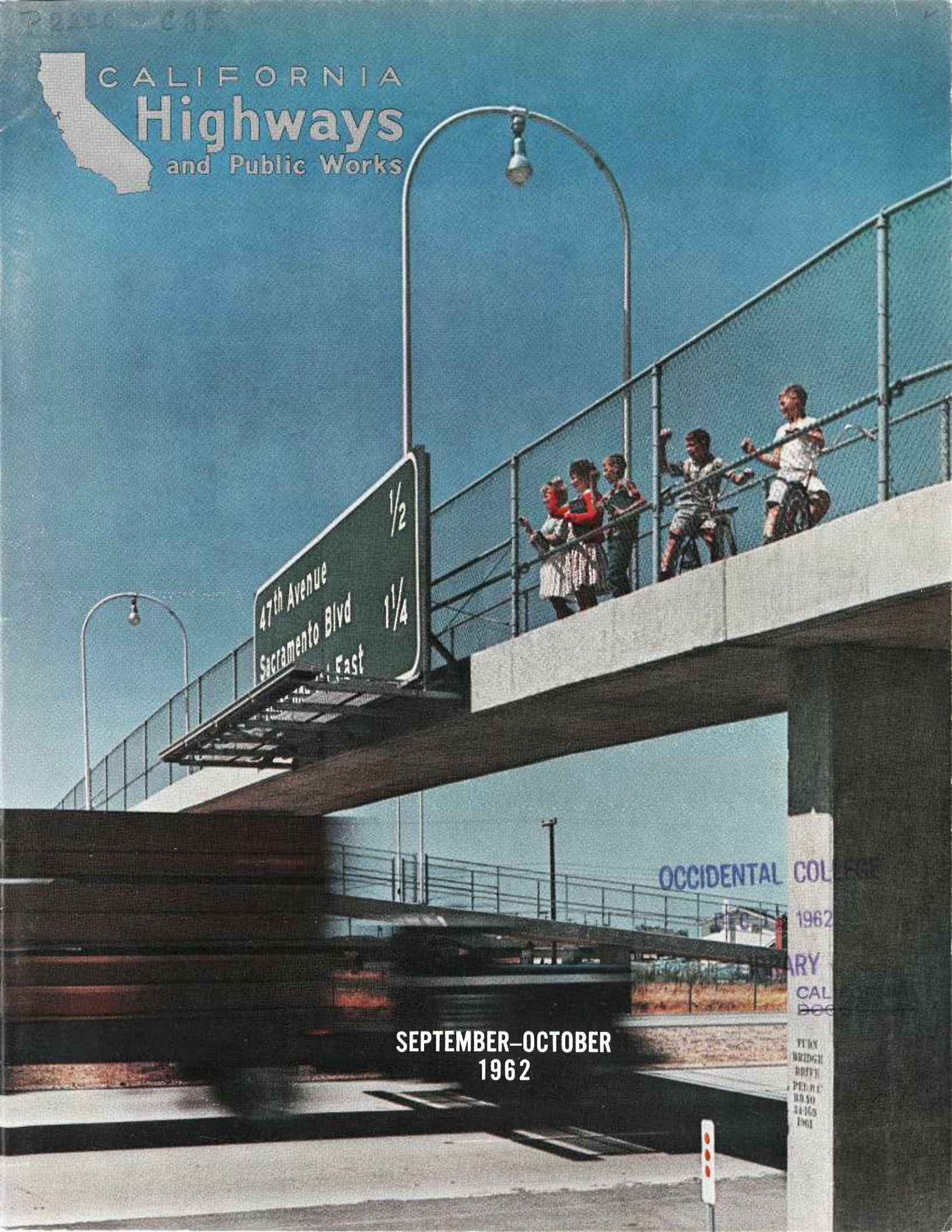
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Highway Program Featured in Two Articles

The California Highway Commission and the Division of Highways were the subjects of two feature articles appearing in automobile club periodicals recently.

The problems and procedures of the Highway Commission are explained in "Freeway Routes and the Highway Commission" appearing in the August 1962 issue (Part 2) of *Auto Club News Pictorial*, published by the Automobile Club of Southern California.

While recognizing the inevitability of disagreement over freeway routes, the article points out that of "511 miles of freeway routes adopted (by the commission) in 1961, only 65 miles involved controversy of any appreciable degree."

Many of these problems, the article says, are due to lack of understanding of the State's freeway program coupled with the natural tendency to resist change if that change appears to be that it is going to be disruptive.

The article then lists some of these normal fears and explains why they seldom materialize. They are:

"Chinese Wall." (Actually, enough over and under crossings and interchanges are provided not only to handle local traffic but to make such cross traffic movement much safer than before.)

"Land Removed From Tax Rolls." (In most instances, the displaced owners will relocate in the same general area in a facility of higher valuation. Secondary additional benefits occur in the form of stimulus to construction and a general upgrading of the community.)

"Decrease in Land Values." (Economic studies have proved beyond a doubt that construction of a freeway in a community raises land market values.)

"Freeways Are Unsightly." (Landscaping is now an integral part of freeway design. "One needs only to fly over one of our urban areas to observe that in many neighborhoods the only green belt in view are the freeways.")

"Loss of Parks." (This is avoided where possible but where park property provides the only economical route, the amount of property acquired is held to a minimum, often replaced in kind and extra pains taken to blend the freeway with the landscape.)

The planning, design, construction and maintenance of state highways are all dealt with in an inclusive article appearing in the September-October 1962 issue of *Motorland*, official magazine of the California State Automobile Association.

The change in transportation ease and speed is dramatically set forth at the beginning of the article by comparison of an excerpt from a 1909 motorist's diary of a 6-day, 83-mile trip rife with blowouts, broken axles and rims and muddy roads and the terse entry of a 1962 motorist who left San Jose at 7 a.m. on a business trip and arrived without incident in Sacramento 2½ hours later.

After calling attention to the current freeway system throughout the State, the article gives a step-by-step account of how a freeway route is adopted, designed and constructed, stressing the co-operation between local communities and state authorities which has made the present freeway and expressway network possible.

There are now 2,425 miles of multilane divided highways in the State of which 1,000 miles are full freeway, the article points out. Another 400 miles of freeway are under construction.

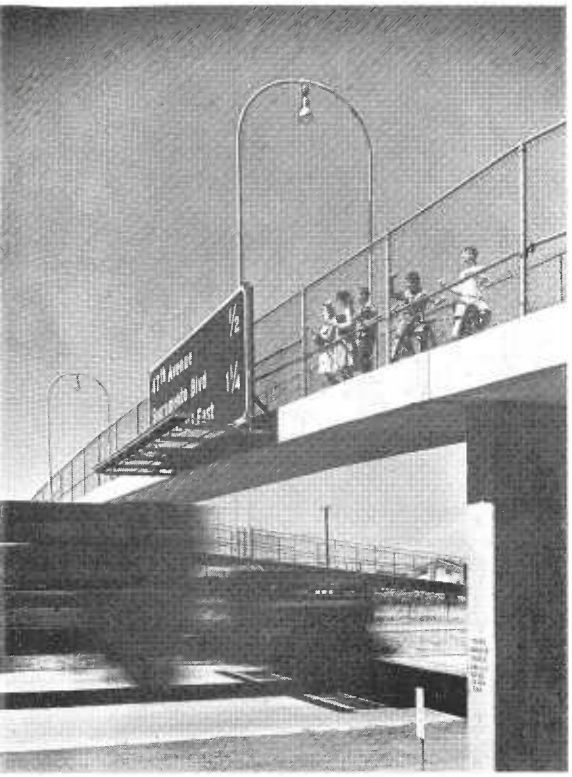
However, within the next 20 years California's traffic load is expected to more than double.

"Despite the enormous challenges of building highways adequate to the needs of the future," the article concludes, "the California Division of Highways is moving ahead, confident that the State's master plan for highways will enable motor vehicle traffic to flow smoothly and safely."

California Highways and Public Works

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

Vol. 41 September-October 1962 Nos. 9-10



FRONT COVER—Children watch freeway traffic from the Turnbridge Drive pedestrian overcrossing on U.S. 50–99 south of Sacramento. See "Kidproof Railings" beginning on page 19. Photo by John Meyerpeter.

BACK COVER—Looking west along construction on the Ventura Freeway from above Telephone Road in the City of Ventura. Sign Route 126 joins the new freeway at the bend (right center). See "Ventura County Freeways" beginning on page 36. Photo by Robert Rose.

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WILLIAM R. CHANEY, *Chief Photographer*

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CALIFORNIA HIGHWAYS AND PUBLIC WORKS

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SACRAMENTO, CALIFORNIA

Bridge Opening

New Span Joins Benicia, Martinez; Ends 115-year-old Ferry Service

On September 15, the Benicia-Martinez Toll Bridge was opened to traffic.

Governor Edmund G. Brown's official proclamation of this fact delivered from the deck of the ferryboat *Carquinez* below the bridge at the stroke of noon, was followed by a blast of horns and whistles, the cheers of spectators and a cloud of released balloons and homing pigeons.

A flight of delta-winged Air Force jets swooped overhead a few moments later and, as if to complete the scene, a gray military transport chose at that moment to slip beneath the central span of the structure.

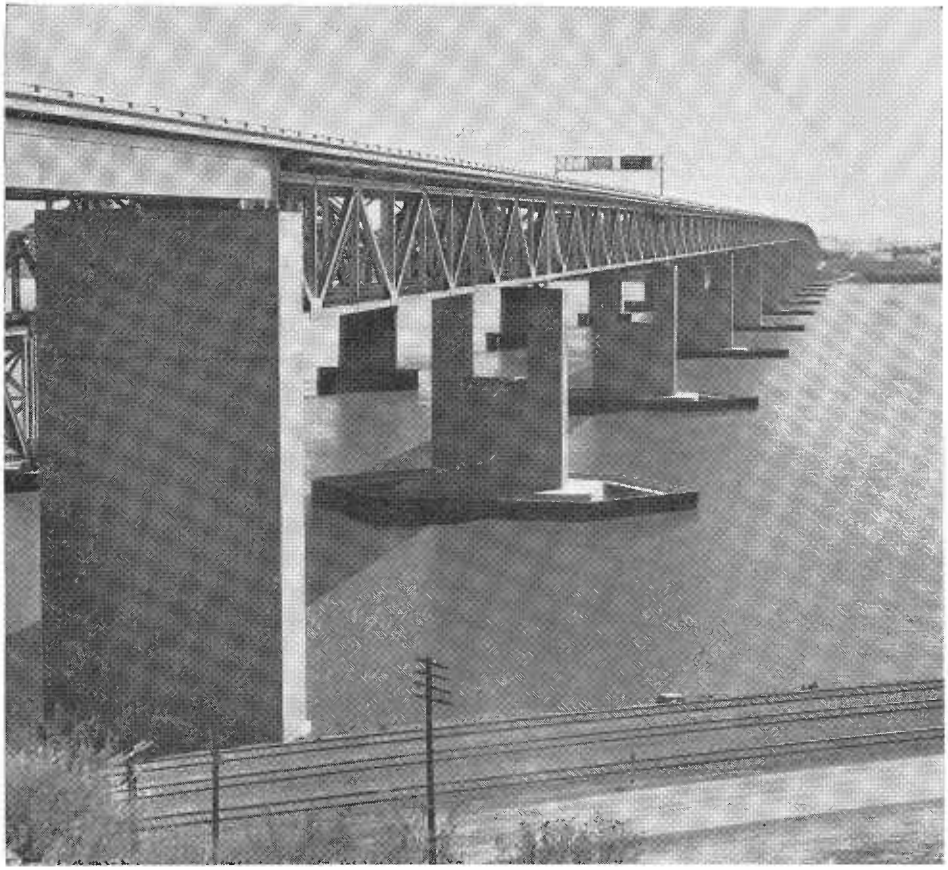
Throughout the day, parades, picnics, street dancing and sport events took place in Benicia and Martinez. All auto traffic was allowed toll free over the bridge until midnight of the first day.

Thus, after three years under construction, the new $27,500,000, 6,215-foot bridge and its freeway approaches were officially opened, carrying State Sign Route 21 across the Carquinez Straits.

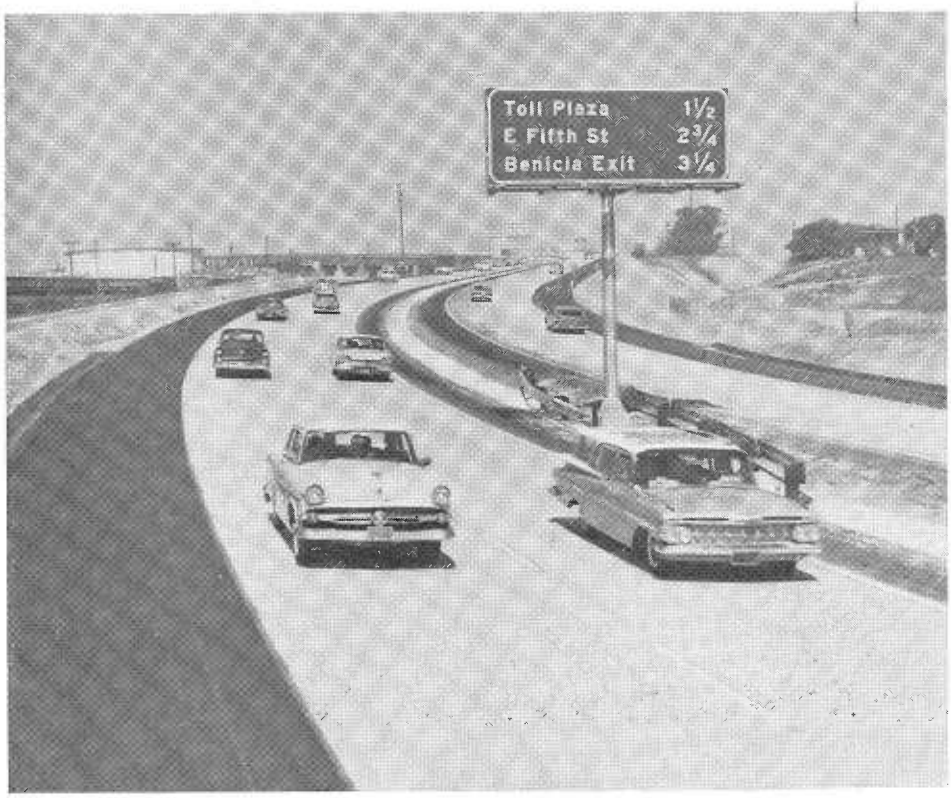
There was also a sad note to the ceremony. It marked the last voyage between Benicia and Martinez of the

Governor Edmund G. Brown, behind the microphones (center), announces the Benicia-Martinez Bridge to be officially opened as released American and State Flags rise into the air borne by balloons.

An aerial of the new Benicia-Martinez Bridge taken a few days after it was opened to traffic. The view is southward toward the City of Martinez in the distance.



The new bridge has a vertical clearance of 138 feet above the water and is 6,215 feet long. This photo is looking south from the Benicia side.



The freeway approach to the bridge at the Martinez end, looking north toward the bridge visible in the background.

Motor Vessel *Carquinez* and the end of the oldest ferry service in the Bay area, which had been in operation for 115 years. (See "Last Ferry" on page 5.)

Long envisioned by civic and state officials and highway planners, the new bridge is another important link in the interstate highway system and will provide an outlet to the north for one of the fastest growing areas in California. It provides a direct connection to the Sacramento Valley and points east and north for cities such as Martinez, Concord, Walnut Creek, Dublin and San Jose, as well as metropolitan Oakland.

As a section of Interstate Route 680, it also constitutes a key link in the circumferential freeway route around the San Francisco Bay area which includes U.S. 40 and the proposed Junipero Serra Freeway on the Peninsula.

Constructing of the bridge was made possible by the Legislature in 1955 when it authorized the California Toll Bridge Authority to issue $80 million in bonds to finance a second parallel Carquinez Bridge and the Benicia-Martinez Bridge.

The second Carquinez Bridge was completed in November 1958. First contract on the Benicia-Martinez Project was awarded in August 1959.

The Benicia-Martinez Bridge has four lanes of traffic with a 10-foot-wide median separating opposing lanes.

It has a 138-foot vertical clearance for navigation.

Some novel money- and time-saving methods were used in construction of the bridge. For example, the concrete pier footings were built on shore, floated into place, anchored and sunk into position.

The concrete piers were constructed by the new slipform method, a 24-hour continuous operation in which the form was jacked up at the rate of about 10 inches an hour until the 100- to 130-foot-high stems were completed.

The major contracts in the construction of the bridge were a $5,769,000 contract for the substructure and an $8,469,000 contract for the superstructure, both awarded in August 1959.

Last Ferry

Benicia-Martinez Service Ends After Opening of New Toll Bridge

By J. J. TEUSCHER, Administrative Section, District X

On September 15, 1962, the Benicia-Martinez Ferry made its last trip across the Carquinez Straits. This date marked not only the end of the state-operated ferry system, but also the end of 115 years of ferry service in the San Francisco Bay area (except for a new Tiburon commuter vessel). On that date the new Benicia-Martinez Bridge was opened to the public.

In 1847 General M. G. Vallejo deeded a portion of his holdings on the Carquinez Straits to Dr. Robert Semple and Mr. Thomas O. Larkin for $100 on the condition that (1) the city to be established there be called either Francisca or Benicia, and (2) that a ferry be established to belong to Robert Semple until 100 families lived in the town—then the proceeds were to be devoted to the public schools.

General Vallejo's stipulations were immediately carried out. The town was named Francisca (shortly to be renamed Benicia) and a ferry was put into operation. The first ferry was a scow built by Charles Heath for Dr. Semple. Since the currents in the Carquinez Straits were very strong, the ferry would usually end up down-

The M.V. *Carquinez* has been sold to the State of Florida for $86,001. It will be used as a part of the State of Florida's ferry system across the mouth of the St. Johns River on the Atlantic Coast east of Jacksonville.

The "Carquinez" makes one of her last runs across the strait between Martinez and Benicia.

stream some distance from Benicia forcing the customers to walk back to the town. The second ferry was a sloop-rigged vessel with a green bow and long protruding horns (appropriately named the *Green Horn*). The second ferry improved on the service by landing not so far downstream.

Rate for Horses

Of interest is the following item in the July 31, 1847, issue of the *Californian* published at San Francisco:

"*Ferry at Benicia City*

In establishing the rates of ferriage across the Bay, I have reference to the gentle horses which might be led onto the boat. But as wild horses and mares have to be hauled in, I have been under the necessity of charging fifty cents each, more than for tame horses."

Preceding this appearance of this article an event of note took place during a routine crossing of the straits. A sudden squall appeared, causing the boat to pitch. Some of the horses became alarmed and started to kick. Part of the boat gave way, plunging the horses into the water. Many were drowned while some others reached shore. Among the ones that reached land was General Vallejo's prize white mare. General Vallejo promptly called the island on which she landed, "Isla de la Yegua" or "Mare Island."

With gold excitement at its height in 1849, Semple's ferry became a very profitable enterprise. He averaged $50 a day even though he had to operate the ferry by himself—his help had taken off for the gold fields. He was offered $3-$5 per man to cross the straits and had up to 30 customers waiting at a time.

First Steam Ferry

In the early 1850's, Captain O. C. Coffin operated the first steam ferryboat across the straits. He later built this up to three boats and continued operation until the Central Pacific Railroad built its train carrying ferries. Also in the early 1850's, Semple had constructed a steam ferryboat which he named the *Colusa*. The steam engines for the boat were not of the same size, but with cogwheels and other necessary parts, the men thought they had the powers of the engines equalized. As the boat started to move, the larger engine overpowered the smaller one, thus moving the boat in a wide circle. The mechanical difficulties were soon corrected and the boat proceeded to Colusa. Her first trip was her last—the engines were disposed of and she was converted to a barge.

When the Central Pacific Railroad put into operation its two huge ferries in 1879, the railroad distance between Sacramento and San Francisco was reduced by 60 miles. These two ferries, the *Solano* and the *Port Costa* were the largest in the world. The *Solano*, carrying both passenger and freight trains, was 420 feet long, 116 feet wide, and 17 feet high. It had a displacement of 5,450 tons and could carry 2 locomotives and 24 passenger cars or 2 locomotives and 36 freight cars. The *Contra Costa* was added to the service in 1914. It was 13 feet longer and 2 feet higher than the *Solano* and had a displacement of 7,198 tons.

Funds Provided

When Captain Coffin was forced to give up his ferry line between Benicia and Martinez due to railroad competition, the two towns were without a direct connection until the State Legislature provided funds for connecting the several county seats with state highways. State Sign Route 21 was entitled to some of these funds as it connected the county seats of Fairfield, Oakland, San Jose and Martinez.

In 1915 the Martinez-Benicia Ferry Company operated the paddle-wheel boat *City of Seattle* (built in 1888). It was operated until 1943 until taken over by the U.S. Navy for use between Mare Island and Vallejo. The company built the *City of Martinez* in 1917, which was used until 1929 when it was replaced by the *Issaquah*.

The American Toll Bridge Company took over the ferry system in 1929 and operated it until 1939 when the State of California bought the Carquinez and Antioch Bridges and announced that it would no longer operate the ferry, as traffic would be diverted across these two bridges. Objections were raised to this plan so the ferry was offered to Solano and Contra Costa Counties, the Cities of Benicia and Martinez, and to the ferry employees, in that order. Subsequently the ferry system became the property of the City of Martinez.

Ferries Traded

The City of Martinez traded the *Issaquah* for the *Charles Van Damme* and also acquired the *City of San Rafael* from the government. After World War II the *Charles Van Damme* was tied up and the *City of San Rafael* became the regular ferry. With the condemnation of the *City of San Rafael* in 1953, the year the State of California took over the ferry as part of the state highway system, the *Charles Van Damme* was the only ferry in operation across the Carquinez Straits. In 1955 the *Charles Van Damme* was damaged and subsequently condemned.

From early in 1955 to late in 1956 the only ferry between Benicia and Martinez was a passenger ferry. In November 1956 the *Carquinez* was built and placed in service until the cessation of ferry operation September 15, 1962.

It is estimated that more than 4 million vehicles have crossed the Carquinez Straits between Benicia and Martinez since the system started. It is not possible to estimate the number of individual passengers who have made the crossing but the figure would undoubtedly exceed 6 million for the 115 years of operation.

NOTE: The author is indebted for many of the historical facts in this article to LeNoir Miller's "Railroad Ferry Days" in the Benicia Arsenal Magazine, March 1951, and to Jacqueline McGart Woodruff's book *Benicia—the Promise of California*, 1947.

EMPLOYEES REASSIGNED

All 24 of the men employed on the Benicia-Martinez Ferry which discontinued operation on September 15 have been offered other jobs with the State Division of Highways, and 19 of them have accepted.

Personnel Officer Marian Smith of the division said that as a result of several months of conferences between highway officials at the Stockton district office and the ferry employees, jobs were located for the 19 who were interested. Of the remaining five, two are retiring from state service and three have resigned for other employment.

After the shutdown of the ferry service the men will transfer to jobs as drawbridge operators, Sacramento Delta ferry operators, or highway maintenance men (two of them on the new toll bridge).

Redlands Freeway

New $16,000,000 Project Serves Local, Interstate Traffic

By W. H. CRAWFORD, District Construction Engineer

Completion of two large-scale projects for freeway construction by Matich Constructors and W. F. Maxwell Company; and Fredericksen & Kasler and Gordon H. Ball, Inc., have ended continuing traffic problems on U.S. 70-99 through the Redlands–Loma Linda area.

Weekend peak flows between the Los Angeles metropolitan area and the desert resort areas around Palm Springs and Twentynine Palms have long suffered from traffic congestion in the Redlands area due to the traffic signal controls and restricted speed zones. The accident rates for sections of the now superseded highway have been higher than the statewide rates for similar types of highways.

These projects, which extend the freeway on U.S. 70-99, a distance of 10.8 miles from the intersection with U.S. 91-395 south of San Bernardino to 0.9 mile east of the city limit of Redlands, provide six lanes of pavement for this major transcontinental route, also designated as Interstate Route 10.

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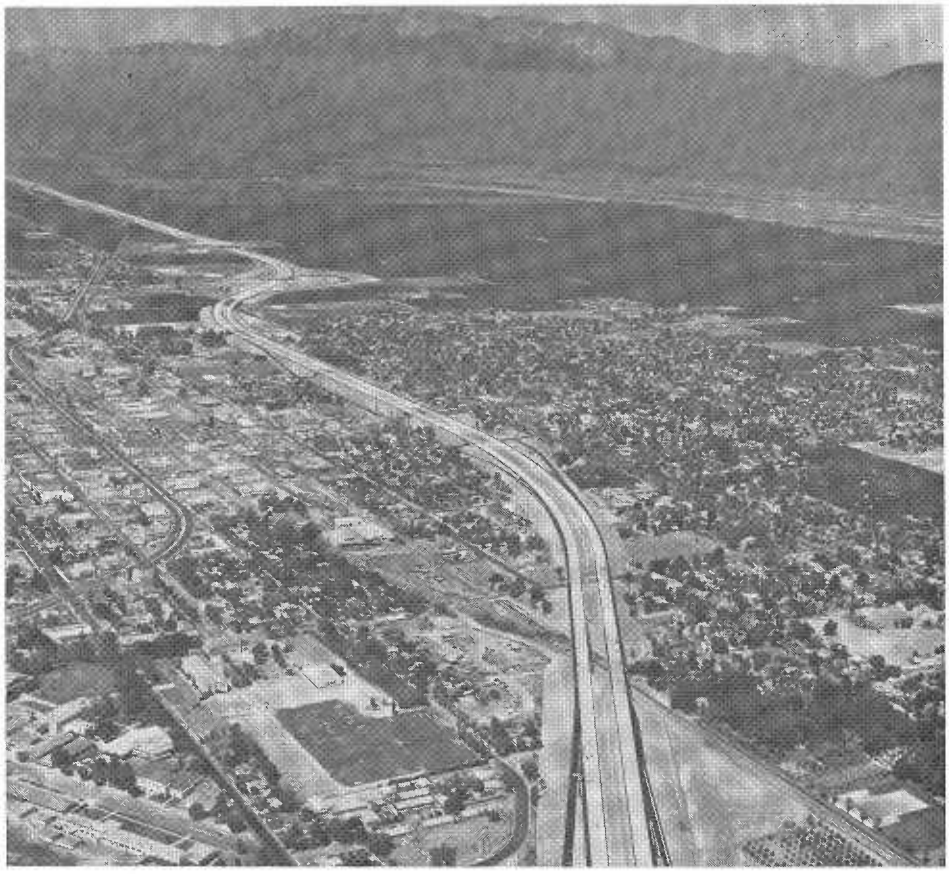
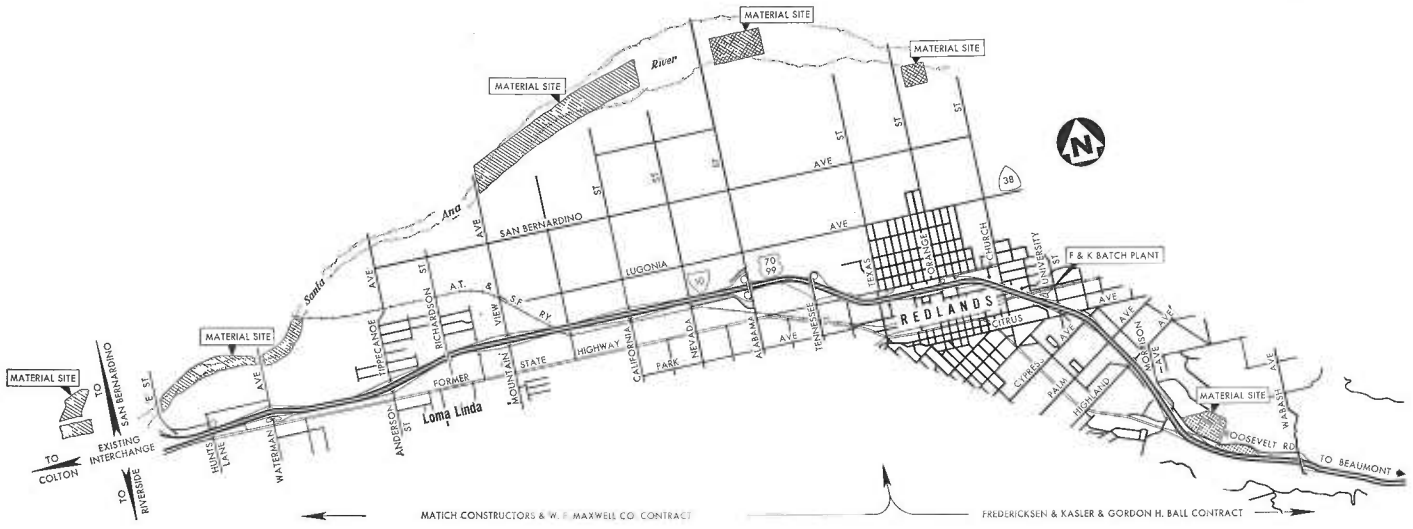
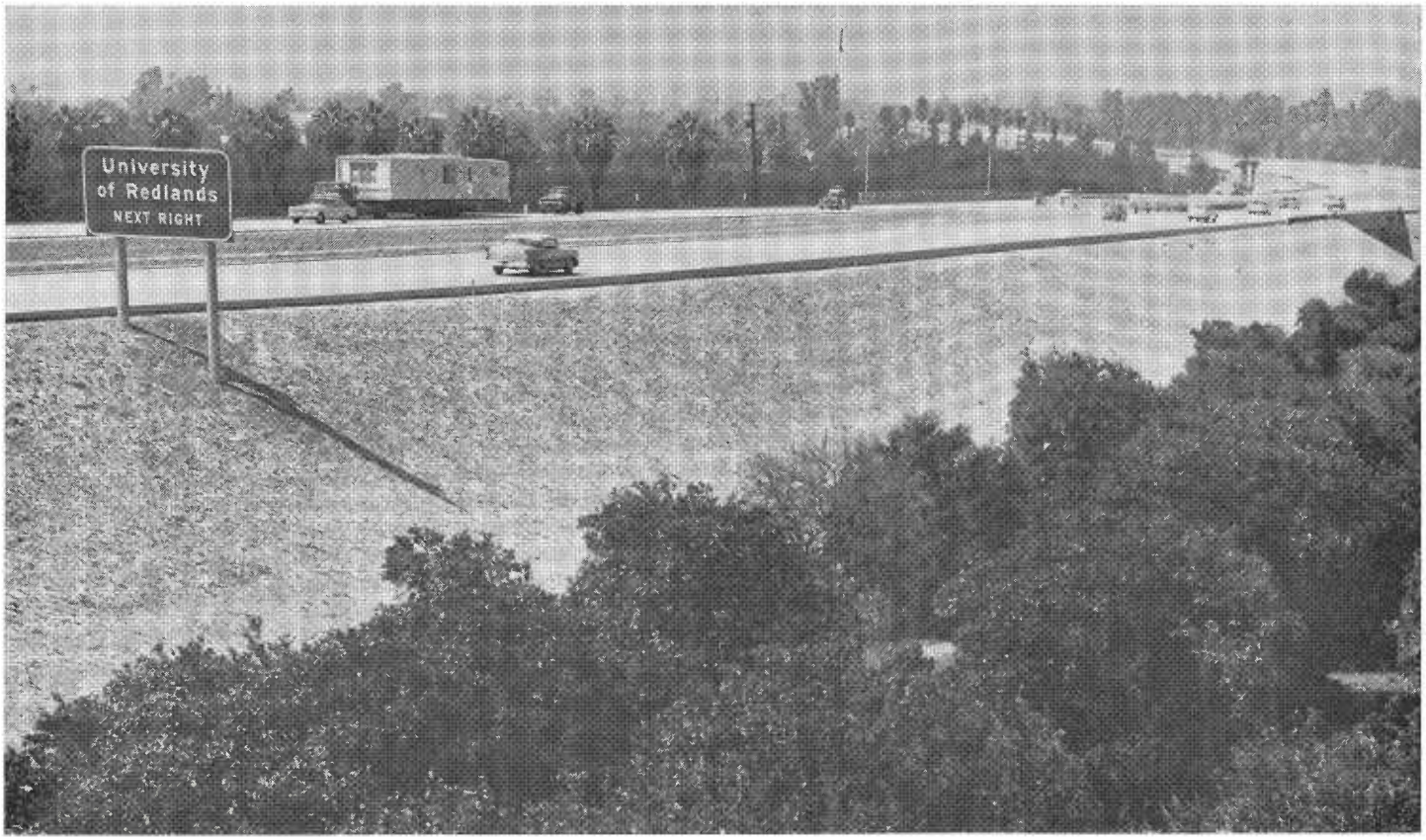


This aerial, looking northwest from above the University Street undercrossing, shows the completed freeway through Redlands and the San Bernardino Valley in the distance. The old four-lane highway is to the left.



A map of the freeway through Redlands and the Loma Linda area. Location of the materials sites used during construction are also shown.

BEFORE—US 70-99 through Redlands before the freeway was completed. The photo shows westbound traffic held up by the traffic signal at Waterman Avenue.



AFTER—Traffic moves along the new freeway near the Palm Avenue undercrossing.

REDLANDS FREEWAY

Continued from page 7 . . .

Two Contracts

The two contracts, which were opened to traffic with impressive ribbon-cutting ceremonies on August 28, 1962, complete 68 miles of continuous full freeway on Interstate 10, from downtown Los Angeles to 2.6 miles east of Redlands. Easterly on this interstate route, for a distance of 58 miles to Indio, the highway is either full freeway or divided expressway which is rapidly being converted to full freeway standards. Construction to full freeway, for a distance of 6 miles east of Banning, is provided in

. . . Continued on page 10

EDITOR CITES ADVANTAGES OF ELEVATED FREEWAY IN REDLANDS

The following editorial, headlined "The Beautiful Freeway and Redlands Future" was published in the August 29, 1962, issue of the Redlands *Facts*. It is reprinted by permission of Frank E. Moore, editor:

To anyone riding on the new freeway through Redlands, the most characteristic reaction will be "my, what a beautiful town." The freeway shows off Redlands like no other route in the community. For the first time since Smiley Heights was closed to the public, the motorist views Redlands in its full glory.

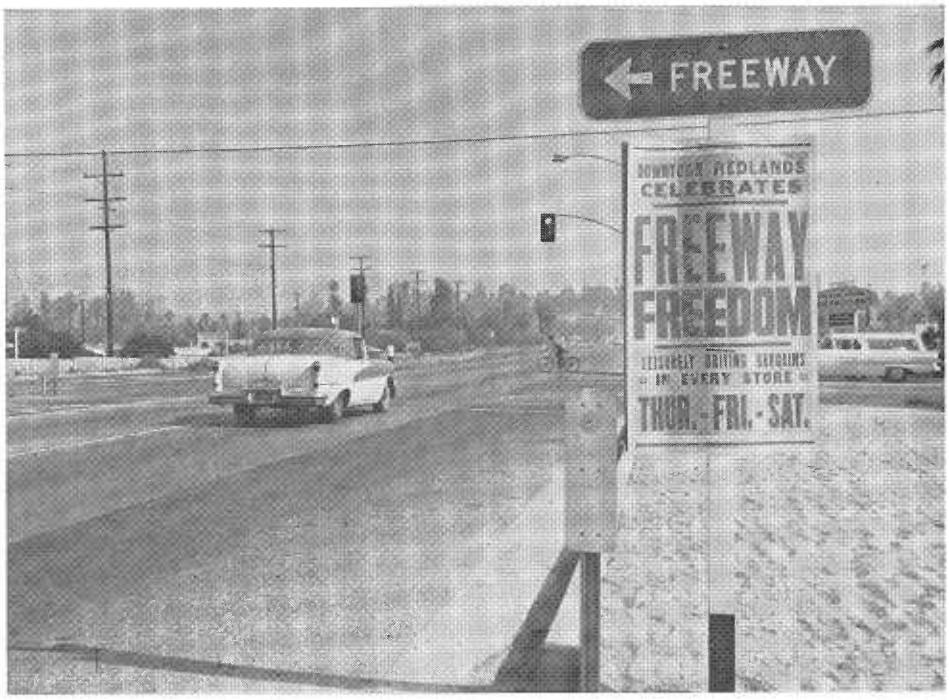
The landscaping of the freeway is now being planned. Like any roadway there are a few eyesores along the way, but these will be screened by plantings envisioned by the City Park Commission and the State Division of Highways. In its final form a few years from now, this will be one of the most beautiful stretches of roadway in the West.

What this means for the future is not too difficult to imagine. Redlands from the freeway will be its own best advertisement. How many people will it beckon? Drive around Southern California and then make your own guess. It will be plenty, but let us hope they don't come in a deluge.

For the economy of Redlands, the long term advantages of the freeway will be important. The through traffic with its noise and hazards will be above town. The city will no longer be divided by masses of cars and trucks that have crowded Highway 99 much of the time. Now it will be possible to cross town conveniently and safely.

This will return the downtown district from City Hall to the Colton avenue hill, to Redlands. It will no longer be sliced by the Highway.

Some businesses which cater to highway traffic may feel an adjustment for a while, but the pattern elsewhere has shown that the long term result is favorable.



Old US 99 in Redlands following the opening of the freeway. Redlands business men are "sold" on the benefits of the freeway to their city and have put up signs such as this one telling everyone so.

The freeway will cause changes in traffic patterns in the community. The on and off ramps and the arterials leading to them will stimulate new driving habits for many a Redlander. This will mean new residential and business developments.

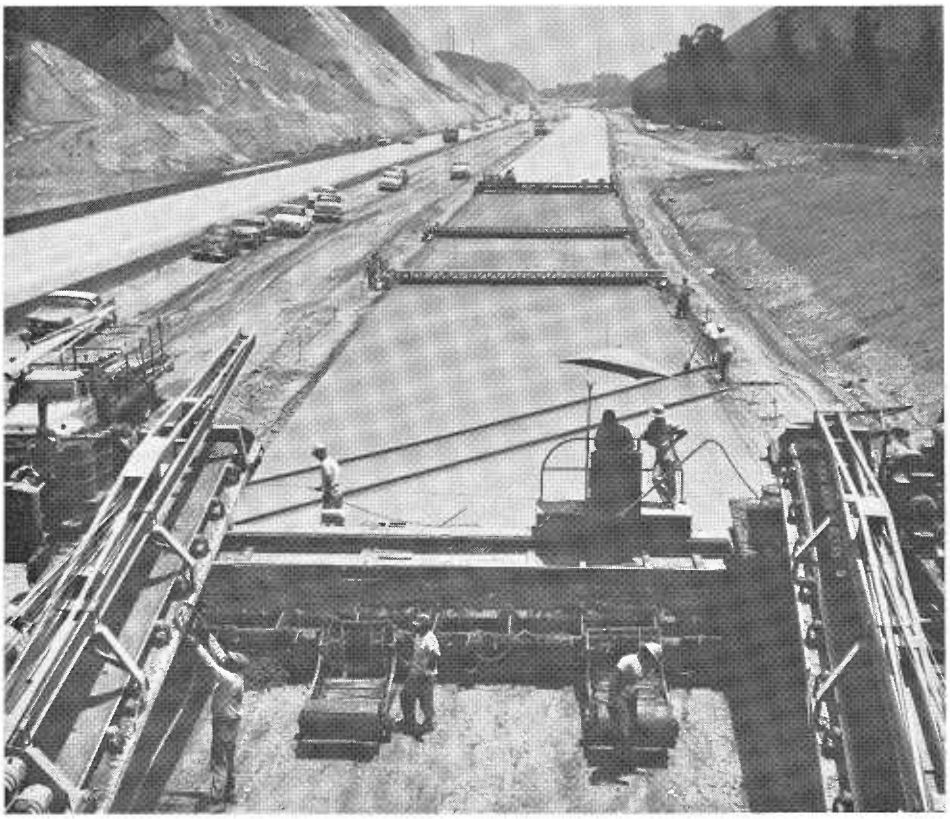
As Redlands faces the future, it is appropriate to note that this extraordinary roadway would not have been built on such an excellent route had it not been for the officials of the city of Redlands and for the city planning department which first had the courage to originate it.

To anyone who followed the developments of the freeway over a 10-year period, it is a marvel that it was possible to reach such a satisfactory outcome. Redlands of tomorrow will be grateful for the judgment exercised by public officials of city, county, the State Division of Highways and Highway Commission. A word, too, should be said for the civic leaders who played such an important role in helping to reach a solution to one of the knottiest problems that confronted Redlands in its 75-year history.

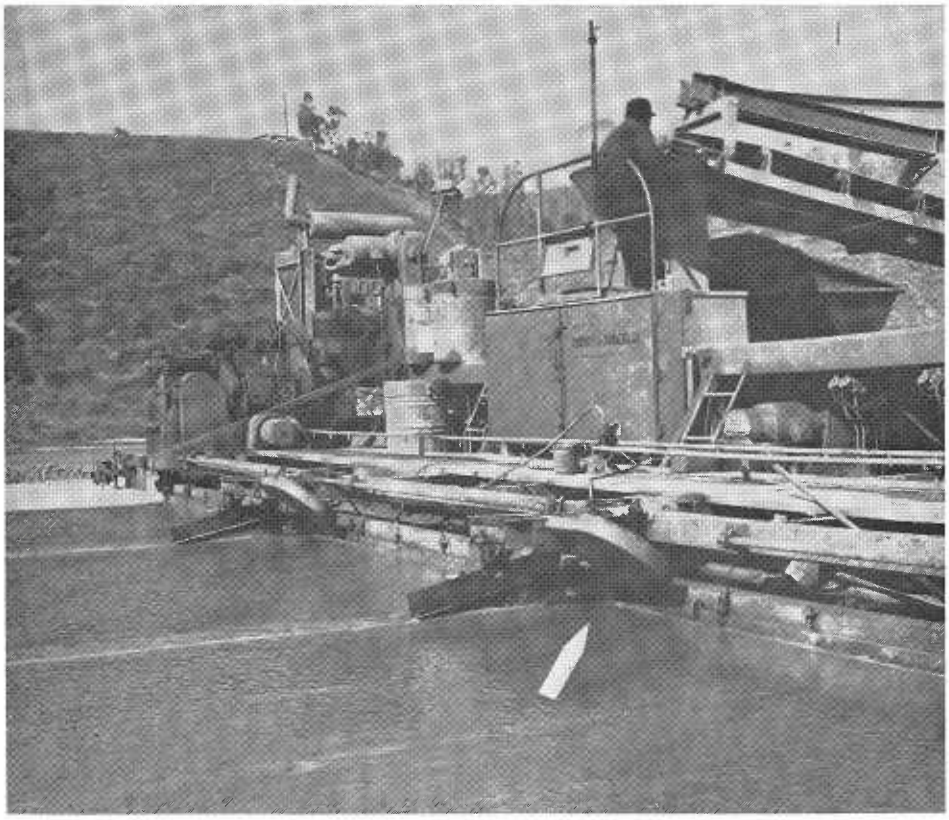
The freeway through Redlands cost $7,946,638 plus the cost of the right of way. The stretch from Redlands to the Octopus cost $6,839,180. Right of way for the two jobs ran to $7,100,000. This expenditure of $23-million is the largest public expenditure to be made in this area in history.

There will be additional costs of improving local connecting streets such as Tennessee street and Ford. This will come in time as the traffic creates the demand.

Taxes on highway users pay the bills. In return, the driving public has a roadway that will be universally proclaimed superb.



FREEWAY CONSTRUCTION—A slipform paver fed by two dual-drum mixers paves three lanes with one pass. Shown successively back of the paver are the pipe float, burlap drag and spray outfit for application of curing membrane.



FREEWAY CONSTRUCTION—This slipform paver carries vibrating plates and drums of plastic tape (white arrow) for longitudinal joints.

REDLANDS FREEWAY

Continued from page 9 . . .

the current state highway budget with construction expected to begin this winter.

The westerly of the two projects that were opened to traffic simultaneously on this freeway was the contract between U.S. 91-395 and Colton Avenue. Under contract to Matich Constructors and W. F. Maxwell Company for $7,500,000, it stretches 5.8 miles and has been under construction since February, 1961.

The new alignment runs north of and is approximately parallel to the existing highway. It passes north of the business district of Loma Linda. Eleven bridges are required on this unit to separate cross traffic.

The major contract items included 192,000 cubic yards of roadway excavation, 4,350,000 tons of imported borrow, 200,000 tons of imported subbase material, 127,000 tons of untreated base, 233,000 square yards of concrete pavement, 21,100 cubic yards of bridge concrete and 5,100,000 pounds bar reinforcing steel.

The materials for the embankments and construction of subbase were obtained from the nearby Santa Ana River. Arrangements for one source from which the Contractor obtained 600,000 tons of material were made by the State. From other sources arranged for by the Contractor, 3,950,000 tons of material were obtained. These material sites in the Santa Ana River were excavated to lines and grades established by the San Bernardino County Flood Control District with resulting excavations conforming to county plan for future channel development.

Total daily production during the period of heavy earthmoving operations averaged 29,500 tons per day. This was accomplished by using two separate spreads, one from the state-designated source and adjacent areas (scraper haul), and one from contractor-developed source between extensions of Mountain View Avenue and Nevada Street (truck haul).

The average production for the scraper operation was 12,000 tons per eight-hour day. Ten rubber-tired scrapers were used for hauling with

two large crawler tractors used in the excavation as push loaders.

The average production from the contractor-developed source was 17,500 tons per 10-hour day. The material was pushed to belt loaders with bulldozers. Bottom-dump trucks were used for hauling.

A substantial increase in the speed of the operation at this source was achieved by use of a truck scale with an in-motion weighing device. By means of an electronic attachment, it was possible for the trucks to proceed across the scale platform at reduced speed and, without stopping, register the weight of the load. The scale provided duplicate tape records of the weights, one for the State Division of Highways and one for the contractor.

Pavement Widths

The 36-foot width of concrete pavement on this contract was placed with a Lewis slip-form paver. The two outside lanes, 24 feet in width, were placed monolithically. The adjacent inside lane was later placed with the paver reduced to a 12-foot width. To obtain pavement grade, this machine depends upon the smoothness of the subgrade and the straight edge characteristics of its tracks. The screed is rigidly set for depth of pavement required. A six-inch-diameter pipe float was operated manually behind the paver to improve the smoothness of the finished pavement. Smoothness specifications for the completed pavement permitted 0.01 foot deviation from a 12-foot straightedge longitudinally and 0.02 foot transversely. High spots were ground off with a concrete bump cutter. The riding qualities of the pavement are very good, with an average reading of 2.0 inches per mile, as determined by the California profilograph. Daily production of concrete was 1,200 cubic yards for the 24-foot width of pavement and 1,000 cubic yards for the 12-foot width.

Job superintendent for the contractor on this contract was Ed Morris. The State was represented by Paul Kirst, resident engineer, and Don Alden, Bridge Department.

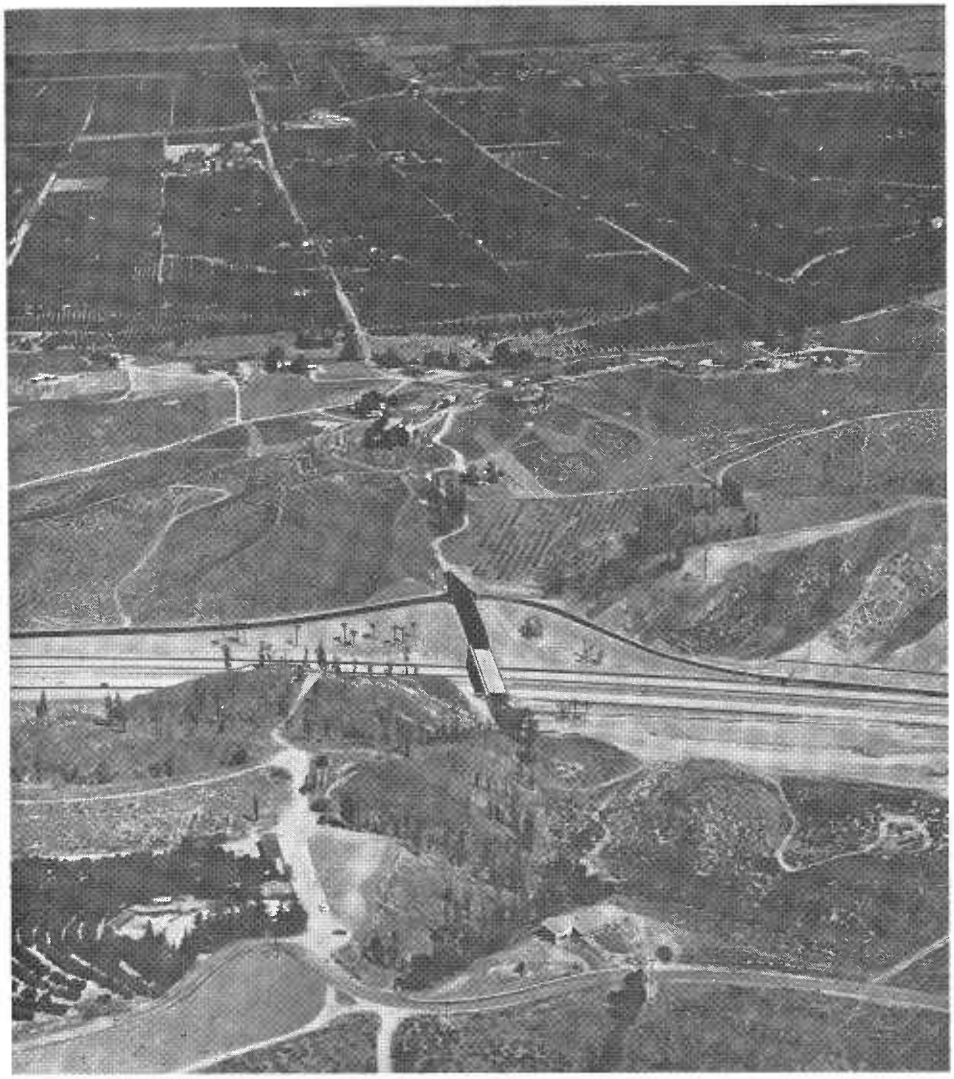
The easterly unit of this freeway extends through Redlands on new alignment from Colton Avenue to 0.9 mile beyond the east city limit, a distance of approximately five miles. Construction of this unit, under $8,500,000 contract to Fredericksen & Kasler and Gordon H. Ball and Gordon H. Ball, Inc., was begun in April 1961.

LANDSCAPING—Planting palm trees at the University Street overcrossing along the new freeway.

Fifteen major structures are required on this project to separate cross traffic and provide adequate interchange facilities. At one of these structures, the Colton–New York Undercrossing, record concrete pours were made.

The structure provides two separated roadways 66 and 68 feet in width. It is a four-span, reinforced-concrete, box-girder bridge about 380 feet long supported on reinforced-concrete column bents and abutments. The box-girder section is 6.5 feet deep. On January 23, 1962, the soffit and stem pour was made for the right bridge. The contractor placed 1,527 cubic yards of concrete between 3.30 a.m. and 7.30 p.m., a total of 16 hours. During the early hours of darkness, concrete was end-dumped from the trucks at the abutments and was wheeled over ramps from the hopper in 15 buggies. The hand-operated buggies placed about 350 cubic yards during the day in an area directly beneath low overhanging high-tension wires. Beginning at about 6 a.m., five truck cranes, each with two concrete buckets, began work. During the final hour and a half, the remaining concrete was placed with a single truck crane.

The pour was made difficult by the overhead wires and traffic on Colton Avenue. For 80 percent of the time, the cranes had to be spotted at the street level below with placing done by signaling from the deck level.



Looking north over the Wabash Avenue Interchange. The new freeway in this section (left to right) follows the general alignment of Reservoir Canyon.

Concrete was batched from two batch plants located a few miles away on Alabama Street.

On March 27, 1962, the soffit and stem pour was made for the left bridge. The contractor placed 1,598 cubic yards of concrete between 5.00 a.m. and 5.30 p.m., a total of 12½ hours. The pour proceeded the same as above, except that only four truck cranes were used. About 400 cubic yards were placed with the buggies. A factor which contributed to the decrease in placing time over that in the other pour was the spotting of two of the cranes on the deck slab of the right bridge.

There are approximately 750 cubic yards in each of the two top deck slabs. Because of the large area and excessive widths, a longitudinal construction joint was placed in each deck providing for four pours of about 375 cubic yards each.

Pours Believed Largest

Each of the above soffit pours of 1,527 cubic yards and 1,598 cubic yards is believed to be the largest single concrete pour ever made on a state bridge structure of the box-girder type. It is also believed that the previous largest pour (also made by Fredericksen & Kasler) was 1,460 cubic yards.

Other major items of work on this project include 1,300,000 cubic yards of roadway excavation, 59,700,000 station yards overhaul, 2,152,000 tons imported borrow, 106,000 tons imported subbase material, 95,500 tons untreated base, 288,000 square yards concrete pavement, 34,800 cubic yards bridge concrete and 8,100,000 pounds reinforcing steel.

In addition to the roadway excavation amounting to 1,300,000 cubic yards, it was necessary to import 2,258,000 tons of material to complete construction of the embankments and provide material for subbase, 1,511,000 tons were obtained from optional sources arranged for by the State and 747,000 tons were obtained from sources developed by the contractor.

During full-scale grading operations on the Fredericksen & Kasler contract, the production of roadway excavation was 15,200 cubic yards per day and the production of imported borrow averaged 11,900 tons per day. The roadway excavation was moved with 12 rubber tired scrapers. Two large crawler tractors were used to assist in loading. The imported borrow was hauled with 20 bottom-dump truck and trailers. Three dozers and a modified loader were used for loading the vehicles.

One Operation

On this contract, the 36-foot width of concrete pavement was placed in one operation with a Guntert & Zimmerman slip-form paver. During this one-pass operation, the longitudinal joints at the lane lines were also formed by insertion of a polyethylene plastic strip two inches in depth in the fresh concrete.

An important distinguishing characteristic of this paver is the electronic guidance system which maintains the machine on predetermined alignment and grade for the completed pavement. Guidance is accomplished by use of sensing elements which operate along tensioned piano wires preset at constant lateral and vertical offset from the pavement edge.

As on the adjoining project, a six-inch pipe float was manually operated behind the paver to improve the smoothness of the finished pavement. The same specified tolerances for smoothness also were in effect.

The production with two mixers averaged 2,250 cubic yards of concrete per day. The riding qualities of the pavement are excellent with an average profilograph reading of 1.5 inch per mile. The overall range for daily runs was from 0.3 to 4.0.

Freeways & Cities

State Engineers Right, Say Banning, Beaumont

(Editor's note: The following article, originally in two installments, appeared in the July 15 and July 22, 1962, issues of the Riverside *Press-Enterprise*. It was written by George Ringwald of the *Press-Enterprise* staff.)

It's taken a while, but the San Gorgonio Pass Communities of Banning and Beaumont have learned what the State Division of Highways engineers has said all along: Freeways that by-pass a community don't hurt the town's business—they help it.

The lesson hasn't been brought completely home yet in Beaumont, because the first shock hasn't quite worn off; it is not quite a year since the state opened the new freeway routing of Highway 60-70-99 south of the town's business district, and it takes at least a year usually for business to start bouncing back.

Beaumont's neighbor to the east, Banning, appears to have completely recovered.

But then it has been six years now since the freeway route was opened just south of Banning's main business district.

"The first few weeks after it opened," recalled one oldtimer, "it seemed real dead—and very strange to be able to find a parking place on Ramsey Street (which carried the state highway traffic previously. But now the traffic is almost as heavy as before."

Banning's city manager, W. F. Peterson, said: "It's been our experience that the town seems to have continued to grow ever since that thing was put in. There've been very few businesses that have folded up, outside of a couple of cafes that were operating on a shoestring anyway. Shortly after the freeway went in here, we lost one service station, and that was because his lease ran out."

Statistics Prove

Statistics bear him out.

The number of water meters, for instance, has climbed from 3,041 in 1958 to 3,288 in 1959, to 3,562 in 1960, to 3,720 in 1961. The number of commercial electric meters has shown a similar steady climb—from 479 in 1958, to 488 in 1959, to 515 in 1960, to 519 in 1961.

In July of 1956, which was when the once-feared freeway opened in Banning, the city's population was 8,628; today it is estimated at 11,300. In 1956, Banning's assessed valuation was under $10 million; today it stands at more than $13 million. Postal receipts have gone up from $117,145 in 1958 to $176,541 in 1961.

This hardly looks like a town that is dying on the vine, as motorists catching a passing glimpse of it from the freeway might suspect.

W. B. Eaton, manager of Banning's Security First National Bank branch, noted that the bank has had a 16 per cent increase in deposits from 1957 to 1961, and a 14 per cent increase in the number of loans.

"And that," added Eaton, who is also vice president of Banning's Chamber of Commerce, "is about the growth of the community, I would say."

One of the town's leading real estate men, Jimmy Thompson said: "For the first six months, everybody said the town was going to die. Now, there's as much traffic as ever, and they're talking about needing a traffic signal on Eighth Street now."

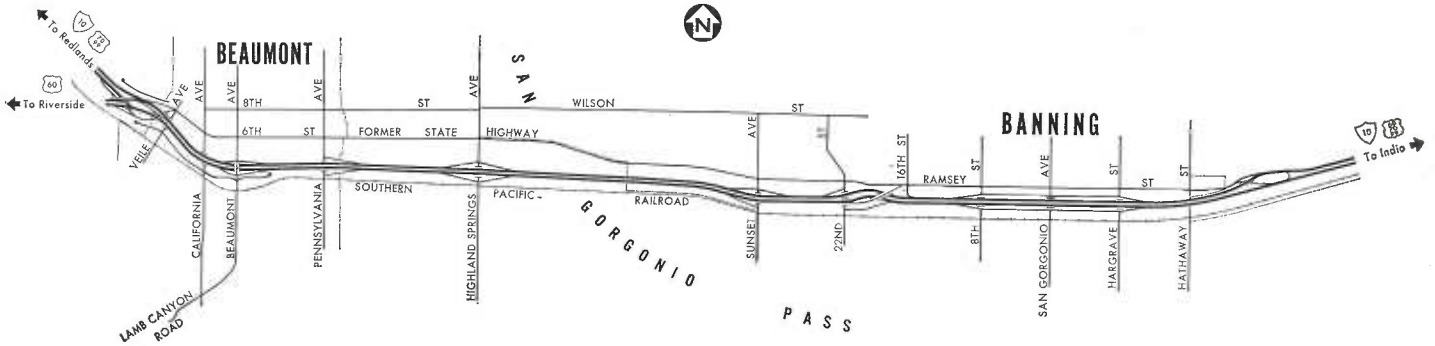
Land Prices Up

Thompson and associate Chester Hendricks, both old-timers in the community, say you can't buy any acreage for less than $2,500 an acre today, and it goes up as high as $7,000, in an industrial zone.

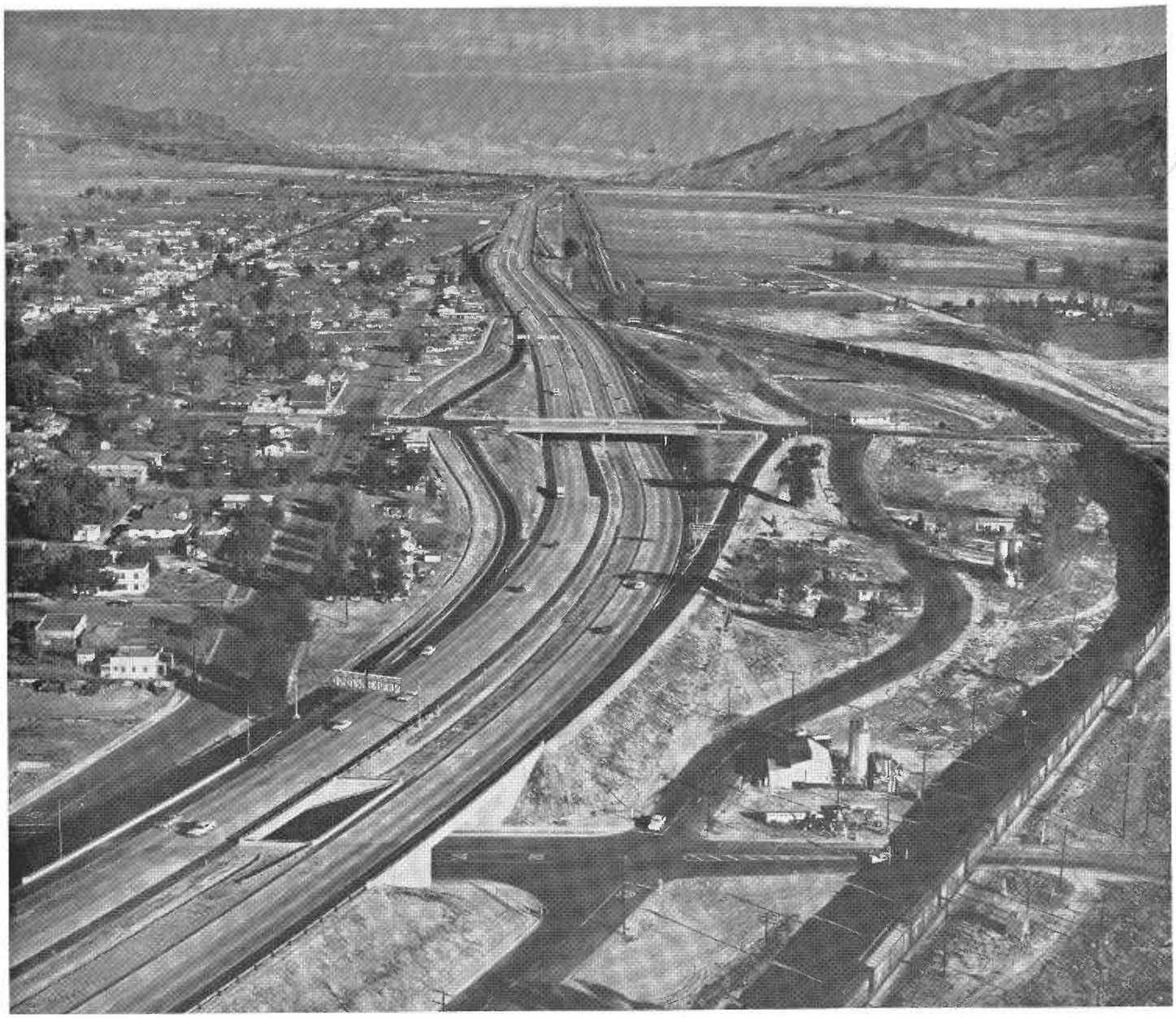
"Seven years ago," said Hendricks, "there was one fellow who sold all of his orchard land for $650 an acre; now, it's priced at $3,500 an acre."

At $2,500 and $3,500 an acre, it is simply not economically feasible to use the land for growing cherries or peaches and apricots, and it is indicative of Banning's growth—which has never been of the spectacular boom type, although it has grown in stature in recent year as an industrial site—that almost all of its 4,000 acres of orchard are now gone—into residential subdivisions, into commercial businesses, into industry.

Even in the hinterland along the highway between Banning and Beaumont, a stretch of several miles of



The San Gorgonio Pass Freeway through the cities of Beaumont and Banning carries all US 60-70-99 (Interstate Route 10) traffic through the area.



The San Gorgonio Pass Freeway, looking eastward. Beaumont is in the left fore and middleground, Banning in the distance. The freeway has taken the through traffic load off the city streets.

mostly undeveloped land, property owners are today asking $2,500 an acre for land that sold for $500 an acre four years ago.

(It is in this sort of no-man's land, incidentally, that the few scattered businesses—a restaurant here and there, a fruit stand, a service station, a motel —were hardest hit by the freeway, since they relied so heavily on highway traffic.

In downtown Banning, business property that was priced at $300 and $400 a front foot before the freeway is now listed at $500 and $600. In the rapidly developing west end of Ramsey Street, business property is listed at $350 a front foot today, and just a few years ago you could have bought it for $50.

Recovery Underway

If Beaumont is not quite recovered from that first shock of the freeway operation, most of the town's businessmen will tell you that it's well on its way. And a drive around town certainly doesn't show any evidence of a business community on the skids; one is, in fact, impressed by the number of attractive new business buildings – a new shopping center, a new savings and loan office, new appliance stores, new service stations.

A market on downtown Sixth Street —the route of the highway traffic before the freeway—is closed, but it was the general trend of development toward the north and east that forced it out, not the freeway.

The city clerk, Bernice Conine, notes that the cancellation of business licenses since the freeway has been neg-

ligible. The city's sales tax receipts did decline since the freeway—from $47,-532 in fiscal 1961 to $46,968 in fiscal 1962—but it was a slight drop, and it could undoubtedly be laid to the falling off at the motels, restaurants and service stations, which are expected to gradually recover.

C. B. Linquist, manager of the First Western Bank in Beaumont, said, "I've seen this happen in other areas where I've been. Like all areas by-passed by freeways, there's a period of adjustment. It hasn't recovered completely, but it will in time."

Actual Help

It is not just that the new freeway routing of 60-70-99 past the twin communities of the San Gorgonio Pass, Banning and Beaumont, has not hurt them—it is that most of the civic leaders and businessmen of the communities feel it has actually helped them.

As Beaumont's Mayor Aubrey Allen expressed it: "All in all, I think it's a good thing. The town will probably now grow along different lines—it's much more satisfactory for our people to be able to come downtown and shop now."

Banning's City Manager, W. F. Peterson said, "I remember back when we had all that traffic, the people who were in that line of cars were anxious to stay in line and get through town as fast as they could. Now, they can get off and park a while and use some of our facilities."

There had been some apprehension in Banning that the freeway would split the town in two. (Although most businessmen wanted the freeway built as close as possible to the old business-highway route along Ramsey Street—rather than farther south along the base of the San Jacinto Mountains, where the state highway engineers originally planned it.) But this hasn't happened.

"In fact," said Peterson, "I consider the railroad more of a detriment to the town than the freeway."

When trains are stopped along the Southern Pacific's tracks through town, Peterson explained, there is not only a tieup of industrial employes wanting to get back to work after lunch, say, but there is the more serious possibility of preventing police or fire protection from reaching the other side of town. An underpass is needed "very badly," Peterson feels.

One Complaint

If there is one complaint that Banning and Beaumont both have, it is that there are not enough off-ramps or that there is not sufficient notice of them to the motorists approaching the towns.

Said Peterson: "People who want to go to Idyllwild or the airport or any of the manufacturing plants—if they miss the Eighth Street off-ramp, they have to go half way to Cabazon before they can get back."

The freeway has done for both Banning and Beaumont what the two communities might have been a long time in doing for themselves—if ever.

In both towns, the route picked (for obvious reasons of economy) was through their worst sections, and it eliminated many of their substandard buildings, both residential and commercial.

As H. E. Flannery, Beaumont's director of planning and building, commented: "It certainly has taken out a lot of old buildings that normally would have taken us a long time to get removed. It has helped to beautify and clean up the town."

The freeway has certainly had no adverse effect on the value of adjacent property—as some feared it might.

One Beaumont real estate dealer, Emil Wohlgemuth, noted, for instance, that a 10-acre parcel lying between the freeway and Beaumont's Sixth Street (the old highway route through town) sold for $40,000 some years back, and is now being held for $200,000.

"I thought it was ridiculous," said Wohlgemuth, "but sooner or later I believe someone will buy it for that."

The general feeling in the two Pass communities was that restaurants, service stations and motels—the businesses relying most directly on tourist traffic—would be the hardest hit by the new freeway routing, and the exception was generally realized, although even in these businesses there are some who feel the freeway helped rather than hurt.

Motel Business Up

Patrick Dundas, a Banning motel owner and president of the town's motel Association, said: "The peculiar thing of it is that the freeway had a good effect. Our business got better after the freeway opened. The first day it opened, it didn't look like there was any traffic at all, but that night we were full. There were people who had come this way and they got so they hated Banning because of the traffic jam."

Beaumont's Mayor Allen said: "Some of the motel operators tell us it hasn't hurt them at all. Salesmen stop off now that didn't before—they like it better because it is quiet."

And ladies attending meetings of the Beaumont Woman's Club on Sixth Street will tell you they're delighted with the change—"you never could hear anything before, for all the truck traffic going by," said one.

There have been a number of restaurants close up on the old highway strip between Banning and Beaumont, but those who didn't panic and could hold on to survive that initial shock that follows for six months to a year after any freeway rerouting will tell you that the business is slowly starting to find them again.

(Some highway businesses, however, are not likely to ever return. The little countryside fruit stands and hot dog stops may be gone forever from the new land of freeways—"a casualty to progress," one Banning businessman called them.)

It is the same story everywhere you go.

"I have a feeling in one sense it's helped," said Beaumont hardware store operator Myrl Beck. "People who didn't like to cross town before with all the traffic, now can come in with ease.

"I really think that in the long run it is going to help us," Beck added.

"When I first came here 32 years ago," he said, "the highway came up Fifth Street. It's moved three times since I've been here and twice before. There've been five different highways through Beaumont and four different business sections, and none of them amounted to anything because we were always waiting for the next move.

"Now," he said, "we can build a business community and forget the highway."

Traffic Relief

Loop Freeways Ease Congestion In Metropolitan Los Angeles

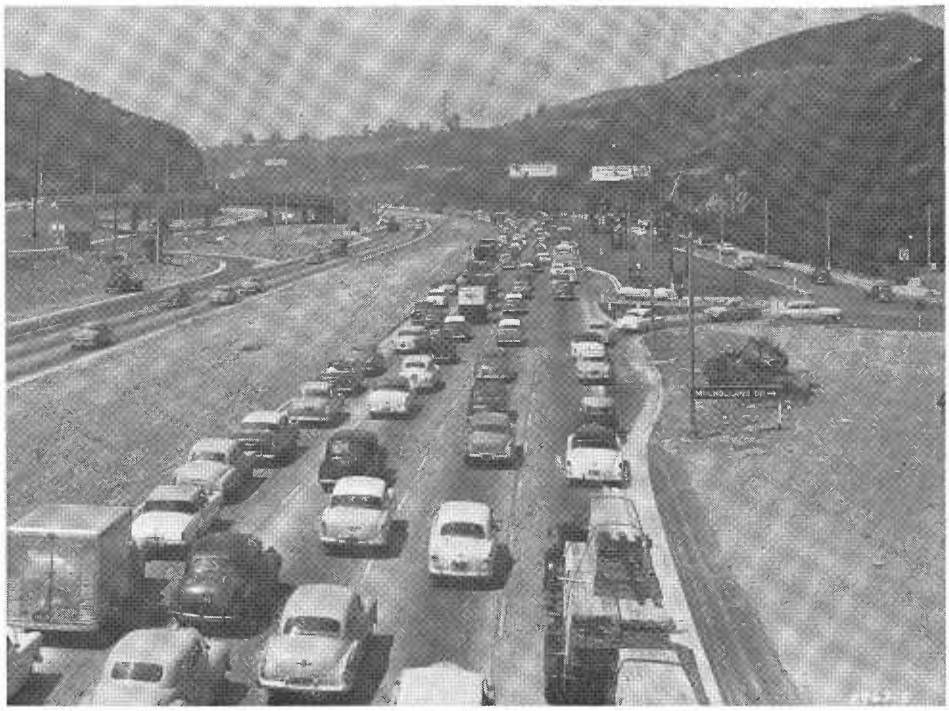
By HEINZ HECKEROTH, Executive Assistant

The recent completion, and opening to traffic, of new freeway segments in District VII has provided many travel alternates on the network in the downtown area. A new high level of service is now afforded metropolitan freeway users; with less probability of interruption of smooth traffic flow due to congestion, and more desirable speeds of operation with resultant travel time savings.

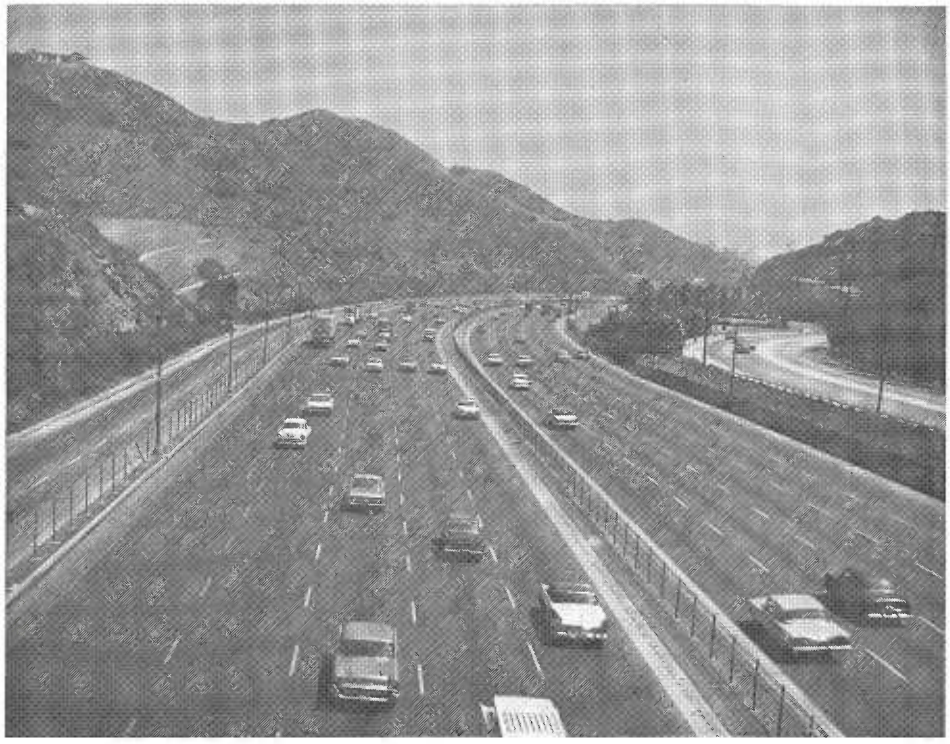
Very significant relief is noted on the Santa Ana Freeway in the civic center "slot area" between the four-level structure and the San Bernardino–Santa Ana Freeway junction. With the option of alternate routes, the slot volume has decreased from an average of 185,000 vehicles per day to 160,000 per day—13 percent less total volume. Peak-hour relief averages 7 percent, creating smoother flow through the area.

The Golden State Freeway, now open from the East Los Angeles Interchange to Lankershim Boulevard in the valley, has virtually eliminated congestion on San Fernando Road and Riverside Drive due to very large diversions to the freeway from these thoroughfares. As a bypass of the downtown area, a very steady growth is noted. When open only from the Pasadena Freeway to Lankershim, the daily volume was 54,000 vehicles per day, but the current volume is 111,000 daily just west of the Pasadena Freeway Interchange. As a truck route, the growth is phenomenal, an increase of 40 percent over earlier truck volumes while Hollywood Freeway trucking has decreased by 16 percent.

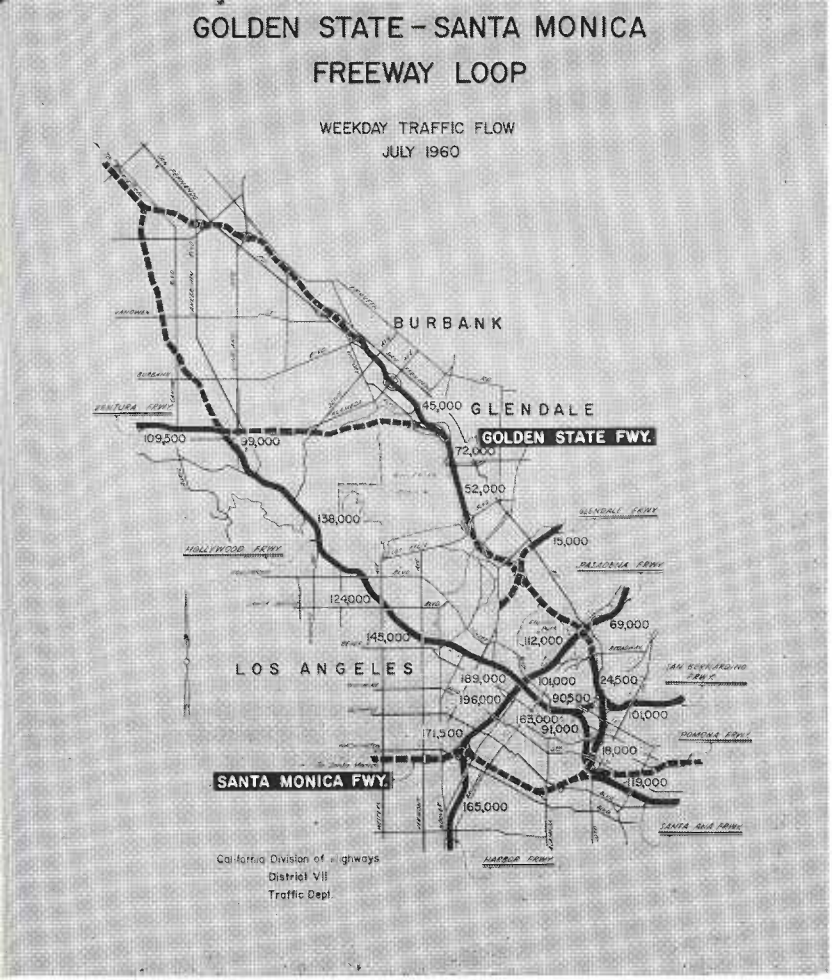
Total volume on the Hollywood Freeway has not decreased, but traffic flow is smoother due to the alternate routing now available; offpeak relief is very noticeable, and because of lesser demand through the "slot,"

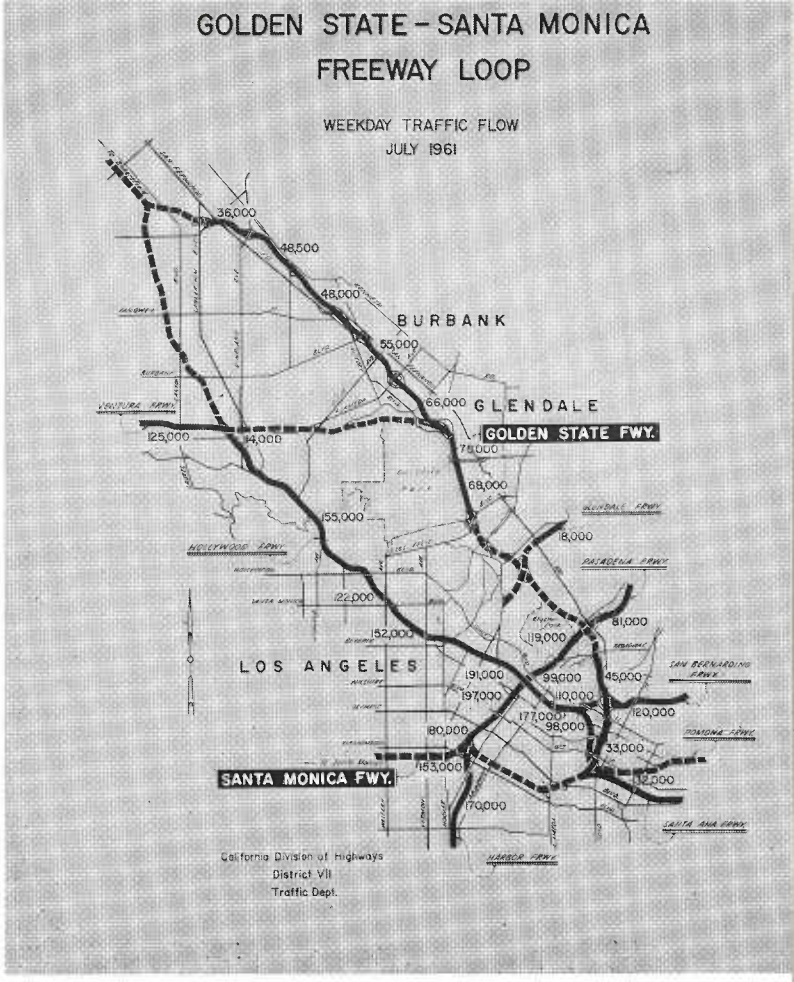


BEFORE—Traffic congestion on the Hollywood Freeway in the Cahuenga Pass before it was widened.

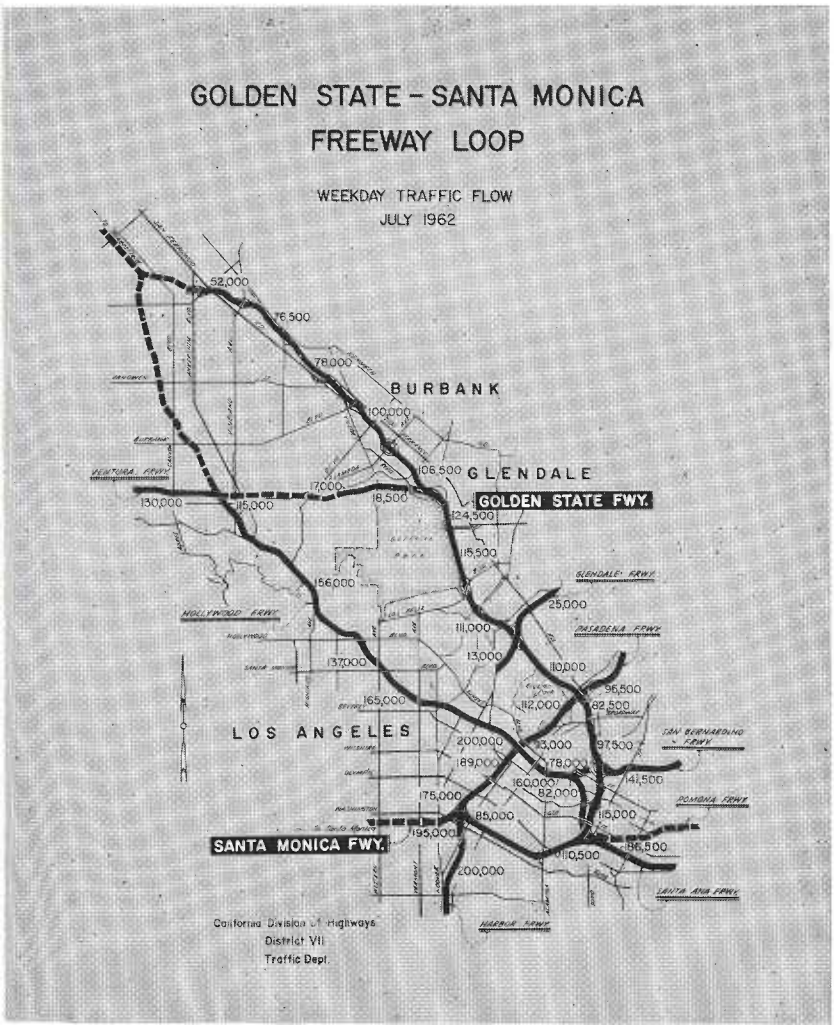


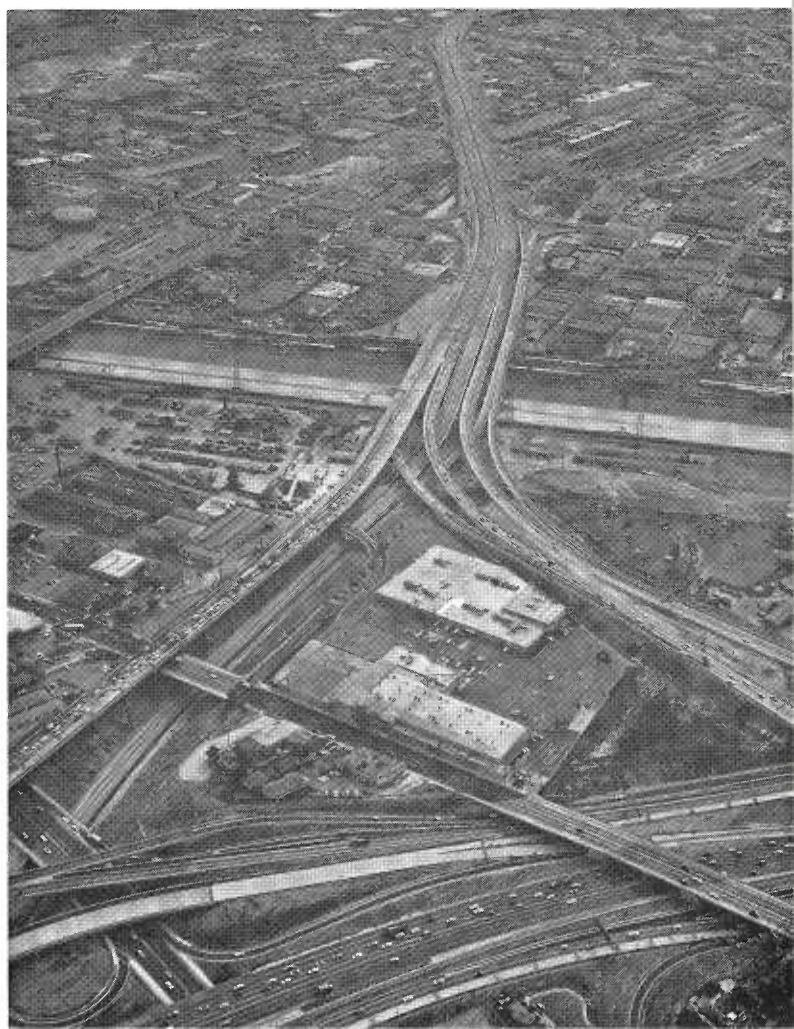
AFTER—The Hollywood Freeway in the Cahuenga Pass after it was widened to five lanes of traffic each way. Note the median barrier fence dividing the roadways.





MAPS ABOVE AND BELOW LEFT show the change in weekday traffic counts during 1960, 1961 and 1962 at specific locations as portions of the Loop Freeway system were completed and opened to traffic. PHOTO BELOW RIGHT—The East Los Angeles Interchange where the Santa Ana, Santa Monica and Golden State Freeways converge.





The Santa Monica-Harbor Freeway Interchange, a part of the Loop. The view is eastward. The section of the Santa Monica Freeway in the final stages of construction when this photo was taken (foreground) is now open to traffic as far as Vermont Avenue.

Looking north along the Golden State Freeway section of the Loop. In the foreground is the Elysian Viaduct and Pasadena Freeway Interchange.

peak-hour flow is likewise smoother and less congested.

The Santa Monica Freeway, closing the "loop" between the East Los Angeles Interchange and the Harbor Freeway, has made a tremendous contribution. Volumes have steadily grown since the opening of the last link at the end of March, the current daily average being 97,000.

The opening dates of the various sections of the loop freeway system are as follows:

GOLDEN STATE FREEWAY

Los Angeles River to Alameda Street, length 2.2 miles, opened to traffic in September 1957.

Glendale Boulevard to the Los Angeles River, length 2.5 miles, opened to traffic in December 1957.

Alameda Street to Burbank Boulevard, length 1.3 miles, opened to traffic in May 1959.

Sixth Street to Pasadena Avenue (includes the San Bernardino Freeway Interchange), length 2.4 miles, opened to traffic in March 1960.

The Santa Ana Freeway to Sixth Street, length 1 mile, opened to traffic in May 1961.

Burbank Avenue to Lankershim Boulevard, length 5.3 miles, opened to traffic in July 1961.

Arnold Street to Glendale Boulevard (includes the Glendale Freeway Interchange), length 3.0 miles, opened to traffic in January 1962.

Pasadena Avenue to Arnold Street (includes the Pasadena Freeway Interchange), length 1.0 mile, opened to traffic March 1962.

SANTA MONICA FREEWAY

Hooper Avenue to the Santa Ana–Golden State Freeways (includes the East Los Angeles Interchange), length 1.8 miles, opened to traffic in December 1961.

Main Street to Hooper Avenue, length 1.2 miles, opened to traffic in January 1962.

Oak Street to Main Street (includes the Harbor Freeway Interchange), length 0.8 mile, opened to traffic in March 1962.

Hoover Street to Oak Street, length 0.5 mile, opened to traffic in June 1962.

Kidproof Railings

Safety Offers Challenge On Pedestrian Crossings

By A. L. ELLIOTT, Bridge Engineer, Planning

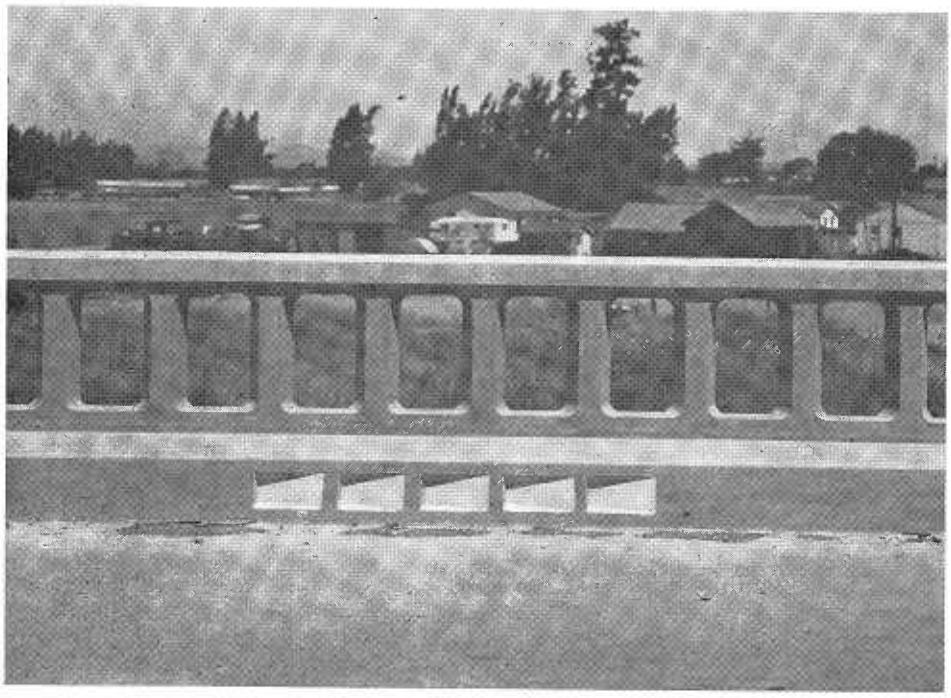
When Tom Sawyer walked along the top rail of a picket fence, his only concern was to be careful lest he tear his pants—for that would certainly have resulted in Aunt Polly tanning his hide. He didn't anticipate the modern day concept that if he tore his pants or impaled himself on one of the pickets, he could then sue the property owner.

Had there been a freeway nearby and had Tom hurt himself because he walked on top of, on the outside of, or crawled through the railing of one of its pedestrian overcrossing structures, Aunt Polly could have brought the matter up as a community issue, asking the state to provide a safe railing for the protection of their children.

What is a safe railing on a pedestrian overcrossing? The meaning of the term seems to have changed over the years. A few years back, a safe railing was one which was high enough and strong enough so that if a person walking beside it stumbled or fell against it, it was high enough and strong enough to prevent his falling through or over. Now, a safe railing has become one which cannot be climbed, cannot be crawled through or on the outside of, one which has mesh small enough so that things cannot be thrown through or over onto the traffic below, yet it still must be open to provide visibility and ventilation. The only feasible solution thus far has been complete enclosure of the pedestrian area with wire mesh, with provision made at the ends so there can be no access to the outside of the cage. A "cage" is just what it is, and it spoils the looks of the structure as well as many of the pleasures of walking across it.

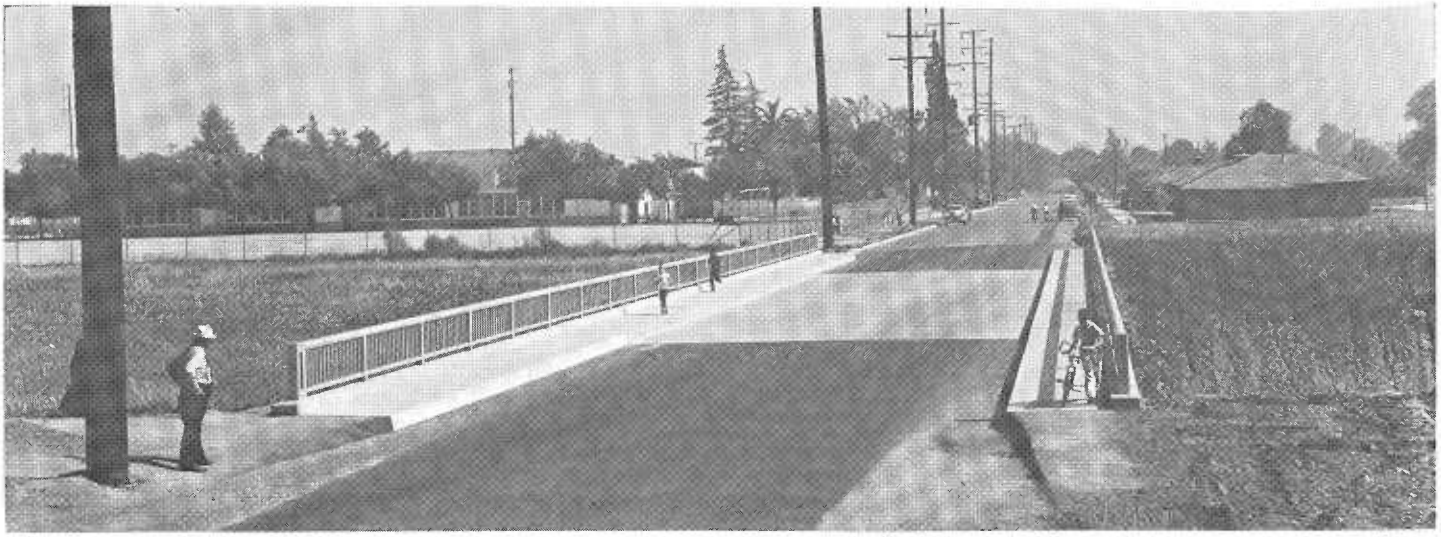
Transition Not Sudden

This transition from an open railing to a cage has not come suddenly. Most of the change has come in the past 10 years. During these recent years there has been a drastic change in the definition of what "safe" means. Actually this is only part of a great social change



A concrete railing of a decade ago. The rail was three feet high and the windows were 10 inches wide.

Here the concrete railing has been faced with a chain link fence so children cannot climb out through the windows and an additional fence has been placed on the edge of the sidewalk to keep them from jumping out into the street.

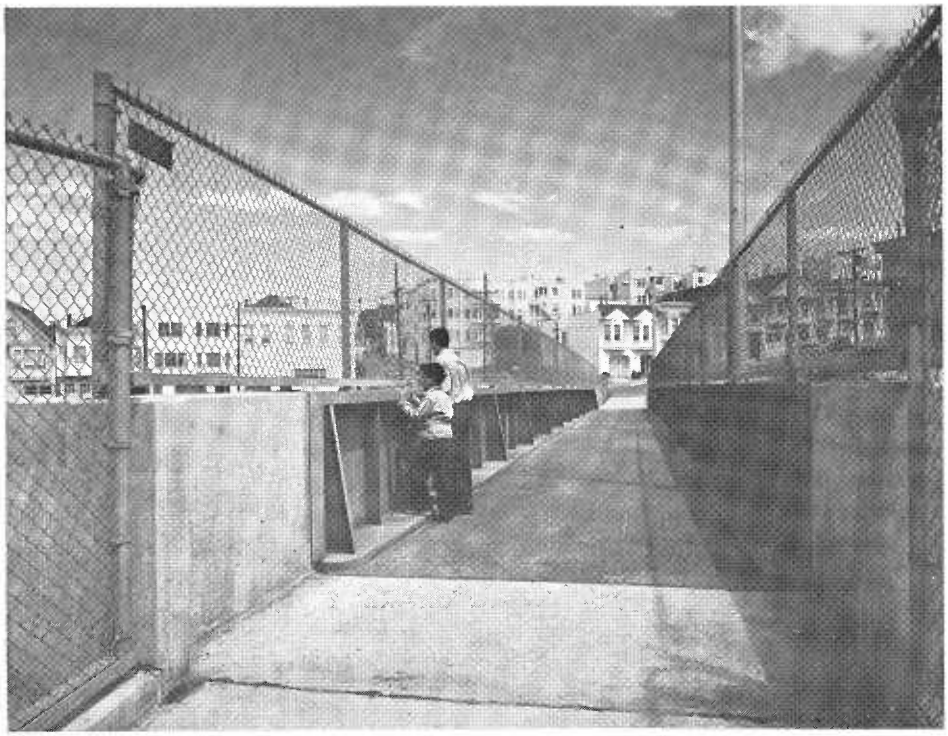


This was the improved steel rail with the round top to prevent walking and closer ballusters to prevent crawling through. This was 1954 and the joys of throwing things on the cars on the freeway below had not been discovered.

of much longer duration. Relief is sought under the laws of negligence more than ever before. Substantial damage verdicts are now awarded on grounds never dreamed of in Tom Sawyer's day. With this change in social attitude toward liability and damages has come a changed concept of the responsibilities of the State toward preventing accidents.

Some years ago the customary railing on a state highway bridge was a concrete rail three feet high with round-topped windows 10 inches wide between 6-inch concrete posts. This was a strong and adequate railing. A 10-inch window was wide enough for a small child to crawl through but if one tried to, someone presumably boxed his ears and told him to get back on the sidewalk where he belonged. The railing was a foot wide on top, and probably a few boys walked on it—if they didn't get caught by their mothers.

The first modification came as an improvement of appearance and also improved safety. Because there was a chance of a small child falling through the 10-inch windows and increased concern about such possibilities, and because a somewhat lighter weight railing looked better and gave greater visibility in urban locations, a steel railing was developed. It was three feet high. It had one-inch-square ballusters with six-inch open spaces, and it was flat on top.



As the idea spread of throwing things on cars passing underneath, chain link fences were added. This was little deterrent, however, as they could lob things over the top with good accuracy. The next step was completely enclosing the walkway.

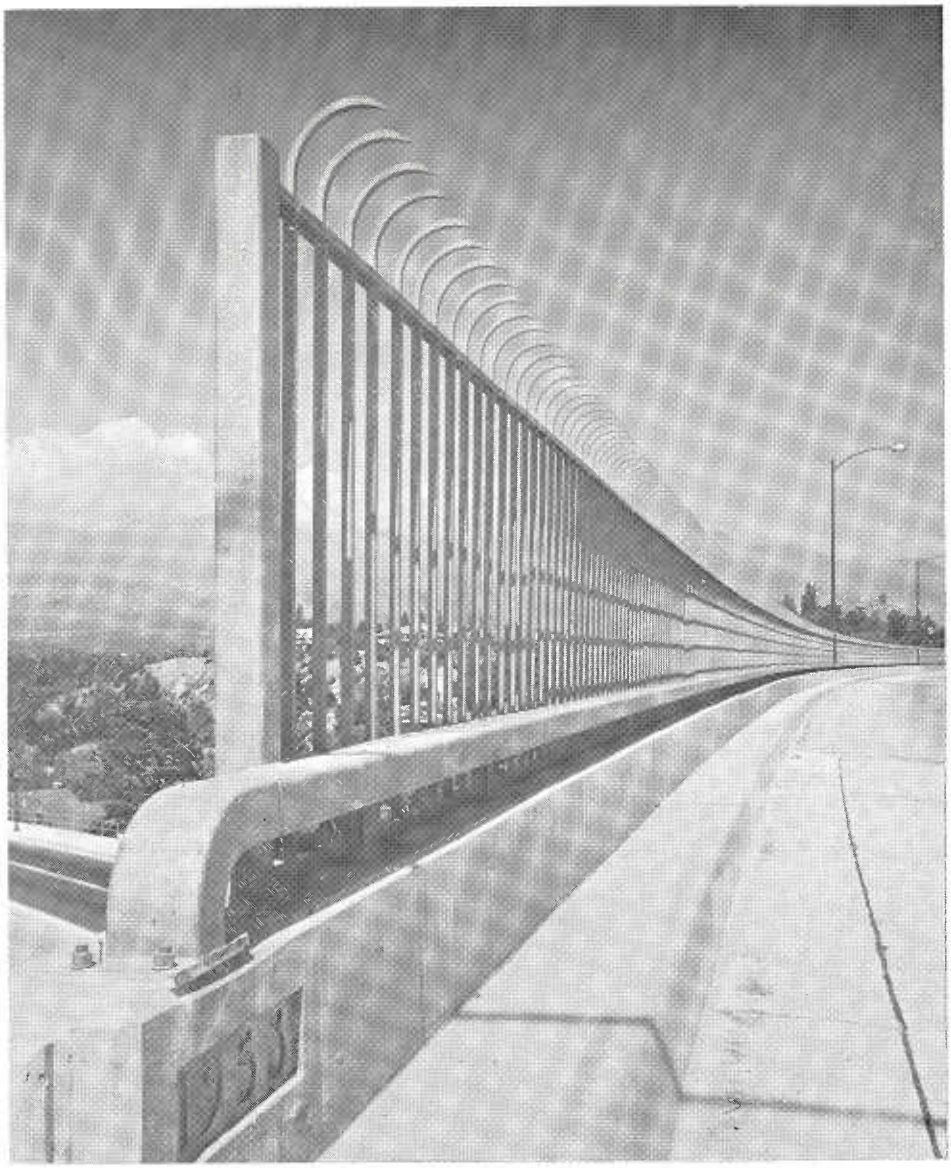
Causes Criticism

Criticism was not long in coming. Pictures were published of small children squeezing through between the ballusters or walking on top. The railing became a challenge. There was no shortage of able Tom Sawyers, but we seemed to have completely forgotten Aunt Polly's approach to the problem. A meeting was called in one city to protest the railings which the State proposed to put on the structures carrying streets across the new freeway. The chief of police succinctly suggested that a proper application of a willow switch here and there would soon cure the problem of children climbing on the railing. His suggestions fell on deaf ears. Aunt Polly had not attended the meeting.

We wondered how the three-foot height and the six-inch openings of our railing compared with those used in the rest of the country. We asked each state how it made its railings and how wide the openings between balusters. We found that 65 percent of the states used railings three feet or less in height. Also 73 percent of them used balluster openings of six inches or more. In other words, California was more cautious than most of the states. Nevertheless we raised our sidewalk railings to 3½ feet to get an extra margin of safety.

An enterprising bridge engineer whose wife worked in a day nursery devised a test slot through which the children were encouraged to try to climb. Nineteen four-and five-year-olds did their best. The controlling factor turned out to be the size of their heads. All of them went through a 6½-inch opening. Four were stopped by a 6-inch opening. Six were stopped by a 5½-inch opening and the remaining nine could not get through a 5-inch opening. On the basis of this very scientific information, the balluster spacing was reduced to five inches clear. This reduction in balluster spacing reduces the "see-through-ability" and is specially objectionable from the side where the railing is viewed at an angle as from a side road approaching an intersection near the end of the bridge. The close-spaced ballusters form a solid screen and shut off the vision of vehicles crossing the structure or approaching from the side.

The walkable flat top of the rail was then criticized. Existing railings were modified. Vertical and sloping plates were welded on top. Short spikes were set along the top of the rail. These were all to a degree successful but were uniformly unsightly. The design of the railing was changed again. Manufacturers who had invested in costly jigs to make the railing began to develop a frustrated look. The railing was made narrower and was rounded on top. Then some kids began riding it like a horse and inching their way out across the span while they straddled the railing. One boy doing this fell off. He was not seriously hurt but his wails echoed up and down the State.



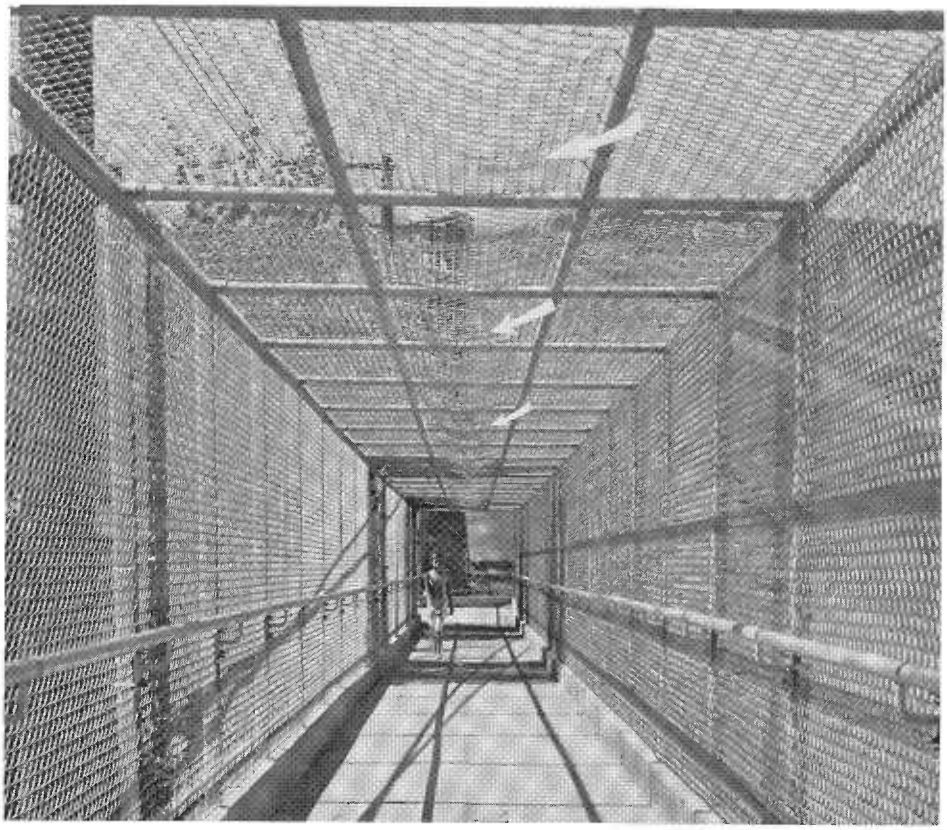
This was the answer to the suicide reputation of the old Arroyo Seco arch. The new structure has this vicious-looking but effective railing.

New Railing Developed

Some communities took matters into their own hands and bolted chain-link fences to the railings. Some fences were installed by the State at city request. A new railing was developed with one-inch-square solid bars with five-inch openings extending 5½ feet into the air. This was an adaption from the special railing devised for the Colorado Street arch in Pasadena to prevent suicides. This rail, with its eight-foot height and the sharpened points turned in toward the roadway, had proved almost 100 percent effective. There was one exception. The victim stood on top of his car and dove over the railing.

About this time another factor entered the railing picture. With the advent of freeways, thrill-seeking youngsters found pleasure in dropping things on the cars passing underneath. They found windshields could be broken and considerable excitement caused with a minimum expenditure of effort. A new cry arose. This had to be prevented. Torso tanning is no longer an acceptable solution. The construction had to be such as to make it impossible for things to be dropped on cars below. High mesh fences were erected. These were found to be ineffective. The kids lobbed rocks and pop bottles over the top with devas-

Completely enclosed, even on the ramps, this pedestrian structure near Sacramento looks very well protected. This apparently is regarded merely as a challenge by the children. The entire length of the roof of the cage across the freeway and down the ramps, is beaten down where countless children have crossed and bounced on the top of the cage instead of staying inside where they should be. (See photo below.)



A close-up of the pedestrian overcrossing shown in the above photo. Note how the roof of the enclosure has been beaten down by children climbing on top and bouncing on it as on a trampoline. The next step is to round the top.

tating accuracy. The entire walkway had to be enclosed.

Metal Shell Is Installed

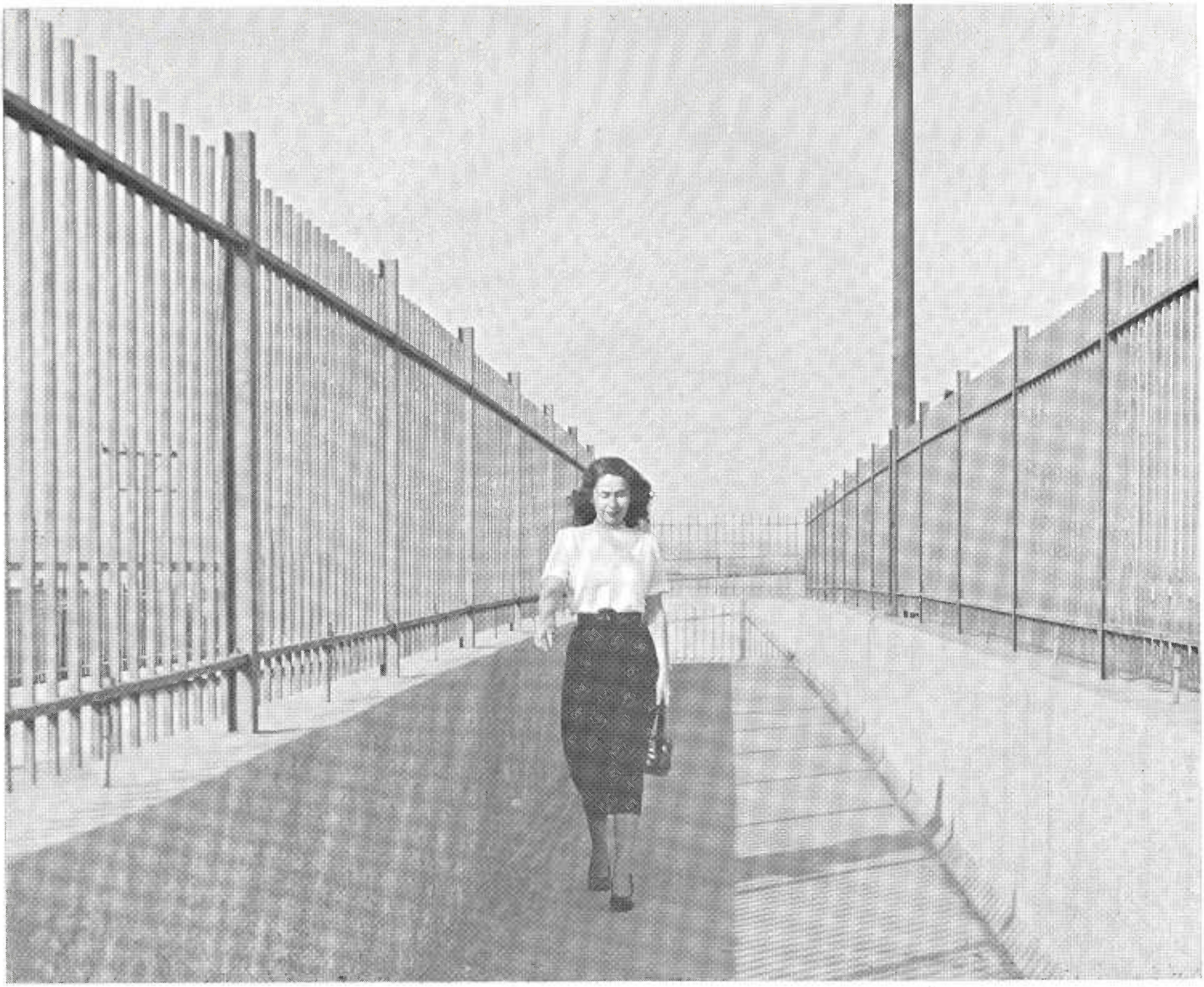
A railroad passing under the Baltimore–Washington Parkway found itself obliged to install a sheet-steel shell over the sidewalk on the overcrossing to prevent kids dropping things onto the trains as they passed underneath. Here in California we enclosed the entire walkway on pedestrian crossings near schools. An eight-foot fence on each side and mesh across the top. This was another challenge. The kids climbed outside and on top and used the flat mesh on top as a trampoline. Now we build the top rounded.

It became quite a feat to work one's way across along the outside of the cage. To prevent this, various devices were tried. Wing fences flaring out from the ends of the cage are effective if they extend far enough out into thin air. A city, thinking to economize, placed such a fence out in the middle of the structure. The kids were supposed to reason that if they could not get clear across, they should not start. One boy got out to the middle and tried to get around the projecting fence. He fell and was killed.

Preventive fences are installed at each end to try to keep the kids from getting outside at all. Barbed wire was used for a few installations but while barbed wire may be used as protection against animals and criminals, it is not cricket to use it against children. Now the end fences are just bigger and longer.

Litterbugs Also Offend

Children are not the only offenders. In spite of antilitterbug laws and propaganda, all manner of junk is flung from moving cars. If that car is crossing a bridge or viaduct, there can be serious danger to those passing or working underneath. Railroads and manufacturing plants under our viaducts are holding in abeyance suggestions for horizontal screens to protect them from objects thrown from cars crossing the viaducts until we can see how serious this problem is. This may well be the next defacement which we will have to attach to our structures as a symbol of the juvenility and



This railing was much better looking than the chain link fence but was too attractive to climb on, both inside and outside, and provided little interference to the rock and bottle droppers.

irresponsibility of a small segment of our citizens.

What does all this protective fencing do to the looks of the structures? It generally makes them look terrible. Ironically, it is the State that is usually criticized for designing "boxy, utilitarian" structures.

Designer's Dilemma

We are caught in a dilemma. We must build accident prevention into our structures and at the same time try to make them good looking. A bridge covered with chain-link fencing is not attractive. Other things have been considered. Clear glass would be broken. Clear plastic would be carved full of names and initials. Opaque glass or plastic panels have been seriously considered but they would shield the occupants from public view—a situation which entails other problems. In addition, any kind of a solid panel cover for the structures would cut off ventilation and make the interior intolerably hot under a summer sun. To date we have not been able to come up with any satisfactory solution better than the mesh fencing. It is regrettable that we must thus clutter our structures. However, lacking the training and responsibility which would make these junior citizens, and some senior citizens, aware of their obligations to others and to public property, we must act as though we were caging little wild animals.

The problems of providing an adequate and good-looking railing become evident. The variety of different protective railings throughout the State gives tangible evidence of the continuous effort we have been making. This business of coping with the mischievous inventiveness of a growing child is frustrating to say the least. To date we do not have the feeling that we are always winning. We need Aunt Polly and her strap. Her punishment was severe and immediate. Possibly it was harsh but also it probably developed character and respect for property. In the long run Aunt Polly's way was best.

Slip-form Job—Fresno

Variation of Previous Techniques Described

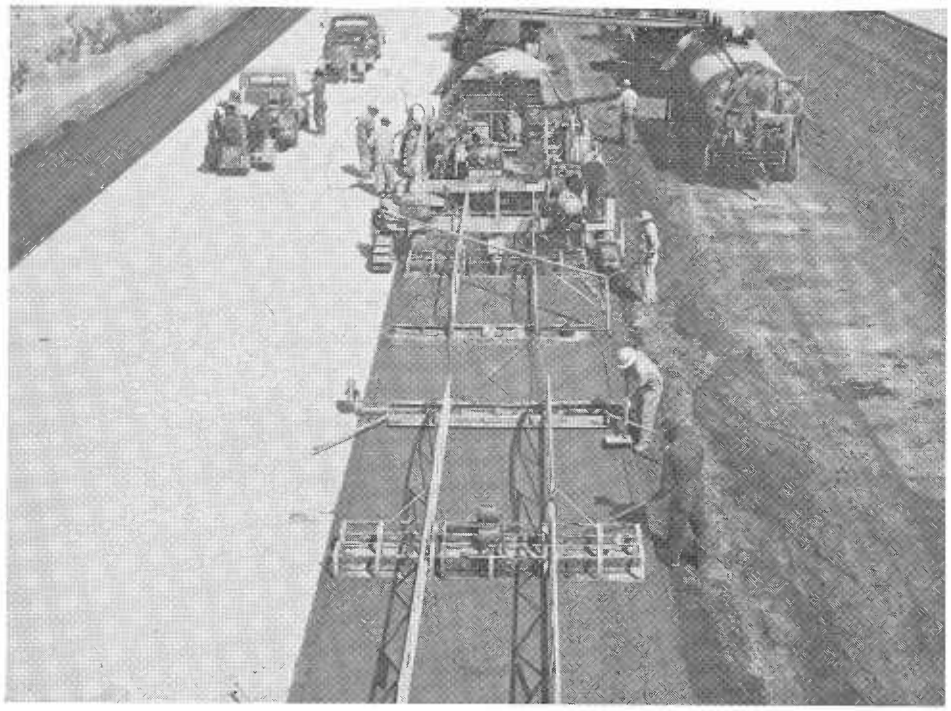
By N. E. HUMISTON, Resident Engineer

The brilliant teamwork of contractors, equipment manufacturers and highway engineers that has scored so many notable successes in creating the modern marvel of highway transportation constantly continues the dramatic advancement of construction technology that has characterized the development and expansion of the state highway system in California almost from the beginning.

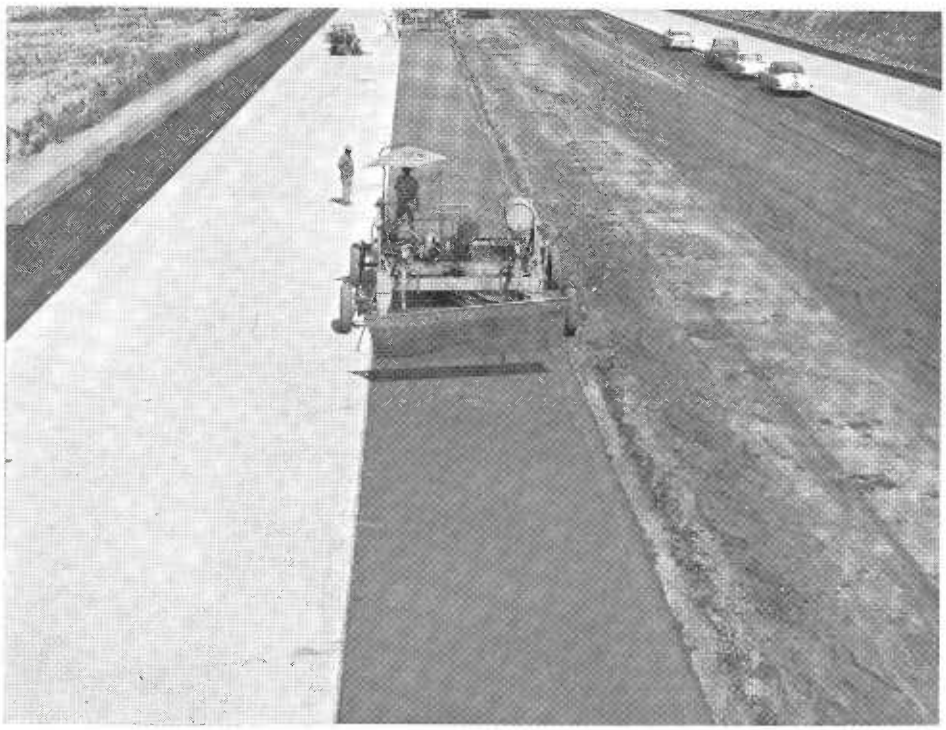
One important illustration is the slip-form method of constructing portland cement concrete pavements which is today contributing in significant measure to the accelerated program of highway construction to provide California and the nation with thousands of miles of safe, efficient highways and freeways at minimum cost.

As some of us recall so vividly, slip-form paving was introduced in California less than five years ago with great expectations and much enthusiasm. In the intervening months and years, the early enthusiasm waned and flickered in the face of seemingly insurmountable operational difficulties. However, despite all setbacks and with painful regard for the expense, the highway team doggedly refined the method and improved the equipment until today with over 450 lane-miles of mainline highway constructed to exacting specifications the slip-form process is emerging as the primary method of concrete paving.

Further improvements and refinements will continue to be achieved as experience grows. This article, one of a continuing series on the subject, reports the innovations and techniques employed on a current project involving 95,000 cubic yards of concrete pavement placed with nonautomatic slip-form paving equipment.



The paving train reduced to half width for the third lane.



The pipe float finishing machine reduced in width for a 12-foot slab.

The contract is one of three for converting U.S. 99 to full freeway standards from the Kings River in Tulare County to the completed section through Fresno, a distance of over 20 miles. An overall story of the entire relocation is planned for a later issue.

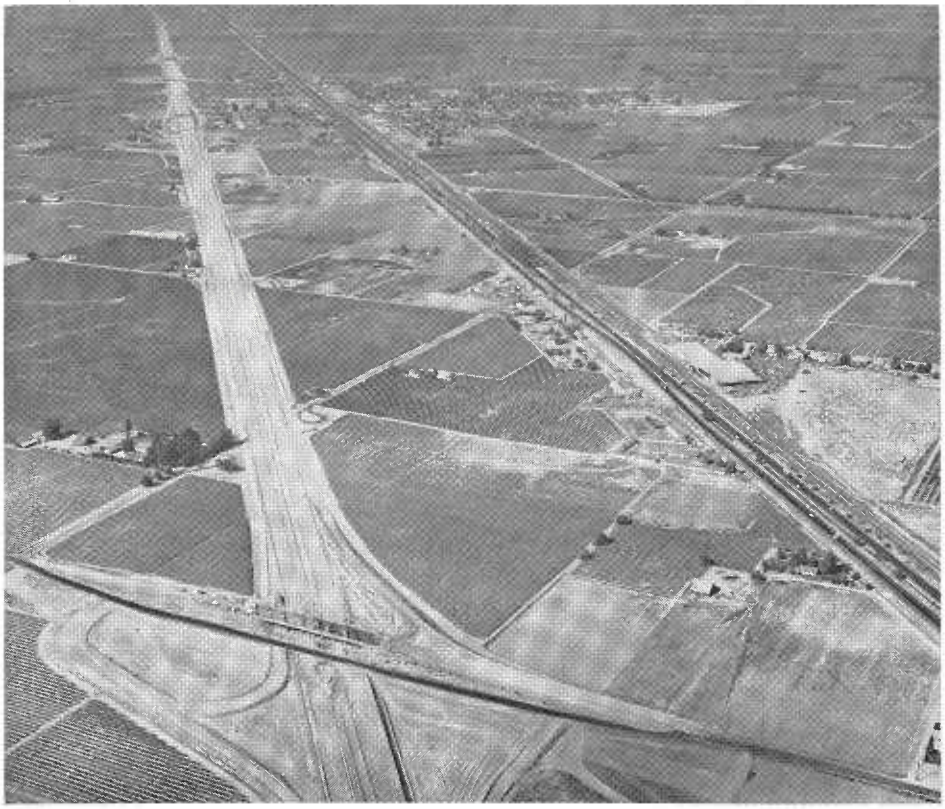
Construction Methods

In electing to exercise the contract option permitting slip-form paving the contractor recognized that very close grade and cross-section tolerances for the subgrade under the pavement would be vitally important in meeting the tight specification requirements for pavement smoothness. Consequently, it was decided early in the contract to exploit the long wheelbase land plane principle, utilized in the construction of the slip-form paver, in subgrading both the aggregate base and the overlaying cement-treated base. Thus the general plan adopted was to finish both base courses and then the pavement utilizing equipment with the same driving gear and long wheelbase planing action.

The two machines involved, a subgrader and a paving machine, are essentially mechanical straightedges 30 feet in length and capable of working to either 12- or 24-foot widths. Sufficient spreading and compacting gear is attached to insure that the mat of material being placed meets the required tolerances for thickness, grade, and riding quality. Both machines were built by the same manufacturer.

Aggregate Subbase

The contractor first constructed a subgrade at the top of the aggregate subbase. The subbase material was delivered to the grade by trucks and scrapers, roughly shaped with motor graders, and compacted. Grade stakes were placed two feet outside the planned edge of pavement and an electronically controlled motor grader was used to trim a track grade approximately six feet in width over these stakes. This track grade was used as a runway for the subgrader which then trimmed the surface of the subbase material to planned grade.



An aerial view of a section of the South Fresno Freeway under construction.

Aggregate Base

Subsequently, two windrows of aggregate base were placed on the prepared subgrade, the amount of material being carefully controlled by three different methods. First, automatic control devices were installed on the gates of each bottom dump trailer. These devices operated by means of a wheel rolling on the surface of the subgrade actuating the trailer gate through a series of lever arms and limit switches. The trailer gates opened or closed according to need so that regardless of the relation of the trailer to the subgrade a uniform volume of material was distributed. These devices worked well so long as the windrows were small enough for the truck and trailer to straddle completely the spread of the preceding truck.

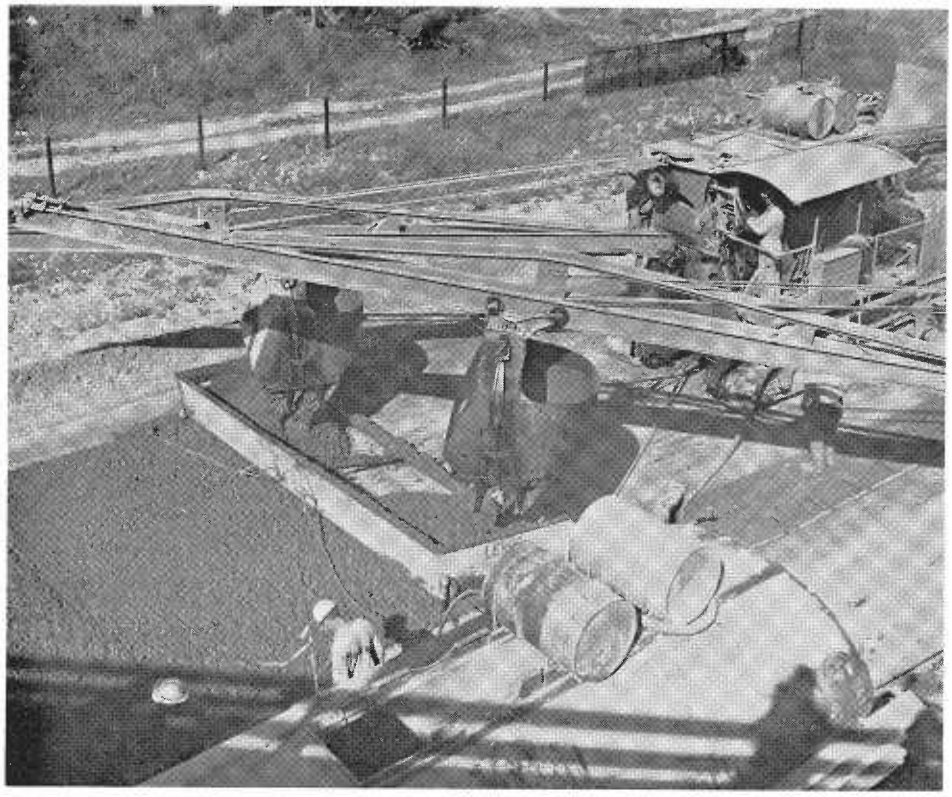
Secondly, the volume of the windrows was checked by comparing delivered tonnage against the distance spread; and thirdly, the windrows were sized with a shaping device mounted on a motor grader.

After the windrows were placed, the subgrader was used to spread and trim the base material to the proper cross section ready for compaction. The subgrader consists of a steel framework about 30 feet in length and 24 feet wide, supported and self-propelled through four crawler treads mounted at each corner. Provision is made to reduce the width of this machine to twelve feet.

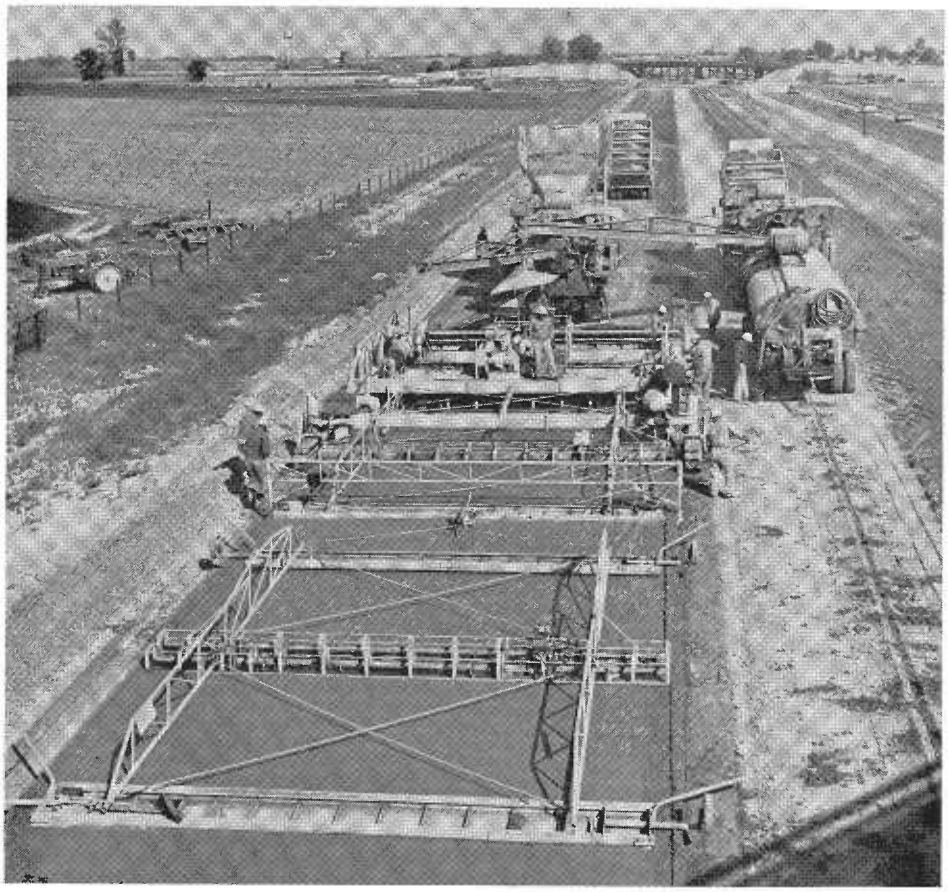
Suspended from the frame is a movable shoveling device used to spread material uniformly across the width of the machine. Two heavy, adjustable screeds oscillate over a distance of about 12 inches and strike the material off at the desired thickness. The forward crawler treads run on the surface of the previously trimmed base material and the rear treads ride on the surface of the material being placed. The height of the screeds relative to the elevation of the crawlers can be adjusted as needed. After compaction, the surface of the base was again trimmed with an electronically controlled motor grader and checked for cross slope and grade.

Cement-treated Base

The third operation was basically a repetition of that described above with the exception that the windrows of



A team of concrete mixers deposits fresh concrete in a spreader box ahead of a slip-form paver.



The slip-form paver towing transverse bump cutters. A polyethylene plastic strip is placed for a centerline joint.

base material were cement-treated prior to being placed and compacted. This material was placed two feet wider on each side than the planned width of pavement, which provided a track grade for the slip-form paver. These track grades were further checked for uniformity by string lining, and any appreciable roughness was removed by trimming or by filling with sheet asphalt as needed. A number of profilographs were run on these track grades for the paver and an index of well below 10 inches per mile was achieved.

24-foot Pavement

After preparation of the cement treated base, a 24-foot width of class "B" concrete pavement was constructed with the slip-form paver. This machine is similar to the subgrader in appearance and dimensions. In addition to the shoveling device, which in this case was used to spread the concrete, a bank of internal vibrators, a fixed vibratory screed, and two oscillating screeds were suspended from the frame. Side forms extended about 10 feet to the rear. A 24-foot-wide spreader box was towed behind one of the two twin-batch mixers. The mixers dumped directly into this spreader box which sized the proper amount of concrete ahead of the paver.

Two transverse bump cutters were towed along the surface of the concrete directly behind the paver. This double set of vibrating screeds was suspended from a framework which is mounted on and carried by two pans approximately 30 feet apart. The screeds acted as the midpoint of a straightedge, cutting and filling any roughness left by the paver.

On an earlier project, the manufacturer provided two four-inch-diameter aluminum pipes towed by hand to float the top of the fresh concrete prior to the burlap drag. A 10-inch aluminum pipe supported and towed by a motor driven carriage was devised for this project. The pipe was stiffened internally and could be swung in any direction for floating forward or backward and could be

lifted from the surface. The first of two burlap drags was mounted on this machine along with a water nozzle providing a light fog spray.

The finished surface was checked for uniformity with 25-foot-long piano-wire straightedges mounted on small motor-driven tractors for easy maneuverability. Any high or low spots indicated were corrected by cutting or filling and by a final floating with the pipe.

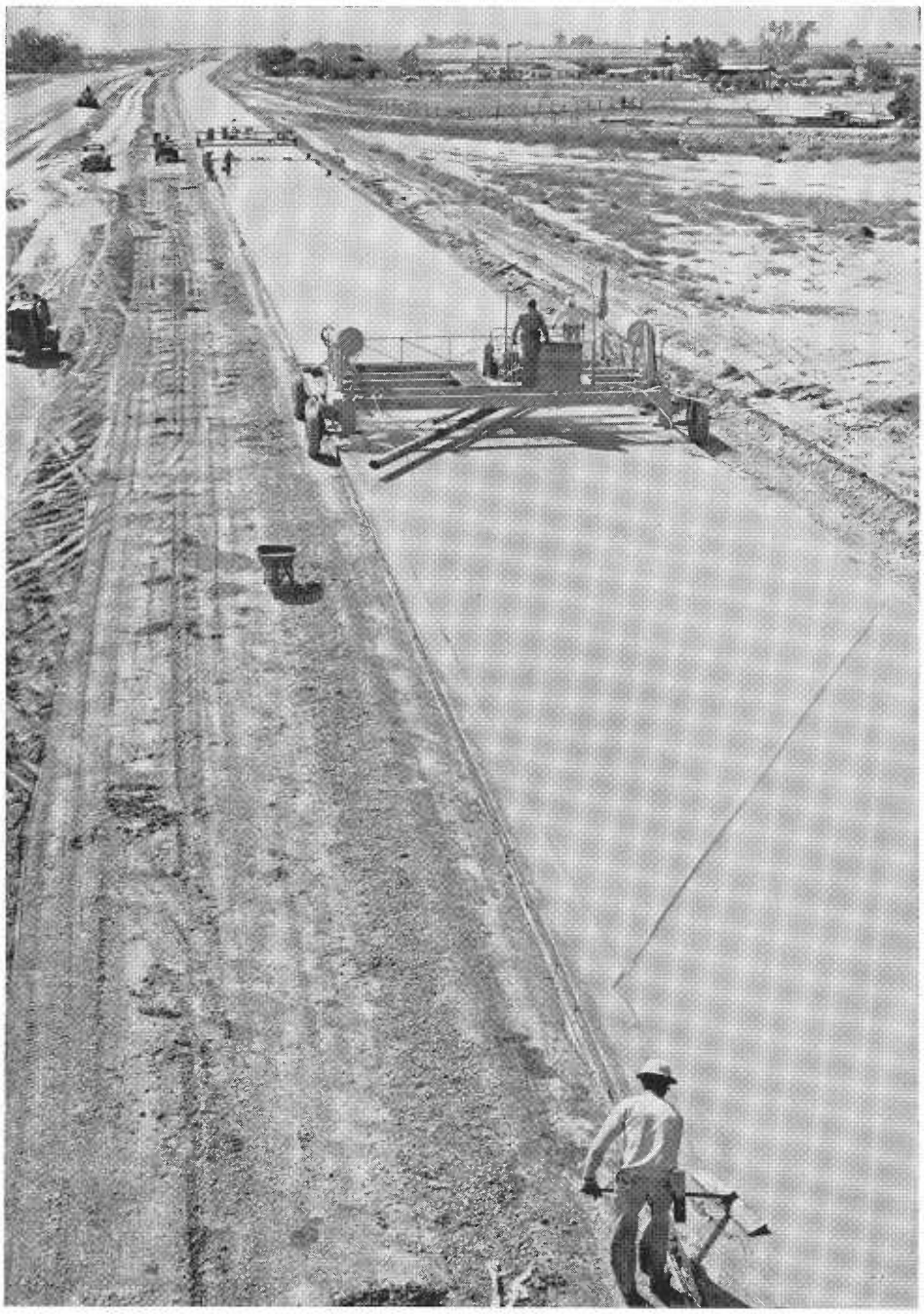
12-foot Pavement

After completion of the initial 24-foot pavement, both the subgrader and the paver were reduced in width to place the additional 12-foot width of base and pavement.

During this operation the left-hand tracks of the paver operated on the surface of the previously placed concrete. Two mixers were used, but it was found necessary to make several modifications before a satisfactory production rate and profile index could be obtained. The number of internal vibrators per foot of width was doubled and the rear tread of the paver was given a slight amount of toe-in so that the rear of the paver had a tendency to push itself toward the other slab. The relative width of the pipe float had to be increased, and it was found necessary to operate it at a more acute angle than on the 24-foot pavement.

Rescreening Aggregates

To insure maximum consistency of concrete, the contractor used an air-entraining agent and rescreened the coarse aggregate at the plant prior to batching. This last was accomplished by blending coarse aggregate in approximately the correct proportions on the tunnel belt and rescreening into two sizes on vibrating screens on top of the bunkers. A small amount of waste material resulted from this method, but better uniformity of the mix was achieved. Little trouble was encountered with the moisture content in fine aggregate, since it was manufactured and stockpiled well in advance of use.



The motor driven carriage finishes the surface with diagonal 10-inch aluminum pipe.

Smoothness Results

The profile index on each days run on the 24-foot pavement averaged under 3 inches per mile. The center of the slab was generally smoother than either of the edges. The majority of the roughness was in low spots evidently due to subsidence of the concrete. It was also found that high or low areas did not usually extend across the slab, nor did starting and stopping the paver appear to induce any additional roughness. The daily profile index on the 12-foot pavement has steadily decreased to a rate now comparable with the 24-foot pavement. Very little grinding of the finished slab appears to be indicated.

Project manager for Westbrook-Morrison-Knudsen is Oliver Pope of Lodi, California. The author is resident engineer for the State and J. M. McDowell is district construction engineer.

Two-county Link

Divided Highway Connects Katella Avenue, Willow Street

By NEWTON H. TEMPLIN, Road Commissioner, Los Angeles County

Completion of the Federal-aid Secondary & Urban Extension project linking Willow Street in Los Angeles County with Katella Avenue in Orange County was highlighted by an unusual ribbon cutting ceremony on May 31, 1962. This highway is an intercounty arterial which now extends from the City of Redondo Beach in Los Angeles County to the City of Anaheim in the County of Orange.

In addition to local, county, city and other dignitaries, delegations from nearby Knott's Berry Farm and Disneyland were on hand to signify the areawide importance of this highway construction project at the ribbon-cutting ceremony, which was held on the deck of the San Gabriel River Bridge. With accompaniment from the Long Beach Municipal Band, the opening of the roadway to traffic was formally accomplished when the familiar old miner's burro from Knott's Berry Farm chewed through the ribbon—and a nearby carrot!

With the aid of a carrot, the burro is enticed to chew through the ribbon and officially open the new divided highway connecting Los Angeles County's Willow Street and Orange County's Katella Avenue. Participating in the ceremony were (left to right) Frank G. Bonelli, Los Angeles County Supervisor; A. S. Koch, Orange County Road Commissioner; Miss Kate Rea; Berry Farm's 'Old Miner'; Mrs. Ella Wallop; Dr. Orville Cole, Long Beach Chamber of Commerce, and Edwin W. Wade, Mayor of Long Beach. The name 'Katella' was made up of the first names of Miss Rea and Mrs. Wallop, both daughters of Orange County pioneer John B. Rea.

Highway Now Continuous

This highway, known as Willow Street in Los Angeles County and Katella Avenue in the County of Orange, is now continuous for a distance of 29 miles and passes through eight cities. Prior to completion of the facility the road was nonexistent between Studebaker Road in Los Angeles County and a point easterly of Coyote Creek in Orange County. The completion of this link now provides a direct connection between the communities on either side of the San Gabriel River and Coyote Creek, including access to the Los Alamitos Naval Air Station.

Southern California residents have long realized the importance of adequate intercounty connections between the Long Beach and harbor areas of Los Angeles County and the western portions of Orange County. However, the need has now become more critical because of the recent development and population expansion within the area. This improvement is a major step in the development of an integrated highway system needed to serve the large industrial, commercial, residential and agricultural centers of these two areas. It will serve to materially alleviate traffic congestion that has developed on parallel routes. The route will provide connections between the future San Diego and the San Gabriel River Freeways, the existing Long Beach and Santa Ana Freeways and the future extension of the Harbor Freeway.

The length of this project is 1.6 miles, with 0.7 mile located within the City of Los Alamitos and Orange County, and the remainder in the City of Long Beach and unincorporated territory of the County of Los Angeles. It consists basically of a four-lane divided highway with shoulders and curbed median. Included are four bridges, two of which are prestressed concrete girder bridges and two of which are reinforced-concrete rigid-frame structures.

The area surrounding the project is relatively low and flat except at the levees of the San Gabriel River and Coyote Creek, which extend some 16 feet above this plane. For this reason, approximately one-third of the roadway was constructed on fill, to a maximum depth of 22 feet.

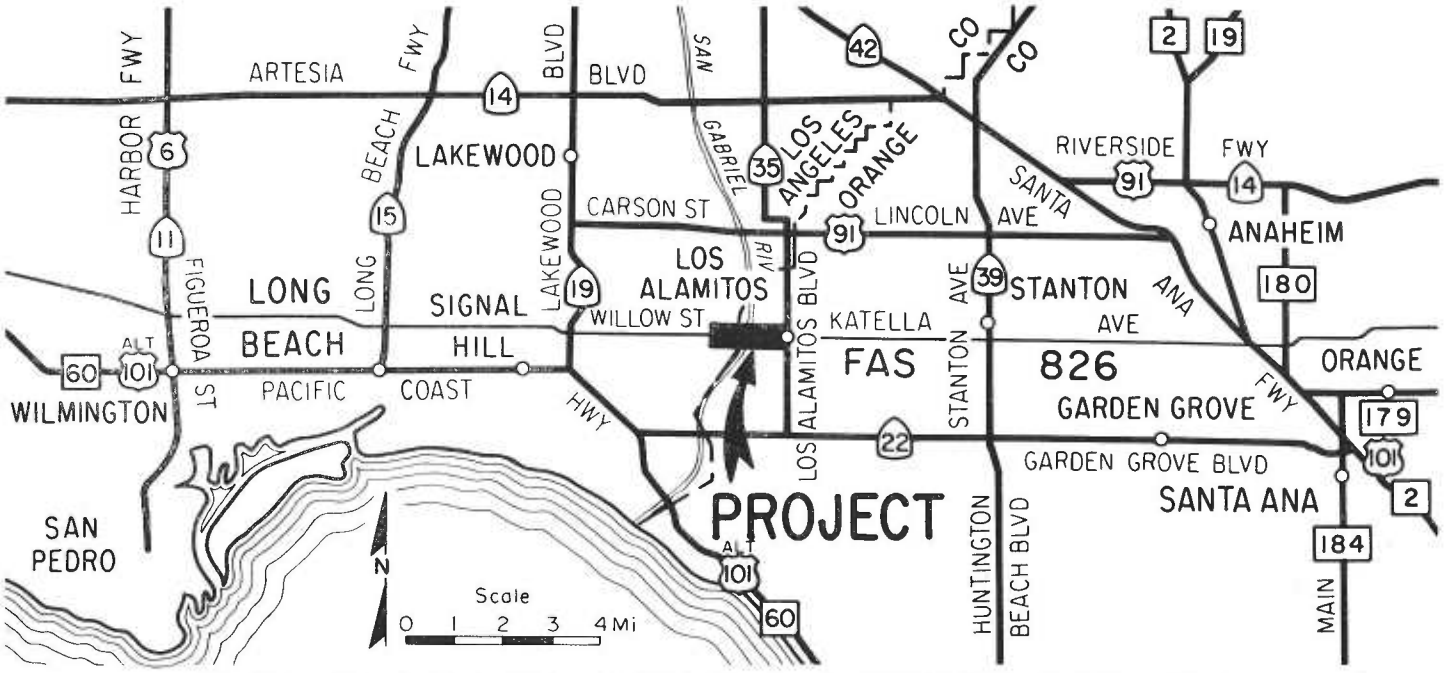
The roadwork consisted of grading the highway and surfacing with asphalt concrete on cement treated base and constructing miscellaneous drainage structures, median, curb and gutter. The San Gabriel River Bridge and Coyote Creek Bridge are four-span reinforced-concrete deck structures, with prestressed concrete girders. Each bridge is approximately 268 feet long, with two 28-foot roadways separated by a six-foot median and with two sidewalks. The girders were of the pretension type and were fabricated at the casting yard of the contractor.

Access Bridges Built

Two single-span access road bridges were constructed within the City of Long Beach portion of the project to serve the multimillion-dollar El Dorado Park, which is currently under development in that area by the city. These structures also provide two 28-foot roadways with median and sidewalks. All of the bridges are pile supported.

The contract was awarded by the State Department of Public Works on June 29, 1961. Work began on July 17, 1961, and was completed and ac-

An aerial view of the new highway looking west from above Katella Avenue in Orange County toward the San Gabriel River and Los Angeles County beyond.



A map showing the location of the new F.A.S. highway on the county line connecting Katella Avenue and Willow Street.

cepted on May 23, 1962—approximately 3½ months ahead of the required date for completion, despite the lengthy and heavy rains which fell in the area during the period of construction.

The total cost of the improvement was approximately $1,236,900. It was financed with federal-aid secondary and state highway funds together with funds from local county and city governments, and was one of the first projects in the Southern California area to utilize the urban extension funds in addition to federal-aid secondary financing. It was also the first intercounty FAS project in the area.

County Co-ordinates Design

By reason of mutual agreement and co-operation between the counties and cities involved, the Los Angeles County Road Department, under the direction of N. H. Templin, road commissioner, co-ordinated the design of the project with the County of Orange and the City of Long Beach. Design of the portions of the project within the County of Orange was performed under the direction of A. S. Koch, road commissioner, and the portion within the City of Long Beach was co-ordinated with the staff of Jess Gilkerson, city engineer. Los Angeles County Supervisors Frank G. Bonelli, of the First District, and Burton W. Chace, chairman of the board's road committee, were particularly active in their support of the project from its inception. The Los Angeles County Road Department provided construction engineering and inspection for the project under the direction of resident engineer Raymond G. Hegwer.

Origin of 'Katella'

An interesting story on how Katella Avenue in Orange County first received its name was related at the ribbon-cutting ceremony. The avenue was first named in about the year 1896, at the same time the Katella School District was formed. It was then a narrow dirt road used mostly for sugar beet trucks and was said to be about "a foot deep with dust." Mr. John B. Rea had two daughters, one named Kate, and one named Ella, so he joined their two names together for Katella. Thas was many years ago but the two sisters Kate (Miss Kate Rea, age 85) and Ella (Mrs. Ella Wallop, age 80) still reside in Orange County and they were present for the dedication of this road project which bears their name.

The successful undertaking and completion of this project involving major highway construction within two cities and the unincorporated territory of two adjacent counties, the obtaining of state and federal aid in connection with the financing of the work, and the resultant economies achieved by reason of being able to combine the individual portions of the highway within the several jurisdictions into one complete project, were made possible only by the ability of several counties and cities to work harmoniously together. It is an outstanding example of what can be accomplished through intercounty cooperation on highways of mutual importance.

SAN DIEGO-HARBOR FREEWAYS

A 4.5-mile section of the San Diego Freeway from Hawthorne Boulevard and 164th Street in Lawndale to a junction with the Harbor Freeway has been opened to traffic. This project completes a 10-mile stretch extending to the Long Beach Freeway in Long Beach.

The southbound lanes of a 4.7-mile section of the Harbor Freeway from 208th Street to the Pacific Coast Highway was opened August 28. The northbound lanes were opened in late September.

Fortuna Project

New Freeway Relieves City's Traffic Congestion

By E. B. THOMAS, Senior Highway Engineer

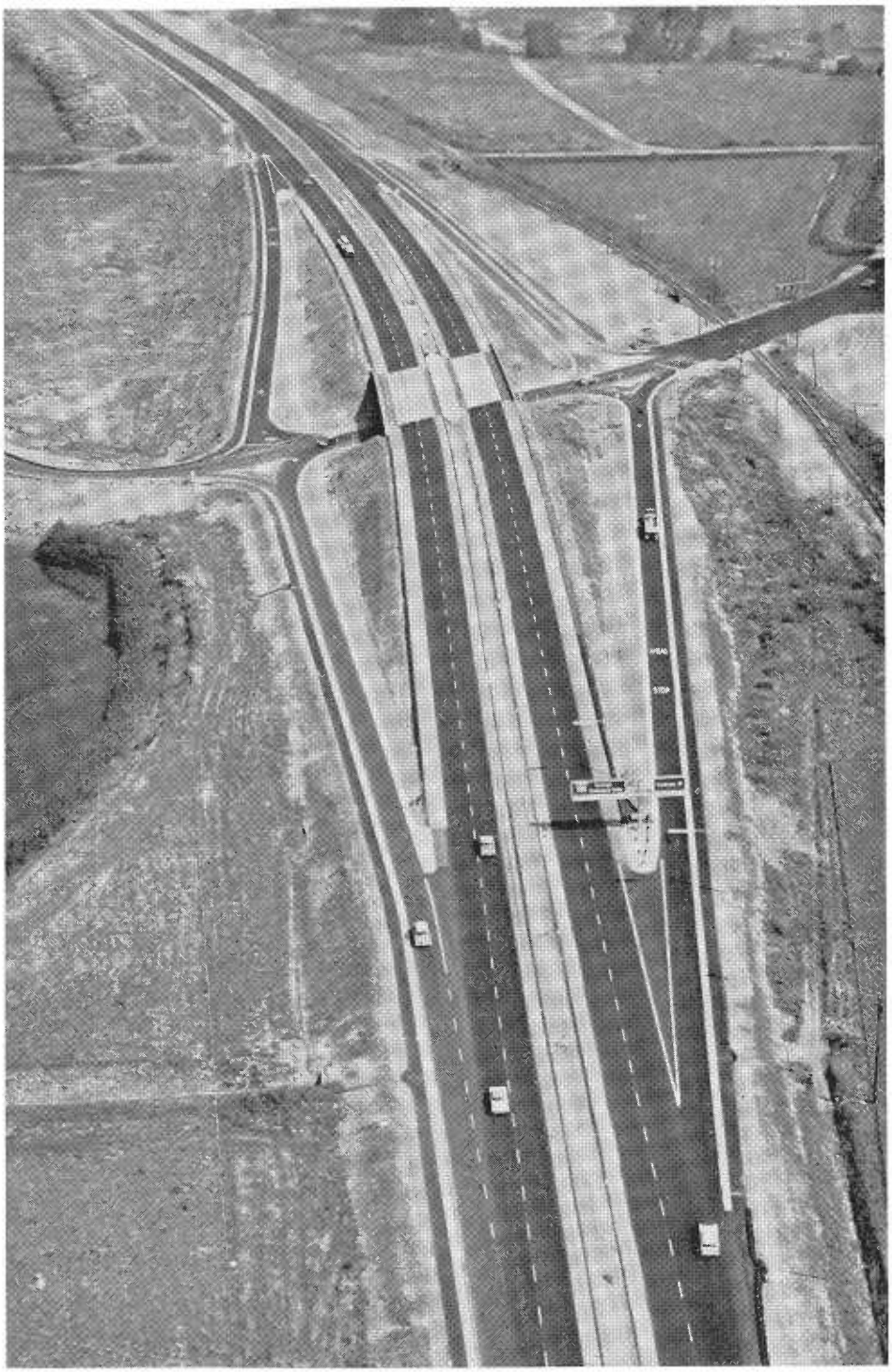
On July 24 the Fortuna Freeway, extending from two miles south to three-tenths of a mile north of the City of Fortuna in Humboldt County, was completed. This 3.9-mile section of U.S. 101 is a four-lane divided freeway and connects with similar sections previously completed on both the north and the south. It fills in the only gap in 16 miles of freeway, extending from the Robinson Ferry Bridge over Eel River, about two miles north of Scotia, to the old Beatrice Overhead at White Slough, about six miles south of Eureka.

As a further extension of this improved highway, there are currently two other freeway projects under construction just south of Eureka. One is scheduled for completion this year and the other in 1963. These will cover the area from Beatrice Overhead to Eureka and will then complete 35 miles of four-lane divided freeway from Robinson Ferry Bridge to the Mad River, 2¾ miles north of Arcata, interrupted only by the portion through the City of Eureka. Eureka is now served in part by a four-lane street section and in part by a two-street couplet, and no major change to this system is planned in the near future.

Completion of the Fortuna project represents the culmination of many years of work by District I personnel. Some of the original reports concerning the deficiencies of the existing highway dated as far back as 1937.

Right-of-way Acquired

Portions of the right-of-way south of Fortuna were purchased on a conventional basis as early as 1945 and were later converted to freeway by purchasing access rights. The original plan was to widen the existing highway through Fortuna to four lanes. Due to



The new Fortuna Freeway, looking north over the Rohnerville undercrossing. Humboldt Beacon photo.

changing needs and policies in the subsequent years, when the project stood idle for lack of construction funds, the line was reprojected, passing along the westerly side of the city and was established as a full freeway.

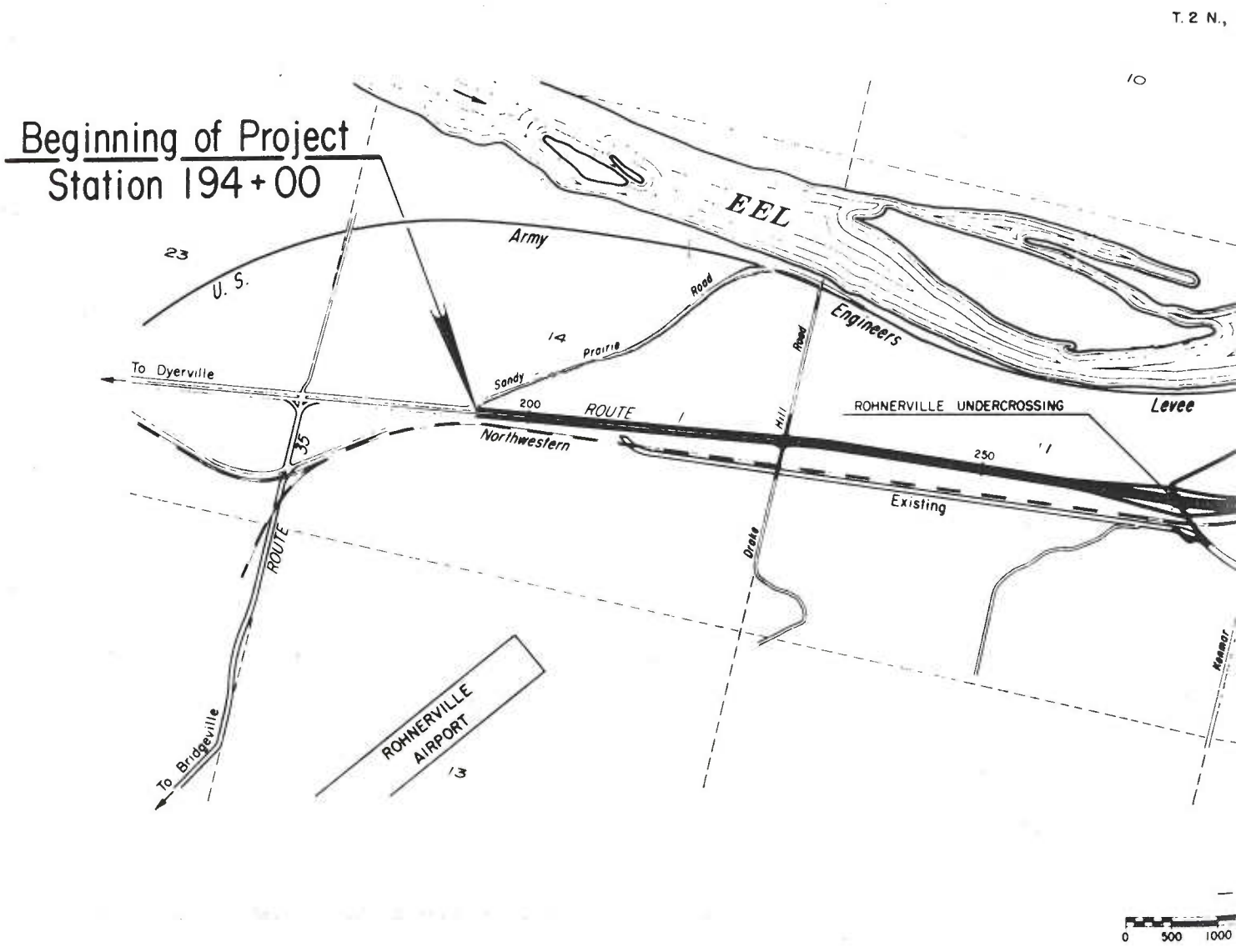
There was originally considerable adverse thinking by local people concerning a bypass of the city, although as traffic problems increased through the years there was a decided change noted in that view point. Considerable thought was given to the situation and the planning was greatly influenced by the results of an external type origin-destination survey made in 1953.

As a result of this planning, access to Fortuna is now conveniently provided at three locations: by the Rohnerville Undercrossing at the southerly entrance to town, the 12th Street Overcrossing near the center of town, and the Fortuna Overhead on the north. The final route was adopted in 1954, and freeway agreements with the city and county were signed the following year.

River Erosion

Serious erosion of the easterly bank of the Eel River during the winters of 1957 and 1958 caused much apprehension over the proposed alignment. During these years the river ate away hundreds of acres of farmland and moved the river bank several hundred feet toward the highway in the vicinity of the planned Rohnerville Undercrossing. To stop further erosion and safeguard our future construction site, the Division of Highways co-operated with the Army Engineers in the construction of the Sandy Prairie Levee, a protection works which extends for approximately 3½ miles parallel to our highway. The State contributed $200,000 toward this levee, which was constructed in 1959-60. This sum represents the actual slope protection value the Division of Highways derived from the project. Construction of this

Map below shows the location of the new freeway which now carries through traffic that formerly used the old highway, here labelled "Existing Traveled Way," through the City of Fortuna.



levee, protecting thousands of acres of valuable land, is, in effect, a "fringe benefit" accruing to the citizens of the Fortuna area as a result of our highway construction, for, without our cooperation and contribution, the Army Engineers would not have gone through with this work.

The erosion which took place prior to construction of the levee was sufficient to necessitate redesign of the Rohnerville Undercrossing. This was originally designed as a trumpet interchange and extended approximately 315 feet into the area washed out by the river. By redesigning this facility as a diamond-type interchange, it was possible to keep most of our construction within the undisturbed area. The only exception is a small portion of a county road connection which skirts the edge of the wash.

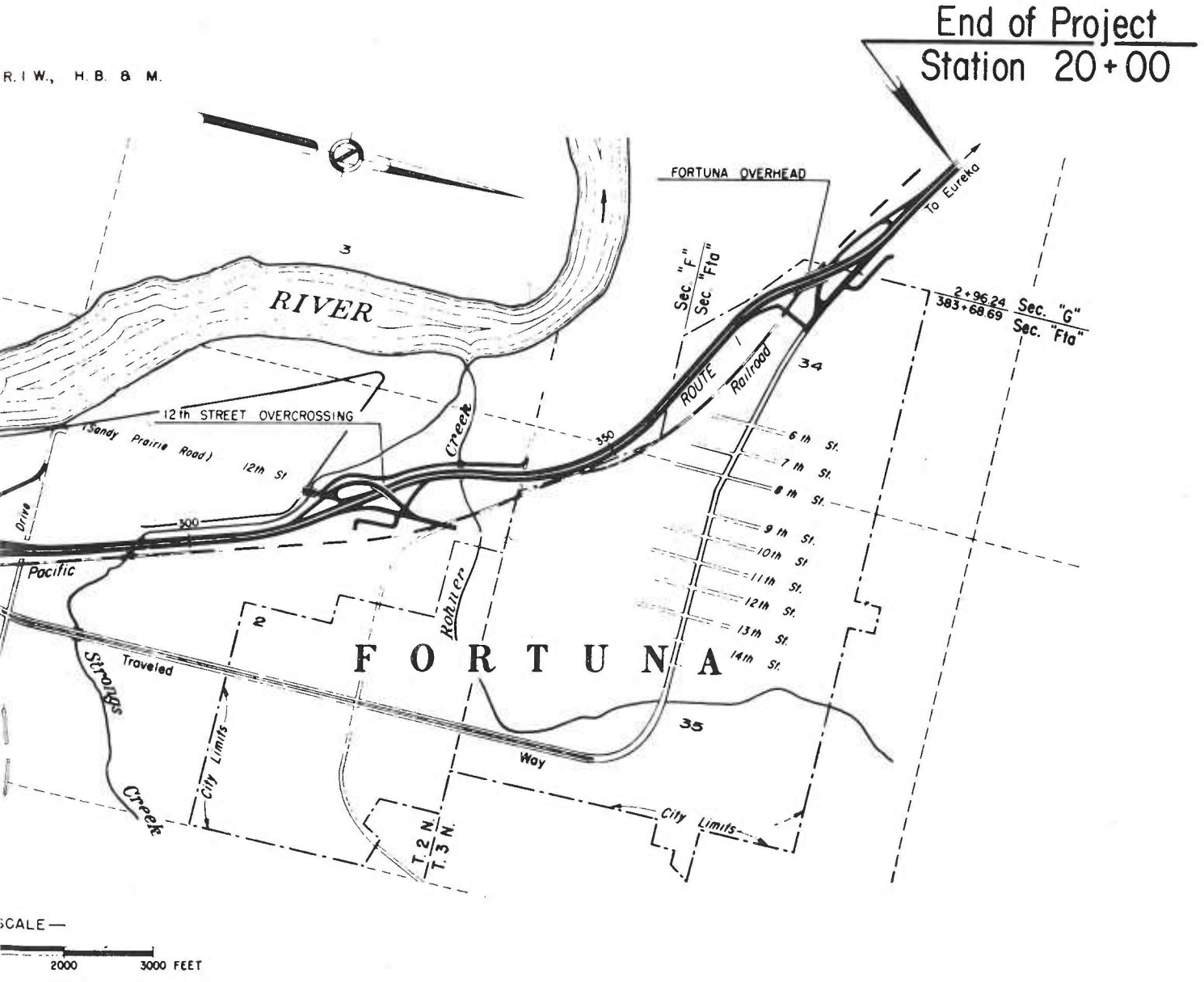
Major Benefits

Two of the major benefits which resulted from this improvement are the elimination of the Alton railroad grade crossing and the alleviation of the traffic problem in Fortuna.

At the Alton railroad grade crossing the old highway is parallel and adjacent to the Northwestern Pacific Railroad on both the north and south sides of the crossing. The crossing is accomplished on a reverse curve and is posted for 30 miles per hour. During the period from 1959 to 1962 there have been 32 accidents recorded here, two of them resulting in fatalities and 13 more in injuries. The new alignment eliminates this crossing, remaining on the westerly side of the railroad until north of Fortuna where the crossing is made at the Fortuna Overhead structure.

Shopping Area Congestion

In Fortuna, the old highway followed the main street over a length of approximately two miles. Of this length, about six-tenths of a mile is a 48-foot-wide street through the shopping area with parking permitted on both sides. Although Fortuna is a city of only 3,500 population, it attracts shoppers from many miles, and, with virtually all business centered on



The 12th Street Overcrossing on the new freeway with the City of Fortuna in the background. Humboldt Beacon photo.

the one street, traffic congestion is a major problem. With through highway traffic added to that developed locally, the downtown peak traffic rose to more than 17,000 vehicles per day in summer months, and it was not uncommon to have vehicles backed up for several blocks behind the one traffic signal in town. The new freeway provides immeasurable relief to the downtown area in the way of less congestion, easier parking, smoother traffic flow and added safety.

Actual construction was commenced in September 1961, shortly after the contract was awarded to Clifford C. Bong & Company of Arcadia. The new roadbed lies on the practically level alluvial soils of the Eel River Valley. Grading was very light and presented no problems.

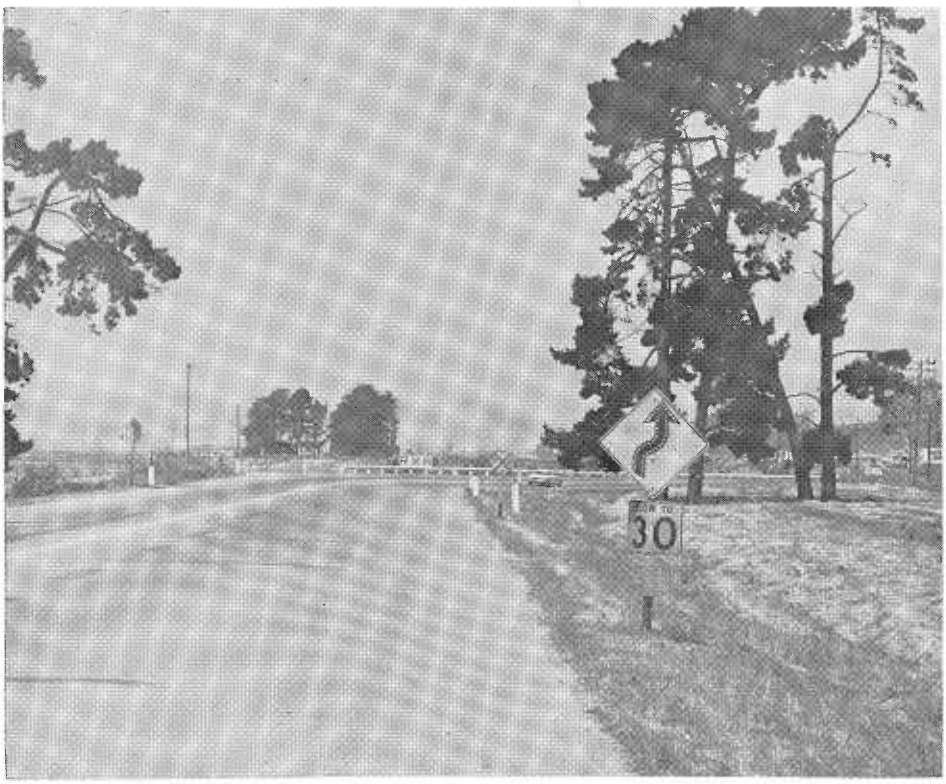
This was primarily a borrow job, there being about 200,000 cubic yards of excavation and over 600,000 cubic yards of imported borrow. Borrow consisted of riverrun gravel obtained from a large bar on the Eel River, adjacent to the project. The borrow was hauled in DW-20's and DW-21's towing large bottom-dump trailers in tandem with their regular scrapers. A Sierra belt loader was used to load both the scrapers and trailers and resulted in maximum loads being attained at all times.

Equipment Damaged

One of the major hazards to this operation, insofar as the contractor was concerned, was the old car bodies and pieces of large bandsaw blades washed down from the lumber mills upstream and buried in the gravel bar. On numerous occasions pieces of this scrap were picked up by the loader and damaged or destroyed the belt, invariably resulting in lost time and considerable repair expense.

Surfacing consists of four inches of asphalt concrete on cement-treated base, and all base and surfacing aggregates were obtained from the same source as the borrow. The various

Congestion on Main Street of Fortuna during July, just before the opening of the new freeway.



Looking north at the Alton Railroad Grade Crossing on the old highway. Note the poor alignment and sight distance.

FORTUNA PROJECT

Concluded

plants required for production of the materials were set up adjacent to the right-of-way, near the center of the job. Mercer Fraser Company of Eureka was the subcontractor on all base and surfacing items.

Chamber Quarterly Features Highways

On the editorial page of the September 1962 State Chamber of Commerce quarterly, *California—Magazine of the Pacific*, the editor points out "Unless a practical working partnership of governmental and private interests can be attained California will be engulfed by its bigness."

This statement sounds the keynote to the special issue, which is intended to bring readers up to date on current highway and transportation advances in the State, as well as to show the problems which must be faced in the future.

More than 90 percent of the issue is devoted to stories on California highways and transportation, representative titles of which include "Freeway Planning," "Right of Way," "California's Highway Commission," and "Freeways and Community Development."

BRIDGE TRAFFIC INCREASES

In the first two weeks since its mid-September opening, the Benicia-Martinez Bridge has carried more than 4,000 vehicles a day on weekdays and many more on weekends, despite the fact that the freeway approach on the Contra Costa side is still under construction and bridge traffic must still use a two-lane connection in the Martinez area. On September 16, a total of 12,232 vehicles passed through the tollgates. The ferry which the bridge replaced carried an average of fewer than 500 cars a day during August, its last month of operation. The heavy traffic using the bridge was hailed as auguring well for the economics of Contra Costa and Solano Counties.

Ventura County Freeways

By E. T. TELFORD, Metropolitan District Highway Engineer

Ventura County, an area of rugged mountains, vast ranch lands and a beautiful seacoast, is growing with the rest of Southern California. Light industrial expansion with subdivisions, business and services that commonly attend the influx of population are transforming the county into a key community, making it a part of Southern California's booming metropolitan economy.

Accessibility and availability of space are two of the most important attractions of the county, making the shift by industry and commerce from the adjoining crowded urban complexes advantageous; for the residents and personnel manning local industry and business, there is the refreshing prospect of country living in a temperate climate, where mountain and beach recreation areas are practically next door.

Interesting Phenomenon

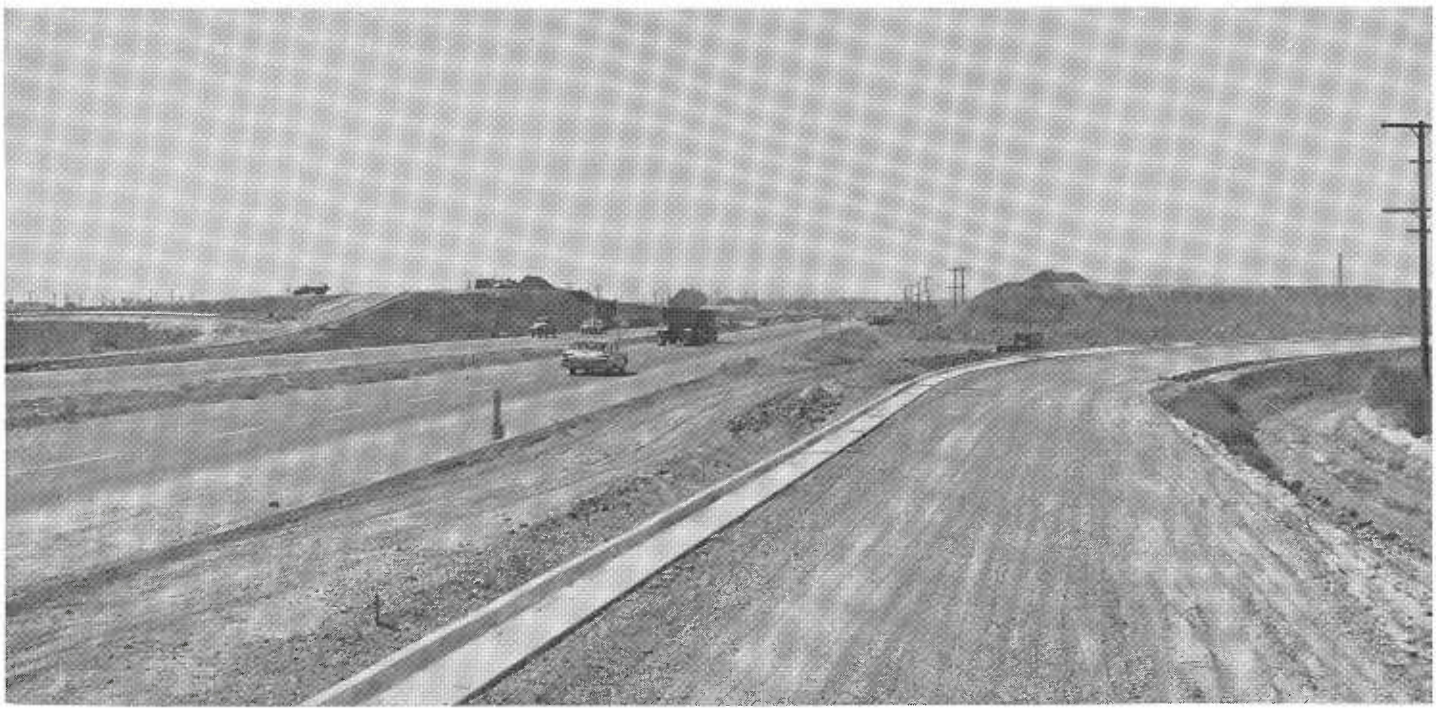
The growth of Ventura County in terms of population statistics is an interesting phenomenon as told by John D. Tapking, Planning Director, Ventura County Planning Department:

"The population of Ventura County on July 1, 1962, was 234,360, almost 19,000 more than one year ago and over 35,000 above the April 1, 1960, census figure. Based on the population as of July 1, 1961, the present annual rate of growth is 8.8 percent, a substantial increase over the 6.5 percent annual rate of growth that occurred in 1960 and the 73.7 percent total increase that took place between 1950 and 1960. This present high rate of growth, which gives no indication of having reached a plateau, places Ventura among the fastest growing counties in California.

"The 10 planning areas of Ventura County are experiencing widely divergent rates of growth. This is, in part, because of the proximity and economic influence of the Los Angeles metropolitan area which has helped accelerate development in the southeastern portion of the county as well as stimulated growth throughout the whole county. The Simi area, for example, is currently growing at a rate of over 36 percent and has almost doubled in size since the 1960 census. The Conejo and Camarillo areas are also rapidly developing with growth rates of over 15 percent and 12 percent respectively."

Annual Growth Rates

Ventura County growth rates, on an annual percentage basis between July 1, 1961, and July 1, 1962, for the various planning areas are given as follows: Camarillo, 12.5; Conejo-Coastal, 15.9; Moorpark, 10.5; Ojai, 8.2; Oxnard, 7.9; Santa Paula, 2.5; *Simi*, 36.6; Ventura, 6.7.



Calleguas Creek Overcrossing under construction on Pacific Coast Highway in the vicinity of Point Mugu.

Ventura Freeway construction, looking eastward from the west end of the job. Note the benched slope to the left of the highway.

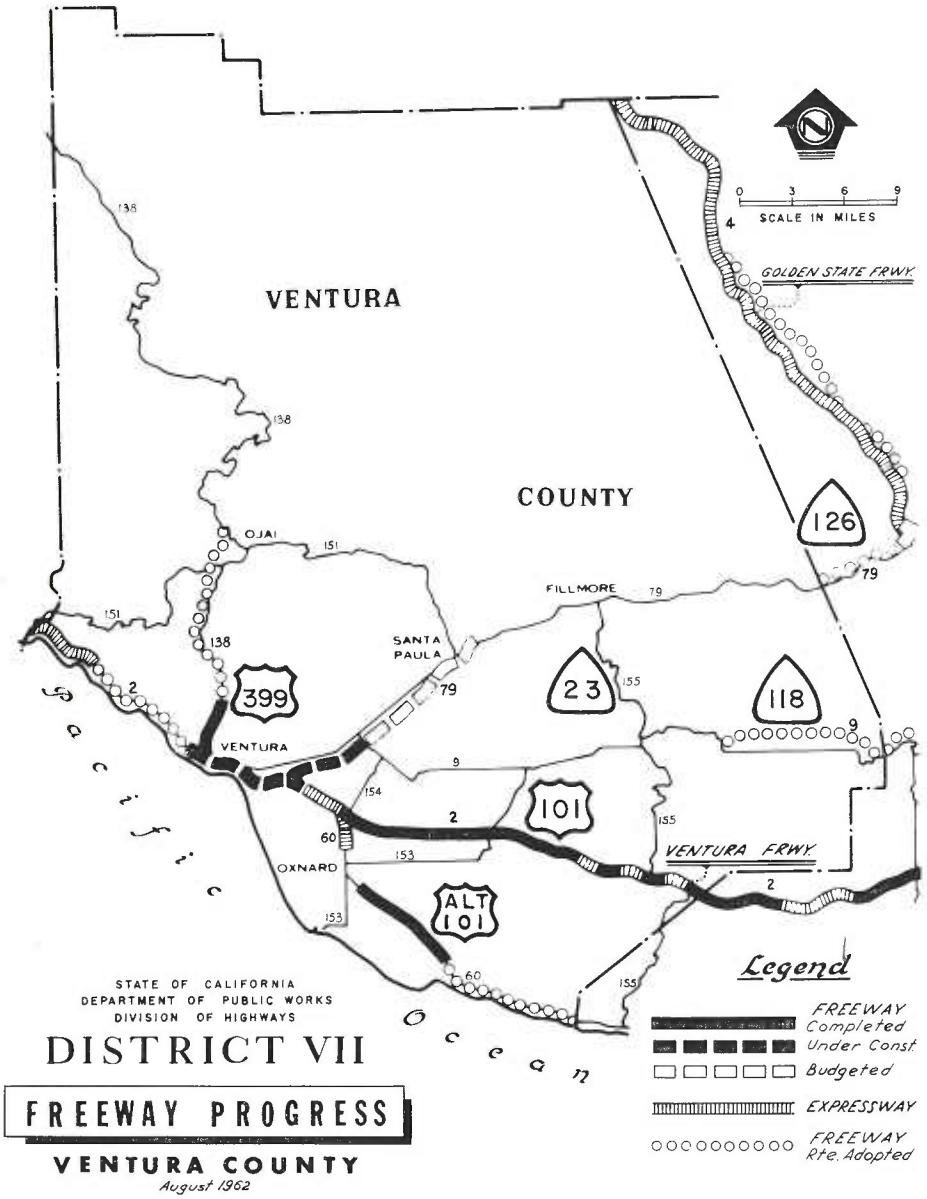
The six cities of Ventura County are also gaining in population, as illustrated by the following table:

Rank	City	Estimated population July 1961	July 1962	Rate of growth
1	Oxnard	42,200	47,037	11.46%
2	San Buenaventura	30,621	32,728	6.88%
3	Santa Paula	13,932	14,294	2.60%
4	Port Hueneme	11,763	12,583	6.97%
5	Ojai	4,804	5,211	8.47%
6	Fillmore	4,838	4,851	.27%

County Roads

Ventura County Road Commissioner C. G. Smith, succeeding the retiring J. V. Kimber, reports that as of August 1962 outstanding contracts in progress on county roads amounted to more than $250,000 and represented various improvements on such routes as Ventura Boulevard, Victoria Avenue Extension, First Street (Simi), West Road, Royal Avenue, Ventura Road Extension, Cochran Street Bridge, Katherine Street Bridge, Hilmont Road, Ventura Boulevard and Tico Road. County road mileage has advanced from 705 in June 1960 to 753 as of March 1962. The major source of county funds for local roads is the state-collected and distributed fuel and in lieu tax and traffic fine revenues, amounting to $2.1 million per annum. These moneys are being invested to best advantage by Ventura County in building its road network.

Since 1956 the State Division of Highways has expended in excess of



Location of freeway planning and construction and their current status is shown in the above map of Ventura County.

$25 million on freeways in Ventura County, including rights of way and construction. An August 1, 1962, breakdown indicates 19 miles of completed freeways and 20 miles of expressways in operation, with 13 miles under construction. The county has 274 miles of constructed state highways of all types and 101 miles of adopted freeway routes. Division of Highways plans, as set forth by Senate Bill 480, 1959 California Legislature, are projected forward to the year 1980, when an estimated $291.1 million will have been invested in 199 miles of freeways in Ventura County. This investment will be reflected in highway user and traffic benefits for twice the current population (234,360, July 1, 1962) and twice the present motor vehicle registration (112,463, June 30, 1962).

Ventura Freeway

The 32 miles of Ventura Expressway from the Los Angeles-Ventura county line to the Ventura Overhead is being converted to full freeway standards as fast as funds become available and plans can be prepared. This conversion consists of grade separation structures either over or under the present expressway together with interchange ramps and frontage roads and the closing of all entrances and exits from the freeway except at interchanges.

Telephone Road—Palm Street

The Ventura Freeway is under construction at two locations within the City of Ventura. The most easterly project extends from Telephone Road to Palm Street, a distance of 4.6 miles, and is being constructed under $9,148,400 contract. Actual work began on March 14, 1960. The estimated completion date of this stretch of the Ventura Freeway is the latter part of October 1962, with stage opening to traffic a little earlier. Ribbon-cutting ceremonies were held by the Ventura Chamber of Commerce on September 27. The six-lane facility will have eight bridges and one pedestrian overcrossing. When completed, the freeway will have temporary connections at the westerly end of the city, at existing U.S. 101, with east and westbound ramps at Oak Street and California Street, pending construction of the connecting freeway link to the west.

The east portion of the job is built on imported borrow originating from the Ventura Port District Small Boat Harbor, two miles distant. 2,700,000 cubic yards of material was secured from this site under difficult conditions utilizing dragline and bottom-dump trucks, followed by push loading with scrapers. In addition to building a haul road, the contractor sank 28 wells around the edge of the excavation to a depth of 50 feet and pumped out the ground-water seepage. This operation was on a round-the-clock basis, lasting 1½ years.

Drainage Facilities

Some of the drainage facilities constructed to handle existing barranca runoff include a 16-foot field-assembled structural plate pipe 626 feet in length at Arundell Barranca near the Sign Route 126 Freeway interchange; a 14- by 9-foot structural plate pipe arch 526 feet long, cambered because of area of extreme settlement; and an 8-foot structural plate pipe 392 feet long paralleling the Southern Pacific Railroad at Lemon Overhead.

Other incidental work centered around ramps and frontage roads. Telegraph Road was realigned and widened to four lanes for some 800 feet.

Seaward Avenue was similarly treated, having been converted to a four-lane overcrossing in an 1,800-foot section. Shore Drive was eliminated from San Pedro Street to San Jon Road, a distance of 3,500 feet, and replaced by a modern frontage road. Chestnut Overhead over the freeway and railroad was converted into a southbound freeway connection from Meta Street.

Among the other construction complications was the relocation of a 24-inch main city sewer at Front Street to a new location opposite the freeway and crossing it at Oak Street. The area adjacent the beach bluffs was a natural water storage basin and had to be replaced with a like installation with a pumphouse at San Jon Creek.

Major construction problems were encountered in the two cut sections at the middle and west end of the job, where ground water was present within five feet of the land surface. The subgrade was in clayey silt and free ground water.

In order to stabilize this condition, the contractor excavated to 2.5 feet below the subgrade and replaced existing material with pervious sand—an extremely difficult and expensive operation. The contractor also installed subterranean gravity perforated metal pipe in an extensive drainage network in the downtown section of the freeway. Here, too, 1,500 feet of solid retaining wall was erected because of adjacent buildings and the limited right-of-way width.

Surcharge Settles

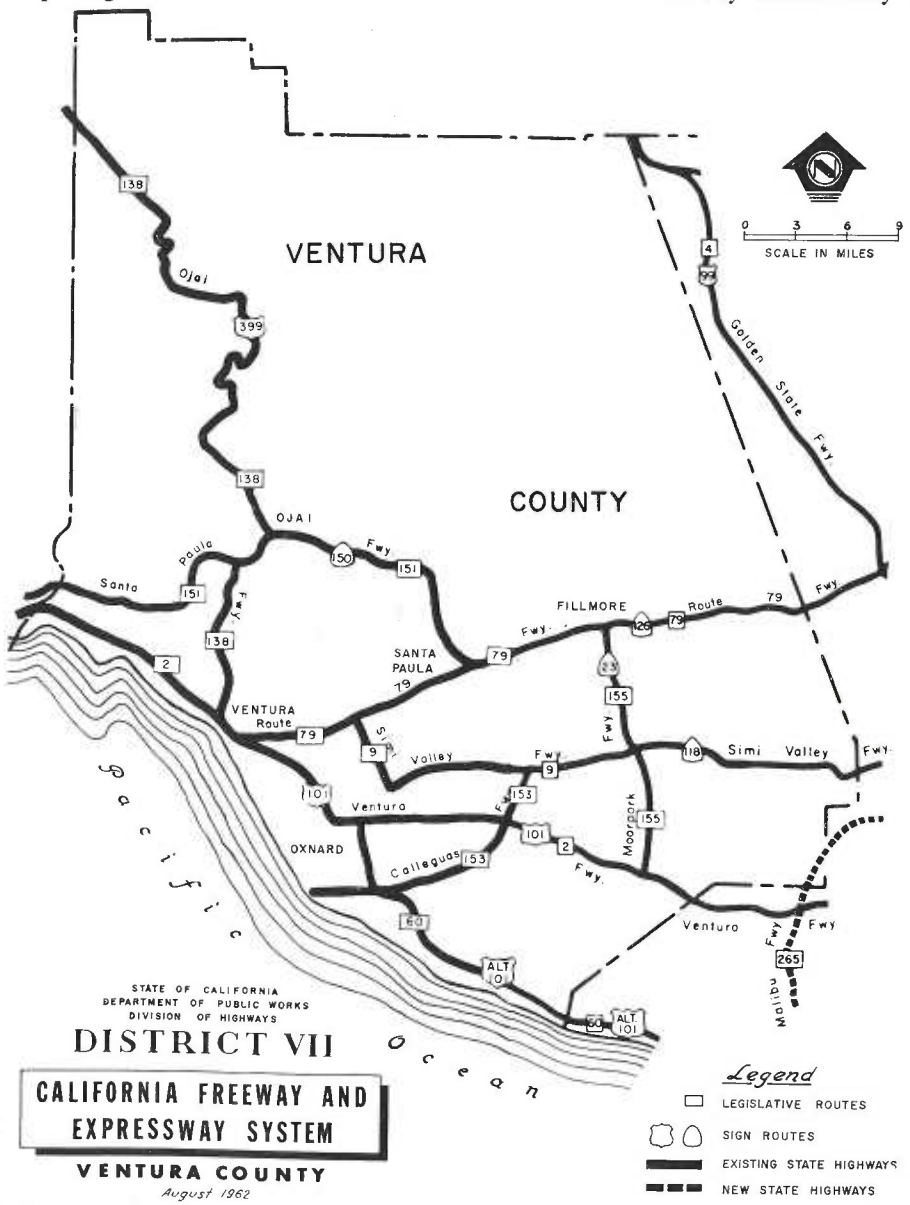
During construction the surcharge for bridges in embankment areas began to settle. At Telephone Road, Main and Lemon Streets the slump reached as much as 2.7–3.2 feet during surcharge settlement periods. The adjacent recreational area along Shore Drive on the beach was improved by freeway construction, since 80,000 cubic yards of excess excavation was placed here in first stage construction of this park, covering an area approximately 2,500 feet long by 800 feet wide.

Construction detouring of traffic on busy U.S. 101 Highway through the city was necessary at Telephone Road and Main Street. However, the opening to traffic of the new freeway will permanently divert existing heavy traffic from old U.S. 101, giving appreciable relief to local and through traffic, besides affording a pleasant prospect of Ventura's orchard, shore and mountain beauties.

This portion of the Ventura Freeway was paved in part with a slip-form paver which laid the concrete in 36-foot widths, or three freeway lanes at a time, completing runs as long as 1,600 and 1,700 feet in a single working day with a comparable amount of yardage. It should be noted that a satisfactory degree of pavement smoothness was also achieved in the fast-moving operation, which utilized the central mix method of supplying the paving train.

Palm Street—Ventura Overhead

On February 28, 1961, work began on three miles of the Ventura Freeway from Palm Street, the end of the contract to the east, and the Ventura Overhead bridge at the entrance to Emma Woods State Park, where connection will be made with existing U.S. 101. Part of the project involves construction of one mile of the Ojai Freeway (U.S. 399) and full interchange with the Ventura Freeway, eliminating a hazardous at-grade intersection at U.S. 101. Both projects are under $7,757,400 contract scheduled for completion in May 1963, though the Ventura Freeway section may be



The freeway and expressway system established for Ventura County by Senate Bill 480 is shown in the above map.

opened to traffic as far west as Taylor offramp by early November 1962.

In all, 10 bridges and one pedestrian undercrossing at Ventura Avenue will be built. The longest bridge, 977 feet, will span the Ventura River. Two other bridges, Garden and West Ventura Overheads, will cross the Southern Pacific Ojai line.

Garden Street was widened for 1,000 feet to provide a suitable entrance to the 31st Agricultural District Fairgrounds (Seaside Park); Front Street, another entrance to Seaside Park, was improved for 1,500 feet; and 700 feet of Beach Street was constructed along the waterfront. At Peking and Harriet Streets a city dump was uncovered during initial grading operations and 50,000 cubic yards of unsuitable material distributed in the fills. The hauling of fill materials for the job was accomplished without interference to traffic by means of a state easement, allowing the contractor to make use of a state-owned haul road.

Major Slide

A major 1,000,000-cubic-yard slide in September 1961 at the westerly end of the project from the freeway cut slope resulted in a serious design and construction problem. At an estimated additional cost to the State of $1 million, basic design was altered and provision made to raise the original freeway grade level 60 feet over a one-mile stretch at the west limits of the project. Design engineers and geologists deemed this the most feasible corrective measure, which would also tend to buttress the unstable north slope. Hence the freeway cut, 250 feet high before the slide, was laid back on a 2- to 1-foot slope; so that what was originally to be a sag between project limits will now be a vertical curve at 2.5 percent grade.

Borchard Road Interchange

The $536,000 Borchard Road interchange is one of a series of projects in Los Angeles and Ventura Counties, which will convert the present Ventura Freeway to full freeway standards, eliminating intersections at grade. This project is located in Newbury Park, another boom area in Ventura County.

The work, started on May 24, 1961, and now completed, consisted of approach roads, frontage roads, ramps and a steel girder bridge carrying Ranch Conejo Boulevard–Borchard Road over the freeway; also the widening of the existing reinforced concrete slab bridge over Arroyo Conejo Creek. The interchange is essentially a two-quadrant cloverleaf with westbound and eastbound on- and offramp connections. In addition to the bridge and approaches, a structural section of existing Ventura Freeway was reinforced with four inches of asphalt concrete on top of old portland cement concrete and the shoulders built up. This work was done on the eastbound roadway, from Conejo Summit eastward for a distance of 3,500 feet. This construction necessitated detouring of Ventura Freeway traffic to westbound lanes in a three-mile section. Every effort was made to minimize inconvenience to the traveling public and the detour was discontinued after a period of two months.

On September 6, 1962, the Newbury Park Chamber of Commerce dedicated this important interchange at special ceremonies.

Moorpark Road Interchange

Serving the community of Thousand Oaks and proceeding in a generally north-south direction, Moorpark Road is being revamped and separated from the Ventura Freeway, its present terminus. Work underway since August 21, 1961, under $1,621,746 contract calls for the construction of a grade separation at the Ventura Freeway, the widening of existing Conejo Creek Bridge and the reconstruction of Moorpark Road to a four-lane divided facility as far as Olsen Road, a distance of 3.7 miles. When completed in mid-December of this year, Moorpark Road (presently measuring 17 and 22 feet in width) will have a 32-foot paved roadway in each direction with a curbed 16-foot median and left-turn pockets. The roadway pavement will measure four inches in thickness.

The first order of work was to prepare Moorpark Road for detouring and temporary widening, followed by construction of a ¾-mile detour to handle Ventura Freeway traffic. With traffic using the two-way bypass section and the temporary connection with Moorpark Road, work proceeded on the Ventura Freeway bridge structure and approach roadways. The Ventura Freeway was widened from four lanes to six for ¾ mile, with provision to complete the eastbound roadway first. This work has since been completed and the new pavement will be striped to accommodate on a temporary basis both outbound and inbound Ventura Freeway traffic, at which time construction can proceed on the north freeway roadway. Completion of this structure will provide a diamond interchange with Moorpark Road, permitting on and off movements for eastbound and westbound freeway traffic.

As of this writing, the southbound roadway of Moorpark Road is completed and has been in use to both northbound and southbound traffic while the other half of the roadway is being completed. This important facility as well as the main line Ventura Freeway have both been kept in service to through and intersectional traffic during construction under elaborate detour conditions.

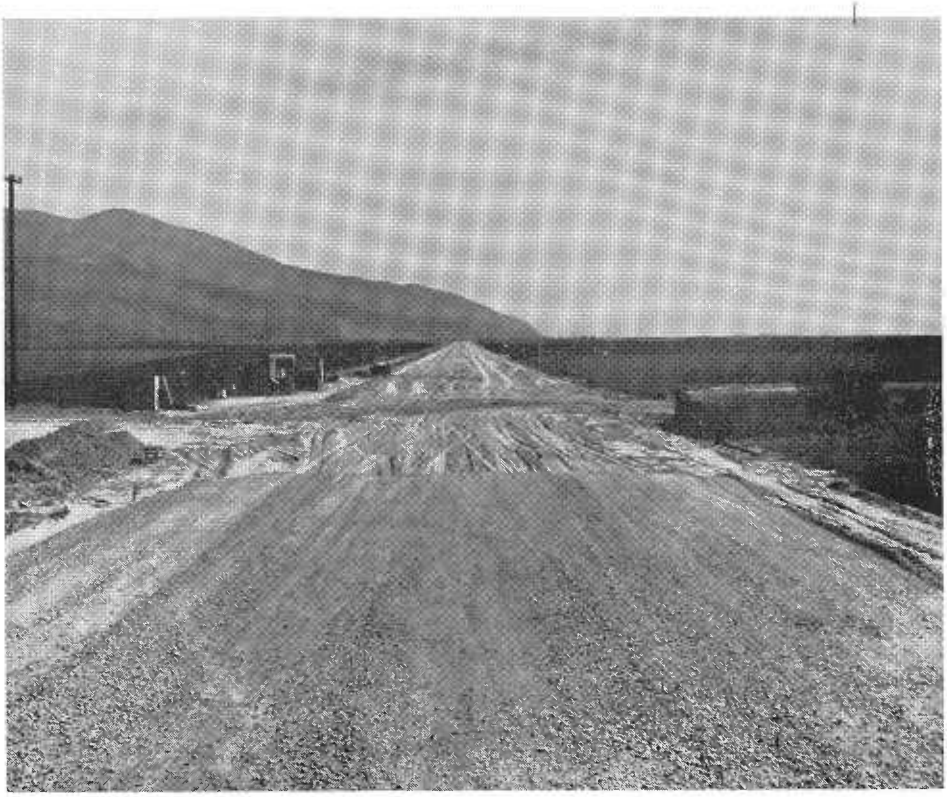
Water Feeder Line

An interesting feature of this project has been the concurrent installation of a 30- and 24-inch steel-lined concrete water feeder line by the Calleguas Municipal Water District under state utility encroachment permit. This line, passing through the median area of Moorpark Road, from Olsen Road to Village Lane, stretches three miles through the job and is part of a $22,000,000 water improvement project designed to serve the water needs of Conejo Valley until 1975, when Feather River water will be made available. Thus, burgeoning Conejo Valley will very shortly receive the added stimulus of a stable and ample water supply from the Metropolitan Water District. This new line will principally supply the fast-growing residential and light industrial expansion in the area, relieving the demands on well water which has become increasingly scarce.

In addition to the aforementioned water main, other water lines and utilities had to be accommodated in the construction area. These included gas mains, crude oil lines, power and telephone overheads.

PHOTO ABOVE LEFT—The recently completed four-laning of Saviers Road, looking north from Bard Street. ABOVE RIGHT—Looking west along Hueneme Road, a recent improvement in the Hueneme area. Four-lane highway joining the near end of the project (right to left) is Saviers Road. BELOW LEFT—The Moorpark Road improvement in Thousand Oaks looking north from the Ventura Freeway under construction (foreground). LOWER RIGHT—The Borchard Road-Ventura Freeway Interchange in the Newbury Park area.

The Ventura Freeway will pass over Moorpark Road on this interchange structure now under construction.



Looking south along the Las Posas Federal-Aid Secondary Road project. At left is Laguna Peak near Point Mugu.

Unusual success was achieved with the slip-form paving apparatus, which laid 12-foot and 24-foot sections of concrete on the Ventura Freeway section of the project. Measurements taken by the profilograph indicated an especially smooth pavement surface of a high of 2.16 inches per mile and a low of 0.48 inch.

Other Interchanges

Tentatively scheduled for the near future are an interchange at Hampshire Road together with an undercrossing at Live Oak Road (estimated cost for the two is $675,000); an interchange at Newbury Park ($750,000); and an interchange at Old Conejo Road ($470,000).

During the 1962–63 construction year, interchanges and frontage roads will be constructed at Triunfo Road ($495,000); at Geneive Street just west of Camarillo ($475,300); and at Central Avenue and Garden Acres, together with a pedestrian overcrossing at Occidental Drive ($950,000).

Upon completion of all this work, U.S. 101 will be full freeway from the Los Angeles county line to Vineyard Avenue just east of Ventura, except for one location at Cunningham Road which has been temporarily deferred in order to co-ordinate the design with the Moorpark Freeway for which public hearings are now being held.

Construction will also get under way within the next two to four years, depending on the availability of funds, on a project for converting the four-mile length between Vineyard Avenue and Telephone Road to full freeway.

Six bridges will be required, four of which are major structures. A proposed bridge for the westbound roadway across the Santa Clara River will be 2,000 feet in length, and separation structures will be constructed at two locations over the Santa Paula branch of the Southern Pacific Railroad; also, an interchange at Victoria Avenue. U.S. 101 Alternate will be carried over both roadways of the Ventura Freeway in lieu of the present bridge over the eastbound roadway. Approximately 1,100,000 cubic yards of imported borrow will be required for embankment. The total cost is estimated at $7,000,000.

Construction will also be underway within the next few years for modification at the interchanges at Rice Road–Santa Clara Avenue and at Rose Road–Ditch Road at a cost of $350,000, and for construction of a separation structure at Cunningham Drive at a cost of $300,000.

Completion of these projects, together with the Agoura Road interchange in Los Angeles County, which is tentatively scheduled to be underway at about the same time, will provide a full freeway between downtown Los Angeles and the City of Ventura.

Ventura-Santa Barbara County Line

Northwest of Ventura from the existing Ventura Overhead, the future Ventura Freeway will be on the landward side of the Southern Pacific tracks as far as the Chanslor Oil Refinery at Seacliff, where the alignment crosses over the tracks and goes out into the ocean for one-half mile to avoid the refinery.

North of Seacliff the freeway will follow the alignment of the present four-lane divided highway to a point one-half mile south of the Santa Barbara county line where it will join a freeway project presently being designed in District V.

For the length from the Ventura Overhead to one-half mile south of the Santa Barbara county line, approximately 3,000,000 cubic yards of excavation and 4,000,000 cubic yards of embankment will be required.

Separation structures with interchange ramps will be provided at Seacliff and at Mussel Shoals; also five small road separation structures. Total cost is estimated at $9,000,000. Construction may start on the first portion, including the section at Seacliff out in the ocean, within the next three to four years, subject to the availability of funds.

Sign Route 126 Freeway

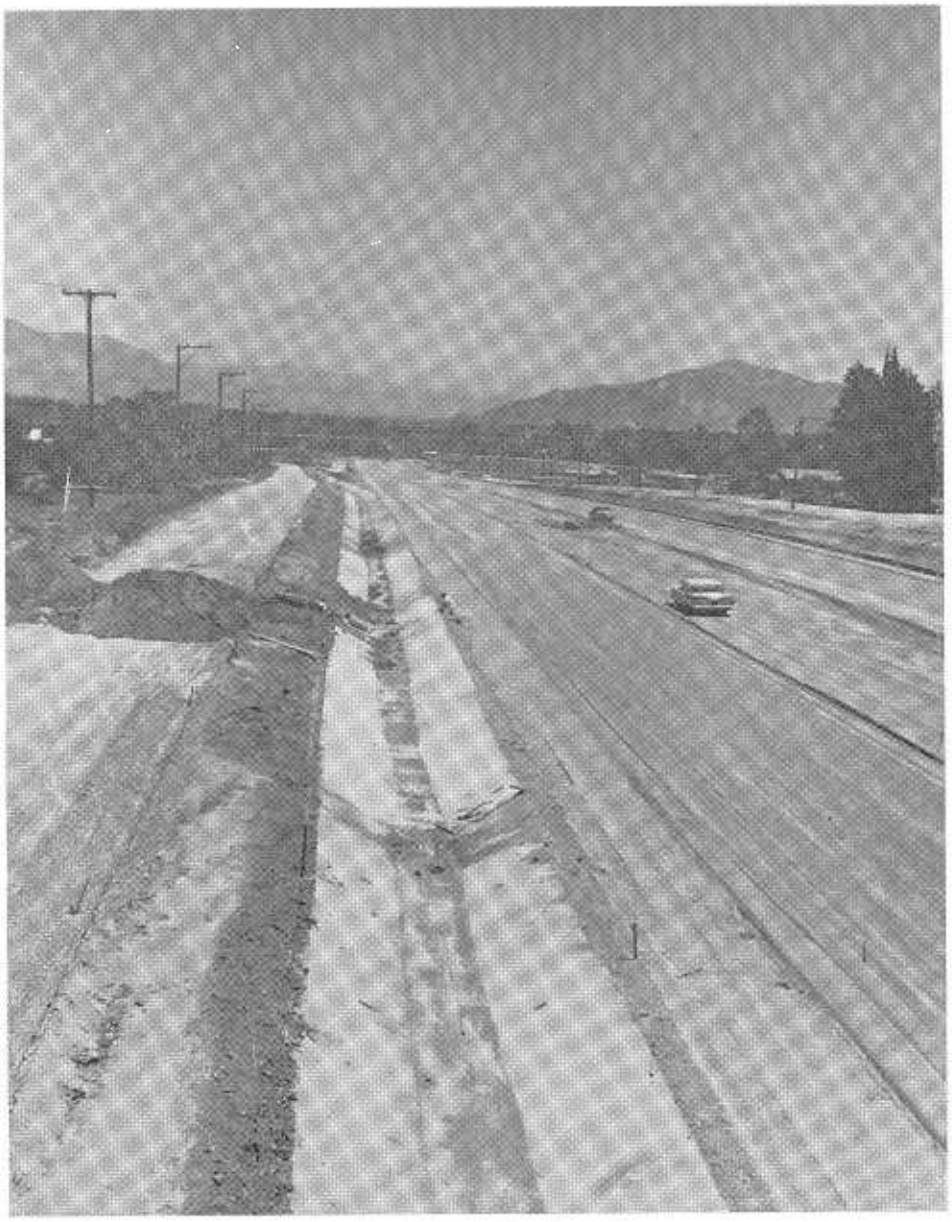
First construction on the Sign Route 126 Freeway, paralleling Telephone and Telegraph Roads in Ventura County, began on August 29, 1961, on a 5.4-mile section linking the future Ventura Freeway with Wells Road. The $3,922,222 project, the estimated completion date for which is May 1963, calls for an initial four-lane construction with provision for an ultimate six lanes. The completed facility will have six bridges and one pedestrian overcrossing which is a prestressed-in-place structure. A massive 14- x 14-foot reinforced-concrete box at Harmon Barranca will constitute a farm undercrossing for pedestrian and vehicular traffic on abutting ranch lands.

The most interesting feature of this at-grade freeway is the drainage system which consists of five miles of four-inch gunnite channel for on- and off-site drainage flanking the north side of the freeway, amounting to 3,200 cubic yards. Two 168-inch structure plate pipes 270 feet and 128 feet in length pass under the freeway at Harmon and Arundell Barrancas for the uninterrupted drainage of these channels. On the east end of the job, Wells Road was relocated as a detour for one-half mile to permit construction of the Wells Road overcrossing. When the Sign Route 126 Freeway is completed and opened to traffic, Telegraph Road (the present state highway) will be improved for permanent relinquishment to Ventura County.

Planning

The Sign Route 126 Freeway begins at the Montalvo intersection and extends easterly into Los Angeles County where it makes connection with the Ridge Route, or the Golden State Freeway. Its total length in Ventura County is aproximately 36 miles. A 14-mile portion between Montalvo junction and Orcutt Road in Santa Paula is presently adopted and the remaining 22 miles is currently under study with a target date for adoption in late 1963.

The Victoria Avenue overcrossing and cloverleaf on Sign Route 126 in Ventura.



This drainage channel flanks the Sign Route 126 Freeway.

Design

Plans are nearly complete and bids will be called for early in 1963 for an 8.5-mile extension of the Sign Route 126 Freeway from Wells Road to Santa Paula. The proposed freeway is on new alignment south of Telegraph Road–Harvard Street. Six miles of the length is in county area and 2.5 miles through the City of Santa Paula. Fifteen structures will be built. The project is budgeted at $7,000,000 in the current 1962–63 fiscal year.

Ojai Freeway

Preliminary plans for an Ojai Freeway project between Mills School and Foster Park are well along. Starting from a point one-fourth mile south of the present grade crossing with the Ojai branch of the Southern Pacific (south of Mills School), the freeway will pass over the railroad and continue to Foster Park, south of the present highway along the base of the mountains.

Separation structures will be required over the railroad and over Ventura Avenue, and complete interchanges at Canada Larga Street and Casitas Pass Road.

Construction may get underway within the next five years, depending upon the availability of funds. Construction is estimated at $2,800,000 and right-of-way at $800,000.

The Highway Commission, on May 23, 1962, adopted the route for the Ojai Freeway between Foster Park and Cozy Dell Canyon northwest of Ojai.

The adopted route follows, in general, the east bank of the Ventura River. The Ojai branch of the Southern Pacific will be moved at four locations and crossed once on structure. Embankment on the west side, adjacent to the Ventura River, will be protected by riprap or other embankment protection. The location of grade separations and interchanges have not yet been determined.

The length of this second project will be 8.4 miles; cost is estimated at $9,900,000 for construction and $2,400,000 for right-of-way.

When completed in future years, the Ojai Freeway (U.S. 399) will extend 57 miles from the City of Ventura to the Santa Barbara county line. As yet no route location studies are in progress on the route north of Ojai.

Pacific Coast Freeway

A section of the Pacific Coast Freeway in Ventura County has been completed since 1957 when 6.8 miles of the route was opened to traffic between Calleguas Creek and Date Street, at a total cost of $2,413,000. The overall length of the Pacific Coast Freeway (U.S. 101 Alternate) in the county is 21 miles between the Los Angeles county line near Malibu and El Rio. The entire route is adopted except for a four-mile stretch between the south city limits of Oxnard and El Rio, which is currently under study with a target date for adoption in mid-1963. The southernmost nine miles of the Pacific Coast Freeway in the county is also under study by the Division of Highways, for relocation and possible readoption in 1963.

Calleguas Creek Overcrossing

Since April 11, 1962, a project has been underway to construct an overcrossing on the Pacific Coast Freeway at Calleguas Creek, seven miles southeast of Oxnard. This facility, in addition to Wood Road overcrossing and a pedestrian overcrossing to the west, will provide further vehicular access for the U.S. Naval Test and Missile

Center, which abuts the freeway. The $642,000 project, a three-quadrant interchange with east- and westbound ramp connections and four bridge lanes, will be completed in late November of this year.

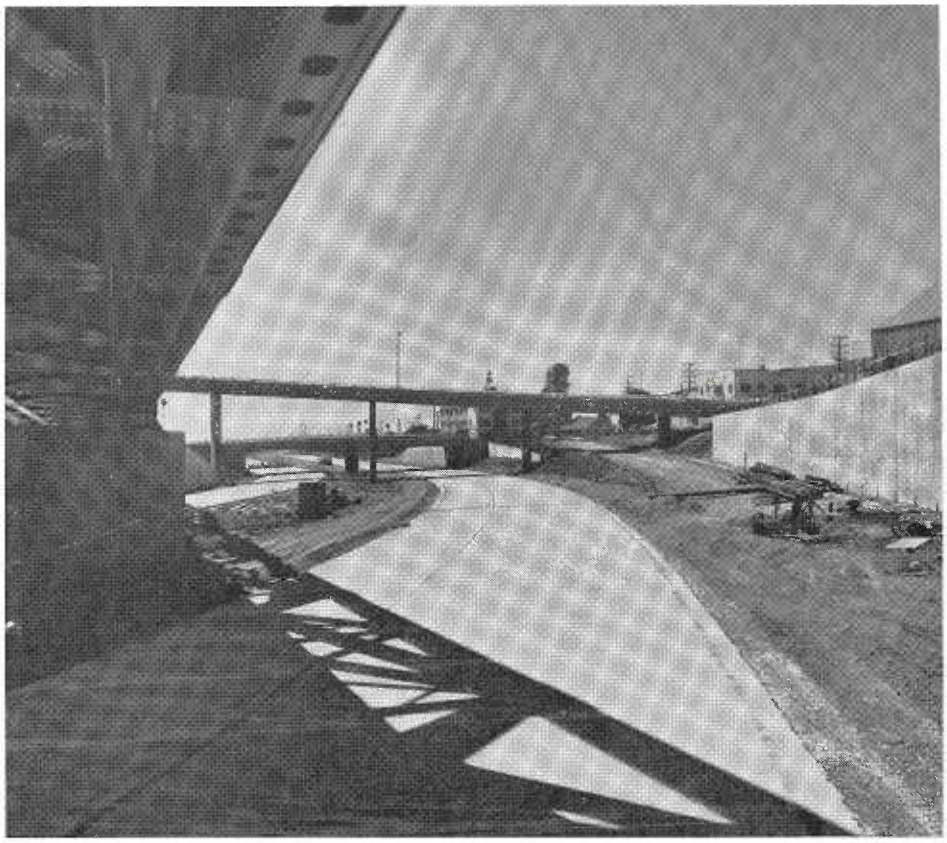
Other Road Projects

Besides work completed and in progress on major freeway jobs, overcrossings and separation structures in various quarters of Ventura County, a number of minor projects on state and local roads are also getting attention. This is a continuing policy of the State Division of Highways—keeping California's existing secondary and feeder routes in good repair and building new improvements where these will contribute to the safe and efficient movement of people and goods.

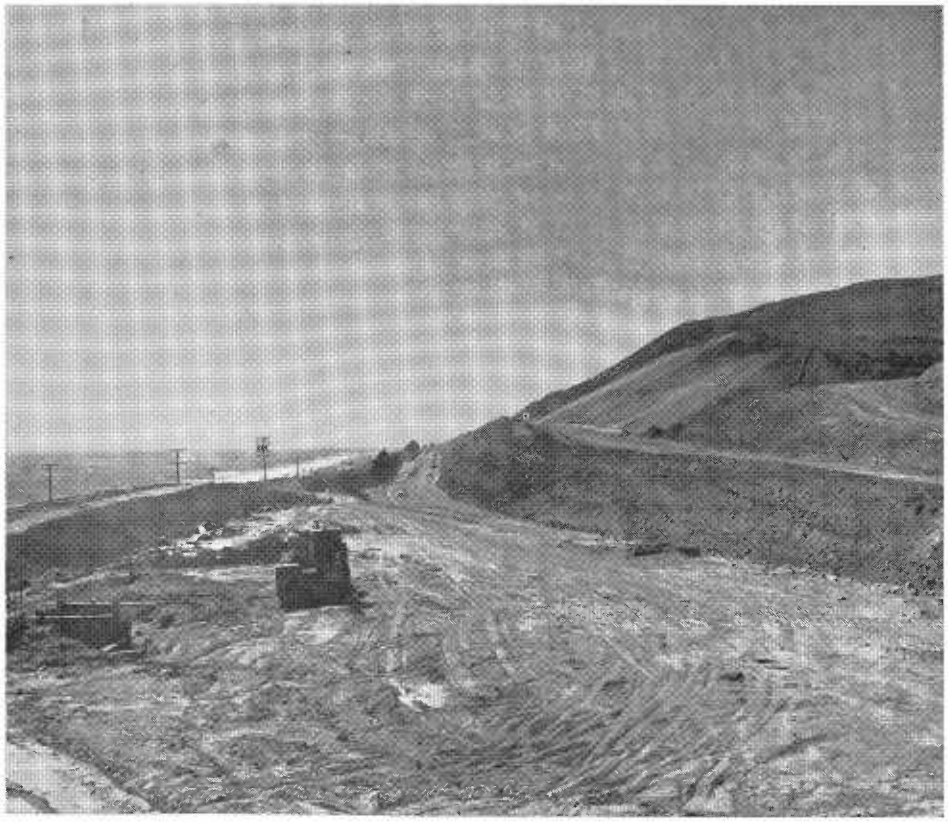
Some of these projects are listed briefly as follows: Las Posas Road extension between Laguna Road and Pacific Coast Freeway, 4.2 miles, a new two-lane facility under $481,000 contract scheduled for completion in November 1962; Saviers and Port Hueneme Roads, four miles, conversion of existing two-lane facility to four-lane divided highway with left-turn channelization, a $889,500 project already completed; Santa Susana Pass Road at the Los Angeles–Ventura county line, 2.7 miles grading, surfacing and realignment, a $127,000 project scheduled for completion in October 1962; grading and surfacing of 15.5 miles of various routes, a $91,000 project already completed; Telegraph Road at Ashwood Avenue and Sexton Road, 0.1 mile; signals, lighting and channelization, a $53,968 project already completed; also, bids were opened in August from a budgeted $28,600 for signals, lighting and channelization at Vineyard Avenue and the Ventura Freeway, and at Oxnard Boulevard and Pacific Coast Highway.

Simi Valley Freeway

The Simi Valley Freeway (State Sign Route 118), begins at State Sign Route 126 near Saticoy and extends easterly to the Los Angeles county line, a distance of about 30 miles. The easterly nine-mile portion of this route between Madera Road in the Simi Valley and the Los Angeles county line has been adopted. The remaining 20 miles



Looking west along the paved roadway of the Ventura Freeway toward the Southern Pacific Ojai Line overhead.



Construction on the Ventura Freeway near the west city limits of Ventura. The embankment to the right was a slide area. Cars drive along present US 101 at the center of the photo.

Ventura Freeway construction through the City of Ventura. The view is eastward. The Ventura River and bridge is center and, just beyond, the Ojai-Ventura Freeway Interchange.

is currently under study with a target date for adoption in late 1963.

Santa Paula Freeway

The Santa Paula Freeway (State Sign Route 150), begins at Rincon Point just north of the Santa Barbara county line and joins State Sign Route 126 in Santa Paula via Ojai. There are no current studies under way at this time as to the ultimate location of this freeway.

Calleguas Freeway

The Calleguas Freeway, portions of which bear State Sign Route 34, extends from the City of Hueneme to State Sign Route 118 near Somis, a distance of some 14 miles. A short length of this freeway between Hueneme and Oxnard is under study in conjunction with the Pacific Coast Freeway between Oxnard and El Rio.

Moorpark Freeway

The Moorpark Freeway (State Sign Route 23), begins at the Ventura Freeway near Newbury Park and joins State Sign Route 126 in Fillmore via Moorpark. Its total length is 16 miles. A California Highway Commission hearing was held on September 19, 1962, in Thousand Oaks, following a district public hearing in January 1962 to discuss route study location results of a seven-mile portion of the Moorpark Freeway lying between the Venture Freeway and Tierra Rejada Road. Data on three basic lines for the future freeway was presented, with estimated construction and right-of-way costs ranging from $22.1 million to $23.3 million.

Spencer Cortelyou

After enjoying 13 years of retirement—preceded by 38 years of state service—Spencer V. Cortelyou died August 9 at age 83, in Claremont. Mr. Cortelyou, who had been Assistant State Highway Engineer in charge of District VII, was one of the leaders in the development of the freeway concept which resulted in the construction of California's first freeway —the Arroyo Seco Parkway between Los Angeles and Pasadena (now known as the Pasadena Freeway), opened December 30, 1940.

Mr. Cortelyou was affectionately known as "Father of the Freeways," having actively participated in the many studies leading to the freeway system in the Los Angeles metropolitan area. Prior to his retirement in 1949, location, design, and construction were well under way on the "backbone" of the Los Angeles freeway system: the San Bernardino (then known as the Ramona), the Hollywood, the Santa Ana, and the Harbor Freeways.

As one of the original employees of the California Division of Highways, Mr. Cortelyou started as Principal Assistant to Division Engineer W. Lewis Clarke on February 1, 1912, in District VII, which claimed his entire career of distinguished state service. (Districts were then called divisions; and District VII originally included the Counties of San Bernardino, Riverside, Imperial and San Diego—as well as its present three Counties of Los Angeles, Orange, and Ventura.)

As a young man, he graduated from the University of Nebraska in 1902, where he gained recognition equivalent to "All American" honors in football.

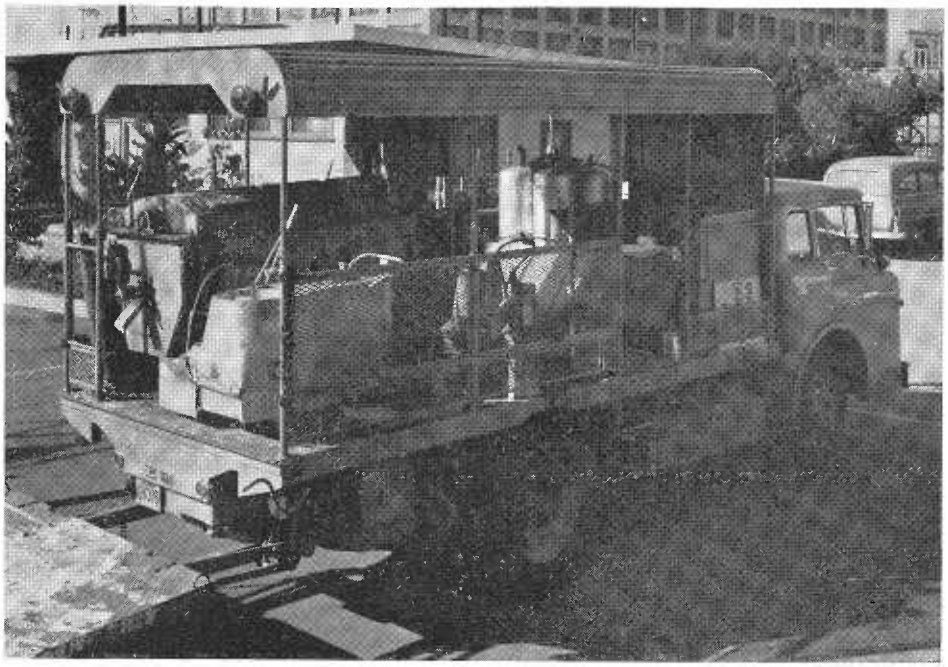
He is survived by a son, Curtis; a daughter, Mrs. Betty Thompson; two brothers; eight grandchildren and one great grandchild.

Traffic Stripes

New Thermoplastic Applicator Proves Worth in Heavy Use Areas

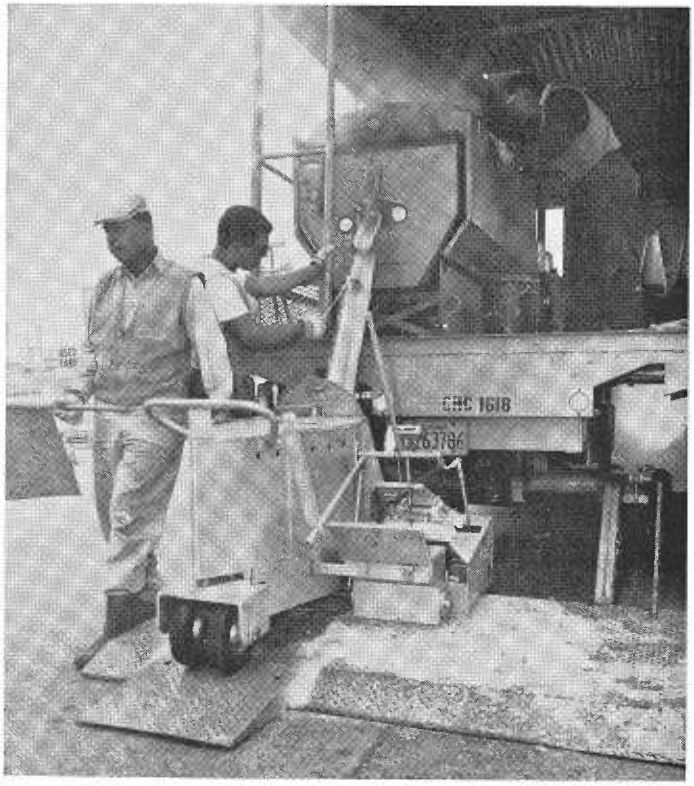
Certain traffic stripes and pedestrian crosswalk striping subject to heavy use in metropolitan areas require frequent replacement. In many of these critical areas, replacement can be made only under difficulty at times of least usage. The traffic lacquer used on the highways is good, and has long life, but for certain critical locations, something with better wearing qualities even though it costs more is more economical. For this reason, the use of hot melting, nonvolatile thermoplastic compounds developed for traffic marking was considered.

Recognizing the advantages of a thermoplastic-type stripe, Division of Highways Maintenance Department requested the Equipment Department to purchase and assemble on a 2½-ton truck, all of the components necessary for applying thermoplastic traffic striping. Two units were constructed for use on an experimental

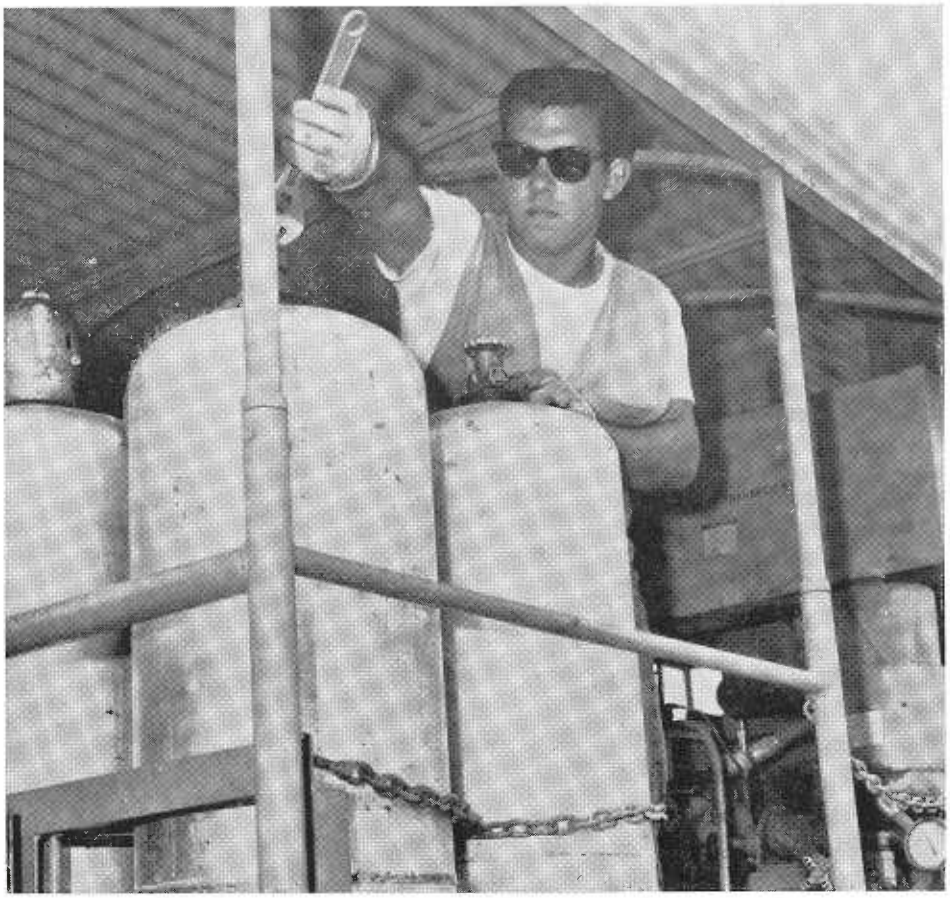


The complete thermoplastic striping truck. Note the location of the hand applicator at the rear of the truck and the hydraulic tailgate which is used to load and unload the applicator.

The stripe applicator in operation. Note the base truck parked in the background out of the way of traffic.



Charging the applicator with hot thermoplastic compound that has been heated in the kettle.



Liquid petroleum in these fuel tanks is used for the thermoplastic heating operation.

Charging the kettle with solid thermoplastic material. Repeated heating of the material does not harm it.

basis in the Los Angeles and San Francisco metropolitan areas.

At Equipment Department Headquarters, two 2½-ton tilt-cab trucks were equipped to handle the thermoplastic striping. This required designing and building special truck bodies to carry a liquid petroleum fired kettle which would melt 800 pounds of the plastic material in one heating. To support this kettle, fuel tanks, heat exchange oil tanks, and a storage bin for the solid material were required. Special toolboxes and access steps to the truck were also required.

The thermoplastic applicator, which is hand operated, is carried from job to job on the truck. It is loaded and unloaded by means of a hydraulically operated tailgate, which also acts as a loading platform when the applicator is charged. The entire striping unit is self-contained, so that it may operate away from its headquarters without the necessity of frequent returns for service.

In operation the material is heated to approximately 600 degrees in the kettle, and then is poured into the hand-operated heated applicator from which the heated material is poured onto the pavement at temperatures between 400 and 450 degrees. The stripes can be poured in widths of 4 inches, 8 inches, and 12 inches. The depth of the stripe is approximately one-eighth of an inch. If beads are required, they may be mixed in with the heated material for exposure as the stripe wears, and a surface layer of beads may be dropped onto the stripe from a bead dispenser mounted on the applicator.

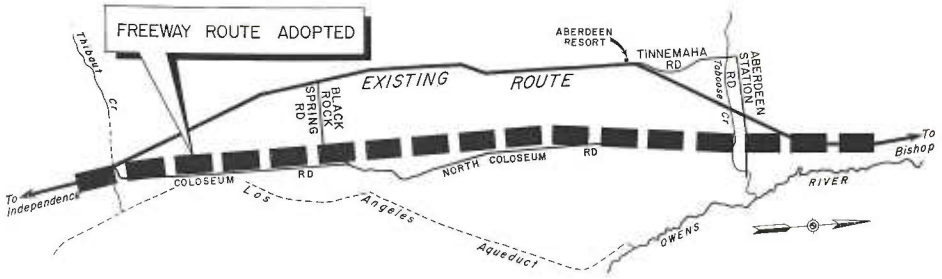
The material will harden sufficiently within eight minutes at an atmospheric temperature of 90 degrees to allow traffic over the lines without pickup or impression. At 50 degrees Fahrenheit the material requires five minutes to harden. The plastic will not break down or deteriorate when in its heated liquid form for long periods of time, and repeated heating does not harm it.

Material costs are much higher than traffic lacquer. Application is much slower than painting. However, the increased wearing ability and the elimination of repeated striping under adverse conditions compensate for the added cost of the thermoplastic stripes.

6,240 Miles

Route Adoptions Now Exceed Half of State Freeway System

The California Highway Commission has passed the halfway mark in the adoption of routes for the 12,414-mile California freeway and expressway system established by the 1959 Legislature. As of August 23, when the commission closed its August meeting, 6,240.5 miles of freeway routes had been adopted. The halfway point was actually reached in July when the commission adopted 10.1 miles of freeway routes to bring the total to 6,213.2 miles.



Interstate Standards

The freeway and expressway system includes nearly 2,200 miles of state highways on the national interstate system, which are being built to interstate standards. The system will also include a number of miles of "two-lane expressways" which will have access control for traffic safety and the preservation of the highway against random encroachment.

The freeway and expressway system eventually will link all cities of 5,000 or more population and will carry 59 percent of the total vehicle travel when completed. Completion is scheduled in 1980 at an estimated cost of 10½ billion dollars.

Hearings Are Waived

None of the commission's eight freeway route adoptions in July and August involved a public hearing by the commission itself. Such hearings were waived by the cities and counties involved.

Routings Listed

July and August freeway route adoptions:

Imperial County—Routing for 6.5 miles of U.S. Highway 80 about five miles west of Winterhaven. Route follows the existing highway.

Inyo County—Routing for the relocation of 10.9 miles of U.S. Highway 6-395 between five miles north of Independence and Black Rock, about 10.8 miles south of Big Pine. Route runs for the most part about a mile to the east of the existing highway and on a more direct line.

Adopted in 1956

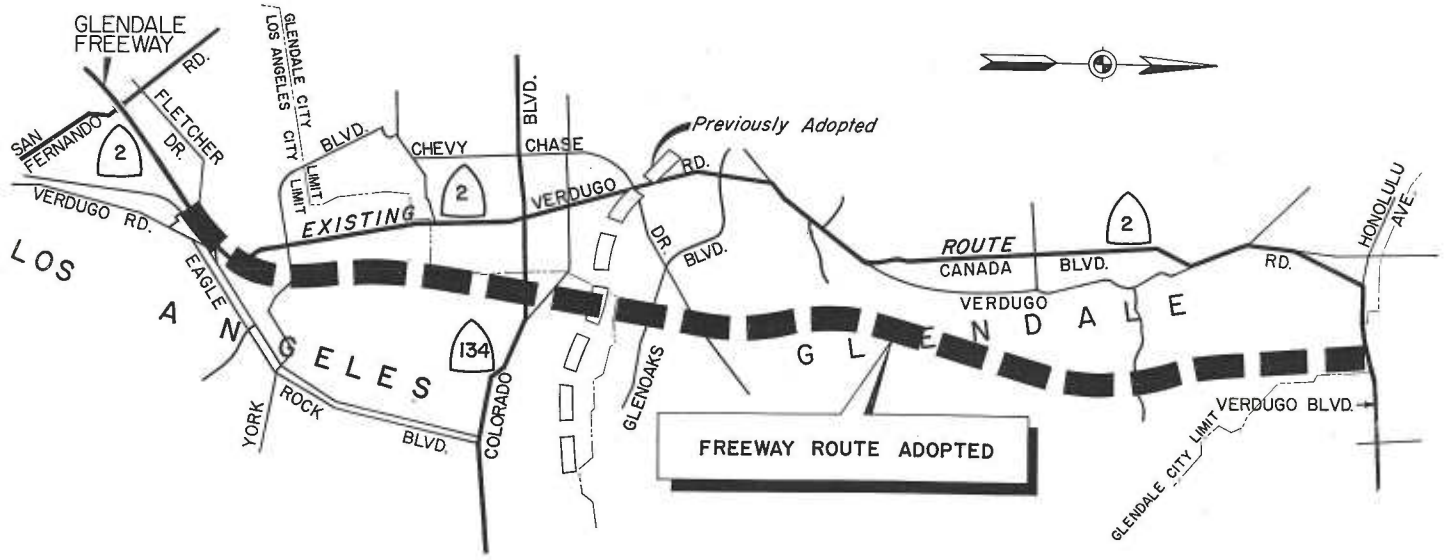
Kern County—Three miles of State Sign Route 178 (Walker Pass Highway) between three miles west of Weldon and Weldon designated as a freeway. Route itself adopted in 1956.

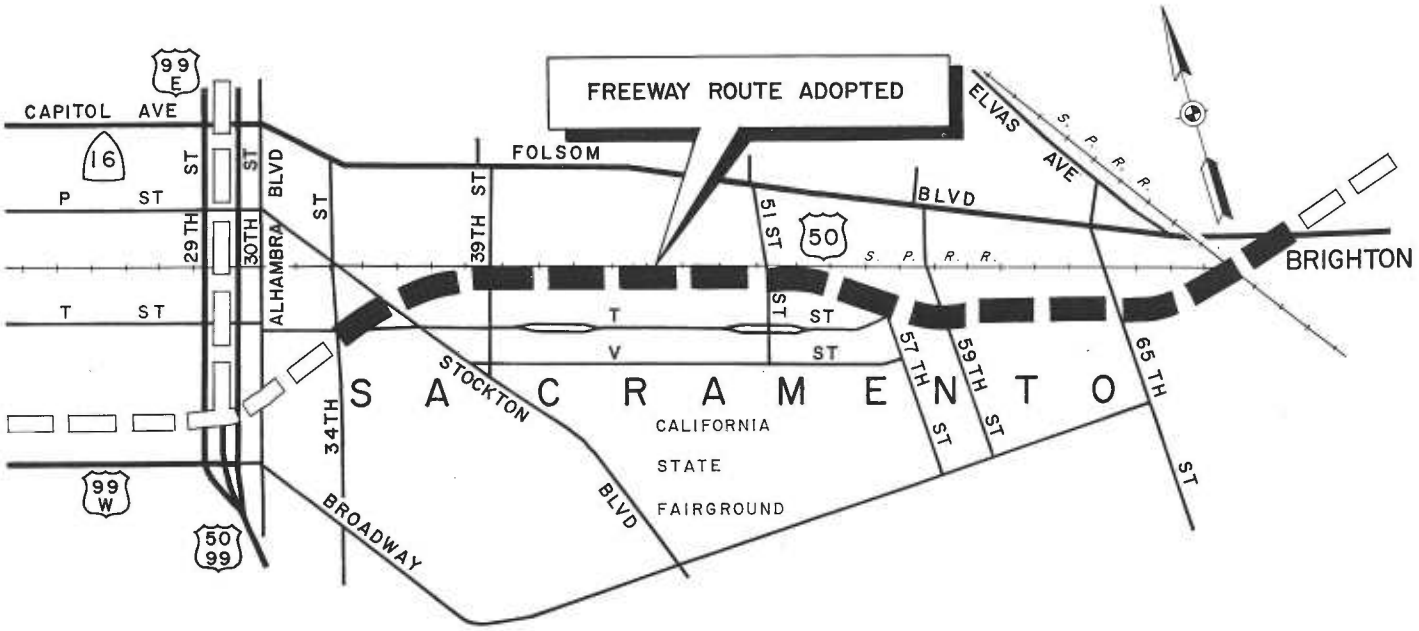
Los Angeles County—Routing for the Route 61 (Glendale) Freeway in Los Angeles and Glendale between Avenue 36 and Verdugo Boulevard, a distance of 6.3 miles. The route runs east of the existing highway, which is part of Sign Route 2.

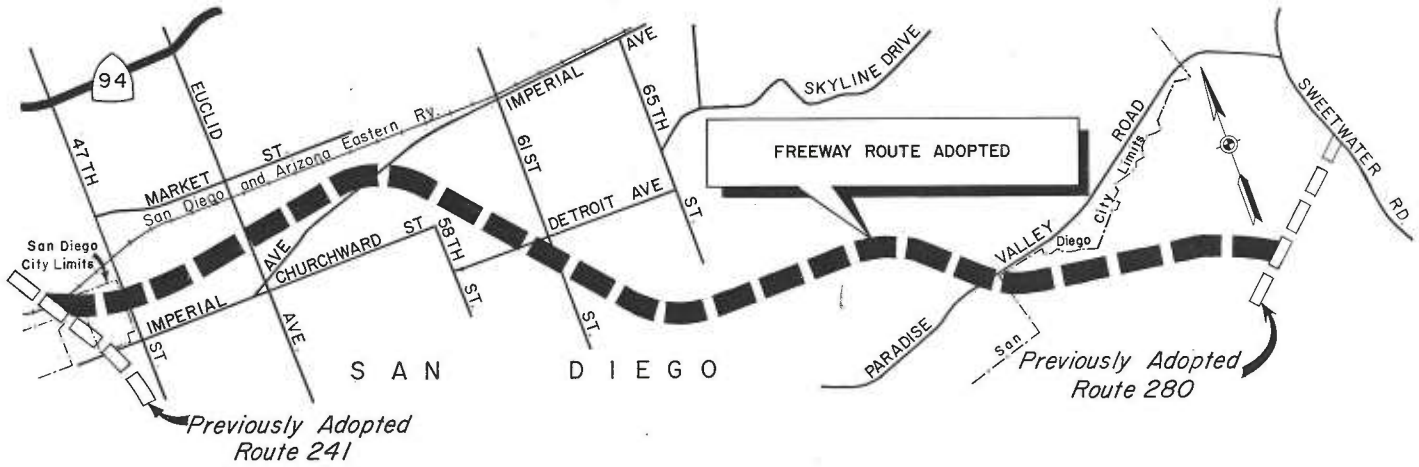
Timber Trestle Replaced

Mendocino County—Routing for an access-controlled highway on State Sign Route 1 in the vicinity of De Haven Creek. Will eliminate a wide loop and allow for replacement of a timber trestle.

Modoc County—Routing for the realignment of two miles of U.S. Highway 395 in Modoc County between 0.7 mile north of the Lassen-Modoc County line and 0.1 mile north of County Road 63 near Likely. Route runs just to the west of the present highway and generally parallel to it.







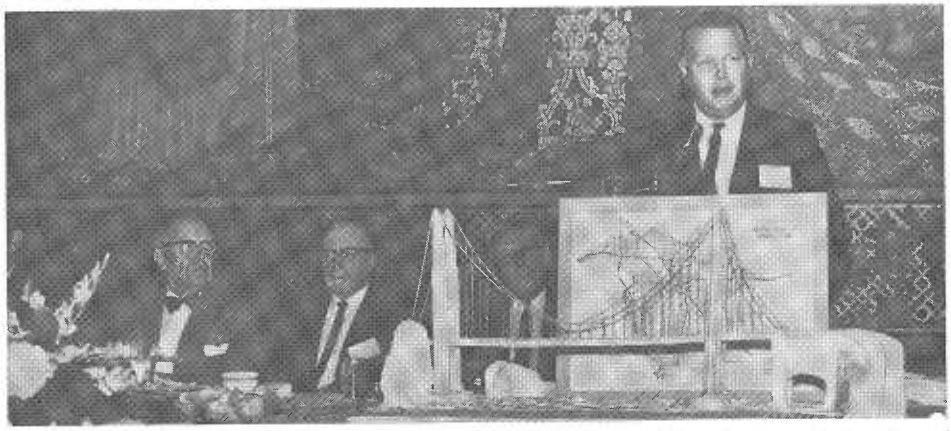
Sacramento County—Routing for 2.7 miles of U.S. Highway 50 in Sacramento between 34th Street and Brighton. The route runs south of the present highway (Folsom Boulevard). It is adjacent to and parallel to the Southern Pacific Railroad tracks and close to the industrial development east of 57th Street.

Connects Future Freeways

San Diego County—Routing for 5.1 miles of State Highway Route 285 in the San Diego area between the adopted route for State Highway Route 241 (Interstate 805) and the adopted route for State Highway Route 280.

The planned Route 285 Freeway will serve as a major east-west connecting highway between the two other future freeways.

BRADFORD IS SPEAKER AT 30th ANNUAL A.B.T.T.A. MEET



Robert B. Bradford, Administrator of the California Highway Transportation Agency and Secretary of the California Toll Bridge Authority, was one of the principal speakers at the 30th annual meeting of the American Bridge, Tunnel and Turnpike Association, held in San Francisco from September 30 to October 4. Others shown are (left to right) H. G. Lohmiller, Secretary and Treasurer of the Davenport Bridge Commission, Davenport, Iowa; Norman C. Raab, Projects Engineer, Division of San Francisco Bay Toll Crossings; and John Pershing, General Manager of the Richmond-Petersburg Turnpike Authority of Richmond, Virginia, and president of the association.

Federal Aid — '51 to '62

By G. G. McGINNESS, Assistant Office Engineer

(This supplements the article by Assistant Office Engineer R. F. Reynolds, which appeared in the January–February 1950 issue of *California Highways and Public Works*.)

From the first apportionment in 1916 through June 30, 1951, California had received a total of over $281,000,000 of federal aid and other federal funds which aided in the financing of our highways and roads. Since June 30, 1951, the total has risen to over $1,700,000,000 including the apportionments for the 1961–62 fiscal year. The federal aid for the 1962–63 fiscal year amounts to more than the total for all the 35 years prior to July 1, 1951.

The national statement of policy concerning future federal-aid for highways, as adopted by the American Association of State Highway Officials on November 21, 1949, resulted in the enactment of federal-aid legislation that incorporated, for the most part, the association's recommendations.

Act of 1950

The Federal-aid Highway Act of 1950 provided federal-aid highway authorizations totaling $500 million for each of the fiscal years ending June 30, 1952, and June 30, 1953. While this act did not include an authorization for the Interstate Highway System nor were the authorizations for the other three classes of federal-aid roads as extensive as recommended by A.A.S.H.O., it did, however, provide for a $50 million annual increase over the sums authorized by the 1948 act.

Also the 1950 act embodied, with some modifications, the association's recommendations concerning the following: the use of federal funds for the retirement of bonds issued by a state for the construction of toll-free facilities; the withholding of federal funds from a city or county for failure to properly maintain a road which they have agreed to maintain instead of withholding from the state as a whole; the authorization of $5 million for disaster damaged highways on the federal aid systems on a 50–50 matching basis; and an increase in the federal ratio of participation in the cost of right-of-way from 33⅓ percent to 50 percent.

The 1950 act also included two new features of importance to the states. One was the requirement for the establishment of a secondary road unit in each state highway department desiring to utilize federal-aid secondary funds. The other new feature provided, as a condition of approval of any federal-aid project involving the bypassing of any city or town, that the state highway department certify to the Commissioner of Public Roads that it has had public hearings and considered the economic effects of such a highway location.

Both of these requirements had already been provided for in California.

Public Hearings

The policy of the California Highway Commission as adopted on July 15, 1948, provided for the holding of public hearings where proposed freeway improvements contemplate use of other than the traversable state highway. This policy was amended on July 23, 1953, and restated on February 18, 1955. The commission again revised its freeway route adoption procedure in 1958 "to provide additional guarantees that local views will be fully heard and carefully considered." (See *California Highways and Public Works*, March–April 1958.)

The 1950 federal act also increased the ratio of federal participation to 100 percent in the improvement of a federal-aid highway project within Indian reservations, nontaxable Indian lands,

PRIMARY—US 101, the Redwood Highway, in Marin County is on the Federal-Aid Primary System. This view is looking south across the Greenbrae Interchange and Corte Madera Creek.

and national parks and monuments under the jurisdiction of the Department of Interior.

First Interstate Funds

The Congress of the United States, recognizing the importance of early improvements to the national system of interstate highways, provided an initial authorization of $25 million a year for a two-year period, beginning July 1, 1953, in the enactment of the Federal-aid Highway Act of 1952.

The 1952 act also increased the yearly authorizations for the other three classes of federal-aid highways from a total of $500 million to $550 million for the 1954 and 1955 fiscal years.

Basis for Apportionment

The apportionment of interstate funds was made to the states on the same basis as provided by existing law for the apportionment of primary funds, i.e., on the basis of area, population, and post road mileage. The federal matching ratio for interstate funds remained the same 50–50 basis as authorized for the other three classes of federal-aid highway funds, i.e., primary, secondary and urban (also referred as "A," "B" and "C" funds, respectively, from the sections of the federal highway acts pertaining thereto).

Public demands for expediting highway construction were partly met by an added stimulus in the approval of the Federal-aid Highway Act of 1954 which provided a total authorization for each of the fiscal years ending June 30, 1956, and June 30, 1957, of $875 million. This yearly amount included $700,000,000 for the ABC systems and $175,000,000 for the interstate system.

California's apportionments under the 1954 act are shown in the accompanying table.

CALIFORNIA APPORTIONMENT UNDER 1954 ACT

System	*1955-56 F.Y.*	*1956-57 F.Y.*
Primary	$14,495,550	$14,521,798
Secondary	7,463,481	7,475,335
Urban	15,378,016	15,417,145
Interstate	9,770,990	9,792,836
Total	$47,108,037	$47,207,114

The total sums of $47,108,037 and $47,207,114 were added to the California State Highway Fund Budget for the 1955–56 and 1956–57 fiscal years, respectively, as estimated revenue in accordance with state law.

The sums of $6,530,546 and $6,540,-919, which represent 87½ percent of the secondary apportionments, were reapportioned by the State to the counties for improving county road sections of the secondary or feeder road system in accordance with the California Secondary Highways Act of 1951.

New FAS Procedure

A radical departure from previous federal-aid legislation and procedure appeared in the Federal-aid Highway Act of 1954. This was the permissive acceptance by the Secretary of Commerce of a certified statement by the state highway department that an approved programmed secondary or feeder road project had been completed in accordance with the standards of design and procedures of construction adopted by that state and previously approved by the Secretary of Commerce. This certificate replaced the long-established procedure of plan, specification and estimate submission to and approval by the Bureau of Public Roads on each individual project.

Since one of the primary objectives of the federal-aid secondary highway program (that of aiding the counties in developing adequate highway engineering organizations) was well along toward complete accomplishment in California, there was no longer a need for close federal supervision. It, therefore, was only natural that California would be one of the first to sign an agreement under the plan. This became effective February 1, 1955.

The substitution of state for federal engineers in the field during the design and construction phase of the FAS projects has developed a closer association between the counties and the State resulting in a better understanding of mutual problems.

Apportioning Method Changed

The 1954 Federal-aid Highway Act also changed the method of apportioning interstate funds among the States. Instead of equal weight being given for the factors of area, population and mileage of post roads, the new interstate money was divided among the states in the following manner: one-half in the ratio which the population of each state bears to the total population of all the states, as shown by the latest available federal census, (with the guarantee that no state receives less than three-fourths of one percent of the money), and one-half in the manner provided for apportioning primary federal-aid funds. Thus the interstate apportionments were based two-thirds on population, one-sixth on area, and one-sixth on post road mileage. At that time California's share of the total apportionment was 6.19 percent.

The 1954 federal law also increased the ratio of federal participation in expenditures for interstate projects to 60 percent of the cost plus an increased percentage for the so-called "public lands states." Under the 1954 act, federal participation in California interstate projects was 66.75 percent.

The research powers of the Secretary of Commerce were considerably broadened by the provisions of the 1954 act so that the Bureau of Public Roads might engage in research on all phases of highway construction, maintenance, safety, financing and traffic conditions and have authority to test, develop, or assist in the testing and development of any material, invention, patented article or process. Such research work may be carried out in co-operation with any other branch of the government, state agency, authority, association, institution, corporation (profit or nonprofit), or any other organization, or person.

Authorizes Other Studies

The Secretary of Commerce was directed by the 1954 act to include in the authorized highway research program studies of economic highway geometrics, structures, and desirable weight and size standards for vehicles using the public highways and of the feasibility of uniformity in state regulations with respect to such standards and submit reports thereof of such studies to the Congress of the United States.

Another important feature of the 1954 act was the directive requiring the Secretary of Commerce to prepare a codification for action by Congress of all existing federal laws pertaining to federal-aid highway construction

and to supplement such a proposed codification act with recommended federal-aid highway legislation. The result was that the federal laws relating to highways were revised, codified, and re-enacted on August 27, 1958, as Title 23, United States Code, "Highways."

Financing Study

Perhaps the most important provision contained in the 1954 act is the one that required the Secretary of Commerce to make a complete study and submit a report to Congress not later than February 1, 1955, of all phases of highway financing, including a study of the cost of completing the several systems of highways in the states and of the progress and feasibility of toll roads with particular attention to the possible effects of such toll roads upon the federal-aid highway programs.

Preliminary estimates obtained from this report (entitled "Needs of the Highway Systems, 1955–84," House Document No. 120, submitted to Congress March 25, 1955) were used as a basis for President Eisenhower's 10-year national highway program.

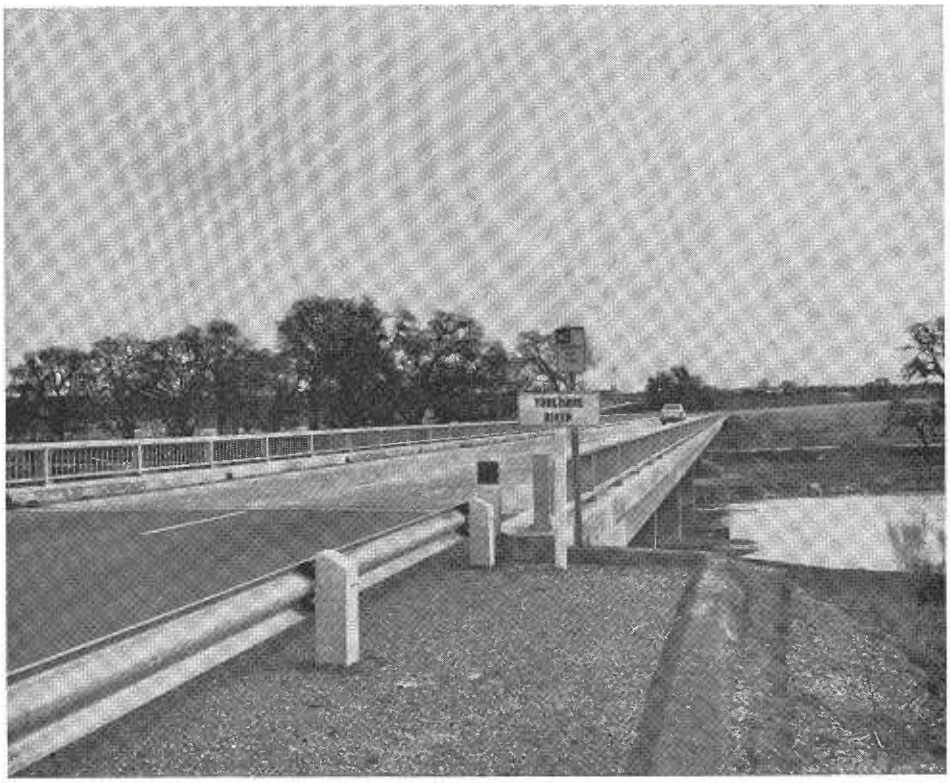
The Federal-aid Highway Act of 1956 implemented the President's program by authorizing the appropriations shown in the accompanying table.

FEDERAL-AID HIGHWAY ACT APPROPRIATIONS

For fiscal year ending June 30	*ABC systems*	*Interstate system*
1957	$125,000,000	$1,000,000,000
1958	850,000,000	1,700,000,000
1959	875,000,000	2,000,000,000
1960		2,200,000,000
1961		2,200,000,000
1962		2,200,000,000
1963		2,200,000,000
1964		2,200,000,000
1965		2,200,000,000
1966		2,200,000,000
1967		2,200,000,000
1968		1,500,000,000
1969		1,025,000,000
Total		$24,825,000,000

The above authorizations for the 1957 fiscal year were in addition to those under the 1954 act resulting in a total apportionment to California for fiscal 1957 as follows:

Primary	$17,118,341
Secondary	8,806,491
Urban	18,211,275
Interstate	66,820,982
Total	$110,957,089



SECONDARY—This new bridge over the Tuolumne River on Stanislaus County Federal-Aid Secondary Road 914 (Geer-Albers Road) north of Turlock is one of the many recent projects financed by FAS, State and county funds.

The sums authorized by the 1956 act for fiscal 1957, 1958 and 1959 were apportioned on the same basis as those under the 1954 act. The apportionments for subsequent years were to be based on revised estimates of cost.

The federal share of cost of projects on the interstate system was increased by the 1956 act to 90 percent plus an increment based on the area of public land within the state which, at the time, made federal interstate participation in California 91.68 percent.

California's additional apportionments under the 1956 act are shown in the accompanying table.

CALIFORNIA'S ADDITIONAL APPORTIONMENTS UNDER 1956 ACT

System	*1957–58 fiscal year*	*1958–59 fiscal year*
Primary	$17,656,495	$18,821,209
Secondary	9,051,859	9,762,001
Urban	19,000,084	19,461,116
Interstate	96,947,850	115,365,437
Total	$142,656,288	$163,409,763

The Federal-aid Highway Act of 1956 provided for 41,000 miles of highways comprising the "national system of interstate and defense highways" to be fully completed in 1972, to standards adequate to accommodate the types and volumes of traffic forecast for the year 1975.

Estimates Required

The 1956 act provided that sums to be appropriated for the fiscal years 1960 through 1969 would be apportioned among the several states in the ratio which the estimated cost of completing the interstate system in each state bears to the sum of the estimated cost of completing the system in all of the states. It required such estimates to be submitted to the Congress by the Secretary of Commerce in January 1958, 1962, 1966, 1967 and 1968. When approved by Congress, these estimates were to be used in making apportionments for following fiscal years.

It also provided that apportionments would be available for expenditure for two years after the close of the fiscal year for which they were authorized and that funds covered by formal agreement for specific projects would be deemed expended. This same principle applies to ABC funds as well as interstate.

The act set definite weight and width limitation for vehicles using the inter-

state system. If state law permits these federal limitations or similar limitations effective under state law on July 1, 1956, whichever is greater, to be exceeded, no apportionment of interstate funds to the state can be made.

The interstate standards require construction of highways with the characteristics of freeways and with access fully controlled. The 1956 act prohibits the addition of points of access to or exits from an interstate project without prior approval of the Secretary of Commerce.

The act contains a section providing for predetermination of prevailing wages by the Secretary of Labor under the Davis–Bacon Act. In compliance with this section, the Secretary of Labor's wage decisions are included in the contract special provisions for every interstate project.

Hearings to Be Certified

The matter of public hearings was enlarged upon in the 1956 act. For a federal-aid highway project involving the bypassing of, or going through, any city, town or village, either incorporated or unincorporated, the State must certify that public hearings have been held, or an opportunity for hearings has been afforded, and that the economic effects of the location have been considered. If hearings are held, copies of the transcript of such hearings must be submitted to the bureau.

The 1958 resolution of the California Highway Commission, based on practices in effect prior to 1949, set forth the policy and procedure for compliance with the above hearing requirement.

Based upon a report of a study made by the Secretary of Commerce, in cooperation with the state highway departments and other interested parties, the 1956 act authorized the participation of federal funds in the cost of relocation of utility facilities necessitated by the construction of a federal-aid project.

Because federal apportionments are based on the estimated cost to complete the system, it is essential that federal fund participation be obtained in all improvement work in connection with the interstate highway system. As storm drains, storm sewers, flood control, drainage and reclamation works are not utilities, the relocation or reconstruction of such facilities must be handled as construction contracts. Often it appears expedient to have such work done by the owners rather than include it in a highway construction contract.

State Retains Responsibility

Although federal regulations permit a state highway department to have work done on a federal-aid project by a local public agency, the State retains full responsibility for all phases of such a project and the necessary procedures are prone to complications which make this manner of performance undesirable. All of the federal approvals needed for a project handled by the State, such as programs, plans, specifications and estimates, and concurrence in award of contract, are necessary when handled by a local public agency.

The labor compliance provisions including wage decisions by the Secretary of Labor, copies of contractor's payrolls, and reports are equally applicable to projects on the interstate system performed by a local agency.

Complications can arise if the agency uses other than the approved current standard specifications of the State. Also, certifications that the right of way is clear can be difficult to obtain from a third party.

Whenever possible, all work in connection with a project on the interstate highway system is handled as a regular state highway contract except when the work involves a utility facility.

The Highway Revenue Act of 1956 provided for a federal gasoline tax of 3 cents per gallon and revised other highway user taxes. A Highway Trust Fund was created into which the motor vehicle fuel and other highway user taxes are deposited. Despite expenditures from the trust fund the authorizations and apportionments, cannot exceed receipts (except in cases where advances may be made from the General Fund).

Act of 1958

The Federal-aid Highway Act of 1958 authorized $900,000,000 for fiscal 1960 and $925,000,000 for fiscal 1961 for the ABC systems under the regular formula for apportionment and ratio of participation. The authorization for the interstate system was increased to $2,500,000,000 for each of these fiscal years but the 1959 act cut the fiscal 1961 authorization back to $2,000,000,000. (At the same time the fiscal 1959 authorization was increased to $2,200,000,000 by the 1958 act.)

California's apportionment of these funds are shown in an accompanying table.

STATE'S APPORTIONMENT UNDER 1958 HIGHWAY ACT

System	*1959–60 F.Y.*	*1960–61 F.Y.*
Primary	$19,253,224	$17,451,261
Secondary	9,970,730	9,224,241
Urban	20,017,148	19,946,525
Interstate	252,779,750	181,086,840
Total	$320,020,852	$227,708,867

The above interstate apportionments reflected a new formula by which California received over 10 percent of the nationwide total, based on the needs to complete the interstate system as estimated in 1958.

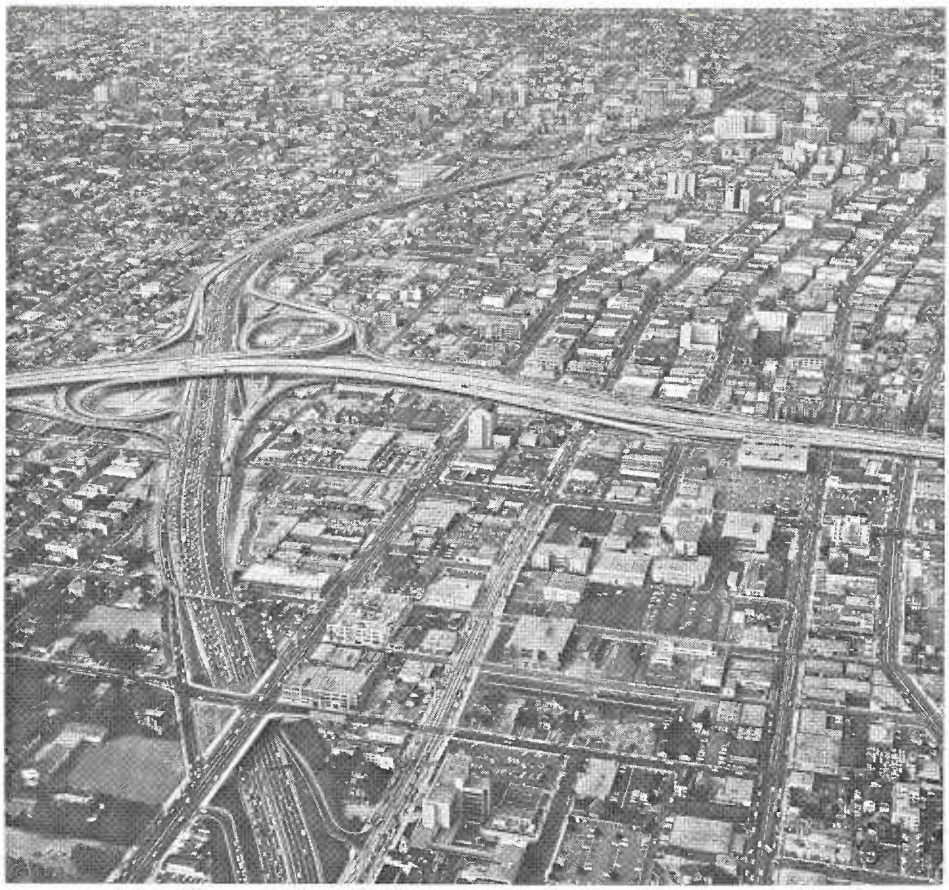
Although the fiscal 1961 authorization for interstate was $2,000,000,000, the amounts estimated to be available from the trust fund were not considered sufficient to cover the expenditure of that sum so the above interstate apportionment is based on a national total of $1,800,000,000.

The ABC apportionments above for fiscal 1961 reflect the apportionments reduced by one-half of the money needed to pay back the borrowed "L" funds, which will be subsequently explained.

For the immediate acceleration of the rate of highway construction on the ABC systems, the 1958 act also authorized the additional amount of $400,000,000 for the fiscal year ending June 30, 1959. It also authorized an additional $200,000,000 for the interstate system for the same period.

California's apportionment of these additional funds was as follows:

System	*1958–59 fiscal year additional*
Primary	$8,647,217
Secondary	4,485,055
Urban	8,941,216
Interstate	11,594,516
Total	$33,668,004



URBAN—The heavily traveled Harbor Freeway in Los Angeles, running from top to bottom in this photo, is an example of a Federal-Aid highway on the Primary system within an urban area. The interchange at left center connects it with the Santa Monica Freeway, which is on the Interstate System.

The above ABC funds, known as "D" funds, were to be used for projects on which contracts could be awarded or work commenced prior to December 1, 1958, and completed before December 1, 1959. These funds were apportioned in the regular manner but the federal share of projects to be financed with this money was two-thirds plus the "public lands" additive.

To further accelerate the "D" fund program, the 1958 act authorized $115,000,000 as loans to the states which might have difficulty in providing matching money. These were known as "L" funds which were paid back one-half in fiscal 1961 and one-half in fiscal 1962.

California used "L" funds as follows:

System	*1958–59 fiscal year "L" funds*
Primary	$3,163,812
Secondary	1,074,665
Urban	1,050,650
Total	$5,289,037

As indicated earlier, the Federal-aid Highway Act of 1958 approved the January 7, 1958, estimate of cost of completing the interstate system as the basis for apportioning funds for the 1960 fiscal year and the 1959 act provided further that it be used for the 1961 and 1962 fiscal years.

The 1959 act increased the federal tax on gasoline to 4 cents from October 1, 1959, to January 1, 1961.

The Federal Highway Act of 1960 authorized $925,000,000 for the primary and secondary systems and urban extensions for the 1962 fiscal year and the same for the 1963 fiscal year.

California's apportionments for these years are shown on the accompanying table.

CALIFORNIA'S SHARE OF 1960 HIGHWAY ACT FUNDS

System	*1961–62 fiscal year*	*1962–63 fiscal year*
Primary	$19,664,114	$22,247,521
Secondary	9,303,650	10,532,114
Urban	24,525,621	25,004,182
Interstate	220,070,812	228,847,200
Total	$273,564,197	$286,631,017

The Federal-aid Highway Act of 1961 approved the apportionment of interstate funds for the fiscal years ending June 30, 1963, 1964, 1965, and 1966 on the basis of the estimate of cost of completing the interstate system as submitted to Congress on January 11, 1961.

California's apportionment factor for these years is 9.656 percent, based on $2,458,512,000 to complete the interstate system in California and $25,461,915,000 to complete the whole nationwide system.

It also amended the authorizations for the interstate system to the following:

Fiscal year ending June 30	*Authorization*
1957	$1,000,000,000
1958	1,700,000,000
1959	2,200,000,000
1960	2,500,000,000
1961	1,800,000,000
1962	2,200,000,000
1963	2,400,000,000
1964	2,600,000,000
1965	2,700,000,000
1966	2,800,000,000
1967	2,900,000,000
1968	3,000,000,000
1969	3,000,000,000
1970	3,000,000,000
1971	2,885,000,000
Total	$36,685,000,000

The 1961 act extended the four-cent federal gasoline tax indefinitely and increased various other highway user taxes which are deposited in the Highway Trust Fund.

Another important provision of the 1961 act was to permit the use of the airspace above and below the grade line of the highway pavement for purposes that will not impair the full use and safety of the highway.

As it was anticipated that revenue from taxes to be deposited in the Highway Trust Fund would not keep pace with the authorized spending, in October 1959 reimbursable obligation ceilings were established by the Bureau of Public Roads. California's ceiling for fiscal 1960 was set at $226,965,000. Within this period intermediate

ceilings were set which created cumulative ceilings as follows:

Actual Obligations

July 1 to September 30, 1959	$21,427,000
October 31, 1959	35,363,000
December 31, 1959	62,603,000
March 31, 1960	144,784,000
June 30, 1960	226,965,000

On July 1, 1959, California had a balance of $138,121,654 of the 1959–60 and prior apportionments which was subject to these spending ceilings. As can be seen from the increments of $13,936,000 and $27,240,000 for the second and third periods respectively, the ceilings created a low rate of obligation in the first part of the fiscal year which prevented California from making full use of the apportionment and resulted in a slowdown in our rate of project advertising. By July 1, 1960, all but a few dollars of the funds available had been obligated. The sum of $58,896,000 was made available on July 1, 1960, and like amounts on August 2, 1960, October 10, 1960, and February 10, 1961, making a total of $235,584,000 released for the fiscal year ending June 30, 1961. By May 17, 1961, all but $35,671.32 of this available money was obligated.

On May 19, 1961, $72,189,000 was made available for obligation; the balance was $18,507,509.36 on August 21, 1961, when $72,195,000 was released. On December 1, 1961, and March 15, 1962, additional releases of $72,195,000 were made available making the total for the year $288,774,000. By June 30, 1962, practically all of this available money was obligated.

For the 1962–63 fiscal year, $420,893,000 has been scheduled for obligation. Of this amount $76,401,000 was released on June 14, 1962 and $98,302,000 on August 14, 1962. These two releases during the first quarter of fiscal 1963 together with the prior releases equal the total of the unobligated balance of the apportionments on July 1, 1959 and the subsequent apportionments for fiscal 1961, 62 and 63.

The accompanying table is a comparison of the apportioned funds and reimbursable obligation releases since the controls were made effective.

COMPARISON OF APPORTIONMENTS AND RELEASES

Fiscal year	*Apportionment*	*Releases*
Unobligated balance 6/30/59	$138,121,654	
1959–60		$226,965,000
1960–61	227,708,867	235,584,000
1961–62	273,564,197	288,774,000
1962–63	286,631,017	174,703,000 [1]
Subtotals	$926,025,732	$926,026,000
1962–63		246,190,000 [2]
1963–64	305,255,800	79,075,000 [3]
Totals	$1,231,281,535	$1,251,291,000

[1] First quarter 1962–63
[2] Scheduled for last three quarters 1962–63
[3] Estimated first quarter 1963-64

It is anticipated that the release for the first quarter of 1963–64 will be more than sufficient to bring the total releases in balance with the total apportionments.

Under reimbursement planning procedures, we may proceed with projects in excess of the reimbursable obligation ceiling by agreeing that federal reimbursement will not be made until funds are available for payment from the Trust Fund. These are called "E" projects. In July 1962 "E" projects in California totaled about $26,000,000. These have been converted and their value deducted from the current reimbursable obligation balance and reimbursement will be in accordance with an established schedule over a three-year period.

The Federal-aid Highway Act of 1961 authorized $2,600,000,000 for the interstate system for the fiscal year ending June 30, 1964, and $2,700,000 for fiscal 1965. In the 1962 act Congress authorized $950,000,000 for the primary and secondary systems and urban extensions for the 1964 fiscal year and $975,000,000 for 1965.

The federal-aid apportionments to California for the 1963–64 fiscal year will be substantially as follows:

(A) Primary System

The apportionment totaled $21,886,000. This is a little over 5 percent of $427,500,000, after provision to apportion not less than 0.5 percent to each state, which was authorized for appropriation to all states by Congress.

The apportionment of primary funds to the states is computed on the basis of one-third area, one-third population, and one-third post road mileage. The values of these elements at present are as follows:

In area, the United States has 3,618,659 square miles, California 158,693 square miles or 4.39 percent of the United States total.

In population (1960 census), the United States had 181,672,719, California 15,717,204 or 8.65 percent of the United States total.

In post roads, the United States has 2,665,294 miles, California 73,524 miles or 2.76 percent of the United States total.

(B) Secondary System

The apportionment totaled $10,178,000. This is over 3½ percent of the $285,000,000 authorized for all of the states.

The apportionment of secondary funds is based one-third on area, one-third on rural population, and one-third on post road mileage. The rural population element is as follows:

For the United States, 55,364,668; for California, 2,144,049 (3.87 percent of the United States total).

The other two elements are the same as for primary.

(C) Urban Extensions

The apportionment totaled $25,274,000. This is almost 11 percent of the $237,500,000 authorized for all states.

Urban funds are apportioned on the basis of population in places of 5,000 or more which in 1960 was as follows:

For the United States, 120,347,251; California, 13,173,572 (10.95 percent of the United States total).

(D) Interstate System

The apportionment totaled $247,917,800. This is 9.656 percent of the $2,600,000,000 authorized by the 1961 Federal-aid Highway Act for all states.

These funds were apportioned on the basis of the 1961 estimate of the cost to complete the system which is as follows:

For the United States, $25,461,915,000; for California, $2,458,512,000 (9.656 percent of the United States total).

Summary of Federal Aid to California for 1963–64 Fiscal Year

Primary	$21,886,000
Secondary	10,178,000
Urban	25,274,000
Interstate	247,917,800
Total	$305,255,800

This total is over 8½ percent of the $3,550,000,000 authorization for all of the states. For federal administration and reasearch, 1¼ percent was deducted before apportionment to the states and the above authorizations have been reduced by this percentage prior to figuring the estimates of apportionments.

The estimated federal-aid apportionments for the 1964–65 fiscal year are as follows assuming the same factors as used for the 1963–64 fiscal year:

Primary	$22,437,000
Secondary	10,421,000
Urban	26,348,000
Interstate	257,453,000
Total	$316,659,000

An entirely new phase has been added to the highway right-of-way acquisition program by a provision in the 1962 Federal-aid Highway Act which concerns relocation assistance to individuals, families and businesses displaced by acquisition or clearance of rights-of-way for any federal-aid highway.

Under this provision, the state highway department must give satisfactory assurance to the Secretary of Commerce that advisory assistance will be given to displaced families before authorization will be granted to call for bids on a federal-aid project.

Relocation Payments

The act also provides that the federal government will participate in relocation payments made by a state highway department to the extent of $200 in the case of an individual or family or $3,000 in the case of a business or nonprofit organization. A state is not required to make relocation payments unless authorized by state law.

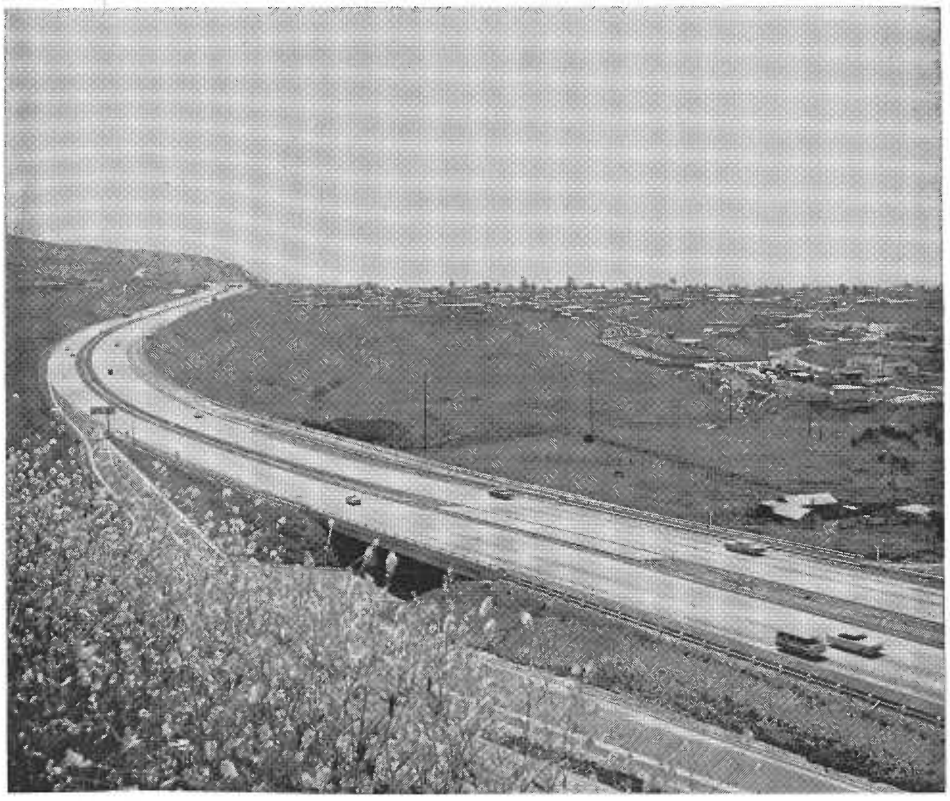
Another provision of the 1962 act, which reaches into an area that has been given increasing consideration by highway engineers, concerns transportation planning in urban areas. Under this provision, programs for federal-aid projects in any urban area of more than 50,000 population will not be approved without a finding by the Secretary of Commerce that such projects are based on a continuing comprehensive transportation planning process carried on co-operatively by the state and the local community.

Of the funds apportioned for expenditure on the A, B, C, and interstate systems, since 1944 federal law has allowed 1½ percent to be spent for highway planning and research. As previously mentioned, the research activities of the Bureau of Public Roads were broadened by the 1954 Federal-aid Highway Act. As evidence of the increased emphasis on research in the highway field, the 1962 act makes the expenditure of the 1½ percent of the funds for planning and research mandatory. The act also provides that, in addition to the above, up to one-half of 1 percent of the A, B and C apportionments may be spent for highway research and planning upon request by the state.

The federal-aid secondary highway system, previously confined to rural areas, may now, under the 1962 act, be located both in rural and urban areas. This provision will alleviate a situation in California wherein counties often found themselves with deficient FAS roads in the urban fringe areas which were not eligible for FAS financing. Also, with more FAS projects reaching and some perhaps crossing city-county boundaries closer co-operation between these agencies may well be an additional benefit derived from the federal-aid program.

FEATHER RIVER BRIDGE

The new $9 million double-decked bridge over the west branch of the Feather River and a 13-mile section of U.S. 40 Alternate from Wicks Corner on the Oroville-Chico Road to Jarbo Gap in the Feather River Canyon has been opened to traffic. This construction is the first link of the $25 million rerouting of the Feather River Highway necessitated by the projected Oroville Dam project. Another highway link from two miles south of Oroville to the city limits will be completed this month. A third link is under construction.



INTERSTATE—Interstate 5 traverses California from south to north. This section of it is a part of US 101 in the San Clemente area, about midway between San Diego and Los Angeles.

San Diego-Coronado Bridge

In accordance with authorization given by the California Toll Bridge Authority at a meeting in San Diego on October 8, the Division of Highways has made a formal application to the United States Army Corps of Engineers to construct a toll bridge between San Diego and Coronado.

The proposed structure, to be built of steel and reinforced concrete, calls for four lanes of traffic with a 10-foot median dividing strip. Minimum vertical clearance would be 185 feet above mean high water through most of the width of the main 960-foot navigation span.

The location of the proposed bridge, as recommended by the Division of Highways in a 151-page report submitted to the CTBA summing up studies carried on under authority of the Budget Acts of 1961 and 1962, is between Crosby Street in San Diego and Fourth Street in Coronado.

A bridge at this location, costing an estimated total of $29,627,000, was recommended as being the most practical of nine alternate possibilities studied, seven of which were found to be financially feasible. Five of the alternatives involved two-lane tube construction; the other four involved four-lane bridges (four-lane tubes were found too costly to be considered).

It was brought out at the two-hour meeting and hearing of the CTBA that opposition to the bridge project is expected from the United States Navy; but the application for a permit is necessary in order to get a definite proposal on record on which the Corps of Engineers can make a finding-of-facts report.

The Corps of Engineers has responsibility under federal law for permitting installation of structures across navigable waters. In accordance with its regular procedure involving large structures, the corps is expected to call for public reaction in making its report.

Support for the proposal was expressed by numerous organizations in the San Diego area whose representatives appeared at the CTBA meeting, while opposition was expressed by the City Council of Coronado and some organizations in that city, and by employees of the ferry service now carrying vehicular traffic between the two cities.

Governor Edmund G. Brown, Chairman of the Toll Bridge Authority, emphasized that approval of the application for a permit did not mean that the authority had approved precise termini for the toll project, especially at the Coronado end.

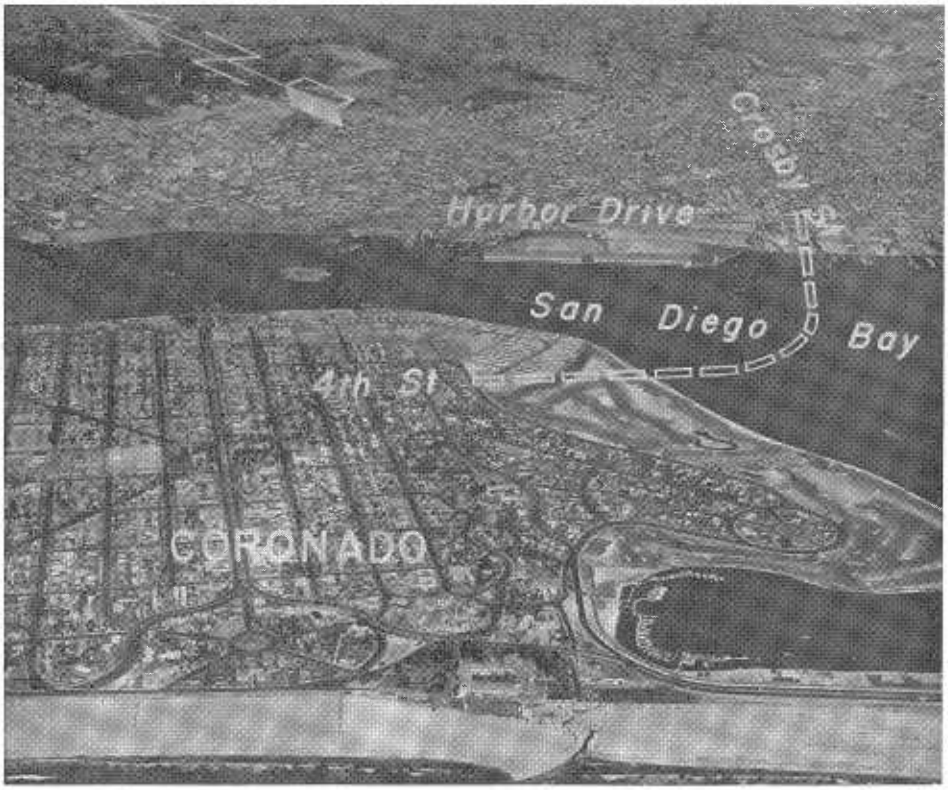
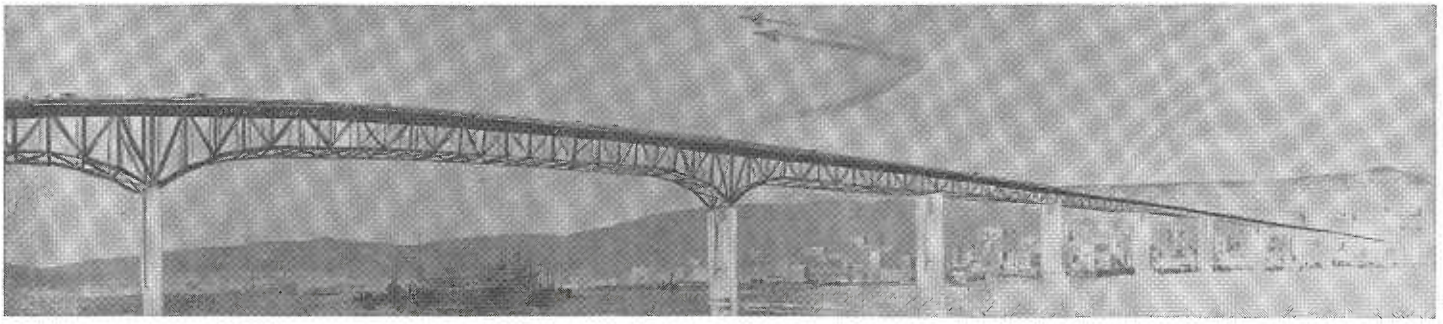


PHOTO ABOVE shows recommended bridge line "E" between Fourth Street in Coronado to Crosby Street in San Diego. The view is northeastward. PHOTO BELOW is of an architectural drawing showing the deck-type truss proposed for bridge spans in the 960-foot range.



District VII Loses M. F. 'Mique' Nelson

Myron F. "Mique" Nelson retired September 28 after 11 years as artist and delineator with the Division of Highways district office in Los Angeles.

His cartoons have appeared regularly in statewide C.S.E.A. publications. His is also well known for his birdseye drawings of freeway interchanges which aid the layman in visualizing the appearance of future freeway construction, a technique he developed during his freelance days in Oakland before he came to work for the division.

Born in Tulare, California, Nelson grew up in Oakland, where he became a freelance commercial artist.

He served with a Red Cross ambulance unit in France during World War I.

He was associated with Walt Disney Productions for 17 years, where he became art director.

Retiring because of ill health in 1948, Nelson went into freelance magazine writing. His stories and articles have appeared in Red Book, Argosy and Colliers. He joined the Division of Highways in 1951.

Nelson is married and has two grandchildren.

Funds Are Allocated To Cut Road Deaths

Governor Edmund G. Brown has announced that the California Highway Transportation Agency has been authorized to use $25,000 of the State's allotment of federal highway safety research funds to launch a year-long statewide advertising campaign designed to reduce California's growing highway death toll.

"The action by the United States Bureau of Public Roads in authorizing the expenditure of this money paves the way for the start of a project which offers a unique approach to highway safety," Governor Brown said. "To my knowledge, this kind of program, which combines advertising with research, has not been tried anywhere else in the nation."

The California Highway Patrol and the advertising firm of Cunningham and Walsh, representing the Advertising Association of the West, have been working together on the preliminary phases of the program for almost two years, Patrol Commissioner Bradford M. Crittenden said.

"These two mass communications media are contributing their air time and poster spaces to this program without charge."

NASH RETIRES; STAFF CHANGES ARE LISTED

Two promotions and a retirement have been announced by the California Division of Highways.

R. V. Potter, an assistant planning engineer, has been named to the post of systems research engineer, replacing A. M. Nash, who retired October 1.

J. Frank Jorgensen, assistant district engineer, planning, in District XI, San Diego, has been promoted to the position of construction engineer for the division in Sacramento. He succeeds Milton Harris, who had held the post since 1954 and was recently appointed assistant operations engineer. Harris died on September 24. (See page 61.)


A. M. NASH

Prior to his promotion Potter was liaison engineer for co-ordination of highway activities with the works of other governmental agencies. Except for service with the Army Corps of Engineers during World War II, in which he held the rank of captain and won six medals and two battle stars, Potter has been an employee of the Division of Highways since 1929. He is a native of New York City and attended the New Jersey College of Engineering and Rutgers University.

Jorgensen started work with the Division of Highways in San Francisco in 1930 between semesters at the University of California and took a full-time position in 1931. He was transferred to Sacramento headquarters in 1934 and went to San Diego in 1936 where he served as resident engineer on construction projects, including the Cabrillo Freeway.


R. V. POTTER

Jorgensen was district construction engineer in District XI from 1947 to 1950, when he was promoted to assistant district engineer, operations. In 1957, he was assigned to the position of assistant district engineer, planning, with overall charge of the planning activities for the more than 1,000 miles of state highways in District XI.

A. M. Nash, whose career of almost 43 years with the Division of Highways has included numerous important assignments in Sacramento headquarters and in various areas of the State and whose work brought him national recognition in the field of highway engineering, was named systems research engineer in 1961.

In the course of his 42 years with the Division of Highways, Nash has worked in four of the division's 11 districts, serving as district engineer in three of them (Eureka, Marysville, San Luis Obispo), in addition to three tours of duty in headquarters office in Sacramento. From 1946 to 1949, he was engineer of design for the division.

Nash is a native of Elk City, Kansas, was educated in Idaho and Washington, his college work having been at the University of Washington. During World War I, he served as a second lieutenant in the Army Aviation Service. He joined the Division of Highways in 1919 as a draftsman and computer.


J. F. JORGENSEN

He is a past vice president of the Western Association of State Highway Officials and has served on important national committees concerned with highway design and construction.

Folkins Is Champion Lawn Bowler of World

The Division of Highways has a world champion in its ranks. He is Dick Folkins, senior highway engineer in the programs and budgets department of District VII who was adjudged the outstanding lawn bowler of the world at a recent competition in Seattle.

To earn the title, Folkins led his team in seven games against competition from this country, Australia, New Zealand, England, South Africa, and Canada. His four-man team made a clean sweep of all seven victories in the international race and in addition copped the American Lawn Bowling Association's Rettie trophy in the triples, which ran six games. The competition was held July 1–10.

DICK FOLKINS

Folkins says the international competition was the stiffest he has ever entered and that the teams from the British Empire were among the strongest there. He has previously participated in a number of national tournaments and has nine other trophies to display from these victories.

Folkins bowls on the average of once a week at his own club, the Arroyo Seco, which consists of approximately 70 members. He himself has been playing for 37 years and says that the number of people interested in lawn bowling in Southern California is gradually increasing, although those interested in formal competition are becoming fewer.

The division boasted another champion several years ago in Tommy Kono, a drafting aid in the highway planning survey, who shattered many world weight-lifting marks as a member of the United States Olympic team at Helsinki in 1952 and subsequent international competitions. Kono has since left the division to go into private business.

Construction Expert Retires in Bay Area

Burnell Van Dalsem, Assistant District Construction Engineer, retired August 1 after more than 34 years with District IV of the California Division of Highways.

Born in San Rafael and educated in the public schools of Martinez and Santa Clara, Van Dalsem joined the Division of Highways in San Francisco in June 1928.

B. VAN DALSEM

Many years of his service with the Construction Department were spent with various Marin County projects including the Waldo approach to to the Golden Gate Bridge.

For the past 13 years he has been assigned to District IV headquarters as Assistant District Construction Engineer in charge of office engineering.

Van Dalsem is a member of Marin Lodge 191, F. & A. M., and from 1955 through 1961 he served as secretary-treasurer of the Division of Highways Quarter-century Club.

He and his wife, who now live in San Rafael, had one son, killed while serving with the U.S. Army in Germany in 1952.

Gillis, Spickelmire Write ARBA Bulletin

The American Road Builders' Association has published "And Now Slip Form Paving" as ARBA Technical Bulletin No. 250.

The 24-page ilustrated bulletin, written by L. R. Gillis, Assistant State Highway Engineer, and Leigh S. Spickelmire, Paving Engineer, both of the California Division of Highways, summarizes the experience with slip-form paving in California since the first experimental project in 1956. The bulletin also discusses various changes in portland cement paving methods used in California since the first portland cement concrete pavement was constructed on the state highway system in 1912.

Technical Bulletin No. 250 may be purchased from the American Road Builders' Association, World Center Building, Washington 6, D.C., for 50 cents per copy. Quantity discounts will be quoted on request for 25 or more copies.

Funds Allocated for Prehistoric Salvage

The California Highway Commission in August allocated $10,000 for salvaging prehistoric remains of archaeological importance that otherwise would be destroyed by freeway construction.

Seven sites believed to contain much information on the westward migration of the Yuman-speaking Indians were discovered by the University of California Archaeological Survey, Los Angeles, between Laguna Junction in San Diego County and Coyote Wells in Imperial County. They lie in the path of the proposed relocation of U.S. 80 as a freeway.

Large quantities of pottery and stone artifacts have been found on the surface at Cottonwood Creek, the most significant site, one mile south of Laguna Junction, and at several locations in Walker Canyon, east of Boulevard, and in Devil's Canyon, on the eastern border of the Jacumba Mountains in southwestern Imperial County. Their discovery offers promise that by careful excavation and analysis of the areas, the cultural sequence at the sites can be reconstructed, according to archaeologists.

The State Division of Beaches and Parks will act as the co-ordinating agency between the Division of Highways and the archaeological workers who will remove and pack objects of value.

The United States Bureau of Public Roads has declared it a matter of national policy to preserve or salvage ruins, sites, artifacts, fossils or other objects of antiquity. The project will be financed in part by federal funds, authorized for this purpose by the Federal-aid Highway and Revenue Act of 1956.

Milton Harris

Milton Harris, longtime highway engineer with the California Division of Highways, died on September 25, in Sacramento, after an extended illness. An employee of the division almost continuously since 1928, he had been assigned as construction engineer since 1954.


MILTON HARRIS

He had previously served as district engineer for District IX with headquarters in Bishop, and had held other assignments in District II (Redding), District IX and Sacramento. Prior to joining the division he graduated from Oregon State College and served as a first lieutenant in World War I.

When construction materials became scarce in the early days of World War II Harris was assigned the responsibility of working out the materials priority problems for necessary highway construction. He was recalled to military service with the Army Corps of Engineers in July of 1942.

Harris served in Italy as a lieutenant colonel with the Allied Military Government and was traffic engineer for the City of Rome. He was awarded the Cross of St. Maurice and Lazarus by the Italian government, and the Lateran Cross by the Vatican.

Upon his return to the Division of Highways in 1946 he was placed in charge of inspecting and purchasing war surplus materials for the Division of Highways in the Sacramento headquarters. Later, as service and supply engineer, he had full charge of and developed procedures for procurment, warehousing and distributing all materials and supplies used by the division. Early in 1953 he was promoted to district engineer at Bishop, and in December 1954 he returned to Division Headquarters as construction engineer. He was appointed assistant operations engineer in August 1962.

Harris is survived by his wife Sabina.

Department Announces Latest Retirements

District I

Harry A. Albright, groundsman, 7 years; Leland T. Crane, senior right-of-way agent, 17 years; Alton D. Cromwell, highway maintenance man II, 28 years; Floyd E. Davis, highway maintenance man II, 9 years; William V. Ferrill, highway foreman, 27 years; Richard H. Ramsey, supervising right-of-way agent, 26 years.

District II

George R. Barry, senior highway engineer, 31 years; Geoffrey Rogers, highway maintenance man I, 37 years; Henry E. Thorpe, highway foreman, 34 years.

District III

Loy W. Alston, highway foreman, 34 years; John J. McLaughlin, highway maintenance man II, 34 years; Daniel W. Pingree, highway foreman, 34 years; Adelaide Reilly, intermediate typist-clerk, 10 years.

District IV

Ray F. Adams, highway maintenance man II, 26 years; Edwin H. Boese, highway maintenance man III, 30 years; Joseph Casini, highway maintenance man I, 18 years; Alfred E. Cooper, highway superintendent, 26 years; Arthur M. Elton, highway maintenance man III, 29 years; Walter J. Flynn, storekeeper I, 16 years; Hugh G. Munro, highway foreman, 26 years; Burnell Van Dalsem, highway engineering associate, 34 years.

District V

Mark L. Cardwell, highway superintendent, 34 years; Jean M. Permasse, highway maintenance man II, 29 years.

District VI

Charles E. Powers, senior highway foreman, 11 years; Harry H. Sewell, highway foreman, 34 years.

District VII

Clifford F. Bartlett, electrician I, 11 years; James H. Clark, skilled laborer, 24 years; Joseph A. Kaiser, highway landscaping leadingman, 14 years; Alfred R. Mattos, highway maintenance man II, 28 years; Kenneth B. Pettis, highway field office assistant, 29 years; Cass M. Rose, senior highway engineer, 24 years.

District VIII

Loren D. Stanton, assistant highway engineer, 3 years; Chester H. Taylor, highway maintenance man I, 25 years; Leo P. Wagner, highway field office assistant, 28 years.

District IX

John H. Creed, senior highway engineer, 34 years; Herman Holt, highway superintendent, 31 years.

District X

Ewell W. Arnold, chief engineer, ferry system, 2 years; Ray A. Green, drawbridge operator, 13 years; George Soward, ferry operator, 10 years; Russell M. Stewart, deckhand, 1 year.

District XI

Maude E. Yauck, senior stenographer, 18 years.

Headquarters Office

Olive Armstrong, senior stenographer, 32 years; Nelson R. Bangert, supervising highway engineer, 34 years; E. Helen Halsted, assistant information officer, 36 years; Carolyn B. Vogt, intermediate stenographer, 10 years.

Headquarters Shop

Arthur O. Martinson, general superintendent of highway shops, 32 years; Emory E. Peck, senior machine parts storekeeper, 29 years; Albert C. Smith, heavy equipment mechanic, 26 years.

Shop 2

Wilbur B. Clemmons, machine parts storekeeper, 12 years.

Shop 5

William R. Ramsey, automobile mechanic, 25 years.

Shop 7

Albert A. Hilton, highway equipment superintendent II, 41 years.

Maintenance Expert N. R. Bangert Retires

After 34 years service with the Division of Highways, Nelson R. Bangert, supervising engineer in headquarters maintenance department retired July 31. He was appointed assistant maintenance engineer in 1933, and has had the same job ever since.

Bangert started his career with the Division of Highways as a draftsman in the District VIII office in San Bernardino in 1928, and shortly thereafter worked in the same district as an assistant resident engineer and as a highway maintenance foreman. In 1930, he became maintenance foreman at Barstow, and in 1931, an assistant resident engineer in Imperial County. In 1932, just prior to his headquarters assignment, he was maintenance superintendent at Indio.


N. R. BANGERT

Born in Alton, Illinois, Bangert came to California in 1907, attending school in Pomona, Los Angeles and Alhambra. He was graduated from the University of California in 1928 with a bachelor of science degree in civil engineering.

Bangert served as maintenance representative on the Division of Highways Bank Protection Committee from December 1953 to his retirement. One of the major accomplishments of this committee was publication in 1960 of a comprehensive reference book entitled *Bank and Shore Protection in California Highway Practice.*

When the United States Navy requested the consulting service of an asphalt paving engineer on the Island of Guam for two weeks in April 1946, Bangert was given this assignment because of his extensive experience in construction and maintenance of bituminous surfaces.

Other highlights of Bangert's career are his extensive work in the development and standardization of maintenance equipment and the programming of the orderly replacement and improvement of maintenance station facilities.

Bangert is an associate member of the Highway Research Board and of the American Society of Civil Engineers.

He and his wife Ethel make their home in Sacramento on Vallejo Way. They have two grown daughters, Dolores and Virginia.

Initial Funds for SSR 152 Relocation

The California Highway Commission in August voted an initial allocation of funds for a joint project with the Department of Water Resources for the relocating of 10.3 miles of the Pacheco Pass Highway (State Sign Route 152) on the north shore of the San Luis Reservoir, now under construction. The relocated section will extend from one mile west to 9.3 miles east of the Santa Clara–Merced county line and will ultimately cost in excess of $14 million.

State Highway Engineer J. C. Womack told the commission that the water project developers, the Department of Water Resources and the United States Bureau of Reclamation, will participate in the expense of the highway relocation.

As the reservoir's dam will be constructed across the existing two-lane highway by early 1965 and the project will require constructing 12.4 miles of four-lane expressway on a roadbed graded for six lanes through rugged terrain, it is imperative that highway relocation work begin as soon as practicable, Womack said.

The project includes building dual reinforced-concrete bridges, each 560 feet long, across the San Luis Forebay portion of the reservoir and providing for connections with roads to service local recreational areas that eventually will be developed in the vicinity.

The commission allocated $100,000 from the 1962–63 state highway budget as an initial contribution to the project at today's meeting. A total of state highway funds in excess of $5 million will be required as the Division of Highways share.

District II Engineer George Barry Leaves

George R. Barry, senior highway engineer in District II (Redding) retired on July 3, 1962. He had been with the Division of Highways for 30 years.

Barry began his state service as an assistant draftsman in Stockton in 1930. He worked for the United States Forest Service from 1933 to 1935 as location engineer on forest highways. He re-entered state service at Bishop in 1935 and then served successively in various engineering assignments with the bridge department, District III at Marysville, and District X at Stockton. In 1950 Barry transferred to the division headquarters in Sacramento, where he received his appointment as senior highway engineer. His primary duties at Sacramento were expediter and procurement officer for steel and copper products for the State during the Korean conflict.


GEORGE R. BARRY

In 1953 Barry transferred to District II in Redding, where he served as district construction engineer until his retirement.

Born in Enumclaw, Washington, Barry attended grade school in Enumclaw, high school at Kent, Washington, and graduated in 1930 from Polytechnic College in Oakland with a bachelor of science degree in civil engineering.

He is a member of the California Society of Professional Engineers, an Elk, and member of Dale Carnegie Club International.

67 PROJECTS ADVERTISED

During September the Department of Public Works advertised for bids on 67 highway projects with an estimated value of $58,785,900. Another 52 contracts for $11,034,200 were awarded and 55 contracts for $9,845,500 were completed. Bids were received from 218 contractors for 45 projects, an average of 4.8 bidders per project.

IN MEMORIAM

District I

Raymond Totten, highway maintenance man II

Harry Veach, associate right-of-way agent

District II

Elsie E. Atkins, intermediate typist-clerk

District III

Robert N. Smith, highway engineering associate

District IV

Manuel Variz, highway maintenance man II

District V

Louis J. Beuttler, highway maintenance man

District VI

Edgar R. Madewell, engineering aid II

Richard J. Manley, highway engineering technician I

James W. Follis, highway maintenance man II

District VII

Warren G. Klingler, highway maintenance man II

Ledell Edwards, groundsman

Edward S. Haynes, junior civil engineer

District IX

Ivadell M. Smith, highway field office assistant

Theodore H. Smith, assistant highway engineer

Headquarters Office

Hazel Charleston Shine, intermediate clerk

Melbourne H. West, principal highway engineer

Milton Harris, principal highway engineer

Bridge Department

Charles C. Blount, foundation driller

Stanley Madan, stock clerk

Larkin F. Payne, foundation driller

Right-of-way Agent Leland Crane Retires

Leland (Lee) T. Crane, assistant district right-of-way agent of district I, Division of Highways, Eureka, retired on August 1.

Lee began his career of state service with District I in 1945 as an assistant right-of-way agent after spending 20 years working for the County of Los Angeles in engineering and right-of-way work.

LELAND T. CRANE

Born in Deerfield, Michigan, Crane moved to Colorado at an early age and completed his high school education in South Denver. He attended the University of Colorado, where he studied engineering, and, during World War II, took additional engineering courses at the University of Southern California.

Lee moved to California in 1923 after serving in the Army during World War I. He first worked in California for the Southern California Bell Telephone Company, leaving in 1925 to work for Los Angeles County.

As assistant district right-of-way agent, crane has been in charge of various right-of-way functions, including negotiations, appraisals, and right-of-way operations.

He is an active member of the Elks Club, the American Right of Way Association, and the California State Employees' Association.

Crane and his wife Neoma plan to take an extended tour of the United States next spring.

The Cranes have two sons, Leland T. II, of Seattle, and Keith, of Weaverville.

BRIDGE RECORDS SET

Heavy traffic on Sunday, August 5, set a new daily traffic record on the Carquinez Bridge, when 65,828 vehicles cross the span. The following week, August 12, 66,377 vehicles were tallied. The previous high was 64,225 vehicles a day, set on June 17 of this year.

Twenty-five-year List

The following employees received 25-year awards during July and August:

District I

Gordon S. McIntosh

District II

Virgil B. Cade
William J. Lowes
John P. Williams

District VIII

Henry J. Marsh

District IX

Lawrence O. Ford

Headquarters Office

Dwight H. Alderson
Charles A. Rider

Bridge Department

Harry T. Carter

Materials and Research Department

Eleanor Z. Smith

I.T.T.E. Sets Annual Conference at UCLA

The 15th annual California Street and Highway Conference has been scheduled for January 24–26, 1963, at the University of California, at Los Angeles.

The conference is sponsored by the university's Institute of Transportation and Traffic Engineering. It brings together the representatives of state, city and county road and street departments for technical discussions and also features nationally prominent guest speakers.

The second link of the Newport Freeway, a 3.5-mile segment from Chapman Avenue in Tustin to the Santa Ana Freeway, was opened to traffic on September 4. The first leg was from the Riverside Freeway to Chapman Avenue. The freeway eventually will connect with the Coast Freeway near Costa Mesa, a distance of 17.7 miles. The cost of the project so far, including rights-of-way, has been $20,678,000.

STATE OF CALIFORNIA

EDMUND G. BROWN, *Governor*

HIGHWAY TRANSPORTATION AGENCY

ROBERT B. BRADFORD . . . Administrator

DEPARTMENT OF PUBLIC WORKS . . . ROBERT B. BRADFORD, Director

FRANK A. CHAMBERS . . . . Chief Deputy Director

RUSSELL J. COONEY . . Deputy Director (Management)
HARRY D. FREEMAN . . Deputy Director (Planning)

T. F. BAGSHAW . . . . . Assistant Director
JOHN H. STANFORD . . . . . Assistant Director

JUSTIN DuCRAY . Departmental Management Analyst
S. ALAN WHITE . . Departmental Personnel Officer

DIVISION OF HIGHWAYS

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

CHAS. E. WAITE . . . Deputy State Highway Engineer
J. P. MURPHY . . . Deputy State Highway Engineer
J. A. LEGARRA . . Deputy State Highway Engineer
LYMAN R. GILLIS . Assistant State Highway Engineer
J. E. McMAHON . . Assistant State Highway Engineer
GEO. LANGSNER . . Assistant State Highway Engineer
FRANK E. BAXTER . Assistant State Highway Engineer
J. C. BURRILL . . . . . Comptroller
C. G. BEER . . . . . Urban Planner
L. L. FUNK . . . . . Planning Engineer
F. N. HVEEM . . . Materials and Research Engineer
J. F. JORGENSEN . . . . . Construction Engineer
SCOTT H. LATHROP . Personnel and Public Information
C. T. LEDDEN . . City and County Projects Engineer
H. C. McCARTY . . . . . Office Engineer
E. J. L. PETERSON . . Program and Budget Engineer
R. V. POTTER . . . . Systems Research Engineer
F. M. REYNOLDS . . . . Planning Survey Engineer
EARL E. SORENSON . . . . . Equipment Engineer
E. L. TINNEY . . . . . Maintenance Engineer
W. L. WARREN . . . . . Engineer of Design
G. M. WEBB . . . . . Traffic Engineer
A. L. ELLIOTT . . . . Bridge Engineer—Planning
L. C. HOLLISTER . Bridge Engineer—Special Projects
I. O. JAHLSTROM . . . Bridge Engineer—Operations
DALE DOWNING . . Bridge Engineer—Southern Area

Right-of-Way

RUDOLF HESS . . . . . Chief Right-of-Way Agent
DEXTER D. MacBRIDE . . . . . Assistant Chief
RAY E. O'BIER . . . . . Assistant Chief
R. S. J. PIANEZZI . . . . . Assistant Chief
JACQUES T. ZEEMAN . . . . . Assistant Chief

District I, Eureka

SAM HELWER . . . . . District Engineer

District II, Redding

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

District III, Marysville

ALAN S. HART . . Assistant State Highway Engineer

District IV, San Francisco

J. P. SINCLAIR . . Assistant State Highway Engineer
L. A. WEYMOUTH . . . . . District Engineer
R. A. HAYLER . . . . . District Engineer
HAIG AYANIAN . . . . . District Engineer

District V, San Luis Obispo

E. R. FOLEY . . . . . District Engineer

District VI, Fresno

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

District VII, Los Angeles

E. T. TELFORD . . . Metropolitan District Engineer
A. L. HIMELHOCH . . . . . District Engineer
GEORGE A. HILL . . . . . District Engineer
A. C. BIRNIE . . . . . District Engineer
A. W. HOY . . . . . District Engineer

CALIFORNIA HIGHWAY COMMISSION

ROBERT B. BRADFORD . Chairman and Director of Public Works
ARTHUR T. LUDDY . . Vice Chairman Sacramento
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ROGER S. WOOLLEY . . . San Diego
JOHN ERRECA . . . . . Los Banos
ABRAHAM KOFMAN . . . San Jose
FRANKLIN S. PAYNE . . Los Angeles
JACK COOPER, Secretary . . . Sacramento

District VIII, San Bernardino

C. V. KANE . . . . . District Engineer

District IX, Bishop

C. A. SHERVINGTON . . . . . District Engineer

District X, Stockton

JOHN G. MEYER . . . . . District Engineer

District XI, San Diego

JACOB DEKEMA . . Assistant State Highway Engineer

State-owned Toll Bridges

CHARLES L. SWEET . . . . . Bridge Engineer

DIVISION OF CONTRACTS AND RIGHTS-OF-WAY (LEGAL)

ROBERT E. REED . . . . . Chief Counsel

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

DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

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

DIVISION OF ARCHITECTURE

EARL W. HAMPTON . . . Acting State Architect, Chief of Division

EARL W. HAMPTON . . . . . Deputy Chief, Architecture and Engineering
HUBERT S. HUNTER . . . . . Deputy Chief, Administrative
ARTHUR F. DUDMAN . . . . . Assistant State Architect (North)
TOM MERET . . . . . Assistant State Architect (South)
CHARLES M. HERD . . . . . Chief Construction Engineer

DIVISION OF AERONAUTICS

CLYDE P. BARNETT . . . . . Director, Chief of Division

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Transportation Agency Exhibit Tours State

This year the Division of Highways, a part of the Department of Public Works, joined with the two other agencies of the State Transportation Agency—The Department of Motor Vehicles and The Highway Patrol—in an exhibit which was shown at the State Fair in Sacramento, at the Los Angeles County Fair at Pomona, and at the Fresno District Fair.

The exhibit, which explained the cooperation of the three agencies in providing better and safer highway travel, was well received at all three fairs, and at Sacramento won a blue ribbon in the transportation class.

In Sacramento a detailed scale model of the area of the planned Second-Third Street Freeway in that city was used, and in Pomona a section of the Cross Town Freeway in San Diego as an example of interstate route design. In Fresno a model of the Santa Monica-San Diego Freeway Interchange in Los Angeles was exhibited, as well as the Sacramento model.

The exhibit was designed to be quickly erected and dismantled. Taken down on Monday, September 10, in Sacramento, it was in position ready for viewing in Pomona on the following Thursday. Since the Fresno Fair directly followed the Los Angeles County Fair, the same quick transfer was necessary. Since the Fresno Fair, parts of the exhibit are being used in still other parts of the State to explain to the public the workings of the various parts of the State Transportation Agency.

The exhibit was continuously manned at all three fairs by highway patrol officers and examining officers of the Department of Motor Vehicles. Building and setting up was by Division of Highways personnel. Design was by Joseph Ralph of the Division of Highways Audio-Visual Section.

Metropolitan Highway Engineer Edward T. Telford of District VII, Los Angeles, looks over the Transportation Agency exhibit at the Los Angeles County Fair in company of Sallye Jo Howell, fair queen (center), and her two attendants.

William Tuthill, Division of Highways Bridge Department Architectural Design Section, does last minute touchup of model displayed in Transportation Agency exhibit at Sacramento State Fair.