

CALIFORNIA

HIGHWAYS AND PUBLIC WORKS

DOCUMENT
ROOM

OCCIDENTAL COLLEGE

DEC 30 1952

LIBRARY

November - December
1952

California Highways and Public Works

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

FRANK B. DURKEE
Director

GEORGE T. McCOY
State Highway Engineer

KENNETH C. ADAMS, Editor

HELEN HALSTED, Associate Editor

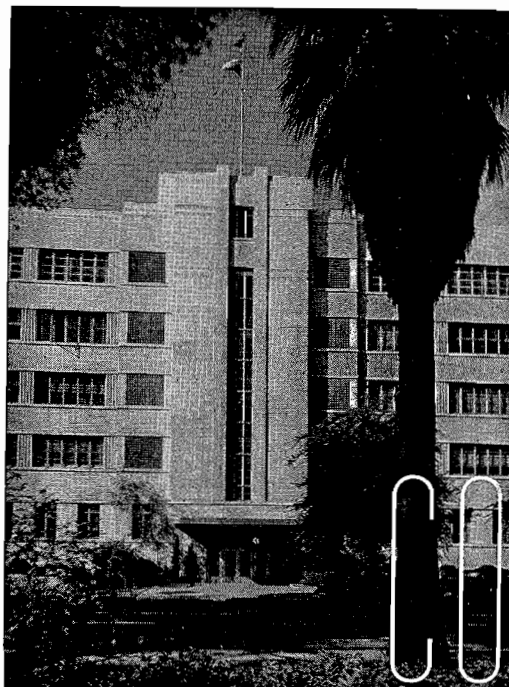
MERRITT R. NICKERSON, Chief Photographer

Published in the interest of highway development in California. Editors of newspapers and others are privileged to use matter contained herein. Cuts will be gladly loaned upon request.

Address communications to

CALIFORNIA HIGHWAYS AND PUBLIC WORKS
P. O. Box 1499
Sacramento, California

Vol. 31 November-December Nos. 11, 12



Public Works Building
Twelfth and N Streets
Sacramento

CONTENTS

	Page
Lights and Shadows in Rugged Mt. Diablo Terrain, Contra Costa County. Farm-to-Market Roads Feed Into Arnold Industrial Freeway. (See Article on Page 5.) Aerial Photo by Merritt R. Nickerson, Chief Photographer.....	Cover
From Old Streets to State-financed Freeways, Illustrated.....	1
By Frank B. Durkee, Director of Public Works	
Industrial Freeway, Illustrated.....	5
By D. M. Young, Resident Engineer	
Long Beach Freeway, Illustrated.....	9
By W. L. Fahey, District Engineer	
Norwalk Diagonal, Illustrated.....	16
By M. E. Cessna, District Engineer	
WASHO Road Test Now Progressing.....	23
Left Turns, Illustrated.....	24
Lab Tests, Illustrated.....	26
By Bailey Tremper, Supervising Materials and Research Engineer	
Next Budget, Illustrated.....	28
Old-timers in Division of Highways Honored, Illustrated.....	38
The Ups and Downs of Bridge Construction, Illustrated.....	39
By J. W. Green, Southern Representative, Bridge Department	
Life Line, Illustrated.....	42
By W. L. Savage, Assistant District Maintenance Engineer	
Early Days, Illustrated.....	44
By R. C. Kennedy, Secretary, California Highway Commission	
In Memoriam, Homer P. Brown.....	47
Bonneroo Stag, Illustrated.....	48
By H. R. Krieh, Associate Highway Engineer	
District VIII Office Building Completed, Illustrated.....	50
By Russell J. Standing, District Office Engineer	
Engineering Course Offered by Division of Highways.....	51
In Memoriam, Lawrence T. Robinson.....	51
River Road, Illustrated.....	52
By R. E. Stickel, District Office Engineer	
State Route 28 in Mendocino Being Realigned, Illustrated.....	54
The California Highway Commission Guests of San Francisco, Illustrated.....	55
Huge Slide on Sign Route 1, Illustrated.....	56
By P. L. Dito, District Maintenance Engineer	
One Fish That Didn't Get Away, Illustrated.....	57
Cornerstone Ceremony Marks Completion of Public Works Building Annex, Illustrated.....	58
Photo of Freeway Through Placerville.....	59
Out of the Mail Bag.....	60
Highway Bids and Awards.....	62

From Old-time Streets to State-financed Freeways

BY FRANK B. DURKEE *
Director of Public Works

Urban Areas Now Get
Increased Share of Funds

OUR PEOPLE frequently are neither aware of, nor perhaps interested in, which agency of government has jurisdiction over the surfaces on which they travel between origin and destination.

In California, we have about 20,000 miles of city streets, exclusive of state highways; approximately 67,000 miles of county roads; about 14,000 miles of state highways; together with a limited mileage of other public roads; a total motor vehicle transportation system over 100,000 miles.

There are states in which all of the rural mileage and some of the city streets are under a single system. But, in California, we reserve to local governments all the jurisdiction possible. This policy, however, poses a challenge. Efficiency and coordination must not be sacrificed for the mere sake of local control.

It has been my privilege in the course of more than 25 years as a state employee to observe that this challenge has been met, particularly in the last decade. We have achieved, under a system of three jurisdictions, a remarkable degree of efficiency. The answer is teamwork, based on mutual good will and understanding. In other words, the matter of jurisdiction can hardly be said to be one of California's street, road and highway problems today.

Highway Amendment of 1902

The people of California did not consider city streets a factor in their original thinking about state highways. Exactly 50 years ago, the people adopted Section 36, Article IV of the Constitution, empowering the Legislature to establish a system of state highways and to declare any county road a state highway and "to extend aid for the construction and maintenance in whole or in part of any county high-

way." It is to be noted that nothing was said about city streets.

Nor was anything said about city streets in the State Highway Bond Acts of 1909 and 1915, or the bond amendment of 1919. The language of these enactments spoke of highways running north and south through the State "connecting" the county seats and the centers of population.

This appears to have been no more than a reflection of the realities of inter-city travel at the time. You left the "through" route, the state highway, when you entered the city, and you proceeded on city streets, usually the main business street, until you passed the city boundary again.

Far from receiving state funds for city street development, the tendency 30 years ago was for the cities to extend aid outside their own borders.

Out of the Mud

Meanwhile, as the State Highway System climbed out of the mud, motorists began to be increasingly aware of the difference between a highway, built with state funds to carry them across country, and a street, built with local funds and designed to serve local traffic, over which they had to travel on the same journey. The smaller and poorer the city, the rougher the trip between its boundaries. There was no need for signs at city boundaries. You knew it when you hit the chuck hole at the end of the state highway pavement.

First Highway Aid to Cities

The first state action to remedy this situation was taken in 1925. The Legislature directed the Highway Commission, upon the request of any city of 2,500 population, or less, to step in and improve up to the standards of the adjacent state highway any street carrying state highway traffic which the city was willing to dedicate for the purpose.

This legislative recognition of the through-traffic problem provided the cue for the Legislature and the Highway Commission to take the logical next step. In 1931, the commission began allotting funds to cities, on a co-operative basis, to enable them to obtain the wider and heavier pavements needed on those streets which connected the rural state highway routes. In 1933, this fund for cooperative projects amounted to the respectable total of \$3,300,000 for the ensuing biennium.

The need for these cooperative funds was relieved by the action of the Legislature in 1933, when it required the commission to allocate one-quarter of a cent per gallon of the gasoline tax for the improvement of state highway routes within cities.

The next most important year for the cities probably was 1935, when the Legislature allocated another one-quarter cent per gallon of gasoline tax to the cities for expenditure on major city streets, other than state highways.

Also, the Legislature took cognizance of the fact that by virtue of the 1933 quarter-cent allocation it had become necessary to think of state highways as going through cities, not to and from cities. As a result, it enacted Section 111 of the Streets and Highways Code, which recognized this fact and spoke for the first time of the "natural course of a state highway" through a city. The Highway Commission was empowered to "determine the location of the connecting portion necessary to make the state highway continuous." The section significantly adds: "Such location may be either through or around such city, depending upon the commission's determination as to which location will be of the greatest benefit to through traffic upon such state highway."

Thus, in 33 years, the thinking had come almost full circle, from ignoring through traffic within cities to recog-

* From a talk by Mr. Durkee before the General Luncheon Session of the Annual Conference of the California League of Cities, San Diego, October 13, 1952.

nizing it as paramount as far as highway routing is concerned.

Collier-Burns Act

The next step was taken, in 1947, when the Collier-Burns Highway Act increased the allocation of gasoline tax funds to cities to five-eighths of a cent per gallon, all of it earmarked for city streets off the State Highway System. At the same time, the Legislature specifically provided that the state highway routes within the cities should remain the responsibility of the State, to be constructed and maintained on the same basis as all other state highways and with state funds.

For all practical purposes, the coin has now been completely reversed. In place of ignoring city streets as a state responsibility, we have come now to the actual creation of new city streets by the State, most of them of the freeway type. Freeways add much more to the city street system than their lane-mile totals indicate. They add far more capacity than an equivalent mileage of ordinary city streets, since they are designed to do their traffic-carrying job without the obstacles presented by parking, intersections, crossing and turning movements and stop and go signals.

Now that we have some freeway mileage within our cities, we wonder how we ever lived without them.

1951 Inventory of Highway Needs

As evidence of the tremendous reversal in thought about state responsibility for highways through cities, I

should like to call attention to the chart entitled "1951 Inventory of State Highway Needs." The Division of Highways at the request of the Legislature submitted last year, that is, 1951, a detailed list of state highway deficiencies. As the chart shows, this study indicated that one and six-tenths billion dollars would be required to bring the state highways outside of cities up to satisfactory standards of safety and capacity.

It was estimated also that nearly an equal amount, one and four-tenths billion dollars, would be required to bring the state highways inside cities up to adequate standards. The recognition of these needs within cities, in the official planning of our state highway development, represents a vast change from the early conception of the State Highway System.

The comparative mileages percentage wise, of state highway inside and outside cities further underline the contrast between the past and present. The total mileage of state highways in California is 13,986. Of this total, 12,767 miles, or 91 percent, lie outside incorporated cities; and only 1,219 miles, or 9 percent are located inside cities. You will note from the chart that the mileage of deficiencies, or needs, is in about the same ratio. The mileage of the State Highway System in need of improvement as of last year came to 11,298. Of this deficient mileage, 10,475 miles are outside cities and constitute 93 percent, and 823 miles are inside cities, and represent 7 percent of the mileage deficiency.

As the two columns on the chart further indicate, the cost of making our state highways adequate for today's traffic would average some \$153,000 per mile outside cities, and \$1,700,000 per mile inside cities. These figures are useful only for purposes of illustration, as there is no such thing as a "typical" mile of state highway, especially in urban areas.

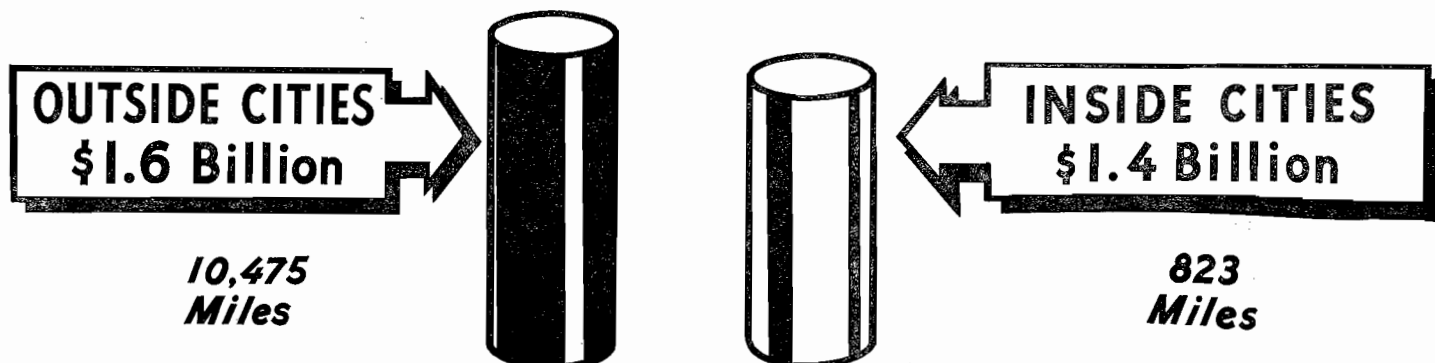
Reasons for this wide variation between rural and urban highway needs and costs are obvious. In the cities, where traffic counts on some freeway sections have already exceeded 100,000 vehicles in a 16-hour period, additional lanes are necessary; traffic interchanges are more complicated; structures are more numerous, wider and longer; and right of way costs are a great deal higher.

Construction Chart 1930-1952

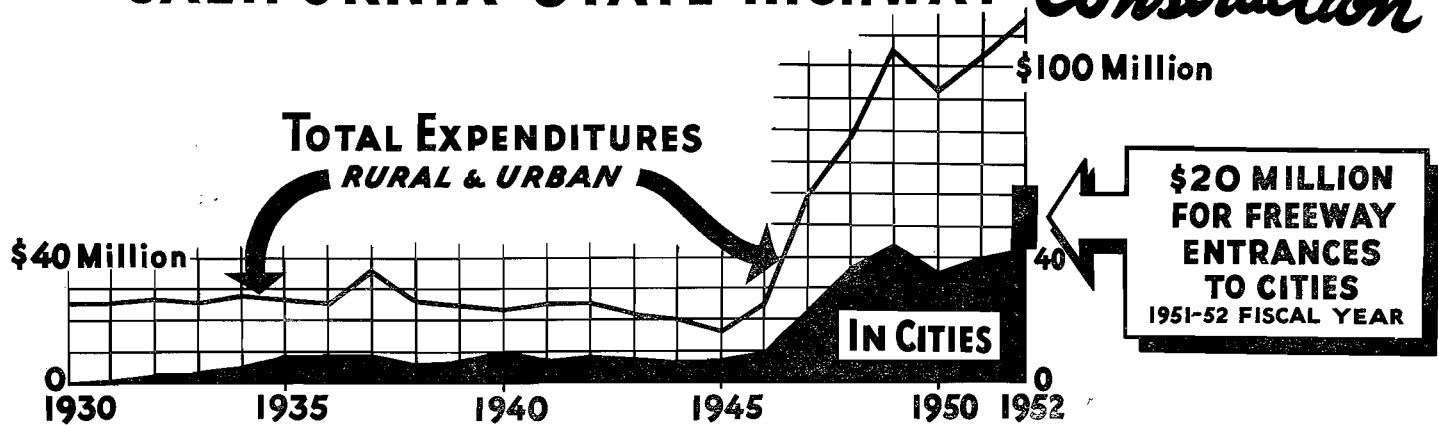
The increasing and continuing attention to the transportation needs within cities is demonstrated by the other chart entitled "California State Highway Construction," which shows the expenditures for state highway improvements, including costs of rights of way, from 1930 through 1952.

You will note that in 1930 the total construction expenditures for state highways, both rural and urban, were about 25 million dollars. Of this total, less than a million dollars was expended inside cities. Expenditure of state highway funds within cities at that time was limited to places of 2,500 population, or less, in accordance with the legislative authorization of 1925.

1951 *Inventory* OF STATE HIGHWAY *needs*



CALIFORNIA STATE HIGHWAY *Construction*



Following the authority vested in the Highway Commission by the Legislature in 1931, allocations for cooperative city projects on state highway routes in cities began to be made without limitation as to size of the city. In the 1931-32 Fiscal Year, nearly a million dollars was expended out of an initial \$2,750,000 cooperative fund. A further cooperative fund allocation of \$3,300,000 for city projects was made by the commission prior to the passage in 1933 of the one-quarter cent per gallon gasoline tax allocation for improvement of state highway routes through cities.

Progress Stepped Up

Since 1947, progress in state highway improvement has stepped up in comparison with preceding years. In the first five years of operation under the Collier-Burns Highway Act, ending June 30, 1952, a total of over \$500,000,000 was expended or obligated for state highway improvement. Of this amount, approximately \$200,000,000 was devoted to state highway routes in cities.

The chart shows the continuing increase in state highway expenditures through cities culminating in the current 1952 expenditure of more than \$43,000,000 out of a total construction and right of way budget of some \$116,000,000.

In addition, since 1947, a total of \$87,802,000 of State Highway Fund moneys has become available for expenditure on city streets, apart from state highways. This total has accrued from the five-eighths of a cent of gasoline tax for city streets provided in the Collier-Burns Act.*

I should like to point out to you that the amounts cited as expended within cities apply to the corporate limits of the municipalities. In addition to the amounts allocated for expenditure within incorporated limits, upwards of \$20,000,000 in construction projects were included in the 1951-52 Fiscal Year budget for major highway developments adjacent to cities in fringe areas. The need for such projects in these areas and their importance to the cities, is recognized, I am sure, by all.

Problem of Transportation

The inventory of state highway needs gives us a target at which to shoot. But it reveals only one segment of a complex and many-sided problem. The time is coming, if indeed, it is not already here, when the highway problem can no longer be dealt with as a clear-cut, independent field, but rather one that must be treated as an integral part of the broad problem of transportation as a whole. To some extent this has always been true; but, whereas, in the past our network of roads, streets and highways has been generally considered as existing alongside other transportation facilities and supplementary to them, now the whole transportation problem has become so interwoven that its various components cannot be fully isolated one from another.

* During the same period there was apportioned to the counties for county road purposes from the Highway Users Tax Fund a total of \$234,955,000.

The function of our transportation system is to move people and goods safely and expeditiously, when and where desired. That means all the way from origin to destination.

The Chamber of Commerce of the United States recently estimated that the mileage traveled by passenger automobile for the first six months of 1952 increased nearly 7 percent over the same period last year. This percentage was higher in California. At the same time, local commercial traffic—transit lines, suburban busses and commuter trains—showed a decrease of 6 percent. Everywhere, as the national chamber points out, common carriers have found it difficult to keep pace with the increase in the use of passenger automobiles, both in local and intercity travel.

We have no idea how far this trend will take us. We do know that in California we had a little over 2,000,000 motor vehicles registered in 1930; about 3,000,000 in 1940; and an estimate of 5,500,000 or more for 1952. California vehicle registration exceeds that of New York State, and is 10 percent of the U. S. total. In the seven years since World War II, motor vehicle registration in the United States increased 70 percent; in California, in the same period, it increased 80 percent. Is it any wonder we have a traffic problem?

Population Figures

In 1940, California had a population of less than 7,000,000. In 1950, more than 7,000,000 lived in our cities alone, with rural population bringing the total for the State to 10,586,000. The latest available estimate of the State's population is about 11,000,000. The State

Chamber of Commerce has forecast a population figure of more than 14,000,000 by 1960, with a registration of 6,500,000 motor vehicles.

The travel on our state highways alone, in 1951, amounted to the fantastic figure of more than 48,000,000,000 vehicle miles. This is almost exactly double the mileage of vehicular travel on our highways in 1940. Again, I say, is it any wonder we have a traffic problem?

Obviously, we have not been able to provide the street and highway facilities required by this tremendous and continuing increase in people and vehicles.

In rural areas, the transportation problem is still one where adequate highways can play a major role in the solution. Highways are doing a pretty good job, within financial limitations, in getting people and goods from city to city. In these rural areas, transportation by motor vehicle is basically a state highway affair. The network of other roads is built around the state highway, which follows the historic main route, between centers of population. Vehicles flow into, along and out of the highway traffic stream, and where the highway has been constructed to adequate standards for today's traffic, there is little congestion and a good level of safety.

Multilane Highways

For example, the highway portion of the transportation system between Los Angeles and Sacramento is doing the job it should, in greater and greater measure. Of the 384 miles of U. S. Highway 99 between those two cities, a total of 236 miles have been constructed to divided multilane standards. An additional 29 miles are under construction.

But when U. S. 99 enters Los Angeles, or Sacramento, something happens. It ceases to dominate the transportation picture; instead, it becomes just another congested city street.

In our cities, which have two-thirds of California's total population, and in large suburban communities around about, the "when and where" of our transportation goal becomes a problem of connecting streets, and also a problem of where to put the car until it is needed for the return trip. The free-



FRANK B. DURKEE

way obviously has not supplied the full solution, and it is doubtful that it ever will. It reduces the nerve-racking congestion en route; but in so doing, it has served to spotlight the collateral problem of parking, or space for parking. With our motor vehicle registration mounting steadily, we are now beginning to provide the traffic lanes necessary to carry cars in motion, but there is always the question of space for cars at rest. It is inevitable that answers to the transportation problem, other than highway improvement, must be considered.

The freeway permits movement of vehicles, but it is mass transportation that moves individuals.

Future Studies

There is no doubt that future consideration of California highway needs will go beyond the scope of past studies. The Joint Legislative Highway Fact-finding Committee has been authorized to expand its current investigation to include roads and streets under local jurisdiction.

The Institute of Transportation and Traffic Engineering at the University of California has been requested to submit to the State Assembly next year a prospectus for a study of metropolitan transportation problems.

Relief for Congestion Demanded Now

In the meantime, we must continue to work, as far as the available funds permit, toward the relief of congestion and the reduction of the accident hazard on our state highways, including the routes within cities. The traffic which needs freeways now simply cannot wait until the over-all metropolitan transportation answer is found and applied.

The Highway Commission has a legislative mandate to provide for the needs of through traffic.

Another mandate has come from the Federal Government, which since 1944, has provided funds for expenditures in urban areas on highways on the Federal Aid Primary System. In the next two years, the allocation for urban federal aid highways in California is estimated at \$11,837,000 per year, to be matched by state funds. The Bureau of Public Roads has just issued the following statement of policy with regard to these expenditures in urban areas:

"Improvements to be financed under provisions of Federal Aid Highway Act of 1944, and subsequent acts, with funds authorized for expenditure only in urban areas, are intended to be substantial in character and of benefit to the involved municipality. Projects which accomplish only incidental improvement, and do not result in increased traffic capacity, shall not be financed with urban funds."

This is a policy with which the California Highway Commission is in hearty agreement. Even though short-term improvements have had to be provided on occasion to meet a genuine emergency, it has always been with regret that the commission has seen long-range highway improvements, designed to provide additional capacity, thus deprived of their full share of the limited funds available.

Advance Planning and Fiscal Policy

The Legislature has taken the same view. In 1943, it put into law its thinking about the orderly and planned development of the State Highway System, and the way in which it wants the solution to our highway problems approached. Section 70.2 of the Streets

... Continued on page 37

Industrial Freeway

Fourth Link of the Arnold Highway Ready Next Spring

By D. M. YOUNG, Resident Engineer

THE FOURTH LINK of the "Arnold Industrial Highway" in Contra Costa County is being rapidly forged in the construction of the Pittsburg-Antioch Freeway.

The freeway is being constructed over fairly flat terrain of the once large Rancho Los Medanos. The Rancho Los Medanos (Medanos meaning sand hills) consisted of nearly 9,000 acres lying in Township 2 North, Range 1 East of the Mt. Diablo base and meridian. The land was first granted to the Mesa brothers by the Mexican government in 1839. Change of ownership occurred frequently from 1850 until 1900 when it was secured by Charles A. Hooper, and has since been operated by the C. A. Hooper Land Company. Industrial and residential expansion together with the creation of the Camp Stone-

man staging depot by the United States Army has absorbed considerable acreage of the initial land grant.

The Pittsburg-Antioch area with extensive water and rail facilities, and the immediate prospect of improved highways, has been rapidly expanding as an industrial unit of the larger San Francisco Bay area.

Antioch Founded in 1850

Antioch was founded in 1850 by pioneers sailing from Maine seeking agricultural lands. The original townsite was laid out and streets named after these pioneers. Later, these street names were replaced by numbered and alphabetical nomenclatures, an attempt at modernization which now is being defeated by tract development with personal names being given the newly developed streets.

Pittsburg, situated at the confluence of the Sacramento and San Joaquin Rivers, was thus officially named in 1911 three years after the founding of the local Columbia Steel Company plant. Originally known as New York Landing, it carried the nomenclature of Black Diamond during the active period of the coal industry.

Approximately four miles southerly of the Pittsburg-Antioch section lies the Diablo soft coal field where once flourished the towns of Nortonville, Sommersville and Stewartville from 1860 until 1902. The coal was transported to the waterfront by three narrow-gauge gravity railroads whence it was shipped by cargo vessels; water being the only transportation available until the advent of the first through railroad in 1878.

Southern Pacific spur track overcrossing, showing freeway paving operations in progress



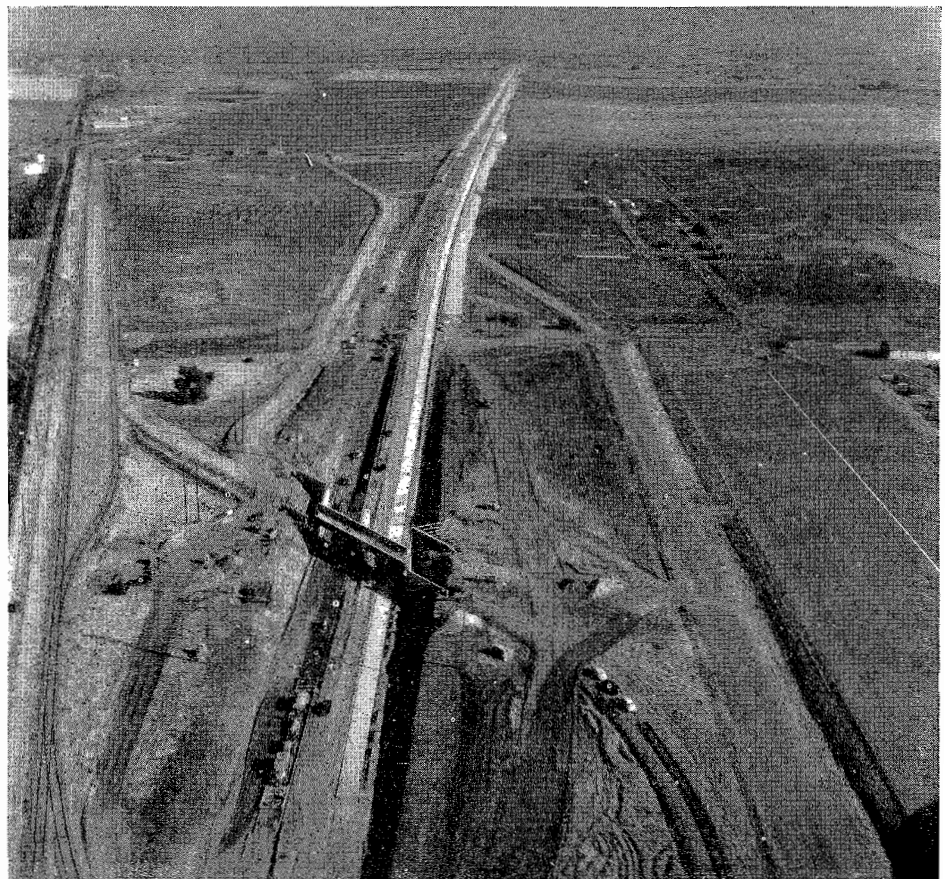
Eliminate Bottleneck

In the latter part of the nineteenth century, development of hard coal mines in Oregon and Washington coupled with water seepage and land slides in the Diablo mines foreshadowed their demise.

The bottleneck created by the temporary connection to the City of Pittsburg at the easterly limits of the present freeway will be eliminated by the diamond interchange now being constructed at Railroad Avenue. Commercial traffic in the large and rapidly expanding Pittsburg-Antioch industrial area will be served by this project as well as "through" traffic from the Delta lands of the Sacramento and San Joaquin Rivers to the Bay area. Grade separation structures together with on and off ramps will provide convenient accessibility for the traveling public.

Work was started under this contract on February 25, 1952, by Peter Kiewit Sons' Company of Omaha, Nebraska, and is being supervised by George Premo, Jr.,

Looking east from railroad spur track overcrossing, which also will accommodate vehicular crossing of Incinerator Road →



Looking west from Harbor Street overcrossing. Railroad Avenue overcrossing and portion of previously completed freeway in background. Camp Stoneman on left.

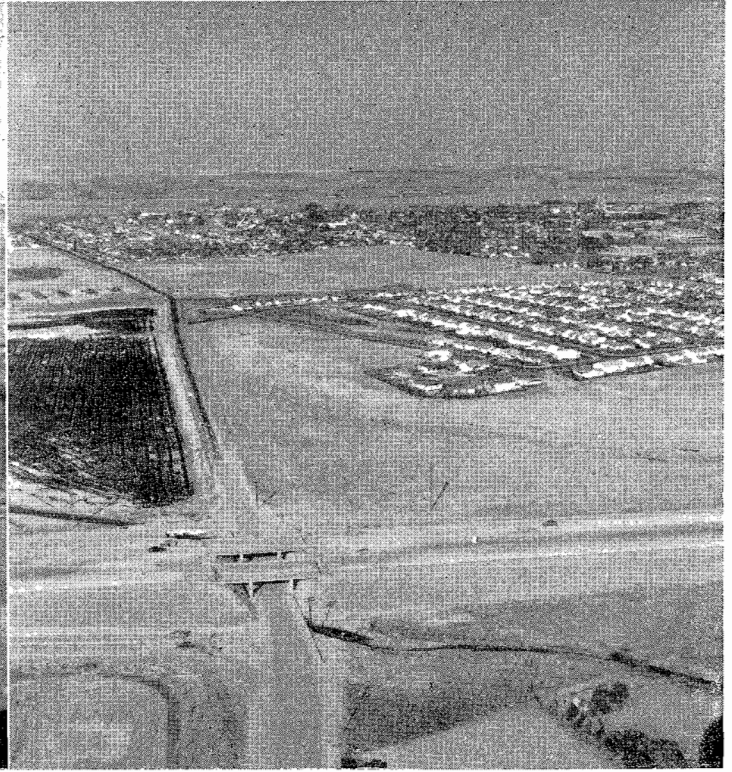
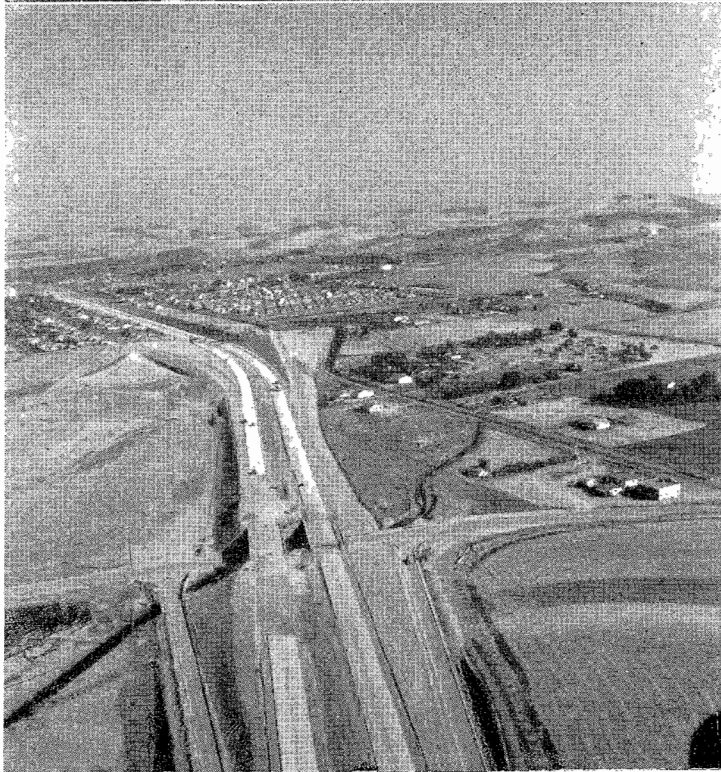
General Superintendent, and Gene Neville, Project Engineer, working out of the division office in Arcadia, California. Progress has been good and it is anticipated the project will be completed about May, 1953, thus utilizing approximately half the 400 working days allotted by the contract.

Divided Four-lane Highway

The project, five miles in length from the southerly city limits of Pittsburg to the easterly portion of Antioch, consists of a divided four-lane portland cement concrete pavement with shoulders, ramps and service roads of plant mixed surfacing.

Numerous structures, including the following grade separations, are being constructed as part of the project.

RAILROAD AVENUE OVERCROSSING is a reinforced concrete flat slab type structure supported on reinforced concrete abutments and center bent on reinforced concrete spread footings.



UPPER LEFT—Looking west from Camp Stoneman underpass with Harbor Street and Railroad Avenue overcrossings in background. UPPER RIGHT—Southern Pacific spur track overcrossing, showing freeway paving operations in progress. LOWER LEFT—Intersection of California Avenue with existing State Highway Route 75, about 1.5 miles east of Pittsburg. LOWER RIGHT—Stewartville Road underpass, looking north toward Antioch.

A diamond type interchange is to be constructed with ramps, signals and lighting to provide free traffic flow at this intersection.

HARBOR STREET OVERCROSSING is similar in construction to the Railroad Avenue structure serving Camp Stoneman.

CAMP STONEMAN ROAD UNDERPASS is a structural steel through-girder railroad underpass and a structural steel rolled beam overcrossing. The

dual structure will serve rail and vehicular traffic within the several portions of Camp Stoneman.

STANDARD OIL ROAD UNDERCROSSING consists of a pair of similar parallel reinforced concrete slab type bridges supported on common reinforced concrete abutments on spread footings.

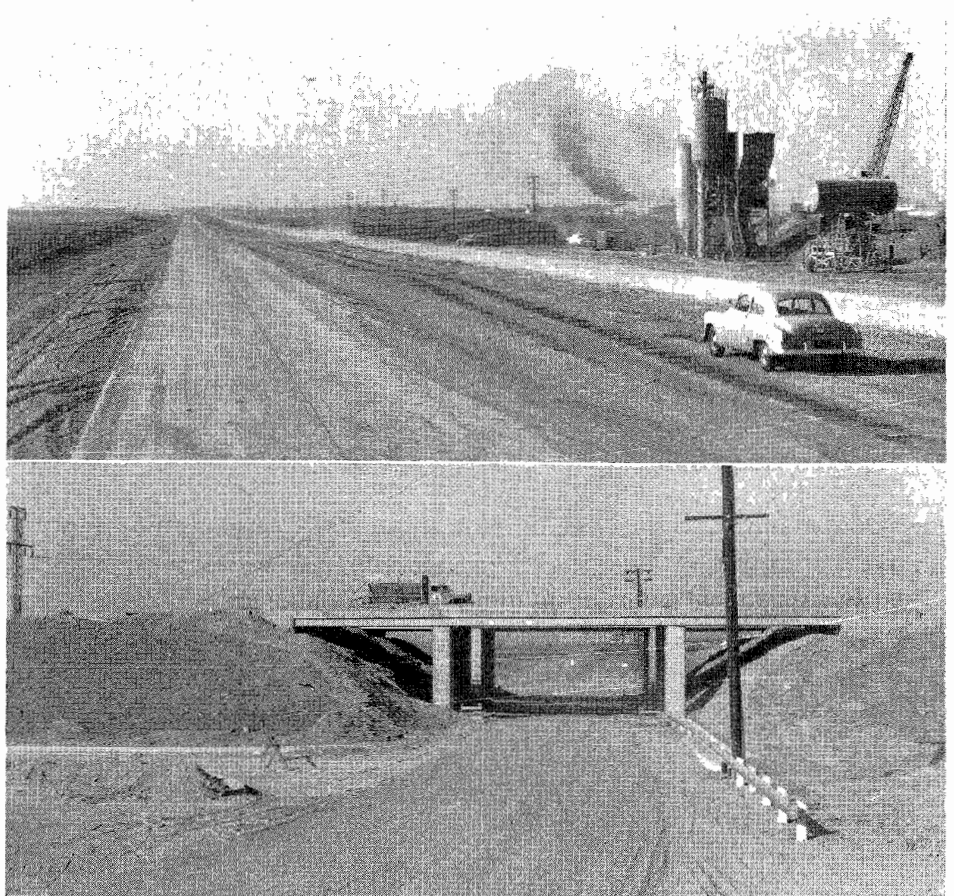
STEWARTVILLE ROAD UNDERCROSSING consists of a pair of similar, parallel, reinforced concrete slab type bridges.

A semidiamond type interchange with lighting and connecting ramps will provide for ingress and egress westerly on the freeway.

H STREET OVERCROSSING consists of a reinforced concrete tee-beam type of bridge with two equal clear spans, each supported on reinforced concrete type abutments and center bent on spread footings.

A semidiamond type interchange will be constructed similar to that at Stewartville Road.

TOP—Section of Arnold Industrial Freeway, looking west, showing contractor's concrete batching plant on right. BOTTOM—Stewartville Road undercrossing, looking north. →



Showing easterly terminus of current freeway construction entering Antioch near A Street ←

Grade Crossings

Channelized grade crossings will be constructed at the Somersville Road and Lone Tree Way intersections. A temporary wye-type connection will be provided to A Street in Antioch at the easterly terminus of this project.

Concrete used in bridge structures and culverts is being mixed in a central mixing plant located midway of the project and hauled to the structures in "dumpcrete" trucks. Air entrainment is being used to prevent segregation of aggregates.

The geometric section of the roadway consists of four 12-foot lanes with 8-foot outside shoulders and a median strip varying in width from a minimum of 12-foot curbed division to 40-foot open division. The surfacing is 8 inches of portland cement concrete placed on 10 to 16 inches of imported base material, of which the top 4 inches is treated with cement. Shoulders will be

... Continued on page 64

Long Beach Freeway

Progress Report on
Construction Operations

By W. L. FAHEY, District Engineer

IN THE MAY-JUNE, 1951, issue of *California Highways and Public Works* there was a story entitled "Moving Forward" by District Engineer M. E. Cessna, written before start of construction, that gave a general description of the inception and development of the Los Angeles River Freeway, as it was then called. This story was published with an illustrative map and with photographs descriptive of this 16.2-mile freeway route extending southerly from the Santa Ana Freeway to Pacific Coast Highway in the City of Long Beach.

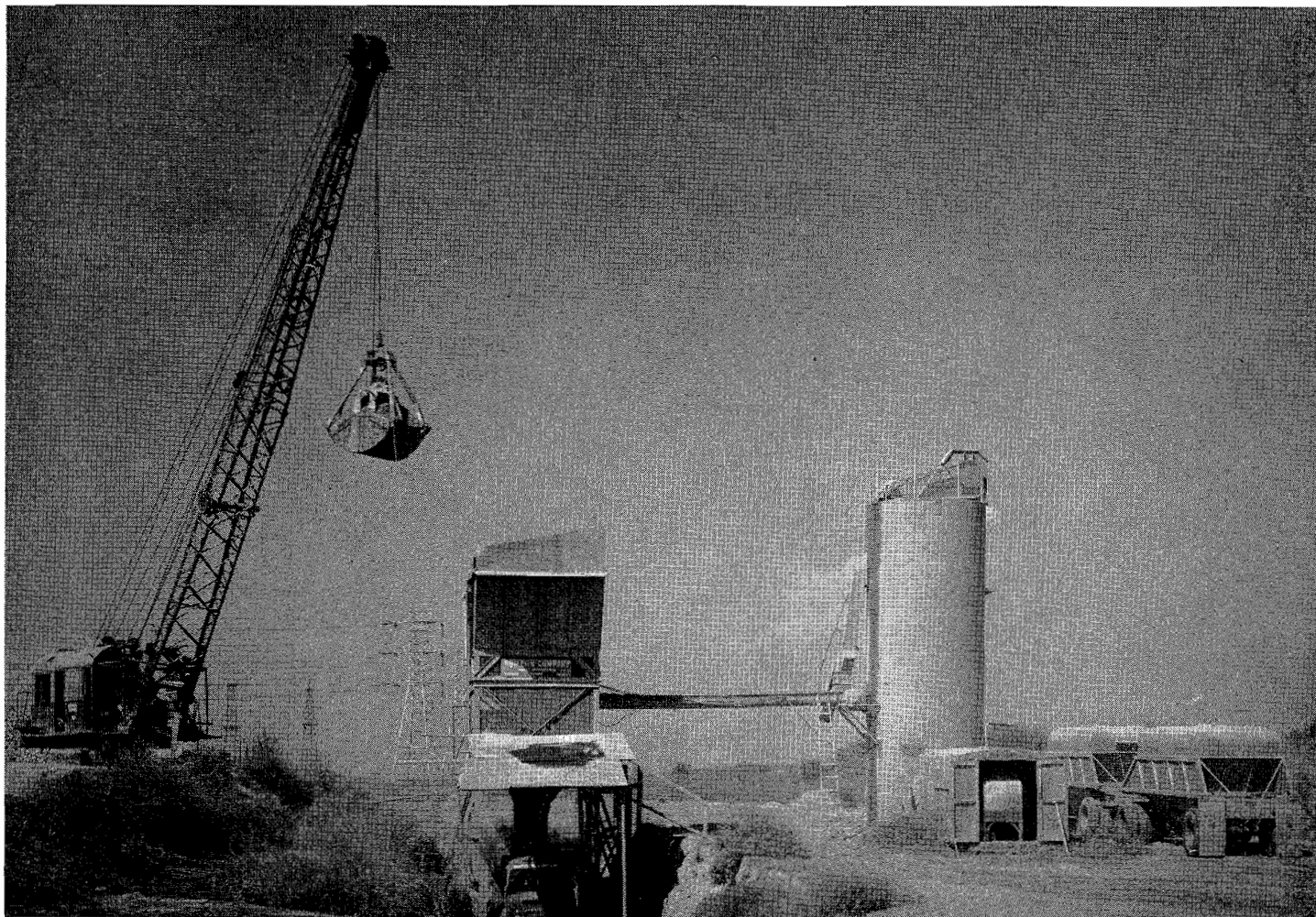
Now Long Beach Freeway

While the original name of this freeway, which will be State Highway Route 167 replacing the present routing along Atlantic Boulevard as shown on various maps, was Los Angeles River Freeway, the Los Angeles County Board of Supervisors some months ago adopted a resolution officially changing the name to Long Beach Freeway. The new designation is logical because the southerly terminus of this freeway is in the City of Long Beach. This new name has been well received by local people, and it appears particularly ap-

propriate because of the accomplishments of Long Beach in developing this freeway, especially the southerly extension thereof beyond Pacific Coast Highway that is inside the city but not on the State Highway System.

At the time the prior story was written, bids had just been received for the first major unit of construction on this freeway, extending from Pacific Coast Highway northerly 2.5 miles to 223d Street. Subsequently, award of this contract was made to Griffith Company and five other contracts have been awarded, so that at the present time

Portland cement concrete batch plant used in construction operations on Long Beach Freeway, located just beyond north end of project



there is a total of \$4,500,000 in construction contracts now in progress.

Bids Opened

Bids were opened on November 6, 1952, in the District VII Los Angeles office for grading, paving, and five bridge structures on the Long Beach Freeway from 223d Street northerly 4.5 miles to the south junction with Atlantic Avenue in the City of Compton. Bids were received from seven contractors. The low bid was submitted by Ukropina, Polich & Kral with the total of the contract items being \$2,559,019. Since this contract carries a time limit of 380 days, we can reasonably expect completion by July,

1954. At this time we will then have completed and open to public traffic full freeway construction for seven miles from Pacific Coast Highway in Long Beach to Atlantic Avenue in Compton.

Radio and television newscasts have made us familiar with the procedure of having reporters on the ground tell their own stories about current happenings. Therefore, we are now having Resident Engineer H. F. Meinke report on the activities on the Long Beach Freeway involving road construction, Supervising Bridge Engineer J. E. McMahon report concerning bridge construction, and Jess D. Gilkerson, City Engineer of Long Beach, report con-

cerning the activities of the City of Long Beach on this freeway for that southerly unit which is not on the State Highway System. Their reports follow:

REPORT BY H. F. MEINKE

On May 31, 1951, State Highway Contract 51-7VC49-F in the amount of \$1,429,146 was awarded to Griffith Company for constructing the first unit of the Long Beach Freeway, about 2.5 miles in length, providing for a six-lane grade-separated divided highway in the City of Long Beach, between Pacific Coast Highway, State Route 60, and 223d Street. This portion of the freeway is adjacent to the westerly levee

Looking northerly along Long Beach Freeway, showing paving operations in progress in vicinity of crossing with Willow Street





Looking southeasterly along Long Beach Freeway, showing grade separation and traffic interchange facilities at Belhart Avenue Crossing

of the Los Angeles River, which forms a natural barrier to cross traffic except at the three main existing bridge crossings at Pacific Coast Highway, Willow Street, and Belhart Street.

The main items of work on this contract consist in general of constructing a graded roadbed; surfacing with Portland cement concrete pavement on cement treated subgrade over imported base material; placing plant-mixed surfacing on shoulders; constructing accelerating and decelerating lanes and interchange roadways surfaced with plant-mixed surfacing on untreated rock base over imported subbase material; placing plant-mixed surfacing on plant-mixed cement treated base; and constructing a new reinforced concrete box girder type of bridge consisting of three spans supported on reinforced concrete bents on untreated timber and

concrete piles. Other miscellaneous items of work consist of drainage structures; plant-mixed surfacing curbs and ditches; concrete curbs, gutters, sidewalks and driveways; concrete pipe culverts; and six-foot chain link fence.

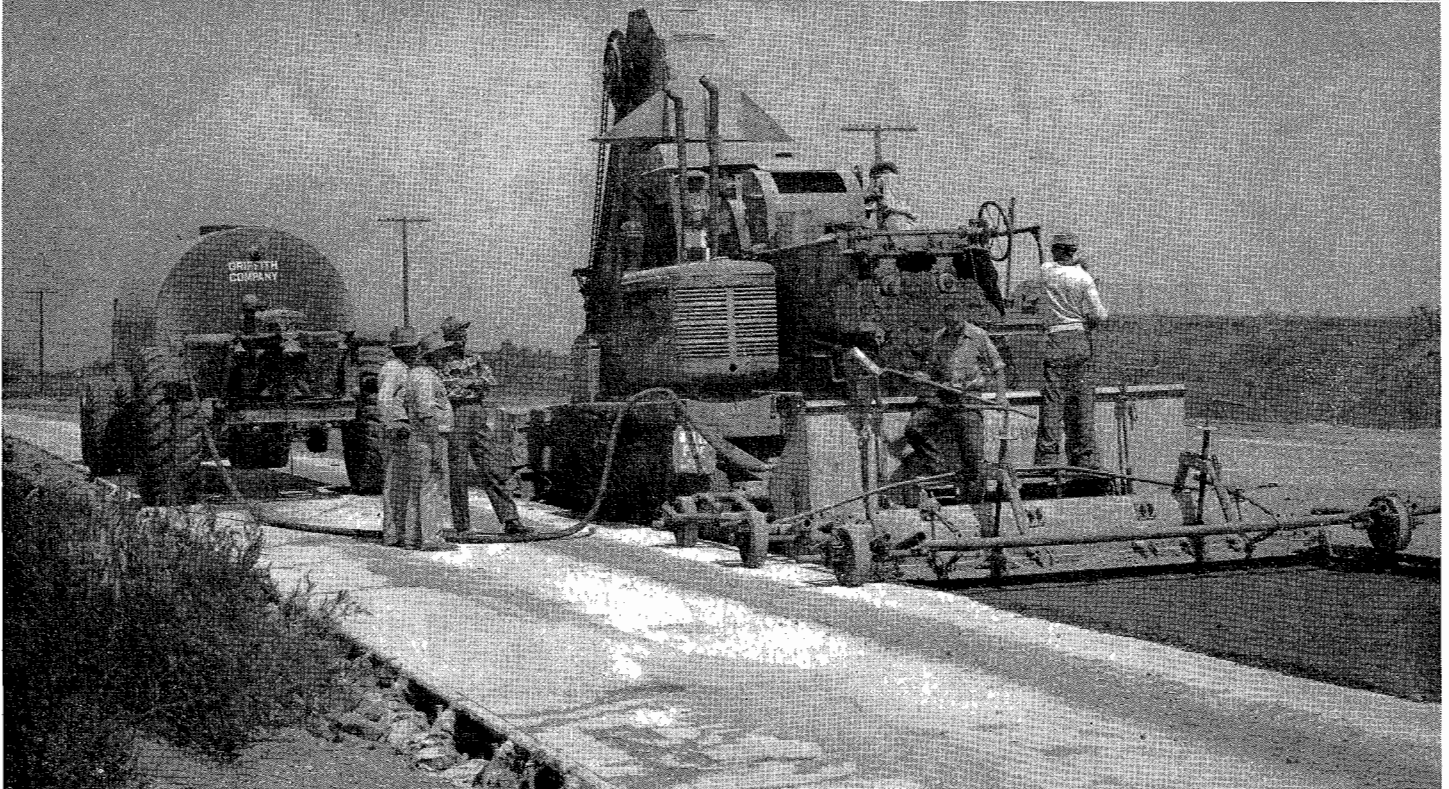
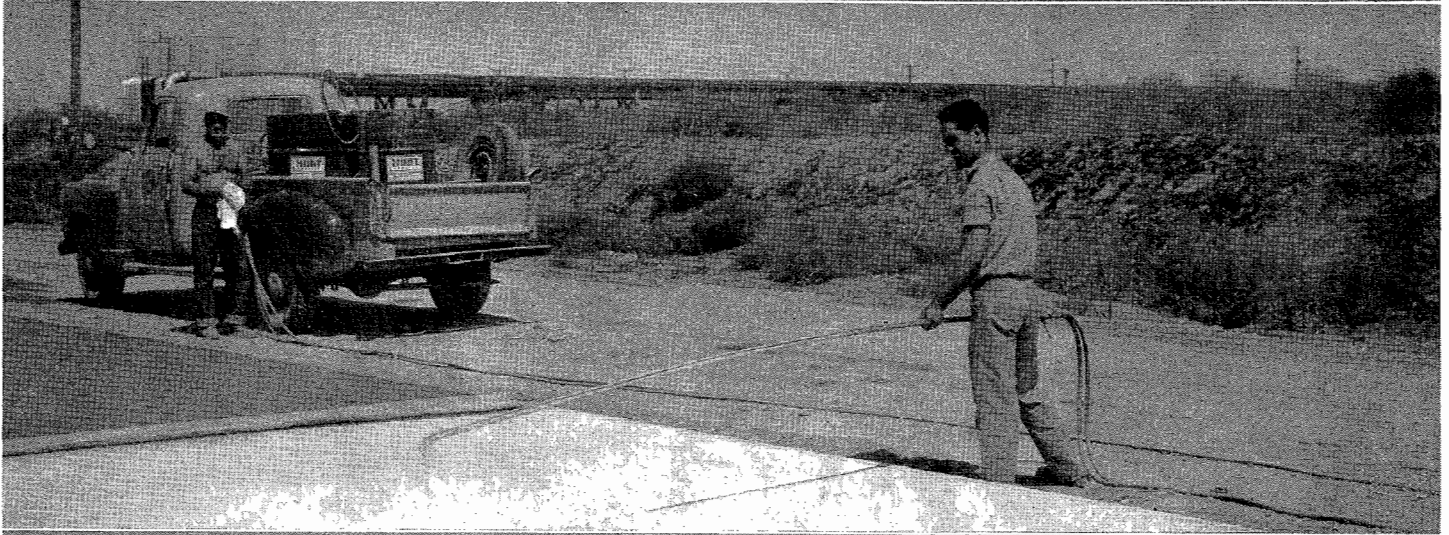
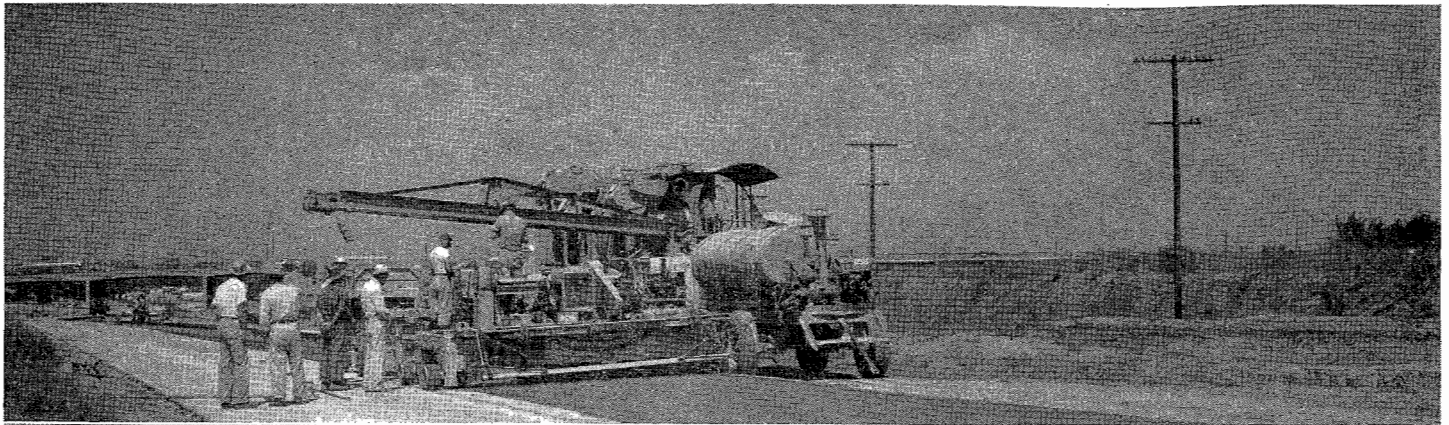
Detour Constructed

The first order of work was to construct an initial detour around the existing grade separation at Pico Avenue and Pacific Coast Highway to permit the removal of the old bridge. The final stage of the detour was then constructed around the State Highway Route 60/167 overcrossing for the use of public traffic until the completion of the new structure was accomplished. The fill material placed in the detour was later salvaged and used for the construction of roadway embankments for on and off ramps at the Pacific Coast Highway grade separation.

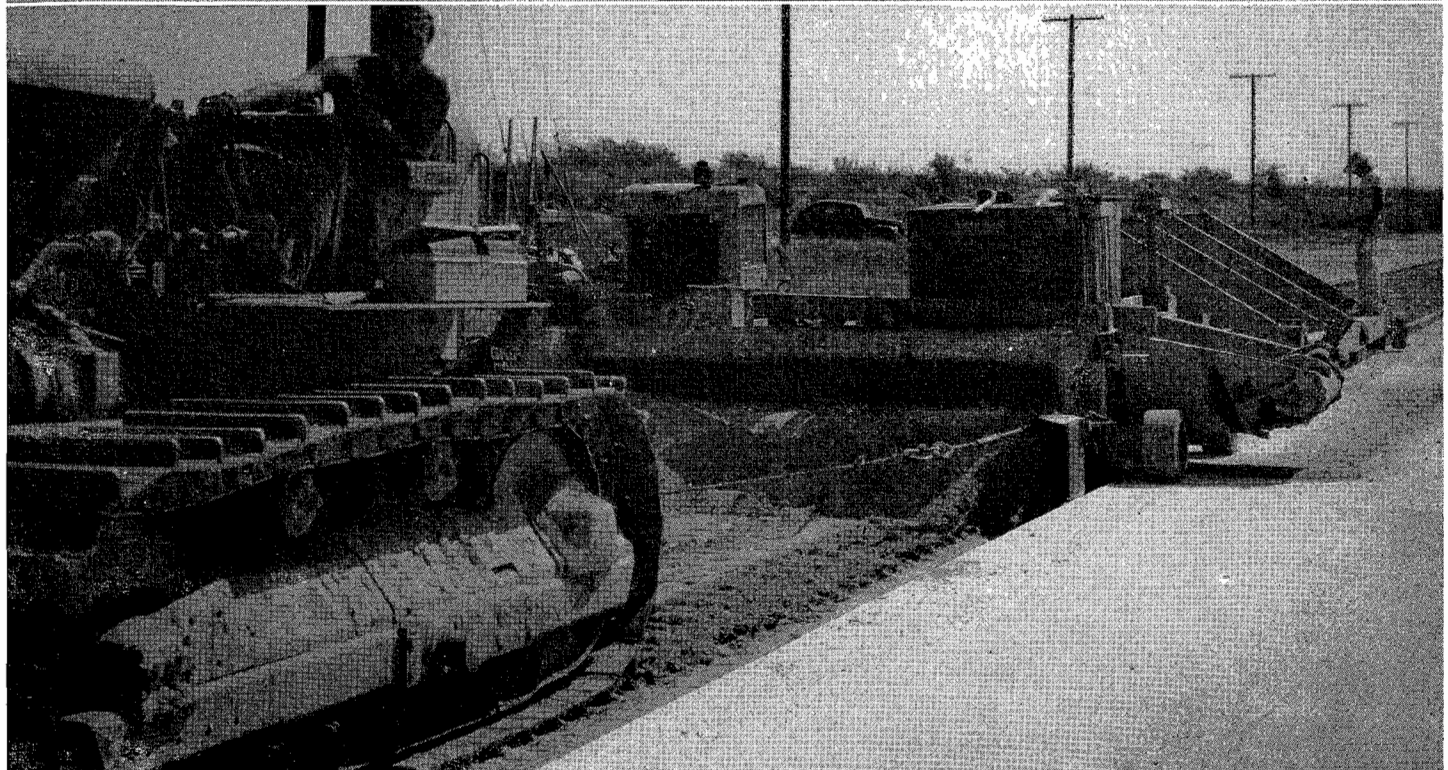
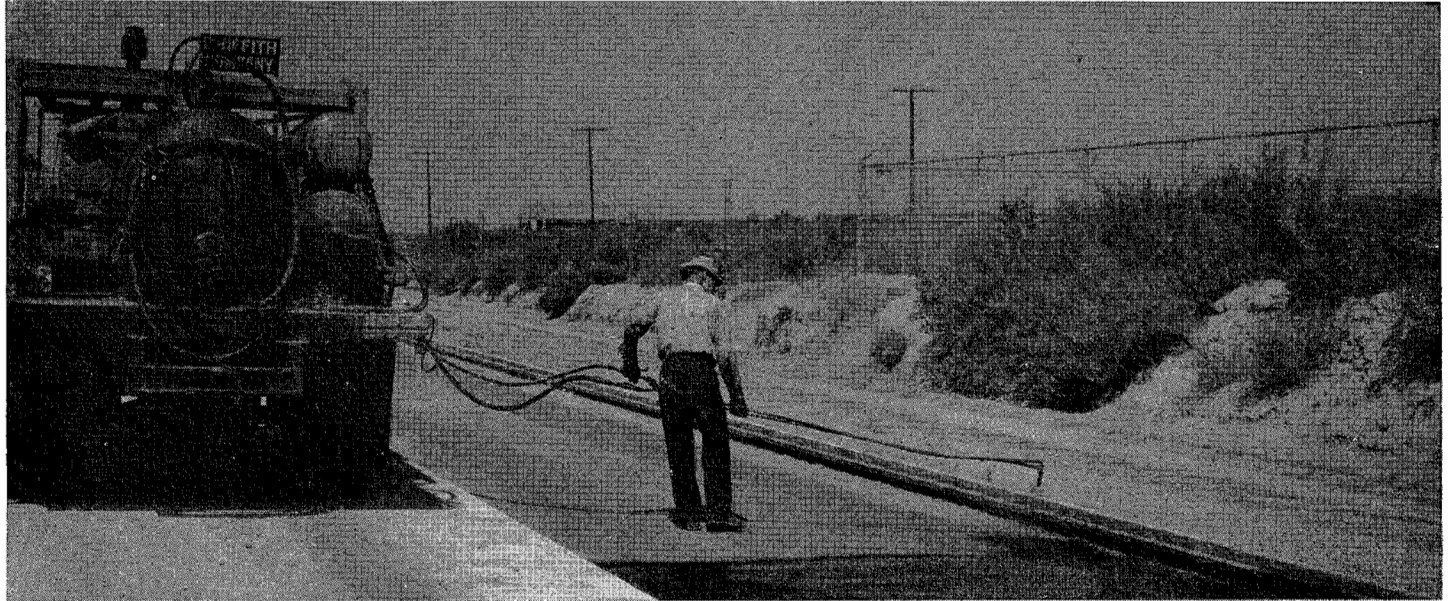
An interesting sidelight in connection with the excavation for the bridge footings was the exposure of free gasoline at elevation -1 foot in the bottom of the excavation. At various times it was necessary for the contractor to pump out this free gasoline and dispose of it in a safe place in order to reduce fire hazard. The consensus of opinion seems to be that the origin of the gasoline was due to accumulated leakage from one or more of the many oil lines in this area. To date all oil companies that have pipelines in the vicinity have disclaimed all responsibility for this gasoline.

Fill Materials

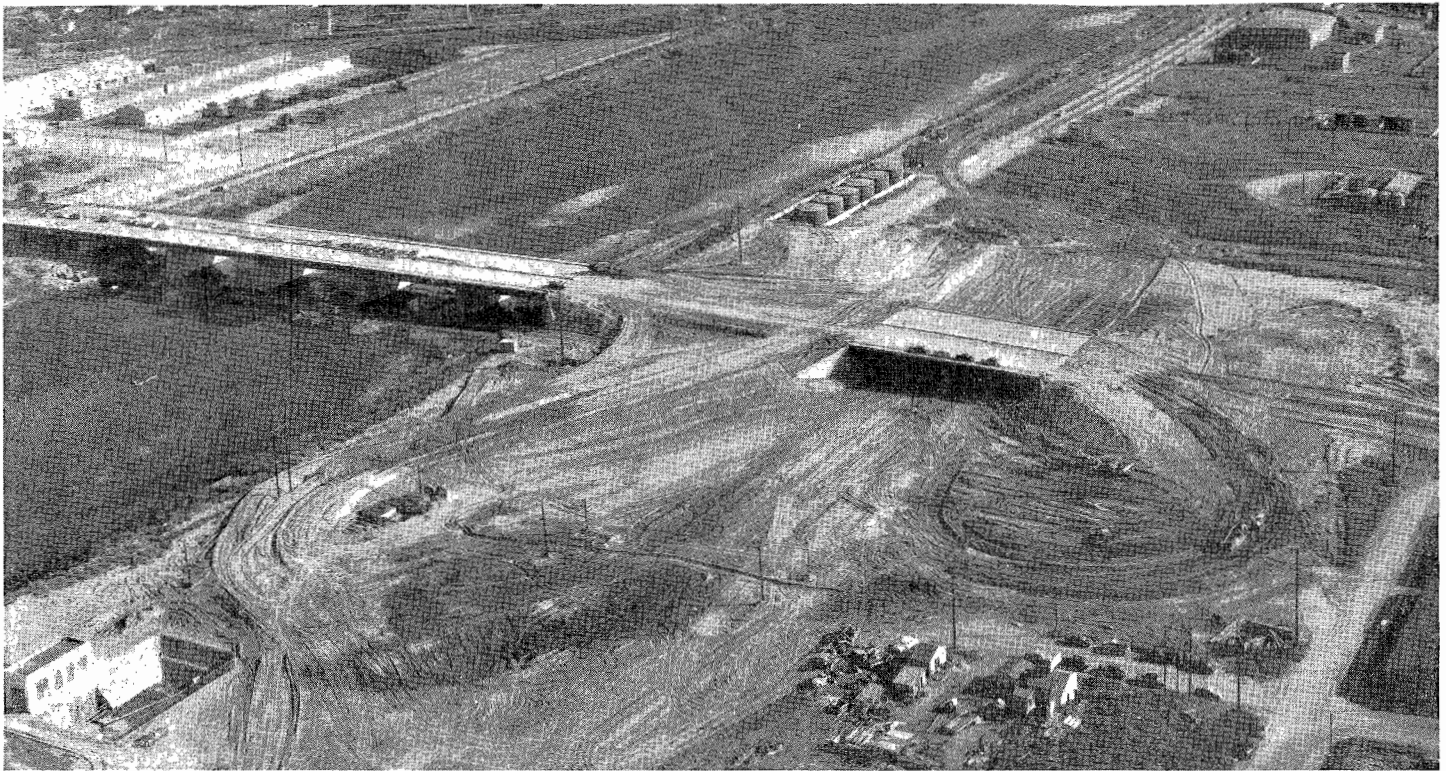
Past experience with fill materials in this coastal plain area has shown that difficulty with roadway embankment construction might be expected due to the deposition of layers of clay material, because during the wet season



UPPER—Construction operations on freeway, showing placing of portland cement concrete pavement with 34-E twin batch paver, mechanical spreader, and mechanical tamper. Willow Street Bridge in background. CENTER—Showing application of grey pigmented sealing compound to newly placed pavement. LOWER—Showing Barber-Greene traveling plant mixing imported base material with water and cement.



UPPER—Showing the placing of steel side forms adjacent to previously laid lane of portland cement concrete. Belhart Street Bridge in background. CENTER—Showing application of asphaltic emulsion seal to freshly laid cement treated subgrade. LOWER—Showing subgrader and windrow sizer cutting subgrade and sizing windrow in preparation for cement treating.



ground water rises to within two feet of the surface of the natural ground and saturates the upper two feet. To insure a firm, stable roadbed under the pavement, the grade line was established approximately three feet above the existing ground surface. Because of this procedure, 115,000 tons of imported borrow was required to complete the roadway embankments.

At the present time the contract is approximately 90 percent complete. Portland cement concrete curb and gutters in the vicinity of the three traffic interchange structures, plant-mixed surfacing of shoulders and ramps, pneumatically applied mortar, erosion control, six-foot chain link fence and finishing roadway are the items of work still remaining to be done. A temporary on-connection at Wardlow Road and a temporary off-connection at 223d Street will be provided to facilitate traffic flow when the project is completed, which is expected to be in mid-December, 1952.

REPORT OF J. E. McMAHON

The State Highway Route 60/167 separation structure, which carries U.S. Route 101 Alternate (Pacific Coast Highway) over the freeway, has been



UPPER—Looking southeasterly, showing construction in progress under Long Beach contracts. Anaheim Street crossing in center. LOWER—Looking northerly at crossing with Pacific Coast Highway.

completed. This is a three-span reinforced concrete structure on concrete piles. The structure was included in the state highway contract with Griffith Company of Los Angeles for that portion of the Long Beach Freeway between State Route 60 and 223d Street. The State's Resident Engineer was F. M. Morril.

The Dominguez Street Underpass which is now under construction carries the Union Pacific Railroad and the Pacific Electric Railway over the Long Beach Freeway, close to the intersection of these two railroads. The project consists of two separate bridge structures with a common abutment at the east end of the bridges. The structures consist of steel plate girder spans supported on reinforced concrete piers and abutments supported on concrete piles. At present, work is in progress on the construction of temporary tracks to carry railroad traffic around the site of the proposed structures. Webb and White are the contractors on this project. Their bid price was \$1,155,929.50. All work under this contract is expected to be completed in March, 1954. The Resident Engineer is N. B. Hallin.

Compton Creek Bridge

The bridge which will carry freeway traffic over Compton Creek is also under construction. This is a three-span reinforced concrete box girder bridge on concrete piles, and is now about 50 percent complete. The Del Amo Undercrossing is also under construction and is approximately 85 percent complete. It is a single-span reinforced con-

crete T-beam structure on concrete piles. The construction of the Compton and Del Amo structures was included in a single contract awarded to R. M. Price Company of Altadena at a cost of \$508,656. The contract is expected to be completed in February, 1953. H. K. Mauzy is the Resident Engineer.

The State Highway Route 175/167 separation structure will carry Artesia Street traffic over the freeway. This separation structure is a four-span reinforced concrete box girder bridge, supported on concrete piles. It is now 50 percent complete and is expected to be completed by April, 1953. The Resident Engineer is C. B. Oustad.

The construction of the section of the Long Beach Freeway from 223d Street to Atlantic Avenue, for which bids were opened on November 6, 1952, includes the construction of the Carson Street Undercrossing, Edison Undercrossing, Edison Road East Undercrossing (off-ramp), Edison Road West Undercrossing (off-ramp), and the Atlantic Avenue Undercrossing.

REPORT BY JESS. D. GILKERSON

The extension of the Long Beach Freeway southerly from Pacific Coast Highway (Route 60) requires special mention because it is the only instance to our knowledge in the postwar era where any governmental agency other than the State Highway Department is carrying out the construction and financing of a modern freeway in the Los Angeles metropolitan freeway system. This condition results primarily

from the fact that the southerly terminus of the freeway (Route 167) as a state highway is Pacific Coast Highway. However, even prior to the incorporation of the freeway in the State Highway System, the City of Long Beach had been protecting the alignment by acquiring rights of way throughout its entire length within the city with resultant extremely low acquisition costs per mile.

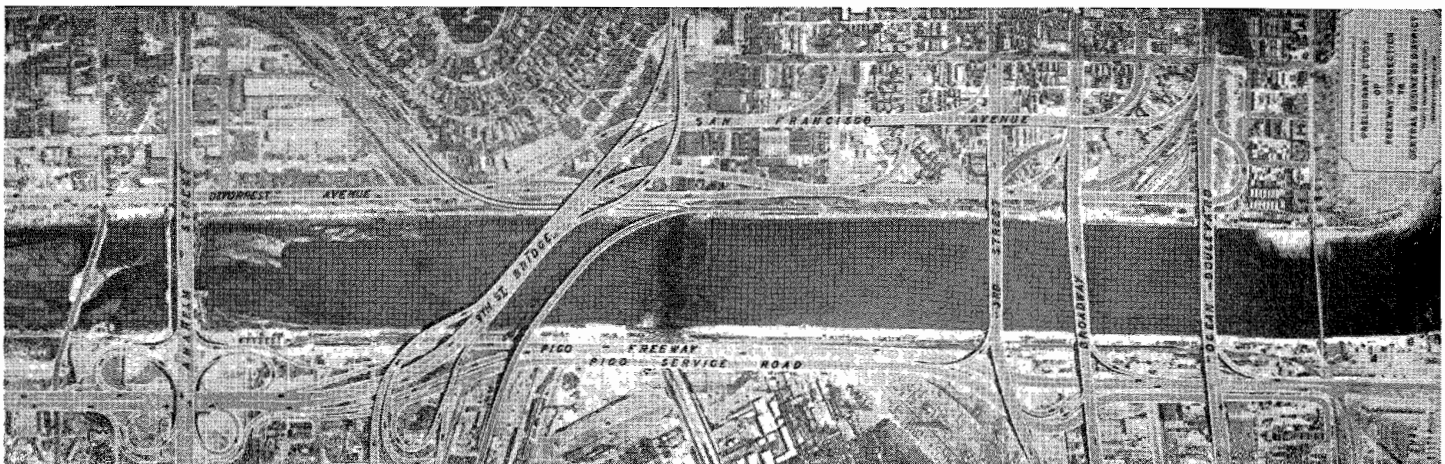
The early construction of the freeway, which will provide for a high-speed through artery between the two largest cities in Los Angeles County, with its great traffic generating power is expected to have a terrific traffic impact on our downtown business district. To this end, the city is now engaging a nationally known traffic engineering firm to assist us in devising an adequate means of distributing this traffic into both our harbor and central business districts, as well as to advise on the related problems of mass transportation terminal facilities and off-street parking.

Bridge and Freeway Ramp

The accompanying illustration is a photograph of one of our preliminary studies of the proposed bridge and freeway ramp system from Anaheim Street south to Seaside Boulevard. This particular study visualizes separation of the major traffic movements into the business district east of the river from the harbor traffic on the west side of the river by means of a diagonal bridge in the general vicinity of Ninth Street.

... Continued on page 37

Photograph of one of preliminary studies for southerly extension of Long Beach Freeway and distribution system into the main business district of Long Beach



Norwalk Diagonal

Strategic Link of Santa Ana Freeway Now Being Constructed

By M. E. CESSNA, District Engineer

AT THE TIME the progress report on the Santa Ana Freeway, by District Engineer W. L. Fahey, was published in the January-February, 1952, issue of *California Highways and Public Works*, the five-mile diagonal from Lakewood Boulevard to Norwalk was listed for future construction. Since that time much has been accomplished on this very important link of the Santa Ana Freeway.

The 1952-1953 Fiscal Year Budget, as approved by the California Highway Commission on October 18, 1951, included an item in an amount of \$3,381,000 for the construction of a portion of the Santa Ana Freeway between Lakewood Boulevard and Firestone

Boulevard near Rosecrans Avenue. The portion proposed for construction with 1952-1953 Fiscal Year funds was from Lakewood Boulevard to Pioneer Boulevard, with the remaining portion from Pioneer Boulevard to Firestone Boulevard to follow in the 1953-1954 Fiscal Year.

Additional Funds Voted

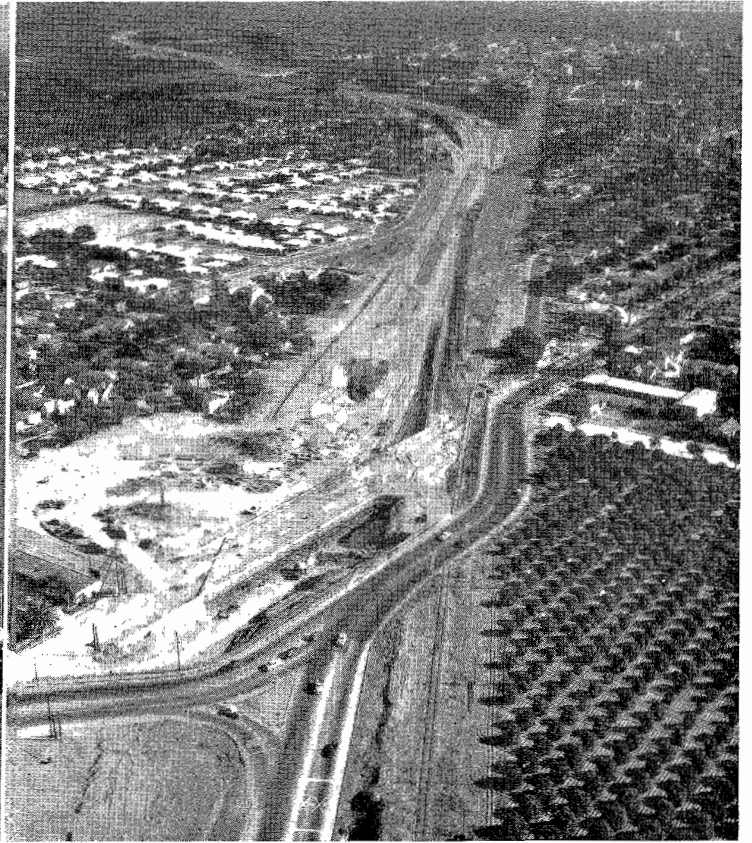
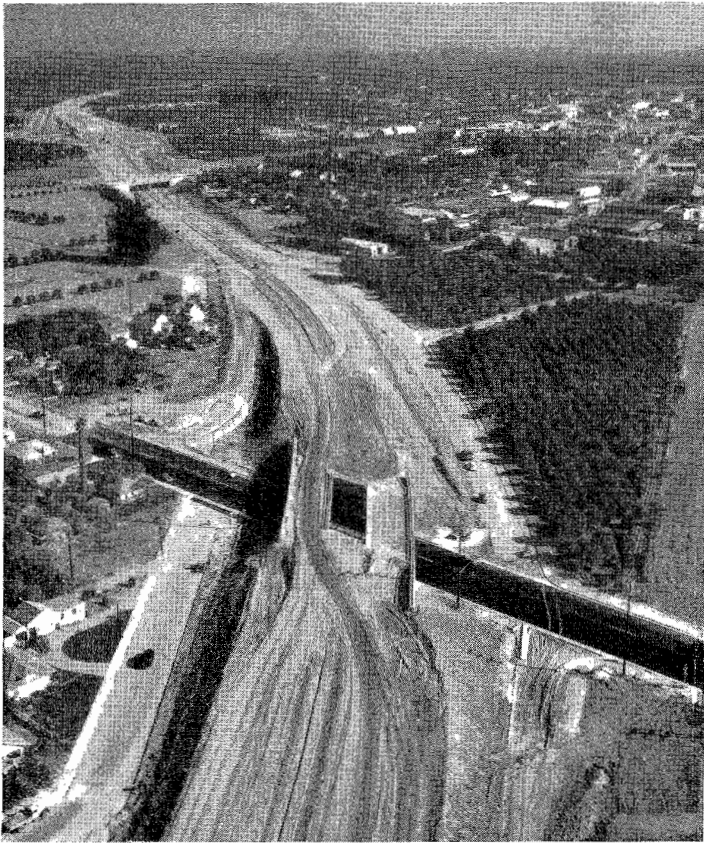
Late in the summer of 1952 when the availability of 1952-1953 Fiscal Year funds became more definitely determined, the Highway Commission decided to expedite the completion of this important section of freeway and made the necessary funds available. On September 16, 1952, additional funds in an amount of \$2,500,000 were voted

to the original item, thus providing a total of \$5,881,000 to complete the Norwalk Diagonal from Lakewood Boulevard to Firestone Boulevard with 1952-1953 Fiscal Year funds.

There are three construction contracts now under way. The first unit covers the portion 1.9 miles long between Lakewood Boulevard and Orr and Day Road. Within those limits a contract is also under way covering the construction of the new bridge over the San Gabriel River. The one mile unit between Orr and Day Road and Pioneer Boulevard, including a railroad grade separation structure at the location of the future Southern Pacific Railroad, has been awarded.

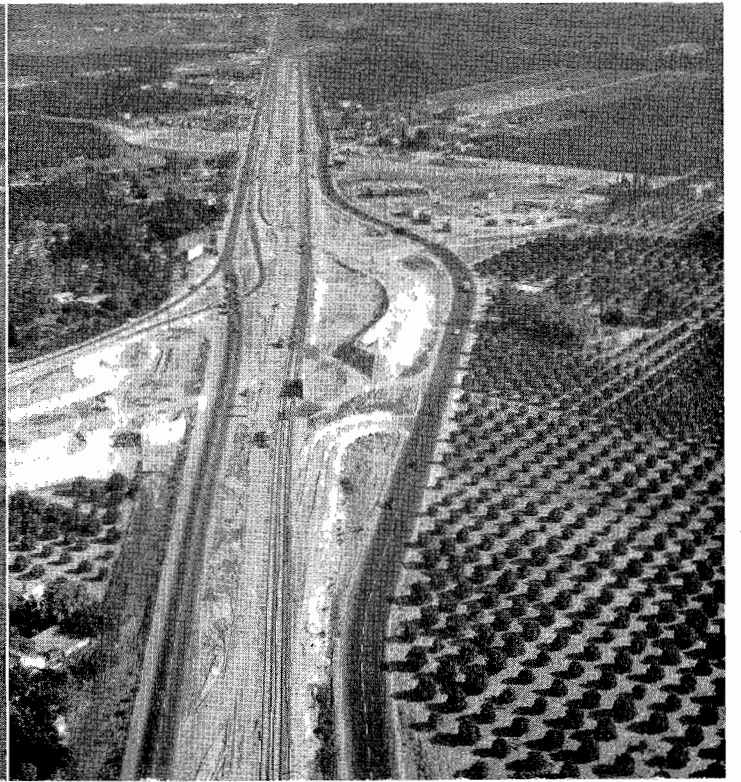
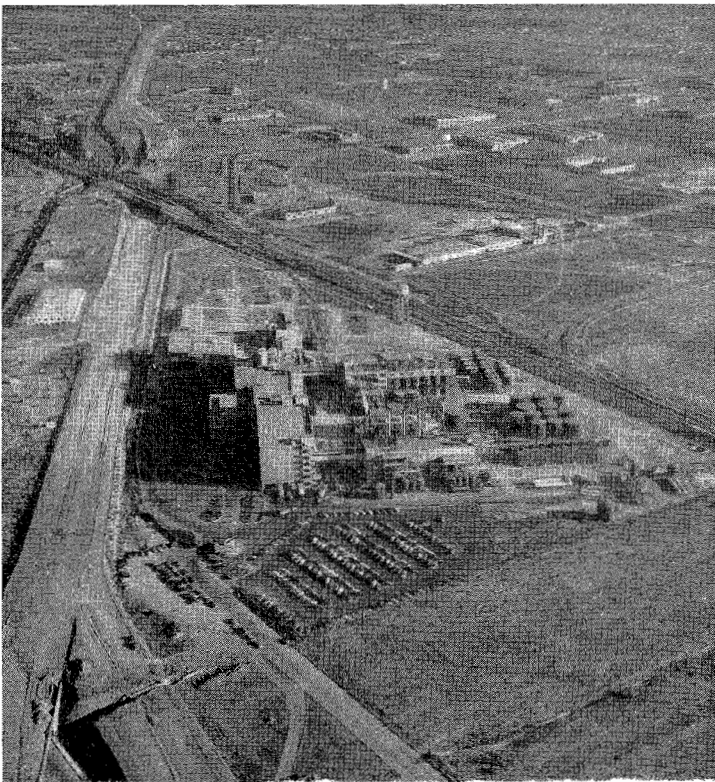
Looking westerly along section of Santa Ana Freeway approaching Los Angeles Civic Center. Grading operations shown are for Alameda Street Overcrossing.

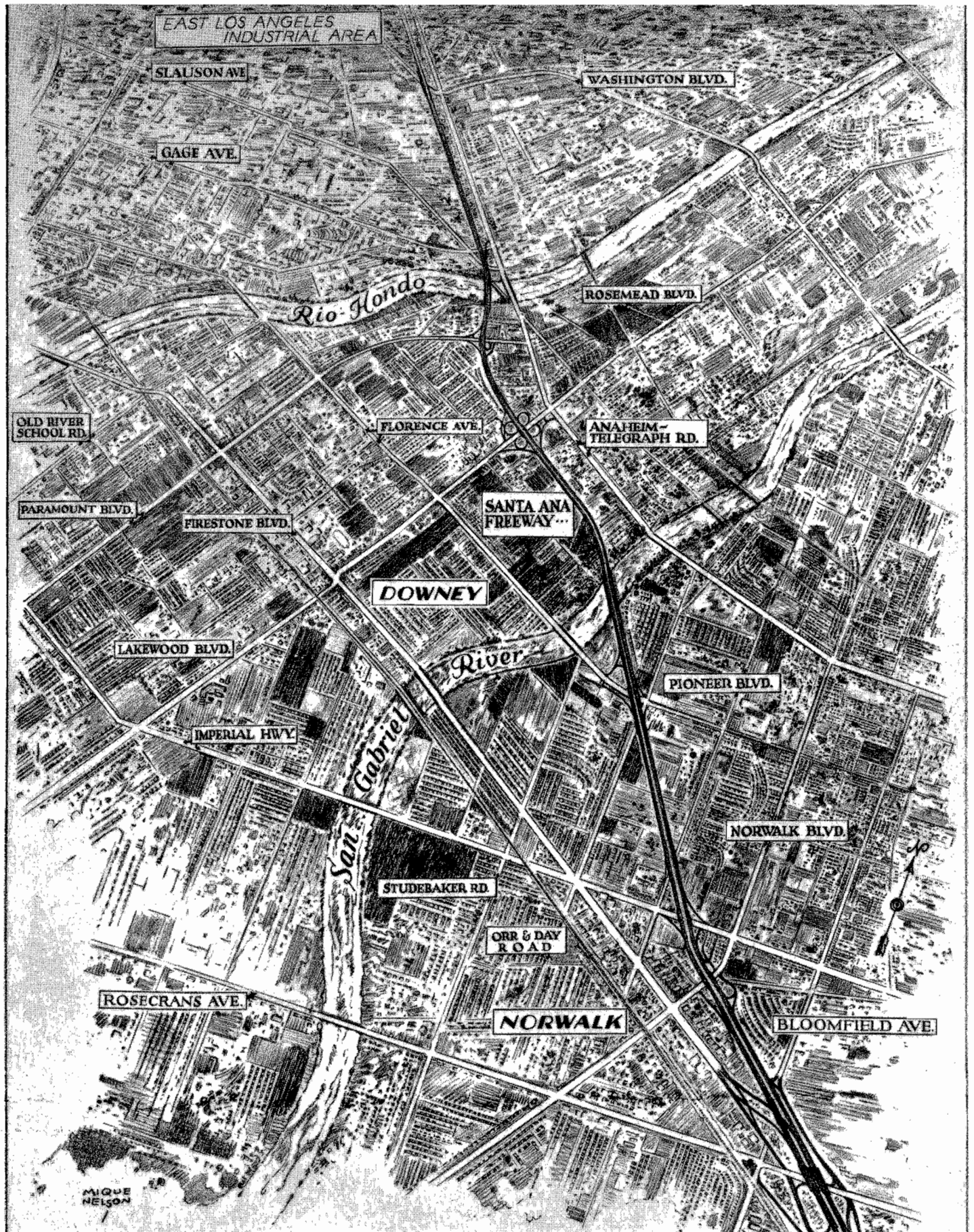


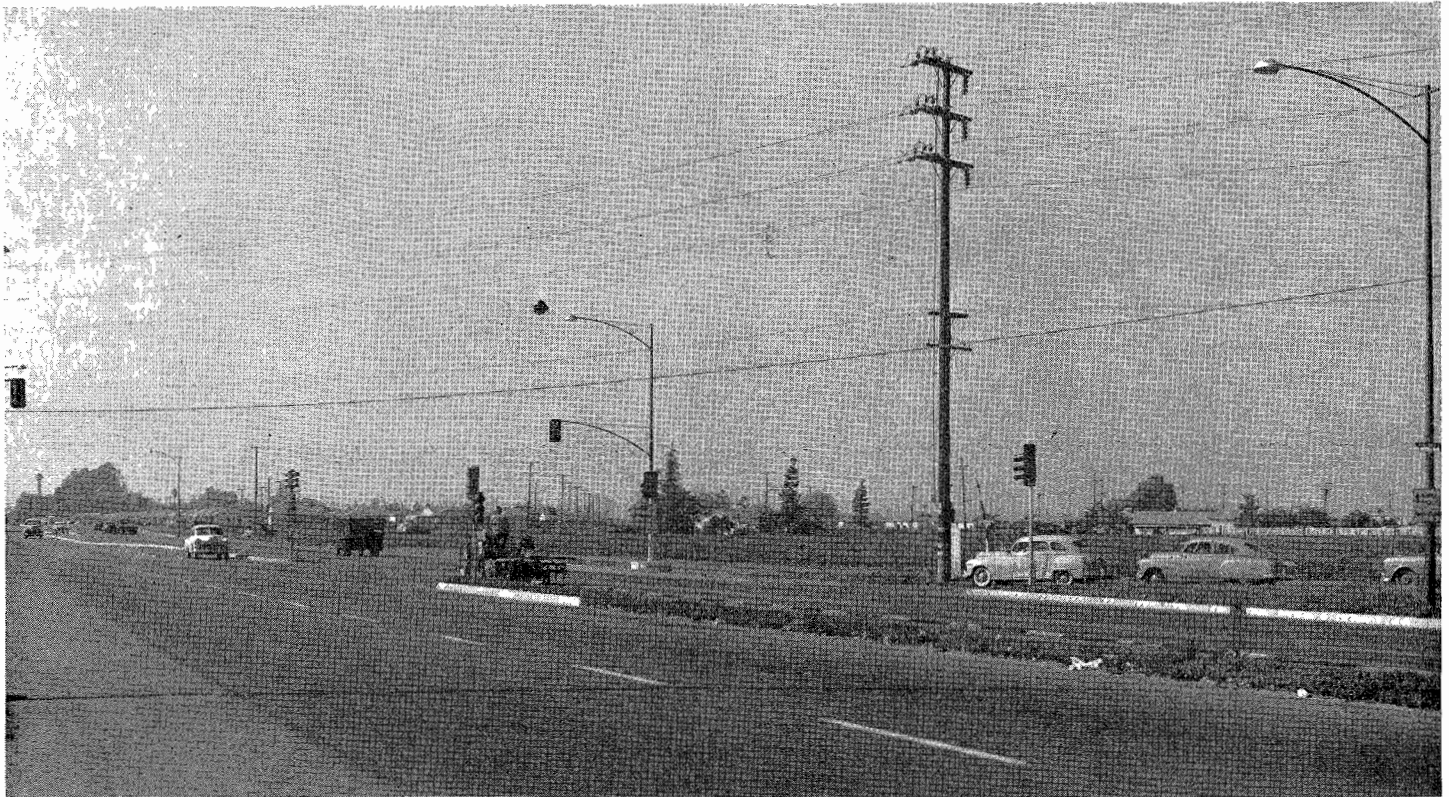


LEFT—Looking southeasterly along Santa Ana Freeway, showing 17th Street Overcrossing in City of Santa Ana. RIGHT—Looking southeasterly along freeway, showing construction in progress on overhead bridge from Main Street, Santa Ana.

LEFT—In left foreground Washington Boulevard Undercrossing and in left background grade separation with Santa Fe Railroad. RIGHT—Construction at intersection with Los Angeles Avenue at Miraflores between Anaheim and Santa Ana.







UPPER—Looking northwesterly along "Norwalk Diagonal" section of Santa Ana Freeway which will follow just to right of line of electric power poles. The channelized and signalized intersection in foreground of Firestone Boulevard with Rosecrans Avenue will be replaced, creating grade separation and traffic interchange system as indicated in lower right hand corner of perspective drawing on opposite page. LOWER—Grading operations on "Norwalk Diagonal" northwesterly from crossing with San Gabriel River.

Several Crossings Provided

Subsequent to the execution of the freeway agreement for this portion of the Santa Ana Freeway, additional fa-

cilities have been provided. A pedestrian crossing is being constructed across the freeway at Buhman Avenue to facilitate the movement of chil-

dren across the freeway between the area north of the freeway and the school which is to be constructed by the Gallatin School District. A grade

separation will be provided at Pioneer Boulevard. Pedestrian crossing is provided at Silverbow Avenue in Norwalk for the use of school children attending the Thomas Moffit School.

This unit of the freeway crosses several important county roads; namely, Orr and Day Road, Florence Avenue, Pioneer Boulevard, Imperial Highway, and Rosecrans Avenue. Grade separations and connections are to be provided at each of these roads except Orr and Day Road, which will have connections without a grade separation. Traffic on Orr and Day Road will cross the freeway via frontage road between Orr and Day Road and Florence Avenue.

Since this unit has been placed under design, the area bounded by the San Gabriel River, Orr and Day Road, and Firestone Boulevard has been for the most part completely subdivided. It is anticipated that the area between Florence Avenue and Pioneer Boulevard will shortly be subdivided. Thus the area to be traversed by the Santa Ana Freeway between Los Angeles and Norwalk will, within a short time, be wholly urban.

Serious Drainage Problem

By reason of the rapid change in land use of this area from agricultural to residential property, a serious drainage problem has arisen. This urbanization has a tendency to concentrate a large amount of water in the Norwalk area. It is hoped that this condition may be ameliorated by the construction of a storm drain system which is included among the projects covered by the projected \$179,000,000 Los Angeles County bond issue that was approved by the voters in the recent general election. The proposed storm drain which will relieve the drainage of the Norwalk area is estimated to cost \$5,000,000. The drainage system provided for the freeway is based upon passing the water in a generally southerly direction at intervals of 200 to 300 feet which is to simulate the natural surface flow now existing and avoiding undue concentration. However, east of Pioneer Boulevard a large concentration of water will pass under Imperial Highway and the freeway, which will be picked up by the storm drain to be constructed under the bond issue.



Looking southeasterly along Santa Ana Freeway, showing start of construction on bridge over San Gabriel River

Freeway Design

The Santa Ana Freeway from Eastman Avenue to Lakewood Boulevard is under construction as a six-lane freeway. The freeway southeasterly from Lakewood Boulevard to Norwalk will

be constructed as a four-lane freeway, with provision being made for an ultimate six-lane freeway. The freeway roadways will consist of Portland cement concrete pavement with plant-mixed surfacing shoulders. Ramp con-



Looking northwesterly along freeway, showing crossing with Lakewood Boulevard in center.
Rio Hondo in background.

nections will be constructed of plant mix surfacing. It is expected that the construction of the last unit of the Norwalk Diagonal, between Pioneer Boulevard and Rosecrans Avenue, will be advertised for bids to be received in December, 1952.

In connection with the various county roads, we have cooperated with Los Angeles County Road Commissioner Sam Kennedy, to obtain designs which will be mutually satisfactory to Los Angeles County and the State. The State and the Southern Pacific Railroad

Company have participated in the joint financing of the railroad grade separation of this railroad's Puente branch which will cross the Santa Ana Freeway easterly of Orr and Day Road.

Railroad Company Plans

The Southern Pacific Railroad Company intends to operate several trains daily over this route, which will bypass the more congested areas traversed by the existing railroad routes in reaching Los Angeles Harbor and the Santa Ana area. The extension of this portion of the Southern Pacific Railroad System may be the forerunner of development of much of this area along industrial lines.

Those projects now under construction have been awarded to United Concrete Pipe Corporation and its successor, Ukropina, Polich and Kral. It is anticipated that the Norwalk Diagonal unit of the Santa Ana Freeway will be completed and opened to traffic in 1954. Completion dates for the four units of construction now under contract between Eastman Avenue, near the east Los Angeles city limits, and Lakewood Boulevard were given in the prior Santa Ana Freeway story referred to above.

The Norwalk Diagonal will be of great value to the motoring public from the standpoints of economy, safety, and convenience. While the benefits are more or less obvious in a general way to the freeway user, an analysis has been made showing the accruing advantages somewhat more concretely.

Traffic Studies

Traffic studies were made of the effect which the Santa Ana Freeway would produce on existing conditions at the intersections of Lakewood Boulevard at Anaheim-Telegraph Road and at Firestone Boulevard. *Study Number 1* shows the existing traffic flow with the Santa Ana Freeway terminating just west of Lakewood Boulevard. *Study 2* depicts estimated traffic if the freeway ended at Lakewood Boulevard. *Study 3* is an estimate showing traffic when the freeway is completed to a junction with Firestone Boulevard in the vicinity of Rosecrans Avenue. Similar effects would be felt at numerous other intersections in the entire

southeastern section of Los Angeles County, but for purposes of illustration these studies will suffice.

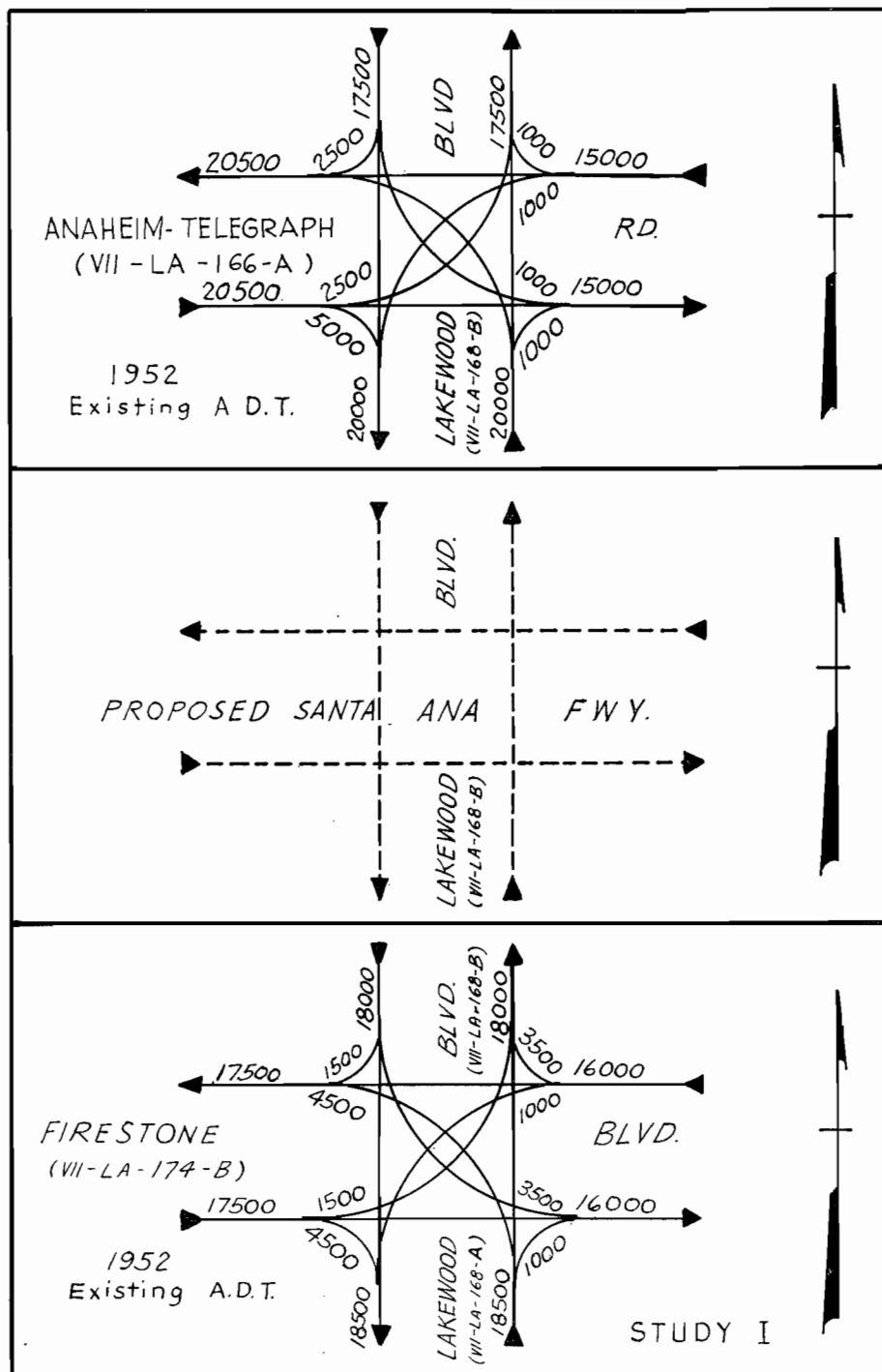
It will be noted in *Study 1* that present traffic conditions at the intersections of Anaheim-Telegraph Road and Firestone Boulevard with Lakewood Boulevard are characterized by extreme congestion and many conflicting vehicular movements of high volume. It has been necessary to install three-phase signals at both these intersections to provide an opportunity for left turning vehicles traveling in a southeasterly-northwesterly direction. This measure has afforded only partial relief to a situation which is already serious and is growing rapidly more severe as increasing traffic volumes are forced to use secondary roads serving as temporary routes for commuter traffic which will use the Santa Ana Freeway as soon as that facility is available. Meanwhile, delays to motorists at both of these intersections are an increasingly vexatious and costly matter.

Congestion Relief

Construction of the Santa Ana Freeway to a junction with Lakewood Boulevard would give considerable relief to the intersection of Anaheim-Telegraph Road and Lakewood Boulevard, but as shown in *Study 2*, conditions would continue to be extremely congested at the intersection of Firestone Boulevard, and for that portion of Lakewood Boulevard from the freeway to Firestone Boulevard.

Completion of the Santa Ana Freeway to a junction with Firestone Boulevard near Rosecrans Avenue will afford relief to both intersections of Lakewood Boulevard with Anaheim-Telegraph Road and with Firestone Boulevard. The general effects following expected alteration in the traffic pattern is of a profound nature, but the outstanding benefits visible in *Study 3* are immediately apparent. Conflicting moves are reduced to a workable minimum. At the intersection of the Santa Ana Freeway and Lakewood Boulevard, the conflicting movements are carried on ramps of a grade separation and no congestion whatever is anticipated.

An evaluation of available traffic accident data shows accident frequency



to be rising at a high rate, which is symptomatic of the conditions to be expected as highway intersections become completely saturated with traffic. Experience shows that in similar instances the reduction of heavy turning movements has brought about a substantial reduction in accident frequency. Similar reductions in the huge volumes of cross traffic accentuates the

tendency. No attempt has been made at this time to ascribe a monetary value to any such anticipated accident reduction.

The distance from the Lakewood Boulevard-Santa Ana Freeway intersection to Firestone Boulevard via the freeway will be approximately 5.18 miles. The distance between the iden-

WASHO Road Test Now Progressing In Malad, Idaho

THE HIGHWAY RESEARCH BOARD announced today that construction of the test road south of Malad, Idaho, has been completed and that preliminary tests under controlled truck traffic are underway. The research project, known as the WASHO Road Test, is sponsored by 11 western state highway departments, with the cooperation of the Bureau of Public Roads, the Automobile Manufacturers' Association, the Truck Trailer Manufacturers' Association, the petroleum industry and others. Administration of the project and the conduct of the research studies have been delegated to the Highway Research Board of the National Academy of Sciences, Washington, D. C., by the Western Association of State Highway Officials. The project is operated through an advisory committee established by the Highway Research Board, and made up of representatives of the contributing and cooperating agencies.

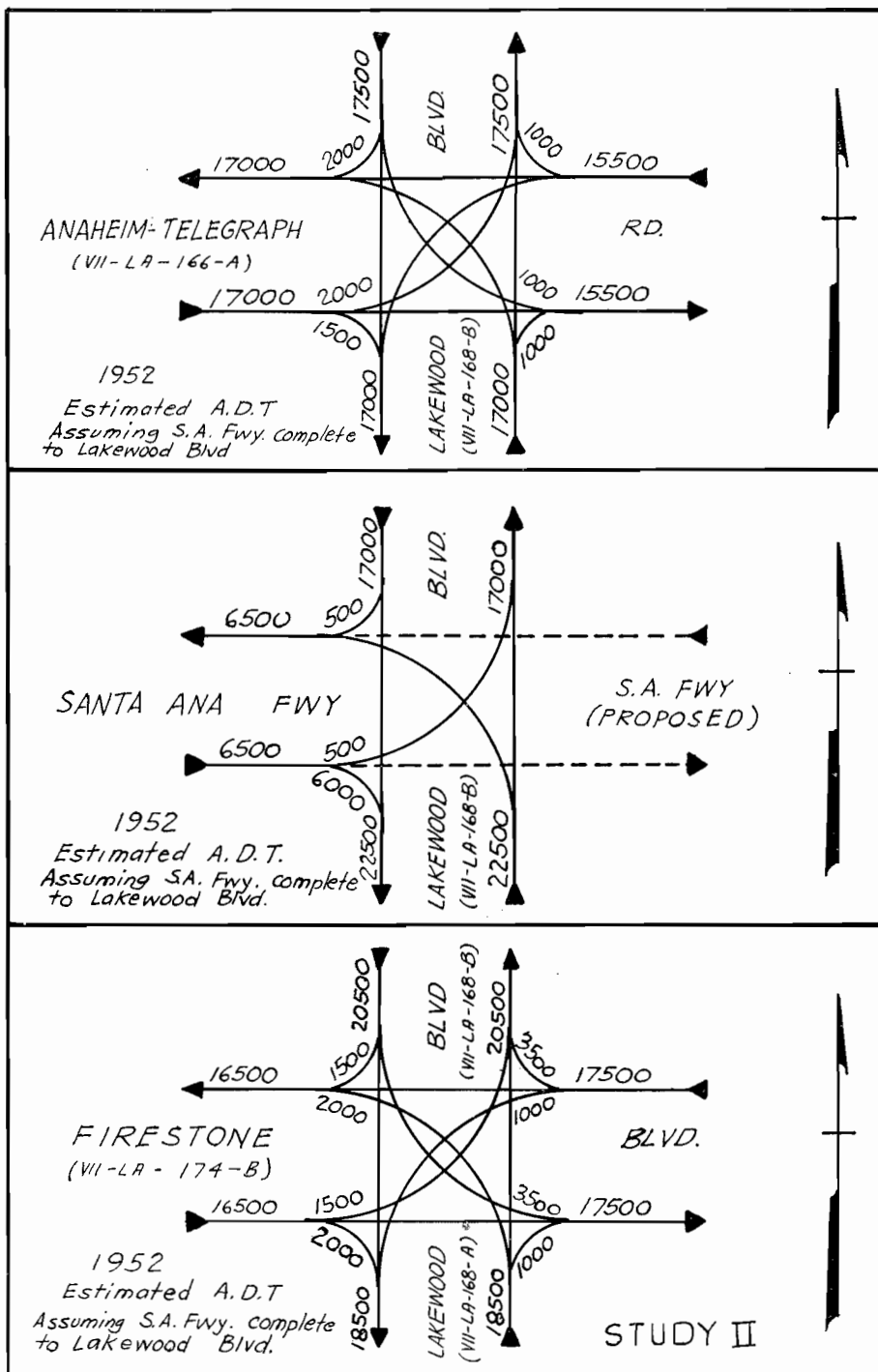
Many Engineers Take Part

The test sections, which were built especially for the test but which will later be incorporated into a relocation of U. S. Route 191, were constructed this summer by the Carl E. Nelson Company, contractors of Logan, Utah. A large staff of Highway Research Board and Bureau of Public Roads engineers inspected every step of the construction and made thousands of tests of the soils underlying the road, the gravel base material, and the asphaltic concrete surfacing to insure uniformity of construction. Because of this rigid construction control, it should be possible to compare the behavior of different sections of the test pavement with each other with the variable of different road materials eliminated, or at least reduced to precisely known proportions. In this way it will be possible to compare the relative effects of different truck loads on different thicknesses of road materials.

Nation-wide Program

The WASHO Road Test is part of a nation-wide attempt by highway engi-

... Continued on page 43



tical points via Lakewood and Firestone Boulevards is 6.69 miles. Average speed along Lakewood and Firestone Boulevards with traffic signals and grade crossings at frequent intervals averages under 35 miles per hour. The average speed that can be reasonably anticipated for the freeway in this area is approximately 50 miles per hour.

Net savings in cost per day to the 26,000 estimated average daily traffic is \$3,393. This is an extremely conservative estimate since a sizable proportion of the benefiting vehicles would be trucks whose proportionate savings are far greater than passenger vehicles.

... Continued on page 36

Left Turns

*Their Elimination Greatly
Reduces Collisions in Rodeo*

THE BEFORE AND AFTER accident diagrams here pictured show the very favorable results obtained by eliminating left turns at the Willow Road intersection in Rodeo on U. S. 40 in Contra Costa County.

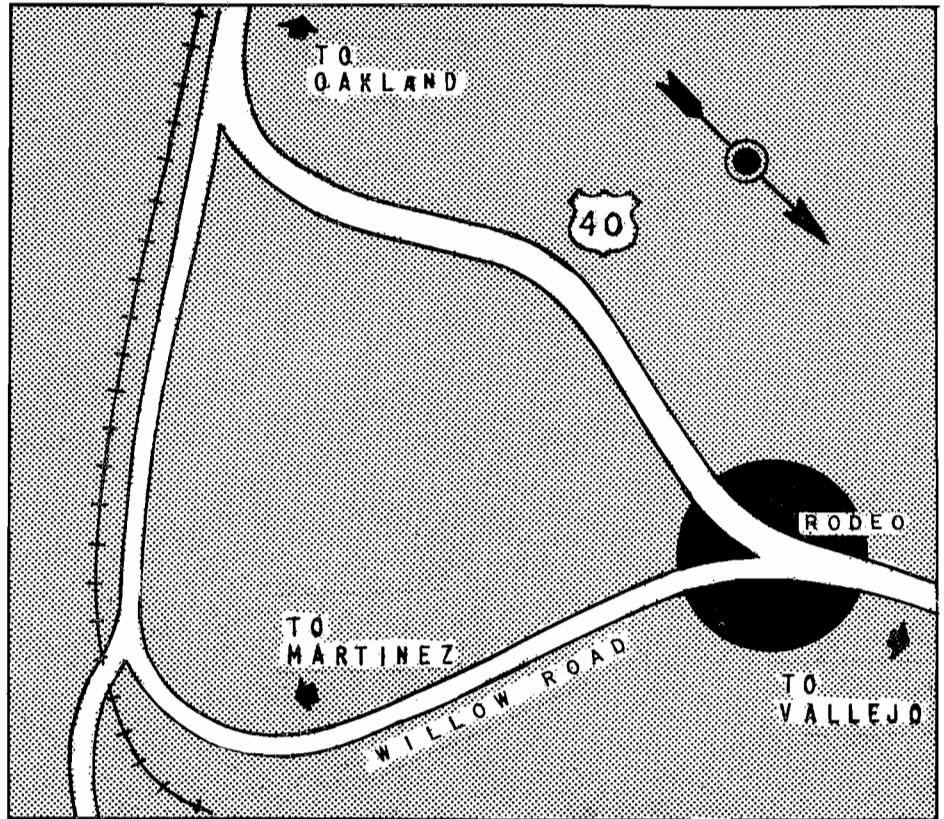
Collisions, including four- and five-car pile-ups, averaged one per week at this intersection prior to the left turn prohibition. Since installation of the oversized, illuminated sign informing motorists of this restriction, accidents have been reduced to an average of one each two months.

The important feature of this corrective measure was the excellent cooperation received from the officials of Contra Costa County. The left turn ban required their approval since Willow Road is under county jurisdiction.

Most unusual is the fact that eastbound motorists are required to travel more than a mile in order to make their left turn at the signalized Hercules intersection.

This latter intersection has been remodeled to provide additional storage for the heavier left-turn movement.

That these design changes were effective is attested by a reduced accident rate at the Hercules intersection after January 18, 1952, in spite of a heavy increase in eastbound left turns.

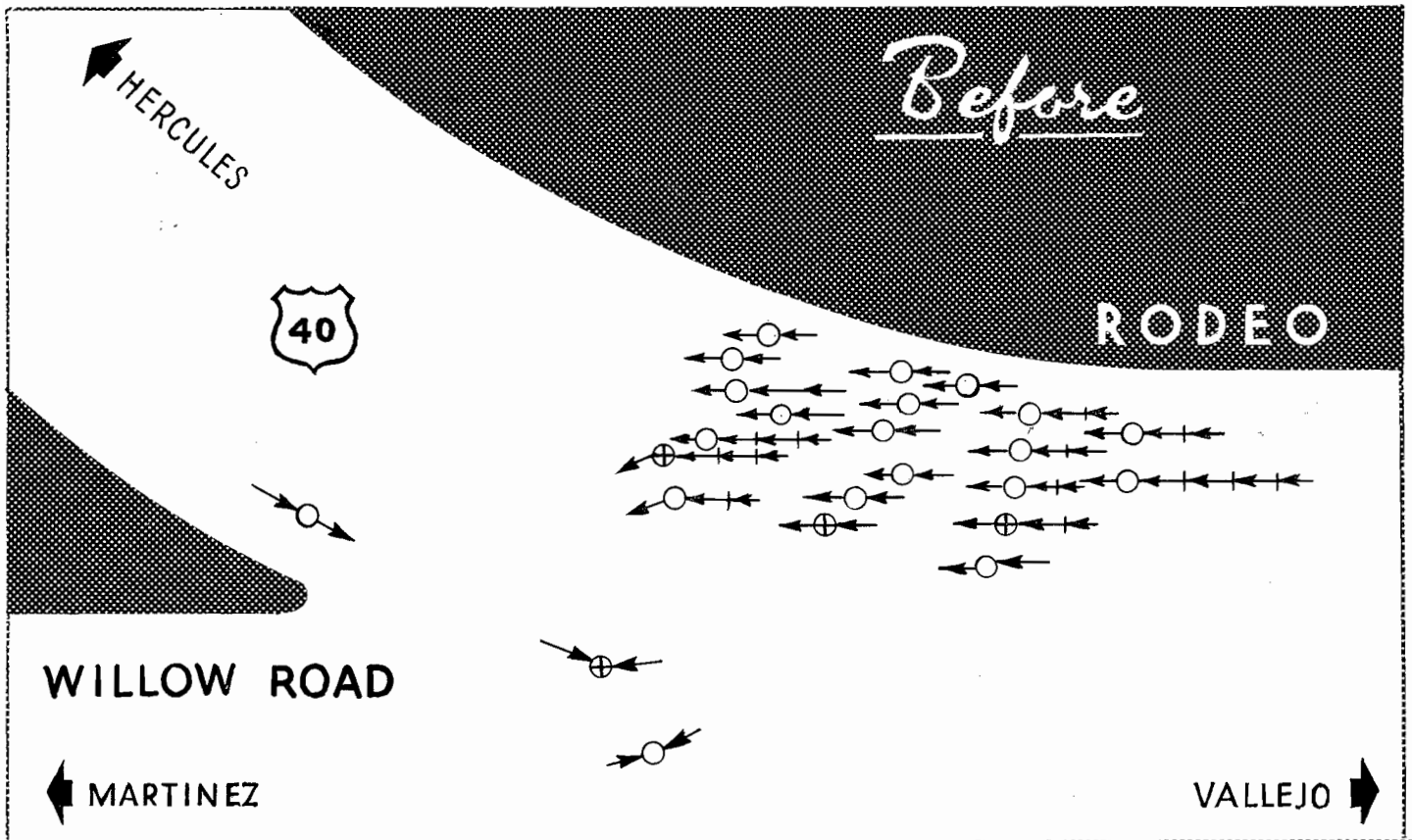


The motorists and general public are apparently well satisfied that the elimination of congestion and an 8 to 1 re-

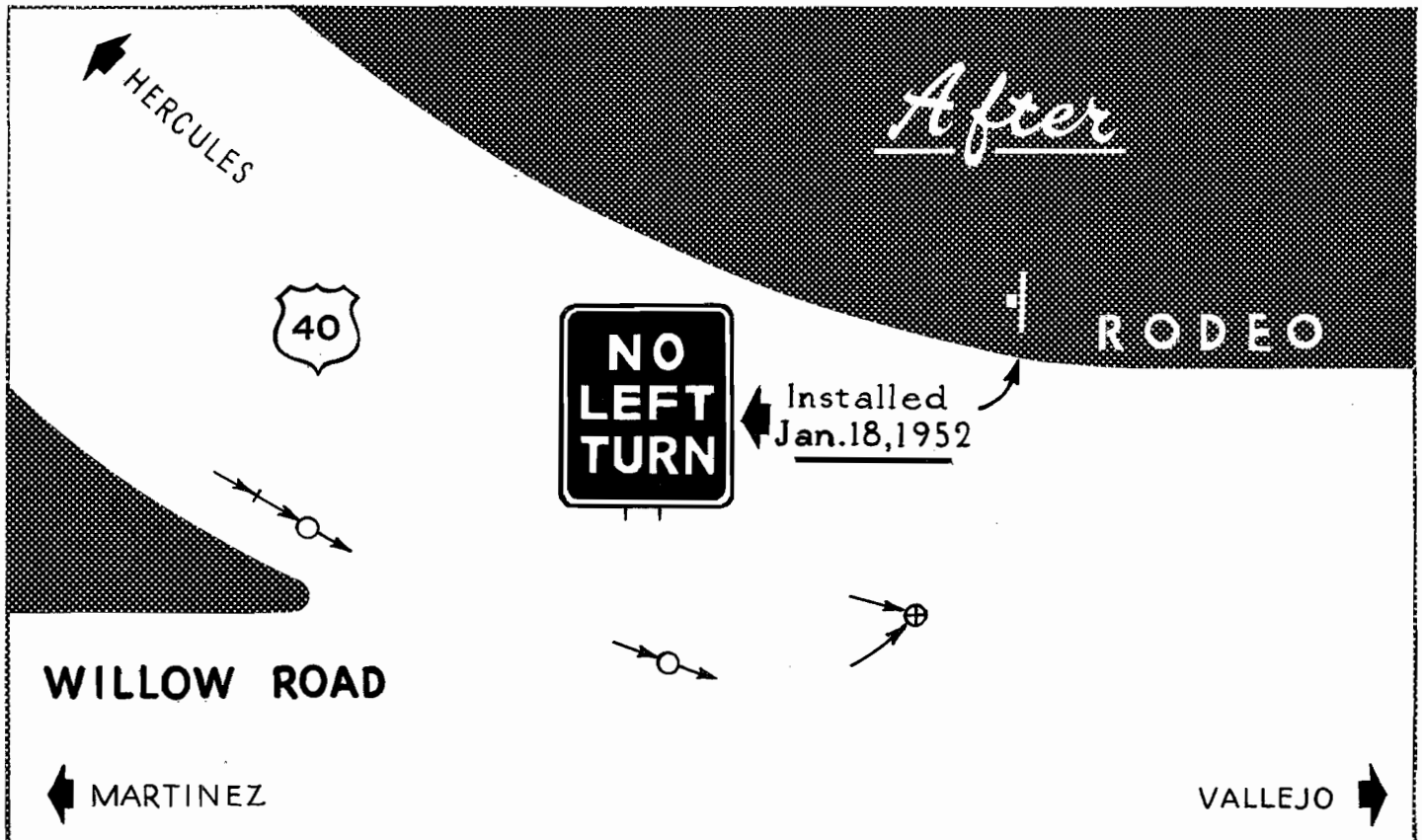
duction in accidents at the Willow Road intersection is adequate compensation for the increased travel.

Looking southerly on US 40 south of Rodeo with Willow Road slanting off to the left. The steady stream of traffic coming down the hill is what a southbound motorist formerly had to cross before entering Willow Road.





These accident diagrams are for six months before January 18, 1952, and six months after January 18, 1952. Each arrow represents a vehicle and its direction of travel. Each open circle is a property damage accident; crossed circle, an injury accident.



Lab Tests

Effect of Delay in Applying Membrane Cure to Concrete

By BAILEY TREMPER, Supervising Materials and Research Engineer

THE NEED of curing concrete is so well known that it would be pointless to again enumerate the advantages that accrue from the retention of moisture during the early stages of the hardening process. Little has been reported, however, on the effect of delay in applying the curing treatment during the first several hours after the concrete is mixed and placed.

This paper gives the results of pilot tests to show the effect of withholding curing treatment under conditions that favor the rapid loss of contained moisture due to evaporation from the exposed surface of the concrete. The paper deals mainly with curing by means of concrete curing compounds, or so-called impervious membranes, a method that is employed extensively. It does not purport to cover all conceivable mixtures, construction practices or weather conditions. Nevertheless the findings point to a principle that does not receive sufficient recognition in practice.

Preliminary tests had demonstrated that a distinct difference in appearance resulted in the formed surfaces of specimens that were sealed very soon after they were cast compared to those to which the seal was not applied until after several hours had elapsed. Following this observation, the additional tests reported herein were made.

Effect on Strength

The curve, *Figure 1*, shows the principal results with respect to the strength of the concrete. It illustrates the value of applying membrane cure at the proper time after concrete is mixed and placed. It is the result of three series of test specimens that were coated with curing compounds at intervals of from one to ten hours after specimens of fresh concrete were molded. The strength of control specimens that were cured with a water-saturated blanket continuously from the time of casting is given a rating of

100 percent. Other values are relative to this base. When no curing of any kind was applied the relative strength dropped to 71 percent.

The curve shows that evaporation of water is beneficial during the period that the concrete is plastic and is bleeding due to the settlement of the solid particles. This process continues under the conditions of the tests for about three hours. At the conclusion of this period, if further loss of water is not prevented the resulting strength of the concrete is seriously impaired. If the curing treatment is not applied before about seven hours its value is largely lost. Loss of strength due to applying the curing compound too early, as at one and two hours, may be due in part to a faulty membrane on a surface that is too wet. This, however, is not the complete answer, for reasons discussed below.

Same Trend Found

In one group, not indicated in *Figure 1*, the same trend was found when the specimens were tightly sealed with metal lids and tape. When sealed with metal immediately the strength was the same, 100 percent, as obtained with a cotton mat applied immediately and kept wet continuously. The strength increased with delay in applying the metal seal up to three or four hours. If sealing was delayed beyond four hours the strength fell off but always remained at a higher level than resulted from comparable membrane cure. It is indicated, therefore, that the trend of the curve of *Figure 1* is general in its application to curing by methods other than that by membrane.

These results were obtained with specimens six inches in diameter and six inches high, cast in metal cans with soldered bottoms. The molds were surrounded with sand as shown in accompanying photo. They were exposed outdoors, away from shade during the summer, adjacent to the laboratory at

Sacramento. The weather was clear, relative humidity was low and afternoon temperatures reached 90 degrees to 100 degrees. It was thus typical of rather severe, but not extreme, conditions with respect to rate of evaporation. The temperature of the sand surrounding the test specimens was 65 degrees in the morning at the start of one series and rose to 100 degrees seven hours later.

After 10 days exposure the specimens were removed from the molds, placed in water for two days and then tested for compressive strength. Saturation in water was necessary to bring the specimens to comparable moisture contents before testing for strength but it undoubtedly raised the relative rating of the poorly cured concrete.

Two series, each containing 24 specimens, were run. In the first series, 20 cylinders were cured with gray pigmented curing compound, two each at hourly intervals up to 10 hours; two specimens were covered immediately with cotton mats which were kept damp continuously and two received no curing treatment whatever. Half of the specimens were tested for compressive strength; the others were sawed longitudinally for observation. In the second series, seven cylinders were cured with gray pigmented curing compound, seven with white pigmented curing compound and seven with metal lids; one each by each method at hourly intervals up to seven hours. Of the remaining three specimens, one was sealed immediately with a metal lid, one was covered immediately with a damp cotton mat and one received no curing treatment.

Test Mixture

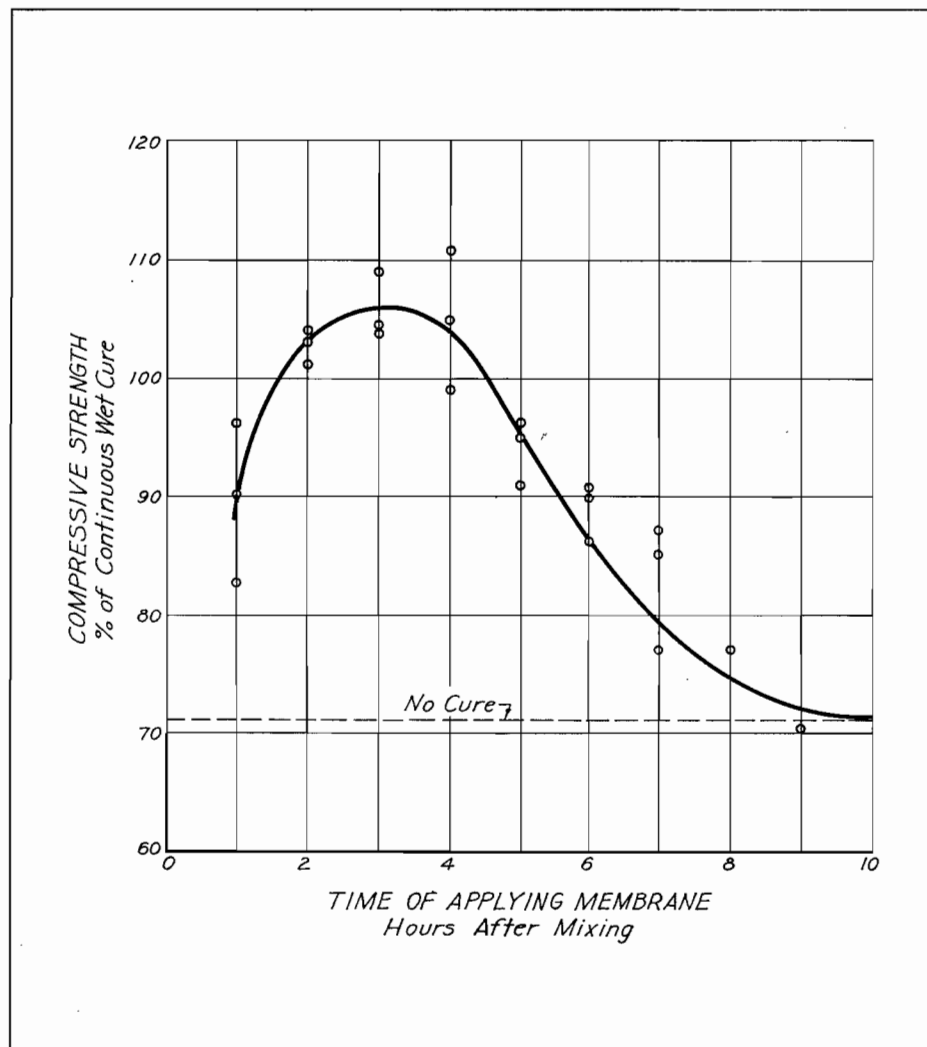
In the first series the concrete contained five sacks of cement per cubic yard, one-inch maximum size of aggregate and water to give a 3½-inch slump. In the second series, six-sack concrete was used with one-inch maxi-

mum aggregate and water to give a 3½-inch slump.

The plotted points in *Figure 1* represent relative strengths of individual specimens. Results with the gray curing compound were slightly higher than the white, but the data are not sufficiently comprehensive to warrant a distinction based solely on tint.

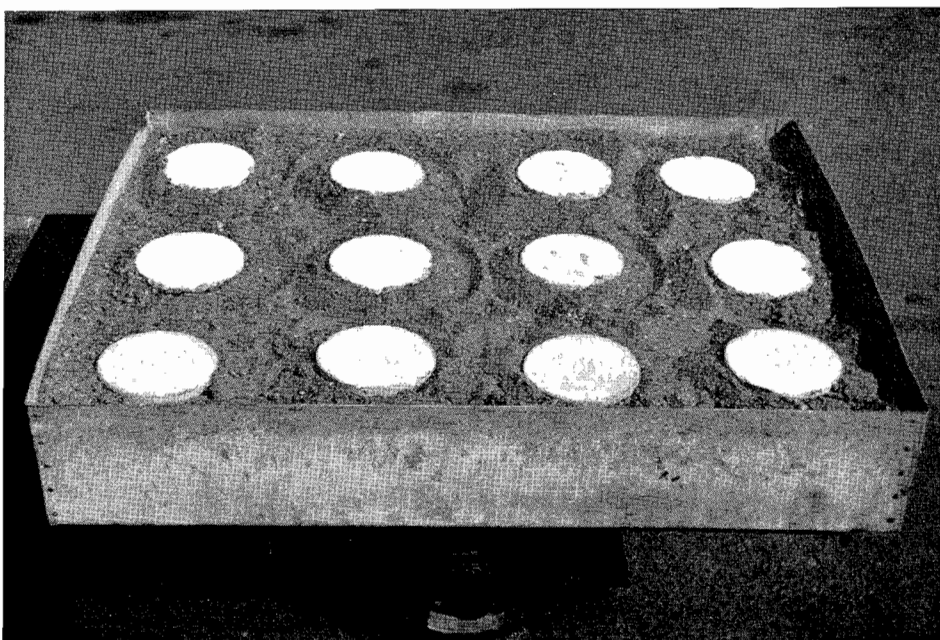
The cylinders that were sawed longitudinally were studied with a low power binocular microscope. As curing was delayed the concrete was seen to be increasingly chalky in appearance and the fine mortar increasingly weaker as revealed by a tendency for it to be torn away from the coarser sand grains by the process of sawing. Poor curing was also evident on the side and bottom of the specimens when they were removed from the molds. They became increasingly rough-textured as curing was delayed.

The optimum time of applying the curing medium probably varies, within limits that are not too wide, according to the materials used, the consistency of the concrete, the depth of the section and the availability of external moisture. Replacement moisture can reach the concrete through surfaces other than that exposed to view, for example, through the bottom of a slab laid directly on a moist subgrade. The tests reported here are believed to represent slabs such as a bridge deck where



UPPER—Strength is highest when curing is started at optimum time.

LOWER—Tests were conducted to simulate a large area of concrete.



there is no contact with the subgrade. Probably they also represent pavement slabs laid on a cement-treated subgrade that has been sealed with asphalt.

Although emphasis has been placed on the effect on compressive strength there are many reasons to believe that the adverse effects of poor curing practice extend to other important properties of concrete also.

Regardless of what may appear to be mitigating circumstances, it is a good rule to follow that intentional curing should start immediately after the water sheen has disappeared from the surface. If a membrane is to be used and if it is not applied promptly the surface should be kept continuously moist by some effective means. Covering with saturated burlap or blankets or frequent sprinkling with water would constitute effective means.

Next Budget

*Highway Commission Allocates
\$169,970,000 for 1953-54 Fiscal Year*

WITH \$76,114,000 allocated for major construction projects (exclusive of right of way) the California Highway Commission on October 22d adopted a state highway budget of \$169,970,000 for the fiscal year from July 1, 1953, to June 30, 1954.

The 1952-53 Budget allocated \$72,-093,000 for major construction out of a total of \$155,711,651.

Included in the State Highway Budget are the following items:

Budget Items

Major construction projects, \$76,-114,000; rights of way, \$33,921,000; maintenance, \$24,000,000; preliminary engineering, \$10,000,000; construction engineering, \$8,000,000; administration, \$5,000,000; buildings and plants, \$3,-500,000; highway planning, \$1,750,000; maintenance and insurance of the San Francisco-Oakland Bay Bridge, \$1,-200,000; minor improvement and betterment, \$1,000,000, and a contingency reserve of \$5,485,000.

Other nonstate highway functions under supervision of the commission were approved in the amounts of \$23,-200,000 from the gas tax fund for major city streets administered by the cities; \$5,760,000 for federal aid secondary roads, the majority of which is apportioned to county roads; and \$70,000 for administration of outdoor advertising.

Major Construction Projects

Some of the major projects provided for are:

Humboldt County, for grading and surfacing 2.9 miles of U. S. 101 at Arcata from Gannon Slough to 0.9 mile north of Plaza Avenue, \$600,000.

Mendocino County, for grading 4.9 miles of U. S. 101 from 4 miles north of Forsythe Creek to Ridgewood Summit, \$900,000.

Shasta County, for grading and structures on U. S. 99 from Boulder Creek to Project City, 4.2 miles, \$750,000.

Siskiyou County, for grading, surfacing, and structures on U. S. 99 from

Spring Street to north city limits of Dunsmuir, \$630,000.

Butte County, for base and surface on 9.6 miles of U. S. 99E from the junction of State Route 87 to Chico Avenue, \$600,000. Grading and structures are under construction from prior budgets.

Placerville Freeway

El Dorado County, for grading and structures on U. S. 50 for a length of 1.5 miles, second construction unit of the freeway through Placerville, \$595,-000. Also \$250,000 was voted for additional right of way through Placerville.

Sacramento-Placer Counties, for grading and structures on the freeway from Ben Ali to ½ mile east of Roseville, a distance of 12.7 miles, \$2,200,000.

Sacramento County, for the freeway from C Street in Sacramento to U. S. 99E near Swanston Road to connect with the North Sacramento Freeway, grading, surfacing, and structures on 2.3 miles, \$1,110,000. The major structures are under construction from prior budgets.

Eastshore Freeway

Alameda County, for grading, paving, and structures on 2.1 miles of U. S. 50 from 0.25 mile easterly of Center Street to 0.10 mile easterly of Foothill Boulevard, \$1,540,000.

Alameda County, for grading, paving, and structures on the Eastshore Freeway south of Ashby Avenue to El Cerrito Avenue Overhead, 3 miles, \$4,600,000.

Contra Costa County, Orinda Road Interchange, grading, paving, and structures on Sign Route 24, \$1,800,000.

Marin County, for grading and structures, 3.9 miles, on U. S. 101 from Manzanita to the Golden Gate Bridge, \$510,000.

San Francisco, Wye viaduct and connecting ramps at intersection of Bayshore Freeway and 13th Street, \$1,105,-000. The major portion of the interchange is under construction from prior budgets.

Bayshore Freeway

San Francisco, grading, paving, and structures on Bayshore Freeway from Hester Avenue, ½ mile north of San Mateo County line, to Alemany Boulevard, 1.7 miles, \$3,350,000.

San Mateo County, for grading and surfacing portions of Sign Route 5 at its junction with Sign Route 1, from Thornton to Edgemar Road, 2.2 miles, \$950,000.

Sonoma County, for bridge across Petaluma Creek on U. S. 101, \$900,000.

Monterey County, for reconstruction of U. S. 101 from San Lucas to 2.5 miles north, \$190,000.

Monterey County, for grading and structures on U. S. 101 from John Street to East Market Street in Salinas, \$635,000. This is the second construction unit on the Salinas Bypass.

Paso Robles Project

Monterey County, for grading and surfacing 1.2 miles of State Route 117 from El Estero to Del Monte Junction, 1.2 miles, \$400,000.

San Benito County, for a bridge and approaches across San Benito River on State Route 22, \$470,000.

San Luis Obispo County, for grading and structures on U. S. 101 for a freeway between Paso Robles and San Miguel, 6.4 miles, \$940,000.

Santa Barbara County, for grading and structures for a freeway on U. S. 101 from 1 mile east of Carpinteria to ½ mile east of Arroyo Parida and Ortega Hill to Sheffield Drive, 3.7 miles, \$1,270,000.

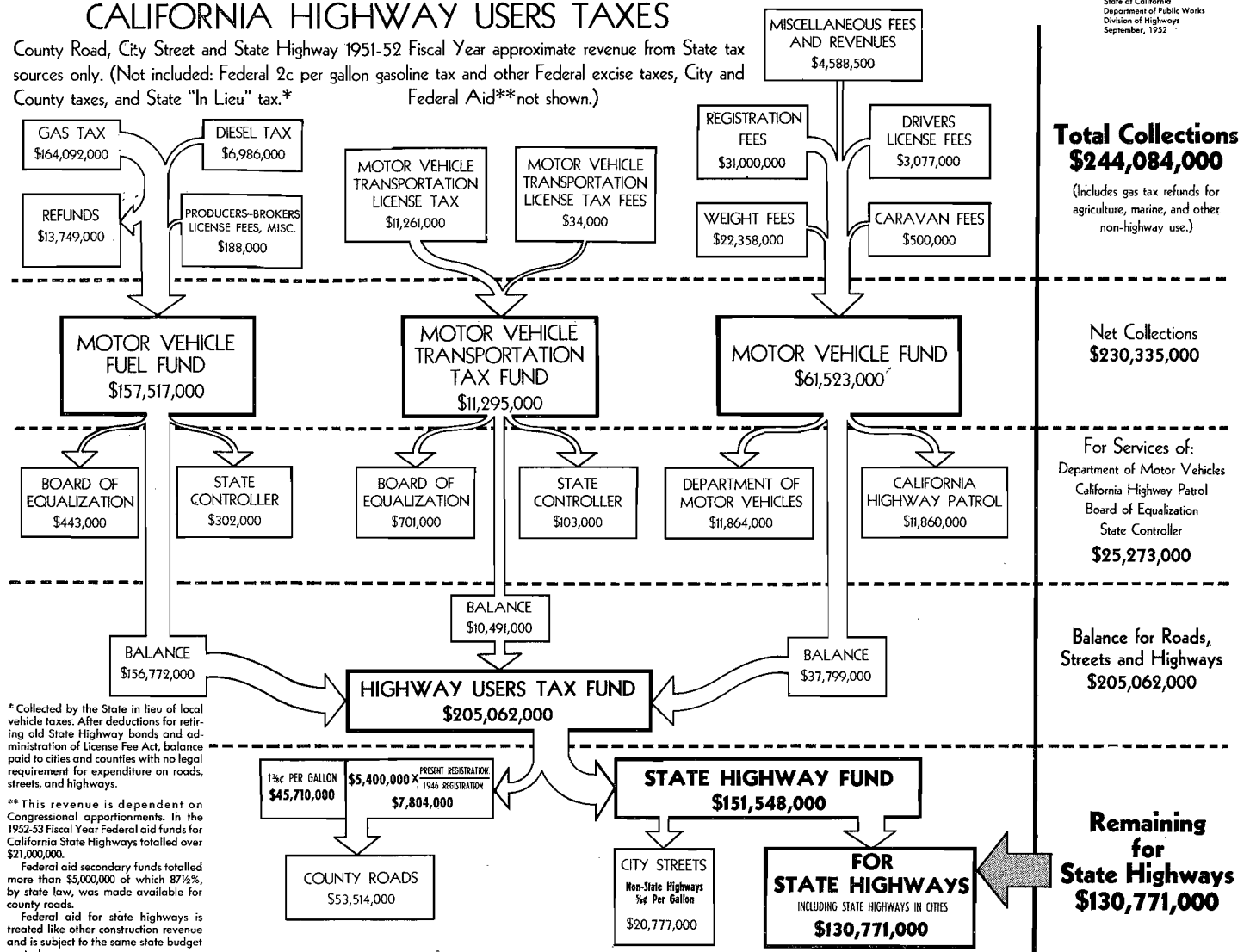
Fresno County, for grading and surfacing, and structures on Sign Route 198, Warthan Canyon, from Lone Pine Inn to 2.8 miles west of Hot Springs Canyon, 5.7 miles, \$420,000.

Kings County, for grading and structures on State Route 135, from Kansas Avenue to 1 mile north of Corcoran, 7 miles, \$320,000.

CALIFORNIA HIGHWAY USERS TAXES

County Road, City Street and State Highway 1951-52 Fiscal Year approximate revenue from State tax sources only. (Not included: Federal 2c per gallon gasoline tax and other Federal excise taxes, City and County taxes, and State "In Lieu" tax.* Federal Aid**not shown.)

State of California
Department of Public Works
Division of Highways
September, 1952



In San Joaquin Valley

Madera County, for surfacing portions of Sign Route 152 from Califa to Merced county line, 8.5 miles, \$390,000.

Kern County, for a bridge and approaches across Kern River at Bakersfield on U. S. 99, \$655,000.

Kern County, for surfacing 7.2 miles of U. S. 399 from Weedpatch to Arvin, \$280,000.

Tulare County, for grading and structure for Visalia Airport interchange on U. S. 99, \$900,000.

Los Angeles County, grading, paving, and structures on Santa Ana Freeway-Ramona Freeway connection, \$1,335,000.

Los Angeles Freeways

Los Angeles County, for grading, paving, and structures on U. S. 99 from 0.6 mile south of junction of Sepulveda Boulevard to 0.4 mile north of the north city limits of Los Angeles at Newhall Junction, 2.8 miles, \$3,140,000.

Los Angeles County, grading, paving, and structures on Ramona Freeway-San Dimas Road to San Bernardino county line, 6.2 miles, \$4,100,000.

Los Angeles, for grading, paving, and structures on portions of Harbor Freeway-Olympic Boulevard to Flower Street, 1.2 miles, \$3,160,000.

Los Angeles County, for structures on Los Angeles River Freeway-north

junction Atlantic Boulevard to Santa Ana Freeway, \$2,740,000.

Los Angeles County, grading, surfacing, and widening structures on Redondo Beach Boulevard and 174th Street, Inglewood Avenue to Normandie Avenue, 3.7 miles, \$890,000.

Orange County, grading, paving, and structures on U. S. 101 from First Street to Red Hill Avenue in Tustin, 1.8 miles, \$1,610,000.

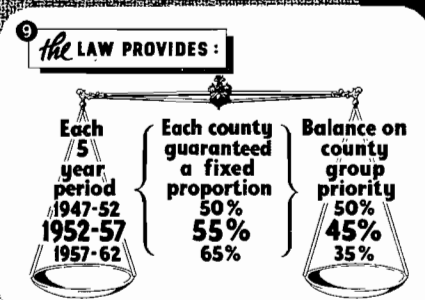
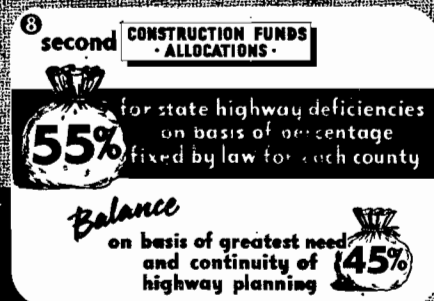
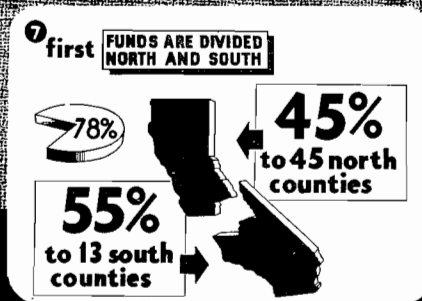
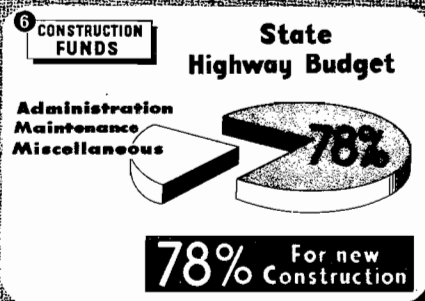
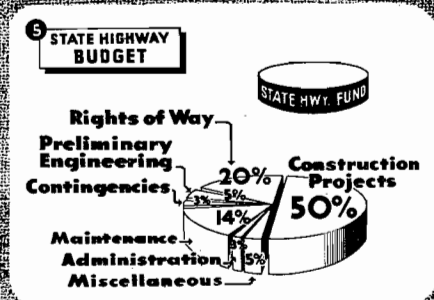
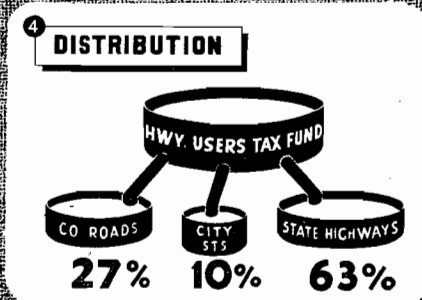
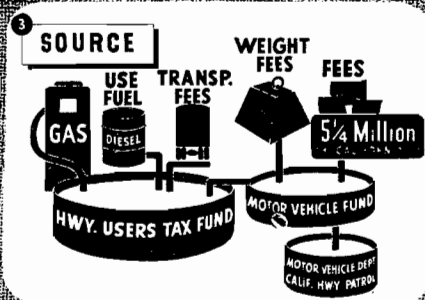
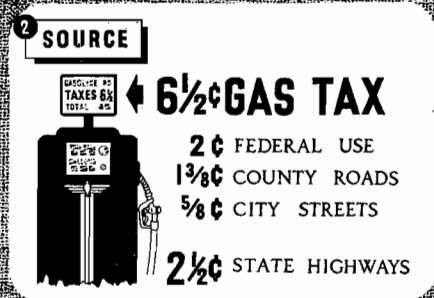
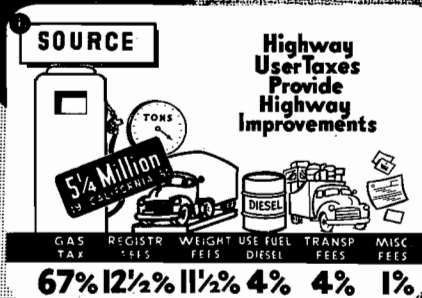
In Orange and Ventura

Orange County, for bridge and approaches across Santa Ana River on State Route 175, \$900,000.

Ventura County, for grading, paving, and structures on U. S. 101 between Calleguas Road to Central Ave-

CALIFORNIA'S HIGHWAYS

and buy ways



how CALIFORNIA STATE HIGHWAYS ARE FINANCED

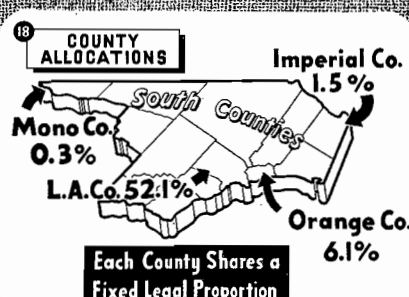
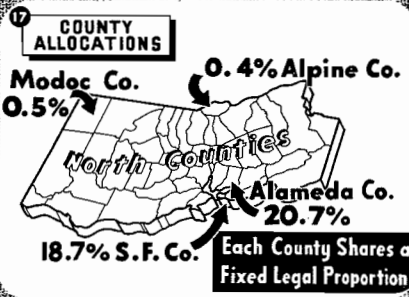
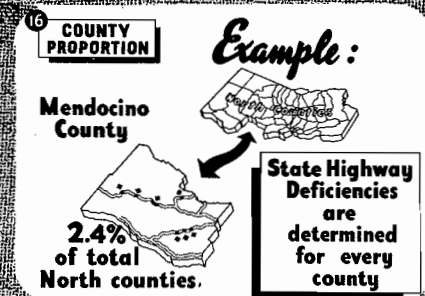
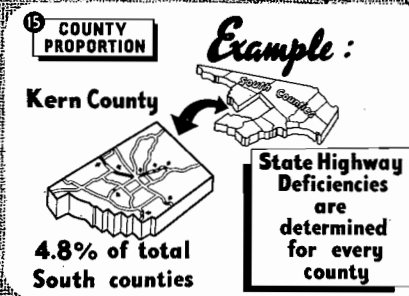
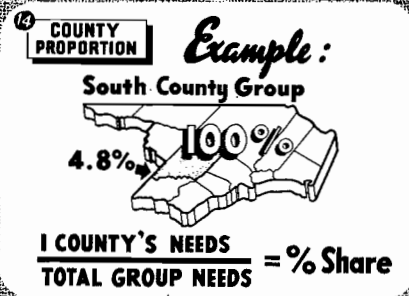
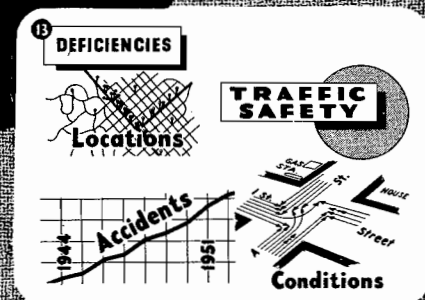
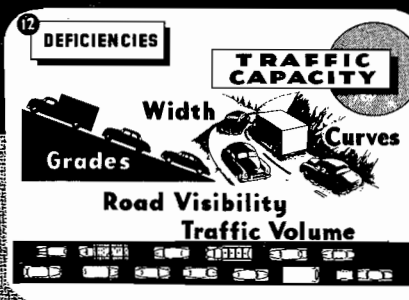
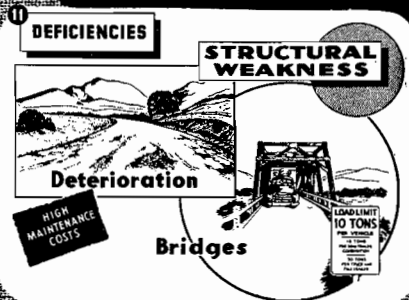
Of the
14,000 mile California State Highway system *more than 11,000 miles are deficient* in some respectaffecting safe traffic capacity

PRIORITY OF NEEDS

DEFICIENCY
 Structural Condition
 Critical Bridges
 Alignment-Grades
 Traffic Volume
 Width
 Accident Record
 Obstructions

PRIORITY

	Road 1	Road 2	Road 3
Structural Condition		✓	✓
Critical Bridges	✓		✓
Alignment-Grades			✓
Traffic Volume		✓	✓
Width		✓	✓
Accident Record	✓	✓	✓
Obstructions	✓	✓	✓



1951 CALIFORNIA VITAL HIGHWAY STATISTICS

Population	Nearly 11 million
Vehicle Registration	Nearly 5½ million
State Highway Mileage	13,986
Vehicle Miles Traveled—Rural State Highway System	14 billion annually
Vehicle Miles Traveled—Full Freeways	710 million annually
Accident Rate—Rural State Highways	2.71 per million vehicle miles
Accident Rate—Full Freeways	1.51 per million vehicle miles
Fatality Rate—Rural State Highways	11.39 per 100 million vehicle miles
Fatality Rate—Full Freeways	2.54 per 100 million vehicle miles

FACTS ON FULL FREEWAYS

(From Records on 50 Miles in Operation, 1951)

Traffic volume 13 times that of average rural state highway.
 Accident rate only about one-half and fatality rate only about one-fifth that of conventional highways.
 Freeways are costly; but in terms of lives saved, congestion relieved and economy of vehicle operation they represent the best practical remedy yet devised for our major highway deficiencies.

Major Construction Projects in State Highway Bu

nue in Camarillo, 5.7 miles, \$1,395,000. A grade separation is under construction from a prior budget.

Riverside County, for grading and surfacing 4.8 miles on U. S. 395 from Nuevo Road to March Air Force Base, \$465,000.

Inyo County, for grading and surfacing 8.6 miles of U. S. 395 from Dunsmovin to Haiwee, \$200,000.

Merced County, for grading and surfacing 3.6 miles of U. S. 99 from Livingston to south of Delhi, \$500,000. A bridge across the Merced River is under construction from a prior budget.

San Joaquin County, for grading and surfacing and structures on U. S. 99 from one mile north of Ripon to Austin Road, 3.4 miles, \$1,385,000.

In Far South

Imperial County, for grading and paving 2.4 miles on U. S. 80 from the

El Centro east city limits to 0.3 mile east of Route 201, \$400,000.

San Diego County, grading, paving, and structures on U. S. 101 for the freeway from Palm City to Mexican border, 3.8 miles, \$1,225,000.

San Diego County, grading and paving portions of State Route 196 from Oceanside to Vista, 6.7 miles, \$750,000.

Los Angeles County, grading, paving, and structures on U. S. 99 from Los Angeles county line to Archibald Avenue in Upland and Ontario, 7.2 miles, \$3,200,000.

Right of Way Allocations

Included in right of way allocations for the next fiscal year are: Eastshore Freeway in Oakland from Broadway to Bay Bridge distribution structure, \$1,000,000, and Route 228 from Foothill Boulevard to Eastshore Freeway, \$1,000,000, both in Alameda County; San Francisco, Embarcadero Freeway

from Lombard and Van Ness to San Francisco-Oakland Bay Bridge, \$1,-750,000; for Los Angeles County, Santa Ana and Hollywood Freeways from Ramona Freeway to Barham Boulevard, portions, \$600,000; Los Angeles County, U. S. 101 from Sepulveda Freeway to Calabasas, \$1,000,000; Los Angeles County, Ramona Freeway from Rosemead Boulevard to San Gabriel River Bridge through El Monte, \$2,500,000; Los Angeles County, Ramona Freeway from San Gabriel River to San Bernardino county line, \$900,000; Los Angeles County, Harbor and Arroyo Seco Freeways from Adobe Street to Gage Avenue, portions, \$4,900,000; Los Angeles, Los Angeles River Freeway from U. S. 101 Alt. to Santa Ana Freeway, \$2,650,000; Riverside County, Sign Route 18 from Arlington Avenue to Russell Street in Riverside, \$1,000,000.

County	Route	Description	Approximate mileage	Estimated cost
Alameda	5, 108 (US 50)	Vicinity of Intersection of Routes 5 and 108, east of Livermore, drainage revision	5.4	\$115,000
Alameda	5 (US 50)	0.25 mile easterly of Center Street to 0.1 mile easterly of Foothill Boulevard, grade, pave and structures	2.1	1,540,000
Alameda	69, 206 (US 40)	Eastshore Freeway South of Ashby Avenue to El Cerrito Overhead, in Emeryville, Berkeley and Albany, grade, pave and structures	3.0	4,600,000
Alameda-Contra Costa	69	Albany Drain and Stege Drain, in Albany and Richmond, bridges		75,000
Alameda	105	0.4 mile westerly of Hesperian Boulevard to 0.3 mile northerly of Harder Road, grade and surface	1.5	350,000
Alameda	227	Mountain Boulevard, Route 75 near Lake Temescal to Route 5 in Oakland, grade and surface (Joint Highway District No. 26)		300,000
Alameda	Various	Rights of way on state highway routes		2,652,000
Alpine	23	Mono county line to Junction Route 24, grade and surface	10.3	352,000
Amador	Various	Rights of way on state highway routes		22,000
Butte	3 (US 99E)	Junction Route 87 to Chico Avenue, base and surface	9.6	600,000
Butte	21, 87 (SR 24)*	Intersection Routes 21 and 87, channelization		40,000
Butte-Glenn	47 (SR 32)	Sacramento River, east of Hamilton City, redeck bridge		160,000
Calaveras-San Joaquin	24 (SR 12)	West of San Joaquin county line to Valley Springs (portions), grade and surface	5.5	350,000
Calaveras	Various	Rights of way on state highway routes		55,000
Contra Costa-Alameda	69	Albany Drain and Stege Drain, in Albany and Richmond, bridges		75,000
Contra Costa	59, 14 (US 40)	Jefferson Avenue to Rollingwood, in Richmond, El Cerrito, San Pablo and Hercules (portions), structures		390,000
Contra Costa	75 (SR 24)	Orinda Road Interchange, grade, pave and structures	0.8	1,800,000
Contra Costa	75 (SR 21)	One Mile south of Pacheco to Martinez grade and surface	5.1	380,000
Contra Costa	106 (SR 4)	Muir Station to Route 75, surface	3.5	300,000
Contra Costa	Various	Rights of way on state highway routes		1,375,000
Del Norte	46	0.5 mile east of Klamath to Turwar Creek, widen and surface	1.8	142,000
El Dorado	11 (US 50)	Through Placerville, grade and structures	1.5	595,000
El Dorado	Various	Rights of way on state highway routes		300,000

* SR = State Sign Route

Budget for 1953-54 Fiscal Year Total \$76,114,000

County	Route	Description	Approximate mileage	Estimated cost
Fresno	4 (US 99)	North city limits of Kingsburg to Selma (east lane), surface	3.1	\$85,000
Fresno	4 (US 99)	0.3 mile south of California Avenue to Santa Clara Street, in Fresno, grade and pave	0.8	175,000
Fresno	10 (SR 198)*	Lone Pine Inn to 2.8 miles west of Hot Springs Canyon (portions), grade, surface, and structures	5.7	420,000
Fresno	41 (SR 180)	Orange Avenue in Fresno to Maple Avenue, surface	1.0	52,000
Fresno	41 (SR 180)	Wahto Creek, bridge and approaches		20,000
Fresno	Various	Rights of way on state highway routes		400,000
Glenn-Butte	47 (SR 32)	Sacramento River east of Hamilton City, redeck bridge		160,000
Humboldt	1 (US 101)	Thogerson Cattlepass, cattlepass		17,000
Humboldt	1 (US 101)	Gannon Slough to 0.9 mile north of Plaza Avenue, grade and surface	2.9	600,000
Humboldt	1 (US 101)	Stephens Grove to Weott (portions), base and surface	6.0	150,000
Humboldt	35 (SR 36)	Alton to Bridgeville (portions), base, surface and drainage	6.9	80,000
Humboldt	Various	Rights of way on state highway routes		300,000
Imperial	12 (US 80)	Coyote Wells Underpass to Plaster City (portions), surface	4.7	50,000
Imperial	27 (US 80)	East city limits of El Centro to 0.3 mile east of Route 201, grade and pave	2.4	400,000
Imperial-Riverside	187 (SR 111)	One mile northwest of Frink Road to 1.2 miles northwest of Riverside county line, shoulders	12.5	75,000
Imperial	201	Junction of Route 187, 0.5 mile east of Alamorio to Calipatria (portions), surface	9.0	100,000
Imperial	Various	Rights of way on state highway routes		205,000
Inyo	23 (US 6, 395)	Dunsmovin to Haiwee, grade and surface	8.6	200,000
Inyo	23 (US 6, 395)	Ash and Cottonwood Creeks, bridges		75,000
Inyo	127 (SR 190)	Rolling Hills to Darwin Junction, grade and surface	9.6	50,000
Inyo	127 (SR 190)	3.8 miles east of Stovepipe Wells to 6.3 miles east of Stovepipe Wells, grade and surface	2.5	25,000
Kern	4 (US 99, 466)	Kern River, bridge and approaches		655,000
Kern	58 (US 466)	Sand Cut to Cable (portions), surface	8.8	280,000
Kern	58 (SR 178)	Goose Lake Slough and Overflow, bridge and approaches		67,000
Kern	58 (US 466)	Replace timber cattlepasses at various locations		10,000
Kern	140	Weedpatch to Arvin, surface	7.2	280,000
Kern	143	Di Giorgio Road to Panama Road (in Lamont), grade and surface	1.0	120,000
Kern	Various	Rights of way on state highway routes		481,000
Kings	135	Kansas Avenue to one mile north of Corcoran (portions), grade and structures	7.0	320,000
Lake	49 (SR 53)	Putah Creek, bridge		220,000
Lassen	29 (SR 36)	In Susanville, curbs, gutters and surface		10,000
Los Angeles	2, 26 (US 99, 101)	Santa Ana Freeway-Ramona Freeway connection in Los Angeles, grade, pave and structures		1,335,000
Los Angeles	2 (US 99, 101)	Vignes Street Separation in Los Angeles, structure		600,000
Los Angeles	4 (US 99)	Junction Route 23 to Kern county line (portions), subseal and surface	5.0	350,000
Los Angeles	4, 23, 157, 158 (US 99, 6) (SR 7)	0.6 mile south of Junction of Route 158 (Sepulveda Boulevard) to 0.4 mile north of north city limits of Los Angeles (Newhall Junction), grade, pave and structures	2.8	3,140,000
Los Angeles	9 (SR 118)	Alta Canyon Road to La Canada-Verdugo Road, grade and surface	1.9	150,000
Los Angeles	23 (US 6)	Sierra Highway from Williams Ranch to Palmdale (portions), grade and surface	4.6	450,000
Los Angeles	26 (US 60, 70, 99)	Ramona Freeway-San Dimas Road to San Bernardino county line, grade, pave and structures	6.2	4,100,000
Los Angeles	60 (US 101 Alt)	Southeasterly city limits of Santa Monica to Olympic Boulevard, grade and surface	1.3	325,000
Los Angeles	61, 62 (SR 2, 39)	Angeles Crest Highway and San Gabriel Canyon Road, Honor Camp Labor, grade		423,000
Los Angeles	165 (SR 11, US 6)	Harbor Freeway-Olympic Boulevard to Flower Street in Los Angeles (portions), grade, pave and structures	1.2 ±	3,160,000
Los Angeles	167 (SR 15)	Los Angeles River Freeway-North Atlantic Boulevard to Santa Ana Freeway, structures		2,740,000
Los Angeles	167	Atlantic Boulevard-Garvey Avenue in Monterey Park (Route 26) to Valley Boulevard in Alhambra (Route 77), grade and surface	0.8	160,000
Los Angeles	168 (SR 19)	Center Street to Bellflower Boulevard, grade and surface	3.3	230,000
Los Angeles	174 (SR 10)	Manchester Avenue-Osage Avenue to Freeman Boulevard, grade and surface	0.6	117,000
Los Angeles	175 (SR 14)	Redondo Beach Boulevard and 174th Street-Inglewood Avenue to Normandie Avenue, grade, surface and widen structure	3.7	890,000
Los Angeles	Various	Rights of way on state highway routes		16,386,500
Madera	32 (SR 152)	Califa to Merced county line (portions), surface	8.5	390,000
Madera	124	Junction Route 32 to south city limits of Chowchilla, surface	2.5	65,000
Madera	126 (SR 145)	Cottonwood Creek, bridge and approaches	0.4	45,000
Madera	Various	Rights of way on state highway routes		110,000
Marin	1 (US 101)	Manzanita to Golden Gate Bridge, grade and structures	3.9	510,000
Marin	52	Alto intersection to Belvedere (portions), surface and shoulders	1.5	100,000
Marin	56 (SR 1)	Tamalpais to Muir Beach (portions), retaining walls		30,000
Marin	Various	Rights of way on state highway routes		240,000
Mariposa	65 (SR 49)	Coulterville to Mariposa (portions), grade and surface	2.0	90,000
Mariposa	110 (SR 132)	Stanislaus county line to Coulterville (portions), grade and surface	7.6	25,000
Mariposa	Various	Rights of way on state highway routes		3,000
Mendocino	1 (US 101)	Four miles north of Forsythe Creek to Ridgewood Summit, grade	4.9	900,000
Mendocino	1 (US 101)	Outlet Creek to Reeves Creek, surface	4.5	280,000

* SR = State Sign Route

County	Route	Description	Approximate mileage	Estimated cost
Mendocino	48 (SR 28)*	North Fork Navarro River, bridge and approaches		\$165,000
Mendocino	70	Russian River, bridge and approaches	0.8	400,000
Mendocino	Various	Rights of way on state highway routes		1,000
Merced	4 (US 99)	O Street in Merced to Buhach Road (portions), surface	4.5	200,000
Merced	4 (US 99)	Livingston to south of Delhi, grade and surface	3.6	500,000
Merced	32 (SR 152)	Through Los Banos, grade and surface	1.1	140,000
Merced	41 (SR 33)	Main Canal, bridge and approaches	0.4	125,000
Merced	122 (SR 140)	San Joaquin River to Merced (portions), grade, surface and structures	5 ±	350,000
Merced	Various	Rights of way on state highway routes		160,000
Modoc	28 (US 395)	Alturas to 11 miles east, honor camp labor, grade	11.0	240,000
Modoc	28 (US 299)	Adin to Rush Creek, surface	4.2	150,000
Modoc	73 (US 395)	Junction Route 28 to state line, honor camp labor, grade and oil	33.8	120,000
Modoc	210 (SR 139)	Perez Overhead, redeck and replace abutments		50,000
Mono	23	Junction Route 95 to Alpine county line, surface	8.0	50,000
Mono	111	Silver Lake to Rush Creek Weir, grade and surface	1.9	70,000
Mono	Various	Rights of way on state highway routes		9,000
Monterey	2 (US 101)	San Lucas to 2.5 miles north, reconstruct	2.4	190,000
Monterey	2 (US 101)	John Street to East Market Street in Salinas (portions), grade and structures	0.7	635,000
Monterey	56 (SR 1)	Redeck timber bridges and replace four cattlepasses		60,000
Monterey	56 (SR 1)	Little Sur River, bridge and approaches	0.7	195,000
Monterey	56 (SR 1)	Loma Linda to Watsonville Junction, grade and surface	1.6	285,000
Monterey	117	El Estero to Del Monte Junction in Monterey, grade and surface	1.2	400,000
Napa	49 (SR 29)	Oakville to Rutherford, surface	1.8	136,000
Napa	Various	Rights of way on state highway routes		30,000
Nevada	25 (SR 49)	Route 15 to near northwest city limits of Nevada City, grade and surface	1 ±	78,000
Nevada	38 (US 40)	Truckee River Bridge and Hinton Overcrossing Bridge, reconstruct railing and curb		20,000
Nevada	Various	Rights of way on state highway routes		100,000
Orange	2 (US 101)	Santa Ana Freeway-First Street to Red Hill Avenue, grade, pave and structures	1.8	1,610,000
Orange	171 (SR 39)	Garfield Avenue to Smeltzer Avenue, grade, pave and structures	3.0	450,000
Orange	171 (SR 39)	Coyote Creek, bridge and approaches		75,000
Orange	175 (SR 14)	Santa Ana River, bridge and approaches		900,000
Orange	176	Imperial Highway, Route 62 (Mirada Avenue) to Route 2 (US 101), grade and surface	2.0	160,000
Orange	Various	Rights of way on state highway routes		1,357,500
Placer-Sacramento	3, 17 (US 40, 99E)	Ben Ali to ½ mile east of Roseville, grade and structures	12.7	2,200,000
Placer	Various	Rights of way on state highway routes		106,000
Plumas	21 (SR 24)	Willow Creek Bridge, construct new abutments		15,000
Plumas	83 (SR 89)	Graeagle Creek, bridge and approaches		85,000
Riverside	26 (US 60, 70, 99)	1.2 miles east of Whitewater to 2.3 miles west of Garnet, grade, surface and structures	2.2	350,000
Riverside	64 (SR 74)	Colt Creek, bridge and approaches		20,000
Riverside	64 (SR 74, 111)	In Indio, Arabia Street to 0.1 mile east of California Street, grade and surface	0.9	50,000
Riverside	64 (US 60, 70)	Desert Center to Blythe (portions), surface	14.0	150,000
Riverside	78 (US 395)	Nuevo Road to March Air Force Base, grade and surface	4.8	465,000
Riverside-Imperial	187 (SR 111)	One mile northwest of Frink Road to 1.2 miles northwest of Riverside county line, shoulders	12.5	75,000
Riverside	Various	Rights of way on state highway routes		2,031,000
Sacramento-Placer	3, 17 (US 40, 99E)	Ben Ali to one-half mile east of Roseville, grade and structures	12.7	2,200,000
Sacramento	11 (SR 24)	Antioch Bridge to 1.5 miles northerly, grade, surface and structures	1.5	800,000
Sacramento	11 (US 50)	Alder Creek, grade and structure		65,000
Sacramento	98	C Street in Sacramento to Route 3 near Swanston Road, grade, surface and structures	2.3	1,110,000
Sacramento	Various	Rights of way on state highway routes		360,000
San Benito	22 (SR 156)	San Benito River, bridge and approaches	1.0	470,000
San Bernardino	26 (US 70, 99)	Los Angeles county line to Archibald Avenue, grade, pave and structures	7.2	3,200,000
San Bernardino	26 (US 70, 99)	Through Colton, surface	1.5	40,000
San Bernardino	31 (US 91, 466)	Three miles west of Halloran Springs to Nevada state line, shoulders	39.1	320,000
San Bernardino	31 (US 91, 66, 466)	Redecking various timber trestle bridges		100,000
San Bernardino	43 (SR 18)	Big Bear City to Box "S" Ranch (portions), grade and surface	3.0	10,000
San Bernardino	58 (US 466)	Hinkley railroad crossing, grade and surface	0.9	75,000
San Bernardino	58 (US 66)	Redecking various timber trestle bridges		300,000
San Bernardino	59 (SR 138)	Los Angeles county line to route 61, grade and surface	6.7	100,000
San Bernardino	59, 188 (SR 2)	West Fork Mojave River, bridges and approaches		120,000
San Bernardino	Various	Rights of way on state highway routes		401,500
San Diego	2 (US 101)	Torrey Pines Grade in San Diego, grade and pave	2.1	200,000
San Diego	2 (US 101)	Monterey Freeway-Palm City to Mexican border, grade, pave and structures	3.8	1,225,000
San Diego	12 (US 80)	College Avenue in San Diego to La Mesa Boulevard in La Mesa, grade and surface	2.5	380,000
San Diego	78 (SR 79)	Warners to the San Luis Rey River (portions), grade and pave	1.2	73,000
San Diego	196 (SR 78)	Oceanside to Vista (portions), grade and pave	6.7	750,000
San Diego	Various	Rights of way on state highway routes		1,026,000
San Francisco	2, 68 (US 40, 50, 101)	Intersection of Bayshore Freeway (Route 68) with 13th Street (Route 2), wye viaduct and connecting ramps	0.2	1,015,000
San Francisco	68 (US 101, By-pass)	Bayshore Freeway-Hester Avenue (one-half mile north of San Mateo county line) to Alemany Boulevard, grade, pave and structures	1.7	3,350,000

* SR = State Sign Route

County	Route	Description	Approximate mileage	Estimated cost
San Francisco	Various	Rights of way on state highway routes		\$2,250,000
San Joaquin	4 (US 99)	One mile north of Ripon to Austin Road, grade, surface and structures	3.4	1,385,000
San Joaquin	5 (US 50)	Banta Road to Grant Line Road, surface	1.9	100,000
San Joaquin-Calaveras	24 (SR 12)*	West of San Joaquin county line to Valley Springs (portions), grade and surface	5.5	350,000
San Joaquin	41 (SR 33)	At Siphon Curve, grade and surface	0.5	75,000
San Joaquin	97 (SR 88)	Plain Creek to Bear Creek, surface	1.8	50,000
San Joaquin	Various	Rights of way on state highway routes		288,000
San Luis Obispo	2 (US 101)	Through Arroyo Grande, grade and surface	1.5	180,000
San Luis Obispo	2 (US 101)	Paso Robles to San Miguel, grade and structures	6.4	940,000
San Luis Obispo	Various	Rights of way on state highway routes		230,000
San Mateo	55 (SR 1, 5)	Junction Routes 55 and 56 at Thornton to Edgemar Road (portions), grade and surface	2.2	950,000
San Mateo	55 (SR 5)	La Honda Road to Alpine Road (portions), surface	7.3	15,000
San Mateo	107	Route 68 to Southern Pacific Railroad crossing in Menlo Park, surface and drainage	0.8	141,000
San Mateo	Various	Rights of way on state highway routes		400,000
Santa Barbara	2 (US 101)	One mile east of Carpinteria to one-half mile east of Arroyo Parida and Ortega Hill to Sheffield Drive, grade and structures	3.7	1,270,000
Santa Barbara	2 (US 101)	Winchester Creek to Las Varas Creek, surface	3.7	180,000
Santa Barbara	2 (US 101)	South city limits of Santa Maria to 0.1 mile north of the north city limits, surface	2.1	160,000
Santa Barbara	138 (US 399)	Quatel Canyon and Ballinger Creek, bridges and approaches		95,000
Santa Barbara	Various	Rights of way on state highway routes		690,000
Santa Clara	2, 119 (US 101, SR 25)	Carnadero Creek and Junction of Routes 2 and 119, revise channelization and construct bridge wing walls		47,000
Santa Clara	32 (SR 152)	Cedar Creek Bridge, widen		20,000
Santa Clara	113	Route 2 to Route 68, surface and bridge	2.5	200,000
Santa Clara	Various	Rights of way on state highway routes		700,000
Santa Cruz	56 (SR 1)	1.5 miles north of Watsonville to Rob Roy Junction, surface	5.7	175,000
Santa Cruz	56 (SR 1)	At Laguna Creek, Joint Highway District No. 9, grade and surface	1.7	230,000
Santa Cruz	Various	Rights of way on state highway routes		170,000
Shasta	3 (US 99)	Boulder Creek to Project City, grade and structures	4.2	750,000
Shasta	28 (US 299)	Churn Creek Bridge, Dry Creek Bridge and Salt Creek Bridge, abutments and wings		60,000
Shasta	Various	Rights of way on state highway routes		50,000
Sierra	Various	Rights of way on state highway routes		5,000
Siskiyou	3 (US 99)	Spring Street to north city limits of Dunsmuir, grade, surface and structure	0.3	630,000
Siskiyou	82	One mile west to one mile east of Forest Mountain Summit (portions), grade and surface	1.5	285,000
Siskiyou	Various	Rights of way on state highway routes		80,000
Solano-Yolo	7	Route 6 to Woodland Wye, grade, surface and structure	1.5	600,000
Solano	208 (SR 48)	Napa River near Vallejo, redeck portions of bridge		50,000
Solano	Various	Rights of way on state highway routes		258,500
Sonoma	1, 51 (US 101, SR 12)	0.6 mile south of Venezia to 0.2 mile south of Lytton Overhead and Stony Point Road to 0.1 mile west of Northwestern Pacific Railroad, widen and surface	2.7	150,000
Sonoma	1 (US 101)	Petaluma Creek Bridge, grade and structure		900,000
Sonoma	56 (SR 1)	Jenner to Mendocino county line (portions), grade and surface	39 ±	100,000
Sonoma	103 (SR 28)	Route 1 to Maacama Creek (portions), grade and surface		10,000
Sonoma	104 (SR 12)	One mile west of Monte Rio to Monte Rio (portions), grade and surface	0.5	85,000
Sonoma	104	1.1 miles west of Gossage Creek to Gossage Creek, grade and surface	1.1	150,000
Sonoma	104	Petaluma Creek in Petaluma, redeck bridge		45,000
Sonoma	Various	Rights of way on state highway routes		375,000
Stanislaus	13	Modesto Irrigation District Canal, bridge and approaches		50,000
Stanislaus	Various	Rights of way on state highway routes		25,000
Tehama	47 (SR 32)	Deer Creek, bridge and approaches		90,000
Tehama	Various	Rights of way on state highway routes		28,000
Trinity	20 (US 299)	1.8 miles east of Weaverville to Douglas City (portions), grade and surface	3 ±	200,000
Trinity	20 (US 299)	Humboldt county line to Prairie Creek, honor camp labor, grade		325,000
Trinity	20 (US 299)	Humboldt county line to Prairie Creek, base and dust oil	17 ±	20,000
Trinity	Various	Rights of way on state highway routes		15,000
Tulare	4, 10 (US 99)	Visalia Airport Interchange, grade and structure		900,000
Tulare	131	Kaweah River, bridge and approaches		205,000
Tulare	134 (SR 63)	Ash Avenue to Route 132, grade and surface	0.8	270,000
Tulare	Various	Rights of way on state highway routes		460,000
Tuolumne	Various	Rights of way on state highway routes		5,000
Ventura	2 (US 101)	Calleguas Road to Central Avenue in Camarillo, grade, pave and structures	5.7	1,395,000
Ventura	79 (SR 126)	Junction Route 2 in Ventura to Junction Route 154 (Wells Road) (portions), surface and shoulders	3.4	60,000
Ventura	138 (US 399)	Meiners Road to Matilija Hot Springs Road (portions), grade, pave and structures	2.7	310,000
Ventura	138 (US 399)	At Billy Creek, Timba Creek and Berges Creek, bridges and approaches		83,000
Ventura	Various	Rights of way on state highway routes		1,110,000
Yolo-Solano	7	Route 6 to Woodland Wye, grade, surface and structure	1.5	600,000
Yolo	87 (SR 24)	Knights Landing-Ridge Cut Bridge, widen structure		24,000
Yolo	90	Winters to Madison, base and surface	10.7	140,000
Yolo	Various	Rights of way on state highway routes		59,500
Yuba	Various	Rights of way on state highway routes		100,000

* SR = State Sign Route

Norwalk Diagonal

Continued from page 23 . . .

Also, the vehicular speeds of 50 m.p.h. and 35 m.p.h. for the freeway and the existing routes, respectively, are both decidedly conservative values and tend to minimize net user savings. Notwith-

standing these conservative assumptions, a net annual savings of \$1,238,445 starting in 1954 after opening of this section of the Santa Ana Freeway seems assured for the users of the Norwalk Diagonal.

The following is an economic comparison in user costs for a single passenger car using the freeway or the major existing route:

FROM JUNCTION SANTA ANA FREEWAY AND LAKEWOOD BOULEVARD TO JUNCTION SANTA ANA FREEWAY AND FIRESTONE BOULEVARD

Distance via Santa Ana Freeway	5.18 mi.
Time via Santa Ana Freeway @ 50 m.p.h.	6.22 min.
Mileage cost per vehicle @ \$0.03 per mi.	\$0.1554
Time cost per vehicle @ \$0.02 per min.	0.1244
Total cost per vehicle	\$0.2798
Distance via Lakewood and Firestone Boule-	
vards	6.69 mi.
Time via Lakewood and Firestone Boulevards	
@ 35 m.p.h.	11.48 min.
Mileage cost per vehicle @ \$0.03 per mi.	\$0.2007
Time cost per vehicle @ \$0.02 per min.	0.2296
Total cost per vehicle	\$0.4303

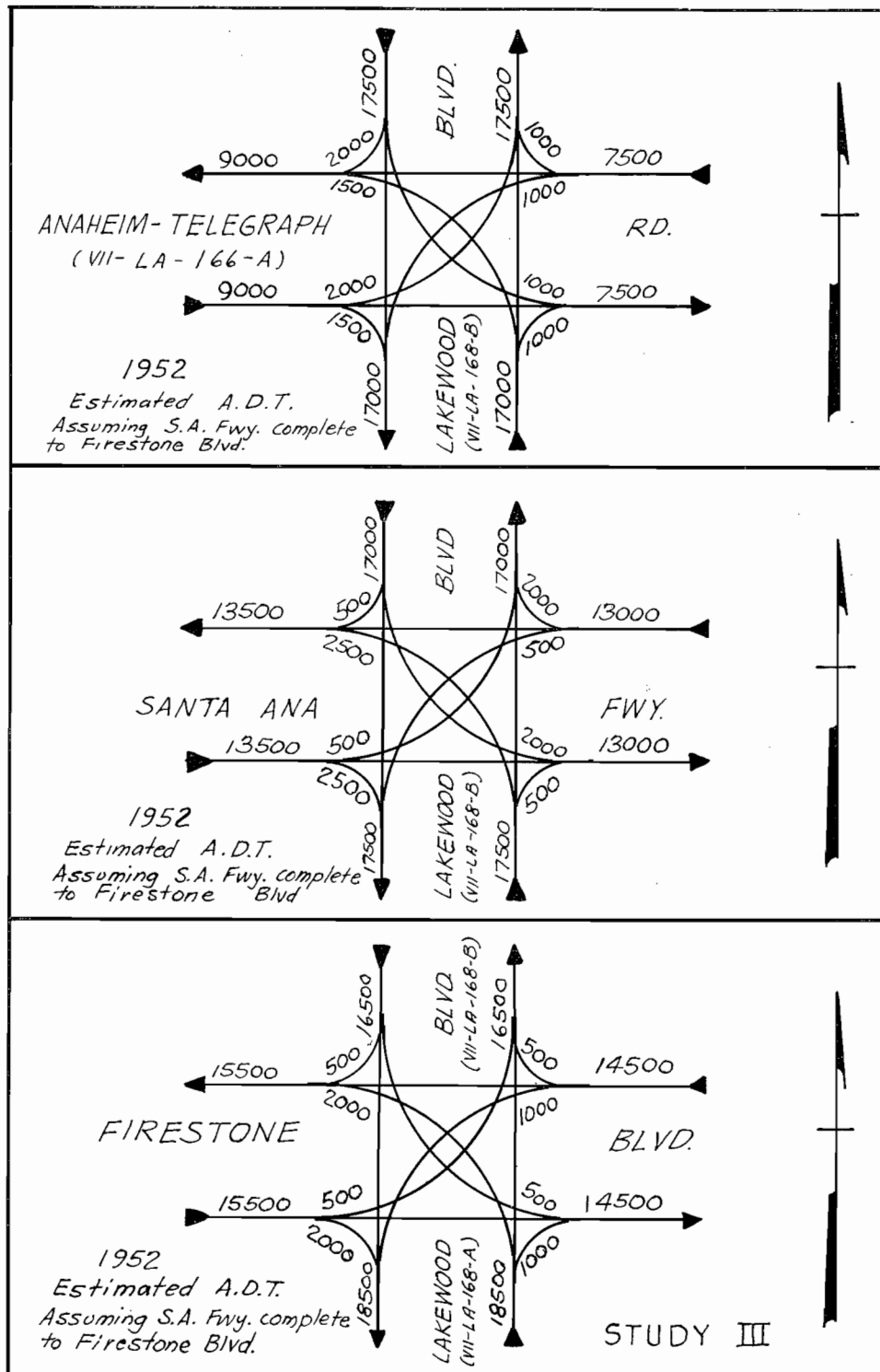
History Behind Mokelumne Hill

Motorists who pass through Mokelumne Hill in Calaveras County are not always aware of the colorful history that lies behind this little town. "Moke Hill," as it is popularly known, has quite probably seen more of gold mining, of bloodshed and battles, than any other town in the area.

Early in 1849, according to the National Automobile Club, a small band of discharged soldiers wandered onto the site of the present town, pitched their tents, and settled down to look for gold. Within a very few years the ground had proved itself to be so rich in the metal that the population had soared up to around four thousand, individual miners were taking as much as \$20,000 from claims no more than 16 feet square, and a single area on the southern edge of town was well on its way to producing around \$30,000,000 worth of gold. Mokelumne Hill had become a "boom town" in the truest sense of the word.

Moke Hill was a prosperous trading center for the nearby camps and served as the county seat of Calaveras County from 1852 to 1866.

When the gold had gone, however, the men went too, and today Moke Hill has simmered down to a small Mother Lode town with a population of little over 500.



Streets to Freeways

Continued from page 4...

and Highways Code contains this provision:

"It is hereby declared to be the policy of the Legislature to provide for advance planning and continuity of fiscal policy in the construction and improvement of the State Highway System and in the administration of expenditures from the State Highway Fund. The California Highway Commission is directed to follow such policy insofar as possible."

The Highway Commission and the State Highway Engineer, in my opinion, have endeavored in good faith to adhere to this sound policy, which is responsible for much of the progress we have made in recent years.

Critical Deficiencies

As indicated by the chart, the 1951 estimated cost of bringing our present highway system up to adequate standards is approximately \$3,000,000,000. Under the present system of financing, the engineers tell me it will take 30 years, or more, to achieve this improvement. This is without provision for further cost increases or additional increased needs due to our continued rapid growth. Neither does it take into account the possibility of further additions to the State Highway System.

The Collier-Burns Act, itself, provided for the expansion of the State Highway System by approximately 75 miles, much of it in highly developed metropolitan areas where freeways are needed. The estimated construction cost on this mileage alone is more than \$268,000,000.

Public Awareness

We should all be encouraged by the increasing tendency of people everywhere to ask some long-range and very searching questions about their highways and their functions. We are finding a highly gratifying awareness on the part of the public of the existence of the highway problem as a whole. Highway users are increasingly concerned with traffic safety, and are impressed by the fact that fatal accidents on full freeways occur only one-fifth

as often as they do on the rural state highway system as a whole. They are aware of the saving in time and money accruing to them as a result of freedom from stop lights and congestion.

Civic leaders of our cities are becoming increasingly aware that development of an adequate over-all local transportation network is a life and death matter for the downtown business district. They are proving this awareness by their long-range planning and zoning measures, and particularly by their growing determination to provide off-street parking facilities. They are insisting on comprehensive planning to insure the permanent value of their street improvement programs.

Broad State-wide View

Most encouraging, people in all parts of California are coming more and more to see their interdependence in highway matters. They are taking a broad, state-wide view of what is essentially a state-wide problem.

This enlightened attitude is the brightest spot on our highway and transportation horizon. It cannot fail to be translated into intelligent action which will point toward a real solution of our difficulties. Its fruits are already evident in the coordinated attack which is being made on highway problems in more and more sections of the State. The officials and engineers of the State Division of Highways are sitting down with the staffs of city, county, and regional planning commissions, and with other officials of city and county governments. They are endeavoring to weigh all the multiple and complex factors which make up the local and regional transportation picture, and fitting it into the state-wide picture. They exchange facts and ideas about land use, soil conditions, local economic trends, traffic data, construction costs, and engineering problems. They measure the effect of a local road or street improvement on the state highway with which it connects, and of the improvement of state highways on the local systems.

In other words, we have the foundation for a good start on the solution of our street, road, and highway problem. First, we have achieved the necessary atmosphere of teamwork which

Long Beach Freeway

Continued from page 15...

It further contemplates a one-way street system into the downtown area with provision for two one-way bridges in the general vicinity of Broadway and Third Street, respectively.

The active subsidence in this general area which has already resulted in six feet of settlement in the vicinity of Ocean Boulevard with an additional predicted ultimate subsidence of approximately 10 feet has resulted in a very serious flood hazard, for which remedial work is an early must. Accordingly, the Army and County Flood Control Engineers have scheduled raising the levees and reconstruction of the bridge improvements to start in the spring of 1953. Time being of the essence, all planning and construction by the many agencies involved must be expedited to the utmost. The following remarks as to our program, both current and future, will give a brief insight into the magnitude of the problem.

Storm Drain Pump

Nearing completion is the section between Anaheim Street and Pacific Coast Highway, which includes the \$125,000 storm drain pump station constructed by Gardner & McCall, together with a \$140,000 paving contract by Boddum Construction Company. Nearing completion also is the Guy F. Atkinson \$2,000,000 contract with the Harbor Department of the city for the Anaheim Street Bridge and its inter-

... Continued on page 38

makes possible a coordinated effort. Second, there is the growing awareness of the complex nature and the vast extent of the transportation problem. And, finally, there is general agreement that recognition of the serious traffic problems within cities, and in the expanding metropolitan areas, must be balanced by recognition of the needs of rural areas. California's highway transportation system, if it is to be truly suited to present-day and future requirements, must be designed as a properly integrated network of city streets, county roads, and state highways.

Long Beach Freeway

Continued from page 37 . . .

change with the freeway. Architectural and engineering contracts have been awarded to Moffatt & Nichol for preparation of plans for the \$4,086,000 Ninth Street Bridge and to J. Herb Davies of this city for preparation of plans for the \$4,376,000 Ocean Boulevard Bridge.

To provide a detour during construction of these new bridges, bids are to be received by our Harbor Department, on November 13, 1952, for moving the Ocean Boulevard Bridge southerly to Santa Cruz Avenue at an estimated cost of \$227,000, including demolition of piling at the present bridge location, levee work, and new bridge approaches.

Acquisition Cost \$4,000,000

The removal of the existing Seventh Street Bridge and its replacement with a railway bridge, just south of Ninth Street, at an estimated cost of \$750,000, as well as the ultimate replacement of the existing Broadway Bridge with one or more bridges between Ocean Boulevard and Ninth Street, will be required to adequately handle the traffic. It is conservatively estimated that the total acquisition cost for the freeway development, south of Pacific Coast Highway, will be \$4,000,000 with additional millions of dollars required for the Broadway Bridge replacement, construction of the on and off ramps, railroad work, and extension of the freeway and service road improvements.

A major portion of the complex financing on this all-embracing program will be defrayed from Long Beach Harbor and General City Funds. However, the Los Angeles County Flood Control District will participate in financing the replacement, in kind, of the bridges which must be removed as a part of the Army Engineers-Flood Control and levee work which will be done with federal moneys. The Pacific Electric Railway, oil producing facilities and many utilities are, likewise, involved in this very comprehensive program, which is further complicated by our big hurdle: *Subsidence*.

Old Timers in Division of Highways Honored



State Highway Engineer George T. McCoy presents certificate to Fred J. Grumm, retired Deputy State Highway Engineer. Director of Public Works Frank B. Durkee on McCoy's left and Assistant State Highway Engineer Charles E. Waite in background.

CERTIFICATES for 25 years of service with the State of California were awarded at a dinner at the University Club in Sacramento on November 14th to 53 long-time present and retired employees of the Division of Highways in the Sacramento area.

The guests of honor were introduced by Assistant State Highway Engineer C. E. Waite, and received their 25-year awards, consisting of a framed certificate and a pin, from State Highway Engineer George T. McCoy. Brief talks were given by Frank B. Durkee, State Director of Public Works, and by McCoy.

With a few exceptions, the recipients of the certificates at the dinner are employees from the Division's headquarters office. Other Division of Highways units in the Sacramento area will hold separate presentation ceremonies, as will the division's 11 district offices throughout the State. A few of the retired employees at the dinner served in other parts of the State but now make their homes in the vicinity of Sacramento.

The honorees and their years of service as of December 31, 1951, are as follows:

Present employees: William Bock, 32 years; Lawrence V. Campbell, 32; Edward F. Carter, 30; George N. Cook, 29; Lloyd D. Craig, 26; Mrs. Coral E. Davis, 30; Leo S. Fahy, 30; George F. Hellesoe, 26; E. Roy Higgins, 30; F. N. Hveem, 34; Wilburn H. Irish, 32; George A. Karsten, 26; Harold B. LaForge, 32; Henry L. Mahoney, 30; Herbert S. Marshall, 27; Robert W. McCrea, 29; William C. McNeely, 37.

Luke D. Packard, 26 years; Mrs. Helen F. Randolph, 29; Bertram A. Reber, 28; Rodney F. Reynolds, 33; A. Irving Rivett, 36; Emil J. Saldine, 26; William J. Stonebraker, 26; Baynard A. Switzer, 27; Ray B. Vernon, 27; J. Wilbur Vickrey, 34; Herbert A. Waterman, 32; Durward Wickham, 25; Richard H. Wilson, 28; Earl Withycombe, 30; Clarence F. Woodin, 33; Joseph O. Zink, 28.

Retired employees: Charles M. Butts, 39 years; Herbert L. Cooper, 26; Mrs.

. . . Continued on page 64

THE UPS AND DOWNS OF BRIDGE CONSTRUCTION

By J. W. GREEN, Southern Representative, Bridge Department

WHERE CONSTRUCTION work is nearby or along heavily traveled traffic arterials where detours are not feasible to maintain, State Division of Highways specifications always require that the contractor shall pass traffic through construction and conduct his work so as to offer as little inconvenience and delay to public traffic as possible. When public traffic has to be shut off from sections of such important freeways as the Santa Ana Freeway and the Ramona Freeway, this becomes news. Not only do the local newspapers carry the stories, but moving pictures are taken and shown in newscasts over television. Particularly is this so when the closing is caused by massive structural steel assemblies being raised up or taken down. Both of

these operations occurred recently in District VII within one week of each other.

Temporary Bridge

On October 21, 1952, it was necessary to close the section of Anaheim-Telegraph Road adjoining the Santa Ana Freeway, between Washington Boulevard and Slauson Avenue, in order to permit the taking down of structural steel girders of the temporary shoo-fly bridge that carried the Santa Fe Railroad traffic over Anaheim-Telegraph Road. The closing of this important traffic arterial was necessary so that the Consolidated Western Steel Corporation could bring in mobile cranes and take down the 24-ton structural steel girders in the shoo-fly

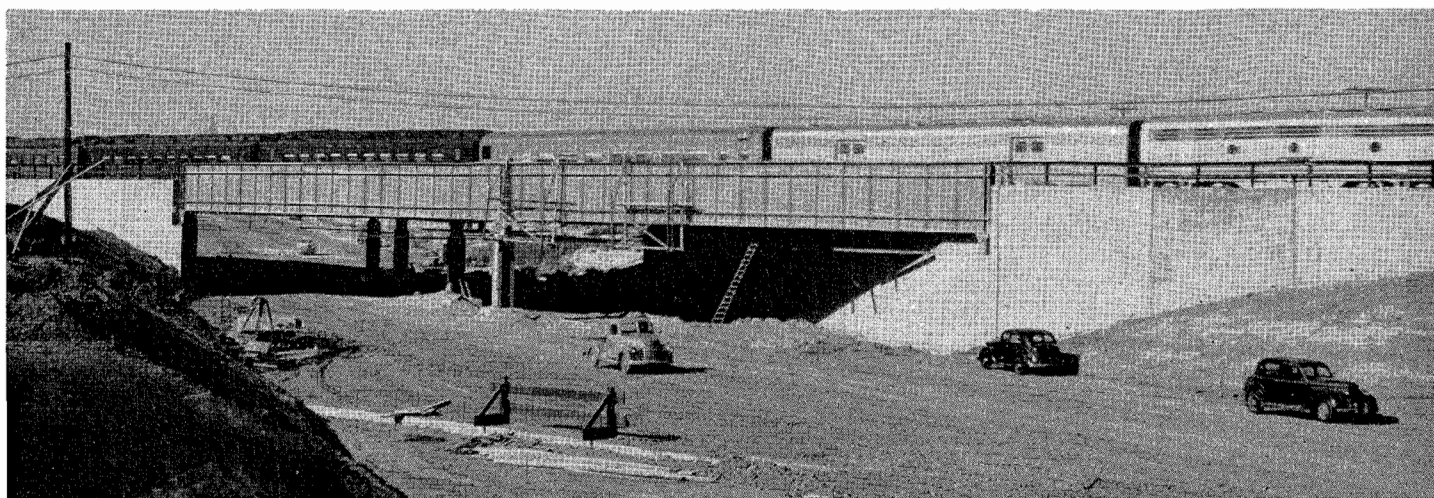
bridge. This temporary bridge had been erected over Anaheim-Telegraph Road a short distance southerly of the main line of the Santa Fe Railroad in order to provide a shoo-fly, or by-pass, for railroad traffic around the construction for the new railroad grade separation bridge on the Santa Ana Freeway, known as the Simons Underpass.

Simons Underpass

Simons Underpass is a structural steel through girder-type bridge carrying the two main line tracks and two lead tracks of the Santa Fe Railroad across the Santa Ana Freeway. It consists of two spans each, approximately 104 feet long, supported on reinforced concrete abutments and a center pier of struc-

Southerly section of Evergreen Avenue pedestrian overcrossing being swung into place by three truck cranes. Closing of Ramona Freeway to public traffic was required during this operation. Photograph by Consolidated Western Steel Corporation.



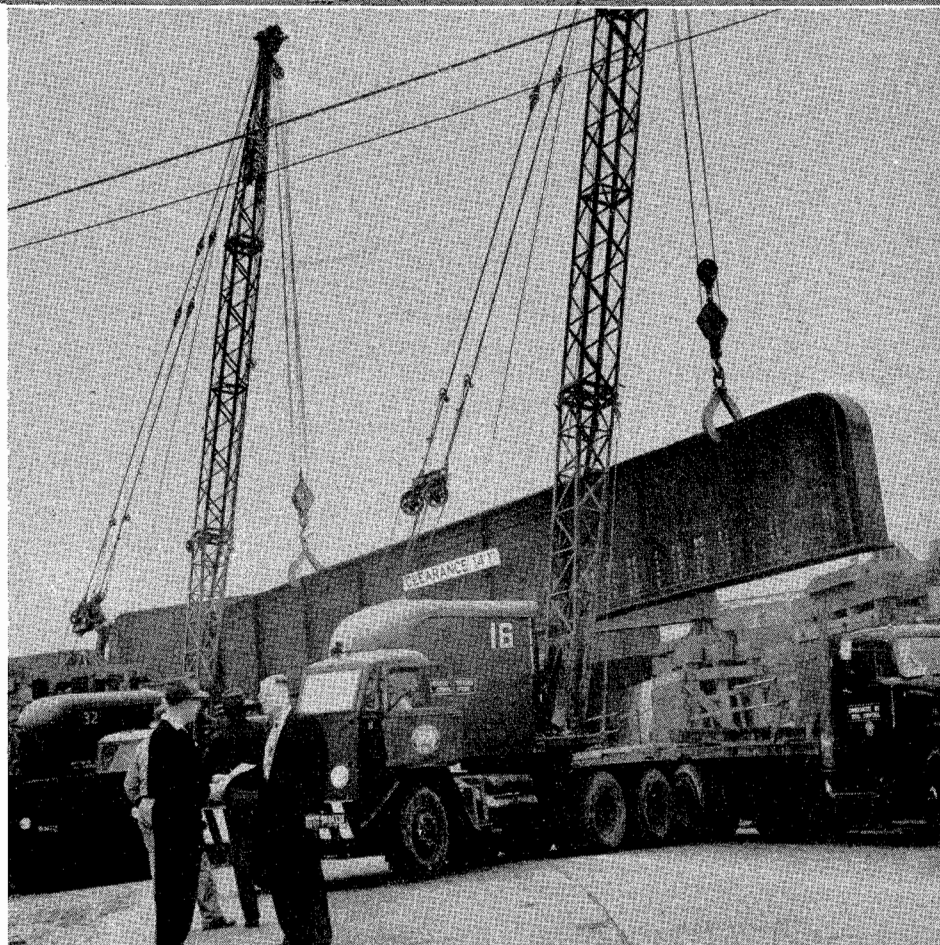


tural steel columns. There are four structural steel girders connected by 21-inch and 30-inch floor beams, with a total weight of 1,250 tons. The interior girders are over 11 feet in depth and weigh 192 tons each. They were fabricated in three parts, the largest weighing 76 tons. These interior girders weigh over one ton per foot, being possibly the heaviest per foot that the bridge department has yet designed. The two interior steel columns weigh 23 tons each. There are about 3,000 cubic yards of concrete in the abutments, wingwalls and center pier footings. The main girders were fabricated by the American Bridge Company and all other structural steel by the Consolidated Western Steel Corporation. All erection was done by the latter company.

Construction Difficulties

Due to the extreme weight of girder sections, it was a difficult erection job. The center sections of the interior girders were erected by two 20-ton and two 40-ton cranes. The interior columns of the center pier were erected by two 20-ton cranes and placed on anchor bolts six feet long and three inches in diameter. These anchor bolts were cast in 20- x 40-foot concrete footings.

The field rivets were all one-inch in diameter and varied in length to over 11 inches, which is considered something of a record for length. All rivets over $8\frac{3}{8}$ inches were tapered one thirty-second inch to enable a better job of filling the rivet holes with the rivet shank. Difficulty was encountered in driving



UPPER—New Simons underpass structure nearly completed and carrying main line Santa Fe Railroad trains over Santa Ana Freeway now in process of construction. LOWER—Dismantling operations at Simons underpass shoo-fly bridge structure with mobile crane about to place girders on truck and trailer. J. M. Curran, Resident Engineer, left, and A. D. Griffin, Assistant District Engineer, observe operations. Photo by Los Angeles Times.

rivets between the floor beams because of the limited space between them. It is interesting to note that the erection of the 1,250 tons of structural steel and driving of 30,000 field rivets was completed in a little over 10 weeks.

Shoo-fly Bridge Removed

The Simons Underpass was completed and opened to the full load of railroad traffic on October 6, 1952. Then followed the removal of the railroad shoo-fly and the shoo-fly bridge.

Dismantling operations went off according to schedule. After removal by the mobile cranes and loading on trucks, the girders were hauled to the local yard of the Consolidated Western Steel Corporation for reconditioning, loading on freight cars, and shipment to the Santa Fe Railroad storage yard at San Bernardino. These girders were the property of the Santa Fe Railroad and had been rented to the State for the year's time during which the railroad shoo-fly had to be kept in operation. This was a highly satisfactory arrangement because at the time of the erection of the shoo-fly bridge structural steel was in critical supply.

The railroad shoo-fly work and the construction of the Simons Underpass railroad grade separation bridge, costing approximately \$800,000, were carried out as a part of the United Concrete Pipe Corporation contract for Santa Ana Freeway construction between Washington Boulevard and Todd Avenue. The resident engineer on the bridge construction is J. M. Curran.

Traffic Control Problem

One week after the dismantling operations at the Simons Underpass, it was necessary to close the Ramona Freeway in the City Terrace area east of Los Angeles for a period of three hours for a similar operation, but in reverse, with prefabricated, welded structural steel bridge sections being raised up into permanent position over the freeway and over the Pacific Electric Railway.

The erection of structural steel for the Evergreen Avenue Pedestrian Overcrossing created quite a problem in the coordination of traffic control. The largest of three girder bridge sections, a 138-foot, 21-ton steel section, was hauled from the Consolidated Western Steel Corporation plant located in southwestern Los Angeles over city streets, and was finally erected over the heavily traveled Ramona Freeway. Due to the extreme length of this section of the bridge, erection had to be done in such a manner that both the eastbound and westbound lanes of the freeway were closed. To accomplish this all traffic had to be detoured and rerouted over a distance of three miles, requiring the

close cooperation of various public and private agencies.

Pedestrian Overcrossing

This pedestrian overcrossing connects a shopping center and school area in City Terrace with a housing project of the Los Angeles City Housing Authority. The 310-foot bridge spans the six-lane westbound and eastbound Ramona Freeway and south frontage road, two tracks of the Pacific Electric Railway, and an area reserved for a future city street. The structure is supported at the ends on reinforced concrete abutments, with stairways provided. Three concrete piers, 25 feet in height, support the center span and the southerly span. An eight-foot reinforced concrete slab walkway is being provided, which is supported between the five-foot welded steel girders on steel floor beams. All piers and abutments are supported on "cast in place" concrete piles driven to a minimum bearing of 32 tons per pile. A steel picket-style fence will be provided along the top of girders and pipe hand-rail will be constructed for the entire structure.

Center Span Erected First

The center and highest span was erected as the first operation. The north span crossing the railway tracks was placed as the second operation, one end of which was attached to the hinge on the center span cantilever. This latter operation detained two Pacific Electric freight trains about one-half hour. The third section on the south side of the bridge was the most difficult to place and caused the Ramona Freeway to be closed for about three hours during midday when traffic was the lightest.

Erection of the steel girder sections required the use of three 12-ton truck cranes owned and operated by the Consolidated Western Steel Corporation. The total length of the south span, including hauling equipment, was in excess of 160 feet and was transported to the site by the Belyea Truck Company of Los Angeles. As there were few routes from the company yard to the site that could accommodate this length, the hauling was successfully made along City Terrace Drive, over Eastern Avenue Bridge, down Murphy

Street and Ramp Underpass, and westbound to the bridge site on Ramona Freeway.

Eastbound traffic was carried off the freeway at Fickett Street and westbound traffic was diverted at the recently completed Murphy Street Ramp Underpass. Credit should be given to the Police Department of the City of Los Angeles, Hollenbeck Division, and the California Highway Patrol for the successful handling of traffic.

This \$85,000 contract is being carried out by J. E. Haddock, Ltd., of Pasadena. George Wiggers is bridge superintendent. Completion date of all work on this structure will be early in 1953. The resident engineer on this contract is W. A. McIntyre.

FROM WISCONSIN

THE STATE OF WISCONSIN
HIGHWAY COMMISSION

MILWAUKEE 2
November 6, 1952

California Highways and Public Works
Sacramento, California

GENTLEMEN: We wish to express our thanks and appreciation for being included on your mailing list for *California Highways and Public Works*.

The informative and constructive way in which you present your highway programs and construction methods and the descriptive and interesting manner in which you call attention to the many varied resources and natural beauties of your great state make it one of the best magazines which we receive.

Yours very truly

STATE HIGHWAY COMMISSION
OF WISCONSIN

JOSEPH A. STRANSKY
Division Engineer

FROM AUSTRALIA

VICTORIA, AUSTRALIA

KENNETH C. ADAMS, *Editor*

DEAR MR. ADAMS: Having received your magazine during the last year, I would like to take the opportunity of thanking you for forwarding it to me.

I have found the articles and photographs of the greatest interest.

Yours sincerely,

IAN R. RANKIN



After snow storm, poles outline road

due to breakage and deterioration, however, they withstood the effects of wind much better than the metal poles. The 10-foot metal poles used were fabricated of brittle steel. They are driven approximately one foot below ground and the nine feet above develops a terrific vibration during high wind and as a result fatigue develops near the frozen ground or hard snow line.

During strong winds the narrow metal poles sometimes appear to be one foot wide when viewed from a distance as a result of the back and forth vibration path. One employee reported seeing a metal pole break off at the frozen snow line and hurled through the air by the strong wind. An approximate 15 percent breakage of poles occurred

last winter due to wind, contact with snow removal equipment during the periods of zero visibility and other causes.

During the winter of 1950-51 an experiment of attaching sheets of scotch-lite and standard reflectors to the poles to identify them was tried. The reflectorizing attachments stood out during calm weather, as shown in *accompanying photo*, but were not visible during snowstorms.

Snow poles are placed on approximately 150 miles of highway in District IX being installed between October 15th and November 15th and removed approximately April 1st or as conditions govern.

Standard three-inch reflectors attached to snow poles



WASHO Road Test

Continued from page 23 . . .

neers and the highway transportation industry to develop factual information upon which to base design of highways for heavy truck loads, to guide legislators attempting to draw equitable tax laws for highway users, and to help truck manufacturers and operators to determine reasonable and efficient vehicle operating sizes and weights.

The test pavement of the WASHO project is in the form of two loops, one of which will be tested under trucks with tandem axles and one under single-axle trucks. Each loop has two tangents both of which contain five 300-ft. test sections. The five sections in each straightaway have different total thicknesses of granular base plus bituminous mat ranging from 22 inches to 6 inches. On the tandem-axle loop, tractor-semi-trailers will operate in one lane with 40,000-lb. tandem-axle loads, and in the other lane with 32,000-lb. tandem-axle loads. Tractor-semi-trailers with single-axle loads of 22,400- and 18,000-lb. will operate in the two lanes of the other loop. Instruments are being installed in the pavement to measure quantitatively the relative effects of these loads on the pavement, and the visible damage to the various pavement sections, if any, will be carefully studied.

Special studies of the deflections in the pavement under a limited number of other (lower) axle loads at various truck speeds are now under way. The regular test, which will consist of 18 hours of truck traffic per day over the test sections, six days a week, will begin early in November. According to present plans, this traffic will be discontinued during the winter and started again in the spring or early summer. By the fall of 1953, when the principal program of tests will be completed, each test section will have been subjected to over 200,000 heavy axle loads.

IMPROPER PASSING RISKY

Passing another car on a curve or hill is such an obviously reckless procedure, it is amazing that motorists will attempt it. However, enough of them tried it last year to cause the death of 310 persons and bring injuries to 5,800 others.

Early Days

Minutes of First Highway Commission
In 1913 Make Interesting Reading

By R. C. (CASS) KENNEDY, Secretary, California Highway Commission

(Continued from last issue)

AT THE FIRST meeting of the Highway Commission in 1913, J. P. Sherbesman, who was editor and manager of *Western Excavator* published in San Francisco, requested the commission to place his name on the mailing list for the *Bulletin* and that he be notified when the commission advertised for bids. This is the first entry regarding the magazine, now *California Highways and Public Works*, since the notice that the commission had decided to publish one every month.

At the present time, our *California Highways and Public Works* magazine has a circulation of approximately 30,000 copies. It goes to 43 foreign countries; to all the state highway departments of the 48 States of the United States, and to many colleges, universities and libraries.

If you remember back to where a letter had been received from somebody regarding the width of tires on wagons and buggies, you will realize that even in those days excessive loads evidently were breaking down our highways. An item in the minutes of the first meeting of 1913 shows that a telegram had been received from Kaleb Tanner, secretary of the State Road Commission of Salt Lake City, Utah, requesting a copy of our "Wide Tire Laws." Evidently, some steps were being taken to try to protect our highways even in those days.

Bids for Laboratory

Bids for the 16 x 16-foot Laboratory Building were opened on the last day of January, and a firm called Siller Bros., of Sacramento, was the low bidder with a bid of \$805. Residents of Sacramento may remember this firm. It had a planing mill on 13th Street between P and Q Streets, and a lumber yard on S Street between 12th and 13th Streets. In addition to running the mill and selling the lumber, the firm also contracted on the side for building purposes.

After the contract for the Laboratory Building had been let, the contractor suddenly discovered that he had forgotten to add \$180 for the cost of plastering, and Siller Bros. refused to sign the contract. Whereupon, the commission rescinded the contract, or rather the award of the contract, and voted to go ahead and build the building by day labor.

Back in 1913, the commission was getting safety-minded apparently. An attorney from San Francisco appeared before the commissioners and urged that attention be given the matter of providing in proposed legislation regulating motor cars, that adequate signal devices be required upon automobiles. The notes from the minutes do not state what kind of signal devices should be required.

Available Funds in 1913

On February 4, 1913, the Highway Engineer submitted a statement to the commission, entitled, "Estimated Available Funds for Highway Contracts and Expense of Administration." His first entry is "Bonds Sold to Date, \$2,000,000," and from that amount he takes out \$1,207,000 reserved for contracts, and \$140,000 for materials to be delivered in the future; and \$144,000 for administration purposes; \$221,000 plus for payments on contracts 1 to 18. He also lists \$67,000 worth of equipment and about \$390,000 for expenses, and shows that there is allotted \$1,700,000 for reserves and expenses to date. That left available for new state highway contracts the large sum of \$273,283.67. In this day and age that wouldn't go very far.

At the afternoon meeting on March 21, 1913, a number of asphalt contractors appeared before the commission and complained bitterly that the specifications of three-eighths to one-half inch of asphaltic concrete wearing surface was not enough. They had no complaint to make of the concrete base

construction, but they did say that they should have at least two inches of asphaltic concrete wearing surface. This would cost approximately \$12,000 extra per mile, and they admitted that it would be impossible to complete the highway system under the \$18,000,000 bond issue. The Highway Engineer insisted that the interest at 4 percent on the excess cost of the construction proposed by the contractors was more than sufficient to maintain the thinner wearing surface which the commission proposed to use.

Present Specifications

Whether the contractors were right in that day and age is a question that can be argued from now to Doom's Day. Traffic at that time was comparatively light and the number of automobiles was comparatively few, but the contractors were apparently away ahead of their times.

At the present time, our specifications call for three inches of plant mix. "Plant mix" is the same thing as asphaltic concrete. So, probably the contractors were not as far wrong as they might have been.

Our No. 1 contract was in San Mateo County on El Camino Real. A small section of this original highway was still in existence opposite Tanforan Race Track, with a thin asphaltic concrete top, up until about four years ago, when it was repaved.

On March 26, 1913, the commission took a far, far look at things and decided that the premiums on the bonds of the division engineers be reimbursed to them upon the presentation of their paid vouchers for such premiums. Up to a short time ago, this was still in effect, but now, the Division of Highways buys a blanket bond, as it is called, which covers every employee of the State Highway Division. This is common practice with all large organizations.

Big Transactions

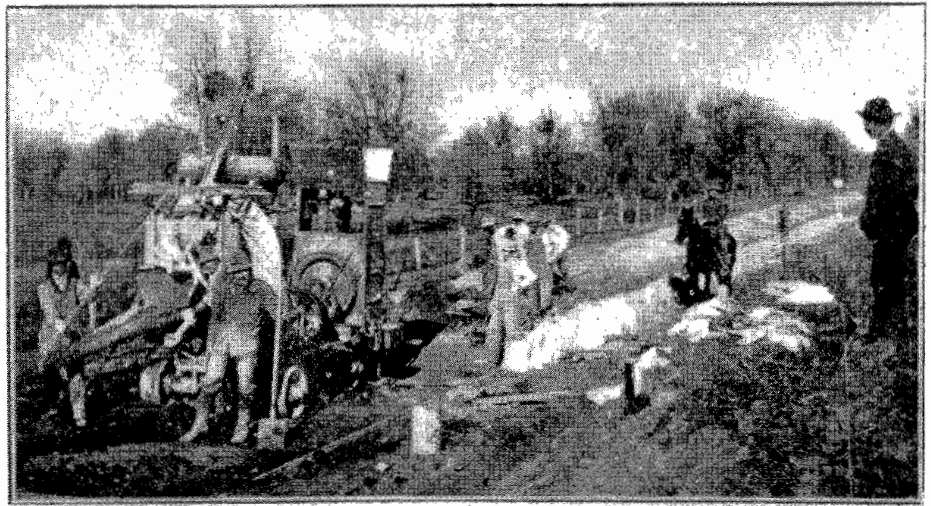
There are a couple of items in the minutes of the April meeting that I think will give some people a chuckle. At that time, the commission sold one horse for \$100, and sold one team of black Geldings, including halters; one pair of old horse blankets, and one set of harness, including bridles and collars, for \$370, and it also sold two sets of harness—one set with collars and one set without collars, for \$38. These transactions take up a little better than one page of the minutes, as the commission had to vote that all of this money had to be turned in to the State Controller and to request the State Controller to credit these amounts to the State Highway Fund. Again, later on that month, at another meeting, the commission sold another set of double harness for \$22.50. This item takes up twelve to fifteen lines in the minutes in order to get the amount back to the State Controller and properly credited to the State Highway Fund.

Salary Increases

In May of 1913, the Highway Engineer proposed some new titles and some new pay rates. Division Engineers were to be raised to \$325 a month; Assistant Division Engineers to \$200 per month; and Assistant Highway Engineer from \$275 to \$325 a month. State Highway Engineer Fletcher also requested that the office known as Assistant State Highway Engineer be designated as the First Assistant Highway Engineer, and that a new office of the Second Assistant Highway Engineer be created. All this was done by votes.

The State Highway Engineer started a new section by creating the position of a Bridge Engineer at \$300 a month. The commission also voted to buy a hydraulic testing machine for crushing concrete cubes. This was made in Philadelphia, and the purchase price was to be \$315 f.o.b. Philadelphia. Naturally, this was to come out to Sacramento and be installed in the commission's new laboratory.

There is also a note in the minutes of May, 1913, that F. P. Borgnis, heretofore employed as chief draftsman at headquarters, at a monthly salary of \$165, be transferred to the position of Special Right of Way Agent, to report



Concrete mixer on state highway near Roseville, Placer County, in 1913

directly to the attorney without change of salary. This, if I remember correctly, is the first notice of the start of the Right of Way Division of the State Highway Department.

Railroad Underpass

In May, 1913, there is also the first mention of an underpass under a railroad. The commission had quite a discussion regarding the proposed underpass under the Southern Pacific Railroad about one mile west of Roseville in Placer County. The Southern Pacific was opposed to grade crossings. Difficulties were run into because the County of Placer refused to bear its one-half share of the cost of the underpass. The railroad company offered to pay its one-half. So the matter was referred to the Railroad Commission to determine what proportion of the expense should be borne by the railroad company and what part by the State.

The Roseville underpass finally was completed April 1, 1950, at a cost of \$1,485,000.

In June, 1913, the commission transferred C. L. Rakestraw to the position of Right of Way Agent in Division IV at \$150 per month. The Right of Way Department was beginning to take shape.

Forerunner of Bayshore Freeway

In July, 1913, a delegation from San Francisco, Burlingame and San Mateo appeared before the commission and very strongly urged the widening of the pavement for all of the state highway through San Mateo County, and

especially of those portions in the southerly part on which the contracts had been let for only 20-foot width. This delegation stated that San Francisco County, which was paying one-third of the taxes for the roads, was having no money spent within its limits, but was vitally interested in seeing that the single main state highway running south from San Francisco and all down the peninsula as far as San Jose should be at least 24 feet in width.

The delegation stated that already the traffic was so congested, with only a small portion of the work done, that the stream of automobiles was blocked on the 24-foot width—and this, before the road was completed and before there was any impetus to travel such as would occur at the time of the World's Fair in 1915. The delegation stated that in justice to the combined interests of San Francisco and San Mateo Counties the highway should be widened from 20 to 24 feet.

Thirty-nine years after this delegation asked for the widening, the Highway Commission allotted moneys to build the Bayshore Freeway through San Francisco, San Mateo, and Santa Clara Counties, connecting San Jose and San Francisco.

Evidently in 1913, quite a number of jobs were done by day labor or by the Highway Division, for on August 26, 1913, the commission voted that the Highway Engineer be empowered to purchase two Buffalo-Pitts 12-ton steam rollers, at the price of \$3,250 each. One would be used in El Dorado

County, and the other one in San Luis Obispo County.

Grade Crossings

Apparently, the commission was having some trouble with crossings by public utilities, for on this date it requested of the State Railroad Commission that all applications for permission to make grade, overhead or underhead crossings of public highways should contain the information whether or not said crossings affect the state highways, and that in such cases the Highway Commission should be so advised and given an opportunity to be heard in the matter.

On September 23, 1913, the commission received a letter from the Kirkman Nurseries, Inc., of Fresno, asking permission to plant shade trees along the state highway in Fresno and Madera Counties. The secretary was instructed to write and thank the nurseries for its letter and to say that the commission favored the planting of trees to afford shade and produce the most satisfactory growth, regardless of telegraph lines along our state highways.

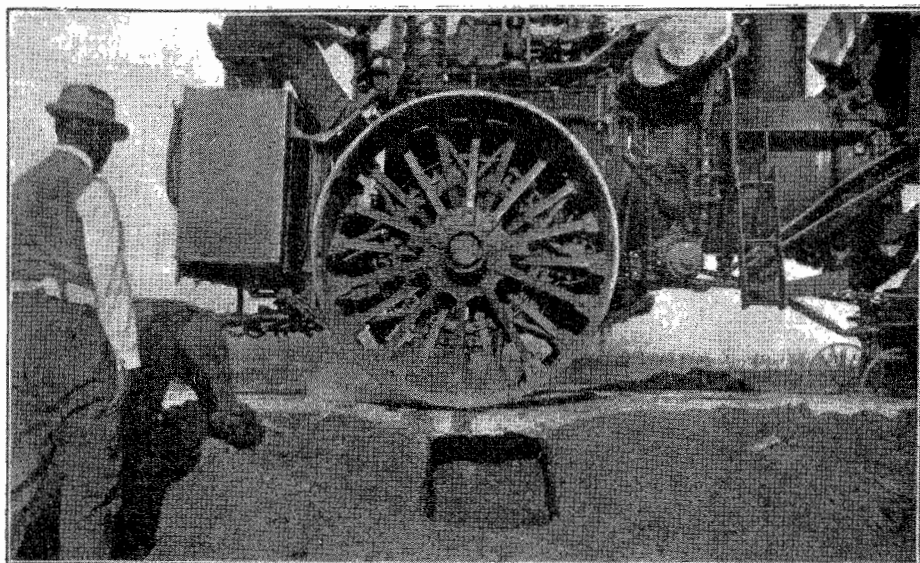
El Dorado Petition

In October of 1913, the Highway Engineer was authorized to dispose of a Franklin automobile, then assigned to Division VI, at the best possible price, and was authorized to purchase an Overland, five-passenger car, 1914 model, to take its place, at a price not to exceed \$1,200. Evidently, the roads in that day and age were wearing out the cars in about a year's time.

Also in October, the Highway Engineer stated that the citizens of El Dorado requested that the macadam pavement through the town be widened from 12 to 20 feet. This was voted, provided that the citizens donated to the State Highway Fund the sum of \$350 to defray the cost of such widening.

In November, 1913, the Highway Engineer reported that he had forwarded to the State Controller the sum of \$350 which had been donated by certain El Dorado citizens. This money was for the purpose of widening the state highway through the town of El Dorado.

In November of 1913, the Advisory Board of the Engineering Department passed a long resolution giving the Cali-



Testing four-inch base on state highway in 1913

fornia Highway Commission additional jurisdiction and powers. The Highway Commission was to take full control and disposition of the moneys accruing to the State for the maintenance of state highways from the revenues of the Motor Vehicle Act. And it was to take full charge of the maintenance of state highways contemplated to be maintained by the Motor Vehicle Act, and to perfect such organization as might be deemed necessary to carry on with "celerity and efficiency" the work to be done in maintaining the state highway. And that is how the Division of Highways took over the maintenance of state highways.

There was a request from a contractor who had a contract to construct a portion of the state highway between Encinitas and Oceanside in San Diego County. He asked that he be permitted to use ocean water in mixing concrete for the construction of the highway. This is common practice today, where fresh water is not immediately available and where the work is being done very close to salt water. It seems that our laboratory has decided that salt water has little or no effect upon the wearing and lasting qualities of concrete.

No Money for Experiments

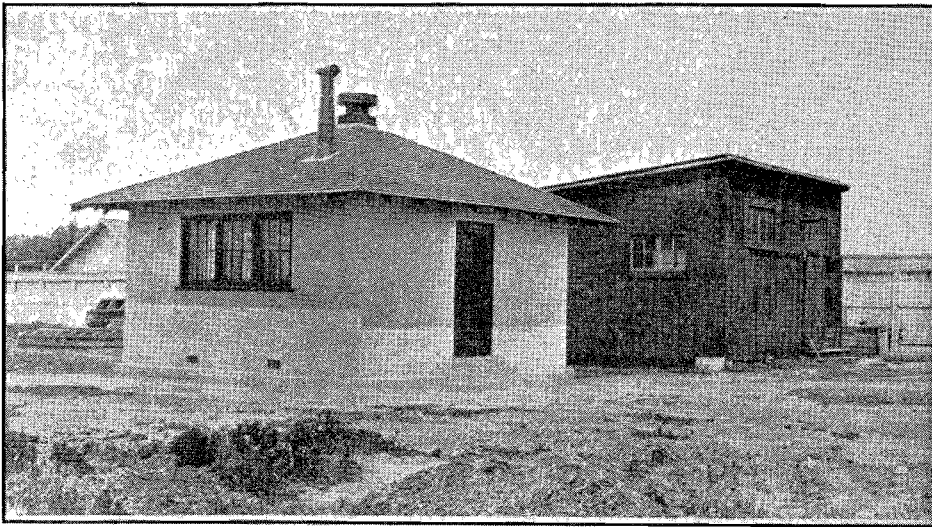
On December 29, there appeared a group of people from San Francisco, headed by J. A. Marsh, president of the Motor Car Dealers' Association of

San Francisco, who urged that the commission build a strip of experimental highway for the purpose of testing out various kinds of road-building methods. This group urged that about eight miles each of brick pavement, Warrenite pavement, and various kinds of asphaltic concrete and bituminous surfaced roads be constructed at an outlay of \$100,000 or more. The speaker stated that his attention was first called to a matter such as this by observing on a trip to Seattle some years before that experimental roads of this character had been built in that section and had resulted in educating the public in practical road construction. It was explained by Commissioners Darlington and Blaney that the commission had no money available for such experimental road construction. But it was explained that the commission would gladly undertake such construction if the money were provided as a donation by outside parties. That seems to have ended that discussion.

Right of Way Department

On December 29, 1913, the commission voted that George B. Harrison, who resided in Los Angeles, be employed as Chief of the Right of Way Department. His term of service was to begin on December 16th and he was to get a monthly salary of \$200 per month.

At the present time, there are approximately 550 people employed in



First highway laboratory built at State Fairgrounds in 1913

our various right of way sections in our 11 districts and our Headquarters Office here in Sacramento. These people are busy on nothing but right of way matters.

Also, on this date, a letter was received from F. W. Steelins, Assistant Cashier of the Bank of Woodland, with reference to a proposition to sell to the State the so-called "Craig and Stevens Toll Road" between Lakeport and Pyeta, commonly known as the "Squaw Rock and Highland Springs Toll Road." The letter stated that the cost to the State would be much less than the original cost of the road and it could be used as a lateral into Lake County. This matter was referred to the State Engineer for his recommendations.

Yolo Causeway

On December 30th, a delegation, consisting of businessmen of both Yolo and Sacramento Counties, appeared before the commission and tried to learn the probable cost of the construction of the proposed causeway and state highway from Sacramento to Davis, crossing the Yolo Basin. Highway Engineer Fletcher stated that the State proposed to construct the causeway upon driven concrete piles, and that the total length of the trestle work would be approximately 16,000 feet; 14,000 feet of this would be of a permanent character and the remainder of wood and cheaper construction. The estimated cost of this concrete trestle would be approximately \$415,000. In

addition to this, seven and one-half miles of graded and paved highway from the trestle to Davis, including a subway passage under the Southern Pacific tracks, would bring the cost up to \$500,000. That did not include the cost of the connecting link between the causeway and the City of Sacramento along the levees of the West Sacramento Valley Company's lands, as proposed. The Highway Engineer's total estimate, including the 10 percent for overhead charges, was \$625,000.

The question of financing this causeway came up and a Mr. Bonnheim stated that, under the present conditions, it was practically impossible to raise \$625,000 for the purchase of state highway bonds. State Treasurer Roberts gave assurance that for a bonus of \$25,000, he could guarantee that \$625,000 worth of highway bonds could be floated on the market to bond-buying houses. The delegation informed the commission that an active canvass would be commenced at once, and that as soon as the \$25,000 was subscribed, the matter would be taken up with the State Treasurer and the commission would be advised of the fact.

On December 31, 1913, the commission met with a group from Alameda County regarding the matter of constructing a series of experimental sections of state highway in that county. The commissioners informed the delegation that they would join with the supervisors of Alameda County in such experimental tests and would apportion from the state highway funds a

In Memoriam

HOMER P. BROWN

Following a lengthy illness which caused him to resign as a member of the California Highway Commission on October 26, 1951, Homer P. Brown died in San Francisco on November 24th. He was appointed to the commission by Governor Earl Warren on September 14, 1943.

Mr. Brown was general manager of the Diamond Springs Lime Company located at Diamond Springs, El Dorado County, near Placerville. He was an active member of the El Dorado Chamber of Commerce, of which he was a director, and chairman of the Industries Committee of the Sacramento Valley Council of the California State Chamber of Commerce. He was also a director of the Mother Lode Highway Association.

He was a member of the Sutter Club of Sacramento and of the Bohemian Club of San Francisco.

Mr. Brown was born in Butte County July 4, 1878, and was engaged in the sugar industry for 21 years.

He went to El Dorado County about 1927 and built the plant of the Diamond Springs Lime Company, which he owned and operated.

Mr. Brown is survived by his widow, Eva; a daughter, Mrs. Phyllis Fout of San Francisco; a sister, a granddaughter and two great granddaughters.

pro rata of from \$8,000 to \$10,000 per mile for such work. This would be done only with the understanding that the supervisors or private persons or corporations would furnish additional funds necessary for such experimental construction. It was finally decided that a state highway of 16,000 feet, divided into lengths of about 1,000 feet each, would afford ample room to test at least 16 different kinds or types of highway construction. The supervisors were prepared to assure the commission that the extra funds necessary for the experimental tests were available and they would have a further meeting sometime in January.

(To Be Continued)

Bonneroo Stag

District VII Construction
Department Presents Trophy

By H. R. KRIEGH, Associate Highway Engineer

IN DISTRICT VII, Los Angeles, the Construction Department, Division of Highways, held its "First Annual Bonneroo Stag," on the evening of September 12, 1952.

Trophies were presented to the resident engineer and contractor who turned out the best job completed in District VII during 1951.

Stanley Ball, of N. M. Ball Sons, the contractor on the best contract, and Herb Belford, the resident engineer, received trophies, which were miniature Galion, tandem gold-plated rollers, mounted on varnished hardwood bases having golden plates on which their names, the name of the contract, and the reason for the award, were engraved. Certificates, signed by state officials and bearing a State of California Seal, were presented to Chet Orcutt, the superintendent for N. M. Ball Sons, and to the state personnel, who were instrumental in obtaining the best contract. W. L. Fahey, District Engineer, and F. B. Cressy, Assistant District Engineer, made the presentations.

Contractors Speak

Stanley Ball, spokesman for N. M. Ball Sons, thanked the state employees and told how his father, founder of the firm, had instructed his sons "if you cannot do it right, it is better to leave it undone." He was followed by Orcutt, his superintendent, Ray Cahoon from Basich Brothers, Joe Porcher from Griffith Company, Vido Kovacevich from Vido Kovacevich Company, Neal Saul from J. E. Haddock, Ltd., Al Mecham from M. S. Mecham and Sons, Jack Kasler from Fredericksen and Kasler, Cox Brothers Construction Company, and Lee Boettig from Warren Southwest, the contractors on the ten best contracts.

Belford, in his acceptance speech, thanked N. M. Ball Sons for their good work and gave the credit for the award to his assistants. He was followed by other resident engineers who were on the ten best contracts and by the as-



Trophy presented to contractor N. M. Ball Sons at first annual Bonneroo Stag. Resident Engineer awarded similar trophy.

sistants who received certificates: C. A. Brallier, Jr., J. A. Coffey, R. E. C. DeLaney, H. J. Downs, F. L. Everitt, C. A. Galloostian, L. S. Higley, Richard Jones, W. M. McKnight, H. F. Meinke, K. P. Mock, J. L. Nausler, C. I. Palmer, Ralph Palmer, H. T. Peasall, Henry O. Salberg, E. R. Smart, C. N. Wilczek, and Ira K. Zipperman.

Play Presented

Two hundred engineers and contractors were present, and were served a dinner, preceding the awards, by ladies of the Old Dixie's staff. After the awards, a play, "Una Día Typical En La Oficina? Del Ingeniero Residente," written by Resident Engineer C. E. Dresser, was presented by Construction Department personnel. The high light of the play—when McCarty (Jack Smith), one of the inspectors who fouled up on the job, was sentenced to

the District Office Design Department by Resident Engineer Pinchpenny (K. D. Lewis), shot himself as he left the field office—brought down the house.

Cressy Originates Ceremony

The year the first contracts were completed under the expanded program brought about by the Collier-Burns Act, a District VII Field Supervising Engineer asked Cressy one afternoon in the fall of 1948: "Which job would you say was the best?"

"Several of our jobs this year have been 4.0, but I would have to make a study before I could point definitely to the best," Cressy ducked a direct reply to the question. From that moment on, however, he turned over in his mind a plan by which every resident engineer would know how his completed project stood.

When he was back in his office again Cressy instructed the author to fix up a form for rating the jobs. These forms were to be given to the Field Supervisors and one was to be filled out and turned in to the office at the end of each completed project. The form was prepared as follows:

Each contract was divided into its main phases of work; grading, structures, subgrade, paving, curbs and gutters, finishing roadway, and any others which required close supervision and inspection. Items for safety, treatment of the traveling public, and complexity were added. The engineering cost was also given consideration. The field supervisors were instructed to use four words in rating the phases of the work: excellent, good, fair, and below average.

Reports Are Graded

At the end of the year the reports were graded by Cressy and his staff with numerical grades. Each phase of work was weighted. The old Navy numerical system was used, 4.0 for excellent, etc. The score obtained was divided by the score which could have been obtained had all phases been rated excellent, which gave a fraction usually from 0.99 for the best jobs down to as low as 0.60 for the ones which were not so good.

O. K. From Headquarters

When Headquarter's Office received the first report of the ratings for the calendar year 1949, the district was given the go ahead signal to continue the procedure for the next years ahead, and was promised the benefit of the use of Headquarter's roughometer for rating the pavement smoothness. The roughometer has proven to be a great help and has frequently been the deciding factor in separating two contracts which tied for first place.

"Why not present a trophy to the winner?" Robert Innis, one of the younger members of Cressy's staff, offered the suggestion in question form one day early in 1952.

"Say, you may have something there," Cressy approved, but left the question open for discussion. "What would you suggest?" Several ideas were presented and at last the present trophy was decided upon because the

Ten Best Contracts

A list of the 10 best contracts in each of the years 1949, 1950 and 1951 is given below together with the names of the resident engineers and contractors:

1949

Contractor	Description	Resident Engineer
1. Griffith Company	Santa Ana Freeway, Soto to Eastman	Basil Frykland
2. Peter Kiewit Sons' Co.	Hollywood Freeway, Vineland to Barham	H. E. Belford
3. Schroeder & Co.	Alameda Ave., Victory to West City Limits, Burbank	C. E. Dresser
4. Vido Kovacevich Co.	Lakewood Blvd., Beverly to Bellflower	F. E. Sturgeon
5. Peter Kiewit Sons' Co.	Ridge Route, Los Alamos Creek to 2.3 miles S. Route 59	R. E. Deffebach
6. Peter Kiewit Sons' Co.	Ventura Blvd., 1.6 miles E. to 1.6 miles W. of Malibu Junction	R. V. Chase
7. Clyde W. Wood, Inc.	Coast Hwy., Seaciff to Mussel Shoal	A. W. Carr
8. M. S. Mecham & Sons and Boddum & Peterson	Valley Boulevard, San Bernardino Road to Route 26	H. Ayanian
9. J. E. Haddock, Ltd.	Sepulveda Blvd., Playa St. to East City Limits, Culver City	C. C. French
10. Jesse S. Smith	Arroyo Seco Parkway, Bartlett St. to Figueroa Terrace	L. E. Steele

1950

1. Peter Kiewit Sons' Co.	Santa Ana Freeway, Rosecrans to Orange County Line	Basil Frykland and A. W. Carr
2. C. O. Sparks & Mundo Engr. Company	Firestone Blvd., Central to Ivy	R. A. Collins
3. Sully Miller Contr. Co.	Huntington Beach Blvd., Garfield, 23d St.	C. J. McCullough
4. Vido Kovacevich Co.	San Fernando Rd., Pacoima to Sayre	F. E. Sturgeon
5. Griffith Company	Coast Hwy., El Rio to Oxnard	M. F. Masters
6. Griffith Company	Route 4, Burbank Blvd. to San Fernando Rd.	Roy M. Cooley
7. J. E. Haddock, Ltd.	Rosemead Blvd., Beverly to Garvey	F. A. Read
8. Vido Kovacevich Co.	Foothill Blvd., Shamrock to Huntington Dr.	D. J. Faulkner
9. Griffith Company	Anaheim-Telegraph, Hoefner to A. T. & S. F. Ry.	C. E. Dresser
10. Baker & Pollock	Coast Hwy., North City Limits to South City Limits, Oxnard	M. F. Masters

1951

1. N. M. Ball Sons	Hollywood Freeway, Virgil to Glendale	H. E. Belford
2. Basich Bros., W. C. LeFever and D. Gerald Bing	Ridge Route, Castaic Creek to Palomas Wash	R. E. Deffebach and F. E. Sturgeon
3. N. M. Ball Sons	Hollywood Freeway, Glendale to Grand	Haig Ayanian
4. Griffith Company	Hollywood Freeway, Western to Virgil	John Rifter
5. Vido Kovacevich Co.	Rosemead Blvd., Valley to Garvey	Roy M. Cooley
6. J. E. Haddock, Ltd.	Ramona Freeway, Evergreen to Helen Dr.	Basil Frykland
7. M. S. Mecham & Sons	Lakewood Blvd., Carson to Center	L. W. Sixt
8. Fredricksen & Kasler	Ventura Blvd., 2 miles E. of County Line to 1 mile W. of Moorpark Rd.	M. F. Masters
9. Cox Bros. Const. Co.	Coast Hwy., Seascout Base to South City Limits, Newport Beach	D. J. Faulkner
10. Warren Southwest, Inc.	Coast Hwy., Vermont to Figueroa	C. C. French

tandem roller to engineers is symbolic of smoothness.

"How would you suggest that we make the presentation?" Cressy asked his head man, Evan Bower, one morning at the round table. (The round table is the group which gathers in the office before working hours to hear the latest yarn.)

"I think we should have a party."

"What kind of party?" Cressy asked.

"That should be put to a vote of the field men," Bower replied.

Vote for Stag Party

"OK, get out a questionnaire and whatever the vote shows make the necessary arrangements."

The questionnaire was prepared and sent out. The resulting vote was almost two to one in favor of a "stag" party.

Not long afterward Cressy and Bower were inspecting Camp 37 and

the portion of the Big Pine road under construction by prison labor. One of the foremen was talking to Camp Superintendent Harry Johnson about job assignments.

"Joe Dokes will like that; he will think that is bonneroo," the foreman said after Harry had told him what he had lined up for Joe.

"Say that again," Cressy smiled, for he thought his ears were hearing things or a new word had been added to the dictionary. "Bonneroo," Harry Johnson repeated the word for the foreman, "that means he will like the job."

"Say that gives me an idea," Bower joined in, "I'm going to call our party 'Bonneroo Stag'." And thus came about the presentation party and ceremonial which was described at the start.

The word "bonneroo" is a slang and colloquial pronunciation of the French

... Continued on page 51

DISTRICT VIII OFFICE BUILDING IS COMPLETED

By RUSSELL J. STANDING, District Office Engineer

A THREEFOLD enlargement of the State Division of Highways Office in San Bernardino is completed and occupied by all departments.

A \$500,000 building program has been carried on for nearly two years with the addition of a two-story reinforced concrete office wing on the easterly

side and a smaller one-story addition to the rear. A complete remodeling of the existing structure to harmonize with the new addition has produced a very pleasing appearance.

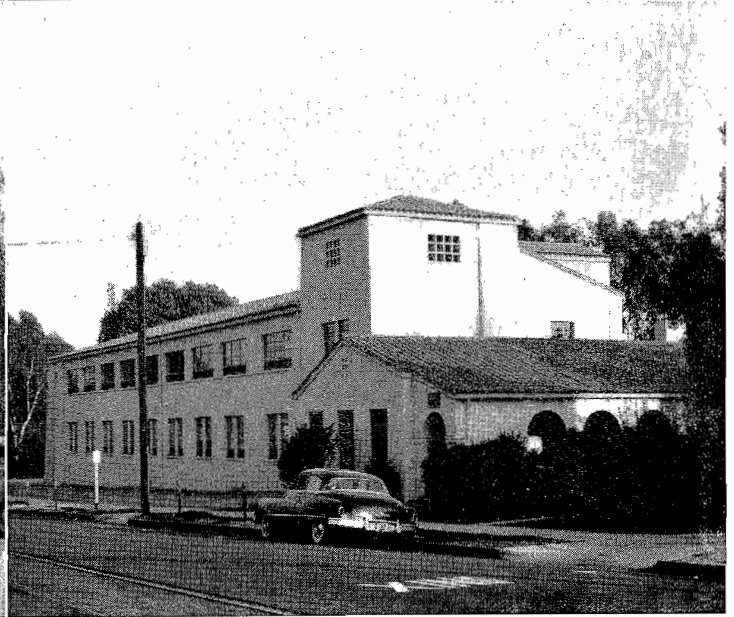
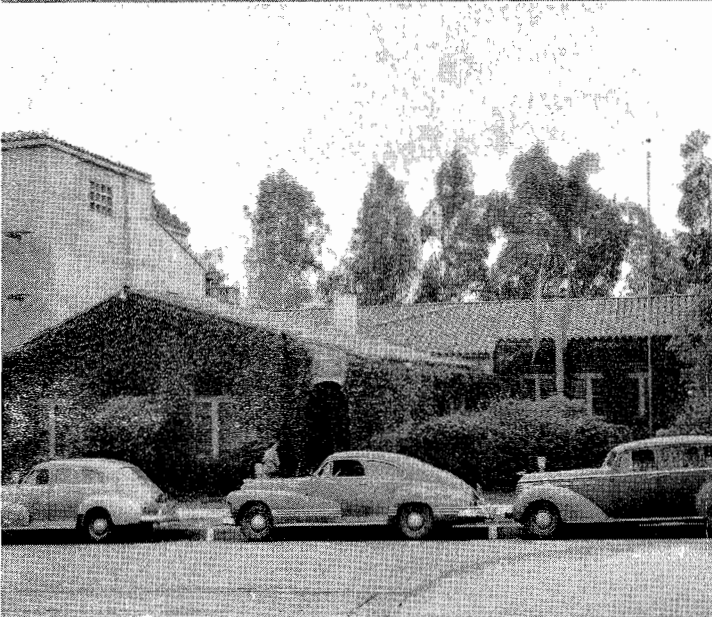
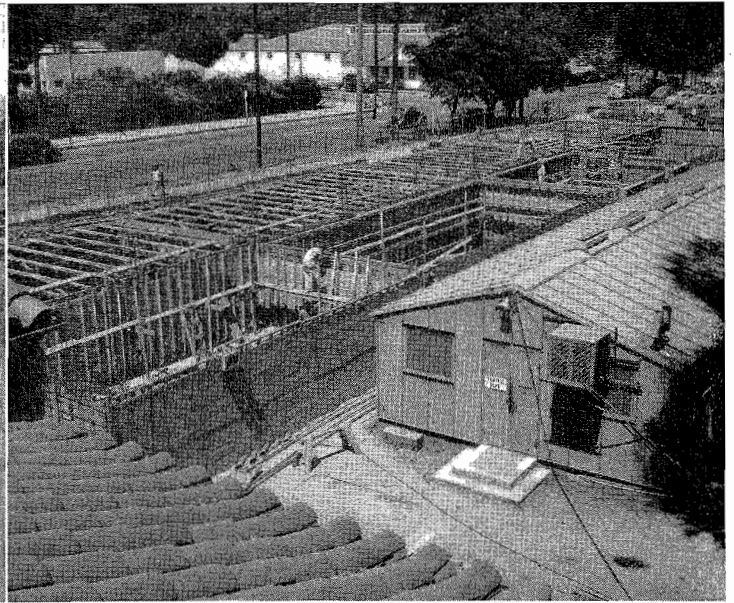
The completion of the building has enabled the state agency to bring all its activities under one roof at the head-

quarters at 247 Third Street, just east of Arrowhead Avenue, in San Bernardino.

Crowded Conditions

For the past 10 years the district forces have been handicapped because of crowded conditions. Some offices

UPPER LEFT—Excavation started on new building April 17, 1951. In background is old building and to left is one of three Army-type buildings used by district personnel since World War II. UPPER RIGHT—June 13, 1951. Ready to wrap up basement section of east wing. LOWER LEFT—Front view of ivy clad old building that has been completely remodeled inside and is still the main entrance. LOWER RIGHT—Completed building. Built of heavy reinforced concrete on wide foundations, it is virtually earthquake proof.



have been located in rented quarters in the business district, while others have been compelled to occupy Army-type buildings on the headquarters grounds. This great increase in the State's highway program in the last few years has brought out the need for additional space.

The building is an old California mission style structure with reinforced concrete walls and red tile roof. The outer wall finish is a cream-colored stucco. Such details as a series of arches bordering the cloister and ornamental iron gates at the entrances to the cloister and patio serve to beautify the exterior. This style of architecture is monumental to the early history of the spot, the building being near the site of the old fort and stage depot established by the Mormon pioneers who settled the valley.

Design of Building

In plan the building is L shaped, the lobby and private offices being included in the leg of the L and the bottom portion of the east wing. The main drafting rooms are on the second floor of this wing. The square portion within the L and facing the street is enclosed by a concrete wall forming a patio. A cloister along the inner side of the leg shelters the walk from the sidewalk to the main entrance which leads to the lobby in the central portion of the building.

The original building which covered approximately 5,000 square feet of floor space was completed early in 1927 at a cost of approximately \$29,000. The new building covers an area of 28,000 square feet and was completed in August of this year.

The landscaping plan has been approved and it is expected that the work will be completed before the end of the current year at which time an "open house" is planned for the public to view the building and become acquainted with the personnel.

The general contractor on the building was the Harvey A. Nichols Company. The air conditioning and heating system was placed by Conditionaires Limited, and the electrical contract by Vancott Company, all of Los Angeles.

The general contract was for \$347,614.22; air conditioning \$106,646.24; electrical contract \$47,403.62.

Engineering Course Is Offered by the Division of Highways

"BITUMINOUS PAVEMENTS for Roads and Streets," is the subject of a short course currently offered to engineering personnel of the Division of Highways and others in various parts of the State.

Jointly sponsored by the Institute of Transportation and Traffic Engineering and the Engineering Extension Division, both of the University of California, the course is being given in 12 cities throughout the State during the winter and spring. The opening presentation was held in San Bernardino on October 17th and the last session is scheduled for next April in Bishop.

The course consists of four 3-hour meetings held on successive week ends in each of the cities. Among the topics presented are: types of bituminous pavements, construction operations, significant properties of bituminous mixtures, factors influencing selection of bitumens, field sampling of materials, testing of aggregates and bitumens, preparation of bituminous mixtures and kinds and significance of tests and mixtures.

Besides San Bernardino, the course has already been given in Redding, San Diego and Berkeley. The remaining cities where the course will be held and the opening dates are: San Luis Obispo, December 12th; Los Angeles, January 9th; Stockton, January 23d; Fresno, February 13th; San Jose, March 6; Eureka, March 20th; Marysville, April 3d, and Bishop, April 17th.

Bonneroo Stag

Continued from page 49 . . .

words "bonne rue" which mean, literally translated, good street, but which are used by laborers and others to express their satisfaction as to their job assignment; i.e., a soft job is "bonneroo." The words take on a more significant and expressive meaning as used for the name of this social function and suggest more nearly the original meaning "good street" or a "good highway" ceremonial.

In Memoriam

LAWRENCE T. ROBINSON

Lawrence T. Robinson, Highway Superintendent on the maintenance staff of District IV, Division of Highways, passed away at the Permanente Hospital in Oakland after a short illness.

Larry, as he was known by all his friends and acquaintances both within and outside the state organization, had numerous distinctive qualities desired by many and possessed by few—his principal quality being to carry out to perfection any assignment given him. The vacancy left by him in the district organization is one that will be difficult to fill and his years of association with us will be long remembered.

Larry was born in Jamestown in the Mother Lode country on January 23, 1904, and was one of a family of seven boys and four girls. He completed grammar school in Jamestown and his high school education at Sonora, the county seat of Tuolumne County.

Immediately after his graduation from high school he started to work for the old California Highway Commission as laborer and was promoted progressively to graderman, truck driver, mechanic helper, subforeman, and highway foreman, all in Districts III and X, before transferring to District IV in 1935, upon promotion to Highway Superintendent.

Larry's tenure in District X was primarily in the Sonora area, with short periods of time at Rio Vista, Sacramento and Merced.

His first assignment in District IV was the highway superintendency at San Jose, one of the heavier maintenance sections, which he held until 1948 when he was reassigned to the Hayward territory, for a short period, and in the same year was assigned to the District Office to handle liaison work regarding maintenance functions between the State Division of Highways and the 66 cities in the district.

During Larry's assignment in the Sonora area he met Miss Clyde Fugett of Sacramento, and they were married in Reno in 1927.

River Road

Critical Kiesel Crossing on Sacramento-Woodland Route Doomed

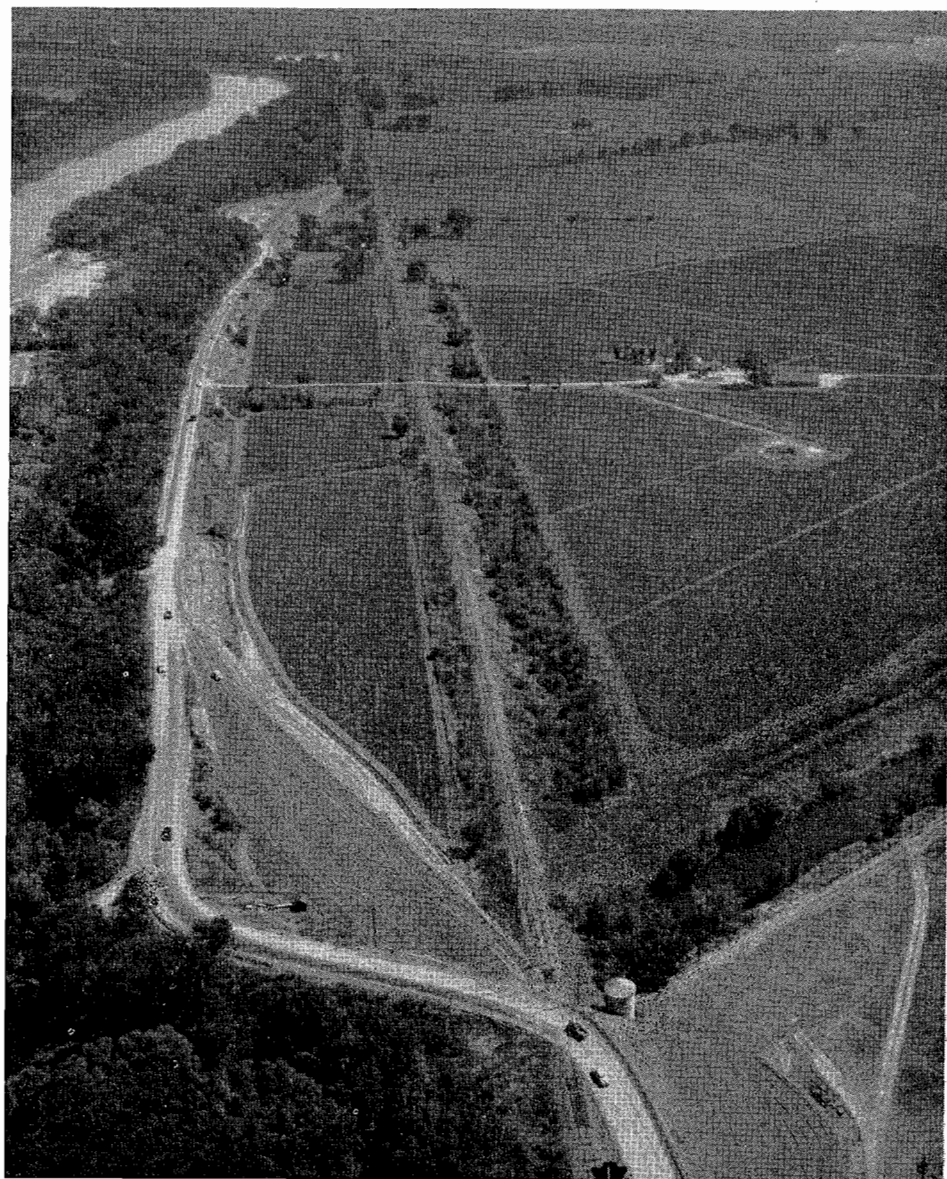
By R. E. STICKEL, District Office Engineer

HAZARDS and inconveniences caused by inferior alignment and substandard sight distance together with increased maintenance costs due to inadequate depth of base and surfacing were responsible for the initiation of a project currently under way on the Sacramento-Woodland River Road between one-half mile north of Kiesel and two miles south of Kiesel, road III-Yol-50-E,F (State Sign Routes 16 and 24).

The highway on which this project is located is a direct connection between Sacramento and Woodland. It is the shortest vehicular thoroughfare from Sacramento to Woodland and points north and west of Woodland. For a long period all classes of traffic between Sacramento and Woodland and points north have used it, but since October in 1949, when a load limit was established through the City of Davis, it has become an increasingly important route for heavily loaded trucks. A substantial portion of the truck traffic is local in nature, stemming from the fact that there is considerable farm-to-market transport of sugar beets, rice, hops and garden truck raised on the rich, agricultural lands in the Sacramento River bottom.

Kiesel Crossing

After the project under way is completed, three hazardous locations will have been improved. The first and most critical location under revision by the current contract is marked by the point where the highway crosses the Sacramento Northern Railway tracks. At this point, known as Kiesel Crossing, the highway ascends abruptly from the valley floor to follow along the crest of the river levee. A summit vertical curve restricts sight distance here. The sharp curvature of 175-foot radius is not compensated for by superelevation due to the fact that a flat transverse section at the railroad tracks is mandatory. Limited clearance lines of the railroad make extensive use of guardrail



This aerial photo shows the realignment on the Sacramento-Woodland Road. Existing alignment is on left and the new one is shown on the right in this picture.

and guideposts for roadway delineation an impossibility.

The second hazardous location is 0.3 mile north of the crossing, where the highway skirts a former railroad spur and station grounds. This spur has long since been removed and the area has more recently been occupied by a large advertising sign. To the traveling pub-

lic the only visible reason for the circuitous alignment was to avoid this sign.

Inferior Alignment

The third location, 0.6 mile south of the crossing, is another instance of inferior alignment, in this case due to the highway's location on the crest of the winding levee which borders the Sac-

ramento River and parallels the meandering stream. This location is most hazardous from the traffic safety standpoint at night. To the night driver the appearance of headlights ahead gives the illusion of the road continuing straight ahead from levee top to levee top instead of twisting on short-radius curvature to right or left.

With poor visibility aggravated in foggy weather conditions due to glaring headlights the probability of mishap is increased. At this third location a road approach which is used by an adjacent farm ramps up sharply from ground level to the road grade atop the levee. Vehicles entering the highway are not visible from the road until they pull out on the edges of the traveled lane. With loaded trucks pulling on and off the highway, especially during harvest seasons, conditions for safe travel are unfavorable.

Traffic Accidents

Traffic accident studies at Kiesel Crossing for the period January, 1946, to July, 1950, provide the following information: 42 people were injured; five were killed. Forty-two of the accidents were single car accidents, while 17 involved two or more cars. Six of the accidents occurred under wet weather conditions; 53 occurred during the dry. Twenty of the accidents occurred at night; 39 occurred during the day. Speeds on the route in general run, from observation, between 45 and 50 miles per hour for the larger part of the normal traffic despite the fact that safe speeds of 25 miles per hour or less should not be exceeded at several points, including Kiesel Crossing. The traffic accident profile shows that the majority of the accidents occurred at the crossing. The lack of sight distance in the flat section at the railroad crossing which normally would be superelevated causes many east-bound vehicles to fail to negotiate the curve and go off the road down the steep levee slope. None of the accidents involved trains.

In addition to deficiencies from the traffic safety standpoint deterioration in the pavement due to the heavy volume of traffic indicated that extensive reinforcement of base and surfacing was imminent.

Reason for Location

Examination of the project led to fixing the crossing at its present location, providing a better angle and grade at the intersection, and increasing reversing curve radii there to figures of 800 feet and 1,200 feet. Inferior alignment 0.3 mile north and 0.6 mile south of the crossing was eliminated. Grade rates at the crossing will not exceed 1.5 percent. A factor considered in maintaining the highway alignment at its present location at the crossing was the necessity of retaining in place a large, concrete pump house which otherwise would have had to be reconstructed at some nearby location. The end of the project was fixed approximately two miles south of the crossing in order to extend the limits of improved pavement over areas badly in need of patching and reinforcement. No special warning devices were deemed justified at the improved crossing due to the moderate amount of rail traffic. Rail traffic, on the average, amounts to only one train each way per day during daylight hours and one each way approximately every two months after dark.

Nearing Completion

Arrangements were made by the State for the contractor to secure imported borrow material from the overflow area lying between the existing highway and the Sacramento River. This area is under water during the winter season. In order to minimize the scour in the river bottom it was required in the contract provisions that transverse strips 25 feet in width, including the existing brush and standing timber, should be left in place at 800-foot intervals in the borrow area.

On the new alignment the typical cross section will consist of 24x0.25 foot plant-mixed surfacing on 0.67-foot untreated rock base and 0.67-foot sub-base material. The 4-foot shoulders will consist of 0.25 foot tapering to 0.13 foot of plant-mixed surfacing on untreated rock base and imported subbase.

The contract for this project was awarded to A. Teichert and Sons, Inc., Sacramento, June 10, 1952. Work was begun July 11, 1952, and will be completed in December. Mr. Edward F. Silva, Jr., represents the State as resident engineer.

BOMBAY'S EXPERIMENT IN THE NATIONALIZATION OF ROAD TRANSPORT

California Highways and Public Works is in receipt of a copy of *State Transport Review*, the monthly publication of the Bombay State Road Transport Corporation. It is a special supplement to mark the completion of four years of Bombay's nationalized road transport.

India's first great experiment in nationalization of road transport has been carried on under difficult conditions. What has been accomplished is noteworthy.

Editor Joseph John of the *State Transport Review* has turned out an informative and valuable special issue. —Editor.

NETHERLANDS WATCHES STATE HIGHWAY WORK

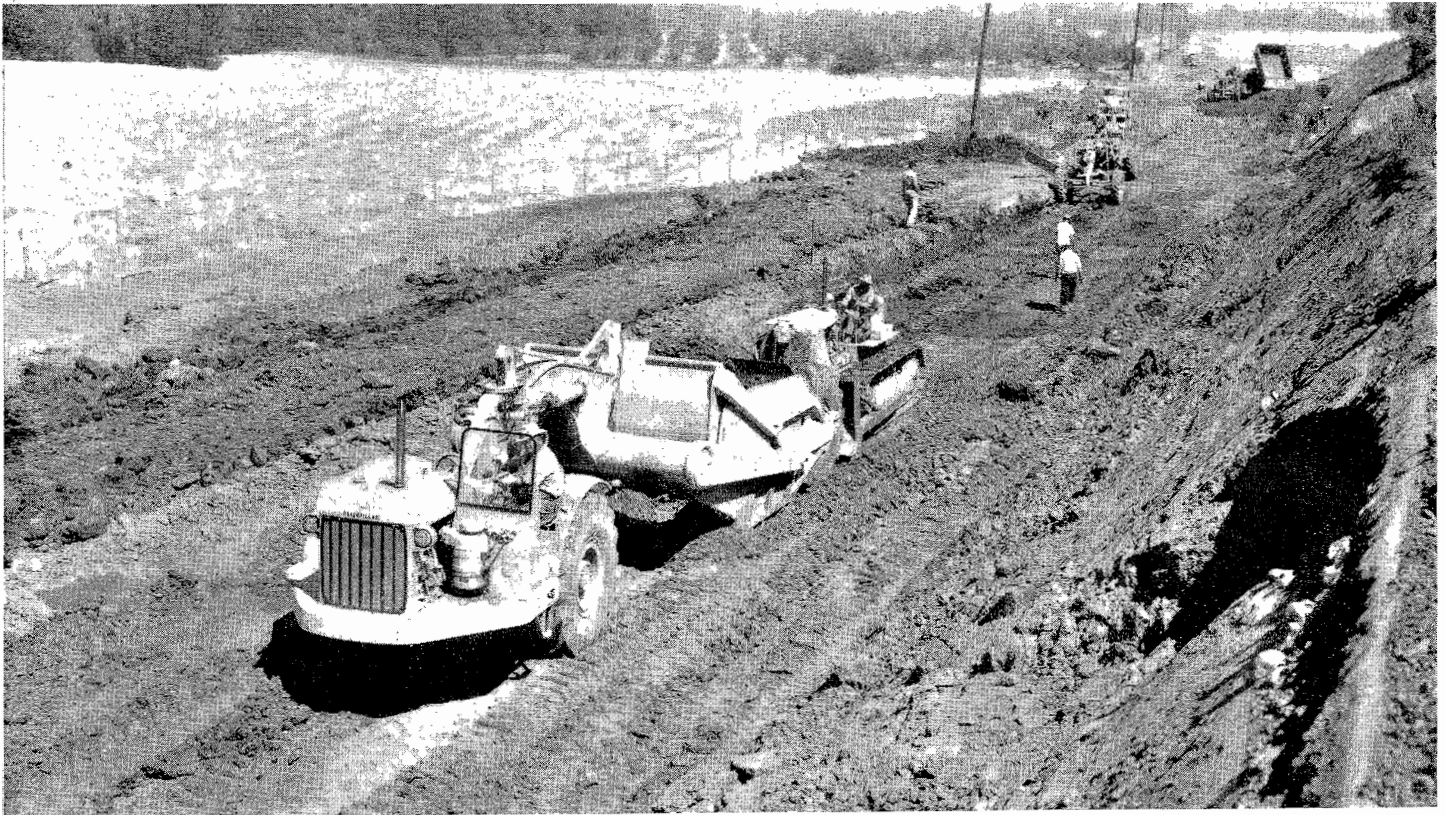
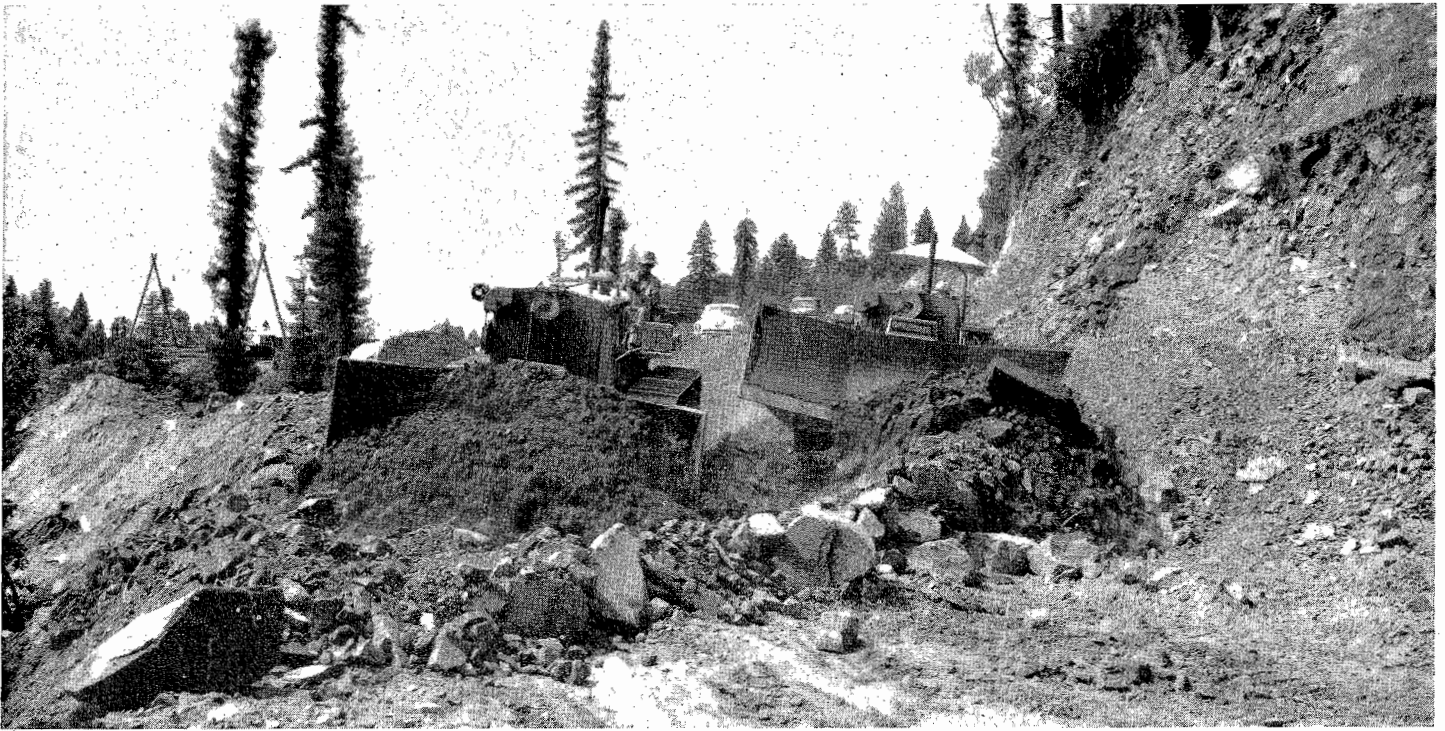
FOR MANY YEARS highway engineers in the Netherlands have been interested in California highway and bridge construction. How closely they follow the outstanding progress in this State is indicated in the July, 1952, issue of *Wegen*, a publication devoted to highways and published in Amsterdam. In this issue the editors of *Wegen* summarize nine articles which appeared in the January-February issue of *California Highways and Public Works*.

The articles were Epic Battle, by N. R. Bangert, dealing with the snow removal on mountain highways last winter; Santa Ana Freeway, by W. L. Fahey; Hollywood Freeway Through Los Angeles, by R. C. Kennedy; Ramona Freeway, by B. N. Frykland; Ridge Route Reconstruction as Freeway, by C. P. Montgomery; U. S. 99 Job, by W. M. Nett; New State Highway Through Placerville, by J. F. Lipp; Street Sweepers, by N. H. Heggie, and Orinda Slide, by E. W. Herlinger and Gifford Stafford.

POPULATION OF NEW MEXICO

The population of New Mexico showed an increase of 28.1 percent between the years 1940 and 1950, according to the National Automobile Club. The population in the 1950 census was 681,187.

STATE ROUTE 28 IN MENDOCINO BEING REALIGNED



These photographs, by Caterpillar Tractor Co., were taken on Contractor Arthur B. Siri's job just southeast of Boonville, California, on State Route 28, in Mendocino County.

The contract, involving 33,500 yards of dirt, is for realigning 1.3 miles of the highway to eliminate a section of crooked road. The new road will be 35 feet wide, including shoulders.

COMMISSION MEETS WITH CIVIC LEADERS



The California Highway Commission, holding its regular September meeting in San Francisco, together with members of State Highway Engineer George T. McCoy's staff, toured the San Francisco freeway system as guests of the Chamber of Commerce of that city. A luncheon at Yacht Harbor followed the trip.

The tour of the freeways being built in San Francisco started at 9 a.m., September 17th, from Highways Building in San Francisco and included a trip through the new Broadway Tunnel. The bus, carrying the group, was the first commercial vehicle allowed through the new tunnel.

At the luncheon, short talks were given by W. P. Fuller III, President of the San Francisco Chamber of Commerce; Leonard Mosias, Chairman of the Highway Committee of the Chamber, and Frank B. Durkee, Director of Public Works and Chairman of the California Highway Commission.

This photo was taken at the luncheon, which was attended by many civic leaders and officials of San Francisco.

BRITISH COLUMBIA INTERESTED

DEPARTMENT OF PUBLIC WORKS
Langford Sign Shop, Langford, V.I., B.C.

California Highways and Public Works

DEAR SIR: Re your official journal, *California Highways and Public Works*, I would very much like to

be placed on your mailing list. I have found your publication of great interest and much help to me.

Having been at the recent University of California Institute of Transportation and Traffic Engineering Short Course on Traffic Engineering, and I. T. E. annual meeting, I met California Division of Highways personnel and they told me of the avail-

ability of the journal, and of its usefulness.

My address is as follows: J. H. Harding, Traffic Engineer, B. C. Public Works Department, Station Road, Langford, B. C., Canada.

Yours truly,

J. H. HARDING
Traffic Engineer

Huge Slide on Sign Route 1 South of Lucia

By P. L. DITO, District Maintenance Engineer, District V

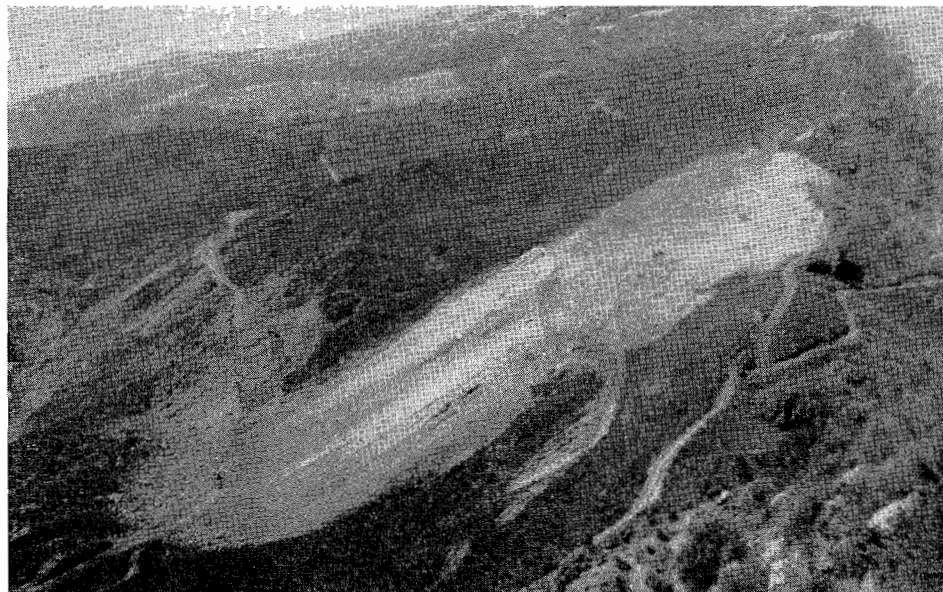
THAT PORTION of scenic Sign Route 1 between Carmel and San Simeon, first opened to traffic in June of 1937, has been subject to many slides of various intensities during past winter seasons. However, this year on August 14, 1952, in the middle of the vacation and tourist season, a major slide occurred necessitating closure of the road for a period of approximately six weeks.

The slide which occurred at this time was on a portion of State Sign Route 1, approximately three-fourths mile south of Lucia, at which point the highway is constructed on the bluffs and parallels the shoreline. The major movement of the slide extended from the shoreline, which is approximately 150 feet below the road, to the top of the ridge approximately 550 feet above the roadway. The length of the movement was approximately 800 feet. A break developed at the north end of the movement wherein the pavement settled approximately 12 inches, however no break or settlement was ever observed across the roadway at the south limits.

This major movement however was not the immediate concern or the reason for closing the road. There was also a secondary movement which developed at a higher elevation and extended along a shallow surface from 300 feet to 550 feet above the road. This slow movement of the weathered material above the roadway caused a large number of rock fragments to fall and roll down the slope ricocheting onto and across the highway.

The secondary movement above the slide was very slight up until July 21, 1952, the date of the heavy earthquake in this section of the State. At that time the movement appeared to accelerate and it was necessary to place flagmen and use bulldozers in continuous clearing of the roadway of rocks and boulders.

This operation became so hazardous to the workmen that it was necessary to close the road and to unload, reslope



UPPER—General view of slide area during unloading operations.
LOWER—Bulldozers re-establishing road at base of slide.

and bench the upper portion of the slide. This was accomplished by four D-8 tractors and 'dozers working from the top of the slide down, in which all material, of necessity, was pushed into the roadway section.

No Detour Possible

The ruggedness of the terrain prohibited any detour construction and any relocation of the highway would not only be extremely costly but would require a length of time greatly in excess of the time required to unload the slide.

After the top portion of the slide had been unloaded it was then neces-

sary to remove all of the material from the roadway. In performing this task the roadway was shifted slightly toward the ocean utilizing the slide material to construct the new embankment. A trench was then constructed on the right side of the roadway as a protection from falling rocks or slide material encroaching on the traveled way.

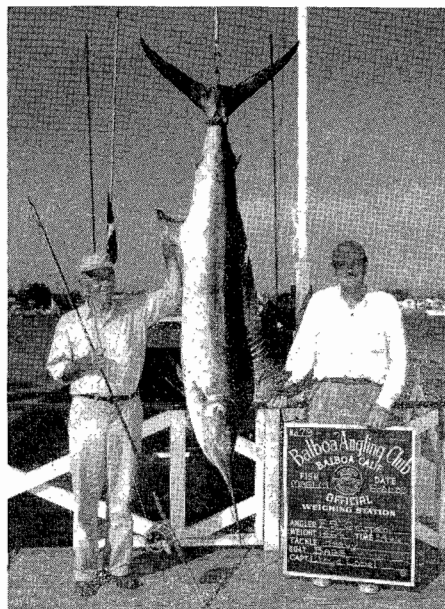
The highway was again opened on September 18, 1952, and during the period between August 15th and September 18th, approximately 200,000 cubic yards of slide material was moved.

THIS IS ONE FISH THAT DIDN'T GET AWAY!

WHEN Edward S. Gripper, known to all his old friends as Ned, retired from service with the State Division of Highways, making his home in South Laguna, he said he was going fishing. And Ned, as the accompanying photograph conclusively proves, is a man of his word!

The day when Ned caught the 146-pound marlin started at 2.30 a.m. August 31, 1952, when Mrs. Gripper roused Ned out for hot cakes and coffee so that he could be on hand with his neighbor, Mr. Gillespie, to start their deep sea fishing trip from Balboa at 4 a.m. They left with Capt. Lloyd Lobel of the 28-foot cabin cruiser *Babs*, prepared to go after either albacore or marlin. They sailed due south and when about 12 miles off Dana Point the two fishermen, Ned and his neighbor, switched from the feathers they were using for albacore to flying fish, in the hope of attracting marlin.

About 9.30 a.m. both Mr. Gillespie and Ned at the same instant had vigorous strikes. They allowed the two marlins to take out some 250 yards of line before throwing the drags and setting the hooks. The two marlins then began to jump out of the water close together, indicating that the lines had crossed. They jumped completely out of the water several times, and then suddenly Mr. Gillespie's line parted. Ned's line held, and after a struggle of 34 minutes he was able to bring the exhausted marlin into the boat. A marlin nine feet long and weighing 146 pounds presents many difficulties in gaffing and loading into a small boat, but all these were successfully overcome.



Ned Gripper on left and Captain Lloyd Lobel on right

Then Ned got to thinking over what he would do with his marlin. He was somewhat appalled at the prospect of cleaning and cutting up so much fish. When he was told at the Balboa Angling Club that the Lark Ellen Home for Boys at Azusa would welcome a gift of fish, this looked to Ned like a good solution to his problem and arrangements were made for his fish to go to the home.

Fish Given to Home for Boys

The Lark Ellen Home for Boys, located on 18 acres of land in Azusa, has eight buildings, swimming pool, playground facilities, and everything necessary to give a healthy, outdoor life to underprivileged boys between the ages of 10 and 16 years who, through

no fault of their own, have been denied the proper home environment.

The Lark Ellen Home for Boys has been the major project of the Los Angeles Lions Host Club since 1923. The history of the home goes back to the early 1890's, when the world famous concert and opera singer, Mme. Ellen Beach Yaw, established a home for newsboys as an inducement to them to stay off the streets. Mme. Yaw was given the name "Lark Ellen" by the late General Harrison Gray Otis, then publisher of the Los Angeles *Times*.

The staff of the home consists of 15 members, headed by Superintendent Carl Miller, and they now are taking care of 60 boys. In telling about the gift of the marlin from Ned Gripper, Mr. Miller said:

"When the fish arrived in the delivery truck, the boys all gathered around bug-eyed and assisted the kitchen staff in cleaning the fish and cutting it up into steaks and chunks for the deep freezer. We have had several wonderful fish dinners and have just used up the last pieces from the deep freezer. We are now in the market for another fish!"

FROM SYDNEY

THE COUNCIL OF THE CITY OF SYDNEY
City Engineer's Department

SYDNEY, N. S. W.

GEORGE T. MCCOY, ESQ.,
Sacramento, U. S. A.

DEAR MR. MCCOY: During my visit to America in 1947 it was my privilege to spend some time in the State of California and to meet you and other members of your division.

Since that time you have been good enough to forward regularly to me copies of your official journal *California Highways and Public Works*, a publication which has proved to be of practical use to me and to my staff, a service which is much appreciated.

With every good wish,

Yours sincerely,

A. H. GARNSEY
City Engineer

Bids for Prestressed Bridge Opened

Bids for construction of California's first prestressed concrete bridge designed for heavy highway traffic, which will be constructed at Weber Avenue in the City of Fresno, were opened in Sacramento on November 19th.

The structure will carry traffic

southbound on Weber Avenue over US 99. The only other prestressed structure in the State is a pedestrian bridge across the Arroyo Seco in Los Angeles.

Thomas Construction Company of Fresno was low bidder with a proposal of \$91,363.90.

CORNERSTONE CEREMONY MARKS COMPLETION OF ANNEX TO PUBLIC WORKS BUILDING IN SACRAMENTO

ON THURSDAY, October 23, 1952, the marble cornerstone of the annex to the Public Works Building at Twelfth and O Streets in the City of Sacramento was placed and grouted in its position as an integral part of the reinforced concrete structure.

The first of the five major contracts required for building the annex was dated June 16, 1950, and work was started on July 3, 1950. The building cost approximately \$3,300,000 to complete.

The ceremony marking the laying of the cornerstone was informal in nature as the building serves as an annex to the Public Works Building at Twelfth and N Streets which has been in use for 15 years and for which the cornerstone was laid on June 4, 1936, in a formal ceremony by Earl Lee Kelly, Director of Public Works and the Honorable Frank F. Merriam, Governor of California at that time.

Frank B. Durkee, present Director of Public Works and Chairman of the California Highway Commission, was presiding officer for the ceremony of laying the cornerstone and Chester H. Warlow of Fresno, member of the California Highway Commission and Past Grand Master of Masons of California, performed the duty of laying the stone.

Other members of the Highway Commission who were present at the ceremony included: Harrison R. Baker of Pasadena, James A. Guthrie of San Bernardino, H. Walter Sandelin of Ukiah, Charles T. Leigh of San Diego, H. Stephen Chase of Sacramento, and the commission's secretary, R. C. Kennedy.

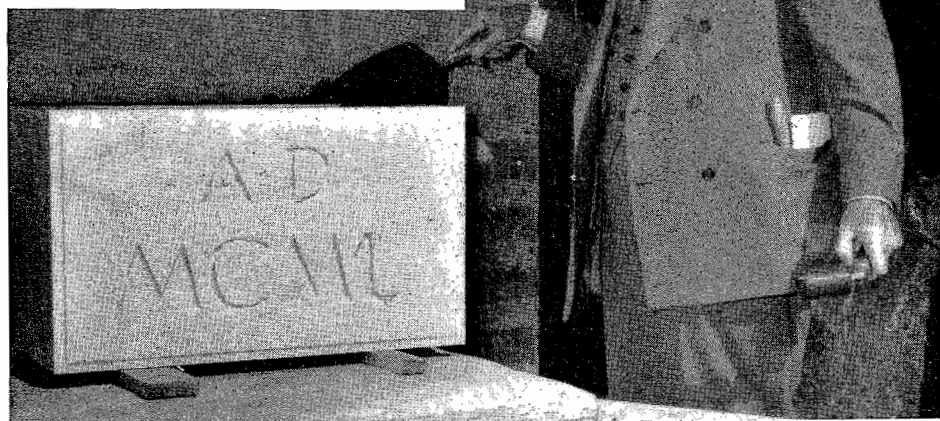
Unfortunately, the Honorable Earl Warren, Governor, could not be present as he was absent from the State. The Governor was represented by M. F. Small of his secretarial staff.

James S. Dean, Director of Finance, who was particularly interested as portions of the annex will house some em-

ployees of the Division of Architecture and Division of Water Resources, both General Fund departments, was unable to be present. In his absence, Deputy Director of Finance A. Earl Washburn represented the Department of Finance.

The several divisions of the Depart-

Highway Commissioner Chester H. Warlow lays cornerstone of Public Works Annex



ment of Public Works and other state departments were represented by their respective chiefs as follows: G. T. McCoy, State Highway Engineer and Chief of the Division of Highways; Anson Boyd, State Architect, under whose direction the annex was de-

signed and constructed; A. D. Edmonston, State Engineer and Chief of the Division of Water Resources; Robert E. Reed, Chief of the Division of Contracts and Rights of Way; and A. H. Henderson, Director of the Department of Motor Vehicles.

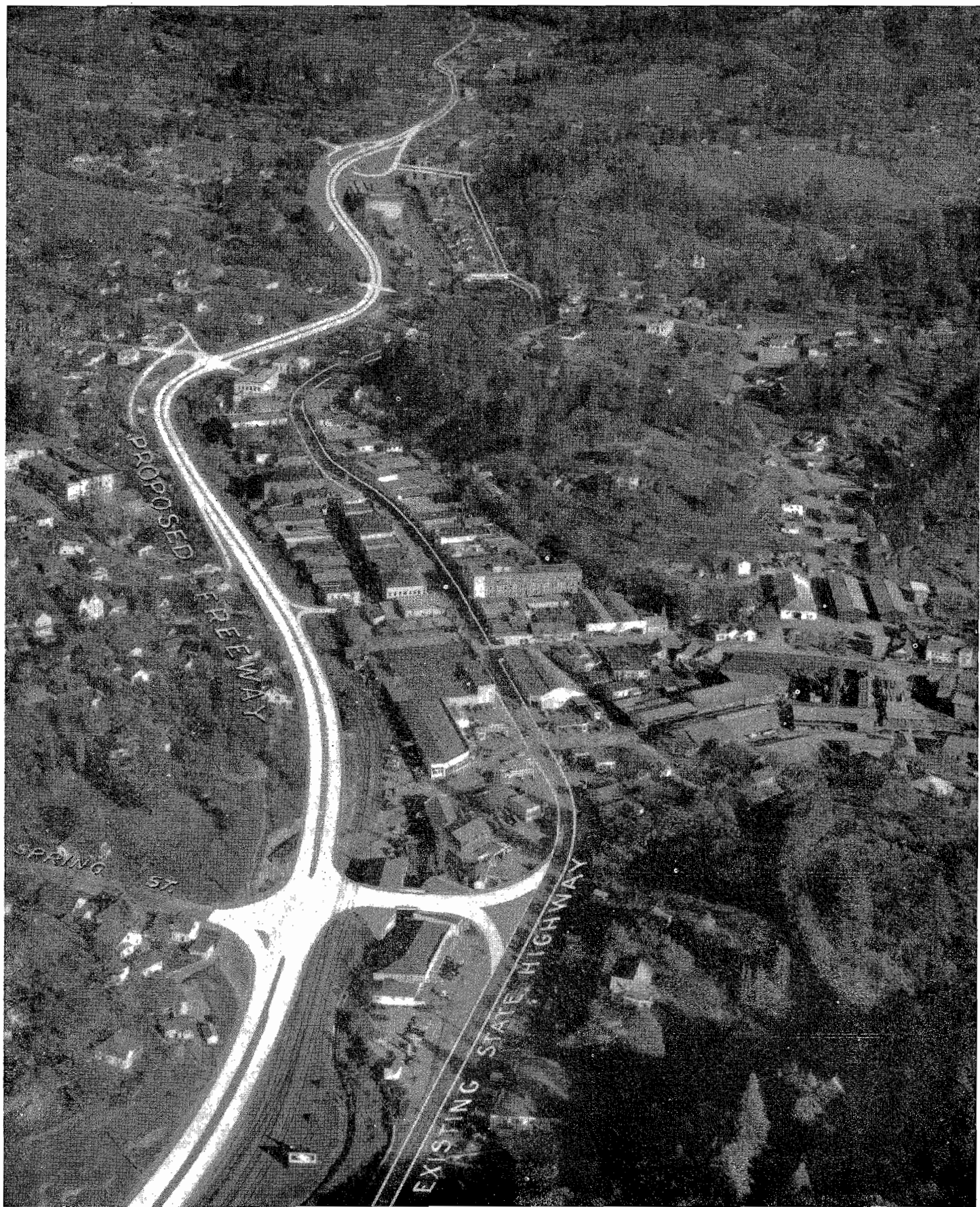
25 Years With Right of Way Department

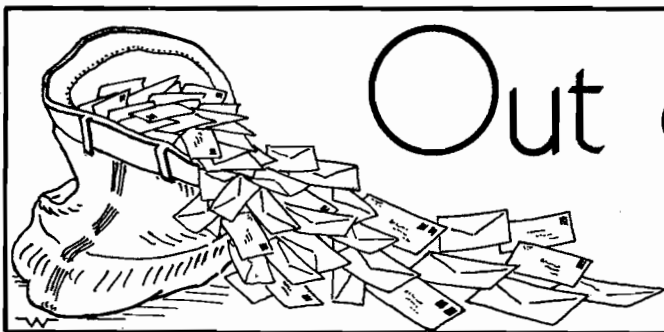
On August 31st, George Pingry completed 25 years with the California State Highway Right of Way Department.

On September 1, 1927, Pingry joined the State Highway Department as district right of way agent for the Fresno district. In 1933 he was transferred to San Diego to take charge of the right of way department of the then newly created District XI. After 12 years in the border city, he moved north to become district right of way agent for

the San Francisco metropolitan area. Two years later he was promoted to assistant chief right of way agent, the position he now holds.

The aerial photograph on the opposite page shows the line of the existing State Highway, US 50, and proposed freeway through Placerville, El Dorado County. In the 1953-54 budget of the California Highway Commission there is an allocation of \$595,000 for the second construction unit of the freeway, which calls for grading and structures for a length of 1.5 miles. There is also an item of \$250,000 for additional right of way through Placerville.





Out of the Mail Bag

FROM AUSTRALIA

By PETER MANTLE

AWAY from the towns and cities in Australia, thousands of miles of roads are made, maintained, and improved, by gangs of workmen who live on the job in well-run hutted camps.

Australia, with a population fewer than 8,500,000 has about 500,000 miles of roads. A substantial part of the continent is very thinly populated and has virtually no roads. But there is still a big area served by roads remote from the places in which the roadmakers have their homes. To take the men out daily to the jobs from their city homes, or even from the regional depots, would involve far too much traveling time. So they live on the job in camps that can be easily packed up and moved to new sites when the work is finished.

Hutted camps and canvas camps for road workers are used in all six states of Australia. Most gangs are highly mechanized. There are few pick-and-shovel men and most of the workers are drivers of some piece of earth-moving equipment.

In the State of Victoria, for instance, about 2,000 men are employed by the Country Roads Board on road making, road maintenance, and bridge construction. The board owns and operates 2,000 items of road making and bridge building equipment. These are additional to the substantial number of privately owned motor trucks whose drivers work on a contract basis.

Victoria, one of the smaller but most highly developed states, has 3,850 miles of state highways, 432 miles of tourist roads and 375 miles of forest roads. For all of these the Country Roads Board pays the entire cost of construction and maintenance. Then there are 9,800 miles of main roads which are generally under the care of municipali-

AUSTRALIAN NEWS & INFORMATION BUREAU

West Coast Office:

206 Sansome Street, San Francisco 4

MR. KENNETH C. ADAMS,
Editor, "*California Highways and Public Works*"

DEAR MR. ADAMS: I have been sending my copy of *California Highways and Public Works* to our head office in Australia after reading it. The office has been very interested in the publication and has prepared a story on road building in Australia which it suggests you might consider using in your publication. I am sending the story to you in the hope that it will prove of sufficient interest for publication.

Yours sincerely,

NORMAN McRAE
West Coast Representative

ties, and 90,000 miles of unclassified roads and streets.

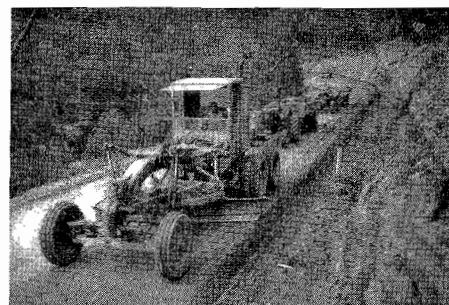
The Country Roads Board gets its income from motor registration fees (about \$8,500,000 a year) and from that part of the petrol tax collected by the Australian Commonwealth Government which is returned to the state. The principle of using a petrol tax for financing roads works is generally regarded as a fair one. Fuel used by a road vehicle is a measure both of the miles run and the load carried, so the operator of the vehicle, in paying a fuel tax, contributes in accordance with the use that he makes of the road system.

City roads are, of course, made sufficiently strong to take continuous heavy traffic. But in the country there

is neither the need nor the money for such heavy construction. The general basis for road construction is judged by the average number of vehicles using the road. If they expect only five vehicles a day, it is sufficient to grade the existing surface. When there are 50 vehicles a day, road-making authorities add a three-inch layer of gravel. Sealing with bitumen is warranted when there are 200 vehicles a day. And when the number rises to anything over 2,000 a day, a higher class pavement is used.

Much of the sealing with bitumen surface is done by men working from tented camps. The work can only be done satisfactorily in the warmer weather between October and April. So early in summer the gang starts out from a main depot with its trucks, sprayers, bitumen heaters, camping gear, and mobile kitchen, to go out for a few months on the road. Generally they live in tents so that they can pull down their camp, move 50 miles along the road, and re-erect their camps, all within a day. They have collapsible seating forms and tables, a mess hut or tent, a mobile kitchen completely fitted out, and small water tanks that are carried in motor trucks.

High-powered road grader built in Australia with British motor; works ahead of multi-typed rollers in a pre-sealing operation that prepares the surface of a new road over the mountains in Victoria for tarring and bitumening



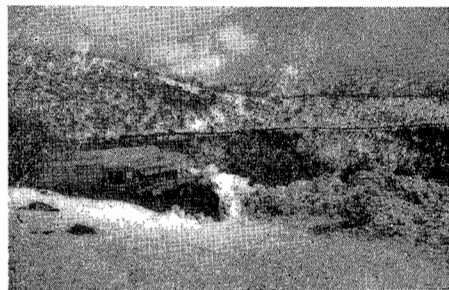
Out on the job a construction gang first grades the road, using power graders to remove any irregularities in the surface. A mechanical broom cleans the surface of dust and loose gravel. Then the center of the road is marked to guide the man driving the sprayer. Meanwhile the tar and the bitumen have been heated in oil-fired heaters. The primary spraying of tar is allowed to soak in, and then comes the bitumen spray which is followed by an automatic spreader that puts an even layer of stones on the surface, to be pressed in and consolidated by motor rollers.

Men driving rollers earn \$28 for a five-day week of 40 hours. Tractor drivers and grader drivers get \$42. The few men who do general laboring work get a camping allowance of two shillings a day which brings their wages up to \$27 a week. Overtime is paid for at time-and-a-half for the first two hours, and double time after that. In the ordinary run of events Saturday and Sunday are holidays, though drivers are paid overtime rates for weekend or after hours maintenance work on their machines.

The Country Roads Board provides all kitchen equipment and pays the wages of a cook and his "offsider" (assistant). The men of a gang form a mess committee to watch over the purchase of food and the selection of menus. They can eat at whatever standard is agreeable to them. They pay for the raw materials of their menus, and most camps eat well and heartily at a present-day (May, 1952) rate of about six shillings a day. The cook gets \$31 for a five-day week and an extra \$4.50 a day if he is required to cook at the weekend.

As many of the gangs include contract men who have their own motor

County Roads Board snowplow, driven by Patrolman "Knocky" Forester, on the "rooftop" of Victoria, keeps the Harrietville-Alpine road open



trucks, contract plant operators and workmen can generally make arrangements to get transport down to their homes after knock-off time on Fridays, and to return on Sunday evenings. But their working week is spent in the tents or huts, with a few amenities like a recreation hut equipped with radio, and with adequate facilities for messing. In some camps the huts are fitted with electric light.

During their first three years of service men are entitled to 10 days leave each year and then become entitled to anything up to three weeks annual leave.

Road work as a whole is controlled by a chief engineer at head office. Each of the 10 roads divisions in Victoria has a supervising engineer with his engineering assistants. A gang is in the charge of an overseer who has generally worked his way up from the bottom. Then there are gangers controlling the drivers and laborers. A road-making gang is equipped with tractors fitted with bulldozer blades, power graders, front-end loaders, motor trucks, and various types of mechanical rollers for compacting. In many parts of the state they are able to use local gravel, stones, and sand, but in others materials have to be transported considerable distances.

Today when Australia has so many jobs offering in primary and secondary industry, it is difficult to find men who will undertake the rather arduous work of stone breaking after the rock has been blasted, and before it can be handled by the normal crushers. So it has been necessary to construct new crushers that can take larger boulders, as well as cranes to lift the boulders into the crushing plant.

Work on the mobile road-making gangs is hard, but there is very little sheer laboring nowadays in Australia. It is a simple life but with the amenities available it is not a rough life. And many of the men find it possible to save a substantial part of their pay. There will doubtless be further improvements in machines to make the road-makers' work easier, but for many years to come Australia, with its big area and relatively small population, will need gangs of men in their huttled camps living on the job—the job of making the life-lines of a continent.

BUNKER GETS AN "A"

5132 Woodlawn Avenue
Chicago 15, Illinois

MR. KENNETH C. ADAMS, *Editor*

DEAR MR. ADAMS: Through the kindness of my brother-in-law, Rev. Philip D. Norvell of Paramount, California, I have the opportunity to read an occasional copy of your fine magazine. Even though I am a layman so far as highway engineering is concerned, I find your magazine very interesting, partly because I have traveled over many of the fine highways in your State, but largely because the magazine is so well edited and the articles you publish are so well written.

I wish to pay especial tribute to the article on "Roads and the Right of Way Department" by Earle R. Bunker, in the May-June issue of this year. As a former English teacher, I would give this report a high grade, if it were submitted to me as an essay in one of my classes. It is interesting, imaginative, well written, and it possesses the desirable qualities of clearness, informativeness, cohesion and conciseness. I hope I may have the pleasure of meeting the author some day. Perhaps I may, as I shall again be spending a winter in your delightful State before many years go by.

I shall look forward to other copies of your magazine which I am sure the Rev. Mr. Norvell will be sending me from time to time.

Cordially yours,

GEORGE W. GRILL

APPRECIATION

California Highways and Public Works

GENTLEMEN: As an avid reader of your publication, I want to express my appreciation for the fine manner in which it keeps the public currently informed of highway and freeway developments in our State. It is a project which deserves the wholehearted support of all those interested in traffic control and safety.

Sincerely,

DONALD K. BYRNE

HIGHWAY BIDS AND AWARDS

September, 1952

ALAMEDA AND SAN JOAQUIN COUNTIES—Between 2 miles east of Redmond Overhead and Corral Hollow Road, about 7.5 miles in length to be graded and base material placed, and reinforced concrete bridges to be constructed. District X, Route 5, Sections E, A. Frederickson & Kasler, Sacramento, \$2,090,711; A. Teichert & Son, Inc., Sacramento, \$1,794,206.30; Frederickson Bros., Emeryville, \$1,764,362; Lord & Bishop & M. J. B. Construction Co., Sacramento, \$1,763,534.25; H. Earl Parker, Inc., & Harms Bros., Sacramento, \$1,745,389.80; Bressi and Bevanda Constructors, North Hollywood, \$1,689,806.25; Ball & Simpson, Berkeley, \$1,689,668.50; Ukropina, Polich, Kral, San Gabriel, \$1,656,583.30; Guy F. Atkinson Co., South San Francisco, \$1,639,308.40; Fredrickson & Watson Const. Co., Oakland, \$1,563,102.29; Dan Caputo & Edward Keeble, San Jose, \$1,555,902.95; Eaton and Smith, San Francisco, \$1,546,815.20. Contract awarded McCammon-Wunderlich Co. & C. K. Moseman, Palo Alto, \$1,447,396.05.

LOS ANGELES COUNTY—On Harbor Freeway, between Olympic Blvd. and Second Street, about 1.1 miles in length to be graded and paved with portland cement concrete pavement on cement treated subgrade and 19 retaining walls and a pedestrian undercrossing to be constructed. District VII, Route 165. Bressi & Bevanda Constructors, North Hollywood, \$2,279,793.75; Griffith Company, Los Angeles, \$2,216,896; Ukropina, Polich, Kral, San Gabriel, \$2,124,473.95; Webb and White and W. J. Disteli, Los Angeles, \$1,987,337.50. Contract awarded J. E. Haddock, Ltd., Pasadena, \$1,919,792.25.

SACRAMENTO COUNTY—Across San Joaquin River, about 5 miles north of Antioch, the northerly approach spans of the existing bridge to be repaired. District X, Route 11, Section C. George Pollock Co., Sacramento, \$32,255; Intrusion-Prepakt, Inc., San Francisco, \$28,142; Barton Construction Co. & Scheyer, El Cerrito, \$23,660; Bos Construction Company, Berkeley, \$22,310. Contract awarded Stanley H. Koller Construction, Crockett, \$19,826.

SAN BERNARDINO COUNTY—City of Redlands at the intersections of Central Avenue with Orange Street and Beacon Street with Citrus Avenue, traffic signals and highway lighting to be furnished and installed and modified. District VIII, Routes 26, 190. Paul R. Gardner, Ontario, \$14,950; Electric & Machinery Service, Inc., South Gate, \$14,915; Fischbach & Moore, Inc., Los Angeles, \$14,829. Contract awarded Ed. Seymour, Long Beach, \$14,170.

SAN BERNARDINO COUNTY—Between Danby and Needles, 32 timber trestle bridges to be redecked with reinforced concrete slabs. District VIII, Route 58, Sections L, M. Owl Truck & Construction Co., Compton, \$182,004; C. B. Tuttle, Long Beach, \$180,567.50; E. G. Perham, Los Angeles, \$179,542.50; Norman I. Fadel, North Hollywood, \$173,482; Pike & Hill, Carey Bros. & Bailey, San Rafael, \$160,218.10; Young & Smith Construction Co., Salt Lake City, Utah, \$156,884. Contract awarded E. S. & N. S. Johnson, Fullerton, \$153,532.

SAN DIEGO COUNTY—In Palm City, at 18th Street and Palm Avenue, a reinforced concrete box culvert to be constructed and the roadway surfaced with plant-mixed surfacing, and a detour to be constructed. District XI, Route 199, Section A. Nielsen Construction Co., San Diego, \$24,942.85; Eimer Bros., Inc., Escondido, \$21,879. Contract awarded Griffith Company, Los Angeles, \$17,192.78.

SAN LUIS OBISPO COUNTY—Between Pismo Beach and San Luis Obispo, about 4.7 miles in net length, existing pavement and shoulders to be surfaced with plant-mixed surfacing and a seal coat applied. District V, Route 2, Section E. Madonna Construction Company, San Luis Obispo, \$107,160; Granite Construction Company, Watsonville, \$96,350; M. J. B. Construction Co., Stockton, \$92,920. Contract awarded Valley Paving Company, Pismo Beach, \$83,353.

SAN MATEO COUNTY—City of Redwood City, at the intersections of Bayshore Highway with Whipple Avenue, and with Chestnut Street—Harbor Blvd., full traffic-actuated signal system and high-

way lighting to be furnished and installed and channelization to be constructed. District IV, Route 68. Peter Sorensen, Redwood City, \$52,890; Underground Elect. Construction Co., Oakland, \$50,963.50; R. Flatland, San Francisco, \$47,036. Contract awarded L. C. Smith Co., San Mateo, \$45,955.

SANTA BARBARA COUNTY—In the City of Santa Barbara, at Salinas Street intersection, about 0.1 mile cross-over and channelization to be graded and surfaced with plant-mixed surfacing on untreated rock base. District V, Route 2. Contract awarded to Baker & Pollock, Ventura, \$17,453.75.

SANTA CLARA COUNTY—Between Peebles Avenue and Madrone Underpass, about 0.4 mile, existing pavement to be widened with plant-mixed surfacing on cement-treated base and imported base material. District IV, Route 2, Section B. J. Henry Harris, Berkeley, \$29,196.50; Granite Construction Co., Watsonville, \$23,827; A. J. Raichs Paving Co., San Jose, \$20,494.25. Contract awarded Leo F. Piazza Paving Co., San Jose, \$17,943.06.

SANTA CLARA AND ALAMEDA COUNTIES—Between Route 68 at Gish Road and Warm Springs, about 8.1 miles to be graded and paved with Portland cement concrete pavement on cement-treated subgrade, and with plant-mixed surfacing on various types of base material, and grade separation structures to be constructed. District IV, Routes 69, 5; Sections A,E,C. Parish Bros., Benicia, \$2,895,101.25; Peter Kiewit Sons' Co., San Francisco, \$2,824,968.85; McCammon-Wunderlich Co. & C. K. Moseman, Palo Alto, \$2,688,903.08; Guy F. Atkinson Co., South San Francisco, \$2,676,090.75; Fredrickson & Watson Construction Co.-M. & K. Corporation, Oakland, \$2,590,450.65; Carl N. Swenson Co., Inc., and Ball and Simpson, Berkeley, \$2,579,122.80; B. J. Ukropina, T. P. Polich & Steve Kral, San Gabriel, \$2,573,015.70. Contract awarded Granite Construction Co., Watsonville, \$2,529,391.

SISKIYOU COUNTY—Between Yreka and Montague, about 5.9 miles in net length, portions to be graded, placing imported base material on portions, cement treating and upper portion, surfacing with road-mixed surfacing, and constructing a reinforced concrete bridge across Yreka Creek. District II, Route 82. Pike & Hill, Carey Bros. & Bailey, San Rafael, \$290,609.40; Eaton & Smith, and Clements & Co., San Francisco, \$266,152.80; Fredrickson & Watson Construction Co., Oakland, \$259,858.80. Contract awarded Harms Bros., Sacramento, \$236,781.50.

SOLANO COUNTY—Protective screen planting between Cordelia Underpass and Ledgewood Creek, District X, Routes 7, 8, Sections H, B; A. Stephen L. Vistica, San Mateo, \$8,508.60; Watkin & Sibbald, San Anselmo, \$8,373; Huettig, Schromm & Bennett, Inc., Palo Alto, \$8,009.30; Diablo View Gardens, Antioch, \$7,226.15; Dana R. Tyson Co., Sacramento, \$7,045.10. Contract awarded Justice-Dunn Co., Oakland, \$6,792.10.

STANISLAUS COUNTY—Cleaning and painting a bridge on State highway in Stanislaus County across Tuolumne River, about 2.5 miles west of La Grange. District X, Route 110, Section E. John P. McGuire, San Jose, \$11,200; J. S. Morris Co., Berkeley, \$8,870; Klaas Bros., Los Angeles, \$12,830. Contract awarded R. W. Reade & Co., Berkeley, \$7,060.

TULARE COUNTY—For furnishing and installing traffic signal system and highway lighting in Tulare County, City of Visalia, at the intersection of Mineral King Avenue with Giddings Avenue. District VI, Route 10. Wilbur D. Steers Electric, Visalia, \$11,996.45; Robinson Electric, Fresno, \$9,910; Westates Electric Construction Co., Los Angeles, \$8,835. Contract awarded L. H. Leonardi Electric Construction Co., San Rafael, \$8,280.

TULARE COUNTY—Across Tule River at south city limits of Porterville, a reinforced concrete bridge to be repaired. District VI, Route 129, Section B. Friant Construction Company, Fresno, \$12,213. Contract awarded Volpa Bros., Fresno, \$12,003.

TULARE COUNTY—Between Bartlett Park Road & Clavicle, about 6.5 miles in length to be widened with plant-mixed surfacing on imported base material and drainage structures to be extended. District VI, Route 127, Section B. Gordon H. Ball & San Ramon

Valley Land Co., Berkeley, \$105,301.55. Contract awarded C. F. Oliphant, Hanford, \$99,973.50.

F. A. S. County Routes

NEVADA COUNTY—About 9 miles north of Nevada City, between State Highway Route 25 and 3.3 miles east, about 3.3 miles in length to be graded, imported sub-base material and imported base material to be placed and bituminous surface treatment to be applied. District III, FAS Route 765. Paul E. McCollum & C. L. Cypher, Richmond, \$99,379.40; Clements & Co., Hayward, \$97,927; Harms Bros., Sacramento, \$93,050; J. Henry Harris, Berkeley, \$86,129; Huntington Bros., Napa, \$84,920; H. Earl Parker, Inc., Marysville, \$76,872.20; Lefever & Bing, West Sacramento, \$76,122; Joe Chevreau, Auburn, \$68,726.40. Contract awarded Elmer J. Warner, Stockton, \$66,548.20.

ORANGE COUNTY—On Bristol Street and Palisades Road, between Delhi Road and MacArthur Blvd., about 4.3 miles in net length, to be graded and surfaced with plant-mixed surfacing on untreated rock base and bituminous surface treatment to be applied to untreated rock base on the shoulders. District VII, FAS Route 1182. Clyde W. Wood & Sons, Inc., North Hollywood, \$313,285.64; Griffith Company, Los Angeles, \$266,871.25; J. A. Thompson & Son, Contractors, Inglewood, \$255,275.70; R. J. Noble Company and R. J. Noble, Orange, \$246,167.55. Contract awarded Sully-Miller Contracting Co., Long Beach, \$237,405.

SANTA CLARA COUNTY—On San Jose-Stevens Creek Road, between Saratoga-Sunnyvale Road and Orange Avenue, about 1.2 miles in length, additional roadway widths to be graded and plant-mixed surfacing to be placed over imported base material, bituminous treated imported base material and existing pavement. District IV, FAS Route 1000. McCammon-Wunderlich Co., Palo Alto, \$179,012.05; J. Henry Harris, Berkeley, \$171,968.34; L. C. Smith Co., San Mateo, \$158,016.41; A. J. Raichs Paving Co., San Jose, \$146,395.05; Edward Keeble, San Jose, \$142,501.30. Contract awarded Leo F. Piazza Paving Co., San Jose, \$128,596.75.

October, 1952

ALAMEDA COUNTY—On Hesperian Boulevard, at San Lorenzo Creek, a steel girder bridge to be constructed and about 0.15 mile of approaches to be graded and surfaced with plant-mixed surfacing on crusher run base. District IV, Route 69, Section B. D. M. Sandling, San Pablo, \$104,837.50; J. Henry Harris, Berkeley, \$84,150.25; Chas. S. Moore & Robert R. Murdoch, Oakland, \$79,099.50; Stolte, Inc., Oakland, \$78,198; Wheeler Construction Company, Oakland, \$76,965.05; Bos Construction Co., Berkeley, \$74,981; Dan Caputo, San Jose, \$68,237.05. Contract awarded Fredrickson & Watson Construction Co. & M & K Corp., Oakland, \$62,809.44.

ALAMEDA COUNTY—Between Fallon and Market Streets, about 1 mile in length, undercrossings and retaining walls to be constructed, portions of a freeway to be graded, surface ramps and city streets to be graded and to be surfaced with plant-mixed surfacing on cement treated base or crusher run base, and highway lighting and traffic signal systems to be installed. District IV, Route 69. Charles L. Harney, Inc., San Francisco, \$1,289,144.20; Fredrickson & Watson Construction Co., M & K Corp., Oakland, \$1,229,840.35; Stolte, Inc., & Gallagher & Burk, Inc., Oakland, \$1,208,990. Contract awarded Ball & Simpson & Erickson, Phillips & Wiseberg, Berkeley, \$1,196,231.70.

ALAMEDA COUNTY—Eastshore Freeway at Hegenberger Road, about 0.5 mile in length, to be graded and surfaced with plant-mixed surfacing on crusher run base. District IV, Route 69. J. Henry Harris, Berkeley, \$69,849.85; Fredrickson & Watson Construction Co., Oakland, \$66,666.66; Independent Construction Co., Oakland, \$64,697.70. Contract awarded Gallagher & Burk, Inc., Oakland, \$62,359.30.

ALAMEDA COUNTY—On Eastshore Freeway, between High Street and 38th Ave., about 0.3 mile in net length of roadside areas to be prepared and planted; a watering system to be installed; cut slopes are to be stabilized; and bituminous penetration treatment is to be applied. District IV, Route 69. McGuire & Hester, Oakland, \$89,487.71; J. Henry Harris, Berkeley, \$53,788.85; Watkin & Sibbald, San Anselmo, \$46,957.12; Huettig, Schramm & Bennett, Inc., Palo Alto, \$44,528.29; Justice-Dunn Co., Oakland, \$40,918.02. Contract awarded Stephen L. Vistica, San Mateo, \$38,458.70.

ALAMEDA COUNTY—From Alvarado Road to East City Limits of Berkeley, on Tunnel Road, plant mix surfacing and install guard railing. District IV, Route 206. O. C. Jones & Sons, Berkeley, \$12,397. Contract awarded J. Henry Harris, Berkeley, \$11,718.

CONTRA COSTA COUNTY—At Pine Creek, about 1.1 miles southwest of Concord, a reinforced concrete box culvert to be constructed and plant-mixed surfacing placed over crusher run base. District IV, Route 75, Section B. Friant Construction Co., Fresno, \$17,672; J. Henry Harris, Berkeley, \$17,399; Bos Construction Co., Berkeley, \$17,262.50; Al Erickson & Co., Napa, \$17,133. Contract awarded Wheeler Construction Co., Oakland, \$15,790.75.

FRESNO COUNTY—Portions between 4 miles east of Cove Road and White Deer Road, about 6 miles in net length, to be graded and surfaced with plant-mixed surfacing on cement treated base, and construct a reinforced concrete slab and girder bridge across Mill Creek. District VI, Route 41, Section T. Hess Construction Co., Inc., Long Beach, \$847,561; Harms Bros., Sacramento, \$831,676.60; Gordon H. Ball & San Ramon Valley Land Co., Berkeley, \$796,371.30; Guy F. Atkinson Co., South San Francisco, \$795,407.10; Fredericksen & Kaiser, Sacramento, \$793,185; H. Earl Parker, Inc., Marysville, \$792,411.35; Ukropina-Polich-Kral, San Gabriel, \$783,955.10; Fredrickson & Watson Construction Co., Oakland, \$735,745.90. Contract awarded Eaton & Smith, San Francisco, \$732,384.10.

HUMBOLDT AND SONOMA COUNTIES—Across Eel River, south of Scotia; and across Russian River at Guerneville, two existing steel bridges to be repaired. District I, Routes 1 and 104, Sections E, B. Laredon Construction Co., Hollywood, \$25,775. Contract awarded Bos Construction Co., Berkeley, \$21,594.75.

IMPERIAL COUNTY—Across Valerie Wash about 7.3 miles south of Riverside County Line, a reinforced concrete slab bridge to be constructed. District XI, Route 26, Section E. Geo. W. Peterson & Jack W. Baker, Los Angeles, \$46,260; E. G. Perham, Los Angeles, \$25,908; Norman I. Fadel, North Hollywood, \$25,301; C. B. Tuttle, Long Beach, \$25,254. Contract awarded W. J. Disteli, Los Angeles, \$25,228.50.

IMPERIAL COUNTY—Across Araz Wash, 6.3 miles west of the Colorado River Bridge at Yuma, Arizona, about 0.2 mile in length of detour to be graded and surfaced and a reinforced concrete bridge to be constructed. District XI, Route 27, Section B. Sooy and Jackson and Marks Bros. Construction Co., Redlands, \$74,127.25; C. B. Tuttle, Long Beach, \$66,993.50; Young & Smith Construction Co., Salt Lake City, Utah, \$66,519; Norman I. Fadel, North Hollywood, \$61,764.50. Contract awarded Laredon Construction Co., Los Angeles, \$61,364.50.

IMPERIAL COUNTY—Across the Holtville Main Drain, 9.2 miles north of Holtville, a reinforced concrete bridge to be constructed and a detour to be graded and bituminous surface treatment applied. District XI, Route 187, Section B. Laredon Construction Co., Los Angeles, \$69,483; Sooy & Jackson and Marks Bros. Construction Co., Redlands, \$65,552.78; Basich Bros. Construction Co., N. L. Basich & R. L. Basich, Garvey, \$64,503.50. Contract awarded O. B. Pierson, Bellflower, \$56,884.50.

LOS ANGELES COUNTY—At the intersections of Foothill Boulevard with Rosemont Avenue and with Briggs Avenue, traffic signal systems and highway lighting to be furnished and installed. District VII, Route 9, Section A. Harry F. Brewer, Long Beach, \$14,306; Fischbach and Moore, Incorporated, Los Angeles, \$13,332; Electric and Machinery Service, Inc., South Gate, \$12,960; C. D. Draucker, Inc., Los Angeles, \$11,263. Contract awarded Westates Electrical Construction Co., Los Angeles, \$10,892.

LOS ANGELES COUNTY—On Santa Ana Freeway, between Lakewood Boulevard and Pioneer Boulevard, highway lighting and illuminated sign sys-

tems to be furnished and installed. District VII, Route 166, Section A. Westates Electrical Const. Co., Los Angeles, \$38,992. Contract awarded Newbery Electric Corporation, Los Angeles, \$35,117.

LOS ANGELES COUNTY—At the intersection of Manchester Boulevard with Inglewood Avenue, and with Greville Avenue, traffic signal system to be furnished and installed and traffic signal system to be modified. District VII, Route 174. C. D. Draucker, Inc., Los Angeles, \$6,605; Fischbach & Moore, Incorporated, Los Angeles, \$6,054; Electric and Machinery Service, Inc., South Gate, \$5,887; Harry F. Brewer, Long Beach, \$5,367. Contract awarded Westates Electrical Construction Co., Los Angeles, \$4,599.

LOS ANGELES AND ORANGE COUNTIES—At the intersections of Valley Boulevard with Third Avenue; Carson Street with Woodruff Avenue in and adjacent to the City of Long Beach; and Orange-thorpe Avenue with Lemon Street, full traffic-actuated signal systems and highway lighting to be furnished and installed. District VII, Routes 170, 178, 175, Sections B, A, B. Electric and Machinery Service, Inc., South Gate, \$40,120; Westates Electrical Construction Co., Los Angeles, \$33,896; Ed. Seymour, Long Beach, \$31,745. Contract awarded Fischbach and Moore, Incorporated, Los Angeles, \$29,660.

MENDOCINO COUNTY—In Russian Gulch State Park, a reinforced concrete slab bridge to be constructed. District I. C. C. Gildersleeve, Grass Valley, \$11,480.67. Contract awarded Reed & Tuttle, Redwood Valley, \$9,830.

ORANGE COUNTY—Between Pacific Coast Highway in Newport Beach and 20th Street in Costa Mesa, about 1.9 miles in length, to be graded and surfaced with plant-mixed surfacing on cement treated base over imported subbase material. District VII, Route 43, Sections Npt. B, A. Griffith Company, Los Angeles, \$752,216.50; Cox Bros. Construction Co., Stanton, \$741,685; A. Teichert & Son, Inc., Sacramento, \$716,779. Contract awarded Sully-Miller Contracting Company, Long Beach, \$716,033.40.

ORANGE COUNTY—On Placentia-Yorba Road, between Esperanza Road and Route 43, a reinforced concrete bridge to be constructed and about 0.6 mile in length to be graded and surfaced with plant-mixed surfacing on untreated rock base. District VII, Route 176, Section A. Tumblin Company, Bakersfield, \$338,810; Norman I. Fadel, North Hollywood, \$311,226; Charles MacClosky Company, San Francisco, \$282,839.50; Webb & White, Los Angeles, \$278,144.20; Hubbs Equipment Co. & Bakker Construction Co., J. V., Colton, \$263,844.30; Fredericksen & Kasler, Sacramento, \$258,470.92; O. B. Pierson, Bellflower, \$256,027.26. Contract awarded J. A. Thompson & Son, Contractors, Inglewood, \$243,254.

RIVERSIDE COUNTY—At Palo Verde Lagoon, at West C Canal and at C-03 Canal, a reinforced concrete bridge to be constructed, reinforced concrete pipe siphons to be installed, and about 0.6 mile of roadway to be graded and surfaced with road-mixed surfacing. District XI, Route 146, Sections A, B. E. G. Perham, Los Angeles, \$111,113; Norman I. Fadel, North Hollywood, \$92,486.50; E. F. Grandy, Laguna Beach, \$91,971.40. Contract awarded Sooy & Jackson and Marks Bros. Construction Co., Redlands, \$80,065.25.

SACRAMENTO COUNTY—City of Sacramento, at the intersections of Folsom Boulevard with Alhambra Boulevard, 34th Street, 36th Street, 39th Street, 47th Street, 51st Street, 55th Street, and 59th Street, traffic signal systems and highway lighting to be furnished and installed and modified. District III, Route 11. Collins Electrical Co., Sacramento, \$38,753; Underground Electric Construction Co., Oakland, \$35,597; Luppen & Hawley, Inc., Sacramento, \$31,080.37; R. Gould & Son, Stockton, \$29,995; Reliable Elevator Works, Sacramento, \$29,938. Contract awarded L. H. Leonardi Electric Construction Co., San Rafael, \$28,121.

SAN BERNARDINO COUNTY—City of San Bernardino at the intersections of Mount Vernon Ave. with Mill St., Rialto Ave., Second St., and Fourth St., and Second St. with Viaduct Blvd.; traffic signal systems and highway lighting to be furnished and installed and channelization to be constructed. District VIII, Route 31. Westates Electrical Const. Co., Los Angeles, \$50,803; Fischbach and Moore, Incorporated, Los Angeles, \$49,983; Paul R. Gardner, Ontario, \$49,688.56. Contract awarded Drury Electric Co., San Bernardino, \$46,702.25.

SAN BERNARDINO COUNTY—In the City of Upland, between Euclid Avenue and East City Limits, about 1.3 miles in length, the roadbed to be widened

and resurfaced with plant-mixed surfacing. District VIII, Route 190, Matich Brothers, Colton, \$32,557. Contract awarded George Herz & Co., San Bernardino, \$31,622.90.

SAN DIEGO COUNTY—Between Buena Vista Creek in Carlsbad and Monterey Drive in Oceanside, highway lighting to be furnished and installed. District XI, Route 2, Sections Cdb, Ocn. California Electric Works, San Diego, \$48,630. Contract awarded Ets-Hokin & Galvan, San Diego, \$47,343.

SAN DIEGO COUNTY—In the City of San Diego, between Park Boulevard and Texas Street, about 0.5 mile in length, to be surfaced with plant-mixed surfacing. District XI, Route 12. V. R. Dennis Construction Co., San Diego, \$29,477.50; Daley Corporation, San Diego, \$26,150; R. E. Hazard Contracting Co., San Diego, \$26,140.90. Contract awarded Griffith Company, Los Angeles, \$25,643.80.

SAN DIEGO COUNTY—In the City of San Diego on the east side of Calhoun Street, adjacent to District XI Office Building, about 0.08 mile in length, curbs and sidewalks to be constructed. District XI. T. B. Penick & Sons, San Diego, \$2,328.75. Contract awarded J. B. Henry, San Diego, \$2,211.

SANTA CLARA COUNTY—At the intersections of Bayshore Highway with San Antonio Road and with Middlefield Road, full traffic-actuated signal system and highway lighting to be furnished and installed and channelization to be constructed at one intersection and highway lighting to be furnished and installed at one intersection. District IV, Route 68, Sections A, P.A. E. G. Kurze Electrical Works, San Jose, \$27,573.70; A. J. Raich Paving Co., San Jose, \$25,534.50; R. Flatland, San Francisco, \$24,237.12; J. Henry Harris, Berkeley, \$24,230.50; L. C. Smith Company, San Mateo, \$23,742.50; Fields Electric Works, Santa Clara, \$23,554.50. Contract awarded Howard Electric Co., Gilroy, \$22,688.50.

SHASTA COUNTY—In Anderson, at the intersection of South St. and Route 3, and at the intersection of North St. and Route 3, furnish and install highway lighting systems. District II, Route 3, Section A. Shasta Electric Co., Redding, \$4,357.97. Contract awarded L. H. Leonardi Elect. Const. Co., San Rafael, \$2,773.

SOLANO COUNTY—Across Miner Slough, about 12 miles north of Rio Vista, a bridge to be repaired. District X, Route 99, Section A. D. M. Sandling, San Pablo, \$74,648.75; Bos Construction Co., Berkeley, \$74,444; Stolte, Inc., Oakland, \$64,542; Barton Construction Co. & K. S. Scheyer, Oakland, \$63,952; Lord & Bishop, Sacramento, \$58,394. Contract awarded M. A. Jenkins, Sacramento, \$54,451.

SUTTER COUNTY—At Sycamore Canal, about 3 miles west of Yuba City, bridge to be widened. District III, Route 15, Section B. C. C. Gildersleeve, Grass Valley, \$20,413.16; O'Connor Bros., Red Bluff, \$19,945.50; Rice Brothers, Inc., Marysville, \$18,754; Wm. S. Shedd, Yuba City, \$17,777; A. A. Edmondson, San Fernando, \$17,529; Friant Construction Co., Fresno, \$17,262. Contract awarded Al Erickson & Co., Napa, \$16,576.

TUOLUMNE COUNTY—Between Moccasin Creek Road and Priest, about 3.8 miles in length, to be graded and surfaced with plant-mixed surfacing on untreated rock base. District X, Route 40, Section B. C. V. Kenworthy, Stockton, \$527,418; Ukropina-Polich-Kral, San Gabriel, \$466,258.50; Fredrickson Bros., Emeryville, \$458,812.50; Eaton & Smith, San Francisco, \$447,744; Harms Bros., Sacramento, \$445,863.50; J. Henry Harris, Berkeley, \$423,556.60; Transocean Engineering Corp., San Lorenzo, \$418,417; Ball & Simpson, Berkeley, \$416,990.85; R. P. Shea Co., Riverside, \$415,762.20; H. Earl Parker, Inc., Marysville, \$376,720.90. Contract awarded Paul E. McCollum & C. L. Cypher, Richmond, \$335,435.80.

VENTURA COUNTY—Over the tracks of the Southern Pacific Company, Fifth Street and Route 153 at Camarillo, a bridge to be constructed and approach ramps to be graded. District VII, Route 2, Section B. Clyde W. Wood & Sons, Inc., North Hollywood, \$693,276.75; Guy F. Atkinson Company, Long Beach, \$628,725; Norman I. Fadel, North Hollywood, \$613,115.75; FEPCO, Los Angeles, \$604,680.50; Griffith Company, Los Angeles, \$597,678.25; K. B. Nicholas, Ontario, \$592,162.20; MacDonald and Kruse, Sun Valley, \$575,627.75; Byerts & Sons & Geo. K. Thatcher, Los Angeles, \$574,794.25; Carl N. Swenson Co., Inc., San Jose, \$564,632.25; O. B. Pierson and P. D. Ware, Paramount, \$553,970.65; Charles MacClosky Company, San Francisco, \$534,859.50; J. A.

Thompson & Son, Contractors, Inglewood, \$532,292.50. Contract awarded George W. Peterson & Jack W. Baker, Los Angeles, \$508,613.

F. A. S. County Routes

HUMBOLDT COUNTY—Between east city limits of Eureka and 1.26 miles southeasterly, existing roadbed to be widened and surfaced with plant-mixed surfacing. District I, Route 501. Contract awarded Mercer, Fraser Co. & Mercer, Fraser Gas Co., Inc., Eureka, \$32,635.

RIVERSIDE COUNTY—Between 0.6 mile south of Route 26 and Route 26 at Garnet, a railroad overhead to be constructed and about 0.6 mile in length of roadway to be graded, imported base material to be placed, and portions to be cement treated and surfaced with road-mixed surfacing, and a seal coat to be applied. District VIII, Route 1178. Charles MacClosky Company, San Francisco, \$194,453.45; Norman I. Fadel, North Hollywood, \$192,488; Marshall, Haas, & Royce, Belmont, \$187,418; George Herz & Co., San Bernardino, \$183,827.40; E. F. Grandy, Laguna Beach, \$169,122.90. Contract awarded Basich Bros. Construction Co. N. L. Basich-R. L. Basich, Garvey, \$163,194.45.

SAN LUIS OBISPO COUNTY—On Calf Canyon-Huer Huero Road between Huer Huero-La Panza Road and 3.2 miles west, about 3.2 miles in length, to be graded and imported base material placed. District V, Route 676. Pacific Contracting Corp., Newport Beach, \$158,375; C. V. Kenworthy, Stockton, \$153,565; Paul E. McCallum, Richmond, \$146,159.10; Valley Paving Co., Pismo Beach, \$143,550; A. A. Edmonson, San Fernando, \$134,787.45; John Delphia, Patterson, \$124,989; Madonna Const. Co., San Luis Obispo, \$123,395. Contract awarded M.J.B. Const. Co., Stockton, \$102,306.

SONOMA COUNTY—On Valley Ford Cut-off, between 1.7 miles and 3.6 miles westerly of Valley Ford, about 1.9 miles in length, to be graded and imported base material placed and a seal coat applied. District IV, Route 777. Fredrickson Bros., Emeryville, \$260,978.01; J. Henry Harris, Berkeley, \$244,835.50; Huntington Bros., Napa, \$241,774; Eaton & Smith, San Francisco, \$228,695.20; John Delphia, Patterson, \$227,256.60; Pike & Hill, Carey Bros. & Bailey, San Rafael, \$226,931.82; A. B. Siri, Inc., Santa Rosa, \$223,403.60; Brown-Ely Co., Contractors, Corte Madera, \$220,292.25. Contract awarded J. R. Armstrong, El Cerrito, \$217,413.69.

TULARE COUNTY—Between Farmersville and State Route 10 at Mitchell's Corner, and between Farmersville and Exeter, about 5.3 miles in length, to be graded and surfaced with plant mixed surfacing on cement treated base. District VI, Routes 1136, 1143. G. W. Ellis Const. Co., North Hollywood, \$371,067.50; Volpa Bros., Fresno, \$329,853.60; M. J. Ruddy & Son, Modesto, \$308,364.75; Clements & Co., Hayward, \$279,117.50; Baun Const. Co., Fresno, \$277,161.90; Gordon H. Ball & San Ramon Valley Land Co., Berkeley, \$272,976.61; Griffith Co., Los Angeles, \$270,276.10; Rex Sawyer & Wm. S. & Bruce F. Rogers Co., Madera, \$268,448.50; Ukropina Polich-Kral, San Gabriel, \$259,325.50. Contract awarded Rice Bros., Inc., Marysville, \$254,879.10.

November, 1952

CALAVERAS COUNTY—Between 3.3 miles east of San Joaquin County line and 1.5 miles west of Valley Springs, about 5 miles in length, to be widened and surfaced with plant-mixed surfacing on untreated rock base. District X, Route 24, Section A. Pike & Hill, Carey Bros. & Bailey, San Rafael, \$357,895.75; R. P. Shea Co., Riverside, \$315,689.45; Louis Biasotti & Son, Stockton, \$302,629.90; Claude C. Wood Co., Lodi, \$299,712.75; J. Henry Harris, Berkeley, \$296,218.40; Harms Bros., Sacramento, \$289,052.25; Fredrickson & Watson Construction Co., Oakland, \$279,850; Fredrickson Bros., Emeryville, \$274,983.90; Munn & Perkins, Modesto, \$244,622; Ukropina-Polich-Kral, San Gabriel, \$237,750.10. Contract awarded M. J. Ruddy & Son, Modesto, \$221,362.

SACRAMENTO COUNTY—In the City of Sacramento at Folsom Boulevard near 59th Street, for constructing a paved storage area. District III. McGillivray Construction Co., Sacramento, \$15,182.50; Brighton Sand & Gravel Co., Sacramento, \$12,943; A. Teichert & Sons, Inc., Sacramento, \$11,923.30. Contract awarded J. R. Reeves, Sacramento, \$10,162.50.

SAN FRANCISCO—At Alemany Rotary, in San Francisco, widen two-way lane ramp and relocate electroliters and illuminated sign. District IV, Route 68. Eaton & Smith, San Francisco, \$10,576.50; J. Henry Harris, Berkeley, \$10,207.10; Pacific Pavements Co., Ltd., San Francisco, \$9,480. Contract awarded Chas. L. Harney, Inc., San Francisco, \$7,897.20.

SANTA BARBARA—At Rincon Creek Culvert, about 0.15 mile east of Santa Barbara, constructing outlet apron for arch culvert. District V, Route 2, Section H. N. M. Saliba Co., Los Angeles, \$23,185; Norman I. Fadel, North Hollywood, \$20,610. Contract awarded to Friant Construction Co., Fresno, \$14,824.50.

F. A. S. County Routes

FRESNO COUNTY—On Dickenson Avenue, between McMullin Grade and Whitesbridge Road, about 5.1 miles in length, to be graded and surfaced with plant-mixed surfacing on imported base material. District VI, Route 809. Leo F. Piazza Paving Co., San Jose, \$243,505.28; Clements & Co., Hayward, \$195,897; Volpa Bros., Fresno, \$189,679; Thomas Construction Co., Fresno, \$186,004. Contract awarded to Baun Construction Co., Fresno, \$174,807.70.

THANK YOU, JUDGE

SANTA BARBARA COUNTY
Santa Barbara, California

MR. KENNETH C. ADAMS, *Editor*
California Highways and Public Works

DEAR MR. ADAMS: I have just received *California Highways and Public Works* and I wish to compliment you upon the excellence of the publication. I have been on your mailing list for a number of years and have read each copy of your publication with a great deal of interest. You and your entire staff are to be complimented upon its excellent quality.

Very truly yours,

ERNEST D. WAGNER,
Judge of the Superior Court

Old Timers Honored

Continued from page 38 . . .

Laura K. Craft, 27; Thomas H. Den-nis, 36; Mrs. Viola Driver, 28; William F. Faustman, 39; Preston L. Fite, 31; Fred J. Grumm, 28; George C. Han-son, 39; Albert L. Hardy, 26; L. E. Mc-Dougal, 26; James H. Patrick, 25; Lewis W. Seymour, 32; William A. Smith, 32; R. H. Stalnaker, 36; James G. Standley, 36; T. E. Stanton, 39; Ira G. Thomas, 32; Charles E. Thorp, 32; George R. Winslow, 29.

Awards to those completing 25 years of state service during 1952 will be made later.

Industrial Freeway

Continued from page 8 . . .

of plant-mixed surfacing on cement-treated base.

Design of Freeway

Skirting the present southerly border of Pittsburg and Antioch enables the freeway to be constructed in the more sparsely populated sections over rolling terrain, thus affording flat grades and minimum curvature. The maximum grade is 3½ percent, and the total curvature is 32 degrees with a minimum radius of 3,000 feet.

An interesting feature is the depressing of the freeway below the ground surface and use of diamond type interchanges within the cities of Pittsburg and Antioch. This type of construction maintains the same relative grades of cross streets and minimizes the areas required for approach ramps, thus effecting economy in acquisition of right of way in developed sections and in construction of shorter separation structures.

The construction cost of this project, exclusive of right of way, is \$2,700,000. The right of way and right of way clearance costs approximate \$800,000, making a total cost for the five-mile freeway project \$3,500,000, financed by state and federal-aid funds.

The work is under the general supervision of Assistant State Highway Engineer B. W. Booker, with the author as resident engineer and R. B. Neff as the Bridge Department representative on the project.

This fourth unit will complete 20 miles of the "Arnold Industrial Highway" from Muir Station at the southern outskirts of Martinez to Antioch. The first eight miles started in 1938 consists of a two-lane highway to a junction of Route 24; the remainder is a four-lane limited access freeway.

SPEED IS KILLER

Excessive speed is a sudden and brutal killer. Whenever you hurry to make an appointment, or give yourself up to the lure of that wide and open road, you are giving this killer a chance to kill you.

EARL WARREN
Governor of California

FRANK B. DURKEE
Director of Public Works

HIGHWAY COMMISSION

ARRISON R. BAKER	Pasadena
STEPHEN CHASE	Sacramento
AMES A. GUTHRIE	San Bernardino
WALTER SANDELIN	Ukiah
HESTER H. WARLOW	Fresno
HARLES T. LEIGH	San Diego
L. C. KENNEDY, Secretary	Sacramento

DIVISION OF HIGHWAYS

JO. T. MCCOY	State Highway Engineer
P. M. GILLIS	Deputy State Highway Engineer
THAS. E. WAITE	Assistant State Highway Engineer
EARL WITCOMBE	Assistant State Highway Engineer
F. W. PANHORST	Assistant State Highway Engineer
J. W. VICKREY	Assistant State Highway Engineer
R. H. WILSON	Assistant State Highway Engineer
N. HVEEM	Materials and Research Engineer
GEORGE F. HELLESOE	Maintenance Engineer
C. YOUNG	Engineer of Design
E. T. TELFORD	Traffic Engineer
DON G. EVANS	Construction Engineer
H. B. LA FORGE	Engineer of Federal Secondary Roads
L. V. CAMPBELL	Engineer of City and Cooperative Projects
EARL E. SORENSON	Equipment Engineer
H. C. MCCARTY	Office Engineer
MILTON HARRIS	Service and Supply Engineer
J. C. WOMACK	Planning Engineer
J. P. MURPHY	Principal Highway Engineer
F. M. REYNOLDS	Principal Highway Engineer
E. J. SALDINE	Principal Highway Engineer
I. O. JAHLSTROM	Principal Bridge Engineer
STEWART MITCHELL	Principal Bridge Engineer
E. R. HIGGINS	Comptroller

Right of Way Department

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

District IV

B. W. BOOKER	Assistant State Highway Engineer
------------------------	----------------------------------

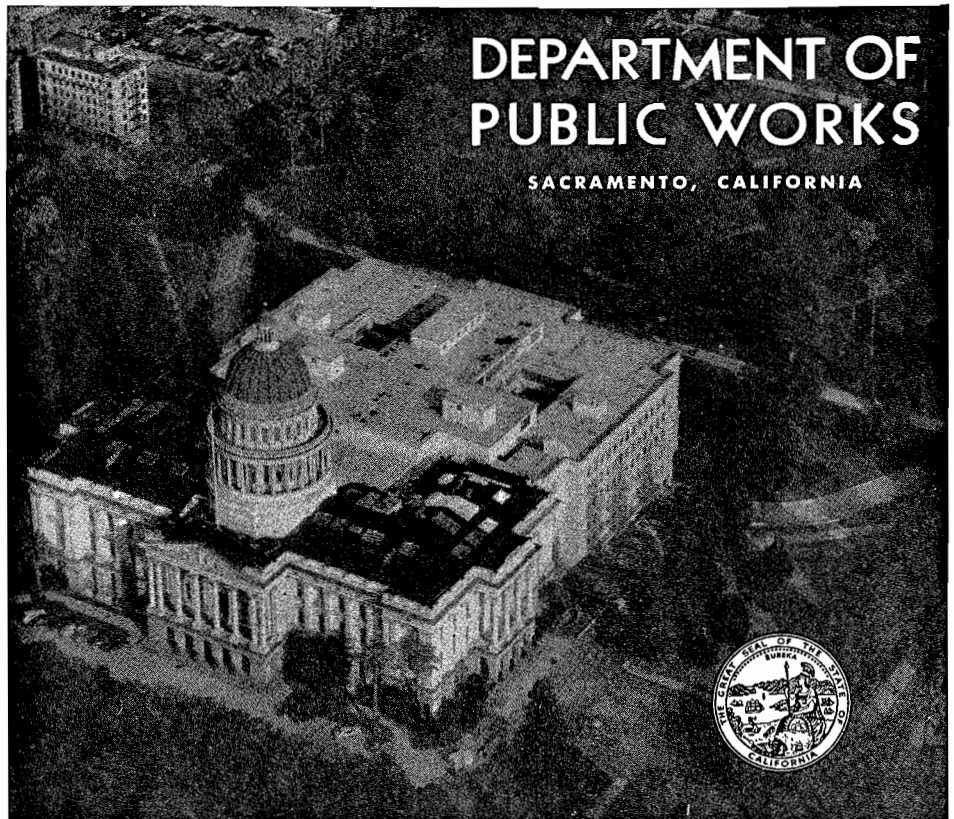
District VII

P. O. HARDING	Assistant State Highway Engineer
-------------------------	----------------------------------

DIVISION OF HIGHWAYS

District Engineers

C. V. KANE	District I, Eureka
J. W. TRASK	District II, Redding
A. M. NASH	District III, Marysville
J. P. SINCLAIR	District IV, San Francisco
L. A. WEYMOUTH	District IV, San Francisco
E. J. L. PETERSON	District V, San Luis Obispo
E. T. SCOTT	District VI, Fresno
W. L. FAHEY	District VII, Los Angeles
M. E. CESSNA	District VII, Los Angeles
S. W. LOWDEN	District VIII, San Bernardino
ALAN S. HART	District IX, Bishop
JOHN G. MEYER	District X, Stockton
E. E. WALLACE	District XI, San Diego
HOWARD C. WOOD	Bridge Engineer
	State-owned Toll Bridges



DEPARTMENT OF PUBLIC WORKS

SACRAMENTO, CALIFORNIA



DIVISION OF CONTRACTS AND RIGHTS OF WAY

Legal

ROBERT E. REED	Chief
GEORGE C. HADLEY	Attorney
HOLLOWAY JONES	Attorney

DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

NORMAN C. RAAB	Project Engineer
--------------------------	------------------

DIVISION OF WATER RESOURCES

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

DIVISION OF ARCHITECTURE

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

Administrative Service

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

Planning and Design Service

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

Construction Service

D. C. WILLETT	Chief Construction Engineer
F. A. JOHNSON	Principal Structural Engineer
NATE W. DOWNES	Supervising Engineer of Maintenance and Operations

Area Construction Supervisors

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

Area Structural Engineers, Schoolhouse Section

C. M. HERD	Area I, San Francisco
M. A. EWING	Area II, Sacramento
H. W. BOLIN	Area III, Los Angeles

CALIFORNIA STATE HIGHWAY SYSTEM

SCALE IN MILES

0 50 100

