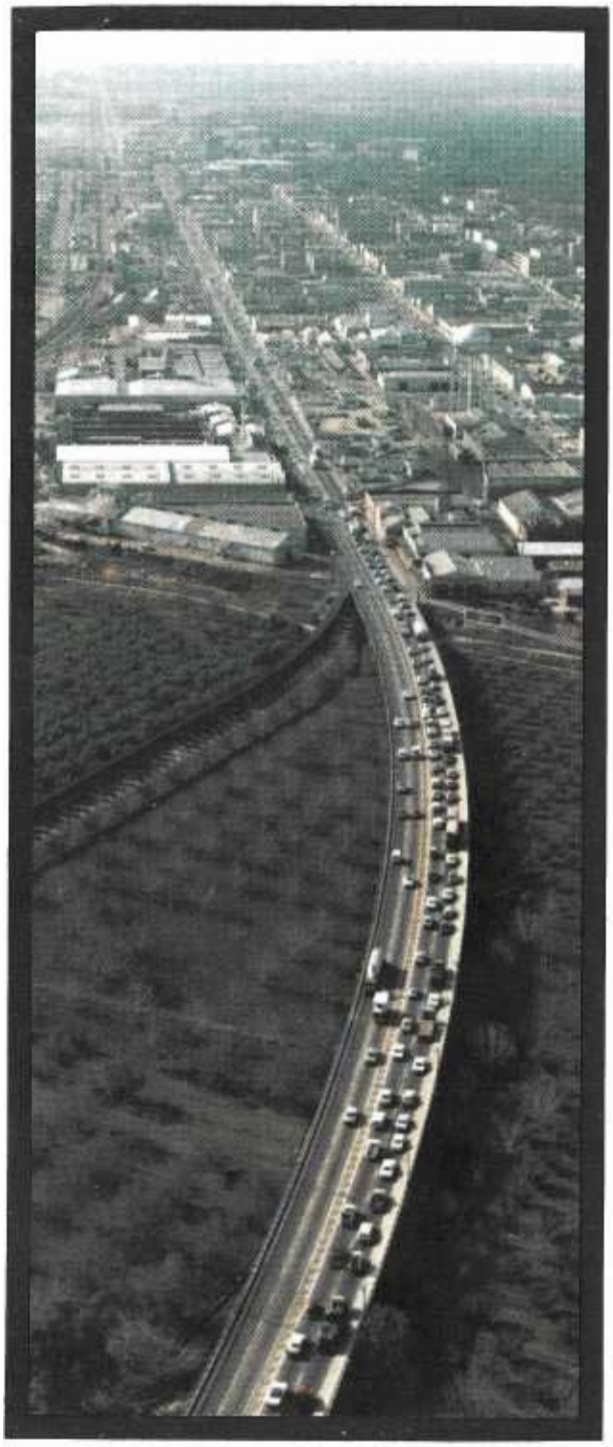
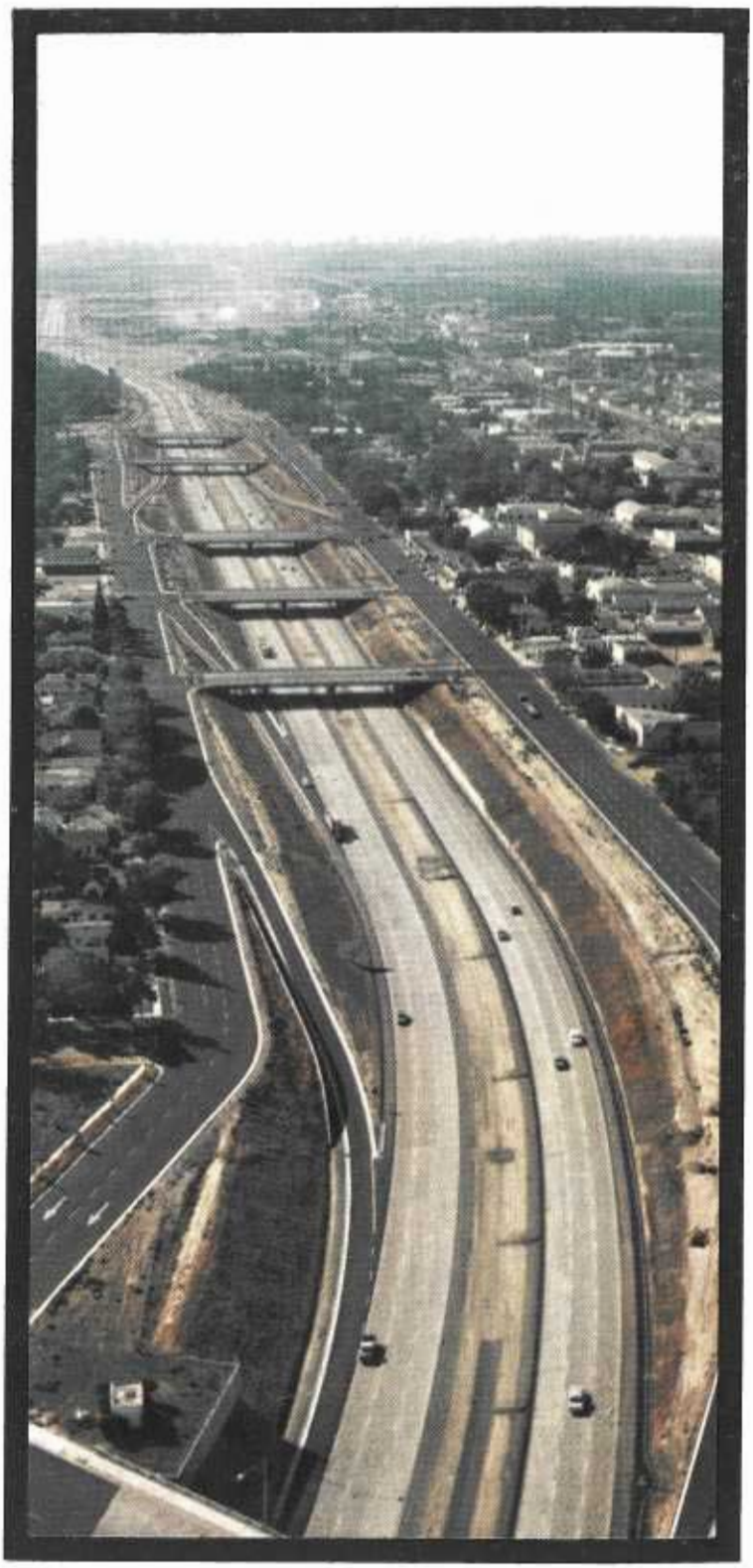
# CALIFORNIA highways and public works





SEPTEMBER-OCTOBER 1965

# Temporary Gas Tax Off

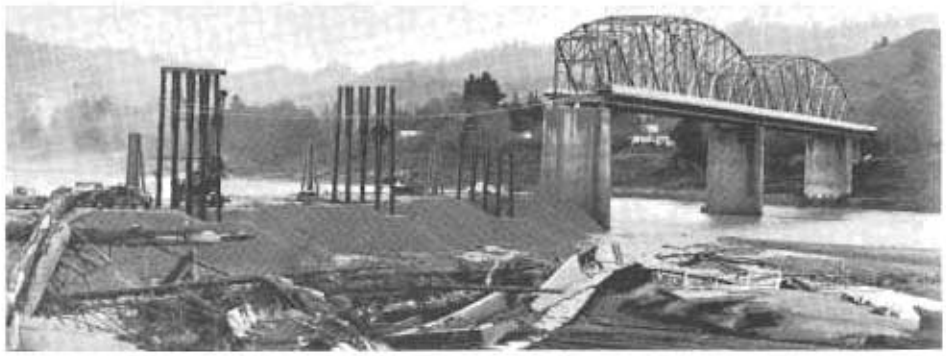
January 6, 1965



August 31 was the cut-off date for the one-cent gas tax Californians paid to reconstruct roads in the north of the state that were damaged in the Christmas floods of 1964.

Governor Edmund G. Brown eliminated the tax four months before the legal expiration date. Including federal funds for emergency relief, $67 million has been raised.

Typical of restorations in progress are these views of the Eel River Bridge at Rio Dell, Humboldt County.



ABOVE: February 26, 1965

BELOW: August 19, 1965

# California Highways and Public Works

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

VOL. 44 September-October Nos. 9–10

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*FRONT COVER: These two aerial views are "before and after" aspects of U.S. 99 in Modesto, with the right hand picture showing the new freeway opened this summer. Landscaping will be effected in a later contract. Both photographs by William Chaney.*

*BACK COVER: One of the glories of the high country is the quaking aspen in fall. This grove overlooks State Route 89 in the Monitor Pass region. Photography by John Meyerpeter.*

# Airspace

## *State Groups Plan for Over and Under Freeway Use*

By AUSTIN R. DOYLE, Information Officer

"California is gaining 1,750 persons a day. By 1980, we are convinced that the resulting land shortage will force us to build over and under freeways for nonhighway purposes whether we plan now for that use or not."

The speaker was Robert B. Bradford, administrator of the Transportation Agency and chairman of the California Highway Commission, addressing a meeting of federal, state, county and city officials in Sacramento on July 20, called to identify the many possible beneficial uses of such freeway airspace and to tap the reactions of local governing bodies.

In the discussion which included mention of apartments, office buildings and restaurants above freeways, and city and county buildings as well as parking lots below them, Bradford added, "We are not talking of any total use of this airspace, but rather, the selected development of this property, sensitively done in selected areas."

He said that this can be accomplished only by the teamwork of state, cities and counties, and that all such construction must conform to the zoning of local government.

Quick support of a program for planning the best use of freeway airspace was pledged by Richard Carpenter, executive director of the League of California Cities, and Vincent Cooper, assistant general manager of the County Supervisors Association.

Bradford made clear that the purpose of the discussion was both to discover how to fit the use of freeway airspace into a program of community betterment as well as "to find how to lease this space for long terms to put tax dollars back on the assessment rolls for the 1 to 3 percent of assessed valuation taken by freeways from the cities and counties."

He added that although freeways do take land from tax rolls, California's experience has shown that they so increase the value of adjacent land that they benefit the community taxwise.

Back in 1962, Governor Edmund G. Brown had said that the State would take advantage of new federal regulations relinquishing airspace rights on Interstate freeways to the states concerned.

*Governor Edmund G. Brown summed up the potential of airspace recently when he said, "The sky's the limit."*

### "Sky Is Now the Limit"

"The sky is now the limit, in a very real and practical sense, on combining freeways with every type of beneficial use," he said. "I can visualize public buildings, hotels, apartments and recreational facilities straddling our below-ground freeway sections, and additional parking, commercial and other uses beneath the viaduct areas."

Bradford stated that the meeting was in harmony with the Governor's philosophy that maximum value must be extracted from all state-owned lands if California taxpayers are to receive fair treatment.

He said that highway transportation planners realize that material benefits exist if land can be used for more than one purpose and the state is ready to promote double or triple use wherever feasible.

Indeed, the sky is really the limit, judging by the diverse experiences of communities in other states.

In Hartford, Connecticut, for example, a public library has been constructed over an expressway; in Chicago, an expressway lances smoothly through a post office building; a $14 million bus station straddles an interstate expressway in New York City, and four 32-story apartment buildings have been built over this same route, the freeway approaches to the George Washington Bridge, spanning the Hudson River to New Jersey.

New York City sold at auction, rather than leased, the rights to the airspace for two city blocks above this freeway for $1,065,000. In this airspace, the developers invested approximately $19,600,000 for the housing of 960 families, more than three times the taxable value of the previous property, giving the city a higher tax return than before the buildings were removed to permit the freeway's construction.

Speaking before the American Association of State Highway Officials' Committee on Legal Affairs in 1962, H. J. Morton, assistant general council of the Bureau of Public Roads, said that contrasted with outright sale, "the leasing of air rights can be even more profitable over the long run, especially in those states, which, like California, can tax leasehold property; also the state retains a reversionary interest and has the benefit of the continuing income from the lease rental and any appreciation in value over the years."

#### Pasadena Freeway

Boyd P. Welin, vice mayor of Pasadena, representing six California communities at the Sacramento meeting, said that Pasadena was considering decking over the Pasadena Freeway near the new Blair High School to provide for tennis and handball courts and other campus activities.

He added that such use of freeway airspace would prevent the necessity of taking adjacent properties from the tax rolls.

Welin, accompanied by City Manager Elder Gunter, presented models showing proposed airspace development over and under future freeways in his city.

Some of his proposals included heliports above freeways, a city park atop the north-south (Long Beach) freeway under Colorado Boulevard, and green spots to beautify the city in areas zoned for industrial use.

After Walter Hahn, Jr., assistant city manager of San Diego, suggested that cities take inventory of their needs for airspace and present plans to the state, rather than waiting for the state to take the lead in planning, the City of Stockton and San Joaquin County were singled out for their planning now—years before construction—for the possible use of land under the future Crosstown Freeway in Stockton as the site for public buildings.

California's experience in leasing airspace dates back to 1942 when areas under the San Francisco approaches to the San Francisco-Oakland Bay Bridge were rented for parking purposes.

#### First Use of Airspace

The first use of airspace under freeways was in 1954 when areas for parking were leased under San Francisco's Bayshore Freeway. Today, such leases exist for space under the Bayshore, Central and Embarcadero Freeways in San Francisco; the Nimitz and MacArthur Freeways in Oakland; and the Santa Monica Freeway in Los Angeles.

Additionally, the Division of Highways has maintenance stations under the Bayshore and MacArthur Freeways, and the City of Oakland dispatches police emergency vehicles from a location under the Nimitz Freeway near its Hall of Justice.

Legislation passed this year by California's Legislature provides for such use by emergency vehicles at no cost to local governments.

In an article in *American Highways* in 1954, former California State Highway Engineer George T. McCoy said that space beneath freeways must be put to sound and practical use, especially within the centroid of metropolitan areas where land scarcity causes parking facilities to be at a premium or nonexistant.

McCoy revealed that the Division of Highways had studied the feasibility of substituting a viaduct structure for a fill on a section of the downtown Harbor Freeway in Los Angeles to develop parking space underneath.

An attempt was made to enlist the various central business district organizations in the creation of parking lot districts to make up the difference in cost between the planned fill construction and a viaduct, so that the space beneath the freeway between 7th and 12th Streets could accommodate about 4,000 parking spaces.

However, local interest and cooperation were not spontaneous, and the acute traffic congestion in downtown Los Angeles would not permit delay in the construction of the Harbor Freeway.

#### First Limited to Parking

When the National System of Defense and Interstate Highways was instituted in 1956, the use of airspace was limited to parking by public agencies. California led the attack to remove this restriction.

When a fraternal order offered to lease space under Santa Monica Freeway (Interstate 10), the Federal Bureau of Public Roads, although in sympathy with the state, had to rule against it.

Since California estimated that she eventually might realize millions of dollars from private parking leases, and since under California law possessory interests under leaseholds are subject to local taxation, the state in 1961, with American Association of State Highway Officials support, proposed an amendment to permit the use of interstate airspace by private interests.

The Subcommittee on Roads of the House Committee on Public Works not only recommended favorable action, but proposed further liberalization of the law to permit airspace use for nonparking purposes, subject to

*Members of the Senate Fact Finding Committee on Transportation and Public Utilities which considered the problem of freeway airspace development at its meeting in San Francisco on August 18 are shown (left to right): Senator Fred Marler, Jr., Shasta-Trinity; Mrs. Helen Winslow, committee secretary; Senators Luther Gibson, Solano; Richard Dolwig, San Mateo; John Schmitz, Orange; Randolph Collier, Del Norte-Siskiyou, committee chairman; Carl Christensen, Humboldt; and Stan Pittman, Butte; William Scheuermann, committee consultant; Emerson Rhyner, deputy chief of the Division of Contracts and Rights-of-way, and Rudy Hess, head of the Right-of-way Department of the Division of Highways.*

*Boyd P. Welin, vice mayor of Pasadena (standing), shows Transportation Agency Administrator Robert B. Bradford (center) and Pasadena City Manager Elmer Gunter a model illustrating some of the uses of freeway airspace under consideration in his city.*

conditions relating to the free flow of traffic and rules and regulations of the Secretary of Commerce.

This was passed and signed into law in June, 1961.

#### Wide Range of Regulations

The wide range of regulations applied by the Secretary of Commerce through the Bureau of Public Roads included provisions that forbid federal financing of any added costs for proposed airspace use, beyond the normal cost of freeway construction; that forbid automotive service stations or other commercial establishments for servicing the motor vehicle users to be constructed on the right-of-way; that require state and Bureau of Public Roads approval prior to the beginning of construction of the nature and term of the proposed use, the general design of facilities, and advance arrangements for emergency maintenance procedures.

The regulations also concern such design features as the amount of space between the top of a building under a freeway and the bottom of the structure, adequate ventilation, fireproofing, on-premise signs and displays, and terms of lease, including restoration of the airspace to satisfactory conditions when use is ended.

Present authority for California to lease airspace is contained in Section 104.12 of the Streets and Highways Code (1961), which permits the Department of Public Works to lease the use of areas above and below state highways to public agencies or private individuals, subject to such reservations and conditions as the state deems necessary to protect the safety of the highway and abutting and adjacent property.

This code section authorizes the Highway Commission to prescribe the leasing procedures.

#### Commission's Policy Explained

At the July 20th meeting, Chairman Bradford explained the commission's policy of using an "offer and proposal" format for awarding leases involving building improvements to private interests, rather than standard competitive bidding procedures.

"This procedure has been used successfully by many Redevelopment Agencies," he said. "It calls for the developer to submit his plans and his offers of payment for our consideration. We are free to consider what the local community most desires—what will do the most for our people—rather than being bound to accept the highest bid."

A California Highway Commission resolution of December 1964 made extensive changes in previous policy, Bradford said. Before, leases were limited to five years and the construction of building improvements was prohibited.

"Naturally, with the new concept of putting the land occupied by our freeways to multiple use, our leases must be for periods sufficient to amortize building costs. Such leases could easily run 51 or more years."

The first bid received under the new offer and proposal format was opened in June. A developer has proposed the construction of an office building above the Webster Street Tube in Oakland on Route 61.

Another development under discussion which would involve a long term lease is the proposal to construct a U.S. Post Office under the "W-X" (Interstate 80) Freeway in Sacramento.

The Transportation Agency administrator said that the new procedure will require substantial preliminary investment by the prospective lessees and extensive analysis and investigation by the State Department of Public Works and local agencies. The department is charged with recommending the award of airspace leases to the commission for approval.

#### Instructions to Districts

State Highway Engineer J. C. Womack has described the instructions sent the 11 highway districts implementing the commission resolution.

In brief, the appropriate district must notify the State Highway Engineer of any inquiries, plans or proposals for the construction of building improvements under or over freeways, and prior to using the offer and proposal format, submit a report justifying consideration.

The report must state that the proposal will not conflict with any highway changes which may be necessary in the foreseeable future; that it has been discussed with local authorities

and is not in conflict with local planning or zoning ordinances.

Should this preliminary report be approved, the district will prepare brochures describing the space to be offered for lease, the conditions of use, and minimum acceptable offers if necessary. It also will advertise widely the availability of the brochures and offer and proposal forms to assure reaching potential developers.

Following receipt of the completed forms, they will be evaluated carefully by the District Design and Right-of-way Departments, then the advice of the Bridge Department and the State Division of Architecture will be secured as to the compatibility of the building with the highway design.

Each development proposal must be discussed with the technical staff of the local government and its written comments obtained.

#### Districts Will Submit Reports

Finally, the district will submit its complete report to the State Highway Engineer, who in turn will evaluate all proposals and recommend suitable action to the Highway Commission.

During the July meeting several representatives of cities and counties spoke of the commission resolution which requires that proposed uses of airspace be in agreement with local zoning regulations. Some observed that such use might not be in conflict with zoning but still be objectionable to the local government. Bradford gave assurances that the state will not permit any use within a community against its wishes.

"Again I emphasize," he said, "although we would like to receive rental revenues and get many improvements on the local tax rolls, we are not concerned with the high bid. What we want are imaginative plans that can be carried out for the benefit of all."

Somewhat similar meetings will be held in southern California, the San Francisco Bay area, and at a third site to be selected.

Bradford's mention of rental revenue brings into focus a conflict in views between the state and the Bureau of Public Roads concerning the division of such income.

The U.S. Comptroller General, when asked in 1962 if the Bureau of Public Roads could require the states to pay a pro rata share of the net proceeds of airspace rentals, doubted that the payments could be required.

He referred to the legislative history of the bills concerning airspace and said that Congress did not consider the question of division of income although it knew that income would be forthcoming.

As a result of this decision, the Bureau of Public Roads Instructional Memorandum of March 21, 1962, provided that the "disposition of income received from the authorized use of airspace will be the responsibility of the states."

*Shown is a model of possible building development above a depressed freeway (left to right in center). The section illustrated is in the "Golden Triangle" area of Beverly Hills.*

#### Complexities of Use

The complexities of the use of freeway airspace are enormous. How to have the freeway serve its principal function, the movement of traffic, while involved with building improvements which might affect an adjacent property owner's rights to light, air, view and access, and please or displease the local community, will require major decisions.

These must be made.

President Johnson told the mayors of many cities whom he invited to witness the signing of the bill creating a new cabinet post for urban affairs, that in 35 years the trend to urbanization will cause the need for as many homes, schools and office buildings to be constructed in cities as exist today.

Several years ago, the *Wall Street Journal* cited the advantages of constructing modern offices and apartments, using air rights in prized central locations.

Discussing development over railroad tracks or other low-lying facilities, the *Journal* reported the developers' belief that high rental incomes more than compensate for the extra cost of construction.

The developer does not have to go through "the tedious process of assembling several adjacent plots, demolishing existing buildings, and perhaps, relocating tenants. Instead, he can often pick up a large site in one transaction."

Freeway airspace development predictably will become of increasing public interest. A Division of Highways news release reporting the meeting of July 20 was printed by a majority of the state's press.

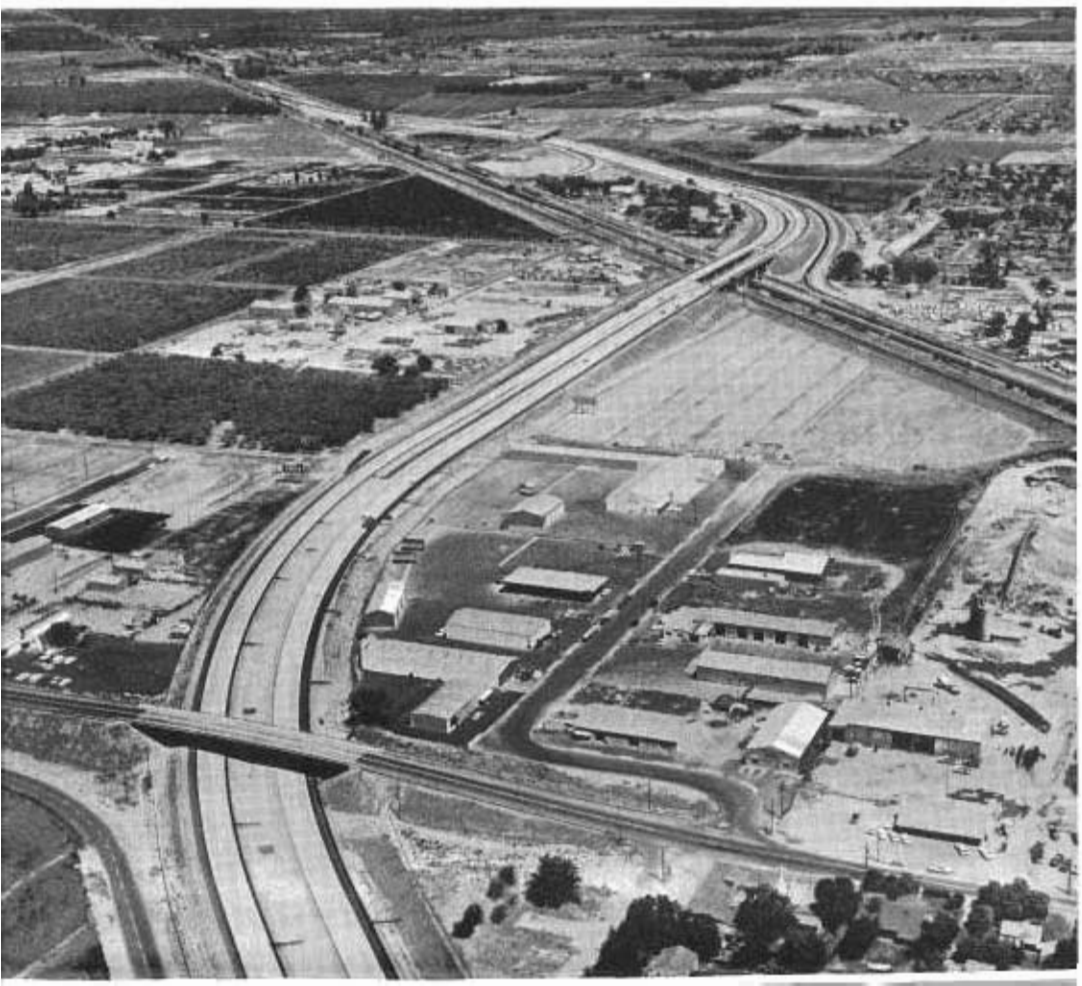
California's Legislature is interested in the problem. The Senate Fact Finding Committee on Transportation and Public Utilities considered it at its meeting in San Francisco on August 18. This committee intends to hold public meetings in metropolitan areas on the matter.

As Governor Brown said, "the sky's the limit."

# Modesto Freeway

By WALTER E. CURTIS,
Project Engineer

*PHOTO ABOVE: The new freeway makes sweeping curves as it crosses over old Highway 99 (foreground) and 7th Street and under Crows Landing Road south of Modesto. PHOTO BELOW: Concrete ribbons provide safe traveling for the motorist over and under once-hazardous intersections and railroad tracks.*




Traffic began using the new six-lane, nine-mile Highway 99 freeway through Modesto and Ceres on June 30, 1965.

Opening of the freeway eliminated the slow, bumper-to-bumper pace on busy 9th Street through Modesto and the signalized cross traffic through Ceres. It culminated more than 14 years of studies and planning, and three years of construction work.

Origin and destination studies began in 1948. Local officials and interested citizens participated with enthusiasm in the planning of alternate route studies. By 1952, their help and cooperation was reflected in the final freeway route which was ultimately adopted by the California Highway Commission. Their continued assistance resulted in a freeway designed to facilitate the flow of local traffic, while permitting the through motorist an uninterrupted and safe trip.

### Bottleneck Eliminated

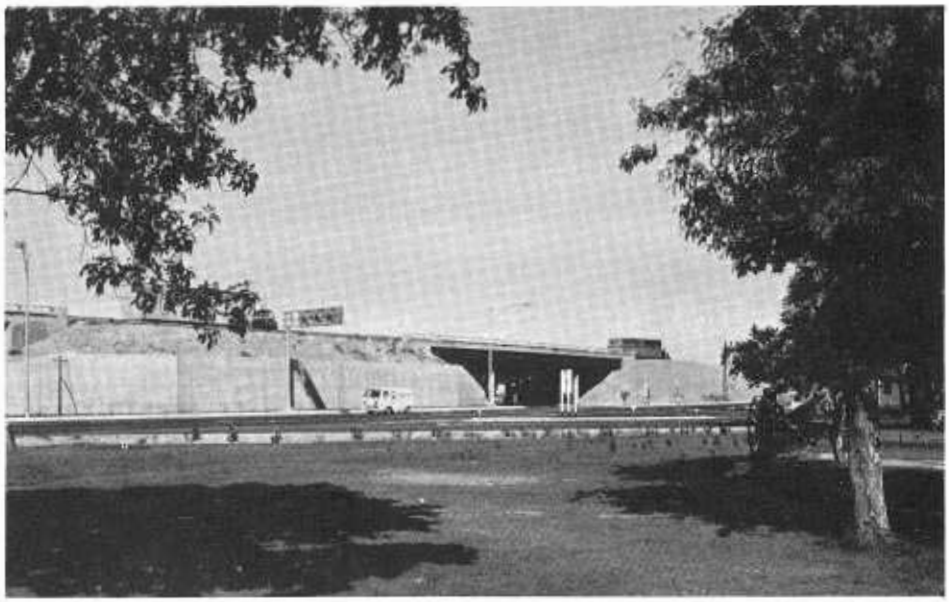
Today's motorists are now enjoying the benefits of this teamwork, whether they travel safely and easily through Modesto and Ceres or select one of the many conveniently located exit ramps to enjoy the hospitality of these growing agricultural and industrial communities.

At the same time, thousands of local residents are now enjoying the ease of shopping in town. They cross over the new freeway on any of these strategically located bridges rather than wait for a long freight train to pass, or fight their way through the heavy truck traffic which formerly went through their cities on what is now known as "Business US 99."

Highway 99 no longer acts as a traffic barrier, separating the east from the west, but instead it is bringing these sections of town closer together by means of safer overcrossings.

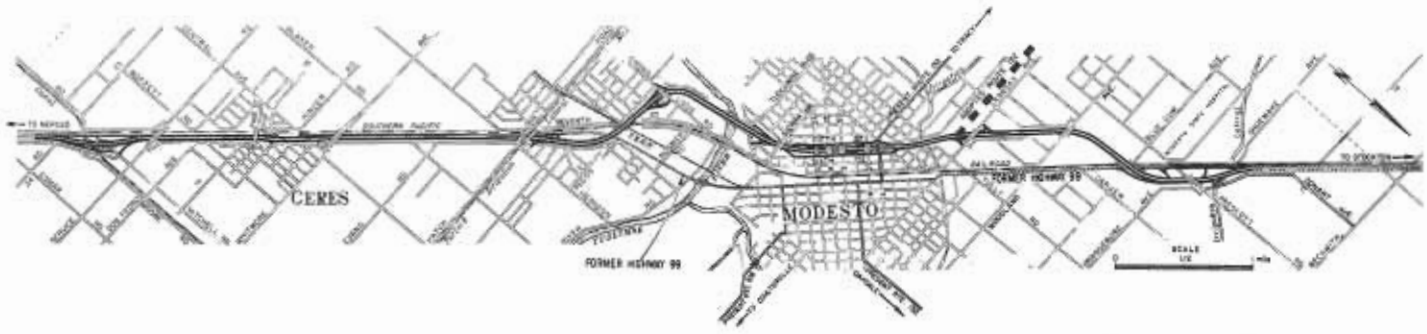
### Detours

Four miles of this nine-mile freeway construction were hidden from the view of the passing motorist and even a casual glance would not have made him aware of the size and impact of this $13,500,000 undertaking. Only at the ends of the project and at Hatch Road could he have got an idea and some visible hint of his coming liberation from the traffic snarls through this area. One of the most challenging construction problems encountered in the face of complicated traffic movements was to provide smooth passage of traffic through the ends of the projects and at Hatch Road. Eight separate detour plans had to be developed over the entire length of the projects



*Freeway traffic over North Street goes unnoticed by the children playing on the cannon in a Ceres park.*

*The freeway now carries with ease twice the volume of traffic which formerly bogged down by congestion on Modesto's Ninth Street.*




*The nine-mile, $13,500,000 Modesto Freeway project also extends through Ceres on Highway 99. It culminates more than 14 years of studies and planning and three years of construction.*


*Motorists no longer have to slow to a crawl through downtown Modesto on old Highway 99 which they once did as shown in this photo.*


*High speed detours were well posted and the double-blocked-out median barrier protected motorists against oncoming traffic.*

to insure that the passing motorist was traveling in the proper highway lane at the right time.

#### Magnitude

Because of budgetary and staging problems, the freeway construction was handled under four separate projects. The initial $1,200,000 contract eliminated all at-grade intersections by the construction of frontage roads from south of Hatch Road to Whitmore Avenue and an interchange at Hatch Road.

The second project was a grading and structures contract for the portion within Modesto itself. It entailed placing freeway embankments, constructing approach fills and bridges to elevate the freeway grade over the railroad at the north and south ends of Modesto, and constructing approach fills and parallel bridges over the Tuolumne River. This work began in July 1962 and cost approximately $5,300,000. The third project, the $3,500,000 Ceres Freeway, was started in August 1963. Its completion time was carefully calculated to coincide with the completion of the fourth contract, the final stage of the Modesto project. This final stage consisted of a base and surfacing contract for the Modesto portion of the freeway. Work bgean in May 1964 and cost approximately $3,500,000.

Ten interchanges were involved in the design and construction of this freeway, together with nine grade separation structures and dual bridges over the Tuolumne River. The earth fills for the proposed Highway 132 interchange in the vicinity of Kansas Avenue were constructed; however, this freeway-to-freeway connection will not be completed until the future project on Highway 132 is constructed. The completed freeway consists of six lanes from Mitchell Road in Ceres northward to the future Highway 132 interchange. Four lanes are then provided to Prescott Road.

#### Continuity of Development

On the basis of traffic studies and coordinated planning, the freeway was located "close-in" to Modesto and Ceres. As a result commuters are now able to reach work easily and safely and will have a wide choice of places


*Old Highway 99 (Ninth Street in Modesto) was resurfaced by the state prior to relinquishing a portion to the city to become a part of the downtown commercial core.*

to live. Businesses and factories will be able to use the freeway for fast and convenient transportation of agriculture and manufactured products.

In Modesto, the freeway parallels 5th and 6th Streets, the north-south local city streets. Traffic is collected onto 5th and 6th Streets from the freeway ramps and local areas, then diffused through the urban developments by local city streets, which are fed off "H" and "I" Streets, the main arteries.

#### Landscaping Plans

In keeping with the appearance of much of the area, with its tree-lined streets, shaded lawns and parks, a future landscaping project will provide green slopes and make the freeway an eye-appealing project.

As a prelude to things to come, 42 olive trees and six palm trees were recently salvaged from Highway 99 in Salida and transplanted on the Modesto Freeway.

#### Growing Pains

This Modesto-Ceres Freeway construction is another highlight of progress to keep pace with the population of the area, which is growing at twice the rate of the state as a whole. The completed freeway is but a step in the continuing effort to perpetuate the local community motto appearing on the illuminated metal arch at the entrance to Modesto on the old highway "Modesto—Water, Wealth, Contentment and Health."

*Highway 99 traffic through Modesto now uses this non-stop, six-lane freeway ending the long, slow signal-punctuated trip along Ninth Street.*

# Rio Vista Street Job

By RAYMOND F. BARTH, Director of Public Works, City of Rio Vista


The City of Rio Vista, in Solano County, recently gave its Main Street, from Front Street to Fifth Street, a new look by complete reconstruction under a contract with Asta Construction Company of Rio Vista.

The $62,000 project, which meets the requirements of the Collier-Unruh Local Transportation Development Act, was financed with gas tax funds.

#### Four Travel Lanes

The new street is 64 feet between curb faces, has 8-foot sidewalks and is contained in an 80-foot right-of-way. Pavement markings provide for four 12-foot travel lanes and two 8-foot lanes for parallel parking.

Formerly, two of the four blocks reconstructed were 50 feet wide between curbs while the other two blocks were 60 feet wide between curbs. Before Main Street was widened, diagonal parking was permitted.

#### Sidewalks Replaced

In addition to the construction of new curb and gutter and pavement, it was necessary to replace all of the sidewalk areas because of either the widening or grade changes.

Reconstruction of the street afforded the city an opportunity to replace an ancient 4-inch water main with a new 12-inch line as well as to place the wire for energizing the street lighting circuits underground.

Design was handled by the Vallejo firm of Edward P. Schwafel—Engineer, Inc. Pavement marking was performed by state forces.


*BEFORE: Main Street in Rio Vista prior to widening and reconstruction. The street had two lanes and diagonal parking. (Photo by J. B. Andrew)*


*AFTER: Main Street in Rio Vista following reconstruction. A wider roadway and parallel parking have given enough space for four lanes of traffic. (Photo by River News-Herald)*

*An outstanding feature of I-5 is the fully landscaped four-level interchange with Route 395 in Balboa Park.*

# King's Highway

## *Royal Facelifting for I-5 in San Diego*

By DALLAS DICKSON, Associate Highway Engineer


Ever since a group of dedicated Spanish padres established El Camino Real as their inter-mission thoroughfare, its route has dominated the southern California highway scene.

Call it by its Spanish name, which means "The Royal Road," or by the popular but now inaccurate "101," Interstate Route 5 is easily the most important single route in the southern part of the state. As a prime north-south link between San Francisco, Los Angeles and San Diego, 101 has always been heavily traveled. Under the impetus of the interstate highway program, a massive reconstruction program is afoot in San Diego County, rebuilding old 101 from its beginning at San Ysidro on the Mexican border to the Orange County line near San Clemente.

Let's take an imaginary tour on I-5 as it traverses San Diego County, and see what is being done to bring this important route to interstate highway stature. The key map (see page 13) will help orient you as we leave San Ysidro and head north.

### Built in 1950's

From San Ysidro to National City we are on a four-lane freeway built in the early 1950's. This, and the similar sections through Oceanside are the only parts of I-5 not yet budgeted for construction to full interstate standards. This southernmost section of the freeway is scheduled to be converted to such standards in another few years.

At National City we enter a recently completed section of the San Diego Freeway, popularly known as the "Crosstown," and find that we can now travel the entire breadth of the central business district on eight lanes of concrete-paved freeway.

This eight-mile section has probably done more to speed travel and promote safety than any other highway project in San Diego. A time savings of at least six minutes has been achieved on an average trip in this area. It is estimated that through traffic saves as much as 15 minutes travel time. In addition, the normal reduction in accident rates experienced in freeway driving is a key benefit.

### Fully Landscaped Interchange

An outstanding feature of this route is the fully landscaped four-level interchange with Route 395 in Balboa Park.

North of the "four-level" the new freeway connects to old US 101 via newly completed twin viaducts. The area under these structures provides parking for employees of the nearby aerospace industries. The opening of this connection earlier this year eliminated two traffic signal installations, with a further increase in time saved.

The freeway construction now is being pushed northward toward the proposed interchange with I-8, the major east-west route in San Diego County. The 2.5-mile section currently being built north of the twin viaducts features another viaduct three-tenths of a mile long, which will bypass what is locally known as the "world's longest traffic signal." This multiphase signal at Rosecrans and I-5

will soon be the last full traffic signal system on I-5 in San Diego County, and its elimination will speed local and through traffic noticeably.

#### Most Complex Section

Probably the most ambitious and complex section of I-5 will be the interchange with Interstate Route 8. This interchange was constructed in model form by the Bridge Department, both for design study and public information purposes. In addition, construction personnel find such a model is a real help in building a project as complex as this. This interchange will also connect to new Route 109, providing a high degree of service to San Diego's rapidly expanding beach resort areas.

Although construction on this interchange will not begin until 1966, there will be a contract let this year for bids opened September 15 for a short section of freeway north of the interchange proper. This project will help traffic during construction of the main interchange and will eliminate two narrow existing bridges. Between this area and Balboa Avenue several budgeted projects are in the works, but construction will not be completed to convert the existing four-lane freeway to eight-lane interstate standards until 1969.

#### Five Contracts Underway

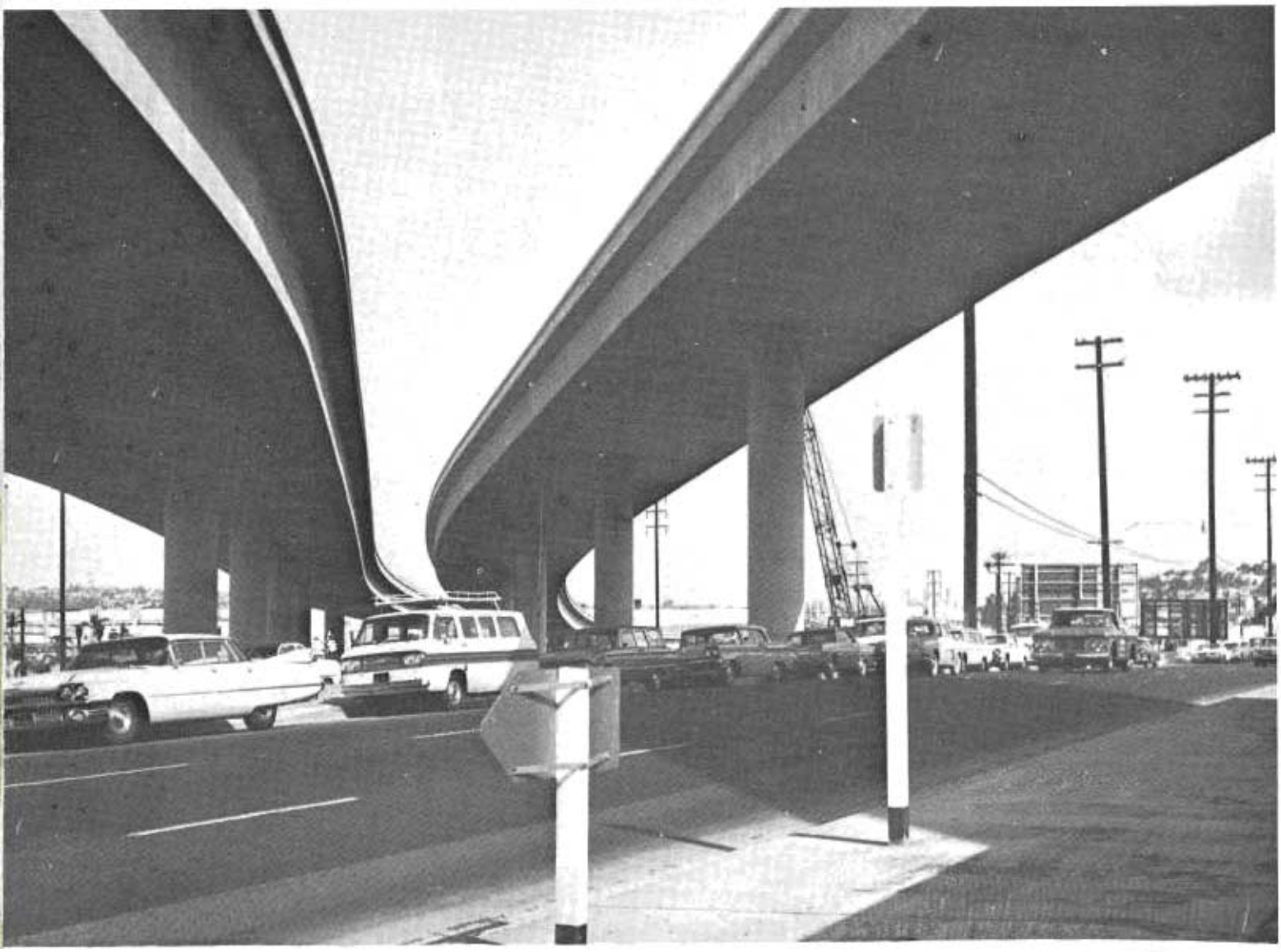
The area between Balboa Avenue in San Diego and the existing freeway in Carlsbad is the scene of the most intense construction activity in the area at present. From Balboa Avenue to the north there are currently five contracts underway, all of which will provide for eight-lane concrete pavement, designed to Interstate standards.

A contract underway in Rose Canyon north of Balboa Avenue in San Diego provides a connection to La Jolla via Ardath Road, a major street facility recently completed by the City of San Diego. Motorists traveling between downtown San Diego and La Jolla will notice a significant time savings when the new connection is completed. In addition, one five-mile section was recently opened to traffic near Del Mar and another project is advertised. Although the completed portion is "open-ended," connecting thus far only to county roads, there is a surprising amount of traffic using this facility.

To link this section with the old freeway in Carlsbad, two projects are scheduled for completion by 1966. The four contracts to the south will also be completed by then. The timing of the whole series of contracts from Balboa Avenue to Carlsbad is most critical, in that they must all be completed before traffic can be diverted from the existing highway at the south end.

This traffic switch is currently scheduled for the summer of 1966, hopefully in time to help out during the late summer traffic peaks which

*Newly completed twin viaducts connect the freeway with US 101 north of the four-level interchange.*



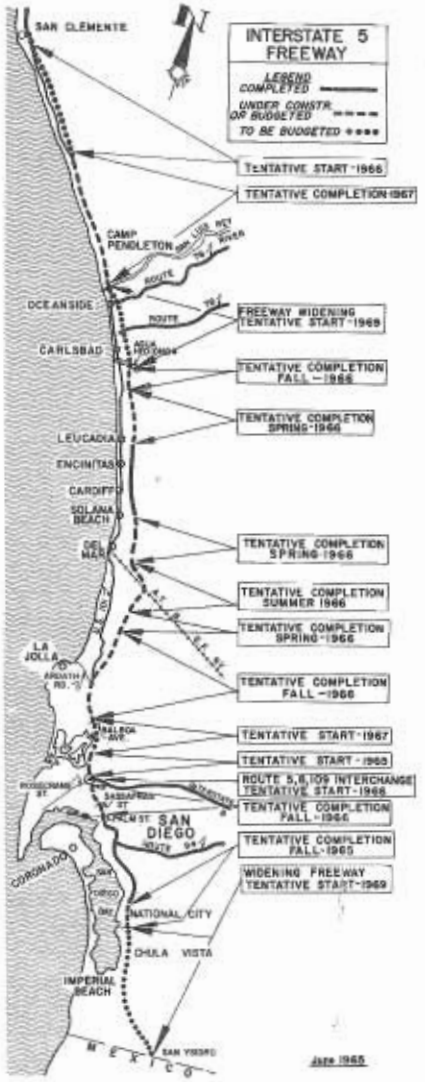
*A section of the new freeway just prior to its being opened to traffic.*

occur coincidentally with the racing season at the Del Mar Turf Club.

**1966 Completion**

Thus we see that by the middle of 1966 I-5 should be completed to freeway standards all the way from the Mexican border to just north of Oceanside. From Oceanside to San Clemente the existing highway is four lanes, with a narrow median. To combat an increasing accident rate, we have just completed the installation of median barriers on the northern part of this area. The hope is that this will minimize the accident picture until the road can be completed to freeway standards. Work on the modernization of this stretch of old 101 should begin, and be open to traffic sometime in 1967. With its completion the motorist leaving San Diego will have smooth sailing on I-5 throughout the county.

*For design study and public information purposes, the Bridge Department constructed the Interstate 5 and 8 interchange in model form.*




*Status of planning and construction on I-5 between San Ysidro and San Clemente is shown on the above map.*

# California's Interstate 15:


## *186 Miles of Divided Highway Across the Desert*

By TAYLOR SMITH, Associate Highway Engineer


Completion of an 18-mile freeway section near Baker this fall brings California's 186-mile portion of Interstate Route 15 to expressway and freeway standards for its entire length.

Two-thirds of the mileage in the Golden State is complete to Interstate standards. The route begins at a junction with Interstate 10 in San Bernardino; continuing easterly, it enters Nevada 15 miles beyond Mountain Pass.

Only two sections of expressway remain—a 52-mile stretch from Devore Road north of San Bernardino to Sidewinder Road south of Barstow will be upgraded in the future, as will a 15-mile segment in Cajon Pass. The latter is slated for realignment and widening, with construction of four overcrossings between Victorville and Barstow.

### History

Historically, Interstate Highway 15 between San Bernardino and Barstow is a part of the National Old Trails Highway which was incorporated into the state highway system by legislative act in 1909. From Barstow to the Nevada state line, it is a part of the Mormon Trail, which later became the Arrowhead Trail, and was added to the state highway system by legislative act in May, 1925.

When taken into the state highway system, the road consisted of a macadam-surfaced county road through Cajon Pass. It reached Victorville by way of Coyote Canyon and Hesperia.

From Victorville to Barstow the road was mainly a joining of local ranch roads which followed the Mojave River through Helendale. The oiled surface ended near Cajon Summit and the remainder of the route was either rocky or sandy and never smooth.

### Early Routes

To reach Las Vegas and Salt Lake City from Barstow, the adventurous early-day motorist had a choice of two routes.

The first was to swing north from the National Old Trails Highway at Daggett and follow the Arrowhead Trail northerly of the present highway through Red Pass, Silver Lake and Goodspring, Nevada.

The second and preferred route, even though of longer distance, continued east on the National Old Trails Highway through Ludlow and Amboy to Klinefelter. At Klinefelter, a trail turned north through Searchlight to Las Vegas. This route was preferred because it was more heavily traveled. It roughly paralleled the Santa Fe Railway from which help could be obtained in emergencies, as railroad crews would aid stranded motorists.

Even though San Bernardino County, in 1924, pushed through a new alignment of the Arrowhead Trail from Yermo easterly by following the Union Pacific Railway for some 20 miles and then on diagonally northwest through Baker and Silver Lake, most people still preferred the longer route over the National Old Trails Highway through Klinefelter and Searchlight.

E. Q. Sullivan, retired district engineer, reported that in 1924 his first

inspection trip over the county road required 18 hours of driving to reach Las Vegas from Barstow and that not another car was met or passed for the entire distance.

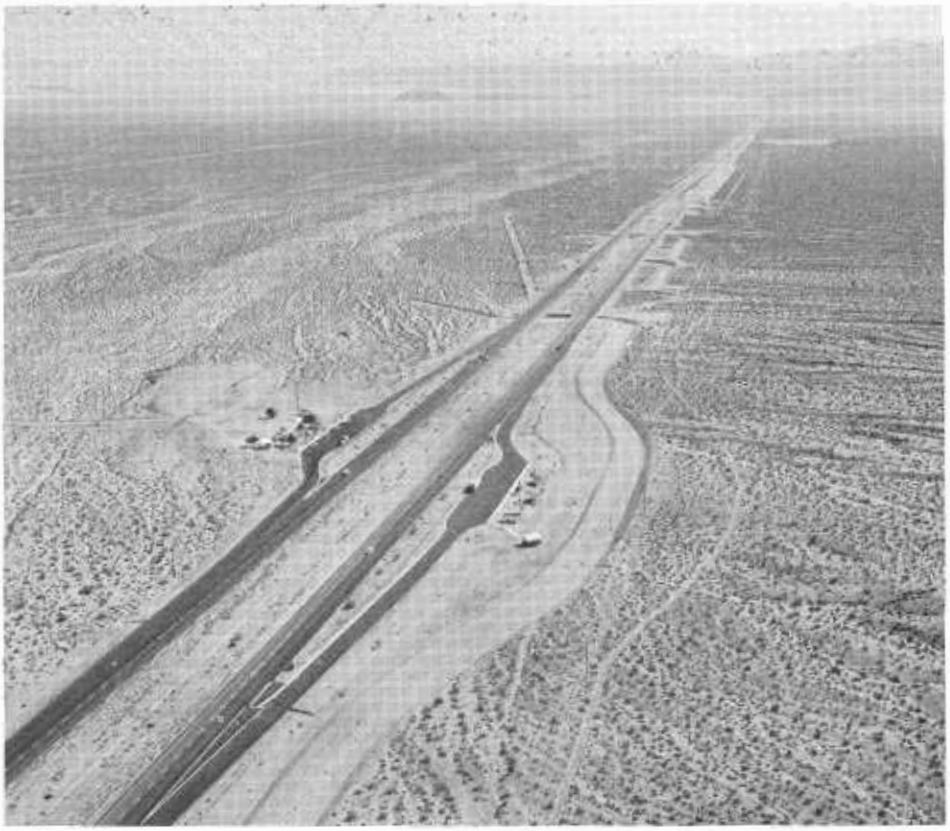
#### Construction

Construction in the period of 1922 to 1927 consisted of building a 21- to 24-foot unsurfaced roadway for approximately 105 miles from Cajon Summit to Cronese Valley east of Barstow.

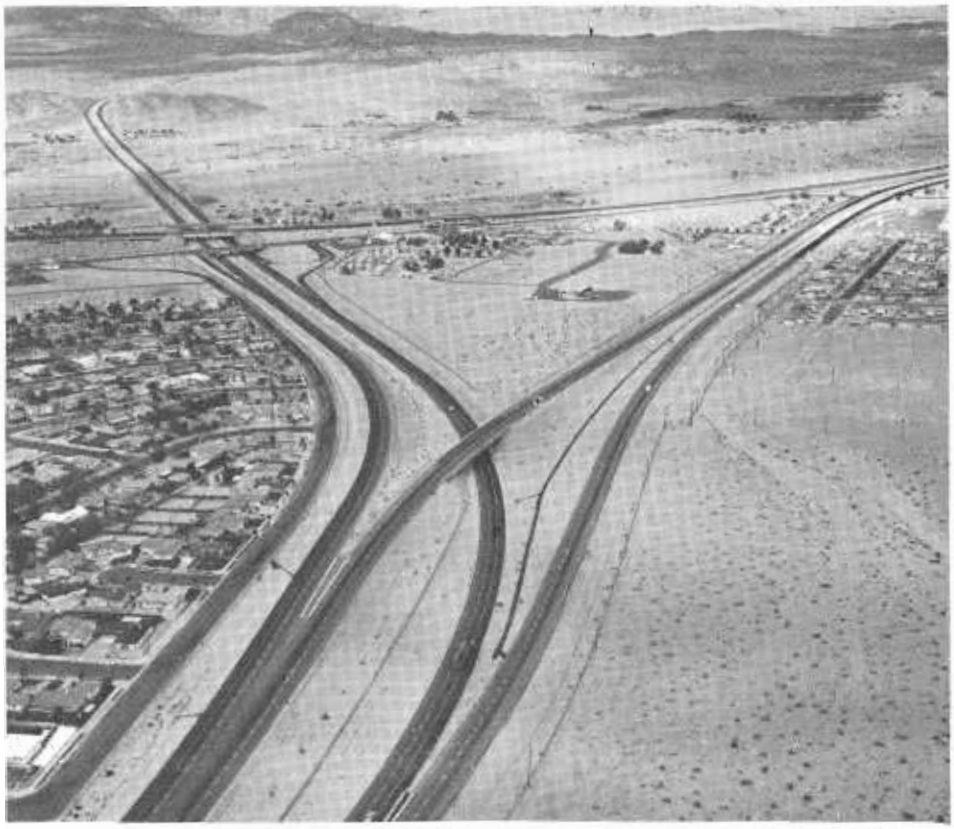
Hesperia became the first community to be bypassed when realignment was made directly from Cajon Summit to Victorville and the road surfaced in 1922. In 1930, an oil dust palliative was placed on the road from Cronese Valley to the Nevada state line. This oiled surface is still traversable today on many of the sections of the old Arrowhead Trail abandoned in the early 1930's because of realignment.

#### Realignment

In the early 1930's major realignment was made in Cajon Pass and new alignment provided directly to Yermo from Barstow. Construction during this period provided a so-called "60-mile-per-hour" highway of two 10-foot surfaced driving lanes and unsurfaced shoulders. Realignment continued until 1937 when the final section was completed between Mountain Pass and the Nevada state line.



*Aerial panorama of the Halloran Springs Roadside Rest areas. View is westerly down Baker Grade toward Soda Dry Lake.*



*The junction of Interstate 15 and Interstate 40 spreads like a "Y" near the east city limits of Barstow, encompassing residential sections that have developed since construction of the freeway.*

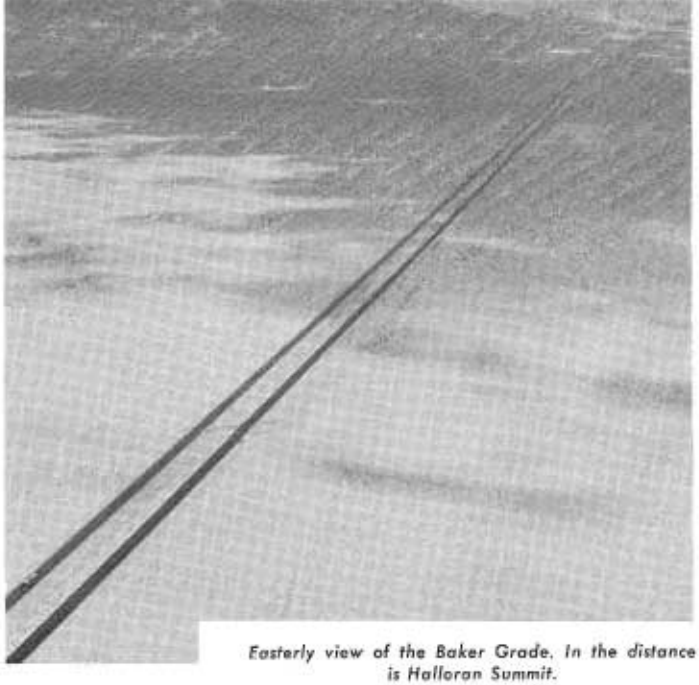
During the major construction in the early thirties, horizontal alignment was greatly improved and asphalt-covered, timber-decked bridges supported on timber piles were constructed over the major stream channels. The narrow 24.5-foot width of these structures contributed to the accident record as traffic increased each year. Shortly after World War II, the bridges were redecked and widened to 26 feet.

All of the structures on the route were reaching structural inadequacy after 30 years service at the time they were replaced with portland cement concrete units when separate roadbeds were constructed.

#### After the War

Little improvement other than routine maintenance was undertaken on the route until after World War II,

*Parkinsonia trees have been planted in the median and along roadway slopes between Victorville and Barstow to enhance the appearance of the freeway. These trees require no watering.*



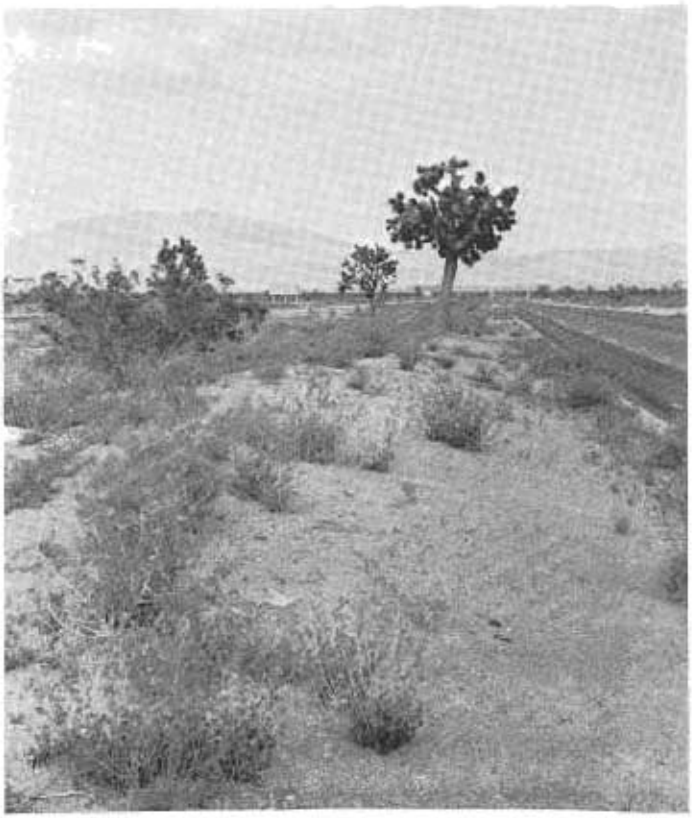
*Easterly view of the Baker Grade. In the distance is Halloran Summit.*

# PICTURES OF THE NEW

*All vehicles entering the state on Interstate 15 are required to stop for an agricultural inspection at this station near Yermo.*

*Native shrubs and trees were not disturbed by construction. From this point near Halloran Summit, the roadway is visible for 13 miles as it dips down to Valley Wells and rises toward Clark Mountain.*

*Roadside rest area at Halloran Springs provides shaded picnic tables, water, and rest facilities for motorists.*



A Division of Highways' maintenance crew used two Fordson tractors to tow a grader in 1924. The Dodge at left is in "step" with those times.

Construction near Cajon Summit in 1930, when the winding old road at the left was replaced on new alignment. A crew of laborers is finishing excavation slopes.

Much of the roadway excavation during early construction was accomplished with mule-drawn fresnoes.

An early view of an improved section of the Arrowhead Trail after the ruts had been dragged smooth and tire-puncturing rocks removed. Speeds of 35 miles per hour could be attained.

# CONTRAST WITH THE OLD

A view of the unsurfaced Arrowhead Trail west of Cronese Dry Lake in 1927. Rocks, removed from the traveled roadway as tire hazards, are visible at left.

when in the early 1950's (as an interim measure) most of the road was resurfaced, the width of traveled way increased, and surfaced shoulders added.

Conversion to expressway and freeway was undertaken in 1953 in Cajon Pass and was completed over the summit to Victorville in 1956. Relocation around Victorville was completed in 1957. Oro Grande and Helendale were bypassed in 1958, when major realignment shifted the highway easterly to a more direct route from Victorville to Barstow and cut 4.7 miles from the distance between the two cities.

The highway was relocated southerly around Barstow in 1962 and northerly around Yermo in 1963. Baker became the last community to be bypassed with the completion of construction in 1965.

#### Future Plans

Future plans for this route include a realignment from Devore Road to Cajon Summit which will decrease the road's length by 1¼ miles. The result will be an estimated user's savings of $46,000,000 over a 20-year period.

Desert construction on Interstate 15 has been most notable for the length of highway constructed under each contract. The 29-mile project between Victorville and Barstow is the longest expressway completed under one contract in the state. Other desert projects have ranged from 18 to 25 miles in length. This route also has the distinction of containing the 1,500th mile of freeway to be completed in California.

Construction methods and techniques have shown remarkable improvement since the first roads were completed with mule-drawn fresnoes. Early-day tractors gradually replaced mules as power for towed graders which in turn were replaced by motor graders for placing the "desert mix" of the early 1930's.

New maintenance stations have been constructed at Victorville, Barstow, Baker and Mountain Pass and existing stations utilized at Cajon and San Bernardino. Modern living quarters are provided at the stations at Baker and Mountain Pass as an inducement for workmen to live in such remote areas where living quarters would not otherwise be available.

The original Arrowhead Trail followed a route between springs and wells so that the average distance from one source of water to another was usually about 20 miles.

Water is still important for the present-day motorist, as many cars tend to overheat on long desert grades during the summer high temperatures. To assist the traveling public, safety rest areas have been constructed at Midway, Halloran Springs, and Wheaton Springs with water available at all three locations. Rest rooms and picnic ramadas were added at Halloran Springs and Wheaton Springs during the summer of 1965 and similar facilities will soon be added at Midway.

Future plans provide for additional roadside rests at Cozy Dell in Cajon Pass and at Sidewinder Road south of Barstow.

To provide erosion protection and to act as a screen between opposing streams of traffic, every effort was made not to disturb native shrubs and bushes. Experience has shown that many years are required for native growth to reappear after it has been disturbed.

To enhance the appearance of the freeway and relieve the desolate appearance, Parkinsonia trees have been planted in the median and along the roadway slopes between Victorville and Barstow. A tree-planting project is also planned on the Baker grade.

#### Traffic

Traffic volumes have increased steadily over the years. The average daily traffic has increased from fewer than 100 vehicles per day in 1926 to 6,500 vehicles per day in 1964 passing the California-Nevada state line at Mountain Pass. The highest volumes occur on weekends, when daily traffic has reached 10,000 vehicles.

# SPOT CORRECTIONS INTENSIFIED

Before this section of Route 70-99 in Sutter County at right was widened and a left-turn lane installed last spring, motorists waiting to turn left were endangered by traffic rounding the bend behind them. This location had been the site of 19 accidents in the period 1961–64—most of which were "rear enders." The Division of Highways has intensified its efforts to identify and correct such points of accident concentration that can be improved by traffic engineering, in line with increased national emphasis on traffic safety.

Spot corrections are now established as a specially financed category in the annual state highway budget.

# Shields Avenue

## *Fresno Widens Street to Four-lane, Divided Arterial*

By DONALD M. WINTON, Assistant City Engineer, City of Fresno


The City of Fresno, like many cities in California, has been trapped for many years with insurmountable street deficiencies, while handicapped with a skyrocketing tax structure inadequate to meet these deficiencies.

The Collier-Unruh Local Transportation Development Act which increased the state gas tax one cent in 1963 along with other highway user tax increases has given Fresno and other cities, and counties, a shot in the arm by providing more money to chip away at our many street needs at a faster pace, bringing our street deficiencies down to a tolerable level.

A good example in the City of Fresno is the recent widening of one mile of Shields Avenue from Palm to Glenn Avenues. The old road was predominantly 36 feet between curbs on 60 feet of right-of-way. Development is light commercial and residential. The 1965 ADT (average daily traffic) being 12,000 cars was causing serious congestion problems. By 1985, traffic would increase to 18,000 cars a day. As a result, this project was number one on the city's priority list.

*Shields Avenue in the City of Fresno after its widening to a four-lane, divided roadway.*

### Four-lane Divided Arterial

The new construction is a four-lane divided arterial with parking provided. The new right-of-way is 100 feet. The limited landscaping, paid for by city funds, has encouraged property owners to make similar improvements. The result is an efficient and attractive street.

Financing for this project began in 1963–64, when the City of Fresno budgeted $295,000 for right-of-way acquisition. This amount represents the city's entire gas tax revenue available for new construction for that year. At this rate the city would have required two years to budget sufficient funds, using only the ⅜-cent gas tax revenues, as the project had R/W costs amounting to $355,000 and construction costs amounting to $180,000.

Because the new 1-cent gas tax revenue provided the City of Fresno with an additional $330,000 annually, the city was able to construct this project and another smaller project, one year earlier. Future projects costing approximately $600,000 or less will require only one year of financing because of this new money.

### Full Effect Not Yet Felt

The full effect of the new legislation, however, has not as yet been entirely felt by all cities and counties in the State of California because of provisions requiring matching credits to qualify for the new 1-cent gas tax revenues. To date most organizations have been able to keep pace using past expenditures and subdivider expenditures as their matching money. This backlog will be exhausted soon and governmental units will have to use general funds to equal the revenue from the one cent gas tax.

In the case of the City of Fresno, matching credits must be provided in the approximate amount of $330,000 annually. Considering the estimate of $130,000 to come from subdividers, Fresno's general fund will then be required to expend an additional $200,000 per year for our matching share.

The anticipated availability of $850,000 per year for R/W and construction costs in the near future, as compared to approximately $300,000 per year that has been available in the past, will enable the City of Fresno to triple its street improvement program. Thus, with the aid of the Collier-Unruh Act, the City of Fresno is pressing towards the goal of providing its citizens effective relief from staggering street deficiencies. The motorists throughout California will soon be enjoying greatly needed road and street improvements, saving them millions of dollars in time delay and decreased accident experiences.

# The Ridge Route

*Construction History, Future Plans Summarized*

By HEINZ HECKEROTH, Senior Design Engineer and
BARRY COHON, Assistant Information Officer


"I didn't get into town very often then, but my husband used to go in regularly either to Los Angeles or Bakersfield — at least twice a year," said Mrs. Mary Ralphs of Gorman as she recalled pioneer life in the northern sector of Los Angeles County some 60 years ago.

Bakersfield was a day-and-a-half trip north from their ranch by horse and buggy, and Los Angeles was two-and-a-half days south, necessitating stopovers at Elizabeth Lake and Newhall. Now, Bakersfield is 45 minutes away, and Los Angeles just over one hour via Interstate 5—and that time will soon be cut even further by new

*An unidentified highway engineer pauses at Ralphs' ranch house at Gorman Station in this 1913 view. The house, originally a one-story log cabin later covered with siding and enlarged, immediately adjoined the first Ridge Route. Later, the house was destroyed to make room for the 1933 realigned highway.*

*Looking south through the Big Cut on the first Ridge Route highway. The time: 1915.*

work on the Ridge Route portion of California's "backbone" road.

In the early days, Gorman was a stage stop near the summit of the long and tortuous north-south route through lonely ranch country. Later, except for occasional gypsy caravans, Mary Ralphs recalls not seeing a human being outside her immediate family for many weeks at a time. She raised eight children, all of whom remain within a few miles of the old Gorman ranch. Fit and smiling at 83, Mary Ralphs today is the grandmother of a family that plans to add a 60-unit, two-story motel to the restaurant and other enterprises they now operate in the area.

#### Ridge Route History

The story of the Gorman ranch is tied to the history of the Ridge Route. The state highway, when opened to automobile traffic in 1914, went right past the Ralphs ranchhouse. The family was twice relocated when the route was realigned in the '30's and '40's.

Livestock is still the primary product of the area, but land development is increasing rapidly, spurred by the northward expansion of Los Angeles' metropolitan complex. In the Castaic-San Francisquito Canyon vicinity, about 30 miles south of Gorman, $24-000-and-up homes are frequently purchased before they are even built in brand new tracts. A state college is planned for the area.

Accelerating the development along the Ridge Route are public works projects by the State Department of Water Resources and the Division of Highways. As in the case of the Westside Freeway through the San Joaquin Valley, the State Water Project's California Aqueduct parallels and crosses the freeway. Two State Water Project reservoirs will be built in the Ridge Route area to help bolster southern California's water supply, they will also attract a large volume of recreation traffic to their shores. Castaic Reservoir terminal facility of the West Branch of the California Aqueduct and Pyramid Reservoir will then skirt Interstate 5. A huge tunnel will connect the two reservoirs.

*The Gorman schoolhouse in 1913. The people on the porch are not quite identifiable although Mary Ralphs surmises that some are her children—because the white horse named Pluto was their transportation to school.*

#### A Vital Link

Since 1914, the Ridge Route has been a vital link in California's highway network. The "old old" highway, still in limited use, wound through the rugged mountains for over 48 miles and included so many curves that a driver had to make more than 100 complete circles. In the '20's it was still considered an example of bold engineering but it proved inadequate to carry the traffic load of a rapidly growing region.

This growth was directly reflected in heavier motor vehicle traffic of all types, particularly along this key transportation link between the increased agricultural and petroleum production of the San Joaquin Valley and the expanding industrial, commercial and population development south of the Tehachapis.

In 1933 a new, wider, and more direct route (the Ridge Route Alter-

*Four-horse Fresno scrapers gnaw their way through the mountains for the original Ridge Route in this photo taken June 24, 1915.*


*A vertical aerial of the Tejon Summit area shows the present highway and a section of the proposed realignment. Line with circles shows location of the San Andreas Fault through this area.*

nate) through Piru Gorge cut 10 miles off the trip between Castaic and Lebec. But increasing traffic, particularly heavy trucks, soon began to strain the capacity of this three-lane highway. In 1940, improvement studies were started but construction had to be postponed until after World War II. From 1947 to 1952 the route was widened and modernized to a four-lane expressway. By 1969 it will be an eight-lane freeway with gentle curves and an improved profile.

#### Planning

Planning and design studies for converting the Ridge Route to full freeway have been underway since 1955. In 1957–1958 the original freeway concepts for the route from the north city limits of Los Angeles to the Kern County line were formalized. Numerous supplemental reports prepared since that time have modified the original concept of six-lane initial construction and eight-lane ultimate construction. The design and construction now underway features an eight-lane Interstate freeway for the entire 45 miles at an estimated construction cost of 90 million dollars, with a design speed of 70 miles per hour using 3000-foot radius curves and 4.5 percent maximum desirable grade on new construction.

The freeway construction utilizes various sections of the old four-lane expressway in several ways:

1. Converting the existing expressway to full freeway with a widened right-of-way;

2. Using the existing expressway as part of an adjacent and paralleling frontage road system which will revert to local control;

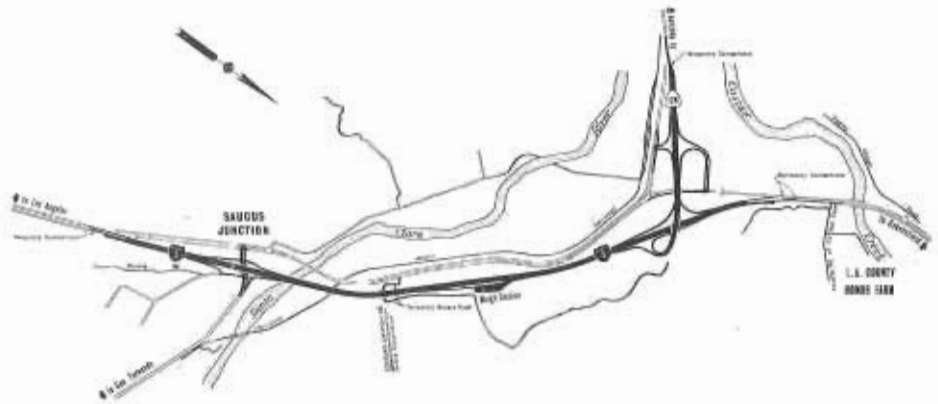
3. Using some existing expressway as an access road to the Piru Creek headquarters;

4. Converting existing expressway to a one-directional freeway roadway which would be coupled with a widely separated, newly constructed freeway roadway to carry traffic in the other direction. At one location, in the vicinity of the Five-mile Grade north of Castaic, the roadways are "reversed" — the new southbound roadway will be east of the existing expressway, which will carry northbound traffic—for reasons of safety and economy.

The terrain traversed by the freeway varies from the relatively low and flat Santa Clara River–Castaic Creek Valley at an elevation of 1,200 feet to the relatively high and gently sloping Gorman Creek Valley at an elevation of 3,500 feet; from the Weldon-Gavin Canyon Summit at an elevation of 1,800 feet, just north of the Los Angeles city limits to the Holland or, more properly, Tejon Summit at an elevation of 4,200 feet, near the Kern county line. It includes 14 miles through rugged mountain terrain where the average elevation is 2,800 feet.

#### Land Use

Land use has been agricultural—predominantly grazing in the Gorman area—with some truck farming in the Newhall-Saugus-Castaic area. The 14 miles in Angeles National Forest is covered with dense low native growth and is expected to remain in its natural state under administration of the United States Forest Service. The Gorman area probably will continue to be predominantly agricultural for




*A map showing the new freeway interchange and separations between Saugus Junction and Castaic at the south end of the Ridge Route.*

a number of years and therefore motorist service developments will be centered around interchanges.

Conversely, the Newhall-Saugus-Castaic area might well explode with mushrooming urbanization, a future spill-over from Los Angeles' San Fernando Valley. Indicative is a population of 4,000 in 1955, 17,000 today, and 115,000 predicted in 1985. Subdivision grading now underway, recent completion of a golf course near Saugus Junction, the number of tentative tract maps filed with Los Angeles County, and development studies started, are all barometers of this expected growth.

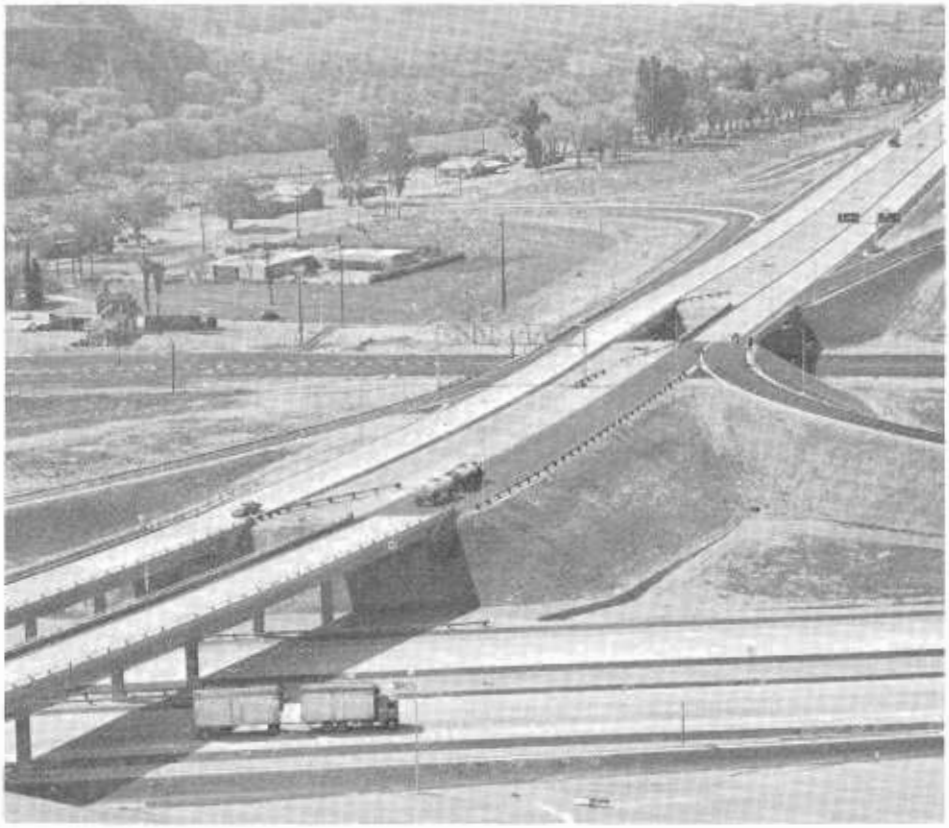
The recreational potential along the route will be greatly enhanced by the construction by 1971 of the Castaic Reservoir, the terminal reservoir of the West Branch of the California Aqueduct of the State Water Project. Included in the land acquisition program for the reservoir is acreage to be improved to serve the recreational needs of an estimated 12,000 people per day. The lake formed behind the 330-foot high earthfill dam will cover an area of 2,600 surface acres, store 350,000 acre-feet of water and provide 34 miles of shoreline.

The second State Water Project reservoir will be built in the Pyramid Rock area of Piru Creek. The Pyramid Reservoir lies entirely within Angeles National Forest in a rugged canyon. Its anticipated completion year is 1973.

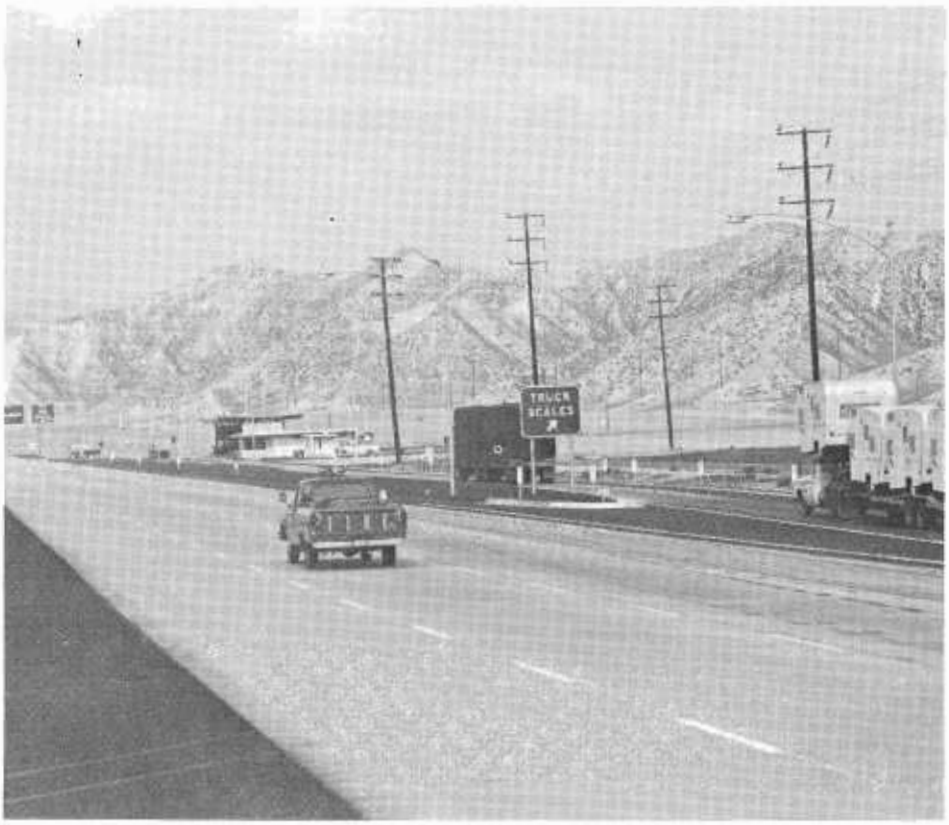
#### Traffic Forecasts

Traffic forecasts reflect the anticipated urban growth of California and the recreation potential of this area. Within 20 years, traffic on Interstate 5 is expected to increase 400 percent. (See table) Trucks will comprise nearly 20 percent of the Average Daily Traffic and about 5 percent of the peak hour traffic. At present, they comprise about 15 percent of the traffic, with the bulk of this percentage made up of big rigs—four-axle or more.

The area traversed by this portion of Interstate 5 furnishes a major traffic corridor as well as a major utility

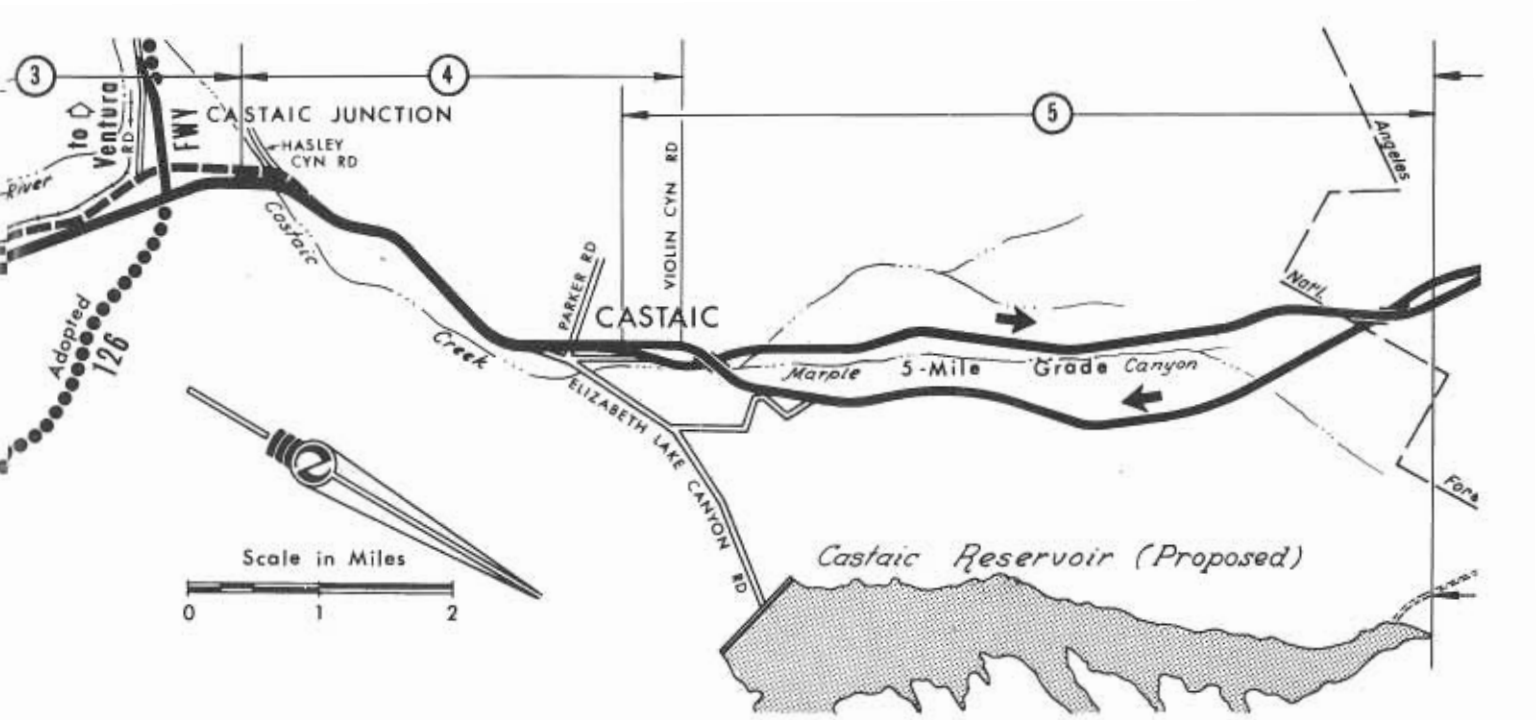


*Looking west along the Route 126 Freeway from its interchange with the Ridge Route (foreground). The frontage road undercrossing is in the center. (See map previous page)*

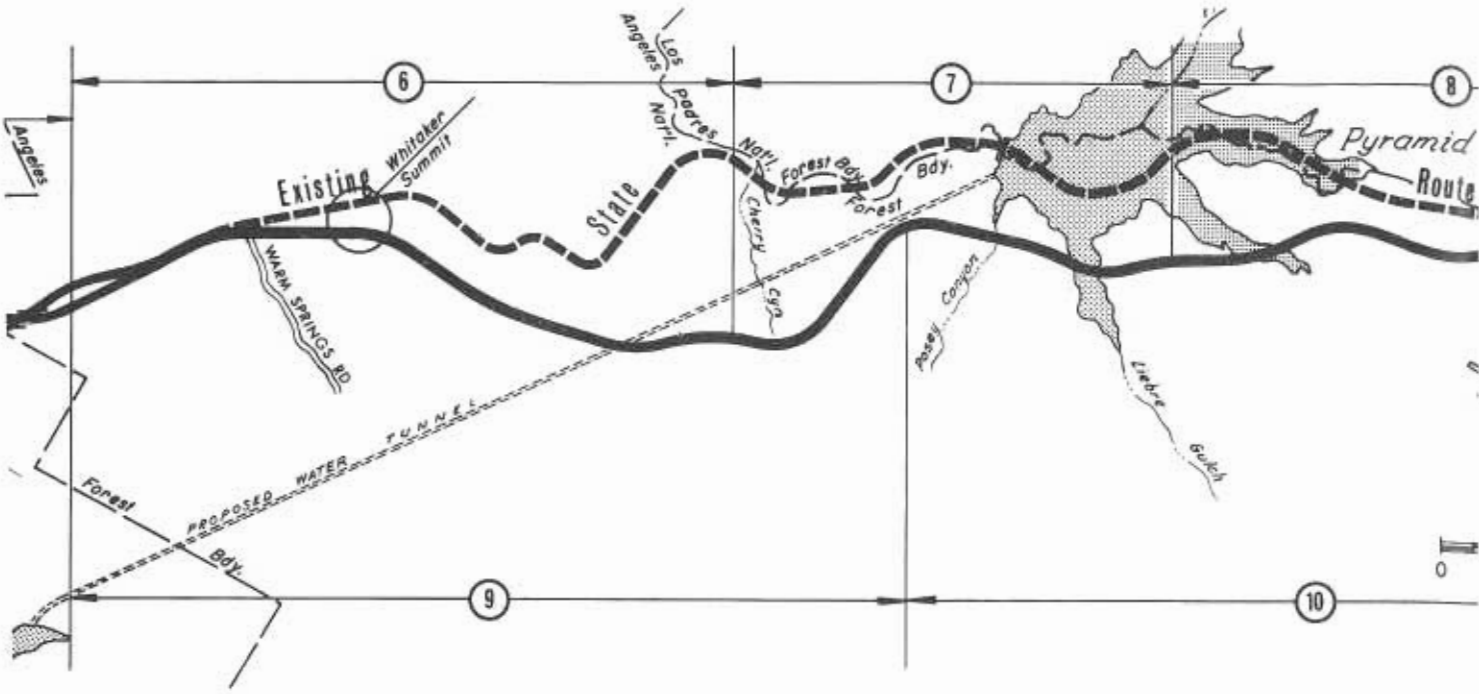



*The new California Highway Patrol truck scales went into operation last January near the Interstate 5-Route 126 interchange. (See map previous page)*


| | 1 | 2 |
|---|---|---|
| **LIMITS:** | 1.1 miles to 4.1 miles north of Route 14 | 4.1 miles north of Route 14 to 1 mile south of Santa Clara River |
| **LENGTH:** | 3 miles | 3½ miles |
| **TERRAIN:** | Canyon | Hilly farm land |
| **INTERCHANGES:** | None, 3 bridges | Two now: Pico-Lyons Ave. and Soledad Canyon Road;<br>One future: McBean Parkway |
| **BUDGET AMOUNT AND FISCAL YEAR:** | $7,500,000<br>1965–66 | $3,500,000<br>1965–66 |
| **DESIGN CHARACTERISTICS:** | 70-m.p.h. 8-lane freeway 4.6% max. grade, 3000′ minimum radius curves, separate roadways using a 60′ median. Extensive modification of Gavin Canyon drainage system includes several major transverse and longitudinal culvert and open channel installations and numerous minor culvert crossings. Major roadside rest includes parking for 20 cars and 4 trucks plus picnic and comfort facilities. | Alignment and profile based on 70-m.p.h. standards using separate grade line with 60′ median. Stage construction for minimum traffic interruption. Portions of existing expressway roadway near Pico-Lyons will be frontage road. Major contract items include 1,000,000 cubic yards of roadway excavation. Drainage uses cross culverts to perpetuate natural drainage pattern. |
| **STATUS:** | Under construction | Under construction |
| **TARGET DATE:** | Mid-1967 | Mid-1967 |
| **PROJECT ENGINEER:** | Bob Allen | Bob Allen |
| **CONSTRUCTION ENGINEER:** | Mike Sturgeon | |

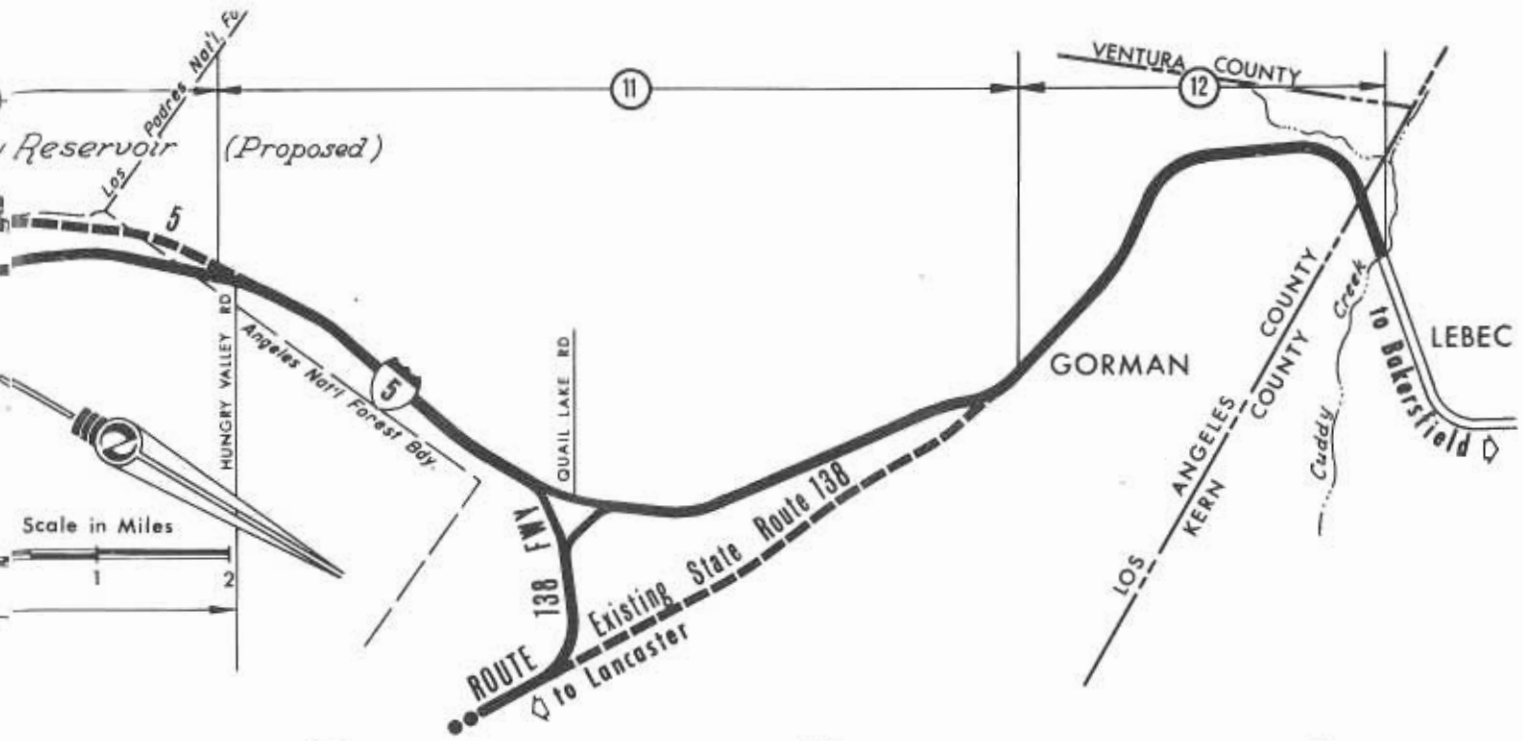



| 3 | 4 | 5 |
|---|---|---|
| 0.8 mi. so. of Saugus Jct. to 3.1 mi. so. of Castaic | 0.4 mi. so. of Castaic Creek Bridge to 1 mi. no. of Parker Road. | 0.4 miles to 6.8 miles north of Parker Rd., Castaic |
| 3.3 miles | 4 miles | 6.4 miles, including the famous 5-mile grade |
| Rolling hills | Flat river plains | Mountainous |
| Interchange at Saugus Jct. and Castaic Jct., plus initial phase of interchange between Route 5 and 126. Also structures over S.P.R.R. and Santa Clara River | Hasley Canyon Road, Parker Road, and Violin Canyon Road. | None |
| $5,600,000 | $5,000,000<br>1966–67 | $12,000,000<br>1965–66 |
| Old 4-lane expressway resurfaced and relinquished to L. A. County. Major weigh station and brake inspection station for northbound trucks. | Conversion of present 4-lane expressway to full freeway, using 70-m.p.h. design standards, 3000' minimum radius and 36' median. | Existing roadway in 5-mile grade to be reconstructed on existing alignment to serve northbound traffic. New roadway to be constructed on east side of Marple Canyon for southbound traffic. This will produce an "English style" road with up to a 2000' median. |
| Completed.<br>Opened to traffic Dec. 22, 1964 | Design nearing completion | Late design stage |
| | Spring 1968 | End of 1968 |
| Billy Hunter & Ken Hintzman | Ken Hintzman | Vince Ramirez |
| R. M. Innis | | |

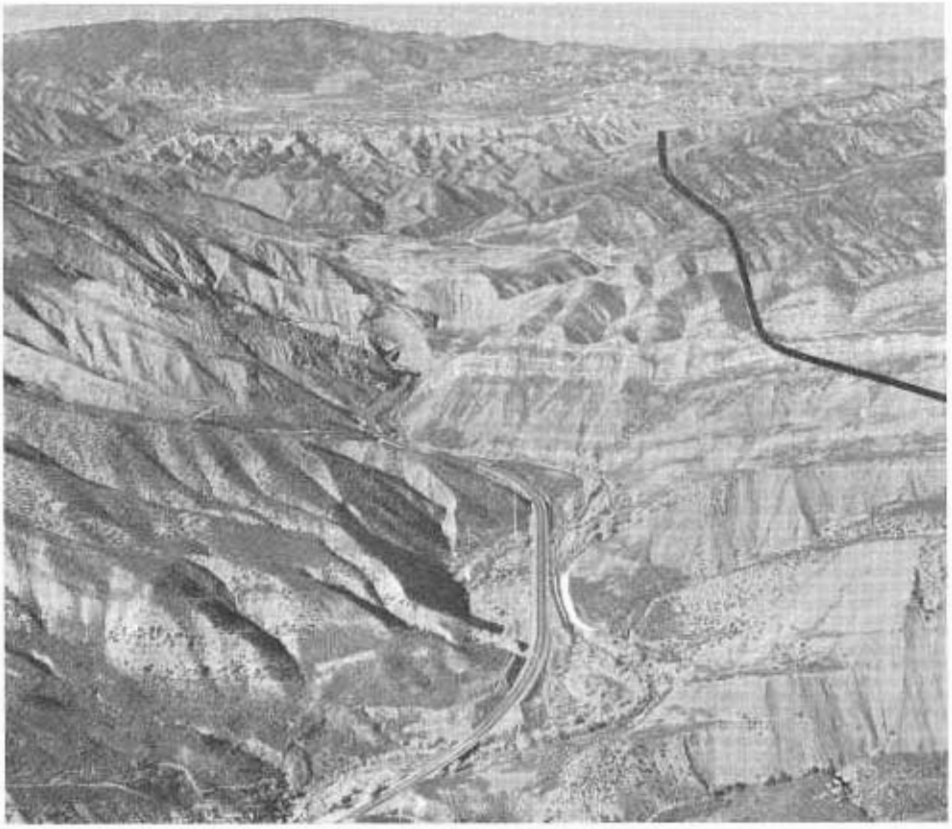



| | 6 | 7 |
|---|---|---|
| **LIMITS:** | 6.9 mi. to 12.3 mi. north of Castaic | 12.3 mi. north of Castaic to 10.3 mi. south of Rte. 138 |
| **LENGTH:** | 5.4 miles | 3.6 miles |
| **TERRAIN:** | Mountainous | Mountainous |
| **INTERCHANGES:** | Warm Springs Rd. | None |
| **BUDGET AMOUNT AND FISCAL YEAR:** | $7,800,000 in '65–66<br>$4,600,000 in '66–67 | $9,500,000 in '65–66<br>$6,000,000 in '66–67 |
| **DESIGN CHARACTERISTICS:** | *1st stage:* grading and substructures for ultimate 8-lane fwy. with minimum 36' median, split roadway through a portion, minimum 3000' radius curve. Old roadway will be relinquished to county. Maximum grade: 4.2% | *1st stage:* grading and structures for ultimate 8-lane fwy. with 36' median and 3000' radius curves, including large arch culverts of special design at Cherry Canyon, Allen Canyon, Posey Canyon, and Liebre Gulch. |
| **STATUS:** | Under constr. | Under constr. |
| **TARGET DATE:** | | |
| **PROJECT ENGINEER:** | Bob Allen | Bob Allen |
| **CONSTRUCTION ENGINEER:** | John Byrne | Ken Mock |

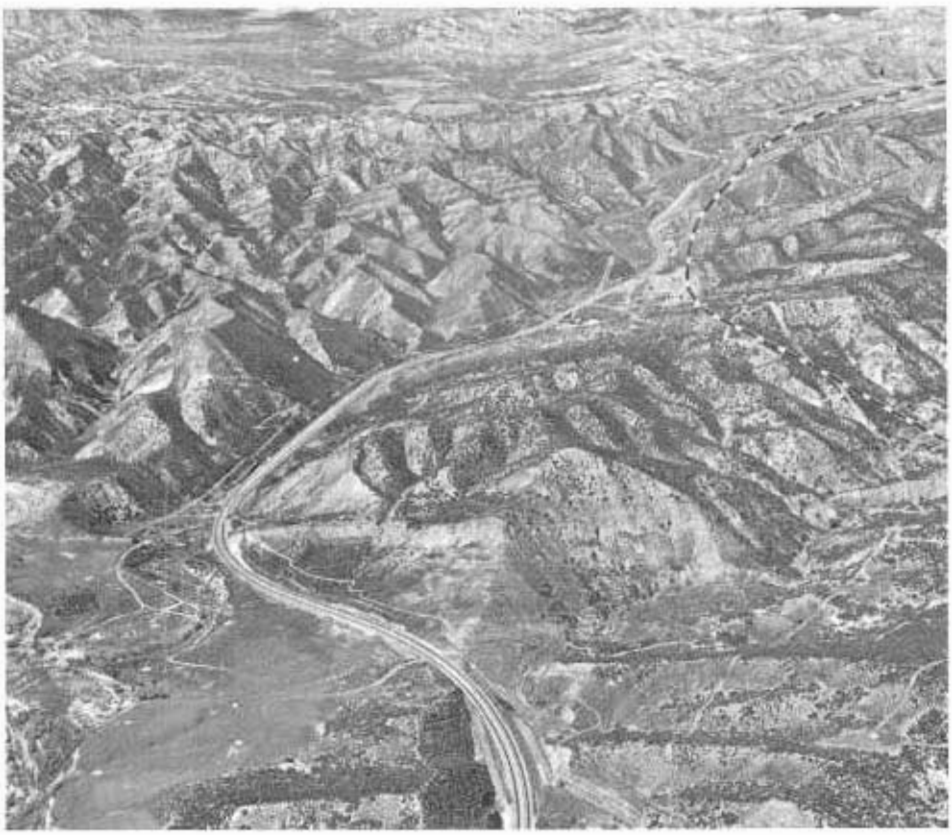
| | 9 | 10 |
|---|---|---|
| | *2nd stage:* Paving 6.8 mi. No. to 13.2 mi. no. of Parker Rd., Castaic. $3,500,000 in '67–68 | *2nd stage:* Paving, 13.2 mi. of Parker Rd. to 6.7 mi. so. of Route 138, 6.4 miles in length, $3,200,000 in '67–68. Old road to be relinquished to county upon completion of paving of freeway. |
| | Open in early 1969 | Open in early 1969 |
| | Ken Hintzman: Project Engineer. | Ken Hintzman: Project Engineer. |




| 8 | 11 | 12 |
|---|---|---|
| 10.3 to 6.8 mi. south of Rte. 138 | 6.8 mi. so. of existing Rte. 138 to 0.6 mi. no. of same; and Rte. 138 fwy. from Rte. 5 to 2.1 mi. east of 5 | 0.6 mi. no. of Rte. 138 near Gorman to Cuddy Creek Bridge in Kern County. |
| 3.5 miles | Rte. 5—7.4 miles<br>Rte. 138—2.1 miles | 3.8 miles |
| Rugged mountains with cuts and fills up to 300' | Mountains and high meadow | Top of ridge |
| None | Hungry Valley Road Rte. 138 and Quail Lake Rd. | 3 bridges |
| $5,400,000 in '65–66<br>$3,200,000 in '66–67 | $9,400,000<br>1965–66 | $5,900,000<br>1965–66 |
| *1st stage:* grading and structures for new alignment with 3000' radius curves and grades not exceeding 3.6%. | 8-lane freeway on present alignment; utilizing portions of existing ppc pavement; stage construction will maintain 2 lanes traffic in each direction. Route 138 is 1st leg of Metropolitan bypass. Inside the interchange, 175 acres will be developed for commercial purposes. | 8-lane freeway with 22' median and 2600' maximum radius curves. Massive detour provisions during construction. San Andreas fault requires lowering grades at summit by 50'. |
| Under constr. | | Under constr. |
| | Planned to open by end of 1967 | Late 1966 opening. |
| Hank Harvey | Charles Strand | Rolland Marino |
| John Muhich | | Bob Innis |



*Scenic Piru Gorge showing the existing route and, to the right, the projected new route for Interstate 5.*



*Looking north from Liebre Gulch along the existing Ridge Route with the projected new route indicated by the broken line (upper right).*

route for overhead transmission lines, natural gas lines, and oil lines. Numerous utility relocations along the route are necessary because of the new freeway location.

In Angeles National Forest, utility relocation design solutions and construction activities were subject both to the state's encroachment policies and to the Forest Service Special Use Permit procedures. Utility relocation is a major right-of-way expense, amounting to $4.5 million and involving 60 separate agreements with no less than 10 individual utility companies.

**AVERAGE DAILY TRAFFIC ON INTERSTATE 5**

| *In 1964* | *Location* | *Predicted for 1985* |
|---|---|---|
| 24,000 | Weldon Canyon Summit | 90,000 |
| 20,000 | Castaic Junction | 60,000 |
| 15,000 | Tejon Summit | 60,000 |

The United States Forest Service cooperated fully in negotiating for freeway right-of-way through the Angeles National Forest. A normal right-of-way width of 800 feet was required, and widths up to one-half mile are necessary to contain the largest cut and fill sections. Concern was expressed by the forest service in regard to fire prevention, erosion control, and aesthetics as pertaining to protection of natural ground cover. Therefore, an extensive fire prevention plan has been included in the planned appropriation for freeway right-of-way. Erosion control measures include obliterating all construction and service roads after construction (unless required for fire protection purposes), extensive seeding and straw placement on new embankment slopes, and massive dissipators at drainage outlets to return the accelerated flow to natural stream velocity.

#### Location and Design

The planning studies for routing the Interstate 5 Freeway were conducted in two parts: from the north city limits of Los Angeles to Parker Road near the community of Castaic, and from Parker Road to the Kern county line. These studies were preceded by

earlier ones on locations through the mountains and over the Tejon Summit.

Three possible alternate crossings of the summit were chosen in addition to the one now being reconstructed. All crossings were planned with stress on the importance of reducing the old 6 percent grades in order that user costs could be reduced. Originally included was a study of a 9,600-foot-long tunnel with 3-percent maximum grades. The latter proposal was found impractical from an economic standpoint.

The proposal to lower the summit elevation near the existing expressway alignment was discussed at a public hearing in Gorman in June 1961, covering the stretch of highway between 9.5 miles south of Gorman and the Kern county line. The remaining length, to Parker Road, was the subject of two public hearings in Castaic in January 1962 and March 1964. Relocation around the federal power withdrawal areas in Piru Creek was discussed along with the possibility of using the existing expressway for northbound traffic and building a new roadway for southbound traffic to the east, at what is commonly known as the Five-mile Grade, just north of the community of Castaic.

The results of studies between the north city limits of Los Angeles and Parker Road were discussed at a public hearing in Castaic in 1957. The selection was predominantly a reconstruction of the existing expressway, with minor relocations planned between Saugus and Castaic Junctions.

#### Design

For design purposes the route has been segmented into 12 major projects. (See map and "Ridge Route at a Glance").

These projects include the construction of two major freeway-to-freeway interchanges (between Route 5 and Route 126 near Castaic Junction; and Route 5 and Route 138 south of Gorman), as well as 13 local interchanges.

Alignment and profile standards necessitated numerous large cut and embankment sections with the attendant excavation of 50 million cubic yards of material for the 12-mile relocation through the National Forest.

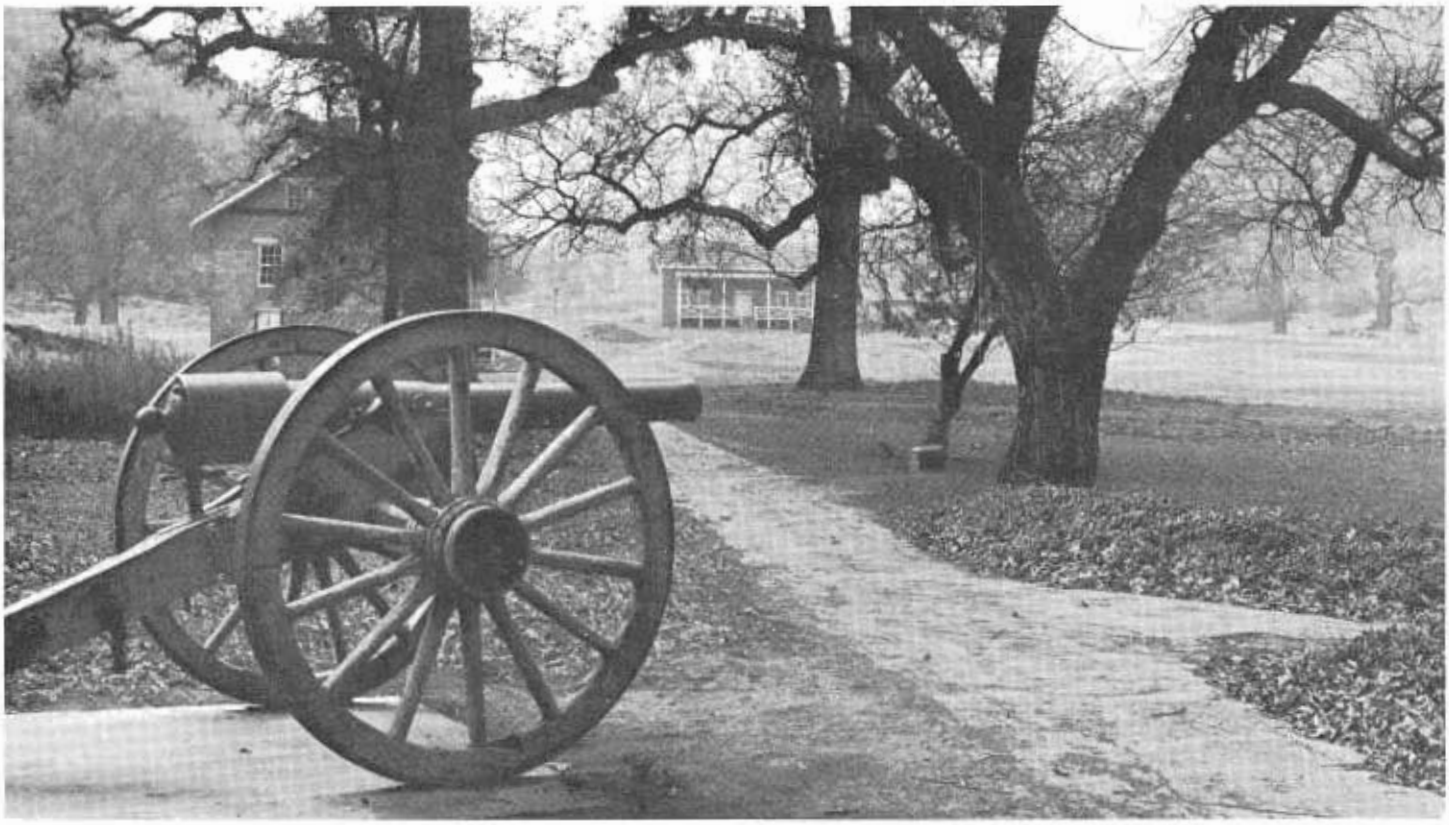
#### Roadside Rests

Portions of Interstate 5 Freeway are included in the State Scenic Highway System, and special provisions for travelers are included in the design. On the section between the Route 14 Interchange and Lyons Avenue, a safety roadside rest is planned for Los Angeles-bound traffic. This rest area, will include parking spaces for both automobiles and trucks, with picnic and comfort facilities, and will also afford visitors a convenient opportunity to consult their road maps before entering the Los Angeles metropolitan area.

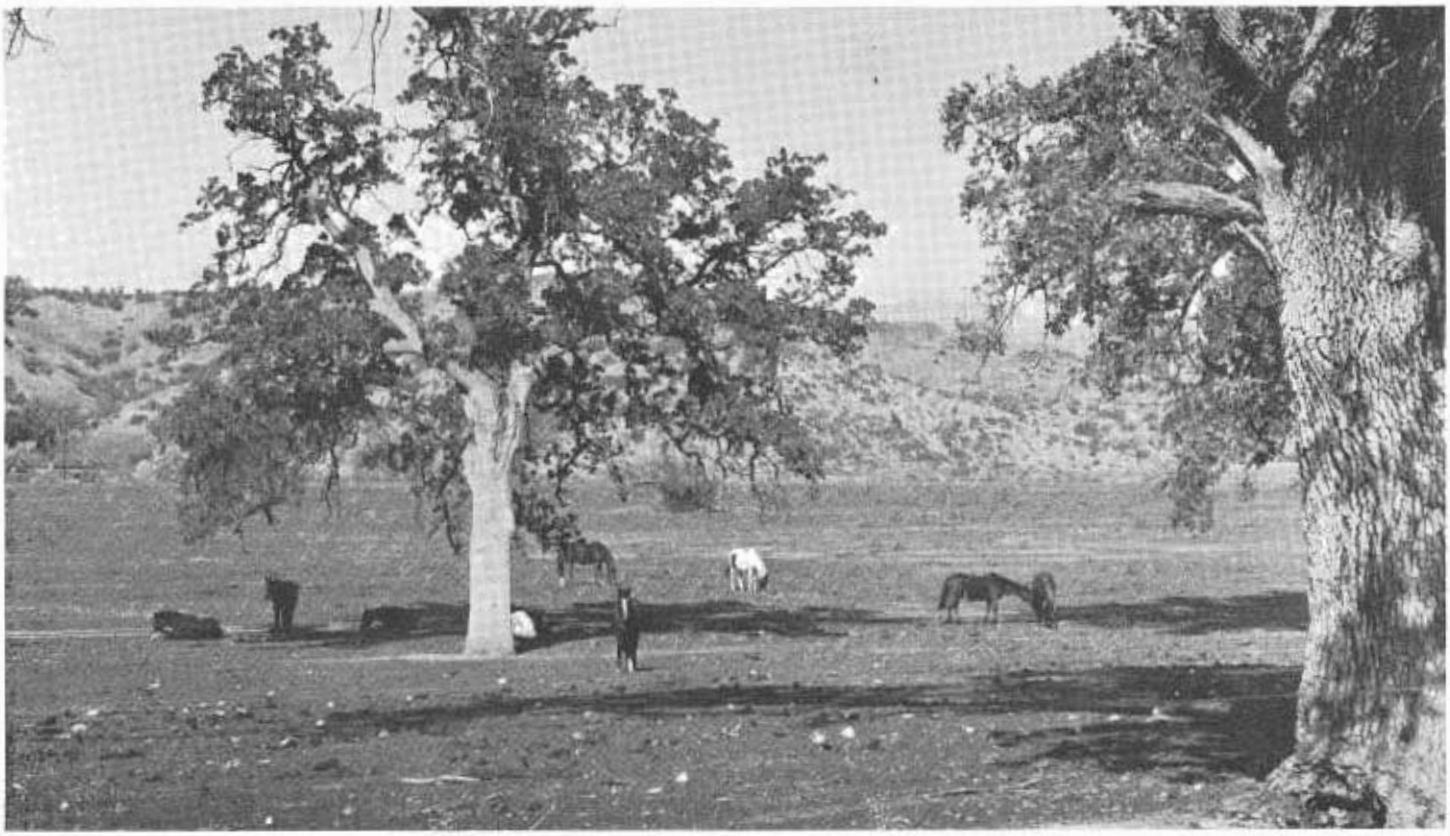
#### Drainage

Drainage has been a major consideration in design. A problem immediately south of the community of Castaic has been recurrent flooding of frontage road and expressway roadways due to large volumes of sand washed down from hills immediately west of the proposed freeway location. Culverts have periodically become plugged because of transported sediment deposits at and above their entrances as well as poor outlet conditions. New construction proposes three debris basins at the most troublesome canyons for storage of material carried by the waters. Passage of the clear flow through enlarged freeway culverts should alleviate this problem.

*The existing Ridge Route looking north from Paradise Ranch with the projected relocation shown by the broken line (upper right).*



*Silent cannons sleep under spreading shade trees at old Fort Tejon. Once a military post, the fort is now a State Historical Park and one of the most colorful landmarks along the Ridge Route.*



*Rolling horse and cattle country north of Castaic still has not felt the urban push but the land these horses graze on may soon be too valuable to keep them there. The view is west toward the present highway.*

*The Ralphs' ranch house today overlooks massive construction activity on the new Interstate 5 Freeway. Mrs. Mary Ralphs stands in the front yard.*

Extremely high cuts and fills in the National Forest area required special design at seven locations, including six reinforced concrete arches and one multibarreled structural plate pipe. These seven locations were the subject of an extensive material foundation investigation which resulted in recommendations for bedding, profile grade and alignment which would minimize differential settlement for the concrete arches. In all, some 69.1 million cubic yards of earth will be moved in constructing these 45 miles of freeway. *This is 27 percent more than the figure of 54.2 million cubic yards moved to construct the Aswan Dam.*

The multibarreled structural plate pipe mentioned above is located in Apple Canyon. This installation was considered the only feasible solution to offset the extreme differential settlement expected. The 140-foot fill requires specially fabricated heavy plates. Instrumentation at this culvert is contemplated in order to measure settlement and embankment pressures, to verify design theory in practice.

### Trucks

Included in the highway design were provisions reflecting the heavy volume of trucking which the route will carry, not only weighing stations which will be operated by the California Highway Patrol, but also areas where truck drivers can conveniently check their loads and their brakes and other equipment at the top of long downhill grades.

The southbound weigh station will be located within the interchange area with Route 405 (San Diego Freeway) near San Fernando. The northbound one, combined with an inspection area, was recently constructed between Saugus and Castaic Junction.

One of the inspection areas for truck drivers will be constructed north of Castaic at Whitaker Summit, in advance of the five-mile southbound 4 percent downgrade. At Holland Summit, north of Gorman, grading will include provision for a future roadside rest complete with truck inspection facilities. An area for load and brake inspection was provided earlier in advance of the Grapevine Grade in Kern County.

### Summary

Designing an 8-lane Interstate freeway to serve the country once crossed in four back-breaking days by horse and wagon has involved cooperation with all the usual public and private agencies, plus the State Department of Water Resources and the Forest Service. Planners have been presented with geological challenges by its highly differentiated landscape and its proximity to the San Andreas Fault. And, the construction phase has been approached under the pressure of a constantly mounting volume of traffic, both commercial and private.

The first 50 years on the Ridge Route were the hardest. Now, as the second half-century is entered, obscure places with picturesque names like Violin Saddle, Grasshopper Canyon, and Hungry Valley, will soon become familiar and highly accessible locations.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# "a renaissance in engineering"

*creating space age highways*

*California Highways and Public Works*
*September–October 1965*

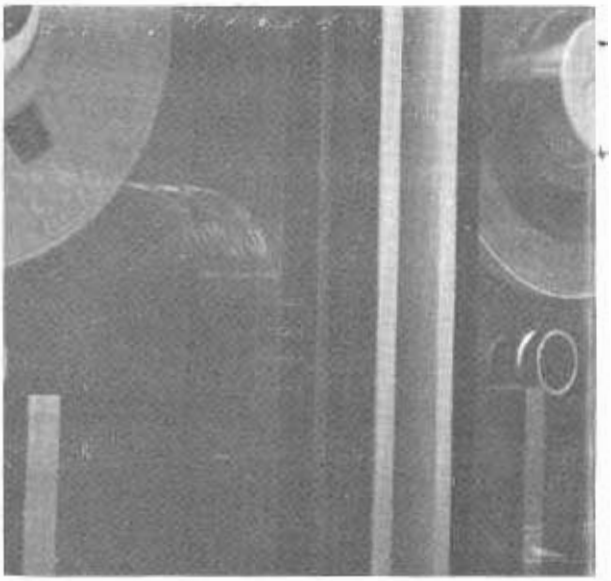
One expert recently said that highway engineers have as much need for modern computers as those working in the space industry. In California, where the Division of Highways has been using data-processing equipment since before World War II, this is becoming more apparent each year.

Back in 1957 when there was some concern regarding a shortage of engineers, Harmer E. Davis, Director of the Institute of Transportation and Traffic Engineering of the University of California, pointed out that the day of the computer had arrived, and observed: "You might say that we are now in a position to do for the drudgery of highway engineering what power equipment has done for the hand labor of highway construction. As one speaker remarked, these technological improvements 'can make the engineer the master of his tools rather than the slave of his calculations' . . . Here is a renaissance in engineering."

**renaissance grows**

Today, some eight years later, this "renaissance" is stronger than ever. The machines are doing most of the routine tasks in accounting, and compiling great masses of traffic data. They can compute earthwork quantities, vertical alignment, route distances, areas, "traverses," and even draw cross-sections of roadways at any point specified. The engineers, freed of these detailed chores, are now able to devote their time to broader aspects of engineering.

In the fields of urban planning, for instance, complex studies such as the "LARTS," or Los Angeles Region Transportation Study, would be literally impossible without computers to do the incredible number of detailed computations required. This study, a continuing one involving 5 counties and 122 cities, seeks to analyze the movements of nearly 8,000,000 people who live



in 568,000 apartments and more than two million houses spread over 5,776,000 acres. They own 3,437,000 automobiles and require the services of 409,000 trucks to keep them fed, sheltered, and happy.

With 5½ million slots into which to drop information, organizing and computing the totals would require thousands of employees, a huge building or series of buildings, and months or possibly years of work. With computers which occupy a few hundred square feet of floor space, the information can be transferred to punched cards and fed into the tiny magnetized-iron, doughnut-shaped coils of the memory banks. When the study is complete, it will return the information in a few hours, all neatly organized in any arrangement which has been directed.

**trip analysis**

In this case the computers reported private vehicles in the study area make 12,342,000 trips, and the 409,000 trucks make 1,803,000 trips, for a total of 84,541,000 vehicle-miles each day. The computers further indicated which were shopping trips, work trips, and "other." Also shown was average vehicle occupancy, which varies with the type of trip. Work trips have the lowest average occupancy—1.2; while understandably, recreation trips are highest.

From the data which have been stored in them, the machines can provide all sorts of additional information for special charts and studies; such as median age, median income, population density, and distribution of commercial and residential units. Without computers each set of statistics such as this would require a laborious file search on the part of hundreds of workers. The machines can furnish it in a few hours by drawing it in prearranged order from their memory banks.

When all these figures are in, a "model" can then be constructed. From this many other figures can be interpolated such as 20-year predictions on land use, population density, cars owned per family, and other information vital in the study of highway networks.

**rapid transit too**

Future estimates will consider not only vehicular trips, but also take into account possible diversion of trips into rapid transit systems. In other words the computers will analyze the changes in "people movements" in the future should new modes of travel become available and popular.


*in at night . . .*
*out the next morning.*

The machines have for some time proved of great value in the field of right-of-way engineering calculations. Only a decade ago this portion of highway planning was a precise but time-consuming operation which kept dozens of young engineers occupied in each district, not only computing the areas involved, but also checking on each other's calculations.

A "traverse" or trigonometric computation of boundaries enclosing an area of land, when done by a human mathematician, and checked by another, may take anywhere from one to several hours; the computer does it in a few seconds, and so accurately no checking is needed. The only vertification needed is a recheck on the data supplied the machine.

**deeds and condemnations**

Last year the Right of Way engineering staff used traverses to prepare 9,000 deeds, 9,000 appraisal maps, 4,500 condemnation descriptions, 1,000 descriptions of abandonment and relinquishment maps, and 1,800 director's deeds.

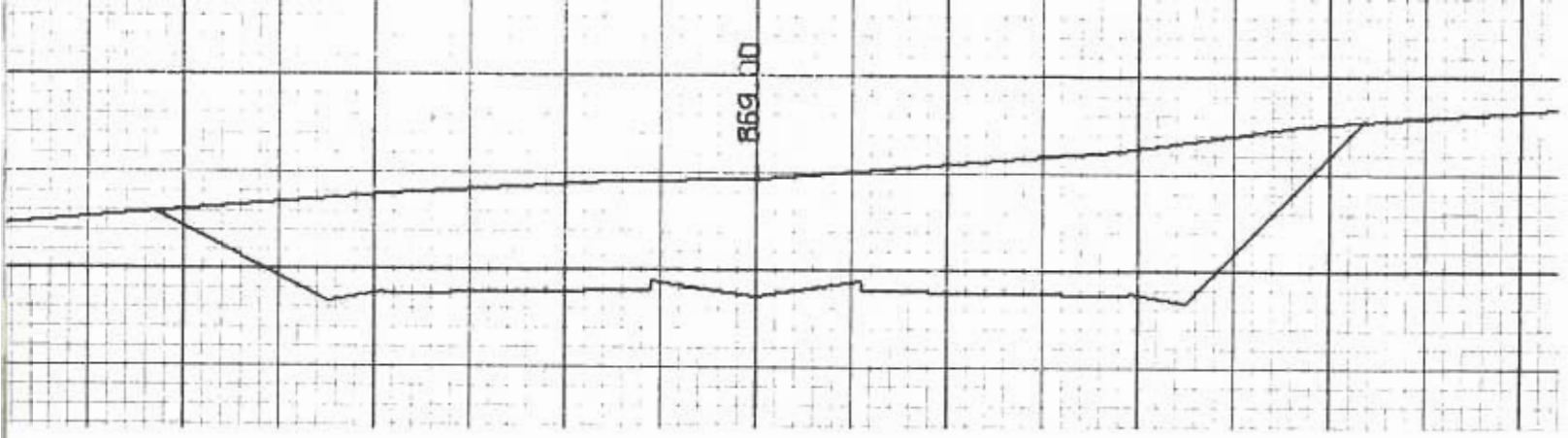
In modern bridge engineering, computers are used in many ways. Traverse computations have many applications in design of structures, as do the complicated mathematics involved in vertical alignments. There are many special programs—test, experimental, and unique problems—which require special machine setups outside the routine approach.

Obviously, structural analysis in general offers a multitude of opportunities for using the machines to do the repetitive and lengthy calculations involved. A prestressed concrete girder understandably takes its load in a different manner to that taken by a steel beam. A steel beam which is physically joined to a concrete deck above becomes a composite beam which has different characteristics again. All of these structural elements have "moments," or tendencies to bend, which are distinct from the others in quality but not in direction, since all are subject to compression, twisting, and tension.

These forces and moments have been measured and calculated for most known substances, so that their determination is a function of their volume or thickness or depth or length or other limiting factor. Since moment varies at every point between the center and ends of a span, the calculation of the correct size of a given material to carry a required load is a detailed, time-consuming problem. Today, computers do problems of this sort with ease and infinitely faster than a man can do them.

**stresses, loading, settlement**

Important calculations such as frame analysis, to examine structural behavior




under many different loading conditions, can be computed in a matter of seconds. Problems regarding influence lines, tunnel and arch stresses, force and concrete strength of prestressed girders have been programed for computer solution. From the data furnished by the machines, engineers can estimate total settlement of bridge approach fills or compute volumes of excavation for bridge abutments and piers.

Traverses are used in the horizontal layout of a structure, and one structure may require hundreds of such calculations. The length of the straight girders needed to carry a curved roadway is one example. This is even more complicated when the curved structure is "skewed." All sorts of traverse problems are involved in the location of points for various construction purposes which relate to each other.

Computers also are becoming increasingly important in all phases of highway design. The omnipresent traverse is again a constant problem, including many with three or more courses, or sides, with at least two unknowns. These calculations were once the province of young engineers who had to work them out, but the headquarters office machines handle them now for all the districts. Service is about the same as for modern film developing. When the requests come in at night, they go out the next morning.

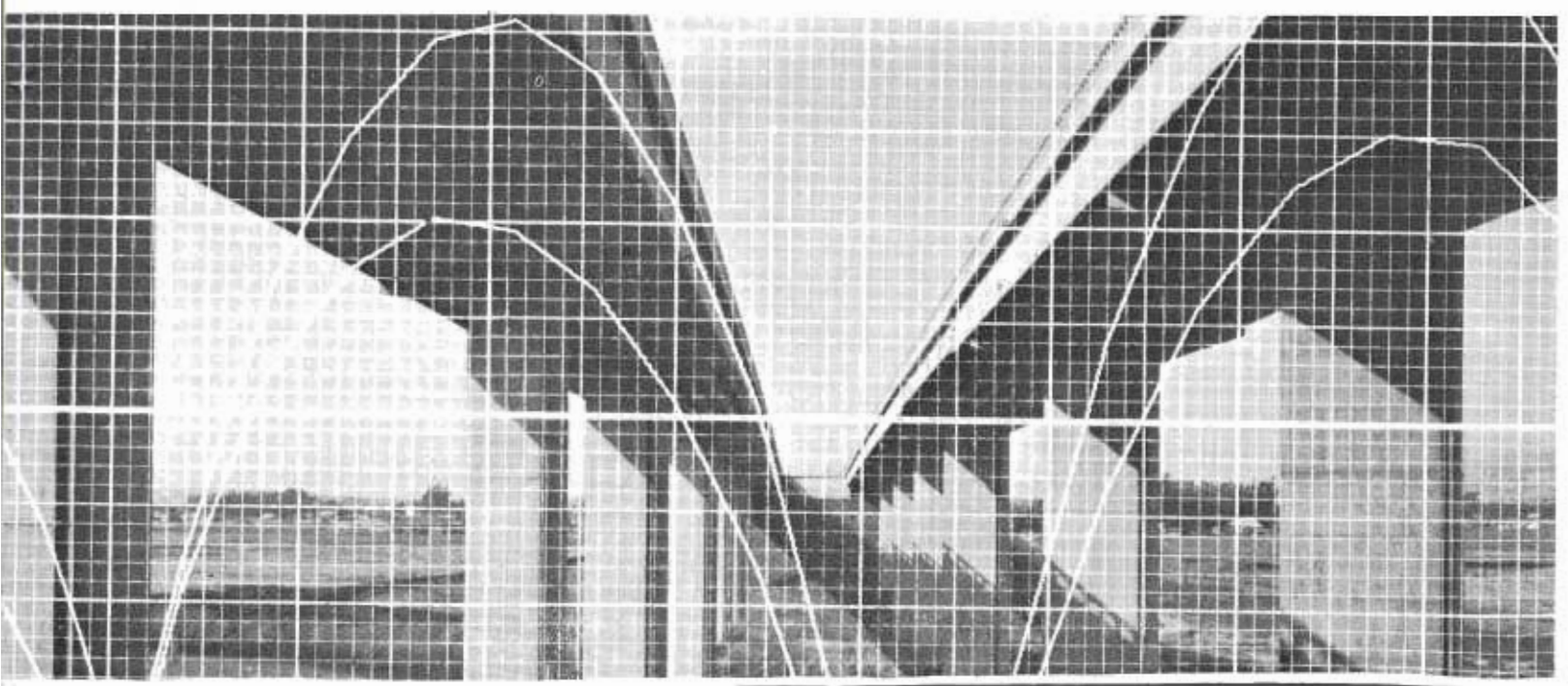
In the design of cut and fill sections for highways, there has always been a great amount of time-consuming computation involved in the development of cross-section plots, planimetering cross-sections, areas, and the calculation of quantities. Until a few years ago, this work was done by engineering personnel. Today the computer completes a cross-section in a few seconds.

### man-hour savings

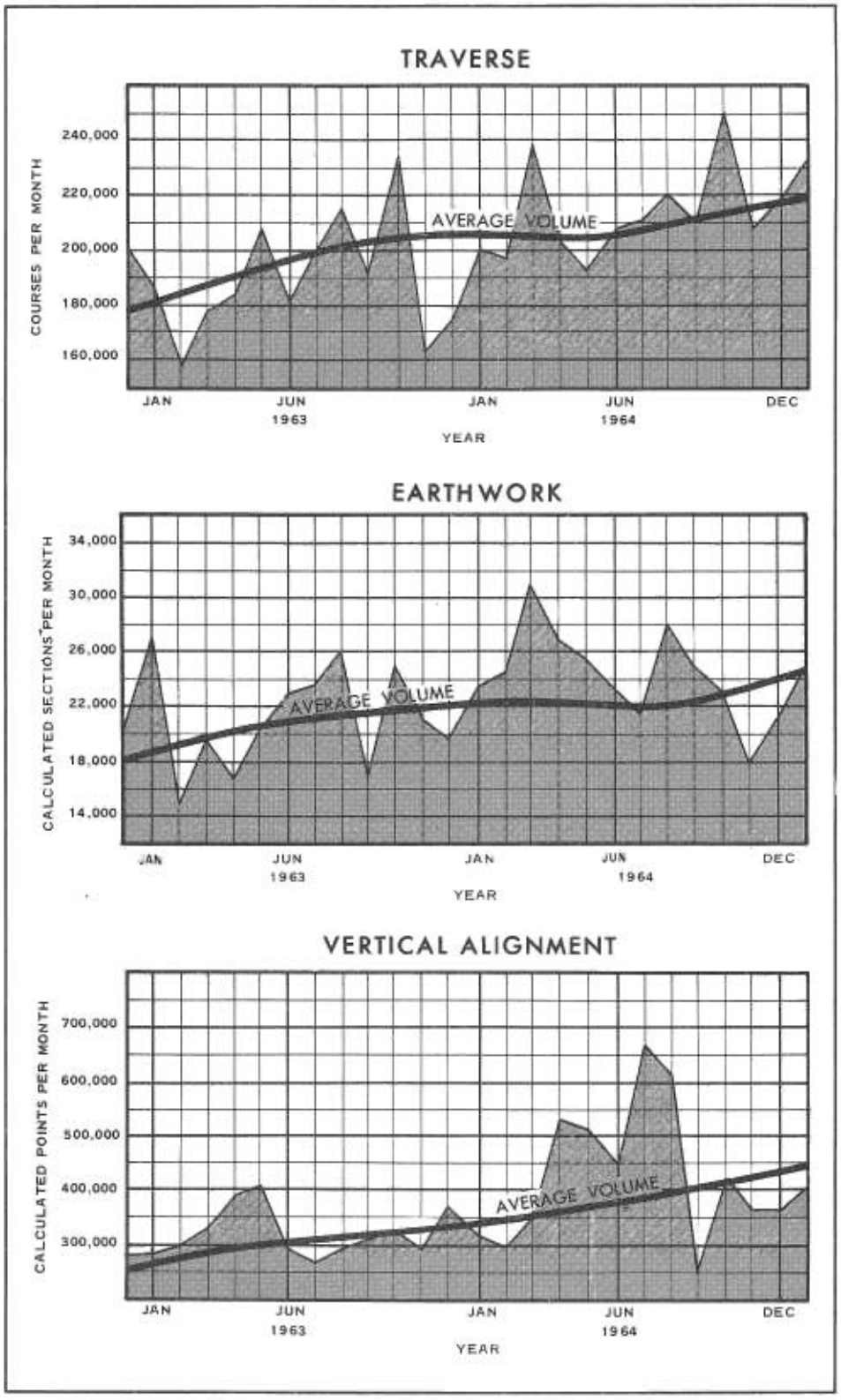
The traverse program is very popular. Usage varies greatly from month to month, but more than 210,000 traverse courses are computed monthly at an estimated saving of three man-minutes per course, resulting in savings in the neighborhood of 10,000 man-hours monthly.

In 1964, a study which compared certain freeway traffic routing procedures showed the cost of manual routing was $3,500 and mechanical routing $1,044, a saving of nearly $2,500 per assignment. Of particular importance was the reduction of mapping and coding time—74 man-days reduced to 18.

A major advantage of the mechanical routing procedure is that the rout-



*The artistry of the computers is shown by this machine drawn earthwork cross-section.*



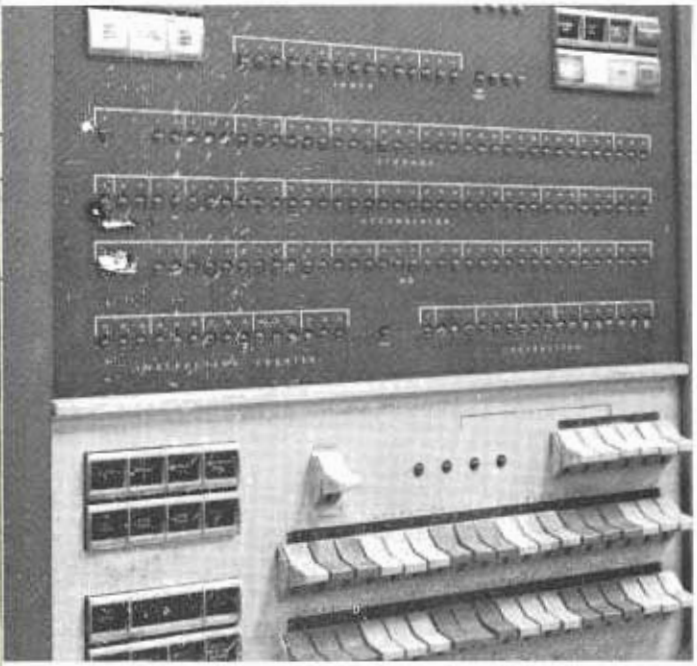

ings are consistent. In manual routing, where usually more than one person is doing the work, inconsistencies naturally can occur.

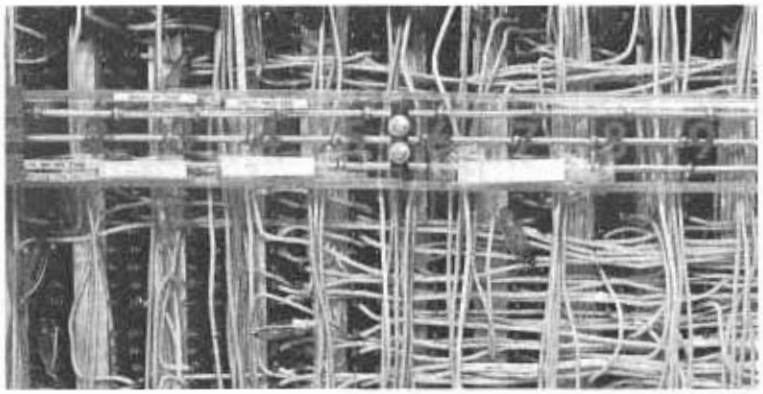
**new accident analysis**

Accident information has been collected and studied for years, and any suspicious clumping of accidents on a specific section of road is immediately investigated. A new and more sophisticated accident analysis is being developed in a special project now under way at headquarters. Statistics on the 120,000 accidents now occurring in California annually are being fed into the computers to get information on a statewide basis in many categories. Tabulations are being made available which will aid in the identification, priority rating, and analyses of accident problem locations.

In the early thirties, before the computer age, the Highway Planning Survey Department (now the Urban Planning Department) was using machines to process statistical data in punched cards. In addition to research projects, machine tabulating methods were used to assemble traffic data, such as origin and destination statistics, into meaningful reports. Gradually, the division turned from handling a relatively small amount of statistical and traffic data,

*Diagram superimposed on photo is one drawn by machine showing maximum positive and negative moments.*





## *new tools . . . to meet new needs.*

to more ambitious demands for processing great volumes of data through complex and high-speed calculation.

Between 1954 and 1957, the division acquired two IBM 604 calculators and then two IBM 650 computers. The designed capabilities of these machines provided the means to create a system which solved such engineering problems as traverse calculation and earthwork quantities.

### machine orientation grows

Thus, by 1961, when the second generation computers were available, the Highway Planning Survey Department was well established as a machine oriented installation. By this time also, the machines had taken over many accounting calculations.

Since 1961, the division has acquired two IBM 1401 computer systems, an IBM 704 computer system, and IBM 1460 computer system. These computers not only handle such routine matters as statistical, accounting, and management reports but assume a much larger role in traffic assignments and improved engineering calculations.

In the latter part of 1962, the consulting firm of Price, Waterhouse & Company was retained to analyze the division's organization and systems and to make recommendations which would optimize the efficiency of the division through electronic data processing. The accounting system of the Division of Highways was assigned top priority in this study. The consulting firm was directed to study the accounting system, data transmission, management reports, EDP organizational structure, new EDP applications, and recommend an overall electronic data-processing system.

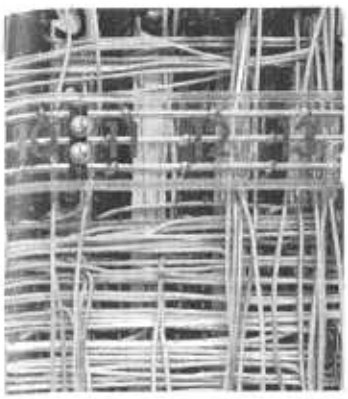
After a comprehensive study, Price Waterhouse provided detailed reports in 1963 which not only proposed use of EDP facilities for preparing current concise reports of cost and physical status, but also proposed an organization reappraisal by pointing out that a data processing department is a general service department which must meet the needs of a wide range of operating units.

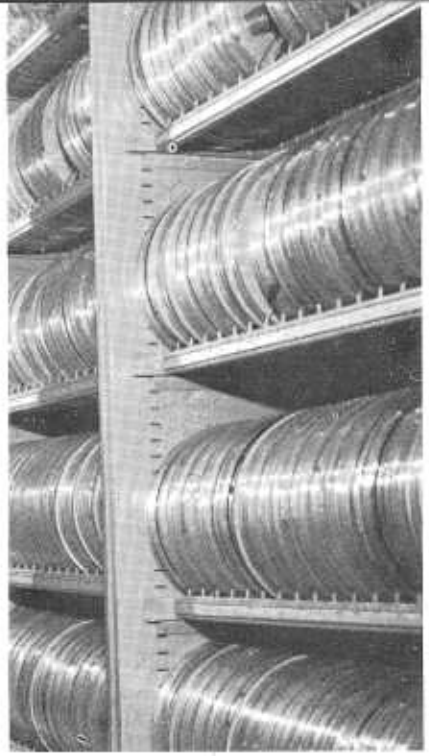
### computer department

As a result of these recommendations, the Computer Systems Department was established in 1964. It is administered by a principal highway engineer, who reports to the Deputy State Highway Engineer, Administration.

Included in the department is an Advance Planning and Research Unit composed of engineers and statisticians with electronic data-processing experience who review and evaluate the procedures of the division to see how these procedures can be helped by the use of computing equipment. This unit develops new computer uses in the fields of highway engineering and management which would result in time and money savings in the division's operations. Essentially, this type of work is systems analysis, which includes defining the problem, reviewing and analysing existing practices, developing and testing new procedures, and instructing and training personnel to put the procedures into effect.

The computer industry has made giant steps forward in machine design and capacity. Generally speaking, computers today fall into categories of first, second, or third generation depending on whether their internal components are tubes, transistors, or microcircuitry. Simply stated, micro-






circuitry means miniature electronic circuits. These latest machines are capable of far greater speed than the computers we now possess.

Realizing the increased potential of this contemporary equipment, the Computer Systems Department has just completed studies looking toward the division's acquisition of a third generation computer.

**for the future?**

The impact upon our data processing systems by third generation computers cannot be foreseen or defined, but it is bound to be significant. Certainly a greater degree of automation will be possible which will mean faster service to the user at cheaper cost. Most challenging, however, is the prospect of more sophisticated applications because of such features and increased capacity and overall capabilities.

One important innovation, called time sharing or multiprograming, would allow each highway district to submit problems directly to the computer and receive solutions back in a short span of time via a district data-processing section. Equipment already developed would make it possible to equip each district console with a cathode ray tube repeater hooked into the main system in Sacramento. Whatever the operator types on the console shows in the tube, and he can check his work before releasing it into the system. On the simpler questions he can have a reply virtually instantaneously.

Equipment also available could provide the means for telemetering traffic data from all highways and freeways into a computer. The I.B.M. Corporation currently has a research project underway in San Jose to collect information on this type of use. Loops buried in the pavement count the traffic and speed of the traffic, and control the traffic lights.

**electronic traffic police?**

This type of control was not possible with the older type computers used in traffic control, for they could not differentiate speeds. If traffic jammed and began to move very slowly, the machine thought things were going fine, because it was only getting a few signals per period. Digital computers recognize traffic slowdowns and can be coded to take action. It is possible that in the not too distant future such machines will control freeway traffic, closing and opening ramps, and establishing speed control.

The new equipment should also give much more accurate and detailed traffic counting. Machines cannot only be used to count traffic and analyze its speed, but it is possible to hook up any number of counters to a central control via telephone wires. At desired intervals, and varying for each station if it is of value, the control station can "telephone" the counter on a conventional phone number and ask it for its count since the last call. Intervals can be as short as five minutes or less.

These are a few of the applications of modern electronic data processing to major highway problems, and a hint of some of the things to come. New applications are being discovered daily. In an industry which has gone from the marvel of the vacuum tube computer of a generation ago, to the miracle of today's microcircuit machines, infinitely more compact and infinitely more versatile, any attempts at specific long-range prophecy would be naïve.

# I-8 East of El Cajon

By F. H. KREFT, Resident Engineer


San Diego is now the third largest city in California with a population of 641,000. There is an additional 600,000 population in the adjacent communities.

This rapidly expanding metropolitan area is located in the extreme southwest corner of the state. This location contributes to land transportation problems, as traffic is limited on the west by the Pacific Ocean and on the south by the International border. The greatest number of commodities and people are transported upon highways to the north and to the east.

The major arterial highway to the east is Interstate 8—an important part of the interstate highway system. This highway traverses San Diego and Imperial Counties, a distance of 180 miles before reaching the Arizona line at Yuma.

This route provides access to a seaport for the Imperial Valley, one of the largest agriculture producing centers in the nation. Construction on this route is complicated by mountains, deserts and vast distances.

By 1972 it is expected that this arterial will be completed through these two counties at an approximate cost of 200 million dollars.

*Looking west on Interstate 8 towards El Cajon showing the connection with Business 80. In the foreground is the Greenfield Drive interchange and Broadway undercrossing.*

#### Eleven Jobs Completed

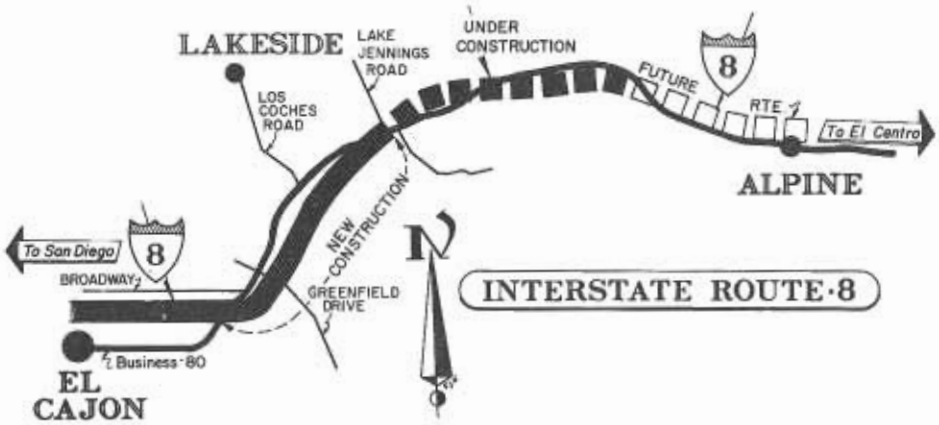
Previous years saw the completion of 11 construction contracts on Interstate 8, providing an unbroken 17 miles of freeway from its western terminus at Interstate 5 (US 101) in the Old Town area of San Diego to the eastern edge of the City of El Cajon at a total cost of 30 million dollars (see the 1961 September-October issue of *California Highways and Public Works*).

This year has seen the completion of another four-mile segment of this freeway easterly to Lake Jennings Road. This section provides a direct route in and out of El Cajon with a saving of time and distance. It features the elimination of both the "Tunnel Hill" grade and the traffic bottleneck at Greenfield Drive.

Work began on this segment in December 1963 with the award of a contract to the Daley Corporation. Work was completed in July 1965 at a cost of $3,446,265. The contract was designed and constructed for ultimate eight-lane development. However, only four lanes were paved at this time.

#### Excavation Furnishes Subbase

Roadway embankment and aggregate subbase for the contract were




*A four-mile section of freeway west of Lake Jennings Road was completed in July. The section east of the road is now under construction.*

obtained from roadway excavation; 1,590,000 cubic yards of roadway excavation were required. Considerable amounts of this excavation could be moved with conventional rubber-tired earthmovers, more than one-third of the excavation was rock and required drilling and shooting. The rock work was so extensive that more than a year was required to complete the roadway excavation.

Most of the excavation could be hauled without interference to the traveling public. The small portion that was hauled across existing Highway 80 required considerable traffic safety precautions to protect the motorists. Two flagmen were stationed at the crossing and they were equipped with two hand-operated, battery-powered eight-inch stoplights. Crossing was limited to weekdays between 8 a.m. and 4 p.m. to further eliminate inconvenience.

The largest percentage of the rock excavation came from the "Tunnel Hill" cut. This cut was over 120 feet in height and featured 1:1 cut slopes with a 20-foot-wide bench 50 feet above the shoulder. The cut slope above the bench on the south side of the highway was not stable and required laying back to a slope of 1½:1.

#### Tunnel Hill Problem

"Tunnel Hill" had previously been a problem to the motoring public. The steep grades and narrow width of the existing Highway 80 over this hill had become a major traffic bottleneck. Elimination of this grade and the intersection at Greenfield Drive is responsible for a time saving of approximately 5 minutes for trucks traveling Interstate 8.

Construction of the drainage facilities and bridges was performed simultaneously with the roadway excavation. Seven reinforced concrete box culverts were required, including one 444 feet long across Los Coches Creek. Three "tee" girder bridges were built on the contract. Two bridges simply span cross streets at Broadway and Los Coches Road. The bridge at Greenfield Drive was part of a full-diamond interchange. Embankment construction at the Los Coches Road Undercrossing provides for future development of a diamond interchange when traffic warrants.

Superintendent for the Daley Corporation on the contract was Robert Cadwell and project manager was Harry Muns. The writer was resident engineer for the Division of Highways. Glen Carver was the Bridge Department representative.

Two projects are presently under contract to the east of Lake Jennings Road. Upon their completion in 1966 another six miles of Interstate 8 will be improved to freeway standards.

*Looking west on Interstate 8 toward the Los Coches Road undercrossing with adjacent grading for a future interchange. Beyond is the Tunnel Hill cut.*

# Statistical Specifications?

*Analysis Phase of Quality Control Study Raises Many Questions*

By JOHN L. BEATON,* Materials and Research Engineer

During the past year, California has cooperated with the U.S. Bureau of Public Roads in their regional workshop study of quality control. The purpose of this study is to make a statistical analysis of highway materials control tests and to develop statistical specifications for control of construction. Several states are involved in this study.

When we started our program, we came to the conclusion that it was really a two-part study. The first part consists of statistical surveys of specific construction items. This part would require planning, time, and staff, but would not present any great difficulties.

The second part, the preparation and evaluation of statistical specifications, we felt would be a more complicated subject. This would require a long, serious look at the data collected in these surveys and a close study of present practices. It would also lead us into an area where we have limited experience and so must move forward slowly and only as experience is gained.

### Items Included

The construction items included in our survey are as shown below:

| Construction Items | Tests |
|---|---|
| 1. Roadway Embankment | a. Relative Compaction Test |
| 2. Untreated Base Material | a. Sieve Analysis<br>b. Sand Equivalent<br>c. R-value |
| 3. Subbase Material | a. Sieve Analysis<br>b. Sand Equivalent<br>c. R-value |
| 4. Cement Treated Base | a. Determination of Cement Content |
| 5. Structural Concrete Aggregate | a. Sieve Analysis<br>b. Sand Equivalent<br>c. Cleanness |
| 6. Plastic Concrete | a. Slump of PCC (Kelly Ball Method) |

* Condensed from a paper delivered before the Conference on Research and Development of Quality Control and Acceptance Specifications for Materials and Construction using Advanced Technology, Bureau of Public Roads, Washington, D.C., April 5–7, 1965.

*Norman Schmautz of the Bridge Department prepares concrete aggregate samples for shipment to the District Laboratory. Samples shown represent approximately 1,200 tons of aggregate.*

In addition to the samples taken in the field, we are also analyzing certain laboratory data we have on file for the following items:

| Construction Items | Tests |
|---|---|
| 7. Portland Cement | a. Expansion in Water and Contraction in Air (Mortar) Calif. Test Method No. 527 |
| 8. Corrugated Metal Pipe | a. Thickness of Galvanizing |
| 9. Paving Asphalt | a. Penetration Test |

The field sampling and testing involved in our program was carried out by the various districts and the Bridge Department. However, it was independent of and in addition to the normal job control. The items were not statistically analyzed until after the operating job personnel had indicated them to be acceptable. The men assigned to this work were all well experienced in construction materials sampling and testing. They were selected for their competency so as to

minimize variations due to sampling techniques.

#### Districts Allowed Freedom

Each district was allowed freedom in doing its portion of the study within, of course, the necessary experimental limits. Headquarters Laboratory provided the project engineers with four examples of random sampling and allowed them to choose the method which best fit the particular operation. These were: (1) random time, (2) random batch, (3) random location, or (4) random length along a windrow. A project coordinator from Headquarters Laboratory visited each job at least once and most jobs two or three times. He observed the sampling and testing procedures and talked directly with the people doing the work.

To date, we have completed all the field sampling and most of the testing. An IBM 704 computer program was written to analyze this data. The first item, earthwork embankment compaction study, is completed. Figures 1, 2, and 3, show the distribution curves obtained on the three jobs included in this study.

Project No. 1 (Figure 1) had relatively shallow fills of a homogeneous material placed over a valley floor. The materials and placement approached very nearly an ideal condition. Eight and one-half percent of the tests were below our specification of 90 percent relative compaction. In other words, we did as well on this project as reported for the AASHO Road Test. They had 8.8 percent below specifications. Our range on this job was from 87 to 98 with an average of 92.9 percent.

#### Second Project

Our second project (Figure 2) was constructed over rolling terrain with the earth being a mixture of clay and stream-rounded cobbles. It represents about an average variation in material and compaction control. Thirty seven percent of the area under the curve is below specifications; 49 percent of the tests shown on the histogram are below the established limit.

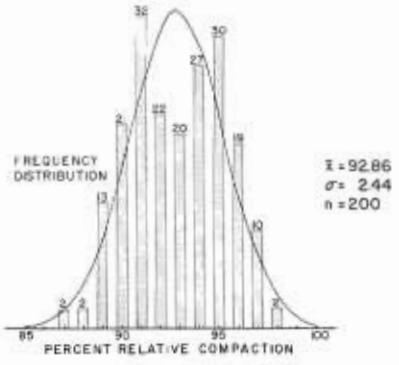



FIGURE 1

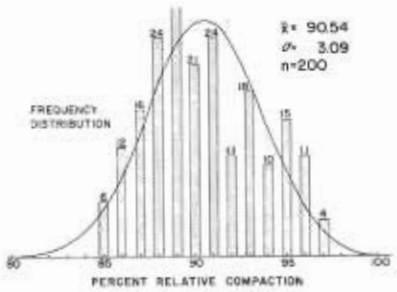



FIGURE 2

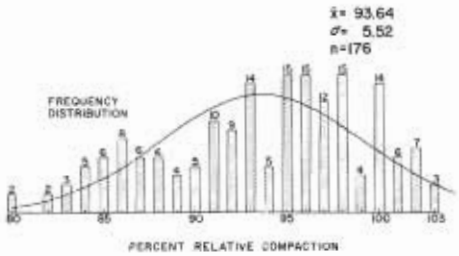



FIGURE 3

*ROADWAY EMBANKMENT STUDY GRAPHS: Project 1 (top) had relatively shallow fills of homogeneous material placed over a valley floor. The materials and placement approached very nearly an ideal condition. Project 2 (middle) was constructed over rolling terrain with the earth being a mixture of clay and stream-rounded pebbles. It represents about an average variation in material and compaction control. Project 3 (bottom) is located in rugged north coastal region of California in unstable, nonuniform and wet terrain.*

The range is from 85 to 97 with an average of 90.5 percent.

The third project (Figure 3) is located in the rugged north coastal region of California, and the terrain could be described in three words—unstable, nonuniform, and wet. It varies from sandstone to soft clays and approaches the maximum in difficulty and variation of placement and materials, 23 percent of the area under both the curve and the histogram was below specifications. The range is from 80 to 103 with an average of 93.7 percent. It is interesting to note that although this project had the greatest dispersion, the average was the highest of the three.

#### Observations Made

With the above three projects in mind, and remembering that these are all good jobs that fully comply with specifications, we can make the following two observations:

(1) Variability in compaction is a measurable quantity requiring recognition. The basic variability is in the material or process and would remain essentially unchanged regardless of the method of testing, be it nuclear, sand volume, water balloon or any other method;

(2) The change in variability from project to project even within one state, at least in California, can be very large. Any statistical specification which places restrictions on the use of engineering judgment must allow for these large differences in conditions. In other words, it may be necessary to have several statistical specifications, at least as far as its limits are concerned, even within one state.

As stated earlier, this study is divided into two phases; we are now approaching the second phase, and following are some of the questions that we are starting to discuss:

1. Will the use of statistical specifications significantly increase the cost of construction?
2. Since the specification would be based on the premise that the test results will be normally distributed, do we not have problems accepting or rejecting the first few lots? We certainly cannot wait until the fill

(or other item) is built before making a decision.

3. When a material has been rejected by the state, and reworked by the contractor, as is often the case when building earth embankments, how much reworking is required before we have a new universe from which to draw a sample? In other words, how would we know that we are not resampling the same or a slightly altered universe, thus increasing the risk to the state of accepting poor quality material? (See Figure 4.)
4. The entire area of rejecting material may require additional thought. The rules of rejection used today may not be applicable when using statistical specifications. Perhaps a different sampling plan or variation limits would be needed for material requiring reworking and blending.
5. The point in the construction process where sampling should be done may require greater definition for statistical specifications than for our present specifications; or perhaps we should be thinking about process control specifications performed under supervision by the supplier and contractor, with end point acceptance specifications by the state. If so, what happens when a completed item is rejected by end point specifications?
6. Since the number of test samples must be specified, does it not follow that some procedure must be established to assure that the testing process is in operational control? This might involve control charts or other records which will be needed for each field test involved. Should this be included in the specifications? We have to be sure that the testing precision assumed in the specification can be duplicated in the field.
7. Undoubtedly, many of the present AASHO and ASTM test methods will need to be updated to establish procedures for measuring the precision of a testing unit. And, of course, all such specifications will need to be adapted to the statistical approach.
8. A question arises as to what should be in a specification and what should be in a test method. In other words, should the limits be specified in the contract document with tolerances established in the test method? Also, in which of the documents should the sampling method be presented in greatest detail?

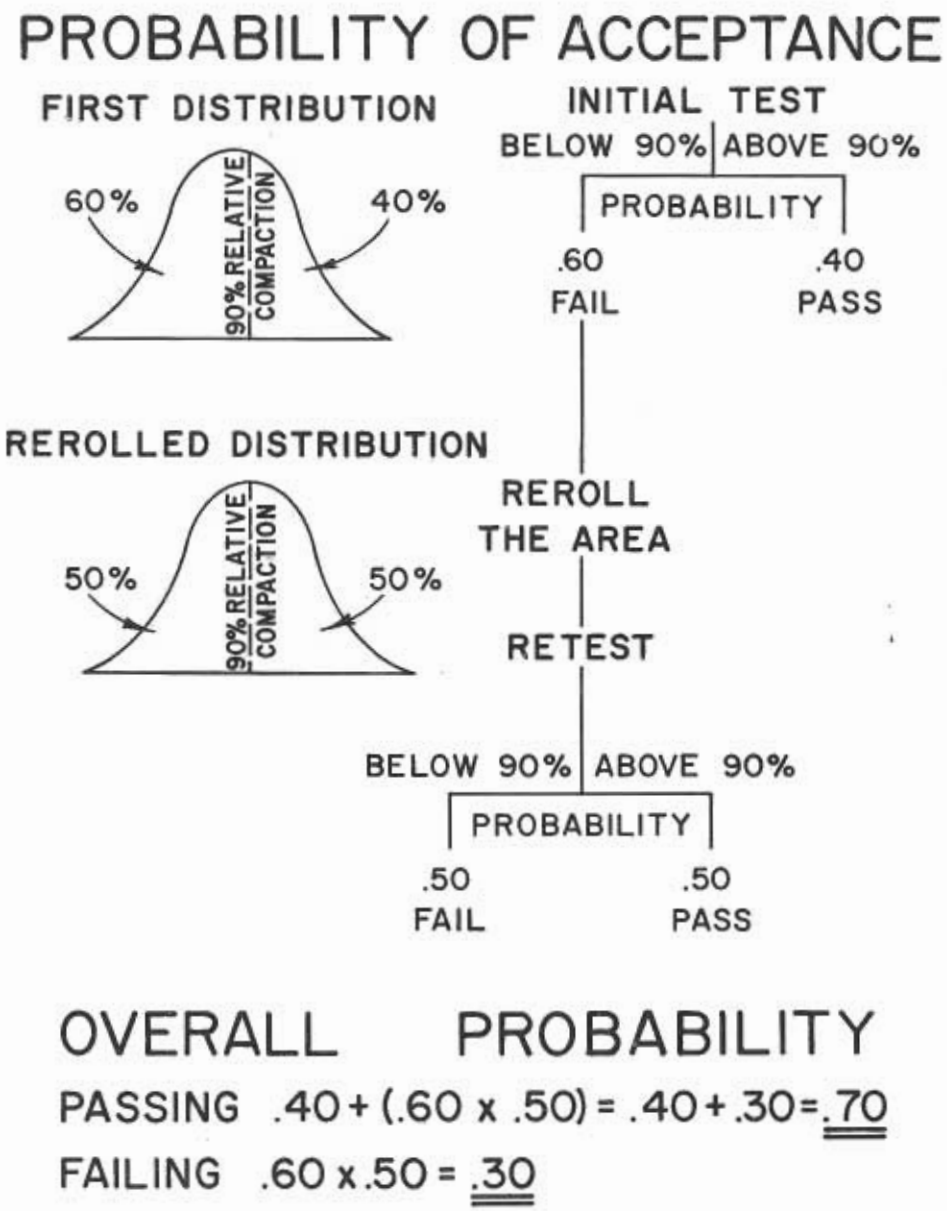
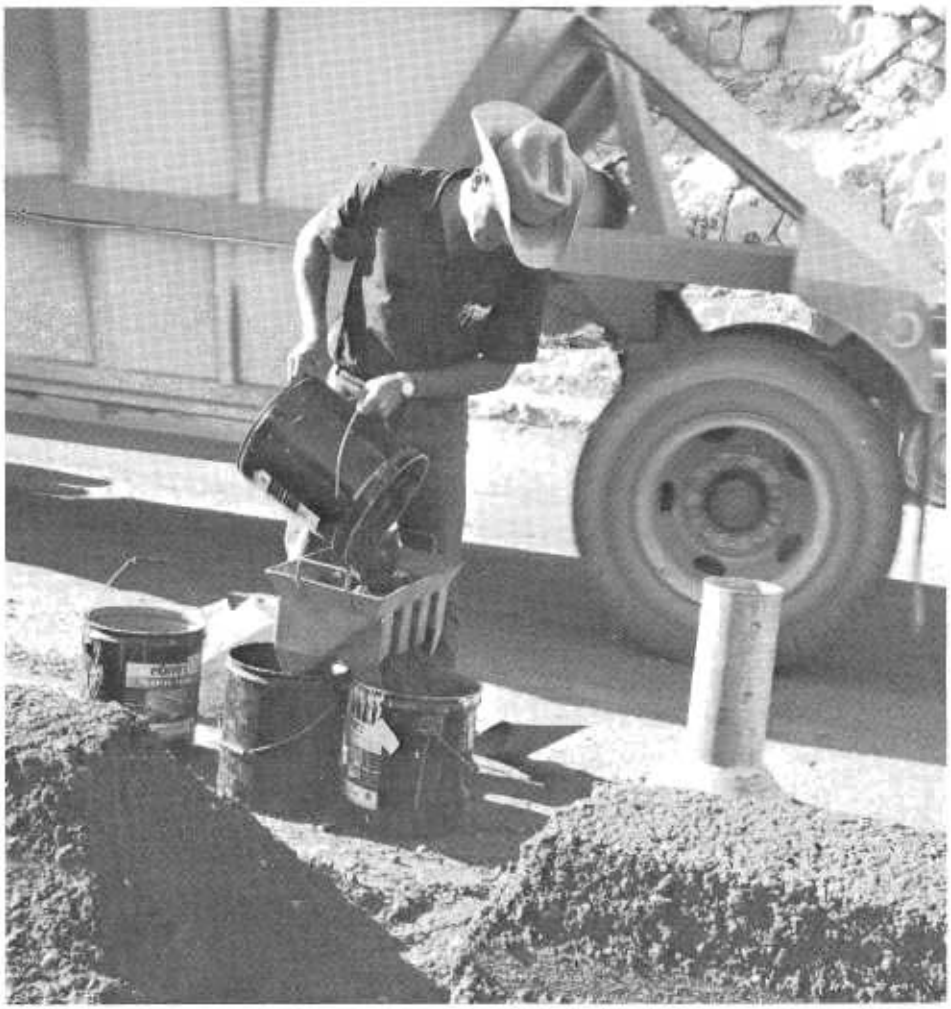



*Figure 4 shows how resampling affects the probability of accepting earthwork. With the distribution of a lift as shown, 40 percent of all possible test results would pass; this means that the probabilities of a test result complying with the specifications is 40 percent. If the test result falls below the specification limit, rerolling and retesting is required. Assuming that a test result from the rerolled lift would have a 50 percent chance of complying and because retesting is performed only when a sample fails, the total probability of acceptance would be 70 percent as shown in the figure.*



*Don Sturtevan of District 11 samples aggregate base from windrow. Note procedure followed in removing a complete section from the windrow and splitting the sample immediately.*

9. Will the adoption of statistical specifications interrupt the trend toward end result specifications?

In addition to the foregoing points, we should always keep in mind that no specification is limited to the content of the legal document. In the final analysis there will always be borderline data — unforeseen construction problems and other circumstances requiring a judgment decision, regardless of the type of specification used. At the very best, a statistical specification can only *assist* the engineer in making the decision. We may find that the statistical survey done in one state may not be applicable in all other states because of the varying level of enforcement or of laws or of attitudes. We should also bear in mind that the unwritten portion (policies, attitudes, etc.) of any specification will vary from state to state and from agency to agency.

**Use Study Needed**

In raising these questions, we do not intend to imply they are beyond solution or that statistics is not a valuable engineering tool. Our point is that the use of statistical specifications must be carefully analyzed. It is a new approach to control of highway construction and if improperly administered could lead to excessive costs without commensurate gains in our highway serviceability. On the other hand, statistical analysis has always been a part of our special studies programs and we feel that the additional coverage we are gaining from this study of many of our standard construction items will give us information in some areas where we have only guessed in the past.

# Federal-Aid Chief McGinness Retires

Gillette G. McGinness, Chief of the Federal-Aid Section of the State Division of Highways, will retire on November 30 with more than 38 years of service.

McGinness joined the division as a messenger in 1926. He worked as stake puncher, chainman, rodman and levelman on survey crews including the Feather River Canyon in 1929 and the Redwood Highway in 1933.

G. G. McGINNESS

He became an engineering aid in 1933 and a junior highway engineer in 1936. From then on he advanced through the professional ranks becoming assistant stores engineer in 1949. He became head of the Service and Supply Section in 1953 and was promoted to assistant office engineer in charge of the newly formed Industry Contact Section in 1958.

He became assistant officer engineer in charge of the Federal-Aid Section in 1961.

McGinness was born in Richmond, California, and attended grade, high school and junior college in Sacramento. He later attended courses at Sacramento State College.

McGinness is a Mason and a member of Sacramento Lodge No. 40.

He and his wife, Aurora, have two daughters, Mrs. Gordon Owes of Portland, Oregon and Mrs. Robert Manning of Oroville.

The McGinnesses will make their home at Kyburz, El Dorado County, following his retirement.

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The State Department of Public Works has awarded a $4,086,000 contract for constructing five miles of four-lane Interstate 580 between approximately four miles east and one mile west of the San Joaquin-Alameda county line.

# Operation Transplant

By DONALD L. YOUNG, Highway Landscape Specialist


"Operation Transplant" is a plan under which District 10 saves trees along future freeway routes by finding them new homes.

The Redevelopment Agency of the City of Stockton recently purchased from the Division of Highways 64 trees located in the yards of the homes along the future Westside Freeway route. Twenty of the trees have already been moved into the Hunter Square Plaza and are now providing "instant shade." The remaining 44 trees are boxed and stored for transplanting this fall to the Main Street Mall of the West End Urban Renewal Project.

The trees include a southern magnolia, deodar cedar, camphor, silk

*PHOTO ABOVE: Salvaged from a future Westside Freeway route this beautiful tree will provide shade for shoppers in downtown Stockton. PHOTO BELOW LEFT: This tree is 50 feet tall, weighs 25 tons and is estimated to be a half century old. It will be transplanted from a storage yard to the Main Street Mall in Stockton this October. PHOTO BELOW RIGHT: A 25-ton motor crane gently lowers one of the olive trees into a hole on the northeast corner of the Kansas Avenue interchange in Modesto. (Photo courtesy Modesto Bee)*


*A tall palm tree finds a new home where old Highway 99 goes under the new Modesto Freeway.*

oak, umbrella tree, and several olive and Modesto ash trees.

Two types of hormones are being used to make sure they survive the ordeal. One was watered into the soil around the trees before they were moved to slow down root growth—a timber tranquilizer, so to speak; the other is applied after the tree is moved to speed up root growth.

During July, District 10 had 42 olive trees and six Canary Island date palm trees, 15 to 45 feet high, transplanted from the median of Highway 99 in Salida to the new freeway through Modesto.

These trees were located in the path of future freeway construction and were moved to selected locations between Hatch Road and the Prescott Road Overcrossing. They were planted as a part of a more extensive landscaping program being planned for this new freeway.

This plan is another of the Division of Highways continuing efforts to provide landscaping to harmonize with the natural environment, while producing an aesthetically pleasing effect.

# DIVISION ANNOUNCES RECENT RETIREMENTS

### District 1

Verne A. Boulware, highway maintenance man II, 36 years.

### District 2

Edwin E. Olson, highway maintenance man II, 21 years; Ralph H. Twaddle, senior highway engineer, 37 years.

### District 3

James R. Keefer, light power shovel operator, 14 years; Roland I. Nicholson, senior highway engineer, 35 years; Marvin D. Schance, highway maintenance man II, 33 years; John O. Smith, forestry cook I, 13 years; Garlon G. Wilson, highway foreman, 37 years.

### District 4

Robert M. Addison, highway maintenance man II, 15 years; Frank B. Lindsay, assistant highway engineer, 15 years; Mabel E. Seymour, intermediate file clerk, 14 years.

### District 5

Herbert J. Holman, assistant highway engineer, 35 years; Fred C. Moore, supervising right-of-way agent, 29 years; Donald L. Robbins, tree trimmer, 18 years.

### District 6

Preston S. Jordan, highway maintenance man II, 31 years.

### District 7

Lena M. Barrett, highway field office assistant, 11 years; Abner E. Beard, highway maintenance man II, 26 years; Oscar W. Carlson, highway engineering associate, 18 years; Paul I. Zimmerman, engineering aid II, 3 years.

### District 8

Mary Ann Jewett, intermediate clerk, 15 years.

### District 9

Bliss A. Hinshaw, highway foreman, 25 years; Henry C. McAllister, highway maintenance man II, 27 years.

### District 10

Leslie A. Anderson, highway field office assistant, 14 years.

### District 11

Eugene A. Casey, assistant highway engineer, 32 years; Frank E. Hansen, highway foreman, 34 years; Clarence E. Harpham, highway engineering technician I, 17 years; George A. Thomson, assistant highway engineer, 34 years.

### Headquarters Office

G. Glenn Eaton, intermediate clerk, 6 years; Baynard A. Switzer, senior highway engineer, 40 years.

### Materials and Research

John R. Vincent, assistant steel inspector, 10 years.

### Bridge

Ilmar O. Jahlstrom, principal bridge engineer, 37 years.

## SHOPS

### Shop 2

Valda V. Smith, heavy equipment mechanic Rg. A, 15 years.

### Shop 6

Homer Young, highway equipment superintendent I, 34 years.

### Shop 8

Ray S. Milnor, assistant highway mechanic foreman, 41 years.

### Shop 9

Raymond P. Steffen, heavy equipment mechanic Rg. A, 7 years.

### Shop 11

Edward H. Higginson, highway equipment superintendent I, 30 years.

# '65 Legislation

When Governor Edmund G. Brown signed a proclamation on August 3rd which terminated a special extra cent per gallon tax on motor vehicle fuels his jubilance was understandable.

The tax was imposed by Senate Bill 268, introduced by Senator Randolph Collier, chairman of the Transportation Committee, to repair the roads and highways in the areas of northern California ravaged by last winter's floods.

This urgency measure went into effect on April 1st, and the act provided for its continuance for a maximum of nine months. However, the Governor's action ending it after only five months was based on progress made in the repair program and the acquisition of sufficient funds from federal and other sources to insure its completion.

Most of the legislation affecting state highway routes was embodied in the technical bill, SB 87, and the omnibus route bill, SB 81, authored by Senator Randolph Collier. As introduced, they contained the recommendations of the Department of Public Works. They were amended several times during the session to include other legislation introduced originally as separate bills.

**Conflict Between Bills**

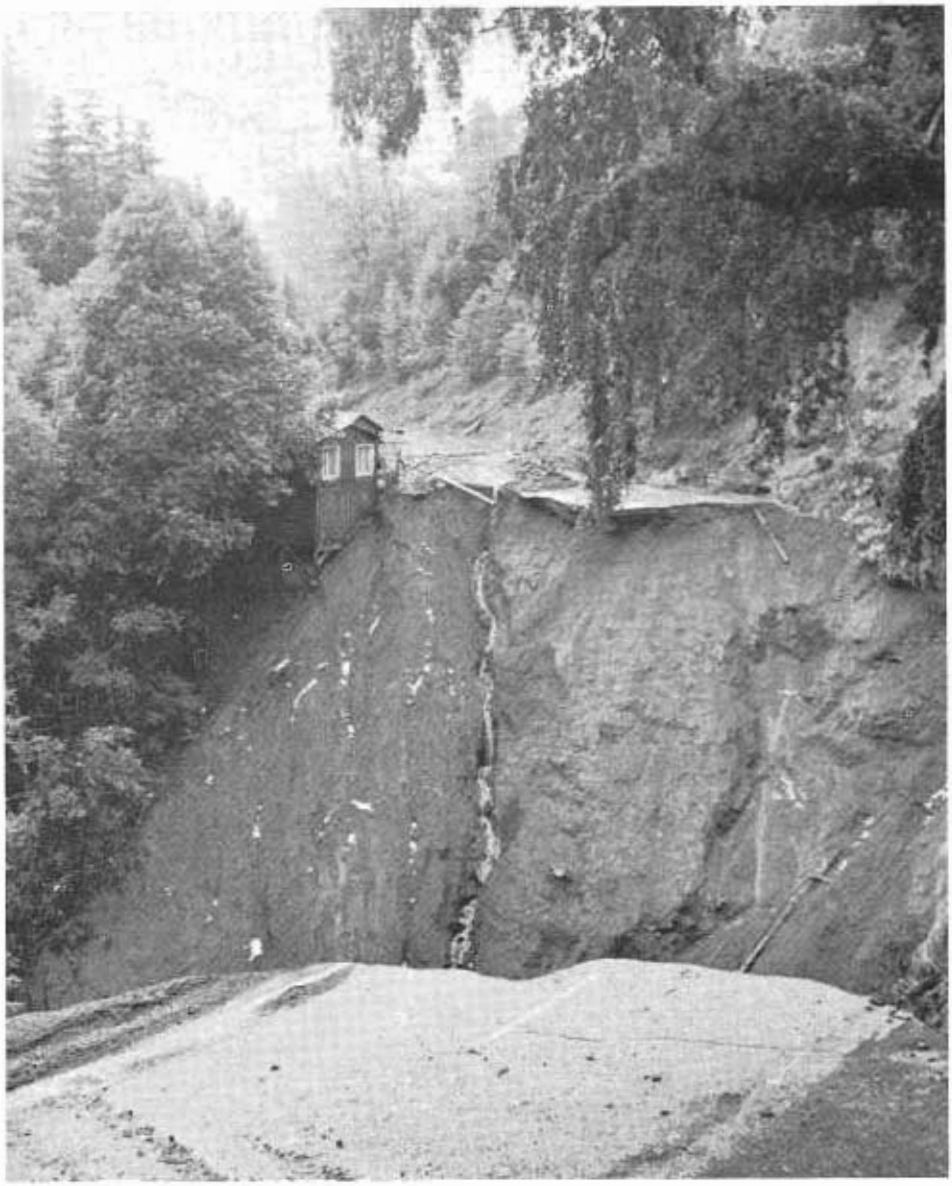
Oddly enough, both bills were passed during the closing hours of the session and each made changes in California's freeway and expressway system, but since SB 81 was signed and chaptered later than SB 87, it automatically nullified any provisions of the earlier bill changing this network of access-controlled routes.

Conflict between the two bills was known prior to adjournment but efforts to reconcile them failed in the press of more urgent matters.

A total of 234.6 miles was added to the state's freeway and expressway system and 151.9 miles deleted, for a net gain of 82.7 miles. It now contains 12,497 miles.

Some of the more interesting changes made to the State Highway System were the addition of the long-awaited route through Mendocino Pass in the coastal mountain range, between US 101 at Longvale in Mendocino County, and Willows in the Sacramento Valley, Glenn County—a distance of 119 miles.

A 10.2-mile stretch of Mulholland Drive in Los Angeles County, between Route 27 and the San Diego Freeway (Interstate 405), was added to both the state highway system and scenic system as Route 268; the 4-mile Richmond-San Rafael Bridge was brought into both the state highway system and the freeway and expressway system as Route 17; and Route 170 was extended approximately 2



*Emergency legislation added a temporary one cent per gallon to the gas tax to finance reconstruction of state highways damaged during the devastating Christmas floods of 1964. This photo shows a washout of a section of US 101 at Squaw Creek in Mendocino County shortly after it occurred in December, 1964.* *(See photo next page)*

miles southwesterly to the Los Angeles Airport as a state highway in the freeway and expressway system.

On the other hand, the 4.7-mile Route 188 (Fallen Leaf Lake Road) in the Lake Tahoe area, an unimproved lane that few realized was in the state highway system, was dropped from it, and the section of Route 111 in Riverside County between Indio and Palm Springs was retained as a state highway but removed from the freeway and expressway system.

#### Agency Name Shortened

In addition to such bills as the one shortening the name of the "Highway Transportation Agency" to the "Transportation Agency," and that revising certain provisions of the Collier-Unruh Act affecting the "select systems" of city streets and county roads—both of greatest import to the technical staffs of the state, cities and counties—the Legislature passed and Governor Brown signed into law many measures of public interest.

These range from consideration of procedures for locating highways to highway aesthetics, safety, financing, toll bridges and rapid transit, and assistance to those forced to relocate because of highway construction.

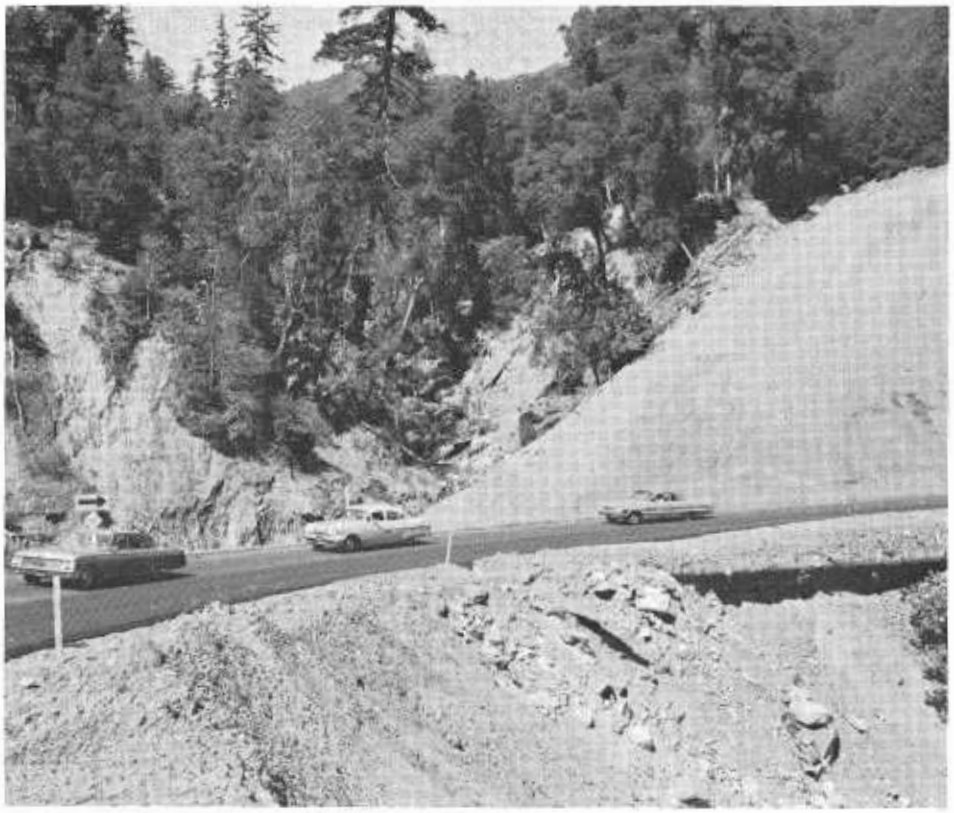
Several bills sponsored by Assemblyman Z'berg related to procedures leading to the adoption of routings for freeways and other state highways.

To understand them, the following background information is needed:

The Legislature is responsible for determining the termini of state highways. Frequently, it will add such controls as "from A to Z via D, M and X."

Since routes cannot be laid out "as the crow flies," but rather are subject to such geographic, sociologic and economic controls as mountain and river barriers, parks and hospitals, and the costs of needed rights-of-way, the California Highway Commission is charged with choosing the best of the many alternate alignments studied.

In making such a determination, the commission considers the recommendations of the State Highway Engineer and the results of public hearings conducted locally by the Division of Highways. Whenever asked by a local government concerning locating a freeway, or on many occasions by its own motion, the commission itself will hold a public hearing before selecting the exact routing.



*The section of US 101 at Squaw Creek (photo, previous page) following its reconstruction. Photo was taken on March 17, 1965.*

#### Graphic Portrayals

Assembly Bill 1430 requires the Department of Public Works to present graphic portrayals, where appropriate, of significant portions of route alternates at public hearings in connection with state highway locations, when requested by any city or county affected. The portrayals may be by means of either sketches or preliminary models.

(Current operating procedure of the various highway districts calls for displays of aerial photographs with the proposed freeway superimposed to be shown in the lobby of the meeting hall and at the meeting via overhead projecture; artists' sketches and expensive scale models, with the degree of such visual presentation related to public interest and controversy.)

An amendment to the Streets and Highways Code (AB 1431) removed the direction in the law that the Highway Commission should establish state highways at the "most direct and practicable" location.

This new law will not cause a change in the commission's existing procedure, however, as the commission has long recognized the necessity of considering such community values as master plans for development, schools, economic impact of the routing on an area, cemeteries, and a host of other factors, as equally formidable barriers, and rightfully so, as geologic faults, bays and deserts.

A new piece of legislation, AB 1432, provides that a local agency may petition the Highway Commission for a hearing if it discovers during preliminary discussions between it and the state's freeway builders that it is dissatisfied with a proposed segment under study.

An addition to the Streets and Highways Code (AB 1435) now requires the Highway Commission to report why it determined on a specific freeway location, including consideration given to driver benefits, community values, recreational and park areas, historical and aesthetic values,

*Legislation made the Richmond-San Rafael Bridge a part of the state highway system and the freeway and expressway system as Route 17.*

the values of property, impact on local tax rolls, state and local public facilities, city street and county road traffic, and the total projected regional transportation requirements.

#### 'Parkway' Is Defined

In the general field of aesthetics, Senator Fred Farr's bill (SB 725) defined a "parkway" and established a State Parkway Program.

The general concept of a parkway is of a park-like facility with a road meandering through it. It is so designed for low-speed, recreational driving that motorists may park to picnic, hike or bicycle.

Although the primary responsibility for the program rests with the Department of Parks and Recreation working together with the Advisory Committee on a Master Plan for Scenic Highways, the responsibility for the construction and maintenance of the roadway within the park rests with the Department of Public Works.

California's increased spending on landscaping and other plantings, reflecting the growing demand that roadways be as attractive as feasible, necessitates, of course, increased sums for the plantings already accomplished.

Senate Bill 1045 has amended the Streets and Highways Code to raise the amount which may be spent each year for the maintenance of landscaping and functional planting on state highways from $7,500,000 to $10,000,000.

#### Procedures Established

A bill (SB 134) which added Section 105.6 to the Streets and Highways Code, established procedures for the joint development of freeways and adjacent facilities for pedestrians, bicycles and other nonmotorized traffic.

Such facilities are to be constructed only where the Department of Public Works has determined that they will not constitute a safety hazard or interfere with traffic.

The total cost of construction and maintenance of such facilities will be borne by the communities requesting them. Highway funds will not be used, and the right of eminent domain will not be exercised to acquire property for such facilities.

Under safety may be classified such bills as Assemblyman Kennick's AB 346 which provided, unless otherwise agreed on, the cost of maintenance of railroad automatic grade crossing protection on any city street, county road or state highway, constructed or altered after October 1, 1965, shall be divided between the railroad and the public body involved in the same proportion as the original cost of the facility was divided.

It further provided that the Highway Commission shall set aside an amount not to exceed $1,000,000 annually for allocation to the Public Utilities Commission for paying the share of the cities and counties.

The '65 Legislature also appropriated $255,000 for expenditure by the Department of Public Works in a continuing program of research on highway safety.

The jointly sponsored SB 361 and AB 294 (Senator Collier and Assemblyman Foran) added seven sections to the Government Code and two to the Streets and Highways Code, authorizing moving payments to those persons or businesses displaced by state highway projects, as well as by projects of certain other state agencies, and authorized the Department of Public Works to give relocation advisory assistance to those families affected.

## I-5 in South State Gets $8,209,000 Job

The State Department of Public Works has announced the award of an $8,209,574.75 contract in Los Angeles County for widening Interstate Route 5 (US 99) south of Gorman, from four-lane expressway to eight-lane freeway between 6.8 miles south and 0.6 mile north of Route 138; and also constructing Route 138 as four-lane freeway (with sufficient right-of-way for an ultimate eight lanes) 2.1 miles east of Interstate 5.

The project includes construction of interchanges with Quail Lake and Hungry Valley roads, and with Route 138, as well as a bridge across Gorman Creek.

# New Route Adoptions

At its July meeting in Sacramento, the California Highway Commission adopted locations for nearly 30 miles of freeways on four routes in Los Angeles and San Diego counties.

Meeting the following month in San Francisco, the commission adopted a conventional highway routing for 2.8 miles of Route 187 in Los Angeles and Culver City, and designated a two-mile section of Waterman Avenue in San Bernardino as interim Route 18, pending freeway construction.

The Route 1 Freeway will extend between Vermont Avenue in Los Angeles and the Pacific Coast Highway at Colorado Street in Long Beach, connecting with a newly adopted section of the Route 22 (Garden Grove Freeway) between this point and the Los Cerritos Channel.

The two segments form a continuous 11.6-mile east-west freeway for which 14 alternate alignment combinations were studied and presented at public hearings in Long Beach by both the Division of Highways and the commission.

Plans of the Division of Highways call for the construction of an eight-lane freeway on both routes at a combined cost of $107,800,00, including rights-of-way.

In San Diego County, the commission revised a previously adopted routing for approximately 6.4 miles of the Interstate 8 Freeway between one-half mile west of Japatul Valley Road and one mile west of Laguna Junction.

This section was included in a 27-mile routing between east of El Cajon and Laguna Junction which was



adopted by the commission in March 1959.

In recommending the revision, State Highway Engineer J. C. Womack had told the commission that it would cost $2,800,000 more for construction and rights-of-way than the alignment previously adopted, but would save about $8,400,000 in 20-year user benefits.

He added that the revised routing would affect fewer homes and improvements, and avoid groves of oak and pine trees and two national forest picnic and recreational areas than would have been required by the previous routing.

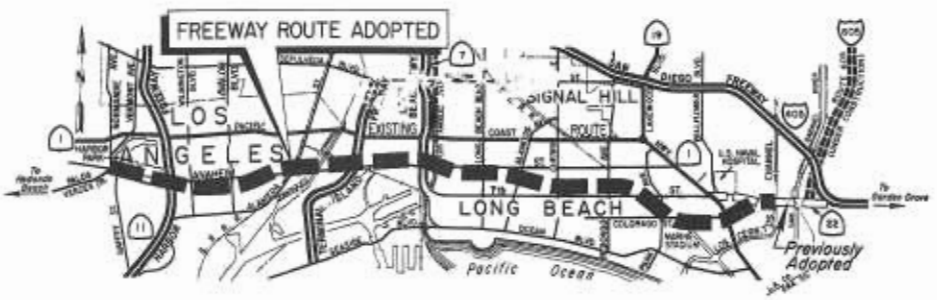
A four-lane freeway with a minimum median width of 100 feet is planned for this section at an estimated construction and right-of-way cost of $14,600,000.

In another San Diego County action, the commission adopted a freeway routing for 10.8 miles of Route 125 between south of Mission Gorge Road in the Santee area and the adopted alignment of the future Route 56 Freeway near Poway.

Although construction of this north-south belt-line freeway along the eastern fringe of the San Diego metropolitan area is not expected for a number of years, the commission determined the routing at this time to permit more orderly planning for anticipated local development.

The new alignment for Route 187 will carry traffic along Venice Boulevard for 2.8 miles, between east of Sepulveda Boulevard at the Los Angeles-Culver City border and the Santa Monica Freeway, just east of La Cienega Boulevard in Los Angeles.

The revised alignment of interim Route 18, Waterman Avenue between Route 30 (Crosstown Freeway) and the north city limit of San Bernardino, was requested by the city council and county board of supervisors to facilitate the movement of traffic to and from the mountains.



## Grace Marie Hines Retires November 12

Grace Marie Hines, presently secretary to the Deputy Administrator of the Transportation Agency, and also secretary to many Deputy Directors of the Department of Public Works and California Highway Commission officials over the past 35½ years, will retire from state service November 12.

Since January 1959, Mrs. Hines has been secretary to Frank Chambers; first when he was appointed Secretary of the California Highway Commission, then Assistant Director of the Department of Public Works, and presently Deputy Administrator of the Transportation Agency.

GRACE MARIE HINES

Mrs. Hines' career with the state began in June of 1925, when she was employed as secretary to the Office Engineer of District 3, then located in the former Fruit Building at 4th and J Streets in Sacramento, before that district office was moved to Marysville. From 1933 to 1940 she served as secretary to Deputy Directors of Public Works Morgan Keaton, Ed Neron, Franz Sache, and Gus Henderson; and from 1940 to '44 was secretary to Director of Public Works Frank Clark.

After a three-year period of remaining at home, Mrs. Hines resumed work during the legislative session of 1947, as secretary to Harold P. Norton, special representative of the Department of Public Works. In October of the same year she transferred to Central Office Administration, working for George Cook, then assistant secretary of the California Highway Commission; and in turn served five secretaries of the commission.

Mrs. Hines, who is also active in the Order of Eastern Star, resigned for a 16-month period from 1952 to 1954 to serve as Worthy Matron of Rainbow Chapter No. 385. She was appointed Grand Esther of the State of California for the year 1961, traveling to various parts of California during weekends and vacation.

She is also affiliated with Menzaleh Temple No. 16, Daughters of the Nile, and presently serves as marshal of the organization. Golf is a favorite recreation.

Mrs. Hines is a native Californian, born in Petaluma. She attended high school, Sacramento Junior College, and Standard School for Private Secretaries in Sacramento.

Her husband, Walter, is a car shop supervisor employed by the Southern Pacific Company. The Hineses plan a Hawaiian vacation for next year.

## IN MEMORIAM

**District 1**

Bruce A. Anderson, engineering student trainee, range B; Roy D. Johnson, assistant highway engineer; John T. Prior, engineering student trainee, range B.

**District 3**

Charles H. Chappelle, highway engineering associate; Michael Prychodnik, highway maintenance man II.

**District 4**

Walter K. French, highway maintenance man II.

**District 6**

Robert S. Percival, supervising highway engineer.

**District 7**

John H. Castaneda, highway landscape maintenance man; Leroy G. Exum, highway engineering technician I.

**District 8**

Stanley D. Walker, engineering aid II.

**District 9**

Albert C. Squires, highway foreman.

**District 10**

James C. Casados, junior clerk.

**Headquarters Office**

Merle E. Davis, senior account clerk.

## Bridge Agreements Chief Has Retired

Frank Wilbur Robison, head of the Agreements Section of the Bridge Department, State Division of Highways, retired August 31.

Robison was in charge of the negotiation of maintenance and construction agreements with railroads in connection with the building of grade crossings and separations.

Robison joined the Division of Highways in 1928. He left state service in the early 1930's to complete his studies at the University of California at Berkeley and get his engineering degree. From 1934 to 1936 he was employed as an engineer on the construction of the San Francisco-Oakland Bay Bridge, after which he resumed his service with the Division of Highways' Bridge Department as assistant resident and resident engineer on bridge projects both in northern and southern California.

F. WILBUR ROBISON

In 1939 he transferred to the headquarters office of the Bridge Department in Sacramento where he held various assignments in quantity calculations, specification writing, bridge design, preliminary investigation and reports and finally as chief of the Agreements Sections.

Robison was born near Viola, Shasta County, and attended grade and high schools in Esparto and Santa Cruz.

He is a member of the American Society of Civil Engineers, Sacramento Commandery No. 2, Knights Templar and Sacramento Chapter No. 3, Royal Arch Masons.

Robison and his wife, Virginia, have a son, David Wilbur, now stationed with the U.S. armed forces in the Far East.

# THIRD RIGHT-OF-WAY ACADEMY HELD AT UC DAVIS CAMPUS

*Some 90 of the Division of Highway's junior right-of-way agents and some of its newer assistant agents from the state's 11 highway districts attended a concentrated 88-hour course of technical training in property acquisition and related fields. Course was conducted August 2–14 at the University of California Davis campus.*

## Frank A. Sutcliffe Retired September 1

Frank A. Sutcliffe, Highway Superintendent in District 5, retired on September 1 after 39 years with the State Division of Highways.

Sutcliffe was superintendent at Buellton for 8 years and Paso Robles for 14.

A native San Franciscan, he attended schools in the Sacramento area and first went to work for the California Highway Commission as a chainman in 1923. After several years away from state service he rejoined the Division of Highways in 1931 and was promoted to foreman in 1935. He became a superintendent in 1943.

Sutcliffe is a charter member of the California State Employees' Association and charter president of Chapter 98. He later served as regional director for Region X. He is a Past Grand of the Odd Fellows and Rebekahs.

Sutcliffe and his wife, Emily, have two sons and a daughter and 11 grandchildren.

## Right-of-Way Agent Fred Moore Retires

Fred C. Moore retired as the district right-of-way agent in District 5 on June 30.

Moore began his professional career as a mining engineer for Nevada Consolidated Copper Company in Ray, Arizona, in 1928. From 1931 to 1934 he was engineer and assayer for the Easyz Bird Mine at Mokelumne Hill, California. He then spent a year as superintendent of the Boston Gold Mines at Mokelumne Hill.

FRED C. MOORE

Moore began employment with the State Division of Highways in 1936 as a junior highway engineer in District 10. He transferred to the Right-of-way Department in District 10 as an assistant right-of-way agent in 1944, and to District 5 in 1948 to take charge of the Right-of-way Department as district right-of-way agent. He was later promoted to supervising right-of-way agent.

Moore and his wife, Leta, have two daughters: Blanche, of Stockton, and Elizabeth, of Fort Wayne, Indiana. He is a member of the American Right-of-way Association, Society of Real Estate Appraisers, an Associate of the School of Mineral Sciences of Stanford University, a Scottish Rite Mason, and a member of the Commonwealth Club.

## Shop 2's Wilkinson Saves Drowning Boy

The fast action of Roy Wilkinson, heavy equipment mechanic with Shop 2, Division of Highways, in Redding saved a young boy from drowning in Lakewood Manor Lagoon.

On the morning of July 4, Wilkinson was eating breakfast in his home when another young boy came to the door and said, "There's a boy in the lake and he's drowning."

Wilkinson, an ex-Marine, dashed from his house and down to the boat dock. Thinking he saw what might be a red shirt deep in the water he plunged in and reached the bottom of the lagoon which is 15 feet at this point. As he started up again he found the boy and brought him up to the surface.

Wilkinson applied artificial respiration and after a few minutes the boy revived.

The nine-year-old boy, Kenneth Hightower, a nonswimmer, had been carrying his fishing gear when he tripped over a boat eye and fell into the lagoon.

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The State Department of Public Works has awarded a $3,469,000 contract for constructing 1½ miles of eight-lane Interstate 5 Freeway between the San Diego River and three-quarters of a mile north of Tercolate Creek in San Diego County.

## Scenic Highways Committee Meets With Governor

*The Governor's Advisory Committee on a Master Plan for Scenic Highways met on September 21 in Sacramento.*

*Items on the agenda included a status report pertaining to the committee's plans for a guide to assist in designating official scenic corridors and a report on legislation affecting the scenic highway system. Also acted upon was a draft of a report to the California Legislature.*

*Relationship of scenic highways to the general federal and state highway programs was also examined.*

*Standing about Governor Edmund G. Brown are (left to right) State Director of Public Works John Erreca and committee members Dee W. McKenzie, chief of the highways and bridges division of Sacramento County Department of Public Works; Charles Perry Walker, City Councilman and former Mayor of Manhattan Beach; Richard Leonard, San Francisco attorney and conservationist; Robert Grunwald of Hanford, city and regional planning consultant; Nathaniel Owings of Big Sur, noted architect; Harry P. Schmidt of Gustine, Merced County Supervisor and committee chairman; and Edwin S. Moore, San Francisco, executive vice president of the California State Automobile Association.*

## ANNUAL SAFETY ENGINEERS MEETING HELD IN SACRAMENTO

*The annual Safety Engineers Conference was conducted in Sacramento during August. Those who attended from the districts had a busy week for in addition to their usual sessions, they spent two days at the Materials Laboratory becoming familiar with protective measures required by the field use of radioisotopes, and the informal farewell party that marked Division Safety Engineer Baynard Switzer's (seated, fifth from right) last day in the office prior to retirement.*

# DISTRICT 1 OPENS NEW OFFICE BUILDING WING IN EUREKA

*Coinciding with observance of National Highway Week, District Engineer Sam Helwer invited the general public to an informal open house to look over the recently completed wing of the district office building at 1656 Union Street in Eureka. District employees were on hand in the lobby to guide groups through the building and answer questions about Division of Highways operations.*

# TIOGA CLOSED FOR BRIDGE CONNECTION

State Highway 120 was completely closed to traffic at historic Tioga Pass from September 13 (Monday) through September 17 (Friday) while workmen removed a temporary bridge being used during construction and made connections to the permanent bridge which had been constructed beneath it.

Closure dates were selected, says California Division of Highways District 9 Engineer C. A. Shervington, because they caused the least inconvenience to Labor Day weekend vacationers and to summer tourists.

Modifications and improvements at Tioga Pass were started three years ago. The lengthy construction period was necessary because annual heavy snowfalls at the 9,500-foot level permit crews to work only a few months each summer.

Although a lofty climb under the best conditions, Route 120 between US 395 near Lee Vining and the eastern edge of Yosemite National Park is becoming increasingly popular with California drivers.

In July, 30,000 vehicles traveled over it although it had to be closed temporarily for several hours on weekdays when blasting operations were required to remove rock from the sheer cliffs.

Much of the work was done on weeknights when traffic on the road was at a minimum.

## Department Awards Two Large Contracts

The State Department of Public Works has announced the award of a $1,628,000 contract for construction of an interchange at Avenue 12 and a separation at Avenue 13 on US 99 between the Fresno county line and Madera.

The contract is the final phases of converting this section of US 99 from expressway to full freeway.

The department also announced award of a $1,487,000 contract for constructing a bridge and approaches across the Klamath River on Route 96 just south of Orleans in Humboldt County.

The original bridge was washed out during the recent Christmas floods.

# STATE OF CALIFORNIA

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C. RAY VARLEY . . . . . Assistant Director
JUSTIN DuCRAY . Departmental Management Analyst
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J. A. LEGARRA . . Deputy State Highway Engineer
GEO. LANGSNER . . Deputy State Highway Engineer
LYMAN R. GILLIS . Assistant State Highway Engineer
J. E. McMAHON . . Assistant State Highway Engineer
FRANK E. BAXTER . Assistant State Highway Engineer
GEORGE A. HILL . Assistant State Highway Engineer
J. C. BURRILL . . . . . Comptroller
NEAL E. ANDERSEN . . . . . Equipment Engineer
JOHN L. BEATON . . Materials and Research Engineer
C. G. BEER . . . . . Urban Planner
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ALVORD C. ESTEP . . . . . Engineer of Design
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SCOTT H. LATHROP . Personnel and Public Information
C. T. LEDDEN . . City and County Projects Engineer
JACK E. PEDDY . . . . Project Control Engineer
DANA G. PENGILLY . . . . . Planning Engineer
E. J. L. PETERSON . . Program and Budget Engineer
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PAUL C. SHERIDAN . . . . . Office Engineer
E. L. TINNEY . . . . . Maintenance Engineer
DONALD P. VAN RIPER . Principal Landscape Architect
J. E. WILSON . . . . . Traffic Engineer
A. L. ELLIOTT . . . . Bridge Engineer—Planning
H. R. HINEMAN . . . Bridge Engineer—Operations
R. J. IVY . . . Bridge Engineer—Administration
DALE DOWNING . . Bridge Engineer—Southern Area

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HARRY L. KAGAN . . . . . Assistant Chief
DEXTER D. MacBRIDE . . . . . Assistant Chief
R. S. J. PIANEZZI . . . . . Assistant Chief

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SAM HELWER . . . . . District Engineer

***District 2, Redding***

H. S. MILES . . . . . District Engineer

***District 3, Marysville***

W. L. WARREN . . . . . District Engineer

***District 4, San Francisco***

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R. A. HAYLER . . . . . Deputy District Engineer
HAIG AYANIAN . . . . . Deputy District Engineer
C. F. GREENE . . . . . Deputy District Engineer

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***District 6, Fresno***

W. L. WELCH . . . . . District Engineer

***District 7, Los Angeles***

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A. L. HIMELHOCH . . . . Deputy District Engineer
A. C. BIRNIE . . . . . Deputy District Engineer
A. W. HOY . . . . . Deputy District Engineer
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*printed in* CALIFORNIA OFFICE OF STATE PRINTING

# NATIONAL HIGHWAY WEEK OBSERVED THROUGHOUT CALIFORNIA

National Highway Week was observed throughout California during the week, September 19-25, 1965. More communities took part than in any past year with much of the impetus coming from local chambers of commerce.

The National Highway Week Committee for California was headed by cochairmen Harrison Baker of Los Angeles who served in the south and Sherman Duckel of San Francisco who performed like duties in the north. Administrative secretary was Richard Bowler of the Auto Club of Southern California. Publicity secretary was Dick Pollard of Californians for Modern Highways.

Activities included the usual dedications and ground-breaking ceremonies associated with recently completed or about-to-begin freeway construction. Not so usual was the planting of a single redbud shrub at Mariposa where the Highway 140 Association chose National Highway Week as the proper time to plant the first of 20,000 redbud shrubs that will one day transform Route 140 into the "Redbud Highway."

Also unique was the activity conducted by the City of Sunnyvale and the Sunnyvale Chamber of Commerce. The fact that there was no construction project about to begin or end in their locale did not deter them—they simply went on a tour of going projects, held proper ceremonies in the city hall and sponsored a luncheon.

Another tour, slightly different in nature, took place in Sacramento where the press inspected all highway construction in the vicinity of the city.

As a prelude to the week, Californians for Modern Highways sponsored an exhibit at the California State Fair in Sacramento that was dedicated to the state highway system.

In Los Angeles County, District 7, 8 and 11 joined with Californians for Modern Highways in operating an exhibit at the county fair in Pomona. The focal point was the showing of two movies. The first was Walt Disney's "Freeway Phobia" that Disney permitted to be shown in advance of its regular commercial release date. The second was "Christmas Floods—1964," a vivid film account of the subject.

Other visual exhibits were popular throughout the state but the San Francisco Bay area probably led in their use with nine on display in a like number of locations.

Radio and television stations were most cooperative with many donating public service time for announcements pertaining to National Highway Week. Approximately 20 television shows pertaining to the occasion were aired in various parts of California. They ranged in scope from panel discussions of local problems to film coverage of the restoration of Humboldt County's highways that were damaged in last year's floods.

Newspapers were equally generous and were probably unanimous in printing news stories of observances that took place in their communities. Newspapers published by labor unions were especially receptive to news of National Highway Week.

Only a few of the events that took place during the week are mentioned here. There were many others of equal or greater importance, that occurred in other communities.