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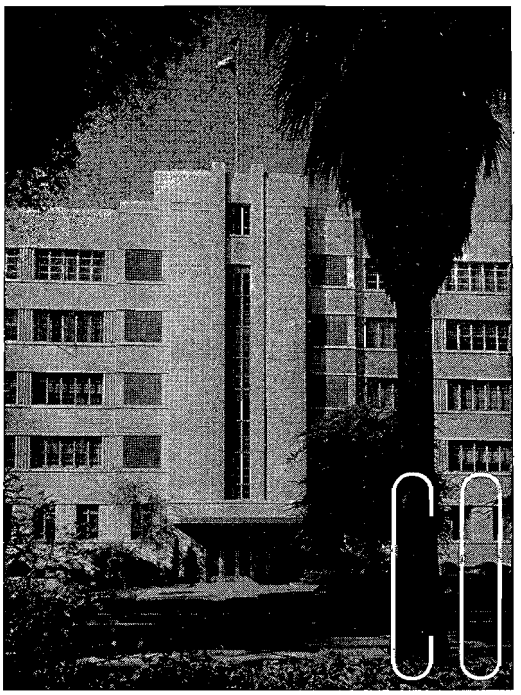

Public Works Building
Twelfth and N Streets
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Due to lack of space, the next installment of "Early Days" by R. C. (Cass) Kennedy will appear in the May-June issue of *California Highways and Public Works.*

Problems and Progress on Los Angeles Freeway System

By P. O. HARDING
Assistant State Highway Engineer

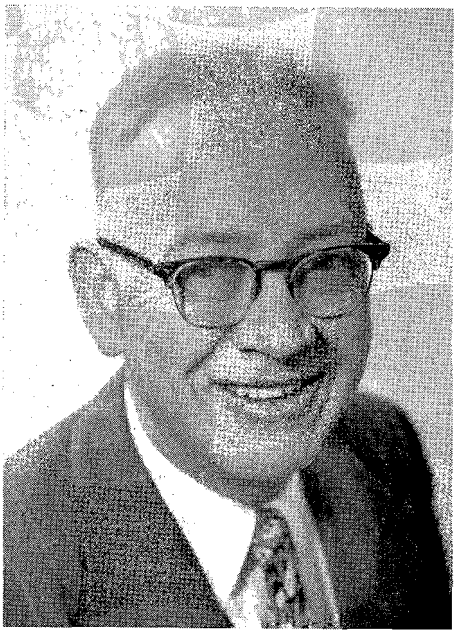
A YEAR AGO I gave a report in this magazine on the progress of the freeway system in the Los Angeles metropolitan area, and attempted to portray the role of the Division of Highways in the development of this freeway system.

A brief summary indicates that although the highway system was inaugurated in California in 1912 as a rural system, recognition of the problem through municipalities started as early as 1925 and became general by 1935, at which time both the State Highway System had been extended through the cities, and a ¼-cent allocation of gas tax funds was given to the cities for a system of major streets within each municipality. Coincident with this, and without any increase in revenue, the former rural State Highway System mileage was approximately doubled to its present status of 14,000 miles.

Efforts to obtain additional revenue prior to the outbreak of war in December of 1941 were unsuccessful, and with the stalemate produced by the war, no additional revenue was made available until the passage of the Collier-Burns Act in 1947. The tremendous influx of population, accompanied by unprecedented subdivision development for residential facilities, and the corollary commercial and industrial growth, resulted in an even greater rate of increase in motor vehicle registration.

Critical Deficiencies

This, combined with the general inflation of the Korean War in the brief postwar period, has resulted in the creation of more problems than the funds available can solve. Stated in another manner, the critical deficiencies of $1,470,000,000 on a statewide basis, of 1946, upon which the Collier-Burns Act was based, had increased to some 3 billion dollars by 1951 in spite of the fact that the State had expended over half a billion dollars toward the correction of those deficiencies in the interim.



In spite of the funds being too little and too late, rather notable progress upon a freeway system in the Los Angeles metropolitan area was noted. This had been possible because of the foresight and cooperative efforts of cities, counties and civil organizations in presenting a proposed metropolitan freeway system upon which general and rather widespread agreement had been reached prior to the enactment of the 1947 legislation, which had enabled a start upon the primary state arterials involved in that system.

Creeping Paralysis of Traffic

I stated a year ago that the major justification for the metropolitan freeway is to relieve the creeping paralysis of traffic congestion which has been taking place upon the existing street arterials. We have today in the Los Angeles metropolitan area, more specific evidence upon this statement.

A year ago I cited the traffic upon the Hollywood Freeway which, upon opening in December of 1950, immediately carried 32,000 vehicles per day, and had but a year ago increased to some 99,000 vehicles per day. Present traffic counts indicate that this had at the time of study, 1952, increased to some 112,000 vehicles per day, and coincident with this there has been a relief of traffic on parallel arterials. This relief upon existing arterials has to a large extent been sufficient in scope to make them operate in accordance with the traffic signal controls at the speeds designed for those controls. It has simplified the mass transportation operations upon such arterials and has made these arterials function more efficiently as distributors to the ultimate source or destination of the traffic within the area.

The 613 miles of freeways indicated upon the over-all map here of course include many of the State Highway System and many which may never be built. I recently prepared an estimate of the cost of completing today this entire system, indicating a total cost of some $2,000,000,000. I also completed an estimate of the cost of the creeping paralysis of congestion without such freeway system, and found that within a period of some 12 years this would be equal to the $2,000,000,000 required to complete such overall freeway system.

I similarly prepared an estimate of the economic benefit in the relief, both direct and indirect, given to traffic if this entire freeway system could be constructed. This showed that in less than the 12-year time, the total cost of the freeway system would be saved. In other words, within 12 years' time the net economic gain with the freeway system would be double the cost of that freeway system, which proves the statement made by many eminent authorities, including the Commissioner of Public Roads, T. H. MacDonald, that you pay for these highways whether you have them or not, only you pay more for them if you do not have them.

One of the most forward-looking steps in giving ultimate emphasis toward completing the metropolitan freeway system within the foreseeable future was occasioned by Chapter 20, Extraordinary Session, 1952, providing $10,000,000 for the advance acquisition of rights of way in the paths of freeway routes where imminent development to a higher property usage affecting ultimate freeway costs was apparent. This for the first time has given the Highway Commission the opportunity to adopt routes and permit actual negotiations for vacant lands in the path of the freeway prior to its subdivision for residential, industrial or other developments occurring with such rapidity in this period of extreme growth. Heretofore, the Highway Commission has been forced to follow a policy of adopting these routes only at such time as they could foresee funds with which to actually enter into a program of right of way acquisition, followed within a reasonably short period of time by a program of construction. Heretofore, the adoption of such route gave the State, in effect, an option upon the properties in the paths of the route without any funds to protect the route.

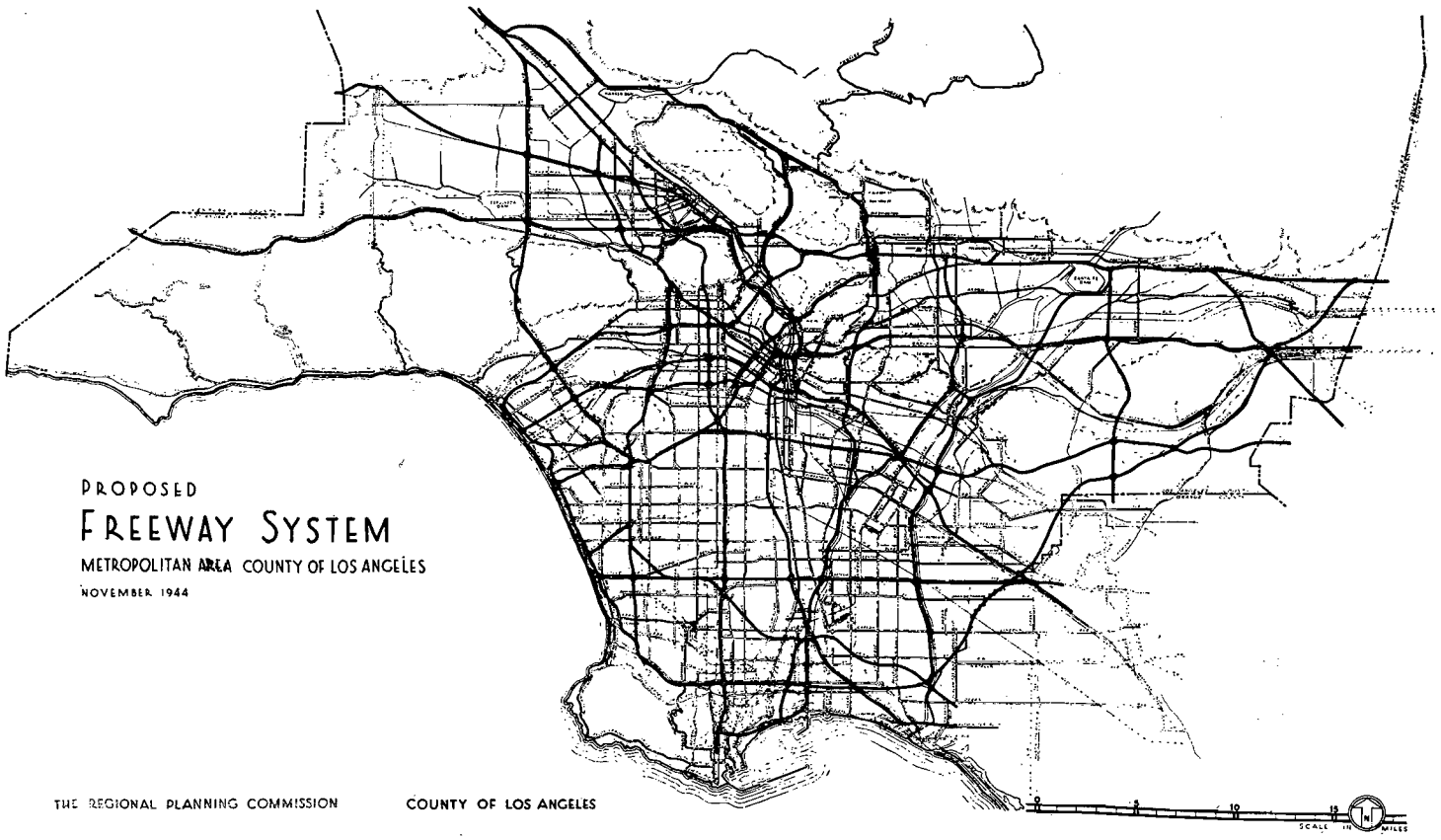
On the other hand, in the face of the glaring need for traffic relief, the commission felt obligated to confine its right of way acquisition to only those projects upon which construction was imminent for the purpose of traffic relief. It would otherwise be scattering its funds over future planning rather than concentrating upon the traffic problem. The new law enables the commission to step in immediately in the adoption of a route, and to proceed immediately with the acquisition of vacant lands subject to subdivision or the erection of expen-

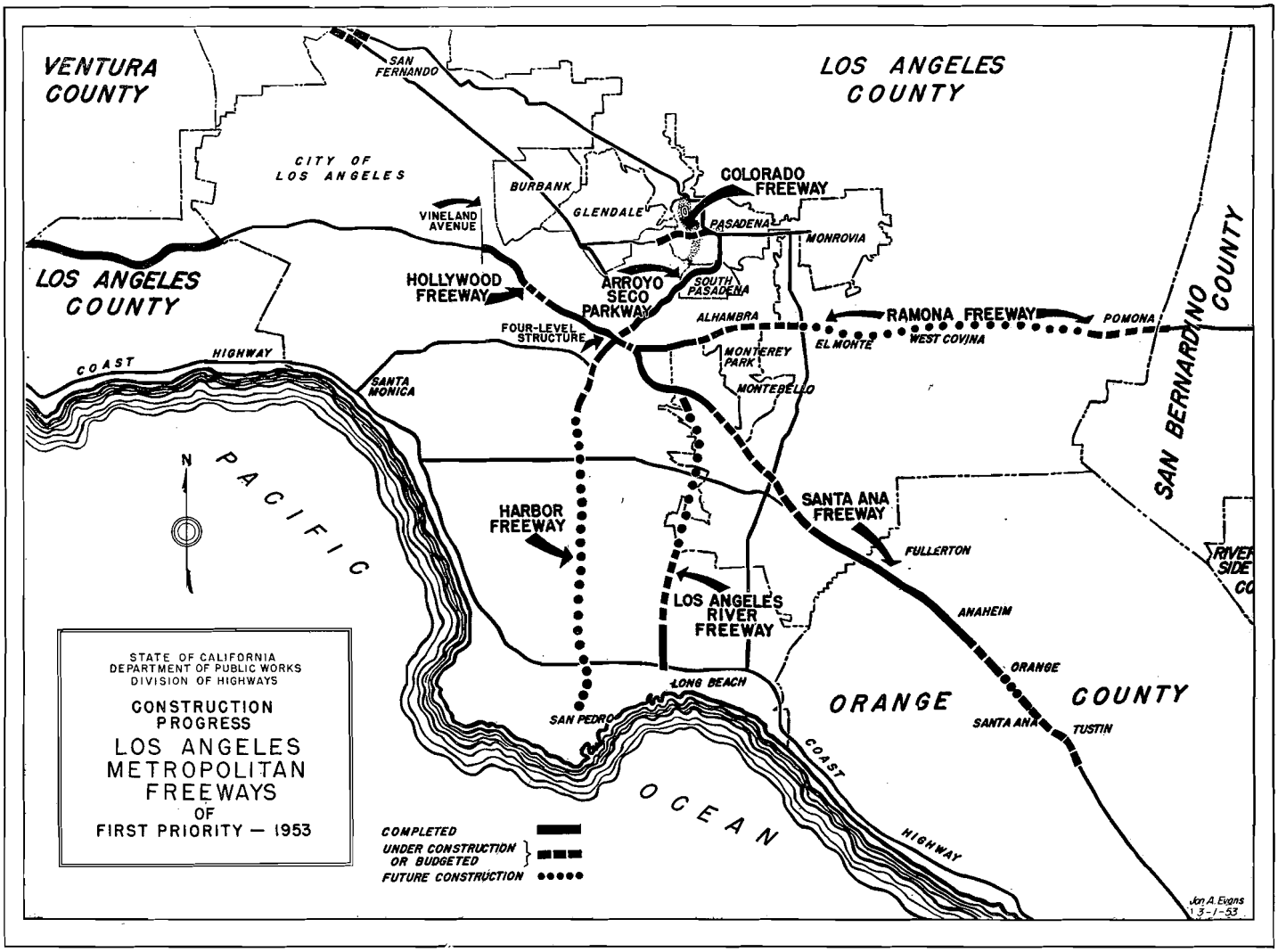
TABLE SHOWING TRAFFIC DIVERTED TO HOLLYWOOD FREEWAY BY PARALLEL MAJOR STREETS

(Figueroa Street Cordon)

Parallel major street	Distance from freeway, ft.	Grand Ave. to Silver Lake Blvd., 1951		Los Angeles St. to Western Ave., 1952	
		Diverted, ADT	Diverted, percent	Diverted, ADT	Diverted, percent
San Fernando Rd. northwest of Ave. 26	11,000	1,500	4	4,500	9
Riverside Dr. west of Figueroa	9,000	7,100	18	14,100	34
Sunset Blvd. west of Figueroa	500	2,800	9	13,100	40
Temple St. west of Boylston	500	9,900	48	10,700	49
First St. west of Figueroa	2,000	7,400	41	6,000	32
Second St. west of Figueroa	2,500	1,900	9	6,000	26
Third St. west of Figueroa	3,100	5,800	30	1,500	7
Fifth St. west of Figueroa	4,500	1,100	8	3,500	23
Sixth St. west of Figueroa	5,000	1,800	13	5,500	39
Wilshire Blvd. west of Figueroa	5,400	700	3	3,500	16
Olympic Blvd. west of Figueroa	10,000	2,700	6	10,100	22
Totals	----	42,700	15.2	78,500	26.5
Traffic remaining on major streets but benefited by freeway				217,500	73.5%
Total traffic on streets involved in study				296,000	100%

The Parkway System as shown hereon was unanimously approved by the Los Angeles Metropolitan Parkway Engineering Committee at a meeting held on February 7, 1946, to which representatives of all cities in the portion of the Los Angeles Metropolitan Area within Los Angeles County had been invited to attend.





sive improvements thereon. As explained a year ago, the ratio of unimproved to improved rights of way may run as high as 10 to 1 for residential properties.

Integrity of Future Route

Another prime advantage is that this permits the Highway Commission to support the heroic efforts of the various planning commissions controlling both unincorporated and incorporated areas to establish and maintain the complete integrity of a future freeway route. This law has permitted activity in protecting vacant properties on previously adopted routes, as well as upon the extended route adoptions permitted. Although this law did not become effective until November of 1952, the commission has already adopted routes totaling 100 miles in Los Angeles and Orange Counties, and contemplates additional route adoptions within a relatively short period of time.

Approximately 60 percent of the $10,000,000 provided under this law has been tentatively allocated to the Los Angeles metropolitan area where the greatest savings in future rights of way costs can be realized. It is hoped that the present session of the Legislature will provide additional funds for continuation of these efforts and for the acquisition of improved properties on such routes which constitute so-called "hardship" cases—that is, people who must sell for some reason or other, and find that they cannot sell to a willing buyer in the path of a freeway where the State will presumably acquire the property within a relatively short period of time. The commission has already authorized acquisition upon the Harbor Freeway, upon the Los Angeles River Freeway (Long Beach Freeway), upon the Sepulveda Freeway, upon the Ventura Freeway, and upon the Hollywood Freeway extension and various other routes. These involve, for this area only, some 300 parcels in relatively large ownerships aggregating over $3,000,000, upon which acquisition has already been started. It is expected that all of the available money will be obligated within a few months' time.

Subdivision Activities

Statements of a year ago should be reiterated, however, that in many cases the development is already here and that the funds appropriated under this act provide no relief for such freeway

Looking northeasterly along Arroyo Seco Parkway from above San Fernando Road

Looking northerly along Harbor Freeway showing Eighth Street undercrossing bridge construction in foreground

projects. This is under the assumption that fully improved areas are in a static condition, and the tremendous savings afforded by acquiring now undeveloped properties cannot apply to them.

The continued activity in subdivisions within Los Angeles County shows the wisdom of this legislation, for we have been able to catch several sections of freeway upon which subdivisions had already been approved, and thus avoid tremendous future costs of preserving a right of way through these areas.

It will be noted from the map on subdivisions from 1945 to 1952, inclusive, that the totals 1945 to 1951 appeared on the map of a year ago, to which have been added the figures for subdivisions both within and outside the City of Los Angeles.

Construction Progress

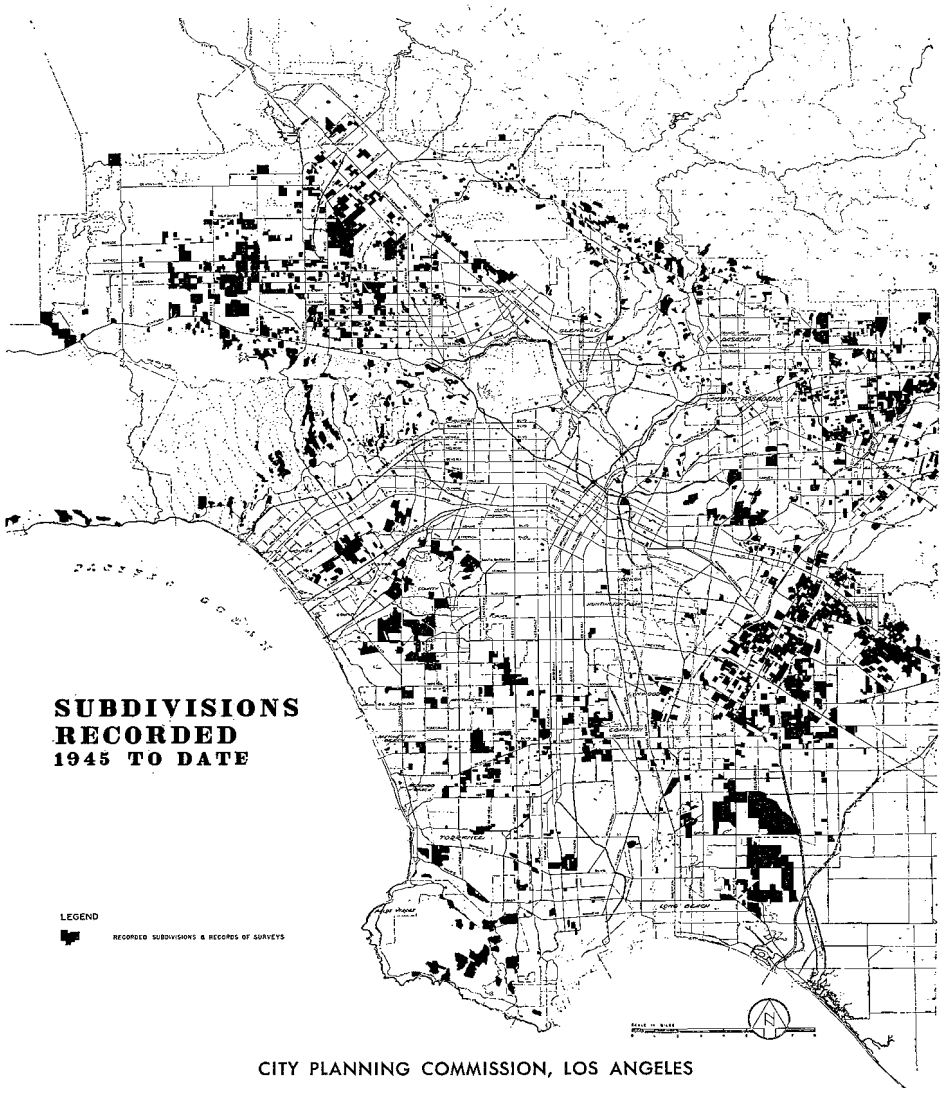
The map showing construction progress has been revised from that shown a year ago, but the true progress made during the year can hardly be reflected on a map of this kind. Our program contemplates opening to public travel each section of freeway as soon as construction operations will permit the public to use it with safety. Each time such section is opened we gain, quickly, valuable origin and destination data by analyzing the traffic flow before and immediately after each opening.

Each time a freeway section is opened to traffic, we know that it moves the point of congestion at the former terminal point to the new terminus. Each time, however, definite benefits are realized in eliminating the conflict with cross traffic within the actual limits of the section opened. Each section eliminates overloaded portions of parallel arterials. And this brings us to an important phase of this problem; namely, the limitations of the metropolitan freeways, particularly in the light of the overload which these freeways must carry until such time as the system can be extended to provide the relief necessary to bring them back to a traffic load which will permit them to operate in line with the basis of their design.

Capacity and Segregation

The freeway is not adapted to segregation of traffic except in line with the designed channelizations for flow in the interchanges and the entrance and exit ramps. As the freeway reaches its practical or designed capacity, it is meeting a critical phase of segregation. As it exceeds the practical capacity, as most of our freeways will for a number of years to come, the efficiency of segregation commences to decrease. The capacity, as previously stated, is based upon a designed volume of 1,500 vehicles per lane of free-flowing traffic, in comparison to an approximate maximum of about 600 vehicles per lane for any surface arterial controlled through traffic signals. These same traffic signals upon surface arterials, however, produce gaps in the traffic, permitting at signal changes appreciable ease in weaving and segregating for proper turning movements ahead, not enjoyed by the overloaded freeway.

Unlike many other engineering facilities, the over-all design capacity of the freeway has its limitations. For example, in sewer or storm drain design the engineer is confronted with the delivery of fluids at certain specified rates from well-defined present or future sources. As the collective effect of these fluids increases, the problem is one of providing a larger and larger conduit for the flow of the total volumes of fluids involved, in which the ultimate destination is well defined by nature. In the case of water supply, the reverse process is largely involved, wherein large volumes of water are taken from sources in nature and gradually distributed to other sources in line with well-established distribution



CITY PLANNING COMMISSION, LOS ANGELES

For factual data on subdivisions recorded see page 7

Subdivisions	City of Los Angeles			Outside City of Los Angeles		
	No. of subdivisions	No. of lots	Lots per subdivision	No. of subdivisions	No. of lots	Lots per subdivision
1945 to 1950	1,136	55,593	49	1,622	108,784	67
1951	255	7,866	30.7	248	17,144	69
1945 to 1951	1,391	63,459	45.5	1,870	125,928	67.7
1952	326	11,329	39.7	325	21,269	65.4
1945 to 1952	1,717	74,838	43.6	2,195	147,197	67

volumes for present and predicted population.

The above table is self-explanatory with reference to the number of lots per subdivision within and outside the City of Los Angeles, those outside averaging over the seven-year period 50 percent more lots per subdivision than those within the city. This indicates the diminishing availability of larger tracts within the city suitable for subdivision, in comparison to outlying areas. It also shows that of the total subdivisions, practically double the number of lots occurred outside the City of Los Angeles, in comparison to those within the city limits. The totals show 3,912 subdivisions with 221,935 lots, or an over-all average of 56.8 lots per subdivision. It is definitely known that much of the subdivision activity has been stimulated by the metropolitan freeway program, which expands the horizon of vehicular travel within given time belts roughly in proportion to the speeds of travel which would exist without the freeways and those which it is possible to attain by use of the freeways.

Traffic Volume Controls

Unlike these problems, the metropolitan freeway may be considered to start with a relatively small volume of traffic and to gradually accumulate traffic on the one hand and constantly discharge it on the other, but with a definite restriction upon the total volume that can be channeled through it. This total volume is definitely controlled by the very traffic having ingress and egress to the freeway, and involves the very uncertain element of human behavior, wherein one individual may affect the progress of many by erratic or unsafe acts.

This has placed a limitation roughly prescribed at four lanes in each direction for freeway travel, and for a number of years past it was thought that three lanes in each direction should be the maximum to be considered. A three-lane freeway from one outside lane to the other, involves weaving across the center lane and merging with the opposite lane. On the other hand, four lanes involves a weaving operation across two lanes and merging with a third to make the transition between the outside lanes. As the volume upon the freeway increases, this becomes more difficult to accomplish.

Definite Limitations

Many times we are asked by citizens why we do not build a super freeway involving many times the number of lanes discussed here. It is quite probable that anyone getting onto such a freeway at one point, intending to depart at some other point, would find it impossible to make the transition without either greatly impairing the over-all speed upon the freeway through weaving conflict provided, or finding it absolutely impossible to make the transition at all, where the practical capacity of the lanes involved had been exceeded.

The city streets to which freeways deliver their traffic also have their very definite limitations, both in traffic capacity and in their much slower speeds of travel. It would be folly to build a freeway which could deliver 6,000 vehicles per hour at high speeds of travel to a garage or parking facility which had a capacity of, say, 6,000 vehicles, but which could only absorb these vehicles at the rate of 3,000 per hour. As a matter of fact, the traffic destined for such parking facility would be able to utilize same with equal efficiency by any traffic-carrying facility delivering vehicles at the rate of 3,000 per hour. As the ultimate source of large volumes of traffic is approached by a freeway, this is a point which must be given most careful analysis, lest the very problem of segregating the traffic be unequal to the facility delivering same, resulting in backing up, and destroying the basic utility of the freeway.

Definite Progress

Coincident with the studies of the problems involved—certain scarcity of critical materials and strikes within the past year—definite progress has been made in extending the freeway system beyond the limits cited a year ago. Since the war the State Division of Highways has spent or obligated some $180,000,000 and has budgeted for the 1952-53 Fiscal Year an additional $32,000,000 on the Los Angeles metropolitan freeway system. The opening of the Western Avenue to Holywood Boulevard section of the Hollywood Freeway on March 16th, under the sponsorship of the Hollywood Chamber of Commerce, was a notable milestone of progress in view of the very heavy congestion of travel on local streets crossing the freeway at a diagonal. This still leaves the Hollywood Boulevard to Cahuenga Pass section of this important freeway under construction, scheduled for opening approximately one year from the present time. There is now open, however, five and one-half miles between the Civic Center and Hollywood Boulevard on this end of the freeway, and approximately three miles on the other end of the freeway, in the over-all 10-mile length involved.

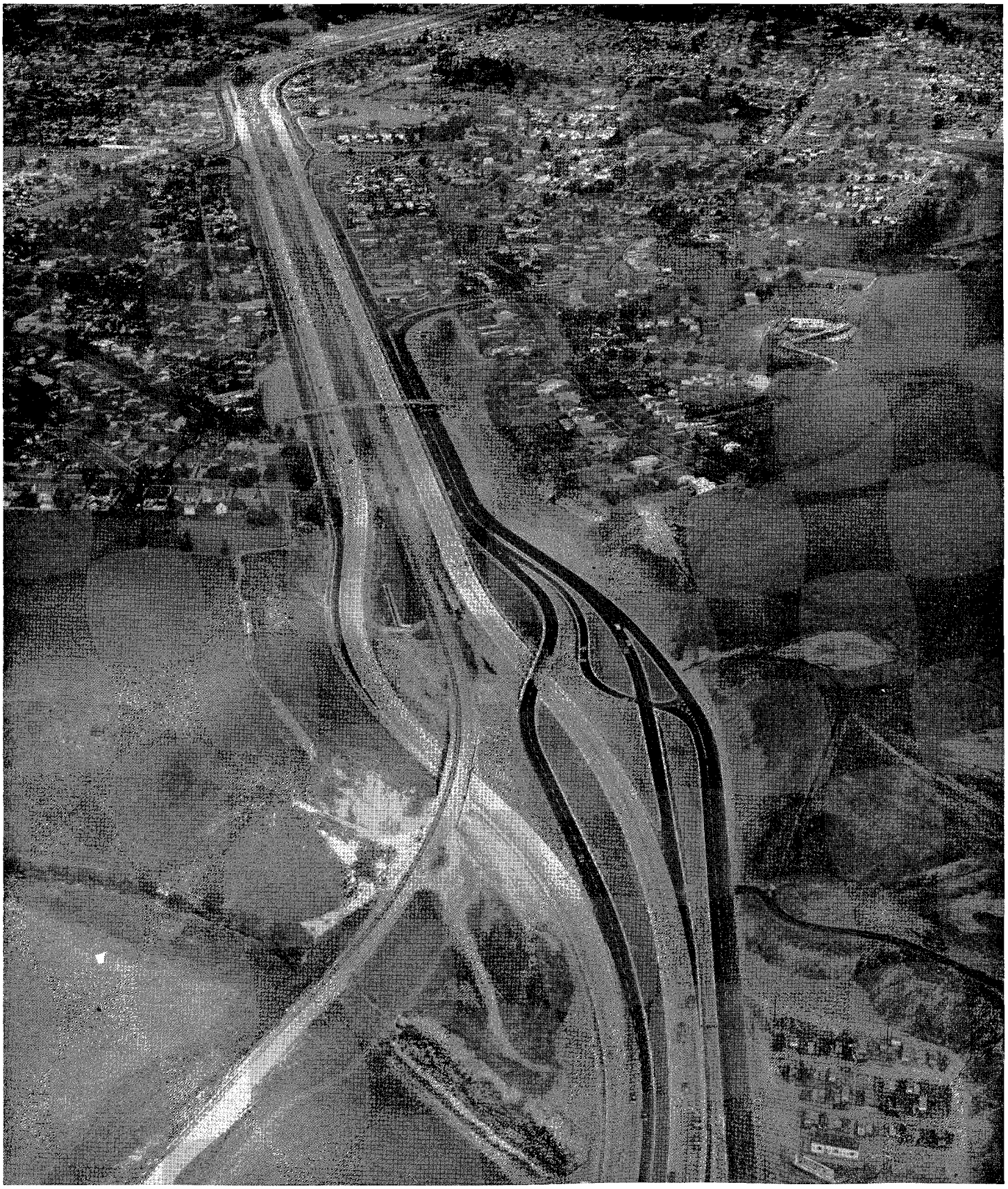
We are now "pulling the plug" between the Arroyo Seco Parkway and the four-level interchange mentioned a year ago, and expect to have this completed late this summer, which will for the first time provide full interchange between the Arroyo Seco, Harbor, Hollywood and Santa Ana Freeways.

Harbor Freeway

On July 30, 1952, a short section of the Harbor Freeway from the four-level interchange to Third Street was opened to traffic. Grade separation bridges have been completed at First, Second, Third, Fourth, Fifth and Sixth Streets and Wilshire Boulevard. Construction work started in 1952 is in progress on grade separation bridges at Seventh, Eighth, Ninth, Olympic, Eleventh, Twelfth, and at Pico and Venice Boulevards. On September 24, 1952, contract was awarded for grading and paving between Third Street and Olympic Boulevard, the estimated date of completion of which is in early

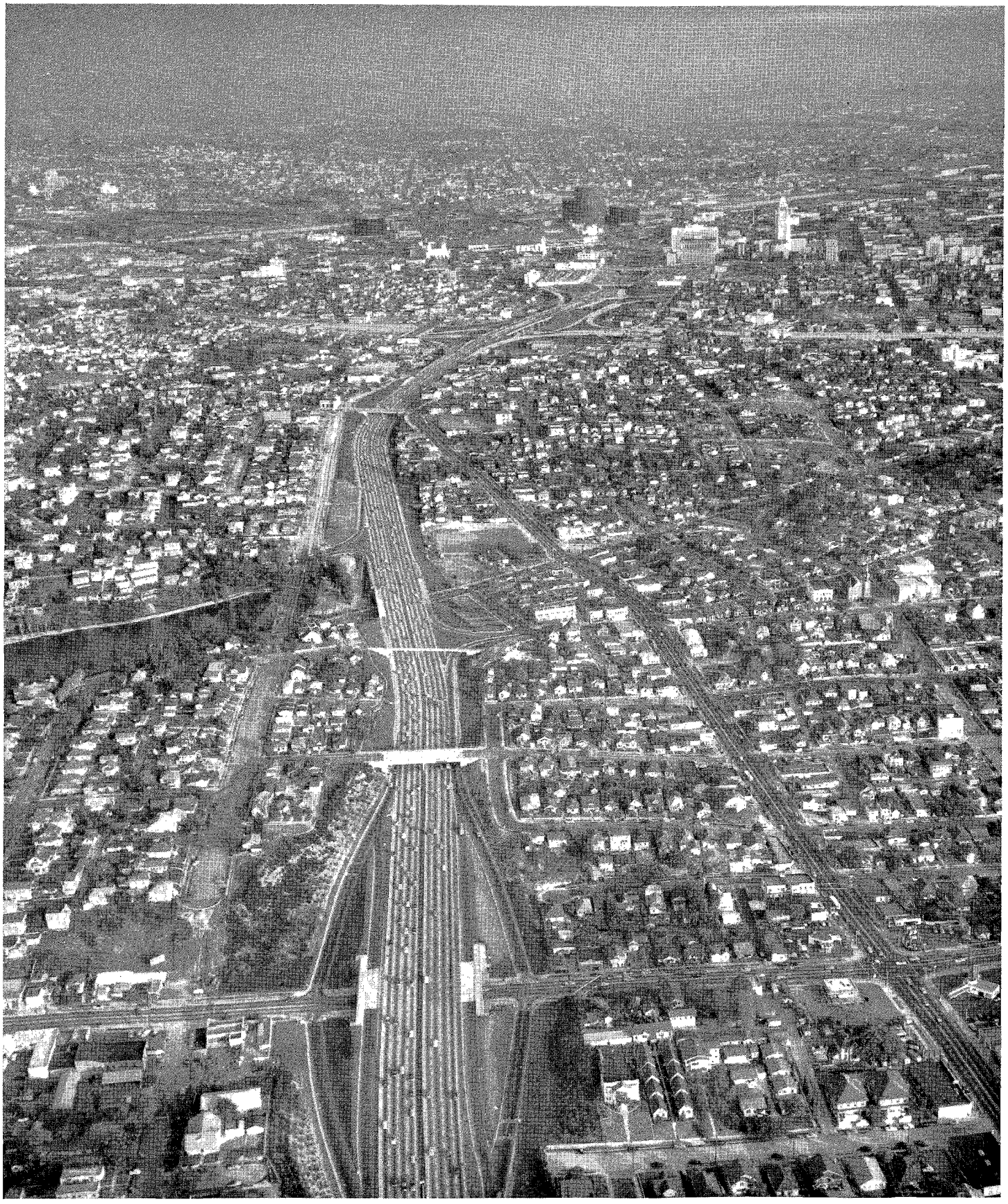
Aerial view looking westerly along Santa Ana-Hollywood Freeway. Los Angeles Civic Center area foreground. Heavy traffic using detours around site for Alameda Street grade separation under construction. Los Angeles Union Railroad Station shown foreground right. Federal Building and other Civic Center buildings shown center left. Four-level interchange structure in background with Harbor Freeway extending to the left and Arroyo Seco Parkway to the right.

Aerial view looking westerly along Ramona Freeway, showing construction in progress. The grade separation in background is at Atlantic Boulevard. Completed section of this freeway recently opened to traffic from Fremont Avenue to Eastern Avenue is shown in background.

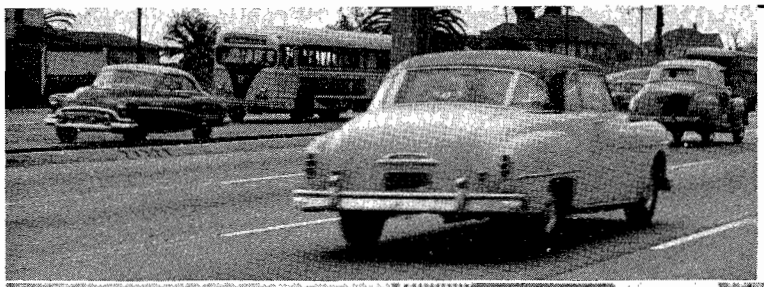


Looking easterly along completed portion of Ramona Freeway recently opened to traffic between Eastern Avenue and Fremont Avenue

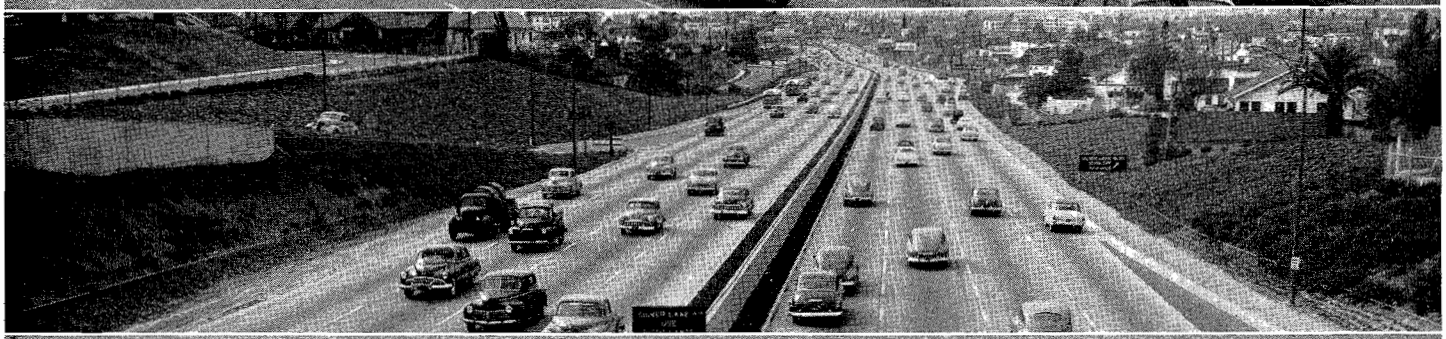
Looking north along Harbor Freeway, taken from above Olympic Boulevard. Construction in progress is shown between Ninth Street and Third Street. Statler Hotel will be noted center right and four-level interchange structure in background.

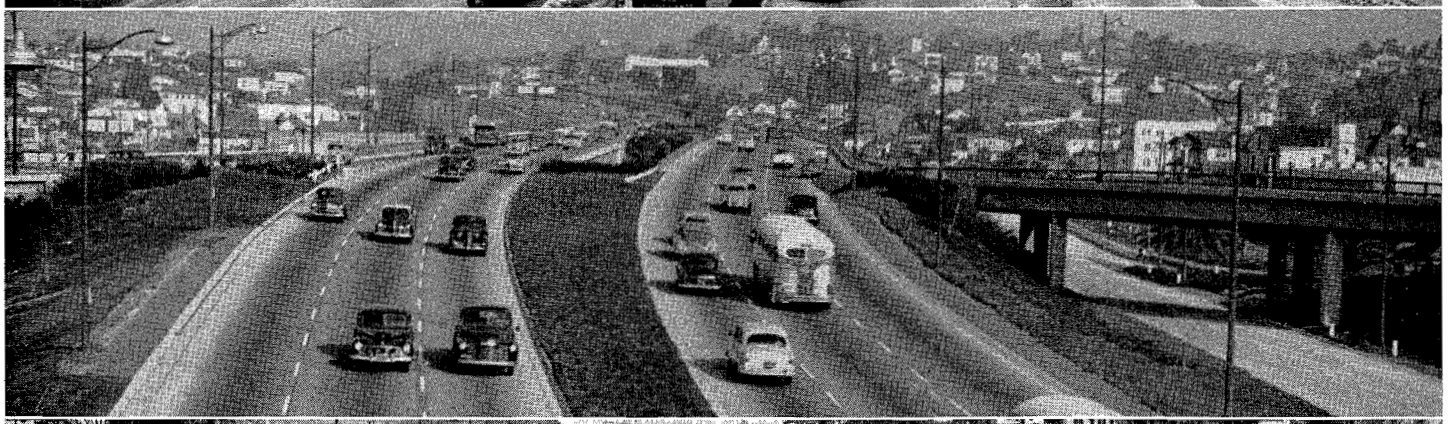


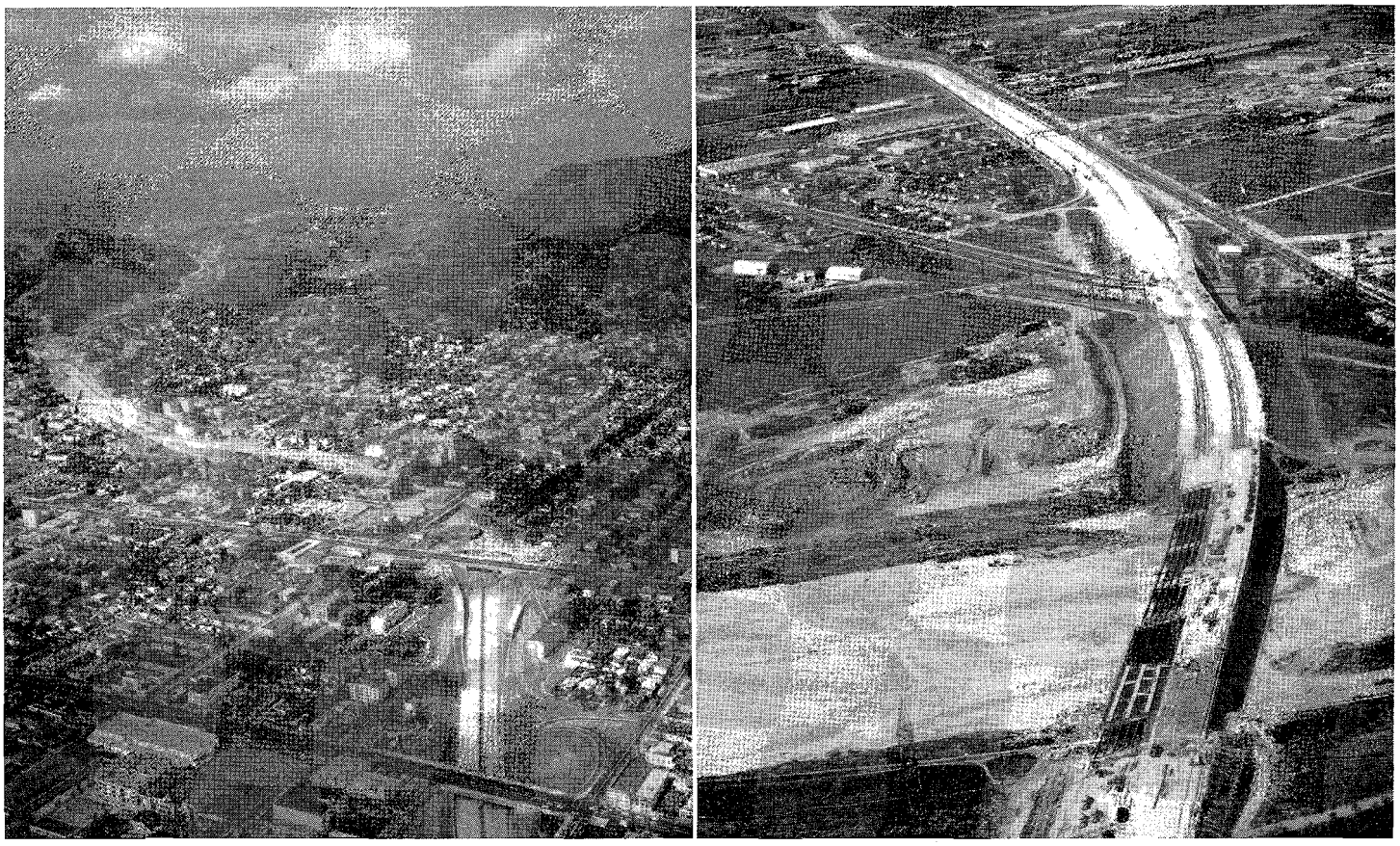
Looking easterly along completed portion on Hollywood Freeway from Alvarado Street into Civic Center. This is the section now carrying in excess of 115,000 vehicles per day, which is the subject of study of traffic diversion in the article.



These photos show heavy traffic on Hollywood Freeway sections to which Mr. Harding refers in his article







LEFT—Looking northwesterly along Hollywood Freeway, showing in foreground portion of completed construction opened to public traffic March 16, 1953, as far as Hollywood Boulevard. The section under construction extends from Hollywood Boulevard to Pilgrimage Bridge in Cahuenga Pass shown in upper left of picture with San Fernando Valley in background. RIGHT—Looking toward Los Angeles, showing Santa Ana Freeway under construction. The bridge in foreground is over the Rio Hondo. The bridge in center is over the Pacific Electric Railway and Slauson Avenue. Construction nearing completion is shown in upper portion of photograph and it is expected that this section will be ready to open to public traffic the latter part of April, 1953.

spring of 1954. It is anticipated that we will shortly advertise a contract for completing the grading, paving and remaining structures from Olympic Boulevard to Figueroa Street in the vicinity of 23d Street.

Notable progress has been made in right of way acquisition in the San Pedro area at the southerly end of this freeway, and it is expected construction will follow as soon as right of way acquisition has been completed. On the Harbor Freeway to date there have been 462 buildings moved, 103 demolished, and 15 major contracts have been awarded. Total expenditure for rights of way and construction to date is approximately $30,000,000.

Santa Ana Freeway

The section of the Santa Ana Freeway from Ditman Street to connection with the formerly completed short section in the vicinity of Atlantic Boulevard was recently opened without fanfare, in stages to provide the greatest convenience to the traveling public in coordination with the contractor's work. This is reported to have given such relief to congested Olympic Boulevard, upon which this traffic formerly discharged, that bus routes operating upon that street have been able to eliminate approximately 10 minutes in their operating schedule. It is expected to open by the end of April that section between Atlantic Boulevard and Slauson Avenue just this side of the Rio Hondo Bridge. In the meantime construction is in progress between this point and Norwalk, and this entire freeway, with the exception of one very minor section just this side of Santa Ana, should be opened all the way from Los Angeles to and through the City of Santa Ana in Orange County in early 1954.

Construction is also under way on the important downtown one-third-mile section on Aliso Street between Los Angeles and Lyon Streets, which includes the building of the Alameda Street grade separation structure, with tracks for the Southern Pacific Railroad. This is scheduled for completion by the end of this year, but there yet remains to be constructed the Vignes Street grade separation and the widening of the Aliso Street Bridge across the Los Angeles River, to fully complete this freeway within the City of Los Angeles. In clearing the right of way for the Santa Ana Freeway, a total of 1,171 buildings have been removed and 40 have been demolished. Sixty construction contracts have been awarded in the over-all 32-mile length between the Civic Center in Los Angeles through Santa Ana. Total expenditures for rights of way and construction to date are $45,000,000.

Ramona Freeway

The Ramona Freeway has now been opened to traffic in stages to Fremont

Boulevard in Alhambra, eliminating a temporary bottleneck, saving approximately five minutes to bus operations using the parallel streets. It has all been under contract to Rosemead Boulevard for some time past, and all this work should be completed by December of this year, thus opening to traffic the full 10-mile length from Aliso Street to Rosemead. A contract is now in progress for freeway construction and the building of seven grade separation bridges in the City of Pomona near the easterly boundary of Los Angeles County, and it is expected to advertise almost immediately work which will complete the freeway through Pomona and Claremont. To date, 290 buildings have been removed, 22 demolished, and a total of 27 construction contracts have been awarded in the over-all 30-mile length within Los Angeles County. Total expenditure to date for rights of way and construction is approximately $23,000,000.

Long Beach Freeway

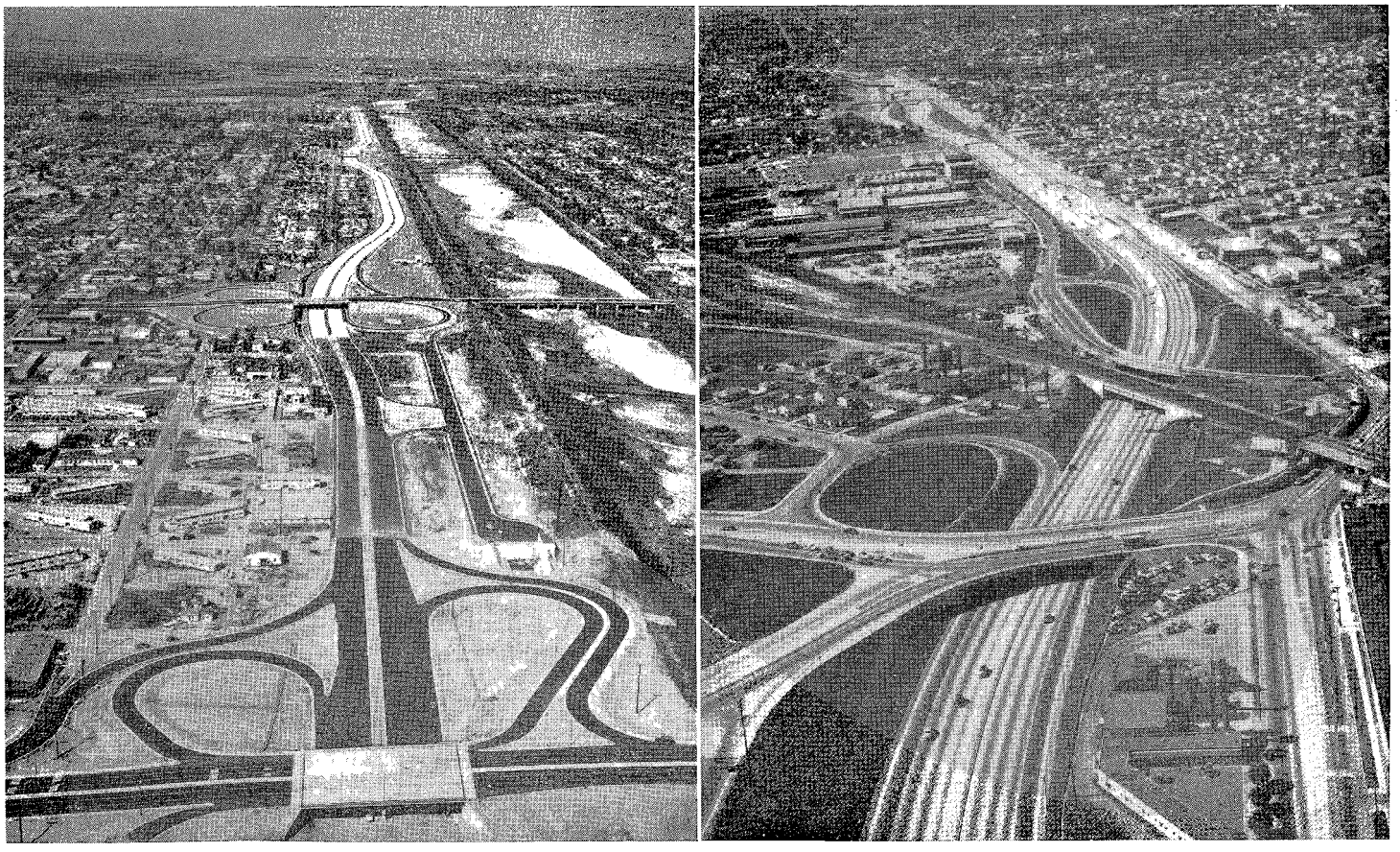
The Long Beach Freeway (Los Angeles River Freeway), placed in the State Highway System by the Legislature in 1947, has under way at the present time six construction projects between 223d Street and Atlantic Boulevard in the City of Compton. The section between the Pacific Coast Highway and 223d Street was opened to traffic at the first of the year, and work is now in progress in acquisition of rights of way throughout the entire 16-mile length between the Pacific Coast Highway on the south and the Santa Ana Freeway on the north. Total expenditures to date for rights of way and construction are approximately $12,000,000, and right of way has involved the removal of 261 buildings and the demolition of three to date.

Notable progress has been made by the City of Long Beach in extending this freeway southerly of its state limits at the Pacific Coast Highway, and the city expects to open a portion of this freeway north of Anaheim Street almost immediately. The total estimated cost of the city's portion of this freeway is in the neighborhood of $12,000,000, all of which is being financed from other than state highway funds.

Colorado Freeway

The Colorado Freeway Bridge over the Arroyo Seco, joining Pasadena and the Eagle Rock section of Los Angeles, is expected to be completed by December of this year. The Guy F. Atkinson Company, which is building this bridge, is also the contractor on the adjacent section of freeway extending westerly to the Los Angeles city limits and easterly to a connection with Holly Street in Pasadena. To date $7,000,000 has been spent for right of

LEFT—Looking northerly along the Long Beach Freeway (Los Angeles River Freeway), showing in foreground grade separation bridge, with Anaheim Street, a City of Long Beach project, extending to Pacific Coast Highway in center of picture. From this point northerly recently completed by State 2.5 mile section joins with Belhart Bridge in vicinity of 223d Street. RIGHT—Looking northwesterly along Santa Ana Freeway, showing in foreground previously completed one-mile unit in vicinity of Atlantic Boulevard and Union Pacific Railroad in East Los Angeles area. Section recently opened to traffic joining this completed section with section in Los Angeles City shown in upper left.



Looking northerly up the Arroyo Seco showing in foreground the old two-lane Colorado Street Bridge built in 1912 and the new Colorado six-lane freeway bridge under construction. The famous Rose Bowl will be seen upper center, left. Northwesterly portion of Pasadena and community of Altadena shown in background.

way acquisition and construction on this freeway, in which 27 buildings have been removed and 13 demolished.

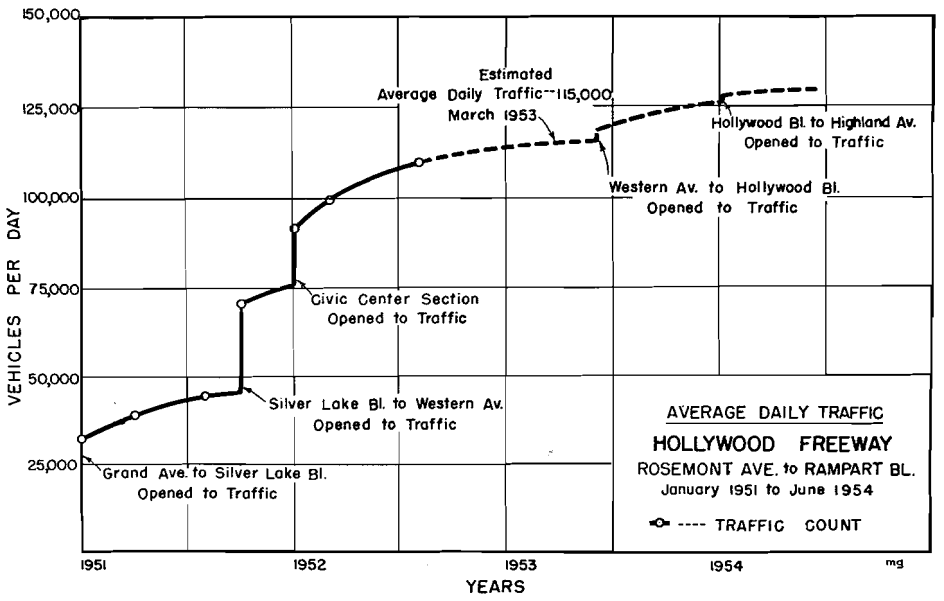
It should be noted that the last unit of the Ridge Route between the north city limits of Los Angeles and the Kern County line has now been completed at a total cost of $14,000,000 for the 45.2 miles of this expressway. A contract has been advertised to extend this from the north city limits into a connection with Sepulveda Boulevard.

Right of way acquisition is proceeding upon the Alessandro Freeway, the Sepulveda Freeway, and sections of the Ventura Freeway. Contract work in Ventura County on this latter freeway will provide a grade separation at the town of Camarillo.

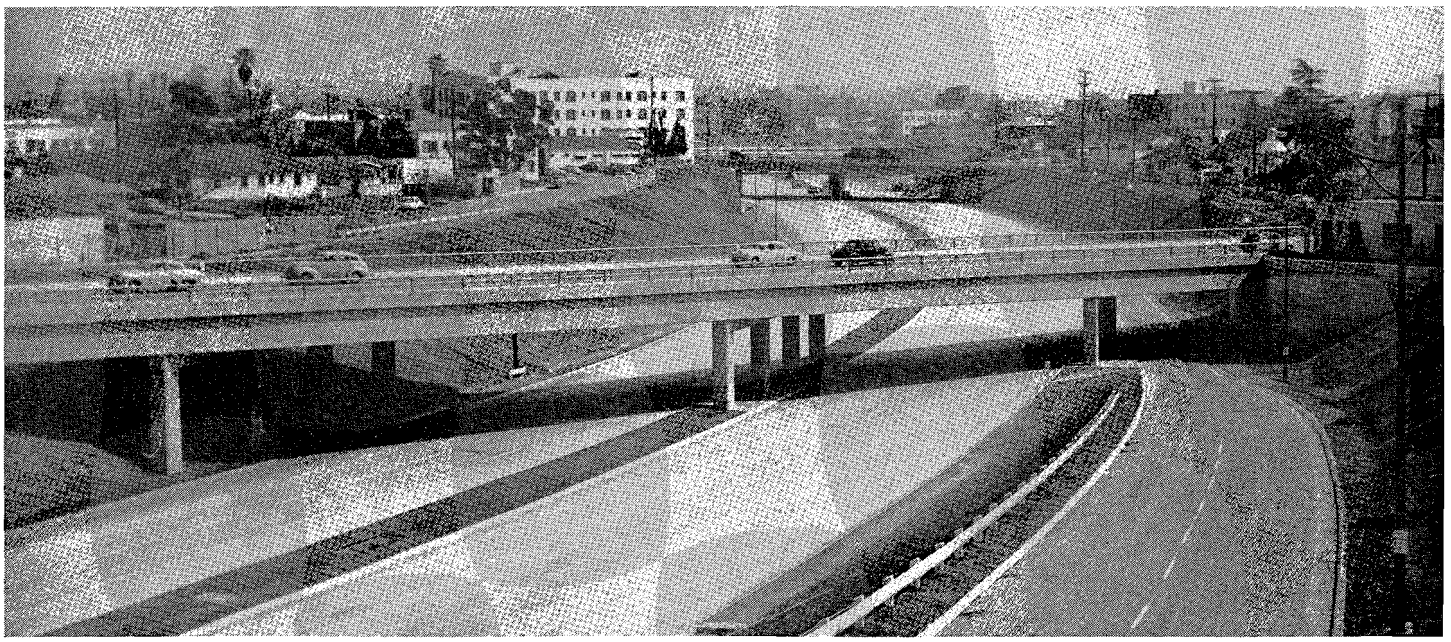
Los Angeles County recently opened to traffic a section of expressway from roughly Stocker Street to Jefferson Boulevard, which now extends this expressway from the City of Inglewood to Jefferson Boulevard in the general route indicated on the map for the Crenshaw Freeway.

One of the glaring defects indicated by the construction progress map is that it shows no activity upon a freeway extending westerly from the central business area of Los Angeles. We have long recognized the need for such freeway, but the overloaded condition of the Hollywood Freeway during its brief life of service has made it necessary that we reappraise the situation to determine whether a Santa Monica Freeway extending to the west, or a Venice-Olympic Freeway farther to the south, should be given priority, or whether it would be possible to determine upon some compromise route giving equal or better service. We have recently completed the initial phases of a traffic study for the entire western area, and are at the present time supplementing this by a vehicle use survey which will give us origin and destination data having a direct bearing upon the problem. Additional finances, if provided by the Legislature, should permit us to crystallize our thinking into action in providing the best facility possible for this very important area in this metropolitan district.

The latest figure on vehicular registration in Los Angeles County, as of the end of 1952, is 2,225,938 vehicles. There are only six states, other than California, having more registered vehicles than this single county within California. These are New York, Illinois, Ohio, Pennsylvania, Texas and Michigan.



Showing Wilton Avenue, Fountain Avenue and Western Avenue. Photo taken from top of KTTV Studio Building.



U.S. 70-99 Freeway

Pomona-Claremont-Ontario-Upland Section Under Construction

By L. S. VAN VOORHIS, Assistant District Engineer, District VII, and JACOB DEKEMA, Assistant District Engineer, District VIII

ONE OF THE vital links in the U. S. 70-99 Freeway will soon relieve the congestion through Pomona, Claremont, Upland and Ontario. Three contracts are currently under way for the construction of 14 grade separations in District VIII and seven in District VII and two bridges across major drainage channels financed by the 1952-53 Fiscal Year Budget. These contracts total $2,836,000.

On October 22, 1952, the California Highway Commission adopted the State Highway budget for the 1953-54 Fiscal Year which provides for the completion of this 13.4-mile portion of freeway. Four million one hundred thousand dollars has been allocated for the 6.2 miles in Los Angeles County from San Dimas Road to the San Bernardino county line at Mills Avenue. Completion of the 7.2 miles from there to a junction with the existing expressway east of Ontario at Archibald Avenue is to be financed from the $3,200,000 provided therefor by the commission.

Ten Million Dollar Project

Thus, a total of $10,136,000 has been budgeted for construction of 13.4 miles of four-lane divided, high standard, full freeway.

The various structure contracts are expected to be completed late in the summer of 1953, but contracts for grading and paving can commence well before completion of the bridges. The District VIII portion was advertised for bids to be received March 12, 1953, with the District VII section to follow immediately thereafter.

Three more grade separations and three pedestrian undercrossings are to be built in Los Angeles County as part of the future contract. Traffic is expected to use the completed freeway in 1955.

The proposed freeway is on new alignment for its entire length as shown on the accompanying artist's sketch.

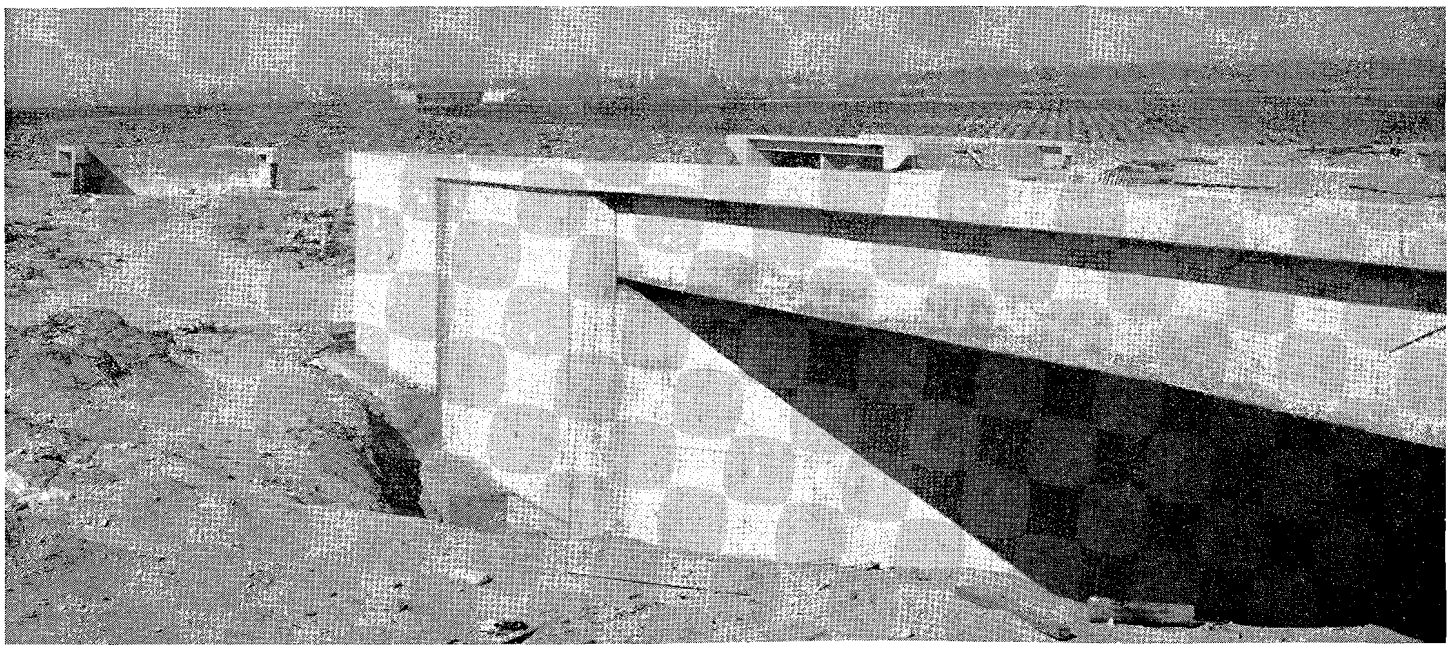
The route selected is slightly longer than the existing highway, but the savings in right of way costs on the adopted location are large enough to more than offset the cost of additional length of travel.

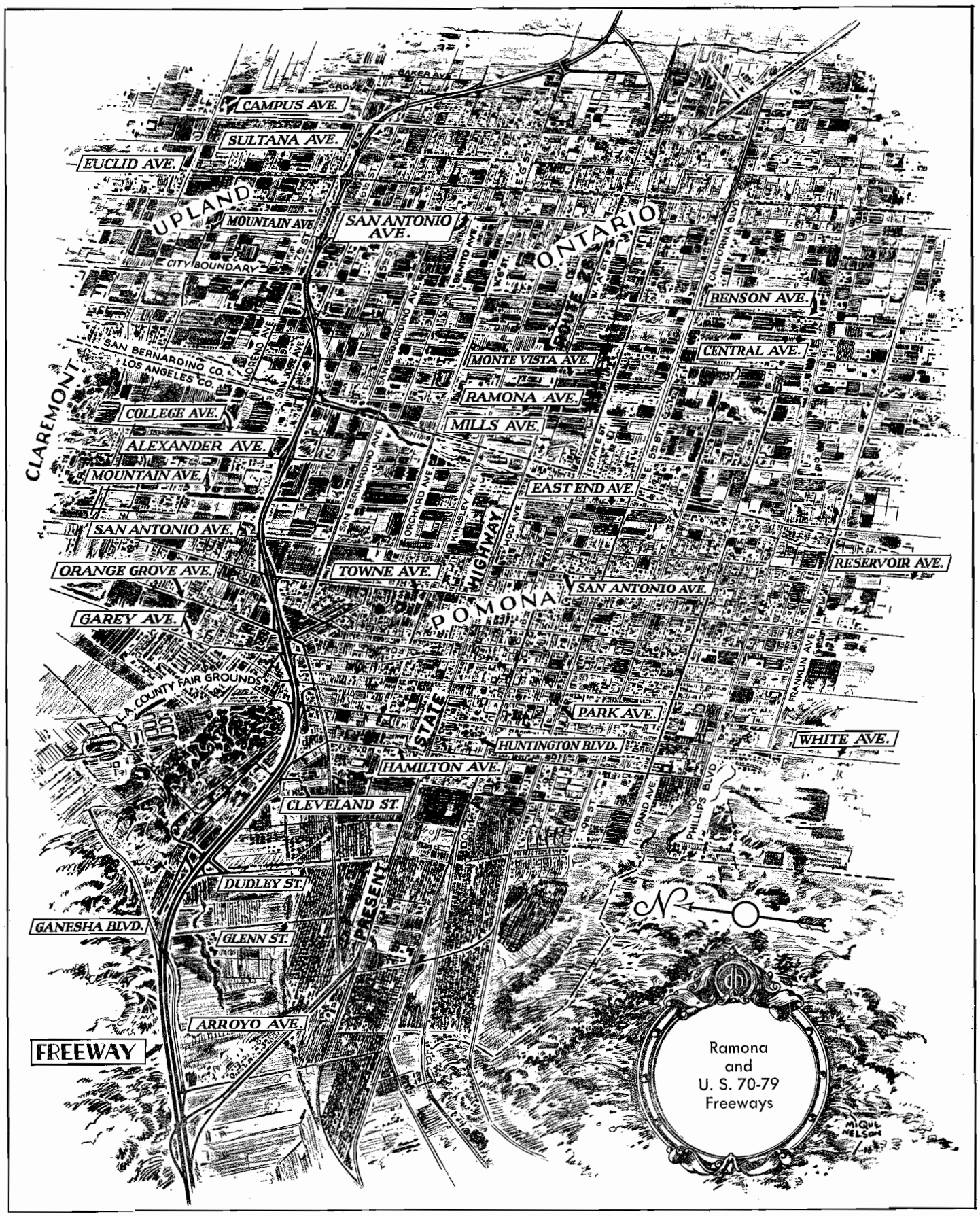
The existing traveled way passes through considerable roadside development, and restricted speed zones have been established over the major portion of the section which will be superseded.

To Relieve City Congestion

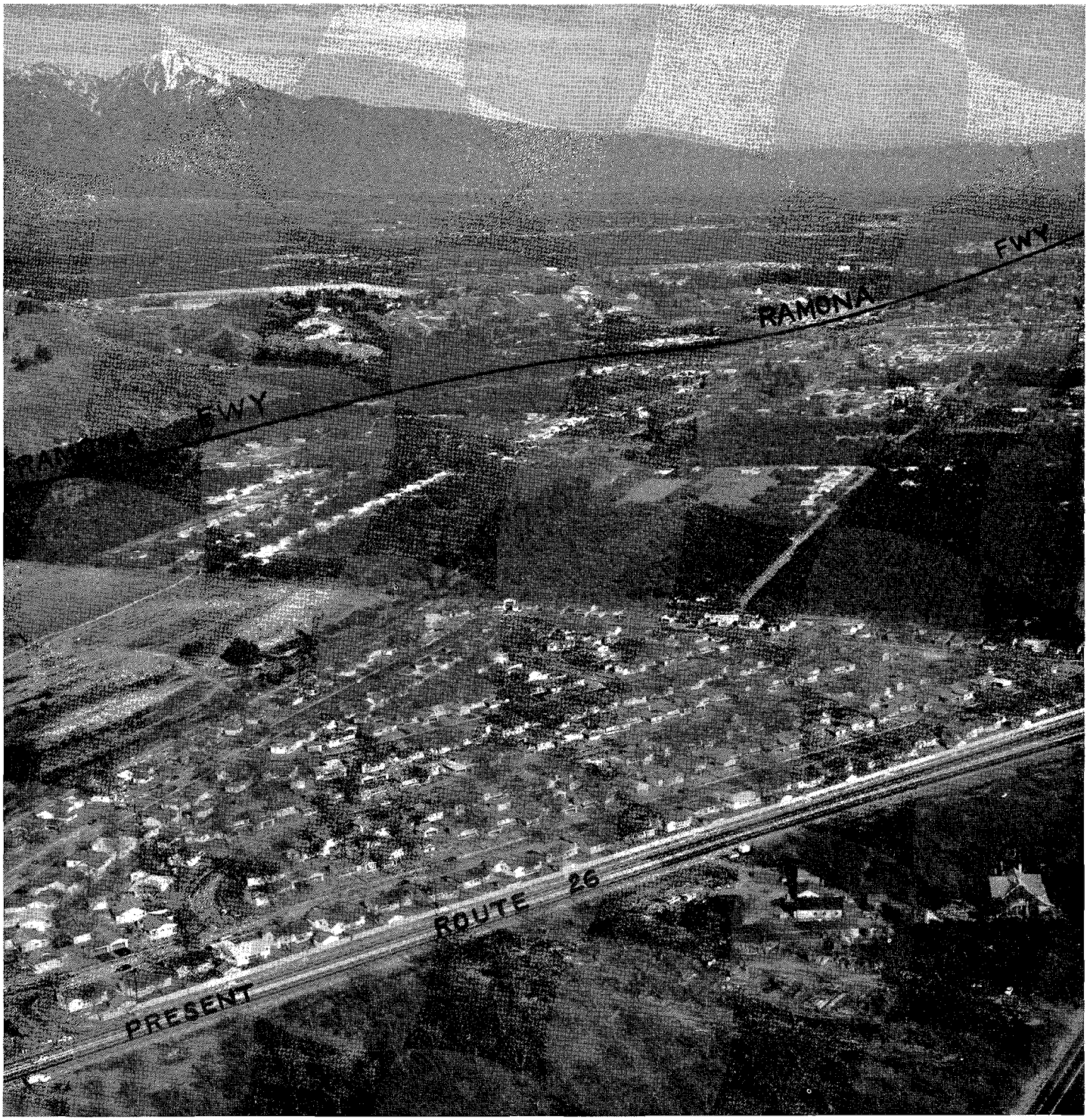
Completion of the work is anxiously awaited by citizens of Pomona, Ontario and adjacent communities to permit moving the heavy through traffic on U. S. 99 and U. S. 70 from present city streets to the new freeway. When this has been accomplished, it will again be possible for motorists to park easily, cross the street safely and shop

Looking toward Ontario through the Guasti vineyards at the east end of the project





In Los Angeles County the Ramona Freeway is known by that name. When it crosses the San Bernardino County line it becomes U. S. 70-99 Freeway.



Section of freeway through City of Pomona, showing present Route 26 in foreground. The Los Angeles County Fairgrounds is shown in center left and Ganesha Park center right. The snow-covered peak in background left is Cucamonga Mountain.

leisurely in the thriving business sections of these outstanding California cities. As local shoppers and those from surrounding areas discover the convenience and comfort created by removing the noisy hazardous through traffic from Holt Avenue in Pomona and A Street in Ontario, a healthy increase in sales may be anticipated.

There are nine traffic signals in Los Angeles County and eight in San Bernardino County.

It is conservatively estimated that the driving time through the Pomona and Ontario Area will be reduced 50 percent when the freeway is completed.

Plan Ultimate Six Lanes

This project was reported upon in this magazine in the July-August, 1950, issue announcing execution of

the freeway agreement with the City of Pomona and as a part of a general discussion of the route by Assistant State Highway Engineer P. O. Harding in the September-October, 1951, issue.

The entire length of the two grading and paving contracts will be constructed as a four-lane freeway with provision for ultimate expansion to six lanes by the addition of two lanes in the median area. The lanes of the traveled way will consist of Portland cement concrete pavement. Shoulders, auxiliary lanes and ramps are to be plant-mix surfacing.

The interchanges in the Pomona-Claremont area are of several types with the diamond shape used predominately. These points in ingress and egress are located at important cross streets and are, in general, evenly spaced throughout the area. The braided connection with the existing traveled way near the westerly end of the project will not only provide a convenient entrance to Pomona but will also become the junction of two freeways. Upon completion of the freeway, the westerly one mile of existing Route 26 will become Route 77. The latter route has been declared a freeway from its junction with the Ramona Freeway to the San Bernardino County line. The freeway also crosses State Route 19 which is Garvey Avenue. This route, carrying approximately 10,000 vehicles per day, is the most important connection between Foothill Boulevard, State Route 9, and Pomona.

Diamond Type Interchanges

Diamond type interchanges are being constructed in the Upland-Ontario area which will permit traffic to move in the direction desired without circuity of travel. The anticipated volume of left-turn movements is relatively low and does not justify the high right of way cost involved in the construction of cloverleaf loops. At the east end of the project, a direct connection to the old highway is provided, affording safe and convenient access to the Ontario business section from the east.

It is anticipated that the contractors will arrange with the San Bernardino County Flood Control District to obtain large volumes of imported borrow at locations where the excavation of material will be of substantial benefit to the retarding basin construction program under way by the Flood Control District. Similar arrangements are anticipated with the Pomona Valley Protective Association.

Take Care of Storm Waters

The Cities of Ontario and Upland are built on a debris cone and in this entire area, the north-south city streets serve as storm channels during periods of heavy rainfall. An existing storm drain along Eighth Street in Upland, one-half mile north of the freeway, intercepts all the runoff in the Upland area except the most severe flood flows. By reconstructing the city streets at their existing grade at the various overcrossings, the bridges will act as flumes to carry excess storm water harmlessly over the freeway. The depressed portion of the freeway between San Antonio Avenue and Sixth Street drains by gravity flow into Cucamonga Wash.

In the Claremont-Pomona area, also, the drainage is to be carried in the existing north-south streets. Since the freeway is to be constructed on a grade above natural ground, no drainage problems are encountered where streets are bridged. On cul-de-sac streets, the surface water is carried under the fill by means of the low-wide structures, whose shape is adapted to the wide-shallow street flow. The recent storm drain bond issue proposal voted by the people in Los Angeles County promises to provide modern underground storm drains for the more critical areas in which flooding is being aggravated by the rapid change in use of the land from agricultural to residential development. Every effort is being made to correlate the freeway design and construction with that of the local agencies to promote the maximum drainage protection for residents and highways alike.

Famous Boulevard

The City of Ontario was founded in 1882 by George and W. B. Chaffey who named it after the Canadian province from which they had emigrated. The city was incorporated in 1891 with a population of 800. Upland, Ontario's sister city to the north, was incorporated in 1906. A large portion of the new freeway in District VIII is being constructed along the joint boundary of the two cities, but with grade separations at numerous intersecting streets, the two communities will be drawn closer together as they will hardly be aware of the heavy traffic flowing on the freeway.

The two cities' major connection is by means of Euclid Avenue, one of California's most renowned scenic attractions. Eighteen miles long, 200 feet wide, this boulevard extends from the foothills on the north to the valley on the south. Its two roadways are separated by a wide median planted with pepper trees by the Chaffeys in 1883 and 1884. With its emerald green lawns and giant pepper and grevillea trees, the broad avenue is beloved by neighboring citizens and admired by thousands of tourists each year.

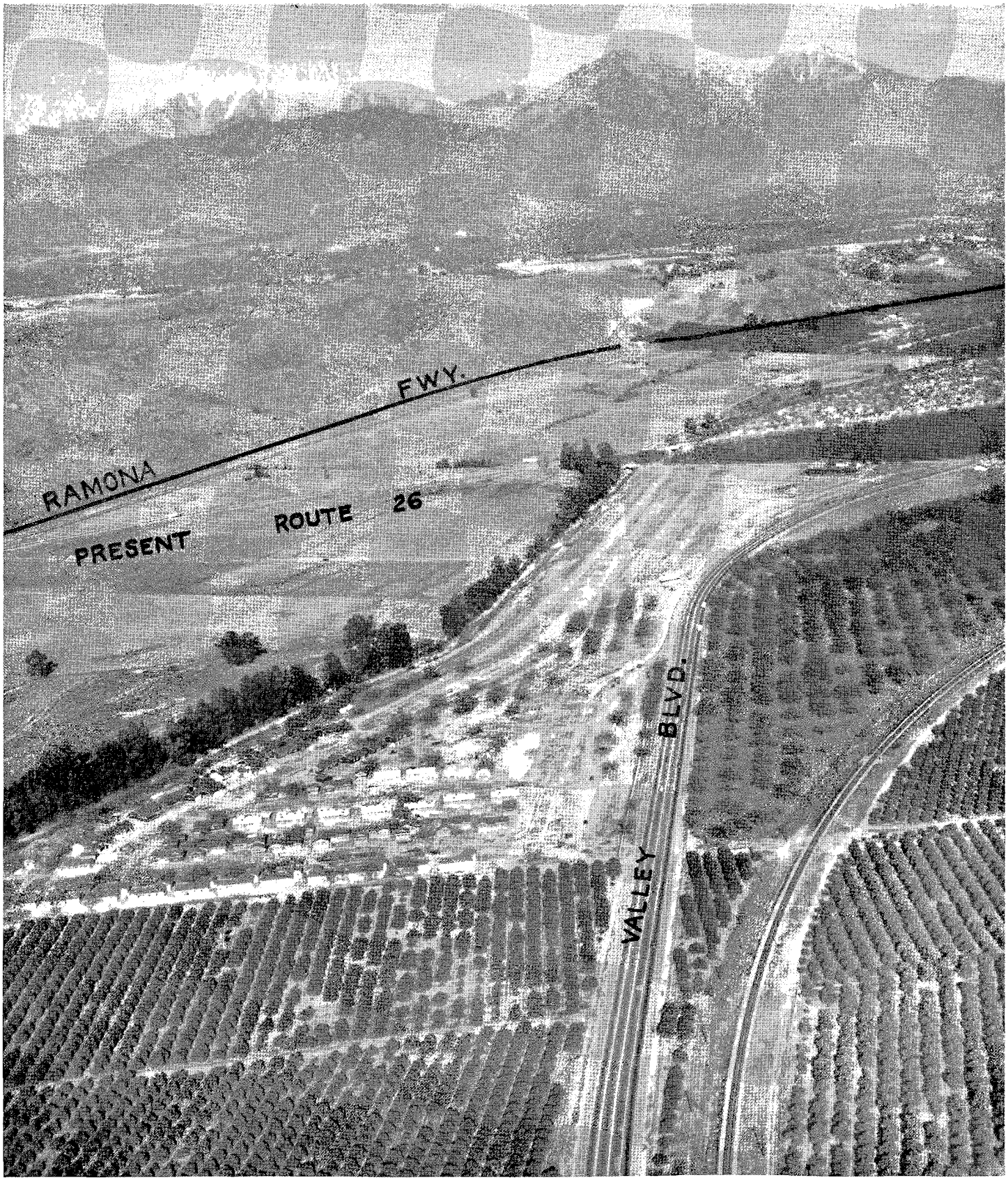
Beautification Planned

The interchange at the freeway and Euclid Avenue will provide the main access for the cities, Upland and Ontario, to the freeway. Construction at the crossing is being performed in a manner that will in no way mar the beauty of the boulevard. The communities have started a movement for the establishment of a park at the intersection to further enhance the attraction and to encourage the hurrying motorist to pause and relax.

Easterly of Upland-Ontario, the freeway passes through the largest vineyard in the world—5,000 acres extending from the mountains to Guasti on the south. Headquarters for the vineyard is in Guasti while in nearby Cucamonga will be found the oldest winery in California, established in 1839.

The City of Pomona, named after the Roman Goddess of Fruits and Gardens, was founded on August 20, 1875. Located in the old Rancho San Jose, first settled by the early Spanish Dons, and surrounded by miles of fertile hills and valleys, Pomona gained early prominence as an important agricultural and trading center.

By 1887, the year of incorporation as a city, Pomona boasted of a population of 3,500, with schools, a newspaper, churches, banks, fruit canneries, nurseries and hotels.



Western section of freeway entering City of Pomona. In the foreground is shown initial unit of $100,000,000 Liberty Homes development that will embrace substantially all of the area shown in the photograph between the freeway and the Southern Pacific Railroad. In the background left is Mount Baldy and, right, Cucamonga Mountain.

Renowned Pomona Fair

Today Pomona is a thriving city having upwards of 40,000 people residing within her 14 square mile area. With her fine residential suburbs, shopping districts, industrial developments, beautiful parks and trees, churches and schools, Pomona represents one of the well-integrated, prosperous cities of Southern California. Being the home of the Los Angeles County Fair, the largest county fair in the world, with its magnificent representation of cultural, industrial, agricultural and commercial achievements of our great Nation, and also the home of the famous Kellogg Arabian Horse Ranch, now called the Kellogg Unit of the California State Polytechnic College, Pomona attracts over a million visitors each year.

The route of the freeway follows very closely the old Los Angeles and San Bernardino Stage Road which passed along the southerly side of Ganesha Park and joined the historic Butterfield Stage Route at a point which is now Pomona's westerly city limits.

Freeway Helps Land Values

During the negotiations with Pomona to reach a freeway agreement, the greater share of the property traversed by the freeway route was devoted to citrus groves. A considerable amount of opposition to the freeway was based upon the premise that the freeway would be a blight on the contiguous land and seriously reduce its value. At the present time, statistics on building activity show the Pomona area to be one of the fastest growing communities in Southern California. The value of building permits for 1952 were in excess of four times that for 1951. Mayor Alan Orsborn of Pomona recently announced publicly that the subdivision activity in the vicinity of the freeway is such that there is practically an absolute lack of land immediately adjacent to the freeway that is not now in actual construction of homes or contemplated for subdivision purposes.

In addition to the bridge construction previously mentioned, the major items of work involve 1,930,000 cubic yards of roadway excavation, 1,921,000 tons of imported material, 58,400 asphaltic plant-mixed material and 86,200 cubic yards of Portland cement concrete pavement.

The distance from the junction with the Santa Ana Freeway in Los Angeles to Colton is 52.7 miles. Upon completion of the Pomona-Ontario unit, there will be 22.8 miles of full freeway and 14.7 miles of expressway open to traffic, which leaves 15.2 miles of full freeway in Los Angeles County remaining to be constructed.

T. H. MacDONALD PRAISED

THE CALIFORNIA Highway Commission at its meeting in Sacramento on March 19, adopted a resolution commending U. S. Public Roads Commissioner Thomas H. MacDonald, who retired on April 1st, for his many years of devoted service in the development of modern-day highways. Secretary of Commerce Sinclair Weeks appointed Francis V. du Pont of Wilmington, Delaware, to succeed MacDonald. The commission's resolution is as follows:

WHEREAS, The Honorable Thomas H. MacDonald is retiring after 34 years of public service as Commissioner of Public Roads; and

WHEREAS, During these long years of service, Commissioner MacDonald has championed a national system of good roads and made an outstanding contribution throughout the Nation; and

WHEREAS, Commissioner MacDonald has received national and international recognition in his chosen field of endeavor; now, therefore, be it

Resolved, That the California Highway Commission in regular session this nineteenth day of March, 1953, convey to Mr. MacDonald its sincere appreciation for his contribution to good roads and its best wishes for a continued interest in the future development of the Nation.

In Memoriam

JAMES M. HODGES

Funeral services were held on March 18, 1953, for James M. Hodges, retired Supervising Highway Engineer for the State Division of Highways, who died in Alhambra on March 14th. Mr. Hodges was born March 13, 1894, at Loveland, Colorado. He was a graduate of Los Angeles High School

"Jim," as he was known throughout the State, started his highway service with District VII on December 28, 1914, as an axeman on one of the survey parties on the original survey for the "Old Ridge Route." From December 12, 1917, to August 1, 1919, during World War I, he was on military leave with the Army in France. Upon his return to civilian life, Jim advanced through the various survey party positions and was instrument man at the time he left District VII on May 18, 1920, when he resigned to accept out-of-state employment.

Jim returned to the State Division of Highways service December 1, 1928, to accept a position as Resident Engineer in District VIII. When portions of Riverside County and Imperial County were relinquished by District VIII in 1933 to become a part of the new District XI with headquarters in San Diego, Jim automatically became an employee of District XI.

On April 25, 1936, Jim transferred to Sacramento Headquarters Office where he worked for a period of five years. On March 16, 1941, he became District Maintenance Engineer for District IX, with headquarters in Bishop, which position he held until August 1, 1947. On this date Jim transferred again to Sacramento and worked until March 23, 1949, on the office engineers' staff.

He then returned to District VII as Assistant District Engineer in charge of surveys, which position he held until his retirement on May 1, 1952.

His home during recent years has been at 2220 Winthrop Drive, Alhambra. He is survived by his wife, Mrs. Grace A. Hodges, his mother, Mrs. Annie Hodges, and his brother, Joel B. Hodges.

The One-way Street

Its Effect on Retail Business

By JOHN F. KELLY, Headquarters Right of Way Agent

THE PURPOSE of this economic study conducted by the California Division of Highways is to determine how retail business is affected when the traffic on city streets is changed from two-way to one-way, particularly when those streets are part of the State Highway System. The one-way street system has the full support and cooperation of the traveling public because these new thoroughfares have been a benefit to them. However, the unanswered question is, "Has this benefit to the traveling public been at the expense of retail business along the newly created one-way streets, or has it also benefited from the change in the traffic pattern?"

Diversified Improvements

For making this one-way street study 16th Street in Sacramento has been selected because the majority of the street frontage is utilized for commercial uses, varying from small retail stores to one of the largest automobile dealerships in the city. This northbound one-way street extends 2.4 miles through the heart of the city. Portions of U. S. Highway Routes 40, 50 and 99 through Sacramento use 16th Street. The diversity of improvements on 16th Street makes it an excellent example to be used for comparing the activity of retail business in other communities either now using or contemplating using one-way streets in the future. After all, the importance of any economic study is to provide a factual report which can be used as a reference and guide by other communities which are confronted with similar problems.

The network of streets in the central portion of Sacramento follow a grid pattern. The accompanying diagram shows the major streets and highway routes in this section of the city. Traffic congestion has been relieved considerably in the central area of the city by converting several of the heavily traveled two-way streets into one-way thoroughfares. At present, there are nine north and southbound, and six east and westbound one-way streets.

City Traffic Studies

Since adopting the one-way street system on a limited scale, the City of Sacramento has carefully studied the effects of this change. The primary purpose of their studies has been to determine how much the one-way street system has improved traffic conditions.

The following resume briefly outlines the results of the studies completed by the city:

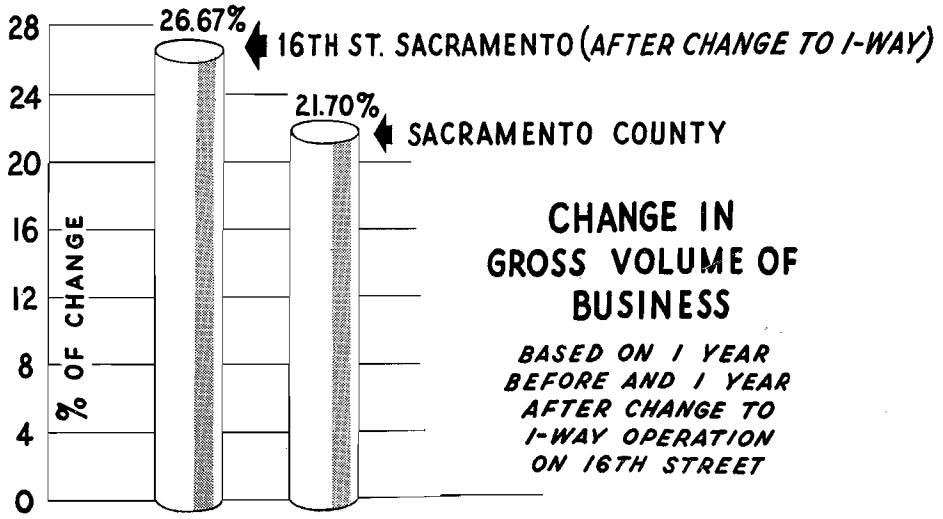
1. Traffic volume increased 14.0 percent on the pairs of one-way streets as compared with these same streets when they were two-way streets.
2. Traffic speed during one-way operation increased 24.4 percent in peak hours and 41.4 percent other hours.
3. Vehicle accident rate reduced an average of 15.5 percent on the one-way streets.
4. Pedestrian accidents reduced by an average of 61.9 percent on all streets converted from two-way to one-way.
5. Greatly enlarging the one-way street system indicates a need of changes in the local bus routes.
6. The effectiveness of one-way streets is being hampered by commercial vehicles double parking and blocking one of the traffic lanes. Increase in number and size of curb loading zones may be one of the best corrective measures.
7. Local business groups have expressed satisfaction with changes made from two-way to one-way streets and are encouraging the city to increase the number of one-way streets.

In general the results of the studies made by the city show that from a *traffic* standpoint, the change from two-way to one-way has been a success.

From a land economic standpoint this study deals with the effect of the one-way street on the adjoining property, particularly retail business. In this phase, a separate segregation of traffic and accident figures has been made for the purpose of confining all factual data to the study period.

Two-year Study

This two-year period is a comparison of the one year of two-way traffic with one year of one-way traffic. The study period began on July 1, 1949, and ended June 30, 1951. The dates of the study do not coincide exactly with the dates on which 16th Street was



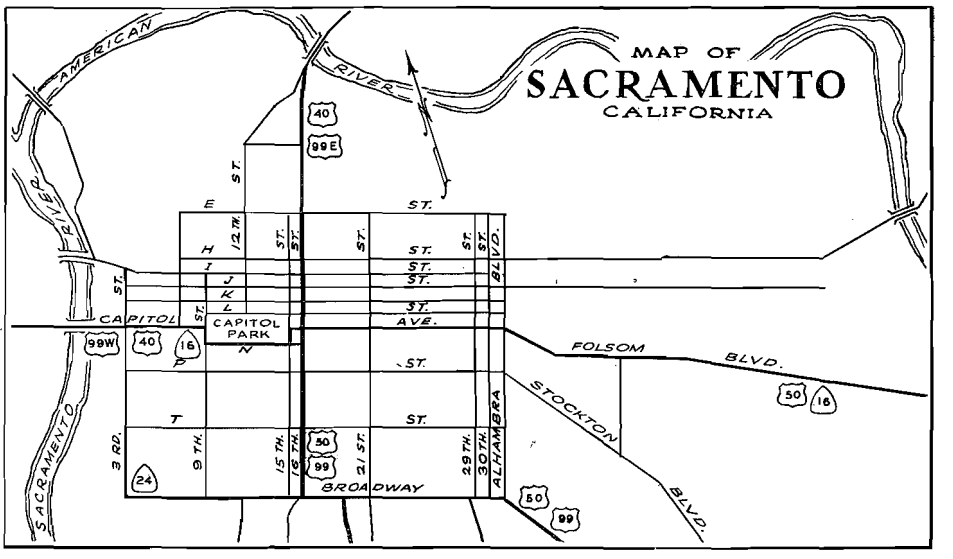
converted from two-way to one-way traffic. The gross sales are reported on a quarterly basis and for an accurate interpretation of these figures we have used the quarterly date nearest the actual date on which traffic was changed on 16th Street. Adjustments have been made for the difference in time so that the study accurately covers two identical 12-month periods.

Retail Business

The sales tax returns as reported by each retail outlet on 16th Street to the State Board of Equalization provides the facts for making the retail business study. These facts show that all retail business on 16th Street during the year of one-way traffic increased 26.57 percent over the previous year of two-way traffic. To determine if this increase is above or below the normal expectancy for change in retail business during this particular time, a comparison has been made of all retail business in Sacramento County. During the same comparative time period, all retail business in the county showed an increase of 21.70 percent. This means that retail business on 16th Street made a 4.87 percent greater increase during the year of one-way traffic than all retail business throughout the county during that same year. The use of county figures for comparative purposes is based on the fact that previous studies have shown that business in the City of Sacramento sets the business pattern of the county.

Corner Sites

Several major streets cross 16th Street and provide very desirable corner locations for retail business. A segregation has been made between the retail outlets located at corner locations and those having their entire frontage on 16th Street. The figures reveal that all business on corner locations made an increase of 26.90 percent during the year of one-way traffic as compared with the year of two-way travel. Those retail outlets having their entire frontage on 16th Street and without the influence of major intersecting streets made business gains amounting to 25.39 percent during the year of one-way traffic. It is interesting to note that the gross business performed at corner locations



represented 78.24 percent of all business along 16th Street and the remaining 21.76 percent of total business was done by outlets having frontage exclusively on 16th Street. These figures show that although the greatest volume of business was performed at the corner sites, their gains were only slightly higher than the increased returns made by the smaller businesses having inside locations.

Volume of Business

A classification has been made of the volume of business performed by each retail outlet along 16th Street in order to show the representation of business by size. Of the 144 retail outlets reporting their gross business volume for sales tax purposes, 91 were in business during the entire or the majority of the time covered by this economic study. The other 53 reported such fragmentary returns that it was not possible to classify them according to their annual gross returns; therefore, they were not included in this phase of the study. Forty of the 91 retail outlets in the study were small business establishments having annual gross receipts under $50,000. Thirty-one retail outlets had annual receipts between $50,000 and $200,000 and the remaining 20 outlets in this study had annual gross receipts of $200,000 or more. These statistics show that 44 percent of the retail outlets on 16th Street would be classed as small businesses.

New Business

Further information of interest with respect to the retail phase of this economic study deals with the changes made in business operations along 16th Street. During the year of two-way traffic, there were seven new businesses started, whereas 11 new businesses started in the year of one-way traffic. During each single year of the study there were three retail outlets which closed without a succeeding successor.

Accidents and Traffic

The volume of traffic on 16th Street decreased from 14.49 to 13.60 million vehicle miles (MVM) during the last 10 months of the one-way phase of this study as compared with the last 10 months of the two-way phase. A 10-month study period was used on traffic volume rather than the full year because this phase of the study was restricted to the actual days when traffic was either one-way or two-way. Converting the traffic volume into vehicle use per day, the facts show there were 20,945 vehicles using 16th Street during the two-way system as compared with 19,672 vehicles using the street when it became one way.

Accidents Decrease

Vehicle accidents on 16th Street decreased 16.36 percent during the one-way period of the study as compared with the previous two-way traffic sys-

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Tracy Expressway

Realignment of U. S. 50 in Alameda-San Joaquin Counties

By W. F. FLEHARTY, Assistant District Construction Engineer

CONSTRUCTION now is well under way on the seven and one-half mile grading project on U. S. 50, beginning at the eastern end of the Altamont four-lane highway constructed in 1937 and ending at Corral Hollow Road which is located approximately one-half of a mile west of the present crossing of U. S. 50 and the Southern Pacific Railroad tracks near the west city limits of Tracy. Portland cement concrete paving and a temporary connection to the present highway near the west city limits of Tracy will be completed as a separate project scheduled to start in 1954. A further project is contemplated for an interchange and railroad separation structure at the west city limits.

This project is all on new alignment lying approximately one and one-quarter miles south of the existing highway. Upon completion the new routing will save the traffic traveling between Tracy and the East Bay area points approximately nine-tenths of a mile of distance over an inadequate two-lane highway with insufficient shoulder widths and with approximately one-third of the distance through the foothills on a rolling, no-passing grade with several horizontal curves.

Present Route Congested

Approximately 10,000 vehicles per day are using the existing two-lane highway at the present time. Vehicular traffic is estimated to increase to 16,500 vehicles per day by 1970. This number of vehicles, of which approximately 15 percent is trucks, are operating over the existing highway which is necessarily badly congested, especially for the westbound traffic on the upgrade in Alameda County.

The new facility will eliminate this congestion and with the nine-tenths of a mile shorter distance will result in a considerable savings in traveling time, distance and cost to the motoring public as well as a reduction in vehicle accidents.

Rights of way have been acquired on a full freeway basis with all access to private property being acquired and eliminating access to and across the highway at grade except at Patterson Pass, Hansen and Lammers Roads. One and one-third miles of existing county road on the eastern end of the project will be utilized as a frontage road to serve the local traffic.

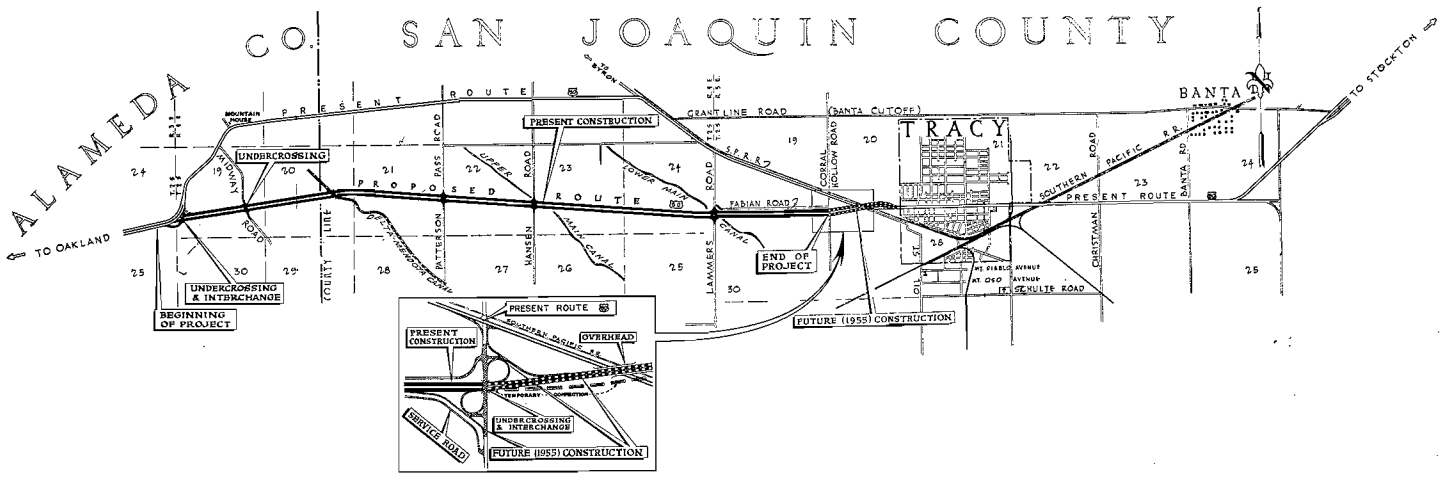
The major work consists of constructing three underpass structures beneath the new four-lane highway, twin bridges over the Delta-Mendota Canal, the usual irrigation and drainage structures and grading of the four-lane expressway with sufficient base material for the subsequent paving contract, all at an estimated cost of $1,558,400. This project should be completed about July 1, 1954, followed by the paving project which should be completed in 1955. The third contract for the interchange and railroad separation will follow.

Mountain House Underpass

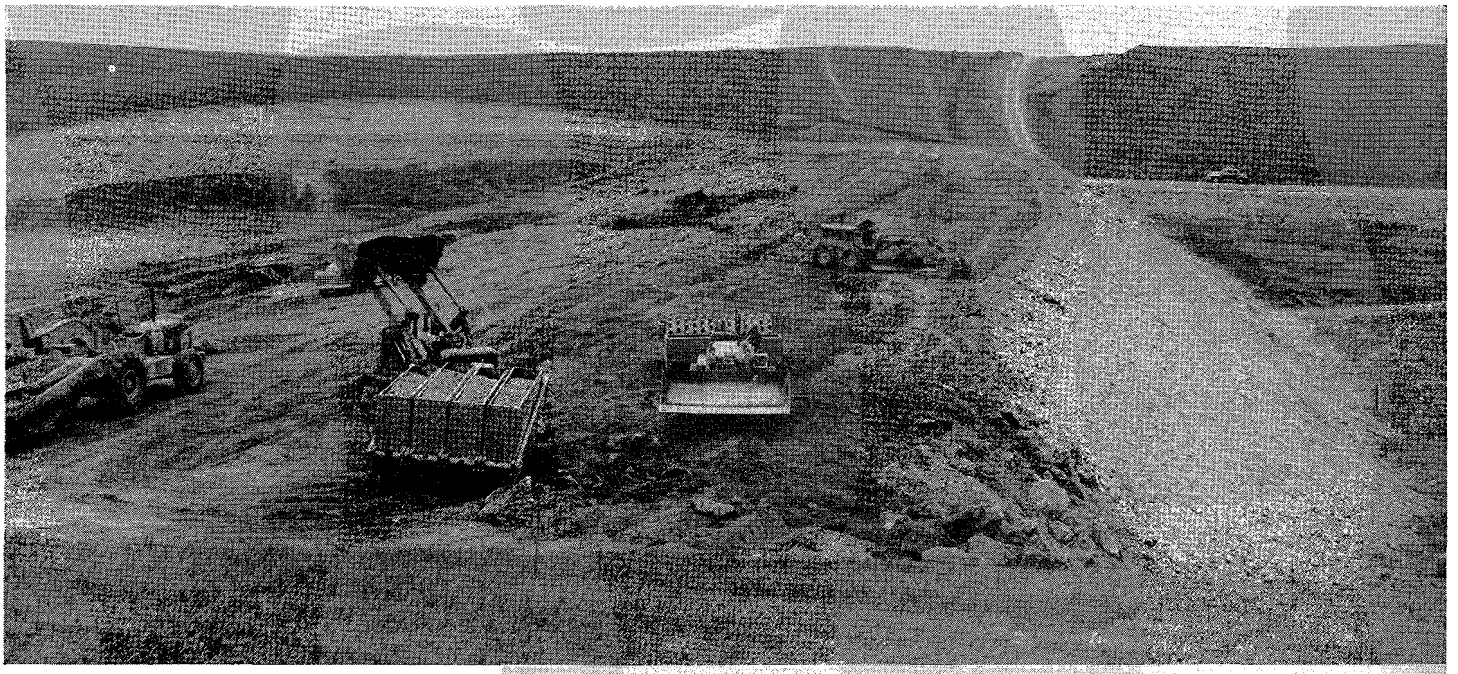
Traffic bound for Mountain House via the existing highway will be carried under the new expressway by the construction of a three-span open and reinforced concrete slab bridge 137 feet 9¼ inches long and 79½ feet wide carrying two 35-foot roadways with a four-foot division curb. Foundation pile work has been started on this structure.

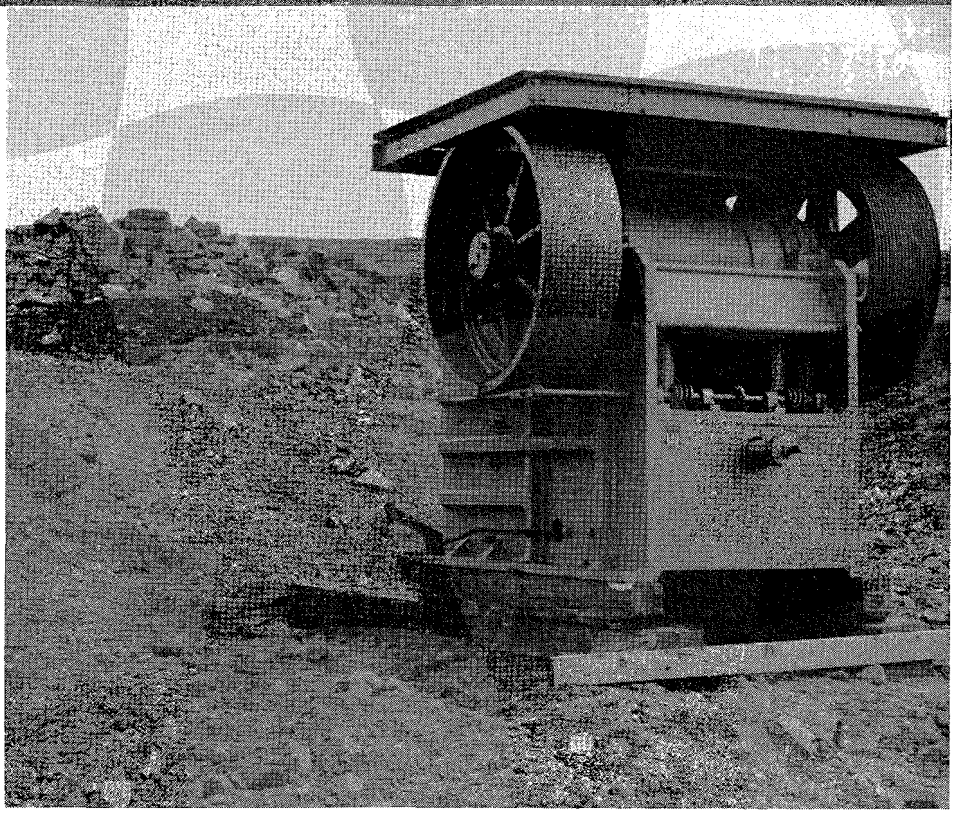
Midway Road Underpass

Midway Road traffic will be carried under the expressway by the construction of two reinforced concrete slab bridges of three spans each with open ends; both structures will be 102 feet 6½ inches long with a 28-foot roadway between the curbs. Embankment work in the vicinity of this structure



DETAIL OF CORRAL HOLLOW ROAD INTERSECTION





UPPER—Midway Road fill showing heavy equipment. LOWER—Mountain House Underpass off ramp construction. Rock crusher in foreground.

is being rushed to allow an early start on constructing this structure.

Delta-Mendota Bridges

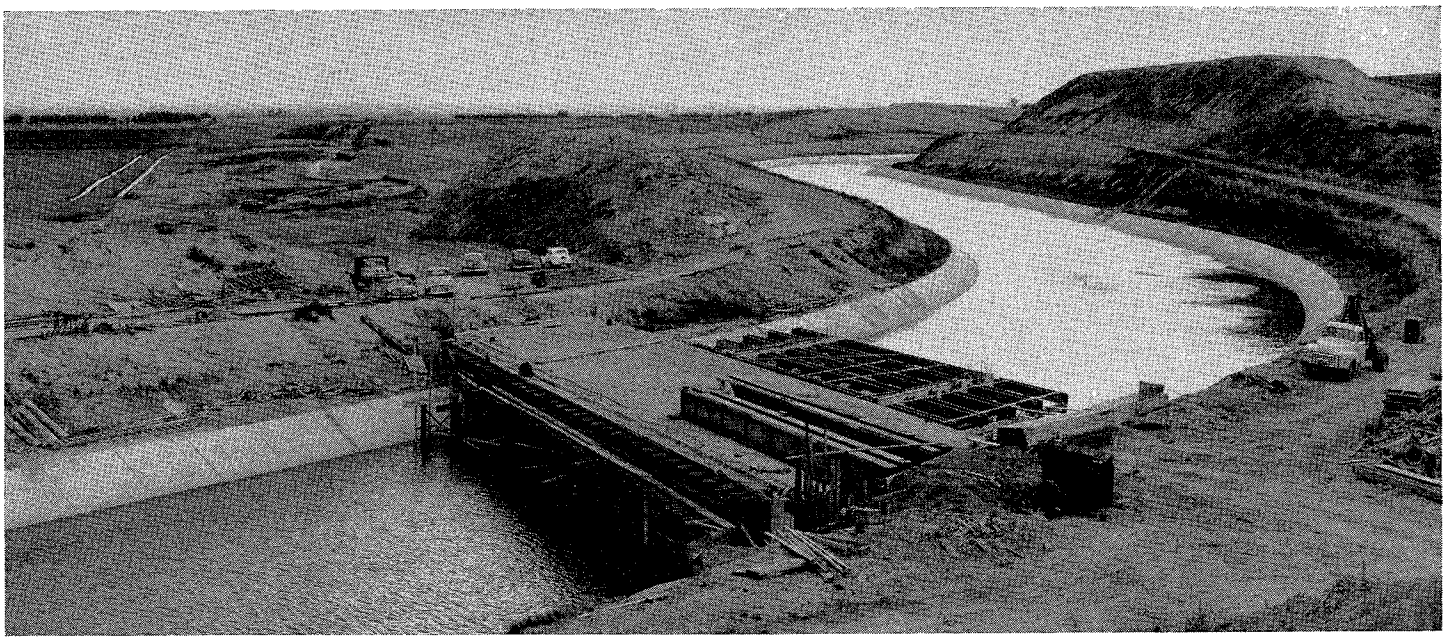
The highway traffic will cross the Delta-Mendota Canal over two reinforced concrete girder bridges, each having three spans for a total length of 156 feet 5 inches and a width of 28 feet between the curbs.

An unusual water condition develops at this location as this canal is used all summer to carry irrigation water back up the San Joaquin Valley, thus making the dry canal season fall during the winter months. The tentative schedule obtained from the U. S. Bureau of Reclamation prior to starting this project was for no pumping operations during the period November 1, 1952, to January 31, 1953, with the exception of short test runs involving one pump. The actual pumping schedule was, no pumping during the period November 26, 1952, to February 13, 1953. There were no test runs during this period. This allowed ample time to cut through the four-inch concrete canal lining, excavate the footings, form and pour the concrete footings and bents without having to work under water. This same four-inch concrete canal lining was utilized as footings for the false work with a maximum allowable load of 25 pounds per square inch.

Construction of these structures was further aided by their accessibility over the existing gravel road along the east canal bank and the timber bridge across the canal near the bridge site.

Delta-Mendota Canal Maintenance Underpass

The original plan for handling Delta-Mendota Canal maintenance traffic was changed by amended contract to construct at a cost of $50,000 a reinforced concrete box underpass 12 feet wide and 14 feet high with graded roadway connections to the



View showing construction of Delta-Mendota Bridge, unit of Tracy Expressway

existing road along the east bank of the canal. This will eliminate any possibility of conflicting traffic and the potential accident hazard.

Irrigation Facilities

As the San Joaquin County portion of this project traverses the Westside Irrigation District a concentrated effort had to be made during the winter season to have all irrigation crossing structures completed prior to the start of the 1953 irrigation season. Due to the lack of rainfall during January and February of this year the irrigation season started February 20, 1953, approximately six weeks earlier than normal.

Earthwork

Some 637,000 cubic yards of the 877,000 cubic yards in the roadway cuts will be utilized to construct the road embankments and will involve 21,700,000 station yards of overhaul. The remaining 240,000 cubic yards of material from the westerly end of the project will be crushed for sub-base and base materials.

The 1.7 miles located in Alameda County and the first one-quarter mile in San Joaquin County are located through rolling foothill country resulting in heavy cut and embankment sections with relatively short haul distances. The soils throughout this area are composed of materials ranging from adobe topsoil and hardpans to sandstone in the deeper cut sections; these variable materials in conjunction with short hauls created quite a compaction problem. The final combination of compacting equipment consisted of a large sheepsfoot tamper towed by a large tractor and a 50-ton four-wheeled pneumatic super compactor also towed behind a large tractor.

The material from the westerly end of the project that is to be crushed is composed of sandstone, conglomerate and semicemented gravel mixture and is to be crushed by a unitized plant consisting of a 32 x 40-inch primary jaw crusher, an 18 x 36-inch intermediate jaw crusher and a 40 x 24-inch secondary roll crusher. It will be necessary to maintain a production of 2,400 tons per day to complete this project within the contract time limit.

Work is now under way preparatory to setting up this crushing equipment and drilling the rock cut for blasting operations. The sandstone formation has broken up in chunks too large for even the oversize crushing equipment. Subsequent changes have resulted in breaking this material down to smaller particles which should better fit the crushing equipment. All conditions considered, this quarrying and crushing operation poses a very interesting problem.

This project is being constructed as a joint venture by McCammon-Wunderlich Company and C. K. Moseman. Moseman is constructing the major structures and the McCammon-Wunderlich Company is performing the balance of the work.

E. L. Craun is the Resident Engineer for the Division of Highways on this project.

RIGHT-OF-WAY ECONOMICS

ASSOCIATION OF WASHINGTON CITIES
Seattle 5, Washington

MR. KENNETH C. ADAMS, *Editor*

DEAR MR. ADAMS: We have come, recently, to find the contents of your publication most valuable to the cities of this State in reference to the economics of right-of-way acquisition.

It is our understanding that this office can be placed on your mailing list and receive this publication regularly. We shall appreciate having our name added to your mailing list.

Sincerely,

FLOYD M. JENNINGS
Planning Consultant

One-way Street

Continued from page 25 . . .

tem. The difference in traffic volume has been taken into consideration in arriving at the percentage decrease in vehicle accidents. Using the same method of adjusting the volume of traffic of the two comparative periods, the statistics show that during the one-way traffic period of this study, pedestrian accidents decreased 22.03 percent.

These figures are noteworthy in view of the fact that vehicle registration, the volume of traffic and the number of vehicle and pedestrian accidents are steadily increasing on all major streets and highways throughout the State.

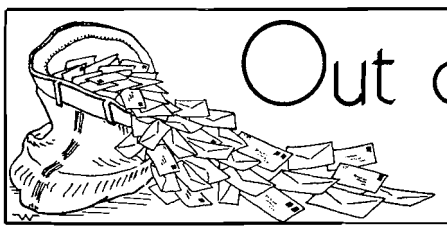
Property Values Firm

An investigation of all recorded property sales on 16th Street from 1948 to 1953 reveals that 24 individual properties sold at least once during those five years and seven of these parcels resold within that period of time. During the two-year period covered by this economic study, 13 of the 24 properties were sold; eight parcels transferred in the first year of the study when traffic on 16th Street was two-way and five parcels sold during the second year when traffic was one-way. The selling price of properties on 16th Street was compared with the sales of property having similar characteristics and located on two-way streets in the immediate area.

The results of this phase of the study definitely show that real property having frontage on 16th Street has followed the same general price trend as comparable property fronting on two-way streets in this section of the city.

Conclusion

One-way streets are increasing in popularity as an effective interim method of relieving traffic congestion on city streets pending the time when the traffic count is such that it justifies complete separation by a freeway or similar type facility. Principle factors contributing to this popularity are: (1) substantial reduction in vehicle and pedestrian accidents; (2) increased traffic-carrying capacity on one-way streets; (3) relatively inexpensive cost of converting streets from two-way to one-way traffic. These factors alone have justified the change to one-way streets.



Out of the Mail Bag

FROM PHILIPPINES

MC LIBRARY, MINDANAO COLLEGES
Davao City, Philippines

Department of Public Works
Division of Highways
California, U. S. A.

SIR: We learned from the Monthly Checklist of State Publications, Volume 43, No. 5, May, 1952, that you furnish on request some of your published materials.

In this connection we would like to request that we be supplied a copy of your *California Highways and Public Works*, Volume 31, No. 1-2. This material will be of great help to our students particularly in their studies and their research work.

Whatever help or favor you may extend to us will be highly appreciated.

Very respectfully,

SOTERO L. PALABYAB
Librarian

THANKS FOR COMPLIMENT

California Highways and Public Works
Sacramento, California

GENTLEMEN: I have received your valued publication for a number of years and enjoy every bit of the information regarding our highway system. I would not want to miss a single issue, and desire at this time to compliment your staff on a splendid job. Please change my address on your mailing list as shown below.

Yours very truly,

ARTHUR H. ZIEGLER
Sacramento, California

One of the remaining obstacles to the general acceptance of one-way street principle has been the belief of local businessmen that the conversion to this principle was detrimental to their business. This study has produced sufficient facts so that we feel it should remove this last major objection to their general acceptance.

ENGINEER WANTS MAGAZINE

Berkeley 4, California

California Highways and Public Works
Sacramento, California

GENTLEMEN: From time to time when I have been lucky enough to obtain a copy of your *California Highways and Public Works* magazine, a wealth of information has been obtained regarding proposed, current and completed construction projects. As a taxpayer and a motorist, whose appreciation of improved roadways is always felt, it is of importance to know firsthand of the facts governing the future highway projects. To be well informed on these matters makes not only for general interest, but is a vital necessity since the work on this phase of transportation will affect us all in the future.

I would appreciate being placed on your mailing list for this fine publication. My connection is with the Pacific Gas and Electric Company in San Francisco as an electrical engineer.

Very truly yours,

ERIK A. JACOBSON

MAGAZINE INFORMATIVE

CARL A. SCHULTZ
Licensed Real Estate Broker
Los Angeles

California Highways and Public Works
Sacramento, California

GENTLEMEN: We have for several years been recipients of the magazine, *California Highways and Public Works* and not only enjoy its contents but consider that it is most informative and part of our general education as citizens of the State of California.

CARL A. SHULTZ

Antioch Bridge

Repairs on Old Span Have Removed Traffic Hazards

By O. M. UHL, Associate Bridge Engineer

THE REINFORCED concrete trestle forming the north approach to the San Joaquin River Bridge on State Sign Route 24 was repaired under contract during the latter part of 1952. These repairs were necessary to make the trestle safe for all combinations of legal loads until construction of a new approach on an improved alignment is completed. The proposed approach structure is currently budgeted for construction to begin in 1953.

The San Joaquin River Bridge near Antioch was constructed by the American Toll Bridge Company in 1926. It was operated as a toll bridge until September, 1940, when it was purchased by the State and made toll free.

Sharp Horizontal Curve

The north approach trestle consists of a series of reinforced concrete girder spans supported on fur-column tower bents, with open expansion joints in the deck over each tower bent. The bents are founded on timber piles. The sharp horizontal curve, irregular profile and lateral shifting owing to settlement of this trestle have been the subject of increasing concern to the Division of Highways during recent years.

The end bent of the trestle is near the location of the old loading slip of the ferry which operated on the river prior to 1926. The horizontal curve in the trestle was designed to align it with the levee road which ran to the ferry slip. Consequently, the trestle parallels the river levee over a considerable portion of its length. The levee is approximately 18 feet above the plane of the island at this location, and this overburden on the underlying soft material is believed to have contributed largely to the lateral shifting of the trestle. Accompanying photos show the trestle looking west long the levee road. The improvement in both vertical and horizontal alignment brought about by this repair work are readily visible.

Periodic Surveys

Periodic surveys of the trestle have been made since 1940. The survey of March, 1952, indicated pile settlement of as much as 2.4 feet at the northerly end bent. Settlements of one foot or more have occurred at the columns of several other bents in the northerly spans. Lateral shifting of as much as one foot, and longitudinal displacements of six inches at three of the deck expansion joints have also occurred.

A major repair contract was awarded in October, 1952, to strengthen the structure, repair critical deterioration, and relieve critical stresses induced by unequal settlement in six spans adjacent to the northerly end bent. The contract involved the construction of supplemental bents and timber cribs at six contiguous bents at the north end of the trestle, jacking of six end spans to an improved profile, and strengthening of columns weakened by deterioration and racking.

Structural steel beams and H-pile sections were furnished to the contractor by the State.

Tower Bents Installed

Tower bents consisting of six timber posts and double steel caps were installed at two existing tower bents. Timber cribs were constructed at five additional bents. With one exception, the cribs and supplemental bents are founded on reinforced concrete pedestals. A lens of saturated peat was encountered at one of the north pedestals on the lower side of the levee. A layer of sand backfill was placed on the exposed peat, and a timber mat, 10 feet x 12 feet in plan, was placed thereon. This revision produced a stable footing which did not settle when the load of the superstructure was transferred to it.

The purpose of the double steel caps was to provide jacking facilities and the installation of steel chairs after the existing columns had been severed and the bridge deck raised. Accompanying photos show the supplemental bents. Cribs were constructed where the height of the structure was not sufficient to provide adequate bracing for bents.

Hydraulic Jacks

The contract plans specified the use of hydraulic jacks. A total of four 100-ton jacks and eight 60-ton jacks were furnished by the contractor. The jacks were pretested, prior to jacking operations. Following are properties of the jacks:

Capacity	Diameter of ram, inches	Maximum rise, inches	Over-all height, inches
60 tons	5	8	15
100 tons	6½	12	20

The contractor also furnished four pressure gages which were used continuously during preloading and jacking operations to measure loads on the jacks. Fluid pressure used to raise the rams of the jacks, was provided by a central pump operated by compressed air. A specially reinforced rubber hose designed to withstand a maximum pressure of 6,500 pounds per square inch, was used for pressure lines.

Before the columns were severed, and prior to jacking operations, the supplemental bents and cribs were preloaded to test the bearing capacities of the new pedestals. The entire load of each span was transferred to the new pedestals during this operation. The foundations were adequate since settlements of only approximately one-half inch were observed.

Bridge Deck Raised

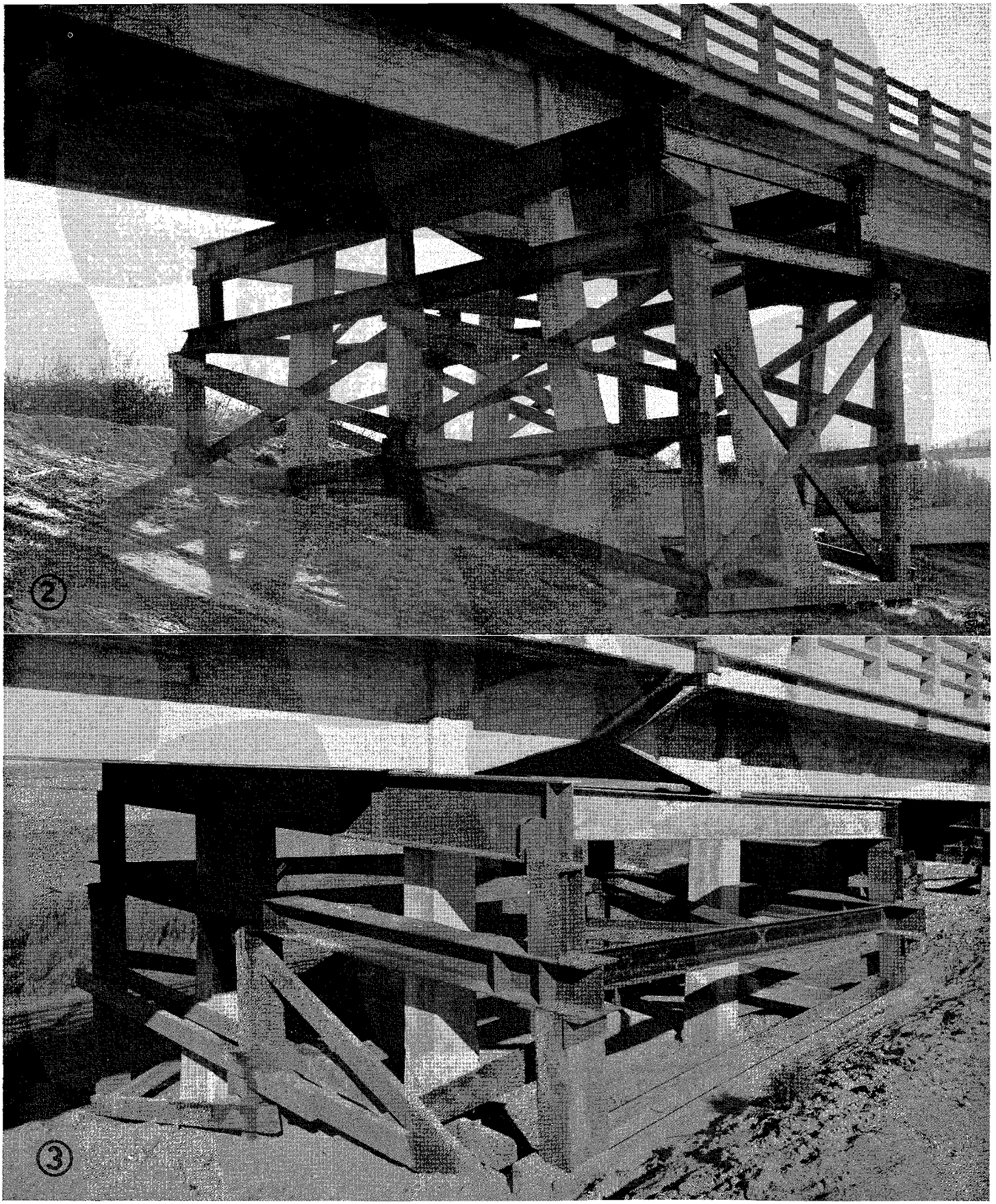
After the supplemental bents had been preloaded, the existing columns were severed adjacent to the existing column struts at the ground line. Next, the bridge deck was raised to an improved profile by means of the hydraulic jacks. The deck was raised a maximum of 10 inches during this operation. After the loads had been transferred from the jacks to temporary timber blocks, the severed

UPPER—Looking west along levee road. General elevation of north approach trestle looking west along top of levee. LOWER—Contra Costa County, Route 11, Antioch Bridge, roadway view looking west.

columns were recast, using 2 percent calcium chloride to hasten set of the cement. Finally, steel chairs fabricated from H-pile sections were inserted and welded in place between the steel caps of the supplemental bents. The steel chairs transfer a portion of the span loads to the supplemental bents and decrease the loads on the existing columns and timber piles. Extra steel wedges were furnished by the contractor for future use in case settlement of the supplemental bents occurs. The wedges can be inserted between the upper steel caps and steel chairs.

Columns Reinforced

A total of 10 existing columns were reinforced with 10-inch steel H-pile sections. These columns had developed critical strains and required strengthening. Some columns had settled only slight amounts and it was not necessary to sever and raise them to obtain stress relief. These are located at various bents south of the six end spans. Double steel wedges were inserted at the bottoms of the steel H-sections and grout pads placed at their tops to bring these supplemental supports into bearing. Steel brackets on the sides of the steel columns were provided for jacking so the steel would take a share of the load. Their use assured full bearing of steel columns at top and bottom.



UPPER—Tower bent 98-99 SW. View of supplemental bent looking toward top of levee. LOWER—View of supplemental bent showing double steel caps and diagonal bracing systems.

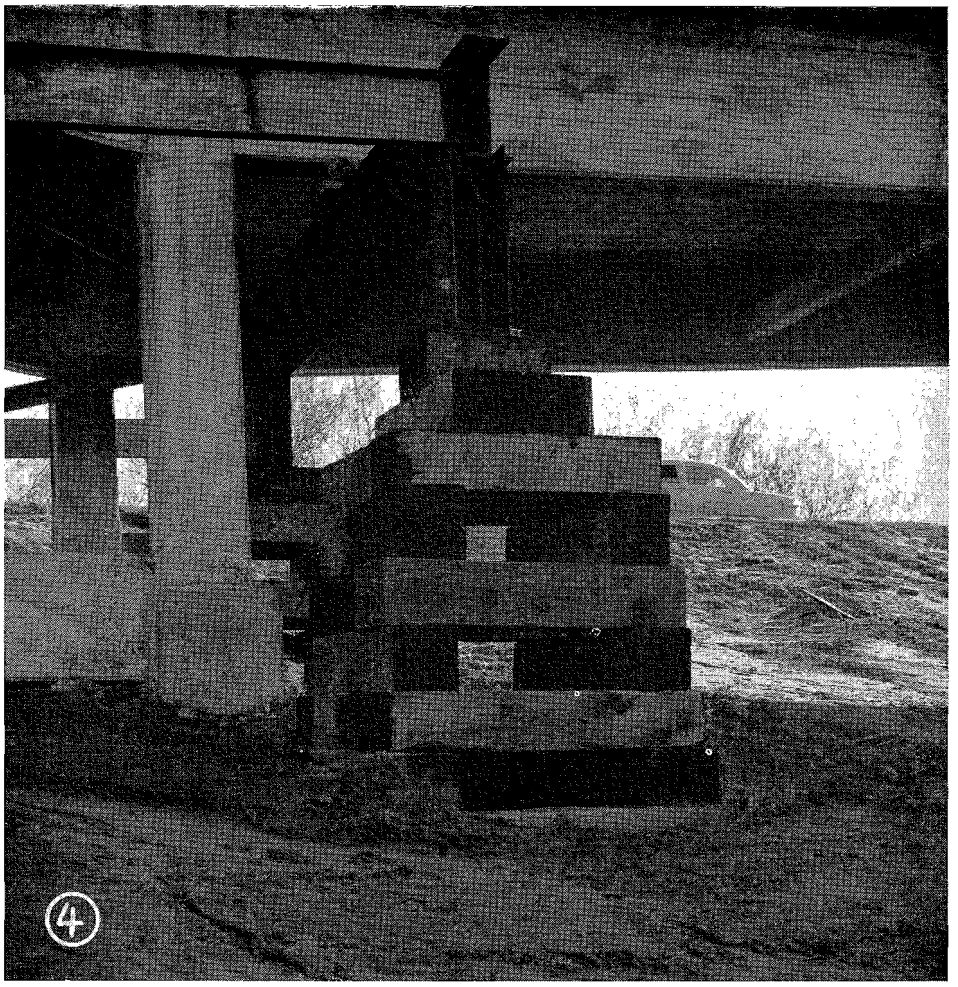
In the past as the structure settled, bituminous surfacing was added to the deck to eliminate offsets at the joints. It was necessary to remove portions of this surfacing during jacking operations to obtain an improved riding deck. Except during the removal of surfacing and jacking operations, the work was accomplished with no traffic delay. One-way traffic was maintained during these periods.

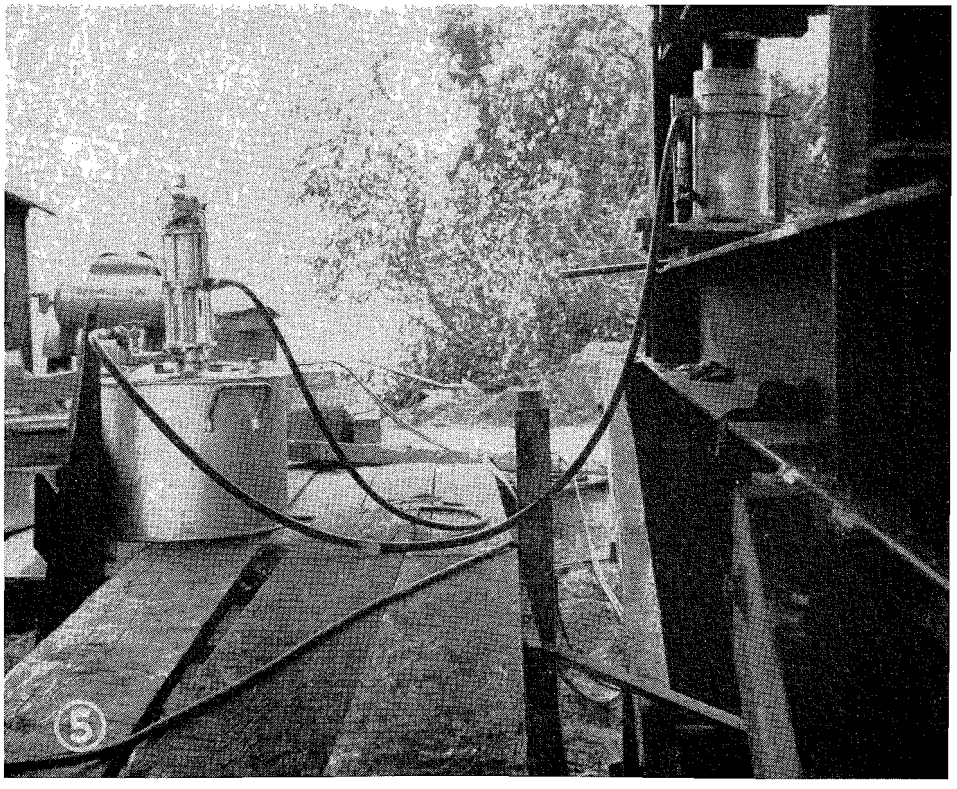
Traffic Hazards Removed

As a result of these repairs, the hazards to traffic as developed by past settlement have been removed. The structure has been given temporary additional supports which should be adequate until the new approach can be built later this year.

The prime contract was awarded to Stanley H. Koller Construction of Crockett, California. Bender and Beale of Richmond, California, held a subcontract for steel erection. Forty-four working days were required to complete the contract.

The design and construction were performed under the direction of F. W. Panhorst, Assistant State Highway Engineer. George W. Smith, of the Bridge Department, designed the structural elements and devised the method of transferring the loads to the supplemental bents. The author was resident engineering during construction.





UPPER—Timber crib for supplemental support of existing column. LOWER—View of hydraulic jack, pump and accessories.

HIGHWAY HYPNOSIS

Purposely vary your speed, not every minute or two, but perhaps every quarter of an hour to avoid falling victim to a driving experience known as "highway hypnosis." This insidious condition, warns the California State Automobile Association, can overcome the driver traveling a steady speed over straight road for a long time and accounts for many rear-end collisions on today's highways.

Storm Damage

Loss on State Highways in Northern Counties $1,500,000

By E. L. MILLER, Supervising Highway Engineer

DAMAGE to state highways in the north coastal counties of California, estimated at about $1,500,000, occurred as the result of a Pacific storm of severe intensity during the week-end of January 16th to 18th, inclusive, which extended from the Van Duzen River, south of Eureka, to the Oregon state line.

The impact of the storm severed state highway facilities in numerous places and disrupted normal traffic for a week or more. The damage resulting from the heavy rainfall and high river and stream stages affected in some measure the entire populace of coastal region north of Eureka. Flooding of the towns of Orick and Klamath, as well as the extensive damage to the entire transportation systems in northern Humboldt and Del Norte Counties, led to the declaration by Governor Warren of a state of emergency within the area.

Heavy Rainfall

In severity this storm was comparable to the storms of 1927, 1937, and 1950, which also resulted in heavy damage in the north coastal regions. In several locations the high-water stages and attending damage exceeded that of these previous storms. Some idea of the intensity of rainfall may be obtained from the following tabulated rainfall for the storm period.

Rainfall for Storm of January, 1953
By Inches

	Date			Total rainfall for storm
	16th	17th	18th	
Cresent City	2.00	6.68	4.74	13.42
Orleans	1.22	4.20	3.57	8.99
Prairie Creek	2.00	4.88	5.19	12.07
Redwood Creek	1.71	6.20	7.00	14.91
Eureka	0.92	3.70	1.84	6.46
Scotia	0.00	0.94	3.21	4.15

An examination of these data reveals that the highest recorded 24-hour intensity of seven inches was recorded at Redwood Creek which also recorded the highest total of 14.91 inches for the storm and that the area north of Eureka experienced the heavier rainfall, all stations recording nine inches of rainfall or over for the week end.

This storm followed in the wake of several weeks of intermittent light to heavy rainfall which had thoroughly soaked the countryside and kept the rivers and streams at a moderate stage. The resulting runoff swelled all streams north of Eureka to flood proportions. At Orick, high water in Redwood Creek exceeded by 10 inches all other high waters recorded at that location and flooded the town of Orick to depths of from two to four feet, causing extensive property damage as well as damage to highways and bridges.

Flood Stage on Mad River

Flood stage of Mad River measured at the bridge north of Arcata was the highest since the structure was built in 1929 and resulted in flooding of the lowlands and damage to several small highway bridges and approaches.

High water in the Klamath River was the highest in 18 years and, although records are incomplete, it is the general opinion that the flood stage was equal to or even exceeded that of the 1927 storm. The town of Klamath was flooded to a depth of from three to four feet, the first time since 1927, and a number of dwellings at Klamath Glen were destroyed by high water.

Smith River reached a flood stage of within 1.5 feet of the 1950 level, but, fortunately, the resulting highway damage, though severe at several locations, did not reach the proportions of the 1950 storm.

Debris Causes Damage

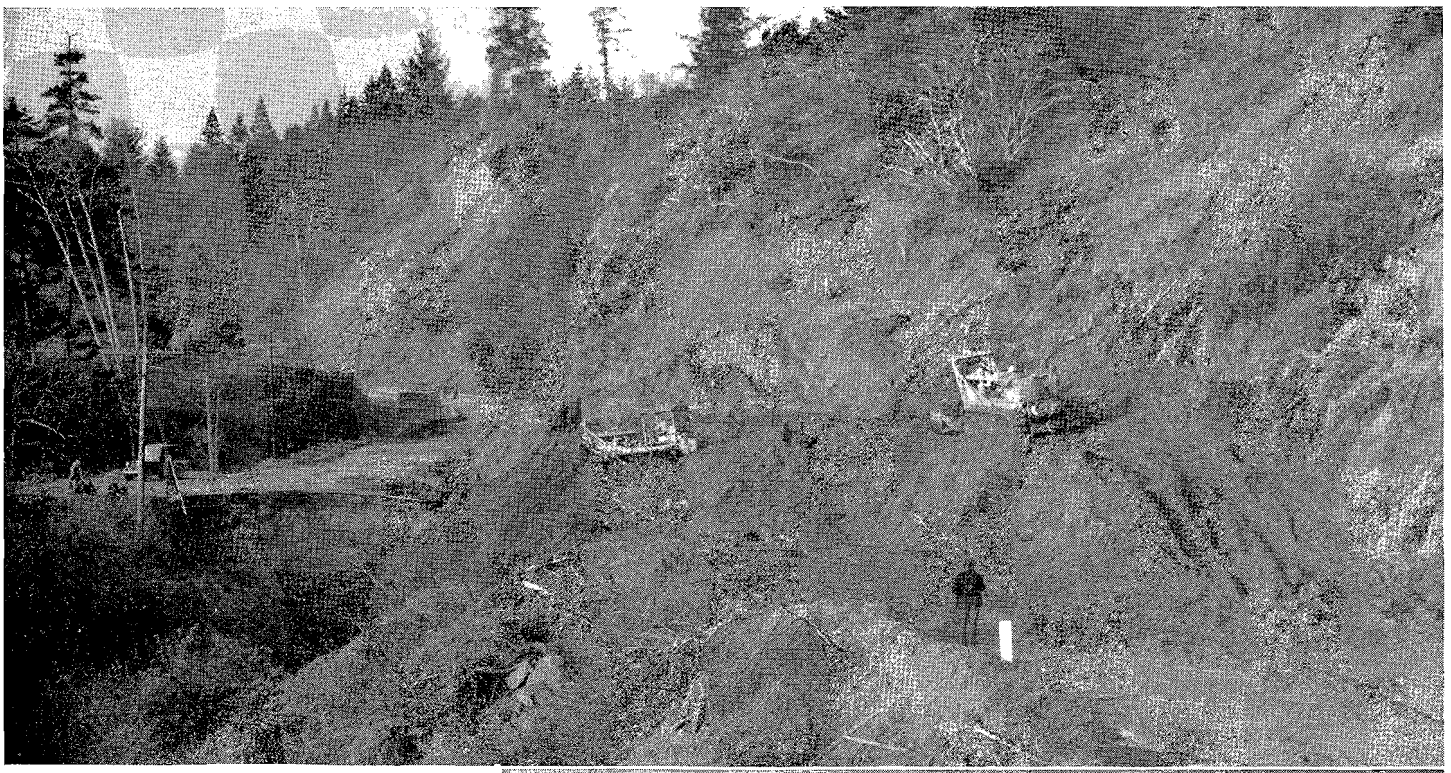
High water alone was not accountable for all the damage suffered by the highways in this area. An extreme debris condition existed at the time of the storm as a result of slashings left by logging operations. The debris-laden streams plugged numerous drainage structures, resulting in the loss or partial loss of roadway and damage to structures at many locations. During the height of the storm, efforts of the maintenance crews were primarily directed toward removing debris to preserve drainage.

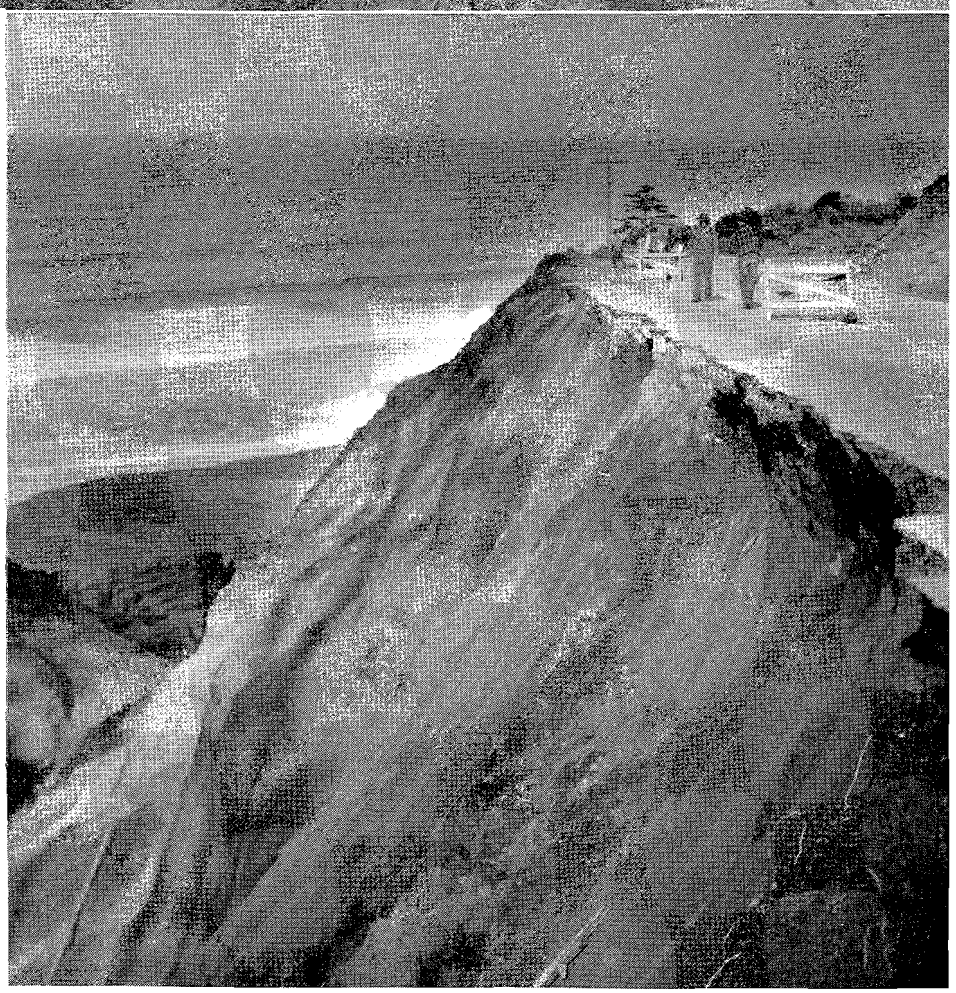
The Redwood Highway between Eureka and Crescent City was closed for several days due to flooding and washouts. Emergency repairs made by maintenance forces with state-owned and rented equipment permitted opening the road to light traffic on January 23d, and to all traffic the following day. Slipouts, washouts, slides, and bank erosion were prevalent throughout the section.

Serious Washout

The most serious washout occurred about 20 miles north of Eureka where plugged drainage resulted in the complete loss of a large sidehill embankment. To complicate emergency repairs, a slide occurred at the same location where state forces and rented bulldozers had to cut into the hillside to construct a detour around the washout. A similar washout near the Humboldt-Del Norte County line closed the road to all traffic until a temporary detour could be constructed. From Crescent City to the Oregon state line the damage was confined to several locations where high water scoured the banks and partially destroyed existing bank protection. The damage, though severe, did not cause any serious delay to traffic.

The Roosevelt Highway from Crescent City to the Oregon state line was closed due to a partially destroyed bridge at Jordan Creek, about four miles north of Crescent City and a washed out bridge at Gilbert Creek, about one mile south of the Oregon state line. Emergency repairs were made at Jordan Creek, and state forces, cooperating with Del Norte County, repaired and improved a county road detour around Gilbert Creek, permitting travel to resume on January 23d.



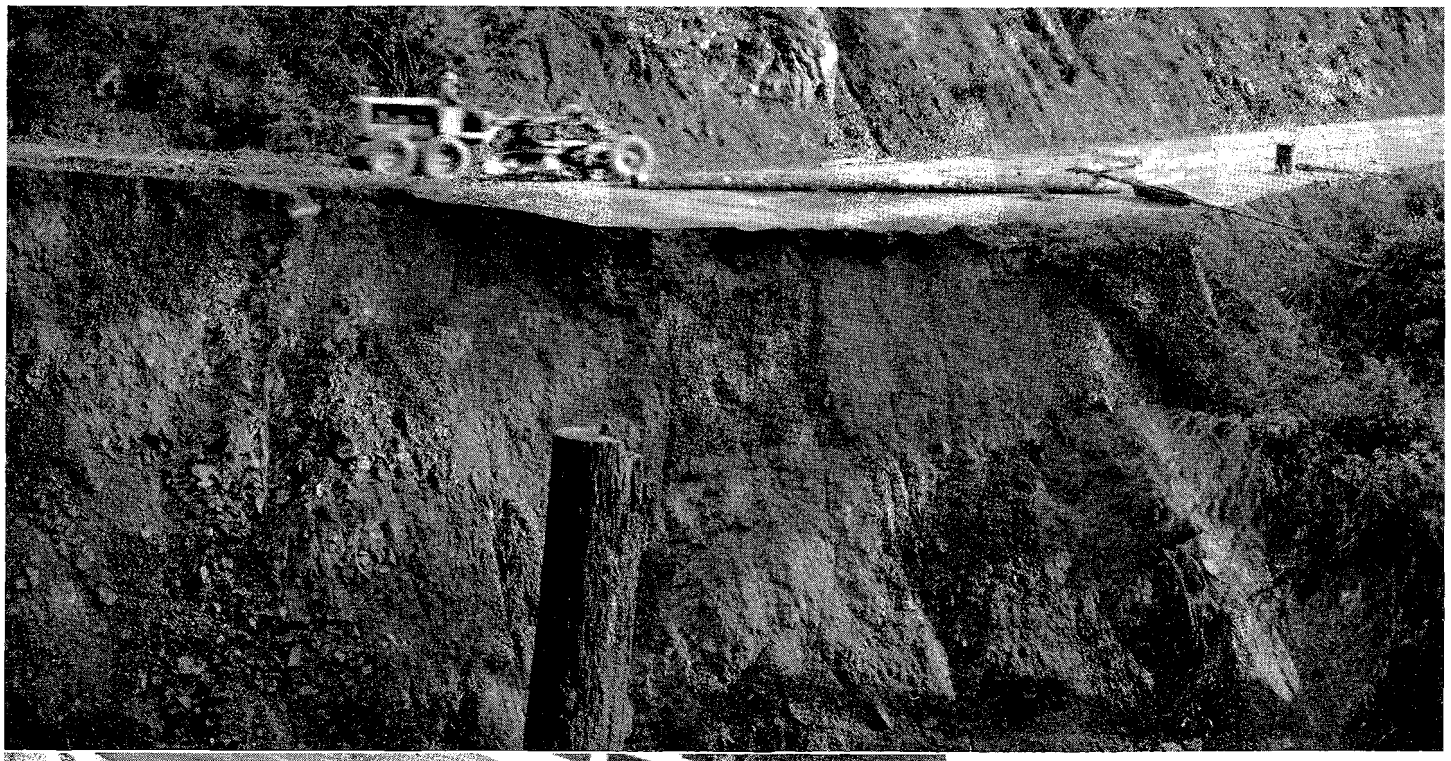


UPPER — Temporary detour under construction around washed out embankment 20 miles north of Eureka on Redwood Highway. LOWER—Washed out roadway on Redwood Highway seven miles north of Trinidad.

Both of the above bridges will have to be replaced with new structures.

Arcata-Redding Lateral

Damage to the Arcata-Redding lateral, U. S. Route 299, consisted of numerous slides and slipouts of varying size, plugged drainage structures, washed out embankments, and a washout of the west approach and damage to the abutment of the Weaver Creek bridge near Weaverville. The most serious damage occurred about five miles east of Blue Lake where a 15,000 cubic yard embankment was completely destroyed when a culvert became plugged. Fortunately, it was possible to detour traffic around the washout on a remaining portion of the old road after making some repairs. Two other sections of roadway near Willow Creek were completely destroyed due to plugging of drainage structures by debris-laden streams. Several days were required before traffic was able to proceed as far as Willow Creek and the route was opened throughout on January 26th.



Fifteen hundred cubic yards of embankment washed out five miles east of Blue Lake on Arcata to Redding lateral, U. S. 299

Washed out bridge at Gilbert Creek two miles south of Oregon state line on Roosevelt Highway

Klamath River Lateral

The Klamath River lateral was damaged even more severely. A large slide and several slipouts closed the road between Klamath and Klamath Glen. Between Martins Ferry and U. S. Route 99 plugged drainage and heavy runoff resulted in many washed out embankments, slides, and slipouts. The most serious slipout some 400 feet in length occurred at Ulathorne Creek near Orleans. Several days were required before it was possible to open this section to emergency traffic.

Two major structures received serious damage, and a number of smaller bridges were damaged to some degree. The westerly pier of the steel span at Bluff Creek was undermined and settled about two feet as well as being displaced horizontally. One abutment and span of the Seiad Creek bridge was destroyed. Temporary repairs have now been made so that travel has been resumed.

State Sign Route 36 between Alton and Bridgeville also was damaged though not as extensively as the northerly laterals.

. . . Continued on page 59

West Sacramento Freeway *Will Be Completed Late In Fall of This Year*

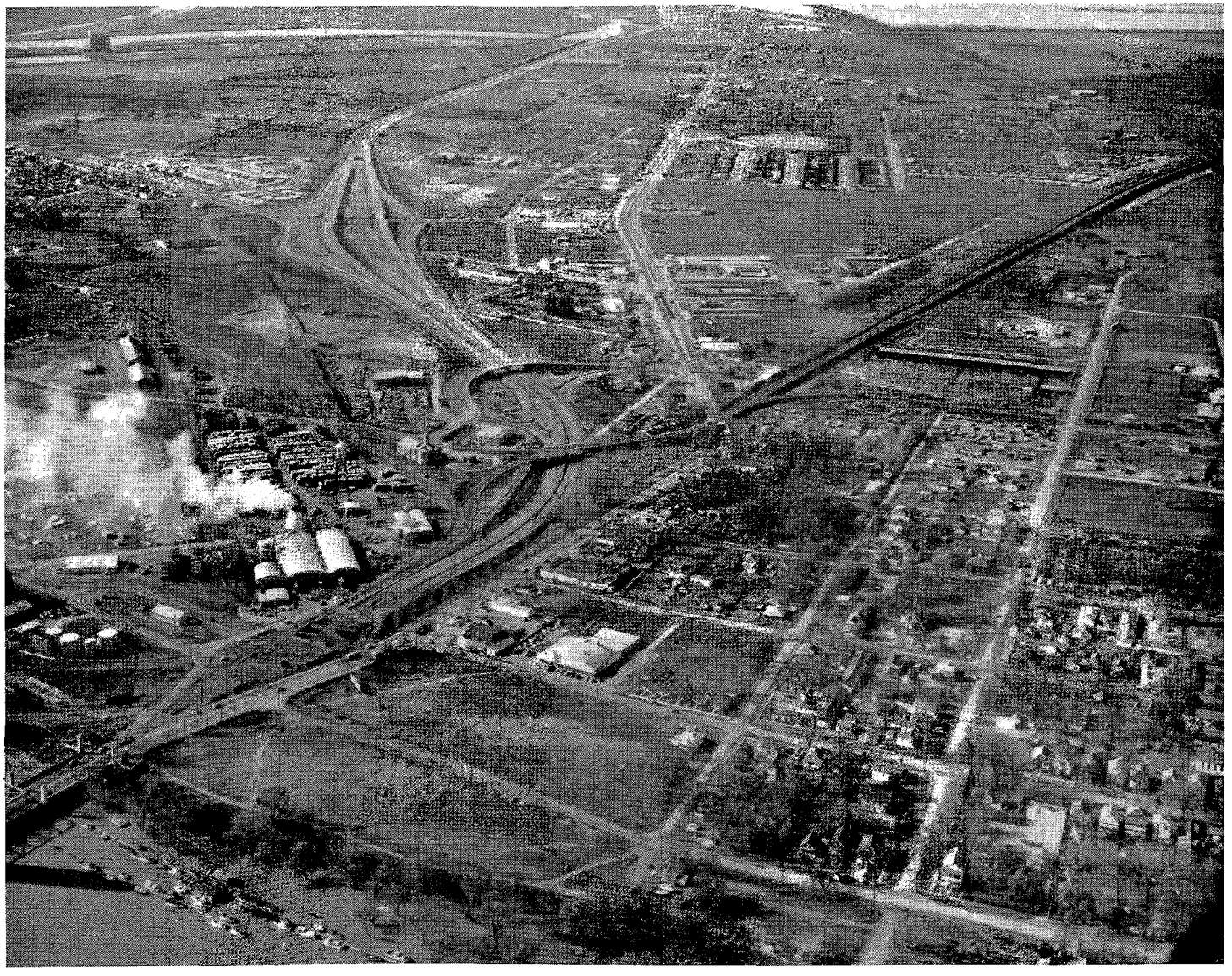
By R. E. STICKEL, District Office Engineer

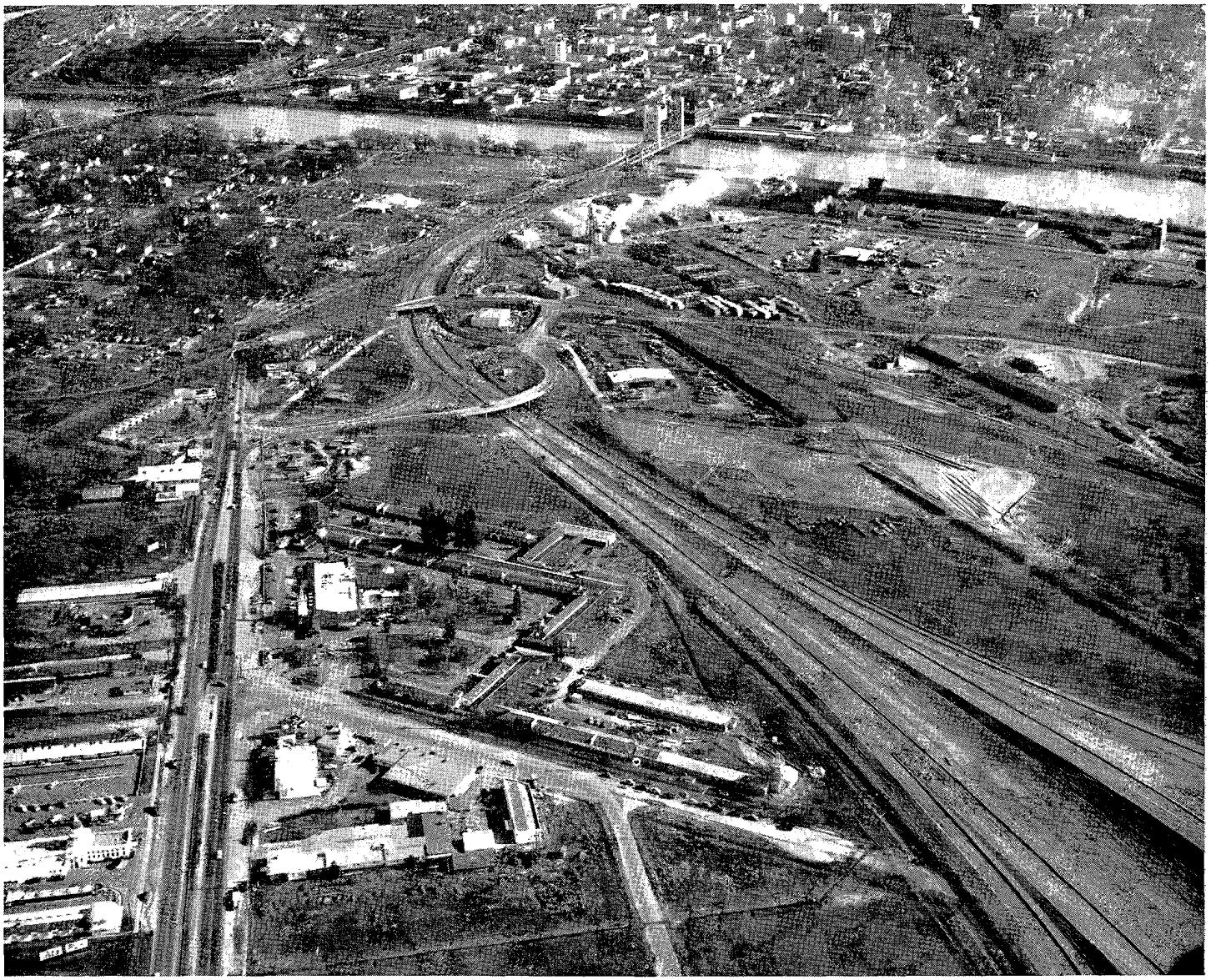
In another year an important link in an ultimate freeway between the Bay area and California's capital city will be completed. This link, comprising the so-called "West Sacramento Freeway," in Yolo County extends from the Yolo Causeway to the Tower Bridge across the Sacramento River, a distance of approximately four miles.

Deficiencies in the present route, U. S. 40, became apparent nearly a decade ago, when insufficient traffic lanes and lack of control of access began to restrict the orderly flow of traffic. It was realized that normal increases in traffic volume and expanded ribbon commercial development would accentuate the deficiencies.

The frontage between the Yolo Causeway and the Tower Bridge was more than 50 percent commercial, including motor courts, large truck filling stations, an open air theater, markets, and several industrial establishments. The area behind the frontage was subdivided for the most part and had begun to support considerable urban development. Widening of the Washington Underpass, near the Tower Bridge, and improving approaches thereto presented an im-

From top to bottom structures on freeway are as follows: West Acres-Boulevard Undercrossing, Routes 6-99 separation structures, Davis Highway Ramp Overcrossing, West Sacramento Underpass, State Box and Third Street Undercrossing and west end of Tower Bridge. The Washington Underpass is shown on the old Davis Highway opposite the West Sacramento Underpass.





From top to bottom structures are as follows: Tower Bridge, West Sacramento Underpass and Davis Highway Ramp Overcrossing

mediate necessity if sufficient traffic lanes were to be provided.

Entire Relocation

An entire relocation of this section of highway proved advisable. The route adopted by the Highway Commission lies south of the existing suburban development; it traverses agricultural land, except for a moderately developed industrial area adjacent to the Tower Bridge. Right of way costs were minimized on this location.

In design provision was made for a tangent alignment at the Yolo Causeway to provide for future connection to a widened causeway. At the intersection of the freeway with Route 99 provision was made for connection to future highway facilities entering Sacramento south of the Tower Bridge.

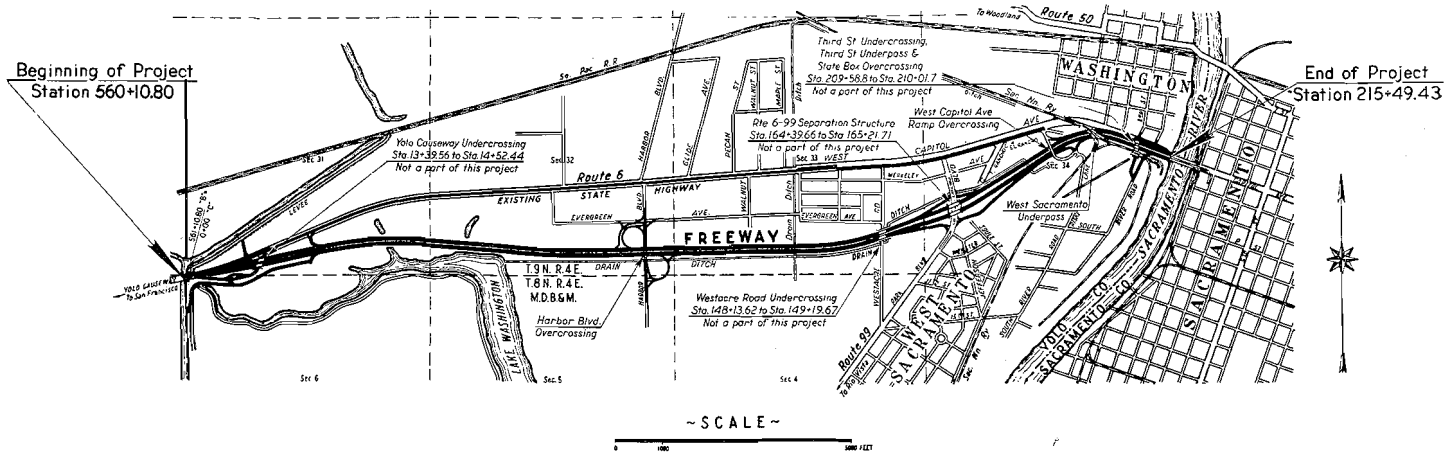
Access is, of course, controlled; and traffic will be permitted to leave and enter the freeway only at the Yolo Causeway, at Harbor Boulevard, at Route 6-99 Interchange, and at the Tower Bridge, where complete interchanges with grade separations will be provided.

This freeway, which will carry average daily traffic in excess of 24,000 vehicles per day, will cost more than $3,400,000. Limited funds, combined with high construction costs, made a program of stage construction mandatory.

Railroad Realigned

Provision for realignment at the Sacramento Northern Railroad occasioned construction of structures designated as the West Sacramento Underpass and the Third Street Underpass near the Tower Bridge. Grading for the railroad roadbed was accomplished under state contract. The placing of ballast and laying of track was accomplished by railroad forces.

A complex structure was required at Third Street, where the freeway,



Net Length of Project 21,185.30 feet - 4.012 miles

From top to bottom structures are as follows: Tower Bridge, West Sacramento Underpass, Davis Highway Ramp Overcrossings and Routes 6-99 separation structures

From top to bottom structures are as follows: Tower Bridge, West Sacramento Underpass and Davis Highway Ramp Overcrossing

the Sacramento Northern Railroad, and an access road to the State Box Company passes over Third Street. The southerly portion of this structure, consisting of the Third Street Underpass and the State Box Overcrossing, was constructed under one contract and the remainder is being constructed under a second contract.

Over 500,000 cubic yards of imported borrow were placed on the major grading contract. A large portion of this was obtained from the proposed deep water channel of the Sacramento-Yolo Port District, about 1¼ miles south of the Yolo Causeway Undercrossing. Provision was made on the

... Continued on page 59

Project Contracts

Description of contract	Contractor	Approx. cost	Acceptance date
Grade and pave on Merkley Ave.	Brighton Sand & Gravel	$10,000	April 4, 1951
Construct two separation structures: Rt. 6-99 separation (EB & WB); grade and pave minor artery at interchange	MacClosky & Harms	249,000	August 30, 1951
Construct two separation structures (EB & WB) Yolo Causeway undercrossing	MacClosky & Harms	97,000	November 14, 1951
Construct two separation structures: Westacre Rd. (EB & WB); grade and pave minor artery	MacClosky & Harms	88,000	January 11, 1952
Grade railroad roadbed	Brighton Sand & Gravel	23,000	April 1, 1952
Construct four separation structures: West Capital Ave. ramp overcrossing, West Sacramento underpass, Third St. underpass, and State Box overcrossing	A. Teichert & Son	401,000	May 20, 1952
Grading Yolo Causeway to 0.8 mile west of Tower Bridge	United Concrete Pipe	621,000	November 14, 1952
Grading 0.8 mile west to 0.1 mile west of Tower Bridge	Ukropina-Polich-Kral	190,000	Underway
Construct structure and grade approaches at Third St. undercrossing	Ukropina-Polich-Kral	77,000	Underway

Traffic Paint

Its Development in California Makes an Interesting Story

By E. D. BOTTS, Senior Chemical Testing Engineer

CALIFORNIA'S traffic paint program—the development and placing of that broken white line which guides you along the highway—is maintained at an annual cost of approximately $700,000. The evolution of that line from city crosswalk delineation through the solid line of the highway to the reflectorized broken line of today is probably familiar to most motorists. The technology and compositional factors associated with the development are not so well known, although many of our highway personnel are aware of California's pioneering in the field. They will remember also the introduction of the "California Formula" which was developed by the late G. H. P. Lichthardt of the Materials and Research Department of the Division of Highways.

California Formula

This "California Formula" was used successfully in California for many years and had widespread use in several other states for a time. It encountered disfavor in the East in later years, partly because of the inconvenience experienced in its manufacture and partly because of its limited durability in those areas. In California, however, it gave good service on asphaltic pavements as recently as 1951. Except for the emergence of national shortages which forced us into other formulations, we would perhaps still be using this formula, though its relatively slow drying properties would render it very annoying under present day traffic volume. The temporary shortages made necessary some make-shift substitutions for the emergency, then a program designed to stabilize and improve our position in this field was begun. Perhaps one should say the program was intensified rather than begun, for experimentation has been in progress continuously since the adoption of the traffic line as a fixed part of the highway program.

Abrasion Apparatus

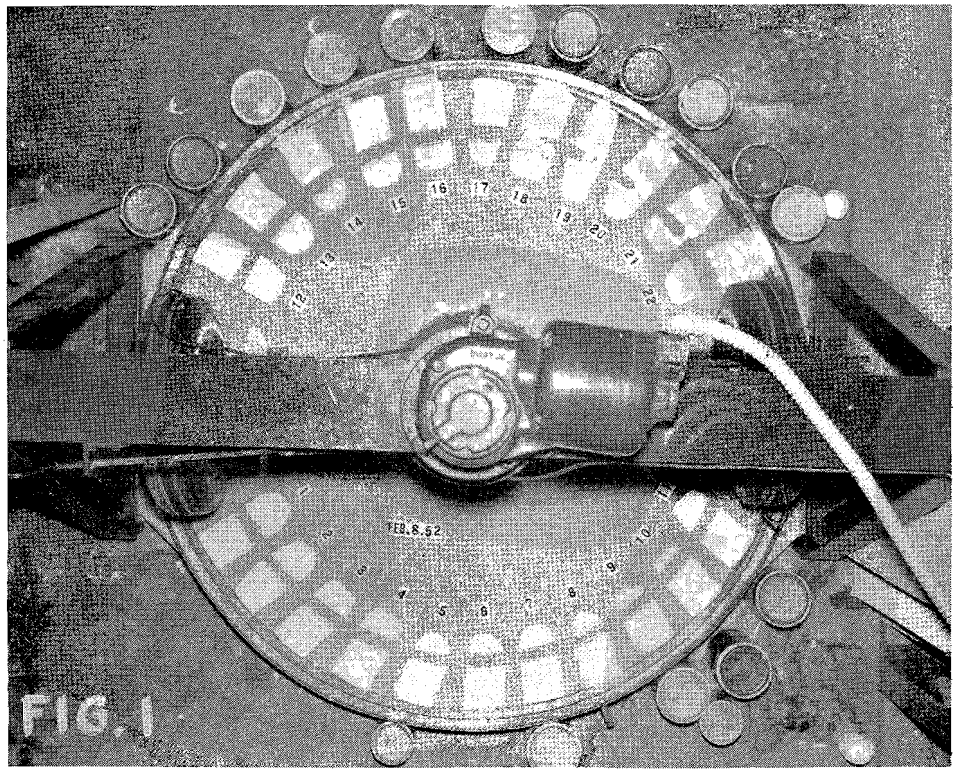
Preliminary experimentation with a large number of formulations on transverse traffic lines led to the selection of a few of them for large scale trial. An abrasion apparatus based on a design developed by the Los Angeles City Bureau of Standards was used as an accessory in some of this work. This apparatus consists of a three-quarter-inch plate glass, four feet in diameter, which acts as a track for anchorage of traffic stripes. The stripes .015 inch thick when wet, are drawn with a doctor blade and allowed to cure for a minimum of 72 hours. Weighted rubber-tired wheels set at a 2-degree bias are then driven over the lines in a dry condition for a definite number of passes. A similar treatment is then applied to the lines under wet conditions.

Figure 1 shows the results of a typical test of this kind on the apparatus in use in the Materials and Research Department. In this instance the apparatus was run until virtually all samples failed. It would be superfluous to identify each of the lines and its composition in an article of this kind.

Results of Tests

It should be pointed out, however, that the correlation of such tests with practical service tests is not as good as was hoped for. The test is exclusively a measure of the resistance of a film to abrasion. The lack of correlation between tests on this apparatus and those on a highway is not due to

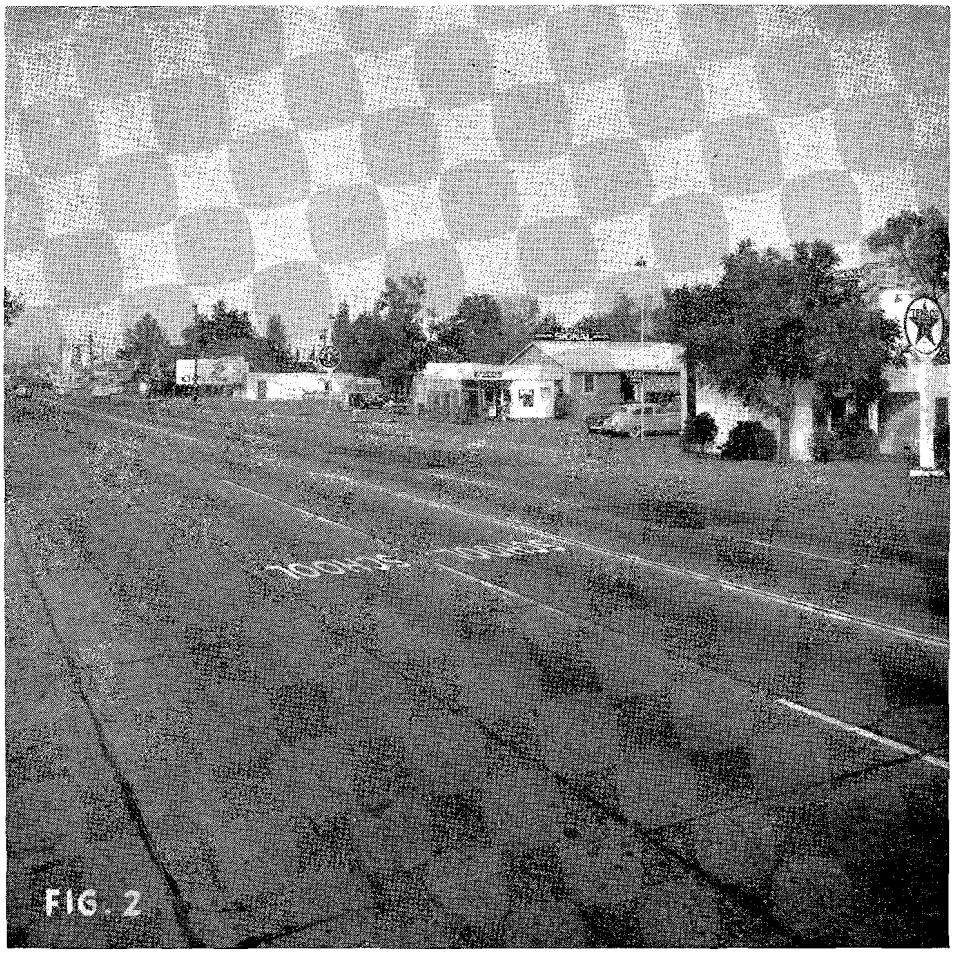
Apparatus used to compare the abrasion resistance of paint films



improper comparative measurement of abrasion but rather to the fact that many other factors are involved in making a satisfactory traffic line. Highway pavements are of concrete or asphaltic mixtures and there is no complete correlation between transverse line performance tests on the highway if the tests are widely separated with respect to location or time of application. Indeed there is no complete correlation of the performance of the traffic lines throughout the State even under comparable traffic conditions. The laboratory tests do give valuable information however, and point the way for establishing large scale tests, which, after all, are the real criteria by which we must be guided, both as to feasibility of manufacture and use.

Bids on Five Types of Paint

Following this premise (that large-scale tests under service conditions provide the best criteria for traffic stripe performance), we issued invitations for bids in 1950 on five differ-



These two photos show California Type II (Alkyd) pavement marking near an intersection after seven months of service. UPPER—Lodi on U. S. 99; LOWER —On Stockton By-pass, U. S. 99.

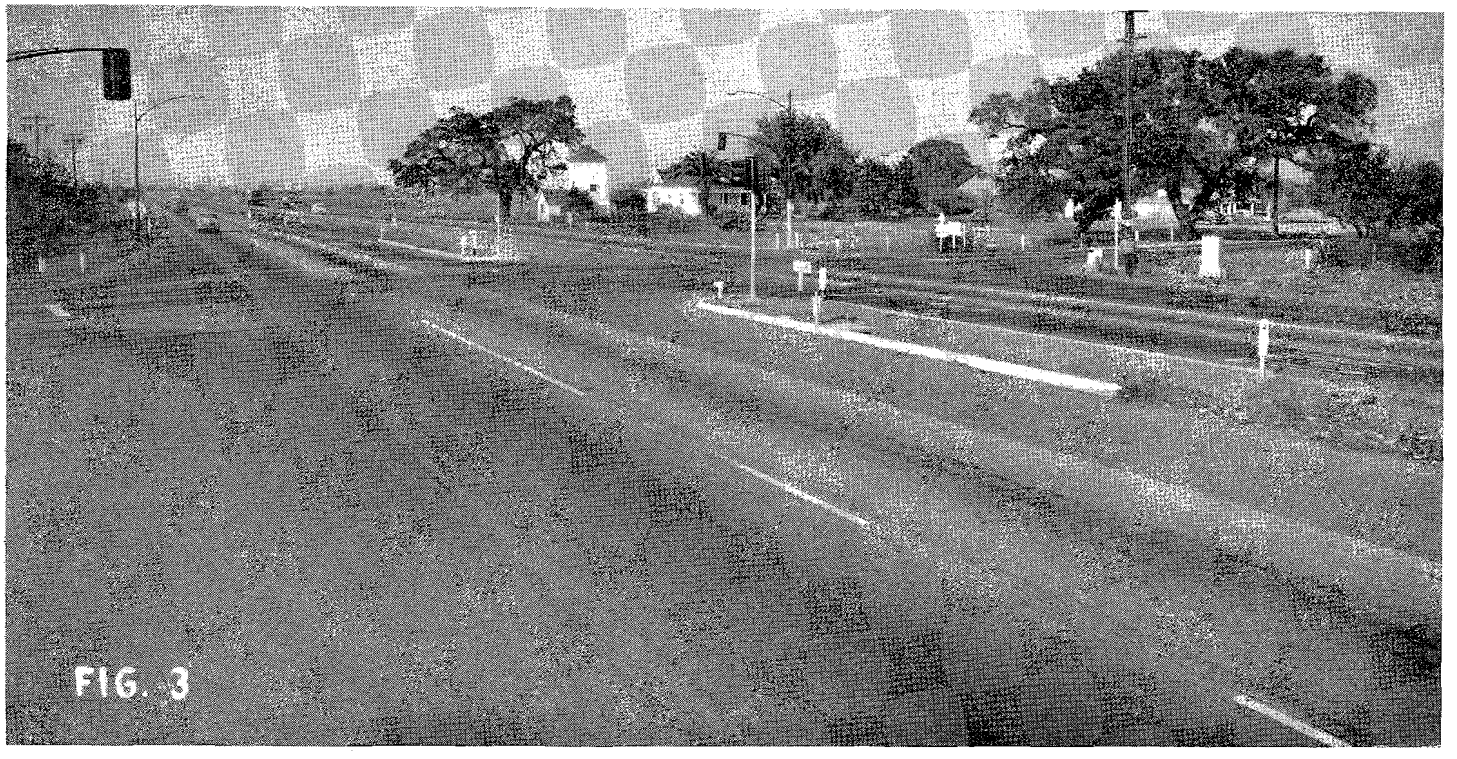



FIG. 4

ent vehicular types of traffic paint. These types were:

I—The D. B. B. Manila resin and chinawood oil—the "California Formula."
II—Alkyd.
III—Dispersion resin.
IV—Chinawood oil—pentalyn varnish—chlorinated rubber.
V—Modified phenolic resin, castor oil, chlorinated rubber.

The pigmentation was left to the discretion of the manufacturer with the proviso that covering capacity should be 200 square feet per gallon as a minimum.

. . . Continued on page 55

UPPER—Single line in foreground is California's Experimental Type III in background. On U. S. 50 section change just east of Folsom. LOWER—California Standard Type IV traffic stripe after eight months' service.

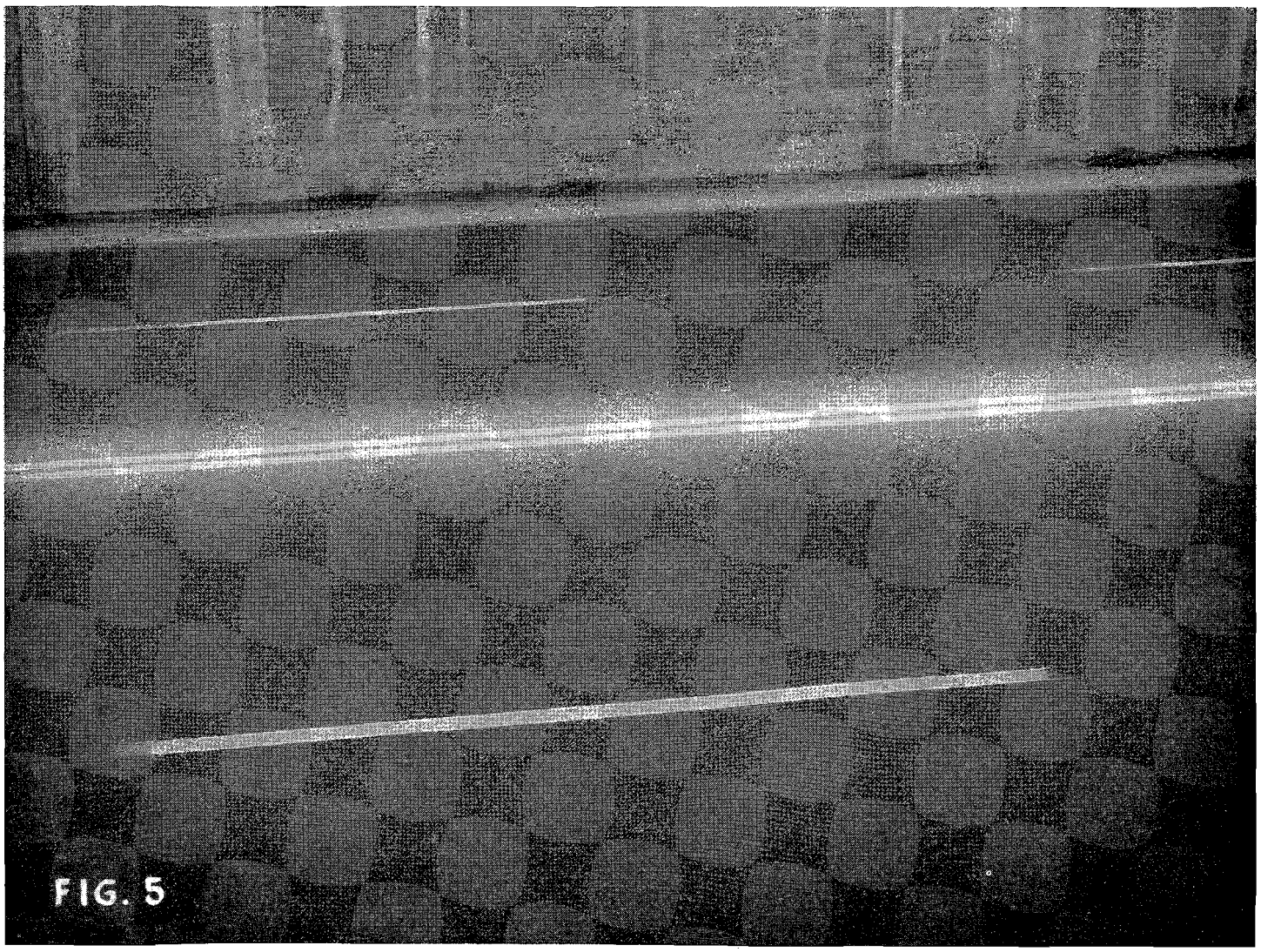


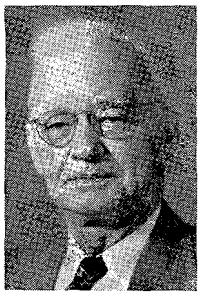
FIG. 5

Retirements *from* Service

WILLIAM J. GOUGH

Widely-known and respected, Wm. J. (Major) Gough of the Equipment Department, Division of Highways, retired February 28, 1953.

Mr. Gough is one of the oldest of the Equipment Department employees, having been with that department since its inception.



WILLIAM J. GOUGH

He was born on February 20, 1883, in historic old Leonardstown, St. Mary's County, Maryland. He attended Baltimore Polytechnic College and Johns Hopkins University receiving his degree in civil engineering in 1903.

For several years he followed his profession with the Louisville and Nashville Railroad and on Mexican, Central American and Chilean railroad construction projects. In 1911 he came west to visit a sister in Los Angeles, and while there he was invited to also visit San Diego. His first trip west convinced him that California, and San Diego in particular, was the place for which he had been searching.

Almost immediately after his arrival there he met and married Margaret Mannix and seriously settled down to the business of making a home. Their two children, William, Jr., and Margaret, were born there.

Served in World War I

During the next few years he was employed as civil engineer by the Babcock interests and the Spreckels Development Co., taking a part in the great expansion that took place in that area prior to the first World War. His remarkable personality won for him many friends and acquaintances among some of the Nation's most prominent

... Continued on page 45

WILLIS F. JONES

WILLIS F. ("BILL") JONES retired from state service on March 1st after 25 years with the State Division of Highways as an Assistant Highway Engineer. Outside of a six-months' temporary assignment to District XI in San Diego, on military defense roads, his entire service was spent in District VIII in San Bernardino.

WILLIS F. JONES

Bill was educated in the public schools of Spokane, Washington. He started on his varied engineering career of 40 years in 1910 in British Columbia, as a chairman on a railroad location party for the Kettle Valley Railroad (a subsidiary of the Canadian Pacific Railroad), between Midway, B. C., and Hope, B. C. He was topographer on one of six parties for the Canadian Pacific Railroad on double-track location between Vancouver, B. C., and Calgary, Alberta; instrument man and resident engineer for the latter railroad on double-track construction out of Vancouver, B. C.; resident engineer on railroad construction for the Pacific Great Eastern Railroad between Squamish and Prince George, B. C., and assistant resident engineer on maintenance for the C. P. R. at Revelstoke, B. C.

In 1916, Bill returned to the United States as a resident engineer on an I. C. C. valuation survey for the Northern Pacific Railroad between Tacoma, Washington, and St. Paul, Minnesota. Then he engineered on power line location and construction for the Montana Power Company; was county engineer in eastern Washington for four years, and resident engi-

... Continued on page 45

JOSEPH S. LEMOS

Joseph S. Lemos, highway superintendent in charge of the Groveland area in Tuolumne County, retired on February 1, 1953, after 35 years of continuous service with the Division of Highways.

JOSEPH S. LEMOS

Lemos began his career with the State in 1917 at San Jose when he took a job as a truck driver with the California Highway Commission. In 1921, he transferred to the Ione territory as a mechanic.

This was in the days before asphalt surfacing and in order to control the dust, water wagons often were kept in operation day and night. Lemos' job was to keep the trucks in repair. He was also expected to take his turn at driving. During this period in his career he was transferred throughout the district with one order: Keep the equipment moving.

Many of the improvements and labor-saving devices which Lemos installed on the equipment during these and later years have become standard throughout the division.

In July, 1930, he was appointed highway foreman at Ione and in April, 1934, was advanced to superintendent with his headquarters at Crestview in Mono County, a post he held for six years.

In 1940 he was transferred to District X as a roving superintendent and during the next few months was assigned to various territories to take charge of resurfacing and general repair projects.

Lemos was appointed to his post at Groveland in January, 1941.

WILLIAM J. GOUGH

Continued from page 44 . . .

people who, like he himself, had succumbed to the charm of San Diego and its salubrious climate and had remained to make their home there.

World War I interrupted whatever plans he had for the future and in July, 1917, he entered the service of the U. S. Army. He was discharged in March, 1919, with the rank of Lt. Colonel.

Immediately following his discharge, he entered the service of the California Division of Highways as Assistant Highway Engineer, being selected by A. B. Fletcher, then State Highway Engineer, to prepare the foundations for the organization which later became the Equipment Department. He has served that department for 34 years.

Is Legionnaire

He has been an officer of, and was instrumental in the formation of one of the oldest American Legion posts in the West: Post No. 61, Sacramento. He is also a member of the American Society of Civil Engineers.

The "Major" as he is known by his fellow workers has, through the years, made an increasingly greater number of friends.

The Equipment Department is proud of Major Gough. He has not only won the profound respect of the men and women with whom he has worked so long, but their enduring and sincere affection. They wish him and Mrs. Gough many long and happy years of retirement.

WILLIS F. JONES

Continued from page 44 . . .

neer for the State of Idaho on highway location and construction for four years at Lewiston and Coeur D'Alene.

He came to California in 1925. After a year or so in charge of mapping the entire County of Riverside for the county assessor's records, Bill started with the State Division of Highways as a draftsman on February 8, 1928. He has served in various capacities in the division in both field and office.

During the stress of war conditions of the second world war and the rapid expansion of freeways to meet the State's highway needs, Bill was transferred to the District Right of Way Department where he finished his last eight years. As Right of Way Agent for two years, he assisted in right of way appraisals and acquisitions and wound up his service as District Right of Way Engineer, in charge of the engineering phases of right of way work including condemnation, exhibits, excess property, and record maps.

Bill has been active in C. S. E. A., having been the first temporary chairman in the San Bernardino chapter's organization and delegate to the first convention at Sacramento. Later, he was on the State Civil Service Committee and president of San Bernardino Chapter.

During his 25 years as a resident of San Bernardino, he has been active in civic affairs, having served as chapter president of the following organizations: County Horticultural Society, Speakers' Club, and American Association of Engineers, of which he is a senior member. He is also a member of the San Bernardino Mineralogical Society (rock hounds), and the Orange Belt Kennel Club. His hobbies are gardening and landscaping. He plans to enter the real estate business in San Bernardino.

P. RENWICK GREEN

With 40 years of service with the Division of Highways behind him, P. Renwick Green retired on January 31st as chief draftsman, Highway District III, headquarters Marysville.

Born in San Francisco and educated in the public schools of that city, Green in 1909 went to Tucson, Arizona, to work for the Southern Pacific Company. Upon his return to California he worked for the old Oakland-Antioch Railroad for a year and a half and then took a position with the Division of Highways in Willits, Mendocino County. He served there for 11 years, a period broken for one year in 1916 by lack of state appropriation. His next move was to headquarters in Sacramento. When District III office was moved from Sacramento to Marysville in 1933, he went along as chief draftsman and served continuously in that district until his retirement.

Mr. and Mrs. Green plan to travel and to spend considerable time during the summer months at their home near Sierra City.

STUDENTS USE MAGAZINE

UNIVERSITY OF CALIFORNIA
Institute of Transportation and
Traffic Engineering
Headquarters: Berkeley 4, California

March 9, 1953

Mr. Kenneth C. Adams, *Editor*

Dear Mr. Adams: As has been our custom during the past few years, I am submitting a list of names and addresses of students currently enrolled in the highway engineering course who we would like to see placed on the mailing list for *California Highways and Public Works.*

We are anxious to have the students read the magazine and to do all that we can to motivate the students in seeking a job with the Division of Highways after graduation.

Many of the students who have received the magazine have expressed their appreciation for this courtesy and have enjoyed reading the many fine articles in the magazine. I have found that each issue has two or three articles which I can assign for outside reading to supplement the regular course work.

Thanking you for this courtesy, I remain

Sincerely yours,

Ralph A. Moyer
Professor of Civil Engineering and Research Engineer
Institute of Transportation and Traffic Engineering

SOUTHWESTERN ARBORETUM

Southwestern Arboretum, located between Florence Junction and Superior on U. S. 60 in Arizona, is reported by the National Automobile Club to contain 10,000 varieties of plants from every continent.

Gas Tax to Cities

Review of Laws and Rulings Governing These Allocations

By L. V. CAMPBELL, Engineer of City and Cooperative Projects

This is the second installment of an article by Mr. Campbell.

Affecting Utilities

By that principle the construction of sanitary sewers, water mains, or other underground facilities are not permissible if the installation or replacement is being done to take advantage of the construction on the street. In general, any obstruction to the proposed improvement which requires removal or anything which is damaged or destroyed by reason of the new construction, may be removed, replaced, or restored to an equivalent condition to that which existed before construction, and the cost defrayed from gas tax funds. This, of course, does not include the removal of facilities that are in the street by franchise or permit which requires their removal and relocation at the utilities expense upon order of the city. Street railway franchises generally contain such a clause and public funds should not be used to relieve a private corporation of its just and legal obligations. Except as included in the restoration or replacement of existing facilities, gas tax funds may not be used for the construction of sanitary sewers, water supply lines, electrical conduits and other utilities.

Position of Department

The act requires that plans, specifications and estimate shall be approved by the department before the city may advertise for bids or proceed with construction work by day labor. In the review of plans and specifications there is no thought on the part of the department to assume a paternalistic or bureaucratic attitude. We fully recognize that many cities have well-organized engineering departments that are eminently qualified to design and construct pavements, bridges, and other structures. On the other hand, there may be cases perhaps where the department can be of real help. The district engineers and the entire department are ready and willing at all times to confer and discuss matters with cities. Plans and specifications are reviewed without any intention of being critical. Our only endeavor is to be helpful and constructive in any suggestions we may have to offer. The law puts the responsibility for the approval of plans upon the department. This responsibility is taken very seriously.

In the design of bridges and culverts, the department uses the standard specifications for highways, bridges, and incidental structures adopted by the American Association of State Highway Officials with slight modifications. State highway structures are designed for an H-20-S-16 loading except in the case of the most remote and lightest traffic laterals. An H-15 loading is the lightest loading that conforms to maximum legal loads permitted by the California Vehicle Act. In reviewing structural plans the department is guided by those design specifications. We cannot approve plans that in our opinion are structurally deficient or manifestly inadequate for the traffic. Where special conditions exist that would justify a lighter loading, we are willing to take such factors into consideration when making the review. When submitting plans for approval, cities are requested to include certain data including the live load used in the design for our information in making the review.

Safety Lighting

In order to differentiate between safety lighting and general street illumination, the department has adopted a criterion for safety lighting. Major city street funds may be expressed for safety lighting only when one or more of the following criteria are met:

1. That traffic signals are warranted. The warrants for traffic signals are as contained in the Manual on Uniform Traffic Control Devices for Streets and Highways, prepared by a joint committee of the A.A.S.H.O. Institute of Traffic Engineers and National Conference on Street and Highway Safety.
2. That there are five or more accidents a year and 50 percent or more occur under conditions other than daylight.
3. That, with less than five accidents per year at any one location, three or more accidents per year under conditions other than daylight may justify illumination.

When submitting plans and specifications for safety lighting, they should be accompanied by data showing that the proposed installation complies with one or more of the above criteria. The fact that traffic signals may be already in place at the intersection does not of itself satisfy criterion number one. Traffic signals may be installed with major city street funds without submitting data showing justification, and consequently even though the signals have been approved by the department they may not satisfy the warrants required in the Manual of Uniform Traffic Control Devices. It is therefore essential that when the traffic signal warrant is being used as a criterion for the installation of safety lighting, that data be submitted showing that traffic signals are warranted.

Specifications

The same comments apply to the review of specifications as to the review of plans. Many cities have standard specifications which have been approved by the city council as standards for city work. These specifications are used for work financed from the gas tax allocation as well as for other street improvements. Such practice is entirely satisfactory to the department. In such case it is suggested the city submit a copy of its standard specifications for approval by the department as a standard for use on gas tax projects; otherwise it is necessary that a copy of the city standard specifications accompany the special provisions and proposal form for each job. Other cities have not

adopted standard specifications, and in that case it is necessary to compile a complete specification for each job or to incorporate the state standard specifications by reference.

A sample form of special provisions has been prepared which may be used for street improvement or construction work financed from gas tax funds. The sample form incorporates the state standard specifications by reference. Use of the form is not compulsory. It was issued as a service to the cities. It will be noted in many cases in the state standard specifications reference is made to details that are to be included in the specal provisions. In using the state specifications care should be taken that all such items are included in the special provisions that are referred to in the standard specifications. In this connection attention is called to the requirement of including in the specifications the four general state laws applying to public works; namely, the alien labor, eight hours of labor, the prevailing wage, and the domestic materials or Buy American Act. There has been some difference of opinion in regard to the application of these general state laws to charter cities. I do not attempt to advise upon legal matters. I am merely repeating the advice of our attorneys. Furthermore, this matter has had a test in the courts. A decision of the State Supreme Court in the case of *Southern California Roads Company* v. *McGuire et al.*, No. S. F. 15215, P. 89 Cal. Dec. 5, upholds the prevailing wage law as applying to charter cities. Let me stress that the prevailing wage rates must be published in the advertisement.

Preliminary Estimates of Cost

There is not very much to say about preliminary estimates of cost. We are all of us human and are therefore liable to make mistakes. In these times of rapidly changing economic conditions preliminary estimates are quite likely to be wide of the mark. When you consider the large difference in the amount of the bids submitted by different contractors for the same job, I consider the correctness and consistency of the engineers' estimates to be remarkable. Those instances in which the engineer's estimate is materially under the low bid is certainly no reflection upon his ability as an engineer. The code contains a requirement that the written consent of the department must be secured before any contract may be awarded for an amount in excess of the estimates of cost, or to other than the low bidder on the grounds that the low bidder is not responsible, or before the work may be done by day labor. In these days of rapidly increasing prices it is not uncommon that the low bid received for a job is somewhat over the engineer's estimate. The department has a rule that when a city recommends the award of a contract at a price more than 10 percent in excess of the engineer's estimate, it shall be accompanied by a statement from the city engineer analyzing the difference between his estimate and the low bid. This analysis and other data presented will be submitted to the State Highway Engineer for his information in considering the award of the contract at the higher price.

Major City Streets

The code provides for a system of major city streets and that the city streets not included in the major city street system are designated as the city's secondary street system. It also requires the system of major city streets to be selected by the council on the basis of greatest general city importance subject to the approval of the department. Streets may from time to time be included in or excluded from the city system of major city streets subject to the approval in each case of the department.

There seems to be some confusion about the legal limitations on the mileage of major city streets. The mileage of major city streets in any city and county is limited by the act to 50 percent of its total street mileage. It will be recalled that the Collier-Burns Act limits the primary system of county roads to 50 percent of the total maintained mileage of county roads. San Francisco is the only municipality in the State organized as a combined city and county. San Francisco being a combined city and county receives both major city street funds and the county allocation of gas tax funds. There is no legal limitation on the mileage of major city streets in other cities. In one draft of the bill, however, the major city street system was limited to 25 percent of the total mileage of city streets. Due to the varying and multitudinous problems confronted by the different cities varying in size from a few hundred to nearly two million in population, I do not believe that a fixed limitation on major city street mileage would be feasible, neither would an explicit and precise definition of a major city street be practical. The act stipulates that they shall be of general city importance, and I am satisfied that the city councils are sincere in complying with the law in making their selection.

Large System Opposed

There seems to be little point, however, in designating a large system of major city streets and the department is definitely opposed to an excessively large system. Under the original act the gas tax funds could be expended only on the then-called "streets of major importance." This limitation applied to maintenance expenditures as well as construction expenditures. The Collier-Burns Act liberalized this provision and permitted maintenance funds to be expended upon secondary city streets as well as upon major city streets and limited the expenditure to 40 percent of the annual revenue. Incidentally this 40 percent represents the amount derived from one-fourth cent of gas tax revenue, the amount of the total original allocation. Since maintenance funds may be expended upon secondary city streets, there is no need to designate a large major city street system in order to expend the gas tax funds on maintenance of a larger mileage of city streets. Another point to be considered is the relatively small amount of the annual apportionment. With the small amount of money available it will be many years before a city can widen or construct a very extensive mileage of city streets. At such time as the present major city street system approaches improvement to an adequate standard, the department will not only willingly but gladly approve the designation of additional major city streets. With the expenditure of gas tax funds for maintenance being lim-

ited to streets of major importance, there was a definite reason and a decided advantage to having a large system of such streets. As a consequence numerous cities had extensive systems comprising a great majority of the streets within the city. Furthermore there was no definition or no indication in the law of what constituted a major city street, the only requirement being that streets of major importance should be agreed upon between the department and the legislative body of the city. The Collier-Burns Act changed the name from streets of major importance to major city streets and required that the major city streets should be of greatest general city importance. We now have a criterion to go by in the selection of major city streets, that is, they should be of greatest general city importance.

Opinion of Attorneys

At the time the Collier-Burns Act went into effect I discussed this matter of major city streets with our attorneys particularly with respect to the transition from the old streets of major importance to the new major city streets. They considered that a system of major city streets should be adopted by all cities for expenditure of the gas tax allocation due to the change in the law; that for all practical purposes the system of streets of major importance and a system of major city streets are one and the same. In order to avoid the possibility of any legal difficulties, a clause was included in the first project agreement subsequent to the enactment of the Collier-Burns Act for those cities that had not designated a new system of major city streets, declaring that the streets of major importance previously designated under the provisions of Section 195 of the Streets and Highways Code constituted the approved system of major city streets. This procedure resulted in many cities having an excessively large system of major city streets.

At such time as a city wishes to designate additional major city streets it is requested to reconsider the entire major street system with a view of bringing it within reasonable limits and at the same time include the new streets it wishes to designate. The designation of a new major street system immediately poses many problems. A start on the selection of the system could be made by first formulating a tentative contruction program that you wish to construct with gas tax revenue during the next five years. The streets in that program would then be number one priority for your major street system. Such a construction program would not be binding upon the city, it need not even be official, it is merely a tool for the use of the public works officer in ascertaining those streets that are a "must" in the selection of the major street system.

Width of Streets

There is perhaps no single item which creates more difference of opinion among engineers than the matter of street widths.

A large number of variegated street widths today are hand-me-downs from the horse and buggy days. In those days the right-of-way width on a proposed street was often determined by the subdivider; the necessary width for sidewalks and planting areas was then taken on each side, and what was left in the middle was dedicated for the use of vehicles. Thus we find widths between curbs varying from about 18 feet to 100 feet, and covering the whole range of widths in between, on streets originally laid out to carry the same type and volume of traffic. We all know that a large percentage of the odd-width streets can never be economically altered due to development on adjacent property, and in these cases all we can do is struggle along and make the best of what we have. There are many cases, however, where the adjacent development is such that additional right of way can be acquired within a reasonable cost, and the street widened to an adequate dimension as part of a reconstruction program.

In the early days of state highway construction in California the standard width of pavement was 15 feet. The width of a traffic lane increased progressively to 8 feet, then to 9 feet, then 10 feet and 11 feet before 12 feet was adopted as the width of a traffic lane by the State.

Width of Traffic Lane

In the summer of 1933 the United States Bureau of Public Roads undertook a study to determine the proper width for a traffic lane. The method adopted for the study was to trail and take motion pictures of vehicles in the act of passing. Many interesting facts were developed from the study. Overtaking and passing a vehicle going in the same direction is a much more difficult operation and requires a greater width of road than meeting and passing a vehicle going in the opposite direction. It was observed that both passenger cars and trucks apparently tend to center themselves closely on the center line of their own traffic lane and maintain that position when being overtaken and passed. The average lateral clearance allowed by drivers in overtaking and passing another car was five feet. This clearance was taken regardless of the width of pavement. This apparently does not hold true in opposite direction passing as the drivers seemed to be satisfied with less than five feet clearance on the narrower pavement but will take more than five feet on the wider pavement, there being an apparent tendency to swerve slightly to the right irrespective of whether or not the clearance is more or less than five feet.

Design Standards Adopted

While these studies were made on rural highways, their results apply with equal force to urban street conditions. Speeds of from 25 to 35 miles an hour overwhelmingly predominated in the studies. Speeds that high and higher prevail in most urban areas in California except where traffic is extremely congested. As a result of these studies the American Association of State Highway Officials adopted design standards as follows: For a traffic density of over 200 vehicles per hour traffic lanes 12 feet wide; curbs to be at least two feet from the edge of the pavement; the lateral clearance from the right edge of pavement to the face of walls or to abutments or piers at underpasses at least six feet; the lateral clearance between the left edge of the pavement and the base of a center pier or abutment at least 4½ feet.

... To be continued

Welded Steel Superstructure

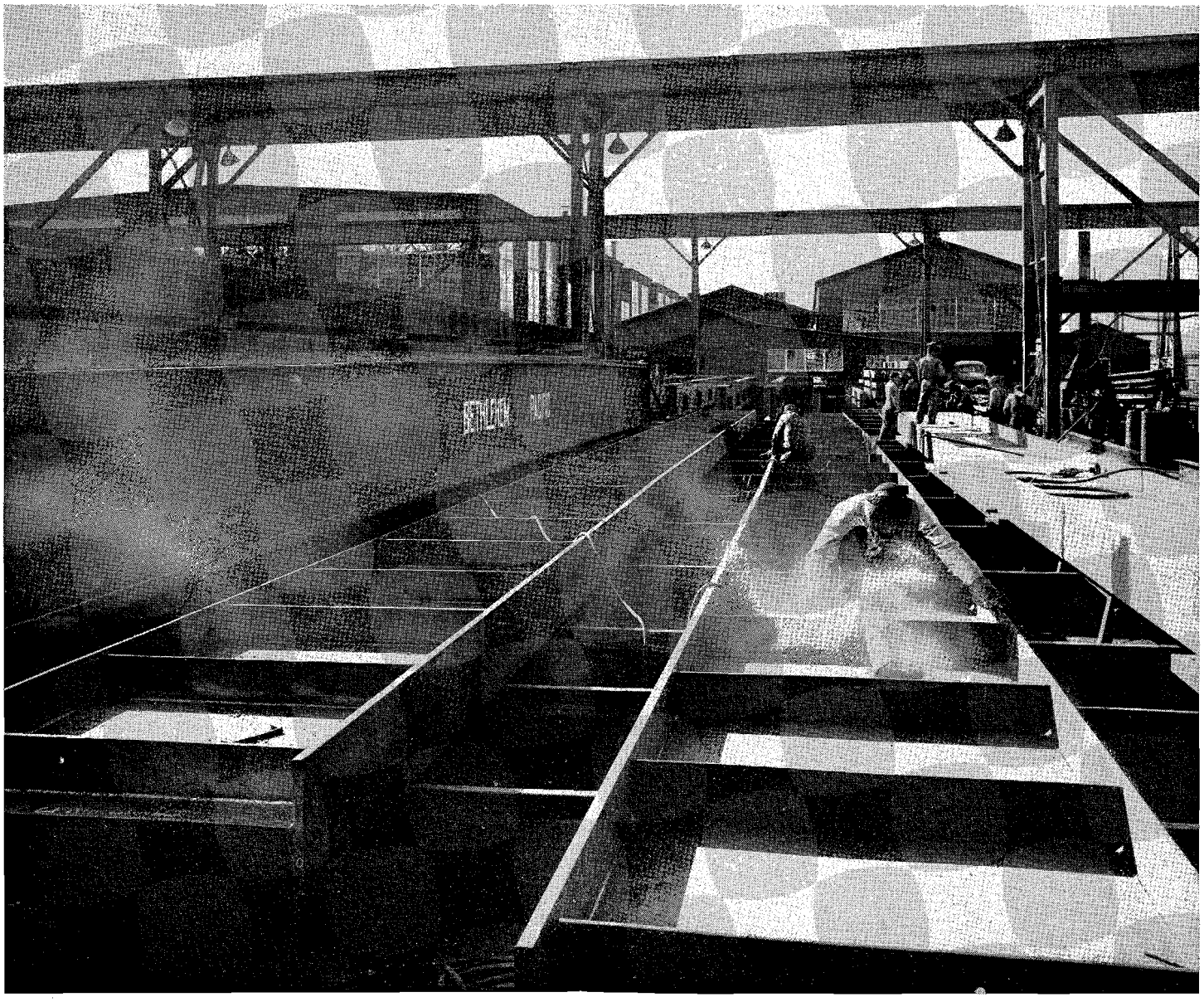
By W. R. McINTYRE,
Associate Bridge Engineer

Construction on Ramona Freeway In Alhambra for Almansor Avenue Overhead

ERECTION of a welded steel superstructure for the Almansor Avenue overhead bridge on Ramona Freeway, in the City of Alhambra, was carried out on February 24 and February 25, 1953. This bridge is a part of construction work by Griffith Company, the State Division of Highways contractor, on the 1.7 mile section of the Ramona Freeway from Eighth Street to Jackson Avenue in Alhambra.

It is the first all-welded steel highway bridge of major importance to be constructed over Ramona Freeway. This bridge extends 270 feet between reinforced concrete abutments and two intermediate piers, across six lanes of the east- and westbound freeway, north and south frontage roads and the tracks of the Pacific Electric Railway. A two-lane roadway with two 6-foot sidewalks is being provided on this steel structure, which is 29 feet above the ground at the highest elevation and consists of three spans, two spans 90 feet long and one 86 feet in length. For pedestrian convenience,

Fabrication of all-welded plate girders at Bethlehem-Pacific Coast Steel Corporation plant in Los Angeles



UPPER—All structural steel in place and field welding of diaphragm connections under way. Note welded shear lugs on top flanges of girders. LOWER—Side view looking northeasterly showing all three spans of steel in place.

north and south abutments have 8-foot wide stairways leading to the sidewalks on the frontage roads.

Designed on Tangent

The structure is designed on a tangent, although the approaches some 100 feet beyond the bridge abutments curve into the bridge and into Almansor Avenue at the existing street grade. The approximate lengths of the approaches on each end of the bridge are 500 feet, with an 8 percent gradient. The profile of the bridge deck follows a 450-foot vertical curve.

Preliminary studies indicated that an all-welded steel girder layout would be more economical than either a riveted steel plate girder, or a reinforced concrete girder structure. Composite action between the steel girders and the concrete roadway slab is obtained by the use of small steel bars or shear lugs welded crosswise of the top flanges of the girders. Abutment and pier footings rest on cast-in-place concrete piles, varying in length from 22 feet to 37 feet.

Steel girders have been provided with a 5-inch crown or camber which has been fabricated into the girder purposely to follow as closely as possible the vertical curve of the bridge

deck. All girders are 4 feet 6 inches in depth and are composed of a ⅜-inch web plate and ¾-inch to 1⅞-inch flange plates. Stiffner plates welded to the side of the web plate vary from 3-feet 6-inch intervals at the supports to 4-feet 6-inch intervals at the center of the span. In the entire structure a total of 2½ miles of welds was used.

Size of Weld

The size of weld varied from 5/16-inch to ⅜-inch in section. All upper and lower chords have been welded by the semiautomatic process, which produced maximum uniformity of weld section. Weld sections were checked by inspection through the use of the modern gamma-ray method by the State Testing Laboratory.

Structural steel was delivered to the site from the Bethlehem Pacific Coast Steel Company plant located in Los Angeles via truck and trailer along city streets. Each truck and trailer conveyed two welded girder sections. A total of 15 girder sections was required for the complete superstructure. Each girder section weighs approximately 11½ tons.

Steel girders were erected in five lines on the bearing assemblies with a 25-ton truck crane equipped with a 60-foot boom and 18-inch channel diaphragm assemblies are bolted in position between the girders, ready for the final field welding to tie the bridge girders together. All members and elements in the steel superstructure are welded and no rivets are being used.

This bridge was designed and is being constructed by the Bridge Department of the State Division of Highways under the general supervision of F. W. Panhorst, Assistant State Highway Engineer, Bridges, with J. W. Green, Southern Bridge Department Representative, and the Bridge Department representative on the project.

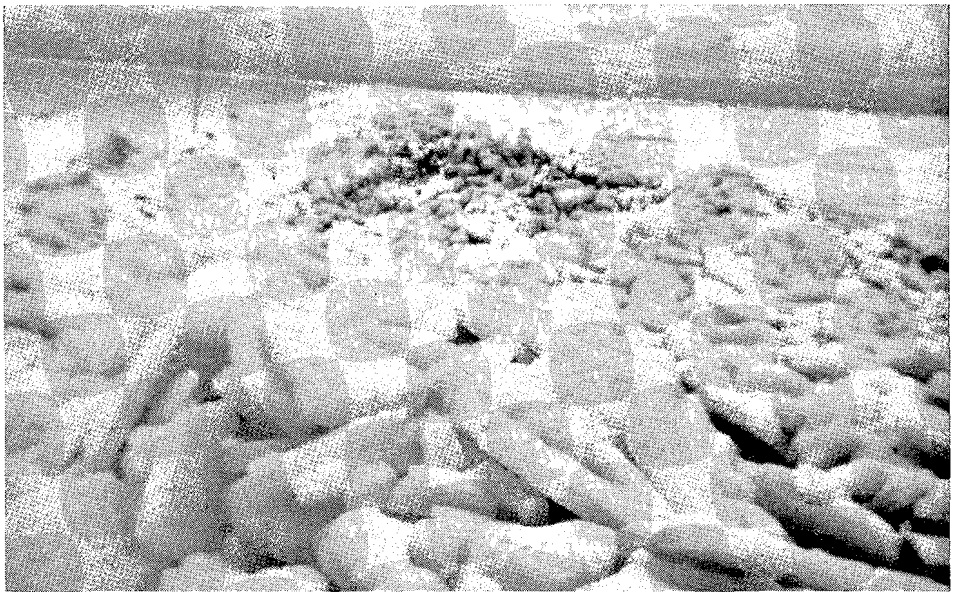
The general contractor for this project is Griffith Company. Joe Porcher is general superintendent and Hal McGregor is bridge superintendent. Subcontractor and fabricators, including erection of the steel in place, is Bethlehem Pacific Coast Steel Corporation of Los Angeles. F. C. Todd, Jr., is general manager and R. W. Binder is chief engineer of the steel company.

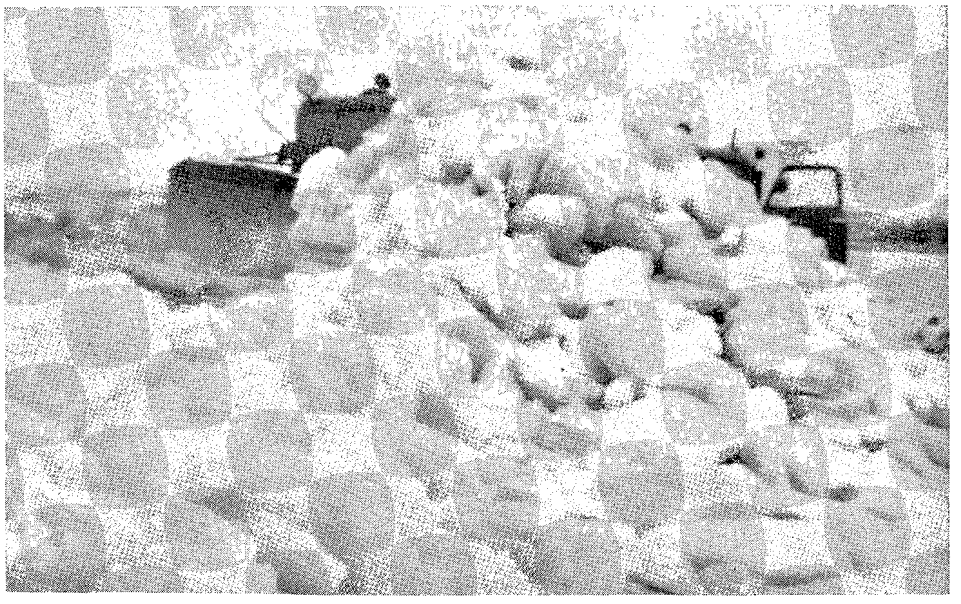
Unusual Type Road Closure in Modoc Co.

EXTREME cold weather and heavy winds at Cedarville Causeway, in Modoc County, combined to produce an unusual type of road closure and present additional problems to maintenance forces.

Cedarville Causeway is a low embankment section constructed across Middle Alkali Lake, a large shallow lake located on Surprise Valley just east of Cedarville. During the cold spell in December the shallow waters of the lake froze, and as the ice cracked, heavy wind and wave action forced the ice cakes onto the causeway and piled them up until the entire roadway was covered to a depth of from 8 to 10 feet.

Heavy duty snow plows aided by a bulldozer to break down the piles were required to remove the piled up ice cake and open the road.





UPPER—Ice piled up 8 to 10 feet high on Cedarville Causeway by high winds.
LOWER—Bulldozer removing ice from causeway.

District Highway Engineers Named

Appointment of two new district engineers in the Division of Highways and transfer of two others have been announced by State Highway Engineer George T. McCoy.

The appointments resulted from vacancies left by the untimely death of Spencer W. Lowden, District Engineer of District VIII, with headquarters at San Bernardino, and the retirement of Mark E. Cessna, District Engineer in charge of planning for District VII, with headquarters at Los Angeles.

The new assignments are as follows:

Edward T. Telford, Traffic Engineer, from Headquarters Office at Sacramento to District VII as district engineer in charge of planning. Telford will serve directly under Assistant State Highway Engineer Paul O. Harding at Los Angeles.

C. V. Kane, District Engineer of District I, with headquarters at Eureka, from that post to district engineer at San Bernardino.

Alan S. Hart, District Engineer of District IX, with headquarters at Bishop, from that post to district engineer at Eureka, replacing Kane.

Milton Harris, Service and Supply Engineer, from Headquarters Office at Sacramento, promoted to district engineer at Bishop, replacing Hart.

McCoy temporarily assigned Assistant Traffic Engineer H. H. Deardorff to the position of acting traffic engineer at Headquarters Office.

Edward T. Telford

EDWARD T. TELFORD, formerly traffic engineer of the California Division of Highways in Sacramento, assumed his new duties as District Engineer, Planning, of District VII headquarters of

... Continued on page 53

Milton Harris

RESPONSIBILITY for the improvement and maintenance of state highways in all of Mono and Inyo Counties and in parts of Kern and San Bernardino Counties has been assumed by Milton Harris as district engineer of District IX, Division of Highways, with headquarters in Bishop.

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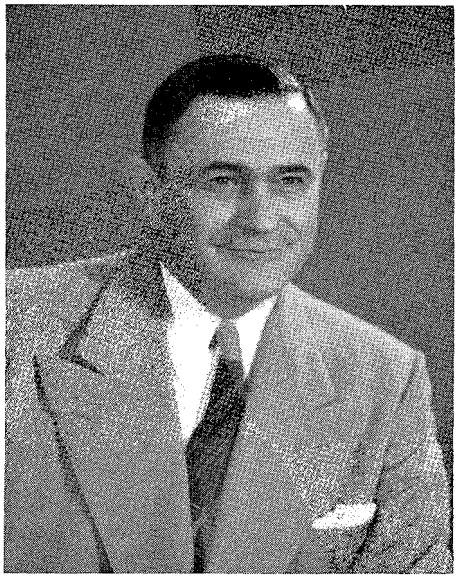

Clyde V. Kane

AFTER A BRIEF ABSENCE from the State Division of Highways District VIII headquarters in San Bernardino, where he has spent most of his professional career, Clyde V. Kane returned

... Continued on page 53

Alan S. Hart

ALAN S. HART, who formerly served District I of the Division of Highways as assistant district engineer, returned to the Eureka headquarters on February 16th as district engineer. He had served in District VIII for 24 years prior to his assignment to Eureka last year.

Hart is thoroughly familiar with the North Coastal district, comprising all of Del Norte, Humboldt, Mendocino and Lake Counties and parts of Siskiyou and Trinity Counties. He will be responsible for the improvement and maintenance of the more than 900 miles of state highways in the area.

Born in Santa Rosa, Hart received his preliminary education in public schools in Gerber and Red Bluff. He later studied civil engineering at Sacramento Junior College and first joined the Division of Highways in Sacramento in 1928 as a junior engineering aid. He worked on highway projects during summer vacations until his graduation from the University of California at Berkeley as a civil engineer in 1930.

Following his graduation he returned to the Sacramento district as a civil engineering aid. He remained in District III until 1945, when he was appointed to the post of district maintenance engineer in District V, San Luis Obispo.

In 1948, as a supervising highway engineer, Hart was sent to the Eureka office, where he assumed administrative duties as assistant district engineer under George F. Hellesoe, at that time district engineer of District I and now maintenance engineer for the Division of Highways at Sacramento Headquarters Office.

Hart was appointed district engineer of District IX in Bishop in October, 1950, remaining there until his present assignment.

Edward T. Telford

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the Division of Highways in Los Angeles on February 16th.

In his new position Telford will be in charge of the planning, location and advance design of the intricate system of state highways and freeways in the Los Angeles metropolitan area, embracing Los Angeles, Orange and Ventura Counties. He succeeds M. E. Cessna, who recently retired.

No stranger to the Los Angeles area and its complicated traffic problems, Telford served there as a resident engineer from 1932 to 1936.

Telford joined the Division of Highways in December, 1927, as a civil engineer in the District VI office in Fresno. In succeeding years he served in district offices in Bishop and Eureka and at Sacramento headquarters, as well as in the Los Angeles area. He was appointed engineer of design for the division in 1950 and became traffic engineer last July.

A veteran of World War I, Telford was office engineer at District I headquarters, Eureka, when he was recalled to active duty in the Army in early 1941. In 1943 he was sent to North Africa and later to the India-Burma theater, where he commanded elements in direct support of driving the Japanese army out of northern Burma. He returned to civilian life in 1946 as a colonel.

In his more than 25 years with the Division of Highways, Telford served in various capacities, both technical and administrative, obtaining well-rounded experience in all phases of highway construction and design.

He is a native of Santa Barbara.

Clyde V. Kane

Continued from page 52 . . .

on February 23d to take full charge as district engineer.

L. R. McNeely had been the acting district engineer since the death last month of Spencer W. Lowden.

Kane goes to the important San Bernardino district after serving as district engineer of District I, with headquarters in Eureka, since last August. Before his promotion as district engineer in the northwest area, he spent 24 years in District VIII, San Bernardino and Riverside Counties, where he advanced through the ranks to the post of assistant district engineer.

Born in New Mexico, Kane was graduated from the Clear Lake Union High School in Lakeport in 1921. His first engineering job was on a survey party for the Southern Pacific Railroad in the Imperial Valley, and then in Oregon.

Later he entered the University of California, where he received his degree in civil engineering in 1927. After brief periods in South America and in San Francisco, he joined the San Bernardino office of the Division of Highways in 1928 as a draftsman. Successively he became construction inspector, resident engineer on highway construction projects, and chief draftsman.

He entered military service in November, 1942, with the Army Engineers. He served for more than a year as chief of the engineering division for the construction of a portion of the Pan American Highway in Central America. Following that assignment he was sent to Burma, where he was area engineer in charge of constructing and maintaining part of the Ledo Road and nearby airstrips.

Kane returned to civil life in 1946 and was placed in charge of highway location and construction in the San Bernardino district. In 1947 he assumed the post of assistant district engineer of District VIII, serving in that capacity until his promotion and transfer to District I as district engineer.

Milton Harris

Continued from page 52 . . .

Harris, Service and Supply Engineer in the Headquarters Office in Sacramento since 1947, is no stranger to the trans-Sierra district. He served there between 1934 and 1938 as assistant resident engineer, location engineer and finally as the district office engineer and district construction engineer, gaining first-hand knowledge of the district.

A native of Oregon, Harris received his degree in civil engineering from Oregon State College in 1917. Following service in World War I, he was employed in various engineering capacities, joining the Division of Highways in 1928 as an instrument man in the Eureka office.

In 1934 he was assigned to the Bishop office where he worked under the supervision of the late Spencer W. Lowden, then district engineer of District IX.

He was transferred to the Sacramento Headquarters Office in 1938 as an assistant traffic engineer. When construction materials became scarce in the early days of World War II, Harris was assigned the responsibility of working out the materials priority problems for necessary highway construction, including a large mileage of military access roads requested by the Federal Government.

Harris was recalled to military service with the Army Engineers in July, 1942. After serving as post engineer at Camp Kohler, Wisconsin, and the Air Force Storage Depot in Maywood, California, he was sent to Italy. There he was named chief of the transportation section of the Allied Military Government and in that capacity served as traffic engineer of the City of Rome.

The Vatican awarded him the Lateran Cross for aid in re-establishing transportation in Vatican City. He was also awarded the Cross of St. Maurice and Lazarus by the Italian Government for his work in rehabilitating the Italian transport industry.

Returning to civil life in 1946, Harris was placed in charge of inspecting and purchasing war surplus materials for the Division of Highways in the Sacramento Headquarters. Later, as service and supply engineer, he had full charge of and developed procedures for procurement, warehousing and distributing all materials and supplies used by the division.

Harris and his wife moved to Bishop, his appointment as district engineer being effective February 9th.

DISTRICT VII NAMES BEST TEN CONTRACTS COMPLETED IN 1952

EACH YEAR since 1949, the District VII, Los Angeles, Construction Department has judged the contracts completed during the calendar year, and selected the best 10 in order of excellence. Relative positions on the list are determined by rating each contract on the quality of the grading, structures, subgrade, paving, curbs and gutters, finishing roadway, and any other items requiring close supervision and inspection. Other factors entering into the rating are safety, public relations, complexity of the over-all project, and engineering costs over which the resident engineer has direct control.

Obviously every highway contract is a cooperative project requiring the best efforts of both the contractor and the resident engineer, and the ratings therefore reflect credit to both. Following are the selections for the 1952 calendar year:

Last year trophies topped by miniature Galion rollers were presented to N. M. Ball Sons, Contractors, and to H. E. Belford, Resident Engineer, for completing a portion of the Hollywood Freeway between Virgil Avenue and Glendale Boulevard, which was rated the best contract completed during 1951. Certificates were also presented to the contractor's superintendent and the various state engineering personnel who contributed to the successful completion of the work. (The festivities accompanying the presentations took place last September, and were reported in the November-December, 1952, issue of *California Highways and Public Works* under the title "Bonneroo Stag.")

The Second Annual Bonneroo Stag will take place on Friday, April 17, 1953, at the Mona Lisa Restaurant on Wilshire Boulevard, at which time the two perpetual trophies will be presented to the new winners.

Contractor	Description	Resident engineer
1. A. Teichert & Son	Santa Ana Canyon Rd., Peralta School to Riverside County line	A. W. Carr and W. M. McKnight
2. R. A. Erwin	Holt Ave., Hamilton Blvd. to west city limits, Pomona	W. V. Brady
3. Griffith Co.	Long Beach Freeway, Rt. 60 to 223d St.	H. F. Meinke
4. Webb & White	Harbor Freeway, Fourth St. to Temple St.	H. E. Belford
5. Webb & White	Hollywood Freeway, Grand Ave. to Los Angeles St.	R. A. Collins
6. A. Teichert & Son	Ridge Route, Frenchman's Flat to Los Alamos Creek	C. J. McCullough
7. Fredericksen & Kasler	Coast Highway, Santa Clara River Bridge through Montalvo	M. F. Masters
8. Vido Kovacevich Co.	Atlantic Blvd., Telegraph Rd. to Garvey Ave.	J. W. Shaver and R. H. Butler
9. Boddum & Peterson	Pomona Blvd., Ferris Ave. to Potrero Grande Ave.	L. W. Sixt
10. Jesse S. Smith	Ventura Ave., Oakview Ave. to Rt. 151	L. S. Higley

DRIVING IN OUTSIDE LANE

When driving in the outside lane you should drive as far away from the parked cars as the stream of traffic will permit. Drive at a reduced speed and with extra care. Look ahead, anticipate the actions of the people who are on the sidewalk, and it will help you to avoid disaster. If someone should step out from between parked cars, be sure that you can come to a stop in time.

Traffic Paint

Continued from page 43 . . .

California had used Type I for many years so we knew what to expect of it. Type II had also been used at times and something of its over-all performance was known. The durability of the alkyd in general paint formulations is well known among paint technologists. It is most commonly tabbed by the layman as a "synthetic" which of course is in a sense applicable to all paints. Properly adapted to traffic line requirements this alkyd type gives excellent service in many locations. The 50,000 gallons acquired in this instance performed well on surfaces in the interior section of the State. On the coastal areas or in an environment of high humidity it failed quickly. In one instance, a line of this type practically disappeared within 10 days after application. A heavy rain had fallen a few hours after it was applied. This condition, combined with heavy traffic, practically obliterated the line in a very short time. Other locations where traffic was equally severe were well marked by this same paint for several months. *See Figs. 2 and 3.*

Type III Not So Good

Type III conformed approximately to one of the federal specifications for traffic paint. In general it gave good service but it was rather vigorously criticized by the paint crews as having "no body" and spattering excessively during application even though its viscosity, pigment, and nonvolatile content were correct. That this criticism was justified to some degree is apparent in *Fig. 4.* In the immediate foreground is a single line of Type I. Type III lines with the frayed edges are in the background. Some adjustment of this formulation could render it quite acceptable, but we have abandoned it for the present.

Type IV Adopted as Standard

Type IV out-performed the other formulations and has been adopted by the State as our current standard traffic paint. Some modifications have been necessary at times to meet conditions prevailing in the raw materials market. The current specification calls for a definite and detailed formulation. The key substance of this formulation is chlorinated natural rubber, sold under the trade name of Parlon. This material controls the character of the film to a marked degree and aids greatly in reducing the initial drying time—that is the time to reach the state of what we call "no pick-up." Combined with the chinawood oil—pentalyn varnish—it offers a tough film of good durability and abrasion-resisting character.

The greatest deficiency of Parlon as a component of paint films is its incompatibility with many frequently used materials. This particular pentalyn varnish is one of the few vehicles known to afford compatibility sufficient to assure complete package stability for a reasonable length of time. Even in this formulation a certain degree of incompatibility results as the volatile content of the paint evaporates. The same phenomenon existed to a degree in the old "California Formula." It is probably a desirable feature in that it provides a film permeable to water vapor which may form under the paint. Otherwise certain conditions would cause blistering and early failure.

Service Life of Lines

The general serviceability of this Type IV paint is apparent in *Figs. 5, 6 and 7.* The lines shown here are all on concrete and in a location where the traffic count approximates 30,000 vehicles daily. Even on the curves where abrasion and shear are excessive the lines show up well. Although these photographs were taken eight months after application, the lines were in good enough condition to withstand six months more of the heavy wear before being repainted. It should be pointed out that this is an exceptional case, just as failure after two or three months is likewise unusual. The average effective service life of this Type IV line is from 6 to 10 months, the actual life depending upon the location and time of year it is applied. Weather cycles exert a certain if not a definite influence on the service life of the lines. Heavy rains following a long period of high temperature and ultra-violet radiation seem to accelerate failures of many organic films. Naturally the shock and abrasive influence of heavily weighted tires do not lessen the effectiveness of these factors, so traffic lines undergoing such a series of attack will generally show early failure.

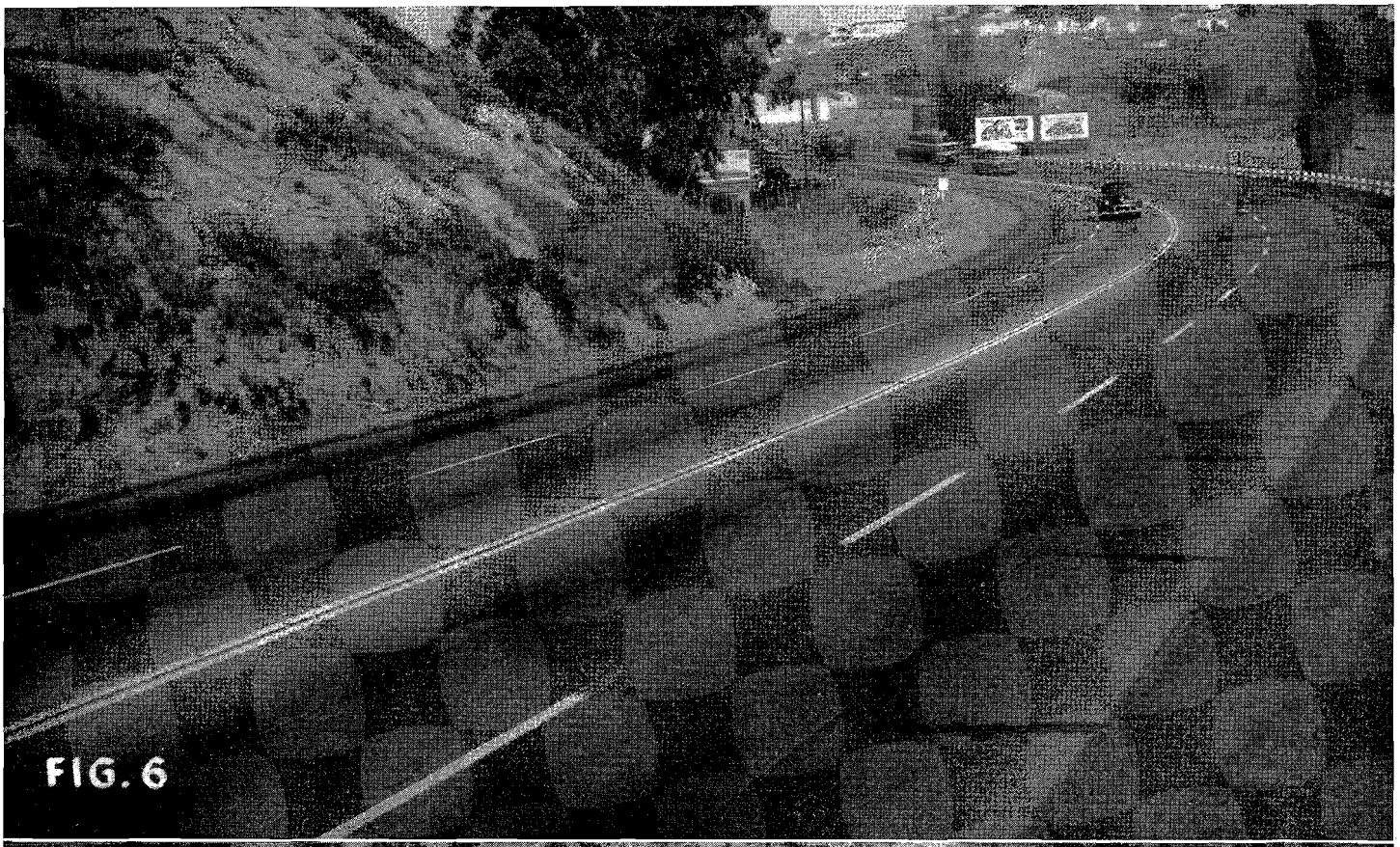
Type V Abandoned

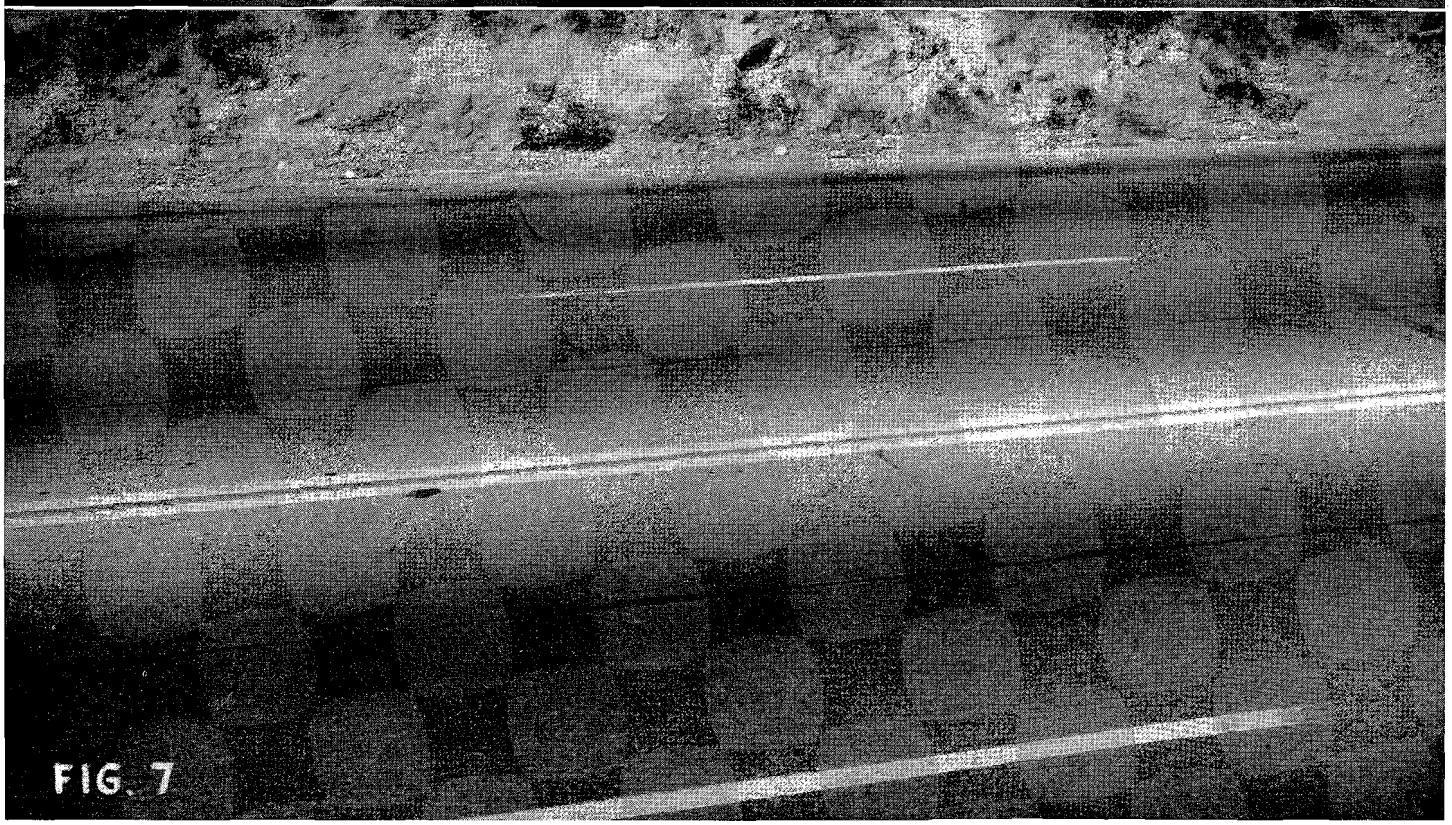
Type V formulation had to be abandoned because of compatibility difficulties. This case exemplifies the necessity for large-scale experimentation in manufacture. No difficulties had been encountered in the preliminary small-scale preparation of this paint, but in large-scale production discrepant features were quickly detected. This formulation was replaced by another type of composition in which we attempted to exploit the characteristics of Parlon at a reduced cost of finished product.

About 5,000 gallons of the new formulation was produced and used in various locations over the State. It worked well in general and gave good service as a traffic stripe. However, one of our striping crews turned up a characteristic in the paint which caused it to be dropped from further consideration. The crew placed 80 gallons of the paint in each of two reservoirs on the truck and started laying a stripe one morning. While the paint was being used from one tank the other was being agitated. When the switch-over was made to the second tank the paint was found to be of a consistency of thick mayonnaise and could not be used in the spray at all. This phenomenon could not be reproduced in small scale operations in the laboratory. The manufacturer could do it by agitation in a 500-gallon mixing vat. Such are the anomalies one finds in paint technology and manufacture.

Durability Requisite

Returning again to durability as one of the prime requisites of a traffic stripe, it is well known that portland cement concrete pavement is a much more difficult surface on which to maintain a properly marked traffic stripe than is asphalt pavement. There is a wide variation among paints with respect to durability on similar surfaces, but practically all of those developed up to this time will do better on asphalt than on portland cement. *See Fig 8.* There are several reasons for this difference, the chief one being lack of adhesion of the film to a concrete surface. Concrete is alkaline and tends to saponify the oils and resins in many films. Moisture carrying a salt content creeps through the concrete and under the paint film. For this reason the film must necessarily "breathe," that is, be pervious to





UPPER—California Standard Type IV traffic stripe after eight months' service on U. S. 40 west of Carquinez Bridge. LOWER—Same type after eight months' service on U. S. 40 at west city limits of Rodeo.

water vapor, or it will be pushed off the pavement. It must also possess a degree of plasticity to prevent cracking and chipping as temperature changes and compressions of the film take place under traffic.

Giving a film all of these and other characteristics does not compensate for the moderate solvent action that a fresh paint exerts on asphalt to bind the two surfaces together. Common paint solvents have no perceptible effect on concrete so the adhesion of a paint film to this type of pavement is largely a physical phenomenon.

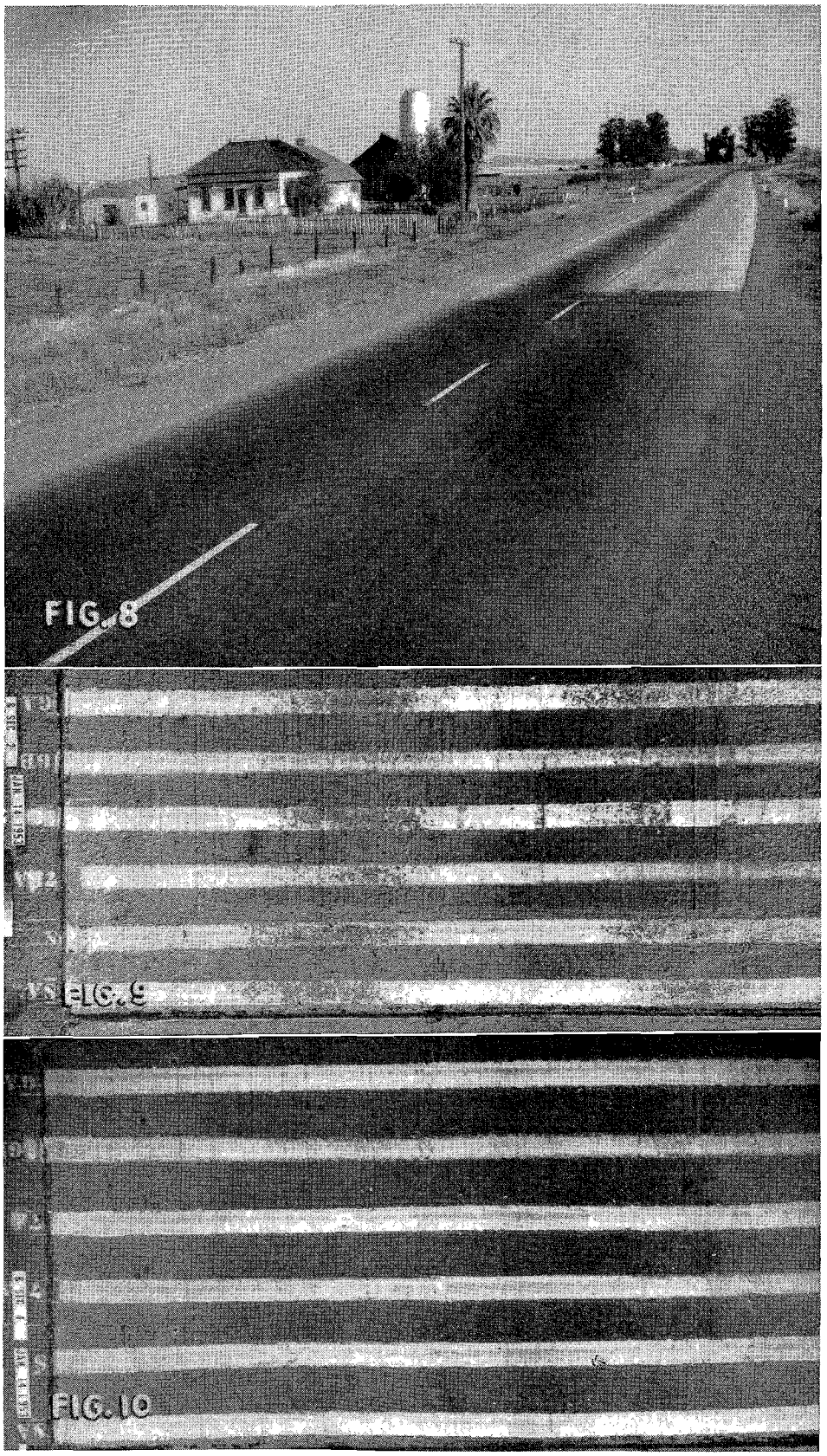
Experiments

The Materials and Research Department has done some extensive experimentation in seeking ways to increase this bond and thus extend the service life of a traffic stripe. *Figs. 9 and 10* show a series of transverse traffic stripes which were all placed on the same day on adjoining sections of concrete. The lines bearing the same number in each photograph are composed of identical paints and were sprayed successively from the same can. For example, line *6A in Fig 9* was placed within two minutes of the laying of *6A in Fig 10*. The only difference between the two sections was in a pretreatment of the concrete under the lines shown in *Fig. 10.*

The pretreatment consisted of spraying the concrete on which lines were to be placed with a dilute alcoholic solution of phosphoric acid. The lines were placed about 20 minutes following the acid treatment. This particular acid is ideal for the purpose because it neutralizes any alkali on the surface and leaves a thin film of insoluble calcium phosphate as an anchor for the paint film. The effectiveness of the treatment is obvious from the photographs. At the time the photographs were taken the lines had been exposed for six months on a highway having an average daily traffic of about 30,000 cars. *Line No. 8* is California's standard stripe now in use.

Question Not Determined

It would be nice if we could assume that this practice would show equally well at all locations under all traffic conditions. Unfortunately, where there is sand and gravel on the road, as is



UPPER—Comparative serviceability of traffic line paint on asphalt (foreground) and concrete (background). CENTER—Experimental transverse traffic lines on bare concrete after six months' exposure. Traffic 30,000 vehicles daily. LOWER—Same as center except that concrete had been pre-treated with phosphoric acid.

often the case at intersections, the phosphoric acid does not seem to do any good. The sand and mud carried onto the pavement by the tires of vehicles entering the highway are too effective as a grinding agent, especially during wet conditions. On the other hand, on curves where the shear and wear by tires are excessive, the wearing qualities of the stripe are somewhat extended beyond the normal by this pretreatment. Whether or not the pretreatment of concrete for traffic striping is economically defensible is still to be determined.

Lines on Curves

One of the factors involved in the apparent lack of correlation of the observed service life of traffic stripes is the design of the highway. A narrow two-lane highway which causes a driver to veer from the shoulder towards the center line will invariably show stripe failure earlier than a wide four-lane highway where the tires contact the line less frequently. Likewise the line on a curve is much more attractive to all of us as drivers than the shoulder or edge of the pavement. A glance at the lines on a straightaway and those on curves will tell the story. The line on a curve will rarely last as long as that on the straight stretches. The only remedy for this situation is to eliminate the curves or modify them. That, of course, is impractical on many roads and probably can not be achieved in any substantial measure on many others. Because of these factors we try to use a paint that has a high over-all performance rating as well as one which meets other requisites of present day traffic conditions.

Drying Time of Paint

One of the more important additional requirements is the drying time of the paint—the time of "no pick up" when traffic runs over the line. Our present formulation meets this condition in seven to ten minutes, while specifications demand a maximum of 15 minutes. In spite of this short time, careless motorists ruin a considerable portion of the traffic line by running over it before the line has "set." Probably most drivers have noticed stripes with tangential faint lines extending into the center of the traffic lane. Each of these is due to a careless or indifferent motorist who has crossed the stripe within seven or eight minutes of its placement. Such maneuvers not only create an unsightly highway but ruin the portion of line where the wheels cross it. So far no one has developed a traffic paint that will "set" instantaneously upon being placed on the pavement.

Pending such development the cooperation of the motoring public is required to maintain a neat serviceable traffic stripe.

Some research men, notably the English, have reported excellent results from the use of hot mixes as traffic lines. These mixes are not thought to be practicable for use in California.

Performance Specification

It might be said in passing that some vendors are very anxious for the State to adopt a performance specification for traffic paints. This would be desirable certainly if we could devise a test which could be performed quickly and would be a guarantee of the performance of the paint on the highway. As has been indicated in the foregoing, no such test has been devised up to now, so far as we know. A specification involving a few performance tests combined with composition requirements seems to be the best method of securing a uniform product that will perform in accordance with previously established standards.

Most of this discussion has been centered around the vehicle of the traffic paint. It is probably the most important part of the paint in so far as durability, drying time, etc., are concerned. The pigment, nevertheless, is of great importance and plays its role in most of the characteristics displayed by a paint. Of prime importance in any paint is the relative volume of the pigment and nonvolatile vehicle. This factor is known to the trade as pigment volume concentration or "P. V. C." and is usually expressed as percentage. The optimum value must be determined by experiment for each vehicle and the use to which the paint is to be put must be considered in this respect. Our traffic paint specification calls for about 45 percent P. V. C. This value is a compromise among the requirements for good visibility, durability and the ability of the vehicle to hold small glass spheres or "beads" used to reflectorize the line to increase night visibility. Where "beads" are not used, a somewhat higher P. V. C. is generally desirable.

Reflectorized Lines

The effect of the reflectorized lines is not realized by many motorists. It has not escaped the observing driver, however. Many people have asked what caused the line to "come up at you" at night and to point out how much better some lines show at night than others. Some people have even noticed how the night line has appeared white and clean while in daylight it has has been dirty and somewhat discolored. That, of course, is because we see at night the reflected surface of that portion of paint under the beads. It has been protected from dust and surface wear and consequently is clean.

The failure of such lines to function satisfactorily in rain or when pavements are wet is the greatest deficiency in the traffic striping program. Water disperses light effectively, so instead of getting a reflection from our headlights, we get nothing that is distinctive. It is an unfortunate fact from the Highway Engineer's viewpoint because during such weather conditions a line is needed more than during good weather. Some compensation may be realized in the fact that fog is not so efficient in the dispersion process and a line may be followed reasonably well if the fog is not too dense.

Rainy Weather Failure

The discoloration and unsightly appearance that a "beaded" line acquires after a few months exposure is due largely to traffic dust, although certain constituents of the paint vehicles may be part of the trouble. Overcoming this is another problem. It is not insoluble, for the surface could be washed if conditions would warrant such procedure. I fear, however, the rainy weather failure will remain with us indefinitely. It is impossible to repeal the laws of physics, but an answer to the difficulty may lie in a completely different approach. The man who accomplishes the feat of developing an applicable and practical solution to the problem will have earned his niche in the hall of Highway Engineering Fame.

There are numerous other details involved in the traffic paint program—too many, in fact, to attempt to describe them completely. The factors of prime consideration which guide the program may be listed in an approximate order of importance as applicability, durability, visibility, drying time and cost. Interchange of some of the listed properties would not be disturbing.

Storm Damage

Continued from page 36 . . .

Yager Creek Bridge

The west abutment of Yager Creek bridge near Carlotta was partially undermined and settled about four inches. A railroad bridge immediately downstream was completely destroyed. Grizzly Creek bridge was seriously damaged when a group of three redwood trees fell across it, demolishing the concrete railing and cracking the downstream girder of the center span.

In addition to a major slipout and a number of smaller slides and slipouts, a large slide developed about 17 miles east of Alton. This slide broke back about 600 feet on the steep hillside. Although the slide removal on the roadway was accomplished to permit traffic to proceed, the major proportion of the work remains. A large mass of unstable material remains at the top of the slide. Benching and the removal of about 20,000 cubic yards of material will have to be done before the area is stabilized.

It was due to the efforts of the maintenance crews working day and night throughout the storm that losses were not considerably greater than they were. The work done to date by state forces and equipment supplemented by rented equipment is of an emergency nature to restore two-way travel throughout the area. Several months will be required before conditions are restored to normal.

FAIR WEATHER AND FOUL PLAY

Fair weather and foul play often go together on the highway and sunshine cannot save a driver from the consequences of speeding and carelessness. Approximately 70 percent of all traffic accident fatalities occur on dry pavements.

West Sacramento Freeway

Continued from page 40 . . .

minor grading contract for paving the county road at the West Capitol Avenue Ramp Overcrossing. This permits county road traffic to pass over the freeway without interfering with construction operations throughout the current and remaining contracts.

Bids will be received April 8th for a contract for the paving of the freeway, surfacing connecting ramps, and constructing separation structures and an interchange at Harbor Boulevard. One final contract, which will be advertised later, will provide signing and illumination at critical locations throughout the project.

It is hoped the completed project may be opened for traffic use sometime late in the fall of this year.

Expressways Do Not Adversely Affect Property Values

In an article titled "Expressways and Real Estate Values," Adrian F. McDonald, M. A. I., conductor of lectures and field courses on appraising at Yale University, has this to say about the effect expressways have on residential properties in proximity to them:

"In considering areas near the expressway, all sections of Connecticut suitable for residential use and within easy access to the Merritt and Wilbur Cross highway sections have increased in desirability—rate of marketability and value. Today it is easier to sell properties in the proximity of the Connecticut expressway routes than ever before and at better prices.

"The results of a comprehensive survey of towns in Fairfield County where the Merritt Parkway has been in use for several years are so clear cut as to be remarkable in their consistency—sales of land adjoining the parkway and in the vicinity showed a substantially higher level of prices than comparable land some distance removed.

"Sales for the past five years in Greenwich and Darien in Fairfield County show absolutely no adverse effects from extremely heavy truck traffic on U. S. 1 even where the rear lines of properties may be within 100 to 150 feet from the traffic."

In Memoriam

THOMAS A. BEDFORD

Thomas A. Bedford, 83, former assistant engineer of the Department of Surveys and Plans in the State Division of Highways, died in Redding, Shasta County, March 14th.

From 1911 until 1923 Bedford was Division Engineer for the State in the second district, embracing Shasta, Siskiyou, Modoc, Lassen, Tehama and Trinity Counties. During that time he supervised the construction of the first paved highway in the area and the first road from Redding to Dunsmuir, Siskiyou County.

In 1923 he was transferred to Willits, Mendocino County, where he was made engineer for the district including Del Norte, Humboldt, Mendocino and Lake Counties.

He was transferred to Sacramento in 1928 where he was assistant engineer for the Department of Surveys and Plans, a post he held until his retirement in 1939. In that position he laid out most of the modern highway routes through the State.

He was at one time county engineer for San Diego County and also supervised construction of a railroad in Mexico and a highway in Cuba.

He leaves his sons, T. A., Jr., of Willow Run, Mich., vice president and general manager of the Kaiser-Fraser Corporation, and Clay H. of Ann Arbor, Mich., president of the Chase Aircraft Company; daughters, Mrs. Frances Lindt of Dunsmuir and Mrs. Mary Sue Fitzgerald of Merced; seven grandchildren and one great grandchild.

MAKING HIGHWAYS SAFE

A "safe" highway is only as safe as its users wish to make it. This is true no matter what speed limits, highway engineering and traffic controls are devised to protect the motorists.

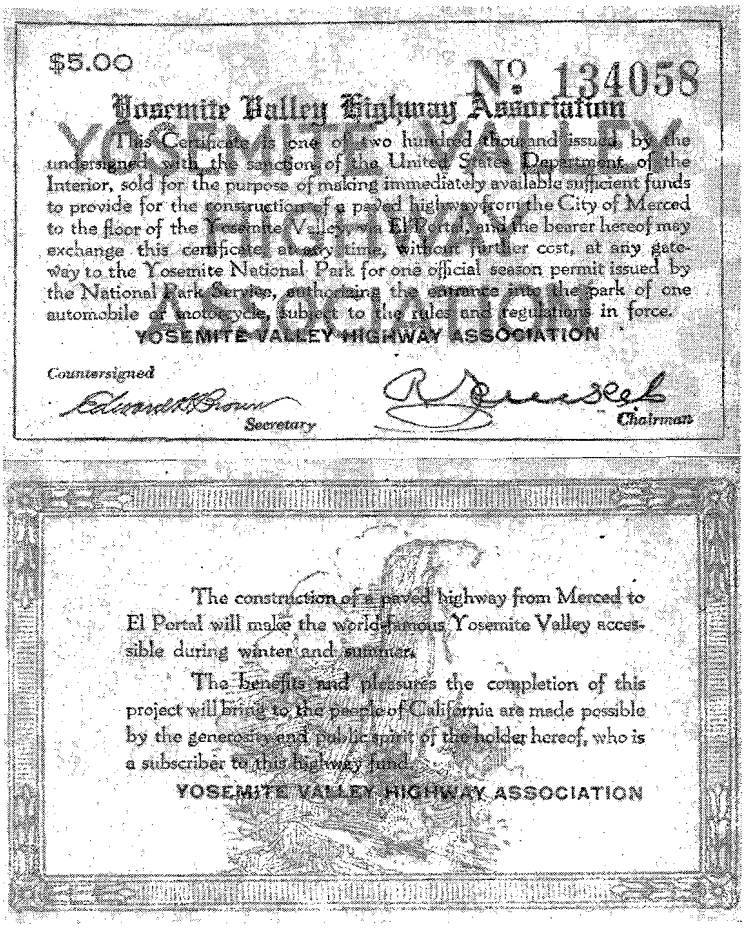
HIGHWAY FUND WAS SHORT IN 1919, TOO

With the California Legislature wrestling with the problem of how to provide additional millions to overcome deficiencies on the State Highway System, James R. Wilson, former Sacramento postmaster, and other old-time good roads enthusiasts recall a campaign launched by the Yosemite Valley Highway Association on May 22, 1919, to raise $1,000,000 which, with $700,000 of state and federal money would provide for construction of a paved highway from Merced to Yosemite Valley via El Portal.

The association composed of commercial organizations, civic bodies and automobile dealers of the State, sponsored a campaign to sell 200,000 certificates at $5 each. Under the plan each motorist in the State (the auto registration in 1919 was 477,450) was asked to subscribe $5 receiving in return from the National Park Service a permit to Yosemite Park, the permit "to be good for any one of the succeeding seasons."

Governor William D. Stephens bought the first of the 200,000 certificates offered and issued a statement calling on public spirited citizens to give their support to the campaign.

In his book "California Highways," Ben Blow noted that in July, 1926, "about $112,000 are being held in trust in San Francisco to finance paving of the Merced to Yosemite Highway. The money was raised in 1919 by automobile clubs and civic organizations by the sale of automobile permits to enter Yosemite Park, under an agreement with the Secretary of the Interior that the money would be held until the State completed the grading. It is proposed to use this fund next spring to defray the cost of placing an oil macadam surfacing on the Merced Canyon section."



About 1,000,000 cubic yards of earth and rock were moved on the Briceburg unit of the project. In addition a crushed rock surfacing, 4 inches thick and 20 feet wide, was applied. Five bridges were necessary across Bear Creek, Slate Gulch, Sweetwater Creek, South Fork and Merced River. The grading, surfacing, and the bridges represented an expenditure of about $1,200,000.

The Chairman of the Yosemite Valley Highway Association was Rudolph Spreckels. He appointed a committee of 28, consisting of H. R. Basford, President of the California State Automobile Association; Frederick J. Koster, John S. Mitchell, Richard Prosser, Robert Newton Lynch, Baldwin Vale, Edward H. Brown, and Percy Towne of San Francisco; Joseph E. Caine and Robert W. Martland, Oakland; Watt L. Moreland, W. H. Keller, H. D. Darlington, P. H. Greer, Fred L. Baker, and Lorin A. Handley, of Los Angeles; Wm. Tompkins and Melville Klauber, San Diego; L. A. Nares and Mayor W. F. Toomey, Fresno; George Wright, Santa Barbara; Dudley Saeltzer, Redding; John R. Graham, Merced; W. G. Scott, Bishop; C. A. Barlow, Bakersfield, and Frank Miller, Riverside.

Philip T. Prather, automobile dealer of San Francisco, was chairman of the central coast counties section of the association in the campaign.

DINOSAUR CANYON

Dinosaur Canyon, located 60 miles north of Flagstaff in Arizona, is reported by the National Automobile Club to be flanked by immense rocks on which are found tracks of the dinosaur.

SPEEDING

Motorists are not killed by speeding in itself. They are usually killed by the sudden stop. A car traveling at 60 miles per hour strikes with the same impact as it would if it were dropped from the top of a nine-story building.

GIVE AND TAKE

Driving in traffic calls for a good deal of give and take. The wise motorist is willing to give and take graciously in every driving situation for he knows that a little courtesy will go a long way to keep him safe.

Steel Superstructure for Daniels Railroad Spur Underpass

By W. R. DOUGLAS, Resident Engineer

It was a great day for the sidewalk superintendents in the Los Angeles Civic Center area, when steel plate girders for the Daniels Spur Underpass were set in place. The 100,000 motorists who daily pass this construction project eyed approvingly construction progress that will eventually eliminate the traffic bottleneck that has long existed at Alameda and Aliso Streets in downtown Los Angeles.

The Daniels Railroad Spur Underpass is part of the project that includes the Alameda Street Underpass and one-third of a mile of divided concrete roadways which will extend the existing end of the Santa Ana Freeway eastward from the Los Angeles Civic Center. When completed the 180-foot-long structure will provide the

UPPER LEFT—Raising steel girders from truck to place on piers. Note great number of sidewalk superintendents. UPPER RIGHT—Swinging girder into position. LOWER—Girders for first span in final position. Note Los Angeles Union Station in background.

Southern Pacific Railroad a single-track bridge across the freeway for freight service to commercial enterprises south of the freeway.

The structure has three spans of 77-, 61- and 41-foot lengths. Girder sections measure 90 inches in height. Pictures show the Union Steel Company of Los Angeles, structural steel subcontractor, placing the steel girders. Delivery of the girders through crowded traffic was effected with a minimum of delay and erection of the steel was performed without a hitch. A Northwest 80 crane was used to hoist the steel girders in place. Maximum girder weight for the 77-foot girders is 27.5 tons.

A portion of the steel erection was televised by Station KTLA of Los Angeles and reports agree the steel workers gave stellar performances.

Next and final steel erection set for the project is for the railroad section of the Alameda Underpass. Contractors for the project are G. W. Peterson and J. W. Baker of Los Angeles.

HIGHWAY BIDS AND AWARDS

JANUARY, 1953

ALAMEDA COUNTY—In the City of Oakland, on Fallon Street between Seventh and Eighth Streets, about 0.05 mile to be graded and paved with Portland cement concrete on cement treated subgrade. District IV, Route 105, Gallagher & Burk, Inc., Oakland, $17,726; O. C. Jones & Sons, Berkeley, $18,203; J. Henry Harris, Berkeley, $21,780. Contract awarded to Ball & Simpson, Berkeley, $17,097.60.

CONTRA COSTA COUNTY—On Freitas Lane, 600 feet south of Tregallos Road, near the City of Antioch, three prefabricated metal buildings to be furnished and erected, gasoline and diesel storage tanks and appurtenances to be furnished and installed, wash rack to be constructed, existing well to be deepened, fence to be constructed, and sewer, water, and electrical facilities to be installed. District IV, Antioch Maintenance Station. Da Roza-Ribal, Inc., Dutch Flat, $27,879; Robert Bardell, Oakland, $28,606; Hancock Construction Co., Lafayette, $28,967; J. Henry Harris, Berkeley, $31,264. Contract awarded to C. Norman Peterson, Berkeley, $27,439.60.

IMPERIAL COUNTY—At intersection of Holt Avenue and Pine Road, at Orita Turn and at intersection of Wiest Road and Main Street, a net length of about 1.3 miles, to be graded and surfaced with road-mixed surfacing on cement treated base. District XI, Routes 187, 201, Sections B, C, C. Esby C. Young, D. B. A. E. C. Young, San Fernando, $139,-619; Norman I. Fadel, North Hollywood, $139,896; James E. Roberts, San Bernardino, $147,260; Clyde W. Wood & Sons, Inc., North Hollywood, $161,059. Contract awarded to Basich Bros. Construction Co., N. L. Basich & R. L. Basich, South San Gabriel, $131,654.50.

LOS ANGELES COUNTY—At the intersection of Fifth Avenue and Bellevue Avenue in the City of Pomona, full traffic-actuated signal system and highway lighting to be furnished and installed and channelization to be constructed. District VII, Routes 19, 77. Paul R. Gardner, Ontario, $19,599; Electric & Machinery Service, Inc., South Gate, $20,117; Fischbach and Moore, Inc., Los Angeles, $21,060; C. D. Draucker, Inc., Los Angeles, $21,386. Contract awarded to Westates Electrical Construction Co., Los Angeles, $19,239.50.

LOS ANGELES COUNTY—In the Cities of Compton and Long Beach, on Artesia Street between Alameda Street and Long Beach Boulevard, about 0.8 mile to be graded and paved with asphalt concrete on untreated rock base, to provide a four-lane divided highway. District VII, Route 175. Vido Kovacevich Co., Rosemead, $212,669; J. E. Haddock, Ltd., Pasadena, $214,311; Griffith Company, Los Angeles, $215,209; J. A. Thompson & Son, Contractors, Inglewood, $216,565; Ukropina-Polich-Kral, San Gabriel, $217,773; Warren Southwest, Inc., Torrance, $222,994; Hess Construction Co., Inc., Long Beach, $228,470. Contract awarded to M. S. Mecham & Sons, South Gate, $211,444.30.

MONTEREY COUNTY—At intersection of Monterey-Castroville Road with Salinas-Watsonville Road, full traffic-actuated signal system and highway lighting to be furnished and installed. District V, Routes 22, 56, 118; Sections A, I, J, A. L. H. Leonardi Electric Construction Co., San Rafael, $13,-595; R. Flatland, San Francisco, $13,930; Howard Electric Co., Gilroy, $14,442. Contract awarded to R. Goold & Son, Stockton, $12,930.

SAN LUIS OBISPO COUNTY—Between Marsh Street and San Luis Obispo Creek in the City of San Luis Obispo, about 2.3 miles to be graded and a base constructed of imported base material on imported subbase material; ramps, connections and city streets to be graded and paved with plant-mixed surfacing on imported base material and cement treated base, to provide a four-lane divided highway. District V, Route 2. John Delphia and M. J. Ruddy & Son, Patterson, $689,037; M. J. B. Construction Co., Stockton, $784,634; Fredrickson & Watson Construction Co., Oakland, $785,894; McCammon-Wunderlich Co., Palo Alto, $788,129; Valley Paving Co., Pismo Beach, $816,344; Granite Construction Co., Watsonville, $818,607; Clyde W. Wood & Sons, Inc., North Hollywood, $827,666. Contract awarded to Madonna Construction Co., San Luis Obispo, $573,145.15.

TUOLUMNE COUNTY—At Dan's Creek, about one mile southeast of Jacksonville, a reinforced concrete bridge to be widened and approaches constructed. District X, Route 40, Section A. Friant Construction Co., Fresno, $30,398; Beerman & Jones, Sonora, $32,934; R. E. Hertel, Sacramento, $34,781; J. Henry Harris, Berkeley, $36,757; B. S. McElderry, Berkeley, $50,504; Owl Truck & Construction Co., Compton, $55,251. Contract awarded to Paul E. McCollum, Richmond, $26,349.50.

F. A. S. County Route

NAPA COUNTY—On Silverado Trail at Conn Creek, about five miles south of St. Helena, about 0.4 mile to be graded and surfaced with road-mixed surfacing on untreated rock base. District IV, Route 607. Huntington Bros., Napa, $21,308; B. S. McElderry, Berkeley, $21,483; Slinsen Construction Co., Napa, $22,167; Arthur B. Siri, Inc., Santa Rosa, $23,283; E. A. Forde Co., San Anselmo, $24,593; Brown-Ely Co. Contr., Corte Madera, $24,759; I. J. Ely Co., Larkspur, $25,877; Harms Bros., Sacramento, $27,705; Fredrickson Bros., Emeryville, $27,-907; O'Connor Bros., Red Bluff, $28,183; J. Henry Harris, Berkeley, $28,491; Ace Excavators, Oakland, $29,613. Contract awarded to Harold Smith, St. Helena, $20,889.

FEBRUARY, 1953

ALAMEDA COUNTY—At Forty-second Avenue off ramp about 0.2 mile in length to be resurfaced with plant-mixed surfacing, and curbs to be constructed in Oakland. District IV, Route 69. O. C. Jones & Sons, Berkeley, $6,733; Independent Construction, Oakland, $6,892.50; Lee J. Immel, San Pablo, $7,698.50; J. Henry Harris, Berkeley, $8,-865.80; Frederickson & Watson Construction Co., Oakland, $11,912. Contract awarded to Gallagher & Burk, Inc., Oakland, $6,489.

ALAMEDA COUNTY—At the intersections of Jackson Street with Harder Road and Eastshore Freeway Ramps, traffic signal systems and highway lighting to be furnished and installed. District IV, Route 69, 105, Sections D, A. Scott-Buttner, Electric Company, Inc., Oakland, $13,975; Manning and Whitaker, Inc., San Francisco, $14,926; Underground Electric Construction Company, Oakland, $16,292; Howard Electric Company, Gilroy, $16,409; R. Goold and Son, Stockton, $16,748; R. Flatland, San Francisco, $15,479; L. H. Leonardi Electric Construction Company, San Rafael, $15,325; T. L. Rosenberg Company, Oakland, $17,552; Jones Electric Company, Inc., Hayward, $15,850; Abbett Electric Corporation, San Francisco, $23,058. Contract awarded to Hall-Sloat Electric Company, Inc., Oakland, $13,660.

EL DORADO—At Locust and Washington Streets, in the City of Placerville, two reinforced concrete bridges to be constructed, and approaches and city streets to be graded. District III, Route 11. Tumblin Company, Bakersfield, $303,804; James P. Morton, Placerville, $304,730.39; Thomas Construction Company, Fresno, $336,632; Dan Caputo, San Jose, $337,630; Bishop, Younger, Bradley Company, San Francisco, $350,934; Young & Smith Construction Company, Salt Lake City, Utah, $351,-988; Lord & Bishop, Sacramento, $355,782; Charles MacClosky Company, San Francisco, $356,413; Granite Construction Company, Watsonville, $361,-453; Guy F. Atkinson Company, South San Francisco, $364,926.65; Paul E. McCollum & C. L. Cypher, Richmond, $384,438; George Pollock Company, Sacramento, $385,179; Fredrickson Bros., Emeryville, $387,337; Nomellini Construction Company, Stockton, $398,630.50. Contract awarded to Fredrickson & Watson Construction Company, Oakland, $294,999.30.

IMPERIAL—Between 2.6 miles east of Calexico and Hemlock Canal (Portions) about 4.8 miles in net length to be graded and surfaced with road mixed surfacing on imported base material. District XI, Route 202, Section C. Basich Bros. Construction Company, N. L. Basich & R. L. Basich, San Gabriel, $276,462.80; Webb and White, Los Angeles, $295,-978; E. C. Young, San Fernando, $303,933; Norman I. Fadel, North Hollywood, $309,201; Arthur H. Famulars and Roland T. Reynolds, J. V. Anaheim, $310,522.50; Dimmit and Taylor, Monrovia, $342,-481.10; Clyde W. Wood and Sons, Inc., North Hollywood, $346,463.20; Flickinger and Welker, Inc., Los Angeles, $390,938. Contract awarded to James E. Roberts, San Bernardino, $251,728.20.

LOS ANGELES—Roadside development of State Highway in Los Angeles County, between 174th Street and Rosecrans Ave. District VII, Route 164-Rdo. B., Tor., A, Haw. F. A. Tetley and Son, Tetley Nurseries, Corona, $8,303.21; James E. Boothe, Compton, $9,240.58. Contract awarded to Gonzalez and Puerta, Lomita, $6,954.27.

LOS ANGELES—Between Route 60 and 223d Street in the City of Long Beach, about 2.5 miles in length of roadside areas to be prepared and planted. District VII, Route 167, LBch. Stephen L. Vistica, San Mateo, $19,777; Gonzales and Puerta, Lomita, $19,899.80; Dana R. Tyson Company, Sacramento, $21,628; D. and M. Sprinkler Company, Long Beach, $22,914.80; Keith E. Card, Long Beach, $22,964.28; Justice-Dunn Company, Oakland, $23,888.80; James E. Boothe, Compton, $24,-381.60; Castro & Fisher, Glendale, $25,504.54. Contract awarded to Jannoch Nurseries, Altadena, $18,-014.64.

ORANGE—Between Peralta School and Riverside County Line, about 6.3 miles in length, roadside areas to be prepared and planted. District VII, Route 43, Section B. Jannoch Nurseries, Altadena, $8,400; Stephen L. Vistica, San Mateo, $9,375; Dana R. Tyson Company, Sacramento, $10,987; Castro and Fisher, Glendale, $11,170.75; Henry C. Soto Corporation, Los Angeles, $14,548. Contract awarded to Justice-Dunn Company, Oakland, $7,641.70.

SACRAMENTO, SOLANO — On Steamboat Slough and Cache Slough, about 3.1 miles west of Ryde and about 2.4 miles north of Rio Vista, respectively, three ferry boats to be repaired, cleaned and painted. District X, Route 100, 99, Section A, A; A. Moore Dry Dock Company, Oakland, $17,936; Dowrelio's Boat Works, Crockett, $27,486. Contract awarded to Colberg Boat Works, Stockton, $16,758.

SAN BERNARDINO—City of Colton, at the intersections of I Street with Eighth Street, Tenth Street, and Mt. Vernon Avenue, a traffic signal system and highway lighting to be modified, a fixed-time traffic signal system and highway lighting, and a full traffic-actuated signal system and highway lighting to be furnished and installed. District VIII, Route 26, 43, 31-Col. Paul R. Gardner, Ontario, $17,982; Electric and Machinery Service, Inc., South Gate, $18,368; Drury Electric Company, San Bernardino, $25,386. Contract awarded to Fischbach and Moore, Incorporated, Los Angeles, $17,568.

SAN BERNARDINO—City of Barstow, at the intersections of Main Street with First Street and Second Street, traffic-actuated signal systems and highway lighting to be furnished and installed. District VIII, Route 31, 58-Bsw. Electric and Machinery Service, Incorporated, South Gate, $23,627. Contract awarded to Paul R. Gardner, Ontario, $22,076.

SAN DIEGO—Between Vista and Escondido, portions, about 0.5 mile on new alignment to be graded and surfaced with P. M. S. on C. T. D. over selected material; about 6.1 miles to be widened, C. T. D. to be constructed and P. M. S. to be placed over existing surfacing and C. T. B. and seal coats to be applied over both new construction and resurfacing. District XI, Route 196, Section B, Esd. Cox Bros. Construction Company, Stanton, $237,995; R. A. Erwin, Colton, $243,513.25; Einer Bros., Incorporated, Escondido, $279,386; Flickinger-Welker, Incorporated, Los Angeles, $283,208; Daly Corporation, San Diego, $294,875. Contract awarded to Ralph B. Slaughter, Julian, $234,368.

SAN DIEGO—At Palm City Interchange, about 0.1 mile in length, to be graded and surfaced with P. M. S. and the existing highway lighting system to be modified. District XI, Route 2, 199, Section G, A. Contract awarded to Griffith Company, Los Angeles, $18,501.45.

SAN LUIS OBISPO—Near Shell Beach, Highway lighting systems to be furnished and installed. District V, Route 2, Section E. Clines Electric, San Luis Obispo, $6,242; Ets-Hokin and Galvan, Wilmington, $6,654; Howard Electric Company, Gilroy, $5,692; L. H. Leonardi Electric Construction Company, San Rafael, $7,275. Contract awarded to Gallagher and Ochs, San Luis Obispo, $5,389.

TULARE—Between Tulare Airport and Tagus, about 7.9 miles in length to be surfaced with P. C. C. on C. T. S. and with P. M. S. on U. R. B. District VI, Route 4-B, Tul, F. Gordon H. Ball and San Ramon Valley Land Company, Berkeley, $1,061,532.40; Griffith Company, Los Angeles $1,095,399.50; Webb and White, Los Angeles, $1,125,106; Ukropina-Polich-Kral, San Gabriel, $1,128,003.70; Fredrickson and Watson Construction Company, Oakland, $1,148,413.70; M. J. B. Construction Company, Stockton, $1,192,715; Peter Kewit Sons Company, Arcadia, $1,204,253. Contract awarded to Guy F. Atkinson Company, South San Francisco, $1,055,875.

TULARE—In and adjacent to the City of Porterville, on Route 127 between Cornell Street and Park Street about 0.3 mile to be surfaced with P. M. S. over C. T. B. and highway lighting to be furnished and installed. District VI, Route 127-Ptrv., B. Dicco Incorporated, Bakersfield, $31,205.20; C. F. Oliphant, Hanford, $32,400; Friant Construction Company, Fresno, $34,411.50; Baum Construction Company, Fresno, $38,262; Gene Richards, Fresno, $38,428; Griffen Company, Los Angeles, $38,890.50. Contract awarded to Gordon H. Ball and San Ramon Valley Land Company, Berkeley, $30,781.

TULARE—In Tulare County, City of Tulare, at the intersection of Tulare Street with L Street. Traffic signal system to be furnished and installed. District VI, Route 134-Tul. L. H. Leonardi Electric Construction Company, San Rafael, $3,100; Dale Electric, Fresno, $3,395; Robinson Electric, Fresno, $3,600; A. C. Electric Company, Bakersfield, $5,290. Contract awarded to R. Goold & Son, Stockton, $2,975.

VENTURA—Between Point Mugu and Little Sycamore Creek, portions, embankment slopes to be reconstructed and heavy, medium extra heavy, and extra heavy stone riprap to be placed. District VII, Route 60-A. Guy F. Atkinson Company, Long Beach, $288,525. Contract awarded to J. B. Stringfellow Company, Riverside, $233,350.

F. A. S. County Route

LOS ANGELES—On Rosecrans Avenue, between San Gabriel River and Lakewood Blvd., about 1.8 miles in length to be graded and surfaced with P. M. S. length, to be graded and surfaced with P. M. S. on untreated rock base and existing pavement. District VII, Route 840. Osborn Company, Pasadena, $153,244; J. A. Thompson and Son Contractors, Inglewood, $159,592; Warren Southwest, Inc., Torrance, $159,912.70; Jesse S. Smith, Glendale, $161,145; J. E. Haddock, Ltd., Pasadena, $161,700; M. S. Mecham and Sons, South Gate, $163,307; Griffith Company, Los Angeles, $163,364; Hess Construction Company, Inc., Long Beach, $171,676.50; Robert E. L. Parker Company, Claremont, $177,477; Charles MacClosky Company, San Francisco, $194,713; Basich Bros. Construction Company, N. L. Basich & R. L. Basich, South San Gebriel, $195,663. Contract awarded to Vido Kovacevich Company, Rosemead, $145,418.50.

March, 1953

CONTRA COSTA AND SACRAMENTO COUNTIES—Across San Joaquin River at Antioch, portions of the existing bridge to be cleaned and painted and a painter's catwalk to be constructed. District X, Route 11, Sections A, C. J. P. Carroll Co., Los Angeles, $83,470; Allied Painters and Decorators, Inc., Oakland, $86,236; R. W. Renade and Co., Berkeley, $87,694.60; Deemer and Deemer, San Francisco, $96,347.20. Contract awarded to Eric Lundeen, Inc., Los Angeles, $47,663.

KERN COUNTY—At Wheeler Ridge Maintenance Station a well to be drilled and cased. District VI, Route 4, Section B. Williams & DeVoe, Wasco, $7,840.90; B. & B. Drilling Co., Bakersfield, $10,839.50; Byron Jackson Service Co., Bakersfield, $11,371. Contract awarded to Evans Bros., Lancaster, $7,600.

LOS ANGELES COUNTY—At the intersection of Firestone Blvd. with Studebaker Road, traffic signal system and highway lighting to be furnished and installed. District VII, Route 174, Section B. Electric and Machinery Service, Inc., South Gate, $15,217; C. D. Draucker, Inc., Los Angeles, $15,448; Fischbach and Moore, Inc., Los Angeles, $16,303. Contract awarded to Westates Electrical Construction Co., Los Angeles, $14,956.

LOS ANGELES COUNTY—In and adjacent to the City of Compton, at the intersection of Artesia Street with Alameda Street, traffic-actuated signal system and highway lighting to be furnished and installed and channelization to be constructed. District VII, Route 175, Section A. Fischbach and Moore, Inc., Los Angeles, $19,368.50; Electric and Machinery Service, Inc., South Gate, $19,762. Contract awarded to Westates Electrical Construction Co., Los Angeles, $18,965.

LOS ANGELES COUNTY—In the Cities of Redondo Beach and Manhattan Beach on Redondo Beach Blvd. between Pier Ave. and Inglewood Ave., about 1.2 miles in length, the existing pavement to be surfaced with P. M. S. and widened with P. M. S. on C. T. B. District VII, Route 175. McAmis and Baker, Gardena, $139,728; Griffith Co., Los Angeles, $144,945; Warren Southwest, Inc., Torrance, $147,207; Oswald Bros. Co., Los Angeles, $148,630. Contract awarded to J. A. Thompson and Son, Contractors, Inglewood, $131,998.50.

LOS ANGELES COUNTY—In the City of El Segundo, at the intersection of Sepulveda Blvd. with Grand Ave.; in the City of Culver City at the intersection of Sepulveda Blvd. with Lindblade St. and in the City of Inglewood, at the intersection of Centinela Ave. with Eucalyptus Ave.; traffic signal systems and highway lighting to be furnished and installed. District VII, Route 60, 158, 164, Section E. Westates Electrical Construction Co., Los Angeles, $20,502; Electric and Machinery Service, Inc., South Gate, $20,851; Fischbach and Moore, Inc., Los Angeles, $21,220. Contract awarded C. D. Draucker, Inc., Los Angeles, $19,865.

MONTEREY COUNTY—Between Chualar and Spence Underpass about 5.2 miles in length of roadside areas to be prepared and planted. District V, Route 2, Section B. Stephen L. Vistica, San Mateo, $16,530; Watkin and Sibbald, San Anselmo, $16,812; Justice-Dunn Co., Oakland, $16,920; Rudolph Watson, San Mateo, $18,095; Dana R. Tyson Co., Sacramento, $20,194; Leonard Coates Nurseries, Inc., San Jose, $26,900. Contract awarded to Huettig, Schromm, and Bennet, Inc., Palo Alto, $16,485.

RIVERSIDE COUNTY—City of Riverside, on Eighth St. between Walnut St. and Park Ave., on First St., between Main St. and Market St. and on Market St. between First St. and 14th St., traffic signal system to be furnished and installed and channelization to be constructed at two intersections and traffic signal system to be modified at 10 intersections. District VIII, Route 19, 43. Electric and Machinery Service, Inc., South Gate, $24,333; Drury Electric Co., San Bernardino, $25,512.50. Contract awarded to Fischbach and Moore, Inc., Los Angeles, $24,121.70.

SAN BERNARDINO COUNTY—In the City of Redlands at the intersection of Orange St. with Colton Ave.-Terrace Ave. Furnishing and installing traffic signal system and highway lighting. District VIII, Route 190. Fischbach and Moore, Inc., Los Angeles, $8,693; Electric and Machinery Service, Inc., South Gate, $8,785; Drury Electric Co., San Bernardino, $10,108. Contract awarded to Paul R. Gardner, Ontario, $7,726.

SAN MATEO COUNTY—At Burlingame Creek (Sanchez Creek), in the City of Burlingame the existing bridge is to be removed and replaced with a field assembled plate pipe arch and about 50 ft. in length is to be graded and surfaced with P. M. S. on C. R. B. District IV, Route 2. Minton Company, Contractors, Oakland, $28,917; The Lowrie Paving Co., Inc., San Francisco, $28,999.24; Lew Jones Construction Co., San Jose, $29,315.40; Eaton and Smith, San Francisco, $33,888.30; N. M. Saliba Co., Los Angeles, $36,000; L. C. Smith Co., San Mateo, $36,064.40; K. Scheyer, El Cerrito, $37,040; Friant Construction Co., Fresno, $37,057; Kevry Construction Co., San Leandro, $38,182; James W. Hill, Walnut Creek, $38,391.30; Edward Keeble, San Jose, $39,295; J. Henry Harris, Berkeley, $40,615.40; McGuire and Hester, Oakland, $41,877.50; Underground Construction Co., Oakland, $42,261.40. Contract awarded to Chas. S. Moore, San Jose, $25,780.20.

FOREST SERVICE CHANGES

Eugene R. Lepley, Supervisor of the Harney National Forest in South Dakota, has transferred to the California Region of the Forest Service, as the new Assistant Chief of Operation. He will take over the position now held by Jack C. Kern and Kern will replace Lepley as supervisor of the Harney. This interregional exchange of Forest Service personnel is in accordance with the service policy of varied assignments to broaden the knowledge and experience of its personnel.

Mr. and Mrs. Lepley and their two daughters have selected Fairfax, Marin County, as the location of their new home.

V. C. Martin Gets An Appointment To West Point

Vincent C. Martin, 2333 Cortez Lane, Sacramento, of the California Division of Highways was appointed to West Point on February 18th by Congressman John E. Moss of the Third District. An employee of the division since June, 1952, Martin has been serving as an under engineering aide in the Bridge Department. He formerly attended Sacramento High School and concluded three years of ROTC training there as a first lieutenant in the school battalion. One of 32 candidates for the appointment Martin will remain in state employment until July of this year, at which time he will leave for the academy.

A strapping six-footer, he hopes to play football for the Army and is seriously considering a career as a military engineer upon graduation. He knows army life from two years his family spent in Japan while his father was stationed there with occupation forces during 1948 and 1949.

TIMBER BRIDGE SURVEY

The important part played by engineered timber construction in the development of America's highways is detailed by Raymond Archibald, Chief, Western Headquarters, U. S. Bureau of Public Roads, in the new book, "Proceedings of Wood Symposium on 100 Years of Engineering Progress With Wood," just published by Timber Engineering Company, affiliate of National Lumber Manufacturers Association.

Mr. Archibald, presenting "A Survey of Timber Highway Bridges in the United States," shows how timber engineering principles were applied to highway bridges 112 years ago. Emphasis is placed on the progress resulting from developments in preservative treatments, timber connectors and laminated structural lumber.

A limited number of "Wood Symposium Proceedings" has been prepared, and single copies are available, without charge, on request to Timber Engineering Company, Dept. WS-H, 1319 18th Street, N.W., Washington 6, D. C.

COMPLIMENT FOR JERRY LIPP

Mr. Frank C. Balfour
Chief Right of Way Agent
Division of Highways

Dear Sir: I am taking this opportunity to express congratulations to your department for the able manner in which the purchasing of property for the Placerville Freeway has been carried out by your right of way agent, Mr. Jerome Lipp. I feel I speak for a large majority of Placerville residents in expressing agreement with the policies of the department and appreciation for the fair and impartial manner in which they were carried out in negotiations conducted by Mr. Lipp.

The difficulties of the terrain, sentiment, personality, and the problem of agreement on values may or may not have been more pronounced in this instance than generally are met by your people in the field; it is evident that they all were met here in a manner to do credit to and make friends for the Division of Highways.

It is heartening to see public responsibility placed in the hands of persons able to balance the load. The interests of the highway user—and taxpayer—together with that of the local property owner, I feel, were both ably represented here by Mr. Lipp with a minimum of disturbance to community life in the many necessary relocations and removals of residential and commercial properties.

Sincerely,

George Ross, *Editor*
Mountain Democrat
Placerville

MORE VEHICLES IN CALIFORNIA THAN IN ANY FOREIGN COUNTRY

California has more registered motor vehicles than any other state or any foreign country, according to a report released by the Touring Bureau of the Automobile Club of Southern California.

As of December 31, 1952, there were 5,548,642 vehicles registered. This includes automobiles, trucks, trailers and motorcycles. Not figured in this state total are 68,000 vehicles exempt from registration, such as official cars, consular service vehicles, and automobiles belonging to paraplegics.

TAKE A BOW, BALFOUR

MAY CO.
Los Angeles

February 12, 1953

Mr. Frank C. Balfour
Chief Right of Way Agent
Sacramento, California

Dear Mr. Balfour: It is with much regret that we missed seeing you before you left our city. By not being able to do it in person, we resort to this letter as the means of expressing to you our sincere appreciation for your courtesies, fair-minded considerations and most cooperative attitude in assisting in every way you can to promptly resolve the many details and problems concerning land we are endeavoring to acquire for a new store site in San Fernando Valley.

It is indeed most gratifying to come in contact with and be aware of such a competent, able public official as you have proven yourself to be in this instance. We wish to thank you very much for your fairness in evaluating our interests, yet at the same time putting the interests of the State of California first and foremost in any decisions you have made. We are looking forward to the pleasure of meeting you soon.

Most cordially yours,

(Signed) W. J. Brunmark
Vice President

REQUEST GRANTED

California Highways and Public Works
Sacramento, California

Gentlemen: I would appreciate very much your putting me on your mailing list to receive your bi-monthly publication *California Highways and Public Works.*

As a member of the City Planning Committee of the San Francisco Junior Chamber of Commerce, I am interested in highways and transportation and feel your publication would be of much benefit both to me and my committee.

Carter Norris, Jr.
Special Agent
Fidelity and Deposit Company of Maryland

EARL WARREN
Governor of California

•

FRANK B. DURKEE
Director of Public Works

•

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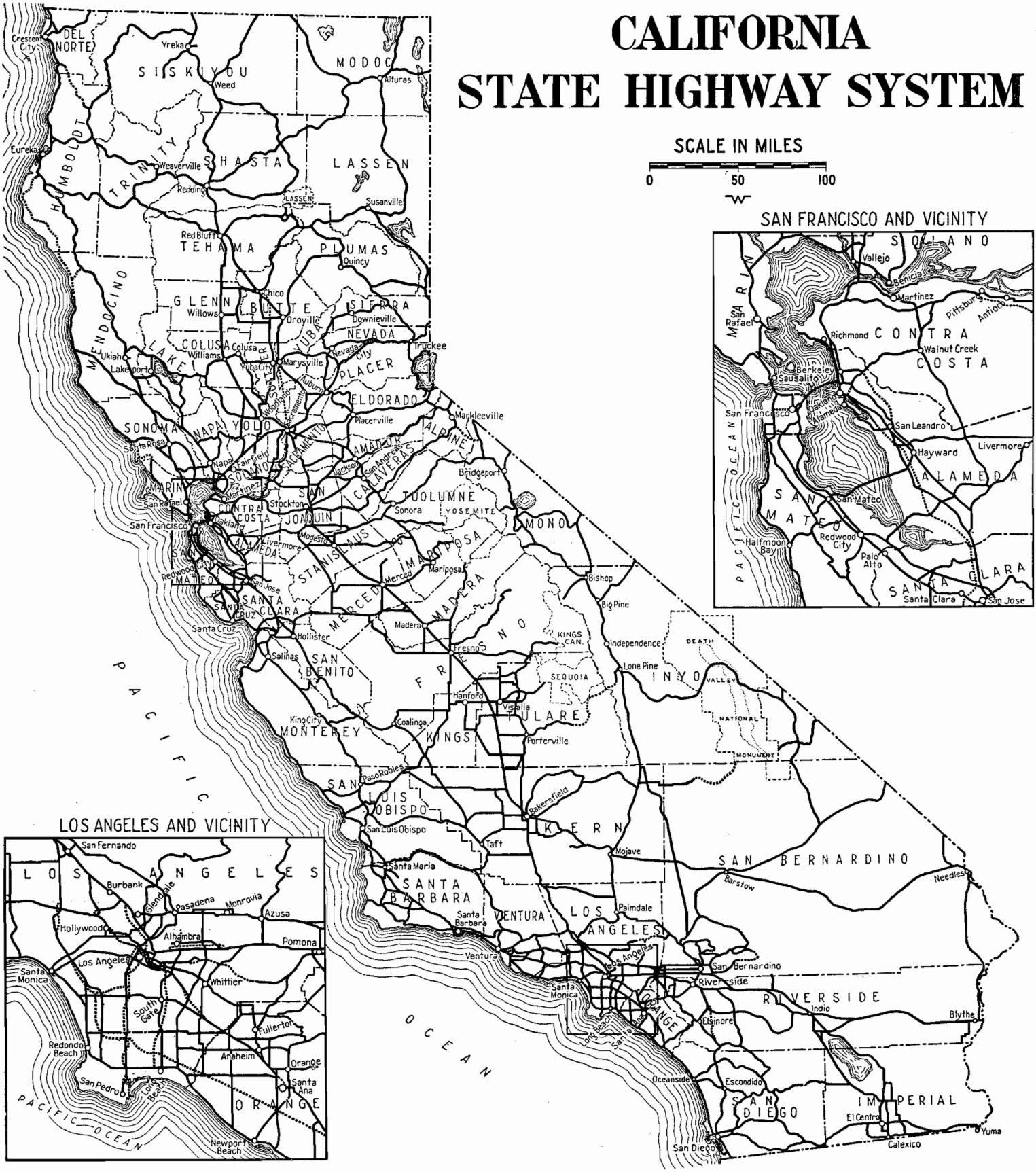
CALIFORNIA
STATE HIGHWAY SYSTEM



Sept. 1951