foothill Boulevard, MacArthur Boulevard and East 14th Street, as well as a direct connection to an existing major city street, Bancroft Avenue in San Leandro. Studies for this thoroughfare were commenced in 1941 and protection of the right-of-way started. With the Engineering Department, Planning

Commission, Park Department, and Recreation Board participating, the general policy of a parkway with the railroad located in a wide median strip was formulated. The Park Department and Recreation Board are to make maximum use of surplus properties for park and playground facilities, and the Planning Commission agreed to co-ordinate the zoning so as to maintain the present land-use. With this general policy set, detailed planning was undertaken by the Engineering Department under the direction of John A. Morin, City Engineer, to tackle the specific problems.

#### **Design Problems**

What can be done with a railroad spur track on a major street? The railroad is the chief transportation link for major industries that are located in this area. The railroad was located partly in city street under spur track permit and partly in private rights-of-way. These private rights-of-way resulted in a noncontinuous street dedication. After much study and negotiation with railroad officials a satisfactory solution was reached. The city purchased all of the existing railroad rights-of-way and under a spur track permit the railroad moved the track into the center of the new street alignment. A wide median strip was provided which will not only afford a landscaped right-of-way but also make room for ample left-turn lanes at all intersections. This wide right-of-way will also provide for an additional two traffic lanes if required. A study of the traffic circulation in this area established which crossings of the railroad and thoroughfare were necessary. Those not needed were closed with the resulting fewer crossings making the railroad operation and the parkway use much safer. The agreement between the city and railroad on the division of costs for the relocation of the railroad removed the major block in way of the Bancroft Avenue Parkway.

#### **Pavement Design**

With the removal of this obstruction and the planning initiated for the required utility rearrangements, the remaining design problems were considered. The typical section of the Bancroft Avenue Parkway is planned as two 12-foot moving lanes in each direction, a parking lane eight feet wide, and the previously mentioned left-turn lanes which are also 12 feet wide. This section is made up of a concrete curb and six-foot-wide concrete gutter in the parking lane, 25 feet of pavement and a concrete curb with one-foot-wide concrete gutter at the median strip. There are sidewalk crossings of the median strip at each intersection and a sidewalk area is provided for five-foot sidewalk next to the curb.

Tests on the subgrade indicated a poor foundation material of heavy clay. To support the anticipated loads on this heavy clay subgrade a pavement thickness of 18 inches was designed. This pavement section consists of four inches of selected material subbase, eight inches of crusher-run base and six inches of asphaltic concrete surfacing, of which the top two inches was open-graded mix.

#### **Co-operative Financing**

With the location and planning well established, the financing of the project was undertaken. Inasmuch as this was a major city street, the project was eligible for state gas-tax funds; however, inasmuch as the parkway was an intercity thoroughfare serving San Leandro traffic as well as Oakland, county aid was also solicited. These negotiations resulted in the use of Alameda County gas-tax funds allocated to the City of Oakland under the mayors' formula (an administrative agreement worked out by Oakland Mayor Clifford E. Rishell, the mayors of other cities of Alameda County, and the Alameda County Board of Supervisors relative to redistribution for city use of state





An aerial view of the recently completed Bancroft Avenue Freeway in Oakland. A noncontinuous street and railroad right-of-way was converted to a major thoroughfare and railroad parkway.

gas-tax funds allocated to the county) for construction of the first two units of the parkway. It is anticipated that the remaining portions not under contract now will be similarly financed.

With design and financing completed, the purchase of rights-of-way was accomplished. A total of \$1,313,-

800 has been spent acquiring rights-of-way for the project. This has been financed by state gas tax funds allocated to the City of Oakland for major city streets. As these properties were acquired, contracts were awarded for clearing of all existing improvements. With the clearing

completed, construction operations could be commenced after co-ordinating the relocation of the railroad, the gas, electricity, and water lines, the sewers and the storm conduits with all agencies involved.

The contract for the first unit of the project from 107th Avenue to 90th Avenue was awarded November 1, 1956, by the Oakland City Council to Lee Construction Company of San Leandro and was completed on October 2, 1957, at a cost of \$414,860.

The contract for the second unit of the parkway was awarded by the Oakland City Council June 25, 1957, to Gallagher and Burk, Inc., of Oakland, and at present is under construction. The contractor's bid for this unit was \$359,603.

#### Future Construction

The third unit is presently in the design stage, with a tentative construction date set for spring of 1958, at an estimated construction cost of \$450,000. Following this unit, which will run to Havenscourt Boulevard, the parkway will follow the present alignment of Bond Street. The improvement in this area will involve the reconstruction of the existing pavement, construction of new pavement in areas where Bond Street is not presently improved (small previously nondedicated stretches which were purchased when commuter trains were discontinued). The estimated cost for construction and right-of-way for the portion from Havenscourt Boulevard westerly is \$2,000,000. The eventual terminus of this project will be at East 14th Street at 46th Avenue, with another leg to tie into the Eastshore Freeway via State Route 235.

In this manner funds presently available are being used to culminate 30 years of engineering planning. Major problems involving right-of-way acquisition, railroad location, utility co-operation and other construction difficulties are being surmounted to provide the citizens of Oakland, San Leandro and Alameda County with a new parkway to relieve existing congested major streets and provide the required connections to the planned future freeways in Metropolitan Oakland.



# OPERATIONS AND ACTIVITIES OF MATERIALS AND RESEARCH DEPARTMENT

## PART VI—Administration and Services Section

By HARRY R. CEDERGREN, Senior Materials and Research Engineer

IN THE May-June, 1957, issue of *California Highways and Public Works* Francis N. Hveem, Materials and Research Engineer, presented an outline of the general operations and activities of the Materials and Research Department. Each of the subsequent issues has contained an article giving a review of the work of one of the four testing sections—Pavement, Technical, Structural Materials, and Foundation. This article, covering the operations of the Administration and Services Section, concludes the six-part series outlining the activities of the Materials and Research Department.

The five preceding articles about the Materials and Research Department have related a great diversity of activities performed in the various sections. The department conducts research and makes investigations on anything needed for the construction and maintenance of highways, including such widely differing materials as asphalt, latex, timber, paint, cement, steel, concrete, soil, rock, survey tapes, traffic lights, etc. In the past, much of the work of the laboratories was directed toward verifying the quality of materials being used in highway work. The present trend places increased emphasis on research and special investigations.

For many years the Materials and Research Department has believed that careful study and research in the properties and usage of materials can pay substantial dividends. Many of

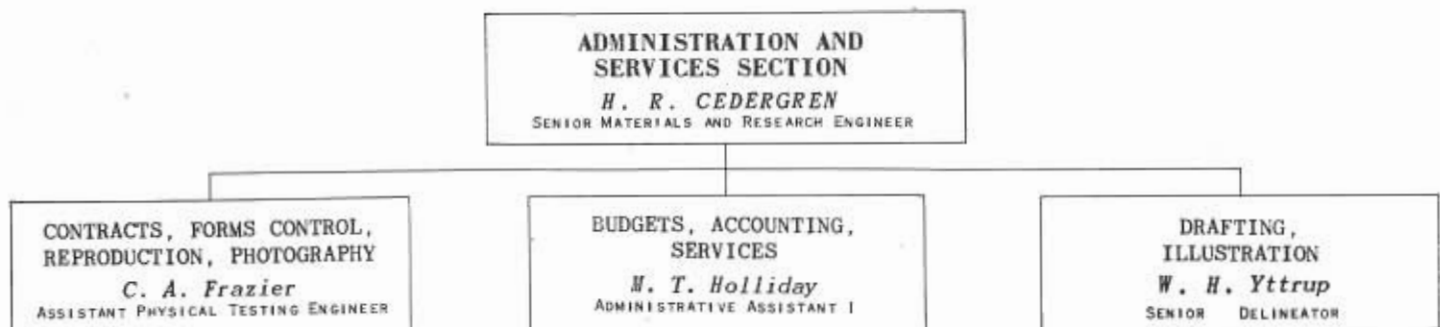
the employees of the four testing sections are engaged directly in a wide variety of interesting and sometimes spectacular testing and research activities that are aimed toward this goal. Needless to say, much hard work is required of other individuals who indirectly contribute to the work. The broad scope of work in the different laboratories creates demands for many stock items of tools, supplies, materials and other services that are more or less common to all. This concluding article discusses the activities of the Administration and Services Section, in furnishing services needed by all sections of the department.

### Scope of Activities

The Administration and Services Section provides a variety of services, and co-ordinates miscellaneous activities that are required for the smooth and orderly operation of all working units. The section operates a drafting room, and a photographic and reproduction unit that prepares illustrative material of various kinds for reports originating in the other sections. An accounting office maintains nonrental equipment inventory and budget control, service agreement and purchase files, renders bills for work and services performed for other highway and governmental agencies, maintains cost and revenue records, and performs accounting studies. The section prepares reports, maintains records, and furnishes miscellaneous services such

as mail distribution, telephone switchboard, messenger service, building upkeep and maintenance, car pool, shipping and receiving and related activities. It makes periodic analyses of payroll and other expenditures to enable the Materials and Research Engineer and his staff to keep abreast of financial matters.

The section compiles various reports—for example, the department's contribution for the Annual Report to the Governor—from material furnished by the various sections. It edits the department's monthly newssheet "Random Samples" and prepares general information booklets, such as one for orientation of new employees. It works with the clerical staff in the sections to prepare and maintain Manuals of Office Procedures. The section handles interviews with prospective new employees and conducts exit interviews for individuals leaving the department. It arranges laboratory safety meetings and supplies safety information to employees. It is developing a program of standardization of laboratory weights and balances. An employee of the section has studied modern practices in forms design and usage and assists all sections in making laboratory report forms clear, efficient and as uniform as possible. All forms used are scrutinized and referred to the Standard Forms Manual. The section co-ordinates or manages miscellaneous employee activities such as approved charity drives, etc.







Numerous office activities are needed for the operation of the department. LEFT—The Administrative Assistant discusses billing procedure for charges on a contract. RIGHT—Vital to every section's activities is the mail desk in the "Front Office."

A small personnel office handles local personnel matters for the department including the maintenance of official personnel records, the processing of official personnel documents, the submission of payroll data and distribution of paychecks. The section maintains active files on preliminary and current contract records for the convenience of all sections. The section supervisor prepares training schedules to fill the needs of trainees and visitors from the districts and other Division of Highways departments, students, visitors from other states and other countries, and other people interested in methods, apparatus, and ideas that have originated in the department. Some of the major activities of the section will be discussed in the following paragraphs:

#### **Many Operations Unusual**

Many of the operations of the Materials and Research Department are "one time" affairs—each one new, different, and unusual. Others are standardized or repeated day after day. "Unusual" projects appear so often that they are commonplace. Nevertheless, the procuring of special testing apparatus and supplies that are needed for these enterprises keeps the accounting unit on its toes much of the time. Budget control, nonrental inventory of various testing devices, and

other accounting procedures are routine activities of this unit.

This group handles all details in connection with the approval and "follow through" of approximately 2,500 purchase requests a year, covering specialized laboratory and field equipment and supplies. The work includes the editing of requests submitted by the several laboratory sections, conferences with persons submitting the requests, checking for budget encumbrance, posting of account records, etc. Purchase orders issued by the Department of Finance are registered, receiving documents are checked, and vendors' invoices audited for payment. Approximately 1,000 Subpurchase Orders for emergency buying are issued each year, and 100 current service agreements maintained for special services.

#### **Cost Records Kept**

Highway districts and departments, state and federal agencies, and cities and counties are billed for services rendered by this department in accordance with published schedules. Cost account records and revenue analyses are kept on a monthly basis so that the Materials and Research Engineer may be fully informed on fiscal operations of the department.

Nonrental inventory records on laboratory equipment valued at more than \$500,000 are maintained in ac-

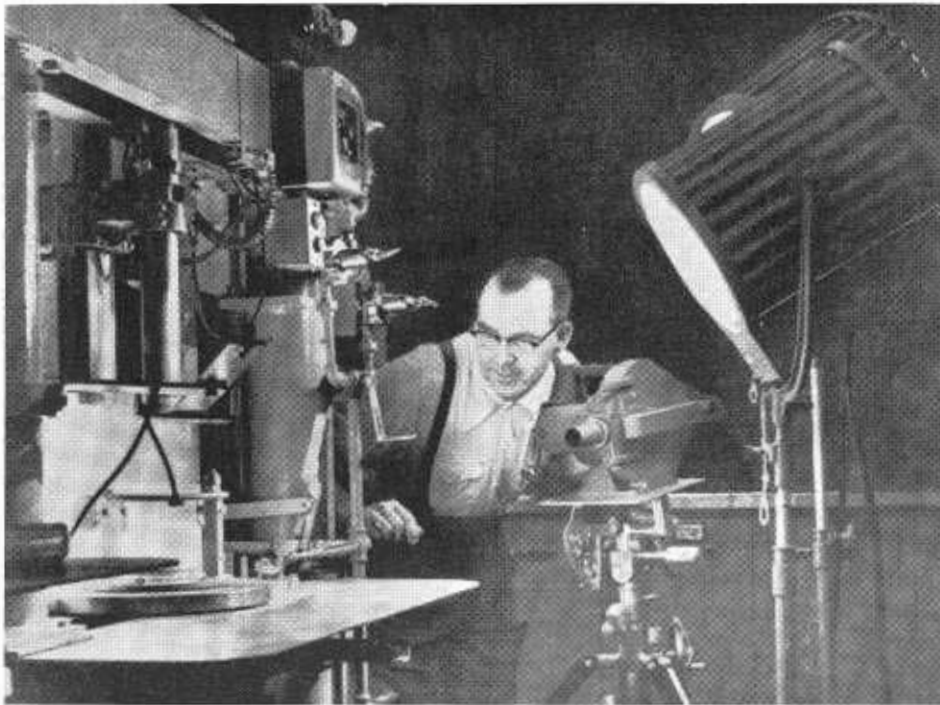
cordance with standardized procedures. Work routines are studied for possible improvement, facts and data are accumulated, and special investigations conducted when requested by management personnel.

During the 44 years of its existence the Materials and Research Department has developed dozens of new testing devices and ideas. We have also not hesitated to borrow good ideas from others. The department is well-known for its work with the alkali aggregate reaction test for concrete, horizontal drains, development of economical traffic paint, epoxy adhesives, improvement in welding techniques, and researches in asphalt and bituminous paving technology, just to mention a few items.

#### **New Manual**

Many new research and special investigation projects requiring highly specialized apparatus and supplies are begun on short notice and are of such urgency that engineers directly concerned are unable to request the ordering of necessary items far enough in advance to allow for routine purchase. Securing earliest possible delivery of required items then becomes the problem of the employees handling purchase requests. These people are continually being faced with the necessity of trying to expedite delivery by working within the many rules and





A photographer in the Materials and Research Department has many and varied duties. Here he uses a high speed camera in a study of the behavior of soils during compaction.

requirements covering purchase procedures and at the same time maintaining the good will and co-operation of other agency employees who handle the documents. The new "Manual of Instructions" prepared by the Service and Supply Department outlines in some detail the procedures that are to be followed in procuring supplies and services and is an excellent reference on this subject.

Seldom does the Materials and Research Department request the purchase of foreign-made devices or materials; however, upon occasion no domestic item will do the job satisfactorily, and a foreign-made item is known to be available. Transactions for such purchases require unusual care in processing to avoid conflict with state and national laws and policies. An item of this sort was a soniscope, available only from a firm in Canada. Clearance eventually was obtained and the order was placed by the Finance Purchasing Division. After long delay, notice was received from the United States Customs Office that the shipment had arrived at the Canadian border, and a substantial payment would be required in order to secure clearance. Much appreciated co-operation of District IV accounting office

and several headquarters employees, including the highway disbursing officer, finally secured delivery of the soniscope.

#### Early Delivery Important

Fortunately, most purchase requirements of the department do not cause so many complications and the problem is more often one of getting

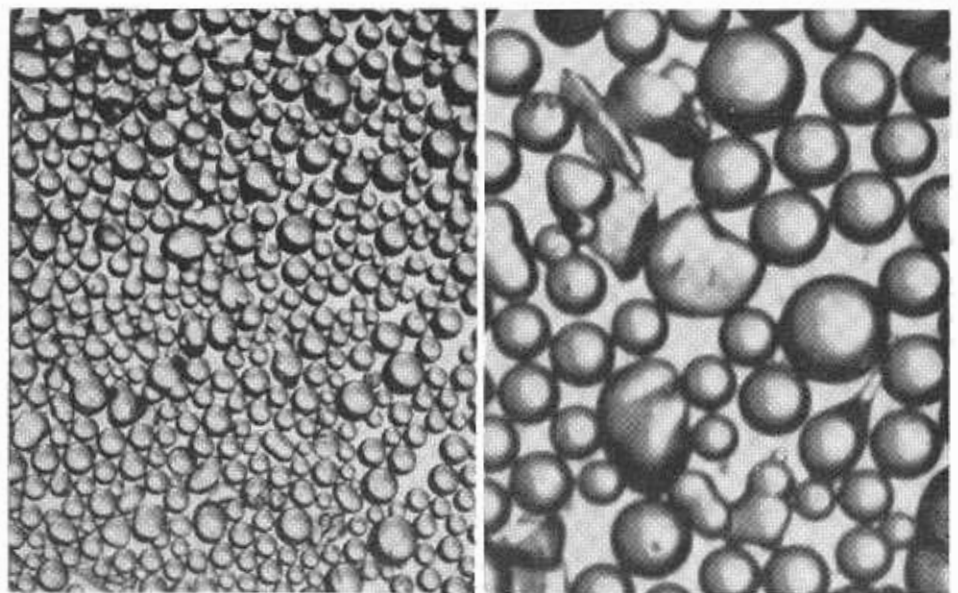
things delivered in the shortest possible time.

All bills must be carefully audited prior to approval for payment. Some require detailed handling that is far more time-consuming than the small amounts of money involved might imply. Bills for demurrage charged by the vendors on oxygen and acetylene gas cylinder containers held beyond a 30-day "free" period are an excellent example:

Though each cylinder has an identifying serial number, the vendors' bills show calculation of demurrage only by the totals on hand, without further identification. Since the vendors also bill for "lost" cylinders, it has been necessary to use an especially designed work sheet form that provides for listing all cylinders received and returned by serial number in order to accomplish positive audit when discrepancies occur.

#### Return of Cylinders

Gases are used in several of the laboratory sections, and in addition, cylinders continually are being returned and picked up by our field personnel at the vendors' various out-of-town locations. The employee who signs each tag is responsible for recording serial numbers of the cylinders received and returned. When the employee "forgets," additional time



Macro-camera shows details of small objects. This picture shows typical glass "beads" used in traffic paint: Left, magnified 10 times; right, magnified 30 times.



must be spent by the Accounting Personnel in "riding herd."

Cost records maintained by this department for the materials and research engineer's information require detailed posting. Our accounting office is small, and laboratory technicians are no more meticulous than any other variety of engineer when it comes to forwarding packing slips and delivery tags, etc.

The administration of a staff of a couple of hundred people requires a surprisingly large variety of personnel transactions. While basic transactions of all Division of Highways personnel are supervised by "Headquarters Personnel Office," the actual preparation of documents and the filing of personnel data for our employees are carried out by our own personnel office. One experienced personnel clerk with the part-time help of another has been able to take care of this work. Our personnel office is one of the smallest units of the department but at times just about the most important. On payday everyone welcomes the girl with the pay warrants. A good personnel clerk is a real asset to any department. She must be accurate in the preparation of documents, willing to listen to employees' personal problems with a sympathetic ear, and is expected to handle all personnel transactions in a strictly confidential manner.

#### Photographic Section

An essential part of any research project or special investigation is the report outlining the scope of the work and summarizing the findings. Personnel in the photographic, reproduction and drafting units are charged with the job of helping the technical staffs express their ideas on printed pages or before audiences. They may be called upon to prepare almost any kind of illustrative material from large posters such as the 7-foot by 12-foot chart illustrated in the opening article by F. N. Hveem to complete sets of working drawings for an original testing device, or photographs and charts for technical reports. Some of the engineers and specialists of the various sections frequently are asked to represent the Division of Highways at conferences and technical



A draftsman for the Materials and Research Department must be versatile. Engineering details of structures, maps, machine drawing, architectural design and the illustrative arts are all in the day's work.

meetings throughout the United States. Employees of the illustrative unit prepare for the speakers charts, graphs, slides, and color illustrations of various types. They also prepare illustrative material for reproduction in *California Highways and Public Works*.

Technical reports and papers originating in the department usually are illustrated with photographs. When photographs are needed they usually show an operation in progress in one of the laboratories or in the field. When feasible, the Service and Supply Department has assigned their photographers to special projects such as the bridge barrier curb investigations made for the Bridge Department. Since a project may require only a few pictures, taken on comparatively short notice, the Materials and Research Department has placed on its staff a photographer who can be assigned immediately to projects as they arise. He has a small darkroom and the basic photographic equipment needed for

this work. He has become familiar with the jargon of the engineers and technicians and understands basically what they are trying to show photographically. Most of his work is rather specialized. For example, a high-speed motion picture camera is used to slow down certain operations that are not visible to the naked eye. By speeding up this camera he can reduce the speed of a projected action to one one-hundredth of its actual speed. Pictures have been taken with this camera as part of the study of events that take place during the compaction of laboratory specimens and for detailed sequences of mechanical operations. A slow-motion study of one device showed with remarkable clarity actions that were not even suspected to be taking place. Some simple changes in design eliminated serious vibrations that were causing trouble.

#### Color Prints Useful

In general, photographic illustrations for reports prepared by the vari-



ous sections are made in black and white; however, color prints have been found useful for many purposes such as depicting the corrosion of metals and other actions that are largely lost in black and white pictures. In addition to its work in the preparation of illustrative material for technical reports and papers, the photographic unit develops a record of the progress of technical investigations. Pictorial records have been found to be an irreplaceable supplement to physical observations and tests. The photographer also prepares photographic copies of forms, charts, reports, and other material being reproduced by the offset method, and maintains and indexes a central laboratory negative file.

Many testing devices have been invented or improved upon by the Materials and Research Department. Frequently, a new apparatus has been developed by close contact between a man with an idea and an instrument maker. Ideas may be worked out with the aid of rough sketches; however, after a device has been developed, detailed drawings generally are prepared. Some of this work has been done by people in the Structural Materials Section; however, the drafting unit has prepared working drawings of numerous new instruments. Complete mechanical drawings have been prepared for many original pieces of equipment such as the following:

1. The asphalt extractor.
2. Mechanical compactor for soils and bituminous mixes.
3. Hveem stabilometer.
4. Sand volume apparatus.
5. Modified Benkelman beam apparatus.
6. 60-inch I. D. sphere photometer.
7. California type soil samplers.
8. Unconfined compression machine.
9. Reflux moisture test apparatus.
10. Kelly penetration apparatus.
11. Abrasion test equipment.
12. California impact compaction apparatus.
13. Cohesimeter.
14. Expansion pressure apparatus.
15. Fatigue testing machine.

The drafting unit prepares illustrative material needed by the testing sections of the laboratory. They regularly prepare drawings showing the results of investigations performed by the Foundation Section. They delineate the underground rock and soil conditions as determined from samples

taken by the field crews, and other physical conditions. They present details of the installation of horizontal drains for the control or prevention of slides. The drafting unit also maintains a central file of engineering tracings for all sections of the department. A close affiliation between the drafting and illustration personnel and the research staff is essential in the development of useful illustrative material.

After all of the various illustrative material has been prepared for reproduction, reports for distribution usually are printed by the offset method. A multilith operator prints most of the reports that are written by the department. The artwork for the current series of articles was developed by the illustrative unit.

#### Miscellaneous Services

In addition to its work in accounting, personnel, drafting and reproduction as outlined above, the section provides numerous general services needed for the operation of all units of the department. These services include general building upkeep and maintenance, the operation of a car pool, shipping and receiving, telephone switchboard, messenger service and mail distribution, etc. The Administration and Services Section also maintains files on all active highway con-

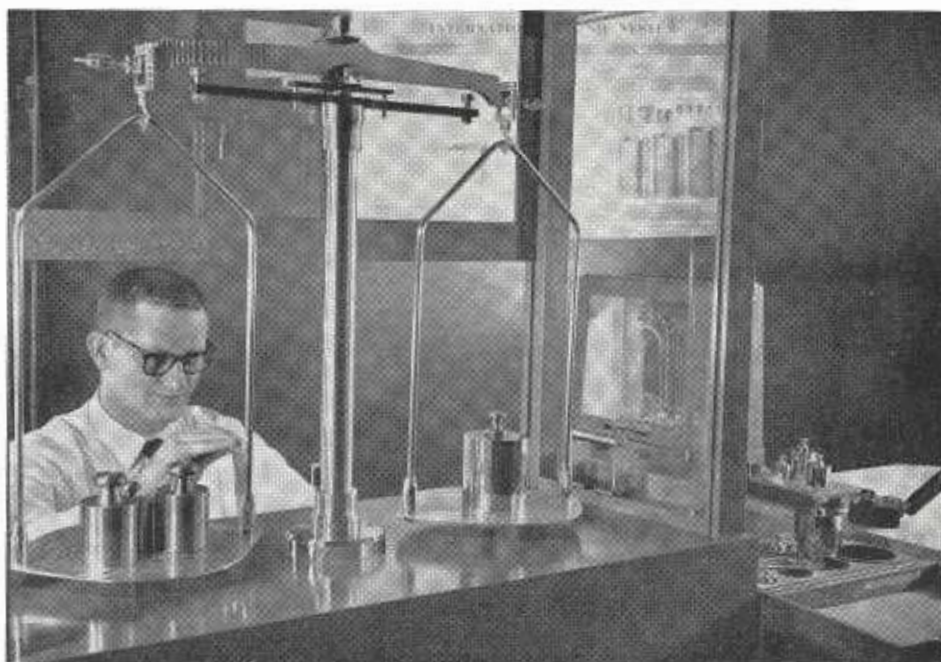
struction from the "project report" stage through the completion of each contract or work order. These files enable employees of all sections to quickly locate pertinent data, design information, contract specifications, test results and materials reports.

The work of the Materials and Research Department has brought about the development of a sizable number of forms. An employee of the Administration and Services Section has made a study of modern trends in forms design. He has aided all sections in the design of new forms and has improved existing forms when necessary before submittal for reprints. Attention to the design and control of forms has made possible the saving of time of people in all sections.

One of the newest additions to the work of the Administration and Services Section is the preparation of a program to develop standards of accuracy of laboratory weights and balances. Each of the testing sections has done its own standardization work in the past. A consolidated effort to co-ordinate the standardizing activities of all sections is underway.

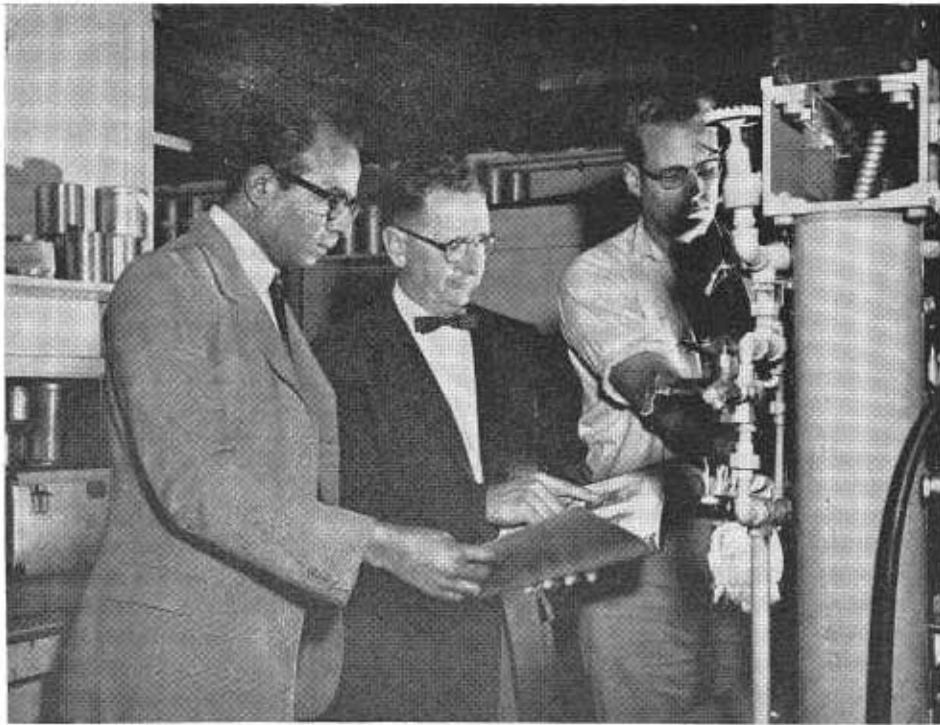
#### Training Programs

Many different kinds of skills are required for the accomplishment of the work of the Materials and Research



Standardization of weights and balances assures that laboratory work will be accurate and precise





Engineers and other specialists from foreign countries are a common sight in Materials and Research laboratories. Picture shows Dr. B. G. Singh of Trinidad (left) being shown a California test method.

Department. Anyone who becomes experienced in a specific activity is likely to be on the way toward becoming a specialist. Once a man has become expert in a particular kind of work, there is a tendency for him to continue indefinitely in that work. To a degree this specialization is necessary; however, the department is attempting to broaden the scope of work of its employees by job rotation whenever feasible. To accomplish this objective, proper training programs have been developed to fit individual needs.

The Materials and Research Department, being a segment of a modern engineering organization, receives many visitors from foreign countries and other parts of the United States. Training programs are developed to meet the needs of many such individuals who visit our department each year. The laboratories are open to anyone in the districts or another state department who wishes either a short tour or an extensive training. Recently one of the districts sent about 14 construction and materials men to our laboratories for a few days observation of our methods. This group was interested primarily in highway pavements and earth foundations. Schedules were developed with

the bulk of their time in the Pavement Section and the Foundation Section. Other visitors have been primarily interested in concrete, traffic paint, welded structures, horizontal drains or other specialized activities. Groups of students from local schools may wish to tour the laboratories in an hour or two. Engineers and officials from foreign countries sometimes wish to remain in the department as long as three or four months for detailed study of certain phases of our work. Some of these visitors learn our methods by actually carrying them out. Whatever the desires of our visitors and trainees, programs are developed to meet their individual needs.

#### Foreign Visitors

Our department receives numerous foreign visitors who are referred to us by the U. S. Bureau of Public Roads or the Department of State. More than 300 engineers and other officials from 33 foreign countries have registered in the Materials and Research Engineer's guest book. While these people come to us mainly to study our methods, our people derive considerable pleasure and benefit from their contacts with these visitors. Foreign visitors

generally have an excellent technical background and a good command of the English language. A mutual exchange of ideas is beneficial to them and to us. In general, our instructors have little difficulty from the standpoint of a language barrier; however, upon occasion visitors are received who scarcely understand what is being said to them. The language problem strains the abilities of our engineers to the limit. Sometimes we look among our staff desperately for an interpreter. Recently one of our Spanish-speaking employees helped ease conversation with a group of Mexican engineering students. Another of our employees who speaks a little Japanese spent a couple of days acting as interpreter for an official from Japan. All situations that have arisen in the past have been handled with reasonable satisfaction. However, we wouldn't know what to do if a group suddenly descended upon us from Siberia. We speak no Russian.

The views of some of our visitors are typified by the statement of a recent engineer from Pakistan who said, "California is a great state, the Division of Highways has the most beautiful highways in the world, and the Materials and Research Department is—," but then he begins to sound just like a native son of California so we won't quote him any further.

#### Demands Are Continual

In the above paragraphs we have outlined some of the activities of the Administration and Services Section that are necessary for the smooth and orderly functioning of the working units. We have mentioned some of the problems of keeping the research and testing units supplied with the articles and materials of their trade. We have mentioned the work of our illustration and reproduction unit in helping the technical staffs get their ideas down on printed pages. We have touched upon the continual demands for developing training programs for engineers from other units of the Division of Highways and from other lands and states of our own Country. These activities go on behind the scenes and appear less spectacular than

... Continued on page 56



# Ribbon Cutting

Chico-Hog Springs Section  
Of Sign Route 32 Improved

IN A TRADITIONAL ceremony on January 9th, F. W. Tarr of the Statewide Highway Committee of the State Chamber of Commerce cut the ribbon to signal the opening of the recently completed highway improvement on State Sign Route 32 between Chico and Hog Springs. This ceremony marked the culmination of two separate but adjoining projects representing an expenditure of over a million dollars: one to widen Eighth and Ninth Streets in Chico from Main Street to near Fir Street and the other to construct the 5.4-mile length of highway from near Fir Street to Hog Springs, a combined length of about six and one-half miles.

In addition to Tarr, other speakers at the well-attended opening were: Claude Alexander, Chairman of the Butte County Board of Supervisors; Dr. Vern M. Bartram, President of the Chamber of Commerce; Andrew R. Morrison, Chamber Secretary-Manager; Chico Mayor Theodore Meriam; State Senator Paul L. Byrne, and Alan S. Hart, District Engineer of Division of Highways District.

## Two Contracts

Lester L. Rice and Sons, Inc., of Yuba City had the \$176,284 contract to widen and surface Eighth and Ninth Streets in Chico. Earl R. Horn was resident engineer.

The adjoining project was constructed by A. Teichert and Son, Inc., of Sacramento at a cost of \$872,773. Right-of-way was purchased during 1955 and 1956 at a cost of approximately \$130,000. One of the features of this project was the relocation of Little Chico Creek and the diversion of Dead Horse Slough which necessitated the removal of approximately 60,000 cubic yards of material. Grading for the roadway required excavation of about 100,000 cubic yards. Forty-two thousand tons of rock base was placed under 20,000 tons of plant-mixed surfacing to complete the roadway. Two reinforced concrete bridges



F. W. Tarr, longtime member of the Statewide Highway Committee of the California State Chamber of Commerce, cuts the ribbon to place in service an improved section of State Sign Route 32. Assisting are (left to right): Dr. Vern M. Bartram, President of the Chico Chamber of Commerce; State Senator Paul L. Byrne of Butte County; Tarr; Theodore Meriam, Mayor of Chico; Alan S. Hart, District Engineer, Marysville; and Claude Alexander, Chairman, Butte County Board of Supervisors. (Chico Record-Enterprise Photo)

were constructed across the diversion channel of Dead Horse Slough, requiring 325 cubic yards of concrete and 90,000 pounds of steel. M. E. Ryan, Sr., represented the Division of Highways as resident engineer.

The road is principally a recreation route for summer vacationists and is a shortcut to Lassen Park and Lake Almanor for travelers coming from the west and south of Chico as well as those from the immediate vicinity of Chico.

## Historic Road

Frank B. Durkee, former Director of Public Works, in his brochure entitled "Deer Creek Highway," as this portion of the route is known locally, has this to say about the early history of the route:

"From the time the early pioneers settled in California the need was evident for a direct highway from Chico toward Susanville and the country north and east of there.

"Although used by Peter Lassen prior to 1855, the development of such a route really started in 1863 when the gold rush had ebbed in California and the miners sought the shortest way to the Idaho mines. This earliest development was meager—only a toll trail—for 'saddle trains' along what was to become the Humboldt Road. The first saddle train is recorded as having left Chico on April 3, 1865. Accommodations for 'passengers' consisted of a mule or horse to straddle, a blanket roll, and food along the way."



# Alvarado-Niles Road

*Unique Method  
Builds Bridge*

By OLOF E. ANDERSON, County Surveyor and Road Commissioner

ALAMEDA COUNTY, in co-operation with the United States Bureau of Public Roads and the California Division of Highways, recently completed the newly reconstructed Alvarado-Niles Road between Alquire and Decoto Roads. The 2.4-mile project was constructed at a total cost of \$200,000 (exclusive of engineering) utilizing federal, state and county funds under the federal-aid secondary highway program. The new road intersects the recently completed section of the East-shore Freeway (State Highway Route 69) between Jackson Street and Beard Road.

The Alvarado-Niles Road serves an area devoted primarily to truck farming; however, easterly of the road are located several industrial developments that have access to this route and utilize it extensively for employee access. In addition, the trend of residential growth is toward this area as is evidenced by the fact that the local school district has purchased 46 acres fronting on the Alvarado-Niles Road for a high school site. Before improvement, the road showed evidence of surface failure due to the thin bituminous-treated surfacing and inadequate cover over the native material. High annual maintenance costs resulted.

Traffic studies indicated that the Alvarado-Niles Road would be the primary east-west feeder into the freeway system and the estimated future average daily traffic further indicated that a four-lane facility would ultimately be necessary. However, the construction of a four-lane facility was not warranted at this time, but the acquisition of the necessary additional right-of-way for the four lanes was considered economically practicable. On this basis, the current improvement is one-half of a two-stage development plan, or the construction of two lanes of an ultimate four-lane divided highway. With minor exceptions, the additional right-of-way acquired was all on

one side of the existing road. The alignment of the present improvement followed the existing roadway.

#### **Pavement Widened**

Structurally, the section for the current improvement was designed on the basis of a traffic index of 6.54 and a minimum resistance value ("R") of 30 for the base material. On this basis, the following section was adopted: three inches of plant-mixed asphaltic surfacing; six inches of Class "B" cement-treated base; and six inches of imported subbase material. The pavement width is 40 feet, consisting of two 12-foot moving lanes and two eight-foot shoulders delineated by a fine seal coat. There were approximately 10,000 cubic yards of waste excavation in the contract to be disposed of by the contractor.

A local disposal site was not specified in the contract. The architect for the aforementioned proposed high school, however, met with representatives of Alameda County to determine whether surplus excavated material would be available to the school district. The architect was referred to the contractor and an agreement was made whereby the waste material would be stock piled on the school property. Thus the contractor was able to waste the material locally without double handling, which resulted in a saving for both parties to the agreement.

#### **Plant Mix Used**

The special provisions provided for either plant-mixing or road-mixing the cement-treated base material. For various reasons the contractor elected to plant-mix the material. Chief among those reasons was the availability of materials from a commercial plant in the area and the traffic hazards that would have resulted through road-mixing. The material was hauled eight miles from the plant to the job with end dumps and placed on the grade with

two windrow spreader boxes side by side. The operation thereby progressed for the full width of the roadway.

A unique feature of the contract was the construction of the Dry Creek crossing, consisting of a reinforced concrete cored-slab bridge of one span, supported on concrete piles. Built in 1910 and consisting of a double-span reinforced concrete slab, the existing structure was deficient in roadway width and hydraulic properties not complying with channel improvements proposed by the flood control district.

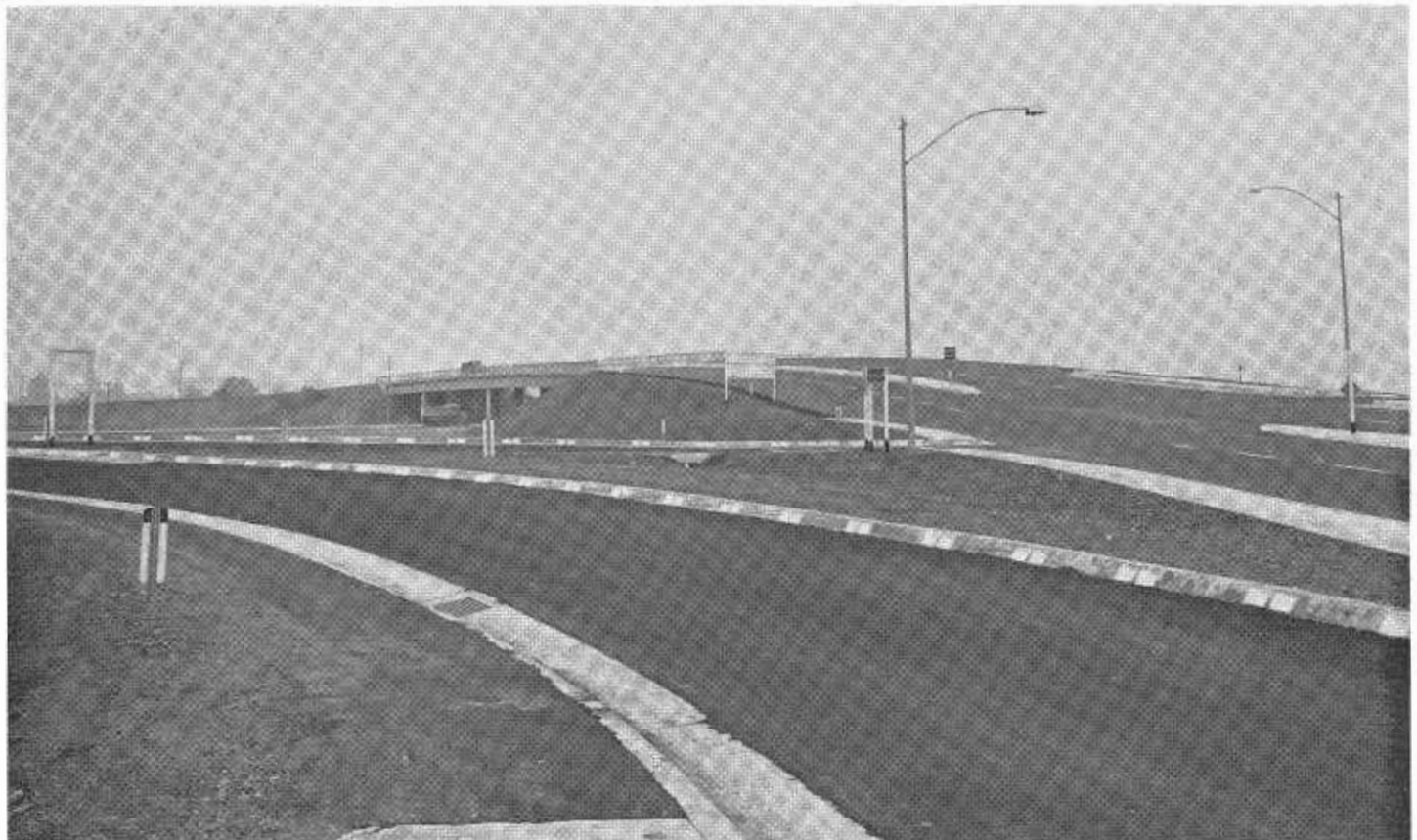
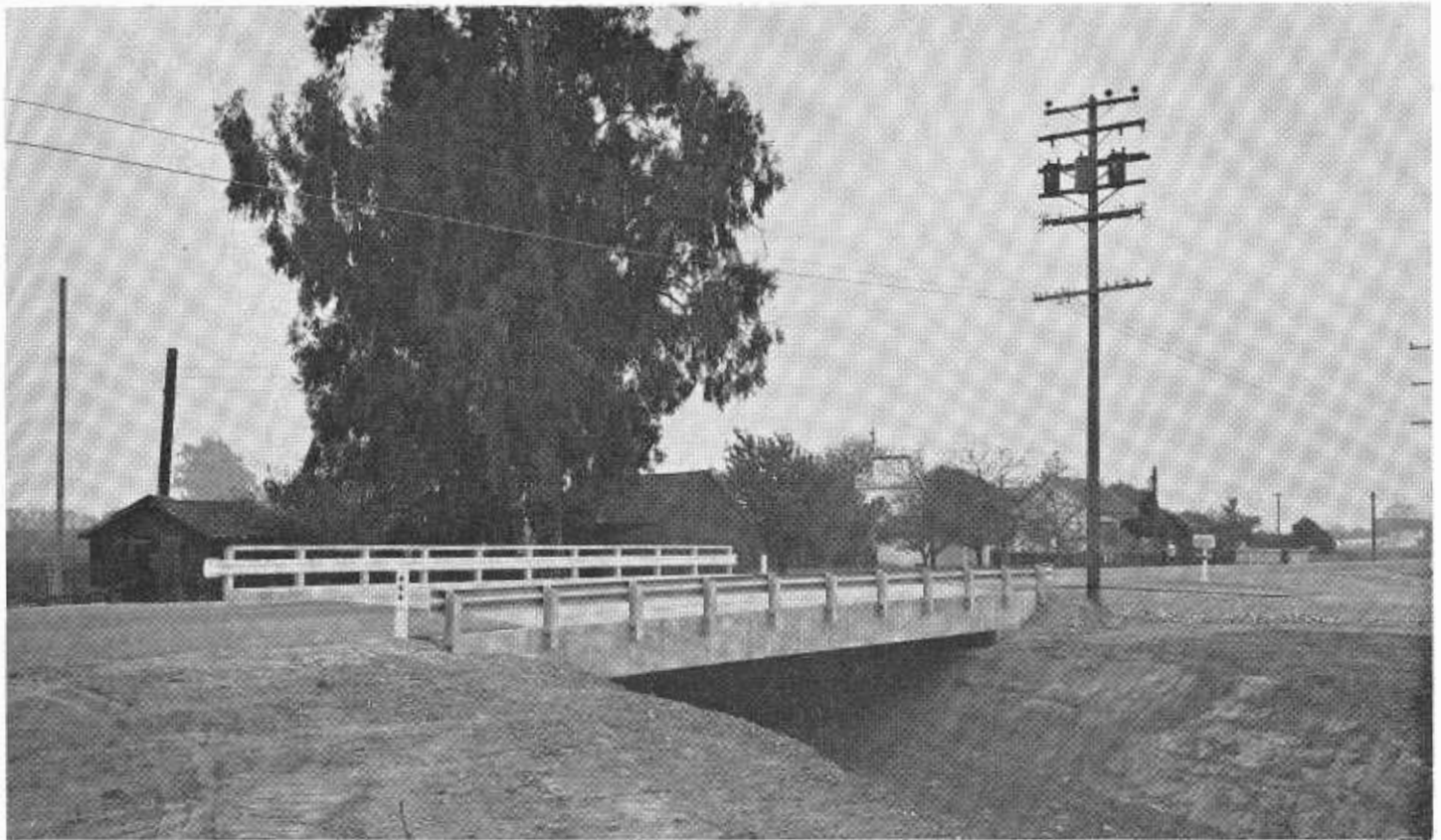
#### **No Falsework Necessary**

In lieu of conventional timber falsework, the contractor elected to cast the slab on a compacted fill. His primary reason for selecting this method being the large falsework members required to support the heavy dead load of a structure of this type. The material used for the fill was waste excavation from the roadway and consisted of a granular clay-loam material which compacted very satisfactorily. This material was brought up to within one foot of finished grade. Sand was used for the final lift. Double 2-inch by 4-inch deck forms were securely staked to the fill to the desired elevation, after which sand was brought up flush with the top of the forms and the plywood panels fastened. If the plywood panels did not have a firm supporting base, the weight of the concrete would "dish" the panels from support to support and the effect would be reflected in the finished structure. However, by carefully placing the fill, panel by panel, and with the use of a vibrating compactor, the contractor was able to provide a stable base which resulted in a neat appearing surface when stripped.

The Sonovoid tubes were supported by semicircular snap-tie cradles which in turn were anchored to the 2-inch by 4-inch deck forms. The tubes were

... Continued on page 54





UPPER—An unusual method was used in the construction of this Alameda County Federal Aid Secondary bridge. The bridge deck was built on a compacted earth fill just as though it were a section of concrete pavement. The channel was excavated after the concrete had set. LOWER—The Alvarado-Niles Road Overcrossing at the Eastshore Freeway.



# San Miguel

*Bypass of Historic Mission  
Town on US 101 Completed*

By J. W. ROBERTSON, Resident Engineer

ANOTHER LINK in the four-lane construction of US 101 has been completed and was opened to public traffic late in November of 1957.

Recently completed at a cost of approximately \$1,184,000 is 3.1 miles of US 101 between two miles south of San Miguel and the south boundary of Camp Roberts. Located near the north boundary of San Luis Obispo County, this full freeway facility bypasses the unincorporated community of San Miguel.

The town of San Miguel, located approximately three miles south of Camp Roberts is primarily a farming and ranching community. The principal attraction for tourists and the historical minded public is Mission San Miguel Arcángel, which was founded in 1797, and located "one day's journey" between Mission San Luis

Obispo and Mission San Antonio. Mission San Miguel was the sixteenth link in Padre Junipero Serra's chain of 21 original California missions.

The new freeway, constructed on new alignment throughout its length, lies westerly of the town of San Miguel and generally parallels old US 101, which is to be relinquished to the County of San Luis Obispo. The beginning of the project is contiguous to the four-lane expressway completed in 1954 between the City of Paso Robles and two miles south of San Miguel.

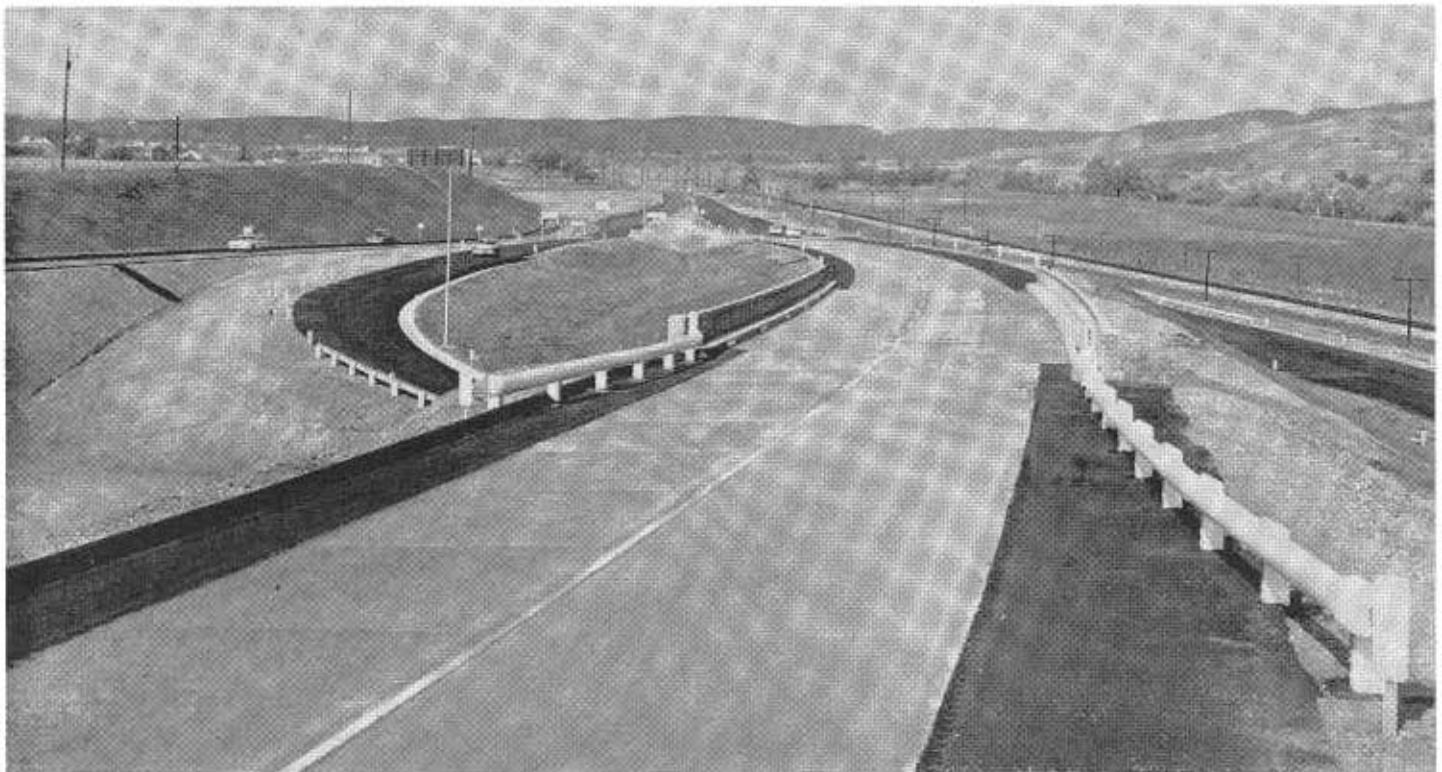
#### Local Material Used

The typical structural section of the mainline consisted of 0.67 foot of portland cement concrete and 0.33 foot of cement-treated subgrade on 1.0 foot of selected subbase material for a total cover thickness of 2.0 feet.

The roadway excavation between Stations 443 and 454 was of suitable quality to permit its use as selected subbase material in lieu of the more usual practice of providing imported subbase and imported base.

Selected material was hauled to the grade in two-axle scrapers. Since the material contained approximately 5 percent of oversize, the contractor equipped two continuous belt loaders with grizzly attachments to move the oversize before loading and delivering to the grade. This procedure enabled him to load out a scraper in approximately 90 seconds.

As some difficulty was experienced during the early stages of placing the selected subbase due to lack of fine material, it was considered advisable to provide a Class "C" cement treatment to the upper 0.50 foot under the



The north end of the San Miguel Bypass looking toward Camp Roberts in the left background. Traffic entering San Miguel uses the ramp curving under the freeway in the middleground.



PMS surfaced main line shoulders and frontage roads.

The work of mixing, spreading and compacting the cement treated material was performed at force account, since no contract items had been provided for this work. The final cost for cement treatment was approximately 15 cents per square yard.

Ramp construction consisted of 0.25 foot of Type "B" plant-mixed surfacing and 0.50 foot of Class "B" cement treated base over 0.50 foot of selected subbase material.

### Three Large Cuts

Roadway excavation for the project was obtained from three principal cuts. Total roadway excavation exclusive of rehandling stockpiled materials was approximately 690,000 cubic yards. This included approximately 80,000 cubic yards of selected material which was hauled and placed throughout the freeway facility.

Two of the three principal cuts were approximately 160 feet and 100 feet in height, respectively, and were of a sidehill nature. The natural ground lying on approximately a 1½:1 slope required the contractor to develop long, easy haul routes for accommodation of large earthmoving equipment. All cuts greater than 40 feet in height were constructed with 1:1 slopes and 20-foot benches provided at 50-foot elevation increments to reduce slide potentialities.

Except for the selected material, the excavated material consisted principally of sandy silts and silty clays, together with terrace sands and gravels. The material was loosened by scarifying and was hauled in conventional two- and three-axle pneumatic-tired scrapers, supplemented by push dozers. Compaction was obtained with sheepsfoot rollers supplemented by segmented steel wheel rollers. Except for the selected subbase material, the production rate for roadway excavation was between 12,000 and 18,000 cubic yards per day.

### Traffic Diverted

Portland cement concrete pavement operations were started May 16, 1957, and continued until June 11, 1957, at which time it was necessary for the contractor to divert traffic to the



Local traffic entering or leaving the bypass between the northern and southern ends does so at this interchange located west of the city

newly constructed left lanes in order to complete the earthwork at the south terminus of the project.

Material for use as mineral aggregate for P. C. C. pavement was manufactured by the contractor at a granite quarry located approximately 28 miles south of the project.

The contractor elected to erect his P. C. C. batch plant at the city of Paso Robles for serving both this project and a state highway project being constructed concurrently in the City of Paso Robles. This constituted a haul of approximately eight miles from the batch plant to the project. Production rates were approximately 960 cubic yards per day.

Metal strips (16-gauge) were used as weakened plane joints at 60-foot intervals on the initial lanes of pavement. Corresponding strips were placed adjacent on the companion lanes including all working joints. All other weakened plane joints were formed by sawing. This method of operation proved highly successful as only four random cracks developed during construction despite daily tem-

perature variations of between 20 and 40 degrees.

Three reinforced concrete bridges were constructed to serve as interchanges at each end of the project and at 10th Street. These interchanges will provide ingress and egress to the town of San Miguel without interruption.

The prime contractor was the Madonna Construction Company of San Luis Obispo, represented by superintendents R. W. Osborne and R. E. Chafin. Major subcontractors were Statewide Steel Erection Co. for placing bar reinforcing steel, P & Z Co., Inc., for furnishing and driving piles, and Valley Electric Company for the highway lighting system.

The work was performed under the general supervision of Mr. A. M. Nash, District Engineer. R. S. Samuelson and John Pettine were the Bridge Department representatives with the author as resident engineer.

It is common these days to speak of billion-dollar road programs. How much is a billion dollars? If a man started playing the stock market with a billion dollars for a stake, he could lose \$1,000 a day for 26 centuries.



## Carl S. Hamilton

Carl S. Hamilton, Supervising Bridge Engineer on state-owned toll bridges, died suddenly on December 19, 1957, at his home in Oakland.

Hamilton was born on March 24, 1897, at Northport, Washington, and spent his early years in that state and in British Columbia. During World War I he served with the Canadian Army, attaining the rank of captain. He was wounded in action three times.

Following the war he studied engineering at the University of British Columbia. In 1922 he moved to the San Francisco Bay area where he pursued his engineering career on several projects, including the Posey Tube. This was followed by two years on bridge construction with the Bureau of Public Roads.

Hamilton's service with the State of California began in August, 1929, when he went to work for the Bridge Department as resident engineer on bridge and subway construction. In May, 1933, he was transferred to the construction engineering staff of the San Francisco-Oakland Bay Bridge where he was assigned responsibility for caisson construction in the fabricating shipyards. His next assignment, in May, 1937, was to the permanent operating and maintenance staff of the Bay Bridge. In this position, which he held until his death, he was in direct charge of all maintenance activities on the several toll bridges, and after 1938 served also as second in charge of the entire operating and maintenance organization.

Hamilton was recognized as a leading West Coast expert on paints and protective coatings.

Hamilton is survived by his widow, Isabelle; his son, William C. Hamilton; his daughter, Mrs. Isabelle E. Dunlap, and seven grandchildren.

During the 1956-57 Fiscal Year, Division of Highways maintenance crews painted traffic lines and other pavement markings on more than 10,700 miles of rural state highways.

## Warlow Is Elected CHC Vice Chairman

Chester H. Warlow, of Fresno, has been elected Vice Chairman of the California Highway Commission, succeeding James A. Guthrie, of San Bernardino.

Warlow has served on the commission since his appointment by former Governor Earl Warren in 1943. He was reappointed by Warren in 1945, 1949 and 1953, and by Governor Goodwin J. Knight in 1957. He previously served as commission vice chairman in 1954 and 1956.

A retired lawyer, banker and oil company executive, Warlow has been active in promoting the planning and construction of an adequate highway system in California since he became a member of the Roads and Resorts Committee of the Fresno County Chamber of Commerce in 1927.

He was educated in Fresno public schools and graduated from Stanford University in 1911 where he also completed his law studies. He was admitted to the California bar in 1913.

During World War I, Warlow served as a first lieutenant in the U. S. Air Service. He is a 33d Degree Mason and a past Grand Master of Masons in California.

## Highway Commission Names Laguna Freeway

The California Highway Commission has assigned the name Laguna Freeway to the adopted freeway route for State Highway Route 185 in Orange County from U. S. Highway 101 in the vicinity of Irvine to a point near the City of Laguna Beach.

A freeway route for State Highway Route 185 was adopted by the commission in November, 1954. The freeway route provides for some relocation of the present highway, known as Laguna Canyon Road, on a more direct line.

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

## Ted Jain

Ted Jain, 57, former District III City and County Projects Engineer in Marysville, died of a heart attack February 11, 1958, in Yuba City.

A veteran of 25 years with the Division of Highways, Jain retired in 1955.

Jain was born in Boulder, Colorado, and attended grade school in Boulder and high school in Greybull, Wyoming. He studied at San Diego State College after arriving in California in 1924.

From 1927 to 1930 he was an engineering draftsman for the San Diego city engineer. He went to work for the Division of Highways in San Bernardino in 1930. Following a short assignment in San Luis Obispo, he transferred to Marysville in 1934.

Jain had charge of the squad that designed the North Sacramento Freeway. He was appointed District III City Project Engineer in 1949, and in 1950 also assumed the duties of administering the federal aid secondary county road program for the district.

During World War II he was a Navy officer, serving in the Pacific area with the Seabees. He is survived by his wife, Georgia.

Three other freeway routes in Orange County were assigned names in October. They are the Newport Freeway, Garden Grove Freeway and Riverside Freeway.

MICHIGAN STATE HIGHWAY DEPARTMENT  
November 15, 1957

*Editor, California Highways and  
Public Works*

SIR: I would like to express my sincere appreciation for receiving your excellent magazine.

Your editorial and pictorial coverage is so complete that one can readily understand the popularity of your magazine.

In Michigan, we look forward to every issue of your publication.

Sincerely,

HAROLD N. BRUNORND  
Co-ordinating and Scheduling  
Engineer



## John O. Bronson Named to Highway Commission

Governor Goodwin J. Knight announced the appointment of John O. Bronson, Sacramento, to the California Highway Commission succeeding H. Stephen Chase, Sacramento, resigned, for a term ending January 15, 1959. The appointment requires confirmation by the State Senate.



JOHN O. BRONSON

Bronson was born in Sacramento September 18, 1903, and was educated in the public schools of Sacramento, Los Angeles and Santa Monica. He attended the University of California at Davis. From 1924 to 1940 he was a produce buyer for the California Fruit Exchange and other companies in the Sacramento Valley. Subsequent to that time he had been in the general insurance business in Sacramento, operating under the name of John O. Bronson Company with a branch office at Al Tahoe, El Dorado County.

Bronson has been active in highway matters for the past 10 years, serving as a member of the California State Chamber of Commerce State Highway Committee, the Collier Joint Interim Factfinding Committee, the Sacramento City Planning Commis-

## NEW DEVICE SPEEDS DISTANCE MEASUREMENT

A NEW AND UNIQUE surveying tool designed to provide quick and accurate measurements of long distances is now being used on an experimental basis by the Division of Highways.

The device, an electronic distance measuring meter, was obtained by the division some three months ago. Since then it has proved to be consistently reliable in on-the-job use at several locations in the State.

The unusual instrument is used primarily in determining long distances which are difficult to measure by conventional surveying methods, and it is expected to speed the early planning of lengthy highway developments.

With this device it is possible to supplement existing geodetic survey data in less time, with fewer men, and at reduced expense. New survey base points and check points, specifically suited to highway construction needs, can be set without encountering many of the problems normally faced in establishing these data.

Basically the instrument works like this:

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sion, and various other subcommittees and regional committees of the State Chamber of Commerce, as well as being chairman of the Sacramento City-County Chamber of Commerce Highway Committee. He is treasurer of the Greater Broadway Association of Sacramento, a member of the Native Sons of the Golden West and the Elks Lodge.

Bronson is married and has one daughter, a student at McClatchy High School.

Chase has served on the commission since October, 1951. He was reappointed in 1955 for a term to run until January 15, 1959.

The former district manager of the American Trust Company in Sacramento, he was promoted in 1955 to senior vice president and transferred to San Francisco.

Chase said that his duties as a bank official made it impossible for him to find adequate time to fully carry out his responsibilities as a member of the commission.

The meter box shoots a beam of pulsating light at the distant reflector which contains seven precisely ground prisms made of high quality optical glass. The pulsating beam is reflected back to a photo tube at the light source. The time lag in sending and receiving the light pulses is converted by the instrument into units of distance.

Light pulses, from a small 15-watt bulb, are dispatched 1,500,000 times a second. Because of the precise design of the reflector, the light from even an ordinary pen flashlight has been picked up from as far away as six miles.

Under ideal atmospheric and visibility conditions, the instrument is effective over distances up to 20 miles with a maximum error of only four inches. Longest distance covered thus far by Division of Highways operators was 14 miles.

Although the usual survey crew contains from four to seven men, only two are required to operate this instrument. Total weight of the meter box and mechanism, the reflector, and a small generator to supply necessary power is about 150 pounds.

SANTA ROSA, CALIF.

*Editor, California Highways  
and Public Works*

SIR: Having traveled the length and breadth of our State for many years on all kinds of highways from the early days to the present time, I want to congratulate the California Highway Department for the fine progress and excellent highways and freeways they are bringing to the traveling public. Just another example of the high caliber of personnel, from the bottom to the top, we have working for us in the department.

Wishing you continued success for your publication, I am

Cordially yours,

FRED H. CLARK

In 1895 there were only four registered motor vehicles in the United States. By 1900 there were 8,000. That figure has jumped to more than 60 million vehicles on the road today.



# Redwood Highway

Four-lane Construction  
Requires Traffic Control

By R. BERGROTH, District Office Engineer

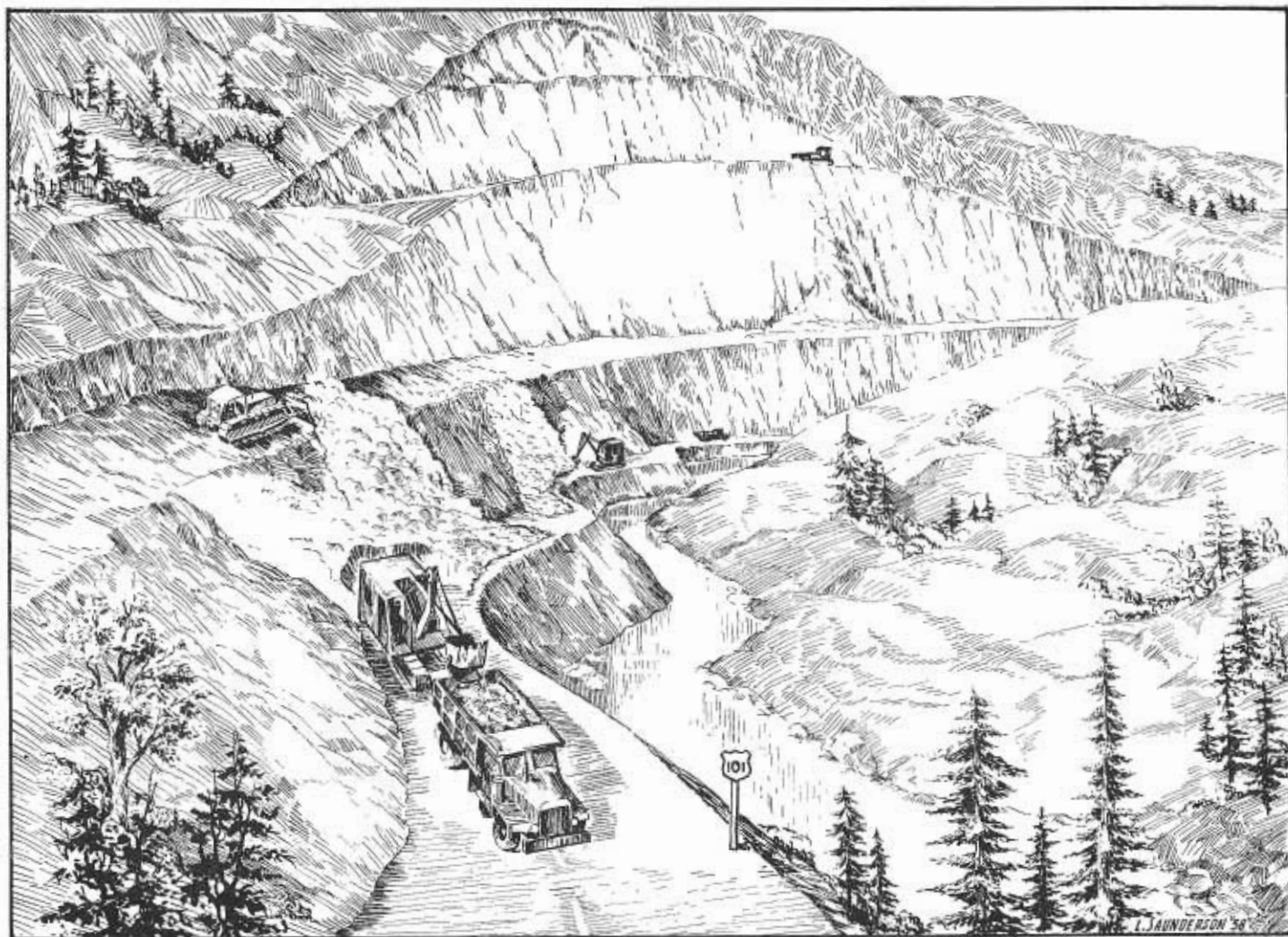
THE 1958 CONSTRUCTION season in District I will see considerable continued activity in the program of converting the world-famous Redwood Highway to four-lane freeway or expressway standards.

Of particular note is a 2.8-mile project in Mendocino County about 12 miles north of Laytonville. The exact project limits extend from 0.2 mile north of Farmhouse Inn to one mile north of Tan Oak Park.

This project, for which bids were opened on February 26, 1958, provides for the construction of a four-lane expressway in a narrow canyon already containing the old existing highway and meandering Rattlesnake Creek. The contract was awarded to Ball and Simpson, of Berkeley, California, on a low bid of \$1,814,527.60.

The new highway alignment, with its easy curves, is crisscrossed by the existing traveled way whose alignment is of 1914 standards. As in the

case of most highways of that vintage, the old highway is narrow and crooked, having been constructed generally parallel to the meandering course of Rattlesnake Creek. The new and old grades are also at variance and, in general, construction of new cuts and fills will necessarily be carried on through and immediately adjacent to the existing pavement. About 775,000 cubic yards of roadway excavation are involved. This situation, with no practical detour available, poses a



This sketch by Larry Sanderson of the District I staff, illustrating the heavy excavation necessary in the canyon of Rattlesnake Creek on U. S. 101 in northern Mendocino County, will be featured this summer in a leaflet to be handed to motorists who are delayed by the construction



problem in carrying traffic through the work, as well as permitting construction operations to proceed during the relatively short construction season in this area.

As design of the project progressed, it became obvious that there was no alternative but to place regularly scheduled controls on public traffic movements through the work for specified periods of time. This is essential for the safety of traffic, as well as to permit the contractor to work economically to complete the project within a reasonable period of time.

The contract provisions, therefore, specifically permit the contractor to close the highway for two regularly scheduled four-hour periods daily. Opening and closing schedules will be publicized widely so that all concerned may plan accordingly and so that unavoidable delays will be held to a minimum.

The contractor will be permitted to close the project to all public traffic during grading and earth-moving operations for two four-hour periods during the night. This situation may exist for a period up to 50 consecutive working days as selected by the contractor. Actual closing time will be from 9 p.m. to 1 a.m., and from 2 a.m. to 6 a.m., except on weekends and holidays. On weekends and holidays, the contractor will be required to provide two traffic lanes at all times between 6 a.m. Saturday and 6 a.m. Monday, or between 6 p.m. of the day preceding a legal holiday until 6 a.m. of the day following the holiday.

During all other working hours the road may not be closed to traffic for a period greater than 30 minutes at any one time. School busses and regularly scheduled public transportation busses will not be delayed more than 10 minutes. The necessity of providing for emergency equipment, such as fire fighting, ambulances, etc., will be recognized, and immediate action will be taken to open the road in the shortest possible time during any such emergency.

To keep the public informed of road closure schedules, appropriate signs four feet by eight feet in size will be placed and maintained at five strategic locations along US 101 between Ukiah

on the south and Arcata in the north. Near established delay points at each end of the project, comfort stations and pay telephones will be maintained for public convenience. Pamphlets explaining the scope of the work and reasons for delay will be distributed to the public at these locations.

The project, in general, consists of constructing a four-lane roadway with plant-mixed surfacing on cement-treated base. The roadway will be 60 feet wide, and will provide four 12-foot traffic lanes with a four-foot division strip and four-foot shoulders.

Rattlesnake Creek has prior rights in the confines of its narrow canyon and its flow, therefore, must be maintained. The construction of a modern four-lane roadway within this limited area requires channel changes where embankments infringe on the natural creek channel. To protect the embankments from the erosive action of the stream will require rock slope protection and heavy stone riprap. At one location where Rattlesnake Creek makes a horseshoe bend around a 200-foot-high solid rock promontory, the new roadway embankment encroaches into the streambed up to this promontory. An open channel change through this rock point was not economically feasible. Therefore, as a prelude to actual construction of the new highway, a tunnel was designed and built under the direction of the Bridge Department in 1956. The unlined tunnel is 136 feet long, 23 feet high, and 20 feet wide. It was constructed under contract by Mercer, Fraser Company, of Eureka, at a cost of \$39,000, and involved 1,719 cubic yards of tunnel excavation.

The completion of this project will fulfill a long-felt need by eliminating a particularly substandard section of highway. The old, narrow, and crooked roadway has long been inadequate; and the shady and frosty conditions generally prevalent during the winters aggravated this situation and created hazardous traveling conditions.

Americans spend almost 22 billion dollars a year for domestic travel, counting only those trips involving overnight stops. Of these trips, 85 percent are made by car.

## Harold Byroads Ends 40-Year Career

Harold Byroads, District XI Maintenance Superintendent at Escondido since 1950, retired March 1 after nearly 40 years with the Division of Highways.

His retirement closed out a career that began when he went to work setting header-board stakes on a highway project near Turlock in 1918.



HAROLD BYROADS

From 1920 to 1923 he worked on construction jobs in Tracy, Marysville, Wheatland and Hamilton City. In 1923 he was transferred to the Maintenance Department at Stockton. From 1924 to 1926 he was an equipment operator on the Big Oak Flat Road. In 1926 he was again transferred to Stockton where he served for 12 years and was advanced to foreman. He was appointed maintenance superintendent at Indio in 1938 and served there until he moved to Escondido in 1950.

Byroads and his wife, Vera, were married in Modesto in 1922. They have three children, Vyrll of San Mateo, Melvin of San Carlos, and Adrienne, who attends college in Los Angeles.

The Byroads have lived in Vista for seven years, but now plan to move to Santa Barbara. They also plan to spend the first months of his retirement in traveling through the mid-western and northern United States.

CITY OF SAN RAFAEL

*Editor, California Highways  
and Public Works*

SIR: I wish to congratulate you and your staff on the excellent job in making the *California Highways and Public Works* magazine such an interesting and informative publication.

Very truly yours,

W. C. CORNWELL  
Assistant City Clerk



## REPORT FROM DISTRICT IV

Continued from page 20 . . .

north of the city limits. This project is being financed jointly by the State and Joint Highway District No. 9. The State is budgeting \$419,000 toward the \$729,000 cost of construction. Contractor is the Granite Construction Company.

South of the city, Sign Route 1 has been operating as an expressway for some time to the Rob Roy Junction. Planning studies are now under way for further multilane improvement of Sign Routes 1 and 152 past Watsonville in co-operation with studies in Monterey County by District V.

### OTHER NORTH BAY COUNTY FREEWAYS

Work is now under way on State Sign Route 37 for the replacement of the existing Petaluma Creek Bridge by Ben C. Gerwick, Inc., and J. H. Pomeroy & Co., Inc. The new bridge itself will be a single structure, 2,200 feet long, having four lanes and will cost \$2,433,000 including abutment fills. Provision is made for possible future widening to six lanes on this route. Replacement of the existing substandard two-lane bridge is required because it is structurally and geometrically deficient.

The above project is the third stage of a four-lane freeway extending from Ignacio Wye to Sears Point. The last stage completed was the construction in 1951 of two lanes of this future freeway and a graded four-lane road-bed from Petaluma Creek to Tolay Creek.

Budgeted this next year is \$2,444,000 for completing the entire facility as a four-lane, future six-lane, expressway between US 101 and 0.5 mile west of the junction of State Sign Route 48 in Sonoma County.

### Sonoma Valley Freeway

A new freeway route was adopted on January 24, 1957, connecting Sebastopol through Santa Rosa to Kenwood. This 17.4-mile route follows the existing highway from the east city limits of Sebastopol to the vicinity of Wright Road, then traverses just north of the present route and adjacent to the Petaluma and Santa Rosa Railroad to the vicinity of US High-

way 101 in Santa Rosa. The route then continues on a generally direct northeasterly course to rejoin the present highway near Los Alamos Road east of Melita and follows the present highway routing to south of Kenwood. Surveys and design studies for details are now under way.

An interim project on this route has been recently completed in Santa Rosa. Work extended between US 101 and 0.17 mile east of Farmers Lane. College Avenue and Fourth Street were widened to four lanes and channelized. This project was a co-operative one with the City of Santa Rosa.

### Napa Valley Freeway

A 3.8-mile section of two-lane, future four-lane, expressway was finished in December, 1956, between four miles north of St. Helena and Calistoga. The contractor on this \$550,000 project was Huntington Bros.

Work is continuing on this route in 1958-59 with \$735,000 in the budget for the initial two lanes of a future four-lane expressway extending from 0.9 mile south to two miles north of Yountville. Work should commence on this 2.9-mile project by early summer.

### Napa Area—Sign Routes 12, 29 and 37

In 1957 a contract was completed by Lee J. Immel for the addition of two lanes to Sign Route 29 north of the City of Napa. The project extended between Union Station and Orchard Avenue. Addition of the lanes converts the 2.3-mile stretch into a four-lane expressway and provides a faster and safer facility. Cost of construction was \$474,000.

In 1955, the initial two lanes of a future four-lane freeway were constructed from a point two miles east of the Sonoma-Napa county line for a distance of 2.7 miles.

Southerly of Napa on Sign Routes 12 to 20 to the Sonoma county line, the present routes have been operating as expressways for many years although access rights have not been fully acquired. It is expected that at some future period, when justified, development will be to freeway standards.

## ALVARADO-NILES ROAD

Continued from page 46 . . .

anchored to the snap-tie cradles by metal bundling straps and were quite successful as there was no apparent evidence of uplift in the tubes. Horizontal displacement was prevented by pouring the deck in vertical stages, which in turn facilitated vibration between and beneath the tubes.

### Channel Improvement

Excavation of the channel beneath the bridge was complicated due to the limited headroom of eight feet. The flood control district, however, has plans now in progress to improve the channel in the near future with a channel elevation two feet lower than that existing. The contractor was allowed to excavate to the future channel depth in order to provide work room for his excavating equipment. A D-6 loader was used to rough out to bottom width and a motor grader was used for final sloping. The two feet of overexcavation was then back-filled and compacted to the existing stream line.

Design and construction engineering for the project were provided at county expense and by personnel operating under the direction of Olof E. Anderson, County Surveyor and Road Commissioner of Alameda County. The contract for the project was let by the Department of Public Works, Division of Highways, to Eugene G. Alves Construction Company, Inc., of Pittsburg, California, on June 24, 1957. Work was begun on July 10th and continued until completion on November 15th, under the direction of Mr. Dale Marr as representative for the contractor and general supervision by engineering personnel from District IV, Division of Highways. Ronald F. Sorensen was Resident Engineer for Alameda County on the project.

How big a job is road sign maintenance on California's highway system?

State highway maintenance crews installed more than 14,000 new traffic signs during the 1956-57 Fiscal Year. They also replaced 7,000 more, washed and cleaned another 38,000, repaired 20,000, straightened 5,000, relocated 11,000, removed 4,000 and painted more than 30,000 signposts.



# CHC Hearings

## Commission Revises Freeway Route Adoption Procedure

THE CALIFORNIA Highway Commission has revised its freeway route adoption procedure "to provide additional guarantees that local views will be fully heard and carefully considered."

C. M. Gilliss, Director of the State Department of Public Works and Chairman of the Commission, explained that the revised procedure "is in line with the continuing efforts of the California Highway Commission and the State Highway Engineer to improve freeway location procedures to meet changing conditions."

"The changes," Gilliss said, "provide additional guarantees that local views will be fully heard and carefully considered before any conclusions or recommendations as to specific routes are made."

"They are also designed to provide for frequent consultation between local officials and state highway officials from the initiation of route studies to the adoption of a route by the commission—that is, right from the beginning up until the decision is made."

"In adopting the revisions, the commission recognized the desirability of making changes and improvements from time to time as circumstances and changes in federal law might warrant, just as did the California Legislature in Senate Concurrent Resolution No. 90, Session of 1957."

"The commission does not contemplate that the procedure as revised need be inflexible; rather the commission considers its procedure to be always open to improvement as it may appear desirable or necessary."

The text of the revised resolution, amending and superseding one adopted February 18, 1955, is as follows:

*Resolved, by the California Highway Commission, That the following procedure shall be followed in the adoption of freeway locations on the State Highway System:*

"1. When it is proposed to locate or relocate any portion of a state highway as a freeway, the State Highway Engineer, or his authorized representative, shall:

"(a) At the initiation of the studies necessary to determine the possible locations to

be presented to the commission for consideration, and from time to time thereafter, confer with the appropriate local governing bodies, and other agencies that may be affected thereby and with their technical and planning personnel, obtaining where available any master or general plan of the area;

"(b) Call to the attention of the appropriate local governing body, in writing, the provisions of Section 75.5 of the Streets and Highways Code;

"(c) When sufficient information has been accumulated to permit intelligent discussion, publicize and hold such public meeting, or meetings, as may be reasonably necessary to acquaint interested individuals, officials and civic or other groups with the studies made and the information developed, and to obtain their views with respect thereto.

"In conducting any such meetings where major controversy appears probable, the State Highway Engineer may arrange for a Division of Highways employee, not employed in the district office involved, to act as presiding officer.

"2. The State Highway Engineer shall submit to the commission a written report, covering the results of such conferences and meetings, the relationship between all proposed locations and any master or general plans of the affected local agency or agencies, any information submitted pursuant to Section 75.5 of the Streets and Highways Code, the studies made, and a recommendation as to the location of the freeway.

"3. When authorized so to do by the commission, the State Highway Engineer shall notify the appropriate local governing body, which notice shall be publicized, of the intention of the commission to consider the location of the freeway. Such notification shall include a statement that the commission or designated members thereof will hold a public hearing on the proposal, if requested to do so by the local legislative body within thirty (30) days after the first regular meeting of such body following receipt of such written notification; provided, however, that if, prior to receipt of such notification from the commission, the local legislative body or bodies shall have, by resolution, declared that no public hearing by the commission is necessary, then the notification by the State Highway Engineer shall advise such local body only of the intention of the commission to consider the matter.

"4. If any such legislative body requests such hearing, the commission, or a designated member or members thereof, will hold, a hearing, after public notice given in such manner as the commission may determine, at which time and place all persons, and official bodies and other organiza-

tions interested in the matter, shall be afforded an opportunity to be heard. The commission may also, on its own motion, call a public meeting or hold such hearings, as it may deem appropriate.

"5. After the expiration of such period of thirty (30) days, if no hearing is requested, or after such meetings or hearings as the commission may hold, the commission will adopt a location for the freeway between the limits under consideration.

"6. The authorization referred to in numbered paragraph 3 of this resolution, to give public notice of the commission's intention to hold a hearing, shall be by resolution of the commission relating to each specific freeway location proposed to be considered. In all other respects, this resolution authorizes the State Highway Engineer, without further resolution or order of this commission, to do such things and take such action as may appear to him to be necessary or proper to comply with the above specified procedure.

"7. At any public meetings held by the State Highway Engineer, or his authorized representative, any material transmitted by an affected city or county pursuant to Section 75.5 of the Streets and Highways Code shall be presented at the meeting by the person conducting the meeting or hearing, if so requested by the affected city or county, or shall be received in such manner as the affected city or county requests.

"8. It is recognized that, in addition to the foregoing, the State Highway Engineer, through his representatives, may hold any additional meetings or hearings required to qualify any highway project for the use of federal funds pursuant to any federal statute or rule or regulation promulgated thereunder.

"9. The resolution of the commission regarding the subject matter hereof, adopted on February 18, 1955, is hereby rescinded."

CABRAMATTA, AUSTRALIA

*Editor, California Highways and Public Works*

SIR: Since last year I regularly receive your magnificent publication.

The article in September-October issue "Public Relations" made quite an impression. Your magazine contains a wealth of information on design and possibilities in alignment and pavement of highways.

H. KARMAN, Surveyor



## RIGHT-OF-WAY CLEARANCE

Continued from page 24 . . .

in new right-of-way acquired by the State for them in exchange for their right-of-way needed for the freeway along the coast.

The acquisition of operating property from railroads, property of other public utility companies, and oil companies' pipeline rights-of-way, is inherently integrated with the operation of the facility; the acquiring of these rights-of-way is handled by a negotiating group of right-of-way agents specializing in this function. Most of the major utility and oil companies have a similar organization contacting the State's Right-of-Way Department and this close liaison has resulted in being able to award highway construction contracts on schedule.

### Cost Basis Established

Pursuant to legislative authority, agreements referred to as "Master Contracts" have been entered into with several of the major utility companies in California establishing the basis for portioning utility costs on freeways with these respective utility companies. These contracts have virtually eliminated disagreements in the determination of liability between company and State, and have in effect greatly expedited utility relocation with these companies.

Other than the Collier-Burns provisions the basis test in determining who pays the cost of relocating utility facilities is whether or not the utility holds an easement prior to State's ownership. Generally speaking, if the utility is located in the freeway under permit, utility assumes the relocation costs. An analysis of these facts determines the extent to which the utility company is entitled to reimbursement for relocation of utility facilities. In old established areas where the State superseded a city in interest by declaring a city street a state highway it has been necessary to dig into the archives of the city to determine the rights of the parties. By co-ordinating the work of the utility companies with the highway program, uninterrupted utility service to the public has been achieved and the public benefited from the

## John A. Stein Ends 29 Years With State

John A. Stein, Equipment Superintendent at Shop 10, Stockton, retired from state service on February 28, 1958.

Born in Lodi, Stein attended Lodi schools. He first became interested in a mechanical career in watching the operations of the early Central Valley canneries, and started his working career setting up food manufacturing equipment for these canneries.



JOHN A. STEIN

This part of his career was followed by five years as an engineering officer aboard various merchant vessels, traveling the world. Later he became an early-day automobile enthusiast.

In 1925 Stein joined the Division of Highways. However, in 1929, he left to become the service manager at a Stockton garage. The State called him back in 1933, when he was appointed Superintendent of Equipment at Shop 9 in Bishop, where he stayed until 1942. He was then transferred to Shop 1, Eureka, and later in the same year the Division of Highways lent him to the U. S. Public Roads Administration as a general consultant on the Alcan Highway in Alaska,

orderly progress of the freeway construction. In the past five years this district expended approximately 7½ million dollars for the relocation of public utilities.

The total expenditures by the State in the past five years in the Los Angeles District in clearing rights of way total about 10 million dollars. In this same period the district received approximately 8½ million dollars from the sale of buildings to be removed from the rights-of-way and in addition to this revenue the State collected over 7 million dollars in rentals in the past five years from buildings during the period between the time of their acquisition and when they had to be removed to clear the rights-of-way.

where he made appraisals and surveys of equipment and repair shops.

Late in 1943, when the Alcan Highway assignment was completed, Stein came to Shop 10 as the superintendent of equipment, remaining until his retirement.

John Stein is a member of many organizations, including Kerak Temple of Reno, Stockton Commandery No. 8, Knights Templar, and Owens Valley Chapter 124, Royal Arch Masons.

He is a Past President of both the Bishop Chapter of C. S. E. A., and the Native Sons of Lodi.

## Highway Conference Held at COP Campus

Director of Public Works C. M. Gilliss was one of the principal speakers at the First Annual Highway Conference held on the College of the Pacific Campus at Stockton on March 3d, 4th, and 5th.

Members of the Division of Highways staff who participated in discussion panels held during the three days were Assistant State Highway Engineers F. W. Panhorst and J. W. Trask, District Engineer J. G. Meyer and Assistant District Engineer Bruno Dentino from Stockton; and F. E. Baxter, Maintenance Engineers; Dale Downing, Senior Bridge Engineer; and George Sherman, Senior Materials and Research Engineer, from Sacramento.

## MATERIALS AND RESEARCH

Continued from page 44 . . .

the countless research activities and investigations going on in the working units. Knowing that our department is making progress in the ever-changing highway materials scene and that we are a part of this work gives us a feeling of participation and accomplishment.

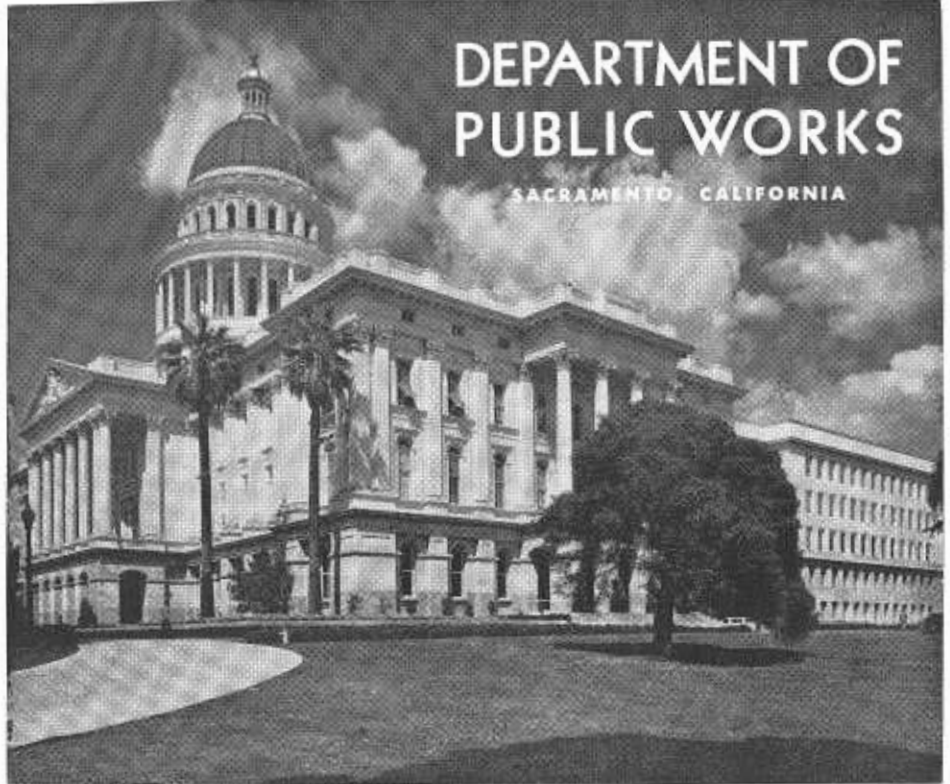
Some of the ideas presented in the above article were developed upon suggestions of Bill Yttrup, Senior Delineator; Minor Holliday, Administrative Assistant I; and Charles Frazier, Assistant Physical Testing Engineer, all having supervisory responsibilities in the Administration and Services Unit.



**GOODWIN J. KNIGHT**  
Governor of California

# DEPARTMENT OF PUBLIC WORKS

SACRAMENTO, CALIFORNIA



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CHESTER H. WARLOW, Vice Chairman . . . Fresno  
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ROBERT E. McCLURE . . . . . Santa Monica  
FRED W. SPEERS . . . . . Escondido  
ROBERT L. BISHOP . . . . . Santa Rosa  
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A. H. HENDERSON . . . . . Deputy Director  
T. FRED BAGSHAW . . . . . Assistant Director  
JOHN STANFORD . . . . . Management Analyst  
S. ALAN WHITE . . . . . Departmental Personnel Officer  
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State Highway Engineer, Chief of Division  
J. W. VICKREY . . . . . Deputy State Highway Engineer  
CHAS. E. WAITE . . . . . Deputy State Highway Engineer  
J. W. TRASK . . . . . Assistant State Highway Engineer  
F. W. PANHORST . . . . . Assistant State Highway Engineer  
J. C. WOMACK . . . . . Assistant State Highway Engineer  
J. P. MURPHY . . . . . Assistant State Highway Engineer  
F. N. HVEEM . . . . . Materials and Research Engineer  
FRANK E. BAXTER . . . . . Maintenance Engineer  
GEO. LANGSNER . . . . . Engineer of Design  
G. M. WEBB . . . . . Traffic Engineer  
MILTON HARRIS . . . . . Construction Engineer  
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I. O. JAHILSTROM . . . . . Bridge Engineer—Operations  
R. R. ROWE . . . . . Bridge Engineer—Special Studies  
J. E. McMAHON . . . . . Bridge Engineer—Southern Area  
L. C. HOLLISTER . . . . . Projects Engineer—Carquinez  
E. R. HIGGINS . . . . . Comptroller

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E. F. WAGNER . . . . . Deputy Chief Right-of-Way Agent  
RUDOLPH HESS . . . . . Assistant Chief  
R. S. J. PIANEZZI . . . . . Assistant Chief  
E. M. MacDONALD . . . . . Assistant Chief

### District IV

B. W. BOOKER . . . . . Assistant State Highway Engineer

### District VII

E. T. TELFORD . . . . . Assistant State Highway Engineer

### District Engineers

SAM HELWER . . . . . District I, Eureka  
H. S. MILES . . . . . District II, Redding  
ALAN S. HART . . . . . District III, Marysville

J. P. SINCLAIR . . . . . District IV, San Francisco  
L. A. WEYMOUTH . . . . . District IV, San Francisco  
R. A. HAYLER . . . . . District IV, San Francisco  
A. M. NASH . . . . . District V, San Luis Obispo  
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LYMAN R. GILLIS . . . . . District VII, Los Angeles  
C. V. KANE . . . . . District VIII, San Bernardino  
E. R. FOLEY . . . . . District IX, Bishop  
JOHN G. MEYER . . . . . District X, Stockton  
J. DEKEMA . . . . . District XI, San Diego  
HOWARD C. WOOD . . . . . Bridge Engineer  
State-owned Toll Bridges

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GEORGE C. HADLEY . . . . . Assistant Chief  
HOLLOWAY JONES . . . . . Assistant Chief  
HARRY S. FENTON . . . . . Assistant Chief

## DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

NORMAN C. RAAB . . . . . Chief of Division  
BEN BALALA . . . . . Principal Bridge Engineer

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ROBERT W. FORMHALS . . . . . Administrative Assistant to State Architect  
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