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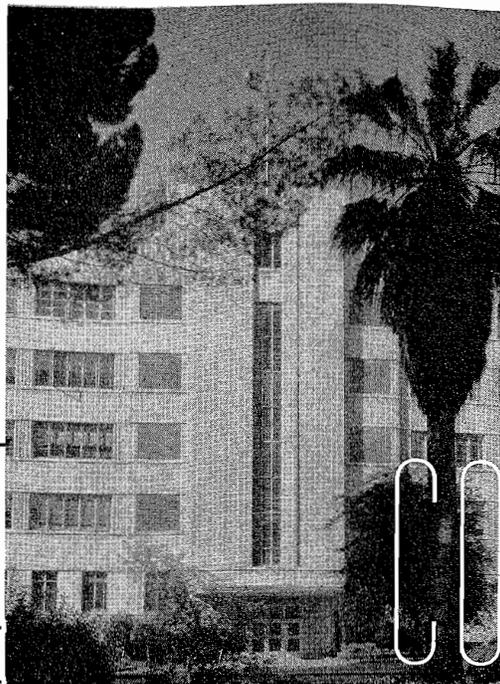
Official Journal of the Division of Highways,
Department of Public Works, State of California

KENNETH C. ADAMS, Editor

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Southern

By PAUL O. HARDING
Assistant State Highway Engineer

Progress Report on Los Angeles Highways

Freeways

SHORTLY AFTER the termination of World War II the California State Legislature under the Collier-Burns Highway Act provided financing permitting a serious start on the correction of the accumulated deficiencies upon the California State Highway System. One of the most important phases of this effort involved the construction of metropolitan freeways, prior progress on which in District VII including Los Angeles, Ventura and Orange Counties, has been reported from time to time. The last session of the Legislature provided further funds to accelerate this program of work, the results of which in expediting progress after such a short lapse of time may not be readily apparent to many citizens of the State. These added funds, however, are having a definite effect upon the progress of the freeway program, the impact of which will be gradual but positive.

ADVANCED RIGHTS OF WAY

The 1952 Session of the Legislature for the first time provided funds earmarked for advance acquisition of rights of way on freeway routes in the path of imminent residential, commercial or industrial property development. The last session of the Legislature increased these funds and converted them into a revolving fund reimbursible from regular highway users funds at such time as future construction upon such freeways is possible. Here again progress on this phase of endeavor may not be immediately apparent but the benefits both in the saving of many millions of dollars of future funds and in the expediting of the over-all metropolitan freeway program is all on the positive side of the ledger.

At the end of the war and for many years prior thereto, the state gasoline



PAUL O. HARDING

tax was 3 cents per gallon, of which $1\frac{3}{4}$ cents was available for state highways. The Collier-Burns Highway Act of 1947 increased the gas tax to $4\frac{1}{2}$ cents per gallon and supplemented this by other motor vehicle fees, which, however, were more than offset by a 2-cent-per-gallon allocation to cities and counties for roads and streets off the highway system. The 1953 Legislature increased the state gasoline tax to 6 cents per gallon, also increasing supplemental taxes in proportion, but made this increase effective for only two years, after which both the gas tax and supplemental fees are to be decreased to the $5\frac{1}{2}$ -cent equivalent. The 1952 Legislature had provided \$10,000,000 for advance rights of way, which was converted into a revolving fund and increased to \$30,000,000 at the 1953 Session of the Legislature.

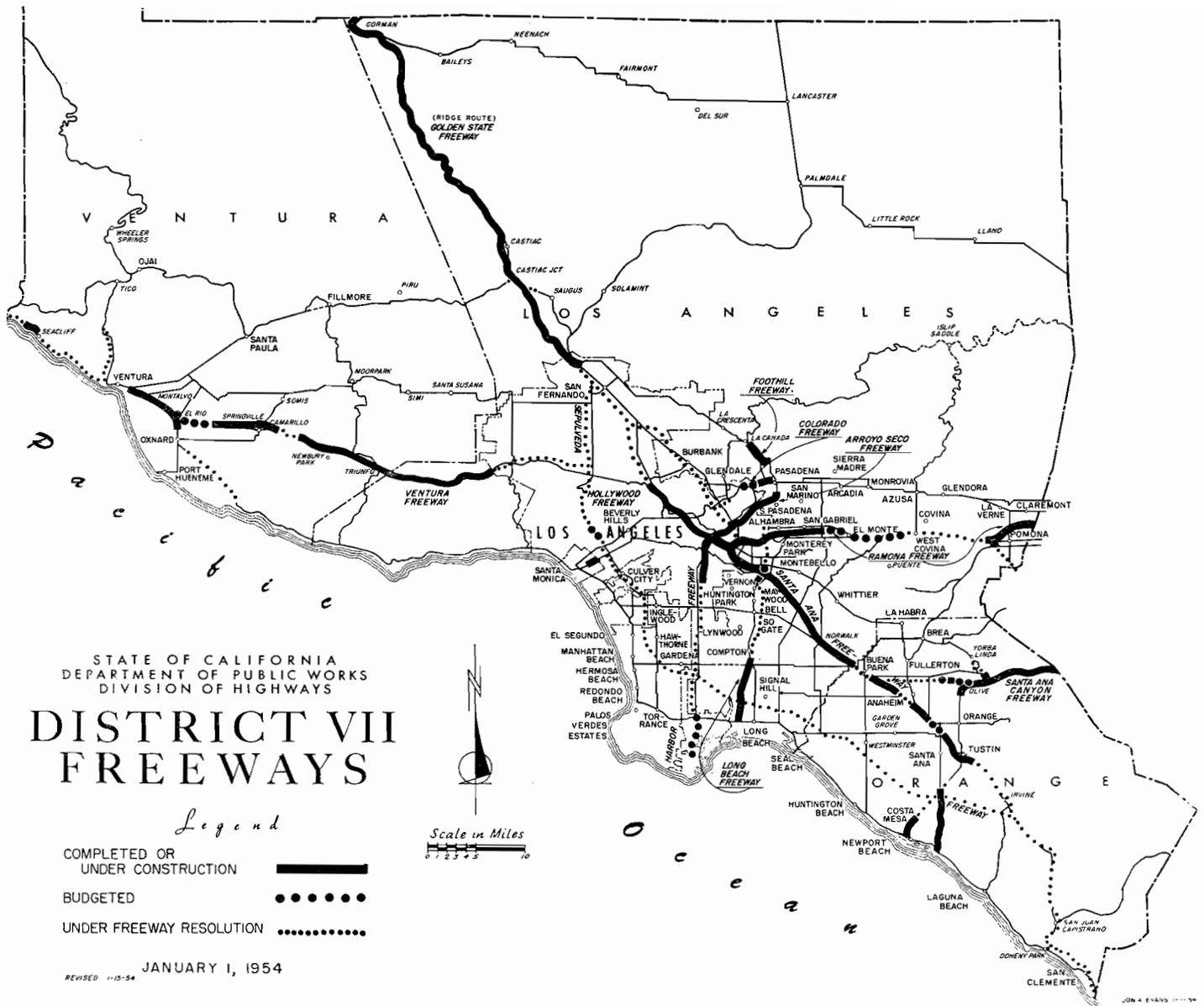
LOS ANGELES AREA

In the metropolitan Los Angeles area those freeways of the system providing the greatest traffic service are, naturally, those which lie through the most densely settled areas where the right-of-way problem is extremely acute and may entail 60 percent or more of the total cost of the project. Planning for such freeways must be on the basis of providing sufficient right-of-way funds to permit construction for traffic relief at the earliest possible date. The immediate effect, therefore, of the additional funds allocated to this important metropolitan area in the 1953-54 Fiscal Year was an allocation of some 56 percent of the total District VII budget for rights of way involving the acquisition of an estimated 3,600 parcels. Work on this acquisition, upon which construction will largely follow in the 1954-55 Fiscal Year, has been progressing most satisfactorily.

Our policy has always been to clear acquired right of way immediately ahead of construction, so that work upon this heavy right-of-way program is not readily apparent to the public. Next year much more tangible evidence will be presented in the form of construction accomplishment. Previous right-of-way acquisition, however, permitted some acceleration of construction in the present year, although most projects now being completed and opened for travel are largely the result of the original Collier-Burns financing.

FULL FREEWAYS

Within the Los Angeles metropolitan area the freeways are being developed on a full freeway basis with all conflict of cross traffic eliminated by grade separation bridges, and all in-



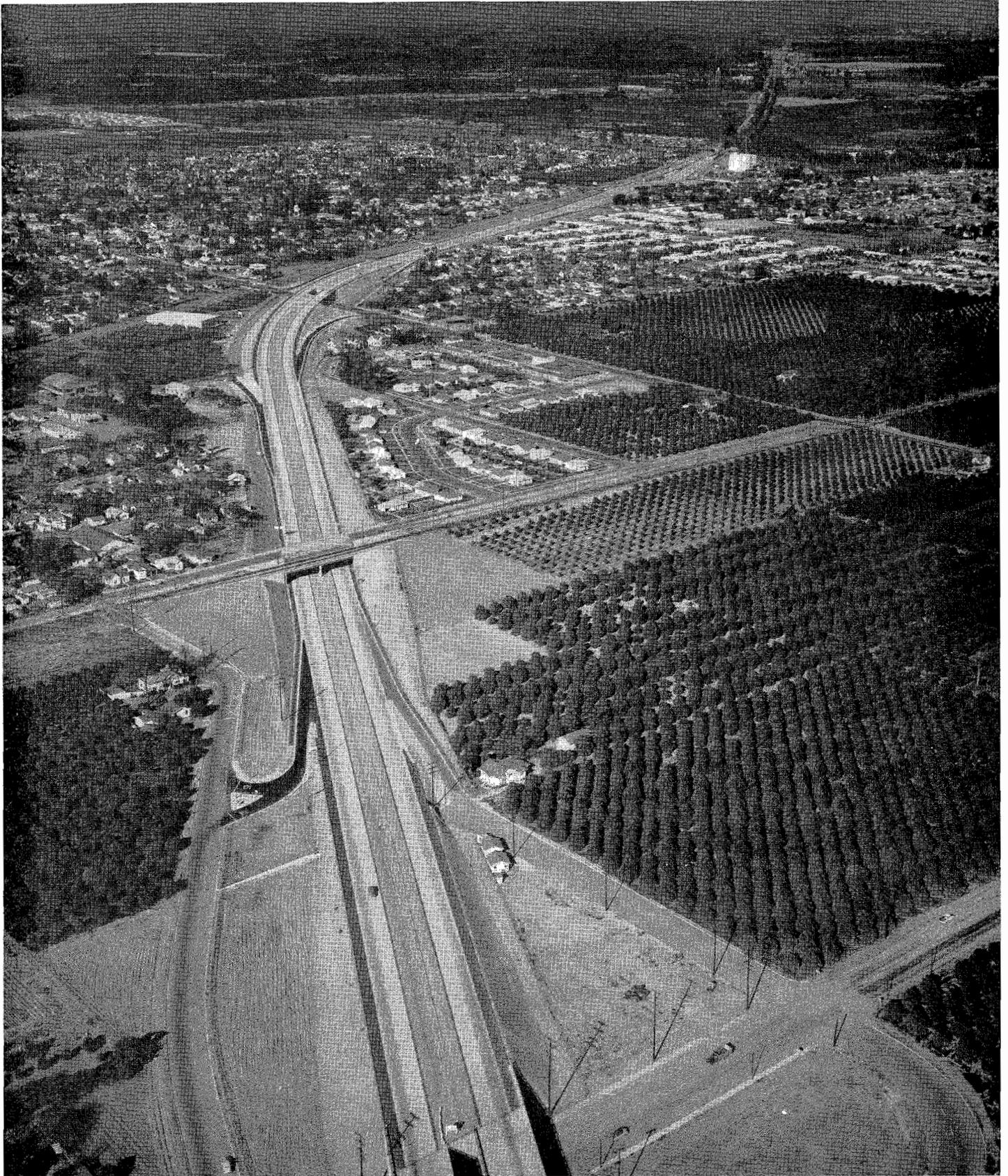
gress and egress rights of abutting properties along the freeway completely eliminated. Other District VII freeways in outlying rural or semi-rural areas are, technically speaking, expressways. The rights of way are obtained largely on a freeway basis. The access is definitely controlled. The first construction is on a stage basis as a four-lane divided highway with channelized and signalized intersections at grade provided for cross-traffic arterials. The plan is that at some later date when funds are available and traffic demands so warrant that grade separation bridges will be built in place of the highway intersections at grade.

The accompanying map and tabulation showing status of District VII freeway projects indicate in a general way the progress that has been made. To date of January 1, 1954, a total of 133 miles of freeways and expressways have been completed in District VII and 40 miles are under construction. The total sum to date that has been expended for completed freeways, freeways in progress and right-of-way acquisition therefor is \$259,000,000. The budget for the 1954-55 Fiscal Year recently adopted by the California Highway Commission allocates a total of \$63,000,000 for expenditure upon District VII freeways. Thus, the total expended and obligated for District VII freeways is now \$322,000,000.

Brief description of the status of each of the District VII freeway projects follows:

Hollywood Freeway

Fully financed and completed, except for one mile now under construction, is the entire 10-mile length of the Hollywood Freeway between Spring Street in the Los Angeles Civic Center and Vineland Avenue in the San Fernando Valley. Construction under contract is in progress between Highland Avenue and Hollywood Boulevard by the Bongiovanni Construction Company with estimated completion of pavement during April, 1954. The exact date depends upon



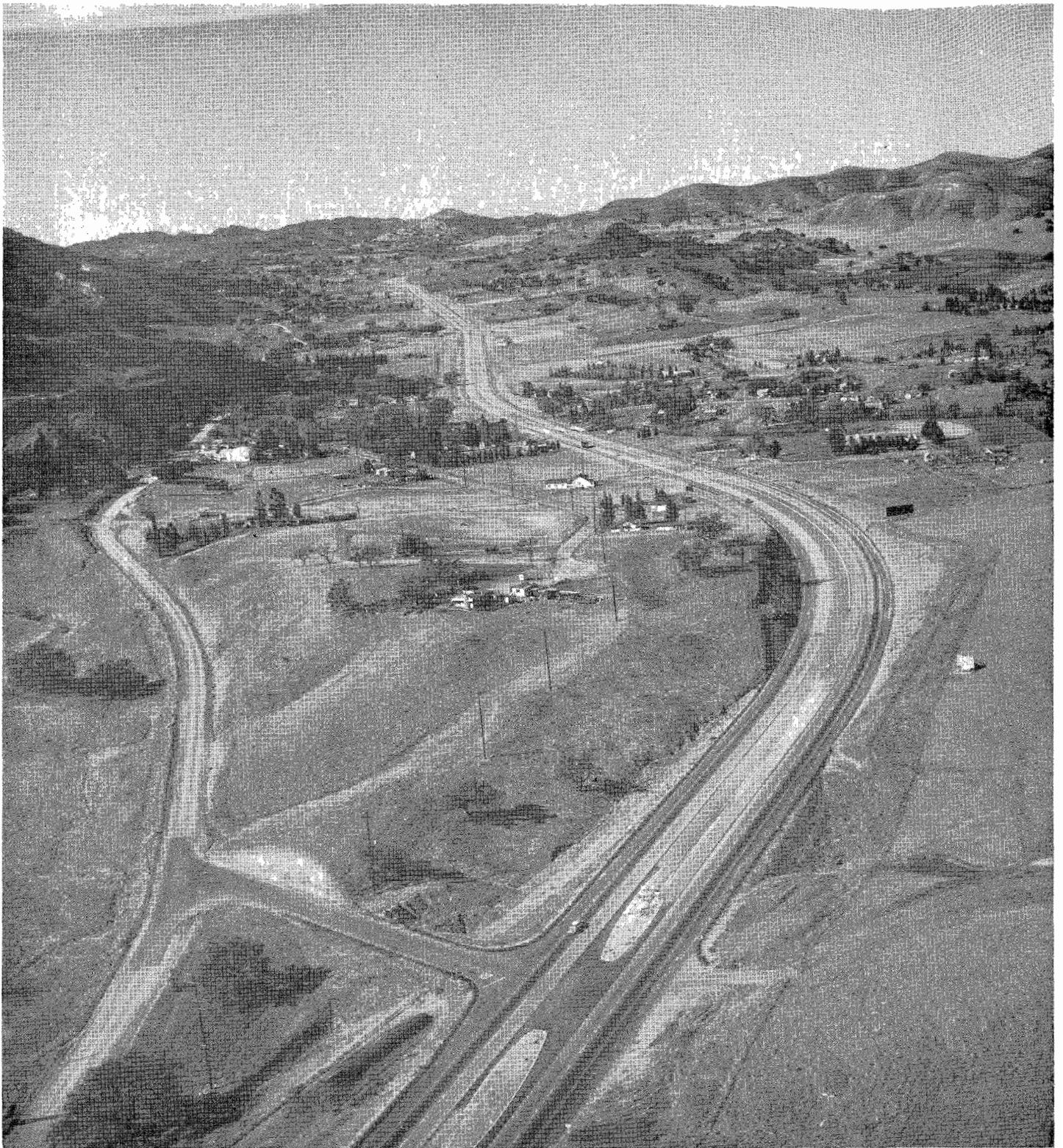
Looking northwesterly along Santa Ana Freeway, showing Grand Avenue Undercrossing in foreground; Lincoln Avenue Overcrossing and Santa Fe Railroad grade separation shown center left



Looking southeasterly along grading operations for Golden State Freeway in Weldon Canyon. San Fernando reservoirs skirted by Sepulveda Boulevard shown in background.



Looking westerly along the Santa Ana Canyon Freeway, showing in foreground junction with Yorba Boulevard. Santa Ana River in background.



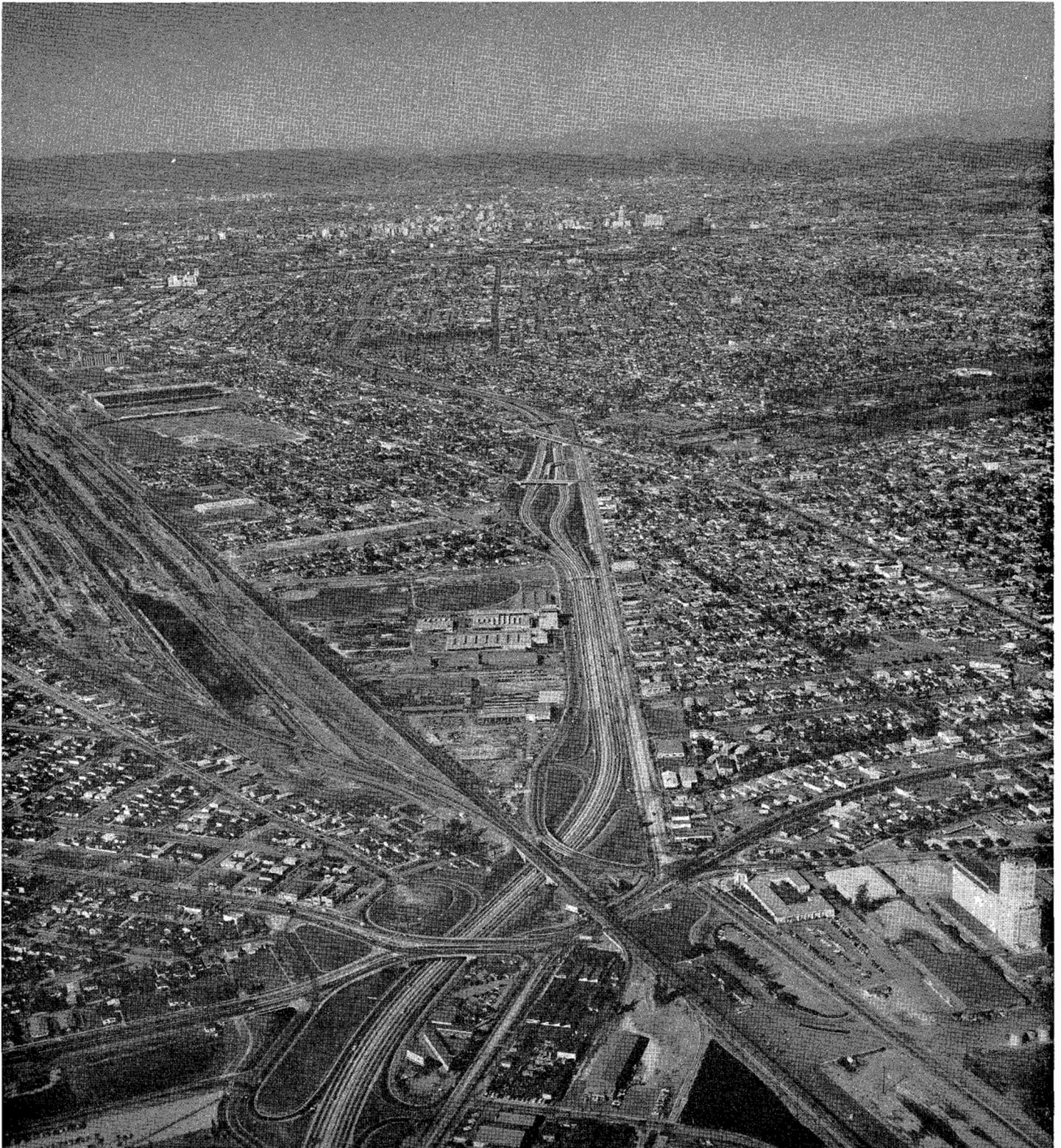
Looking westerly along completed section of Ventura Freeway through community of Agoura. Old state highway now used as local road on left.

the uncertain weather conditions prevailing at this time of year. Total cost of the completely financed Hollywood Freeway including certain deferred right of way costs is \$55,000,-

000. Traffic count is 125,000 vehicles per day.

The total length of this freeway from Spring Street in Los Angeles to Browning Avenue south of Tustin in

Orange County is 35.0 miles and to date \$51,000,000 has been expended for right-of-way acquisition and construction. Much of this freeway in Orange County is a limited access ex-



Looking northwesterly along completed Santa Ana Freeway, showing in foreground mixmaster interchange, with Atlantic Boulevard and Union Pacific Railroad being carried over the freeway

pressway with the grade intersections of cross-traffic arterials channelized and signalized. Fourteen miles of continuous full freeway are now open to

public traffic on the Santa Ana Freeway between Spring Street in the Los Angeles Civic Center and Pioneer Boulevard in the Norwalk area.

The next section of the Santa Ana Freeway to be completed and opened to public traffic will be the additional two-mile length from Pioneer Boule-



Looking northwesterly along completed Santa Ana Freeway, showing Lakewood cloverleaf traffic interchange in foreground

ward to Rosecrans Avenue. It is anticipated that this will be opened in October, 1954.

In the 1954-55 budget passed by the State Highway Commission at its meeting in Sacramento on November 19, 1953, there is an item of \$2,450,000 for widening the existing bridge on the Santa Ana Freeway on Aliso Street over the Los Angeles River an additional 42 feet and more, as necessary, to provide for an eight-lane free-

way with central dividing strip and with on and off ramps where required. Also in this 1954-55 budget is an item of \$1,534,000 to build grade separation structures at signalized intersections of cross-traffic arterials between Rosecrans Avenue and the Orange County line. Another item in this budget provides \$3,828,000 for freeway construction of portions between Broadway in Santa Ana and the Orange County-Los Angeles County

line. Traffic count on the completed Santa Ana Freeway in the City of Los Angeles is presently 68,000 vehicles per day.

Arroyo Seco Freeway

Completed and opened to all traffic throughout entire length of eight miles from the four-level traffic interchange structure in Los Angeles to Glenarm Street in Pasadena. Connection with four-level traffic interchange



Looking southerly along Harbor Freeway. Four-level traffic interchange shown in center foreground.

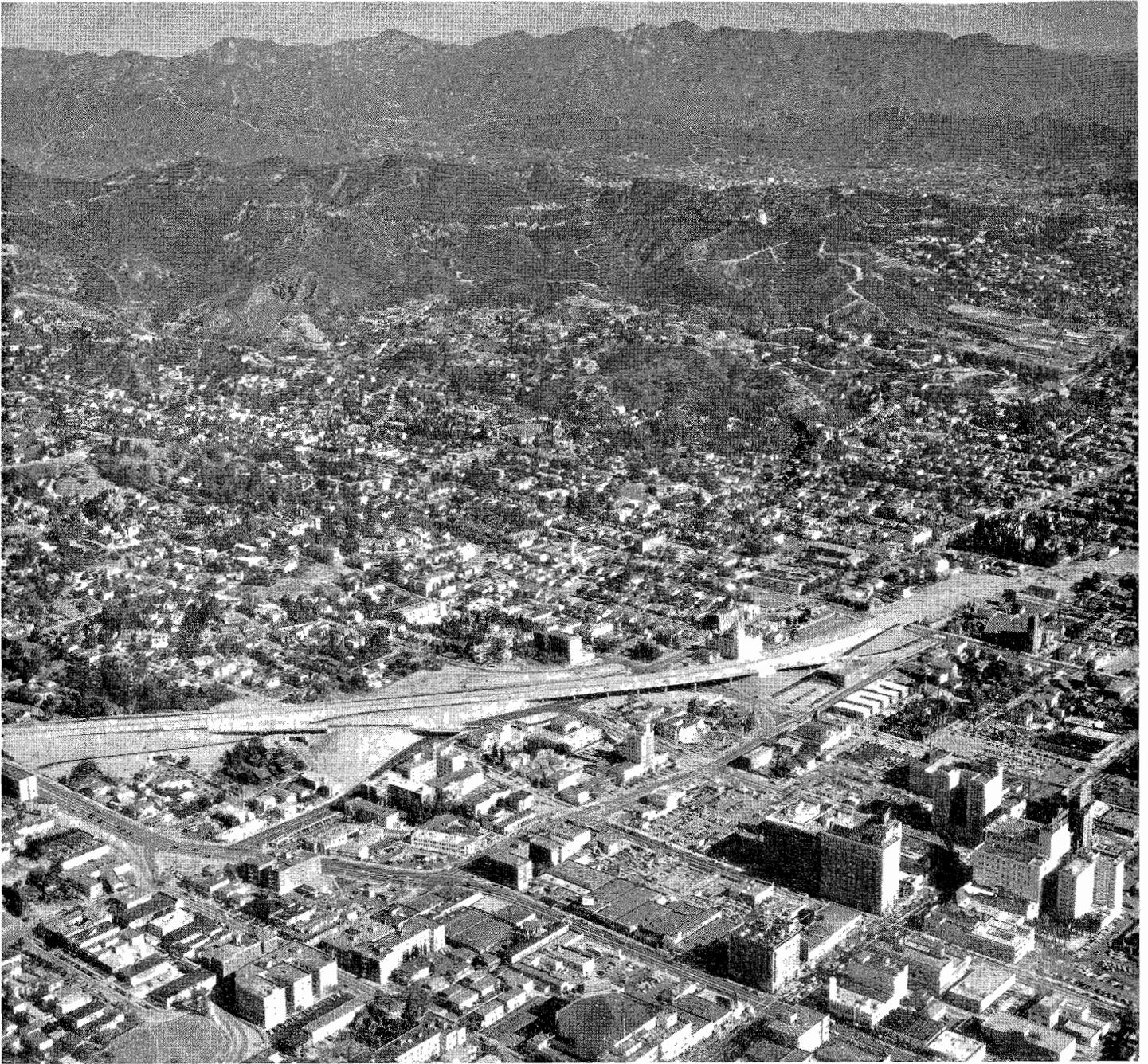
structure was made on September 22, 1953. On that date for the first time all levels of this unique traffic interchange structure, and all connecting roadways, were put into operation. The total cost of the Arroyo Seco Freeway is \$11,000,000. A recent traffic check in a peak evening hour (4.15-5.15 p.m.) indicated that the Arroyo Seco Freeway through the four-lane outbound tunnels carries 8,006 vehicles which is in excess of 2,000

vehicles per lane per hour. This is the accepted basic or theoretical maximum capacity per lane under ideal conditions.

Ramona Freeway

The total length between the junction with the Santa Ana Freeway at the Aliso Street Bridge over the Los Angeles River to the San Bernardino County line is 31.4 miles. The Ramona Freeway is now completed from the junction with the Santa Ana Freeway

in Los Angeles easterly to San Gabriel Boulevard in Alhambra, a distance of 8.5 miles. It is expected that the additional mile to connect the Ramona Freeway with Rosemead Boulevard providing a total of 10 miles of completed Ramona Freeway will be ready to open to traffic early in February, 1954. Also under construction on the Ramona Freeway in District VII is the 6.3-mile length through the Cities of Pomona and Claremont from



Looking northeasterly from above Hollywood business district, showing completed Hollywood Freeway from Cahuenga Boulevard on left to Gower Street on right. Long viaduct in center carries Hollywood Freeway over Argyle Avenue and Franklin Avenue.

San Dimas to the San Bernardino County line. The scheduled date for completion of this construction is January, 1955.

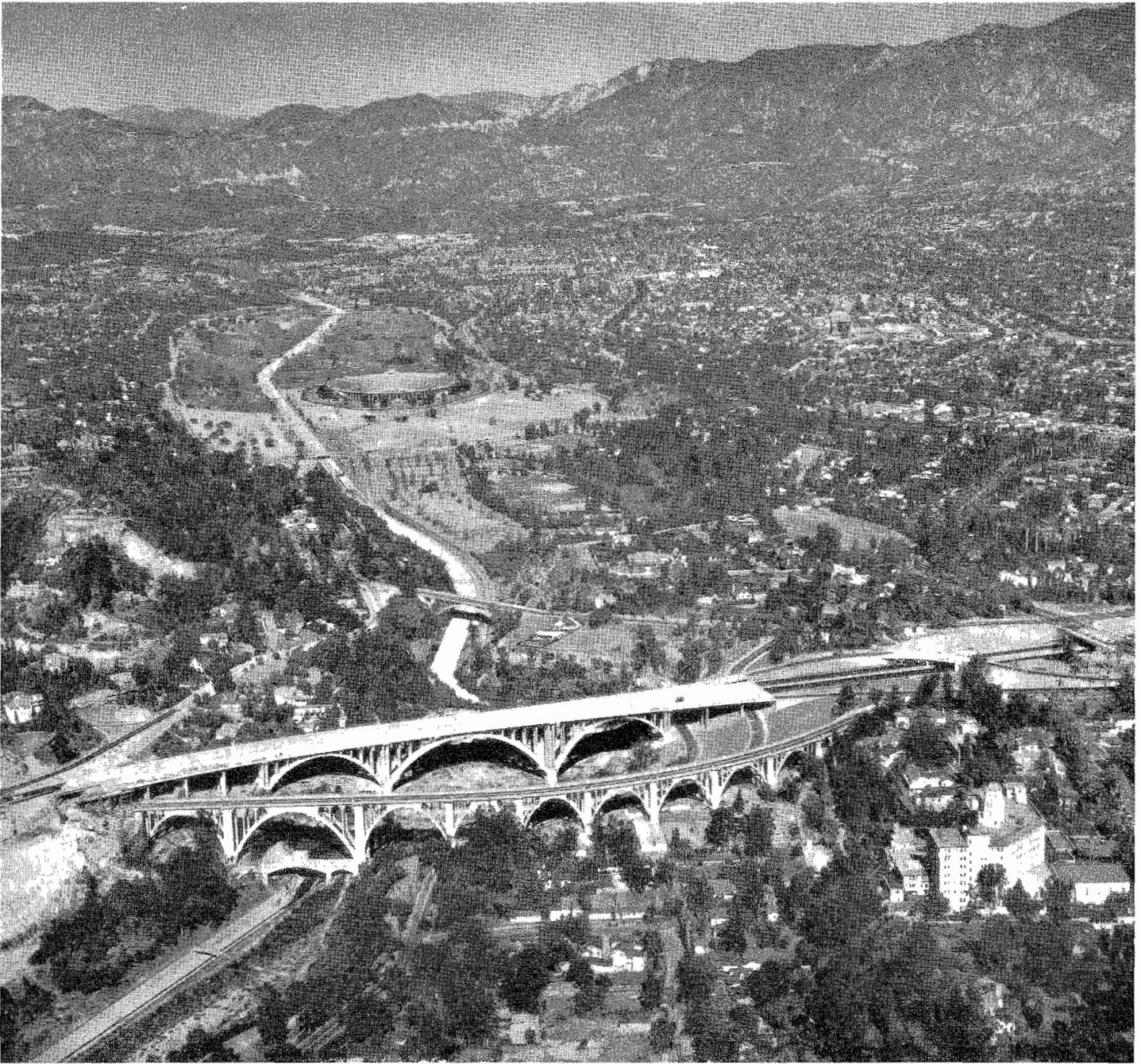
Including completed freeway contracts under construction and right-of-way acquisition there has been expended on the Ramona Freeway \$30,000,000. In the budget for the 1954-55 Fiscal Year there are two items for continuing construction through the

City of El Monte extending from Rosemead Boulevard, a distance of 7.3 miles, to Puente Avenue. The total allocation for these two items is \$13,050,000. Traffic count on the Ramona Freeway near the Los Angeles end is 52,000 vehicles per day.

Harbor Freeway

The Harbor Freeway from the intersection with the four-level traffic

interchange structure near the Los Angeles Civic Center to Battery Street in the San Pedro area is 22.8 miles in length. Of this amount only 0.6 of a mile has been fully completed, although southbound traffic is exiting at Sixth Street and at Wilshire Boulevard, while northbound traffic is now entering this freeway at Fifth Street and Third Street. It is expected that a total of one and one-half miles will



Looking northerly along Arroyo Seco, showing old Colorado Street Bridge and new Colorado Freeway Bridge, with Rose Bowl at center left

be completed and opened to traffic as far south as Olympic Boulevard by April 15, 1954. Completion between Olympic Boulevard and 23d Street at Flower Street is anticipated for December, 1954. To date there has been spent or obligated for right-of-way acquisition and construction on the Harbor Freeway the sum of \$42,000,000. It is anticipated that early in 1954, financed from an allocation in the 1953-54 budget of \$3,660,000, a con-

tract will be advertised and awarded for continuing construction on the Harbor Freeway southerly from 23d Street to 42d Street. In the construction budget for the 1954-55 Fiscal Year there is an item of \$4,650,000 for three miles of construction at the southerly end of the Harbor Freeway from just northerly of Pacific Coast Highway (Route 60) to Battery Street in the San Pedro area. Nearly all of the required right of way for this

project has been obtained. It is expected that this contract will be advertised and work under way early this summer.

Golden State Freeway

On the portion of the Golden State Freeway known as the "Ridge Route" between Tunnel Station and the Kern County line, 45.2 miles has been converted to a four-lane divided expressway. The total cost of this recon-

struction, completed February, 1953, was \$13,500,000. Under construction also on the Golden State Freeway southerly of Tunnel Station to provide junction with State Highway Routes 23, 157 and 158 is the construction by Griffith Company, contractors, of 3.0 miles of freeway with a contract allotment of \$3,300,000. This is scheduled for completion June 15, 1955. This construction is reported in detail by Resident Engineer Robert H. Butler elsewhere in this issue of *California Highways and Public Works*.

Ventura Freeway

The Ventura Freeway from Vine-land Avenue in the San Fernando Valley to the Santa Barbara County line is 61 miles in length. Of this mileage, 22.9 miles have been converted at a

UPPER—Looking northerly along Harbor Freeway construction in progress from Third Street southerly; bridge in foreground carries Venice Boulevard under the freeway. Downtown Los Angeles business district shown center right; City of Pasadena shown in background

LOWER—Ramona Freeway looking northeast, showing cloverleaf traffic interchange at Atlantic Boulevard



STATUS OF DISTRICT VII FREEWAY PROJECTS

January 1, 1954

	Total miles	Completed projects		Under contract		Right-of-way costs
		Miles	Construction costs	Miles	Construction costs	
Hollywood Freeway; Spring St. to Vineland Ave.-----	10.0	8.9	\$25,933,700	1.0	\$3,006,900	\$24,151,300
Santa Ana Freeway; Spring St. (Los Angeles) to Brown- ing Ave.-----	35.0	24.0	27,693,200	9.0	11,750,900	12,089,300
Arroyo Seco Freeway; Four- level structure to Glenarm St. (Pasadena)-----	8.0	8.0	9,238,000	0.0	52,900	1,009,100
Ramona Freeway; Junction with Santa Ana Freeway— Claremont at San Bernar- dino county line-----	31.4	7.6	10,676,000	8.5	8,230,300	11,658,000
Harbor Freeway; Hollywood Freeway to San Pedro----	22.8	0.6	6,717,500	2.4	4,758,200	30,994,900
Ridge Route; Tunnel Sta- tion to Kern county line--	45.2	45.2	11,735,400	-----	-----	1,783,000
Golden State Freeway; Olym- pic Freeway to Tunnel Station-----	29.8	-----	-----	3.0	3,656,700	968,900
Ventura Freeway; Vineland Ave. to Santa Barbara county line-----	61.0	23.1	6,158,100	9.8	2,038,200	4,786,100
Santa Ana Canyon Freeway; Newport Beach to River- side county line-----	26.0	12.9	3,056,100	-----	9,000	1,162,800
Sepulveda Freeway; San Fer- nando Reservoir to El Toro-----	72.5	0.0	-----	0.0	-----	5,097,700
Allesandro Freeway; Los Angeles River to Ave. 36 near Eagle Rock Blvd.---	1.2	0.0	-----	0.0	-----	2,005,600
Colorado Freeway; Patrician Way to Kensington Place--	1.4	0.3	272,100	1.2	5,192,400	2,127,100
Long Beach Freeway; Pacific Coast Highway to Hunt- ington Drive-----	21.8	2.8	2,703,400	5.3	7,402,500	10,697,900
Totals-----	366.1	133.4	\$104,183,500	40.2	\$46,108,000	\$108,531,700

Allesandro Freeway

Right-of-way acquisition on the Allesandro Freeway has been limited to the 1.2 miles easterly of Fletcher Drive between the Los Angeles River and Avenue 36 near Eagle Rock Boulevard. The total expenditure to date for right-of-way acquisition is \$2,000,000.

Colorado Freeway

In the City of Pasadena from Ken- sington Place to Patrician Way, a dis- tance of 1.4 miles, 0.3 mile of the Colo-

rado Freeway has been completed and 1.1 miles is now under construction. This includes the new six-lane free- way bridge over the Arroyo Seco near the Rose Bowl and just northerly of the existing Colorado Street Bridge. This new freeway bridge is nearing completion and two-way traffic is now moving over the northerly half of the new bridge. To date \$7,500,000 has been spent or obligated on this free- way. In the budget for 1954-1955 is an item for continuing the Colorado

cost of \$11,000,000 to four-lane di- vided highway or expressway with limited and controlled access. This completed construction is all westerly of the west city limits of Los Angeles at Calabasas. Within the City of Los Angeles, the State Highway Commis- sion has adopted a freeway resolution covering 10 miles of the Ventura Freeway from Calabasas to Sepulveda Boulevard.

Santa Ana Canyon Freeway

From Newport Beach to the River- side County line is a distance of 26 miles. Of this distance, a length of 12.9 miles in the Santa Ana Canyon has been completed as a limited access expressway at a cost of approximately \$5,000,000. On October 2, 1953, two miles of this freeway at the southerly end through the City of Costa Mesa was completed, also on an expressway basis. The total cost of the construc- tion through Costa Mesa was \$800,000. This latter construction was reported by Resident Engineer J. L. Needham in the November-December, 1953, is- sue of *California Highways and Public Works* magazine starting on page 44.

Sepulveda Freeway

On the Sepulveda Freeway between Venice Boulevard and the Long Beach Freeway, a distance of 33 miles, \$5,- 000,000 has been spent to date for right-of-way acquisition at critical lo- cations in order to acquire rights of way in advance of major improve- ments to private property where de- lay would have made future right-of- way acquisition very costly. The first unit of construction on this freeway, between Waterford Street and Casi- ano Road, will be financed from the allocation of \$800,000 in the 1954-1955 budget made by the State Highway Commission at its November 19, 1953, meeting in Sacramento, for construc- tion. An important item in this pro- posed construction is a grade separa- tion bridge at crossing with Sunset Boulevard.

The State Highway Commission has adopted a freeway resolution extend- ing the Sepulveda Freeway for an ad- ditional 39.5 miles into Orange County to a junction with Route 2 near El Toro.



Aerial view looking northeasterly, showing Harbor Freeway from Seventh Street, foreground right, to Third Street, center left. Los Angeles City Hall and Civic Center buildings, center background.

Freeway westerly from Patrician Way to Eagle Vista Drive in the Eagle Rock area, for which the allocation is \$1,320,000.

Long Beach Freeway (Los Angeles River Freeway)

The total length of the Long Beach Freeway from Pacific Coast Highway (Route 60) in Long Beach to Huntington Drive approaching the City of Alhambra is 21.8 miles. As of the present time, 2.8 miles have been completed from Pacific Coast Highway northerly to 223d Street. A length of 5.3 miles is now under construction between 223d Street and the crossing

with Atlantic Boulevard east of Compton. Also under construction in the East Los Angeles area are two railroad grade separation bridges to carry the Long Beach Freeway over the Santa Fe Railroad Freight Yards and the Union Pacific Railroad Freight Yards. Both of these structures are about one-fourth mile long and the construction cost of these two is \$2,660,000. To date there has been spent on the Long Beach Freeway for right-of-way acquisition and construction \$21,000,000. There are two construction items in the budget for the 1954-1955 Fiscal Year. One item is in the

amount of \$965,000 for construction between Sheila Street and Leonis Street, and the other item is for bridges and connecting roadways over the Santa Ana Freeway between Noakes Street and Verona Street in the amount of \$3,085,000.

Foothill Freeway

The first unit of construction on the Foothill Freeway from Hampton Road in the Flintridge area to Montana Street in Pasadena is now advertised with bids to be received February 4, 1954. The item in the 1953-54 budget for this work is \$2,722,000.



Looking northeasterly, showing four-level traffic interchange in center of photograph; Hollywood Freeway extending from center left to upper right, and Harbor Freeway and Arroyo Seco Freeway extending from lower right to upper left

CONCLUSION

The accompanying photographs and map portray more concretely the progress on certain sections of the above described freeways. They cannot, however, indicate the extensive right-of-way acquisition being made considerably in advance of future consideration. Nor can they indicate the benefits of the advance right-of-

way acquisition program, which represents an entirely separate effort than our regular program of work. Since this advance money for right-of-way acquisition first became available, the State Highway Commission has adopted 138 miles of freeway routes in District VII which would have been impossible to adopt without this protective procedure. At long last the

State Division of Highways can step out ahead and make real progress in coordinating its future freeway program with the over-all community planning of local city and county planning agencies.

Any over-all program of metropolitan freeway progress affects the lives of so many of the citizens of the community that even a regular or imme-

diate program requires the most careful planning of each step of the procedure. These steps must follow in orderly sequence to provide an accomplished result. Operations of any step of procedure cannot be turned on and off like a water faucet. Any such large undertaking requires time to organize and gain momentum, and cannot be suddenly stopped without serious consequences to the community. We have well started the momentum of achievement made possible by the additional funds provided by the Legislature at its last session. In view of the urgent traffic needs of all sections of this metropolitan area, it is hoped we will be able to retain the momentum so gained.

Looking northerly along Long Beach Freeway adjoining the Los Angeles River. The bridges in order are Anaheim Street, Pacific Coast Highway, Willow Street, and 223d Street. →

Looking northwesterly along Hollywood Freeway, showing Hollywood business district, center left; bridge at left carries freeway over Gower Street, the long viaduct in center carries freeway over Argyle Avenue and Franklin Avenue. San Fernando Valley is shown in the background. ↓



GOAL OF SAFER SCHOOL CROSSINGS

A booklet designed to enhance cooperative efforts toward the goal of safer school crossings has been published by the Division of Highways Traffic Department.

It is entitled "School Crossing Protection—Signs, Signals and Devices," and brings together for easy reference the basic laws and regulations.

Subjects covered in the booklet include school safety patrols, adult guards, standard signs (illustrated in color) and flashing yellow lights, both permanent and portable.

Copies of the booklet are being made available to school administrators, and upon request to public officials and to individuals and organizations concerned with the safety of school children in traffic.

ICE ON BRIDGES

Winter drivers are warned by the California State Automobile Association to be wary when crossing bridges. Icy spots form more quickly on bridges than elsewhere.

Tulare Bypass

*Traffic Congestion Through City
Eliminated by Freeway*

By ROY F. JOHNSON, District Construction Engineer

OPENING of the freeway around the City of Tulare, extending from Tulare Airport on the south to the Tagus Ranch on the north, was accomplished with appropriate ceremonies at 2 p.m., on December 11, 1953.

This completes the first section of full freeway constructed in District VI and will eliminate the bottleneck

caused by through traffic going through Tulare.

The ribbon cutting was attended by many local citizens, officials of the Chamber of Commerce of the City of Tulare, with the ribbon being held by District Engineer E. T. Scott and Supervisor Halver Haddock and being severed by Golda Voorhees and Bar-

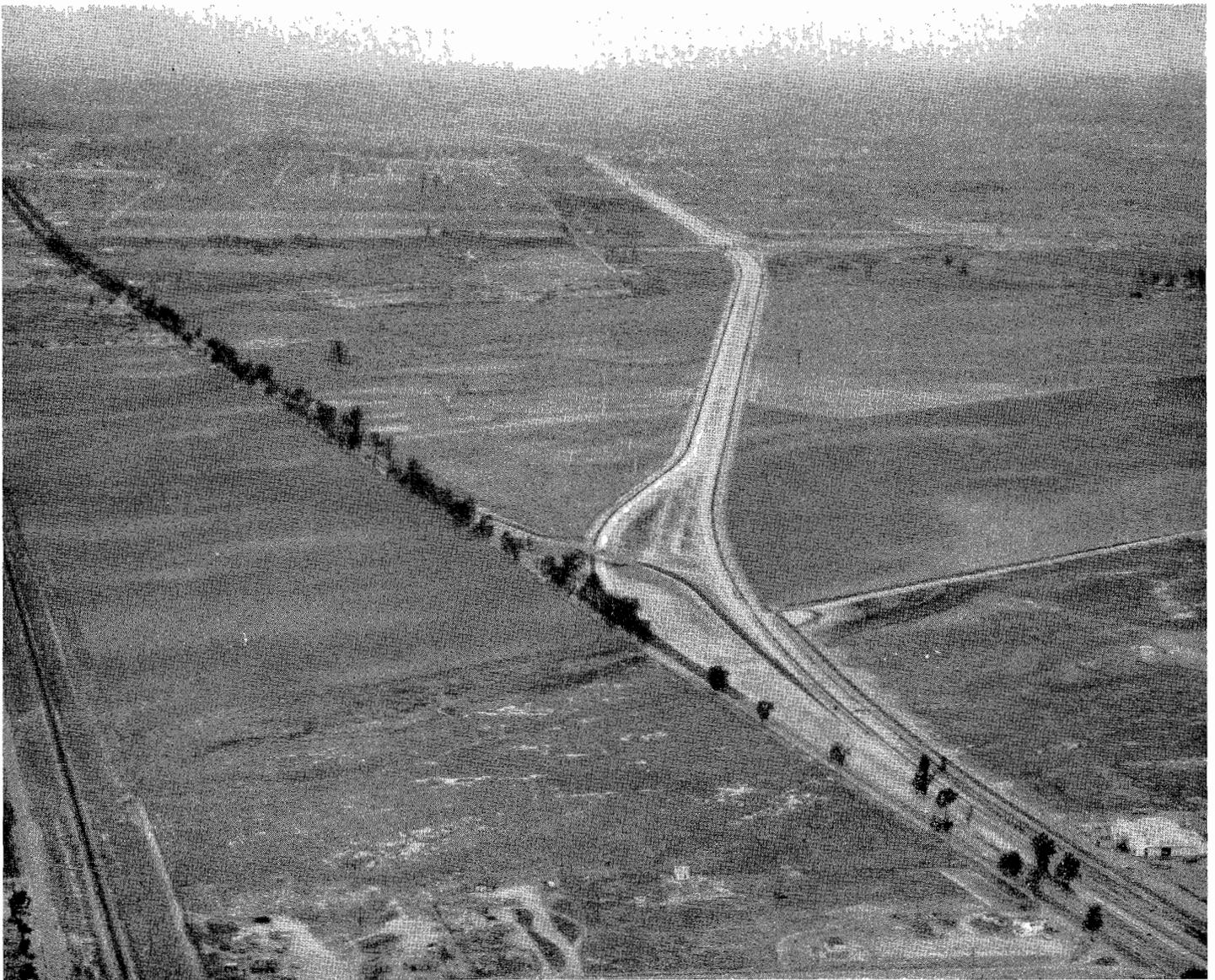
bara Gilbert, students of Tulare High School.

Stage Construction

Improvement was accomplished as stage construction under four contracts as follows:

- (1) Contract 51-6VC5,F, United Concrete Pipe Corporation, Baldwin Park, California, Contractor.

This aerial view shows the Tulare By-pass Freeway



- (2) Contract 52-6VC8-F, Gordon H. Ball, San Ramon Valley Land Co., and Trehitt, Shields and Fisher, Fresno, California, Contractor.
- (3) Contract 53-6VC10-F, Guy F. Atkinson, San Francisco, California, Contractor.
- (4) Contract 53-6VC13, Howard Electric Co., Gilroy, California, Contractor.

The first contract, which embraced grading, installation of drainage facilities, a grade separation at the intersection of US 99 and State Route 134, and a grade separation at the A. T. & S. F. R. R. about one-half mile north of the Tulare city limit.

Separation Structures

The US 99-134 separation is composed of two parallel structures, each structure consisting of two spans about 134 feet in total length, supported on a reinforced concrete bent and reinforced concrete abutments.

These structures each provide a clear roadway width of 26 feet with one five-foot sidewalk.

The railroad separation structure is of steel plate girder construction, consisting of two spans, supported on a

CONSTRUCTION INDUSTRY SADDENED

The Department of Public Works was saddened by the sudden passing on November 25, 1953, of D. L. Morrison, Project Manager for Guy F. Atkinson Co., contractors on the Tulare Freeway.

Mr. Morrison was well known to construction personnel throughout the State, having been closely associated with highway construction for many years.

reinforced concrete bent and reinforced concrete abutments.

This contract also included paving Route 134 (Tulare-Lindsay Highway) between Blackstone Avenue and Lane Avenue.

Construction operations were well advanced when the policy of constructing all projects on new alignment on US 99 to full freeway standards was adopted. This required a revision of the plans of this contract, eliminating certain portions of the work and revising others to conform to the proposed freeway plans.

The contract covering the aforementioned work was approved on November 30, 1950, and the completed first stage project was accepted July 30, 1952.

Second Stage of Project

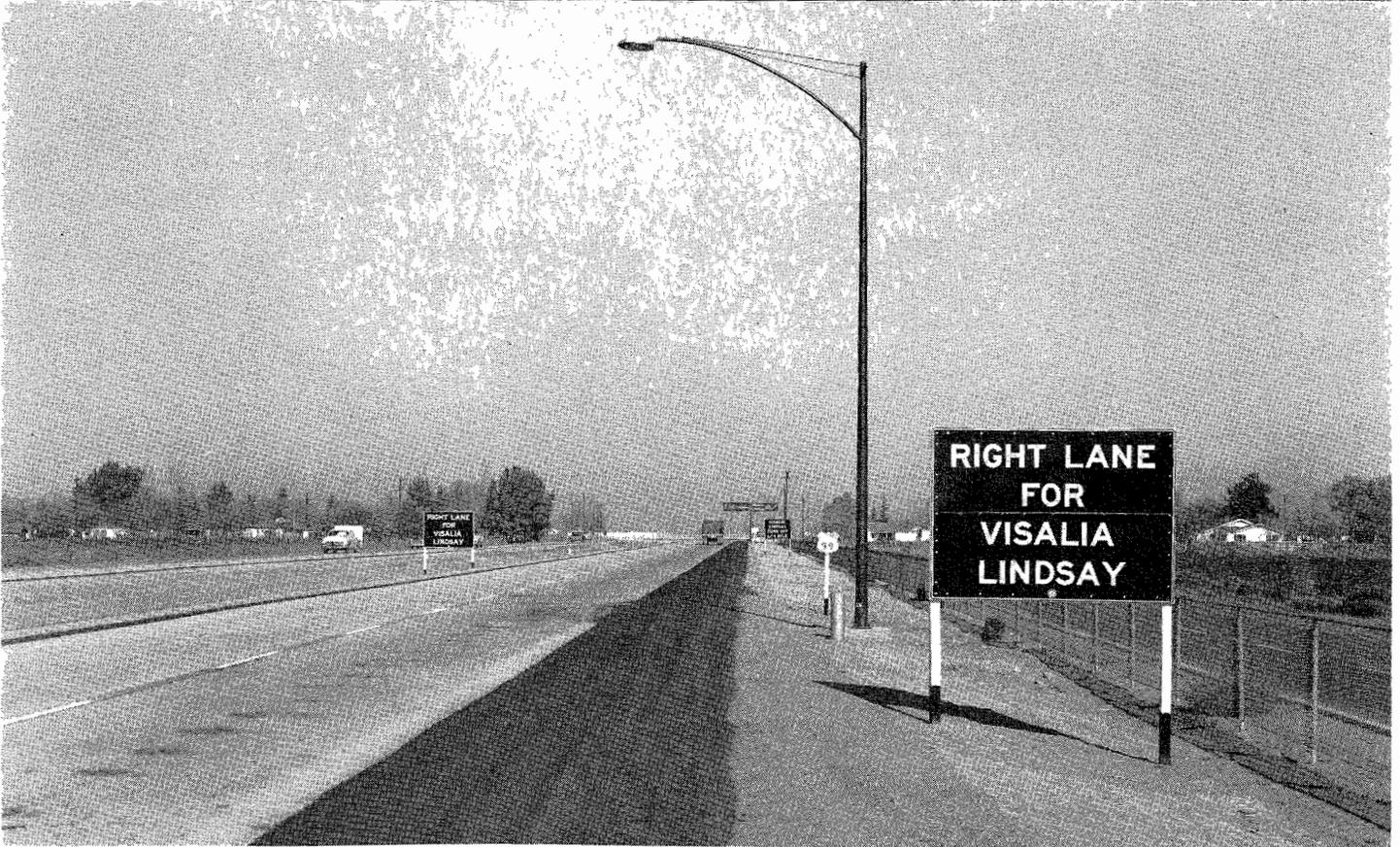
The second stage of this project was authorized under contract 52-6VC8-F and consisted of constructing six overcrossing structures, grading and surfacing bridge approach and other roads, and grading portions of the freeway.

The Airport Overcrossing and Tagus Overcrossing are reinforced concrete box girder bridges, 230 feet long, composed of three spans supported by reinforced concrete abutments and bents with concrete pile foundations. These bridges provide a clear roadway width of 22 feet.

The Hospital Road Overcrossing and Prosperity Avenue Overcrossing are of reinforced concrete box girder construction, 110 feet 6 inches long, each composed of two spans supported by reinforced concrete abutments and a center bent, providing a

District Engineer E. T. Scott, left, and Supervisor Halver Haddock hold a ribbon, which is cut by Golda Voorhees, a Tulare High School driving student, as a symbol of the opening of the Tulare Freeway. The other girl is Barbara Gilbert. Persons in the background include, from left, Harold Rainwater, Councilman Carl Miller, Marvin Fulton, John Reed, Councilman Harry Erwin, Tom Hennon, Police Chief Virgil Kelly, Captain W. E. Riley, Harry Richmond. Photo by C. Howell.





UPPER—Looking north from south end of Tulare By-pass. Overcrossing at left leads to business section of Tulare. LOWER—Looking north toward intersection of US 99 with State Sign Route 63, leading to Visalia and Lindsay.



These photographs show the traffic congestion that existed in downtown Tulare before the Tulare Bypass was completed

Channelization Reduces Accidents

By R. J. ISRAEL, Assistant Traffic Engineer

28-foot clear roadway width with two 4-foot sidewalks.

The abutments and center bent on the Hospital Road structure are on spread footings while concrete pile foundations were utilized in the construction of the Prosperity Avenue Overcrossing.

Cartmill Road Overcrossing is a reinforced concrete box girder bridge, 133 feet 2 inches long, composed of two spans supported by reinforced concrete abutments and a center bent with concrete pile foundations, providing a clear roadway width of 28 feet and one 4-foot sidewalk.

Drainage equipment at Hospital Road and US 99-134 separation consist of electrically operated pumps which discharge into a ditch, two miles long, with gravity discharge into the main canal.

Drainage water at Prosperity Road was pumped into a side ditch from which it was pumped into the Kaweah Ditch.

This contract was approved May 5, 1952, and the completed project accepted August 31, 1953.

Third Stage of Construction

The third stage of this project consisted of constructing portland cement concrete pavement on cement treated base, with plant-mixed surface shoulders, paving the Tagus and Tulare Airport Overcrossings and various ramps and outer highways with plant-mixed surfacing.

The contract for this portion of the work was approved March 16, 1953, and was completed in December.

The final stage of this project consists of furnishing and installing lighting facilities in 11 locations and illuminated signs at three locations along the freeway alignment.

It is of interest to note that this will be the first full freeway to be completed in District VI.

The major items of work required for the entire project consisted of the following:

548,000 cubic yards	Roadway excavation
33,000 cubic yards	Structure excavation
39,000,000 station yards	Overhaul
280,000 cubic yards	Imported earth materials
785,500 pounds	Structural steel
11,000 cubic yards	Portland cement concrete (structures)
19 miles	Fence
1,400,000 pounds	Reinforcing steel
50,000 cubic yards	Portland cement concrete (pavement)

and Public Works

THE ACCOMPANYING "before-and-after" accident diagrams show the favorable results obtained by channelization of the Don Pacheco Wye, the intersection of the Pacheco Pass Highway with the state highway to Hollister.

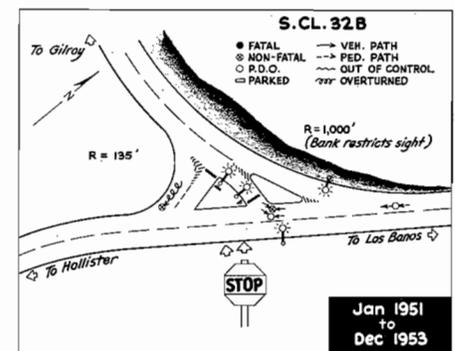
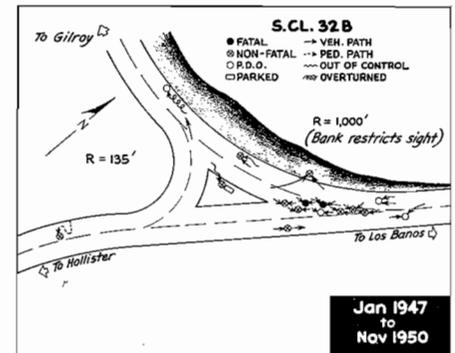
The "before" diagram shows a total of 16 accidents at this location for the 3-year and 10-month period, from January 1, 1947, to November 1, 1950. Severity was extremely high; these 16 accidents involving 3 fatalities and 30 persons injured. The primary cause of the accidents was that drivers, eastbound on the Pacheco Pass Highway, had no way of knowing whether the approaching westbound vehicles would pass harmlessly to their left or cut across in front to the Hollister Connection. Although this condition is typical at Y intersections, it was more critical at this location due to the sight restriction imposed by the adjacent cut bank and the fact that the direction of curvature masked a left-turn arm signal.

The correction consisted of the construction of a simple channelization, as shown graphically in the "after" accident diagram and the photograph. Eastbound vehicles were brought to a stop at sufficient distance from the point of the Y to be able to observe the choice of direction on the part of westbound vehicles and proceed only when it was safe to do so. Safety lighting was also placed as a part of the improvement. Work was completed on January 18, 1951.

The total cost of this completed project will be about \$2,817,076.

The work on this portion of the "Golden State Highway" was initiated under District Engineer E. T. Scott, with C. F. Oliphant as resident engineer in the early stages of construction, being succeeded by R. Windele, who was resident engineer to completion of the work.

T. J. Dunn represented the Bridge



In the after period, of almost three years, from January 18, 1951, to December 1, 1953, there have been only four accidents at this intersection. Two were property damage only accidents and the other two accidents involved three persons injured.

The total cost of the channelization and lighting at this location was \$6,491. This improvement has proved to be a sound investment in traffic safety as evidenced by the marked reduction in the number and severity of accidents.

Department, being succeeded by Walter Bedel.

Paul Wilcox and Harold Pope were the representatives of the United Concrete Pipe Corporation, William B. Spencer and Wayne Haapala, and Alvin Lee were in charge of operations on Contract 52-6VC8-F, D. L. Morrison was project manager for Guy F. Atkinson Company, and Fred Leach was superintendent for Howard Electric Company.

Motels and Freeways

By JOHN F. KELLY, Headquarters Right of Way Agent

IT IS AXIOMATIC to the motel industry that no motor court can be a continuing success unless it is well located. It is also a generally accepted theory that good location means a site on a heavily traveled highway. It follows that one of the great worries of the motel operator is that the road system, during a period of economic expansion, will be continually improved and many highways which are major arteries today may be eliminated, bypassed or become secondary routes, thereby destroying the value of his location. These fears undoubtedly are responsible for the recurrence of statements appearing from time to time in motel trade magazines that motels so affected will suffer a loss to the motel operator of from 25 percent to 50 percent * of his gross receipts.

Although considerable thought and analysis goes into the locating of a motel, no factual studies have been prepared up to this time to determine the actual economic effect of an access-controlled highway upon the motels immediately affected or within the area of influence. The majority of opinions and material published to date on the effect of highway revision has lumped together all highways, including freeways, and publicized opinions applicable to neither.

Goal of Study

This study pertains only to the effect of the freeway or the access-controlled highway. For, if a bypass of a community or the realignment of a section of highway is built on a conventional design and does not incorporate the control of access, it will offer unlimited substitute locations for all of the businesses, including motels which formerly fronted on the superseded route. Nor, does this study purport to indicate the effects of the turnpike or toll road wherein highway merchandising is under the control of the toll road authority at designated

* See *Tourist Court Journal*, December, 1953.

points along the route. Therefore, the goal of this economic study is not to determine what might be anticipated, but what has actually happened, economically to the motels adjacent to a freeway, with restricted access, and motels which have been bypassed by a freeway.

What Survey Shows

The economic studies previously made on the other types of roadside merchandising, such as service stations and cafes, have definitely shown that there is no direct relationship between the volume of traffic and gross business returns.

This study will show, through the facts obtained from a state-wide motel survey, that a successful motel business is not dependent upon just one, but a number of factors. The type of highway in front of a motel is one of several factors influencing the success or failure of motel business. The records of motels throughout the State have conclusively shown that such factors as management, age, appearance, and location can have a greater influence than the type of highway. This study will also show that with all factors equal, there are motels located on access-controlled highways in California which are more successful than comparable motels located on conventional highways.

Influence of Highway

As the study progressed, it became evident that a motel site can be directly influenced by the highway, but the general location for that site is not influenced by the highway. The selection of a location is made by the motel owner. If his selection is one of those locations in the State that has become a destination point and a popular place to stop, he has at least located his motel in an area where there are potential customers. The highway may influence individual sites in the area of his selection but will not change the area as a destination point.

The motel industry is one of the primary types of roadside business and should be highway conscious. It is not unusual that motel owners consider the highway the all-important factor which spells success or failure for a motel. Because this feeling exists among many motel owners, they are going to view any change in the highway system in the vicinity of their motel with skepticism. They are justified in feeling this way until facts are developed to prove exactly what economic effect the access-controlled highway has upon the motel industry in California.

The Division of Highways' policy is and has always been to provide the people with the best highway system possible, but not at an excessive cost to one of the large industries in the State which provide services to the highway motorist.

BASIS OF STUDY

The source of factual information in this study came directly from the motel owners. Every motel located on an access-controlled highway except those which had been located on this type of highway for an insufficient period of time to provide adequate records was contacted and requested to provide information from their records to make this factual study. The study also included motels along highway routes which had been superseded by a new highway, and motels located on conventional highways. There are so many motels in this latter category that the survey was limited to those motels on conventional highways located in the vicinity of access-controlled highways. These motels, because of their location, form an ideal group for direct comparison.

A very high percentage of the motels contacted were cooperative in furnishing all information requested. This meant revealing confidential income figures directly from their records. All of these motels were in-

cluded in the study, except those which reported incomplete or indefinite returns. As a protection to the individual motels, the income figures are reported in the study as percentages and any reference to actual receipts is through group or average figures.

Personal Contact Necessary

Although the personal contact method of obtaining facts for this study required considerable time, it was the only accurate means of obtaining correct gross income figures. Previous economic studies of other types of roadside merchandising could be made without a lengthy survey because of the available source of factual information through the State Board of Equalization. These businesses are required to report their gross income for the purpose of paying state sales tax.

The analysis in this study has not followed the familiar pattern of making a comparison before and after highway construction. Since World War II, the construction of access-controlled highways has become a continuous building program taking place at various locations throughout the State. During this same period of time, a large number of new motels have been constructed in California.

Unit of Measurement

Because of the state-wide character of this study, the variations are of such an extent that it was necessary to develop a unit of measurement which would be applicable to all motels. The only place where direct comparisons could be made were in those areas where stage construction created a situation whereby some motels were facing a freeway and others were still on a conventional highway within the immediate area. In this case, all other economic factors are equally applicable to all motels, the only difference being the type of highway frontage.

One of the most commonly used methods of classifying motel business has been the use of the occupancy factor. This system has merit in providing a guide to motel activity, but it does not furnish the authentic data required for making a factual study. The state-wide survey of motels revealed that a surprisingly small num-

ber of motel owners keep an accurate record of occupancy. This is understandable because those motel owners evidently realize that the income record which they keep for taxation purposes is their most accurate business guide. So many motel owners, and justifiably so, reduce their rental rates—sometimes quite drastically—in order to increase the occupancy of their units. The motel owners who refuse to do this might show a much lower occupancy rate, but it does not necessarily mean that their annual gross income is lower.

Test of Motel Success

In the final analysis, the motel, like any other business enterprise, must produce a good return on the investment in order to be a success. Therefore, the most accurate test of motel success is not the occupancy factor but the actual income earned.

The relationship of gross income to those factors which have the greatest influences on the motel industry is the unit of measurement which provides the answer to the question, "what is the economic effect of access-controlled highways upon motels?"

FOUR GROUPS

All facts influencing the income potential for motels were obtained and tabulated. This study included an analysis of the factual information, as well as the estimates and opinions offered by motel owners. Net income has been considered, but investigation has shown that it would be an inaccurate unit to use for comparative purposes because of the variation in management.

The gross income, as the unit of measure, was applied to the motel unit rather than the motel, because of the variance in the number of units available for rent.

After making the personal contacts with motels throughout the State, an analysis was made of all information obtained. As a result, there were a total of 98 motels with complete figures that could be used for making the study.

The gross income for the units of the 98 motels in this study ranged from an average of \$355 to \$1,744. The method of obtaining the gross in-

come per unit was determined in exactly the same manner for each of the 98 motels; the total annual gross income reported for the motel was divided by the number of units available for rent. To better analyze the gross receipts per unit, the wide range of figures has been divided into four groups.

The motel units which had gross receipts less than \$500 comprised the lowest income group. Those units showing annual gross receipts of \$1,500 or more comprised the highest group. Between the low and high income groups the gross receipts were divided into two classes; those units with annual gross incomes from \$500 to \$1,000 and those showing receipts from \$1,000 to \$1,500.

CHART 1

Gross income per unit	Percent of motels studied	Average gross receipt per unit
Under \$500	10%	\$355
\$500 to \$1,000	40%	\$707
\$1,000 to \$1,500	36%	\$1,181
\$1,500 and over	14%	\$1,744
Total	100%	

Chart 1 shows that 10 percent of the total number of motels had gross receipts under \$500 per unit and 14 percent of the 98 motels had gross receipts of \$1,500 or more.

The largest number of motels in a group, comprising 40 percent of the total, produced an income of \$500 to \$1,000 per unit. The next largest group, representing 36 percent, had annual incomes of \$1,000 to \$1,500 per unit.

In addition to the total number of motels in each of the four income groups, Chart 1 shows the average gross receipts of those motels within each of the income groups.

CHART 2

HIGHWAY LOCATION OF MOTELS IN EACH INCOME GROUP

Gross income per unit	Front-age road	Express-way	By-pass	Conv. hwy.	Total
Under \$500	50%	30%	10%	10%	100%
\$500 to \$1,000	36%	33%	10%	21%	100%
\$1,000 to \$1,500	31%	29%	14%	26%	100%
\$1,500 and over	50%	29%	0	21%	100%

Segregation of Motels

A segregation of the motels within each income group has been made with respect to the type of highway where they are located. Chart 2 shows

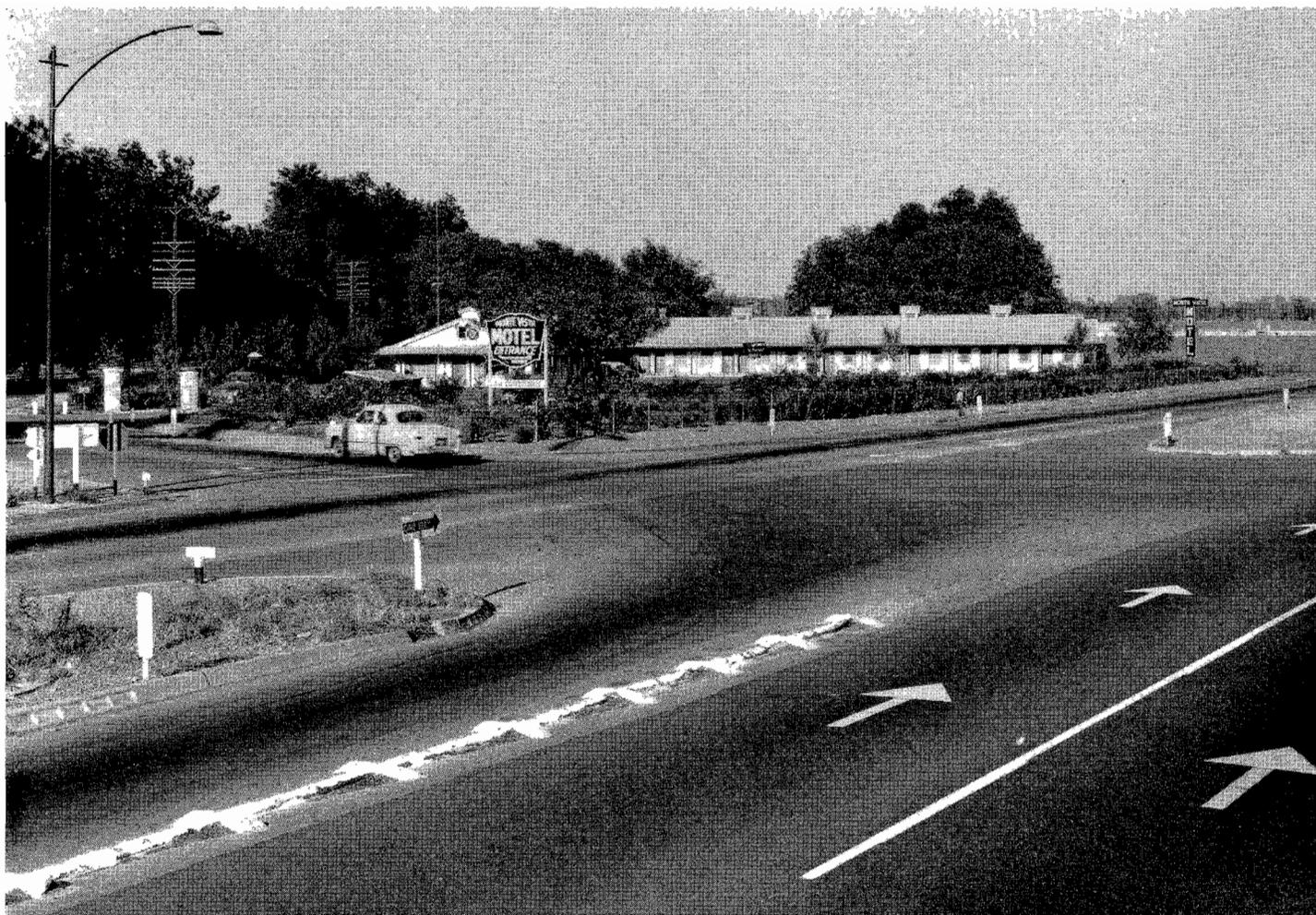


PHOTO 1—Motel on expressway near Vacaville. Access restriction along expressway requires motorists to drive on intersecting road to enter motel property. In the left portion of photo the entrance is identified by stone pillars.

that 50 percent of the motels in both the low and high income groups were located on frontage roads. On expressways the tabulation shows that within the low and high income groups the percentage number represented was nearly the same. The survey showed 10 percent of the low income motels, but none of the high income motels, located on bypassed highways. Ten percent of the low income group and 21 percent of the high income group were located on conventional highways.

The motels in the two middle income brackets, \$500 to \$1,500 per unit, comprised 76 percent of the total number of motels in the study. Approximately two-thirds of the gross returns of these middle income groups were from motels located on frontage roads and expressways.

A separate tabulation of the total gross income of the 98 motels in this study discloses that 69 percent of the total income was derived from the motels located on access-controlled highways.

The dominant factors affecting motel business are the highway influence, age, management, size, competition, and traffic. In addition to these factors, there are other influential items which should be given consideration in analyzing the motel industry, such as commercial business, motor travel association, kitchens and garages. Each factor will be shown in detail as it influenced the motels in this study.

HIGHWAY INFLUENCE

Whereas *Chart 2* reveals the highway location of motels in each income group, *Chart 3* shows the percentage representation by income group of

the motels located on each type of highway. For example, 37 of the 98 motels in the study were located on frontage roads. Therefore, the 37 represent 100 percent of the motels on frontage roads.

According to this chart, 13 percent of the motels on frontage roads had incomes under \$500 per unit, whereas 19 percent had incomes of \$1,500 or more. The remaining 68 percent of the motels on frontage roads were in the two middle income groups.

CHART 3

Gross income per unit	Frontage road	Expressway	By-pass	Conv. hwy.
Under \$500	13%	10%	10%	5%
\$500 to \$1,000	38%	43%	40%	38%
\$1,000 to \$1,500	30%	33%	50%	43%
\$1,500 and over	19%	14%	0	14%
Total	100%	100%	100%	100%

The income group representation on expressways followed a pattern

similar to the motels on frontage roads. A comparison of the income representation of the motels on access-controlled highways shows that the majority had incomes between \$500 and \$1,500 per unit.

Ninety percent of the motels located on bypassed routes were also in the middle income bracket. According to the chart, only 10 percent of the motels bypassed had incomes under \$500 per unit, and none of the motels in this group produced incomes of \$1,500 or more.

Irrespective of the influence of such factors as age, management, size, etc., *Chart 3* is a representative comparison between the access-controlled highways and conventional highways throughout the State.

AGE

Age is considered a strong factor influencing the success of a motel because of the close association of age and appearance. This close association does not necessarily mean that the two are synonymous. Many older motels have been remodeled and normal maintenance kept at such a high level that they remain in direct competition to the newest Class A motels. However, as this type of management is the exception, *Chart 4* does not make allowances for the remodeling, but indicates the average years of actual operations for each income group.

CHART 4

Income gross per unit	Average age
Under \$500	7.5 years
\$500 to \$1,000	7.8 years
\$1,000 to \$1,500	5.8 years
\$1,500 and over	3.9 years

The facts presented in *Chart 4* clearly show that the highest income group also represents the newest group of motels. The oldest motels in this study were in the next to lowest income group. Those motels in the lowest income group were found to be only slightly newer than the oldest group; whereas the difference in age between the other income groups is considerably greater.

Our study indicated that it was not impossible to apply corrective measures to offset this income-age ratio. The average motorist, upon reaching his destination, will generally select the most attractive motel available.

Although older motels may be as well maintained as a new one, the motorist's selection is primarily based upon the general appearance which indicates the age.

To offset this factor, the owner-manager of a successful older motel recently stated that it was necessary to spend several thousand dollars each year in modernizing his motel units. The expense was required so that this older motel could compete with the new motels being constructed in the nearby vicinity. This motel operator further stated that his motel was a Class A business several years ago, but it would have a Class C rating today if he had only performed necessary maintenance.

A new motel does not automatically signify a high income. However, with all other factors being equal, the new motel has a better chance to succeed because the appearance serves as a great inducement to the highway motorist.

MANAGEMENT

Management can be considered one of the factors which most strongly influences the success of a motel. In fact, the survey revealed several cases where poor management caused such an adverse effect upon the reputation of a particular motel that considerable time and money was required by new managers to overcome this handicap.

Chart 5 shows the average length of time for current management of the motels within each of the income groups.

CHART 5

Income gross per unit	Average management
Under \$500	2.6 years
\$500 to \$1,000	4.9 years
\$1,000 to \$1,500	4.0 years
\$1,500 and over	2.4 years

A comparison of *Charts 4 and 5* shows that the relationship between management and age of motels follows a definite pattern. The difference between age and management becomes progressively smaller with each higher income group.

The highest income group reflects a relatively close relationship between motel age and length of time for management. This relationship, as compared with the wide difference in the low income group, indicates that the

older motels are undergoing the greatest turnover in management and ownership. For example, there is a difference of 4.9 years between age and management in the low income group, whereas the difference is only 1.5 years in the high income group.

The combination of age and management, and the consistency of their pattern, as shown on *Charts 4 and 5*, have such an overwhelming influence on the success of a motel that they tend to overshadow all other factors, including the type of highway.

SIZE

In use of the gross receipts per rental unit as the basis of comparison, consideration was given to the size of the motel. The purpose of bringing this factor into the study was to see if the number of units at a single location could substantially influence the gross returns.

Chart 6 shows the average number of units for the motels within each income group.

CHART 6

Gross income per unit	Average number units per motel
Under \$500	11.6 units
\$500 to \$1,000	11.8 units
\$1,000 to \$1,500	16.7 units
\$1,500 and over	15.3 units

The figures in *Chart 6* show that the higher income groups consist of larger motels than the lower income groups. Among the many reasons attributable to the fact that motels with a greater number of rental units are showing higher gross receipts, the following reasons seem to have the greatest merit:

1. Certain overhead items in the operation of a motel are static, regardless of the number of units available for rent.
2. More units would permit the owner to accommodate regular commercial trade all seasons of the year and thereby increase the occupancy during those months when the tourist trade is poor.
3. A large motel could provide a greater variation in rates and thereby appeal to a larger group of motorists.

No evidence was found in making this study to indicate that the type of highway on which the motel was located had any bearing upon the size of the motel. In making the personal

contacts to obtain the factual information, it was interesting to note that the motel owners' opinions were both for and against highway changes which were said to contribute both to the increase and the lack of expansion of motels.

COMPETITION

Many opinions have been written on the advantages and disadvantages of competition in the motel industry. Regardless of whether you feel a competitor nearby is good or bad for business, it is interesting to observe the location of competitors to the motels in this study as shown in *Chart 7*. It is obvious that the distance to a competitor has very little influence upon the gross receipts of a particular motel group whether the income is low or high.

CHART 7

Gross income per unit	Average distance to nearest competitor
(A) Under \$500	0.71 mile
(B) \$500 to \$1,000	0.77 mile
(C) \$1,000 to \$1,500	0.50 mile
(D) \$1,500 and over	0.72 mile

Observations made during this survey indicate that competition can be-

come an asset rather than a liability to the motel operator. The facts obtained show that in general, a group of motels will be more successful than a single motel, when the location is some distance from a city or a natural stopping point such as a major highway intersection. A few exceptions where the single motel was able to attract a large volume of business were in those cases where there were a group of other businesses in that area which could accommodate the motorist for an overnight stop. A few examples were found where the motel operator, through heavy investments, was maintaining the necessary businesses allied to the motel in order to develop his particular site as an attractive stopping place.

Value of Frontage Road

The frontage road offers the opportunity for the development of a group of businesses which will permit motorists to obtain the services they need by making a single stop. At several locations in the State where frontage roads have been installed, prop-

erty owners are constructing businesses which cater to the motorists. Such a development gives the traveler the opportunity to select the services he needs without making dangerous stops along the heavily traveled highway.

The motorist following an auto association guide book, or one who is familiar with the general location of motels throughout the State, will generally drive until he reaches an area where there are ample motel accommodations. So many motorists travel without previously making reservations for motels, that their only safeguard is in numbers. These motorists, in the majority of cases, will not drive a considerable distance further to a single motel because of the risk of not finding a vacancy or being forced to take what is available.

In those few cases where motel operators complained of there being an oversupply of motel accommodations in a specific area, we found that age and management factors were the real reason for the complaint.

PHOTO 2—Motel along expressway in Escondido. Fence across front of property confines motel entrance to side street. Entrance visible in right center portion of photo beyond expressway intersection.



TRAFFIC

Based upon a weekday, 16-hour count in July, 1953, the exact number of vehicles passing by each of the 98 motels in this study has been computed. The average number of vehicles passing in front of each of the four income groups is shown in *Chart 8*.

Gross income per unit	Average number of vehicles
Under \$500	12,365
\$500 to \$1,000	12,779
\$1,000 to \$1,500	12,836
\$1,500 and over	11,868

The figures in *Chart 8* show that a large volume of traffic does not necessarily signify large business receipts for motels. This is apparent when the highest income group appears in the area of lowest traffic volume. A review of the figures in the chart shows that there really is not an appreciable difference in the volume of traffic between the lowest and highest income groups.

The purpose of presenting the actual traffic volume within each income group has been to show that when traffic is used as an aid to the selection of a motel site, the volume of traffic cannot be relied upon as any indication of anticipated business receipts. Perhaps the only time when the number of vehicles can provide any assistance in the selection of a motel site is when the traffic count reveals an extremely small or exceedingly large number of vehicles. It is obvious that the lack of traffic would not provide adequate customers to support a motel or any other roadside business. Likewise, an excessive number of vehicles would create congestion to the point of actually hurting roadside businesses. This fact was found to be the case in several previous economic studies where there was conclusive evidence that when volume of traffic increased to a point of congestion, business receipts had a tendency to decrease proportionately.

Character of Traffic

The *character* of traffic is the primary consideration when traffic is used as an aid in the selection of a motel site. In other words, a sizable proportion of the traffic passing a motel site must consist of motorists who are potential customers. If a high percentage of the traffic consists of local

vehicles, very little, if any, business can be anticipated from this type of motorist. On the other hand, if the majority of the traffic volume passing a motel site is made up of potential customers, the likelihood of success from the traffic standpoint is very good, assuming that there is a reasonable amount of traffic and that the other factors influencing the success of a motel are favorable.

COMMERCIAL BUSINESS

The difference in bookkeeping methods used by motels made it impossible to obtain accurate statistics on the amount of commercial business at each motel. Rather than eliminate the item, the motel owners' estimated percentage of the commercial business has been included. This has been done because commercial business does constitute a portion of motel gross receipts.

Nearly all of the motels included in this survey welcome commercial travelers, and in many cases offer special rates for their accommodation. According to many motel owners, the commercial trade constitutes a considerable portion of their business during the winter months when the volume of tourist traffic is low. The few motels which do not encourage commercial trade were those having a small number of units available for rent, and felt they could not afford to fill their units at commercial rates. The motels located near cities reported the highest estimates of commercial business. Motels located in the rural areas reported the lowest amount of commercial trade. Those motels which reported a considerable volume of commercial business stated that the majority of these guests stopped several times during the year. These customers were anticipated, and the motel owners, as a courtesy, assumed the obligation of providing them accommodations without reservations.

The percentages shown in *Chart 9* represent an average of the estimated commercial business within each of the four income groups.

Gross income per unit	Estimated commercial business
Under \$500	14.0%
\$500 to \$1,000	6.4%
\$1,000 to \$1,500	22.0%
\$1,500 and over	12.5%

It is obvious from the percentages shown in *Chart 9* that figures based upon estimates and opinions present considerable variation. However, it should be safe to say that every income group enjoys a certain amount of commercial business. The only indisputable fact pertaining to commercial business is that the factor of location is paramount. It is the custom of this trade to patronize a good motel close to the center of population. Whether this motel is located on a conventional highway, frontage road, or freeway has no direct bearing. In some cases this trade will shift to the newer motels in the vicinity of a freeway, but only if the distance from the center of population is comparatively equal. If the bypass is completely removed, the motels on the former highway will retain this type of patronage in its entirety.

MOTOR TRAVEL ASSOCIATION

This state-wide motel survey included a tabulation of the number of motels which had secured a recommendation from one or more of the motor travel associations. *Chart 10* shows the percentage number of motels within each of the gross income groups which are listed in one of the motor travel association guide books.

Gross income per unit	Average number recommended
Under \$500	21%
\$500 to \$1,000	28%
\$1,000 to \$1,500	63%
\$1,500 and over	79%

The trend revealed in *Chart 10* suggests that recommendations by one or more of the motor travel associations have a direct relationship to gross receipts. A motel listed in the travel guide books definitely indicates two things:

1. The motel has met certain standards with respect to attractiveness and cleanliness.
2. A fee has been paid by the motel to join the association.

Affiliation with one of the travel associations is a form of advertising. Because it is advertising and a fee is required, some motel owners have stated they prefer to spend money for this purpose through some other medium. Therefore, no published recom-

mendation by a motor travel association can mean that the motel owner prefers another form of advertising, or it could mean that the motel is not acceptable. In the case of new motels, a recommendation may be pending.

In making the survey, several excellent motels and some with very high gross receipts were found to have no affiliation. The number of motels recommended by the auto associations show that it is a very popular form of advertising. The ratio between the number of motels recommended and gross receipts indicates an acceptance by the motorists that those motels have attained desirable standards.

The recommendation of motels by the auto association does not make any reference as to whether the motel is located on an access-controlled or conventional highway. Segregation of motels by income groups revealed that the type of highway where the motel was located does not influence the requirements needed by the motel for a recommendation.

KITCHENS AND GARAGES

The motel along the modern highway is to the motorist what the way-side inn was to the highway traveler many years ago. The old inn always provided food as well as shelter. Like-

wise, many modern motels have all of the facilities capable of providing for all the motorist's needs. A study of the motel industry would hardly be complete without including statistics on kitchens and garages.

Chart 11 shows the percentage of kitchens and garages of the total number of motel units in each income group. The term "garage" includes any type of auto shelter.

CHART 11

Gross income per unit	Kitchens	Garages
Under \$500	22%	55%
\$500 to \$1,000	39%	29%
\$1,000 to \$1,500	22%	19%
\$1,500 and over.....	8%	6%

The primary reason for including the kitchens and garages in the survey was to see if their presence reflected any pronounced influence upon the gross receipts. Due to the climatic conditions in most sections of California, garages are not a necessity, therefore, they do represent an added investment for extra convenience to the motorists. Kitchens also represent an added investment, catering to a certain group of motorists who desire these accommodations.

The facts shown in Chart 11 do not establish an obvious trend with respect to kitchens. Considering the percentage of the total number of motels in

the study within the four income groups, there is evidence that the greatest number of kitchens are in the lower income groups, and there are only a small number of kitchens in the higher income groups.

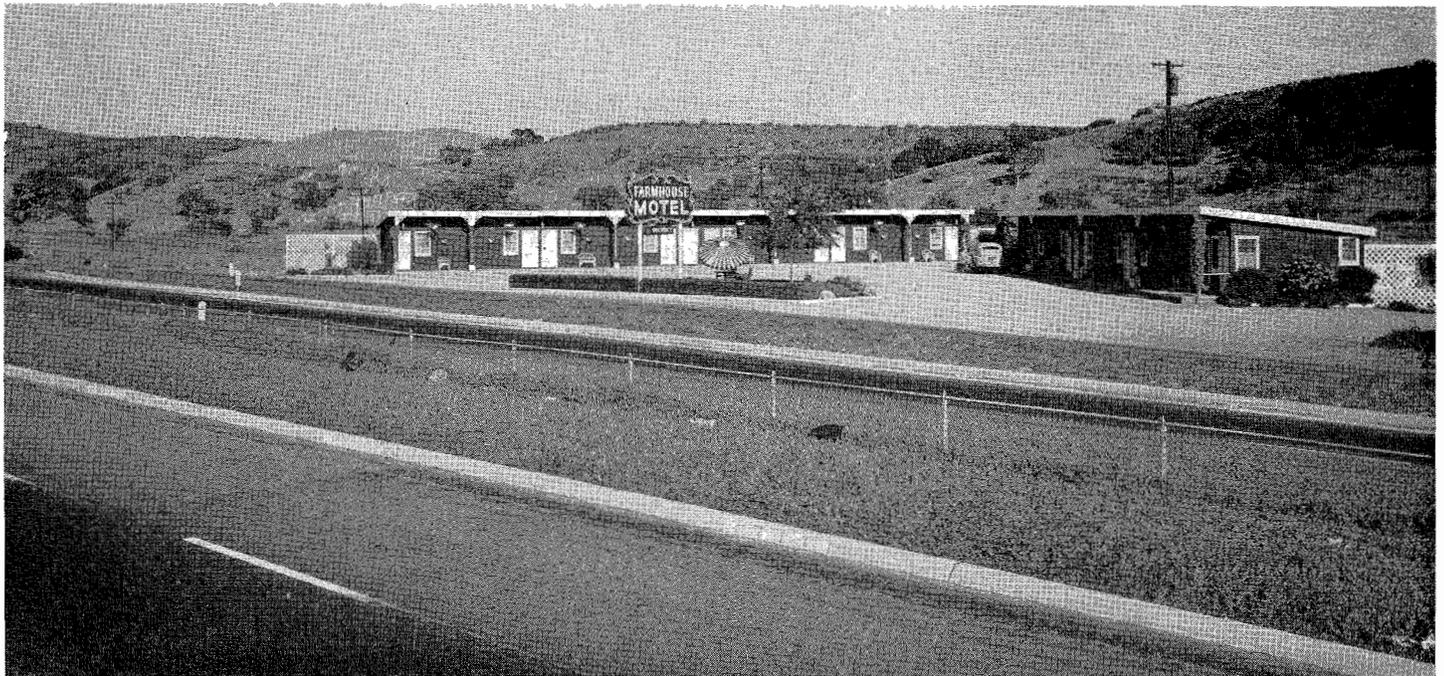
The survey revealed several motels were installing a community kitchen as a courtesy to travelers who are on a special diet and people traveling with small children.

The owners of several of the older motels in this study have stated that they cannot compete with the new deluxe motels for tourist and commercial trade. To compensate for this loss, these older motels are renting the kitchen units on a semipermanent basis. Many of these motel owners have stated that in order to rent any units, it was necessary to have kitchens available.

It is difficult to show the influence of kitchens on gross receipts, because many motels with a number of kitchen units are being rented on a weekly or a monthly basis, and oftentimes show a lower gross return than those which are rented entirely on a day-to-day basis.

The percentage number of garages in each of the income groups follows a very definite trend. The lowest income group shows a large number of garages in relation to the units for

PHOTO 3—Motel on frontage road at Buellton. The arrow sign in extreme left portion of photo marks frontage road opening into through traffic lanes.



rent, whereas the highest income group has an exceedingly small number of garages. Referring to *Chart 4* on age of motels, we find the newest motels in the high income group. By comparison it becomes apparent that the trend in new motel construction is to reduce the number of garage facilities.

FRONTAGE ROAD VS. CONVENTIONAL HIGHWAY

One of the most interesting phases of the study has been the direct comparison of motels on a frontage road with comparable motels on a conventional highway in the same general location. The example used in this study is on US 40 in the North Sacramento area. The frontage road along the completed portion of the freeway is adjacent to a three-lane conventional highway. *Diagram No. 1* shows this portion of US 40. The through traffic lanes of the highway are shown across the center of the diagram and the frontage road adjacent to it is indicated by the black line. The black squares show the location of the motels along the two types of highways.

The frontage road is separated from the highway by concrete curbs. Large shrubs and trees are planted in the area between the curbs to provide a barrier which will confine the entrances into the frontage road at designated openings. A view of this planting strip between the highway and frontage road is shown in *Photo No. 4*. The motels in this area are approximately 4.5 miles from Sacramento.

The motels along the frontage road and those adjacent to the conventional highway are influenced by the same volume of traffic, the same neighbor-

hood, approximately the same distance from the nearby city; in fact, all economic influences are relatively the same. The only real difference, aside from individual characteristics, is the type of highway in front of the motels.

Rating of Motels

This direct comparison offered a total of nine motels; four on a frontage road and five on an adjoining conventional highway. Listing these nine motels according to annual gross receipts per unit, the first, second and third highest incomes were made by three of the motels on the frontage road. The other motel on the frontage road placed seventh. The five motels on the conventional highway rated fourth to ninth.

The motel on the frontage road which placed seventh in the order of income per unit was the oldest motel, in fact, 12 years older than the next oldest motel in the entire group of nine. Because of its age, many units are rented on a semipermanent basis. This type of guest is more concerned with location and its relationship to his employment. Therefore, the type of highway has little influence on this motel.

CHART 12 HIGHWAY LOCATION OF MOTELS ACCORDING TO INCOME

- 1st—Frontage road
- 2d—Frontage road
- 3d—Frontage road
- 4th—Conventional highway
- 5th—Conventional highway
- 6th—Conventional highway
- 7th—Frontage road
- 8th—Conventional highway
- 9th—Conventional highway

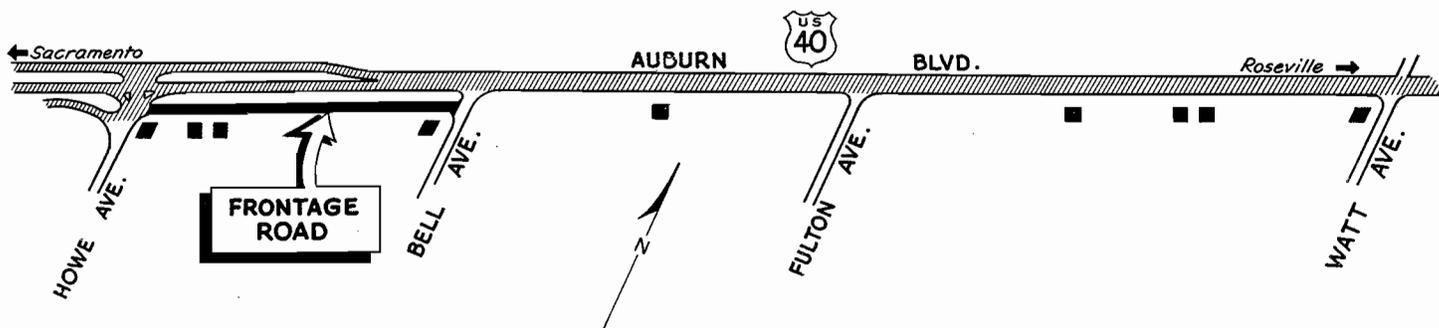
Comparisons on US 40

A direct comparison between an access-controlled and conventional

highway would necessitate all things being equal on both highways. This would be the perfect situation and one that rarely exists. The example in this study, along US 40, approaches this ideal situation better than any other location in the State. That is, only *one* change is required in order to make an accurate direct comparison. The one motel on the frontage road which is so much older than all other motels on both highways must be eliminated in order to make an honest comparison and not throw it completely out of balance. For instance, a comparison of the age shows that the five motels on the conventional highway average 6.4 years in age. Excluding the oldest motel on the frontage road, the average age for the other three was 4.2 years. The average age for the motels on the frontage road would be 8.13 years if the oldest motel was included. This one motel, if included, would make a change of nearly 100 percent in the total average age. For one item in a comparison to create such a drastic change in the total average means that either it is correct and all others are wrong, or the others are relatively within a comparative base and that one single item should be excluded to avoid a completely unbalanced comparison. Elimination of this motel makes it possible to have a fair and just comparison between motels on a frontage road and on a conventional highway.

Chart 13 shows a direct comparison between the five motels on the conventional highway and three motels on the frontage road. The chart reveals the relationship between the motels on the two types of highways and the influence of several important factors upon their business. The figures

DIAGRAM No. 1—Frontage road on freeway and a conventional highway in the North Sacramento area. Black squares show location of motels adjacent to the two different types of highways.



shown on the chart are averages for the motels on both types of highways.

CHART 13

Factors	Three motels Frontage road	Five motels Conven. hwy.
Age	4.20 years	6.40 years
Management	2.75 years	2.85 years
Size	24 units	12 units
Commercial business	52%	9%
Automobile association recommendation	100%	60%
Kitchens	27%	40%
Garages	38%	17%

The three motels on the frontage road in *Chart 13* show a closer relationship between age and management than the five motels on the conventional highways. This resemblance to the pattern established by all of the motels in the state-wide study, as shown in *Charts 4 and 5*, substantiate the fact that longer periods of management offer better chances for success in the motel business than short-term management.

According to *Chart 12*, the three newer motels on the frontage road have the highest gross income per unit of all the motels. The question arises, then, just how much higher was this income? The average gross income per unit for those three motels on the frontage road was 71 percent greater than the average gross per unit of the five motels on the conventional highway.

The high gross income for the motels on the frontage road, as compared with those on a conventional highway, is startling, particularly when we find that there are not any other allied businesses to attract the motorists into the frontage road area, such as a large service station or cafe. As previously stated in this article, a frontage road lends itself to the development of a number of businesses which can furnish a complete one-stop service for the motorists. The ease of moving from one site to another on the frontage road tends to help those businesses on the frontage road which may not initially have attracted the motorist from the through traffic lanes.

MOTEL OWNERS' COMMENTS

In obtaining the facts for this state-wide motel study through personal interview, it was made known that any comments would be welcome. In general, the comments were sincere and reflected the belief and attitudes

of those persons making them at the time of the interview. Experience with other opinion polls has indicated that the best which could be derived from this method was a certain similarity to the actual facts. A tabulation of these comments has been made to see if they followed a pattern which might indicate a definite trend of thought. The results were inconclusive, and are included for information purposes. Many of the remarks centered around the principal factors mentioned previously in the study as having the greatest influence on the motel business.

It is noteworthy that certain influencing factors were mentioned more often than others. Those items most frequently stated voluntarily indicate what is uppermost in the thoughts of the motel owners. These items are listed in the order in which they most frequently were given:

Repeat Business—Motel success requires repeat business in both tourist and commercial trade.

Restaurants—Essential to have eating facilities near motel.

Location—Comments emphasized need for good location. A motel owner on US 99 sold his new motel in exchange for a much older motel in a better location. He claims the change increased his gross income \$5,000 annually. Incidentally, the older motel which he purchased was located on a frontage road.

Size of Motel—The general comment by owner-operated motels without additional help is that 10 units are the maximum they can handle. Many owners with six- and eight-unit motels complain they were too small. Others remarked that a minimum of 10 units were required in order to make the business pay.

Management—All comments expressed the importance of good management for success.

View—Visibility from highway motorist to motel appears to be a "must" according to the comments.

Age—With the construction of new motel units, the older motels are finding it increasingly difficult to compete for overnight guests. Many owners of older motels remark that it is better to rent units to semipermanent guests.

Competition—The only complaint was by the owners of older motels. In general, the motel owners accepted competition as a natural occurrence in any business enterprise.

Highway Grade—General comments by motel owners located along either an up or down grade felt it was a poor place for business. Traffic either moved too fast or the entrance was hazardous.

Commercial Business—Comments followed two distinct patterns. (1) Motel must be near a city to get commercial business. (2) Small motels can't afford to be filled during the summer at commercial rates. Commercial business is the "mainstay" during winter months.

Traffic—Principal comment came from motel owners along conventional highways. They estimated considerable business was lost from motorists on opposite side of highway unable to cross the heavy traffic.

Noise—Comments about equally divided between disadvantage of being close to highway with noise, as compared with being situated away from highway free of noise but losing business because of distance.

Uninformed Motel Purchasers—A surprisingly large number of motel owners remarked that they purchased their motels without previous experience in motel business and without being provided a record of how much income the motel was producing.

If not given voluntarily, comments were asked for regarding *kitchens and garages*. There was a wide variation in remarks on kitchens. In general, the newer motels are reducing number of kitchens. Older motels are relying on kitchens to keep units occupied. The remarks were 10 to 1 in favor of eliminating garages.

In addition to the voluntary remarks made, the motel owners adjacent to access-controlled highways were asked to comment on the physical characteristics peculiar to that type of highway, such as fences, entrances, etc. Because there were comments from all of these particular motel owners, it is impossible to list them in the order of how frequently they occur. However, a brief generalized summary of each item will in-

... Continued on page 36

US 395

Reconstruction in Riverside County Has Been Rapid

By J. DEKEMA, Assistant District Engineer

COMPLETION of the "Perris Bypass" portion of US 395 was taken in stride without public ceremonies by California's motorists who have become used to accepting, without question, the rapid improvement and complete realignment of this major highway that has been in progress since the end of World War II. Contracts between the Riverside-San Diego county line and the City of Riverside have been awarded in a continuous series, with two contracts completed late in 1953. The construction between Sign Route 74 south of Perris and Nuevo Road north of that city was finished by the E. L. Yeager Company of Riverside on September 30, 1953, 50 days ahead of schedule, at a cost of \$762,000. Similar to previous projects in this route, construction consisted of building two lanes of an ultimate four-lane divided expressway on a 142-foot width of right of way with the number of intersections kept to a minimum.

Perris Is Bypassed

The new highway bypasses the city to the east, with easy access provided for traffic entering and leaving town. An interchange north of Perris was

constructed to eliminate conflicting traffic movements. Another grade separation was provided at Perris Boulevard to permit local traffic and school children to cross the high-speed new facility with safety.

Perris Valley was settled in the eighties, coincident with construction of the California Southern Railway which provided a short route from the San Bernardino Valley to San Diego by way of Perris, Elsinore, and Temecula. The original railroad station was at Pinacate about two miles south of the present town, which was laid out and subdivided about 1890. The station was moved and renamed to honor Fred T. Perris, Chief Engineer for the railroad.

Originally Mining Town

Perris was originally a mining town with millions of dollars' worth of gold produced in the Gavilan Hills just west of the city. Water was brought in from Bear Valley in the San Bernardino Mountains, but the town's Class "B" water rights proved inadequate and a decline set in until it was discovered that a large underground water reservoir existed. Today the

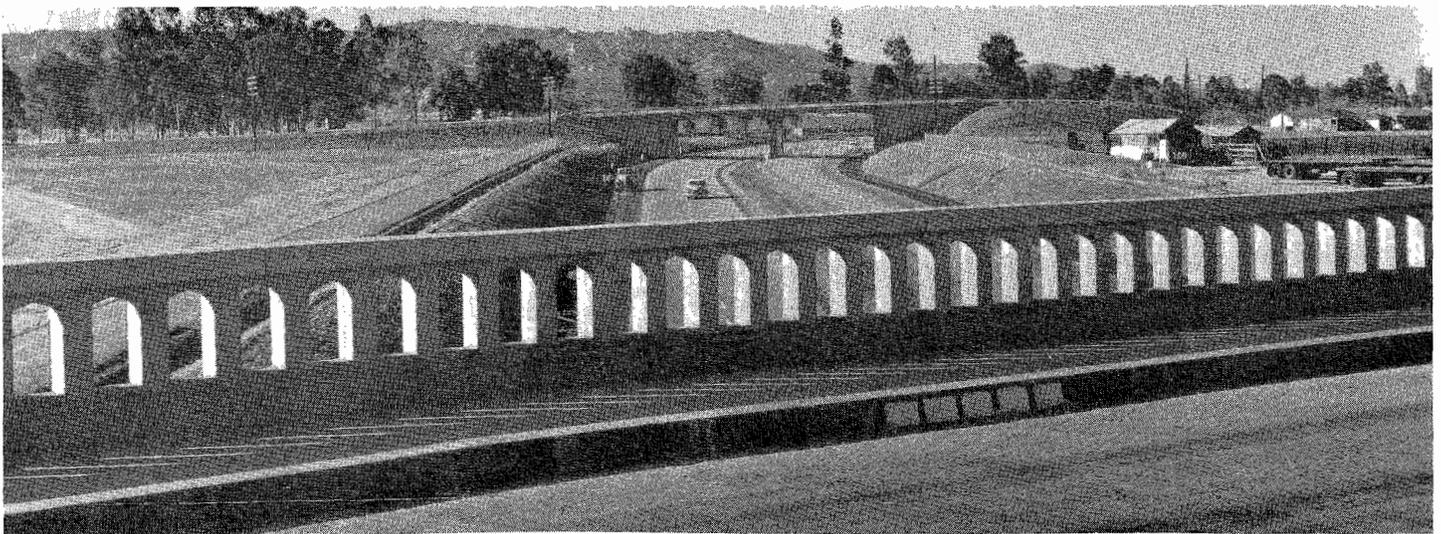
valley is served by the Metropolitan Water District of Southern California, and a rich agricultural future appears assured. With the improved access provided by the modern highway facilities just completed, a continuing expansion of the valley's importance is expected.

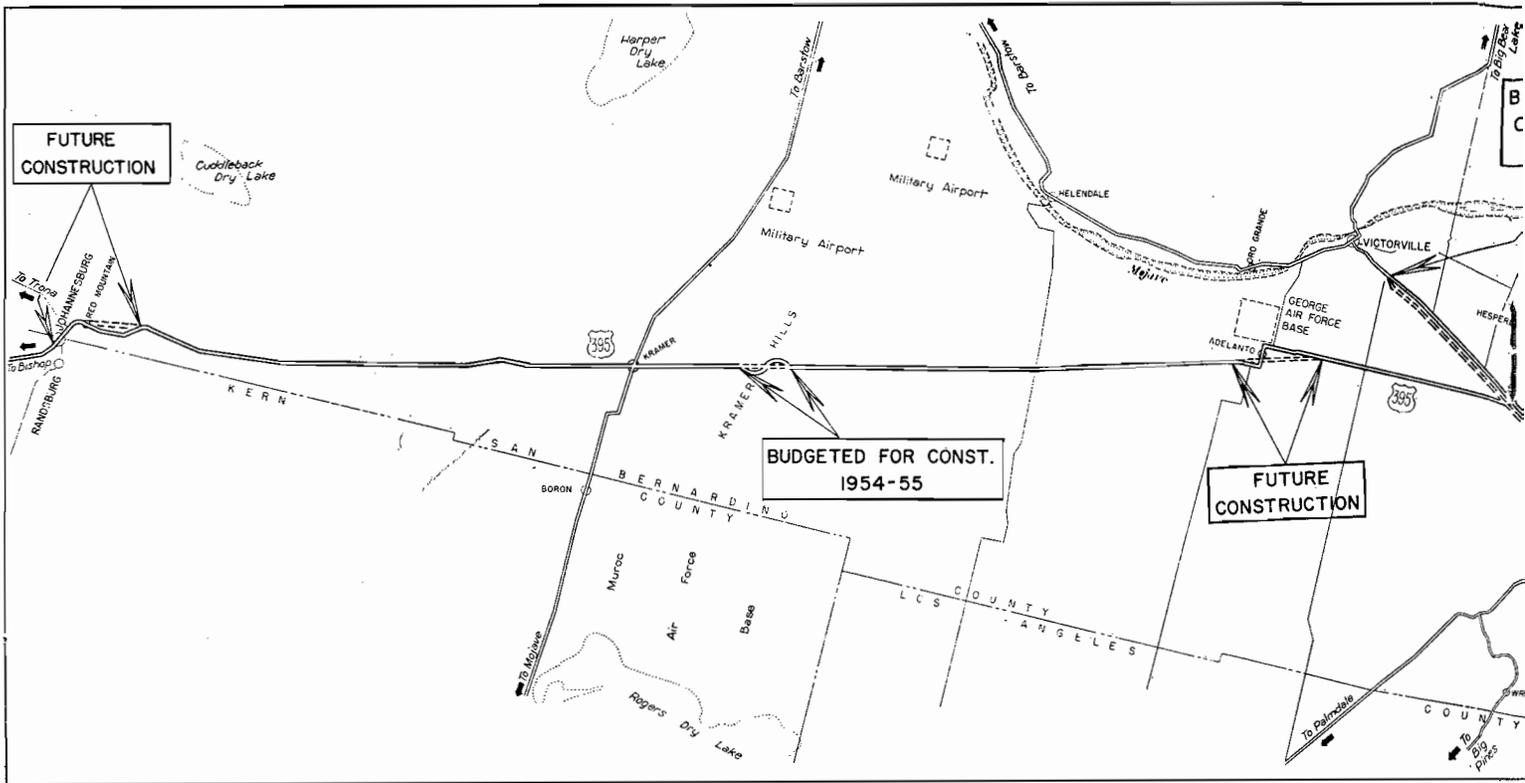
East of the City of Perris, the bypass traverses the two-mile-wide flood plain of the San Jacinto River. Exhaustive preliminary studies revealed that crossing the area subject to flooding with a bridge would increase the cost beyond economic justification. The decision was made to bridge the main channel, and to provide several supplementary "equalizing" openings that would pass the estimated once-in-ten-years flood. The roadbed between bridges is designed as an overflow section functioning as a spillway weir.

Feeder Channel Constructed

In order to improve the flow to the bridges, a "feeder channel" 60 feet wide was constructed on the upstream side parallel to the highway. A similar distribution channel was excavated connecting all the bridges on the downstream side in order to improve

View of US 395 from Perris Boulevard Overcrossing looking north to D Street on-ramp





release of the flood water. Because of the eddying currents expected to occur in these channels, large quantities of riprap were placed to protect the roadway embankment from scour.

Some idea of the problem may be gained from conditions observed in this area in the memorable flood of February, 1927. The top of the nearby railroad tracks was under about a foot of water for a length of two miles.

The entire flooded area was estimated at about 4,500 acres with an average depth of about three feet.

The new bridge across the main channel is 160 feet long. Three auxiliary 14-foot openings on each side of the main bridge were constructed about 100 feet apart, with the central span about 1,400 feet from the main channel. Eleven hundred feet on each side of the main channel, 28-foot

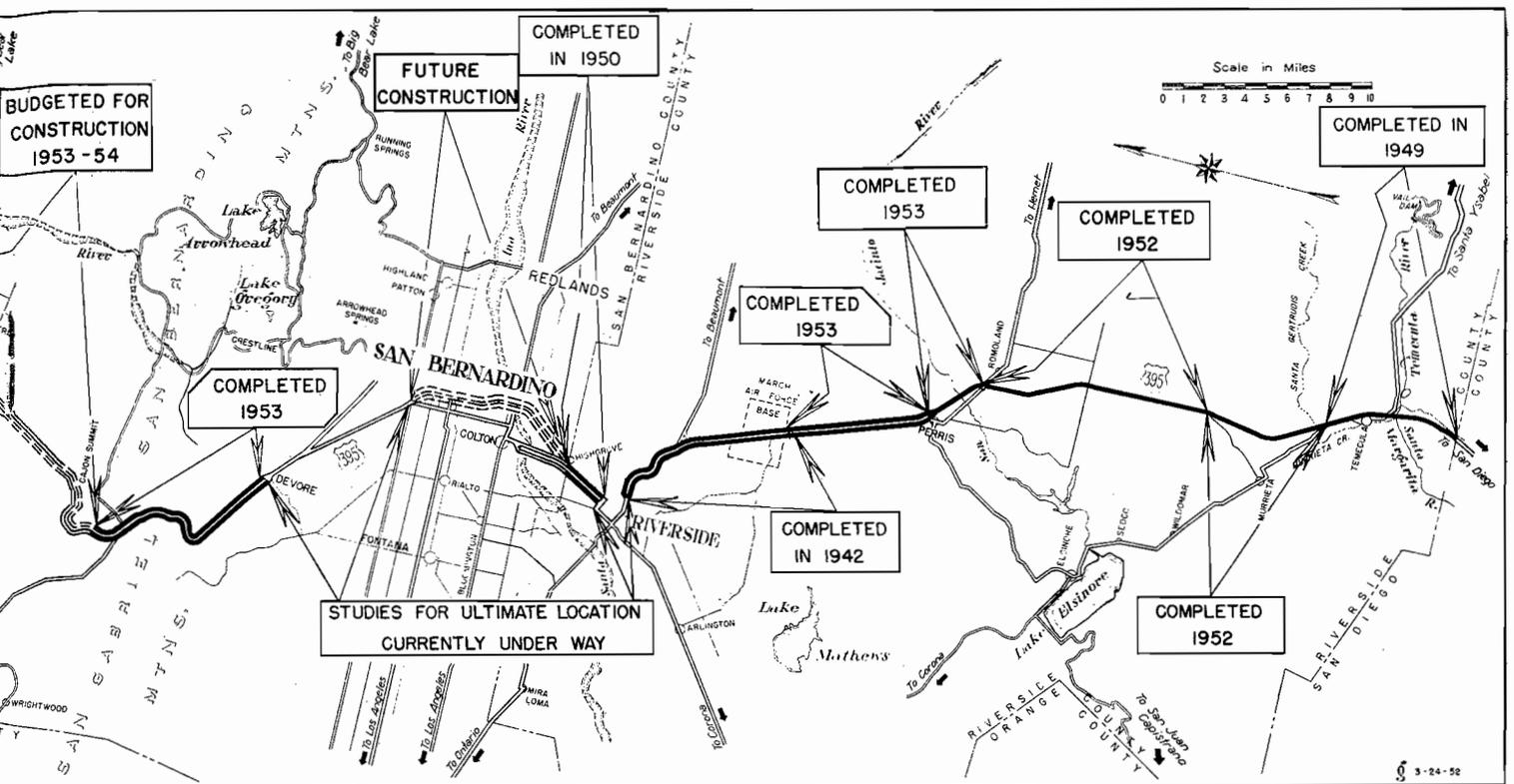
bridges were constructed, making a total of nine bridges. In this manner, the depth of inundation will be nominal, and backwater created by the highway will be insignificant.

Five Contracts

The five contracts from the San Diego county line to March Air Force Base totaled \$3,247,000 in construction cost, and have reduced the dis-

Intersection of US 395 with State Sign Route 74 to Hemet, looking north





tance from Riverside to San Diego by 7.5 miles. Morrison-Knudsen, Inc., of San Francisco, built 5.9 miles from the county line to Temecula, with J. M. Hollister as resident engineer. L. A. & R. S. Crow of El Monte constructed 7.0 miles from Temecula to Antelope Road, with Warren Ford as resident engineer. The largest contract was the 10.5 miles from Antelope to State Sign Route 74 south of Perris constructed

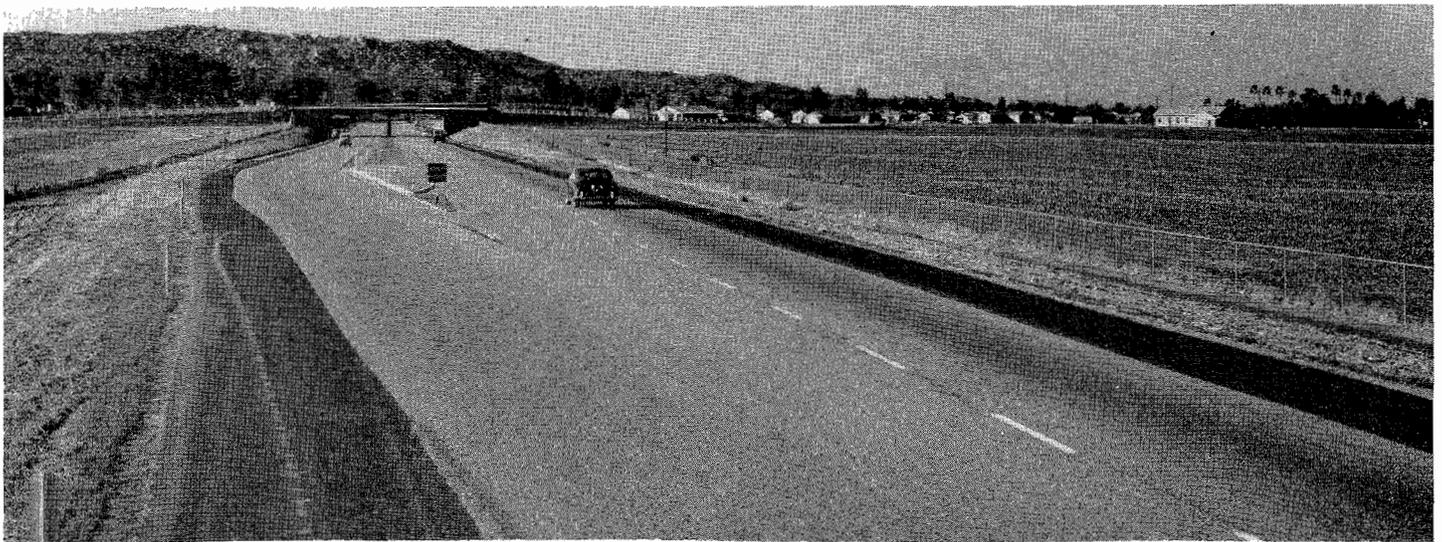
by the E. L. Yeager Company of Riverside. Paul Wittig was resident engineer on this contract. The same firm built the 4.7-mile Perris Bypass, with H. C. Prentice as resident engineer. The latest contract to be completed was the conversion of the old two-lane highway between Perris and March Air Force Base to a four-lane divided expressway. The contractor on this project was the Robert E. L.

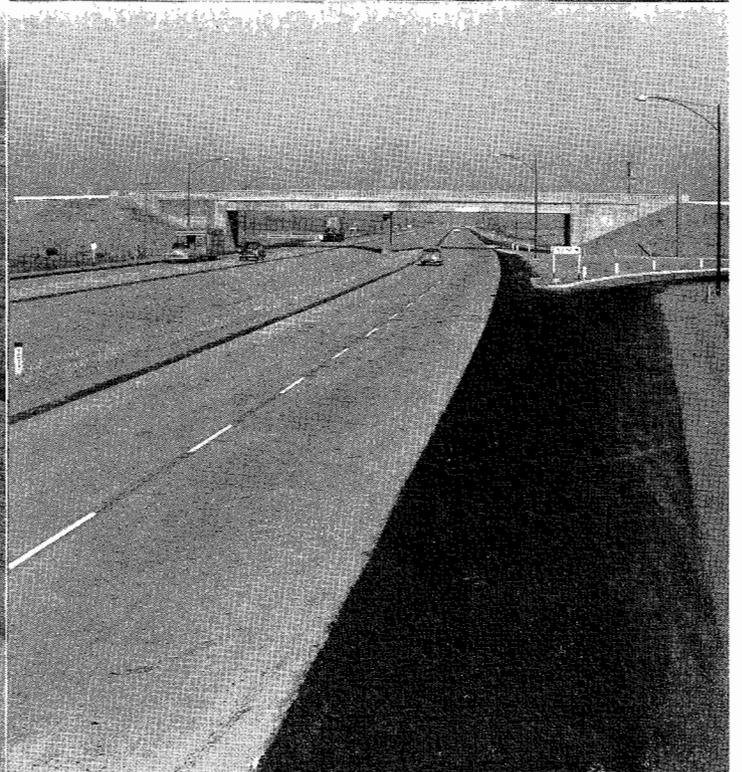
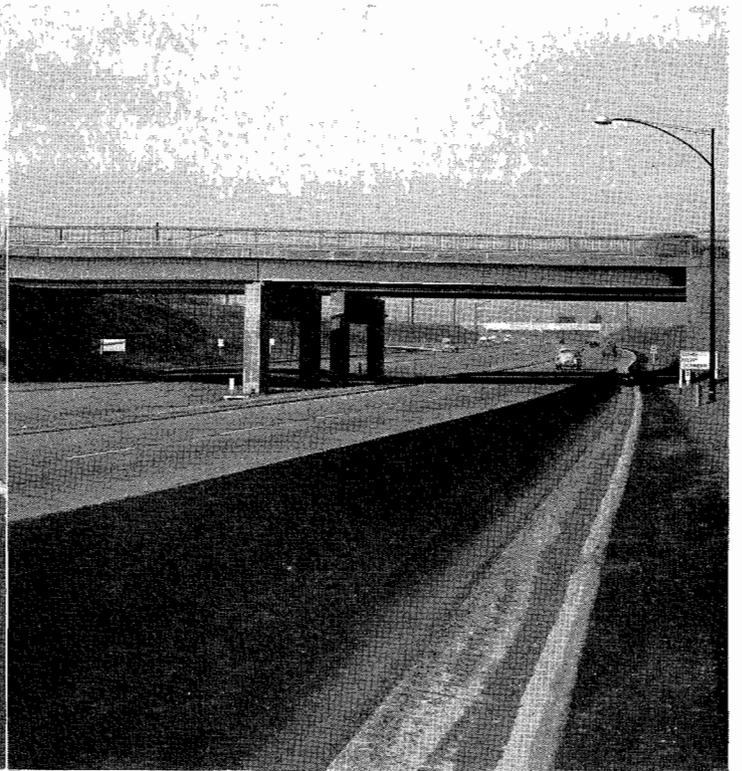
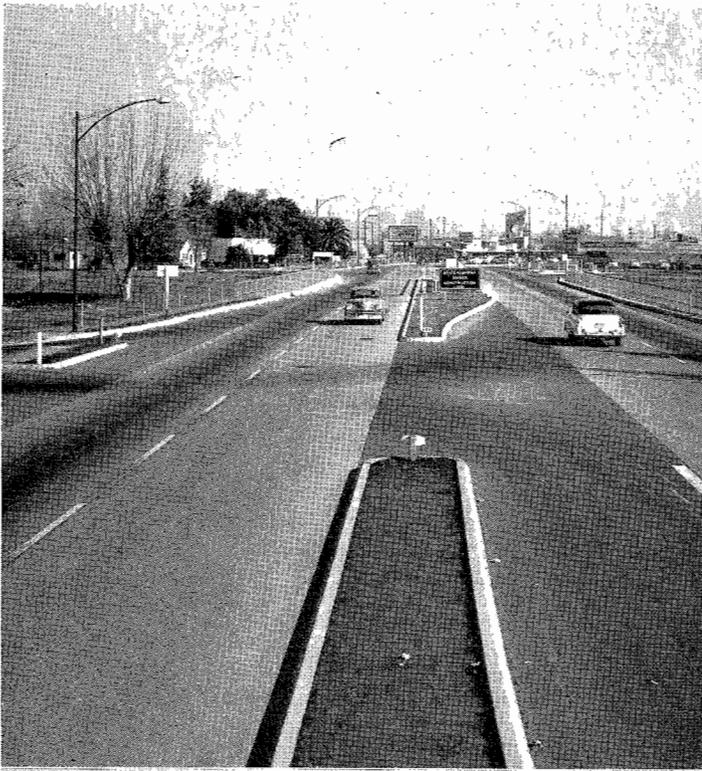
Parker Company of Claremont, who finished the 4.8 miles on December 31, 1953, at a cost of \$407,000. Resident engineer again was H. C. Prentice.

Accident Pattern

In spite of the careful design providing ample sight distance in all directions at every intersection with modern channelization wherever the need was indicated by traffic volumes

Looking north at the transition from two lanes to four lanes divided. The four-lane divided highway is continuous from this point on the Perris Bypass into the City of Riverside.





UPPER LEFT—Looking east on State Sign Route 63, the road to Lindsay, which is carried over Tulare By-pass on bridge in center of picture. UPPER RIGHT—Looking north on by-pass through bridge that carries SSR 63 over freeway. Southern Pacific Railroad crossing in background. LOWER LEFT—Looking north on freeway from overcrossing at south end of Tulare By-pass. LOWER RIGHT—Looking north on freeway toward Paige Road overcrossing.

and movements, a serious accident pattern developed near Murrieta at Webster Road within six months of opening this section to traffic.

Doubling the usual number of advance warning and stop signs and the installation of oversize stop signs did nothing to reduce the accident toll, and traffic on Webster Road continued to ignore the required stop, occasionally with fatal results. Although sight distance at the stop sign was virtually unlimited, it was decided to grade the entire area down to pavement level to permit approaching cross traffic to see the actual pavement surface of the new highway for a considerable distance before making the stop. In addition, power was brought in from a line a quarter of a mile away, and an overhead flashing beacon was installed in time for the 1953 Fourth of July week end. Only two accidents have been reported since that date, and it seems assured that the corrective measures taken will continue to serve in making inattentive motorists aware of the fact that a major highway crosses the apparently harmless rural road.

Famous Vail Ranch

South of Webster Road, in the vicinity of Temecula, the highway traverses the great Vail Ranch, one of the largest agricultural operations in the United States. Four Spanish land grants, the Santa Rosa and Pauba Ranchos, and portions of the Temecula and Little Temecula Ranchos make up a domain of 90,000 acres. Although primarily a cattle ranch, large quantities of alfalfa, barley, potatoes, and row crops are grown, and several orchards dot the countryside.

The ranch has its own dam, a constant radius concrete arch structure across the Temecula River storing 50,000 acre-feet and furnishing a large proportion of the vast volumes of water sustaining the many operations required by 90,000 acres of diversified agriculture.

Ranch headquarters are in Old Temecula, where the adobe building in which the Treaty of Temecula was signed on January 5, 1852, is still in use. This treaty, between the United States and the San Luis Rey, Kahwea, and Cocomahra Indians, permitted

Freeway Contract in Placerville Is Awarded

Director of Public Works Frank B. Durkee has awarded to Piomba Construction Co., San Francisco, a contract for \$809,970 for the major grading and the construction of the remaining traffic and pedestrian bridges along the relocated route of US 50 through the City of Placerville in El Dorado County.

Durkee said that the proposed contract will take care of the major share of remaining construction work along the Placerville Freeway, leaving only a paving contract to be let after the grading is completed.

In addition to grading of the mile and a half of four-lane, divided highway through the city, the project will also include construction of a vehicular separation at Clay Street and pedestrian overcrossings at Coloma Street and Bedford Avenue.

Two New Bridges

Also included will be the construction of two new bridges on the freeway approaches across Hangtown Creek at Canal Street and Spring Street, and the widening of three existing bridges at Canal Street East, Coloma Street and Bedford Avenue.

Work on two bridges carrying the freeway over Locust and Washington Streets is already in progress under a separate contract awarded last Febru-

peaceful settlement of the area. The adobe building was a stop for Butterfield Stages and a station on the main military road between Los Angeles and Arizona during the Civil War.

Further Improvement Planned

With the coming of the California Southern Railway in the early eighties, Temecula moved to its present site on Murrieta Creek a few miles northwest of Old Temecula. Floods on the San Jacinto River in Railroad Canyon between Perris and Elsinore, and on the Santa Margarita River in Temecula Canyon washed out the tracks soon after being completed. They were rebuilt and washed out again, this time not to be replaced. Temecula, however, remained at its new location and has continued to prosper, especially since completion

ary. Major work on the Locust Street bridge was finished and the structure thrown open to traffic last August so that it could be used by the fruit harvest traffic to and from the packing plants in the vicinity.

Total Cost \$3,000,000

Total cost of the new freeway, which is expected to relieve traffic congestion through the city, will exceed \$3,000,000. Included in this amount are construction, right of way, adjustment of railroad tracks and utility lines, and removal of buildings.

The freeway route starts at the west city limits, runs north of Hangtown Creek and the Southern Pacific railroad tracks until it rejoins the present highway near the highway patrol station on the east side of town.

The existing route follows along Main Street to the south of the creek and is subjected to extreme congestion, particularly during the summer months when traffic counts reach as high as 10,000 vehicles a day.

Clearing of the right of way for the new freeway involved some unusual operations, including the moving two years ago of the brick veneer Christian Science Church and the Placerville Women's Shakespeare Clubhouse.

of the bypass in 1949 (see *California Highways and Public Works*, July-August, 1951).

Further improvement of the highway through the metropolitan area of Riverside and San Bernardino is contemplated as soon as funds can be made available therefor. The history of the West proves that better transportation invariably results in a wealthier and more stable economy. The improvement of US 395 and other main transportation arteries will again bear out past experience.

The \$1,600,000 Port Industrial Waterway Bridge at Tacoma, Washington, has been opened to traffic. The 712-foot long bridge, which took nearly two years to build, has a lift-span to permit passage of ocean-going vessels.

Motels . . .

Continued from page 30 . . .

dicating the attitude of these motel owners with respect to the features of the access-controlled highways.

Entrances—The frontage road entrance directly in front of the motel is found to be much more popular than the entrance which was some distance from the motel. The principal reason for more people feeling this way is based upon the opinion that once a person drives by an entrance, he will not turn back. Considerable comment was made about the difficulty of motorists finding entrances into frontage roads after dark. There were no complaints on this matter where openings were illuminated. Several owners stated they felt reflector or illuminated signs would go a long way in correcting this difficulty. Entrances into motels along expressways were generally favorable.

Fences—There was a wide range of comments regarding the likes and dislikes of fences across the front of motel properties. The tabulation of the pros and cons showed the opinions about equally divided for and against a fence. Those liking it felt that it was helpful as a safety measure for protection of motel guests. Other com-

ments in favor of the fence were that it kept out motorists who were not motel guests, and added to the attractiveness of the property. Adverse remarks regarding a fence were generally as follows: If all properties along the highway were fenced at one time, there would be no serious effect. The fence required considerable work to keep a clean appearance in front of the motel.

Frontage Roads—Motel owners located on frontage roads commented in varying degrees of likes and dislikes. The most prevalent remark made by those not liking the frontage road was that strangers had difficulty finding their way into a frontage road, particularly after dark. Many remarks were made that motorists are learning to like the frontage road when they learn its use. The remark was often made that motorists needed to be educated in the use of frontage roads, and the best solution would be some well-placed signs to direct traffic. The comments by those motel owners liking the frontage road were that it added to the attractiveness of the property; it offered opportunity for a one-stop development such as a group of retail outlets catering to motorists; made motel sites more desirable from the standpoint of safety;

better opportunity to have attractive property along a new frontage road.

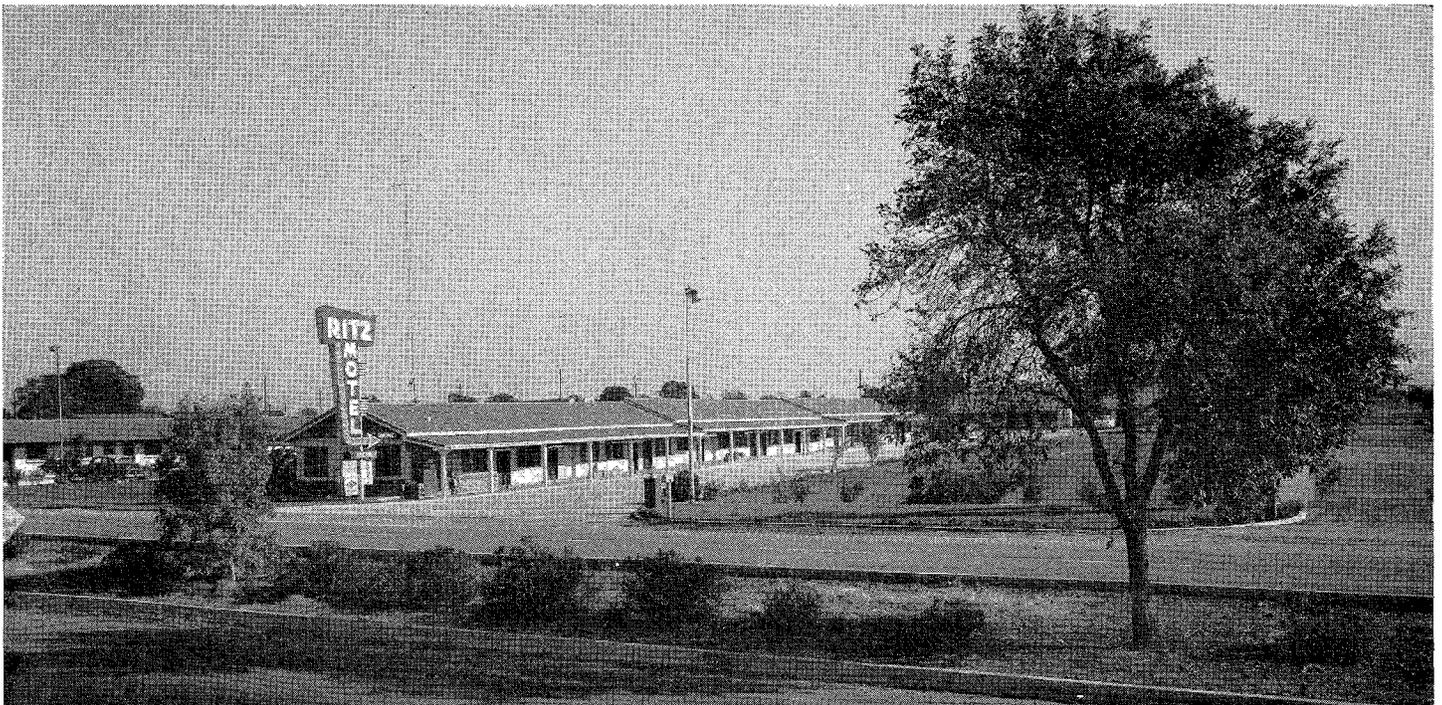
Signs—Nearly all motel owners on the access-controlled highways felt that better signs were needed to notify motorists of an approaching entrance, particularly in the case of frontage road openings. There were many comments that motorists liked frontage roads and would use them more if they were identified better through signs. There is a feeling among many motel owners that motorists are reluctant to turn back once they have passed an entrance. They are of the opinion that potential business is lost because of this, and they believe that adequate signs would increase their business.

From a review of the summary of comments given with respect to each feature of access-controlled highways where remarks were specifically invited, it is notable that the primary concern was having better signs so that motorists unfamiliar with the use of access-controlled highways could be educated through proper direction.

CONCLUSION

In making this study to determine from a factual standpoint the economic effect of access-controlled highways upon motels, we found there were a number of

PHOTO 4—Motel on frontage road in North Sacramento area. Frontage road entrances into through traffic lanes are 350 feet and 1,000 feet distant from motel.



very important factors, in addition to the type of highway, which had a profound influence on the success of a motel. This factual information shows that a weakness in one of these factors, for example, poor management, can be so detrimental to the success of a motel that it is singularly capable of eliminating the effectiveness of all other factors regardless of how favorable they might be.

The principal conclusions in the study:

1. The type of highway can influence the site of the motel, but the general area where the motel is located is *not* influenced by the highway. A motel in a location which does not supply potential customers does not have a fighting chance to succeed.

2. There is conclusive evidence that when the important factors influencing motel business are reasonably equal, the motels on access-controlled highways are capable of attaining even greater success than comparable motels on conventional highways.

3. The isolated motel does not have the opportunity for success that the same motel would have if situated in an area with other motels, despite the inherent competition in such a location.

4. New motels are going to continue to be built. Obsolescence of motels, lack of good hotel facilities, and a host of other reasons, in addition to the highway traveler, will continue to create demand and a need for newer and better motels. The construction of a new highway of freeway design along a new alignment will create some desirable business sites, even though these sites will not have any direct access into the through traffic lanes. When motels become interested in locating on these few sites, they will have to compete with other commercial and industrial enterprises. The few sites which result from the new alignment may be for sale, but at prices not economically sound for a motel investor.

There has been no indication that a group of financially sound and well-managed motels will be affected detrimentally by an access-controlled bypass. Some new motels will locate near the freeway if it is possible to find a reasonable site. Any growing industry, such as the motel business, will be continually attracting new investors. Those businesses which are established must maintain a high level of public service in order to compete with the constant change taking place.

The few sites created by the highway improvement do not accelerate this constant change to any appreciable degree beyond the normal expectancy in any healthy and active business enterprise.

and Public Works

State Wins Los Angeles Beautiful Awards

AS DESCRIBED in the September-October, 1953, issue of *California Highways and Public Works*, nearly all planting of shrubs, trees and ground cover along California highways is for the control of erosion, fire and weeds and for traffic safety. Landscaping, in the sense of beautification for community appearance, is rare and is done only where there is general agreement on the desirability and need for the work.

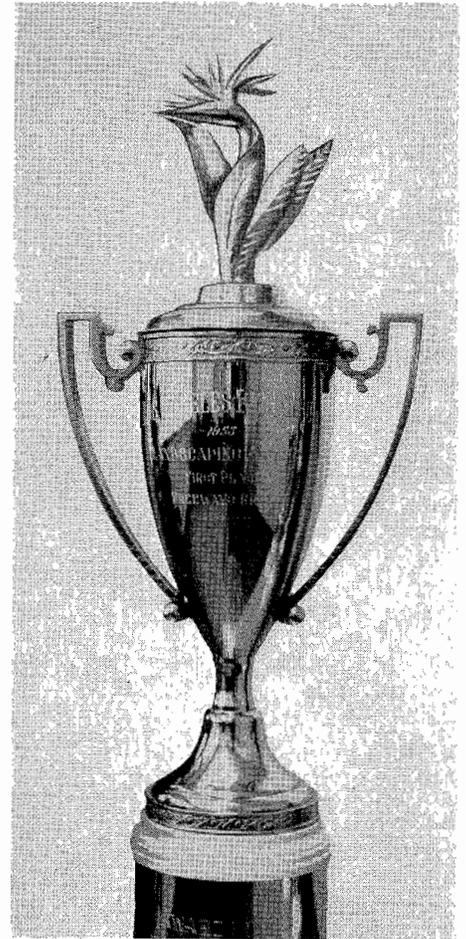
Planting for functional purposes can be attractively done, of course. For example, the ivy and iceplant which were planted to help keep the soil in place on the slopes bordering the Arroyo Seco Parkway and sections of the Hollywood Freeway yield an extra dividend of natural beauty. Trees and shrubs enhance this effect, but are primarily planted to absorb noises and for traffic delineation.

Los Angeles Beautiful, an affiliate of the Los Angeles Chamber of Commerce, recently conducted a city-wide contest for outstanding planting projects. There were 12 classifications, including one for freeways and highways and one for public works buildings, with four prizes in each classification. The competition may become a yearly event on the basis of the widespread interest shown.

Awards to State

The first three prizes in the freeways and highways classification were awarded to state highway projects.

The section of the Hollywood Freeway between Grand Avenue and Glendale Boulevard, which includes the four-level distribution structure, won first place. Planting on this section is probably closer to landscaping of the beautification type than anywhere else on the State Highway System, and was designed in accordance with the desires of Los Angeles city authorities as well as in keeping with the importance of the four-level interchange as the nucleus of a metropolitan freeway system. It was planted in 1950 and 1951, and includes grass, ground cover, shrubs and trees.



First place trophy awarded to Division of Highways. Other awards are of same design but smaller.

Second prize went to the Arroyo Seco Parkway, planted between 1940 and 1948, and third to the section of the Hollywood Freeway between Glendale Boulevard and Western Avenue, planted in 1952 and 1953, both featuring the ivy and iceplant mentioned before.

The freeway planting was designed by H. Dana Bowers, Supervising Landscape Architect of the Division of Highways, and is maintained by District VII maintenance crews under the supervision of A. L. Olmsted, Highway Landscaping Supervisor.

In the public works buildings classification, fourth prize was awarded to the freeway maintenance office at 4170 Clinton Street, adjacent to the Hollywood Freeway in the vicinity of Vermont Avenue.

Golden State

By ROBERT H. BUTLER
Resident Engineer

Progress at Junction With
Four Major Highway Routes

Freeway

HIGHWAY ENGINEERS today, as did their predecessors the guides and explorers of yesteryear, still must seek mountain passes for economical and practical travel. Nature in her mountain blockading of over 5,000,000 inhabitants of the Los Angeles metropolitan area, reluctantly provided only a few passes, the principal one being the renowned Ridge Route, on US 99, now a part of the "Golden State Freeway."

Congregating at the southeasterly end of this pass are San Fernando Road, the most direct route to Los Angeles; Sepulveda Boulevard, serving the San Fernando Valley and beach communities; Foothill Boulevard following the foot of the Sierra Madre Mountains at the San Gabriel Valley; and, as if this were not enough, the Sierra Highway going

easterly to serve the fast growing, jet airplane building and testing area of Palmdale and Lancaster. All four of these arterials are state highway routes.

To combine, to intersect, to accelerate, and to decelerate these congregating major arterials for smooth and efficient traffic flow in spite of nature's seemingly cruel confinement, the highway engineers of District VII, together with the bridge engineers, were forced to search deep into their highway knowledge. Discarding first one alternative and then another, the final answer turned up the following:

The Problem

- Move 1,750,000 yards of material with 29,000,000 station yards of overhaul;
- Build seven bridges varying in span length from 27 feet to 457 feet;

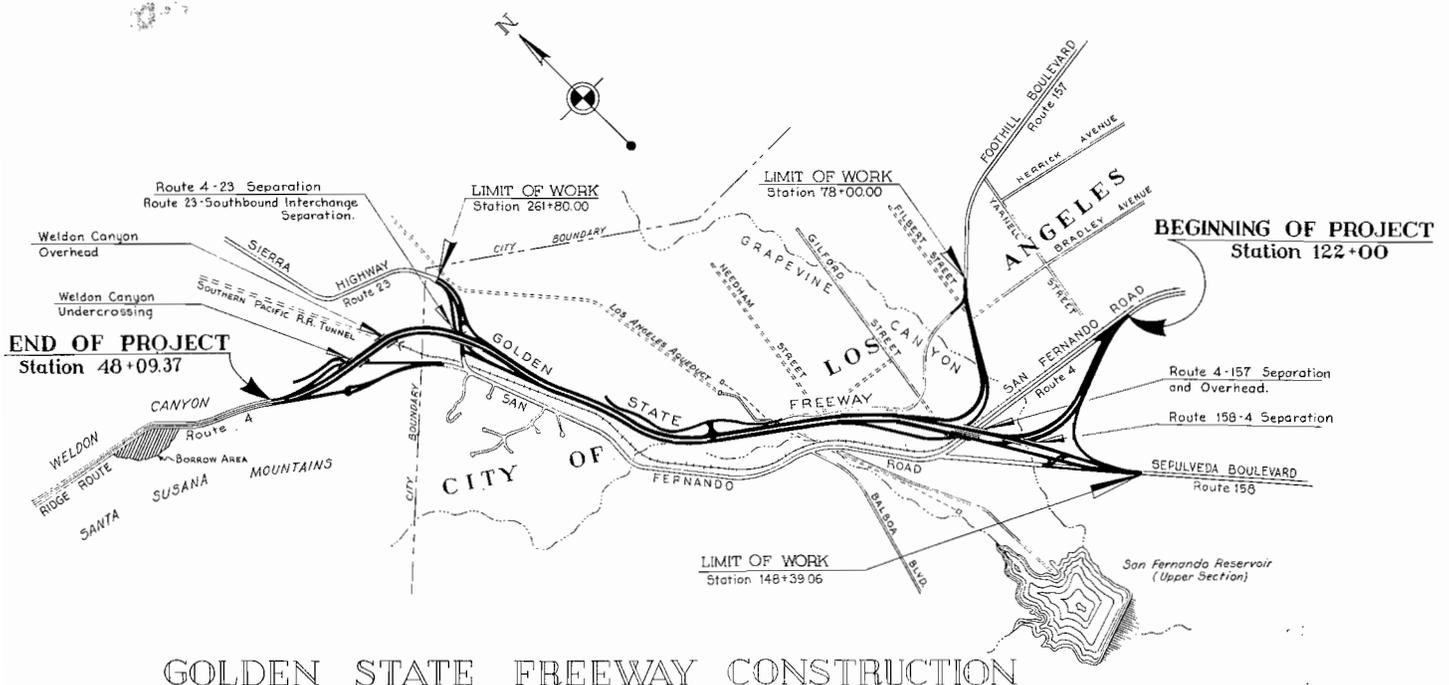
Place 16,000 feet of pipe varying from 8 inches CMP's to 87 inches RCP, including a 14-foot metal plate arch;

Relocate a dozen utility lines, including pipe lines carrying one-third the total natural gas supply of the Los Angeles metropolitan area;

Pave six miles of four-lane and six-lane roadway with Portland cement concrete or asphalt concrete within a three-mile project;

Perform various other work varying from the installation of property fencing to the construction of an equestrian undercrossing.

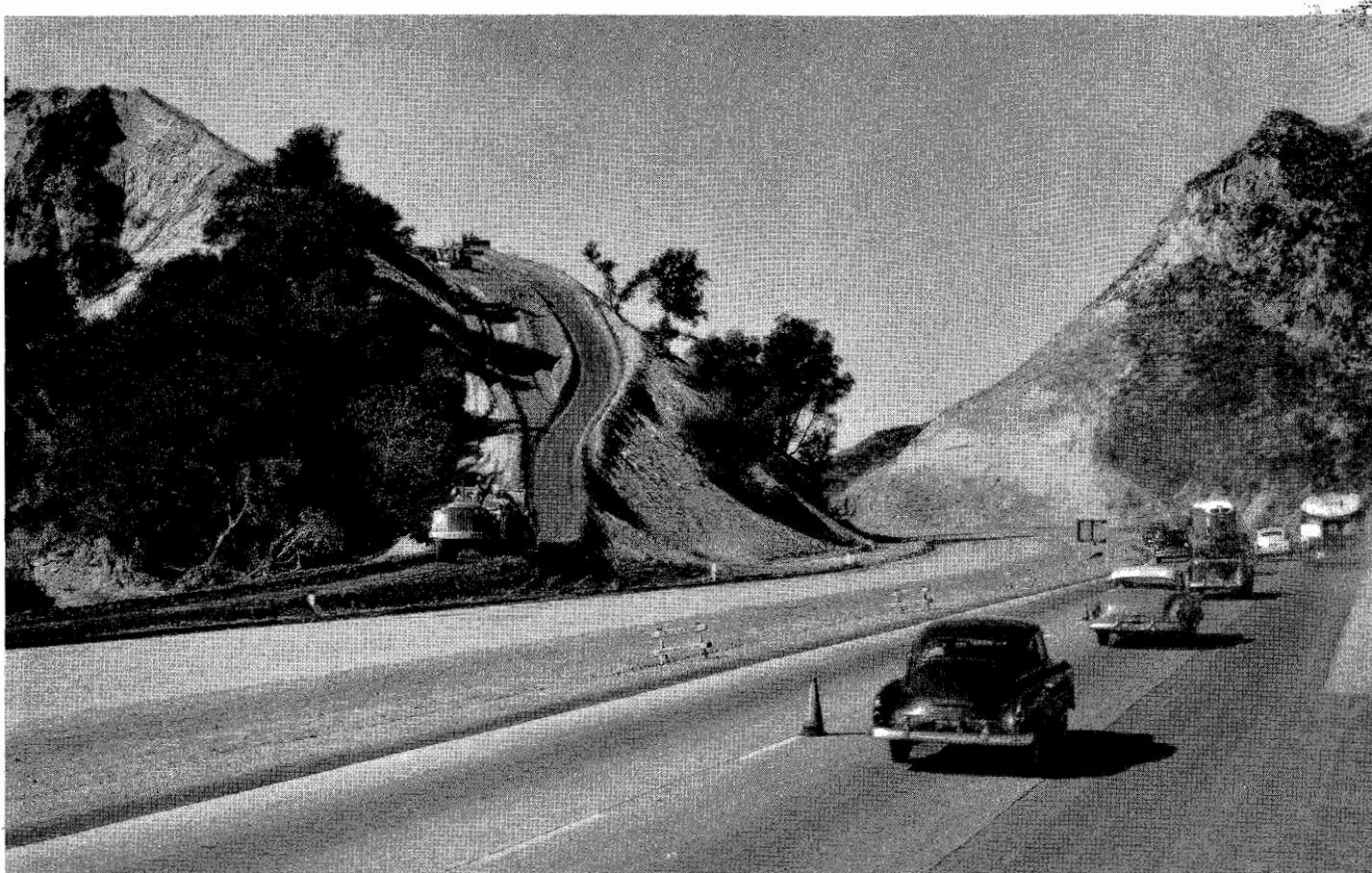
On July 16, 1953, Griffith Company of Los Angeles offered to perform this work on the Golden State Freeway for \$3,060,396.35—about \$407,000 less than the average of 13 other bidders. Griffith Company, after receiving the award of contract, started work on August 31, 1953. Since that



GOLDEN STATE FREEWAY CONSTRUCTION

CONNECTING

RIDGE ROUTE, SIERRA HIGHWAY, FOOTHILL BOULEVARD, SEPULVEDA BOULEVARD & SAN FERNANDO ROAD.



Looking northerly along completed Ridge Route section in Weldon Canyon, showing contractor's equipment descending 40 percent grade with embankment material for Weldon Canyon fill that is being obtained by widening the Weldon Canyon Summit cut

time, with the able assistance of their subcontractors, they are proving that with close coordination and careful planning, many phases of complex freeway construction may be performed simultaneously. To perform these various phases of work, equipment is now being used on the job which has a replacement value of over \$1,000,000.

A million dollars of bridge work on the contract is under the direct supervision of C. J. Woodbridge, Bridge Department representative for the State Division of Highways. It is interesting to observe the variety of structural design included in this group of seven bridges. At the Route 158/4 separation and the Route 23 southbound interchange the large skew angle between abutments and deck called for "outrigger" construction so that girders could span the shortest distance between abutments. Route 4/157 separation and overhead has part of the structure founded on piles, with the concrete box girder

spans joining steel girder spans over the Southern Pacific Railroad.

Weldon Canyon Overhead

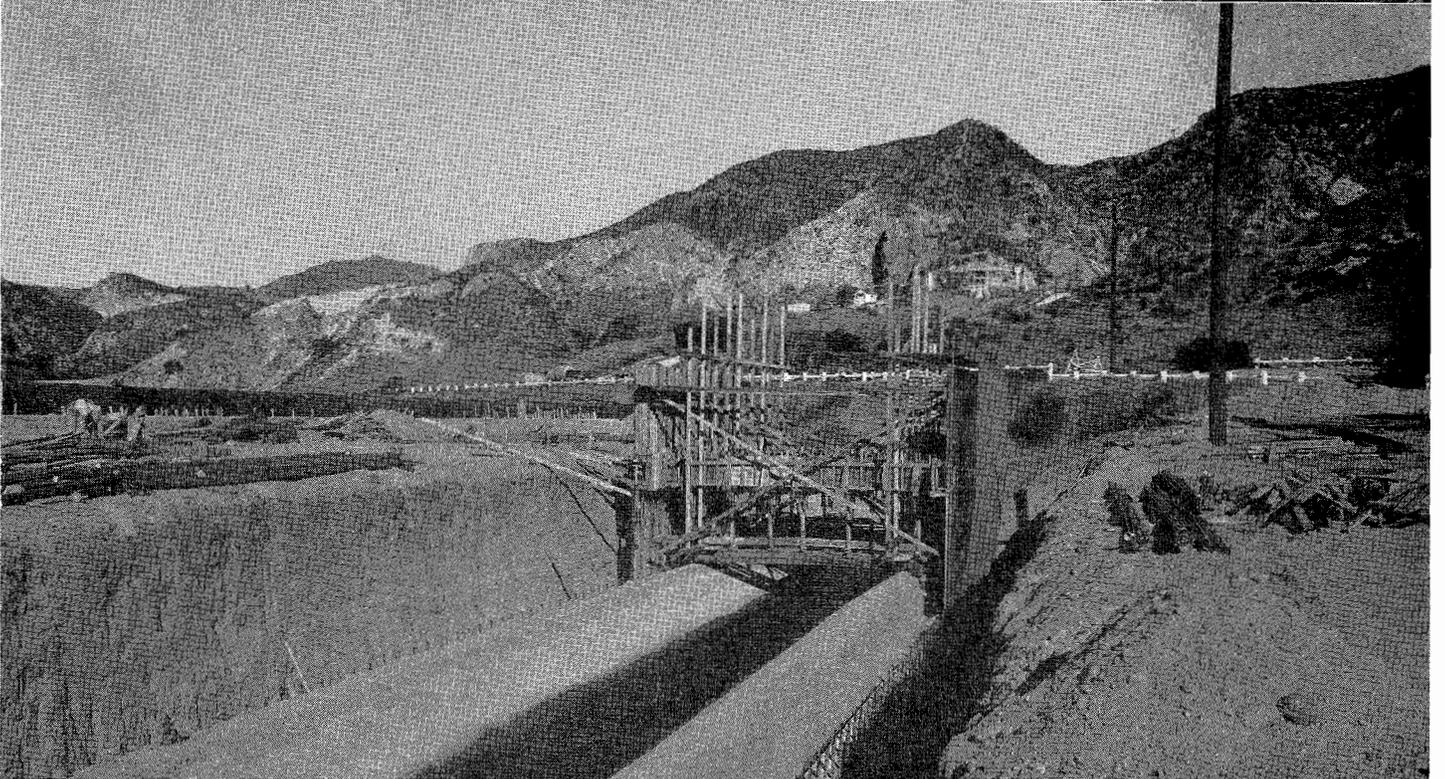
Representing a rather unusual use of a bridge is the Weldon Canyon overhead which crosses the Southern Pacific Railroad Tunnel No. 25 with four spans. To avoid placing additional loads on the tunnel, bents adjacent to the tunnel transmit their loads through cast-in-place piles drilled to 10 feet below the railroad track. Some of the piles are 80 feet deep, and were drilled through layers varying from soft silt to hard rock. While drilled piles were required for this bridge and the Owens Valley-Los Angeles Acqueduct Bridge, it is interesting to note that the contractor elected to use drilled piles for the entire project.

To the passing motorist the earthwork, which has been sublet to J. Tomei and Sons, is most spectacular. One unidentified lady motorist, after seeing a pioneer "cat" perched some

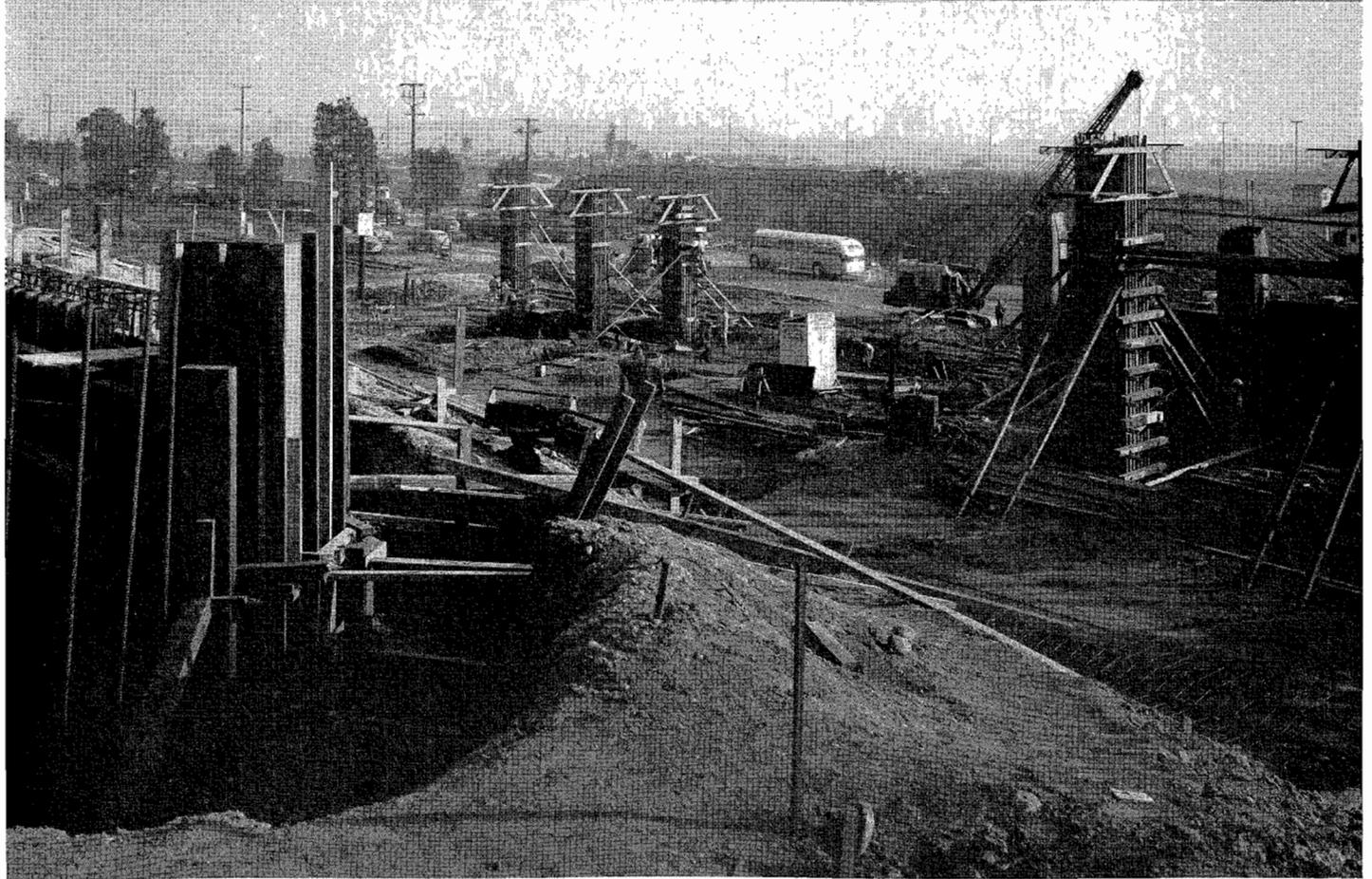
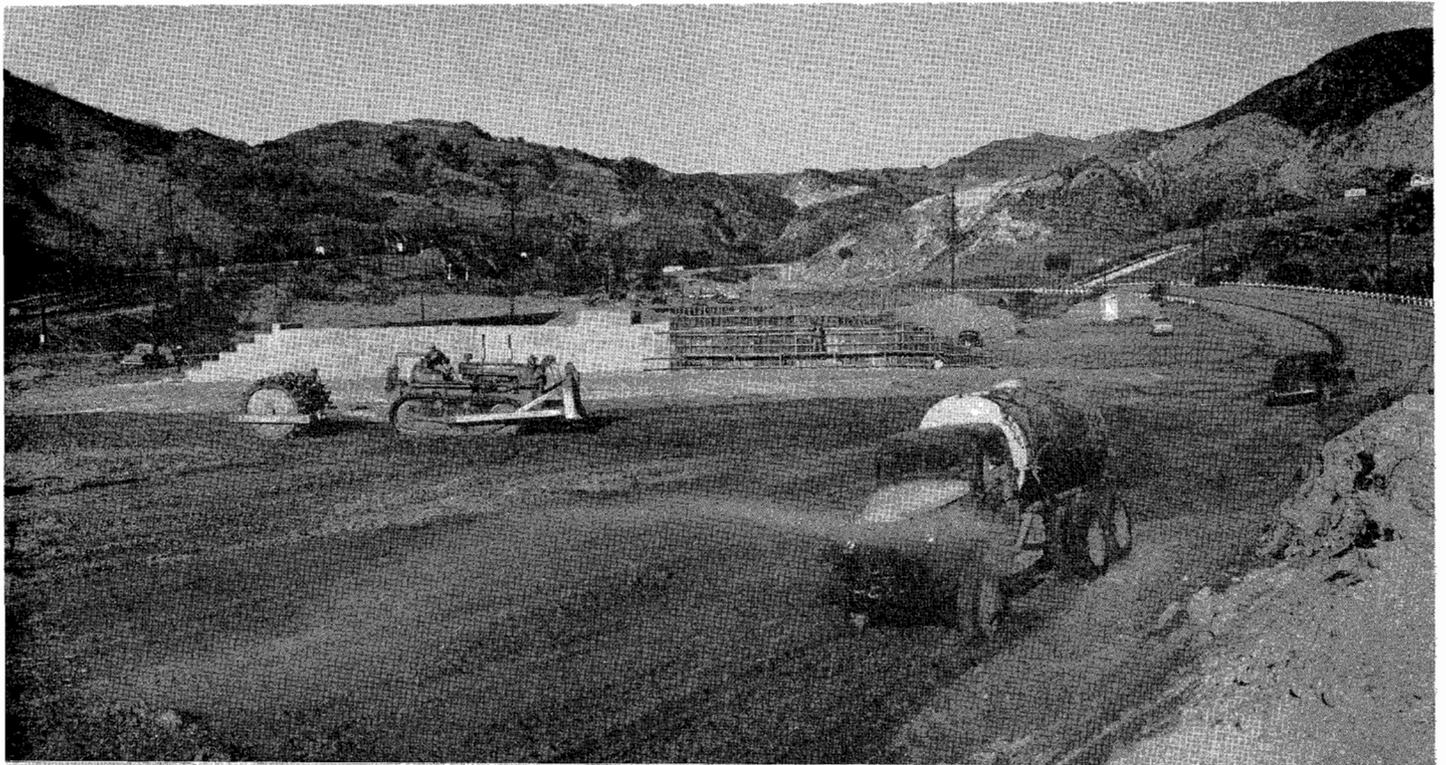
250 feet in the air with apparently nothing holding up the outside track, stepped from her car, pointed upward, let out a scream and promptly fainted. In the heaviest cuts approximately 75,000 cubic yards per 100 feet station will be moved.

Perhaps this business of altering nature to serve man is more realistic to Victor Weldon, a native son born in 1890, than to many of us, at least in a nostalgic sense. In the span of his lifetime he has seen Weldon Canyon, which was named after his father, ravaged by fire and torn by floods, yet still remain a canyon, finally to lose its identity as such because of the growing traffic demand for better highways.

Hal McGregor is job superintendent for Griffith Company, and the writer, resident engineer for the State Division of Highways. Joe Porcher is general superintendent for Griffith Company, and E. A. (Ace) Parker, field supervisor for the State.



UPPER—Looking southeasterly, showing portion of half-million-yard fill under construction in Weldon Canyon. LOWER—Looking northeasterly along Owens Valley-Los Angeles open channel aqueduct, showing special design, reinforced concrete bridge construction to permit passing of freeway over the aqueduct.



UPPER—Looking northerly along Golden State Freeway approaching the Owens Valley-Los Angeles aqueduct crossing, showing fill-compacting operations under way. The structure shown in center of photograph is the reinforced concrete equestrian undercrossing. LOWER—Looking southerly at bridge bents under construction for the Route 4/157 separation structure which will carry the Golden State Freeway over San Fernando Road, the main link of the Southern Pacific Railroad, and the southbound interchange roadway to Foothill Boulevard.

CALIFORNIA'S ACCELERATED HIGHWAY CONSTRUCTION PROGRAM

By FRANK B. DURKEE, Director of Public Works

THE CALIFORNIA HIGHWAY COMMISSION in November, 1953, adopted the largest annual highway budget in the history of California—so far as we know, the largest in the history of any state in the Union, exclusive of toll facilities.

This budget totals \$298,998,830. After making deductions for city streets and other purposes, it provides a total of approximately \$267,000,000 for all state highway functions. Of this amount, \$205,000,000 is allocated for major state highway construction purposes, including right of way acquisition. This is 74 percent more for major construction than was provided for this purpose in the budget adopted in October, 1952.

Deficiencies Always With Us

Whether we go back to the days of forty-nine, to the horse and buggy days of the nineties, or the first bond roads of 1912, California has had a great burden of highway deficiencies. This has continued to the present day. We have seen the Highway Commission, year by year, especially since World War II, take the one step forward which available funds permitted, while mounting traffic left us two steps behind.

This year, at long last, the tide may be said to have turned. It has been possible, with the increased revenues provided by the Highway Act of 1953, to take a real step forward.

During the 1953 Session of the Legislature, in response to questions by legislative committees, representatives of the Department of Public Works expressed the opinion that it would be possible to break the backbone of California's critical highway problem in 10 years, if adequate financing were provided.

New Taxes Made Possible Increase in Current Budget

The Legislature's response was a sizable increase in highway user taxes, which became effective, in part,

on July 1st, last. Largely as a result, the commission was able to revise the previously adopted budget for the current fiscal year (1953-54), and to add to it more than \$87,000,000 for construction and rights of way. Last November the second budget (1954-55) adopted on the basis of the new legislation set the all-time record for highway financing in California.

In view of the fact that the present law provides for a cutback of one-half cent in the gasoline tax and in other taxes at the end of two years, it may well be some years before our state highway construction program will again equal this new record. Some time will necessarily elapse before even our increasing traffic and travel will produce sufficient additional income to provide another \$205,000,000 in one year for major construction purposes.

Features of the 1954-55 Budget

Let us consider some of the important features of the new budget as it pertains to state highways.

This \$267,000,000 is a lot of money. Most of it comes from highway user taxes, and the highway user is entitled to know what he may expect for his money in terms of safer and more expeditious travel.

The largest single category in the 1954-55 State Highway Budget is for major construction and improvement, \$145,387,000 (which does not include rights of way). This represents 55 percent of the total for all state highway purposes. The next largest, rights of way (which is principally to provide for *future* major construction and improvement), is approximately \$60,000,000, or 22 percent.

A part of the remaining 23 percent eventually will go into additional mileage of new and improved highways. There is a small item for minor improvement and betterment, and a substantial one of nearly \$5,000,000 as a contingency reserve most of which may be expected to be transferred by

the end of the fiscal year to construction projects.

Maintenance continues to require approximately \$25,000,000; administration amounts to \$6,500,000; and there are the usual provisions for buildings, plants, equipment, and the maintenance of the San Francisco-Oakland Bay Bridge. The only other major category of expenditure is \$16,000,000 for preliminary engineering—which, like acquisition of rights of way, is essential for the planning of future construction.

An item of \$2,500,000 for federal aid secondary matching funds has been included in the new budget, and a like amount was included in the 1953-54 budget as revised last July.

This new feature of the state highway budget is a provision of the 1953 legislation, which has as its purpose assistance to the counties in matching the federal aid secondary funds allocated to them. The new law now provides that from the State Highway Fund there shall be provided the necessary matching funds as required by federal law, not to exceed \$50,000 for any one county. Thirteen counties already have availed themselves of this assistance, and others are planning to do so before the end of the current fiscal year.

What the New Budget Is Expected to Accomplish

The highway user probably is less concerned with budget details than he is with the mileage of new, modern highways that the dollars represent.

During the 1953 Session of the Legislature considerable was said about priority of highway needs. In answer to legislators' questions, representatives of the department and of the commission gave assurance that any additional funds that might be provided would be used to attack the most critical situations first, and that the job of progressively meeting the State's huge backlog of highway deficiencies would go forward in an

orderly manner and as rapidly as possible, subject, of course, to the allocation formulas of the Legislature.

A study of the two budgets adopted since the new legislation took effect will demonstrate that this promise has been kept. Already there has been a tremendous state-wide advance in the construction of essential urban freeways, intercity expressways, and a large mileage of rural routes; and the progress next year will certainly be even more impressive.

Los Angeles Freeways

In the Los Angeles area, among other projects, the Hollywood-Santa Ana Freeway connection will be completed, providing more than 43 miles of multilane full freeway continuous from Vineland Avenue in the San Fernando Valley to southeast of the City of Tustin except for the portions through Anaheim and Buena Park. The Ramona Freeway will be extended through and easterly of El Monte; the Harbor Freeway, currently in the construction stage as far south as Santa Barbara Avenue, will start reaching northward from San Pedro; the Colorado Freeway will be extended westward from the new Pioneer Bridge in Pasadena; and a start will be made on the Sepulveda Freeway.

In San Francisco

In the San Francisco Bay area, we shall see under way the direct connection between the Bayshore Freeway in San Francisco and the Bay Bridge; the completion of the widened East Shore Freeway north from an enlarged distribution structure to El Cerrito; a new freeway connection from the East Shore Freeway to the Dublin Canyon Freeway section of US 50; freeway development in downtown Oakland; and a real start on the new freeway section of US 40 in western Contra Costa County, extending from Richmond northerly toward the Carquinez Bridge.

Freeway by-passes of the congested business districts of Fresno, Salinas, Arcata, Banning, Petaluma and other cities will be initiated or continued in the new budget. San Diego will see the start of a new east-west freeway on Sign Route 94.

On the major intercity route, progress is no less impressive. By the time all the funds allocated to US 99 in the current budget (1953-54) and the new budget (1954-55) have been expended, there will be a very limited mileage of that route between Los Angeles and Sacramento remaining to be improved to multilane divided highway standards. The expressway construction of US 101 between Los Angeles and San Francisco is going ahead at a rapid pace; and 101 north of San Francisco—the Redwood Highway—is losing more and more of its curves, grades and congestion. More multilane divided miles are being added on US 40; US 50; on US 60-70-99 in Riverside County; and on portions of US 99 north of Sacramento.

Although a large portion of the budget is devoted to freeway construction, many miles of other important improvements are included. Allocations to long-awaited and necessary state highway projects have been made in every county in the State in the new budget or the current budget. These projects represent the most critical deficiencies in their respective regions.

The Continuing Highway Program

Thus we have a budget which represents not only a considerable step forward toward the goal of adequate highways in our State, but which is also a *planned* step forward. Projects which have been at or near the top of the critical list for years have now been advanced to the construction stage. Hundreds of miles of safer, less congested highways will be available for our people far sooner than previously scheduled.

Another important fact about the new budget is that it does not represent a single, spasmodic outburst of highway construction activity. It is part of a continuing program which has been under way since shortly after World War II, with the difference that it is now being carried on at an accelerated rate.

Still another important fact about the budget is that the highway improvements for which it provides are, for the most part, *permanent* im-

provements. The freeway principle—control of access, with little or no cross traffic—is being adhered to on as many new projects as possible. If the traffic needs of California are to be met, and if the public investment in our highways is to be protected and preserved, we must continue to concentrate, wherever possible, on permanent improvements and on highways of the limited access type; otherwise we shall risk dissipating our highway user taxes on projects which will not yield long-term benefits to our people.

Many Projects Yet Unfinished

But, despite all that may be said about our augmented program, we are still deep in the woods. We still have with us, for example, many, many miles of unbuilt freeways in the Los Angeles area; the much-needed addition to the Posey Tube between Oakland and Alameda; the freeway in the Walnut Creek area in Contra Costa County; long substandard stretches of the Redwood Highway; hundreds of inadequate bridges, including a multimillion-dollar additional bridge across Carquinez Straits. This progress report on your state highway program would be out of balance if it failed to take cognizance of how far we have yet to go.

Augmented Program Being Administered

The immediate task of the Division of Highways, however, has been to put the additional funds to work as quickly as possible. At the time the 1953 legislation was under consideration there were questions in some quarters as to the ability of the division and the contracting industry to make full use of the augmented revenues as they would become available. These questions, I believe, have now been pretty definitely answered.

By the end of 1953, with six months to go, the Division of Highways had under construction 277 individual contracts having a value of \$154,000,000. This leaves a balance of \$23,000,000 yet to be contracted against the 1953-54 budget, to be awarded early this spring. Plans and specifications are complete for many projects included in the 1954-55 budget which was adopted by the commission last

November. Some of these projects will be advertised in January and February of this year, so that many contracts will be ready for award on April 1st, as the code permits. Construction should be well under way by this summer.

The State's engineering organization is demonstrating its ability to design and administer the expanded highway program. And the number of bids we are receiving indicates, among other things, that the contracting industry is presently capable of absorbing and handling the increased construction the new funds have made possible. This will be true, I believe, should the present level of taxes be continued, which, of course, is a policy question to be resolved by the Legislature.

Continuous Planning

The value of continuous planning far ahead of immediately available funds was never more clearly demonstrated than by the prompt and effective expenditure now being made of the new highway revenues. Because the Division of Highways was ready with the plans, it was possible for the Highway Commission to adopt an increased and revised budget for the current year within three weeks from the effective date of the legislation. Because the division had completed preliminary studies and was well along on detail design and plans for additional projects, the budget for 1954-55 will be translated into contracts and construction without delay. Further advance planning and preliminary engineering work are being continued and accelerated.

Revolving Fund for Right of Way Important

The revolving funds which the Legislature made available for acquisition of right of way, also has been of great importance in the speedup of the highway program, and in the cutting down of future costs. Some \$20,000,000 has been made available to date, and another \$10,000,000 can be used starting July 1, 1954.

Up to the present, the Highway Commission has authorized the expenditure of \$12,000,000 of the advance right-of-way funds, principally for the acquisition of property on which improvements were being planned. It

is estimated that if this \$12,000,000 had not been available, and the purchase of the properties had had to be deferred until after the contemplated improvements had taken place, \$80,000,000 would have been required to acquire them for state highway purposes. In other words, based on a conservative appraisal of values following anticipated development of properties already acquired, in the process of acquisition, there is a net indicated saving to the State thus far, through the use of this right-of-way revolving fund, of \$68,000,000 in right-of-way costs.

It now appears that it will be possible to continue advance right-of-way acquisition, and that the remaining \$10,000,000 will be drawn on as soon as it becomes available next July. Applying the current rate of savings to the entire \$30,000,000 of revolving funds, a saving of \$170,000,000 may reasonably be expected.

Finally since some portion of the money will be returned to the fund before all of it is expended, and will, in turn, be used to purchase still more advance right of way, further savings undoubtedly will develop. By 1962, when the fund terminates under present law, we may very well have saved as much as \$200,000,000 by acquiring rights of way before property development takes place. It is believed the fund is adequate for the present.

Cooperation With Owners Now Possible

Another important result of the program for advance acquisition of right of way is the immediate and effective cooperation it makes possible between the department and landowners and developers. In areas where future highway construction is under consideration, owners are now enabled to develop their properties knowing how future highway construction is going to affect their property, while the taxpayers save money in the actual costs of land for highways.

Land developers are appreciative of the fact that the State can now back up its long-range highway planning with definite action, and, in turn, they are inclined to pay more attention to future highway needs, and to offer more assistance to highway planners.

Route Adoptions Control Program

But the effectiveness of the advance right-of-way program, like all highway planning, is dependent on a firm and sustained policy of route determination. If we are going to correct our highway deficiencies in any reasonable period of time, and at the least possible cost to the highway user, the State must proceed with a program of route adoptions so that precise plans may be prepared, right of way acquired, and construction undertaken. Therefore, the progress of route adoption proceedings may well control the progress of our augmented highway program.

Present day standards and needs make it inevitable that, to improve almost any California state highway, some private property must be acquired. Despite the careful study that goes into every project, there is bound to be some degree of individual opposition to whatever route is recommended by the State Highway Engineer. The commission stands ready, as always, to give all possible consideration to the expressed desires of a community. But we cannot permit, if we are to serve the general public interest, the bogging down of the continuous, orderly development of an adequate highway system for the 12,000,000 people and the 6,000,000 motor vehicles in California in a flood of individual objections to specific free-way routes.

Transportation has always been the key to development in America. And in this regard highways are vital to the future of California. We must ever be conscious of what the extension and improvement of the highway system is doing to the economy of our State as a whole, and of local areas in particular. Even if the statutes did not so require, it would be the policy of the commission, I am sure, so far as possible to support an equitable and balanced state-wide program. The need for such a balanced program is one of the reasons why route adoptions are so important; why unreasonable delay, for whatever reason, may result in actual loss of business or other detriment to given areas of our State.

Support of Civic Groups Appreciated

In this connection I should like to express the gratitude of the commission for the stand which has been taken by civic organizations in re-

cent route adoption discussions. Such bodies, along with planning commissions and other public-spirited groups, have taken the trouble to inform themselves of the facts—all the facts—involved in the selection of a recommended route, and often have endorsed the proposal of the State Highway Engineer in the face of severe criticism by individual citizens or by newly formed protest organizations.

Such support makes it less difficult for the commission and the engineers to continue planning those freeways which are a recognized, urgent need of motor vehicle users and communities throughout California.

Highway Program Cannot Wait

Transportation I have suggested, is the key to our advancement. Often, in the course of freeway discussions, the question arises: Are freeways and other modern highway improvements the answer, or a complete answer, to our transportation problem?

Certainly there can be little question but that the over-all transportation needs of California will require more than freeways. There is need, in our metropolitan areas particularly, for some form of mass transportation and for what has come to be called rapid transit. We can all agree that any such development should be coordinated with the highway program. But for the present such proposals are largely in the discussion stage. How soon any attainable plan can be agreed upon and implemented, is anybody's guess.

In the meantime, nearly 6,000,000 motor vehicles have been registered in California. The need to provide the highway facilities which they require is our immediate, pressing transportation headache. This is the job of the Division of Highways, and it is a job which cannot wait. The freeway program, with its increased traffic capacity and increased safety, is our answer.

Public Has Accepted Increased Highway Taxes

I have mentioned the gratification of the Highway Commission at being provided the means to accelerate our highway program. There is another source of gratification in this situation. That is the general public ac-

Robert E. McClure Succeeds H. R. Baker

The California Highway Commission has a new member in the person of Robert E. McClure. He was appointed by Governor Goodwin J. Knight on January 15th to serve on



ROBERT E. McCLURE

the Highway Commission for four years succeeding Harrison R. Baker of Pasadena who served four terms.

He was born at Columbus, Ohio, in 1896 but has been a resident of

ceptance of the increased highway user taxes which have made the accelerated program possible.

The Associated Press stated in a recent feature article that, "every time you drive into a service station and say 'fill 'er up!' you are buying a piece of highway."

I believe the general acceptance of the increased taxes is due to public confidence, built up over many years, that our "pay as you go" program is sound, and that the highway user funds are being properly and effectively expended in the improvement and operation of our highway system. I believe, also, that it is attributable in large measure to public awareness

Southern California since 1922. He is the editor and publisher (with J. D. Funk) of the Santa Monica *Evening Outlook* and has become widely known in Southern California for his outstanding editorial writing for his newspaper. He is also the author of five published novels and numerous short stories and articles.

Always active in civic affairs McClure has been Chairman of the Highway Committee of the Santa Monica-Ocean Park Chamber of Commerce for the past three and one-half years. He was the leader in the campaign for a charter change in the City of Santa Monica that led to the adoption of the council and city manager form of government for that city.

He has been a long time director of the local Community Chest, Red Cross, Boy's Club, Chamber of Commerce and other civic organizations. McClure is also president of the Santa Monica Bay Council of the Navy League.

A graduate of Yale University he earned his Phi Beta Kappa key there as well as belonging to Zeta Psi. He was a resident of Pasadena from 1922 to 1936 and now lives in West Los Angeles. He is married and has four children. His father was Colonel Samuel G. McClure (1863-1948), who published newspapers in Ohio and Southern California and was one of the original members of the Metropolitan Water Board of Southern California.

of the need for the increased revenues. For this public awareness a great deal of credit is due to many individuals, publications and organizations for a sustained program of public information concerning the highway needs of our State.

YIELDING RIGHT OF WAY

The first vehicle entering an intersection has the right of way, says the California State Automobile Association. The vehicle on the left yields right of way if two or more vehicles enter intersection simultaneously. Drivers must yield right of way to pedestrians in marked or unmarked crosswalks.

Cost Index

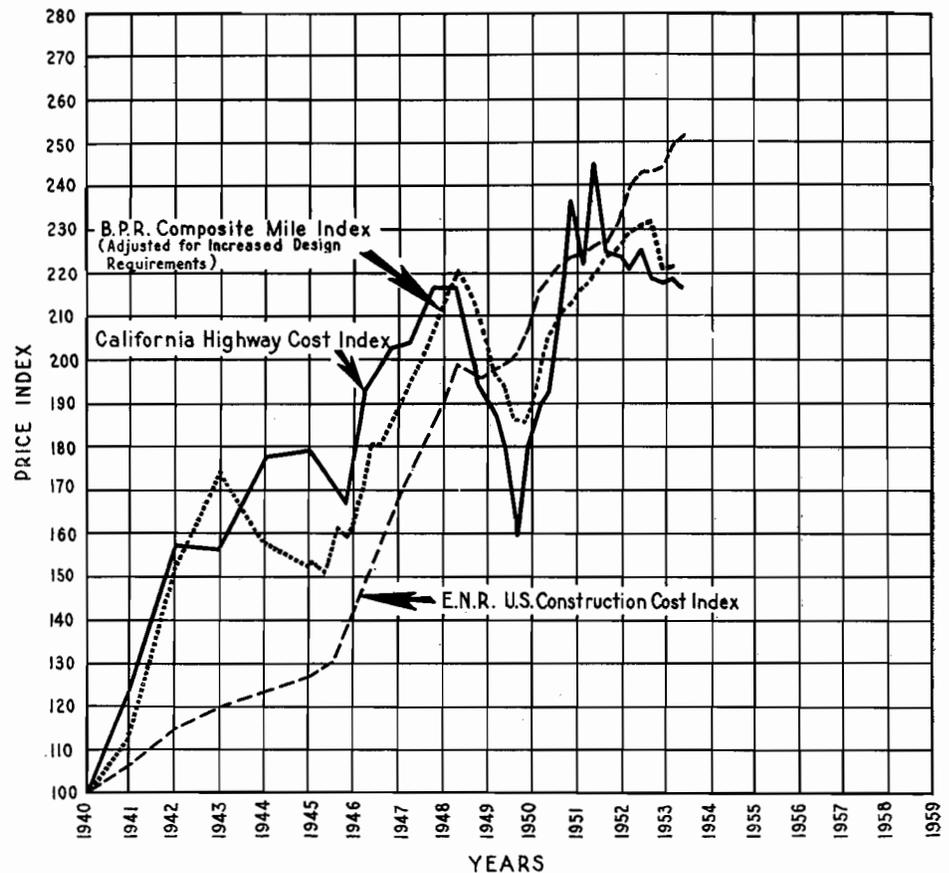
Shows Little Change in Highway Costs
During Fourth Quarter of 1953

RICHARD H. WILSON, Assistant State Highway Engineer
H. C. McCARTY, Office Engineer
JOHN D. GALLAGHER, Assistant Office Engineer

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

PRICE INDEX CONSTRUCTION COSTS

1940 = 100



THE CALIFORNIA Highway Construction Cost Index dropped six-tenths of 1 percent during the fourth quarter of 1953. During the year of 1953 the Index had a maximum spread of only 1.6 points.

The Index stood at 216.7 (1940 = 100) for fourth quarter as compared to 218.0 in the third quarter, 217.5 in the second quarter and 218.3 in the first quarter of 1953 and 226.2 in the fourth quarter of 1952. The fourth quarter of 1953 index figure of 216.7 is 28.7 index points, or 11.7 percent, under the 245.4 of the fourth quarter of 1951 which was the quarter of highest construction costs as reflected by the Index.

The California Highway Construction Cost Index is tabulated below by years and quarters since 1940.

Year	Cost index
1940	100.0
1941	125.0
1942	157.5
1943	156.4
1944	177.8
1945	179.5
1946	179.7
1947	203.3
1948	216.6
1949	190.7
1950 (1st quarter)	160.0
1950 (2d quarter)	180.0
1950 (3d quarter)	189.2
1950 (4th quarter)	194.8
1951 (1st quarter)	215.4
1951 (2d quarter)	238.3
1951 (3d quarter)	221.9
1951 (4th quarter)	245.4
1952 (1st quarter)	224.8
1952 (2d quarter)	224.4
1952 (3d quarter)	221.2
1952 (4th quarter)	226.2
1953 (1st quarter)	218.3
1953 (2d quarter)	217.5
1953 (3d quarter)	218.0
1953 (4th quarter)	216.7

The small spread of the Index through the four quarters of 1953 would indicate a nearly stationary

condition during the year. In the overall this is true, but individual construction items show more fluctuation than the Index would indicate as may be noted in the accompanying tabulation of Average Contract Prices.

While the Index lowered 0.6 percent during the fourth quarter, this drop was effected by decreases of 11.1, 1.9, 12.5 and 7.3 percent respectively in the average unit prices

of roadway excavation, untreated rock base, plant-mixed surfacing and asphalt concrete, and in the face of rises of 7.2, 8.5, 14.1 and 7.8 percent in the unit prices of portland cement concrete pavement, structure concrete, bar reinforcing steel and structural steel, respectively.

It would appear that those items of concrete and steel which showed increases are the ones which are more

CALIFORNIA DIVISION OF HIGHWAYS AVERAGE CONTRACT PRICES

	Roadway excavation, per cu. yd.	Crusher run base, per ton	Plant-mix surfacing, per ton	Asphalt concrete pavement, per ton	PCC pavement, per cu. yd.	PCC structures, per cu. yd.	Bar reinforcing steel, per lb.	Structural steel, per lb.
1940	\$0.22	\$1.54	\$2.19	\$2.97	\$7.68	\$18.33	\$0.040	\$0.083
1941	0.26	2.31	2.84	3.18	7.54	23.31	0.053	0.107
1942	0.35	2.81	4.02	4.16	9.62	29.48	0.073	0.103
1943	0.42	2.26	3.71	4.76	11.48	31.76	0.059	0.080
1944	0.50	2.45	4.10	4.50	10.46	31.99	0.054	0.132
1945	0.51	2.42	4.20	4.88	10.90	37.20	0.059	0.102
1946	0.41	2.45	4.00	4.68	9.48	37.38	0.060	0.099
1947	0.46	2.42	4.32	5.38	12.38	48.44	0.080	0.138
1948	0.55	2.43	4.30	5.38	13.04	49.86	0.092	0.126
1949	0.49	2.67	4.67	4.64	12.28	48.67	0.096	0.117
1st quarter 1950	0.34	2.22	3.65	3.74	---	40.15	0.077	0.081
2d quarter 1950	0.40	2.13	4.48	3.74	10.86	43.03	0.080	0.105
3d quarter 1950	0.41	2.32	4.25	5.50	10.91	44.34	0.093	0.131
4th quarter 1950	0.42	2.81	4.64	4.61	12.55	43.18	0.098	0.120
1st quarter 1951	0.45	3.07	4.06	5.22	11.71	46.38	0.103	0.206
2d quarter 1951	0.63	3.88	4.56	4.63	12.93	51.50	0.105	0.166
3d quarter 1951	0.56	2.88	4.59	3.90	12.41	46.14	0.107	0.165
4th quarter 1951	0.66	2.91	5.66	4.89	12.71	49.38	0.105	0.169
1st quarter 1952	0.56	3.25	4.88	4.77	14.25	47.46	0.094	0.152
2d quarter 1952	0.53	3.19	5.29	4.13	14.20	49.12	0.091	0.143
3d quarter 1952	0.55	2.61	5.49	4.60	12.80	48.21	0.094	0.132
4th quarter 1952	0.66	2.68	4.97	---	12.53	48.45	0.094	0.128
1st quarter 1953	0.45	2.48*	5.27	4.46	12.47	53.19	0.098	0.150
2d quarter 1953	0.50	2.07	5.38	4.59	13.06	52.68	0.091	0.132
3d quarter 1953	0.54	2.15	5.30	4.82	13.78	49.23	0.092	0.129
4th quarter 1953	0.48	2.11	4.74	4.47	14.77	53.41	0.105	0.139

* Untreated rock base substituted for crusher run base at this point.

sensitive to labor costs, while roadway excavation, rock and plant-mixed surfacing in which labor is a lesser factor than machinery decreased.

However, it is still the opinion of this department that the predominating factor at this time in holding overall construction costs to a level and preventing increases is strong competition among bidders. Reference to the accompanying tabulation of the average number of bidders on work of the Division of Highways for the last six months of 1953 shows an increase from 6.2 in July to 7.7 in December, with the larger jobs consistently attracting more contractors. It will be noted that during this six months' period that the average number of bidders on 135 projects costing up to \$50,000 was 5.3 while on 15 projects of from \$50,000 to \$1,000,000 the average number of bidders was 9.5 and on 13 projects of over \$1,000,000 each the average was 10.5 bidders.

Comparison of California Highway Construction Cost Index with the Bu-

**CALIFORNIA DIVISION OF HIGHWAYS
NUMBER AND SIZE OF PROJECTS, TOTAL BID VALUES AND
AVERAGE NUMBER OF BIDDERS
(July 1, 1953, to December 31, 1953)**

Project volume	Up to	\$50,000	\$100,000	\$250,000	\$500,000	Over	All
	\$50,000	to \$100,000	to \$250,000	to \$500,000	to \$1,000,000			$1,000,000	projects
Road projects:							
No. of projects	114	32	28	21	12	3	203
Total value (bid items)	\$2,227,504	\$2,176,383	\$4,523,023	\$7,109,040	\$7,408,849	\$3,665,369	\$27,110,168
Avg. no. bidders	4.9	7.1	7.5	8.7	9.6	9.7	5.6
Structure projects:							
No. of projects	21	8	7	6	5	3	48
Total value (bid items)	\$562,494	\$536,741	\$1,025,106	\$2,353,865	\$2,098,591	\$6,053,917	\$12,630,714
Avg. no. bidders	7.4	9.6	10.3	10.0	9.0	12.7	8.9
Combination projects:							
No. of projects						7	7
Total value (bid items)						\$16,908,600	\$16,908,600
Avg. no. bidders						10.0	10.0
Summary:							
No. of projects	135	40	35	27	15	13	258
Total value (bid items)	\$2,789,998	\$2,713,124	\$5,548,129	\$9,462,905	\$9,507,440	\$26,627,886	\$56,649,482
Avg. no. bidders	5.3	7.6	8.1	9.0	9.5	10.5	6.9

Total Average Bidders by Months

July	Aug.	Sept.	Oct.	Nov.	Dec.
6.2	6.9	6.4	7.6	7.4	7.7

... Continued on page 50

California Bridges

Downtrend of Construction Costs Halted During 1953

By J. S. McCLELLAND, Assistant Statistician, and
W. J. YUSAVAGE, Junior Research Technician, Bridge Department

The following article is the second in a series dealing with California bridge costs. The preceding article, which appeared in the January-February, 1953, issue of *California Highways and Public Works*, provides a general introduction.

For total highway costs, of which bridge costs are but a portion, the reader is referred to a series of articles entitled *Cost Index*, by R. H. Wilson, H. C. McCarthy, R. R. Norton, and J. D. Gallagher, the most recent of which appears in the November-December, 1953, issue of the same publication.

INFLATIONARY conditions accompanying the Korean War pushed California bridge construction costs to an all-time high during the year 1951. The ensuing cost decline, which started late the same year, continued until mid-1953 when the trend was reversed, at least temporarily, and costs once again started upward.

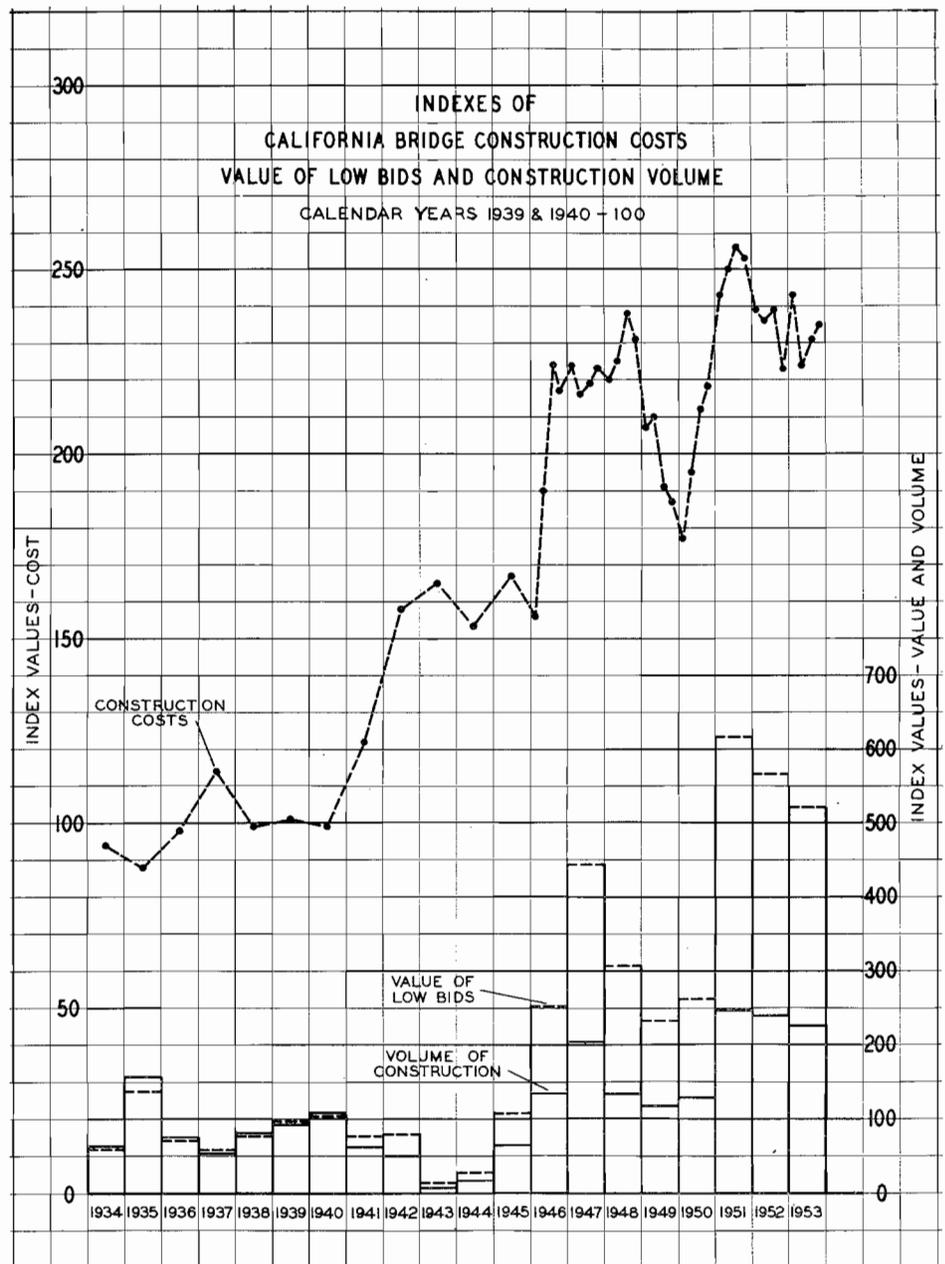
During the first quarter of 1953 costs underwent a sharp but temporary increase indicating, possibly, an attitude of caution in view of the removal of governmental restrictions affecting the construction industry. The cost increase was short-lived, for a show of highly competitive bidding returned second-quarter costs to the level which existed prior to the sudden rise. During the last six months of the year, however, costs began a slow ascent marked by successive increases of 2 percent and 3 percent in the quarterly level of costs. The cost level for each quarter of 1953 can be found in the accompanying chart which indicates the course of California bridge construction costs since 1934.

Defermintion of Costs

California bridge construction costs are reported in the form of an index which compares the total cost of a

schedule of representative work during a given period with the total cost of the same schedule of work during the base period, the calendar years 1939 and 1940. The fixed schedule of work contains the 14 major contract items of work called for in bridge

construction; the quantities of the items are the sums of the respective item quantities in all projects on which bids were received during the base period. Periodic cost of the fixed schedule is obtained by applying the 14 average unit prices for the period



to the fixed quantities; these average item unit prices are computed from the low bids on all bridge projects on which bids were received during the particular period. The 14 items of work, the respective base-period quantities, and the average base-period unit prices can be found in *Table II*.

Volume of Bridge Construction

In addition to construction costs, the chart illustrates the annual levels of expenditure by the State for bridge construction and the resulting physical volume of work. The information is shown in index form with the years 1939 and 1940 as the base. The three indexes shown in the chart appear in tabular form in *Table I* along with levels of expenditure expressed in millions of dollars.

General Trends

Bridge costs reached their record high during the third quarter of 1951 as the most serious dislocations accompanying the Korean War were being felt locally. Some relief was seen late the same year, however, and by the end of 1952 costs were down approximately 12 percent from the 1951 peak. Costs underwent a brief up-down movement early in 1953 which terminated in a moderate upward trend—taking costs, as of the fourth quarter, to within 7 percent of the 1951 peak.

The cost data used in the preparation of the bridge index shows that, among the 14 contract items of work considered, the various items of structural steel have contributed the most to the gross fluctuations of costs during the past several years, and the items of concrete have contributed the most to the long-run rise in the level of costs. As of the last quarter of 1953, structural steel items stand at approximately 200 percent of the base price level. Concrete items stand at approximately 275 percent of the base level, and the other contract items range between the two with the notable exception of excavation which remains at approximately 150 percent.

The rising level of costs during the last half of 1953 does not indicate any relaxation of competition in bidding. Bid records for the past two years

TABLE I
INDEXES RELATING TO CALIFORNIA BRIDGE CONSTRUCTION AND PERIODIC DOLLAR VALUES OF LOW BIDS ON CALIFORNIA BRIDGE CONSTRUCTION

I Year	II Quarter	III Index of the Cost of California Bridge Construction (1939-1940=100)	IV Index of the Value of California Bridge Construction (1939-1940=100)	V Index of the Volume of California Bridge Construction (1939-1940=100)	VI Dollar Value of Low Bids on California Bridge Construction (in millions of dollars)
1934		94	60*	64*	3.1
1935		88	138*	157*	7.1
1936		98	72*	73*	3.7
1937		114	60*	53*	3.1
1938		99	78*	79*	4.0
1939		101	99*	98*	5.1
1940		99	101*	102*	5.2
1941		122	78*	64*	4.0
1942		158	80*	50*	4.1
1943		165	16*	9*	.8
1944		153	29*	19*	1.5
1945		167	109*	65*	5.6
1946	1st	156			
1946	2d	190	247*	133*	12.7
1946	3d	224			
1946	4th	217			
1947	1st	224			
1947	2d	216	443*	202*	22.8
1947	3d	219			
1947	4th	223			
1948	1st	220			
1948	2d	225	307*	134*	15.8
1948	3d	238			
1948	4th	231			
1949	1st	207			
1949	2d	210	233*	117*	12.0
1949	3d	191			
1949	4th	187			
1950	1st	177			
1950	2d	195	262*	129*	13.5
1950	3d	212			
1950	4th	218			
1951	1st	243			
1951	2d	250	617*	247*	31.8
1951	3d	256			
1951	4th	253			
1952	1st	239			
1952	2d	236	561*	237*	28.9
1952	3d	239			
1952	4th	223			
1953	1st	243			
1953	2d	224	522*	227*	26.9
1953	3d	231			
1953	4th	235			

* Average quarterly information.

show a progressive increase in the number of bids received per project. Several projects during the past year attracted 20 or more bids, and the yearly averages of bids per project showed increases from the preceding year of 30 percent and 40 percent for the years 1952 and 1953 respectively.

Outlook

The degree to which the various cost levels during the past few years have been determined by intangible factors is indicated by the failure of wage rates and materials prices to explain the decline of costs since 1951. Factors such as the realignment of the

TABLE II

TOTAL QUANTITIES, WEIGHTED AVERAGE PRICES, AND DOLLAR AND RELATIVE VALUES OF LOW BIDS FOR 14 PRINCIPAL ITEMS OF WORK IN CALIFORNIA BRIDGE CONSTRUCTION, CALENDAR YEARS 1939 AND 1940

Items of work	Total base period contract quantities	Weighted average prices	Dollar values of base period low bids	Relative values
Structure excavation.....	156,286 cu. yds..	\$1.56	\$244,398.00	3.24%
Class "A" Portland cement concrete (structures).....	176,634 cu. yds..	18.42	3,252,837.00	43.13%
Class "A" Portland cement concrete (footing block).....	12,774 cu. yds.	12.04	153,745.00	2.04%
Structural steel (plate girder).....	5,810,000 lbs. ....	.077	450,221.00	5.97%
Structural steel (rolled beam).....	4,953,000 lbs. ....	.063	310,900.00	4.12%
Structural steel (truss).....	7,884,000 lbs. ....	.099	782,269.00	10.37%
Miscellaneous iron and steel.....	766,630 lbs. ....	.138	105,639.00	1.40%
Bar reinforcing steel.....	35,958,000 lbs. ....	.040	1,440,424.00	19.10%
Furnishing steel piling.....	79,329 lin. ft.	1.79	142,168.00	1.88%
Furnishing concrete piling.....	146,861 lin. ft.	1.60	235,477.00	3.12%
Driving steel piling.....	2,313 ea.	25.29	58,490.00	.78%
Driving concrete piling.....	3,781 ea.	40.84	154,411.00	2.05%
Steel bridge railing.....	21,709 lin. ft.	5.93	128,798.00	1.71%
Concrete bridge railing.....	42,976 lin. ft.	1.91	82,190.00	1.09%
Totals.....			\$7,541,967.00	100.00%

supply of labor and materials, increased efficiency on the job, and stiffening competition in the industry have been largely responsible for the decline. During the past year, however, as the downward trend of bridge costs halted, it became apparent that the rate of readjustment was slowing down. Bid prices in the future may follow more closely the trends of wage rates and materials prices.

Wage agreements during the past year gave hourly rate increases ranging from 10 cents to 15 cents to the basic trades; fringe benefits added substantially to the increase of labor costs.

The nominal prices for some basic materials increased during the year, but stiff competition among suppliers held the general level of prices steady.

The outlook for 1954 holds no indication of increases in materials prices, while labor costs are expected to rise only moderately. Accordingly, in view of recent predictions from Federal Government sources that there will be no substantial change in the level of construction activity during 1954, the prospects are good for a leveling of the recent upward trend of bridge construction costs.

Cost Index . . .

Continued from page 47 . . .

reau of Public Roads Composite Mile Index and the Engineering News-Record Construction Cost Index is shown on the accompanying chart. The Engineering News-Record Index for the fourth quarter of 1953 is up 1.1 percent over the second quarter and the U. S. B. P. R. Composite Mile Index for the third quarter of 1953 was 0.5 percent over the second quarter.

In spite of the talk of "correction" of prices (in lieu of the words "recession" or "depression") and in the face of statistics on increasing unemploy-

ment, the records of bid openings on California state highway construction projects give no indication of any appreciable lowering of construction costs.

WEAR WHITE AT NIGHT

A large metropolitan police department made a check of the clothing worn by pedestrians killed in traffic at night. About four-fifths of the victims were wearing dark clothes and one-fifth light-colored garments. This study points up the rule that pedestrians are less likely to encounter traffic mishaps at night if they wear or carry something white after dark so that drivers can see them more easily.

Paul Dunckhorst

AFTER 39 years of continuous service with the State, Paul Dunckhorst, assistant bridge engineer of the Bridge Department, Division of Highways, retired February 1st.

He had been with the Bridge Department for more than 30 years, since May, 1923, and in point of service was one of its oldest employees. He joined the department shortly after it was formed with less than a dozen employees and watched it grow



PAUL DUNCKHORST

to its present size of more than 600.

Dunckhorst is a native of Sacramento, born June 23, 1891, at 1225 J Street, which is now in the downtown business section. He attended grade and high schools in Sacramento and subsequently studied engineering.

First Engineering Job

His first engineering job was with the Pacific Telephone and Telegraph Company in Sacramento, where he started work as a draftsman in January, 1910. In September, 1912, he left the telephone company to join a survey party of the Dozier Construction Company during construction of the Oakland, Antioch & Eastern Railway from Sacramento to Glide, in Yolo County.

In July, 1914, Dunckhorst went to work for the State with Division III of the California Highway Commission, which at that time had offices in the Forum Building, Sacramento. With the exception of three years with the State Reclamation Board in 1916-1918, and a period of four months in 1918 with the U. S. Army, his career continued with the Division of Highways.

The many friends Paul Dunckhorst made in that long association will wish him many happy years in his retirement, in which he will have time to pursue his hobby of photography and to carry out plans to do some extensive traveling.

What I Have Learned From the Bridge Department of the State of California

By W. T. CHANG, Senior Highway Engineer and Chief Bridge Engineer
Taiwan Highway Bureau, Taiwan (Formosa), China

I CAME to the United States under a training program which was sponsored by the Foreign Operations Administration of the State Department of the United States, formerly the Mutual Security Agency. Its purpose is to give technical assistance to foreign countries. My travels in the United States were arranged by the Bureau of Public Roads. I was proposed by our government, the Republic of China, and was approved by the United States Government. Ever since I graduated from the university it has been my desire to get a chance to do postgraduate study in the United States. When I got this lucky chance, I was a very happy man.

Before coming to the United States I was the Chief Highway Bridge Engineer in Taiwan which most people know as Formosa. Formosa is a Portuguese word which means beautiful. We call it Taiwan because it is our Taiwan Province just like California is a part of the United States.

Interesting Statistics

Taiwan has an area of 14,000 square miles, about one-eleventh the area of the State of California, and has a population of 8,000,000. There are 10,000 miles of highways and 11,000 auto vehicles. Of course, most of them are trucks and buses. The average traffic on our 1,000 miles of trunk highways is 500 auto vehicles per day. Any structure whose span length is over 10 feet in length is called a bridge; under that we call it a culvert. There are 7,233 bridges, 10,653 culverts and 35,103 pipe culverts in Taiwan. If we add the length of bridges together the total sum is 67 miles. As to the type, there are suspension bridges, arches, steel trusses, plate girders, and various kinds of reinforced concrete and timber bridges. The loadings are approximately from H-4 to H-15. The longest bridge has a length of 1.2 miles with a series of 200-foot spans.



W. T. CHANG

Perhaps you can get some idea of our bridge construction from the accompanying two pictures. *Figure 1* shows a 110-foot span length arch, open spandrel type reinforced concrete bridge under construction. *Figure 2* shows an old 400-foot suspension bridge now being replaced by a 140-foot arch bridge and five spans of 46-foot cantilevered reinforced concrete girder bridges. Its highest reinforced concrete bent is 66 feet high. Because the depth of water in the channel was 26 feet, the centering of the arch was designed by using three-hinged timber trusses. You can clearly see one of the timber centering trusses in the picture.

Bridge Problems

Our difficult bridge problems come from three factors. They are earthquakes, floods and typhoons. Earthquakes in Taiwan are very serious. In our records one could find many bridge failures because of earthquakes. We arbitrarily chose the seismic coefficient as 1, 1.5 or 2

depending upon the location. We know this is not scientific, but we haven't enough data to develop a better method. The general slopes of river beds are very steep. The ridge in the central part of the island is about 12,000 feet high. The widest part of the island is about 80 miles. If we use one-half of 80 miles to divide the 12,000 feet, we get an average slope of more than 5 percent in the beds of our streams. During flood the velocity of current is terrible, sometimes as high as 40 feet per second. Nearly every year we have bridges washed out or bridge piers settled from scouring. Typhoons are the combination of swift wind and large storm. Last year we had a typhoon which had a wind velocity of 60 miles per hour. It blew down tall buildings and flooded the highways. Several years ago we had two suspension bridge failures from typhoons. Nearly every year we suffer a great loss.

Due to gradual increases either in loading or traffic we must strengthen and widen our existing bridges. Because we are limited in the type of construction and equipment available, our design work presents many problems. We must design so that we can build with what we have.

Arrives in San Francisco

With those problems in mind I hoped to find solutions in the United States. The first place at which I landed was San Francisco. It's a place I have dreamed about for years. I have learned that the two longest suspension bridges in the world are in that city. One is the Golden Gate Bridge which is the longest in span length. The other is the San Francisco-Oakland Bay Bridge which is the longest one. Unfortunately I had only a chance to view it from far away. Hoping to have another chance, I arrived at Washington, D. C. Finally the U. S. Bureau of Public Roads put the Division of Highways of the State of California on my program. I had heard that California has a very large Bridge Department which was considered to be the best

one in the United States. Everyone congratulated me and I felt very happy.

September 10, 1952, I started my adventure in the California Bridge Department. When I entered the great and beautiful Public Works Building, the first thing to surprise me was the Bridge Department signboard with characters painted in golden color. In China golden color represents age and fame.

The Bridge Department of California has many employees including structural engineers, hydraulic engineers, geologists, architects and clerks. They are well organized to cover all phases of bridge work. They have very high technical standards and are very progressive. They train the young engineers and do research work. Their success benefits not only the people of California but also all mankind.

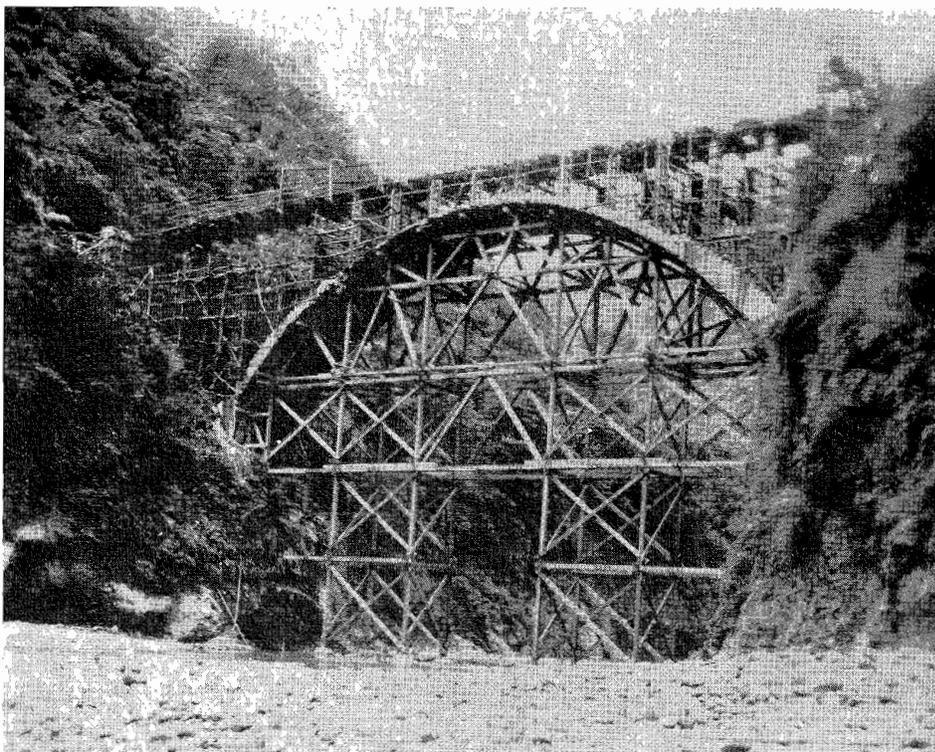
Impressed by Freeway

As one comes to San Francisco, he first sees the Bayshore Freeway with portions of long bridge structures built of welded steel girders. Its aesthetic beauty attracts everyone's attention. One can very easily see the beauty and economy of that structure, but may not realize that the design work resulted from painstaking studies. Structural engineers may be surprised at those cantilever bents, yet they do not know they used the channel-shaped bents with the lower flange buried in the foundation. This marvelous success in the application of structural theory brightens the history of structures.

Bridge designers usually consider the A. A. S. H. O. Standard Specifications for Highway Bridges as a bible. If one wants to design a box girder type reinforced concrete bridge, he will have trouble in finding specifications in that book. A box girder bridge is very beautiful and is very good when the bridge is on curve. The State of California has built many bridges of this type. Its engineers have enough experience to recommend a proposed specification for its design.

Prestressed Concrete Bridges

The economical value of prestressed concrete bridge still is a moot question in the United States. Califor-



One type of arch bridge constructed in Formosa

nia is very progressive in developing the technique of design of this type of bridge. It has built several of them. It cooperated with the University of California in making some tests on this type of construction. They engineers have the scientific spirit to make further studies in order to develop their techniques.

California has various kinds of difficult hydraulic problems in connection with its bridges. It has a research section to make special studies for each problem. It has also developed a chart to solve the design of culverts and has published a bulletin on California culvert practice. In that bulletin is discussed many difficult problems of the design work. I know that the Bureau of Public Roads is doing the same kind of research work, too.

Appreciates Help Given

Sometimes the foundation of a bridge costs very much. Every year we spend a lot of money in foundation work. We are anxious to get some new equipment to get field data at the bridge site in order to improve our design. As yet we haven't found suitable equipment to fit our conditions. The California Bridge Department has designed a drill rig for the

investigation of bridge foundations. It is the most portable equipment that I have ever seen.

Bridge engineers have difficulty in finding new books about the application of highway bridge engineering principles. The California Bridge Department has published many manuals and charts that include almost everything pertaining to its bridge engineering. It is planning to publish more. I consider these manuals as the best series of books on modern highway bridge engineering. I am very happy that I had the chance to read these manuals and to get copies of them.

The most valuable thing that I have learned from the California Bridge Department is that the solution of bridge problems requires thorough investigation of everything contributing to the problem and the proper application of engineering principles and good judgment in arriving at correct solutions. The training they have given me in their methods of organizing their operations to use their skilled engineers and their special equipment to best advantage will be of valuable assistance to my people. Their friendship and kindness to me is highly appreciated.

FAS Project

Reconstruction of Pacific Avenue in San Joaquin County

By CLEMENT A. PLECARPO, Office Engineer, San Joaquin County Highway Department

IN 1852 several citizens of San Joaquin County petitioned the Court of Sessions (predecessor to the board of supervisors) to lay out and establish a county road from Stockton to Dry Creek near what is now Galt. The road was surveyed apparently along an existing roadway or trail and was known as the Lower Sacramento Road. This road extended from the north city limits of Stockton at North Street (now Harding Way) to a toll bridge at the Calaveras River; thence in a northerly direction to Wood's Ferry (now Woodbridge), where toll was charged; thence northerly to Dry Creek and another toll ferry.

On July 12, 1860, deeds to a right of way 80 feet in width were granted to San Joaquin County for the full length of the road. The highway of

today follows the general alignment of the original 1860 road with some alterations and realignment at various points.

An Old Headache

In December 1861 San Joaquin County established a road known as Telegraph Road, beginning at the Five-mile House on Lower Sacramento Road and extending in a northerly direction to Benson's Ferry on the Mokelumne River. The name of this road was later changed to Thornton Road. Thus in 1861 a Y intersection was formed at the Five-mile House which in later years was to give the highway administrators of San Joaquin County many headaches.

In the spring of 1900 San Joaquin County placed the first gravel on the Lower Sacramento Road from North

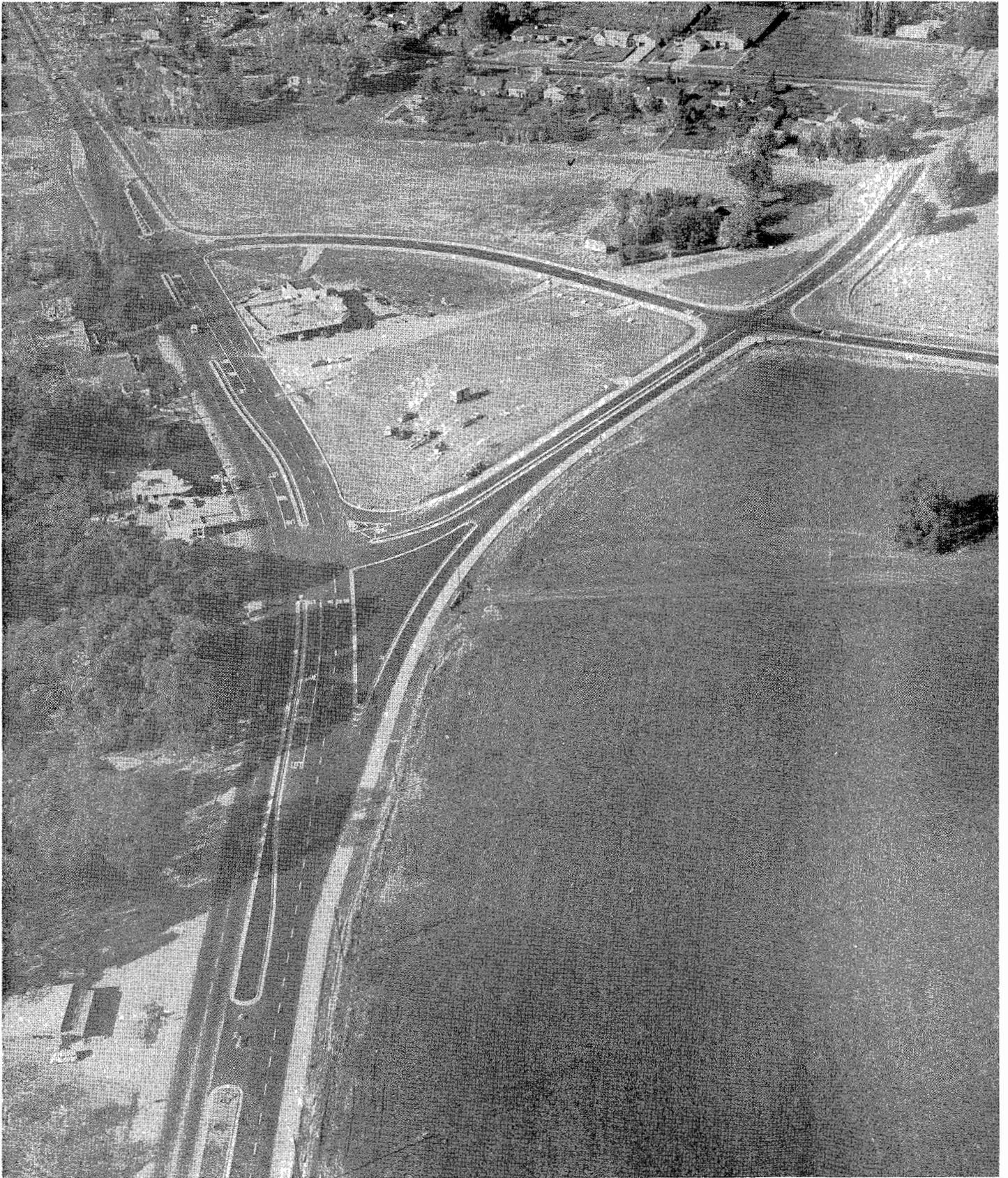
Street (Harding Way) to the Calaveras River, a distance of approximately one and one-half miles, for a cost of \$4,000. At approximately the same time a steel pony truss, 70 feet long, was built across the Calaveras River at a cost of \$2,067. Later, when the Calaveras River was widened by the construction of the Diverting Canal, timber trestles were built at each end of the pony truss.

Good Roads Campaign

In 1908 San Joaquin County launched a good roads campaign by establishing a highway commission. A bond issue was passed by the voters for \$1,890,000, and actual construction of a paved county road system was begun. The Lower Sacramento Road was the first road built and was

Pacific Avenue in 1950, prior to reconstruction under the Federal Aid Secondary Highway Program





Pacific Avenue at Five-mile House intersection looking north. Lower Sacramento Road extends to the upper right. Thornton Road extends to the upper left. Hammer Lane extends east and west across the upper portion of photo. The old Five-mile House is barely visible in the oak grove at left center opposite large triangular traffic island.

constructed at a total cost of \$232,186 for 20.16 miles. That portion of the Lower Sacramento Road between the Stockton city limits and the Five-mile House consisted of 4 feet by 14 inches of asphaltic concrete pavement over 3 inches of base gravel. Work was completed in April, 1911. During the ensuing years the pavement was widened to 20 feet.

In 1921 a reinforced concrete bridge was built across the Calaveras River. This bridge was designed by Julius B. Manthey, who is now the San Joaquin County Road Commissioner.

After the College of Pacific was constructed in 1924, all of the Lower Sacramento Road between Harding Way and a point just south of the Calaveras River became a part of the Stockton street system and was renamed Pacific Avenue.

First Subdivision

In 1936 the first subdivision was developed just north of the Five-mile House, and the development of the northwest suburban area north of the City of Stockton was on its way. Subsequently many more subdivisions were developed, and thousands of homes were constructed between the Calaveras River and the Five-mile House.

In 1946 that portion of the Lower Sacramento Road between the city limits of Stockton (just south of the Calaveras River) and the Five-mile House, and also the Thornton Road became Federal Aid Secondary Route No. 543. The Lower Sacramento Road north of the Five-mile House became FAS Route No. 902 (later changed to FAS Route No. 641).

On June 24, 1946, a petition was submitted by property owners in the area between the Calaveras River and the Five-mile House, calling for the improvement of the Lower Sacramento Road.

In 1948 San Joaquin County renamed that portion of FAS Route No. 543 between the Stockton city limits and the Five-mile House, Pacific Avenue.

Pacific Avenue Problem

In 1950 San Joaquin County began a study of traffic conditions on Pacific Avenue to determine the need of reconstruction. Extensive traffic counts



Lower Sacramento Road on Pacific Avenue extension in San Joaquin County. North end of F.A.S. project S-54312 looking south toward Stockton in the distance.

indicated that 14,000 vehicles per day crossed the Calaveras River Bridge. It was found that at certain times during the day traffic was completely halted by the heavy left turn movements into the various subdivisions. A report with preliminary estimates of costs was submitted to the board of supervisors and authority was given to reconstruct Pacific Avenue as an FAS project. Additional right of way was acquired to give a minimum of 100 feet width.

On May 22, 1951, the Bureau of Public Roads approved the program submitted by San Joaquin County. Construction was scheduled by stages with the work to extend over three budget years. It was proposed to construct ultimately a four-lane divided highway consisting of four 11-foot travel lanes, an 18-foot median strip and two 10-foot shoulders.

The author, under the supervision of Julius B. Manthey, county road commissioner, designed the project and all preliminary and construction

engineering was performed by San Joaquin County forces.

New Calaveras Bridge

The first stage of construction consisted, in general, of constructing a new bridge across the Calaveras River, of reconstructing the railings and replacing the surfacing on the existing bridge, of constructing the southerly approach to the two bridges, and of widening about 2.7 miles of existing pavement north of the Calaveras River. The contract for this stage of work was awarded to Geo. Pollock Company on September 18, 1951, and the completed work was accepted by the Director of Public Works on August 4, 1952. Charles B. Wong and Douglas C. Nelson were resident engineers on this project.

The second stage of construction consisted, in general, of constructing the west curb of the median strip and the west two travel lanes and shoulder. The contract for this stage of

... Continued on page 60

Motor Vehicle Use

California Engaged in Comprehensive Study

By F. M. REYNOLDS, Principal Highway Engineer

THE MOTOR VEHICLE is taken for granted as an essential adjunct of modern American life. This is particularly so in California, which has frequently been described as "a state of rubber-tired wheels." The importance of the motor vehicle in all aspects of personal and economic life was impressed on California and the rest of the Nation during World War II by the necessary imposition of restrictions on motor travel. Since World War II, motor vehicle use has increased heavily everywhere, and in California the vehicle registration is now double what it was in 1940.

For many obvious reasons it is desirable to obtain the facts about the use of the motor vehicle. In other words, just how essential is the motor vehicle to our economy?

Nation-wide Study

On a nation-wide basis, the answer to this question is being sought by the United States Bureau of Public Roads, the agency which administers the allocation of federal highway and road funds to the various states. This study has been completed, or is underway in 25 states.

In California the responsibility for the motor vehicle use study was assigned to the State-wide Highway Planning Survey, a unit of the Planning Department of the State Division of Highways. Under agreement with the Division of Highways, the home interview information collection phase of the study, including selection of the dwellings to be contacted, is being performed by the United States Bureau of the Census.

Bureau of Census Cooperates

Participation in this type of project by the U. S. Bureau of the Census is to the mutual advantage of both the state and federal agencies. It provides an opportune time for the U. S. Bureau of the Census to develop additional trained enumerators for its use



in future census surveys, and it makes it unnecessary for the Division of Highways to employ and train a supervisory staff and enumerators for the sampling and home interview phase of the survey.

For the purpose of this study the State was divided into 11 regions. (See map.) Statistics on the use of the motor vehicle can be developed for

each of these regions with equal accuracy and the prevailing north-south county grouping comparison can also be secured.

Since it is not economically feasible to collect the information from the entire population, a sample of households is taken for interviewing. The accuracy of a scientifically designed sample is to a large extent dependent

VI - MOTOR VEHICLE USE REPORT

A. VEHICLE IDENTIFICATION

1. Make ~~XXXXXXXXXXXXXXXXXXXX~~
 2. Vehicle Type Passenger
 Year Model 52
 3. Body Type 4 Door
 4. Registered unladen weight (Trucks and combs. only) _____ lbs. X-
 5. Was vehicle purchased new. Yes X No _____
 6. When purchased (Month and Year) 0453
 7. Months owned or used during last 12 months 07

8. Estimated total mileage during this period 5767 miles 006
 9. If ownership changed: show total miles traveled during past 12 months in this vehicle and vehicle(s) it replaced _____ miles
 10. Present speedometer reading 5767 miles 006
 11. Estimated miles per gallon 27
 12. Type fuel: Gas Diesel Other (Specify) _____
 13. Fuel consumption card left... MVU-2 - Yes No MVU-2S - Yes No
 14. Did this vehicle driven by members of this household complete any round-trip of 400 or more miles either yesterday or the day before yesterday? Yes No

RESIDENCE CODE _____

on its size. In this case the sample was so designed statistically that the error due to sampling variability was 3½ percent (coefficient of variation), requiring the inclusion of approximately 1.3 percent of the estimated 3,600,000 dwelling units within the State.

The interviewing of all the people in these 46,000 selected dwelling units has been scheduled and distributed over a year's period, starting early in 1953.

Border Interviews

In addition to the information secured from the selected home interviews conducted by the Bureau of the Census, supplementary information is being obtained by the Division of Highways from interviews at the state borders with nonresidents. These border interviews will make it possible to estimate the amount of the total vehicle travel in California which is attributable to nonresident visitors.

The study is so set up and designed that the over-all result will be a composite traffic pattern of all motor ve-

hicle travel in the State of California for a representative 24-hour period.

The schedule illustrated herewith was mutually acceptable to the departments concerned and is believed to include the maximum amount of information feasible for collection in a home type interview.

On the front of the schedule the dwelling unit is described and information on members of the household is listed. The right side of the same sheet (*not illustrated*) is used for the administrative record.

The reverse side of the form (*see illustrations*) is used to describe the vehicle and to record in detail the trips for each vehicle driven by a member of the selected household for specified travel dates. Supplemental sheets are used for additional vehicles and for those households where more than five trips in a vehicle are completed on the specified day.

Information Confidential

The information obtained in the interviews is, of course, confidential,

Sheet 1 of 1 Sheets

B. TRAVEL DATA FOR:
Oct 20 53
 Month Day Year
Tuesday 3
 Day of week

Region and Sample No. B9999
 Population group 6
 Vehicle number 1

C. OWNERSHIP AND OCCUPATION INFORMATION

1. Owner (letter) A
 If "borrowed" or "rented" car was used, check: Borrowed Rented 0
 Occupation and industry AJ
 2. Principal user (letter) A
 (if other than owner)
 Occupation and industry AJ

like any census information. The numbers which are noted in the boxes at the bottom of various sections of the form are for coding purposes, used in transferring the data to tabulating cards.

It will be noted that in addition to recording the terminus of each trip and its purpose, the form also provides for describing the route followed in each case. Although there are practical limitations to the extent of analysis which can be made of this information, it will be possible without too much difficulty to determine:

1. The number of trips and vehicle miles generated for or in connection with earning a living, family business, or for social and recreational purposes;

2. The number of trips and vehicle miles that are made by commercial vehicles;

3. The number of trips and vehicle miles on each of the three major categories of traffic facilities within the State: state highways (urban and rural), county roads and city streets. For the mileage inside cities, summaries will be available by population groupings for cities of less than 5,000 population, those in 5,000-24,999 bracket, those from 25,000 to 99,999 and cities over 100,000. These summaries will cover not only the mileage traveled by residents of cities in the four population groups both inside and outside their home cities, but also the mileage traveled inside the various size cities by all persons using motor vehicles, regardless of where in California they live;

4. The number of "to work" trips by modes of transportation, segregated by "distance to work" groupings.

Confidential - The information obtained in this survey will be accorded confidential treatment by the U. S. Bureau of the Census, the California Division of Highways and the U.S. Bureau of Public Roads for whom the data are being collected. Individual reports will be used for statistical purposes only and will be seen only by authorized employees of these agencies, who are assigned to work on this project. Only statistical summaries will be published, and individual returns will not be used for purposes of regulation or administration of any program.

Form MVU-1
(12-30-52)

U.S. DEPARTMENT OF COMMERCE - BUREAU OF THE CENSUS
Acting as Collecting Agent for the CALIFORNIA DIVISION OF HIGHWAYS
in Cooperation with the U.S. BUREAU OF PUBLIC ROADS

MOTOR VEHICLE USE SURVEY

I - IDENTIFICATION

(1) LOCATION: City Sacramento County Sec
 Address [REDACTED] Apt. No. _____
 (Street, Road, RFD Box No.)
 Phone No. [REDACTED] If Rural _____ mi. _____ from _____
 (Direction) (Nearest town)
 On Road No. _____ Sec. _____ Twp. _____ Range _____

(2) SURFACE TYPE OF ROAD SERVING DWELLING UNIT
 Trail.. 1 Blacktop..... 4
 Earth.. 2 Concrete..... 5
 Gravel. 3 City or Village St.. 6

(3) DISTANCE TO ALL WEATHER ROAD (Total Miles to Nearest Tenth) 1.1

(4) COUNTY CODE..... 34
 (5) CITY AND POPULATION GROUP CODES..... 62706
 (6) REGION AND SAMPLE NUMBER CODES..... 89999
 (7) ROAD SYSTEM OF RESIDENCE..... 3
 (8) IF DWELLING UNIT IS ON A FARM WHAT IS TOTAL NUMBER OF ACRES IN FARM..... 1.1
 (9) RESIDENCE CODE..... 11111

(10) DWELLING UNIT TYPE

Single Family:

Attached.....A
 Detached.....B
 Trailers.....C

Multi-Family:

Apartments.....J
 Duplex or Flat.....K
 Resident Hotels.....L

Non-Dwelling Unit Quarters:

Dormitory.....S
 Fraternity & Sorority...T
 YMCA or YWCA.....U
 Motels.....V
 Hotels.....W

II - OCCUPANTS OF DWELLING UNIT

(Ask Only of Persons 14 Years Old and Over)

Line *	Relationship	Sex	Age	Driver Permit	Did this person do any work at all last week? (If worked one or more hours, enter the occupation; If did not work, enter housewife, student, retired, etc.)	FOR PERSONS WITH OCCUPATIONAL ENTRIES IN COL. 6			What is the distance to this job in 1/10 miles?
						What kind of business or industry did this person work in?	How did this person travel to this job on last week day worked last week? (Enter codes)	What is the distance to this job in 1/10 miles?	
(1)	(2)	Code (3)	(4)	(5)	(6)	Code (7)	Code (8)	LEAVE BLANK	(9)
(A)	Head	A ^M F	31	Yes No	Stetitioner	A State Govt.	J	1	019
(B)	wife	B ^M F	28	Yes No	Housewife		L	0	—
(C)	Son	D ^M F	00	Yes No			T	0	—
(D)		M F		Yes No					

* Circle line letter(s) of person(s) interviewed.
 † If had regular job but did not work last week, enter in column (8) reason: on VACATION, on STRIKE, or was SICK. Also enter Occupation and Industry in columns (6) and (7). If worked on two or more concurrent jobs last week, enter principal occupation and industry worked at. If changed jobs during week enter occupation and industry for last job.

III - VEHICLE INVENTORY

How many vehicles are driven regularly* by members of this dwelling unit? (Include all vehicles driven regularly regardless of ownership or where vehicle is garaged.) * "Regularly" means that the person drives that vehicle more than anyone else, i. e., he is the principal user.

Cars Trucks Others
01 00 00

IV - SUMMARY (Fill after Interview)

Occupants of Dwelling Unit

Total Number	Number of Legal Driving Age	Number Holding Driver Permits
M F	M F	M F
<u>02</u> <u>01</u>	<u>01</u> <u>01</u>	<u>01</u> <u>00</u>

Total No. of Trips
 MVU 04

CODES FOR COLUMN 8

1. Driver of vehicle (auto, taxis, trucks, pickups).
2. Passenger of vehicle (auto, taxis, trucks, pickups).
3. Passenger of bus, internal combustion.
4. Passenger of bus, trolley.
5. Passenger of streetcar.
6. Passenger of railroad.
7. Walked only, or lives at site of work.
8. Other (Ferry, motorcycle, bicycle, etc.)

Comments: _____

Where applicable, the information can be further segregated, if found necessary or worthwhile, by such categories as year model of the vehicle used, its body type, or the length

of the trip. Still further segregations are possible by region of residence and travel, occupation, and the industry employing the driver. For example, one possible by-product of the

Motor Vehicle Use Study in California might be a small-scale origin and destination study depicting the magnitude and direction of the main traffic currents of the entire State.

D. VEHICLE TRIP REPORT

Person (Driver) (1)	Trip No. (2)	Where and when did this trip begin? (3)	Where did this trip end? (4)	FROM	What was the Purpose of the trip? (5)	To	No. in car including driver (6)																																	
A 1	1	Home 14 th & T St. 07 Time Started... 7:30 A.M. <input checked="" type="radio"/> P.M.	33 rd & Broadway		EARNING A LIVING A... Work... <input checked="" type="radio"/> A B... Related Business... B FAMILY BUSINESS J... Medical and Dental... J K... Shopping... K L... Education, Civic and Religion... L M... Eat Meal... M N... Serve Passenger... N O... Home... <input checked="" type="radio"/> O P... Others (Personal, Business, etc.)... P SOCIAL AND RECREATIONAL S... Vacation... S T... Pleasure Ride... T U... Others (Visit friends, etc.)... U		1																																	
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Form MVU-1 (12-30-52)

The importance and value of this type of information in planning not only for streets, roads and highways but for the transportation needs of

California's growing population is self-evident. The gratifying fact that the public itself is aware of the value of the

study is evident from the high degree of cooperation which the home interviewers have received from the families contacted.



South end of F.A.S. project S-543(2) looking south toward Stockton. College of Pacific buildings middle right, Stockton central district at far left.

work was awarded to A. Teichert & Son on May 12, 1952, and the completed work was accepted by the Director of Public Works on October 28, 1952. Charles B. Wong was the resident engineer on this project.

Third Construction Stage

The third and final stage of construction consisted, in general, of completing the four-lane divided highway and constructing the Five-mile House intersection. The median strip was completely curbed with left turn lanes provided at every intersection. The contract for this stage of the work was awarded to A. Teichert & Son on April 17, 1953, and the completed work was accepted by the Director of Public Works on November 20, 1953. Charles B. Wong was the resident engineer and Elmo Ward

and Glen Baumbach were assistant resident engineers. Total cost of the entire project was \$628,000.

On November 14, 1953, the Honorable Goodwin J. Knight, Governor of California, and the Board of Supervisors of San Joaquin County officially opened the first four-lane county highway in San Joaquin County. Board of supervisors members in attendance were W. R. Ruggles, chairman, E. H. Rimington, E. G. Stuckenbruck, C. Hawkins and Ed. Heinbockel.

This has been a history of the development of a highway from the early days of the pioneers of 1852, when all travel was by horse and wagon over muddy primitive trails, to the present day, 100 years later, when 17,000 motor vehicles each day use this modern highway.

State Employees in District VII Are Honored

ON FRIDAY evening, December 11th, upon the occasion of the annual dinner dance and installation of officers for Highway Chapter 101 of the California State Employees' Association in the Coral Room of the Rodger Young Auditorium Building, a special ceremony was conducted for the award of 25-year service certificates and merit award commendation certificates. The presentation of these certificates to State Highway employees in the Los Angeles area was made by Paul O. Harding, Assistant State Highway Engineer, in charge of District VII. Mr. Harding is a past president of the California State Employees' Association.

The 25-year certificates and also appropriate gold pins were presented to the following: James Butler, Gerald G. Dowling, W. L. Fahey, Jesse A. Fleharty, Jack R. Hodson, Elvin L. Humphrey, William Mitchell, Harold Peasnell, William Reifensahl, and Freda C. Tapp.

Certificates of commendation that had been earned by employees in this district resulting from valuable suggestions they had made to the California Merit Award Board that will make state operations more efficient and economical were awarded to William V. Hesp, Luther R. Johnson, Andrew A. Lutterbein, and Lilly G. Paddock.

The new officers for Chapter 101 for 1954 that were installed by Mr. Harding are:

Delbert A. Olden, President; C. N. Wilczek, First Vice President; Paul M. Hine, Second Vice President; Dolores Barker, Secretary; Dorothy Williams, Treasurer; James Anderson, Delegate; Jack Barnes, Delegate; Beth Putman, Delegate; and P. R. Reed, Delegate.

When driving through snow areas, use extreme caution; watch for snow removal equipment at work; and remember that it requires from 60 to 90 feet to bring a car to a stop when driving on packed snow at a speed of 25 miles an hour.

ADVANCE PLANNING BY NORTHERN COUNTIES MERITS PRAISE

By L. ARAMAYO, FAS Engineer, District II, State Division of Highways

STATE HIGHWAY DISTRICT II, embracing the Counties of Siskiyou, Modoc, Trinity, Shasta, Lassen, Tehama and Plumas, contains 1,500.3 miles of state highway routes under the jurisdiction of the California Highway Commission.

This northeastern section of California also contains, under the jurisdiction of the several county boards of supervisors, a total of 6,674.4 miles of county roads. Of these county roads, 517.7 miles, including many of the more heavily traveled routes, are included in the Federal Aid Secondary Highway System. The responsibility for administering the federal aid secondary program in California is assigned by law to the Division of Highways, which brings this state agency into close and regular contact with the county supervisors and their county road commissioners.

Local Initiative

Since the activation of the federal aid secondary program in 1945 the policy of the State Highway Engineer has emphasized a maximum of local initiative in the expenditure of federal as well as county funds in the improvement of county roads, based on the conviction that the greatest benefit to the counties and their road users would result from such a policy. It is becoming increasingly evident that the county supervisor group in the District II area feels the same way.

At the frequent group meetings of the Northern Chapter of the County Supervisors Association of California two county road problems have been under study; the need for modern road design to meet ever-increasing traffic demands, and the need for long-range planning. The rather broad acceptance of these views in this section of the State is undoubtedly due to these conferences.

Today all the counties of District II have adopted a continuous five-year construction program which will be financed with federal, state and county funds.

In Memoriam

MERRITT D. RATHBUN

Masonic funeral services were conducted for Merritt D. Rathbun at the McDonald's Funeral Chapel in Redding on November 16, 1953. Interment was made at the Masonic Cemetery, Millville.

Mr. Rathbun was born in Missouri on March 13, 1874. He came to California and to the Millville area in 1905. He entered state service as an auto mechanic at Shop 2 on August 29, 1923. His retirement came March 31, 1944. He was a member of Northern Light Lodge No. 190, F. & A. M., Millville, for more than 50 years.

His loss is deeply felt at Shop 2, Division of Highways, where he was well known and sincerely liked.

Mr. Rathbun is survived by his wife, Nona, and a daughter, Mrs. Nelda Shanahan.

Advantages of Planned Program

The advantages of such a long-range planned program are obvious. One of the primary advantages lies in the time element; the road commissioner is able to work from a prearranged schedule. This enables him, in turn, to plan ahead the most efficient disposition of his survey and design crews. It also allows him the opportunity to study various alternate solutions to a road improvement problem.

Finally, a planned program helps to keep in focus the over-all picture of the county's traffic situation, both the immediate needs and the ultimate goals.

In this way the supervisors, both collectively and individually, are provided with a measure for current and future progress on the improvement of the roads under county jurisdiction. And the people of the county have some assurance that specific projects are not forgotten or indefinitely deferred but have a place in an orderly planned program.

Team Work Valuable

An extra benefit gained from such a planning policy is in the field of federal-state-county cooperation, particularly important for the purposes of the federal aid secondary program. Advance indication of the county's thinking is valuable to the state and federal agencies concerned and helps to streamline the administrative details of the cooperative arrangement.

The supervisors, of course, cannot commit future boards to a definite construction program. They can, however, designate certain projects for early construction and authorize the preparation of surveys and plans on the others. When a project is completed, another one can be approved and a new one added to the continuous program.

The progressive steps taken and the teamwork demonstrated by this group of counties is a concrete expression of the fundamentals of good local government.

ORCHID FOR DIVISION OF HIGHWAYS

ELECTRIC MILLS, MISS.

January 4, 1954

MR. KENNETH C. ADAMS, *Editor*

DEAR MR. ADAMS: Your publication came to my attention here during my sojourn for the month to get away from old man winter in Wisconsin. *California Highways and Public Works*, November-December, 1953, is a good publication about highway construction in your State. There is no use to engage in superlatives about an excellent job of presenting technical matter and data in a readable form. Your highway reconstruction and bridge building are engineering feats of the first magnitude and reading about them makes me ponder the population problem and the auto registration as to where such difficulties will end.

Yours very truly,

O. H. JOHNSON

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Fellowships for Highway Engineers Are Offered at U. C.

Two Automotive Safety Foundation fellowships for graduate study of highway engineering will be available during the 1954-55 academic year, the University of California has announced.

Each fellowship consists of \$1,500 plus fees for two semesters and two summer sessions, taken consecutively. Attendance at the summer sessions will be optional. The fellowships specify that preference be given to those with practical experience in highway engineering since college, but this is not mandatory.

Applicants must be graduates of a recognized engineering school and qualify for admission to graduate standing in University of California.

Applications may be obtained from the Dean of the Graduate Division, University of California, Berkeley 4, and filing must include transcript of record and letters of recommendation.

Although the stated closing date for fellowship applications at the University is February 15th, this might be deferred, according to Harmer E. Davis, director of the Institute of Transportation and Traffic Engineering.

Davis suggested that if interested individuals anticipate difficulty in making a complete submission by the stated closing date they communicate with the institute. He also suggested that an application be made even though an individual is not able to make a final decision immediately about plans for next fall.

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An Memoriam

GEORGE R. WINSLOW

Enjoying a well-earned retirement after 29 years of service with the Division of Highways, George R. Winslow of Sacramento met a tragic death in a traffic accident on last December 6th. Mr. Winslow was driving home from Los Angeles on US 99 when he ran into the rear of a truck on the evening of December 2d.

Mr. Winslow came to California in 1912 to become associated with Austin B. Fletcher, who, in 1911, was chosen by Governor Hiram W. Johnson to head the first State Highway Department of California.

Born in Boston, Mass., on May 6, 1871, Mr. Winslow attended the Boston and Somerville public schools and then went to the Massachusetts Institute of Technology. One of his Pilgrim ancestors had charge of the roads at Martha's Vineyard Island. His first engineering work was as rodman on the Boston metropolitan sewer system.

In 1898 he went to work for the Massachusetts Highway Commission and computed the earth quantities for the first contract let by the department. In 1906 he was employed by New York State when road construction under that state's first highway bond issue was launched.

Mr. Winslow and Mr. Fletcher had been friends in Massachusetts and when the latter became State Highway Engineer of California he sent for Mr. Winslow, appointing him Office Engineer of the Division of Highways here. The two men worked out the details of the organization of the department. Mr. Winslow was soon elevated to the post of Assistant Highway Engineer.

In 1920, Mr. Winslow was appointed District Engineer of District III, then in Sacramento, served in that capacity for four years and then was appointed Maintenance Engineer. In 1929 he became Assistant Construction Engineer.

Mr. Winslow is survived by three sons, George F., and Jean Paul, engineers with the Division of Highways, and Arthur Leroy of Reno, Nevada; and two daughters, Mrs. Marian Kiernan, San Luis Obispo, and Mrs. Barbara Urias, Sacramento.

GOODWIN J. KNIGHT

Governor of California

FRANK B. DURKEE . . . Director of Public Works

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- I. O. JAHLSTROM Bridge Engineer—Operations
- J. E. McMAHON Bridge Engineer—Southern Area
- STEWART MITCHELL Bridge Engineer—Special Studies
- E. R. HIGGINS Comptroller

Right of Way Department

- FRANK C. BALFOUR Chief Right of Way Agent
- E. F. WAGNER Deputy Chief Right of Way Agent
- GEORGE S. PINGRY Assistant Chief
- R. S. J. PIANEZZI Assistant Chief
- E. M. MacDONALD Assistant Chief

District IV

- B. W. BOOKER Assistant State Highway Engineer

District VII

- P. O. HARDING Assistant State Highway Engineer

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 - E. E. WALLACE District XI, San Diego
 - HOWARD C. WOOD Bridge Engineer
- State-owned Toll Bridges



DEPARTMENT OF PUBLIC WORKS

SACRAMENTO, CALIFORNIA

DIVISION OF CONTRACTS AND RIGHTS OF WAY

Legal

- ROBERT E. REED Chief Counsel
- GEORGE C. HADLEY Assistant Chief
- HOLLOWAY JONES Attorney

DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

- NORMAN C. RAAB Chief of Division

DIVISION OF WATER RESOURCES

- A. D. EDMONSTON State Engineer, Chief of Division
- G. H. JONES Assistant State Engineer, Sacramento River Flood Control Project, Supervision of Safety of Dams, Sacramento-San Joaquin Water Supervision
- T. B. WADDELL Assistant State Engineer, Water Resources Investigations, Central Valley Project, Irrigation Districts
- HARVEY O. BANKS Assistant State Engineer, Water Rights and Water Quality Investigations
- MAX BOOKMAN Principal Hydraulic Engineer, Los Angeles Office
- HENRY HOLSINGER Principal Attorney
- T. R. MERRYWEATHER Administrative Officer

DIVISION OF ARCHITECTURE

- ANSON BOYD State Architect, Chief of Division
- H. S. HUNTER Deputy Chief
- ROBERT W. FORMHALS Administrative Assistant to State Architect

Administrative Service

- W. K. DANIELS Assistant State Architect, Administrative
- WADE O. HALSTEAD Principal Estimator
- EARL W. HAMPTON Construction Budgets Administrator
- CARLETON PIERSON Supervising Contracts Writer

Planning and Design Service

- P. T. POAGE Assistant State Architect, Design and Planning
- A. F. DUDMAN Principal Architectural Designer, Sacramento
- JAMES A. GILLEM Principal Architectural Designer, Los Angeles
- CARL A. HENDERLONG Principal Mechanical and Electrical Engineer
- C. L. IVERSON Chief Architectural Draftsman
- JOHN S. MOORE Supervisor of Special Projects
- WALTER E. LORD Supervising Specifications Writer
- GUSTAV VEHN Production Manager

Construction Service

- C. M. HERD Chief Construction Engineer
- CHAS. PETERSON Principal Structural Engineer
- NATE W. DOWNES Supervising Engineer of Maintenance and Operations

Area Construction Supervisors

- THOMAS M. CURRAN Area I, Oakland
- J. WILLIAM COOK Area II, Sacramento
- FRANK R. AUSTGEN Area III, Los Angeles

Area Structural Engineers, Schoolhouse Section

- M. W. SAHLBERG Area I, San Francisco
- M. A. EWING Area II, Sacramento
- ERNST MAAG Area III, Los Angeles

