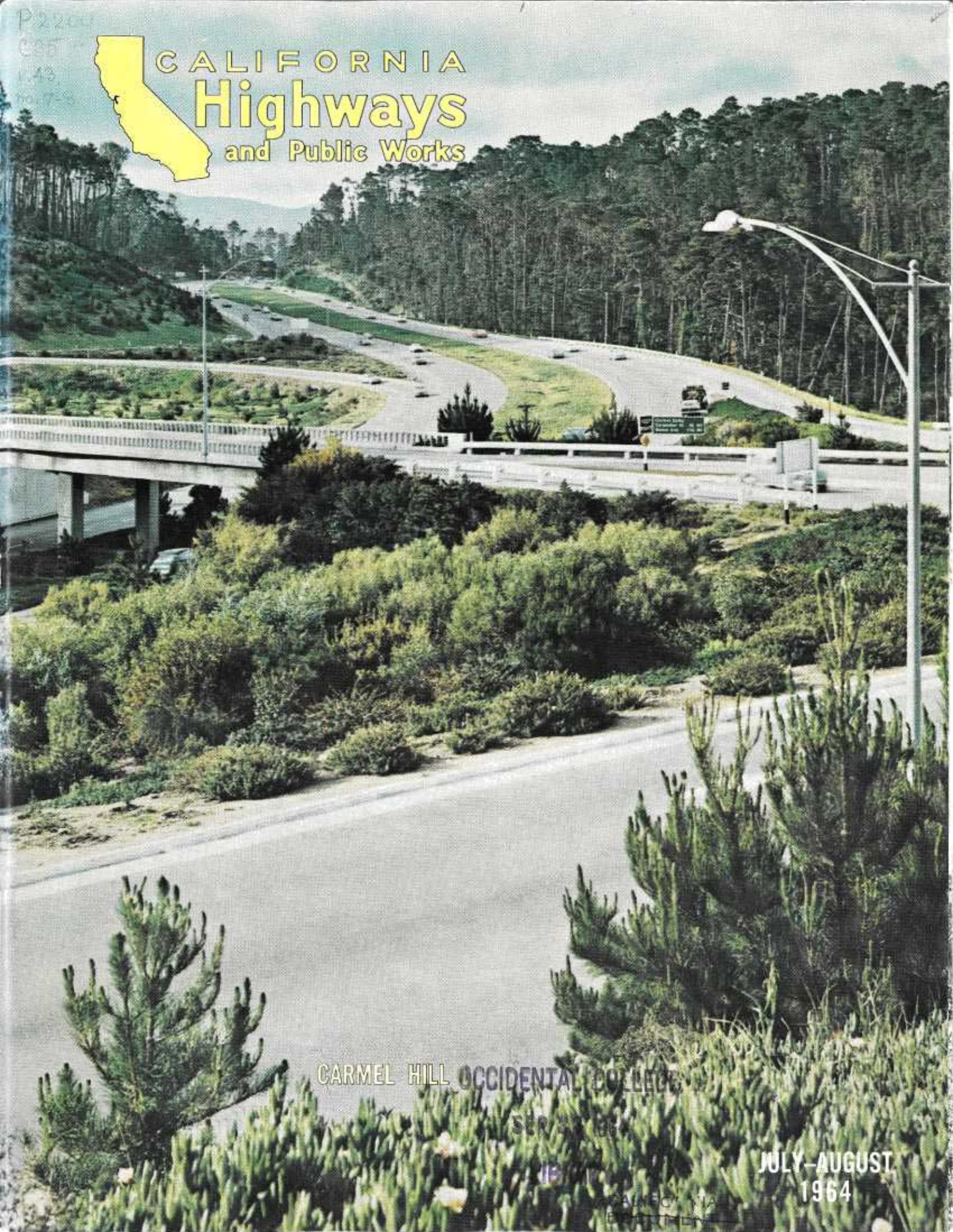


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CALIFORNIA Highways and Public Works



CARMEL HILL OCCIDENTAL COLLEGE

SERIES

15

JULY-AUGUST
1964

President Inaugurates Transit Construction



President Lyndon Johnson listens to Governor Edmund G. Brown prior to setting off the blast marking the start of construction of the Bay Area rapid transit system. At far left is Adrien J. Falk, President of the Bay Area Rapid Transit District; at right, B. R. Stokes, the district's general manager. The ground breaking ceremonies were held at the Diablo Test Track, Concord, June 19.

"Transportation is a bipartisan problem. It is also national in scope. Seventy percent of our people live in urban areas, and 53 of our country's biggest metropolitan areas either border or cross state lines. Their transit problems ignore local boundaries; but their taxing powers are limited and their resources already strained.

"Congress has voted billions of dollars to build highways and airports, dredge harbors, build canals, and improve river navigation. In the last century it helped finance railroads and shipping lines to open up new areas of

the country and new trade routes abroad.

"Now Congress and the Federal Government must help to solve the problem of transportation (caused by the ever increasing number of motor vehicles). These problems require us to create new concepts of cooperation—a creative federalism—between the Federal Government, State governments, and local communities."

These were the words of President Johnson at the dedication of the Bay Area Rapid Transit System in Concord, June 19.

The President predicted the passage of the Urban Mass Transportation

Act which, at the time of his speech, had already passed the Senate and was soon to come to a vote in the House. He praised the "men of vision" who started 12 years ago to make the Bay Area Rapid Transit System a reality; a system the Act would assist.

Johnson warned that if America's urban areas do not develop adequate alternative means of transportation, "the coming crisis of congestion may do more to frustrate the growth and development of America than all the burning deserts and barren mountains which stood in the path of our ancestors a century ago."

California Highways and Public Works

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FRONT COVER. State Sign Route 1, looking southward from the Carmel-Pacific Grove Highway and 17-Mile Drive interchange. The landscaping includes such native plants as Monterey Pine, Monterey Cypress, Gowen Cypress, California Live Oak and Carmel Creeper. Photo by John Meyerpeter.

BACK COVER. The San Diego Freeway (Interstate 5) near the four-level junction at the southern edge of San Diego's 1,400-acre Balboa Park. (See "Crosstown Freeway" page 2.) Photo by John Meyerpeter.



Crosstown Freeway

Interstate 5 Construction Progresses in San Diego

By JACOB DEKEMA, District Engineer



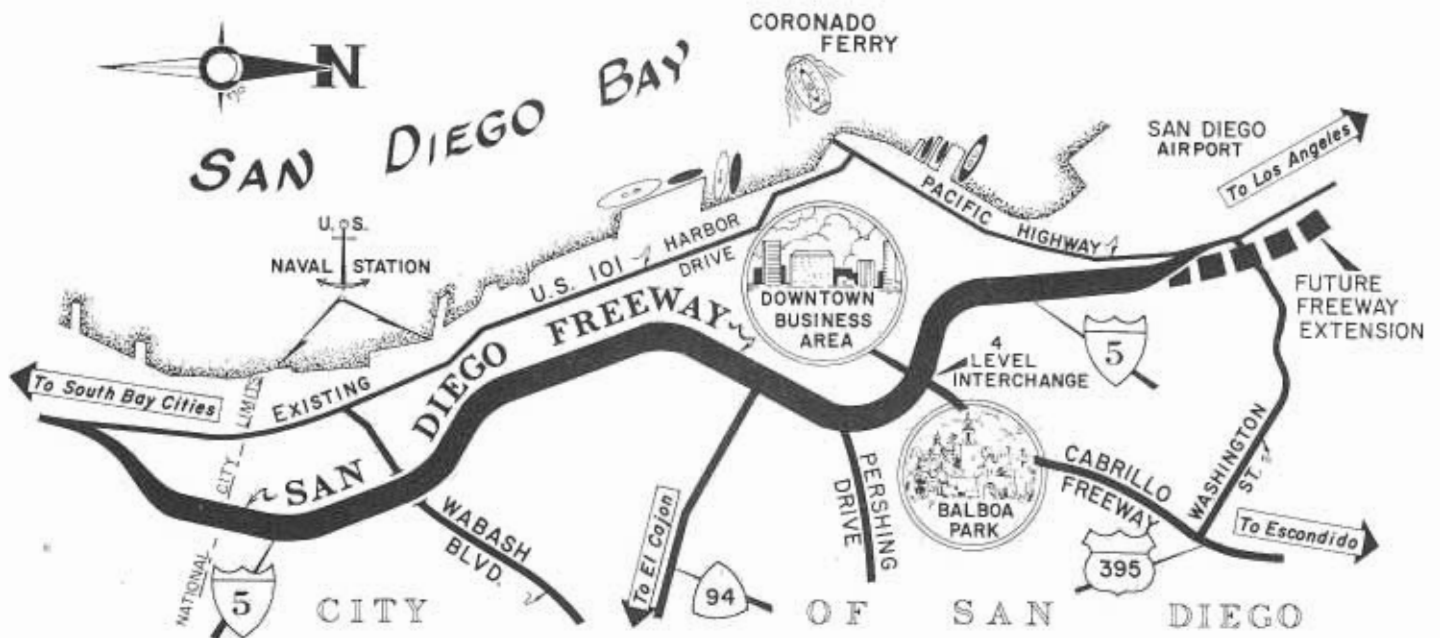
Dedication ceremonies on March 11, 1964 upon completion of almost 7 miles of the San Diego Freeway, marked the opening of a major segment of Interstate 5 between

Palm Street near Lindbergh Field in San Diego and the Montgomery Freeway near the south city limits of National City. Five successive construction contracts totalling in excess of \$30,000,000 were completed between 1960 and 1964 to add this long-needed link to San Diego's rapidly emerging freeway system.

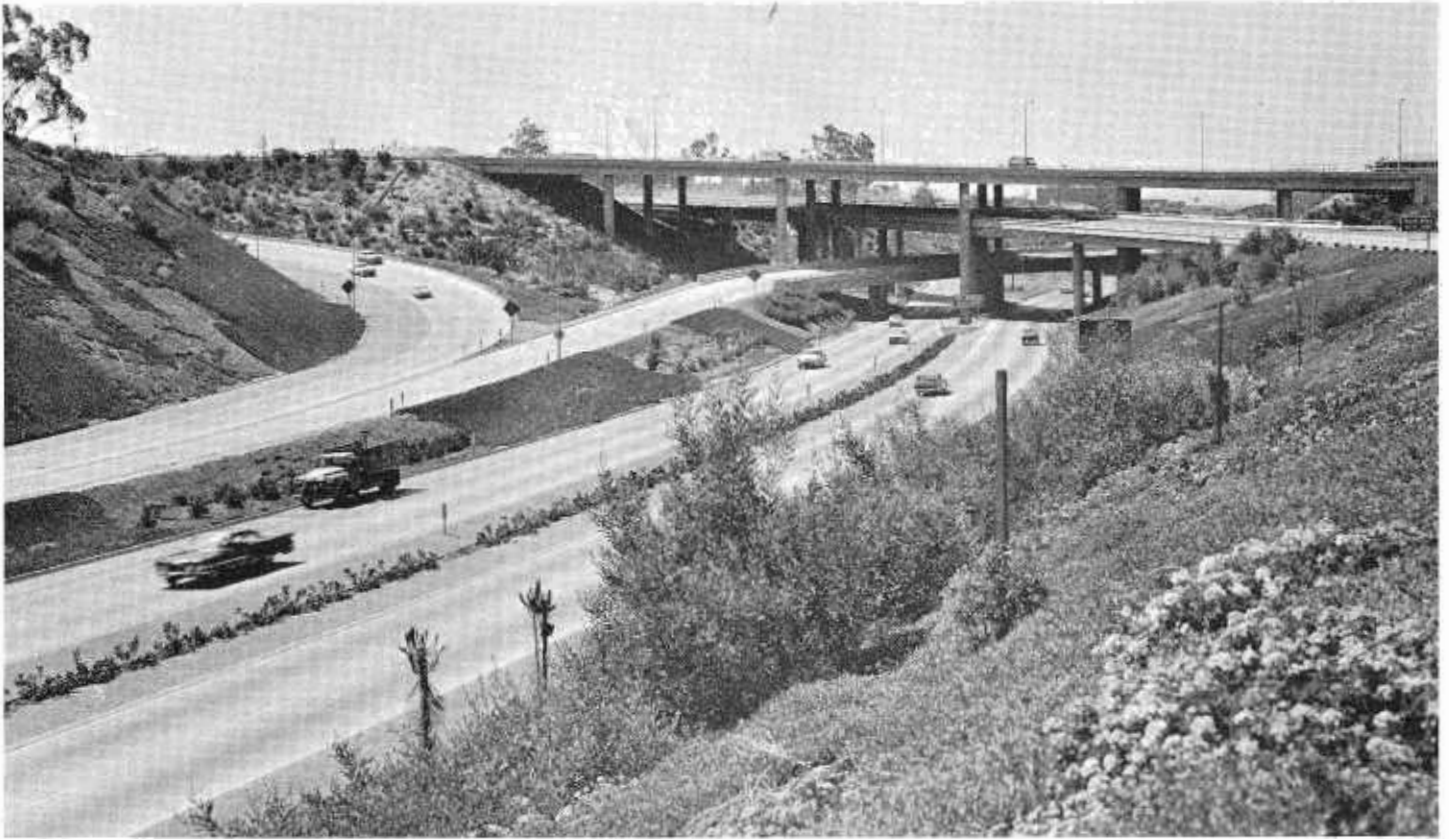
The importance of Interstate 5 to San Diego's economic and other development can hardly be overemphasized. Not only does it carry the principal traffic load between San Diego and Los Angeles, but its unique geographical location also makes it the terminus for many existing or antici-



View of the geometric pattern formed by interconnecting ramps of the Interstate 5-U.S. 395 four-level interchange, looking westward.



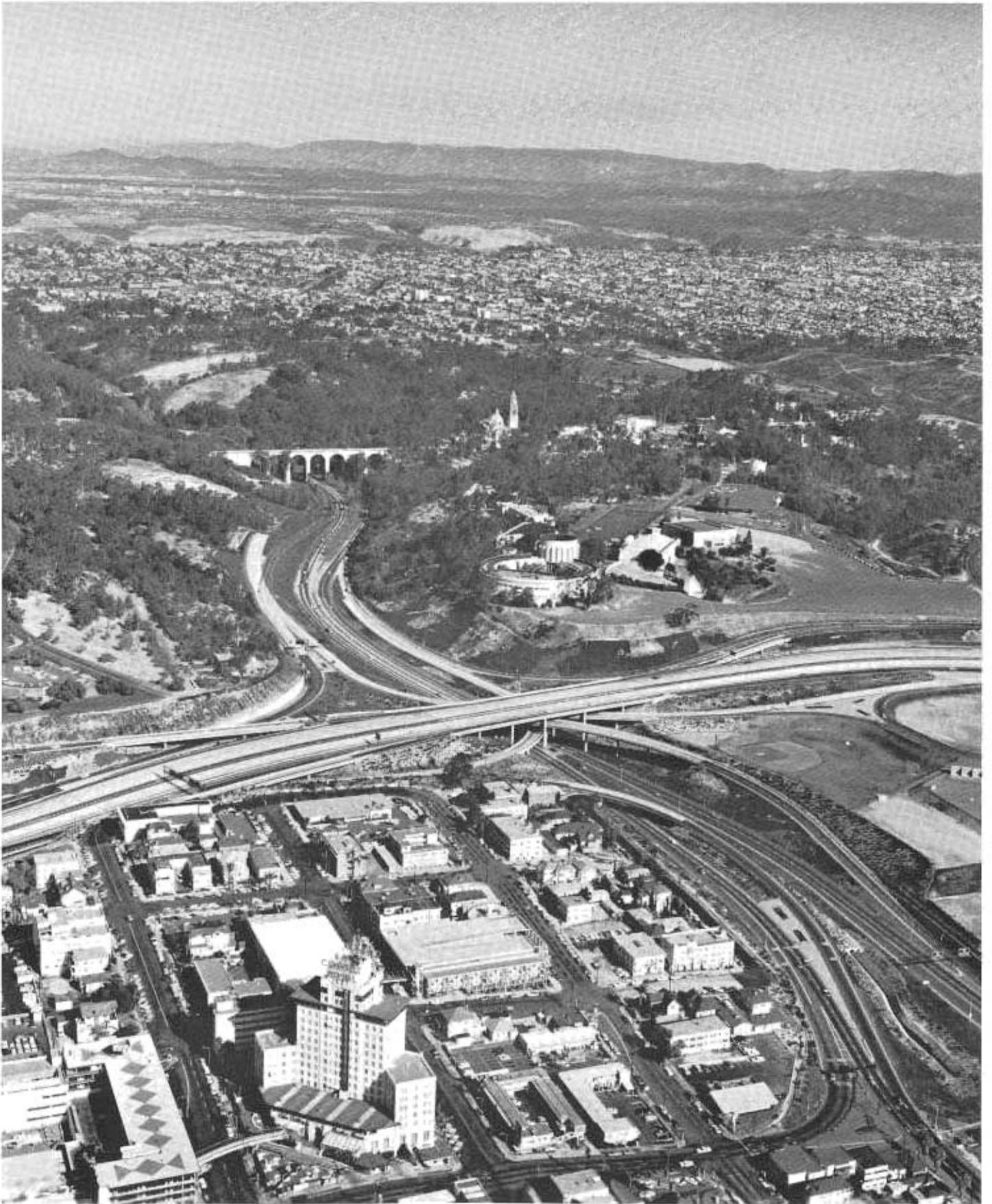
Map showing the location of the Interstate 5 Freeway through the City of San Diego.



The four-level Interstate 5-U.S. 395 interchange looking north, showing landscaping along the freeway in the vicinity of the structure.



Looking north along the Interstate 5 Freeway where it borders the east edge of San Diego's business district. Sign Route 94 connects from right foreground. Pershing Drive connection (future Route 171 Freeway) is in upper right.



An aerial looking northeast from above San Diego's business district showing the Interstate 5-U.S. 395 interchange and Balboa Park beyond.

pated freeways in San Diego County, most of which are in the San Diego metropolitan area.

Shift of Traffic

Since the recent opening of the San Diego Freeway, there has been a decided shift of traffic from other highway facilities to the new freeway. Transfers of traffic from city streets are demonstrated by current counts which show a drop from 48,000 cars a day to 21,000 a day on Harbor Drive (old US 101) westerly of the new freeway, while Main Street (easterly of the new freeway) dropped from 18,400 to 10,900 cars a day. At the same time, traffic loads increased on city streets connecting to the freeway's on- and off-ramps.

The relative advantages of a freeway, in contrast to a conventional highway facility, both in respect to accident as well as fatality rates have become an accepted fact. However, the relationship of time to life is a

little more obscure. Benjamin Franklin said, "If you love life do not waste time . . . for that is what life is made of." The 11 minutes saved by each vehicle between Washington Street in San Diego and the Montgomery Freeway in National City is equal to an average human life span every 49 days. Perhaps it might more impress the average two-way commuter to know that by taking advantage of the new freeway, he now has an additional 22 minutes a day that he may devote to a more productive use of personal time.

First Unit

The first unit to be completed was the four-level interchange area where Interstate 5 and US 395 joint, at the north edge of the downtown business section. The interchange, of necessity, required the use of a portion of Balboa Park's southern edge. This was a cause of concern to engineers and laymen alike, but with landscaping now

well established, the project complements and rivals Cabrillo Freeway (US 395) through Balboa Park which had long been regarded by many as the most beautiful freeway in California. In addition, careful planning and close cooperation between municipal and state officials resulted in filling a number of previously unusable precipitous canyons, producing usable park areas exceeding the acreage occupied by the highway project.

Four successive contracts starting from the four-level interchange projected Interstate 5 northerly to Palm Street in the vicinity of San Diego's airport and southerly to a junction with the future State Route 171 Freeway at Pershing Drive, State Route 94, Wabash Boulevard (State Route 54), and the Montgomery Freeway which serves the South Bay area. A contract to widen the existing four-lane freeway to eight lanes an additional mile southerly, and to provide



The old Pacific Highway, looking south, at Ash Street. The new freeway eliminates 16 traffic signals and 30 railroad siding crossings.



The Interstate 5 Freeway looking east from the north edge of San Diego's business district. Canyon reclaimed by highway embankment is discernible in left background.

ramp connections at 24th Street in National City is presently under way.

A four-lane viaduct connection between Palm Street and the existing highway at Washington Street is presently under construction and will expedite the movement of through-traffic onto the newly completed freeway. This feeder will continue to serve the Point Loma and Midway-Frontier areas of San Diego after the new freeway is constructed northerly on new alignment to the vicinity of the San Diego River next year.

The current budget also includes three projects between Balboa Avenue in San Diego and the City of Carlsbad.

One of these, on which bids will be opened in September, extends Interstate 5 Freeway four miles northerly of Balboa Avenue to the south edge of Camp Matthews. Another, adver-

tised in August, provides an additional 3½ miles of freeway from Miramar Road at the north edge of Camp Matthews to one-half mile south of Carmel Valley Road in Sorrento Valley. The third project, which will be advertised soon, extends the freeway northerly from San Marcos Road near Encinitas 5½ miles to the vicinity of Carlsbad. Currently under way is the construction of 5 miles of freeway from San Marcos Road south to Via de la Valle near Del Mar. This project should be completed in the summer of 1965.

Four contracts have been completed which provided fill and some bridges in unstable lagoon areas where long periods of settlement were necessary.

Simultaneous Completion

Because no adequate road connection exists between the existing US

101 in this section and the new freeway, it is impractical to route through traffic over sections of freeway as they are completed. The scheduling of construction units between San Diego and Carlsbad was therefore based on nearly simultaneous completion of the various segments. The controlling factor has been the evacuation of Camp Matthews by the US Marine Corps to permit freeway construction in that area. Present indications are that a contract through Camp Matthews can be awarded late in 1964 or early 1965 with completion in 1966.

Two other projects still to be budgeted and the three projects in the current budget should also be finished in 1966 to permit opening to traffic the entire section between Balboa Avenue and the existing freeway in Carlsbad.

By this time work should also be underway through Camp Pendleton between Oceanside and San Clemente, and along Mission Bay between the San Diego River and Balboa Avenue. We anticipate that by the end of 1968, Interstate 5 will be carrying uninterrupted freeway traffic from the North San Diego County line to the United States border at San Ysidro.

Traffic studies indicate that additional lanes will have to be added to the existing freeway both north and south of San Diego. Plans to widen the four-lane sections through Oceanside and Carlsbad, as well as southerly from National City to the International Boundary, are presently being prepared.

CONSTRUCTION COSTS

The California Highway Construction Cost Index for the second quarter of 1964 rose to 248.7 (1940=100) which is 2.6 points or 1.1 percent over the first quarter of 1964.

The index has changed very little during the fiscal year ending on June 30 and indicates a continuation of the trend of stability in highway construction cost.

The number of bidders per project during the second quarter averages 5.4 which is 0.4 under the previous quarter.

More Bridge Awards

Two of the ten nationwide awards offered by the Prestressed Concrete Institute in its 1964 Annual Awards Program were taken by California. Awards of Merit were won by the Willow Creek Bridge on the Monterey Coast Highway 65 miles south of Monterey, and by the three prestressed carrying beams over the Arroyo Seco flood control channel in Los Angeles.

This competition is sponsored each year by the Prestressed Concrete Institute to recognize the most outstanding prestressed structures completed during the previous year.

Falsework Eliminated

California makes considerable use of prestressing in concrete to achieve construction without falsework, to design beams which can be erected over busy highways without an extended disruption of traffic, and to achieve a thinner, more attractive profile for some of the structures.

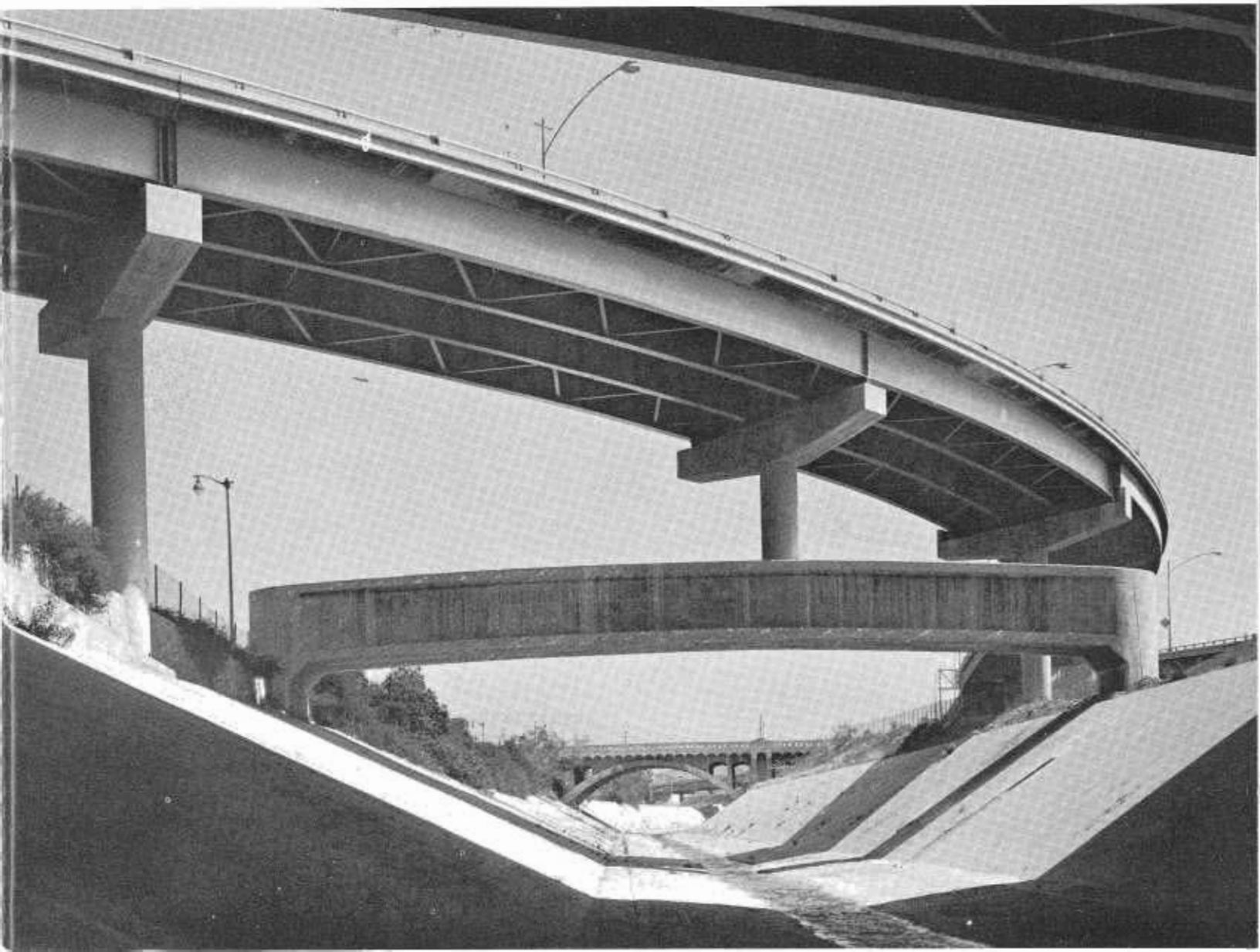
The Willow Creek structure realized a maximum benefit from prestressed concrete. In a remote location, the beams were trucked to the site to create a thin, light-appearing structure in a most attractive setting beside the ocean. The prestressed

beams were 80 feet long and the six-span structure rested on single columns about 110 feet above the stream bed. The bridge carries the coast highway across this deep canyon in the rugged coastline forming a pleasing contrast to this massive country and in this setting becomes a true thing of beauty.

Three Carrying Beams

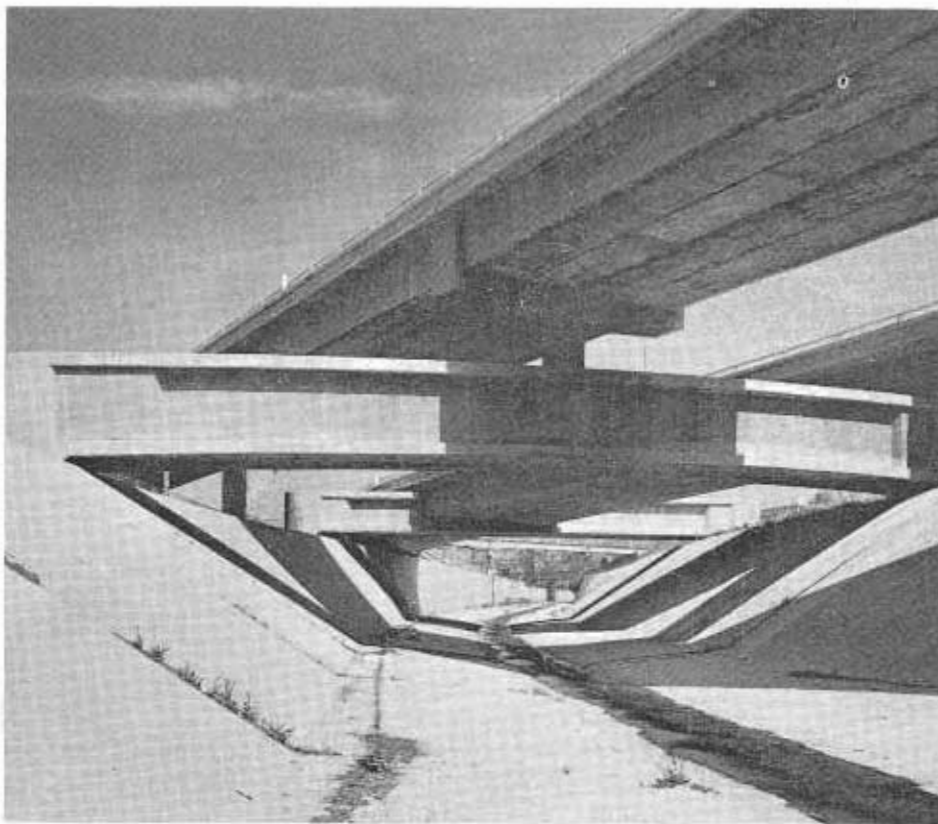
The three carrying beams over the Arroyo Seco flood control channel do not have the naturally attractive setting of Willow Creek, but in their own way they contribute a great deal to the soaring grace of an involved

One of the three prestressed carrying beams over the Arroyo Seco flood control channel in Los Angeles. The beam supports structures on the Elysian viaduct.





The Willow Creek Bridge on Sign Route 1 some 65 miles south of Monterey. The prestressed beams create a thin, light-appearing structure in an attractive setting beside the ocean.



The other two prestressed carrying beams (see preceding page) across the Arroyo Seco flood channel. The beams contribute to the soaring grace of an involved system of freeway ramps.

system of freeway ramps under congested circumstances. Prohibited from putting any columns in the flood control channel, it was necessary to provide supplementary supports for the concrete and steel spans crisscrossing the channel. The designers solved the problem with prestressed carrying beams. These are hollow box girders with spans of as much as 130 feet and stressing forces as high as 9,100,000 pounds. This is probably the highest concentration of prestressing force ever contained in a single beam up to the present time.

Unique Solution Recognized

The judges recognized the unique solution which enabled the designers to simplify and improve the overall appearance of this complicated interchange.

California was the recipient earlier this year of awards by the American Institute of Steel Construction for aesthetic design of four more of its structures on the State Highway System. (See January-February, 1964, issue.)

New S. F. Freeway

Four Miles of Route 82
Built on New Alignment

By HAIG AYANIAN, Deputy District Engineer



Early this fall motorists will be able to drive from the southwesterly section of San Francisco to the Bay Bridge and across to the East Bay and beyond *without once using a city street*. This safer, signal-free driving will be possible as soon as two con-

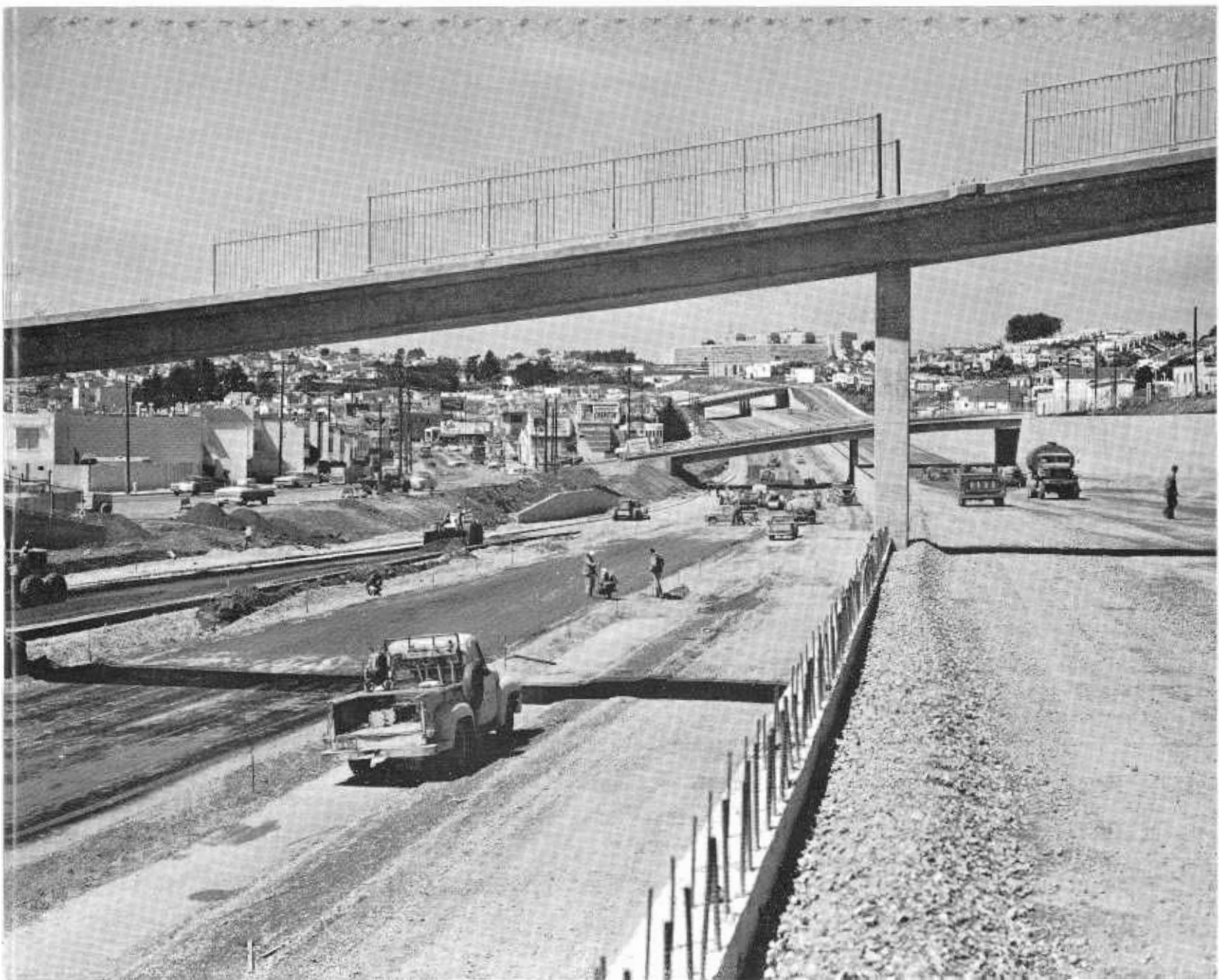
tracts currently under construction on Route 82, known locally as the "Southern" Freeway, are finished.

The route, built on completely new alignment, is located in the natural traffic corridor serving former US 101, which has followed Alemany Boulevard and San Jose Avenue. It also occupies the old Southern Pacific Railroad right-of-way for almost two-thirds of its length. This was the old "Main Line," built in the 1860's as a

rail link between San Francisco and San Jose. Passenger trains stopped using these tracks in 1907 when the bulk of Peninsula train traffic was shifted to the western shores of San Francisco Bay.

More than six years and four major construction projects were required to complete approximately four miles of six- (ultimate eight-) lane freeway from Orizaba Avenue to the Route 82/101 Interchange. The entire job

Looking westerly toward San Francisco City College from the vicinity of Theresa Street pedestrian overcrossing. Also visible are Baden Street and Paulding Street overcrossings. The split level median was utilized to reduce right-of-way requirements and avoid excessive retaining wall height.



was planned as one unit and broken down into four projects for ease of construction. Total cost of construction was \$24,000,000 which was almost matched by the \$18,000,000 cost of right-of-way acquisition. The City and County of San Francisco contributed \$1,800,000 toward the cost of construction and \$500,000 toward right-of-way purchases. Route 82 is one of the few major state highways in San Francisco that is not being constructed with Interstate funds.

In City Master Plan

This freeway route was originally conceived by the City of San Francisco and appears on the city's master plan in substantially the same location

MAP BELOW AND OPPOSITE PAGE. The new Route 82 Freeway in San Francisco extends from the Route 101 interchange to Orizaba Avenue.

it now occupies. On June 21, 1956, the California Highway Commission adopted the section between Orizaba Avenue and Route 101 as a freeway route. The freeway agreement with the City and County of San Francisco was executed on August 29, 1956, and revised on July 7, 1958.

A natural trafficway exists in a valley in the southern part of San Francisco running in a southwesterly direction to the San Mateo County line. Historically, all traffic from the residential areas of the western parts of the city and northwestern San Mateo County destined for the downtown and industrial areas of San Francisco has been forced by the topography of the valley to use this natural corridor, through which Alemany Boulevard and San Jose Avenue pass.

When the need for the "Southern" Freeway was being evaluated, it was found that the combined average daily traffic on these routes exceeded 53,000 vehicles. In addition, afternoon peak-hour traffic on the James Lick Freeway (US 101) bound for Alemany Boulevard backed up in such a manner as to block two of the four south-bound lanes, resulting in a slowing down, and in many cases a complete stoppage, of traffic in this area.

When the new freeway is opened to traffic, it is expected to carry 50,000 vehicles per day and reduce the traffic load on Alemany Boulevard and San Jose Avenue to 24,000. The new freeway is expected to carry an average daily traffic load of 120,000 to 200,000 by 1985.



Construction Problem

The problem of keeping more than 50,000 cars moving through the construction zones each day was the controlling factor on all four contracts. It was solved by a carefully engineered schedule of stage construction to provide for the diversion of traffic to planned detours as each job progressed. Although the detours were only temporary, they were built to structural standards comparable to city streets. In general, the contractor was required to provide full width of traveled way between approximately 4 p.m. and 9 a.m. the following workday morning. At all other times, multilane roadways were reduced by one lane in each direction—but only when and where construction required.

Route 82/101 Interchange

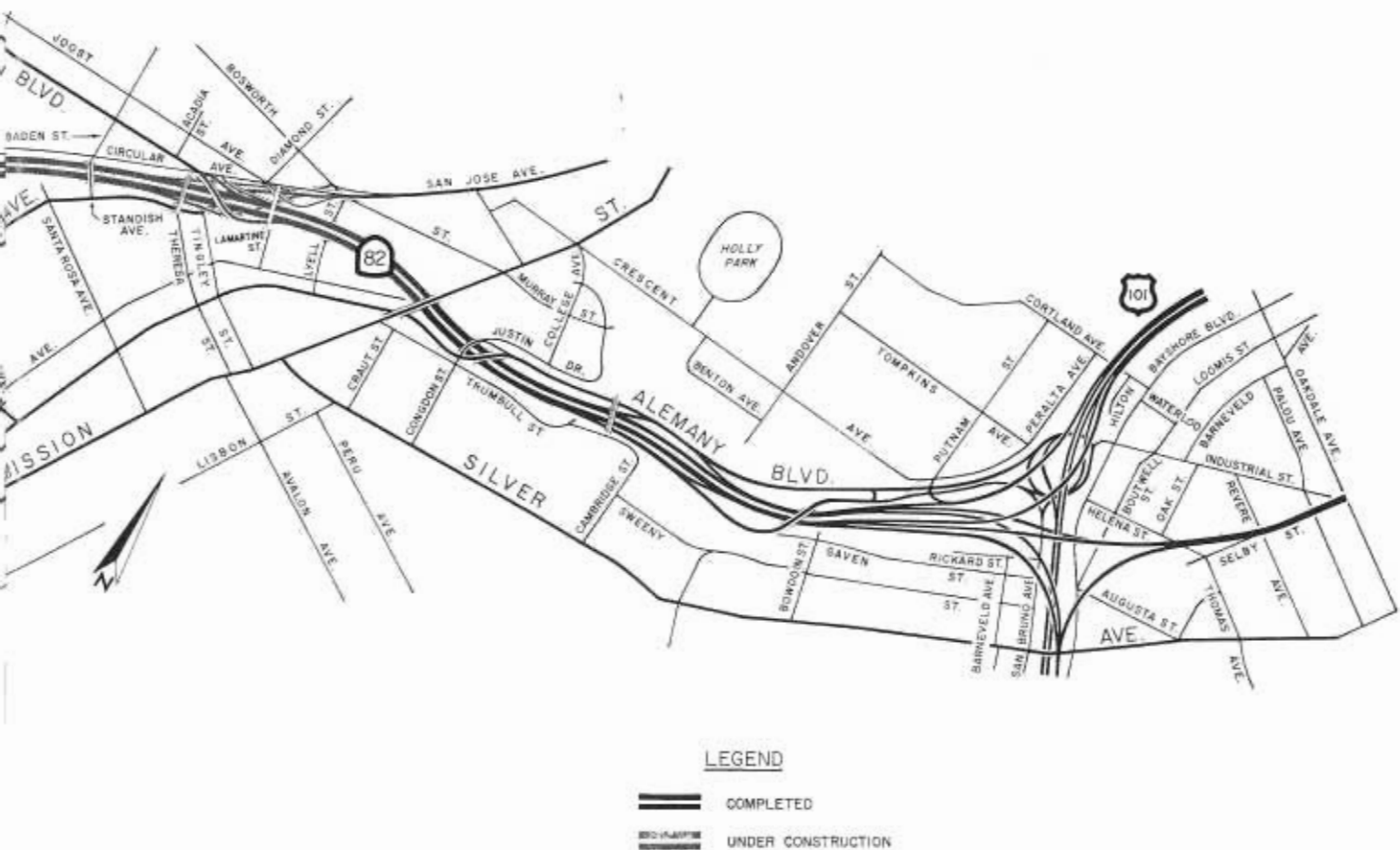
The first step on the construction of the "Southern" Freeway was taken on July 15, 1958, when the Guy F. Atkinson Company began work on a directional interchange between Routes 82 and 101. The work included installation of a prestressed concrete slab bridge at the Bacon Street Undercrossing, widening of the Cortland Avenue Undercrossing, pedestrian undercrossings at Burrows Street and Thornton Avenue, 1,600 lineal feet of retaining walls, and rough grading and excavation only for 0.6 mile of Alemany Boulevard to Trumbull Street.

This project was some 110,000 cubic yards deficient in embankment material. The bulk of the borrow was imported from the Civic Center Plaza, where a large excavation was


being made for Brooks Hall and the parking garage, both underground.

One unusual construction feature on this job was the installation of 10 precast and prestressed girders over the James Lick Freeway in six hours. Traffic was detoured off the freeway from midnight to 6 a.m., while two 35-ton truck cranes were used to set the girders in place. During this job the existing Alemany structure was braced with timber bents under the operating area of each crane.

Under a cooperative agreement, the City and County of San Francisco contributed \$1,585,000 for construction, right-of-way acquisition, and utility relocation for its share of all work done on this unit south of Silver Avenue. A portion of these funds was spent for the relocation and enlarge-



LEGEND

-  COMPLETED
-  UNDER CONSTRUCTION

JUNE 1964



An aerial view of the Route 82/101 interchange which has been in service since June of 1960. East of James Lick Freeway is the recently completed extension of Route 82 which will some day connect with the Route 480 Freeway in the vicinity of the Bay Bridge.

ment of a 5-foot, 9-inch diameter sewer 500 feet long near Phelps Street and Bayshore Boulevard.

This unit opened to traffic on June 20, 1960. Resident engineers were Loren L. Krueger and G. M. Low for the Bridge Department and H. A. Hart representing the district.

Route 82/101 Interchange to Milton Street

Three months later, in September 1960, contractor Charles L. Harney, Inc. began work on the adjoining section of Route 82, a \$4,273,000 project

to build 1.1 miles of freeway between the Route 82/101 Interchange and Milton Street, one block west of the Mission Street Viaduct.

Structures included two bridges to carry Alemany Boulevard traffic over the freeway near Gaven and Congden Streets, overcrossing at Mission Street and Justin Drive, the St. Mary's and Gladstone Drive Pedestrian Overcrossings, and 10 concrete retaining walls built to heights of up to 36 feet to reduce right of way requirements.

When the city widened the old Mission Street Viaduct in 1951, an arch section was built over the Alemany Boulevard trafficway. To preserve the architectural integrity of this structure, it was decided to match the arch with the new Mission Street Overcrossing. The Bridge Department designed the structure as a box girder with a parabolic arch over the Route 82 freeway. The area between the freeway and Alemany Boulevard was walled in.

A combination sanitary and storm sewer was enlarged and relocated outside the freeway right of way under a cooperative agreement with the City and County of San Francisco, which contributed \$200,900 for the construction of a double 6- by 10-foot reinforced concrete box culvert for 2,000 feet along relocated Alemany Boulevard, crossing the freeway at Trumbull Street.

Since there was a deficiency of 80,000 cubic yards of embankment material, borrow sites were specified on state-owned property within the right of way for the next construction unit of Route 82. This requirement enabled the contractor to obtain necessary embankment material for the project under construction while removing material which would otherwise have become surplus with the next unit. The slopes and grading planes specified for the borrow site were at or above the desired grade.

The eastbound lanes were built first and construction of the westbound lanes was not started until after eastbound traffic had been routed onto the new freeway lanes. The contractor elected to use the steel sideform method of placing Portland cement concrete pavement instead of the slip form method. This job was finished on October 13, 1963. Resident engineer was H. A. Hart and the Bridge Department was represented by David Hopkins and George Low.

Mission to Ocean

A little more than a year after the above job began, the same contractor, Charles L. Harney, Inc., started work on the next unit of the Route 82 freeway, a \$6,080,000 project to build 1.3 miles of freeway, 13 structures, 9 retaining walls, and a sewer protective slab between Mission Street and 0.4 mile north of Ocean Avenue. This project is the key job of the four described in this article, both from the standpoint of the number and type of structures and from the fact that the facilities of the San Francisco Bay Area Rapid Transit District will enter the freeway right-of-way within the project limits.

Representatives of the Division of Highways, the City and County of San Francisco, and the transit district

have been working in close cooperation for some six months planning the proposed transit facilities. The transit rail lines as planned will be either on or parallel to the "Southern" Freeway right-of-way all the way from the Baden Street Undercrossing to the San Francisco-San Mateo County line in the vicinity of the Knowles Avenue Transit Station site.

This cooperation was maintained by regular biweekly meetings among representatives of the three organizations and constant interchange of working drawings between the transit authority and highway engineers to coordinate design. Since work on the freeway started on December 13, 1961, and it was not until November 1962 that the electorate authorized the creation of the transit district, freeway construction had been under way

for more than two years before design work even started on the transit facilities. However, it is the goal of the combined operation that by the time this article is published, the alignment of transit facilities along the Route 82 freeway will be firm enough to allow the transit engineers to proceed with final design.

Balboa Park

This section of the freeway runs through Balboa Park and across the southeasterly corner of the City College of San Francisco. When it is completed, it will siphon through traffic away from the highly congested city streets of neighborhood shopping districts along Mission Street.

Negotiations with the City and County of San Francisco over pur-



This view shows the Ocean Avenue overcrossing in the foreground with traffic routed around construction. In order can be seen the Geneva Avenue overcrossing and the San Jose Avenue detour.



Looking westerly toward Monterey Boulevard and access ramp construction.

work, the contractor was required to leave openings in the bridge falsework to permit his heavy equipment and materials to pass through to other sections of the job.

The Branch East Undercrossing, which is 450 feet long, is built on a skew of 60 degrees and the Monterey Boulevard On-Ramp Overcrossing, which, at 710 feet, is the longest structure on this unit, is built on a 40-degree skew to provide for the required minimum radius of curvature, together with span lengths and acceleration lane requirements. To keep right-of-way requirements to a minimum, the median on the portion of this section of Route 82 was designed

on a split level from Havelock to Lyell Street.

The demolition and reconstruction of the Bosworth Street Undercrossing was accomplished in two stages, half of the street being open at a time to provide traffic service to both Bosworth Street and San Jose Avenue. Protective sheds were placed over Bosworth Street during demolition work to protect passing traffic.

Because of the clearance requirements of four levels of traveled way, the abutment walls of the San Jose Avenue Undercrossing near Monterey Boulevard are 35 feet high. Another difficult stage of construction in the same vicinity was excavating for re-

taining walls up to four stories high adjacent to existing streets while permitting traffic to pass through.

On roadway construction, two 12-foot subgrade machines were tied together to permit trimming of the cement-treated base on a 24-foot width.

This section of the Route 82 freeway will not be usable until completion of the fourth unit, described below. The Resident Engineer is E. L. Raymond, while K. L. Baumeister represents the Bridge Department.

Ocean to Orizaba

The same contractor started work October 22, 1962, on the fourth unit, a 1.8-mile section from Havelock

Street, 0.4 mile north of Ocean Avenue, to Orizaba Avenue. Actually, Route 82 leaves the freeway alignment at San Jose Avenue on this project and follows San Jose Avenue in a southwesterly direction to the San Francisco-San Mateo County line. The remainder of this job, from San Jose to Orizaba Avenue, is on State Highway Route 1.

Since this and the preceding unit were both being built by the same contractor and were both scheduled to be finished at approximately the same time, pouring of the portland cement concrete pavement was done in one continuous operation. Subcontractor Gordon H. Ball used a modified slipform paving machine 36 feet wide to pave three 12-foot lanes on both jobs in a single pass, then the machine was turned around and the opposite lanes were paved in another pass. This technique had never before been used in this district for a 36-foot width.

Structures on the fourth unit included overcrossings at San Jose, Geneva and Ocean Avenues, and the San Jose Avenue Offramp at Sickles Avenue. Undercrossings were provided at the Sickles Avenue Onramp and the San Jose-Sickles Separation, and pedestrian overcrossings were installed at Havelock Street and Whipple Avenue.

In addition, a temporary onramp connection to the freeway was provided from Alemany Boulevard at Orizaba Avenue to allow full use of the freeway from Orizaba Avenue to the Route 82/101 Interchange and divert such traffic from city streets. One unusual feature was the provision of pedestrian access ramps to the freeway from the Ocean Avenue Overcrossing to permit passengers from express buses on the freeway to transfer to locals on Ocean and Geneva Avenue.

Other structures included nine reinforced concrete cantilever retaining walls on spread footings totalling 5,410 feet in length, two concrete crib retaining walls, and two gravity type retaining walls. One crib wall, which is 35 feet high and 450 feet long, was placed to protect the Cayuga Playground area from erosion. The abutment wing wall at the San Jose Avenue Overcrossing and the pedestrian

access ramps at the Ocean Avenue Overcrossing were built in two stages to provide continuous traffic service.

Resident Engineer on this job was K. G. Nakagawa and L. S. Miyashiro represents the Bridge Department.

Freeway Extensions

The westerly extension of this freeway is now under construction as part of a major contract for construction on Interstate Route 280 in San Mateo County. When the work is completed, toward the end of 1966, this 0.4-mile section of Route 1 will carry "Southern" Freeway traffic from Orizaba Avenue to the county line in the vicinity of St. Charles Avenue and join to Interstate Route 280 in San Mateo County.

East of the James Lick Freeway (Route 101), work was completed February 10, 1964, by Peter Kiewit Sons' Company on a \$4,100,000 project to build a two-level viaduct from the Route 82/101 Interchange to Newcomb Street on Route 82. This unit will not be usable until completion of the next unit, for which bids were opened on May 20, 1964. The contract has been awarded to the Guy F. Atkinson Company to build the easterly extension of Route 82 from Newcomb to Army Street, including ramp connections to Army Street and Pennsylvania Street. These ramps will be an integral part of the future Islais Creek Interchange. This Interchange will be built when future Route 87, often referred to locally as the "Hunters Point Freeway," is constructed in this area.

Completion of this \$6,100,000 project, expected early in 1966, will provide an alternate route paralleling U.S. 101 from the Route 82/101 Interchange through an industrial area of San Francisco to the general vicinity of Army Street above Third Street.

Landscaping

It was planned to landscape each section of Route 82 after construction was completed. Landscaping of the Interchange was completed on March 15, 1962, at a cost of \$46,000. The sum of \$110,000 has been budgeted and bids were opened on June 3, 1964, to landscape the section between

Bids Called on Two Big Interstate Jobs

The State Division of Highways has called for bids on construction of two major sections of Interstate 5 in San Diego and Glenn Counties.

The \$6,612,000 San Diego County project calls for grading and paving to construct 3.4 miles of eight-lane Interstate 5 freeway on new alignment between Miramar Road and one-half mile south of Carmel Valley road near the north city limits of San Diego. The project includes construction of an interchange structure linking Interstate 5 with the future Interstate 805.

The \$6,600,000 Glenn County project calls for grading and paving to construct an initial four lanes of an ultimate six-lane Interstate 5 freeway on new alignment between one mile north of Artois and the Tehama county line, a distance of 11 miles. The project calls for an extension of State Sign Route 32 from Sixth Street in Orland to connect to the new Interstate 5 route west of Orland, including an interchange between the two routes at the latter point.

Route 101 and 0.1 mile east of Milton Street. The 1964-65 Construction Program contains \$75,000 for landscaping the one-mile section between Havelock and Mission Streets; another \$75,000 will be required to landscape the section of Route 82 freeway from east of Orizaba Avenue to 0.4 mile north of Ocean Avenue and \$35,000 to landscape the easterly extension from Route 101 to Revere Avenue.

With the completion of the construction work described above, Route 82, the "Southern" Freeway, will provide six lanes of full freeway across some six miles of the southern part of San Francisco from the southwesterly area to the industrial areas east of US 101. Later, when traffic conditions warrant, another lane will be constructed for each direction of freeway traffic within the existing right-of-way to provide the ultimate eight-lane width planned.

WASHO

Post-1972 Federal Aid Outlook Discussed at 43d Annual Session

The current accelerated Federal Aid program for highway improvement will undoubtedly continue in some form in the 1970's, according to the consensus of leading speakers at the 43d annual conference of the Western Association of State Highway Officials, held in San Diego June 15-18.

But there were some differences of opinion about what size and shape the future form of federal financing should assume.

The conference, attended by some 500 delegates, visitors and other guests, most of them from the 14 western states whose highway departments comprise the association, along with federal agency representatives, also provided the setting for discussion of a wide range of other topics in both general and technical sessions.

Prominent among these subjects were the matter of specifications, "spot correction" of hazardous loca-

tions, directional signing, truck weight limitations, and the current nationwide program of highway research. Committee sessions also covered new developments and problems in the fields of construction, maintenance, communications, forest roads, right-of-way and administration.

At its concluding session at the El Cortez Hotel on June 18, the association elected C. Taylor Burton, Utah Director of Highways, as its new president, succeeding Oregon State Highway Engineer Forrest Cooper. Other new officers are Colorado State Highway Engineer Charles E. Shumate, vice president; and California Deputy State Highway Engineer George Langsner, secretary-treasurer.

Executive Committee Listed

In addition to the three newly elected officers and Past President Cooper, the executive committee of WASHO for 1964-65 will include:

Charles G. Prah, Washington State Director of Highways; Richard G. Pfister, member of Wyoming State Highway Commission; T. B. White, New Mexico Chief Highway Engineer; and S. N. Halvorson, member of the Montana State Highway Commission.

The association adopted resolutions urging Congress to oppose a proposed reduction of \$1,000,000 in the 1965 federal appropriation for national forest highways and restore the total to the original recommended figure of \$33,000,000; and to increase the annual expenditure for forest highways to \$85,000,000 beginning in 1966. The latter resolution pointed to the increased use of forest highways for both recreational travel and utilization of resources and their role as "integral links in principal highway systems"

... Continued on page 20



A view of the Cotillion Room at the El Cortez Hotel in San Diego at the opening general session of the 43rd Annual WASHO conference.

Hewes Award

Moskowitz' Research in Traffic Engineering Wins New Recognition

The value of numerous and trail-breaking research reports in the field of traffic engineering prepared by Karl Moskowitz has won him a new honor—the Dr. L. I. Hewes Award for outstanding contribution to highway development among employees of 14 western states.

Moskowitz, who is California's assistant traffic engineer in charge of geometric service and traffic service, was adjudged the winner of the 1964 award and was presented with a plaque and a \$500 check at the annual dinner of the Western Association of State Highway Officials, held in San Diego June 17 as a part of the 43d annual WASHO Conference.

The award was established by *Western Construction* magazine in 1951 to honor the memory of the late Dr. Hewes, former western regional chief of the U.S. Bureau of Public Roads and one of WASHO's founders. The publication provides the plaque and cash award, but the annual winner is selected by WASHO from entries submitted by the various highway departments.

Worked for BPR

Moskowitz began his career as an engineer with the U.S. Bureau of Public Roads soon after graduation from the University of California at Berkeley in 1930. During World War II he was commissioned in the U.S. Army Corps of Engineers, and built air field runways and roads in New Guinea and the Philippines.

He resigned from federal employment in 1948 to join the California Division of Highways and has been assigned to the Sacramento headquarters since that time.

Beginning as early as 1947, and in increasing volume since 1954, Moskowitz has contributed a steady stream of research reports in highway engineering which have had considerable influence in the field of traffic operation and freeway design not



Karl Moskowitz (left) accepts the Dr. L. I. Hewes award from Editor Robert L. Byrne of Western Construction magazine. The presentation took place at the annual "family dinner" of the Western Association of State Highway Officials in San Diego on June 17.

only in California but throughout the nation and even abroad.

Among his earlier contributions were the initiation of a sufficiency rating system for highways, and studies of lower-case lettering for directional signs. The latter study, based on California practice, resulted in the adoption of lower-case lettering on the New Jersey Turnpike and the New York State Thruway. This type of lettering is now standard for the National Interstate System.

Writes Prize Paper

One of the later studies, which Moskowitz coauthored with George M. Webb, was adjudged by the High-

way Research Board as the best paper presented at its annual meeting in 1957. This was "California Freeway Capacity Study, 1956," an analysis of the operating characteristics of several high volume freeways. Appearing at the outset of the accelerated nationwide highway program, this report was in heavy demand on the part of highway planners in states which were just then getting into the design stage on major urban freeways.

In 1962 Moskowitz was coauthor (with Leonard Newman) of a paper entitled "Notes on Freeway Capac-

... Continued on page 21



WASHO Past President W. Otis Wright, Nevada State Highway Engineer (at left) officiates at the installation ceremony for the new officers. Left to right: C. E. Shumate, Colorado, vice president; T. B. White, New Mexico, executive committee; C. Taylor Burton, Utah, president; George Langsner, California, secretary-treasurer; Richard G. Pfister, Wyoming, executive committee; Charles G. Prah, Washington, executive committee. Not present for picture: S. N. Halvorson, Montana, executive committee.

WASHO

Continued from page 18 . . .

where construction has been recently speeded up under other programs.

No resolutions were adopted concerning the federal aid outlook for the period after 1972, when the current accelerated financing program enacted in 1956 is scheduled to terminate. The American Association of State Highway Officials already has this matter under study, as was pointed out by a number of conferees, including AASHO President J. Burch McMorran, New York State Superintendent of Public Works.

McMorran noted that it was important to have AASHO's comprehensive nationwide review completed by 1967 as a basis for determination of highway needs in the post-1972 period and to give the states and the highway industry time to prepare for whatever future program Congress might adopt.

Caution Against Overestimation

McMorran also cautioned against over-estimating the role of the completed Interstate System in the nation's total vehicular transportation picture. Even though the 41,000-mile interstate network is expected to carry 20 percent of the total traffic by 1972, he pointed out, the total traffic to be handled will increase by 25 percent in the same period, adding:

"Unless we extensively upgrade our existing systems so they can more effectively complement the Interstate, we will inevitably suffer new traffic problems and we will fail in our effort to reverse the appalling highway injury and fatality records which cause us deep concern."

WASHO President Forrest Cooper, in his major address, also emphasized the importance of the "blood vessels and capillaries" of the future "circulation system of which the Interstate will provide wonderful 'arteries.'" He urged a post-1972 program with "a reasonable amount of additional interstate to integrate the system" but with flexibility so that "state programs may be geared to state needs."

Also suggesting renewed emphasis on non-interstate routes after 1972 was A. E. Johnson, Executive Secretary of AASHO. Like McMorran and Cooper, he pointed out that these routes would be carrying 80 percent of future traffic and have not been modernized to keep pace.

Expansion Is Sound Economics

A different view of the future federal aid picture was advocated by State Senator Randolph Collier of Yreka, the only state legislator to address the conference. His proposal was to expand the interstate system, "because it is sound economics to do so." The system, he said, must "grow

with the growth of the country"; as an example, he noted that California's freeway and expressway system contains almost six times as much mileage as the State's portion of the interstate system, and most of it would have to be built to interstate standards.

Undersecretary of Commerce Clarence D. Martin, Jr. also expressed the need for planning for the post-1972 highway program, calling attention to an anticipated increase of 40 to 50 million people in the nation in the next 12 years. Higher incomes, more leisure and more interest in mobility will also be in the picture, adding up to increasing demands on the new highways.

One point about federal aid which all speakers who mentioned it were agreed on: under no circumstances should federal highway funds be allocated for maintenance.

Instead of talking about the interstate program, as he has done in appearances before highway officials in recent years, Federal Highway Administrator Rex Whitton concentrated on safety and "spot corrections." He called attention to the attack now being stepped up by many states on the problem of hazardous locations on highways not scheduled for major improvement in the near future, where lane widening, channelization, removal of roadside obstacles

and other small-scale safety projects can help appreciably to reduce the nation's toll of traffic deaths which reached 43,400 last year.

Other Aspects

Among the other aspects of highway operation, development and administration touched on by these and other major speakers were:

Specifications—Praise for the newly published AASHO guide specifications for highway construction was coupled by Contractor Maurice Tanner of Phoenix, Arizona, with a plea to the states to adopt them "at least in spirit" and for more cooperative committee effort between highway departments and contractors on the state level.

Truck Weights—Johnson urged "critical consideration" of proposals to increase AASHO's recommendation of 32,000 pounds permissible maximum for tandem axles to 36,000 pounds. Senator Collier, however, felt that Western states should work for such an increase because of the West's greater dependence on truck transportation.

Urban Planning—Undersecretary Martin urged communities to take greater initiative in complying with the urban transportation planning provisions of the 1962 Federal Aid Highway Act, and urged those areas which have lagged in the planning process to speed it up so as not to delay federal aid highway construction in their jurisdictions.

Training—AASHO has established a new committee on management and training, Johnson reported. Its purpose is to assemble and exchange data on management techniques and specialized training.

Research—D. Grant Mickle, executive director of the Highway Research Board, gave a rundown on the progress being made to date under National Cooperative Highway Research Program and other research programs, and stressed comprehensive transportation planning as a major frontier for future research efforts.

The next WASHO conference will be held in Santa Fe, New Mexico. The date has not been firmed up, but it is expected to take place in June 1965.

HEWES AWARD

Continued from page 19...

ity." This paper contains the practical results of more than seven years of observations and research in freeway traffic flow and is acknowledged to be one of the most comprehensive and useful compendiums of information in this field which is available. It was presented to AASHO (Committee on Design) at the 1962 annual meeting and to the Highway Research Board in January, 1963.

Two of Moskowitz' more recent reports have been in the increasingly important area of the overall transportation complex in metropolitan areas. The latter of these, "Living and Travel Patterns in Automobile-Oriented Cities," was presented in October, 1962, at a national symposium in Detroit and has since been widely quoted and reprinted for its practical approach, in human terms, to the hitherto highly theoretical problem of personal transportation. (See page 47 of this issue.)

Is ITE Officer

Moskowitz is a long-time member of the Institute of Traffic Engineers, and recently stepped up from the vice-presidency to the presidency of its Western Section. He is also a member of the American Society of Civil Engineers and of several committees of the Highway Research Board.

The Hewes award has now gone to Californians four times. A cwinner in 1952 was J. T. McWilliam, in recognition of his devising methods for using tabulating machines to process the field notes obtained with gyroscopic equipment. Division Communications Engineer Arnold H. Carver was the recipient in 1954, based on his leading role in developing a statewide highway communications network. And in 1962, Senior Bridge Engineer Roger D. Sunbury and Senior Engineer Welding Technologist Paul G. Jonas shared the award for their joint contribution to the design and use of high-strength steel in large highway bridges and the related development of arc welding.

Alfred E. Heller Is Named to Commission

Alfred E. Heller, Nevada City publisher, was appointed to membership on the California Highway Commission by Governor Edmund G. Brown on July 20, 1964.

Heller succeeds Arthur T. Luddy of Sacramento, who was appointed by Governor Brown in January 1959 and reappointed for a four-year term in



ALFRED E. HELLER

January 1963, but who resigned in July of this year because of ill health which prevented him from attending commission meetings.

Heller has been publisher of the Nevada City *Nugget* since 1959, and is president of California Tomorrow, a research organization concerned with problems of California's continuing growth. He is co-author, with Samuel Wood, of *California, Going Going . . .* and *The Phantom Cities of California*.

A native of San Francisco, he attended the Putney School in Vermont and was graduated from Stanford University. He served in the U.S. Army from 1952 to 1954, including duty in Korea.

Heller's home is in Grass Valley.

Urban Planning Progress

By C. G. BEER, Urban Planner

Recent actions in the San Francisco and Los Angeles areas highlight continued progress toward cooperative transportation planning by all units of government in urbanized areas of the State.

On June 5, 1964, the Bay Area Transportation Study Commission appointed Richard M. Zettel of the Institute of Transportation and Traffic Engineering, University of California, to the position of Study Director. He will supervise the coordinated nine-county study called for by the State Legislature which created the "BATS" Commission in 1963.

On July 2, 1964, the Advisory Committee of the Los Angeles Regional Transportation Study approved a proposed agreement which will be submitted to cities, counties, and State agencies in a five-county area. This agreement will formalize activities which have been carried on under the informal "LARTS" organization since 1960.

Comprehensive Planning

The Federal Aid Highway Act of 1962 states the congressional intent that after July 1, 1965, the Secretary of Commerce shall not approve for federal aid any highway projects in urban areas of more than 50,000 population unless such projects are based on a continuing comprehensive transportation planning process, carried on cooperatively between State and local communities. (See "Urban Planning," *California Highways and Public Works*, March-April 1963.) To date three urbanized areas in California have been approved by the Bureau of Public Roads of the Department of Commerce as qualified by cooperative agreements and established planning processes which meet the terms of the Federal Aid Act.

First of the California urbanized areas to qualify was Fresno. The

Fresno Area Transportation Study (FATS) had been operating informally since 1961. To meet the specific regulations of the Federal Aid Highway Act a formal agreement between the City of Fresno, the City of Clovis, Fresno County and the State Department of Public Works was executed, and Bureau of Public Roads approval was secured in March 1964.

Similar Agreements Executed

Next, the Santa Barbara and San Diego urbanized areas executed similar agreements. The Santa Barbara organization is referred to as the South Coastal Transportation Study (SCOTS) and involves the City of Santa Barbara, Santa Barbara County and the State Department of Public Works. The San Diego urbanized area, like the Fresno area, had pioneered such cooperative planning for many years. A formal agreement to meet the requirements of the Federal Aid Act was prepared largely through the efforts of the City of San Diego, and has been executed by San Diego County, 12 cities, San Diego

Unified Port District, and the State Department of Public Works.

Other urbanized areas in which organization and agreements are being processed are Sacramento, Stockton, and Bakersfield. Although not quite up to the 50,000 population which would bring it under the present requirements of the Federal Aid Act, the Eureka area in Humboldt County has organized a similar procedure.

Cooperation Is Stressed

The purpose of all these efforts is to achieve maximum compatibility of highway transportation networks with local land use plans and rail, air, and water transportation systems in urban areas by means of cooperative long-range planning. The Federal Aid Highway Act will affect the availability of more than \$250,000,000 per year in Federal highway financing for urban projects after July 1, 1965. These funds play an important part in present programs for improvements on the Interstate as well as the State primary and county secondary road systems.

NEW LEGISLATION TIGHTENS CONTROL ON BILLBOARDS

Tighter control regarding commercial billboards located along State highways will go into effect on May 15, 1965, when the Collier-Z'berg Act becomes operational.

The new legislation (Senate Bill No. 44) will prohibit some types of billboards along particular stretches of the Interstate System.

It will double the general license fee from \$65 to \$130. Structure permit fees will increase from their present \$2 level to \$5.

Owners of signs adjacent to land-

scaped freeways will benefit from the legislation, however, for it extends the removal period for signs now in place from the present one year limit to three years.

Rules and regulations will be promulgated by the Director of Public Works.

The Director is authorized to enter into an agreement with the Secretary of Commerce to obtain additional federal funds for which the State becomes eligible through provisions of the act.

HR 381

Results Summarized in Report to Highway Transportation Agency

The continuing growth in motor vehicles in California is assuming the proportions of a tidal wave; and when it does, California state agencies concerned with motor vehicle ownership and use hope to be prepared.

The Legislature started to probe the problem of the phenomenal growth of automobiles using the State's highways and freeways in 1959. House Resolution No. 381, calling for a study of state functions bearing upon the motor vehicle, was adopted then; and now, the results of this three-phase study have been summarized in a comprehensive report to the Highway Transportation Agency.

The report points out that the Golden State is heading rapidly into an expansion of motor vehicle traffic beyond anything the world has ever known.

Forecast for 1980

In 1962, state-registered motor vehicles numbered 9,500,000. By 1980—a short 16 years from now—projections indicate that there will be a gain of 8,000,000 vehicle registrations for a total of about 17,500,000 vehicles in the State. In terms of annual travel mileage, the 76,000,000,000 vehicle miles chalked up by 1962 drivers in California will have burgeoned to a staggering 200,000,000,000 miles in 1980.

Fortunately, California has a highly accelerated highway development program, and planning and programing for this first-rate highway plant extend far into the future. To complement the physical plant, however, it is necessary to find means of fully utilizing the facilities that will be available. The new problems which increased traffic will bring to the highway user must be solved. The state agencies involved in the care of the motorist must meet the responsibility of providing efficient, safe, and convenient motoring. The question which must be answered is: How can this best be done?

Factual Approach

The development of a factual approach to future traffic demands was also of concern to the U.S. Bureau of Public Roads, and their financial assistance toward the study indicated that this State's findings would be of national interest.

Out of the study, which enlisted the aid of more than 250 individuals, representing the Legislature; state, federal, and city administrations; private business; and the public, have come suggested improvements in five areas: Driver Licensing, Financial Responsibility, Highway Patrol Supervision and Services, Highway Traffic Operations, and Vehicle Registration and Titling.

Directed by the Automotive Safety Foundation of Washington, D.C., with Louis R. Morony as Study Director, the planning report sets forth 27 recommendations requiring legislation, 75 suggesting administrative refinements, and 25 revealing areas where further research and study are needed.

Recommendations Listed

Briefly stated, the recommendations of the study include:

- Establishing a sufficiently large staff of driver improvement analysts to work with problem drivers, using driver improvement schools to reeducate those with poor driving habits.
- Requiring every person 18 or under to complete a driver education course prior to being licensed, and ultimately requiring all beginners, regardless of age, to complete such a course.
- Broadening the functions of the Highway Patrol to include more rapid assistance to the disabled vehicle, removal of traffic hazards such as spilled loads, and rapid clearing of accident scenes.
- Developing a plan for emergency closing of freeway entrances and

exits by using remotely controlled electronic devices.

- Expanding the information and education programs to provide additional education to benefit the motorist.
- Establishing research in areas of state government (relating to motor vehicle ownership and use) where there have been few depth studies aimed at increasing factual data.
- Implementing automation and electronic data processing equipment for immediate identification of problem drivers on a statewide—and eventually nationwide—basis.
- Starting a cadet training program whereby Highway Patrol candidates begin an apprenticeship at age 19 and enter the Academy for Traffic Officer training at age 21 after completing two years of preliminary assignments.
- Providing the Patrol with fixed-wing planes and helicopters for more efficient surveillance of traffic conditions.
- Investigating the possibility of automobile registration for the lifetime of a vehicle.

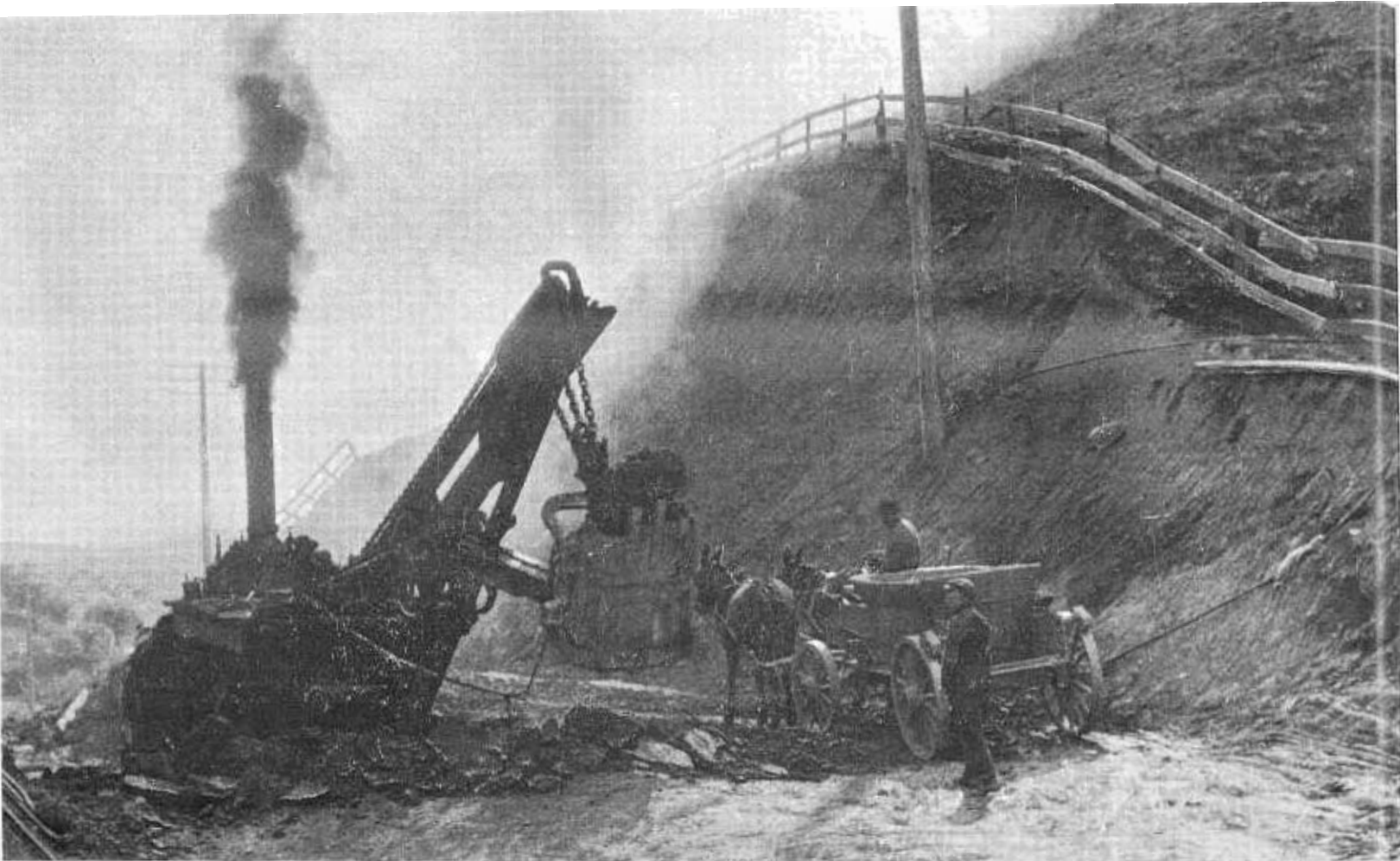
A limited number of copies of the report summary are available upon request from the Highway Transportation Agency, 1120 N Street, Sacramento.

NEW BRIDGE TRAFFIC HIGH

For the third consecutive month, a new traffic record was set on the San Francisco-Oakland Bay Bridge.

On Friday, June 12, a total of 152,073 vehicles crossed the bridge in a single day. The previous high of 148,137 vehicles was made on May 8, 1964.

During the first five months of 1964, a total of 18,889,872 vehicles have used the Bay Bridge, an increase of 9.4 percent over the comparable period of 1963.



Improving the Redwood Highway in Marin County in the vicinity of San Rafael. This photo was made in March, 1916.

The Redwood Highway

Part II — *Building the Road*

By JOHN ROBINSON

The automobile driver today who speeds in almost carefree travel along our modern highways is often completely unaware of how close behind him is the age of the horse. Although railroads and canals were doing much of the long haul freighting in the country by the middle of the 19th century, all other hauling was done either with horses, mules or oxen. In the 1880's the United States had literally millions of draft animals.

One authority points out that at this time there were more than 100,000 mules and horses being used exclusively on city street car lines. A public transportation company in a large city realized several thousand

dollars annually from the sale of manure alone!

In California, transportation was several decades behind the eastern part of the United States. It had been exclusively a cattle country until about 1850, with almost no centers of population, and travel was mostly on horseback.

Despite its rich mines and great acres of productive farm land, the State had not developed a strong tax base even by 1900. Although one of the largest of the United States, it was relatively poor. The few well populated areas in California got first attention for roads, with most of the financing for these roads coming from

the county treasuries. The rich counties had good roads, the poor counties had poor roads. In general, of course, the poorer counties also had the most formidable terrain.

There was little coordination of systems. Counties brought their roads up to the county line and stopped. There was no standard maintenance procedure. Signing was crude, amateurish and usually only of local value.

Dissatisfied with this way of building roads, the people of California began to think in terms of a state system. Earlier efforts had been confined to the trans-mountain routes, and one "Redwood Park State Road", which went through Santa Clara, San Mateo

and Santa Cruz Counties. The road was required to go through "Saratoga Gap" and through the Santa Cruz mountains to the "California Redwood Park." This is now Big Basin State Park.

On November 8, 1910, the Governor signed the State Highway Act, to be effective the 31st of December, 1910. This was in response to growing pressure for a state system, and an outcome of the "good roads" movement which was spreading over the entire United States with the advent of the automobile.

The act said the state system "... shall be constructed ... at a cost not to exceed \$18,000,000 ...". The money was to come from 18,000 suitable bonds issued by the state government in the denomination of \$1,000. Dated the 3d of July 1911, they bore interest at 4 percent, and were numbered from 1 to 18,000. The first 400 of these bonds were to fall due in July, 1917, and succeeding blocks each year thereafter. Sale was to be under direction of the Governor and proceeds went into the State Highway Fund. (The final block of this issue was redeemed in 1961.)

The act called for construction of a system of "highways ... permanent in nature ... finished with oil or macadam ... or such other material ..." as might be judged suitable by the engineers. An act also was passed for organizing highway districts and for the provision of maintenance funds.

Of this \$18,000,000 first issue of California Road Bonds, the State man-



Construction mishap in Sonoma County in the Healdsburg area, in 1914. Establishing a stable road foundation has frequently been a problem on the Redwood Highway.

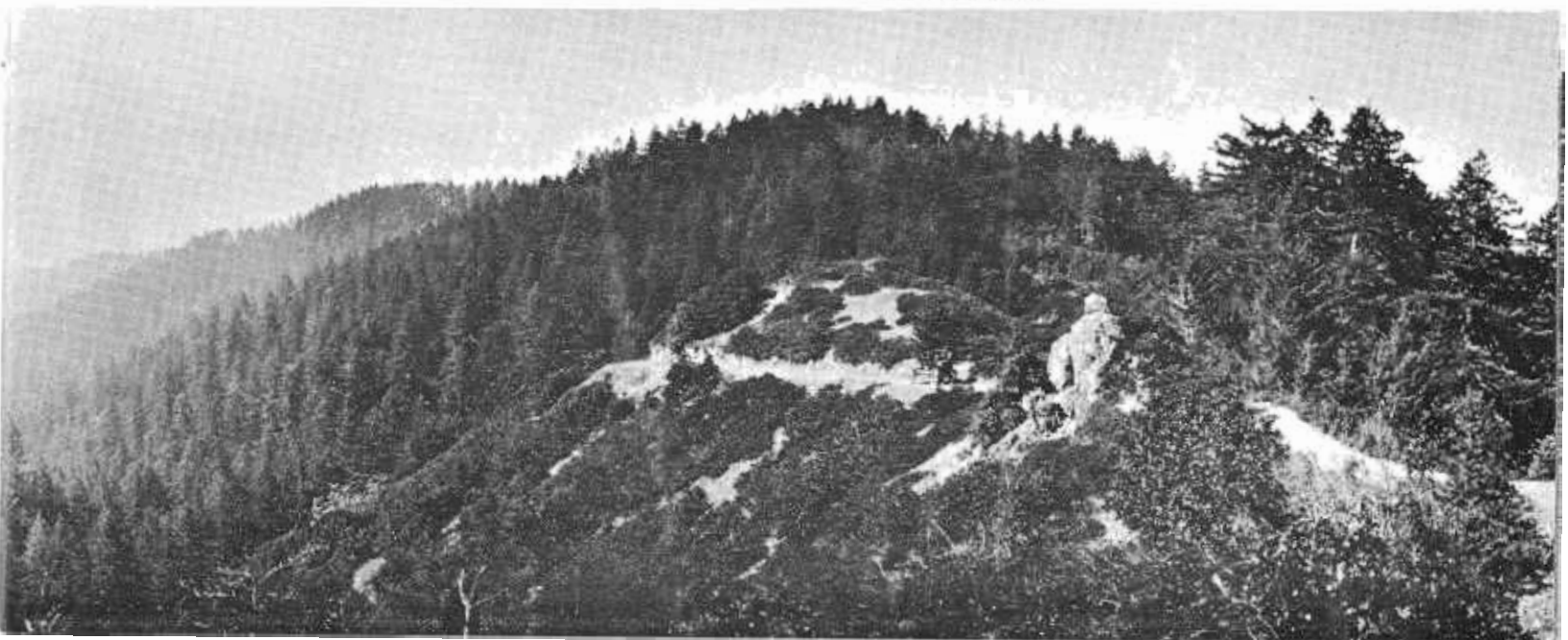
aged to sell only \$4,280,000 worth. The counties had to subscribe for the rest. Humboldt County subscribed \$600,000, Mendocino County \$445,000, Sonoma County \$220,000, and Marin County \$150,000. Sparsely settled, Del Norte County was not able to buy any.

As soon as the money was available the neglected north coastal area road began to get attention. One of the first contracts let in 1912 was for grading from the south Mendocino County line to Hopland. Another was let for paving with asphalt almost 14 miles of the road from Healdsburg to Santa Rosa. Several other contracts

were let but these were the two largest. By 1914, of the 381.2 miles between Sausalito and Crescent City, 111.6 miles had been surveyed or survey was under way.

The surveys themselves represented tremendous effort. There were no roads for the surveyors to bring in their equipment and it had to be brought in to their tent camps by pack horse. Sometimes the slopes along the route were so steep that the surveyors could not even use animals to carry their equipment but had to pack it on their own backs. Often they had to feel their way around the side of perpendicular cliffs, where

Below: View of the old Bell Springs Route, here at about 4,000 feet altitude running along the top of the ridge. This road was the only route from the 1870's until about 1920. It can still be travelled in good weather.





Survey crews fording the Eel River while laying out the original Redwood Highway route through the South Fork Canyon.

later a ledge would be carved out to carry the new road.

Although early road surveys had shown the road should go through the main fork of the Eel, this was no longer possible because the railroad had already gone down this canyon. Were a road to be located down this canyon when the railroad had already taken all the best sites it would be prohibitively expensive. The only other feasible route was the South Fork, which was somewhat less difficult, though longer.

The railroad actually beat the highway into Eureka by several years. The San Francisco *Chronicle* on October 24, 1914 carried a story headlined "Whistles Shriek Joy While Crowd Applauds a Great Undertaking. Miss Alice Palmer christens the new line with bottle of California champagne." One paragraph of the story read "Engineers, shovelmen and tunnelmen, who in seven years built the level pathway along the granite wall of the Eel River Canyon and straight through the rock of jutting promontory, held it their railroad. . . . Financiers, who paid the bills at the rate of \$25 for every inch of the 105 miles of the 'gap' that has been filled, doubtless acquired some legal interest in the property; but today Eureka and Humboldt County took possession."

Message by Smoke Signal

The final linkage point was 80 miles south of Eureka near the county line. Suitably, the message was carried to the outside by smoke signals. Three hundred celebrating people left San Francisco that day on the 7:15 a.m. ferry to take the "Sequoia Special," which had steam up and was waiting at the Sausalito ferry landing. They triumphantly rode northward past cheering crowds at Santa Rosa, Ukiah, Willits, and Asti. Luncheon was served on board. Then they left the more level southern country and began the climb into the mountains and through the rugged canyon.

Unfortunately they didn't quite make it on schedule. About 50 miles south of Eureka the Eel Canyon gave warning of its future actions by dumping a slide 300 yards long on the tracks, delaying them a whole day. When they finally made their way through Fort Seward, Shively, Scotia, Alton, Fortuna, Fernbridge, Lolita, South Bay and triumphantly into the terminal city on Humboldt Bay, the huge whistles of the logging mills blasted forth great shouts of welcome.

Although on November 7, 1916 California voters okayed, nearly four to one, a new bond issue of \$15,000,000 for state highways, work on the



Survey crews here moving camp while developing the South Fork route. Terrain was so rugged animals could not get through.

Redwood Highway fell off because of demands in other parts of the State. In the years 1915-1916 Humboldt County only got 6.93 miles graded; Del Norte County, none; Mendocino County, none; Marin County, none; Sonoma County, 8.12 miles graded and 7.01 miles thin asphalt surfaced. However, the new Eel River bridge south of Scotia, no mean undertaking, was completed in June 1916.

"Kennedy's Survey Party" in camp near Leggett in 1913.



People Eagerly Await Road

Nevertheless, there were always a few contracts underway, and the work went ahead month by month while the northern county residents anxiously awaited its completion. In 1916 the *California Highway Bulletin* said "It is doubtful whether the completion of any stretch of road in the State is looked forward to locally and also by the general public with more eagerness than the gap between Cummings and the Humboldt County line, a distance of 29.3 miles . . . as this change in route of the San Francisco overland road means the elimination of 2,686 feet of heavy grades, its importance may be readily conceived . . . construction entails the erection of several bridges of permanent nature, among which are Cedar Creek Bridge, 350 feet in length, 135 feet in height; Rock Creek Bridge, 210 feet in length, 145 feet in height; and the two crossings of the South Fork of the Eel River, each 350 feet in length . . . the country traversed is in a virgin state, for the most part devoid of wagon roads or even passable trails except those made within recent years by the state highway surveyors . . . the scenery is unsurpassed in California and the Redwood forests. River views and picturesque ruggedness will be a revelation to the tourist."

The *Bulletin* had this to say about the old route, the notorious Bell Springs Grade, "After the first rains come which generally occur in October, this road is impassable for motor vehicles and even for horse drawn vehicles. When snow storms set in, transportation is limited to saddle and pack animals." (This was in the year 1916.)

Twenty and Thirty Percent Grades

"The beginning of the ascent on the south slope is at Cummings, a post office at the foot of 'Rattlesnake Grade'. The elevation is 1,414 feet. A climb of 2,686 feet is made up and down grades exceeding 20%, to the summit, which is distant 12 miles, to an elevation of 4,100 feet. From this point a descent of 3,937 feet is made on up and down grades, some of them as high as 30 percent, to the town of Dyer ville, distant 46 miles from the summit, elevation 163 feet."



View of the Redwood Highway north of Petaluma in March, 1916.



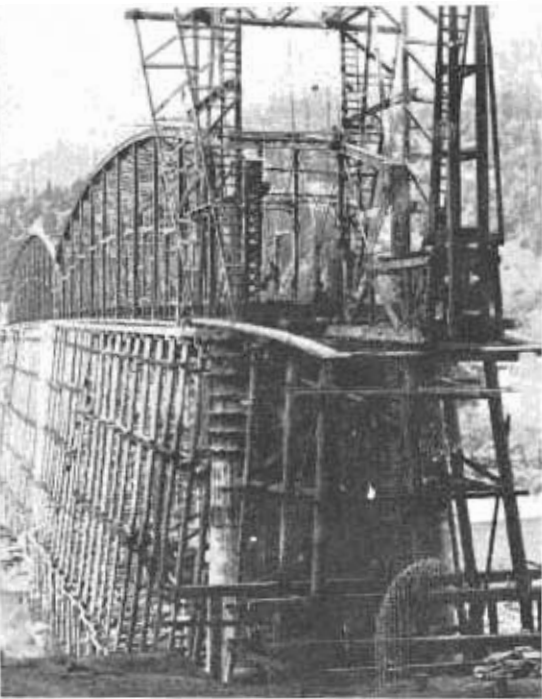
Above: The Redwood Highway, looking south through Garberville, Humboldt County, in 1914.



Below: The Redwood Highway just south of Crescent City in Del Norte County. Grade at left is 10 percent. Photo made on Lincoln's Birthday, 1915.

One of the factors affecting road construction during World War I was the stiff control exercised by the War Industries Board, which made it very difficult to ship highway materials. Furthermore, labor was scarce, since wages were high in the indus-

tries constructing ships and other war materials. During 1917 contract costs rose from 40 to 60 percent. Many contractors suffered and many contracts were completed at a loss to the contractor. As a result, in 1918 about 80 percent of the projects were



South Scotia Bridge, Humboldt County, under construction. Note falsework of local timbers. Photo made October 28, 1916.

deferred. However, California did much better than east of the Rockies, where road building was stopped almost completely.

California had one advantage in its Convict Act of 1915. This law allowed the State to use certain trusted convicts on road-building jobs. During the war these men were



Mechanized equipment used on a job in early days of modernization of Redwood Highway near Cummings, Mendocino County. Note right hand drive on trucks, and loads of hay for mules and horses.

used quite effectively on several roads, including the Redwood Highway.

Best Convict Camp

The Mendocino County camp was considered the best of all the camps used on various jobs throughout the State. During the war when free labor was commanding about \$3 per day, the cost of convict labor per "effective

man day" at this camp was \$2.53. This figure included the cost of their food and lodging, overseers, and all other necessary equipment and supervision.

In Mendocino County the use of convict labor started early. The law was effective in August 1915, and by September the first camp of 30 men was established in the northern part of the county. Ultimately the work was expanded to several camps of 125 men each, working year-round, every day but Sunday, in an area where annual rain and snowfall was 70 inches.

Materials Via Westport

When construction was started on the South Fork of the Eel, there was no adequate road connection in either direction through what was literally virgin wilderness. An emergency haul road had to be built from Leggett Valley to Westport. Here was a little harbor where steamers could enter in good weather and unload supplies, which then were hauled in wagons over the interminable ridges to the South Fork canyon.

The first two years of the work were entirely by pick and shovel. When a trail was finally pushed through to Cummings, teams were brought in to help. In 1918 the first steam shovel got on the job.

But progress, although slow, continued. By 1918 paving was completed from Sausalito to Healdsburg and on



Double arch bridge with trusses made of wood, under construction at Rock Creek, Mendocino County, 1916. Note legs of tower on far bank, used to support lines for transporting materials into position. Bridge was replaced by a concrete one in 1930's.

about 10 miles of highway in the vicinity of Ukiah. Despite the war and the terrain, most of the route north to Dyerville was either graded or under contract. There was a 10-mile section finished from Eureka to Arcata, but from Arcata north to Crescent City the route was still only in a proposed state. Beyond Crescent City there was nothing even proposed!

During this same period, what we now know as US 99 was virtually complete from Red Bluff to Los Angeles. El Camino Real was complete from San Francisco to San Diego.

By 1920 there was a passable road between Sausalito and Eureka, but as



Early type earthmoving equipment used in Del Norte County construction. Note that engine burned wood.



Above: Bar at Big Lagoon in 1920's was so high, lagoon could not drain into sea, and water rose to level of causeway, necessitating drainage ditch to get water into ocean.

late as 1925 there were still long stretches which were unpaved. In 1923 the road between Crescent City and Grants Pass was designated US Highway Route 199 and included in the Forest Highway System. The Bureau of Public Roads made considerable improvement on the old Gasquet route between 1924 and 1926. In 1926 the State improved and realigned a sizeable piece and took over maintenance of the entire route to the Oregon line.

Smith River Rampages

The State had just opened the first part of this route when the Smith River rose to the highest level ever recorded. Many sections of road were completely washed out. Fills built at great labor were swept away. Even at prices prevalent in those days repairs cost several hundred thousand dollars.

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State. These were indicated on a map with a little black circle where each bridge was needed. It made this section look like a bunch of grapes, with barely room for all the circles. Crossings at these points were still being made as at the Klamath River by primitive ferry, or fording.

From the mid-1920's, the story of the Redwood Highway was the careful husbanding of funds to complete the unpaved sections, and the grading and paving of those sections on which no work had yet been done. By 1930 the entire highway had been "improved." Unfortunately, these "improvements" were to standards based on surveys made prior to World War I!

In the 1930's most of the work on the Redwood Highway consisted of widening and realignment. A typical project was a 9.32-mile section in Del Norte County which was realigned at

A great portion of the section between Arcata and Crescent City had had no work done on it at all by the mid-1920's. In 1924 a survey was made of highway bridges needed in the

Below: Power shovel working at Alder Bluff in Del Norte County, not far from the Humboldt County line, about 1925. Cut must be made 32 feet deep here to get bench wide enough for narrow two-lane road.





Orick, northern Humboldt County, about 1925. Vehicle stopped at post office is "stage" running between Crescent City and Eureka at that time. Note big wheels and high clearance. Gasoline in more primitive areas at that time was hauled in steel drums seen at extreme left, and attached, a drum at a time, to pump at service station. Signs say "Orick Post Office," "Notary Public," and "Orick Cash Store."

a cost of a little more than \$700,000, eliminating 205 curves.

There were a number of similar projects indicating that the days of contracts for a few thousand dollars were past. Million-dollar jobs were by no means uncommon and with the tremendous increase in automobile traffic the constant pressure for expenditures all over the State prevented improvement of any large sections of Redwood Highway mileage. Even today there are many miles of this original alignment, built for 20-mile-an-hour traffic, still in operation.

Nearly all of the bridges constructed on the first alignment were of timber and had to be replaced in the 30's not only because they were beginning to be structurally unsound but also because they were of inade-

quate design for later traffic needs. In 1917, when many of these bridges were built, the problem of getting steel to the site was almost insurmountable. It was customary to buy timber near the site, and bring in a portable sawmill with which to cut the necessary bridge members.

Perhaps the biggest single change in the Redwood Highway was construction of the Golden Gate Bridge. It was dedicated in May 1937 and opened during 11 days of "revels, pageantry, parades, and civic demonstrations—thrilling shows on land, water and in the air."

Actually the bridge itself is not a part of the State Highway System. It was built and is operated by the Golden Gate Bridge and Highway District, which represents a group of

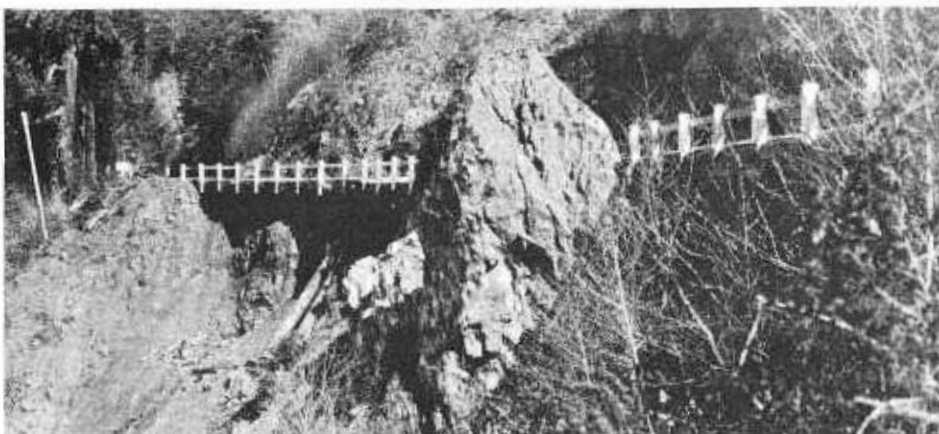
counties. Cost of the bridge was about \$35,000,000. Today this amount would hardly build the abutments.

The Division of Highways designed approaches on both sides and did the engineering work for the tunnels at the top of the Waldo Grade. The approaches were elaborate, particularly on the San Francisco side, but almost immediately the Marin County side was found to be inadequate because the traffic increase was much greater than anticipated.

This was by now true along the entire length of the route. Traffic loads were building up. Money which should have gone for realignment and modernization too often had to be used for stop-gap jobs. Still, many three- and four-lane sections were built, particularly on the southern end of the route, where there was already a hint of the rapid urban growth of post-World War II years.

Also, during the 30's the State took over Highway 1, now called "The Shoreline Highway". The necessity for construction of dozens of bridges on this route diverted sizable amounts of north coastal funds from the Redwood Highway.

During World War II, recreational highways and many secondary routes were ignored in favor of improvements on routes which were considered defense highways. To some extent the Redwood Highway was a defense route for protection of the



Section of Redwood Highway in Del Norte County, in March, 1931. To widen this section it was extended out on viaduct using 30-inch timbers 60 feet long.

coast but this was not given great weight in allocation of funds. Except for sections near defense facilities, very little improvement work was done during World War II.

By the end of World War II the Redwood Highway was farther behind the rest of the state system than before. Conversely, after the war there was a greater interest in recreation and driving. As soon as the factories retooled for peace-time production, automobiles crowded onto the highways in greater numbers than had been dreamed of in prewar years.

Because of expanding urbanization, interest in the outdoors increased in a sort of cultural claustrophobia. People wanted to travel, camp, hike, or just drive for pleasure. The redwoods had been publicized so widely and so often that they were internationally known and one of California's great attractions, so a great deal of this traffic found its way to the Redwood Highway.

All the State could offer this traffic was the tortuous and winding route which, although realigned and improved to 1930 standards in some places, was still dangerous and difficult to drive over much of its length. The tourist from the east was frightened by the tortuous curves along cliffs high above the river. He was exasperated by the twisting, winding route among the great trees which cut down



Klamath River Ferry at Requa, February, 1925.



Above: Damage was great when the Smith River rose to unprecedented heights in 1920's just after the Crescent City-State Line section was taken into the state system.

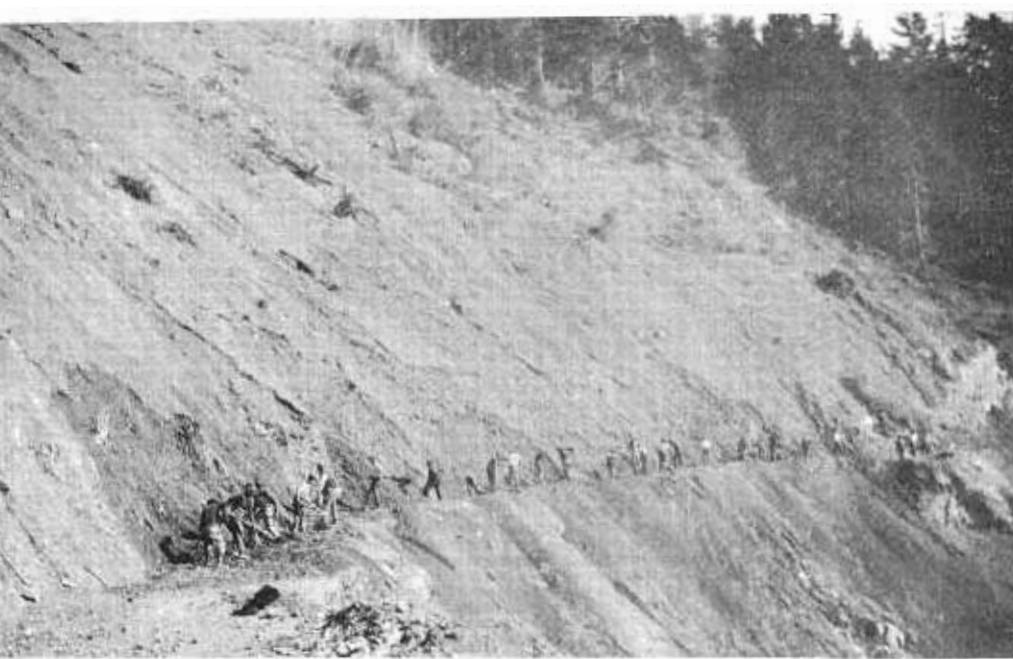


Measuring distance between trees on Redwood Highway in Richardson Grove vicinity, during checks for safe passing distances in 1930.

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Below: Flooded section of Redwood Highway near Humboldt-Del Norte County line, November, 1928.



Digging out road after cliff slid into ocean, Del Norte County, 1925.

on speed and caused long queues to build up behind truck traffic.

The trucks were another element in the problem. Until World War II the logging railroad was still carrying logs in many parts of Mendocino, Humboldt and Del Norte Counties. By the time the war was over, logging had moved into the interior, away from the railroads, and the modern logging truck with its greatly increased power and size was evolved.

It could carry heavier and bigger loads, and was more mobile.

In addition, people were settling in the northern counties in greater numbers. They increased local traffic, and local truck traffic also increased to serve them. Just as the small railroads had disappeared from the scene, so had the small coastal schooner. Why handle cargo several times when the truck could deliver direct to the buyer?



Reconstruction over slide in Mendocino County in the Rattlesnake Summit area in late 1920's.



Even when powered equipment such as this Liberty dump truck could get to site, it could carry little more load than mules and wagon, and repairs after slides were slow and laborious.

As a final coup de grace to the old road came the modern motor car with its low center of gravity, low driver's seat, and high speed. From a practical viewpoint the driver's visibility was cut, while his speed was increased. All over the country, this required more carefully engineered highways. The Redwood Highway was no exception. Its accident rate was building up every year.

In a very real sense a road today in our fast moving technology is much like the cars that use it. To the people who live near the new road and those who drive on it, it is a broad, shining symbol of modern science. But, in the design of the cars which use the road, new ideas and new techniques are developed. So are better ways found to build roads. Traffic loads increase. The motorists themselves demand higher standards. A generation passes and the road is obsolete once more.

In those sections where roads were reasonably well-developed before the advent of the motor car which so dramatically accelerated the pace of road building, the road builders have been able to stay more or less even with the demand. In those places which were undeveloped prior to the advent of the motor car the problem has been acute. This has been true of US 101 in California north of San Francisco.

(The third and concluding article in this series will cover the post-World War II development of the Redwood Highway to date.)



This view of the old Ridgewood Summit road south of Willits in 1938 is typical of old "reversing curve" type of construction used in those days. Earthmoving was slow and costly, and road had to follow the contours. This road has been realigned and widened to four lanes, but many miles of the Redwood Highway still follow contours.



Above: Loss of considerable section of road due to slipout north of Cloverdale, Sonoma County. Stream is upper portion of Russian River.



Results of reversing curves were often the same in the 1930's as today.



Below: Rock slide in road, Redwood Highway north of Leggett, April 7, 1948.

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Banks of the San Gabriel

*Interstate 605 Will Serve Historic, Fast-Developing Area
As Easterly Leg of Los Angeles Metropolitan Freeway Loop*

By BARRY COHON, Assistant Information Officer



A few blocks north of the present intersection of Whittier and Norwalk Boulevards in the City of Whittier, lies the spot where the creation of the world began. So goes a recorded Indian legend.

Within sight of that venerable location, history is in the making again, with the completion of the first link of Interstate Route 605, a freeway paralleling the east bank of the San Gabriel River. Eight contracts, now in various stages of work, will provide an unbroken 23.4 mile artery by mid-

1966, running from the San Diego Freeway (Interstate 405) in Orange County to the San Bernardino Freeway (Interstate 10) in Baldwin Park. Future noninterstate extensions northward and southward will add approximately another eight miles to a route known unofficially as the San Gabriel River Freeway.

This 30-mile freeway, costing over \$60,000,000 to construct, will serve territories as varied and fascinating as any in the State. Beach playground, poultry and dairy farm, oil field, bedroom suburb, college campus, country club, and historical landmark—all line the route which will form the eastern portion of a huge loop around the Los Angeles metropolitan area.

First Completed Section

On June 10, Mayor Monte Wicker of Whittier prepared to cut the ribbon on the first completed stretch of this new route. Recalling his childhood days in the area, he said: "I used to watch them shooting Tarzan pictures down in the gully where this new freeway crosses Whittier Boulevard. Those were the days of silent pictures. They would water their elephants in the river right alongside here, and I used to ride on the elephants." He was standing on the northbound lanes of Interstate 605, a few hundred yards north of Whittier Boulevard, with the San Gabriel River channel on his right. A few minutes later, he got into a new black sedan and led a motorcade



Looking south along Interstate 605 Freeway near Rose Hills Road.

over the spot where he had once hitched a ride on an elephant.

Typical of the enthusiasm with which San Gabriel River Valley residents welcomed this new stretch of freeway, Assemblyman Joe Gonsalves of the 66th District addressed the dedication luncheon on his work with the Assembly transportation committee and the progress of the Freeway-Expressway system. Gonsalves, former mayor of Dairy Valley, has more than a passing interest in the value of the system, being the scion of a pioneer family in the entire dairy farming industry of Southern California.

Discussing various aspects of the highway program, T. Fred Bagshaw, Assistant Director of Public Works, represented Governor Edmund G. Brown. He highlighted the importance of public acceptance and understanding of the freeway system on the statewide level, while Edward T. Telford, District Engineer, explained the function of Interstate 605 in the scheme of things for Southern California.

Picturesque Freeway

First link to be opened on Interstate 605 is a section between Whittier Boulevard and Peck Road extending for 3.3 miles in a cut-fill section overlooking the valley and the river. Resident Engineer, R. C. "Dick" Bek, who took over the job a year ago and saw it to completion, calls this section one of our more picturesque freeways. A smooth project in more ways than one, this job has a profilograph index of 1.6—better than average—and Bek reports a good working relationship with the public, county officials and the Griffith Company, prime contractor on the construction of this \$5.5 million project.

Featured on this section is more extensive use of aluminum glare shield than heretofore, both on curves and on straightaways.

Symbolizing the historical background of the Whittier-to-Peck section of the San Gabriel River Valley, the "mansion" of Pio Pico, last Mexican governor of California, stands as a state historical monument facing



**INTERSTATE
ROUTE 605
FREEWAY**

what will be the Whittier Boulevard southbound onramp. The old adobe boasts a brick well in the courtyard, and a wine cellar stacked with ancient barrels (presumably empty). It attracts the student with its authentically restored interior rooms and its display of relics and documents from the Mexican period. It also attracts art

classes from nearby Whittier adult high school to sketch its humble sprawling exterior.

Restoration Project

That exterior may change its appearance soon in a new restoration project based on research by Martin Cole, curator of the monument. Historical accounts of the origins of the "Casa del Gobernador" differed widely and Cole has been able to track down some of the authentic facts concerning this early California landmark and the man whose name it bears. Pio Pico built the adobe dwelling sometime after his wedding in 1834—exactly how long after remains in doubt. Old residents remember him in his eighties, still the dignified Don receiving visitors on the porch of his home.

What happened to the area around Pio Pico's mansion after he lost it to creditors in 1891? The County Road of those days became Whittier Boulevard, and the adobe saloon where one of Pico's sons was killed expanded to become Jimtown, a patch of substandard housing which has been all but wiped out by the new freeway.

Whittier Area

To the east lies Whittier, a clean and busy city of some 70,000 with a Quaker heritage. Gerald Hathaway, Manager of the Whittier Area Chamber of Commerce, calls Interstate 605 "something we have needed for a long time, namely a north-south highway facility that will eventually tie in with the San Bernardino and Santa Ana Freeways and relieve pressure on Highway 35. Of all the freeways constructed in this area, this is probably the most beneficial to citizens of Whittier, Pico Rivera and the surrounding communities."

By fall of 1964, Interstate 605 is scheduled to be open from Whittier Boulevard to the San Bernardino Freeway, affording sorely needed traffic relief to highway travelers in the eastern section of Los Angeles County and western Orange County. During 1965, the average traffic volume on this new seven-plus miles of Interstate Highway facility is expected to reach 45,000 vehicles per day.



Between rows of tract houses in Norwalk, the cleared land of the Interstate 605 Freeway right-of-way extends northward paralleling the San Gabriel River. Bridges cross the river at Rosacrans Avenue and Imperial Highway.

Along the way, it will serve some interesting areas.

Radius of Service Extended

Flanking the freeway on the east is the Rose Hills Memorial Park. Averaging 15 funerals a day on its 2,750 acres of lawns, gardens and chapels, Rose Hills serves an area from Pasadena and Pomona on the north to Long Beach on the south. Joseph L. Seppi, one of the founders, estimates that the new freeway will extend the park's radius of service from 20 miles to 30 miles.

North of Whittier the California Country Club occupies 138 acres purchased by owner-operator Bill Bryant before Route 605 was adopted. After the freeway route was put through his land Bryant proceeded with his plans anyway and the club prospers today. An underpass connects the 16 holes of the golf course's main section with the two holes which lie west of the freeway. So, in effect, the golf course provides park-like surroundings for the freeway.

As it passes Rose Hills, the freeway skirts a large Victorian frame house

where Mr. and Mrs. Joe Moynier have been living for 30 years. Energetic rancher Moynier came to Southern California in 1925 from his native France. He arrived in Los Angeles with \$7 and an address—that of a countryman named Pellissier. The Pellissier dairy farm was one of the oldest and biggest in the Southland. After 10 years with Pellissier, Moynier bought the ranch he still occupies, with its 12-room house. He describes the changes in the valley since 1940 as "pretty near unbelievable." In the old days, the San Gabriel River was a torrent which all

the ranchers joined forces to dam with logs and brush for irrigation. Moynier was president of the Rincon Ditch Irrigation Company at that time. But year by year, the damming job became easier, until they ran out of water. Tracts of homes began to replace walnut trees after World War II, and the "big push" came in the fifties. Moynier sold the first section of his ranch in 1955 for \$5,000 an acre. At that price, he says, "I left \$3,000,000 on the table." From 1957 to 1961, the State bought other parts of his land for the freeway.

Land Sold for Campus

His old bosses, the Pellissiers, sold some of their land for the campus of the new Rio Hondo Junior College. In 1963 Rio Hondo J. C. separated from the high school district and brought in Dr. Phil H. Putnam as its superintendent and president. Today, with a staff of 100 part-time teachers holding night classes in local high schools for 1,800 students, Dr. Putnam plans for a 1964-65 academic year serving 400 full-time students at an abandoned grade school building, in addition to 2,000 night students at various other locations. This "holding



The adobe residence of Pio Pico once echoed to the music of guitars and a \$12,000 piano—and at fiesta-time, to the laughter of señoritas like Connie Kopenc. Now it faces the Whittier Boulevard off ramp of the new Interstate 605 Freeway.

operation" will continue until September, 1966, when the new campus is scheduled to be completed. Since the Interstate 605 freeway is also sched-

uled for opening at that time, the two facilities are closely associated in the minds of the voters, and of Dr. Putnam. "When I got here," he recalls, "I found that three bond issues for the campus had been defeated. One reason for it was that the only available site for the campus is located at the north end of the junior college district. I campaigned for the bond issue, using the freeway as a selling point, and on the fourth try it won." Bounded on the south and west by Cerritos Junior College District, the Rio Hondo district includes Whittier, South Whittier, Santa Fe Springs, Pico Rivera, and parts of Norwalk and La Puente—all served directly by the new freeway, which will bring the otherwise secluded campus within easy commuting distance for faculty and students in even wider-spread areas.

Shipping Center for Valley

In 1940, Bassett was described as "a Puente Valley shipping point for oranges, lemons, walnuts, and vegetables." It had a population of 216. Today, busy Valley Boulevard and



The California Country Club straddles the freeway north of Whittier.



Aerial view shows future Interstate 605 Freeway course northward through a corner of Downey. Southern California Edison Company installation is at lower left. The three bridges across the San Gabriel River show the locations of Florence Avenue, the Santa Ana Freeway, and Telegraph Road. Beyond Telegraph Road, the river divides Pico Rivera on the west from Santa Fe Springs on the east.

the San Bernardino Freeway form a triangle with the new 605 freeway to serve the rapidly growing industrial and residential traffic. Just to the west of Bassett between the freeway and the river, lies one of the world's biggest duck farms—the only one in Southern California. Here Mr. and Mrs. E. B. Bahnsen raise some 80,000 ducks to ship to local tables and also for export as far away as Hong Kong.

North of Bassett, in the 8-year-old city of Baldwin Park, some 41,000 people are making a residential and

industrial city—the City Council calls it “Hub of the San Gabriel Valley”—out of a community with a rural and frontier heritage. On land once owned by the San Gabriel Mission, small farms, vineyards, chicken and cattle ranches flourished in the days of the town's flamboyant godfather, Lucky Baldwin. In 1878 there was a village here named Pleasant View, later renamed Vineland. Baldwin allegedly planned to eliminate this village by establishing a town of Baldwinville nearby. But while visiting Vineland,

we are told, Baldwin slipped on the steps of a store and fell backwards into the arms of the proprietor's wife. Grateful to her for cushioning his fall he agreed to drop his plans for a rival settlement and told her “My name is yours to do with what you will.”

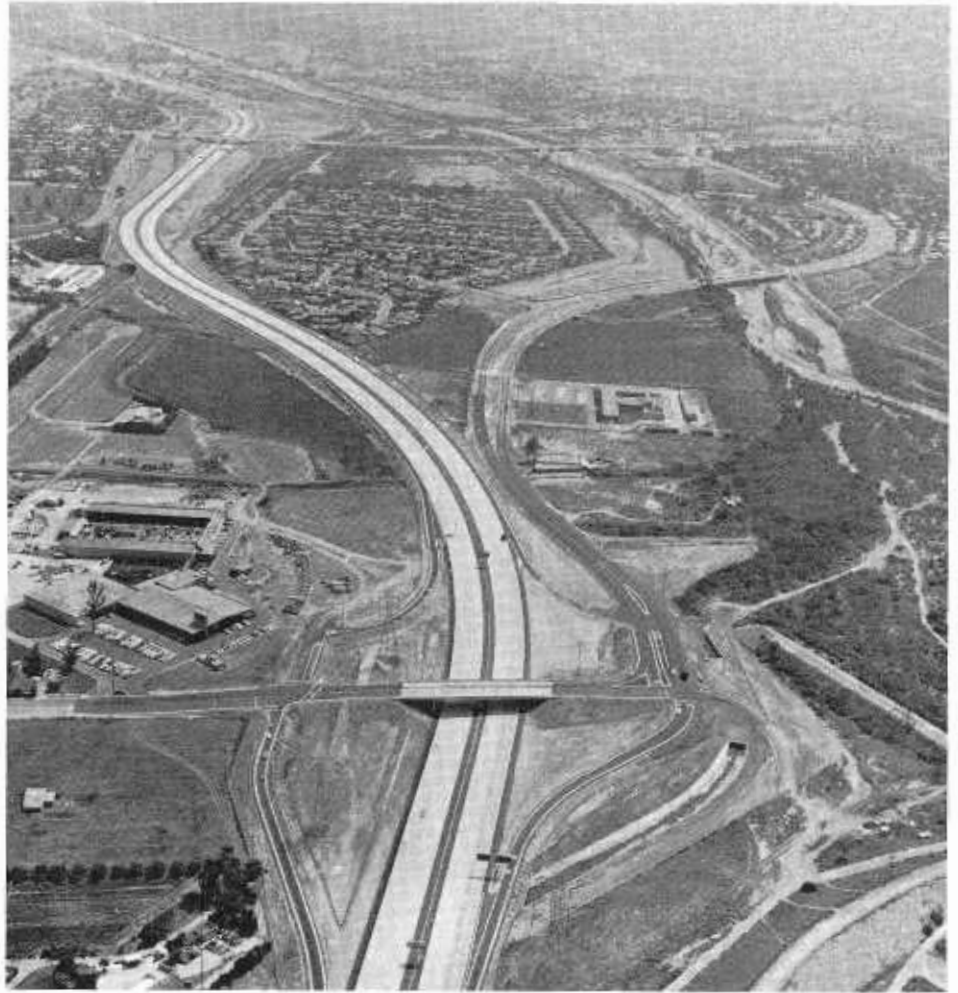
Serves Heavily Settled Area

Southward into the communities of Pico Rivera, Los Nietos, Santa Fe Springs, and Norwalk, the new freeway will be serving heavily settled subdivision areas—7½ miles of backyards, bordering the freeway right-of-

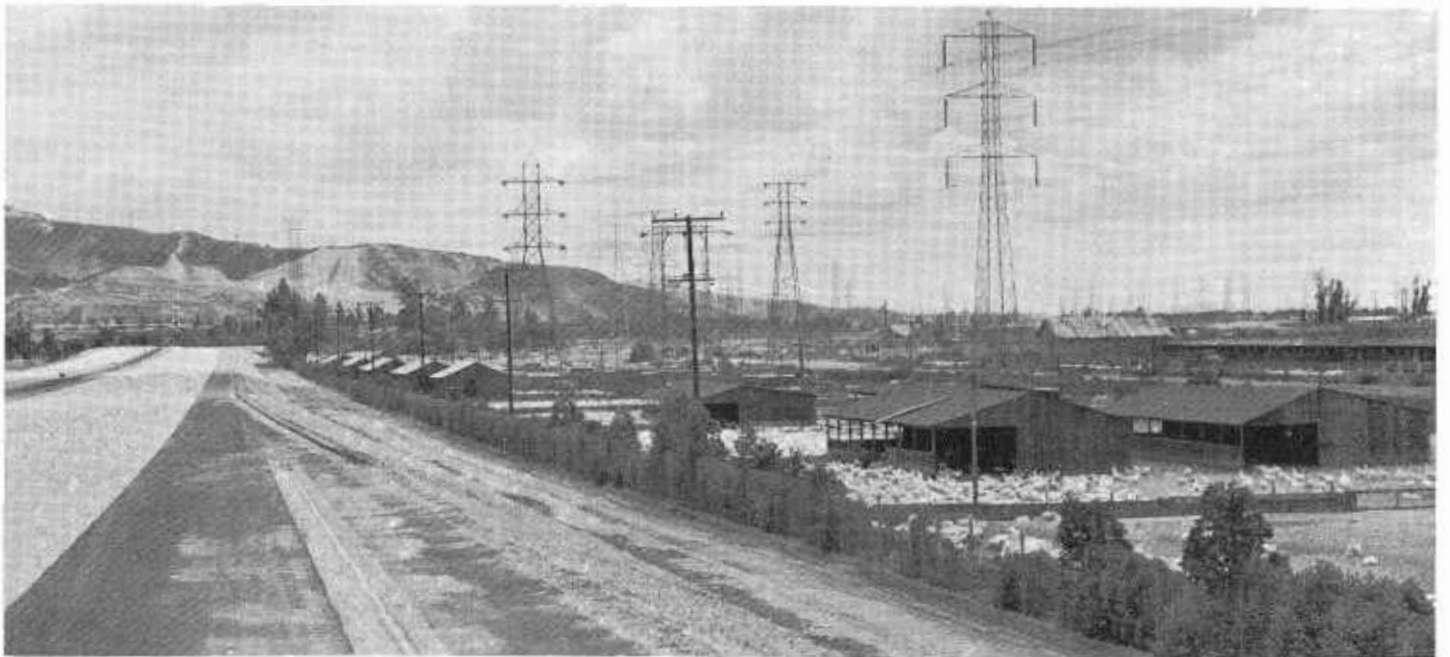
way and the Edison Company's power lines.

Los Nietos, an unincorporated farming and residential community, is named for the Rancho Los Nietos. Granted in 1784 by Governor Fages to Jose Manuel Nieto, the rancho embraced all the land between the Santa Ana and San Gabriel Rivers, from the mountains to the sea—some 300,000 acres.

After Nieto's death in 1804, the grant became three ranchos owned by his heirs. In one of these, Rancho Santa Gertrudes, the villages of Pico and Rivera sprouted. The two towns filled up rapidly, and so did the vacant land between them. In January 1958, majorities of the two town's voters decided to join, and the unhyphenated city of Pico Rivera was born. Back in the 1880's a flood diverted the San Gabriel River to its present channel, leaving the old channel to be renamed the Rio Hondo; Pico Rivera lies between them. In much the same way, but in a reverse pattern, some of the traffic now passing the town on the Santa Ana Freeway will be diverted sometime around the fall of 1965 to the new Route 605 Freeway, thus making Pico Rivera even more acces-



The San Gabriel River Freeway looking south from Rose Hills Road interchange with the Caterpillar Equipment Plant in left foreground.



80,000 ducks live by the freeway.

sible to industries like the Ford plant at Rosemead and Washington Boulevards, one of the town's principal employers . . . and to Pico Rivera's population of over 50,000.

Santa Fe Springs Origin

Moving from the Rancho Los Nietos south and slightly east, we find ourselves back on Pio Pico's former spread. Here in 1880, a certain Dr. Rogers dispensed mineral baths at his "Hydropathic Sanitarium and Congenial Home." In succeeding years, the Congenial Home and its permanent residents changed the community's name to Iron Sulfur Springs, then to Fulton Wells, then to Santa Fe Warm Mineral Springs. Finally the "warm mineral" was dropped, the town which was incorporated on May 15, 1957 as Santa Fe Springs, was honored in 1959 as an All-American City. Today it is primarily an industrial city of less than 16,000 population, roughly three-quarters of its land being zoned M-2. Hard-working orderly Santa Fe Springs has come a long way from the oil-boom days of the 1920's. In 1923, the petroleum pool yielded 79,000,000

barrels. In succeeding years, companies found it cheaper to import Arabian oil than to extract large quantities from the deep wells here. By 1962, quota-controlled productions from 478 active wells in Santa Fe Springs totalled 2,445,234 barrels. Other industries have been brought in to fill the gap, particularly during the last 10 years. Today's operators include Pacific Clay Products—largest plant of its type in the world—as well as food-market warehouses and meat processing plants, a trailer factory, and new plants under construction for the Illinois Tool Company and the Xerox Company.

Reg J. Reardon of the Santa Fe Springs Chamber of Commerce spends most of his time showing new industrial prospects the more than 4,000 acres of industrial land still available, and he looks to the freeways to enhance the value of this land to industrial users.

Norwalk Area Develops

Bedroom for the Santa Fe Springs oil workers of a generation ago was a cow-town called Norwalk, dusty in

the summer and muddy in the winter, and otherwise noted as a truck-garden region and site of a state hospital. The postwar wave of immigration that hit Southern California multiplied Norwalk's population 10 times and more by the mid-50's, and the cow-town was gone for good. Incorporated in 1957, Norwalk today boasts a population of over 90,000, goes in heavily for civic planning, and prides itself on the nickname "Keystone City."

Foreseeing future concentration of multiunit and even high-rise apartment buildings in this area, builders and developers count on the freeway network to bring people and wealth into Norwalk. The Santa Ana Freeway (Interstate 5), and future Route 91 Freeways all serve Norwalk, as well as Downey just to the west. Downey, named for the Civil War governor of California, John G. Downey, is one of the older settled communities of the area, both residentially and industrially.

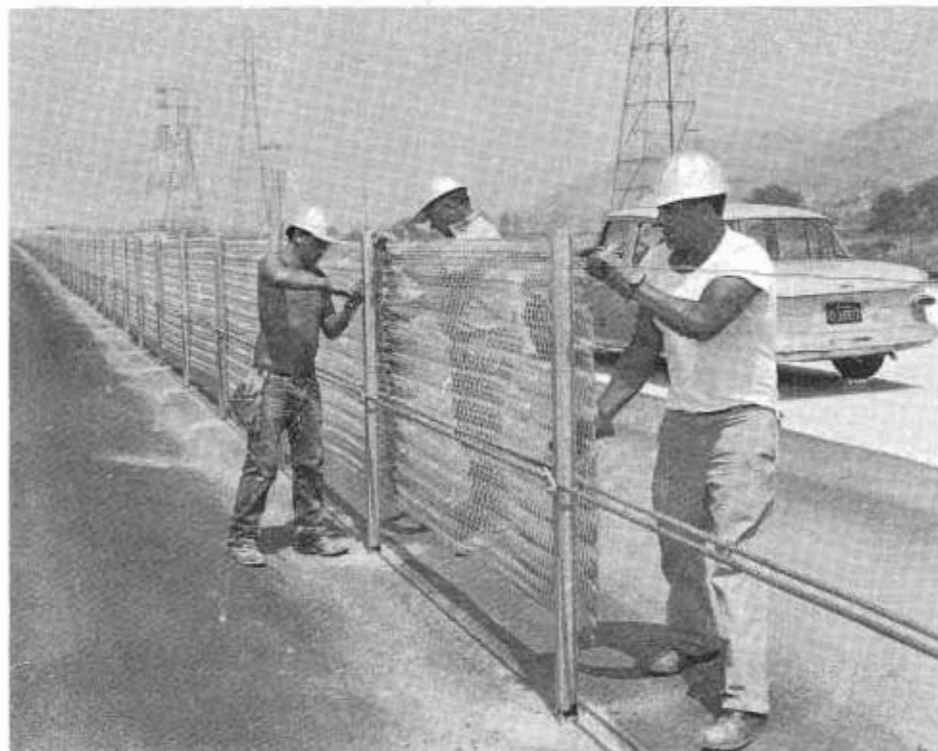
Threading its way between the river channel and Studebaker Road, the new freeway will serve drilling equipment firms in the Santa Fe Springs and Norwalk areas. Farther south, milk and education replace oil as staple industries.

A cow in Dairy Valley gives four gallons of milk per day, and may make her owner \$1,000 a year. Incorporated in 1956, this city of less than 3,600 people has 100,000 cows, mainly black and white Holsteins. Its per capita wealth is the highest in Southern California. In effect Dairy Valley became a city in order to avoid becoming a "city." By incorporating, it can retain its agricultural character, limiting its residences to one every five acres, and thus protecting its rich dairy industry from the subdivisions which have engulfed areas all around it that once were devoted to farming.

Freeways' effects on Dairy Valley merited special mention in a recent report by Los Angeles *Herald-Examiner* writer Frank Lee Donoghue:

San Gabriel Freeway

"Bulldozers and giant earthmovers today are growling out their own song of Dairy Valley's future as the



Installing aluminum glare shield on Interstate Route 605. Shielding is designed so that motorists cannot see through it at the forward angle. Thus opposing traffic and its headlights cannot distract the driver.

north-south San Gabriel River Freeway is being pushed through the no-longer-sleepy cowtown. Completion is anticipated in another two years, when work on the east-west Artesia Freeway is expected to start.

"Dairy Valley, situated as it is on the Santa Ana Freeway, will become a hub city when the two new freeways become operative," said City Manager Bill Stark. "Most of the right-of-way for the Artesia Freeway has been acquired and clearing work is now going on. Our chamber of commerce is calling Dairy Valley a 'sleeping giant.' That's a little overdramatic, but I must agree."

Looking out at a landscape of cattle and cars is the ultra-modern campus of Cerritos College, facing the future freeway from the corner of Studebaker Road and Alondra Boulevard. Picking up where its northern neighbor, Rio Hondo J. C., leaves off, Cerritos' parking lots seem to require more land than its classrooms, underscoring the car-borne character of today's students. Like Rio Hondo, Cerritos lies just east of the Interstate 605 Freeway and will benefit directly from its service as soon as it is completed.

First 'Contract City'

Spreading westward from the west bank of the San Gabriel River, and northward from the San Diego Freeway and the Long Beach line, is the first of California's "contract cities"—Lakewood. Incorporated in 1954 as Los Angeles County's 46th city, Lakewood originated the plan of contracting municipal services to the County. At the time this was an experiment and became known as the "Lakewood plan" which has since found acceptance in many other smaller cities of the state's most populous county, making Lakewood somewhat of a model for students of city planning. Largest employer of Lakewood's citizens is the Douglas Aircraft plant. But the commuting area is expected to spread much wider with the opening of the San Diego Freeway to the Orange County line in mid-September of this year, the completion of the Interstate 605 Freeway to connect with the San Diego Freeway in 1966,



Aerial view shows California Country Club and Ward Duck ranch in relationship to new freeway.

and the subsequent construction of the Route 91 (Artesia) Freeway.

At the south end of Interstate 605 in Orange County at Los Alamitos Boulevard, a twin interchange will connect it with the San Diego and Garden Grove Freeways. Bordering the stretched-out interchange, extensive new housing tracts spread all the way to the county line and across it.

Freeway Loop by Mid-1966

Completion of the freeway in this fast-growing area will open the 23.4 mile loop in mid-1966, enabling traffic of all types to circulate freely to, through, and around Los Angeles by connecting with all its other important freeways—directly with the operating San Diego, Santa Ana, and San Bernardino, and via them with the Long Beach, Harbor, Hollywood, and Golden State. Providing even broader traffic service in the future, Interstate 605 will connect directly with the already adopted Route 91 (Artesia) Freeway, which crosses the San Gabriel River just north of Ar-

tesia Boulevard in the Bellflower area, the Route 42 (Century) Freeway, which will feed into Interstate 605 near the Santa Ana Freeway Interchange, and the Pomona Freeway (Route 60, at South El Monte). Estimated daily volumes of traffic on the completed Interstate 605 Freeway in 1985 should have a magnitude of 125,000 vehicles per day.

Non-Interstate extensions of the San Gabriel River Freeway are planned for the future, both north and south of the termini of Interstate 605: Projected for construction in the next several years, is Route 243, adopted from the San Bernardino Freeway northward to connect with the Interstate 210 (Foothill) Freeway north of Irwindale. Route studies are now in progress on a southerly extension (Route 240) between the San Diego Freeway and Pacific Coast Highway, which would carry the San Gabriel River Freeway to the beach, making it the first direct mountain-to-ocean freeway in the Los Angeles area.

Correspondence

Committee Produces, Revises
Stenos and Typists Handbook

"This manual has been developed in response to the need for uniformity in correspondence practices and other pertinent office procedures in the Division of Highways . . . to be followed in the Headquarters Offices."

Thus begins the new Foreword of the Stenographers and Typists Manual, as drawn up by the Headquarters Correspondence Practices Committee. This group came into being late in 1960, when the need for an authoritative office manual became apparent, and a group of selected secretaries and typing pool supervisors met to start the wheels in motion.

Section Representatives

The various headquarters sections represented—and their *present* representatives—were: Executive Office, Margaret Mullenney, Margaret Long and Evelyn Zell; Personnel, Evelyn Zazzi; Office Engineers, Marian Knoth; Right-of-way, Eileen Lapham; Administration, Louise Hess; Planning, Vivian Brady and Hilda Lima; Bridge, Agnes Brownell; Materials and Research, Agnes Lyon; Operations, Dorothy Gullman; Equipment, Winifred Higgins; Accounting, Ava Kirk; and Management Analysis, Marge Coy. (Recently Service and Supply has also been represented by Tom Biagioni.)

Their meeting resulted in a listing of specific areas not covered by existing instructions, such as circular letters and headquarters office instructions, and discussing the best method of handling these situations. The extent to which correspondence practices should be uniform among offices was also discussed, and a draft of instructions was developed.

Manual Is Issued

In January 1963 the Division's "Stenographers and Typists Manual", incorporating office procedures, was issued. Four main sections covering guides for communications, types of



Discussing the agenda for a future meeting of the Headquarters Correspondence Practices Committee are Chairman Evelyn Zazzi of Personnel (second from left); Co-chairman Hilda Lima of Planning (second from right); and task force members Louise Hess, Administration (left); Marge Coy, Management Analysis (standing); and Winifred Higgins, Equipment (right).

communications, mailing instructions and messenger service are supplemented by special instructions for individual units and three appendices. Each main section in turn is broken down and indexed. In clear, step-by-step instruction, augmented by examples, correspondence practice and office procedure are thoroughly spelled out.

This project completed, the committee realized it could function responsibly on a continuing basis, and a set of guidelines was drawn up. In addition to maintaining the manual's efficiency through up-to-date revision, the group could profitably serve in reviewing additions and changes with division management, and also in cooperating with the training section to determine clerical development and training needs. The training section likewise provides source material and assists in manual evaluation.

Task Force Appointed

In order to function as an organized group, a chairman and cochairman were provided for (six-months terms); and a three-member task force assumes other duties and special assignments. The Management Analysis section affords advice and consultation to the committee on proposed manual changes involving policy, procedure and similar matters, and serves as a clearinghouse for changes.

As an example of current concerns of the Headquarters Correspondence Practices Committee, they have assisted Management Analysis in devising the proposed new district route tags, and in revision of the headquarters office route tag. As practices or procedures warrant attention, the committee schedules them for a future meeting and invites a representative from the department most directly concerned.

Merced Freeway

New Nine-Mile Section
On Route 99 Completed

By DONALD D. HARNEY, Resident Engineer



In June 1964, the last of two contracts was completed and Sign Route 99 was converted to a full freeway from Gerard Avenue south of the City of Merced to Buhach

Road north of the City of Merced. This nine-mile section of new freeway connects with the three-mile Atwater Bypass which was completed in 1957, thus providing the motorists with a total of 12 miles of freeway in Merced County. The completion of this second contract climaxed a construction period spanning nearly four years and costing \$8,000,000.

In July 1960, work began on the first contract to provide for grading an elevated roadbed through the City of Merced on new alignment between 13th and 14th Streets. Drainage facilities and the construction of 15 bridges were also part of this contract.

Three million tons of material was required to construct the embankment for this four-lane roadbed. The material was trucked to the job site in bottom-dump trucks and trailers over state highways and city streets. Although temporary inconveniences were experienced by the local motorists and places of business, these were endured with a fine spirit of cooperation.

Full Interchanges

The first phase of this project also included the construction of two overcrossings above the Southern Pacific Railroad Company tracks, one at the south and one at the north end of the city. Full interchanges were constructed at the junctions of Sign Routes 140 and 59, and also "R" and "V" Streets in the City of Merced.

Undercrossings to accommodate the city traffic were built at 15th, "G", "L", "M" and "O" Streets. Eighteen thousand cubic yards of structure concrete was required for the bridge

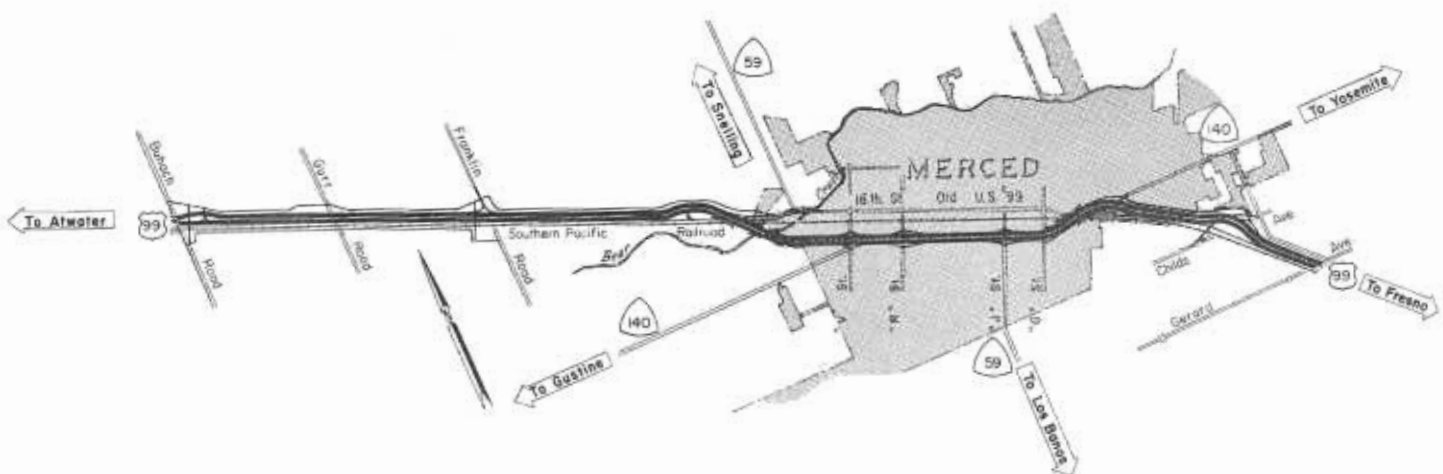
work on this phase, which was completed during April of 1962.

In October 1962, work began on the second contract which consisted of placing the base and paving on the previously completed embankment, construction of seven more bridges, and approximately seven miles of frontage roads.

System of Detours

In order to handle traffic during construction, an intricate system of detours involving four stages had been worked out by the design engineers. As a result, the through traffic was carried around the work with a minimum of inconvenience.

In placing 35,000 cubic yards of portland cement concrete pavement for this project, the contractor used the central mix method and hauled mixed concrete in dump trucks. Although this method had previously been used in other parts of the State, this was the first time that it had been used in this area and it generated considerable local interest.



A map of the Merced area showing the location of the new nine-mile freeway section on Highway 99.



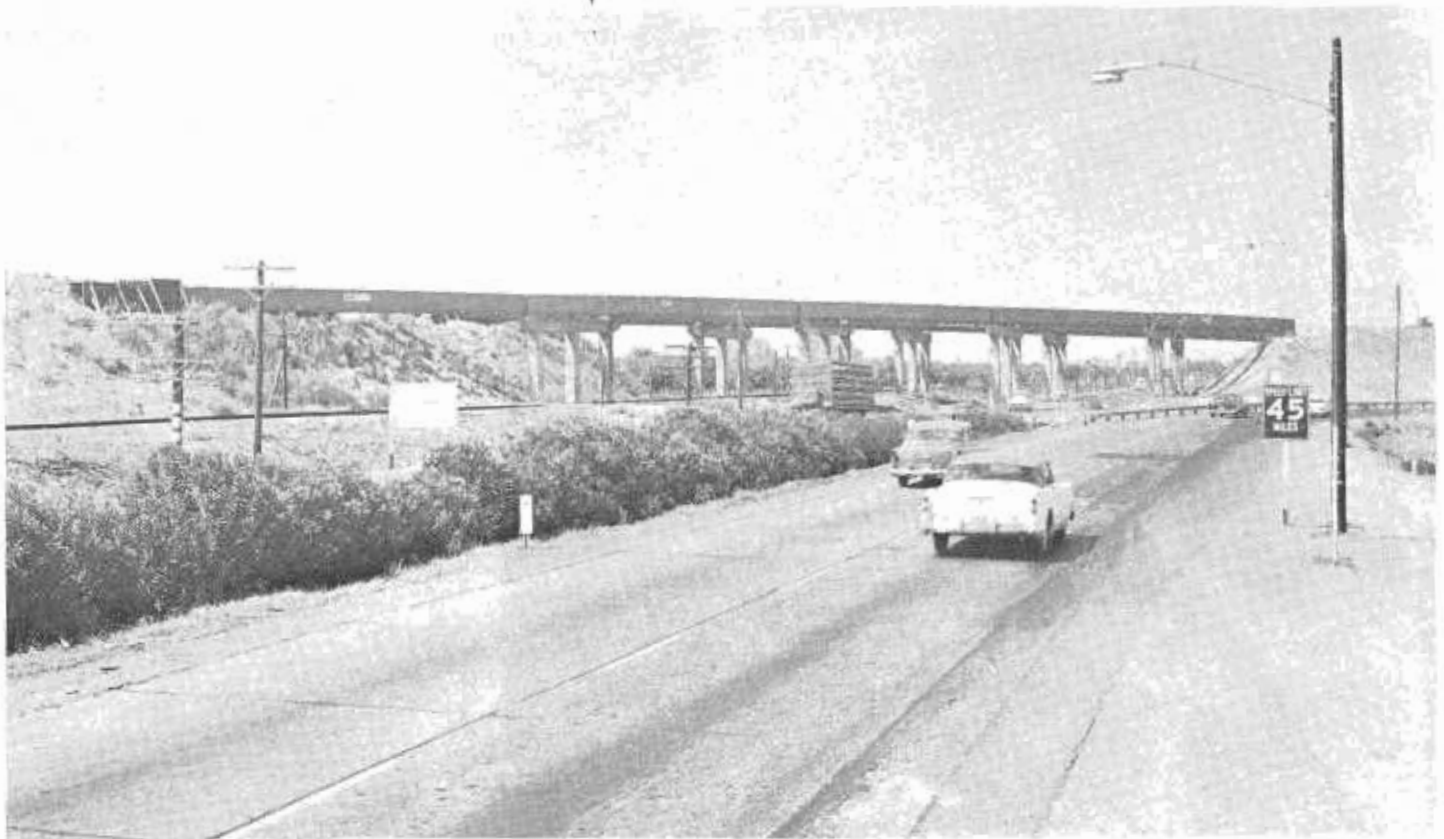
A view of the freeway at the Sign Route 140 ("V" Street) interchange.



The new freeway in the vicinity of the Sign Route 140 interchange showing the Merced off-ramp at upper right.



The new Highway 99-Sign Route 59 ("J" Street) separation in Merced.



The West Merced overcrossing under construction. Highway 99 northbound traffic was detoured around the construction on the recently completed frontage road.



BEFORE. A view of the freeway through Merced when still under construction.



AFTER. The same view as above after the freeway through Merced was completed.

By October 1963, the main segment of the project through the city was ready for traffic. Through the efforts of Merced city officials, the Merced Chamber of Commerce and the contractor, a ribbon-cutting ceremony was held. Mr. Russell J. Cooney, Deputy Director of Public Works and former City Manager of Merced, was the principal speaker. Traffic was then diverted from 16th Street (old US 99) to the new freeway. The opening of this section relieved a highly-congested traffic situation and eliminated several traffic signals along the important north-south artery.

Highway Connections

Between October, 1963, and the completion of the project in June, 1964, the connections to the old US 99 highway were completed at the north and south ends of the freeway; a new bridge was constructed over Black Rascal Creek to handle the southbound traffic; and the interchange at Childs Avenue was completed.

During the period of construction of this project, the contractors and state forces received the finest cooperation from city and county officials and the residents of Merced. The Merced *Sun-Star* periodically printed articles dealing with the progress of the project and was most cooperative about giving publicity to changes in traffic patterns and detours.

Personnel

Key personnel included G. A. Brown, Superintendent for Fredrickson and Watson Construction Co., Lew Jones Construction Co. and Sierra Construction Co. who were awarded the first contract of \$5 million as a joint venture. R. E. Wright and George Thompson were Bridge Department representatives for the State on the first phase. James Kovack was Superintendent for Peter Kiewit Company, the contractor for the second contract of \$3 million. Ken Hironaka was Bridge Department representative and the author was the Resident Engineer for the entire construction project.

Living and Travel Patterns In Auto-Oriented Cities

By KARL MOSKOWITZ, Assistant Traffic Engineer

Editor's Note: This paper was originally presented in Detroit in October, 1962, at a national symposium on "The Dynamics of Urban Transportation" sponsored by the Automobile Manufacturers Association. It has since received increasing national attention.

I.

I do not know when or where the expression "auto-oriented" originated; I first became aware of it when the City Council officially declared Sacramento to be "auto-oriented."

Sacramento is the central city of a U.S. census urbanized area which had a population of 451,920, in 1960—192,000 in the city and 260,000 outside. I live outside, about seven airline miles from downtown.

I am a resident of this auto-oriented community and a civil engineer. Plain residents are not as different from civil engineers as is sometimes supposed. Engineers employ many ways of searching for the truth. These include collecting, sifting, and analyzing data, discovering relationships, and projecting these relationships. They include rational deduction based on the laws of nature, calculating solutions to equations, inventing, building, and testing. But the first thing an engineer does, if he can, is to take a look at what he can see with his own eyes. With this in mind, the first chapter in this essay is going to be the reporting of things I have seen and experienced myself.

Not only do I live in an officially auto-oriented community, but since starting to write this essay, I have come to the conclusion that I am auto-oriented myself.

Family Had No Car

It was not always that way. Until I was 11 years old (in 1921) there was not even a car in my family. In 1914 we moved to San Francisco from

Berkeley, a suburb about 10 miles away, because my father got a job in western San Francisco; and by the then-existing mass transportation, he could come home only on weekends. Later, he got a job in downtown San Francisco, and we moved back to Berkeley.

My father used to commute on the big red trains and white ferryboats of the Southern Pacific Company. The commute books contained tickets for every day in the month. This meant that on Sunday there was an unused commute ticket unless my brother or I used it to go to the city. As a result, I got a lot of rides on those trains and ferryboats, and I loved it.

I can still smell the wax and fresh paint of the upper deck (and the linoleum of the steamer "Berkeley") and the steam and cylinder oil and salt spray of the lower deck. I can still see the big connecting rods and crankshaft of the side-wheel paddles and the walking-beam above of the steamers Santa Clara, Alameda, and Oakland (the Berkeley did not have a walking-beam). I can hear the creak of the piling when the boat hit the slip. I can smell the popcorn roasting in the ferry building. I can feel the slick varnished benches on the seat of my pants. It was a wonderful life, and a wonderful way of starting out the day. I was 12 years old at the time.

Train No Longer Glamorous

Ten years ago I took some rides on the Illinois Central between Chicago and the south side, and last year I took some rides on the subway in New York and on the combination subway-elevated in Philadelphia. In Philadelphia there is a station downtown, underneath the hotel where we stayed, which was reminiscent of the Ferry Building in San Francisco 40 years ago. For some reason it didn't

seem as glamorous at age 51 as it did at age 12.

At the present time, I consider myself auto-oriented because there are two cars in my family of two people. I have a 10-year-old car which I drive 4,000 miles a year to and from work, and my wife has a four-year-old car which she runs errands in and that we use when we go out-of-town. Every time either of us goes any place, we go by car.

I live in the suburbs, 8.8 miles from where I work. It costs me \$317 a year, or \$26.50 per month to commute.*

I set my own time for going and coming. I have a comfortable seat and privacy. I keep dry in rainy weather, and it takes 24 minutes from my door to the door of the office building where I work. When the freeway, which is now underway, is completed, it will only take 18 minutes. It takes up to five minutes to get from the ground floor to the fifth floor of the building by mass transportation (elevators), including the wait.

Could Join Car Pool

If I cared to give up the flexibility of schedule and about 5 more minutes, I could join with two fellow-workers, ride in a newer car, and cut my costs by about two-thirds. As a matter of fact, for six years I did ride in a pool of five, and my cost then was \$75 per year. A fellow across the street who works in the same building that I do *does* ride in a pool of five, each of whom takes the family car once a week. This does not cause him to buy any more cars than he would if he went to work on the train, if there were a train. So his total cost per

* Car Depreciation	\$50
Insurance	58
Garage Rent	78
Gasoline	54
Lube, tires, and repairs	37
Road taxes	40
	<hr/>
	\$317



"In order to provide for between 50 percent and 60 percent of all the travel in an auto-oriented community, about 1.6 to 2 percent of the area should be devoted to freeways. The other 40 to 50 percent of the travel will take place on conventional roads and streets, which occupy about 22 percent of the total urban area." This aerial view looks from downtown Los Angeles toward Hollywood and the San Fernando Valley and shows the Harbor and Hollywood Freeways, with the four-level interchange at right center.

week is 40 cents for a downtown parking space and 97 cents for running expense of his car.

From the window of the room in my home where I am writing this, I can see the homes of five other neighbors, besides the one who works where I do.

One of these neighbors is a brake lining salesman, and his office is a den in his own house. Every time he leaves the house, he goes to a different place; and he puts about 50,000 miles a year on his car.

Second is a lumber dealer, whose yard is about four miles west of here.

Third is a house builder who is presently working on a house three miles north and one mile east of here. Next month he may be working on a house six miles south.

Fourth is a civilian employee of a military establishment four miles north.

Fifth is a salesman in a hardware store two miles northwest.

Where Could Railroad Go?

As a civil engineer who majored in railroad engineering, I have been trying to figure out where I would lay a railroad that all of us could ride, if we were unhappy about driving. I must confess that my training is inadequate to this task. There is a freeway about four miles from where we live that does not quite go downtown yet. This freeway is paralleled by a railroad that does go downtown and is on a high-speed exclusive right-of-way. The railroad goes to the same places that the freeway goes, including the lumber yard and the military base. All of us use the freeway from time to time; three of us use it daily, but none of us uses the railroad. We wouldn't use it even if there were some trains on it, and the reason why is that we don't want to live on the railroad, although four of us do work near it.

All of us go to work by car, at the time we want to go and in the direction we want to go, and the longest it takes any of us is 24 minutes. About the longest trip a person can take in this auto-oriented urban area of a half-million people is one half hour, from edge to edge of the area.

Many persons who are devoting consideration to urban problems seem to encounter a paradox when they contemplate neighborhoods like the one I live in. This school of thought has been epitomized in the following quotation:

"To most individuals, the automobile is a superior means of transportation. It is convenient, it is flexible, it takes them where they want to go.

"From the social viewpoint, on the other hand, transit is the preferred form."¹

My neighbors and I would agree with the part of this quotation regarding the automobile. But why is it necessary to say that the social viewpoint is "on the other hand"? An engineer would tabulate the alternatives as follows:

<i>On the one hand</i>	<i>On the other hand</i>
Automobile	Transit
To most individuals	Social viewpoint
Superior means of transportation	?
Convenient	?
Flexible	?
Takes them where they want to go	?

It is not very difficult to fill in the alternatives where the question marks appear. Inferior, inconvenient, inflexible, does not take most individuals where they want to go. The difficult thing to understand is the alternative that is filled in: Is "social viewpoint" on the other hand from "to most individuals"? Unless social is spelled with a capital S, as in "Social Notes From Newport and Park Avenue" (where transit may be preferred—for the masses), or as in "U.S.S.R." (where transit is also preferred, for reasons of their own), the social viewpoint must be considered equivalent, not opposite, to the viewpoint of most individuals—the individuals to whom the automobile is superior; convenient, flexible, taking them where they want to go, when they want to go, comfortably and in privacy.

Concern About Costs

The same school of thought that places the welfare of society on the

¹ Lyle C. Fitch, "A Transit Paradox." *National Civic Review*, April, 1962.

opposite side from that of most individuals also seems to be very concerned about transportation costs, especially the fact that some of the costs may be "hidden". In this respect, I will guarantee that my six neighbors and I, who from time to time discuss automobile prices, tire prices, gas prices, insurance premiums, and parking fees over the back fence, know a lot more about the cost of driving a car than we do about the cost of running a railroad which some people would ask us to finance. From what we hear, the cost of running a commuter railroad is pretty high, and almost always necessitates getting money from people who don't use the railroad. It would not surprise me if we know more about the cost of driving a car than even the officials who run railroads and set fares know about the cost of transporting commuters, especially on a railroad that doesn't exist at the present time and would have to compete with an existing mass transportation system (highways) that suits most individuals pretty well.

While on the subject of travel performed by my six neighbors and me, I would like to discuss a frequently deplored fact that on the average, an automobile only carries 1.4 to 2.0 persons.

Passengers Per Car

One neighbor rides in a pool of five, and I drive by myself to the office. The average, so far, is 3.0 per car. The man who works at the military base takes a passenger. Now we have eight in three cars, or 2.67 per car. The lumber dealer, the brake salesman, and the builder drive their own cars, solo. Now we have 11 in 6 cars, or 1.83 average. Finally, the hardware salesman's wife drives him to work and returns by herself. To the observer making an occupancy study, this looks like one trip with two persons and one trip with one person, so we now have a total of 14 persons in 8 cars, or 1.75 per car. Actually, however, the last two car trips only accomplished one work trip, so the real average is 12 work trips in 8 cars of 1.5.

We go in six different directions at seven different times, and to me it



"The automobile that makes it possible for the housewife to hop in the car and drive a mile or two to a supermarket, instead of trudging a couple of blocks to the corner grocery, also makes it possible to live on long blocks which cut down the number and area of streets." (Aerial view of suburban freeway near Sacramento in the general area of the author's home.)

seems inevitable, not deplorable, that the average occupancy is low. If it is deplorable, about the only solution I can think of is to follow the example of the residents of an island where I spent some time during the war. Each family had four coconut trees and some grass and chickens and a pig, and they made their own soap and used coconut oil for cooking and lamp fuel, and nobody had to go any place.

What *would* be deplorable would be for all of us to be coerced by

economic sanction or forced by fiat to live in places decreed by governmental authority, or to work in another place, decreed by the same authority.

Advantages of Location

One of the reasons why my neighbors and I live where we do is that for a given amount of housing money, we have more room. We consider this desirable. I have 7,000 square feet of grass, 50 shrubs, 5 trees, and 1,000 square feet of flower beds on my own

lot, and I enjoy them. I may change 2,000 square feet of grass into a swimming pool next spring, but it will still look attractive and will be used and enjoyed.

My neighbors and I think it would be unfortunate if plans were to materialize that would make is impracticable to live the way we do. One such plan might be to make the cost of parking so high, by condemning the now privately owned land on which we park our cars for public purposes

that we could not enjoy it and would have to move.

Another plan might be to use the \$120 per year I pay in road-user taxes to finance the deficit of a single-track railroad which would not come to my neighborhood. It is rumored that this imaginary single-track railroad would be able to carry 40,000 people in one hour. I cannot imagine where these 40,000 people would come from or go to, or what this railroad would be used for during the rest of the day, but I do know that I would not be one of the 40,000.

I also know that my travel time is less now than it was 10 years ago, despite the fact that this area has two and quarter times as many people now as it did then, and the reason for this is that my user taxes have financed highway improvements. It seems pretty obvious to me that if my highway taxes were used to finance someone else's train ride, these improvements would come to a grinding halt, and that I could look for steadily increasing travel time in the future instead of the steadily decreasing time which will really be achieved because the improvements will continue to be made.

II.

How can an auto-oriented urban area solve its transportation problems and provide for future growth?

I have taken an approach to this question which is different from many other attempts in one main way:

Instead of trying to decide what will happen when a given city grows, why not take a look at the cities that have already grown?

I would now like to call the reader's attention to Table 1: "Population, Area, and Miles of Freeway—Five Urban Areas in California".

The five urban areas shown in the table were chosen at random, to cover a wide range in population. Freeway planning in these cities has progressed far enough to know just how many freeways are needed, and, as a matter of fact, where they will be located within a small range of adjustment. In other words, Table 1 is based on facts, not conjecture.

In 1959 the California State Legislature enacted a far-reaching law (Sen-

TABLE 1

POPULATION, AREA, AND MILES OF FREEWAY
FIVE URBAN AREAS IN CALIFORNIA

	<i>Santa Rosa</i>	<i>Fresno</i>	<i>Sacramento</i>	<i>San Diego</i>	<i>Los Angeles</i>
1. Population, 1960	38,800	213,400	438,127	836,200	6,488,000
2. Area, square miles *	13	70	147	263	1,520
3. Population per square mile	2,980	3,050	2,980	3,180	4,260
4. Miles of freeways in operation or budgeted (1962)	4.5	9.1	28.8	38.9	242
5. Miles of freeways needed for 1960 population	5.5	23.5	56.9	99.0	515
6. Freeway miles per square mile	0.42	0.34	0.38	0.38	0.34
7. Per 10,000 population	1.4	1.1	1.3	1.2	0.8
8. Proportion of area occupied by freeways	0.020	0.016	0.018	0.018	0.016

* These areas are slightly different from Census Bureau areas. Census Bureau areas apparently exclude enclaves. For the purpose of relating road miles to area, the overall area must be considered.

ate Bill 480, introduced by Senator Randolph Collier) that established a 12,000-mile freeway system in the State of California. Maps have been drawn which show the freeways that will be required and constructed in all the urban areas in the State by 1980.

No Crystal Ball Needed

All I had to do in order to construct Table 1 was to look at these maps and decide from knowledge of the present status of these five communities how many of these freeways are needed now (1962). There is no crystal-ball gazing involved. I measured the miles and put them down in the table. The miles shown on line 5 would enable residents in all parts of each community to enjoy journey times as portrayed by curve A on Figure 1. (At the present status of construction shown on line 4 of Table 1, some residents but not all get freeway rides; and the typical journey time in most California communities lies somewhere between curves A and B.)

One thing that the reader will note as he studies Table 1 is the amazing consistency between communities having such a wide spread in size. Professor Edgar M. Horwood of the University of Washington tried a similar analysis on a national scale and found almost no consistency. I think maybe there are two reasons for this. First, California has been auto-oriented for quite a while and experience helps; second, he was looking at fu-

ture plans, whereas I am looking at present plans.

There has been a lot of loose talk and writing about the area consumed by freeways, streets, and parking. The facts as shown in Table 1 are different from much of this talk. In order to provide for between 50 percent and 60 percent of all the travel in an auto-oriented community, about 1.6 percent to 2 percent of the area should be devoted to freeways. The other 40 percent to 50 percent of the travel will take place on conventional roads and streets, which occupy about 22 percent of the total urban area. This travel will mostly be short trips and really can be looked upon as land-access travel. No trip can begin or end on a freeway.

Surprising Fact

In the course of investigating areas devoted to travel, I came across a fact which really surprised me, and I imagine will come as quite a shock to some people who have been concerned about land areas consumed for transportation purposes.

In Part I of this essay, I mentioned that I had not always been auto-oriented. The same thing applies to the City of Sacramento. In 1850 Captain John Sutter laid out the City of Sacramento. He could not have been auto-oriented. He was horse- and pedestrian-oriented. He set aside not 1.6 percent, not 15 percent, not 22, but 38 percent of the area for streets and sidewalks.

The parts of Sacramento that were laid out in the 1900-1930 era have about 21 percent of the area in streets, and the parts that have been laid out since World War II have about 15 percent. The overall average in the city limits is 22 percent.

This reduction as the auto came into prominence is not a coincidence. In the days when people had to walk, there had to be a lot of streets because they couldn't walk around the ¼ to ½-mile-long blocks that are suited so well to the automobile age. The automobile that makes it possible for the housewife to hop in the car and drive a mile or two to a supermarket instead of trudging a couple of blocks to the corner grocery, also makes it possible to live on long blocks which cut down the number and area of streets. When the auto-oriented housewife wants to exercise, she again gets in the car and drives to the golf course.

The 18 percent or more of the total area which is thus *saved* by auto transportation will cover the area required for freeways *tenfold*.

Population Will Double

Most California communities anticipate doubling in size during the next 20 years. I do not know whether this will happen or not. During the past 100 years, California has a little more than doubled every 20 years. It is getting to be a habit, and a way of thinking, and people would be surprised if it didn't keep on being that way.

This growth, if it takes place, will create travel. The 1.6 percent of the urban areas, and approximately 0.2 percent of the rural areas that will be occupied by the 12,000-mile freeway system will take care of an amount of travel, in vehicle-miles, equal to the total amount of travel that will be added.

Instead of wringing their hands about this travel, Californians are preparing for it. We do not foresee being "choked" by transportation problems.

Another frequently heard comment based on imagination instead of fact, is that parking takes too much space. The facts are that one car space in an off-street parking facility takes about

340 square feet, including aisles and leftovers. A parallel-parking stall on a street occupies 176 square feet. (This does no mean, to me at least, that on-street parking is desirable.) At 340 square feet apiece, one square mile will provide surface parking for 82,000 cars. To park all of the 3.3 million cars in the Los Angeles urban area simultaneously, off-street at a place other than their home base on one level (as opposed to multilevel parking garages), would require 40 square miles, or 2.6 percent of the urban area. In Sacramento, which is more typical of communities between 20,000 and 1,000,000 population, all 225,000 cars could be parked simultaneously away from home, off-street on one level in 2.7 square miles or 1.8 percent of the area.

Area For Parked Cars

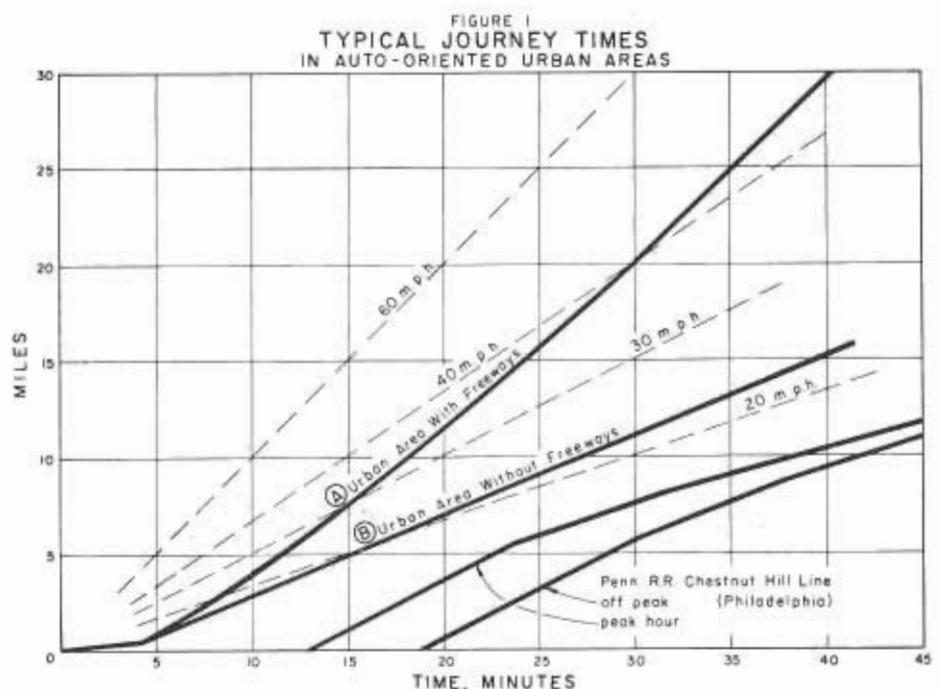
However, all cars are not away from home at any one instant. In fact, less than half of them are, and many of these are on the streets and highways. Also, there are many multilevel facilities. So the actual area devoted to parked cars is more like 0.4 percent to 1.0 percent. I do not think this will break a community. In fact, judging by the financial and any other index

that can be thought of, it seems as though the communities that do have lots of cars and lots of freeways and lots of parking space are doing much better than the ones that don't.

The heart of the matter of areas consumed is this: If you look at an office building you might see an area with 0 percent parking. If you look at a shopping center, you note a large amount of parking area in one place. If you look at a downtown area, you note parking areas in many places. If you look at a garage, it is 100 percent devoted to parking. This is neither good nor bad. It is simply necessary in order to do business. The question is, where do you draw the boundaries of the "area"? In an auto-oriented community, the boundaries are sufficient to encompass the places where the citizens live and work and play. The total area is devoted to all kinds of activities, one of which is parking cars. From the perspective of total community resources, it is the ½ percent to 1 percent of the total area devoted to parking that should be looked at.

Statistical Aspects

To round out the statistical aspects of travel in an auto-oriented community, I have prepared Figure 1 showing



typical journey times for various lengths of trip.

This chart is pretty much self-explanatory. Among other things, it shows why freeways become more important as the community grows larger. Attention is invited to the fact that a 30-minute journey only goes about half as far in a community without freeways as in a community with freeways. This means that for the same travel time, the freeway community can have four times as much area and four times the population.

In order to aid readers who may not live in auto-oriented communities to interpret the chart, I have plotted the journey time and distance along the Chestnut Hill line of the Pennsylvania Railroad on this same chart. This information came from a timetable I picked up in Philadelphia last year (1961). I assumed that the typical passenger lives within five minutes from the station. No allowance was made for his wife's time if she drives down to the station to pick him up. The peak hour journey time is less than the off-peak because the average waiting time for the train to start is only 8 minutes during the peak as opposed to 14 minutes during the off-peak.

The comparison also may be of interest to readers who live in auto-oriented communities that are contemplating large investments in commuter railroads, but before drawing any conclusions from it, they should realize that most of them will live more than five minutes away from the station, and they will also work more than five minutes from the station.

Is it good or bad for an urban area to be spread out, as automobile oriented cities are? ²

In 1962, when I first prepared this paper, I made some comparisons between Los Angeles (an automobile-oriented city) and New York City (a rail-transit-oriented city).

I noticed that there was a lot of traffic congestion in New York City, more in fact than in any other city in the United States; and furthermore,

that the congestion there was comparable only to that in other world cities where extensive rail transit is available: Paris, London and Tokyo. The only large city where there is plenty of rail transit and no automobile traffic congestion is Moscow, and I don't believe that the absence of automobile traffic there is attributable to the presence of subways.

I noticed that prices were high in New York. I noticed that there are lots of offices in New York, and I think that they rent for a lot more money than comparable offices in Los Angeles, and I don't think you can get more work done in them. I think that the prices are related to the rent, and I think that the rent is related to the scarcity of land, and I think that the auto-oriented mobility of Los Angeles makes it impossible for land to get as scarce there as it is in New York, especially on Manhattan Island.

Harmer Davis puts it this way: ³

"If transportation were costless, instantaneous, and everywhere available, we would postulate that the choice of location of activities could be made on a basis other than the fact or act of transport. There would then be no need to concentrate activities merely to avoid transportation costs.

"While the facts of nature and life as we know them preclude achieving this ideal state of effortless transport, there is nevertheless some value in speculating about the implications of having less costly, speedier and more universally available transport than was available at some previous time. An important implication is this: as the availability of transport is increased and its cost decreased, not only are the limitations on the spatial organization of activities in our urban regions relaxed to some degree, but to some degree possibilities are opened up for greater emphasis on locational criteria other than transportation.

"Although the cost of providing transport to support the functioning of our urban regions is still not inconsiderable, no part of these regions now lacks access in some degree. This means that we can begin thinking more about what is optimal organization of urban functions. It means that we no longer are compelled to concentrate all urban activities except housing in a central congested core in

order to obtain the economies of joint use, as conditioned by scarce and costly transportation. If we now choose to concentrate selected functions in a small central core, perhaps we should begin to try to analyze what is the optimal concentration. By the same token, we should more seriously begin to inquire into what is optimal dispersion, and what is a suitable pattern for a dispersed arrangement.

"Once a region attains a sufficient variety and ubiquity of transport throughout, and a range of activities has been located without being unduly inhibited by lack of transport, we might expect that the installation of a particular new transport facility would no longer, of itself, be a dominant factor in inducing new speculative activity in a particular sector of the region; nor would some added transport service necessarily of itself be a guarantee of preserving to some sector activities which it formerly had by virtue of scarce regional transport."

A lot of people have noticed the advantages of living in Los Angeles. Between 1950 and 1960, the population in the urban area of Los Angeles increased by 2.5 million people, from 4.0 to 6.5 million. This makes it the second largest urban area in the country, exceeding the Chicago-Northwestern Indiana urban area by more than one-half million. The 10-year growth alone was more than the total population of all but four of the other urban areas in the U. S. This does not sound like an ailing community. It sounds instead like a thriving community and I think it is because of, not in spite of, the automobiles there.

Los Angeles Urban Area

There are 3.3 million automobiles in the Los Angeles urban area and more than 200 miles of freeways. The autos and trucks travel about six billion miles yearly on the freeways, and another 18 billion miles on the rest of the streets and highways. About six billion passenger movements per year are now being made by automobiles in the Los Angeles area. To appreciate the magnitude of this number, it may be compared with the 1.7 billion passengers that used the subways and buses in New York in 1959. The Los Angeles Freeways are one of the largest and fastest mass transportation systems in the world.

In spite of the congestion that takes place at some locations, the journey

² Editor's note: Portions of the following were inserted by the author in July, 1964.

³ "Some Aspects of the Interrelationship of Transportation and Land Use" by Harmer E. Davis, Director, Institute of Transportation and Traffic Engineering, University of California. (Prepared for an ASCE Conference at Salt Lake City, May 13, 1964.)

time between typical locations in the metropolitan area of Los Angeles is less now than it was 25 years ago (and in fact less than it ever was), notwithstanding that the *increase* in population during that time has been greater than the *total* population of the Philadelphia-New Jersey urban area is now. Travel time is becoming less every year. Between 4:30 and 6 p.m., a 60-mile ride through the whole area along the long axis, from Calabasas to Tustin, takes 90 minutes. During the off peak, it takes 70 minutes. A 45-minute band from 7th and Broadway in the peak hour encompasses 5.8 million people. During the off-peak, 30 minutes takes you clear out of the urbanized area (and on the east side into the next one).

Freeways Connect Areas

I am going to close this essay on living and traveling in auto-oriented cities with a quotation from *Life* magazine (June 20, 1960):

"Los Angeles, seemingly boundless in size and energy, has taken on the one great attribute it has so far lacked—that of a cohesive city. The tremendous sprawl of Los Angeles across the arid hills and valleys gave it the reputation of being many suburbs in search of a city. The expansion continues. But more and more Los Angeles looks, acts, and sounds like a city.

"Imaginative architecture, previously expressed in suburban markets and ranch homes, is forming the heart of downtown from decay into a smart unit of buildings. Home construction on hills closer to the city and the erection of towering apartments have helped consolidate the population. A growing civic pride helped build the \$6 million Sports Arena where the Democratic Convention will be held next month. The roar of civic pride fills the Los Angeles Coliseum when the Dodgers play.

"More important than the Dodgers or civic buildings in giving Los Angeles its new personality are the ribbons of freeway which are gradually tying the city's scattered pieces together."

National Highway Week to Be Marked

Preparations for the fourth annual National Highway Week are going ahead in all parts of California, under the leadership of a statewide committee and numerous local committees.

The observance this year is scheduled for the week of October 4-10. In previous years it has taken place in the spring. This year also sees a new national sponsoring group—the American Association of State Highway Officials, with its member departments assisting with the programs in their respective states.

The California observance will be built to some extent around the 25th anniversary of the State's freeway law, which went into effect in September 1939.

The California National Highway Week Committee is headed by Harrison R. Baker of Pasadena, a former member of the California Highway Commission and a long-time leader in highway affairs.

The vice chairmen are two other former Highway Commission members: Judge John J. Purchio of Alameda County, and Robert E. McClure of Santa Monica.

The committee secretary is Richard K. Bowler, manager of the engineering department of the Automobile Club of Southern California.

More than 25 organizations, some of them statewide and some regional, are represented on the committee. They include auto clubs, governmental organizations, civic organizations, and transportation, construction, and safety organizations.

State Highway Engineer J. C. Womack has instructed the 11 district engineers of the Division of Highways to cooperate extensively with local committees in arranging appropriate events and displays. Ribbon-cutting ceremonies for newly completed highway projects are expected to occur in several locations during the week. Other features will include newspaper articles on regional highway progress, window displays, etc.

Bowers Is Cited as Shade Tree Pioneer

H. Dana Bowers, Supervising Landscape Architect for the California Division of Highways, has received the Award of Achievement of the Western Chapter of the International Shade Tree Conference.

The award is made to a person or firm who has, through specific projects or programs, contributed to the advancement and use of shade trees in the western area.

Presentation was made at the chapter's recent annual meeting in Seattle, Washington.

Bowers was honored by a standing ovation when the award was announced.

A pioneer in roadside development work, Bowers started selecting and developing vista points and fountains along the highways for the State of California in 1929. In 1935 he was placed in charge of the development of roadsides for the whole state highway system.

He has supervised the planting of trees, shrubs, flowers and vines along more than 1,000 miles of modern multi-lane freeways and expressways.

In the presentation of the award, Bowers was cited as one who has planted more ornamental trees and other plants over a greater area for the enjoyment and safety of more people than any other person in the West during his nearly four decades with the State of California. He has searched for and tried every known plant which might fit somewhere into the varied roadside conditions of his State.

Bowers' work also resulted in new standards for erosion control.

His findings have been used by landscape contractors, government agencies and individuals throughout the United States. Many engineers and students from overseas have come to study his methods and work.

Bowers is a charter member of the original Western Shade Tree Conference which he helped organize in 1934.

Staff Promotions

*Hart Heads District IV;
Warren, Estep Advanced*

The appointment of Alan S. Hart, district engineer for the California Division of Highways in the Sacramento-Marysville area for the past seven years, as the new district engineer for the San Francisco Bay area (District IV) has been announced by State Highway Engineer J. C. Womack.

To succeed Hart as the district engineer for District III, an 11-county area with headquarters in Marysville, Womack appointed Willard L. Warren, who has been the division's engineer of design since 1960.

The new engineer of design is Alvord C. Estep, who has been the division's assistant office engineer in charge of industry contacts since 1961 and before that was district design engineer in the San Diego district.



ALAN S. HART

District IV, with headquarters in San Francisco, includes nine counties: Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Santa Cruz and Sonoma. Its highway budget for the current fiscal year amounts to more than \$72,000,000 for construction and rights-of-way.

His new assignment will be Hart's fourth post as district engineer since 1950. In that year he was appointed to head the Bishop district, moving to the Eureka district in 1953 and to Marysville in 1957. He has been closely identified with planning the freeway network for the Sacramento area which is now in the construction stage.

A native of Santa Rosa, Hart was graduated from the University of California in 1930 in civil engineering and has been on the Division of Highways staff since then. His earliest assignments were in the Marysville district. He was promoted to district maintenance engineer at San Luis Obispo in 1945, and to assistant district engineer at Eureka in 1948.

In July, 1962, Hart was promoted "on the job" at Marysville to the civil service rating of assistant state highway engineer.

Hart is a member of the American Society of Civil Engineers and the American Society of Photogrammetry. His other affiliations include the Commonwealth Club of San Francisco, Rotary, Masons, Shrine and Elks.

He and Mrs. Hart have one son, Keith, who lives with his wife and two children in Milpitas.

Warren, the new district engineer of District III, is a native of Kentucky who grew up there and in Ohio, studied engineering at Sacramento City College and the University of California and began his professional



WILLARD L. WARREN

Hart was promoted to the Bay area position, which carries the civil service ranking of metropolitan district engineer, to succeed the late J. P. Sinclair, who passed away last month as the result of a heart attack.



ALVORD C. ESTEP

career with the Nevada State Highway Department in 1936. During World War II he worked for the Army Corps of Engineers in Northern California and Utah.

... Continued on page 56

STAFF PROMOTIONS (Cont.)

Joining the California Division of Highways in 1946, Warren served in the Marysville district in traffic engineering, design, construction and route location, and was transferred to division headquarters in Sacramento in 1950 as assistant engineer of design. He was promoted to engineer of design in 1960.

Warren is a member of the design committee of the American Association of State Highway Officials and is chairman of a design section of the Highway Research Board of the National Academy of Sciences.

A resident of West Sacramento, Yolo County, for the past 18 years, Warren has served as a member of the Board of Trustees of the Woodland High School District and is currently on the board of the West Sacramento Sanitary District, among other civic activities. He and his wife have two daughters, Mrs. Leonard Speth of Fresno, and Linda, a student at Fresno State College.

District III, which he will head, comprises the valley and mountain counties of Butte, El Dorado, Colusa, Glenn, Nevada, Placer, Sacramento, Sierra, Sutter, Yolo and Yuba. Its total budget for construction and rights of way this year amounts to nearly \$60,000,000.

Estep, the new engineer of design, is a native of Cheraw, Colorado, who moved to San Diego in 1935, worked for various engineering firms, and was graduated from San Diego State College in 1943. After U.S. Navy service in World War II as an officer aboard the destroyer U.S.S. Beale, he joined the Division of Highways in San Diego as a field inspector on construction work, advanced to various other assignments, and served as resident engineer on major freeway construction in the San Diego area. He later worked in advance planning and then as district design engineer before his promotion to assistant office engineer in division headquarters in 1961.

Estep is a member of the American Society of Civil Engineers and the American Public Works Association. He and his wife have two sons, David and Douglas.

Right-of-way Posts For Kagan, Frankland

Appointment of Harry L. Kagan as an assistant chief right-of-way agent for the California Division of Highways has been announced.

Kagan, whose appointment was effective June 15, fills the vacancy created by the death of R. E. O'Bier, who headed the division's property acquisition program under the direction of Chief Right of Way Agent Rudolf Hess.



HARRY L. KAGAN

Stepping up to Kagan's former post as supervising right-of-way agent in charge of research and development is Bamford Frankland, who has been in charge of operational research.

In his new position, Kagan will supervise an activity which in the last fiscal year involved the acquisition for highway purposes of 8,131 parcels at a total expenditure of more than \$145,000,000.

A native of San Francisco, he attended Washington High School and San Francisco State College before receiving his A.B. from the University of California in 1942. After four years as a line officer in the Navy, serving in the European and Pacific Theaters, he taught school briefly in San Francisco. In February, 1947, Kagan entered state service as a junior real property agent for the Division of Highways in San Francisco.

He advanced through positions of increasing responsibility in San Francisco until February, 1961, when he was appointed a supervising right-of-way agent and transferred to division headquarters in Sacramento.

One of his recent projects was the organization of the division's first



BAMFORD FRANKLAND

Magazine Loses Associate Editor

John C. Robinson, Associate Editor of *California Highways and Public Works* for the past 4½ years has left the Division of Highways to become chief information officer for the State Department of Social Welfare.

Robinson came to work for Highways in 1957. A native of Farmingdale, New Jersey, he served in the U.S. Navy from 1928 to 1948.

He is co-author of the book "State Parks of California" published by *Sunset Magazine* in 1961.

His articles and photos have appeared in many magazines including *Sunset*, *Better Homes and Gardens*, *Family Circle*, *House Beautiful*, *House and Garden*, *This Week* and various newspaper supplements.

The second installment of this article "Redwood Highway" appears in this issue of the magazine. The third and final installment will appear in the next issue.

right-of-way academy, which was conducted on the Davis campus of the University of California in 1963.

Kagan is a member of the American Right of Way Association. He is married and has a daughter.

Frankland, his successor, was born in Sacramento and attended Sacramento High School before going on to the University of California at Berkeley, where he received a bachelor's degree in 1950. He served in the U.S. Army for two years, and then joined the Division of Highways as a junior right-of-way agent in Marysville.

In January, 1960, he was transferred as an associate right-of-way agent to division headquarters in Sacramento, where he was in charge of land economic studies until recently. He is the author of several articles on the economic impact of freeways.

A member of the American Right of Way Association, Frankland is married and has two sons and a daughter.

Route Adoptions

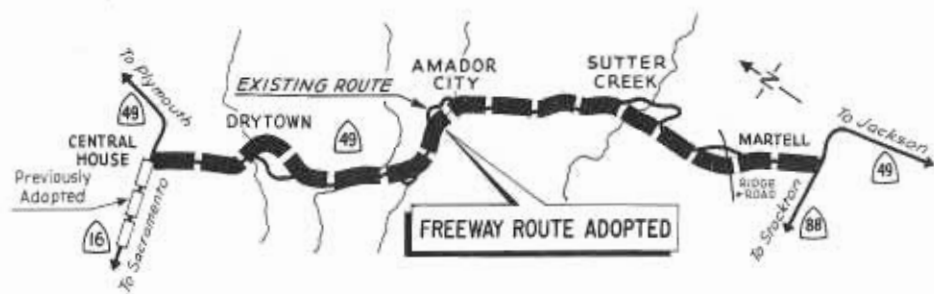
Commission Adopts 115 Miles of Freeway at May, June Meetings

The California Highway Commission adopted the locations for approximately 115 freeway miles on 15 routes at its May and June meetings, as well as relocating or extending more than 30 miles of five conventional highways.

Although all of the adoption actions were preceded by public hearings conducted by the Division of Highways in accordance with established procedures, the commission itself also held public hearings prior to adopting three freeway routes in Fresno, Sacramento and Amador counties.

The Fresno adoption was for 9.4 miles of State Sign Route 41 between "M" Street in Fresno and one mile south of the Madera county line. The southerly portion of the routing had been the subject of considerable local controversy.

In adopting the "C-B" alternate route favored by the State Highway Engineer, the commission noted that the "C" portion south of McKinley Avenue will cost approximately \$2,250,000 less to construct than the



equivalent "B" alternate, while providing \$18,000,000 more in 20-year user benefits. Additionally, it was favored by local property owners.

The commission found little disagreement concerning the "B" portion northerly from McKinley Avenue to the county boundary.

Sacramento County

The adopted route in Sacramento County, identified as the "A" line at the public hearing conducted by the commission in Folsom in April, extends 18.6 miles northerly on Route 65 from west of Sloughouse in Sacra-

mento County to east of Roseville in Placer County.

In its findings, the commission reported that the adopted route, conforming to the "major streets and highways" plan of the Sacramento County Board of Supervisors, the county's master plan for school sites of the San Juan Unified School District, and endorsed by the Roseville City Council and the Placer County Department of Public Works, would provide far greater traffic service than other alternates favored by the City of Folsom and a Fair Oaks civic group.





In Amador County, the commission adopted a freeway routing for 7.9 miles of State Sign Route 49, the "Mother Lode Highway," between State Sign Route 88 at Martell and State Sign Route 16 at Central House.

Built-up Sections Bypassed

The adopted routing generally follows the existing highway alignment but swings away from the built-up sections of Sutter Creek, Amador City and Drytown.

The commission said this routing will avoid disrupting historic sites and buildings, was least costly of the feasible alternates studied, and will provide the best service to local, tourist and through traffic.

Both the Sacramento and Amador County routings had been recommended by State Highway Engineer J. C. Womack.

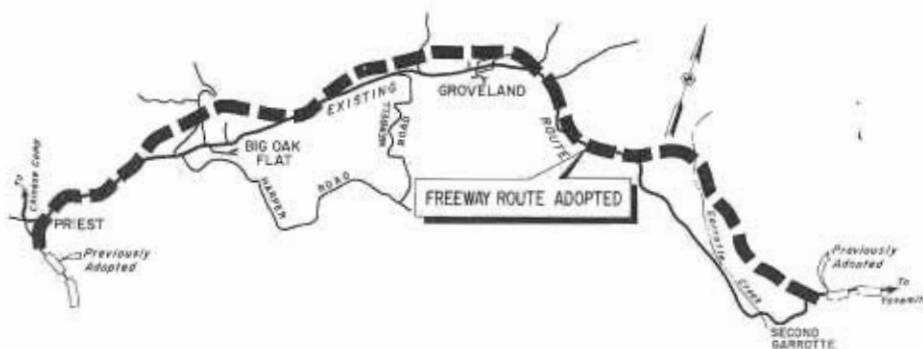
In other freeway adoption actions, the commission located routes as follows:

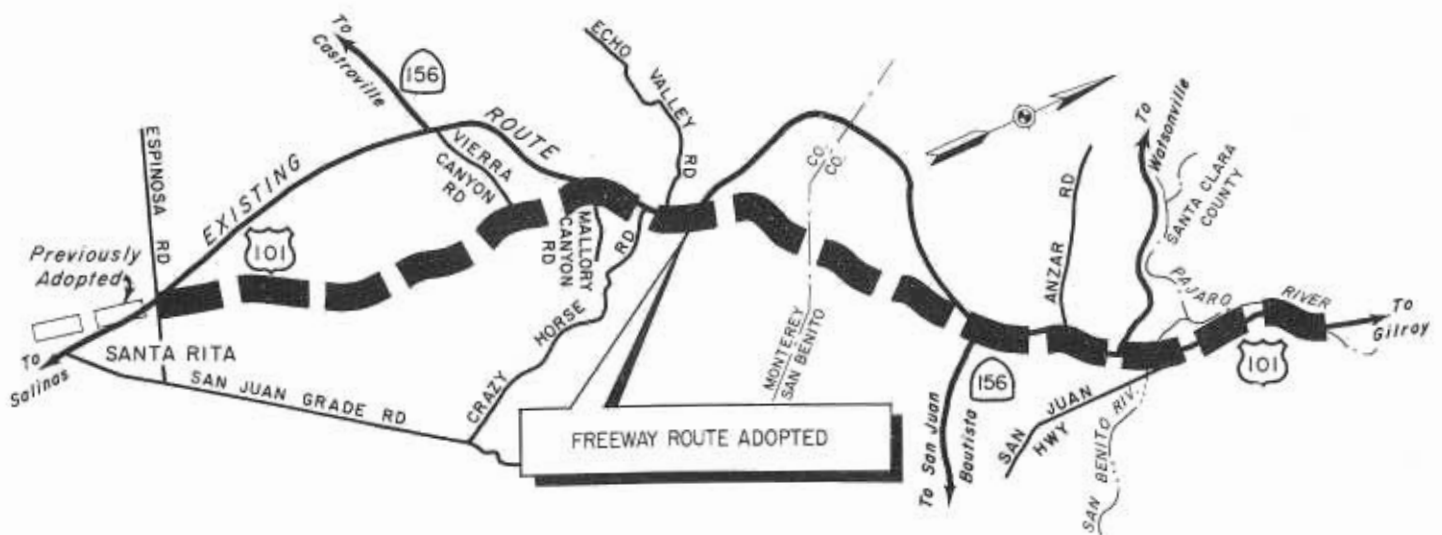
Monterey and San Benito Counties: 15.5 miles of U.S. 101 between Espinosa Road, near Santa Rita in Monterey County, and the San Benito-Santa Clara county line.

Riverside County: 10.1 miles of State Sign Route 74, the "Pines to Palms Highway," between the western boundary of the San Bernardino National Forest and Mountain Center.

Sacramento County: 5.5 miles of new Route 244 in the Fair Oaks-Carmichael area running easterly from a freeway routing adopted in 1961.

Sacramento and Placer Counties: 17 miles of new Route 65 (former U.S. 99E) northerly from Interstate 80 in Sacramento County through the Roseville-Lincoln area of Placer County, and two miles of new Route 193 (former Route 91) between the adopted section of Route 65 southwest of Lincoln and the existing highway near the Titan Missile site.





San Diego County: Five miles of State Sign Route 78 between US 395 in Escondido and the San Diego city limit west of Pasqual Road.

UC at Santa Barbara

Santa Barbara County: One mile of new Route 217 (former Route 236), extending the recently completed Ward Memorial Boulevard Highway along Goleta Slough to the main entrance of the University of California's Santa Barbara campus.

Santa Clara and Alameda Counties: 5.2 miles of State Sign Route 9 between the existing highway at Santa Clara-Alviso Road in Santa Clara County and the adopted route for the Sign Route 17 Freeway in Fremont, Alameda County.

Tuolumne County: 5.9 miles of State Sign Route 120 between Priest and three miles east of Groveland.

Ventura County: 21.4 miles of State Sign Route 126 between west of Orcutt Road, east of Santa Paula, and the Ventura-Los Angeles county line.

Ventura County: 11.2 miles of interconnecting freeway routings of new Route 1 (former US 101 Alternate), new Route 232 (former Route 154), and State Sign Route 118. The 4.1-mile Route 1 section runs from southeast of Oxnard to a new connection with the Ventura Freeway, connecting to the newly adopted 2.2-mile section of Route 232 which extends it

northeastward to the newly adopted route for State Sign Route 118. The 4.9-mile routing for 118 runs between State Sign Route 126, northwest of Saticoy, and the adopted route for Route 232, then easterly to a junction with the existing highway west of La Vista Avenue.

Future Expansion Envisioned

The plans of the Division of Highways call for initial construction ranging from a two-lane, access controlled highway, with provision for expansion to four lanes if and when required, as in Amador County, to construction of an eight- and six-lane freeway, with provision for expansion to eight lanes throughout, as in the interconnected freeway routings in Ventura County.

The cost of these freeways is estimated at \$239,340,000, including rights of way.

The Commission also adopted as conventional highways:

Kern County: A 9.4-mile new routing for Route 223 (former Route 140) between US 99 and Arvin, eliminating six right angle turns and lessening confusion for non-local motorists; and a two-mile extension of new Route 184 (former Route 143) to connect with the US 99-Arvin routing.

Lake County: A 5.9-mile section of new Route 175 (former Route 16), an important east-west lateral across the Mayacmas Mountains between US 101 and the Lake County resort areas,

between one-half mile east of the Mendocino County line and west of the junction with State Sign Route 29.

Siskiyou County: A 12-mile section of State Sign Route 96 between one mile north of Somes Bar and Ti Creek, generally following the alignment of the existing highway through difficult terrain, but with easier grades and curves; and 1.8 miles on new Route 3 (former Route 82) easterly from the adopted route for Interstate 5 east of Yreka.

In another commission route action, a short section of old State Sign Route 1, from its junction with new Route 46 (former State Sign Route 41) at Cambria to 1.3 miles westerly, was redesignated as an extension of the latter highway, and a 350-foot connection was adopted between the redesignated section and the new State Sign Route 1 Expressway.

FIAT LUX!

Our caption to the front cover of the May-June issue of the magazine, in a burst of poetic enthusiasm, wrongly attributed the illumination on the lower deck of the San Francisco-Oakland Bay Bridge to headlights of eastbound traffic rather than to its true source, the fluorescent lighting system recently installed by the Division of Bay Toll Crossings.

Human Relations Coordinator Named

Another step toward assuring equal job opportunity in the California Division of Highways was taken by State Highway Engineer J. C. Womack by the designation of a human relations coordinator for the division, in line with Governor Edmund G. Brown's request to state agencies.

Scott H. Lathrop, principal highway engineer in charge of personnel and public information for the division, was appointed to serve as human relations coordinator. The assignment is in addition to his regular administrative duties.

At the same time Womack ordered statewide distribution to each district engineer, equipment shop superintendent and department head in the division a copy of the instructional booklet entitled "Promoting Equal Job Opportunity—A Guide for Employers," which was issued recently by the State Fair Employment Practices Commission.

Lathrop's job, Womack said, will be to see that the Division of Highways continues and intensifies its efforts to follow existing directives by Governor Brown and State Director of Public Works John Erreca in recruiting, appointing, and promoting highway employees.

"We have already placed in the hands of every division employee," Womack said, "a copy of the Governor's 'Code of Fair Practices' leaflet and Mr. Erreca's circular letter of last August, which calls for 'affirmative and positive action,' not just being against discrimination. I have instructed Mr. Lathrop to follow through to ascertain that all actions involving our employees continue to be on the basis of merit and fitness, without regard to race, color, religion, national origin, or ancestry."

Lathrop has been in charge of personnel administration for the Division of Highways for the past seven years. He is a civil engineering graduate of the University of California. He has served continuously with the Division

Peddy Is Appointed Project Control Head

Appointment of Jack E. Peddy to the newly established position of project control engineer for the California Division of Highways has been announced by State Highway Engineer J. C. Womack.

Peddy was promoted from his position as assistant programs and budgets engineer, an assignment he had held for three years.

His new duties involve working out and putting into effect procedures for



JACK E. PEDDY

the most effective assignment of planning and design personnel to highway projects in the preliminary engineering stage, Womack said. In addition, he will assist in keeping state legislators informed on highway planning and construction scheduling.

Both these assignments, Womack pointed out, are in line with Peddy's recent duties, which have included staff work in connection with the preparation of the annual State Highway Budget and with the scheduling of bid advertising to insure a continuous flow of contract work; and appearances before civic organizations throughout California to report on highway planning and development.

Peddy has been a Division of Highways employee since March, 1948. Born and raised in Fresno, he received his bachelor's degree in civil engineer-

of Highways in various engineering and administrative assignments since 1931, except for World War II service in the U.S. Navy.

In 1959 the Sacramento Section of the American Society of Civil Engineers honored Lathrop with its annual "Engineer of the Year" award for community service. He recently served two one-year terms as president of the Sacramento Council of Churches.

Violet E. Randle

Mrs. Violet E. Randle, Secretary I in the Division of Highways District I office at Eureka, died on July 5 after a long illness.

During her career with the Division she served as secretary to five district engineers: G. F. Hellesoe, A. M. Nash, C. V. Kane, Alan S. Hart and Sam Helwer.

She started work as a junior stenographer in 1946.

Mrs. Randle was born in the Dyer-ville area. She attended Eureka elementary schools and graduated from high school in San Francisco.

Before coming to the Division of Highways, she was employed by the State Department of Education for two years.

She is survived by her husband, Lee, and two daughters, Patricia, 15, and Rebecca, 8.

ing from the University of Michigan in 1946 while participating in the US Marine Corps college training program.

After two years in engineering work in the aviation industry, Peddy joined the Division of Highways staff in the District VI office in Fresno. His earlier assignments were in design, and later he was transferred to construction and was resident engineer on freeway contracts on US 99. Later he advanced to district construction engineer in charge of projects in Fresno, Madera and Kings Counties, and in October, 1958, became the district's advance planning engineer in charge of route location studies.

His service in the Fresno district was interrupted for a year and half by his recall to active Marine Corps duty in the Korean war, where he saw combat duty as an artillery officer.

In August, 1961, Peddy was promoted to his division headquarters position in the programs and budgets department.

Peddy is married and has two sons and a daughter.

Division Announces Latest Retired List

District II

John Q. Cox, highway maintenance man I, 32 years; Clifford P. Higgins, highway foreman, 41 years; Lee Y. Stewart, highway maintenance man I, 12 years.

District III

Dewey E. Allison, highway maintenance man I, 20 years; Curtis H. Kronquest, highway maintenance man I, 9 years.

District IV

Paul Cowgill, highway chief clerk II, 31 years; Franklin K. Gurley, assistant highway engineer, 16 years; Joseph D. Silvera, highway maintenance man II, 30 years.

District V

Claribel S. Babcock, intermediate clerk, 16 years.

District VII

Jerome J. Fisher, highway field office assistant, 12 years; Edward L. Mahoney, highway foreman, 32 years.

District VIII

Ann M. Thomas, intermediate clerk, 12 years; Edgar A. Kellam, junior staff analyst, 13 years.

District XI

Donald B. Frazee, highway maintenance man III, 34 years; Jay V. Sperry, highway maintenance man II, 30 years.

Headquarters Office

Samuel R. Offutt, associate highway engineer, 16 years.

Bridge

Ralph M. Sherick, senior bridge engineer, 31 years.

Headquarters Shop

Russell L. Anderson, mechanics helper, 17 years; Thomas S. Cardona, heavy equipment mechanic, 32 years.

Shop 5

Charles B. Bradfield, automobile mechanic, 19 years.

Bridge Department's R. M. Sherick Leaves

Ralph M. Sherick, Senior Bridge Engineer, in the Advance Planning Section of the Bridge Department, retired on May 31 after 31 years in state service.

A native of the Golden State, Sherick attended San Diego High School and San Diego State College, and graduated from the University of Southern California with a degree of Bachelor of Science in Civil Engineering in 1926.



RALPH M. SHERICK

Sherick's assignments have taken him statewide since he came to work with the department in November, 1933. He served as resident engineer on bridge construction projects both in Southern California and Northern California, and became area construction engineer for the north coastal counties in July of 1947. In 1954 Sherick transferred to the Advance Planning Section, assuming charge of the Report Writing and Review Section.

During World War II he served in the Seabees in the Pacific Theater with the rank of Lieutenant Commander.

Sherick is a past president of the Capitol City Toastmasters Club and is affiliated with the Masonic Lodge in Los Angeles and the York Rite bodies and Ben Ali Temple of the Shrine in Sacramento.

C. Clarke Waterman Retires on July 1

C. Clarke Waterman, District Accounting Officer for the Division of Highways at San Bernardino for more than 22 years, retired on July 1.

Waterman, a native of Buffalo, New York, and a registered public accountant, began work with the division in San Bernardino in May, 1941, as departmental accounting officer, transferring from the Department of Finance and Franchise Tax Commission in Sacramento, with which he had served from 1939.

Ray E. O'Bier

Ray E. O'Bier, Assistant Chief Right-of-way Agent for the California Division of Highways, died suddenly on June 4 in Sacramento. A native of Texas, he had previously lived in San Bernardino 33 years, where he was in charge of the Right-of-way Department of the local Division of Highways District Office from 1945 until his promotion and transfer to Sacramento in 1961.

O'Bier was educated in Texas and took courses in engineering after he moved to California. He came to San Bernardino in 1927 to join the Division of Highways as a member of a survey party. He continued in engineering work until 1935 when he transferred to the Right-of-way Department, where he served continuously until the date of his death. He was 56.

O'Bier was a member of the American Right-of-way Association and American Association of State Highway Officials, a Past Master of the San Bernardino Lodge No. 348 F. & A.M., a member of the Elks, an associate member of the San Bernardino Real Estate Board, and past president of California State Employees Association Chapter No. 7.

He is survived by his wife, Margaret; two sons, Ray, Jr., of San Bernardino, and Gordon, who is with the Fifth Army in Germany; his mother, Mrs. Elizabeth Christensen of San Gabriel, and three sisters, a brother, and two grandchildren.

KOFMAN IS VICE-CHAIRMAN

The California Highway Commission has elected Abraham Kofman of Alameda as its Vice-chairman, succeeding Arthur T. Luddy of Sacramento, who resigned from the Commission recently because of ill health.

Kofman, a San Francisco Bay Area newspaper publisher, was appointed a member of the Commission by Governor Edmund G. Brown in September, 1961. He was reappointed in January, 1964, to a four-year term.

Tempus Fugit Column

The following items appeared 25 years ago in *California Highways and Public Works*:

July, 1939—REALIGNMENT OF RUSSIAN RIVER HIGHWAY NEARING COMPLETION

One of the most popular vacation spots in Northern California—the section between Northwood Park and Guerneville on the Russian River—will soon be served by a new highway having easy curves and very light grades, and using the roadbed of the abandoned Northwestern Pacific Railroad.

It replaces the narrow, winding road originally built to serve the lumber industry, which concluded operations about 1919.

The new 36-foot highway closely follows the river along its entire 3¼-mile length, and passes through the beautiful redwood stands in Guerneville Park.

Placing of steel tie rods in construction of retaining walls proved a problem, as did construction of two concrete bridges on timber pile bents.

July, 1939—NEW DIVIDED APPROACH TO CITY OF MERCED SOLVES FLOOD PROBLEM

Another unit of four-lane divided highway on US 99, Golden State Highway, has been completed, extending for 5.7 miles southeasterly from Merced.

Due to a series of wet winters and changed conditions caused by irrigation ditches and other factors, the highways in the vicinity of Merced have been flooded for four consecutive winters, beginning with 1935.

US 99 was the most immediate problem, with its heavy local and through traffic which had to detour many miles for considerable periods due to the depth of flood waters.

The work in general consisted of widening the existing roadbed and building a new roadbed above the flood land, and constructing new drainage structures in the old roadbed.

The project will be in effect a four-way divided highway most of the time. During extreme floods, there may be period of a few days when the old road will be closed and traffic will use the new high grade as a two-way road until the flood waters subside.

August, 1939—HYDRAULICKING HIGHWAY CUT 210 FEET DEEP COMPLETED THROUGH MOUNTAIN

10,748,000 cubic yards of earth were moved in this huge Trinity County project completed June 30. Approaches to it from Weaverville and Junction City will be completed early in 1940 . . . 25 years after the State Highways Act of 1915 provided for "an extension connecting the interior and coast trunk lines in Northern California through Trinity and Humboldt Counties, by the most direct and practicable route." The final interpretation of this called for an extension of the existing county sea lateral from Weaverville, rather than a route from Douglas City, seven miles south of Weaverville.

This decision posed problems for highway engineers and it was decided to make the cut by hydraulic means, which proved successful and economical. Operations began in early 1933. Average rate of excavation was 8,060 cubic yards per day.

The cut, 2,500 feet in length, is 2,000 feet across the top, with bottom width varying from 50 to 250 feet. It reduces the distance between Weaverville and Junction City by 2½ miles. (First survey over the mountain between the two towns was 10½ miles long.)

August, 1939—SANTA MONICA GRADE SEPARATION PROJECT SOLVES COAST ROUTE PROBLEM

The Colorado Avenue grade separation in Santa Monica will be constructed during the next nine months under a cooperative PWA contract by the city for the purpose of relieving one of the most congested and hazardous intersections on the Roosevelt Highway along the coast—one of the most heavily traveled routes in the State.

IN MEMORIAM

District II

Miles H. Elder, Highway Maintenance Man II

District IV

Joseph P. Sinclair, Metropolitan District Engineer

Mervin W. Nauert, Highway Maintenance Man II

District VII

Leonard W. Ford, Assistant Highway Engineer

District VIII

Evan G. Bower, Supervising Highway Engineer

This will consist of a 650-foot bridge carrying Colorado Avenue over Ocean Avenue, the Roosevelt Highway and the connection to Appian Way to provide a direct connection with the Santa Monica Municipal Pier, for both vehicles and pedestrians. This will greatly facilitate traffic movement, and also provide greater access to the Ocean Park area and to the highly developed beach area immediately south of the pier. Free interchange of traffic will be afforded through ramps and connections.

August, 1939—An article by Landscape Engineer Dana Bowers discussing practical roadside development points out that after some 10 years of trial, the original conception of roadside development (consisting principally of planting of trees, shrubs and flowers) is gradually giving way to the broader, more appropriate and practical concept which strives for more harmonious setting of the roadway into contours of landscape.

Two basic requirements govern an economic and aesthetic plan of highway landscape design, he points out. The cross section, or foundation, upon which the landscape plan must be fabricated requires consideration. Also, there is need for a fertile top soil blanket on newly exposed slopes to hasten revegetation and prevent erosion.

Right of Way Agents Attend 2nd Academy

The second two-week summer training academy for Division of Highways right-of-way agents was conducted August 3-15 at the University of California in Davis.

Approximately 80 of the division's junior agents and some of its newer assistant agents from the State's 11 highway districts received this concentrated 88-hour course of technical training in property acquisition and related fields.

In California's highway program, most of the land required for freeway and highway construction is purchased from private owners. Right-of-way agents are responsible for appraising these lands, negotiating their purchase, and managing them until construction begins. In the 1963-64 fiscal year, approximately 8,000 such transactions were made, representing an expenditure of nearly \$180,000,000.

"The improved productivity demonstrated by agents attending last year's academy—which already represented the top 10 percent of applicants for a right-of-way career—proves the value of the course," said J. C. Womack, State Highway Engineer. "It also spells economy in both time and money because it speeds up the translation of highway user taxes into safe, modern highways and freeways. Also, because right-of-way work is tremendously varied, our agents must supplement technical knowledge of real estate laws and values with recognition that rights of the public and the property owner must be protected. Agents must merit the public's confidence and good will through care, courtesy, and constructive cooperation."

Classroom sessions incorporated: The Right-of-Way Function (1/4 day); Right-of-Way Engineering (3 days); Appraisals (3 1/2 days); Acquisition (3 1/2 days); property management (1/2 day) and Examinations (1/2 day).

Senior members of the division's right-of-way staff served as instructors. Group conferences were scheduled as evening sessions. Classes were

DIVISION EXPANDS ROADSIDE DEVELOPMENT SECTION

Expansion and reorganization of the roadside development and landscaping program of the California Division of Highways, including establishment



D. P. VAN RIPER

of a new position of Principal Landscape Architect, has been announced by State Highway Engineer J. C. Womack.

Donald P. Van Riper, for the past 17 years in charge of landscape architectural activities for the State Office of Architecture and Construction (formerly Division of Architecture), has been appointed to the new position. Van Riper will not only assume responsibility for the State's 30-year-old roadside planting program, which now involves more than \$4,000,000 in new projects annually, but will also work with all units of the division involved in the scenic highway and roadside rest program. In addition, Womack said, he will act as consultant to other state agencies and groups, notably the Governor's Advisory Committee on Scenic Highways.

"Roadside development and aesthetics have been an increasingly important part of the state highway program for a long time," Womack pointed out. "In the past few years, the concepts of highway planning and design have expanded beyond the basic considerations of safe and efficient traffic movement, and we are thinking in terms of the driving environment,

held in the Physical Sciences Building and Olson Hall on the Davis campus, and residence were in Bixby Hall.

Rudolf Hess, Chief Right-of-Way Agent for the Division of Highways, supervised plans and curriculum for the academy, which offered opportunity for a uniform instructional pattern for agents who will apply this training in their respective districts throughout the State,

the whole corridor through which the road passes.

"We are fortunate," he added, "in finding a man of Mr. Van Riper's professional qualifications, long and varied experience and knowledge of state procedures to handle this broadened program."

The reorganization plan advances roadside development to department status, with Van Riper reporting to Assistant State Highway Engineer G. A. Hill, who is in charge of all planning functions.

Van Riper has been a professional landscape architect since his graduation with a bachelor of science degree in that field in 1929 from the University of California, Berkeley.

A native of Newcastle, Placer County, he attended Placer Union High School in Auburn before attending the university. He received his master of science degree in 1932.

His first career activity was with the National Park Service, where he engaged in both design and construction work for Yosemite and Glacier National Parks. Later he was landscape architect for WPA projects in the San Francisco Bay area, and prepared site development plans for the Hollywood Park race track at Inglewood.

From May 1939, to June 1947, with the exception of 3 1/2 years of service as a Navy officer in World War II, Van Riper was landscape architect and assistant to the superintendent of parks for the City of Sacramento.

He entered state service with the Architecture office in June 1947, as senior landscape architect and was promoted to supervising landscape architect two years later. In this position he has been responsible for site planning and development programs and related activities in connection with state building projects of all types.

Van Riper is married and lives in Sacramento. He is a member of the American Society of Landscape Architects. His local affiliations include the Sacramento Planning and Research Council and the Save the American River Association.

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Wrong-Way Warning

*Red Light, Horn, Sign
Will Alert Motorist*

The driver who tries to enter a freeway by going the wrong way onto a ramp meant for off-bound traffic now has sight and sound warning to protect him at one test location in the state highway system.

Once he makes a wrong-way decision, his action triggers a series of devices intended to jar him into comprehension of his mistake and, in turn, into immediate remedial action.

The moment his wheels touch an inconspicuous detector buried in the pavement, a 12-inch red light goes on, a horn emits a blaring sound, and an ominous red sign (bearing the message "Go Back You Are Going Wrong Way") becomes visible.

This series of warning devices is part of an experimental project launched by the State Division of Highways Traffic Department in an attempt to reduce accidents caused by wrong-way drivers.

Statistics show that approximately eight percent of fatal freeway accidents are caused by wrong-way movements, and many more persons—including the innocent victims proceeding unwarned in the right direction—are injured.

About four out of ten wrong-way incidents on freeways occur because vehicles are entering at off-ramps. Since the off-ramp is one instance where engineering ingenuity can offer considerable hope toward a solution, concentrated effort is currently being expended in this area. The experimental project is an outgrowth of this study.

The experiment, at an interchange in the Sacramento area, also incorporates advance warning for the unsuspecting right-way motorist. At the time the red light beams toward the wrong-way vehicle, an amber light flashes the other way, warning oncoming motorists that there is a need for caution.



The detector which activates the warning devices is sensitive to all wrong-way vehicles but is designed so that the movements of right-way vehicles pass unnoticed.

Evaluation of the current project will be made possible by use of a counter which will record the frequency with which the warning signs are made operational by erring motorists. The time of day as well as the date will be recorded. This will enable engineers to supplement their current information with more details on the prevalence of wrong-way movements, and will perhaps lead to other preventive measures.

The first attempt by traffic engineers to reduce the wrong-way problem was the painting of directional arrows at all freeway ramp locations. At other sites, double yellow pavement stripes have proved worthwhile where it is imperative that the motorist keep to the right.

Many people have advocated the installation of spiked barriers for use in eliminating wrong-way problems. This device, however, does not supply all the answers the engineers are seeking. For instance, once a car is disabled by the spikes—presumably with two or four blowouts—it may become a fixed-object target for the next right-way driver. In actual practice, as closely as can be estimated, in excess of 90 percent of freeway wrong-way drivers do manage, somehow, to correct their error without having an accident. This would not be true if motorists suddenly found themselves trapped with disabled vehicles.

It is hoped that the experimental sight-and-sound warning will do what other devices, including the spiked barrier, will not do: Solve the problem of wrong-way movement without leading to other accidents.

