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California Highways and Public Works

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

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PROGRESS

Development on US 40 and
US 99 Being Accelerated

By J. D. GALLAGHER, Assistant Office Engineer

GOVERNOR EARL WARREN'S successful fight in the 1947 Legislature to obtain additional gasoline tax funds for the improvement of state and county highway systems and city streets which culminated in the enactment of the Collier-Burns Highway Act, is paying big dividends to California motorists, according to Director of Public Works C. H. Purcell.

What these additional funds have accomplished and will accomplish in highway development, will be described in four reports covering highway projects completed, under way, and proposed for the near future on U. S. 40, U. S. 101, and U. S. 99 prepared by the Division of Highways under the direction of State Highway Engineer George T. McCoy for submission to Governor Warren.

The first of these reports describes recent development of U. S. 40 in California.

PROBABLY the most important interstate highway in California is U. S. 40. This heavily traveled state route enters California a few miles west of Reno, crosses the high Sierra over Donner Summit at an elevation of 7,000 feet, passes through Sacramento on its way across the valley, reaches the bay area over the Carquinez Straits Bridge near Vallejo, and ends in San Francisco via the San Francisco-Oakland Bay Bridge.

While the El Camino Real along the coastal sections of the State is much older, the U. S. 40 route is of considerable historical importance in that it crosses the Sierra over the trace traveled by the ill-fated Donner Party and followed by thousands of forty-niners in their cross-country journey to California. Since that time, development of portions of the route has been relatively continuous. Since establishment of the State Highway System in 1912, work on this development has been carried on with no appreciable interruption.

... Continued on page 2

NEW BUDGET

(See Budget on Pages 16-20, 22 and 40)

FRUITS of Governor Warren's vigorous and successful fight in the 1947 Special Session of the Legislature for passage of the Collier-Burns Act increasing the gasoline tax, are reflected in a list of major construction projects totaling, including engineering for the fiscal year, \$69,703,000, approved by the California Highway Commission for inclusion in the 1949-50 state highway budget, which was made public by Director of Public Works C. H. Purcell, chairman of the commission.

In addition, the commission budgeted \$17,701,500 to be used for the acquisition of right of way for projects contemplated for the 1950-51 program.

The 1948-49 major construction budget aggregated \$54,006,000.

The 1947-48 Fiscal Year budget as approved by the commission prior to enactment of the Collier-Burns Act amounted to \$34,000,000 for construction, construction engineering, and right of way. In August 1947, when a portion of the increased revenues for state highways became available from the Collier-Burns Act, the commission was enabled to add \$17,000,000 to its 1947-48 budget.

The newly adopted budget provides for allocations to 55 of the 58 California counties. The 1946 budget, preceding the Collier-Burns Act, provided appropriations for only 35 of the 58 counties.

"In preparing the list of projects proposed for inclusion in the 1949-50 highway budget," Purcell said, "the Highway Commission and Division of Highways engineers devoted months to a study of state highway problems and needs and in the final analysis selected critical deficiency projects which, in the judgment of all members of the commission, required immediate attention and action. The commission also had to give serious consideration to the fact that construction costs have increased approximately 90 percent."

... Continued on page 16

SINCE January 1, 1947, a total of 88 projects aggregating 284 miles and totaling in value \$33,966,000 have been completed or placed under construction on U. S. 99 from the Oregon line to the Mexican border.

This was revealed in the second of a series of reports dealing with developments on U. S. 40, U. S. 99, and U. S. 101 prepared by State Highway Engineer George T. McCoy and submitted to Governor Earl Warren by Director of Public Works C. H. Purcell.

"In large measure," Purcell said, "the acceleration of construction on these three major arterials, as well as on other state highways, has been made possible by the Collier-Burns Act sponsored by Governor Warren and enacted at the extraordinary session of the Legislature in 1947 which was called by the Governor for the purpose of increasing the gasoline tax."

HIGHWAY U. S. 99 is the central artery of the California State Highway System, and as such it carries an unusually large volume of traffic, particularly heavy trucking.

U. S. 99 enters California from Oregon north of Yreka and travels southerly through the mountains and over Shasta Dam Reservoir to the Sacramento Valley at Redding. Between Red Bluff and Sacramento the route divides following down both sides of the Sacramento River. That portion on the easterly side, designated as U. S. 99-E, passes through Chico, Yuba City, Marysville and Roseville and the westerly route, U. S. 99-W, passes through Corning, Willows, Williams, Woodland and Davis. From Sacramento, the route is laid out down the middle of the San Joaquin Valley through Stockton, Modesto, Merced, Fresno and Bakersfield. South of Bakersfield, U. S. 99 crosses the Tehachapi Mountains over the Ridge Route at Fort Tejon and

... Continued on page 27



US 40 for a distance of 4.6 miles through the American Canyon is being widened to four-lane divided standards

Continued from page 1 . . .

Under the steady pegging away at improving a section here and a portion there, the route over the Sierra has been developed into one of the best mountain highways in the Nation. Taking into account the going contracts, there only remain 10 miles of less than four-lane highway in the 90-mile portion of this arterial between Sacramento and San Francisco. While development of the route was progressing rapidly prior to World War II, the rate of improvement has been noticeably accelerated since the close of the war, particularly on the heavily traveled arterial sections.

In the three years since 1945 the amount expended for construction and allocated for improvement totals \$10,718,900. Of this figure the sum of \$5,716,500 represents expenditures on completed contracts and \$5,002,400 includes the value of all construction now under way, advertised for bids, and ready for advertising.

U. S. 40 Projects

Divided between several general locations of the route the \$10,700,000 total shows apportionment in the following amounts:

In the San Francisco Bay area, between the Bay Bridge and the Carquinez Straits Bridge—1½ million dollars; widening and separation of roadways in Solano County—nearly 6 millions; the North Sacramento Freeway—nearly 2 millions; freeway through Auburn—1 million; and various locations, principally in the mountains and in the vicinity of Truckee—a little less than ½ million dollars.

The larger projects included in this work consist of the following:

Construction of U. S. 40 through the City of Auburn as a freeway between Nevada Street and one mile east of Auburn, a distance of 2.6 miles. This improvement provided a four-lane divided highway on a new and direct alignment with highway grade separations at Walsh Street and East Street and an overcrossing over the tracks of the Southern Pacific Railroad. The East Street separation provides interchange facilities for traffic using the recently completed new alignment of the state highway to Grass Valley.

Auburn Improvement

The two and one-half miles of freeway has eliminated what was the most aggravated condition of traffic congestion on the mountain portions of this

route. The old route which followed the crooked, narrow and steep streets of old Auburn presented a most picturesque view of this historical California mining center; enjoyment of the scene was, however, ruined completely by the congested traffic on the narrow street, particularly when traveling behind large truck and trailer units which negotiated the steep grades at a snail's pace. On the new divided freeway the distance through Auburn is easily and safely traveled by through traffic in a very few minutes while the traveler who wishes to see the old town may turn off and do so in comparative comfort, unhindered by congestion.

North Sacramento Freeway

The North Sacramento Freeway is another completed section in the development of U. S. 40. The first unit of this section consisted of the viaduct between the northerly end of the Sixteenth Street Bridge over the American River and the City of North Sacramento. Construction of this structure was begun in June 1941 before the entry of this Nation into the war and it was completed in 1944 with tempo-

. . . Continued on page 23

Mother Lode Job

New Highway Through City
Of Jackson Is Completed

By M. C. FOSGATE, District Construction Engineer

A NEW HIGHWAY, as well as a new routing, has just been completed in the City of Jackson, county seat of Amador County and one of the larger towns of the Mother Lode. This is also the location of the junction of the Mother Lode Highway and the Carson Pass Highway. A part of each of these routes is in this project, and each played an important part in the early history of California.

The new routing through the city by-passes the main street, which was very narrow and also was a considerable hazard to traffic. However, it will not interfere with those wishing to enter the business district, as the new routing is at no place more than a short

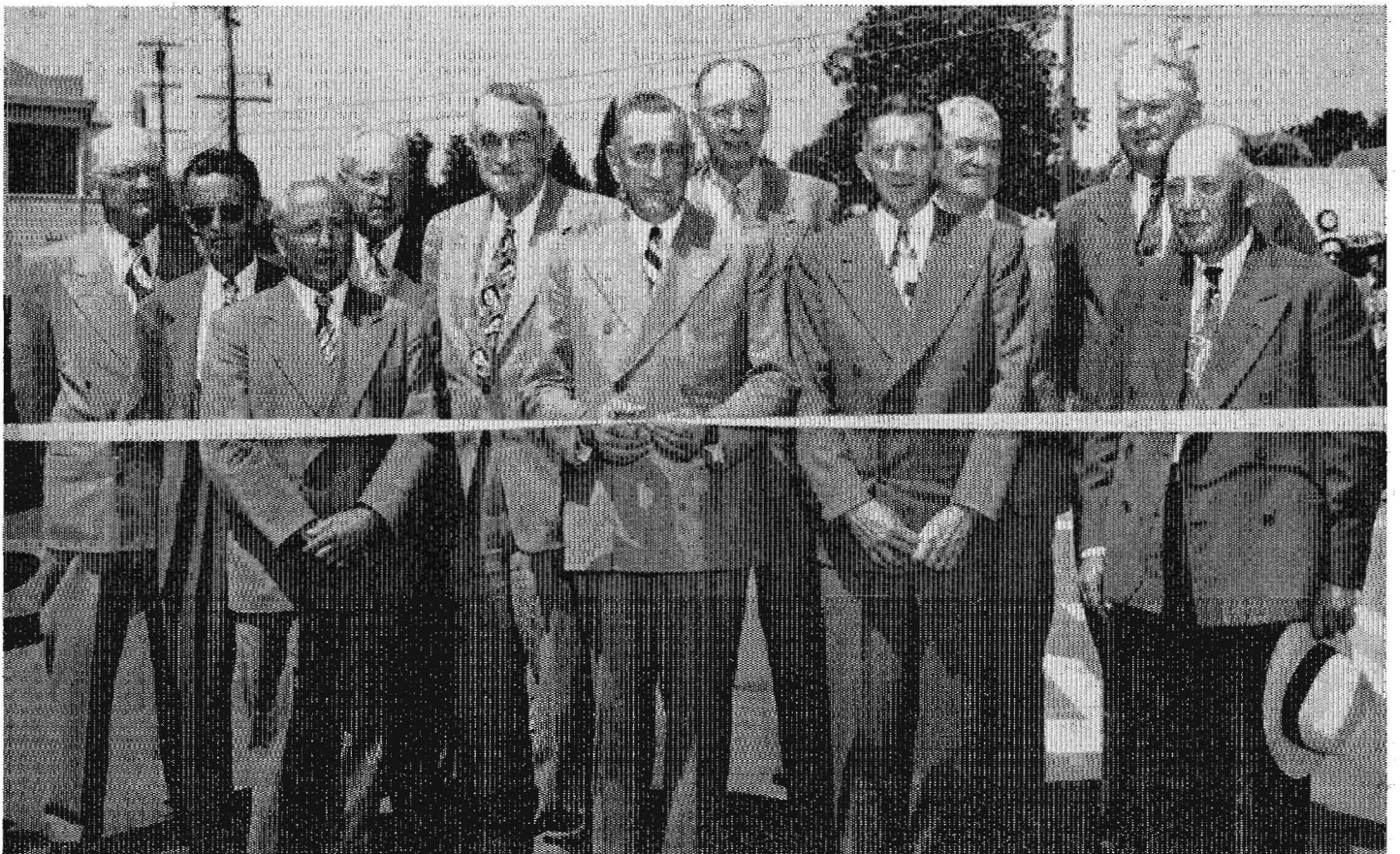


State Highway Commissioner Homer P. Brown addresses celebrants at Jackson

block from the center of town and the intersection leading into the main business district is well-marked and easily discernible to the traveling public.

Citizens of Jackson made the opening of the new highway on August 7th the occasion for a civic celebration. The Jackson City Council headed by Mayor Edward T. Wise was host at luncheon to a group of state, county and municipal officials and business and civic leaders who had been active in promoting the project. District Attorney Gard Chisholm was master of ceremonies at the luncheon, following which ribbon cutting ceremonies were held at the plaza.

Ribbon cutting ceremony for new Jackson highway. Left to right: Supervisor Earl J. Garbarini, former Mayor Wallace Jones, Louis A. Spinetti, all of Jackson; E. C. Bovey, Assistant District Engineer, Stockton; George T. McCoy, State Highway Engineer; Highway Commissioner Homer P. Brown; Charles E. Waite, District Engineer, Stockton; Mayor Edward T. Wise, Alex Ross, of Jackson; Charles Fredrickson, Contractor; Edward Craun, Resident Engineer, Division of Highways





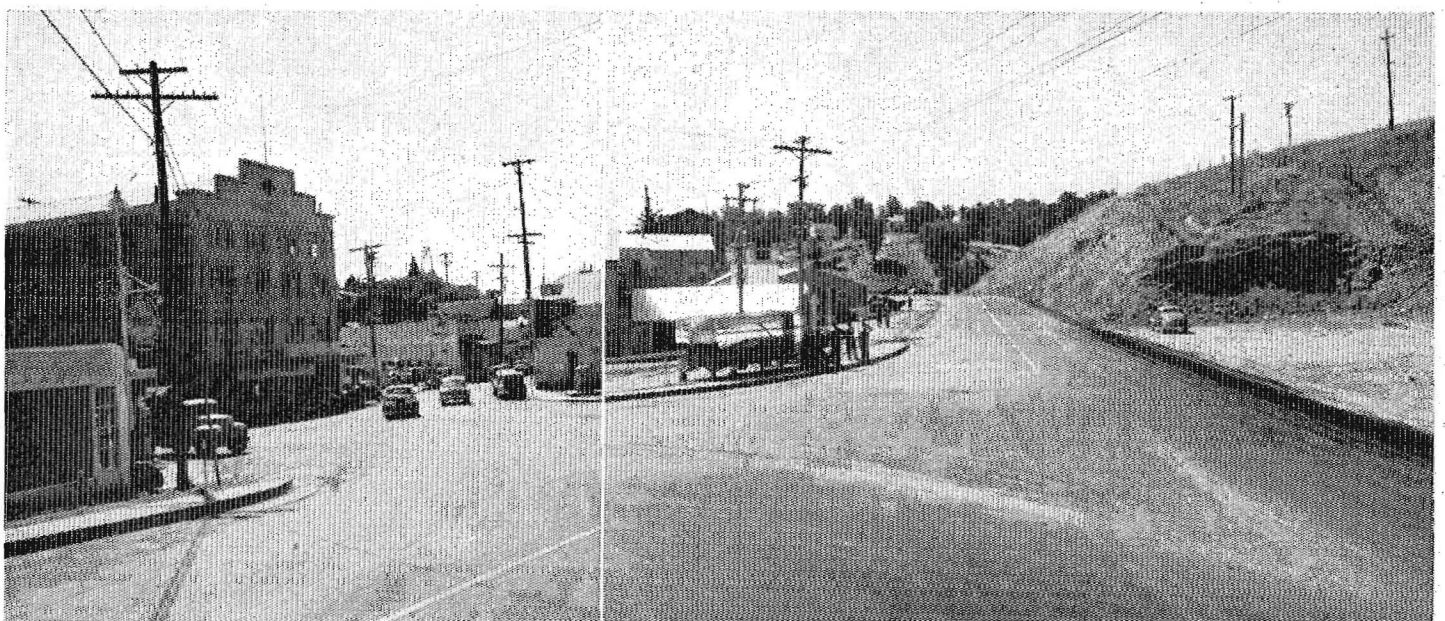
This congested route through Jackson was the only one available until new highway was built

Among the speakers were Mayor Wise, Highway Commissioner Homer T. Brown of Placerville, who said that the Jackson improvement was only a part of Governor Earl Warren's state highway development program; State Highway Engineer George T. McCoy,

who highly praised the cooperation of the people of Jackson in making the new highway possible; Alex Ross, member of the Highway Committee of the State Chamber of Commerce; Charles E. Waite, District Highway Engineer, Stockton, who described the

engineering features of the project; Clem Fredrickson of Fredrickson Bros., who handled the contract for the job; Dan Ramazotti, Chairman of Highway 88 Association; Ed Craun, resident engineer for the Division of Highways; Charles Sipes, California State Chamber

This photograph shows the existing entrance into Jackson on the left and the new alignment on the right



of Commerce; L. A. Spinetti, representing the business interests of Jackson; C. J. Temby, Assistant District Highway Engineer, and District Attorney Chisholm.

Following the cutting of a white ribbon stretched across the highway by Commissioner Brown, visiting officials and guests motored over the new highway, which then was thrown open to traffic.

The City of Jackson has a very picturesque foothill setting, with a wealth of early California historical background and an excursion into the city proper is well worth the time spent to passing tourists. Some of the old original buildings remain in present day use and the visitor will meet with a friendliness which is common in all the Mother Lode towns.

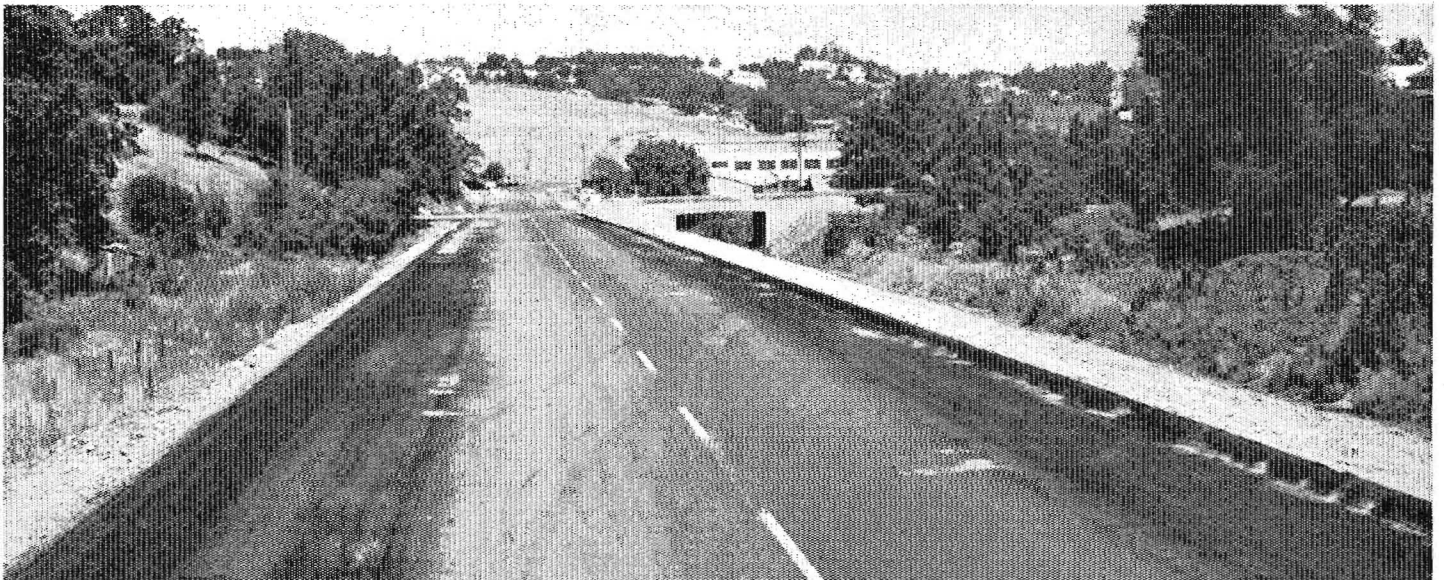


State Highway Engineer George T. McCoy at microphone at Jackson celebration

sitating the use of a number of curves. At the junction of the Carson Pass

pounds per square inch or more, an expansion of 1 percent or less, with a plasticity index of six or less. On top of this imported borrow was placed six inches of untreated rock base, covered with three inches of plant-mixed surfacing. The shoulders were penetration treated and dikes were placed, as required. The section on the north end called for a 36-foot width of pavement which continued to the bridge at the crossing of Jackson Creek. From there on, the pavement was 22 feet in width, with eight-foot shoulders.

One of the major items of extra work on this project was the relocation of sewers. The project from its crossing of Jackson Creek traversed the South Fork of Jackson Creek for a considerable distance, necessitating a channel change for this stream, and for this



The new bridge in the background is at the junction of the Carson Pass Highway and the Mother Lode Highway on the new alignment

This contract was a postwar project, all within the city limits of Jackson and the people of this city have long advocated this construction. Partial preliminary estimates and studies were made as early as March 15, 1941, and on January 4, 1944, the City of Jackson passed a resolution requesting the Division of Highways to give it priority.

Included in the project are three bridges which cross Jackson Creek, the Middle Fork of Jackson Creek and the South Fork of Jackson Creek. The length of the project is 2.3 miles. The alignment was controlled by topography and urban improvements, neces-

Highway and the Mother Lode Highway, a right angle connection is employed in the intersectional design. This is also the location of the bridge across the South Fork of Jackson Creek.

There were 91 parcels of right of way in this project and it was necessary to move 58 buildings, which included both business and residential properties.

The design of the new highway called for one foot of imported borrow over the existing native soils and the specification for this imported borrow called for a minimum bearing value at 0.1 inch penetration of 30 percent or more, with a cementing value of 60

distance the new improvement covered the main sewer which served this section of the city. The only place to restore the sewer was in the channel change of the stream. This necessitated the encasing of the sewer in concrete for the entire distance in order to keep it from floating during high water in the stream. This was also true for a considerable distance on the Middle Fork of Jackson Creek.

Numerous springs were encountered in construction and the springs were of such volume that it was necessary where they appeared to lower the

... Continued on page 33

On Angeles Crest

Work on Recreational Highway Is Resumed

By JOHN RITTER, Senior Highway Engineer

THROUGH some of the most rugged country in the United States, the California Division of Highways is opening up miles of recreational mountain areas by pushing the Angeles Crest Highway from Los Angeles towards Big Pines.

On the slopes of the 8,000-foot peaks forming the northeasterly rim of Los Angeles lies an immense retreat for campers in the summer and for snow enthusiasts in the winter.

Since 1929, as construction funds were made available, 37 miles of graded and surfaced road had already been completed on the Angeles Crest Highway between La Canada and Cedar

Springs when World War II forced the shutting down of the work.

The motoring public now has the advantages of easy access to those recreational spots whose names give a breath of the great outdoors—Red Box, Switzers, Charlton Flats, Newcomb's Ranch, Chilao, Cloudburst Summit and Buckhorn Flats.

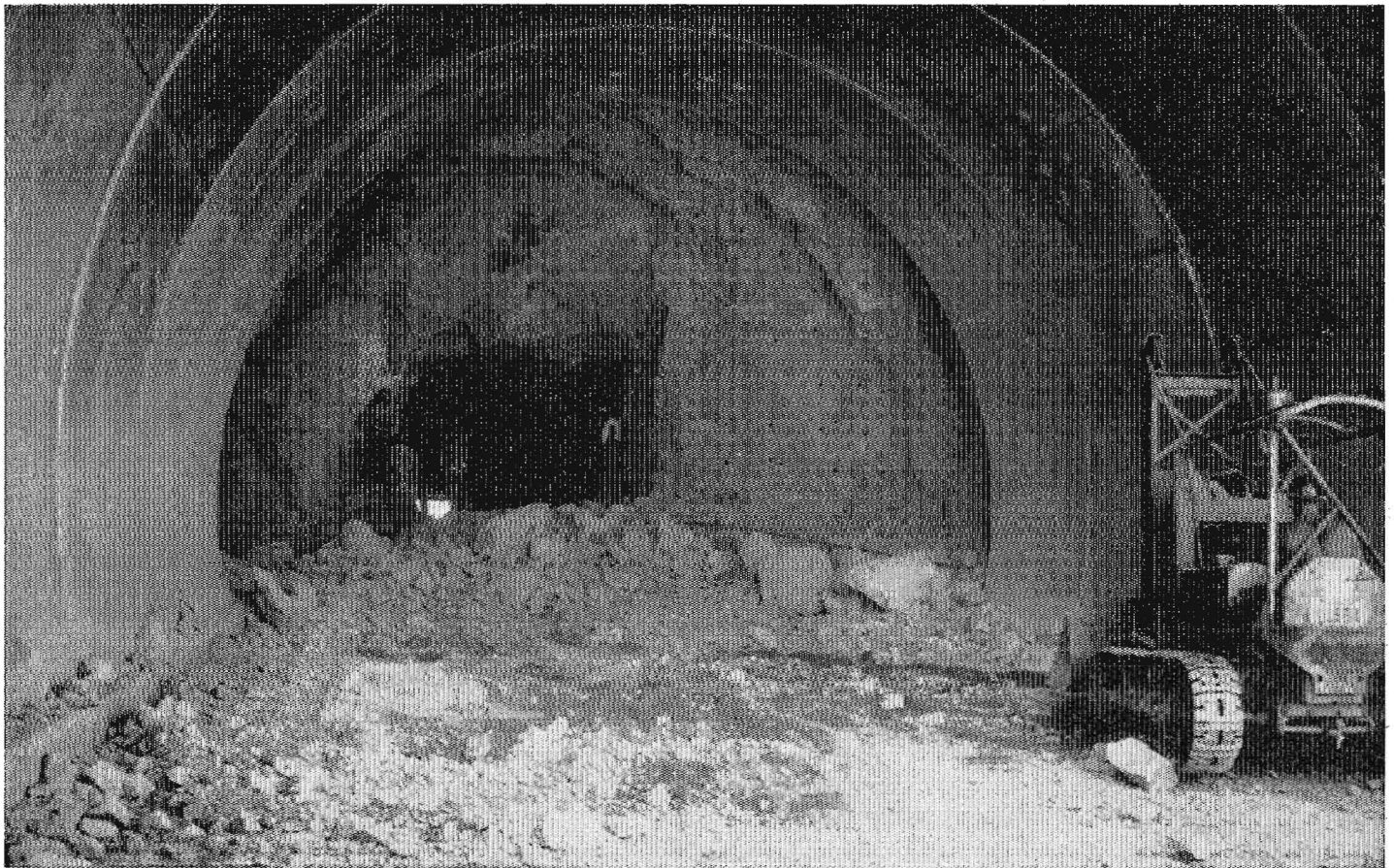
After the war shutdown, active construction work on the Angeles Crest Highway project was resumed early in June, 1946. The present work from Cedar Springs through Islip Saddle to Dawson Saddle upon completion will open up an additional eight miles of high mountain country only 60 miles from the teeming metropolitan area.

One 680-foot tunnel has been excavated and lined, and another 470-foot tunnel is being pushed through the shoulder of 8,240-foot high Mt. Williamson. This country was made on edge, so the State Division of Highways has had to develop its own concrete crib retaining wall to give embankment material a toe hold on the steep mountain sides. Nearly all excavation consists of rock which must be drilled and blasted before being used for embankment construction, masonry culverts, walls and tunnel portal facing.

Out beyond the blasting, men are felling trees and blazing the trail ahead. Rather than burn or bury the

The new Angeles Crest Highway is being pushed on towards Windy Springs through rock and scattered pines





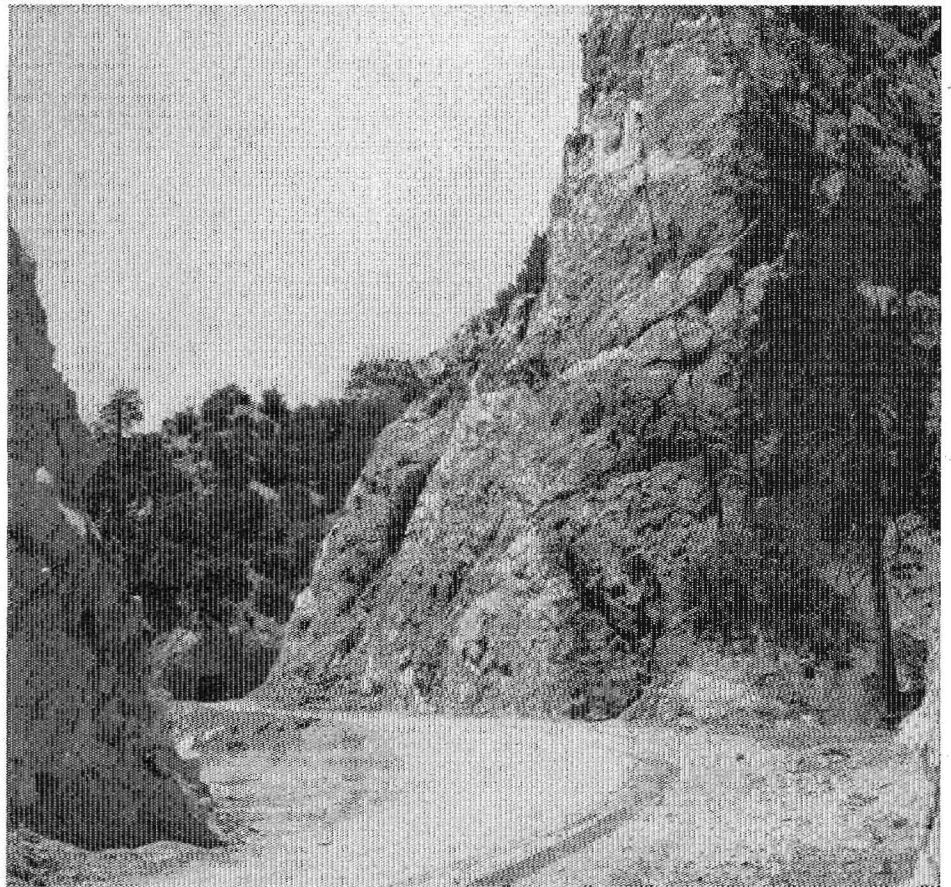
Upper—Dawson Saddle, seven miles distant holds out hope for a gateway to the Big Pines vacation area beyond. Lower—Looking back at the pilot bore for Tunnel No. 2 through shoulder of Mt. Williamson between Cedar Springs and Islip Saddle

felled timber, the Division of Highways has reconstructed a saw mill obtained from the California Institute for Men at Chino and is producing timber for local use as required for form lumber and for tunnel work at a large saving in cost.

Construction work is being done by inmates from the State Penal Institution, with civil service employees of the State Division of Highways for equipment operators and for foremen under the direction of Superintendent Harry D. Johnson. Good living conditions and a feeling of accomplishment make the assignments to this highway camp coveted by the prisoners. There are no fences, no iron bars and no firearms in evidence, but even so attempted escapes by any of the inmates have been very infrequent.

Although available funds restrict the scope and speed of construction prog-

... Continued on page 44



Waddell Bluffs

*Engineers Overcome Obstacles
on Highway to Santa Cruz*

By CHARLES G. URE, Associate Highway Engineer, and
B. J. DAVENPORT, Assistant Highway Engineer

AUGUST saw the completion of a section of State Highway that has been an enigma to a full generation of engineers and builders. As the philosophers have stated, a chain is no stronger than its weakest link. Similarly, the capacity of a highway is limited to its greatest restriction.

Waddell Bluffs, on the Coast Highway between San Francisco and Santa Cruz immediately south of the San Mateo County line, has been the major obstruction to development of Sign Route 1 in District IV since its inclusion into the State System in 1933. Before then, successive county engineers had studied these formidable cliffs without remedy of a permanent nature—probably because of the tremendous

cost involved in constructing over or past the cliffs even though the length involved was only a single mile.

Tortuous Road

As a background for this article, the Ocean Shore Highway as originally taken into the State Highway System consisted of a graded roadway of variable widths from as little as 12 or 14 feet on tortuous and circuitous alignment over most of the 75 miles between San Francisco and Santa Cruz. A succession of projects financed by State Highway and Joint Highway District No. 9 funds had gradually whittled away at the worst sections on each side of the cliffs until a practical route, and an exceedingly picturesque

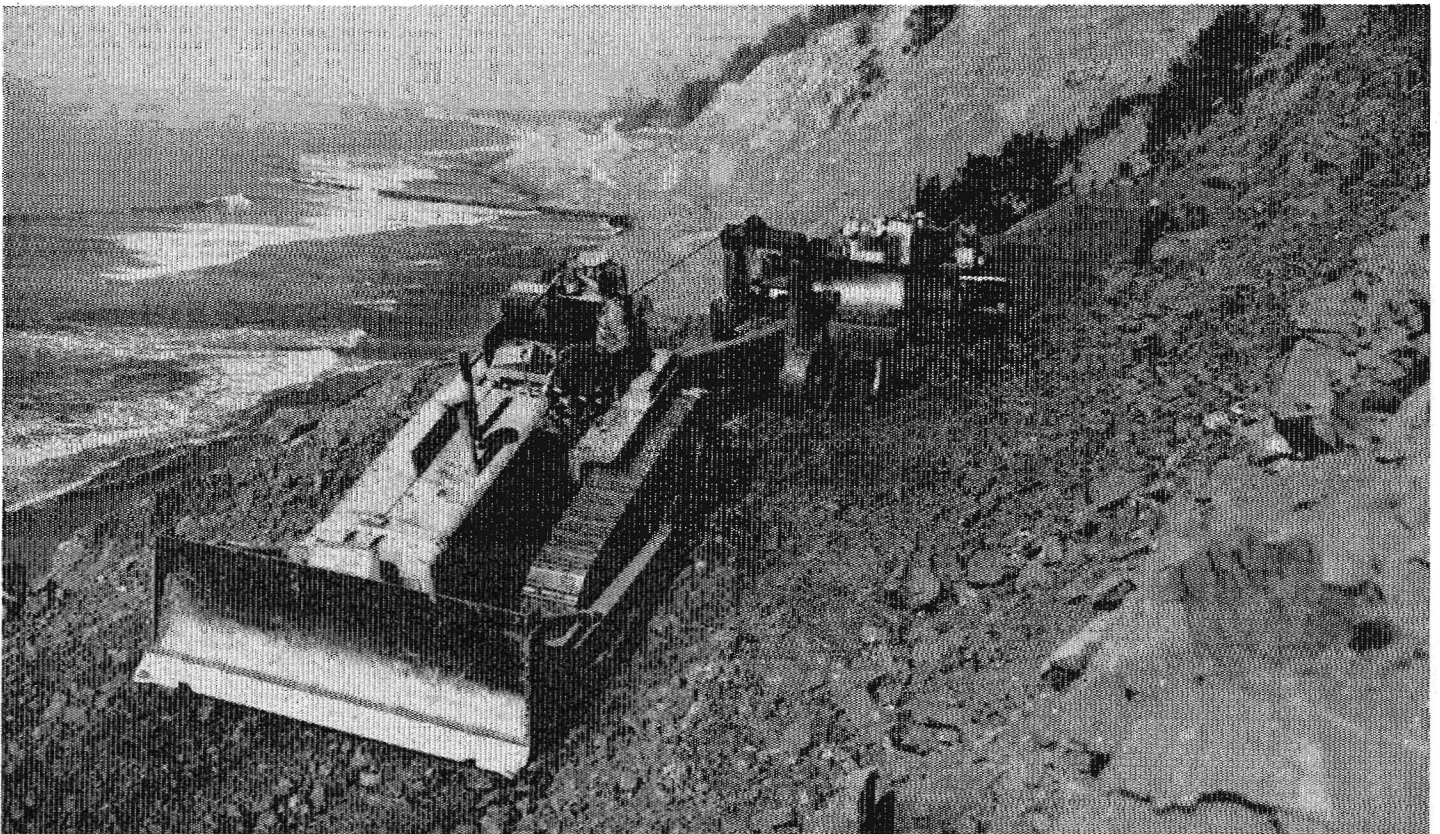
one, was developed. There still remain approximately 30 miles to reconstruct, of which the 1.4-mile section along the sea cliffs at Waddell Creek presented the most difficult problem.

This section involved a major maintenance problem due to slides and erosion which frequently closed this route to through traffic during the rainy season. With this improvement completed such closures will be eliminated for traffic using the route.

War Stopped Construction

Plans for the section had been under preparation and funds had been accumulating in Joint Highway District No. 9 for some time when war came in 1941. Although this was a strategic

Bulldozer crews on the Waddell Bluffs job did not have an easy task



highway in defense of the coast, it was, at the same time, extremely vulnerable and consequently the project was postponed for the duration. Following the war, plans were revived and the project placed under contract in June, 1947, with start of actual construction on July 1, 1947, by the San Francisco firm of Eaton and Smith.

The formation of the cliffs is typical of that found along the coast of Monterey and Santa Cruz Counties and is at the same time unique. The material is a hard, massive shale resembling a sandstone in appearance but possessed of peculiar characteristics. When exposed to the action of the air, particularly when accompanied by light rain, it decomposes rapidly through successive subdivisions of cubical shaped particles. Conversely, when completely submerged, or buried, the material retains all of its original qualities.

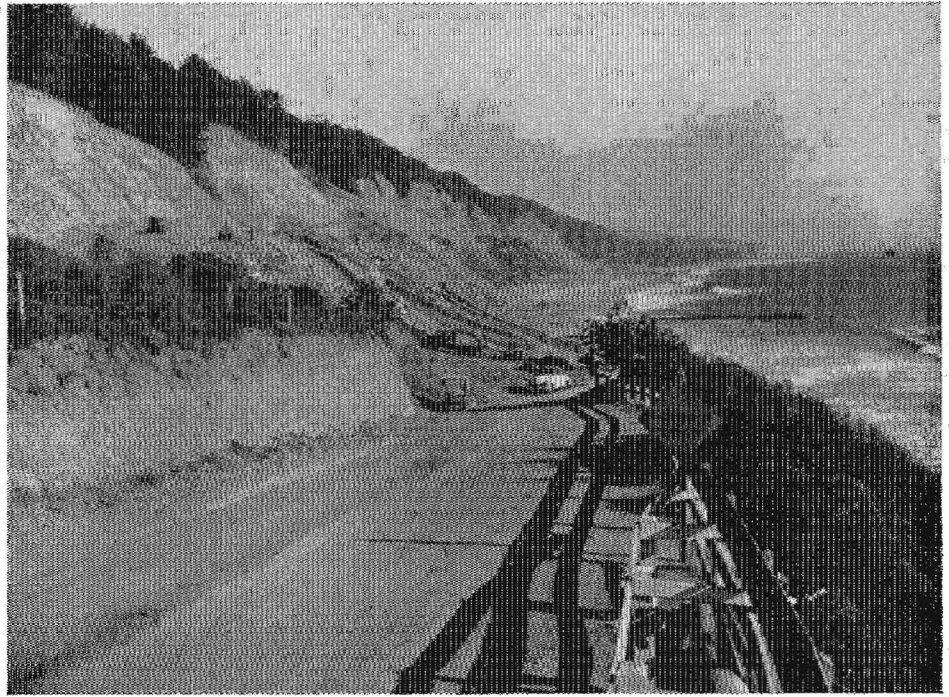
Grading Was Difficult

Grading operations were difficult by reason of the hardness of the material and were further complicated by the limited area that could be operated at any one time. Drilling and shooting were required for practically the entire one million cubic yards involved, but before drilling could be performed it was necessary for tractors and dozers to construct a pilot road along the top of the cut slope. This work was hampered by the existence of soft streaks that had deeply gullied with the result that progress was slow and laborious.

As the pilot road was developed the procedure of excavation was to drill to a depth of approximately 18 feet, load and shoot with a charge averaging about 0.6 pound of 20 percent powder per cubic yard, and then push the loosened material off the bench at the top of the slope onto the ocean beach below. With cuts as great as 215 feet in height, the spectacular aspects of the job can easily be imagined!

Operations Limited

As the cuts were reduced to within about 100 feet above grade, carry-all scrapers were employed for by this time the pushed-over material had built up such waste piles along the beach that further operations of that nature would require double handling of the material. As before stated, operations were limited in area to the bench at



This photograph shows early stages of construction on Waddell Bluffs project as seen near the northerly end. Old road is on the left

the slope line and to the sequence of drilling, shooting, and moving the material. It was found that ten D-8 Caterpillar tractors, four 14- to 28-cubic yard carry-all scrapers and three wagon drill rigs were about all the equipment that could be efficiently employed. This equipment was supplemented by a 2½-cubic yard Northwest shovel and two Euclid dumpwagons. This latter equipment was used mainly in excavation of riprap trench, culvert excavation and development of select material for the top portion of the roadway.

Handling traffic through construction created quite a problem, so specifications were written to permit the road to be closed for intervals not to exceed one hour. At hourly intervals the road along the toe of the bluffs was cleared to permit traffic to pass, after which work would be resumed.

Riprap Wall and Debris Trench

Of equal importance on the project was the construction of a riprap wall approximately 600 feet in length involving the furnishing and placing of approximately 16,000 cubic yards of heavy stone riprap. At the location of the wall the line is out in the ocean, across a cove, where ocean wave action is exceptionally severe. A source of

granite material was developed at a distance of about eight miles from the project that produced excellent material of large size. One truck load consisting of a single stone weighed in at 11 tons, and there were many as big or perhaps even larger.

The design of the project embodies several innovations, notably the debris trench along the toe of the slope and the shape of the drainage structures. The debris trench has a width of 15 feet and a depth of four feet, being separated from the roadway by a berm two feet high. The decomposition of the surface of the cut slopes produces an almost constant "rain" of material that accumulates in the debris trench but sufficient width is provided to operate a motor grader to keep the trench clear by blading or for the operation of a small power shovel. The reinforced concrete culverts are designed with a one-foot width at flowline, flared to a width of three feet and four feet at the top. This is to provide the greatest velocity with any volume of discharge. Velocity is further increased by steep flowline grades of from 10 percent to 28 percent. The culverts are of excess size to carry normal storm runoff and are designed as "sluice-boxes" for sloughed material brought



When this picture of the new Waddell Bluffs Highway was taken, paving and striping were about to begin

to them by storm runoff or by blading in the debris trench.

Only Three Curves

The roadway section consists of one foot of select material under four inches of crusher run base and with a surface of three inches by 22 feet of plant-mixed surfacing. Shoulder treatment consists of a roadmixed blend of 50 percent beach sand with 50 percent of graded select material and SC-2 oil seven feet wide on each side of the pavement.

There are only three curves in the alignment with a minimum radius of 2,000 feet and one short length of 5.50 percent grade.

A reinforced concrete bridge of four 44-foot spans had previously been constructed across Waddell Creek at the south end of this project by a separate contract under supervision of the Bridge Department at a cost of approximately \$85,000.00.

Some of the major quantities on this one mile, two-lane project were:

1,100,000 Cu.yds.	Roadway Excavation
17,650 Tons	Stone riprap
4,300 Tons	Crusher run base
3,250 Tons	Plant-mixed surface.

Estimated final cost of the entire project is approximately \$635,000.

Associate Highway Engineer Charles

G. Ure was resident engineer on the project until April 1, 1948, and since that date the work has been under the supervision of Assistant Highway Engineer B. J. Davenport. Robert Trask is superintendent on the project for the contractor.

The completion of this section should result in a considerable increase of through traffic between San Francisco and Santa Cruz, and when the remaining portion of this route is improved through traffic will have its choice of three attractive, high-speed State highways between the above points by way of the Ocean Shore, the Skyline and the Bayshore.

Terminal Island

Access Road Is Completed as
Freeway at Cost of \$10,242,000

By GEORGE LANGSNER, Senior Highway Engineer

WITH the completion of construction of the Pacific Coast Highway relocation at a cost of \$10,242,000, the Terminal Island Access Road is now fulfilling its function of furnishing a quick and convenient means of access to the United States Naval Base on Terminal Island, in the Los Angeles-Long Beach Harbor Area, from the City of Long Beach and the Wilmington section of the City of Los Angeles. The Terminal Island Access Road is designed to function as a full freeway, with separation of grades provided for at all intersecting streets and railroads.

Originally conceived in 1940 as a Federal Public Roads Administration access road project for the rapidly expanding defense facilities in the Terminal Island area, it is so located that at some later date it may be extended as a freeway from its present northerly terminus at Willow Street in Long Beach to the proposed Los Angeles River Freeway, a portion of which has been adopted as a part of State Highway Route 167, and thus ultimately provide a freeway connection to downtown Los Angeles.

Because of the large amount of critical materials required for the construction, especially steel for the many necessary bridges and viaducts, construction was delayed until the end of war. However, because of the huge investment in permanent facilities and the magnitude of operations at the Naval Base and related activities that were planned during peace times it was felt necessary by the navy to proceed with the construction of the Terminal Island Access Road Project to provide a permanent and satisfactory means of travel to and from the island.

The entire cost of the construction of the Terminal Island Freeway was borne by the United States Government, with the exception of the right of way for the Pacific Coast Highway Relocation, which, being a part of

State Route 60 (U. S. Highway 101—Alternate), was assumed by the State, through agreement between the Public Roads Administration which allotted \$4,400,000 of access road funds available from the National Defense Highway Act and the Navy Department which had specific funds in the amount of \$10,000,000 available for the construction authorized by act of Congress.

All preliminary engineering, all right of way acquisition, and part of the construction engineering for the entire project was done by the Division of Highways of the State of California, subject to approval by the Public Roads Administration. By agreement the Navy Department awarded contracts and supervised the construction of the 1.1 miles adjoining the Naval Base, including the Cerritos Channel Bridge and Viaduct approaches, with the remainder of the contracts awarded by the State Division of Highways, with the concurrence of the Public Roads Administration, the State furnishing the necessary construction engineering personnel.

Description of Route

The Terminal Island Freeway proper begins at Seaside Boulevard on the island which is the exterior boundary of the Naval Base and the backbone of the island's street system. It proceeds northerly and parallel to Henry Ford Avenue, which had the only direct and permanent connection to the mainland by means of a low level bascule bridge with provision for only two lanes for vehicular traffic for a distance of 1.1 miles, crossing Cerritos Channel by means of a high level vertical lift bridge. The location then veers to the east through the oil field and railroad yards of the Union Pacific Railroad for one mile and then curves to the north until it is parallel to the Los Angeles-San Pedro branch of the Union Pacific Railroad which it follows to an intersection with Willow Street, just within the westerly boundary of the City of Long Beach.

Just northerly of Seaside Boulevard and west of Henry Ford Avenue is Dock Street which serves the shipbuilding industry and the wharves and the docks of the Los Angeles Harbor

Looking north toward Pacific Coast Highway (US 101 Alt) grade separation over freeway, with Cloverdale connections in foreground





Terminal Island Freeway looking south toward Cerritos Channel Bridge

that adjoin Cerritos Channel. As part of the project a connection was made to off and on ramps of the Cerritos Channel Bridge approach viaduct by means of the Dock Street extension.

Off and On Ramps

Where the freeway turns east from Henry Ford Avenue, off and on ramps were constructed to provide a connection to Henry Ford Avenue for traffic to and from the Wilmington Section of the City of Los Angeles by way of Anaheim Street and to downtown Los Angeles by way of Alameda Street.

Just south of Anaheim Street and where the freeway turns to the north a ramp for Long Beach bound traffic, known as the "Off Road to Anaheim Street" was constructed to a junction with Anaheim Street, approximately 1,800 feet easterly of the actual crossing of Anaheim Street by the freeway by means of the Anaheim Street Viaduct.

On the north side of Anaheim Street near the end of the off road to Anaheim Street, a street known as I Street paral-

leling the Long Beach-San Pedro line of the Pacific Electric Railway was constructed to provide access from downtown Long Beach for traffic by way of Anaheim Street southbound to Terminal Island, southbound traffic from the freeway by means of the I Street Circle at the north end of the Anaheim Street Viaduct, and northbound traffic by means of a ramp from Hobson Avenue. Northbound traffic from Wilmington using Anaheim Street is furnished access to the freeway by means of a ramp at Hobson Avenue, east of the Anaheim Street Viaduct, while southbound traffic to Wilmington is provided for by a ramp and the improvement of Foote Avenue to Anaheim Street.

Grades Separated

At the intersection with Pacific Coast Highway, which is U. S. Highway 101-Alternate, and is a principal distribution point for Terminal Island traffic, grades were separated and the interchange of traffic is provided for by the cloverleaf design. Because of the sepa-

ration of grades between the Terminal Island Freeway and Pacific Coast Highway and existence of grade crossings of Pacific Coast Highway with tracks of the Union Pacific Railroad immediately adjacent to the freeway and those of the Los Angeles Harbor Department Freight Classification Yard, it was necessary to relocate approximately 0.7 mile of Pacific Coast Highway which was then constructed as a freeway.

The freeway ends with a connection at grade to Willow Street which was improved to its ultimate grade by the City of Long Beach to permit a grade separation with the freeway when it is extended at some future date. The City of Long Beach is now undertaking an extensive improvement of Willow Street, which will provide more convenient access to the freeway.

Design Standards

The freeway was designed and constructed with two 35-foot roadways south of Anaheim Street providing three lanes for moving traffic in each

direction. At the south approach to the Anaheim Street Viaduct was the location of the two-lane off road to Anaheim Street so, therefore, the freeway only required two northbound lanes across the Viaduct and to its northern terminus. Provision is made for three lanes southbound on the Anaheim Street Viaduct as traffic approaches the viaduct from the I Street Circle from Long Beach via Anaheim Street and from the northern terminus of the freeway by means of two-lane roadways.

Acceleration and deceleration lanes conforming to the standards of the American Association of State Highway Engineers were constructed at all ramp and interchange connections in order that traffic movements would flow easily and naturally with a minimum of conflict. Throughout the greater portion of the project a three-foot wide rolled concrete gutter with a five-foot width of hard shoulder was provided on the right edge to permit the emergency parking of disabled motor vehicles. Safety lighting consisting of sodium vapor luminaires and flashing beacons was provided at all locations where traffic diverged to separate destinations.

Despite the numerous oil wells, railroad lines and high tension power transmission lines it was possible after considerable reconnaissance investigations to adopt a location with a minimum radius of curvature of 1,350 feet and a maximum rate of grade of six percent.

The major portion of the right of way required for the Terminal Island Freeway was between Seaside Boulevard and Anaheim Street and was on property belonging to the Union Pacific Railroad Company. The Union Pacific Railroad besides the operation of main line rail facilities, and two freight yards, has several hundred producing oil wells on its property. Even though there is no access permitted from its property to the freeway, the railroad company donated the necessary freeway right of way across its lands, only receiving reimbursement for the necessary cost of rearrangement of its rail and oil facilities to accommodate the freeway construction.

The major problem in clearing the right of way other than relocation of

Union Pacific facilities were the facilities of others both on Union Pacific and other property.

Submarine Cable Relocated

The Southern California Edison Company was required to relocate its submarine cable across Cerritos Channel to clear the construction of the Cerritos Channel Bridge, raise a tower and bridge tower in the center of the I Street Circle to provide proper clearance from its 66,000 and 220,000 volt transmission lines from its Long Beach Steam Plant on Terminal Island, relocate a portion of its 10-inch cast iron water line which is an auxiliary supply for its boilers to clear the off road to Anaheim Street construction, and relocation of numerous transmission pole lines interfering with construction.

The General Petroleum Corporation relocated its production department facilities, including field offices and laboratories, encased pipelines crossing the freeway where required which included oil, "wet" gas gathering lines and natural gasoline lines.

High pressure gas transmission lines of the Pacific Lighting Corporation and of the Southern Counties Gas Company, ranging in diameter from 12 inches to 26 inches, were reconstructed and encased at the freeway crossings and, at the north end of the Anaheim Street Viaduct, it was necessary to reroute approximately 1,200 feet of 12-inch and 26-inch lines to clear the

viaduct footings and approach embankments.

Power Line Change

The Department of Water and Power of the City of Los Angeles was required to relocate power transmission lines interfering with the construction as well as to encase a water line crossing the freeway. The Bankline Oil Company, operators of the oil field on the north side of Anaheim Street, made numerous changes in its private power line and oil gathering facilities.

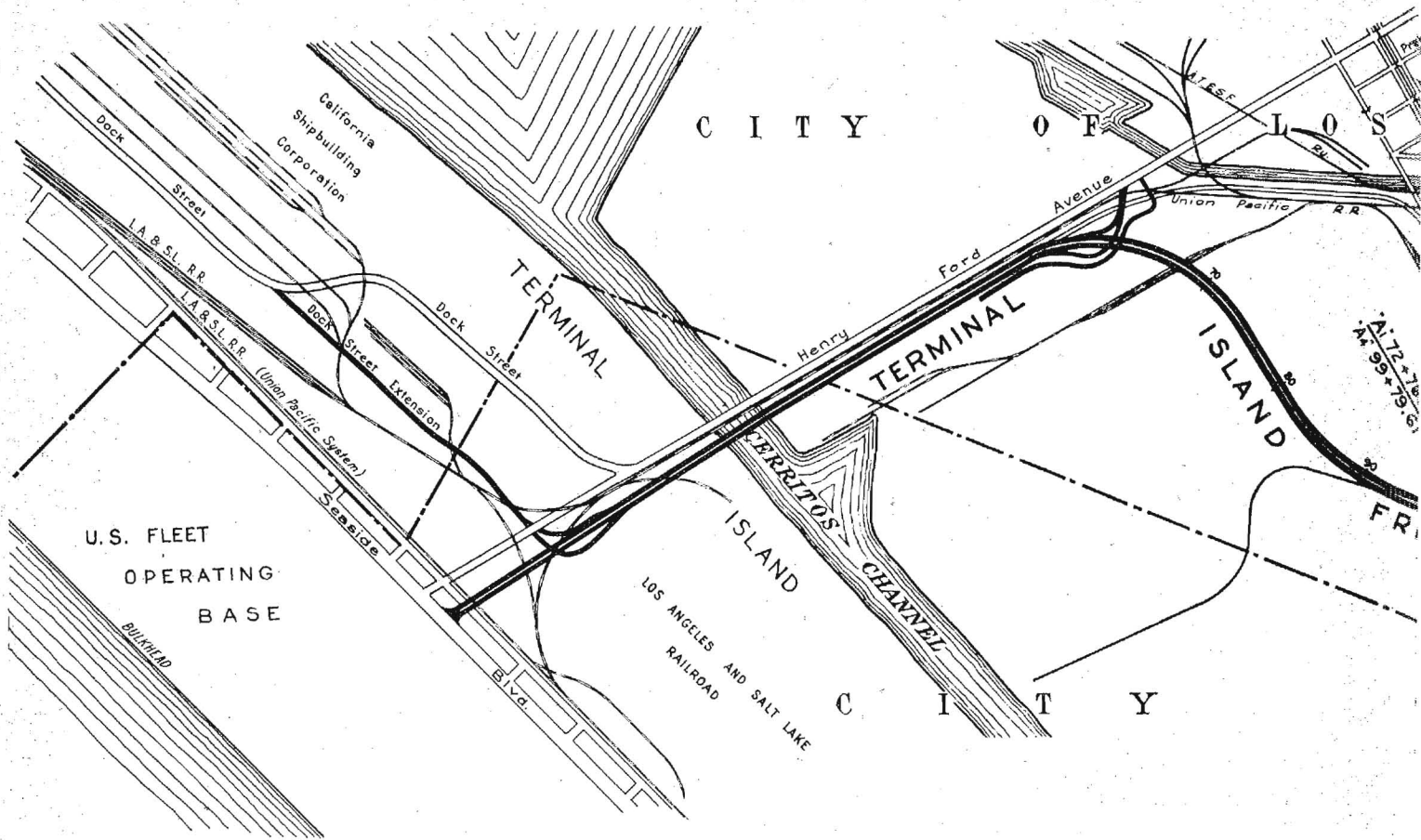
Relocation to clear construction or encasing of pipelines was also required of the facilities of the Lomita-Signal-Wilmington Associates, Wilmington Gasoline Company, Richfield Oil Corporation, Union Oil Company of California, Standard Oil Company of California, The Texas Company, Long Beach Water Department, Associated Telephone Company, and the Western Union Telegraph Company. Railroad facilities of the Long Beach line of the Southern Pacific Railroad and the San Pedro-Long Beach line of the Pacific Electric Railway were also affected.

Construction Contracts

In order to carry on construction throughout the entire project at one time the work was divided into seven contracts. Two contracts were advertised, awarded and supervised by the Bureau of Yards and Docks of the United States Navy Department, while ways of the State of California with the

Freeway looking northeasterly toward Anaheim Street Viaduct over Union Pacific, Southern Pacific, and Pacific Electric Railroad tracks, and Anaheim and I Streets. Off ramp to Anaheim Street in Long Beach is roadway to right





approval of the Public Roads Administration.

The work under Navy supervision was the contract for the Cerritos Channel vertical lift bridge and viaduct approaches and a separate contract for the construction of the freeway approaches to the end of the viaduct, including the Dock Street extension and ramps.

The State supervised the construction of the freeway between Henry Ford Avenue and Willow Street under one contract, which also included the ramps for traffic on and off the freeway to Henry Ford Avenue, a portion of the off road to Anaheim Street, the I Street Circle with its connections by way of I Street, Hobson Avenue, and Foote Avenue to Anaheim Street and numerous roads outside the freeway proper required to serve the oil fields. A separate contract was awarded for the extension of the off road to Anaheim Street and including the construction of the Nicholson Avenue Overhead Crossing of the tracks of the

Union Pacific and Southern Pacific Railroads.

Union Pacific Overhead

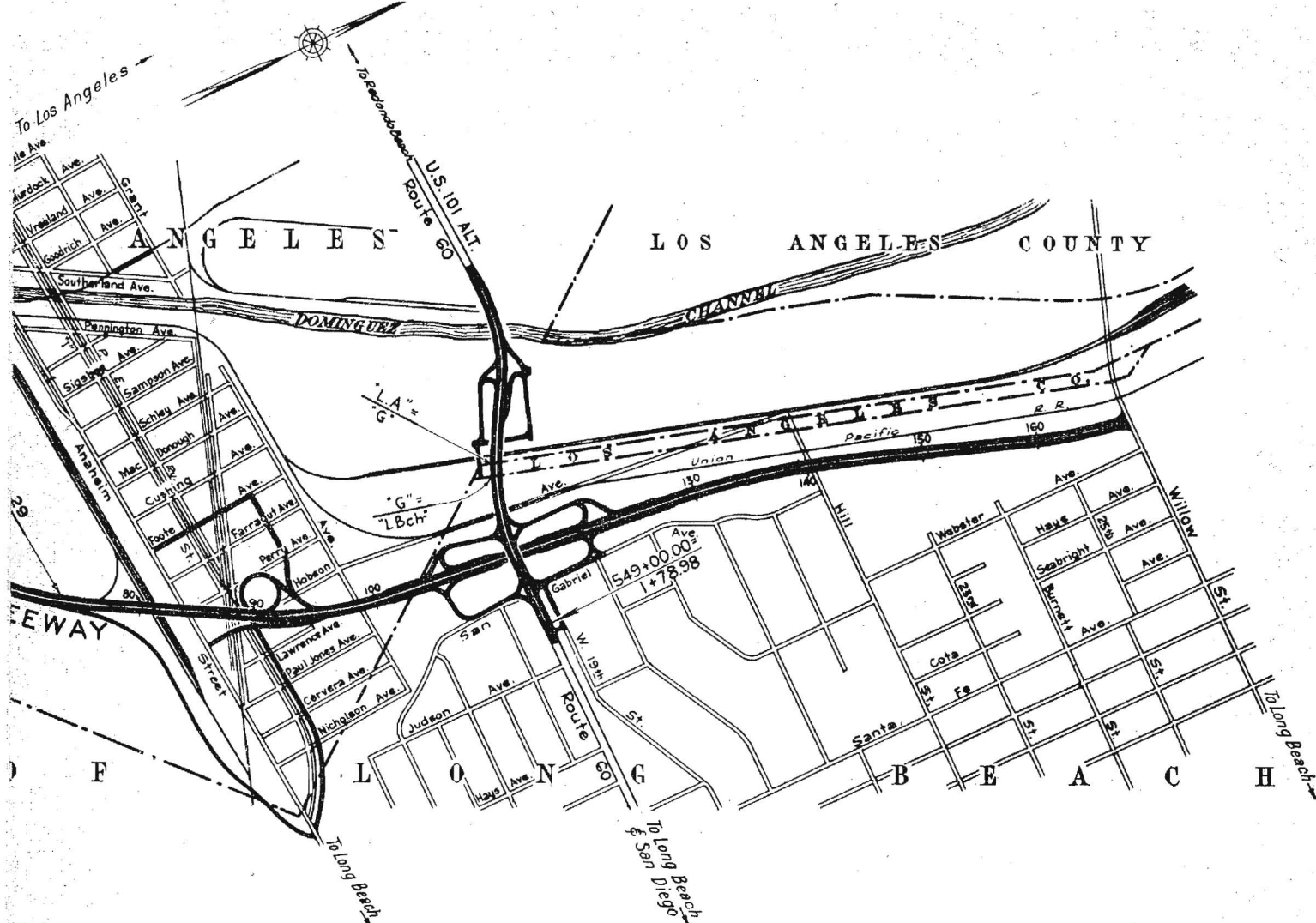
The construction of the Union Pacific Overhead which provided for the separation with the Cerritos Yard of the Union Pacific Railroad and the off and on ramps to Henry Ford Avenue and cross traffic within the oil field was a separate contract. The contract for the Anaheim Street Viaduct provided for the grade separation with an oil field road, the Meade Yard of the Union Pacific Railroad, Anaheim Street, the Long Beach Line of the Southern Pacific Railroad, the San Pedro-Long Beach Line of the Pacific Electric Railway, and with I Street.

The contract for the relocation of Pacific Coast Highway provided for the construction of the interchange roadways with the Terminal Island Freeway as well as the necessary structures for the separation of grades with the Terminal Island Freeway, the San Pedro Line of the Union Pacific Railroad at Hobson Avenue, the Classifica-

tion Yard Tracks of the Los Angeles Harbor Department, and a new bridge across Dominguez Channel, as well as the interchange roadways to the Classification Yard and Warehouses of the Los Angeles Harbor Department. (For further details of bridge construction the reader is referred to the November-December, 1947, issue of "California Highways and Public Works.")

Construction Details

Because of the height of roadway embankments required on poor foundation over marshy land together with the proximity of producing oil wells and high power transmission line towers as well as the necessity for early stabilization of fills to permit placing of pavement and prevent lateral displacement, it was necessary to construct vertical sand drains, ranging in depth from 35 to 50 feet below the original ground surface, a total of 241,400 lineal feet of sand drains being placed. (For further details as to the construction of sand drains the reader is referred to the July-August, 1946,



issue of "California Highways and Public Works.")

All embankments were constructed of imported borrow secured from the bed of the Los Angeles River or from commercial pits. Because of the unstable nature of the existing ground all embankments were placed at the controlled rate of one foot per day with not in excess of three feet a week in order to secure proper consolidation without the development of lateral displacement.

The special provisions for the contracts provided that placing of embankments could be stopped for a maximum of 20 days if found necessary. Surcharge embankments were constructed at the ends of structures and allowed to remain for varying periods to achieve a maximum settlement prior to the placing of pavement in order to reduce any future settlement of the pavement with relation to the bridge deck. Surcharge embankments were also placed over the trunk line

sanitary sewers of the City of Los Angeles to achieve a maximum settlement based on a calculated load from traffic. After allowing the surcharges to remain until the settlement was stabilized, the sewers were exposed, necessary repairs and adjustments to grade and concrete encasement made and then the pipeline was backfilled.

Drainage Facilities

Extensive storm drainage facilities were constructed to serve the freeway. Catch basins were placed to adequately drain the roadways, cross culverts were installed, and an extensive drainage system placed on I Street across Anaheim Street and thence to an existing slough. The pipe sizes ranged from 18 inches to 48 inches in diameter. Parallel to the Pacific Coast Highway a storm drain ranging in diameter from 54 inches to 66 inches was placed for a distance of 2,000 feet to furnish an outlet for existing earth channels and a 51-inch storm drain which were in-

terfered with by embankment construction.

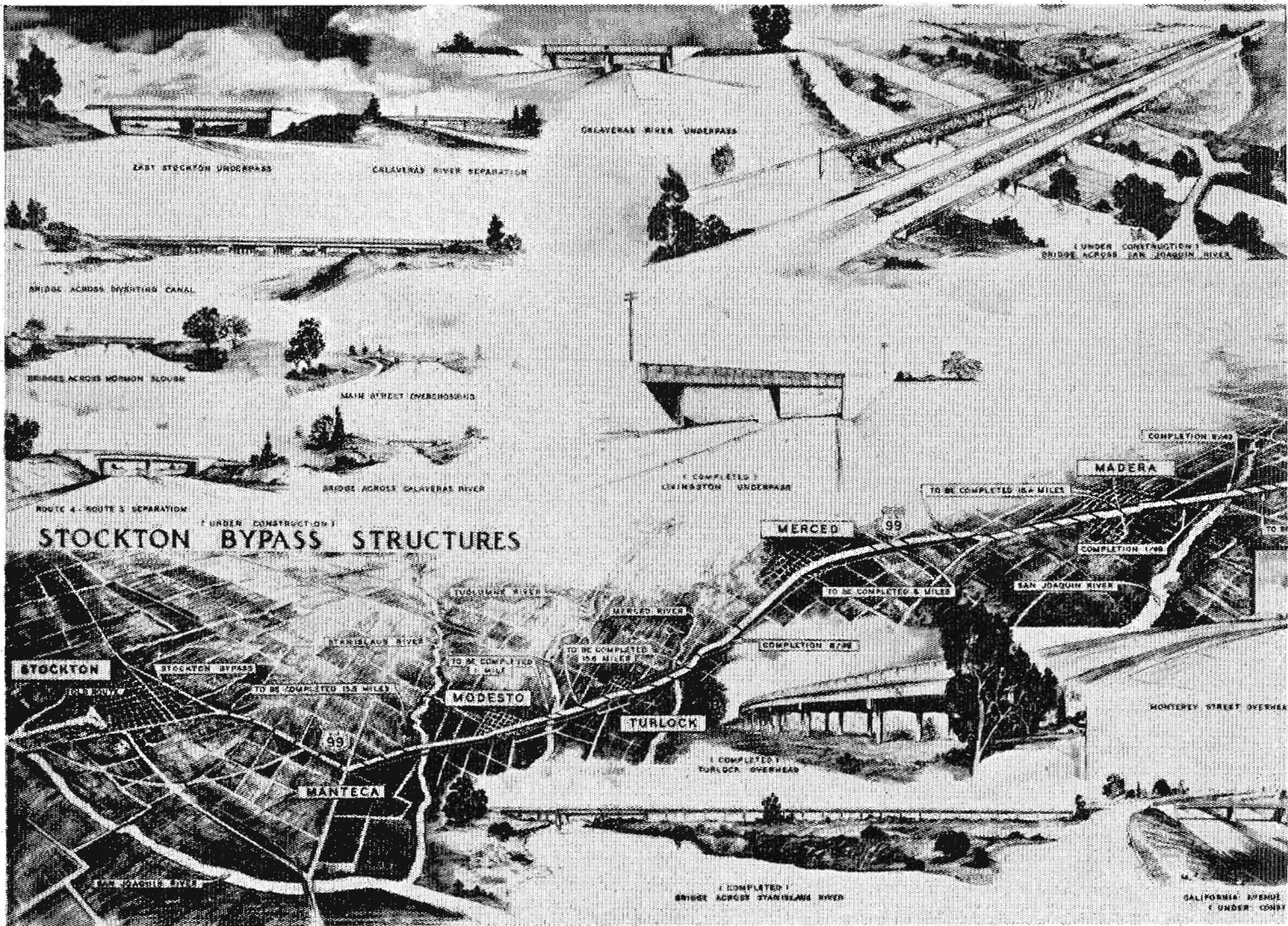
In order to accommodate pipe crossings of oil lines numerous concrete pipe conduits were placed. At three locations six-foot by six-foot reinforced concrete box conduits were constructed to provide crossings for oil, water, "wet" gas, natural gasoline and waste water disposal lines within the Union Pacific Oil Field.

Pavement Construction

Prior to the placing of pavement, six inches of imported subgrade material was placed across the full width of embankments and between the backs of curbs in cut sections. The areas back of the rolled gutters for a width of five feet were backfilled with the imported subgrade material to furnish a hard standing area for emergency parking.

All pavements constructed on the project were of asphalt concrete, using 85 to 100 penetration asphalt cement.

... Continued on page 30



This sketch by Van Der Goes of the bridge department of the Division of Highways shows

Major Construction Projects in State Highway

Continued from page 1...

Of the \$69,703,000 set up for construction in the new budget, \$32,419,000 will be expended in the northern group of counties and \$37,284,000 in

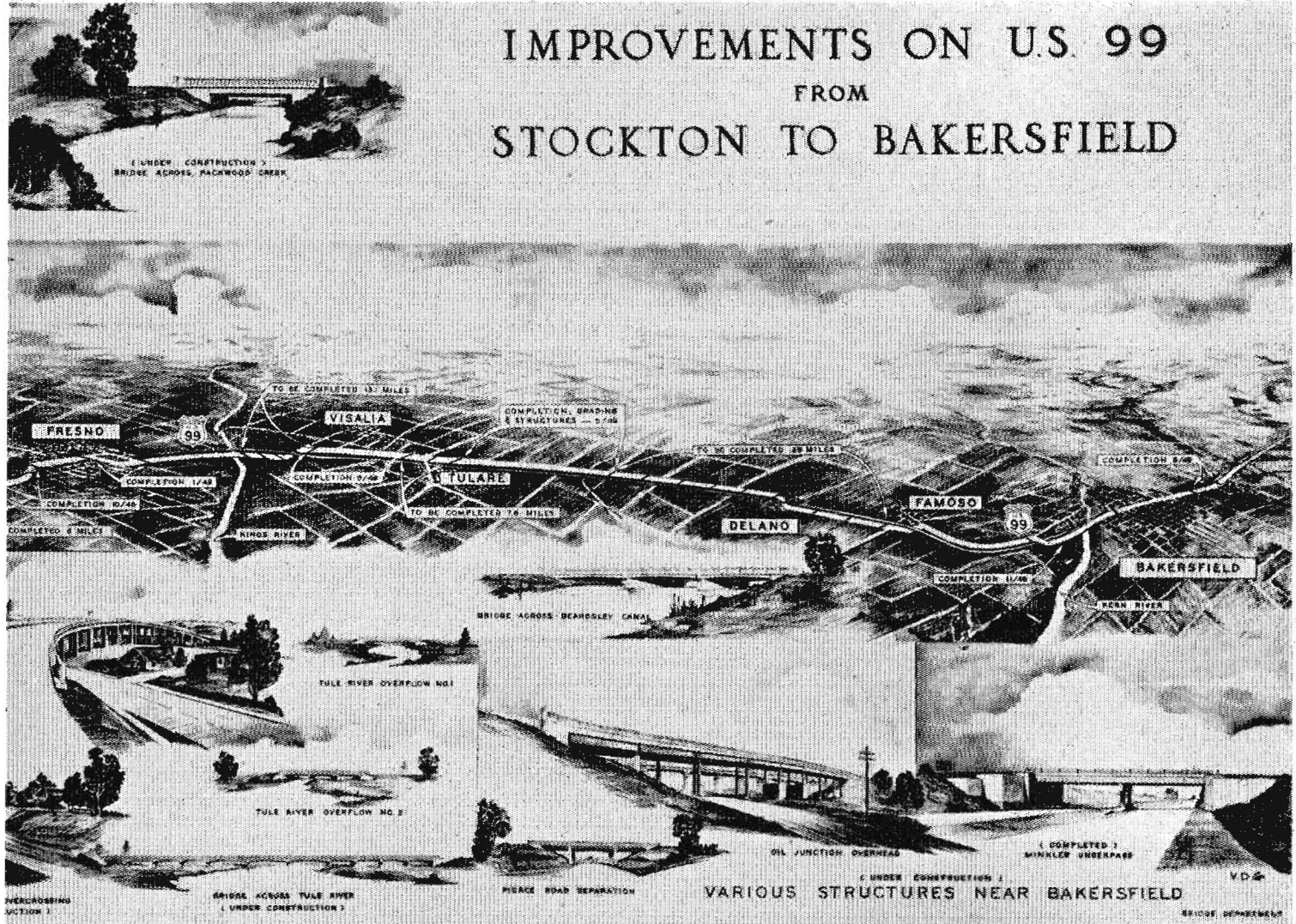
the southern county group. Under the law 55 percent of state highway funds must be distributed among the southern counties while 45 percent goes to the northern group.

With major freeway construction under way in Los Angeles, San Francisco, and Alameda Counties, these political subdivisions are allocated a total of \$31,421,000, divided as follows—

County	Route	Description	Approximate mileage	Estimated cost, including engineering
Alameda	5 (US 50)	Greenville to 1 1/2 miles west of Livermore, grade and pave	5.6	\$1,434,000
Alameda	5 (US 50)	Castra Valley Junction to San Leandro (portions), surface and median curb	3.5	336,000
Alameda	5 (US 50)	Redwood and Dublin Cattlepasses, structures		28,000
Alameda	5, 105 (US 50) (SR 9)	South City Limits to West City Limits of Hayward (portions), reconstruct and surface	1.9	188,000
Alameda	69 (US 40)	Cerrito Creek, culvert		33,000
Alameda	69 (SR 17)	Alvarado to San Leandro (portions), surface and shoulders	5.6	236,000

SR = State Sign Route.

IMPROVEMENTS ON U.S. 99 FROM STOCKTON TO BAKERSFIELD



projects completed, underway and planned on U. S. 99 from Stockton to Bakersfield

Budget for 1949-50 Fiscal Year Total \$69,703,000

Los Angeles, \$20,611,000; San Francisco, \$5,010,000; Alameda, \$5,800,000.

Three of the less populous counties of the State reaped benefits from the Collier-Burns Act. Mono County gets

\$117,000; Alpine, \$280,000 and Modoc County \$1,098,000, the latter for work on interstate connections.

The projects approved for the 1949-50 Fiscal Year and the amounts allo-

ated for construction, including construction engineering sufficient for completion of the projects in their entirety during the next and subsequent fiscal years, are as follows:

County	Route	Description	Approximate mileage	Estimated cost, including engineering
Alameda	69 (SR 17)	South City Limits of Oakland to 38th Street (portions), grade, pave, and structures	3.8	3,153,000
Alameda	107 (SR 21)	Rosewarnes Undercrossing Line Change, grade and surface		56,000
Alameda	227	Mountain Blvd., Rte. 75 to Rte. 5 (portions), grade, pave & structures		336,000
Alameda	Various	Rights of Way on State highway routes		715,000
Alpine	34 (SR 88)	Westerly Boundary to Picketts Junction (portions), grade and surface	5.0	280,000
Amador	Various	Rights of Way on State highway routes		5,000
Butte	3 (US 99)	Sutter County Line to Oroville Wye, widen structures		70,000

SR = State Sign Route.

County	Route	Description	Approximate mileage	Estimated cost, including engineering
Butte	21 (SR 24)	East City Limits of Oroville to Feather River Bridge (portions), base reinforcing and surface	4 1	89,000
Butte	87 (SR 24)	Clear Creek, bridge		28,000
Butte	Various	Rights of Way on State highway routes		1,000
Calaveras	Various	Rights of Way on State highway routes		31,000
Colusa	7 (US 99)	4 miles south of Williams to Glenn County Line (portions), surface and shoulders		44,000
Colusa	Various	Rights of Way on State highway routes		125,000
Contra Costa	75 (SR 24)	3½ miles east of Broadway Tunnel to Rte. 107 in Walnut Creek (portions), widen & surface	6 5	353,000
Contra Costa	75 (SR 4)	Brentwood Junction to Byron Road (portions), surface and shoulders	1 4	77,000
Contra Costa	75 (SR 24)	Port Chicago Road to Pittsburg (portions), grade and structures	4 7	862,000
Contra Costa	106 (SR 4)	Martinez Road to Willow Pass (portions), surface and shoulders	3 7	169,000
Del Norte	1 (US 101)	Richardson Creek to Klamath (portions), surface	2 0	112,000
Del Norte	1 (US 101)	10.6 miles to 6.3 miles South of Crescent City (portions), surface	4 3	207,000
Del Norte	81	Bear Creek, grade, surface and culvert	0 3	39,000
Del Norte	Various	Rights of Way on State highway routes		5,000
El Dorado	11 (US 50)	Placerville to Mays Junction (portions), parking areas		13,000
El Dorado	93	Georgetown to Cool (portions), grade and surface		56,000
El Dorado	Various	Rights of Way for State highway routes		75,000
Fresno	4 (US 99)	Monterey Overcrossing, landscaping		34,000
Fresno	41 (SR 180)	Orange Cove Road to White Deer Road (portions), grade, surface and structures	4 8	700,000
Fresno	138 (SR 33)	Warthan Creek, bridge & approaches		61,000
Fresno	Various	Rights of way on State highway routes		341,000
Glenn	7 (US 99)	Colusa County Line to Tehama County Line (portions), surface & shoulders	27 5	92,000
Glenn	47 (SR 32)	Glenn-Colusa Canal Bridge, redecking		17,000
Glenn	Various	Rights of Way on State highway routes		1,000
Humboldt	1 (US 101)	0.5 mile South of Stone Lagoon Summit to 1.0 Mile South of Orick, grade	3 8	829,000
Humboldt	1 (US 101)	7.6 Miles to 10.4 Miles North of Orick (portions), surface	2 8	140,000
Humboldt-Trinity	20 (US 299)	Willow Creek to White's Bar (portions), Prison Labor, grade and oiling		308,000
Humboldt	46 (SR 96)	Camp Creek, bridge and approaches		56,000
Humboldt	Various	Rights of Way on State highway routes		27,000
Imperial	12 (US 80)	Plaster City to El Centro (portions), surface	4 5	73,000
Imperial	187	Line change mile 5.3 to mile 6.5, grade and surface	1 2	100,000
Imperial	187, 201 (SR 111)	Holtville to Brawley, and East of Heber to East of Brawley (portions), surface and base	4 0	58,000
Imperial	187	Sandia and Alamorio Turns, grade and surface	1 3	112,000
Imperial	187 (SR 111)	Niland to Frink (portions), grade, surface, and structures		336,000
Imperial	201 (SR 111)	Rockwood Canal, bridge and approaches		8,000
Imperial	Various	Rights of Way on State highway routes		2,000
Inyo	23 (US 6)	Olancha to Bishop (portions), shoulders	21 4	81,000
Inyo	(US 395)			
Inyo	23 (US 395)	Dunmovin Hill, bridges and approaches	0 4	50,000
Inyo	76 (US 6)	Lower McNally Canal and Owens River, bridges and approaches		45,000
Inyo	127 (SR 190)	Soda Plant to 8 Miles South, grade and surface	8 0	190,000
Inyo	Various	Rights of Way on State highway routes		2,000
Kern	4 (US 99)	Fort Tejon to 1.4 Miles north of Grapevine (portions), barrier and curbs	4 8	322,000
Kern	4 (US 99)	Approximately Station 375 to Station 480, southbound lanes (portions), surface		39,000
Kern	4 (US 99)	23rd St. to North of Garces Circle, grade and surface	0 9	308,000
Kern	4 (US 99)	Snow Road to Cawelo, barriers, outer highways and access rights	7 5	111,000
Kern	4 (US 99)	Snow Road to Famoso, southbound 8.0 lanes (portions), surface	8 0	162,000
Kern	(US 466)			
Kern	23 (US 6)	North City Limits of Mojave to Station 52, grade and surface	0 8	50,000
Kern	57 (SR 178)	Chimney Creek to Walker Pass (portions), widen and surface	6 8	67,000
Kern	58 (SR 178)	Jerry Slough, bridges		33,000
Kern	140	Hill Creek, cattlepass		11,000
Kern	142	Cow Creek, bridge		17,000
Kern	145 (US 395)	County Line to Junction of Route 145 and Randsburg Road, grade and surface	5 0	56,000
Kern	212	Main Gate of Naval Ordnance Testing Station to San Bernardino County Line (portions), surface	4 1	41,000
Kern	Various	Rights of Way on State highway routes		200,000
Kings	125 (SR 41)	4.0 miles North of Kettleman City to 5th Standard Parallel (portions), grade and surface	6 3	157,000
Lake	49 (SR 53)	1.3 miles to 5.9 miles North of Putah Creek (portions), grade and surface	1 4	202,000
Lake	89 (SR 29)	Middletown to Kelseyville (portions), grade and surface		56,000
Lake	Various	Rights of Way on State highway routes		55,000
Los Angeles	2 (US 101)	Hollywood Parkway, Alameda Street to Highland (portions), grade, pave and structures	7 1	9,626,000
Los Angeles	2 (US 101)	1.7 miles West of Calabasas to 1.5 miles east of Malibu Junction, grade, pave and structures	4 4	1,120,000
Los Angeles	4 (US 99)	0.4 mile South of Castaic Creek to 0.4 mile North of Palomas Wash, grade, pave and structures	4 7	1,232,000
Los Angeles	9 (US 66)	Santa Anita Avenue to east city limits of Sierra Madre Villa, grade, pave and structures	0 9 ±	148,000
Los Angeles	9 (US 66)	Foothill Boulevard at Shamrock to Mountain Avenue at Huntington Drive, grade, pave and structures	1 1 ±	336,000
Los Angeles	23 79 (US 6)	Williams Ranch to Palmdale and Junction Route 23 to Saugus (portions), shoulders	4 1	73,000
Los Angeles	26 (US 60)	Ramona Parkway, Indiana Street to 0.2 mile East of Helen Drive, grade, pave and structures	1 7	1,496,000
Los Angeles	(US 70)			
Los Angeles	60 (US 101)	Alameda to 3200 Ft. east (portions), surface and shoulders	0 5	47,000
Los Angeles	60 (US 101)	Normandie Avenue to Route 60-D (portions), surface and shoulders	0 7	41,000
Los Angeles	60 (US 101)	Washington Blvd. to Venice Blvd. (portions), widen, sidewalks & gutters	0 4	112,000
Los Angeles	61 (SR 2)	Angeles Crest Highway (portions), prison labor, grading		474,000

SR = State Sign Route.

County	Route	Description	Approximate mileage	Estimated cost, including engineering
Los Angeles	158 (SR 7)	Sepulveda Blvd. between Playa St. and East City Limits of Culver City, grade and pave	1.0	112,000
Los Angeles	161 (SR 134)	Victory Blvd. to West City Limits of Burbank (portions), surface and shoulders	2.6	153,000
Los Angeles	165 (US 6)	Harbor Parkway-Adobe Street to Olympic (portions), grade, pave and structures		616,000
Los Angeles	167 (SR 15)	Patata to Mason St. and Tenaya to South City Limits (portions), shoulders	0.3	20,000
Los Angeles	167 (SR 15)	North City Limit of Lynwood to South City Limit (portions), shoulders	1.3	72,000
Los Angeles	168 (SR 19)	Rosemead Boulevard, Garvey Avenue to Valley Blvd., grade, pave and structures	1.4	1,159,000
Los Angeles	170 (SR 35)	Orangethorpe Avenue to Firestone Blvd. (portions), surface	3.2	96,000
Los Angeles	174 (US 101)	Firestone Blvd., Manchester Avenue to Galden Avenue (portions), surface	0.4	22,000
Los Angeles	174 (US 101)	Santa Ana Parkway-Rosecrans to Orange County Line, grade and pave	3.5	1,960,000
Los Angeles	174 (US 101)	Firestone Blvd., Lakewood Blvd. (Rte. 168) to Rosecrans Ave., grade, pave and structures	4.2 ±	806,000
Los Angeles	178 (SR 18)	San Gabriel River, bridge and approaches	0.6	375,000
Los Angeles	213	Through San Fernando with connections to Route 4 near North and South City Limits, grade, pave and structures	1.6	515,000
Los Angeles	Various	Rights of Way on State highway routes		8,635,000
Madera	4 (US 99)	Dry Creek to ½ mile north of Berenda (portions), grade and pave	3.0 ±	448,000
Marin	1 (US 101)	San Rafael to Ignacio (portions), surface and shoulders	2.4	161,000
Marin	1 (US 101)	California Park Overhead to Richardson Bay Bridge (portions), surface and shoulders	1.5	112,000
Marin	8 (SR 37)	Petaluma Creek Bridge, redecking		39,000
Marin	Various	Rights of Way on State highway routes		250,000
Mariposa				
Tuolumne	110 (SR 132)	Stanislaus County Line to Coulterville (portions), grade and surface	3.0	45,000
Mariposa	Various	Rights of Way on State highway routes		36,000
Mendocino	1 (US 101)	Sherwood Road to Sapp Creek (portions), surface	8.5	375,000
Mendocino	48 (SR 28)	Maple Creek to 1.2 miles easterly (portions), grade and surface	1.1	179,000
Mendocino	56 (SR 1)	Salmon Creek, bridge		476,000
Mendocino	Various	Rights of Way on State highway routes		106,000
Merced	4 (US 99)	Merced River to Delhi (portions), surface	1.1	11,000
Merced	32 (SR 152)	Highline Canal to Los Banos (portions), surface	2.0	63,000
Merced	Various	Rights of Way on State highway routes		110,000
Modoc	28	Toms Creek to Cedarville (portions), grade	7.6	728,000
Modoc	73 (US 395)	Route 28 to State Line (portions), Prison labor, grade	33.8	336,000
Modoc	73 (US 395)	Davis Creek to State Line, oiling	15.0	34,000
Modoc	Various	Rights of Way on State highway routes		20,000
Mono	76 (US 6)	South County Line to Nevada State Line (portions), surface	10.0	100,000
Mono	96	4.9 miles north of Rte. 23 to Nevada State Line (portions), grade and surface	8.6	17,000
Mono	Various	Rights of Way on State highway routes		40,000
Monterey	2 (US 101)	San Ardo to King City (portions), surface	4.2	257,000
Monterey	2, 117			
Monterey	(US 101)	South City Limits to Monterey St. in Salinas, grade and surface	0.9	280,000
Monterey	56 (SR 1)	White Creek, bridge, approaches, and drainage correction		112,000
Monterey	56 (SR 1)	South County Boundary to North County Boundary (portions), redecking timber bridges		185,000
Monterey				
Santa Cruz	56 (SR 1)	Watsonville Junction to Front St. in Watsonville, grade, surface, and structure	1.2	774,000
Napa	7 (US 40)	¼ mile west of Napa County Line to Cordelia Underpass, paving	4.2	347,000
Napa	8, 49 (SR 37)			
Nevada	(SR 29)	Foster Road to Union Station, grade and surface	2.8	385,000
Nevada	15 (SR 20)	Squirrel Creek Bridge, grade, surface and culvert	0.2	22,000
Nevada				
Placer	37 (US 40)	Colfax to Truckee (portions), parking areas		35,000
Nevada	38 (US 40)	In Truckee near East City Limits, grade and surface	1.0 ±	56,000
Orange	174 (US 101)	Santa Ana Parkway-Los Angeles County Line to Junction Route 2 at Miraflores (portions), grade, pave and signals	8.0 ±	2,016,000
Orange	176	Orange Creek, bridge		17,000
Orange	Various	Rights of Way on State highway routes		200,000
Placer	3 (US 99)	2 miles North of Andora Subway to Yuba County Line, widen structures		224,000
Placer	3 (US 99)	At Sheridan, Southern Pacific Railroad crossing, grade and surface	0.5	22,000
Placer	37 (US 40)	One Mile East of Auburn to one mile West of Applegate, grade and structures	6.1	1,406,000
Placer				
Nevada	37 (US 40)	Colfax to Truckee (portions), parking areas		35,000
Placer	65 (SR 49)	Auburn City Limits to Rialroad Underpass (portions), grade and surface	0.6	28,000
Plumas	21 (SR 24)	Rock Creek to Belden (portions), surface	3.7	83,000
Plumas	29 (SR 36)	Route 83 to east end of Causeway (portions), grade and surface	4.5	180,000
Riverside	26 (US 99)	1.5 miles east of Garnet to Edom (portions), surface	12.6	269,000
Riverside				
San Bernardino	26 (US 99)	2.3 miles east of Redlands to Beaumont, grade, surface, and structures	9.6	1,904,000
Riverside	(US 70)			
Riverside				
San Bernardino	43 (US 91)	Russel St., in Riverside to 0.1 mile north of San Bernardino County Line, grade and sur-		
Riverside	(US 395)			
Riverside	(SR 18)			
Riverside	64 (SR 74)	Indio to 16 miles east of Desert Center (portions), redeck and reconstruct bridges		150,000
Riverside	(SR 111)			
Riverside	64 (US 60)	Shavers Well to Desert Center (portions), surface	5.0	65,000
Riverside	(US 70)			
Riverside	64 (US 60)	4 miles west of Hopkins Well to Black Butte (portions), surface and base	2.0	62,000
Riverside	(US 70)			

SR = State Sign Route.

County	Route	Description	Approximate mileage	Estimated cost, including engineering
Riverside	64 (SR 74) 194 (SR 79)	West City Limits to Hemet to State Street and Junction Route 64 to North City Limits of Hemet (portions), surface	1.5	30,000
Riverside— San Bernardino	77 (SR 71) 192	Route 43 to Pine Avenue (portions), grade, surface, and bridge	6.4	756,000
Riverside	187	North City Limits of Palm Springs to 3.2 miles south (portions), surface	2.5	40,000
Riverside	Various	Rights of way on State highway routes		320,000
Sacramento	Various	Rights of way on State highway routes		152,500
San Bernardino— Riverside	26 (US 99) (US 70)	2.3 miles east of Redlands to Beaumont, grade, surface and structures	9.6	1,904,000
San Bernardino	31 (US 91) (US 466)	Various Timber Trestle Bridges, redecking		95,000
San Bernardino— Riverside	43 (US 91) (US 395) (SR 18)	Russel St. in Riverside to 0.1 mile north of San Bernardino County Line, grade and surface	2.5	616,000
San Bernardino	58 (US 66)	Various Timber Trestle Bridges, redecking		123,000
San Bernardino	59 (SR 138)	0.9 mile east to 3.8 miles east of Rte. 31 Junction, surface	2.9	17,000
San Bernardino	190	Erwin Lake to one mile east of Rte. 43 (portions), surface	3.0	34,000
San Bernardino— Riverside	192 77 (SR 71)	Route 43 to Pine Avenue (portions), grade, surface, and bridge	6.4	756,000
San Bernardino	192	Arrow Hwy. to 0.1 mile north of 14th Street (portions), surface east 2 lanes	1.2	17,000
San Bernardino	207	Long Point to 1.3 Mi. W. of Running Springs, grade and surface	4.0	1,456,000
San Bernardino	Various	Rights of Way on State highway routes		165,000
San Diego	2 (US 101)	16th Street in National City to Mexican Border (portions), grade, pave and structures	2.5	1,687,000
San Diego	2 (US 101)	San Marcos Creek to Carlsbad (portions), surface	2.0	56,000
San Diego	2 (US 101)	Oceanside to Las Flores (portions), surface	2.0	47,000
San Diego	12 (US 80)	Willows to Sweetwater River (portions), Prison labor, grade and structures	6.3	1,070,000
San Diego	77 (US 395)	A Street to North City Limits of San Diego (portions), illumination		168,000
San Diego	77 (US 395)	San Diego City Limits to Miramar, surface	6.5	728,000
San Diego	78 (SR 79)	Sweetwater River, bridge and approaches	0.2	80,000
San Diego	198 (SR 78) 78 (SR 79)	6 Miles West of Ramona at Mt. Woodson Road, and Santa Ysabel to 1 mile east, grade and surface	1.0	90,000
San Diego	Various	Rights of Way on State highway routes		378,000
San Francisco	2 (US 101)	10th Street to South Van Ness in San Francisco, structures	0.5	1,120,000
San Francisco	68 (US 101)	Augusta to 25th Street in San Francisco, grade, pave, and structures	1.4	3,890,000
San Francisco	Various	Rights of Way on State highway routes		3,210,000
San Joaquin	4 (US 99) 5 (US 50)	Junction of Mariposa Road to Calaveras River and Wilson Way to Route 4, paving	7.2	1,429,000
San Joaquin	4 (US 99)	Calaveras River to Lodi, reconstruct crossovers		62,000
San Joaquin— Stanislaus	4 (US 99)	Salida to Lodi (portions), landscaping	12.5	26,000
San Joaquin	41 (SR 33)	Southerly Boundary to Junction of Route 5 (portions), surface	8.4	170,000
San Joaquin	53 (SR 12)	Potato Slough Bridge, repairs		62,000
San Joaquin	53 (SR 12)	Four Miles East of Terminous, grade and surface	0.5	11,000
San Joaquin	66 (SR 120)	Brennan Road to Easterly Boundary (portions), surface	5.3	120,000
San Joaquin	75 (SR 4)	Old River to Middle River (portions), surface	4.3	134,000
San Joaquin	75 (SR 4)	El Dorado Street to French Camp Turnpike (Charter Way), grade and pave	0.25	71,000
San Joaquin	Various	Rights of Way on State highway routes		34,000
San Luis Obispo	2 (US 101)	Cuesta Siding to 1½ Miles West of Santa Margarita, grade and surface	2.0	594,000
San Luis Obispo	33 (SR 41)	Junction Route 125 to Kern County Line (portions), surface	1.7	52,000
San Luis Obispo	125 (SR 41)	Junction Route 33 to Kern County Line (portions), surface	4.0	149,000
San Luis Obispo	Various	Rights of Way on State highway routes		350,000
San Mateo	56 (SR 1)	Cypress Creek Line Change, grade, surface, and culvert	0.3	38,000
San Mateo	68 (US 101)	Vicinity of Sierra Point, grade and structure		1,008,000
San Mateo	68 (US 101)	Grand Avenue in South San Francisco to Broadway in Burlingame, landscaping		67,000
San Mateo	Various	Rights of Way on State highway routes		200,000
Santa Barbara— Ventura	2 (US 101)	0.2 mile east of Ventura County Line to 0.2 mile east of Carpintera, grade, surface, and structures	2.6	913,000
Santa Barbara	2 (US 101)	Orcutt Wye to Santa Maria, grade and surface	1.5	375,000
Santa Barbara	56 (SR 1)	Jalama Road to Route 149, grade and surface	4.5	381,000
Santa Barbara	Various	Rights of Way on State highway routes		175,000
Santa Clara	2 (US 101)	Ford Road to Morgan Hill (portions), surface and shoulders	6.4	190,000
Santa Clara	2 (US 101)	Gilroy to 0.5 mile south of Sargent Overhead, grade and structures	5.6	1,366,000
Santa Clara	42	Line Change South of Saratoga, grade and surface	0.8	95,000
Santa Cruz— Monterey	56 (SR 1)	Watsonville Junction to Front St. in Watsonville, grade, surface and structures	1.2	774,000
Santa Cruz	116 (SR 9)	San Lorenzo River Crossing, grade, surface, and culvert	0.1	26,000
Shasta	3 (US 99)	Anderson to Clear Creek and Outer Lanes in Anderson, grade, surface, and bridge	5.7	974,000
Shasta	28 (US 299)	Burney Bridges		140,000
Shasta	Various	Rights of Way on State highway routes		100,000
Sierra	25 (SR 49)	Sierra County Line to North Fork Bridge (portions), grade and surface	2.5	280,000
Siskiyou	3 (US 99)	1.1 miles south to 2.3 miles north of Black Butte Overhead, grade, surface, and structure	3.4	437,000

SR = State Sign Route.

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Beneficial Plan

*Freeway Is Profitable
To Vineyard Company*

By RAY E. O'BIER, District Right of Way Agent

IN MAY, 1946, in connection with the construction of a limited freeway on U. S. Highway 60, locally known as Mission Boulevard, between the cities of Ontario and Riverside, California, one of the many property owners affected was the Padre Vineyard Company, which owns and operates approximately 4,030 acres of vineyards in Southern California.

Access rights were acquired for the full length of the ownership affected, no openings were allowed into the highway except at intersecting streets, and a right of way fence was constructed, all of which, according to the company, have resulted in a definite benefit to its adjoining vineyard.

Right of way for the present improvement had previously been acquired from the former owner. Access rights had not been acquired at that time. Upon learning of the transfer of ownership, we immediately contacted the Padre Vineyard Company regarding the acquisition of the access rights.

The vineyard was contiguous to both sides of the highway right of way for approximately one and one-half miles, making a total acquisition of approximately three miles of access rights. Each side of the vineyard bordered upon a traversable road intersecting the proposed limited freeway. In order that the owner could properly operate the vineyard after the construction of a fence on the right of way line by the State, with no allowance made for openings between the intersecting side streets, it was necessary for the owner to remove one row of vines adjacent to the right of way line to allow cultivation turn-around space, which would also serve as a haul road during the harvesting of the grapes.

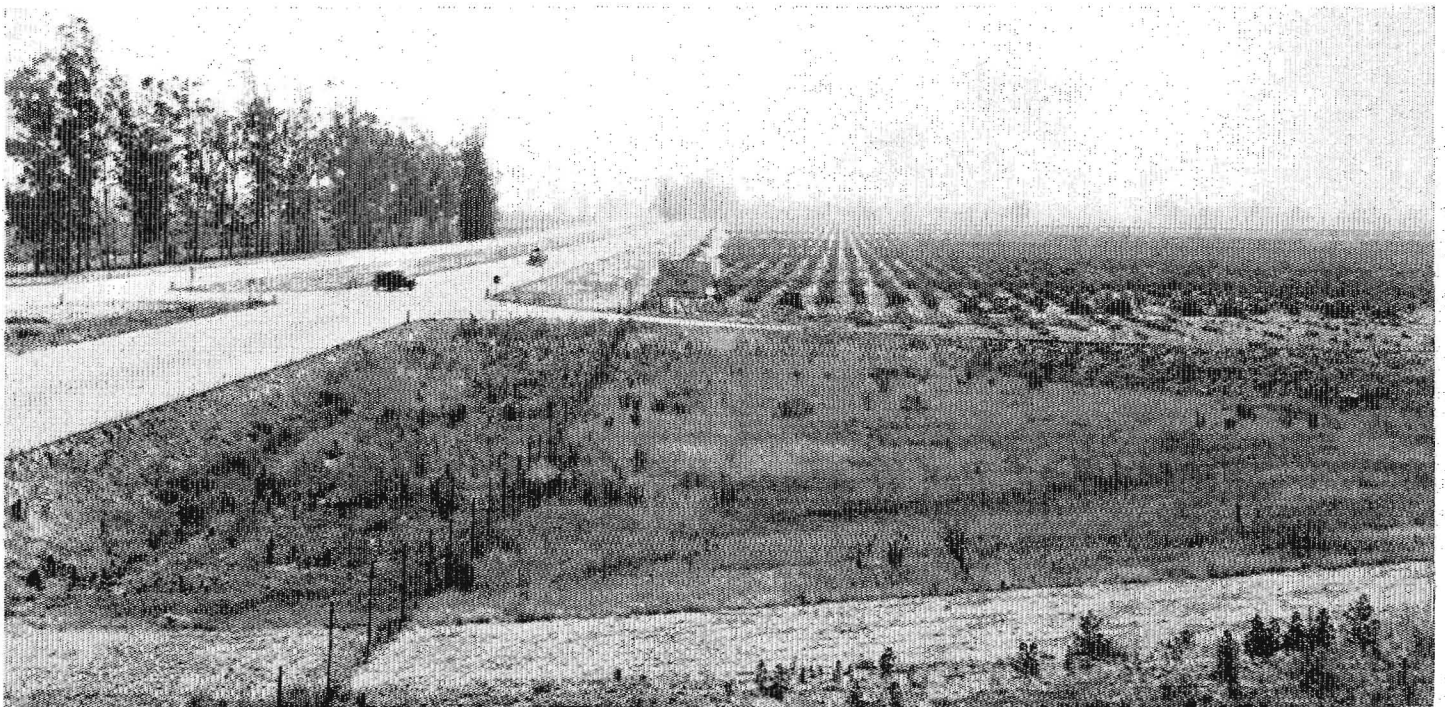
The offer made by the State and accepted by the Padre Vineyard Company was based upon the value of the land and vines included in the area proposed for cultivation turn-around adjacent to the right of way. It was the

State's contention that the remaining vineyard suffered no further damage by reason of the taking of access rights and the construction of the fence; further, that due to the fact that the operators of the company's hauling equipment would have access to the limited freeway only at existing side streets, any damage to operating equipment by collision with vehicles upon the highway would thereby be practically eliminated, resulting in lower replacement costs to the company and a decrease in insurance rates.

The company now states that its operation of the vineyard for the past two years has confirmed these facts. It has also been confirmed that a major benefit is derived by the vineyardists resulting from the construction of the fence, which has totally eliminated the pilferage of grapes, so attractive to the motorists.

We recently contacted the Padre Vineyard Company to ascertain if the

Looking westerly showing vineyard adjacent to north right of way line, right of way fence, and area used for private hauling road





Close up view of private hauling road adjacent to right of way line

taking of access rights and construction of the right of way fence had, in any way, changed its former opinion relative to damages to its remaining property.

Mr. Al Ledig, engineer for the Padre Vineyard Company, stated that after two years of operating their vineyard under the conditions outlined above, they were thoroughly convinced that the construction of the right of way fence and the elimination of all ingress and egress to the abutting limited freeway, with the exception of side streets, had been a definite benefit to their remaining property; and, should any portion of their remaining holdings be similarly affected, they would gladly cooperate with the State as in the past.

"Our vineyards," Mr. Ledig said, "abut upon approximately 14 miles of public roads, both county and state, and we would be very pleased if the entire mileage was the same type as the limited freeway, such as U. S. 60."

The company recommends that the very minimum width of land be used for turn-around space and private haul road, thereby keeping as much of the vineyard intact as possible. It is also the opinion of the company that it is unnecessary to place any type of surfacing on the private haul road as all of its hauling is done by four-wheel-drive trucks, which encounter no difficulty operating over the loose, sandy-type soil, typical of all Southern California vineyard land. According to

company officials, this type of truck was obtained from the War Assets Administration and is now being used by a majority of the larger vineyardists, materially decreasing their over-all operating cost and eliminating any necessity for a hard-surfaced private hauling road.

Many similar acquisitions have occurred in District VIII and are, no doubt, encountered all over the State. In our opinion, the above example positively proves that if the remaining properties from which access rights have been acquired can still operate for their highest and best use, namely, as vineyards or other agricultural-type lands, they are not damaged, but, on the contrary, are definitely benefited.

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MAJOR CONSTRUCTION PROJECTS

County	Route	Description	Approximate mileage	Estimated cost, including engineering
Siskiyou	3 (US 99)	Camp Lowe to Bailey Hill, surface	7.8	353,000
Siskiyou	46 (SR 96)	Clear Creek, bridge and approaches	0.5	123,000
Siskiyou	46 (SR 96)	Dillon Creek, bridge and approaches	0.4	207,000
Solano	7, 6 (US 40)	Ulatis Creek to Northerly Boundary barrier posts, guard rail, and intersection lighting	17.5	56,000
Solano-Napa	7 (US 40)	¼ Mi. West of Napa County Line to Cordelia Underpass, paving	4.2	347,000
Solano	99	Cache Slough Ferry, construct ramps		23,000
Solano	208 (SR 48)	Napa River Bridge, power plant		9,000
Sonoma	1 (US 101)	Healdsburg to Cloverdale (portions), widen and surface	5.0	224,000
Sonoma	1 (US 101)	Through Santa Rosa, landscaping		56,000
Sonoma	8 (SR 37)	Petaluma Creek to Tolay Creek (portions), grade and surface	4.0	594,000
Stanislaus	4 (US 99)	Turlock to Keyes, grade, pave and structures	4.6	666,000

SR = State Sign Route.

. . . Continued on page 40

PROGRESS

Continued from page 2 . . .

rary connections into North Sacramento. One of the first large postwar state highway construction contracts awarded after V-J day consisted of the construction of the freeway from the viaduct to one-half mile east of Ben Ali, a distance of 4.1 miles. The line of this new freeway extends in a large arc to the east of North Sacramento, completely by-passing that city. It was opened to traffic on October 6, 1947.

Construction of the freeway provided six highway grade separations and a subway under the tracks of the Southern Pacific Railroad so there is no cross traffic throughout its entire length. Built as it was just after the end of the war, construction progress was somewhat delayed because of difficulty in obtaining delivery on steel needed for the structures.

Sacramento Subway

While construction of the freeway has not entirely solved the problem of

traffic congestion entering and leaving Sacramento in the mornings and evenings, the present problem has resolved into one of lack of adequate distribution facilities crossing the American River and on the city streets on the south or Sacramento side. The construction of a new subway now in progress under the tracks of the Southern Pacific on Twelfth Street is the first step in providing such additional facilities.

On the portion of the route east of Sacramento, future development is scheduled for several units. At this time, the state highway budget for the next fiscal year, that is July 1, 1949, to June 30, 1950, has not been adopted by the California Highway Commission and it is impossible to state the order in which projects will be undertaken. However, continuation of the North Sacramento Freeway on new alignment from Ben Ali to a point east of Roseville will probably be placed in an early budget. This proposed relocation will provide a by-pass of Roseville on U. S. 40.

Surveys have been authorized by the Commission for widening the Sixteenth Street Bridge over the American River at Sacramento and for development of the U. S. 40 between the bridge and the northerly city limits of Sacramento and on streets within the city.

U. S. 40 in Truckee

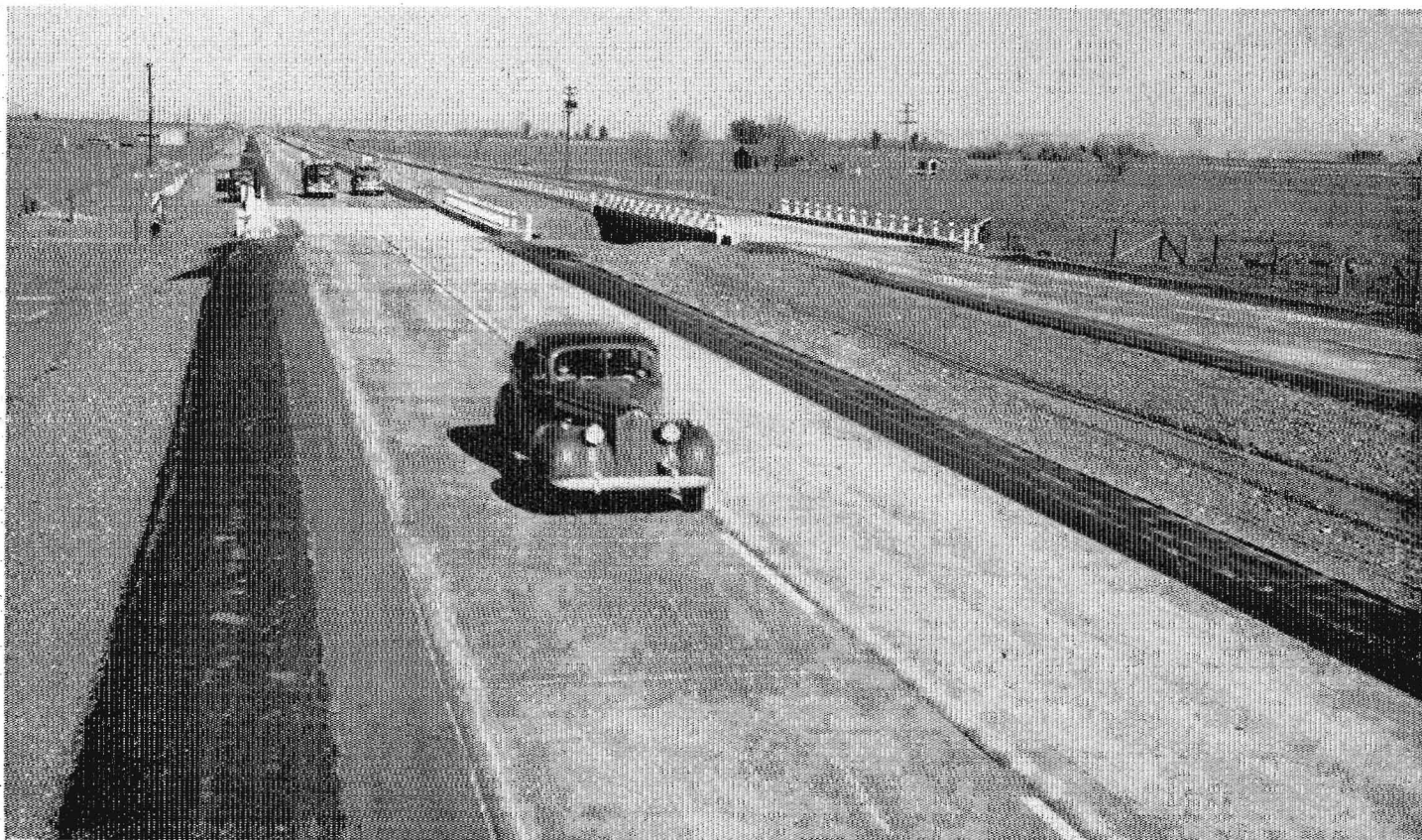
Another survey recently authorized is for improvement of U. S. 40 in Truckee. Here, again, is the situation of a town located upon an arterial highway creating a condition of congestion which must be cleared.

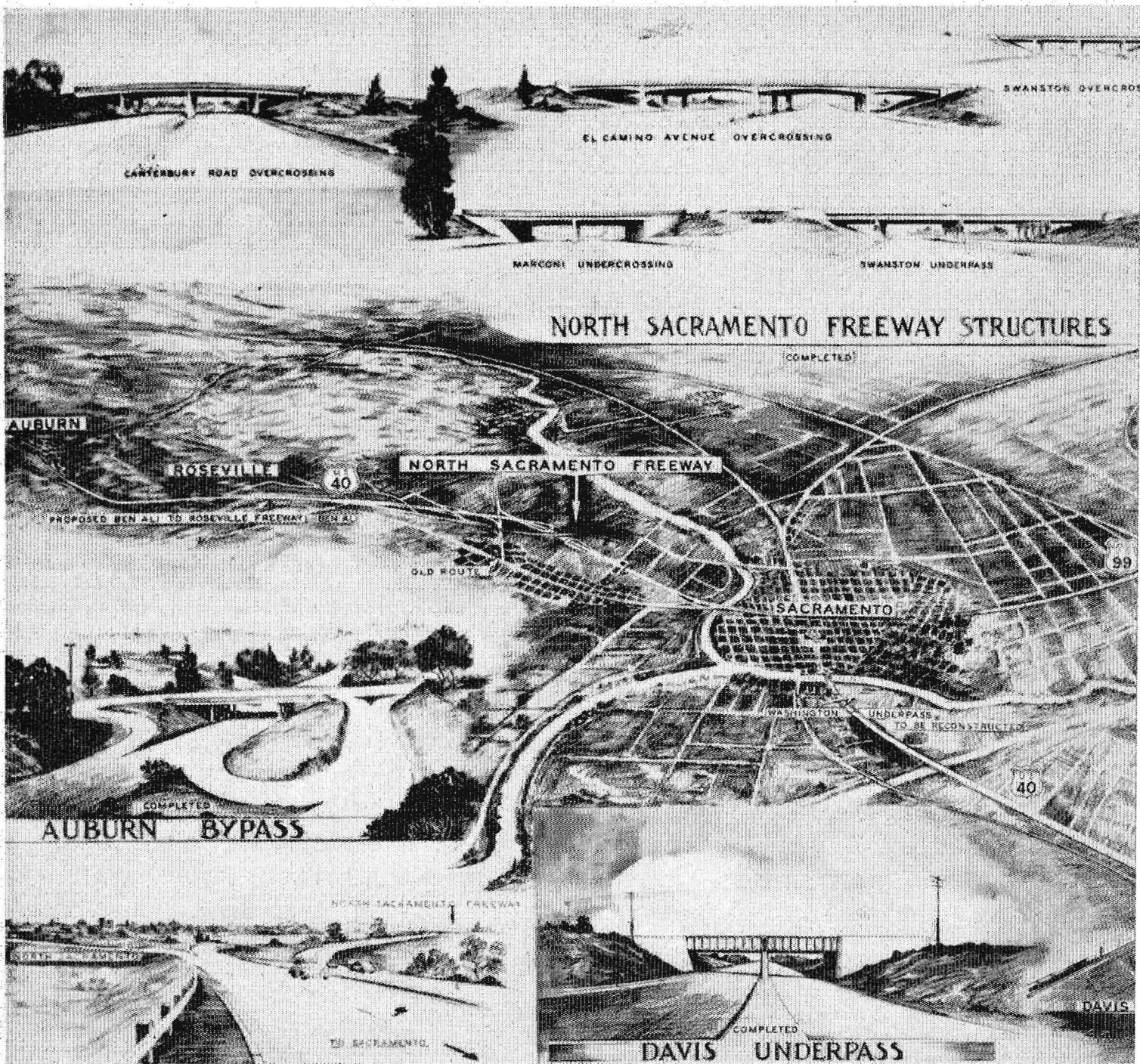
Between Sacramento and the Carquenez Straits Bridge the Division of Highways has been carrying on a most intensive development to U. S. 40.

North of Dixon

Prior to the war, work had been placed under way on converting sections of this portion of the route into four-lane divided highway between 1.3 miles north of Dixon and the Yolo Causeway in Solano and Yolo Counties. Included in this construction were

This photograph was taken north of Midway looking toward Dixon and shows bridge units which converted this section of US 40 into a four-lane divided highway





Sketch map by Van der Goes of the Bridge Department, Division of Highways, showing valley portion of U. S. 40 upon which are indicated Yuba County, including the Sacramento Freeway and freeway developments in Yolo and Solano Counties. The sketch also shows that portion of Sacramento River and Lodi both indicated. Contracts for grading and structures on the Stockton By-pass and for the widening of U. S. 40 through the divided highway at

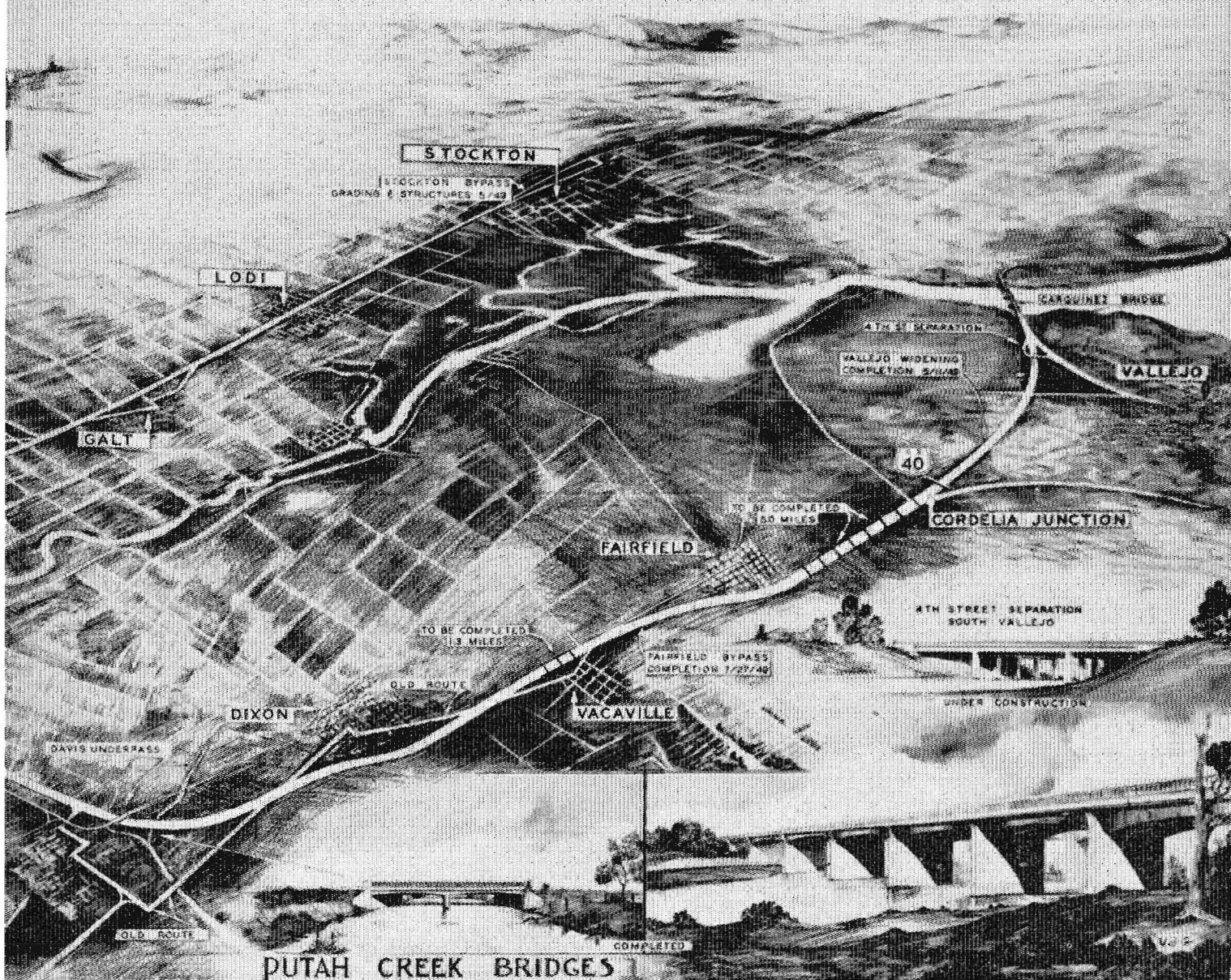
10 bridges across five crossings of Putah Creek and its branches and a subway under the tracks of the Southern Pacific Railroad.

As soon as federal limitations on highway construction were lifted at the close of the war, the program of the

freeway type of state highway development on this route was again set in motion. Contracts were awarded on December 6, 1945, and January 17, 1946, respectively, for constructing 6.0 miles of two-lane pavement parallel to but separated from the existing

highway between Ulatis Creek at Vacaville and Midway and 6.1 miles of four-lane divided pavement between Midway and 1.3 miles north of Dixon. This 12 miles of construction was completed in March 1947 and resulted in provision of continuous freeway facil-

IMPROVEMENTS ON U.S. 40 AND NORTH SACRAMENTO FREEWAY



Recently completed, projected, and going state highway improvements from Auburn, Placer County, to the Carquinez Bridge in Solano County. U. S. 99 between Sacramento and Stockton with the location of the Stockton By-pass and the adjoining freeway between the Calaveras and American Canyon Cutoff are under way with paving contracts to follow. Short remaining sections of U. S. 40 to be converted to four-lane freeways are indicated on sketch.

ities from Vacaville to the Yolo Causeway.

Vallejo Freeway

Intensive construction activities under way at the present time on additional sections of U. S. 40 in Solano County will add sufficient mileage

of modern multiple-lane highway to nearly complete the route as a freeway between Sacramento and the Bay. Four major contracts account for more than four million dollars in going improvements on a total of 19.2 miles between Vacaville and the Carquinez Bridge.

This group of contracts includes the freeway construction between the Vallejo Wye just north of the bridge and the existing four-lane pavement about one-half mile north of the junction of State Route 208 (Sears Point Cut-off). This new freeway unit is 5.6 miles in

length. Included as a major structure on this section is the Fourth Street highway grade separation in South Vallejo.

American Canyon

Another unit in the group of four going contracts is the widening of 4.6 miles of the highway through the American Canyon to four-lane divided standards. The present contract on this unit consists of grading between the easterly end of the existing four-lane pavement about one mile west of the Napa County line and the Cordelia Underpass near the junction with the Jameson Canyon Road. Paving of this section will follow the grading contract in a few months.

The third contract now in progress provides for grading and paving and the construction of bridges between Ledgewood Creek and 3.5 miles east of Fairfield. Construction on this unit is along new alignment by which the highway will completely by-pass the City of Fairfield.

The route of U. S. 40, west of Sacramento, will now by-pass Davis, Dixon, Vacaville, Fairfield and Cordelia, every town between Sacramento and Vallejo. While Vallejo is not by-passed in that the highway passes through the built-up section of South Vallejo, the route is a freeway and provides freeway facilities for traffic.

By-passing Approved

The attitude of most cities and towns toward the subject of being by-passed by heavily traveled arterials has changed drastically in the past decade or so. Time was when it was felt that the route of a main arterial passing through a town was a distinct economic asset. In those days considerable clamor was raised by delegations appearing before the Highway Commission to protest such by-passing. Today the situation is quite the reverse, business men and administrators have learned that through traffic on city or town streets is of little economic value to the community.

An interesting side light on this subject came from business men of Vacaville in connection with recent construction at the Wye on U. S. 40 north of that city when traffic was detoured through Vacaville. The business men

were strongly insistent that the State get traffic out of town—it created congestion only, not business.

The fourth contract on this improvement to U. S. 40 connects with the easterly end of the Fairfield by-pass and consists of grading and paving to freeway standards and construction of bridges on 4.3 miles between 3.5 miles east of Fairfield and 0.4 mile east of Alamo Creek.

Sections to Be Improved

As previously stated, after completion of these construction projects there will remain less than 10 miles of U. S. 40 of less than four-lanes in width between Sacramento and San Francisco. Five miles of this deficiency is located between the Cordelia Subway and Ledgewood Creek and 1.3 miles is between 0.4 mile east of Alamo Creek and Ulatis Creek. The remaining deficiency in highway lanes is located in Yolo County—one stretch east of the causeway and the other westerly of the Washington Underpass at Sacramento.

Between the Carquinez Straits Bridge and the San Francisco-Oakland Bay Bridge, the widening of U. S. 40 through the community of San Pablo in 1946 and 1947 was probably the most noteworthy improvement. While this section, between Wildcat Creek and San Pablo Creek, was only one mile in length, the widening, channelization and installation of traffic signals has been of great assistance in the prevention of congestion and in keeping the heavy traffic on the move. Similar widening and signal installation in Rodeo, between First Street and Sixth Street, a distance of 0.6 of a mile, while not as extensive as the San Pablo improvement, is proportionately effective against congestion.

Between Pinole and Rodeo

Under way at the present time is the widening of 1.5 miles on portions of the highway between the Pinole Overhead and 1.4 miles east of Rodeo. These various widening projects all add to improved facilities, particularly where the work includes provision of a central dividing strip for separating lines of travel.

On the immediate approach of U. S. 40 to the San Francisco-Oakland Bay

Bridge additional facilities are being provided for trucks at the Toll Plaza between the distribution structure and the Toll Plaza, and between the Toll Plaza and the bridge.

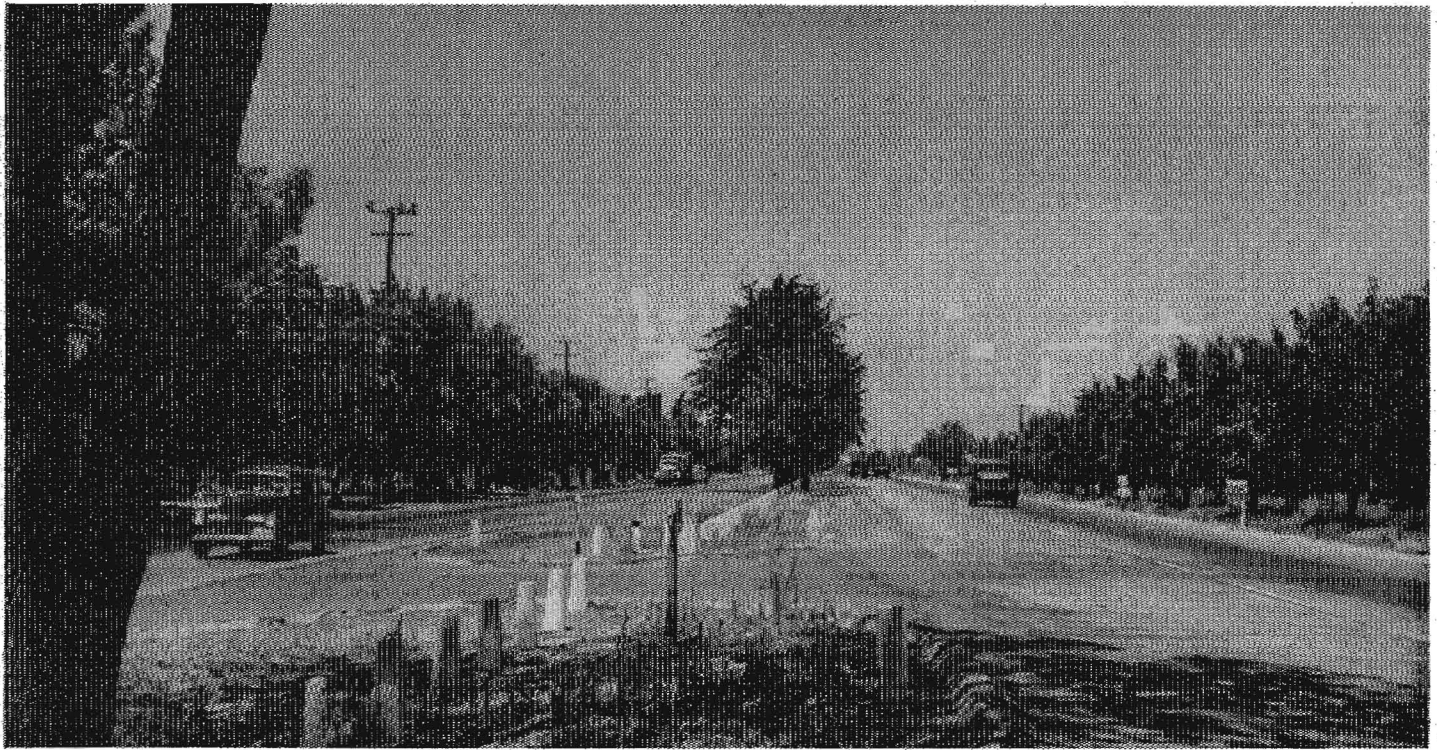
Under two contracts the sand fill, on which the bridge approach is constructed, was widened on the north side and rock slope protection placed along the outer edge of the new fill. The additional truck lanes are being constructed on the newly constructed fill from in back of the Toll Plaza building to the lower deck ramp of the bridge. The total cost of this most recent improvement on the U. S. 40 approach to the San Francisco-Oakland Bay Bridge amounted to more than \$900,000.

On U. S. 99

The accompanying artists' sketch from which are indicated the principal recent improvements to U. S. 40 also shows that section of U. S. 99 between Sacramento and Stockton. U. S. 99 is an important north and south highway which practically bisects the State from the Oregon line to the Mexican border and forms the central artery of the State Highway System. The early completion of this route to modern four-lane divided standards is one of the chief current aims of the State and recent construction between the Calaveras River and Lodi and the going work on the Stockton by-pass are both units in this development.

The by-passing of the City of Stockton by construction of U. S. 99 as a freeway easterly of the central portion of the city will greatly accelerate the movement of through traffic on U. S. 99 and at the same time relieve congestion on the city streets now carrying that through traffic.

The by-pass, on which the grading and construction of structures are now in process, extends from Mariposa Road south of Stockton a distance of 6.3 miles to the Calaveras River, where it connects with the four-lane divided section completed last February on the 8.2 miles between the Calaveras River and Lodi. Construction of this latter section cost \$1,110,000, while the grading and structure contract on the Stockton by-pass section is estimated to cost approximately \$1,700,000.



Recently completed four-lane divided highway on US 99 between Lodi and Stockton

PROGRESS

Continued from page 1 . . .

into the Los Angeles Basin via the San Fernando Valley.

From the southerly end of San Fernando Boulevard in downtown Los Angeles the route turns easterly along Ramona Freeway to Redlands where it turns southeasterly through Beaumont and the San Geronimo Pass to Indio, through the Coachella Valley and along the westerly side of the Salton Sea to El Centro, terminating at Calexico on the Mexican border.

Development of this central artery of the State Highway System, like on all main highways where traffic volumes have increased steadily, has been a continuous operation since the inception of the system. Similar to all highway construction, improvement projects on this route were deferred during the war until the close of hostilities when the Division of Highways put under way its postwar construction program.

The impetus given to development of California highways following the war with state funds accumulated during the years of 1942 to 1945 and federal funds apportioned to the State

under provisions of the Federal Aid Highway Act of 1944 has been carried forward during the past year. Under provisions of the Collier-Burns Act, passed at the 1947 Special Session of the Legislature called by Governor Warren for the purpose of providing more adequate highway revenue, it has been possible to accelerate this rate of construction progress.

88 Projects

Development of U. S. 99 has been included in this progress to the extent that since January 1, 1947, a total of 88 projects have been completed and placed under construction on this route aggregating 284 miles and totaling a sum of \$33,966,000.

That improvement to this important highway artery has not been segregated to any one portion of the State is evidenced by the following recapitulation of the above figures according to five geographical sections through which U. S. 99 passes.

	Miles	
(1) Oregon Line to Sacramento	41.9	\$6,589,000
(2) Sacramento to Merced	35.5	4,215,000
(3) Merced to Bakersfield	75.8	10,381,000
(4) Bakersfield to Los Angeles	51.6	6,607,000
(5) Los Angeles to Mexican Border	79.4	6,174,000
Totals	284.2	\$33,966,000

On the section between the Oregon line and Sacramento some of the larger projects included in the totals given are as follows:

Siskiyou County

In Siskiyou County work is nearing completion on grading construction of 7.8 miles between Camp Lowe and Bailey Hill under one contract and construction of a bridge across Cottonwood Creek and a grade separation under the tracks of the Southern Pacific Railroad at Bailey Hill is under way on another contract. This improvement is entirely on new alignment of this section of U. S. 99 southerly of the Oregon line. Another section of the route in Siskiyou County is being resurfaced over 5.5 miles from Gazelle northerly. This new surface should be completed early in November.

In Shasta County the most important improvement made recently to U. S. 99 is the reconstruction now under way on the five miles between Cottonwood and Anderson. This project is on new and more direct alignment and provides four-lane divided facilities through both towns.

Tehama County

Last November work was completed on reconstruction of the seven miles

between six miles north of Red Bluff and the Shasta County line. South of Red Bluff on U. S. 99-E in Tehama County five bridges were constructed and two bridges widened across various sloughs and creeks last year on 2.8 miles of the highway between Mill Race Creek and Red Bluff.

The largest single project completed since the war on U. S. 99-E north of Sacramento was the bridge across the Feather River between Marysville and Yuba City, together with approaches through both cities. The new structure provides a four-lane divided thoroughfare across the river and the tracks of the Southern Pacific and Western Pacific Railroads at a location about a quarter of a mile upstream from the old bridge. The routing of the highway in both Marysville and Yuba City was changed and constructed to four-lane divided standards, with the exception of the few blocks in the center of Marysville which while widened was not divided. The improvement which included landscaping, lighting and signals has eliminated from the route the bottleneck of the old bridge and narrow congested city streets approaching it.

North Sacramento Freeway

Construction of the North Sacramento Freeway which was described in the former article on improvement to U. S. 40 must also be credited as an improvement to U. S. 99-E since this latter route joins U. S. 40 at Roseville, from where they follow the same route into Sacramento.

Bids will be opened on October 13th for reconstruction of U. S. 99-E through Roseville and to a point north of the Andora subway. This project is of considerable magnitude and is included in the state highway budget for the current fiscal year in an amount of \$1,800,000. The improvement calls for complete realignment of the route through Roseville, eliminating the existing Lincoln Street grade crossing over the tracks in the yard of the Southern Pacific Railroad.

Roseville Subway

By means of grade separation structures included in the project the new highway will pass under Vernon Street, Atlantic Street and the tracks in the Southern Pacific yards at Washington Street. The route then follows the line of Washington Street westerly to Jones Street where it turns north to Holt and thence swings northwesterly on a long sweep to pass through the Andora Subway on a straight line thence back to a junction with the existing highway about two miles northerly of Roseville.

Improvement to U. S. 99 in the San Joaquin Valley section presents a visual example of the policy being followed by the California Highway Commission and the Division of Highways in the development of freeway and four-lane divided highways on a main arterial.

Traffic congestion on main arterials centers around the cities and towns through which the arterials pass and thins out on the rural sections between such centers. In scheduling highway

improvements the State is following the policy of carrying the development in each direction away from such focal points of congestion. This method relieves the locations of most serious congestion first and, as funds become available over a period of time for additional improvements, the development between any two centers will meet thus providing continuous modern standards for the entire route.

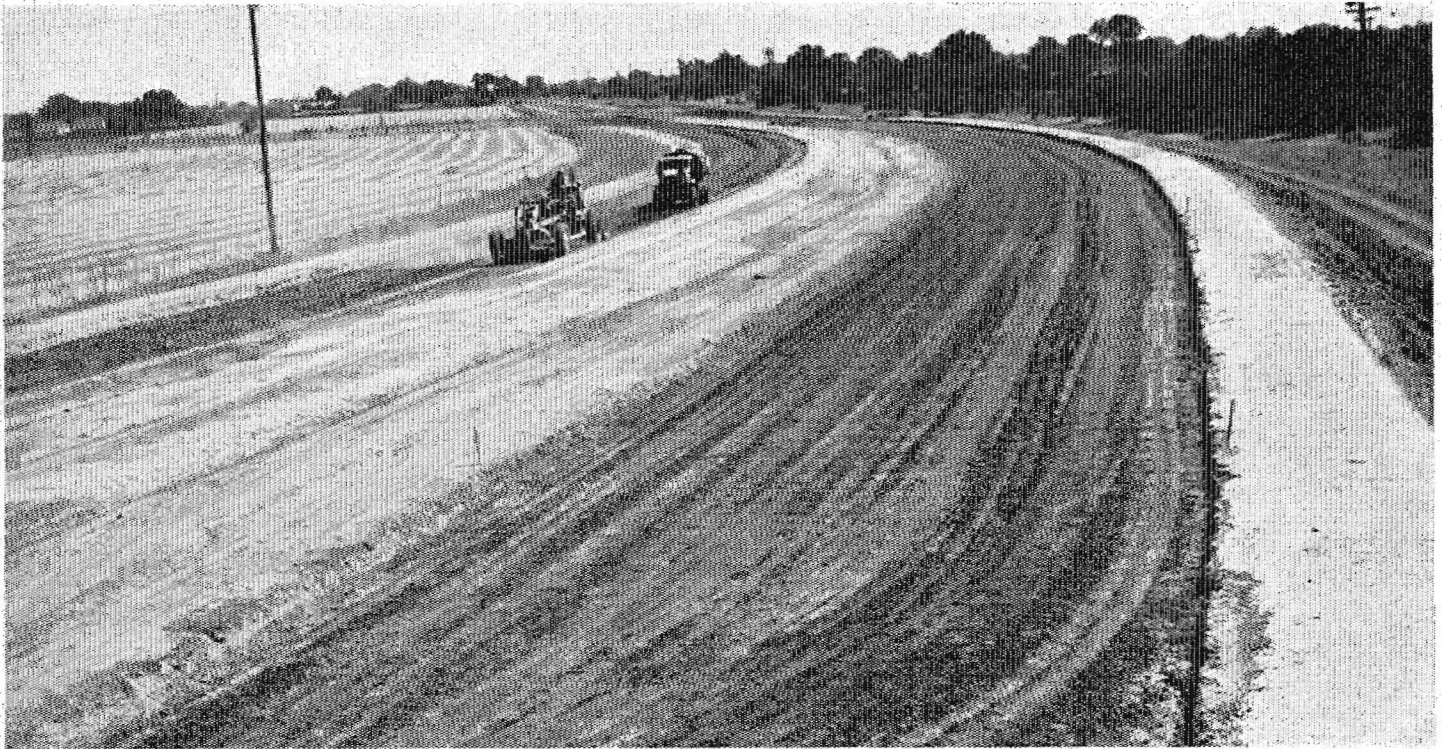
Stockton By-pass

One of the most important improvements to U. S. 99 in central California is construction of the Stockton By-pass which is now in progress. This new addition to the increasing freeway mileage on the State's arterials extends from Mariposa Road south of Stockton a distance of 6.3 miles to the Calaveras River, where it connects with the four-lane divided section completed last year on the 8.2 miles between the Calaveras River and Lodi at a cost of \$1,110,000. The going contract on the By-pass which provides for grading and structures only, will cost approximately \$1,700,000. Paving of the new freeway section will be let under a separate contract which will follow the grading operations.

South of Stockton, construction between Salida and one mile north of Ripon added 4.5 miles more of divided four-lane pavement and a new bridge across the Stanislaus River at the San Joaquin-Stanislaus County line. The road improvement was completed in August, 1947, and the bridge in May, 1948. This project connects at its south-

One of structures on Stockton By-pass now under construction





Grading for realignment of US 99, which will enable traffic to bypass Stockton and congested business section of city

erly end with the four-lane divided section north of Modesto.

Merced County

In Merced County similar improvement to four-lane divided standards was completed last November on 3.8 miles between Black Rascal Creek and Buhach Station. Another contract was awarded on September 8th for an additional 5.7 miles of divided construction between Atwater and Livingston. This contract closes the gap in this type of modern highway development from some miles south of Merced to Livingston.

Work will be completed about the first of the year on the section of U. S. 99 in Madera County between the San Joaquin River and Arcola School which adds 7.1 miles more to the four-lane divided facilities on this route. A contract for a new bridge across the San Joaquin River at the Fresno-Madera County line near Herndon was awarded on June 10th and work is progressing on this new structure. The approaches to the bridge will add an additional mile to the new section. The northerly end of the new highway at Arcola School connects with the existing four-lane divided section between the school and the City of Madera.

Fresno County

In Fresno County a series of contracts have been completed or are still in progress developing U. S. 99 to the four-lane divided standards desired for the entire route between Los Angeles and Sacramento.

In December, 1946, a contract was completed for four-laning 2.1 miles south of Fresno, between Calwa Overpass and Fresno. In February, 1948, a contract was completed carrying the development southerly over the 6.5 miles between Fowler and the Calwa Overpass to a connection with the four-lanes between Selma and Fowler.

Work is now about 60 percent complete in Fresno on the large overhead structure over the Southern Pacific tracks and on freeway construction between the south city limits of Fresno and San Benito Avenue. This freeway project, which is 1.2 miles in length, will cost over one and one-half million dollars, including the overhead structure.

Northerly of Fresno construction is being completed to four-lane standards on 1.8 miles between Belmont Circle and Clinton Avenue.

Tulare County

Another project located in both Fresno and Tulare County is just being

completed on 5.2 miles between one-half mile south of Kingsburg and Selma. This new section raises all of that portion of U. S. 99 in Fresno County between the Tulare County line and Fresno to four-lane divided standards.

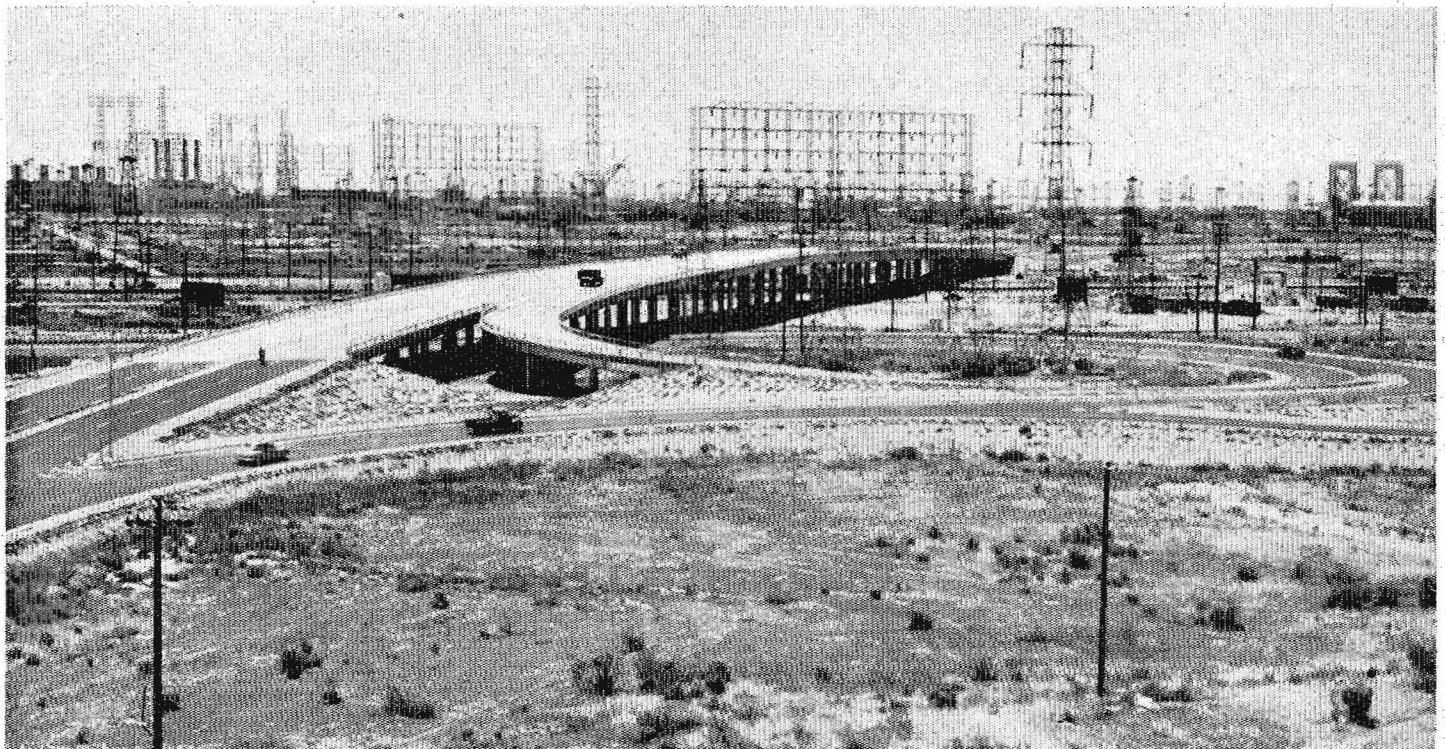
In Tulare County two major contracts are under way at the present time which will add nearly 13 miles to the four-lane divided sections on this central artery of the State Highway System. The one consists of construction of five miles between Tagus and a junction with the Hanford-Visalia lateral and the other, 7.9 miles in length, extends between one mile south of Tip-ton and the Tulare Airport.

Other recent improvements to U. S. 99 in Tulare County have included the construction of a new bridge across the White River Sink and approaches thereto about two miles south of Earlimart and the resurfacing of four miles between Delano in Kern County and 2.5 miles south of Earlimart.

Kern County

In Kern County the largest single project undertaken in recent years is the construction to freeway standards of the 3.6 miles northerly from Bak-ersfield to Snow Road. Work on this contract is nearly finished and its com-

... Continued on page 44



Looking south toward Anaheim Street Viaduct showing off and on connections to freeway

TERMINAL ISLAND

Continued from page 15 . . .

The contract for the freeway between Henry Ford Avenue and Willow Street required the use of timber side forms and the self propelled spreading and finishing machine to ride on the side forms or concrete gutters.

As there was no specified width of lanes in which the asphalt concrete pavement was placed, the contractor supplied two finishing machines with which he was able to spread asphalt pavement in the following widths: 16.5

feet, 17 feet, 20 feet, 20.5 feet, 22.5 feet, 23 feet, 23.5 feet, 24 feet and 24.5 feet by making adjustments in the screed and axle widths while using the other machine or over-night. On the other contracts, because of the large amount of variable widths due to ramps and accelerating and decelerating lanes being such a large proportion of the pavement to be placed the use of side forms was not required and self propelled spreading and finishing machines not requiring side forms were permitted.

The following is a tabulation of the approximate quantities of the major construction quantities involved:

16,120	tons structural steel
4,215	tons reinforcing steel
1,374,000	tons imported borrow
241,400	lineal feet sand drains
132,000	tons imported subgrade material
58,700	cu. yds. concrete structures
4,460	cu. yds. concrete curbs and gutters
75,200	tons asphalt concrete pavement

CONSTRUCTION CONTRACTS

Work	Contractor	Cost	Resident Engineer
Cerritos Channel Bridge and Viaduct.....	United Concrete Pipe Corp. and Raiph A. Bell.	\$5,299,000	Cmdr. J. E. Frorath, USN
Approaches—Seaside Blvd. to 1 mi. Nly.....	Fred D. Chadwick.....	336,000	Cmdr. J. E. Frorath, USN
Henry Ford Ave. to Willow St.....	Macco Corp.	1,114,000	George Langsner
Pacific Coast Highway Relocation.....	James M. Barnes Construction Co.....	1,789,000	W. D. Eaton
Union Pacific Viaduct	Macco Corp.	585,000	J. E. MacMahan, J. M. Curran
Anaheim St. Viaduct	E. W. Elliott Const. Co.....	852,000	J. M. Curran
Nicholson Ave. O'hd.	Oberg Bros.	267,000	J. M. Curran
Total.....		\$10,242,000	

Erosion Control

Racing Tracks Make Contribution
Of Straw to Highway Building

By L. M. BARNETT, Assistant District Construction Engineer

USED bedding straw in large quantities, a by-product of race track enterprises, is being used to perform an important function in the construction of the new modern, high standard mountain City Creek Road connection to the heavily populated playground areas in the San Bernardino Mountains.

Its function is to aid in the reduction of unsightly and costly erosion that would result from the extensive construction of high and unprotected embankment slopes. Inasmuch as extensive scarring of natural countryside results from the heavy grading necessary to construct mountain highways of this type, highway engineers are placing added emphasis on erosion control features. The taxpayer's benefit in dividends is in greatly reduced highway maintenance costs, freedom from fouling contiguous water courses, and immense esthetic value received.

Contractor Buys Straw

The practice of race track stables is to make a complete change of bedding straw for their aristocratic equine guests each day. During racing seasons, there is an especially large amount of straw removed, requiring continual hauling. At one track alone, 18 trucks are in continuous operation. The straw is usually removed from the premises to a central storage site where it is stockpiled and later baled.

The road contractor purchases the straw from a dealer who is under contract to remove the bedding straw from the stables. To date, approximately 150 tons of this straw have been used on the new City Creek Road project.

This straw serves a multiple purpose in helping to provide a vegetative cover designed to retard erosion. It provides a mulch, aiding the growth of seeds and plants; aids in the fertilization of the soil, conserves moisture, and catches native wind-blown seeds. It also aids materially in stabilizing the



Upper—Race track. Center—Loading straw at stables. Lower—Rolling first application of straw with truck crane and tamping roller

topsoil and in preventing erosion during the critical period of time necessary to establish a cover growth on barren embankment slopes.

Erosion Control Practices

Erosion control practice on the City Creek Road has been to use two basic methods of preventing or minimizing destructive effect of rainfall runoff. Artificial structures are used at locations where runoff is or can be concentrated and requires a permanent abrasive resistant medium. Examples of these structures are stone riprap protection of embankment slopes extending into larger streams, asphalt-lined gutters, ditches and shoulder dikes, corrugated metal pipe and part-circle concrete pipe slope drains.

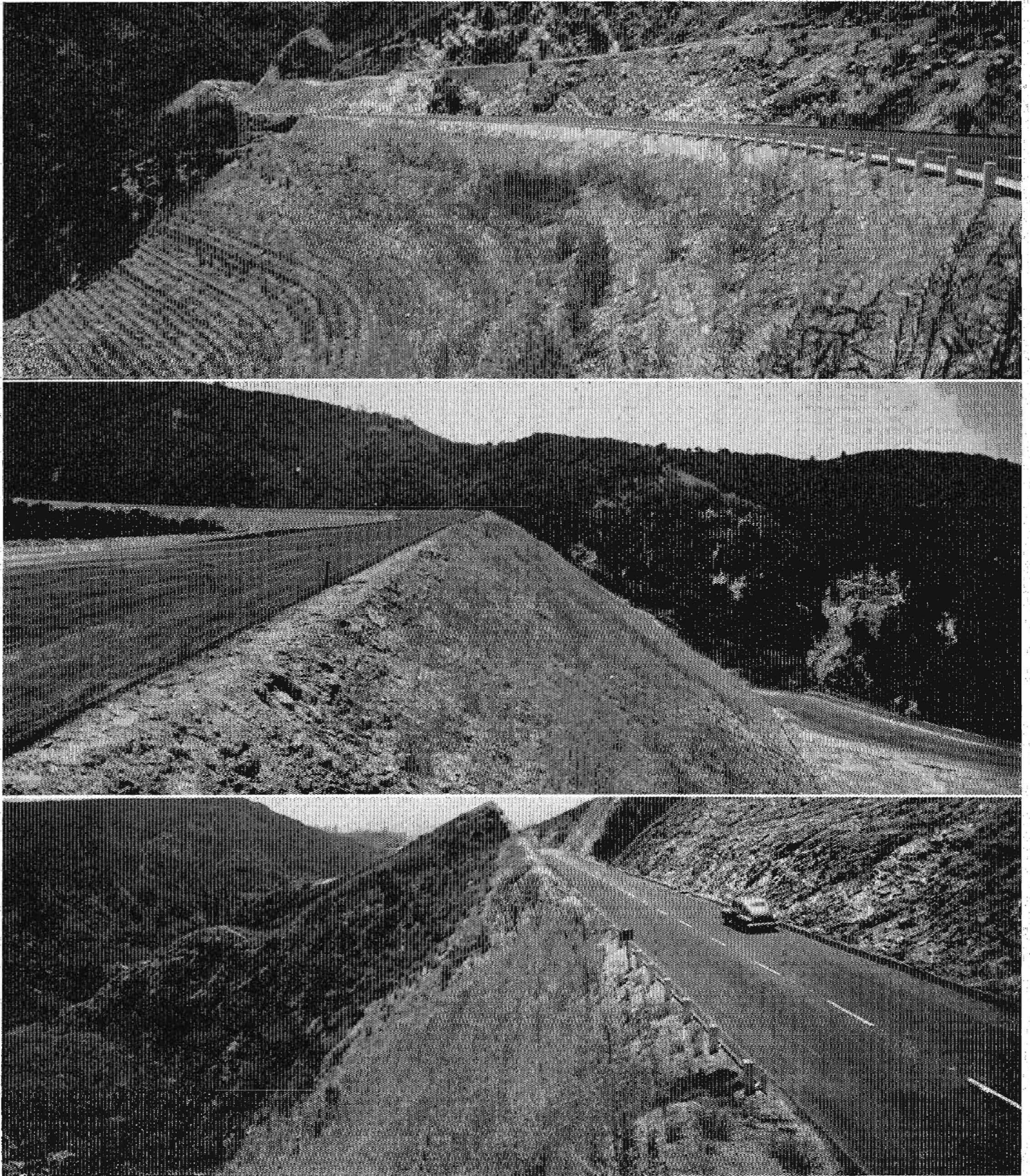
The second method used, and that with which this article is concerned,

is erosion control by natural methods—vegetative growth. On this project, excavation slopes were of rock of sufficient soundness to resist unconcentrated runoff. However, excavated material placed in embankments had, by normal construction operations, generally been broken down to fine particles easily subject to erosion. To protect these high embankment slopes from unconcentrated direct rainfall, multiple planting and seeding operations were used to produce a permanent protective vegetative cover growth. This growth, once established, will require no further maintenance.

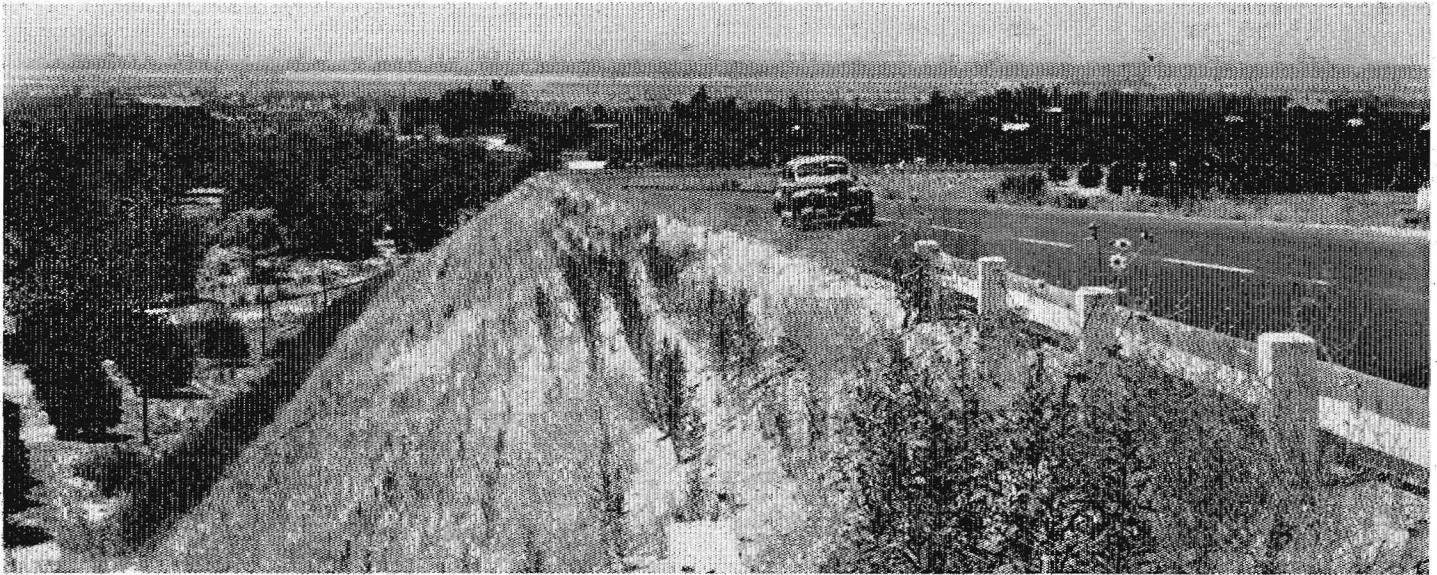
Erosion Control by Vegetative Cover

Embankment slopes are seeded in the amount of 200 pounds to the acre with a mixture consisting of 50 percent barley, 45 percent rye grain, 3 percent alfalfa seed, and 2 percent mustard seed. Immediately after seeding, the slopes are covered with straw in the approximate amount of six tons to the acre, applied in two applications, by hand methods, each application being rolled six times with a sheep's foot tamping roller. This roller serves to compact the slopes as well as incorporate the straw with the soil. In advance of applying straw, a preliminary rolling to stabilize the loose material is often necessary to minimize the downward movement of the straw during rolling operations. This seeding and straw application phase of the erosion control is very important as a preliminary step to the establishment of a permanent cover growth.

A further step in erosion control on the City Creek project is the planting of *Baccharis* plants. Cuttings from these plants are placed by day labor forces during the spring months. The *Baccharis* plant is a willow type, vigorous growing, rot-resisting indigenous shrub, easily grown from cuttings secured in the Santa Ana river-bottom



Upper—Grain and Baccharis six months after planting. Center—Vegetative erosion protection 1½ years after planting. Embankment is 130 feet high.
Lower—Vegetative erosion protection, five months old



Six months after seeding, showing grain, natural growth, and Baccharis. Note heavy growth of 1½-year-old Baccharis on lower portion of fill

lands. These plants have grown exceptionally well on these slopes.

War Surplus Camouflage Wire Used

Additional aid in slope erosion protection pending establishment of cover growth is obtained by the use of wire mats, which are placed within the embankment slopes during construction. They consist of two double courses of war surplus camouflage wire 36 inches wide, placed between two courses of 58-inch width wire fabric with openings of four square inches. They are placed at 15-foot vertical intervals in low embankments, and at 10-foot intervals in higher ones. The mats are placed in a horizontal plane, parallel to the roadway grade and in such a position

that the embankment cover at the outer edge is six inches. They extend continuously for the full length of the fill plus a distance of five feet beyond the intersection of the embankment slope and original ground where they are secured.

The wire mats, straw, grain, Baccharis plants, and other cover growth each plays its role in the different phases of erosion control. The wire mats help prevent major erosion which may occur before or after the permanent growth has taken over. The straw and grains help prevent early erosion from the average storms during the critical period between the time the barren slopes are first exposed to the

rains and until the permanent growth takes over. The straw is important in temporarily controlling erosion and in giving growth to the seeds and plants which later take over permanently.

The first section (3.2 miles) of City Creek Road is completed and in use; a second section (4.2 miles) was completed in September, 1948; a third section (1.8 miles) is well under way; and 5.4 miles remain to be built in order to complete the road from Highland Avenue to Running Springs. Race track stable bedding straw continues to be one of the important factors in preventing eroding soil from depositing in the streams below, in reducing maintenance costs, and in blending the scarred hillsides back into their original picturesque condition.

MOTHER LODE JOB

Continued from page 5 . . .

grade approximately two feet, taking out the unsuitable and wet material and replacing it with drain rock, supplementing this with perforated metal pipe. The work involved alone was in the neighborhood of \$20,000.

The specification on this job called for placing some 1,200 cubic yards of riprap. As the material for riprap was difficult to secure it was replaced with Gunite concrete. In all cases, the riprap was to control erosion which might be caused by the three branches of

Jackson Creek. Arrangements were made to make the change and with the exception of one location, all protection on these streams was made with the use of Gunite at a considerable saving from the original bid price for riprap.

The major items of the work on the contract involved 180,000 cubic yards of roadway excavation, 4,180 cubic yards of structure excavation, 1,470 cubic yards of ditch and channel excavation, 27,000 cubic yards of imported borrow, 725,000 station yards of overhaul, 12,250 tons of untreated

rock base, 6,000 tons of mineral aggregate, 2,585 cubic yards of Class "A" Portland cement concrete structures, 1,800 lineal feet of culvert pipes and 395,000 pounds of bar reinforcing steel.

The total construction cost of the project was approximately \$561,000.

The contractor was Fredrickson Bros. of Emeryville, and Mr. E. L. Craun was resident engineer throughout the entire project. This project was under the general supervision of District Engineer Chas. E. Waite and the author.

Sloughhouse

*Sacramento-Jackson Route Near
Historic Spot Being Realigned*

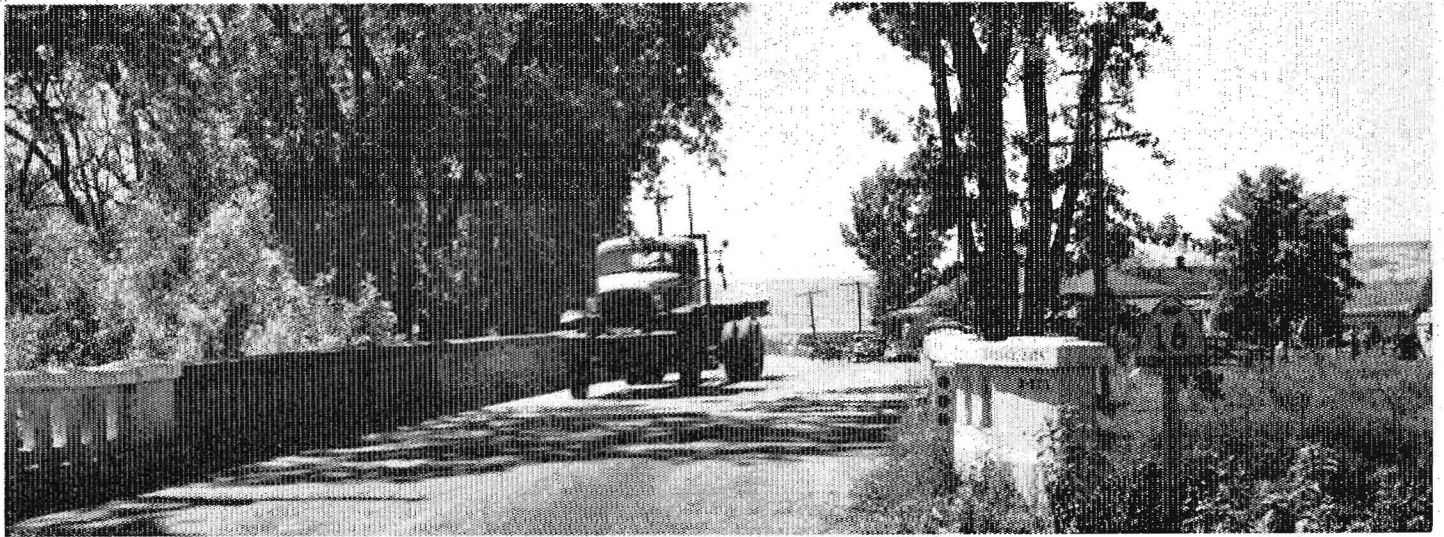
By W. O. VAN DEEVEN, Resident Engineer

WORK has been under way since May of this year on the project calling for the realignment of about one and one-half miles in the vicinity of Sloughhouse, which is on the portion of State Sign Route 16 between Sacramento and Jackson in Amador County.

The original Slough House dates back to gold rush days, having been built in 1850 by an immigrant from Vermont named Jared Sheldon. Sheldon and his partner, William Daylor, were owners of the Omochumnes Mexican land grant and are reputed to have

made great profits from mining, ranching, trading and hotel-keeping. Sheldon's enjoyment of his gains was shortlived, however, as he died during a quarrel with miners in 1851.

... Continued on page 45



Upper—Existing narrow bridge approach to Sloughhouse. Lower—Grading through deep cut on new alignment





These two photographs show heavy equipment used in grading for the new Sacramento-Jackson Highway. Present winding road is shown at left of lower picture

Plantings

Eucalyptus Trees Used for Windbreaks on Freeway

By L. R. McNEELY

Assistant District Engineer

SEEDLING eucalyptus trees planted along State Highway Route 26 are showing rapid growth and promise of early relief from wind hazards on Valley Boulevard, in San Bernardino County between Ontario and Colton.

The freeway between Colton and Ontario with the exception of Kaiser Spur Overhead Crossing was completed in the spring of 1947.

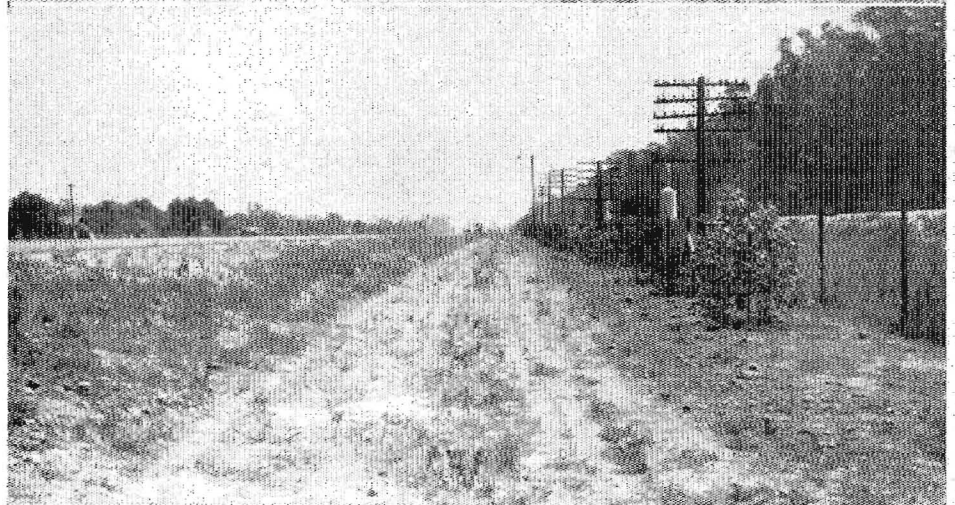
The location between Colton and the Kaiser Spur Overhead Crossing, a distance of 10 miles, runs through cultivated land planted to citrus fruits, berries and vineyards. The soil consists of a sandy loam. For a distance of approximately eight miles on the southerly side the freeway and Southern Pacific Railroad right of way are in common.

From the Kaiser Overhead Crossing to Ontario, a distance of 5.7 miles, the freeway passes through the property of the Garrett Company vineyards. The soil throughout the vineyard area consists of a light sandy loam.

During the winter and spring months strong northerly winds sweep this area. In order to serve as a windbreak and also to screen off the freeway from adjoining property, eucalyptus seedlings were planted on 10-foot centers, five feet from the right of way line throughout the northerly side of the freeway. Where the right of way parallels the Southern Pacific Railroad the plantings were placed five feet from the right of way line on 20-foot centers to reduce the glare from locomotive headlights.

The seedlings were propagated at the Hiway Nursery at Davis, using seed gathered under the direction of the Landscape Engineer from eucalyptus rostrata (Red Gum) trees growing

... Continued on page 37



Upper—Showing size of eucalyptus tree seedlings when planted April 23, 1947. Center—Eucalyptus trees along vineyard near Bloomington. Freeway on left. Trees 15 months old in August, 1948. Lower—Eucalyptus trees 15 months old along Southern Pacific Railroad near Bloomington in August, 1948

Short Cut Across Freeway Ends in Death for Father

A SHORT cut across the Ramona Freeway in Los Angeles proved to be a short cut to the grave for Richard Mehling, 57, father of three children.

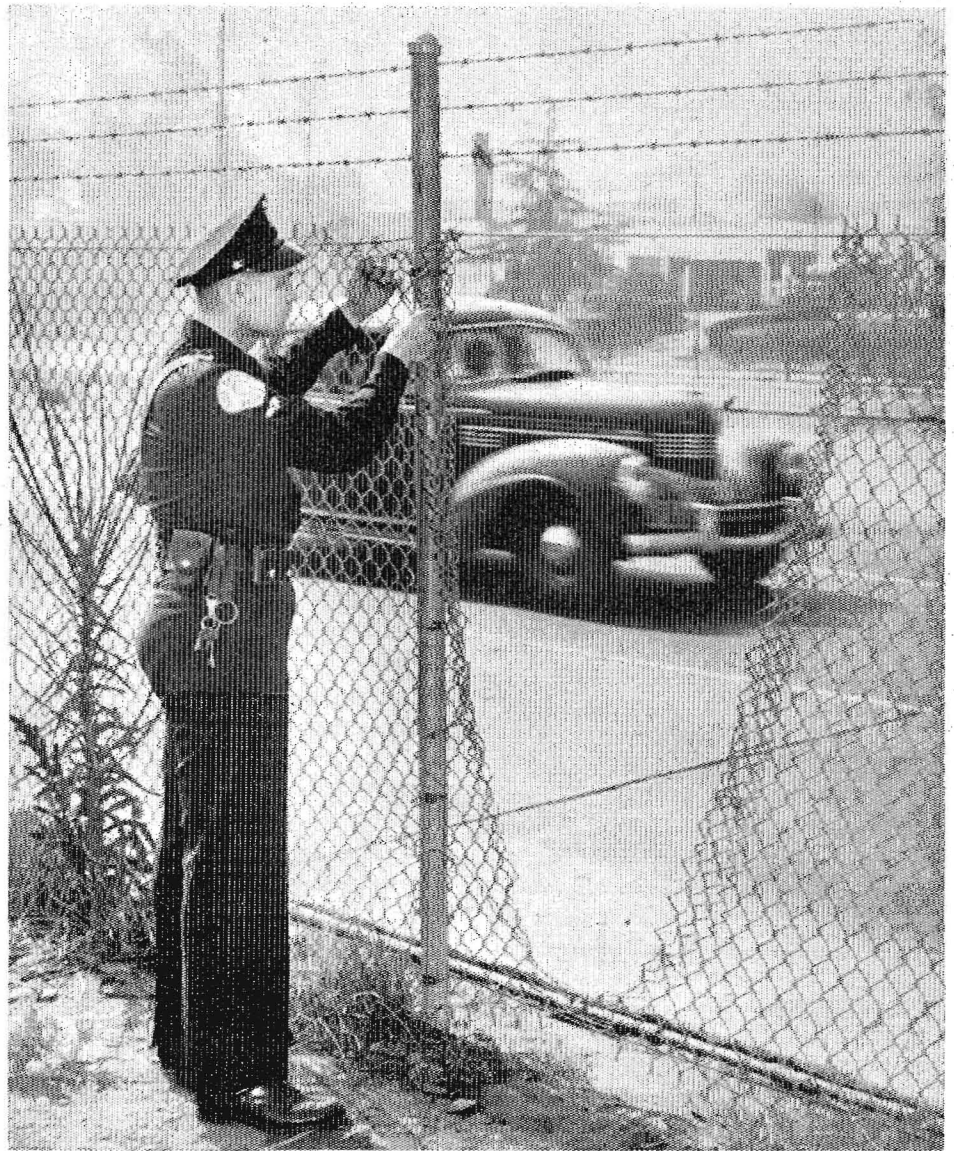
Modern freeway design demands the erection of high wire barriers to prevent pedestrians from crossing at grade level. Vehicles and pedestrians alike are required to cross a freeway on overhead structures or through underpasses.

Mehling ignored this safety precaution insisted upon by highway engineers. Where the street on which he resided, Nieto Lane, ends, someone cut a large hole in the wire fence. A corresponding hole was on the opposite side of the six-lane freeway. How long these apertures had been used by thoughtless pedestrians is not known.

On his way home from work, Mehling stepped through the hole and darted out onto the freeway. A motorist rounding a curve struck and instantly killed him.

The driver was puzzled. He had not seen Mehling. He could not understand how he came to be on the high-speed highway. Neither could the police, who were summoned to the scene of the accident, until they discovered the two holes in the wire barrier.

The police labeled the opening through which Mehling entered the Freeway, "Doorway to Death."



Officer F. G. DuBrutz examines hole cut in fence on high-speed Ramona Freeway. Richard Mehling, who took short cut through hole, was killed by a car

PLANTINGS

Continued from page 36 . . .

successfully in the immediate vicinity of the proposed planting. The seedlings, furnished in two-inch by two-inch by four-inch plant bands, were planted in May, 1947. The average height of the seedlings when planted was from two to five inches. A basin approximately two feet in diameter was made, the seedlings were planted and mulched with straw manure and watered. A shingle was placed at each plant to prevent wind and sunburn.

A crew of from 10 to 12 men placed from 350 to 600 seedlings per day. A total of 8,540 plantings were made. Some replants were made during the spring of 1948 due to the seedlings being destroyed by rodents. Water was applied at the rate of one thorough irrigation per week during the summer and fall season of 1947, and will be continued until the winter rains of 1948.

Ground squirrels and gophers seem to be the most persistent enemies of the eucalyptus plantings. During the winter and spring seasons, winds which

carry a large volume of sand and dust sandblasted the young plantings throughout the vineyard areas thereby retarding their growth.

Photographs were taken of the plantings at various locations on August 5, 1948, when the average age of the plantings was 15 months. The average height of the more advanced groups of plantings was from five to seven feet. There is a considerable variation in height due to soil conditions, the amount of water received, and exposure.

Buellton Agreement

Cooperation of Residents
Brightens Highway Town

By L. H. GIBSON, District Engineer

IN THE DISTRICT V offices of the Division of Highways the Buellton Agreement, in its way, is almost as well known as the Magna Carta, the Bill of Rights, or other famous documents, for the Buellton Agreement was instrumental in bringing through the town of Buellton one of the first "cooperative" freeway sections of heavily-traveled U. S. 101.

Events leading up to the execution of this document and the existence of the freeway section now under construction began with the frequent damaging of overhead members of the nearby Santa Ynez River bridge. This bridge was of pin-connected, steel Pratt truss-type construction and despite a vertical clearance of 14 feet and one inch, damage by over-height loads had resulted in a critical condition. Within 10 years no less than 16 different occasions saw appreciable overhead damage to the bridge, with the ever-present possibility that fur-

ther damage would result in collapse of a span, seriously interrupting the heavy flow of traffic on this principal San Francisco-Los Angeles artery.

By-pass Proposed

Surveys therefore were made and preparation of plans for a new bridge were begun during the latter part of 1943. Also studied were plans to eliminate certain obsolete sections of approaching highway and to correct unsatisfactory alignment in the Buellton vicinity.

The town of Buellton itself was a rather outstanding example of ribbon development and, due to the unreasonably high cost of the State's acquiring right of way through the town and relocating numerous improvements in order to construct a modern freeway, it was deemed more practical to seek a new location east of Buellton, thus by-passing this highway community. Accordingly such a route was adopted

by the California Highway Commission on January 20, 1944, and plans proceeded on this basis.

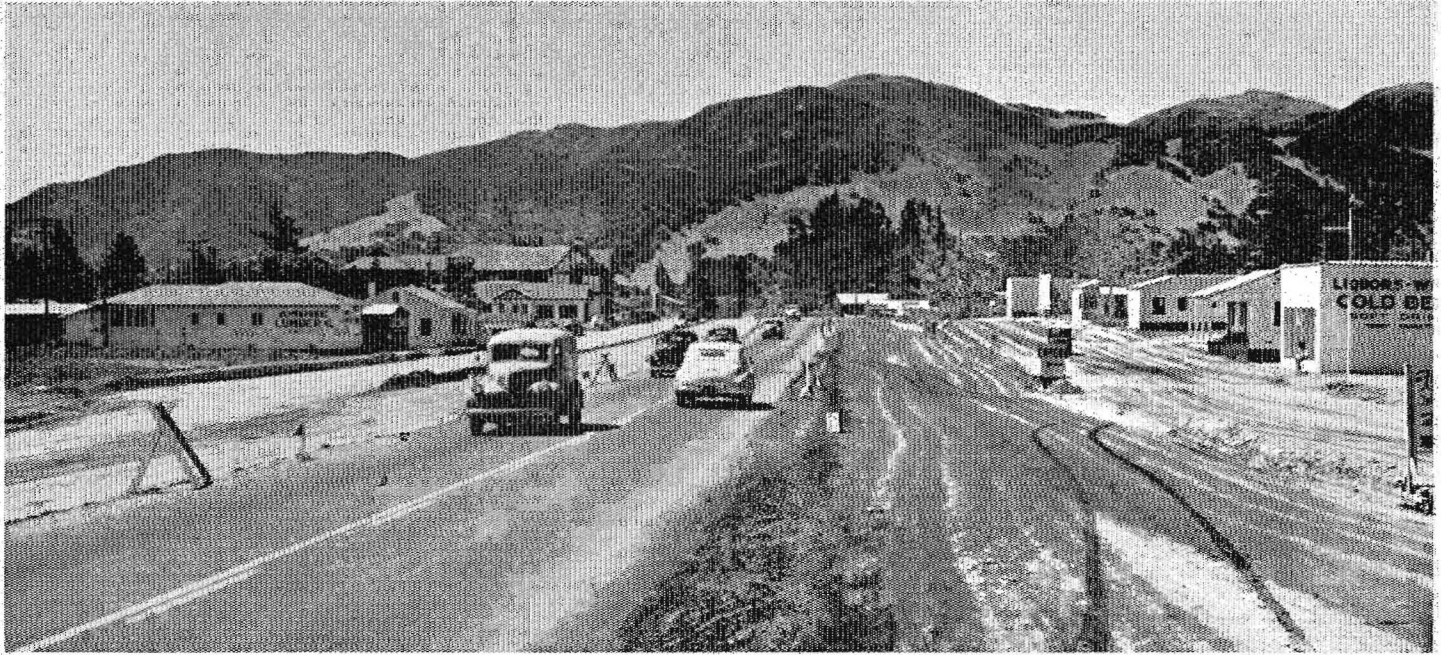
Cooperation of Residents

However, a group of Buellton civic leaders, property owners, and lessees of business premises banded together and presented a counterproposal. If the State would abandon plans for the line to the east and retain its existing line through the town itself, they would donate their respective shares of a 58-foot strip on each side of the existing 60-foot right of way to provide the 176-foot width necessary and would relocate their improvements at their own expense. Severance damages to the property owners involved would be waived, while the County of Santa Barbara would finance the construction and undertake the maintenance of outer service highways paralleling that section of the freeway.

Estimates of the value of such a donation, including land, relocation of

Looking northerly through Buellton, showing construction under way. All structures on right and left were moved back off the existing 60-foot right of way to provide a roadway width of 176 feet





This view is looking southerly through Buellton, showing relocated buildings

improvements, and severance damage waivers ran well over \$130,000 for those property and business owners making this proposal, while an even greater amount would have to be spent by them for necessary betterments caused by such changes. This generous offer was embodied in the Buellton Agreement executed by a decided majority of the affected property owners and the Director of Public Works. The California Highway Commission on March 15, 1948, modified its previous action and adopted the routing through Buellton for the proposed improvement.

Freeway Under Way

The new freeway section is now under construction and 28 groups of improvements have been relocated, including cafes, stores, hotels, and no less than eight different service stations. Though grouped along the town's main thoroughfare, these improvements have been relocated in such manner that there has been no interruption of traffic nor delay to the contractor, while minimum loss of business resulted from the relocation's being effected prior to the peak of summer tourist traffic.

While all property owners along the Buellton section did not take part in the agreement, the action of the ma-

majority who did materially aided negotiations and acquisition of the balance of property through the town. Several owners, in fact, who were not signers at the time, fell in with the spirit of their townsmen and either donated right of way or entered into nominal settlements. Major oil companies with service station interests were particularly cooperative.

Complex Problems

The entire acquisition presented a number of complex problems in connection with acquiring property both from nonsigners of the agreement and from signers whose relocations were more involved than at first anticipated. On the whole, however, the civic-minded action of the large majority which instigated the original agreement paved the way for timely settlement of all negotiations and must receive chief credit for the fact that Buellton is now becoming a model highway community on a modern new freeway.

It is interesting to note that, despite the complexity of acquisition and relocation problems and the diversity of interests involved, all negotiations were completed without resort to court action, except in one instance, and this matter was settled amicably without being brought to trial.

Limited Access

In accordance with freeway practice, right of way was acquired on a limited access basis, with right of access from adjoining property restricted to definite locations or limits. This practice, it is again being proved, will preserve the improved facilities for both through and local traffic and prevent obsolescence likely to be caused by a resumption of ribbon development with its attendant congestion.

The improvement on the three-quarters of a mile within Buellton provides an inner highway consisting of a set of two lanes for traffic in each direction, separated by a 32-foot curbed central division strip and an outer highway on each side, separated from the inner highway by six-foot curbed division strips. On the remaining three miles of the project, present construction consists of two lanes so positioned as to provide for construction of an additional set of lanes to develop a four-lane divided highway when traffic warrants. Surfacing on the central portion of the roadbed is to consist of a three-inch thickness of plant-mixed surfacing on a six-inch thickness of crusher-run base over an imported borrow subbase.

Construction Requirements

This subbase is to have a minimum thickness of nine inches except where

basement materials have a minimum bearing ratio at 0.1-inch penetration of 40 percent or more the minimum thickness is to be six inches. Imported borrow for the subbase must have a minimum bearing ratio of 0.1-inch penetration of 60 percent or more, expansion of 1 percent or less and a plasticity index of six or less. Outer highways will be surfaced with a two-inch thickness of plant-mixed surfacing on a four-inch thickness of crusher-run base over a six-inch thickness of imported borrow. The shoulders, gutters and inside face of embankment dikes are to be surfaced with three inches of plant-mixed surfacing. A seal coat of asphaltic emulsion and fine screenings is to be applied to the plant-mixed surfacing except on shoulders, gutters, and inside face of embankment dikes where an asphaltic emulsion seal is to be applied.

Two Bridges

The Nojoqui Creek and Santa Ynez River bridges are both to be steel

girder structures with reinforced concrete decks and hollow shaft concrete piers with concrete spread footings supported by timber piles. The structures are to consist of four 100-foot spans and 10 100-foot spans, respectively. Each structure is to have a 26-foot roadway.

The bridges were designed by the Bridge Department, Division of Highways. The bridge contract, amounting to \$552,000, is being performed by C. B. Tuttle Company of Long Beach under the supervision of W. B. Piper, Resident Engineer. Construction of the roadway is being performed under a contract amounting to \$534,000 by Dimmitt and Taylor and T. M. Page, Monrovia, under the general supervision of District Engineer L. H. Gibson and District Construction Engineer J. P. Murphy. Mr. J. C. Adams is the Resident Engineer.

Completion Next January

The first of the year will see the completion of the Buellton Freeway

and fulfillment of the plans of those merchants, property owners, and townspeople who originally banded together and voluntarily proposed the cooperative project. And the benefits of the farsighted Buellton Agreement are already observed to be many. The traveling public will be afforded the opportunity of moving directly and uninterruptedly through town or be able to turn off on outer highways and avail itself of the numerous facilities afforded by Buellton's improved cafes, stores, hotels, and service stations.

And the town itself will no longer be a ribbon-developed community with a narrow, obsolete highway winding through it, but will have a spacious, well-landscaped and modernized thoroughfare whose business establishments will bear the bright New Look to attract the traveler of tomorrow—the result of the cooperative Buellton Agreement.

Continued from page 22 . . .

MAJOR CONSTRUCTION PROJECTS

County	Route	Description	Approximate mileage	Estimated cost, including engineering
Stanislaus	4 (US 99)	South County Boundary to Hatch Crossing (portions), surface	9.8	100,000
Stanislaus	4 (US 99)	South of Tuolumne River Bridge, grade and surface	0.1	22,000
Stanislaus— San Joaquin	4 (US 99)	Salida to Lodi (portions), landscaping	12.5	26,000
Stanislaus	41 (SR 33)	North and South of Patterson, grade and surface	0.5	34,000
Stanislaus	Various	Rights of Way on State highway routes		75,000
Sutter	3 (US 99)	Yuba City to Butte County Line, widen structures		22,000
Trinity— Humboldt	20 (US 299)	Willow Creek to White's Bar (portions), Prison labor, grade and oiling		308,000
Trinity	Various	Rights of Way on State highway routes		5,000
Tulare	4 (US 99)	1 Mile South of Tipton to Tulare Airport, surface	7.8	784,000
Tulare	4 (US 99)	Intersections with Route 10, structures and channelization	1.2	448,000
Tulare	129 (SR 65)	Deer Creek and Deer Creek Overflow, bridges and approaches		100,000
Tulare	132	Route 134 to Packwood Creek (portions), surface	5.8	97,000
Tulare	Various	Rights of Way on State highway routes		440,000
Tuolumne	13 (SR 49) (SR 108)	Montezuma Road to South of Jamestown, grade and surface	2.1	179,000
Tuolumne— Mariposa	110 (SR 132)	Stanislaus County Line to Coulterville (portions), grade and surface	3.0	45,000
Ventura	2 (US 101)	Montalvo to Ventura (portions), surface and shoulders	1.5	70,000
Ventura— Santa Barbara	2 (US 101)	0.2 miles east of Ventura County Line to 0.2 mile east of Carpintera, grade, surface and structures	2.6	913,000
Ventura	79 (SR 126)	Wells Road (Rte. 154) to Ellsworth Barranca (portions), surface and shoulders	1.4	54,000
Ventura	138 (US 399)	Mile 1.65 to Mile 6.4 north of Ventura City Limits (portions), surface and shoulders	4.3	145,000
Ventura	153	Junction Route 2 at Camarillo to Junction Route 9 near Somis (portions), surface and shoulders	4.1	97,000
Ventura	Various	Rights of Way on State highway routes		915,000
Yolo	6 (US 40)	Solano County Line to Yolo Causeway, barrier posts and curbs		19,000
Yolo	7 (US 99)	Putah Creek to Colusa County Line, widen structures		149,000
Yolo	7 (US 99)	Zamora Line Change, grade and surface	1.4	196,000
Yolo	50	Salt Royer Creek Bridge and Salt Creek Bridge, grade, surface, and culverts		54,000
Yolo	87 (SR 24)	Knights Landing Bridge, redeck and sidewalks		45,000
Yolo	90	Winters to Route 7, shoulders, base and surface	16.0	224,000
Yolo	Various	Rights of Way on State highway routes		200,000
Yuba	3 (US 99)	Morrison's Crossing to Marysville, widen structures		12,000
Yuba	25 (SR 49)	½ mile west of Sierra County Line to County Line, grade and surface	0.5	56,000

SR = State Sign Route.

Santa Ana Freeway

Another Unit Is
Well Under Way

By B. N. FRYKLAND, Resident Engineer

CONSTRUCTION of the road work on the 1.6 mile section of the Santa Ana Freeway from Soto Street to Eastman Avenue, to connect up previously completed grade separation bridges, is now well under way.

The drainage installations, consisting of the placing of approximately 12,000 lineal feet of concrete pipe and 800 cubic yards of C1 "A" Portland cement concrete, have been completed. The rough grading, consisting of the moving of approximately 330,000 cubic yards of earth, is practically completed and paving operations are ready to start.

The contract for this work was awarded on February 13, 1948, to the Griffith Co. of Los Angeles, and the estimated date of completion is February 28, 1949. The contract allotment is \$1,157,000.

This highway construction project is remarkably free of adverse traffic conditions and obstructions interfering with construction operations, due to the fact that all the houses within the right of way were moved prior to the award of the contract, and all grade separation structures have been completed. This makes it possible for the contractor to conduct his operations within the right of way with a minimum interference.

On this section of the Santa Ana Freeway from Soto Street to Eastman Avenue approximately 200 residential buildings were cleared from the right of way in advance of the starting of construction. In clearing the right of way the State took measures to assist the families whose living quarters had to be moved or demolished to make way for the freeway.

Arrangements were made with the City of Los Angeles and the federal housing authorities for the use of a number of federal-owned house trailers and many families in the path of construction were moved into these. Arrangements were also made whereby the tenants in many buildings were

allowed to occupy the buildings while they were being moved to a new site, and for a period of at least six months thereafter. In other cases houses were sold to be moved with the provision that the purchaser would provide rental quarters for the tenants for at least six months.

In this way the State was able to clear critical right of way areas without the need for arbitrary evictions which would have worked a great hardship on many families. As construction work on the Santa Ana Freeway proceeds into the more open country the difficulties of clearing rights of way will become less.

On the Griffith Company contract modern excavating equipment consisting of carryalls, tournapulls and bulldozers are being used for all roadway excavation operations, as is illustrated by the accompanying photographs. Embankment compaction is obtained with three-gang units of sheepsfoot tampers. A new type of compacting roller has recently been introduced on the job. It consists of a Caterpillar DW-10 hauling unit equipped with grid wheels and pulling a single drum grid trailer. The manufacturer claims that the weight of the grid in contact with the loose soil is 1,000 pounds per square inch. He rates the weight of the towing unit at 12 tons and the trailer at 10 tons. Compaction obtained with this piece of equipment has been very satisfactory.

When completed, the east bound and west bound roadways will consist of three 12-foot traffic lanes each, plus the necessary acceleration and deceleration lanes at the on and off ramps.

Points of egress and ingress for west bound traffic are provided at Soto Street, Grande Vista Avenue, Calzona Street and Ditman Avenue, and for east bound traffic at Concord Street, Calzona Street and Ditman Avenue. Existing city streets will be utilized as outer highways wherever practicable.

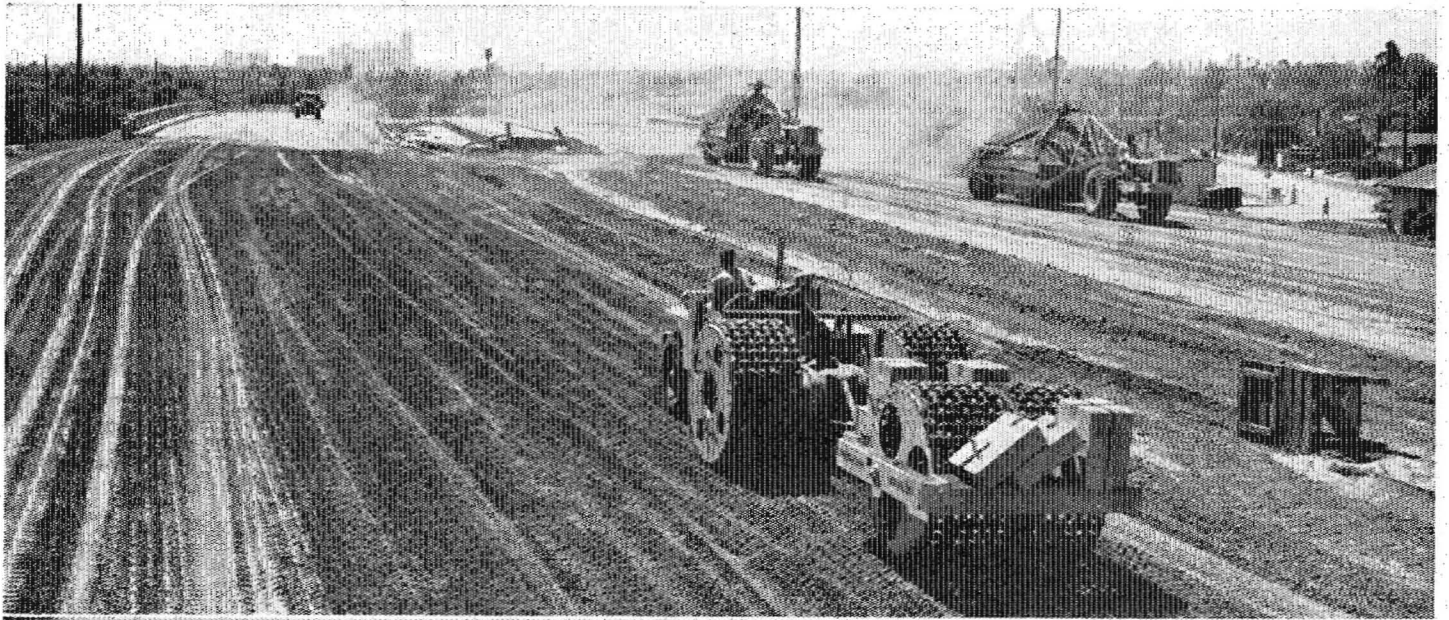
Traffic Institute

THE AMERICAN University, Washington, D. C., recognizing the need for education in traffic management at a time of increasing industrial activity and growing transportation cost, announces an Institute of Industrial Transportation and Traffic Management to be conducted from November 2 through November 23, 1948. This institute will extend the services which the university renders to industry by organizing annual Rail, Air, and Foreign Transportation Institutes.

Applications for admission and requests for information may be sent to Dr. L. M. Homberger, The American University, School of Social Sciences and Public Affairs, 1901 F Street, Northwest, Washington 6, D. C. The last registration day will be October 27, 1948.

New outer highways are being constructed, south of the Freeway, from Esperanza Street to Indiana Street and from Alma Avenue to Hicks Avenue, and north of the Freeway from Los Palos Street to Prado Street and from Indiana Street to Eastman Avenue. The many cross-streets cut off by the Freeway will be connected to the outer highways thereby eliminating what would otherwise be dead-end streets.

The present traffic flow on the previously completed 1.6 mile section of the Freeway, from Aliso Street to Soto Street, is comparatively light. This is no doubt due to short length of completed construction and to the fact that all south bound traffic must leave the Freeway at the off ramp immediately west of Soto Street and proceed southerly on very heavily traveled city streets. It is anticipated that when this section now under construction is completed the volume of traffic using the completed portions of the Santa Ana Freeway will increase greatly.



Upper—View looking west of Indiana Street grade separation, showing earth-moving and compacting equipment at work. Center—View looking east from Euclid Avenue grade separation, showing construction work in progress. Completed Lorena Street grade separation in background. Lower—Looking east from Indiana Street grade separation showing Eastman Avenue, the easterly terminus of the contract in the background. Grading is complete and roadway ready for subgrade and paving operations

Coast Highway

Freeway Development
In San Luis Obispo



Upper—Looking north from French Street, making finished grade. Lower—Freeway looking northerly, showing Santa Lucia Range in distance

THE FIRST of four projects contemplated to convert 16 miles of the Coast Highway, U. S. 101, into a four-lane divided Freeway from Pismo Beach to Cuesta Grade, has been completed between San Luis Obispo and Cuesta Grade.

The projected improvement was divided into four units to facilitate financing, preparation of plans and letting to contract. Construction of the first unit of 2.7 miles between San Luis Obispo and Cuesta Grade has just been completed, and is well advanced on the unit of 4.9 miles between Pismo Beach and Miles Station, and the unit of 6.6 miles between Miles Station and Marsh Street in San Luis Obispo.

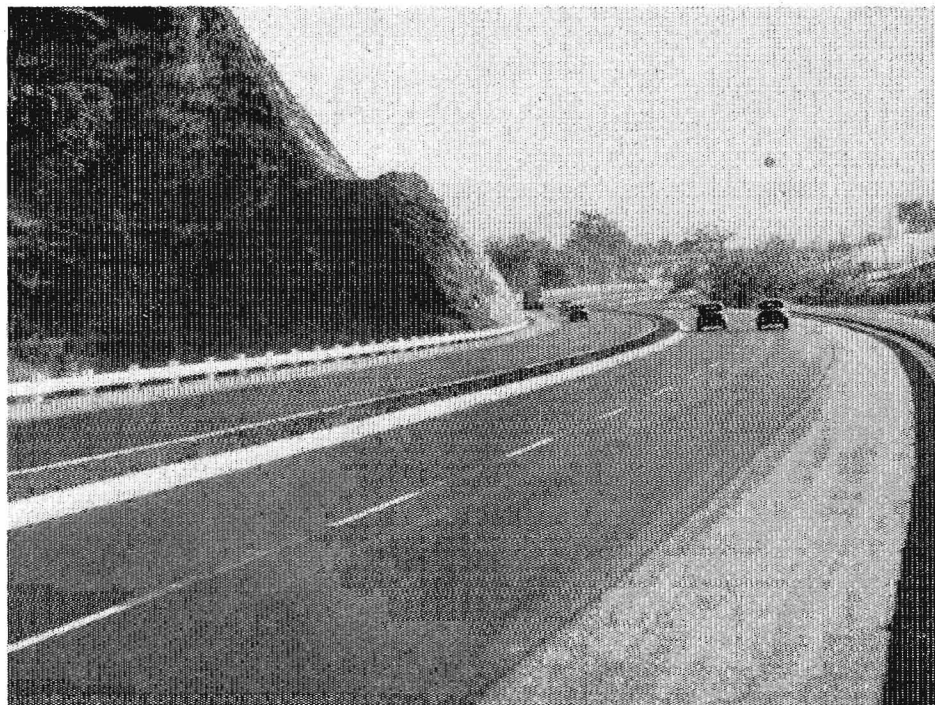


Plans for the unit through San Luis Obispo are nearing completion, and acquisition of the required right of way is to be undertaken in the near future with construction held in abeyance pending funds becoming available to finance it. The first unit was completed at a contract cost of \$735,000. Contracts now in progress on two of the units amount to a total of \$2,558,000. It is estimated that the remaining unit will cost approximately \$2,000,000.

Plans provide for construction of two additional lanes, adjacent to the existing two lanes, except through Shell Beach, and from the Santa Fe Crossing of San Luis Creek to a mile north of San Luis Obispo where a four-lane divided roadbed is provided. The existing two-lane roadbed through Shell Beach is to become an outer highway to serve the business and residential area bordering it on the west. Ribbon development along the existing highway on the southerly approach to San Luis Obispo, and extensive business and residential improvements along the present route through the city make the cost of improving this route so large that it is not commensurate with other advantages of such routing. Construction is therefore along new alignment between the Santa Fe Crossing and a mile north of San Luis Obispo.

On the units now under construction, the surfacing of the traffic lanes consists of a 4-inch thickness of bituminous surfacing on a 6-inch thickness of crusher run base over an imported borrow subbase. The thickness of imported subbase is 0.5 feet, 0.75 feet, or 1.0 feet, depending upon the quality of the underlying or basement soil as determined by the California Bearing Ratio and expansion tests. Shoulders and gutters are to be surfaced with 3 inches of plant-mixed surfacing.

Terrain traversed by the new alignment on the unit just completed required two crossings of San Luis Obispo Creek. Reinforced concrete arched culverts 210 feet in length with waterway areas of 250 square feet were constructed at these locations. These structures involved 3,780 cubic yards of structure excavation, 2,380 cubic yards Portland cement concrete and



Four-lane divided freeway approaching San Luis Obispo from the north

383,000 lbs. of bar reinforcing steel at a total cost of \$167,000.

Fredericksen and Kasler of Sacramento were successful bidders on all of the three units let to contract. The

work is under the general direction of District Engineer, L. H. Gibson, and District Construction Engineer, J. P. Murphy. The Resident Engineers are Mr. V. E. Pearson and Mr. A. L. Lamb.

PROGRESS

Continued from page 29 . . .

pletion will provide traffic with continuous four-lane divided highway facilities between Bakersfield and Famoso. The contract for this newest section north of Bakersfield includes, in addition to the grading and paving, two highway grade separations and interchange at Pierce Road, a steel girder track span for a highway underpass at Minkler Spur, a steel girder overhead across the railroad at Oil Junction, and reinforced concrete bridges across Beardsley Canal and canal lateral No. 29.

On this portion of U. S. 99 north of Bakersfield, the 6.7 miles section between Cawelo and the Famoso Underpass was completed just a year ago.

South of Bakersfield the highway was four-laned on 1.9 miles between Brundage Lane and 24th Street in Bakersfield a little over a year ago and a similar project on 5.1 miles between

ON ANGELES CREST

Continued from page 7 . . .

ress, economical operation is maintained and costs compare favorably with similar construction work elsewhere on State highway work.

Ultimate plans for the Angeles Crest Highway provide for continuing this road construction as funds can be made available until it meets the Big Pines Highway. However, in its present reaches, it brings within easy access of the public a road for interesting hikes and quiet picnics in the mountains, even though it is not as yet a road developed for round-the-loop driving tours.

Hoskins Road and Brundage Lane was completed in June of this year.

Another large project now nearing completion on U. S. 99 in Kern County is the resurfacing between Grapevine Station and Switzers and on a portion of State Route 140. This project involved placing nearly 30 miles of new surface.

C. A. McClung Retires From Bridge Department

CHARLES A. MCCLUNG, Associate Bridge Engineer, retired from the Bridge Department on July 9, 1948, after having spent 18 years in state service. On Sunday, June 27, at a Bridge Department picnic given in his honor at the Recreation Center of McClellan Field, his co-workers gave him a warm farewell. He was presented with a large scroll signed by his fellow workers of many years and a portable radio.

Mac was born in Pittsburgh, Pennsylvania, on February 24, 1879. He attended Pennsylvania State College and graduated as a civil engineer. After graduation, he went through the usual roving existence common to an engineer and finally settled temporarily in Spokane, Washington, doing engineering and contracting work. During this period he studied law nights and finally became a member of the bar.

After returning from service in the first world war, he determined to give the legal profession a whirl, but soon found it not to his liking and returned to his first love, and went into bridge contracting for himself in Spokane. From contracting he returned to engineering, working both in Portland and Spokane and finally came to California and entered service for the State in 1929, since which time, all of his work has been in the Sacramento office of the Bridge Department.

For the past 15 years he had been in charge of the estimating section and has the distinction of having made the detailed cost estimates for 1,056 bridge contracts representing a total value of \$104,700,000. These ran from small spans to his largest estimate which was \$5,299,000 for the Cerritos Channel Bridge near Long Beach.

After his service in World War I, Mac joined the American Legion and has been active in it ever since, especially in connection with Boy Scout activities. He has been associated in scouting with Post 61 for the Legion for 19 years and one of the great pleasures of his life has been the development of many fine young Americans from the boys who have passed through his Scout troop.



Charles A. McClung

As soon as he gets accustomed to not having to turn out every morning for work, Mac and Mrs. McClung are starting East for an extended automobile trip.

Mac's multitude of friends in the department and throughout the state service wish him a long, pleasant and happy retirement.

SLOUGHHOUSE

Continued from page 34...

The old road in this vicinity was at such an elevation that high water in Deer Creek, which is a tributary of the Cosumnes River, periodically flooded the road. Depending on the severity of the flooding, the highway was either entirely closed or its use was impaired greatly.

In order to minimize the possibility of future flooding, the road is being rebuilt on new alignment and grade, from about three-fourths of a mile west to about three-fourths of a mile east

of Sloughhouse. In addition to improving the flood conditions, the revised construction will also reduce the maximum grade from 6 percent to under 5 percent and increase the minimum radius of curvature from 300 feet to 3,000 feet.

Building on new alignment will require the construction of three new bridges, one over Deer Creek itself, and two over overflow channels of the creek. All three bridges will be of the reinforced concrete slab type, that over Deer Creek being 160 feet long, and the two overflow channel structures being 84 and 45 feet long.

The structural design of the new road calls for a 32-foot roadbed width, with a 1.42-foot thickness of imported borrow. Over this will be a 23- by 0.33-inch layer of crusher run base with a 22- by 0.25-inch plant-mixed surfacing.

Preliminary investigations of the materials which would be encountered in excavations indicated that the top portion of the deep cut about one-half mile from the beginning of the project consisted of cemented gravel. It was hoped that by proper selection, material having a minimum bearing value of 20 percent could be obtained for use as selected material throughout the project. In order to prove the source, more tests were taken at greater distances from the proposed center line, but they proved to be disappointing, since they indicated that the gravel deposit was less extensive and the material less uniform in quality than had been hoped. In view of these later test results, and the fact that use of the gravel for selected material would have involved double handling, the original plan was discarded and the structural design of the road changed to include the use of imported borrow from a dredger tailing source about 3.7 miles east of Sloughhouse.

Work on this project is proceeding rapidly, and it is expected that it will be completed early in 1949. Contractors undertaking the project as a joint venture are the Brighton Sand and Gravel Co. and the Lew Jones Construction Co. The author is Resident Engineer for the State.

Bids and Awards

Contracts Awarded for
July and August, 1948

July, 1948

ALAMEDA COUNTY—In the City of Oakland, at the San Francisco-Oakland Bay Bridge Toll Plaza, additional toll facilities to be constructed. District IV, Route 5, Chittenden & Chittenden, Auburn, \$169,685; Chas. T. Brown Co., San Pablo, \$187,256. Contract awarded to Stolte Inc. & The Duncanson-Harrelson Co., Oakland, \$149,306.

CONTRA COSTA COUNTY—Between Pinole Overhead and 0.4 mile east of Rodeo, about 1.5 miles to be widened, paved with plant-mixed surfacing on crusher run base, penetration treatment to be applied to shoulders and an overhead and a bridge to be widened. District IV, Route 14, Section Her, B. J. R. Armstrong, El Cerrito, \$114,925; Lee J. Immel, San Pablo, \$133,950. Contract awarded to J. Henry Harris, Berkeley, \$114,573.

FRESNO COUNTY—Between Selma and Fowler, concrete barrier posts to be furnished and installed. District VI, Route 4, Section A. W. M. Lyles Co., Fresno, \$11,014; E. G. Perham, Los Angeles, \$11,193; Ted F. Baun, Fresno, \$11,432; Fresno Fence Construction Co., Fresno, \$11,462. Contract awarded to Matthew & Jorgenson, Hughson, \$9,581.

HUMBOLDT COUNTY—Across Eureka Slough at Eureka, the steel truss spans of the existing bridge to be cleaned and painted. District I, Route I, Section H. Tom Hull, Eureka, \$7,200. Contract awarded to A. Verne Tucker, Eureka, \$2,750.

HUMBOLDT COUNTY—In the City of Eureka on Broadway Avenue and Fourth Street, between south city limits and Eureka Slough Bridge, portions, about 2.6 miles to be surfaced with plant-mixed surfacing. District I, Route I. Contract awarded to Mercer, Fraser Co., Eureka, \$78,810.

HUMBOLDT COUNTY—Between west boundary of Whittemore Grove State Park and 2.5 miles westerly, about 2.5 miles of roadway to be graded. District I, Route 977. Tyson & Watters Co., Sacramento, \$76,893; Huntington Bros., San Anselmo, \$79,426; Eugene G. Alves & Shaul Construction Co., Hayward, \$84,187; A. G. Raisch & Staring & Galbraith, San Francisco, \$102,328. Contract awarded to M. Malfitano & Son, Inc. & Macal Improvement Co., Inc., Pittsburg, \$73,247.

KERN COUNTY—At Granite Canyon, about 13 miles north of Bakersfield, a reinforced concrete slab bridge to be constructed and about 0.3 mile to be graded and bituminous surface treatment applied. District VI, Route 142, Section B. E. C. Young & Co., Bakersfield, \$49,975; Thomas Construction Co., Santa Barbara, \$52,987; E. S. & N. S. Johnson, Fullerton, \$55,170; Trewitt-Shields & Fisher, Fresno, \$56,607; N. M. Saliba Company, Los Angeles, \$59,085; E. G. Perham, Los Angeles, \$61,362; George W. Peterson, Los Angeles, \$64,217; Matthew & Jorgenson, Hughson, \$69,453; Dieco, Inc., & Dix-Syl Construction Co., Inc., Bakersfield, \$80,447. Contract awarded to Anderson Company, Visalia, \$48,571.

KINGS COUNTY—Between Stratford and 1.8 miles north, about 1.9 miles to be graded and surfaced with road-mixed surfacing on cement-treated base and a reinforced concrete bridge to be constructed. District VI, Route 125, Section D. N. M. Ball Sons, Berkeley, \$197,788; George E. France, Inc., Visalia, \$223,192; Guy F. Atkinson Company, South San Francisco, \$237,022. Contract awarded to Oilfields Trucking Co. and Phoenix Construction Company, Bakersfield, \$188,731.

LASSEN COUNTY—At Devil's Corral near the Susan River Bridge. District II, Route 29, Section B. Contract awarded to Sheldon Oil Company, Suisun, \$15,120.

LOS ANGELES COUNTY—In the City of West Covina, from Frazier Street to Barranca Street, furnish and install semi-traffic actuated signal systems and highway lighting at nine intersections and furnish and install full traffic actuated signal systems and highway lighting at two intersections. District VII,

Route 26, Sections B,W Cov. Prescott Electric & Mfg. Co., Los Angeles, \$74,999; Econolite Corp., Los Angeles, \$77,599; Ets-Hokin & Galvan, San Diego, \$77,634; L. H. Leonardi Electric Construction Co., San Rafael, \$80,493; C. D. Draucker, Inc., Los Angeles, \$83,380; Tri-Cities Electrical Service, Oceanside, \$85,128. Contract awarded to Paul R. Gardner, Ontario, \$74,849.

LOS ANGELES COUNTY—In the City of Manhattan Beach on Sepulveda Boulevard at Marine Avenue, furnish and install full traffic actuated signal system and highway lighting. District VII, Route 60. Prescott Electric and Mfg. Co., Los Angeles, \$10,997; C. D. Draucker, Inc., Los Angeles, \$11,945. Contract awarded to Econolite Corp., Los Angeles, \$10,817.

LOS ANGELES COUNTY—In the City of Los Angeles, near the intersection of Lanzit and Central Avenues, a warehouse site to be constructed. District VII. Cox Bros. Construction Co., Stanton, \$75,210; Fred D. Chadwick, Lynwood, \$78,064; Covina Construction Co., Covina, \$81,097; Chas. T. Brown Co., San Fernando, \$101,242. Contract awarded to Griffith Co., Los Angeles, \$71,661.

LOS ANGELES COUNTY—In the City of Hawthorne on Hawthorne Avenue from 166th Street to 132d Street, furnish and install semitrafic actuated signal systems at four intersections and a fixed time traffic signal system at one intersection. District VII, Route 164, Section A, Haw. C. D. Draucker, Inc., Los Angeles, \$29,120; Prescott Electric and Mfg. Co., Los Angeles, \$29,500. Contract awarded to Econolite Corp., Los Angeles, \$27,829.

LOS ANGELES COUNTY—On Foothill Boulevard from Central Avenue to Commonwealth Avenue, furnish and install full traffic actuated signal systems and highway lighting at two intersections and semitrafic actuated signal systems and highway lighting at seven intersections. District VII, Route 9, Sections A,B. Econolite Corp., Los Angeles, \$76,303. Contract awarded to C. D. Draucker, Inc., Los Angeles, \$68,248.

NAPA AND SOLANO COUNTIES—Between one mile west of Napa County Line and Cordelia Underpass, about 4.6 miles to be graded. District X, Route 7, Sections A,H. Harms Bros., Sacramento, \$560,566; Eaton & Smith, San Francisco, \$567,974; H. Earl Parker, Inc., Marysville, \$609,871. Contract awarded to Parish Bros., Benicia, \$541,697.

ORANGE COUNTY—Between Heim Avenue and Peralta School, about 4.9 miles to be graded and surfaced with plant-mixed surfacing on untreated rock base. District VII, Route 43, Section B. N. M. Ball Sons, Berkeley, \$661,979; Match Bros. & E. L. Yeager, Riverside, \$682,681; Charles MacClosky Co. & C. G. Willis & Sons, San Francisco, \$683,237; Cox Bros. Construction Co. & J. E. Haddock, Ltd., Stanton, \$691,887; Griffith Co., Los Angeles, \$716,191; United Concrete Pipe Corp., Jesse S. Smith & A. A. Edmondson, Baldwin Park, \$727,634; Guy F. Atkinson Co., Long Beach, \$730,804. Contract awarded to Peter Kiewit Sons Co., Arcadia, \$648,936.

SACRAMENTO COUNTY—Between the North Sacramento Viaduct and one-half mile east of Ben Ali, about 4.1 miles, pavement joints to be cleaned and sealed. District III, Route 3, Section B. A. Teichert & Son, Inc., Sacramento, \$11,415. Contract awarded to Concrete Pavement Maintenance Co., San Francisco, \$6,420.

SAN BERNARDINO COUNTY—In the City of Ontario, on "A" Street between West City Limits at Benson Avenue and San Antonio Avenue, about 1.2 miles to be widened on one side and the entire project to be surfaced with plant-mixed surfacing. District VIII, Route 26, Section Ont. R. A. Erwin, Colton, \$53,416; Griffith Co., Los Angeles, \$60,346; Covina Construction Co., Covina, \$65,145. Contract awarded to Match Bros., Colton, \$48,794.

SAN BERNARDINO COUNTY—Between 2.7 miles west of Mountain Pass and 5.2 miles south of the California-Nevada State Line, six timber trestle bridges to be redecked with reinforced concrete

slabs. District VIII, Route 31, Sections N, P. Petersen Construction Co., Monrovia, \$39,248; E. S. & N. S. Johnson, Fullerton, \$39,950. Contract awarded to Thomas Construction Co., Newhall, \$35,675.

SANTA CLARA COUNTY—Over the tracks of the Southern Pacific Co. near Sargent, the steel portions of the existing overhead crossing to be water-proofed and painted. District IV, Route 2, Section C. R. W. Reade & Co., Berkeley, \$7,987; M. Williams & Son, Inc., Oakland, \$8,821; D. E. Burgess Co., San Francisco, \$11,613. Contract awarded to Fred T. Judd Co., Berkeley, \$7,986.

SAN JOAQUIN COUNTY—Constructing dolphins for an existing bridge across Potato Slough at Terminous. District X, Route 53, Section C. Contract awarded to Healy Tibbitts Construction Co., San Francisco, \$4,140.

SAN MATEO COUNTY—Between three miles east of Half Moon Bay and Half Moon Bay, about 2.7 miles, to be widened and surfaced with plant-mixed surfacing. District IV, Route 105, Section A. Frank W. Smith, San Mateo, \$88,705; Clements & Co. and Browne & Krull, Hayward, \$89,420; Granite Construction Co., Watsonville, \$98,664. Contract awarded to L. C. Smith, San Mateo, \$88,627.

SAN MATEO COUNTY—At Redwood Slough, Deep Slough and Tidal Slough, near Redwood City, an existing reinforced concrete bridge and two reinforced concrete culverts to be repaired. District IV, Routes 107, 68. Contract awarded to Emsco. of San Francisco, San Francisco, \$13,657.

SOLANO COUNTY—Between Ledgewood Creek and 3.5 miles east of Fairfield, about 4.7 miles to be graded and paved with Portland cement concrete and two reinforced concrete bridges to be constructed. District X, Route 7, Sections B,C. Morrison-Knudson Co., Inc., San Francisco, \$1,198,564; Harms Bros. & N. M. Ball Sons, Berkeley, \$1,205,736; Fredrickson Bros., Emeryville, \$1,241,462; Fredrickson & Watson Construction Co., Oakland, \$1,244,757; A. Teichert & Son, Inc., Sacramento, \$1,268,678; Peter Kiewit Sons Co., Arcadia, \$1,324,728. Contract awarded to Parish Bros., Benicia, \$1,179,479.

F. A. S. County Projects

ALAMEDA AND CONTRA COSTA COUNTIES—On Crow Canyon Road, between 0.2 mile southwest of County Line and State Highway Route 107, near San Ramon, about 1.8 miles to be graded and surfaced with plant-mixed surfacing and Portland cement concrete pavement on a crusher run base. District IV, Route 801. Granite Construction Co., Watsonville, \$207,319; N. M. Ball Sons, Berkeley, \$226,506; Eaton and Smith, San Francisco, \$232,910; Fredrickson and Watson Construction Co., Oakland, \$235,757; Westbrook & Pope, Sacramento, \$237,527; Chas. L. Harney, Inc., San Francisco, \$245,031; M. J. B. Construction Co., Stockton, \$253,407; Tyson & Watters Co., Sacramento, \$270,027. Contract awarded to Louis Biasotti & Son, Stockton, \$203,371.

ALAMEDA COUNTY—On Jarvis Road, between Dumbarton Road and State Highway Route 69, about 3.4 miles to be graded and surfaced with plant-mixed surfacing on crusher run base. District IV, FAS 1023. Elmer J. Warner, Stockton, \$156,338; J. R. Armstrong, El Cerrito, \$160,455; Lee J. Immel, San Pablo, \$166,883; Granite Construction Co., Watsonville, \$173,263; Ariss-Knapp Co., Oakland, \$185,147; J. Henry Harris, Berkeley, \$203,682; A. S. Jones, Inc., Niles, \$221,423. Contract awarded to Clements & Co., Hayward, \$152,157.

HUMBOLDT COUNTY—Between west boundary of Bull Creek Flat State Park and 7.3 miles westerly, about 7.3 miles to be graded. District I, Route 976. M. Malfitano & Son, Inc., & Macal Improvement Co., Inc., Pittsburg, \$167,232; Tyson & Watters Co., Sacramento, \$180,502. Contract awarded to John Burman & Sons, Eureka, \$161,863.

LASSEN AND MODOC COUNTIES—Between Hayden Hill and State Route 28 near Adin (and

Joint Highway District No. 14) about 13.1 miles to be graded, place crusher run base, and apply prime and seal coats thereon. District II, Route 988, Jr. Hwy. Dist. No. 14. Contract awarded to Harms Bros. & M. W. Brown, Sacramento, \$295,020.

MADERA COUNTY—On Robertson Boulevard, between Lincoln Road and State Highway Route 32, about 5.5 miles to be widened and reinforced with imported subbase material and bituminous treated salvaged surfacing and surfaced with plant-mixed surfacing. District VI, Route FAS 864. Browne and Krull, Palo Alto, \$83,157; R. M. Price Co. and Rex B. Sawyer, Altadena, \$84,859; Elmer J. Warner, Stockton, \$87,269; Brown & Doko, Pismo Beach, \$93,127; Harms Bros. & Miles & Bailey, Madera, \$92,525; A. Teichert & Son, Inc., Sacramento, \$96,644. Contract awarded to Ted F. Baun, Fresno, \$76,791.

MERCED COUNTY—Between Stanislaus County Line and Stevinson, between Livingston and Milliken bridge and Atwater and Winton, about 18.7 miles, constructing shoulders, cement treated base and plant-mixed surfacing. District X, FAS Routes 914, 957, 1058. Granite Construction Company, Watsonville, \$224,831; A. Teichert & Son, Inc., Sacramento, \$226,033; M. J. Ruddy & Son, Modesto, \$245,867. Contract awarded to Frank B. Marks & Sons, Tracy, \$197,243.

ORANGE COUNTY—On Wintersburg Avenue and Los Patos Avenue, between Huntington Beach Boulevard and Coast Highway, about 3.8 miles, to be graded and surfaced with plant-mixed surfacing and bituminous surface treatment to be applied to shoulders. District VII, FAS Route 749. Foster & McHarg, Riverside, \$124,404; Cox Bros. Construction Co., Stanton, \$130,951; Arthur A. Johnson, Laguna Beach, \$135,625; Covina Construction Co., Covina, \$135,708; O'Brien & Bell Constructivo Co., Santa Ana, \$138,812; Roland T. Reynolds, Anaheim, \$157,143; Griffith Co., Los Angeles, \$158,033. Contract awarded to Sully-Miller Contracting Co., Long Beach, \$124,395.

SANTA CRUZ COUNTY—Across Soquel Creek in the town of Soquel, a bridge to be constructed, about 0.1 mile of approaches to be graded and plant-mixed surfacing and penetration treatment applied. District IV, Route FAS 1145. Dan Caputo, San Jose, \$85,709; Grant L. Miner, Palo Alto, \$87,834; Matthew & Jorgenson, Hughson, \$88,826; Chittenden & Chittenden, Auburn, \$91,756. Contract awarded to Granite Construction Co., Watsonville, \$82,645.

SIERRA COUNTY—Between Sierraville and 5.6 miles northerly, about 5.6 miles to be graded and surfaced with road-mixed surfacing. District III, Route FAS 524. Barney H. Stoutenburg, Carson City, \$113,802; Claude C. Wood Co., Lodi, \$125,330; Westbrook & Pope, Sacramento, \$122,067; Clements & Co., Hayward, \$128,915; Huntington Bros., San Anselmo, \$136,397; P. J. Moore & Son and Harms Bros., Sacramento, \$138,629; Tyson & Watters Co., Sacramento, \$143,396; A. R. McEwen & C. M. Syar, Willits, \$143,739; W. H. O'Hair Co., Colusa, \$167,860. Contract awarded to Nevada Constructors, Inc., Reno, \$112,820.

August, 1948

LOS ANGELES COUNTY—On Ridge Route at Saugus Road and at Ventura Road, furnish and install full traffic actuated signal systems and highway lighting systems. District VII, Route 4, Sections F.A. Econolite Corp., Los Angeles, \$32,998; Tri-Cities Electric Service, Oceanside, \$34,632. Contract awarded to California Electric Works, San Diego, \$32,700.

ALAMEDA COUNTY—At San Francisco-Oakland Bay Bridge Toll Plaza, about 0.7 mile, additional truck lanes to be graded and surfaced with plant-mixed surfacing and lighting system to be installed. District IV, Route 5. Ransome Company, Emeryville, \$198,078; J. R. Armstrong, El Cerrito, \$206,321; Fredrickson Bros., Emeryville, \$207,206; Chas. L. Harney, Inc., San Francisco, \$212,894. Contract awarded to Lee J. Immel, San Pablo, \$188,205.

ALAMEDA COUNTY—Over the tracks of the Southern Pacific, Santa Fe, and Key System Railroads and existing ramps, in the City of Oakland, track spans to be waterproofed and ramp spans to be painted. District IV, Routes 5, 69. Foster and Kleiser Co., San Francisco, \$59,086; D. E. Burgess

Co., San Francisco, \$71,717; Atlas Painting Co., Inc., San Francisco, \$73,771. Contract awarded to Pacific Bridge Painting Co., San Francisco, \$40,250.

ALAMEDA COUNTY—Across Arroyo de la Laguna, about three miles north of Sunol, a steel truss bridge to be cleaned and painted. District IV, Route 107, Section B. Atlas Painting Co., Inc., San Francisco, \$2,791; R. W. Reade & Co., Berkeley, \$2,946; M. Williams & Son, Inc., Oakland, \$3,120. Contract awarded to Larry's Painting & Decorating Co., San Francisco, \$2,741.

ALAMEDA COUNTY—Between Centerville and San Leandro, about 6.7 miles, portions of existing pavement to be widened by excavating and placing crusher run base and portions to be surfaced with plant-mixed surfacing over the existing pavement and crusher run base. District IV, Route 69, Sections A,B,S.Ln. Clements & Co., Hayward, \$172,971; Lee J. Immel, San Pablo, \$198,114. Contract awarded to Granite Construction Co., Watsonville, \$171,378.

ALAMEDA COUNTY—On East Shore Freeway between 50th Ave. and 38th Ave. in the City of Oakland; the 42nd Ave. Interchange, consisting of two railroad underpasses, a portion of a railroad overhead, two highway undercrossings, and two highway overcrossings to be constructed and approximately 0.7 mile of roadway to be graded and surfaced with Portland cement concrete pavement and plant-mixed surfacing on cement treated subgrade or crusher run base. District IV, Route 69. Fredrickson & Watson Construction Co. and M. & K. Corp., Oakland, \$1,554,000; MacDonald, Young & Nelson, Inc., and J. H. Pomeroy & Co., Inc., San Francisco, \$1,672,728; Bates & Rogers Construction Corp., San Francisco, \$1,727,019; Stolte, Inc., and The Duncanson Harrelson Co., San Francisco, \$1,735,741; Lee J. Immel, San Pablo, \$1,739,668; A. Soda & Son and Ransome Co., Emeryville, \$1,813,829. Contract awarded to Johnson, Drake and Piper, Inc., Oakland, \$1,487,710.

CONTRA COSTA COUNTY—In the City of Walnut Creek and at the intersection of Route 106 and Pacheco Road, traffic signals and highway lighting to be furnished and installed at three intersections and pavement widening and channelization at one of the intersections. District IV, Routes 75, 106, Sections WIC.C. George Pollock Co., Sacramento, \$27,376; Severin Electric Co., San Francisco, \$28,315; R. Gool & Son, Stockton, \$28,709; Spott Electrical Co., Oakland, \$29,217; H. C. Reid & Co., San Francisco, \$30,194; J. Henry Harris, Berkeley, \$32,386. Contract awarded to Tri-Cities Electrical Service, Oceanside, \$26,480.

CONTRA COSTA COUNTY—On San Pablo Avenue at 13th Street, furnish and place full traffic actuated signal system and highway lighting and construct curbed islands, division strip and plant-mixed raised bars. District IV, Route 14, Section A. Severin Electric Co., San Francisco, \$11,978. Contract awarded to H. C. Reid & Co., San Francisco, \$9,978.

HUMBOLDT AND DEL NORTE COUNTIES—From 2.0 miles south to 0.5 mile north of Humboldt-Del Norte County line, about 2.5 miles to be surfaced with plant-mixed surfacing on cement treated base. District I, Route 1, Sections K.A. Contract awarded to Harms Bros. and C. M. Syar, Sacramento, \$114,288.

HUMBOLDT COUNTY—Across Bull Creek, about 5.4 miles west of Dyerville, the existing steel truss bridge to be redecked with a reinforced concrete slab, and exposed metal surfaces to be cleaned and painted three coats. District I, Redwoods State Park. B. S. McElderry, Berkeley, \$9,086; Jas. H. McFarland, San Francisco, \$11,735; C. C. Gildersleeve, Nevada City, \$11,788; Tom Hull, Eureka, \$12,008; C. E. Johnson, Eureka, \$12,076. Contract awarded to Reed & Tuttle, Redwood Valley, \$8,286.

HUMBOLDT COUNTY—Between Peach Creek and 0.8 mile northerly, about 0.9 mile to be graded and surfaced with base material. District I, Route 46, Section F. O'Connor Bros., Red Bluff, \$94,402; Arthur B. Siri, Inc., and Baldwin, Straub Corp., Santa Rosa, \$109,461; Clifford A. Dunn, Klamath Falls, \$114,550. Contract awarded to Fred J. Maurer & Son, Eureka, \$92,765.

IMPERIAL COUNTY—In the Cities of Calexico and Brawley, about 3.2 miles, plant-mixed surfacing to be placed on existing surfacing and miscellaneous structures to be constructed. District XI,

Routes 26, 187. R. E. Hazard Contracting Co., San Diego, \$95,955. Contract awarded to Basich Bros. Construction Co. and Basich Bros., San Gabriel, \$89,604.

KERN COUNTY—At Canebrake Creek about 11 miles west of junction Routes 57 and 23, a reinforced concrete bridge to be constructed; approaches to be graded and road-mixed surfacing applied thereto. District IX, Route 57, Section K. Contract awarded to Bishop Engineering and Construction Co., Bishop, \$14,454.

KERN COUNTY—Between Derby Street and 0.1 mile west of Meyer Street in Arvin, about 0.6 mile to be widened and bituminous surface treatment applied thereto. District VI, Route 140, Section C. C. E. Young & Co., Bakersfield, \$43,734; Oilfields Trucking Co. and Phoenix Construction Co., Bakersfield, \$49,872. Contract awarded to Griffith Co., Los Angeles, \$37,085.

KERN COUNTY—Between Snow Road and Cawelo, furnishing and installing concrete barrier posts at various locations. District VI, Route 4, Sections D.E. Griffith Co., Los Angeles, \$13,513; Matthew & Jorgenson, Hughson, \$13,776; E. G. Perham, Los Angeles, \$14,706. Contract awarded to C. J. B. Construction Co., Oxnard, \$11,723.

KERN COUNTY—Between Mojave and San Bernardino County line, about 11.5 miles to be graded and surfaced with plant-mixed surfacing on imported borrow base. District IX, Route 58, Sections A,B. Basich Bros. Construction Co. and Basich Bros., San Gabriel, \$150,825; Dicco, Inc., and Dix-Syl Construction Co., Inc., Bakersfield, \$153,732; Cox Bros. Construction Co., Stanton, \$154,588; Fred D. Chadwick, Lynwood, \$156,786; R. A. Erwin, Colton, \$168,776; Jesse S. Smith and A. A. Edmondson, Glendale, \$171,647. Contract awarded to Oilfields Trucking Co. and Phoenix Construction Co., Bakersfield, \$134,983.

KERN COUNTY—At Kern River and at Buena Vista Creek, about 20 miles and 7.5 miles north-east of Taft, an existing timber trestle bridge to be redecked with reinforced concrete slab, and a reinforced concrete box culvert to be constructed. District VI, Routes 139, 140; Sections, A.A. E. S. and N. S. Johnson, Fullerton, \$30,663. Contract awarded to Thomas Construction Co., Newhall, \$26,313.

LOS ANGELES COUNTY—Between 1.6 miles east and 1.6 miles west of Malibu Junction, about 3.2 miles to be graded and surfaced with plant-mixed surfacing on untreated rock base and three bridges to be constructed. District VII, Route 2, Section C. N. M. Ball Sons, Berkeley, \$662,605; A. Teichert & Son, Inc., Sacramento, \$668,422; Chas. MacClosky Co. and C. G. Willis & Sons, Inc., San Francisco, \$705,552; Silva & Hill Construction Co. and Peter L. Ferry & Son and John M. Ferry, Los Angeles, \$726,792; Dicco, Inc., and Dix-Syl Construction Co., Inc., and E. C. Young & Co., Bakersfield, \$741,154; J. E. Haddock, Ltd., Pasadena, \$752,784; Griffith Co., Los Angeles, \$788,410; Winston Bros. Co., Azusa, \$837,691; Claude Fisher Co., Ltd., L. A. and R. S. Crow, Los Angeles, \$852,448. Contract awarded to Peter Kiewit Sons Co., Arcadia, \$658,976.

LOS ANGELES COUNTY—On Hollywood Parkway, at Spring Street, in the City of Los Angeles, a reinforced concrete box girder overcrossing to be constructed. District VII, Route 2. Chas. MacClosky Co., San Francisco, \$194,692; R. M. Price Co., and O. B. Pierson, Altadena, \$194,937; G. W. Peterson, Los Angeles, \$198,303; W. J. Disteli, Los Angeles, \$206,144; Haddock Co., Pasadena, \$214,462; W. E. Byerts, Los Angeles, \$221,179; Spencer Webb Co., Inglewood, \$229,873; Guy F. Atkinson Co., Long Beach, \$243,607; Carlo Bongiovanni, Hollywood, \$275,790. Contract awarded to Oberg Bros. Construction Co., Inglewood, \$193,230.

LOS ANGELES COUNTY—Between White Avenue and Garey Avenue in the City of Pomona, about 0.5 mile to be surfaced with plant-mixed surfacing on existing Portland cement concrete pavement and on new cement treated base. District VII, Route 19. Griffith Co., Los Angeles, \$40,330; R. A. Erwin, Colton, \$41,960. Contract awarded to Cox Bros. Construction Co., Stanton, \$35,246.

LOS ANGELES COUNTY—On Anaheim-Telegraph Road at Greenwood Avenue, on Atlantic Boulevard at Sherbrook Avenue and at Brooklyn Avenue, on Pioneer Boulevard at Artesia Avenue, on Firestone Boulevard at Old River School Road,

and on Carson Street at Bellflower Boulevard, furnish and install traffic actuated signal systems and highway lighting at four intersections; furnish and install fixed time traffic signals at two intersections. District VII, Routes 166, 167, 170, 174, 178, Sections A, A, B, A. Econolite Corp., Los Angeles, \$46,562; California Electric Works, San Diego, \$51,335. Contract awarded to Tri-Cities Electrical Service, Ocean-side, \$44,537.

LOS ANGELES COUNTY—On Rosemead Boulevard between Longden Avenue and Huntington Drive, about 1.2 miles to be resurfaced with plant-mixed surfacing and a curbed median strip to be constructed. District VII, Route 168, Section C. Griffith Co., Los Angeles, \$72,847; J. E. Haddock Ltd. Co., Pasadena, \$74,597; W. E. Hall Co., Alhambra, \$76,978; Peter Kiewit Sons Co., Arcadia, \$80,254; Silva & Hill Construction Co., Los Angeles, \$80,342; Covina Construction Co., Covina, \$80,412; Fred D. Chadwick, Lynwood, \$81,737. Contract awarded to Vido Kovacevich Co., South Gate, \$70,898.

MERCED COUNTY—Between Gustine and San Joaquin River, portions, about 2.7 miles in length, to be graded, surfaced with plant-mixed surfacing on untreated rock base and imported borrow and bituminous surface treatment applied to portions of shoulders and dykes. District X, Route 122, Section Gus, A. Frank B. Marks & Sons, Tracy, \$127,238; Granite Construction Co., Watsonville, \$138,473; M. J. B. Construction Co., Stockton, \$151,030; M. J. Ruddy & Son, Modesto, \$153,179; A. Teichert & Son, Inc., Sacramento, \$161,390; Tyson & Watters Co., Sacramento, \$162,827. Contract awarded to Elmer J. Warner, Stockton, \$118,833.

MONTEREY COUNTY—At Salmon Creek about 18 miles north of San Simeon, a reinforced concrete arch culvert to be constructed and about 0.2 mile of approaches to be graded, imported borrow to be placed and bituminous surface treatment and seal coat applied thereto. District V, Route 56, Section A. Grant L. Miner, Palo Alto, \$99,743; Dan Caputo, San Jose, \$107,477; Granite Construction Co., Watsonville, \$113,457; Chittenden & Chittenden, Auburn, \$151,886. Contract awarded to Matthew & Jorgenson, Hughson, \$93,505.

PLUMAS COUNTY—Between Howells and one-fourth mile west of Keddie and between 1.7 mile east of Chester and east county boundary, a distance of about 27.3 miles, seal coat to be applied. District II, Routes 21, 29, Sections B, C, A. Clements & Co., Hayward, \$40,879; J. Henry Hargis, Berkeley, \$41,412; E. A. Forde, San Anselmo, \$41,749. Contract awarded to Howard B. Folsom, Sacramento, \$35,903.

SAN BERNARDINO COUNTY—Over the tracks of the Santa Fe Railway at Mt. Vernon Avenue, in the City of San Bernardino, the existing steel overhead crossing to be cleaned and painted. District VIII, Route 9. Acme Maintenance Engineering Co., Bell, \$23,499; Atlas Painting Co., Inc., San Francisco, \$23,931; Geo. C. Punton, Chula Vista, \$36,000. Contract awarded to H. W. Kirch & Co., South Pasadena, \$21,367.

SAN BERNARDINO COUNTY—Between Grant Avenue and Highland Avenue, about 1.8 miles to be widened and surfaced with plant-mixed surfacing. District VIII, Route 31, Section Q, S. B. Griffith Co., Los Angeles, \$190,453; R. A. Erwin, Colton, \$192,670; E. L. Yeager, Riverside, \$200,373; Match Bros., Colton, \$215,335. Contract awarded to Geo. Herz & Co., San Bernardino, \$189,261.

SAN BERNARDINO COUNTY—Traffic signal system and highway lighting to be furnished and installed in San Bernardino at intersection of Mt. Vernon Avenue and Rialto Avenue. District VIII, Route 31. Tri-Cities Electrical Service, Oceanside, \$10,722; Ets-Hokin & Galvan, San Diego, \$11,634; Paul R. Gardner, Ontario, \$11,013. Contract awarded to Chas. E. Seymour, Long Beach, \$10,700.

SAN DIEGO COUNTY—Between one-half mile north of San Diego City limits and junction with Murphy Canyon Road, a distance of about 2.8 miles to be resurfaced with plant-mixed surfacing. District XI, Route 77, Section A. Griffith Co., Los Angeles, \$39,441; Daley Corp., San Diego, \$39,972 R. E. Hazard Contracting Co., San Diego, \$41,542.

Contract awarded to V. R. Dennis Construction Co., San Diego, \$38,409.

SAN JOAQUIN COUNTY—Furnishing and installing traffic signals in the City of Lodi at intersections of Cherokee Lane with Lodi Avenue, Pine Street, and Victor Road. District X, Route 4, Section C, Lodi. Del Monte Electric Co., Oakland, \$9,494; R. Goold & Son, Stockton, \$10,025; L. H. Leonardi Electric Construction Co., San Rafael, \$11,968; Chas. I. Cunningham, Oakdale, \$13,244; Collins Electric Co., Stockton, \$13,363; Main Electrical Service, Stockton, \$14,980. Contract awarded to Ets-Hokin & Galvan, Stockton, \$7,632.

SAN LUIS OBISPO COUNTY—At San Luisito Creek and San Bernardo Creek, about 10 miles northwest of San Luis Obispo, 0.2 mile in length, to be graded, surfaced with crusher run base and plant-mixed surfacing and constructing two double reinforced concrete box culverts. District V, Route 56, Section D. Grant L. Miner, Palo Alto, \$44,911; Brown-Doko, Pismo Beach, \$45,682. Contract awarded to O. R. Ochs & Son, San Luis Obispo, \$39,328.

SAN MATEO COUNTY—In the City of San Mateo, between Peninsular Avenue and Poplar Avenue, about 0.4 mile to be graded and bituminous surface treatment to be applied to imported borrow base. District IV, Route 68. Frank W. Smith, San Mateo, \$22,780; E. A. Forde, San Anselmo, \$24,793; Guy F. Atkinson, South San Francisco, \$26,839. Contract awarded to L. C. Smith, San Mateo, \$20,165.

SIERRA COUNTY—For redecking a bridge across the North Fork of North Fork of Yuba River at Downieville. District III, Route 25, Section A. C. C. Gildersleeve, Nevada City, \$9,438; James H. McFarland, San Francisco, \$12,717; L. V. Cantrell, Berkeley, \$14,648. Contract awarded to C. M. Allen, Fairfield, \$8,911.

SONOMA COUNTY—Between 2 miles north of Santa Rosa and 0.7 mile south of Santa Rosa, furnishing and installing traffic signal systems and highway lighting systems. District IV, Route 1, Section E, S. R. O. Abbott Electric Corp., Emeryville, \$39,298; Karl F. Stolling, Santa Rosa, \$41,035; Del Monte Electric Co., Oakland, \$41,776; L. H. Leonardi Electric Construction Co., San Rafael, \$43,615; Tri-Cities Electrical Service, Oceanside, \$43,764; California Electric Works, San Diego, \$43,828; H. C. Reid & Co., San Francisco, \$48,667; Severin Electric Co., San Francisco, \$55,038. Contract awarded to H. S. Tittle Co., San Francisco, \$35,277.

SONOMA-MARIN COUNTY—Between Petaluma and Ignacio, about 11.5 miles in length, pavement joints to be cleaned and sealed. District IV, Route 1, Sections C, A. A. R. Reid Co., San Francisco, \$11,955. Contract awarded to Concrete Pavement Maintenance Co., San Francisco, \$11,771.

STANISLAUS COUNTY—Widening 0.2 mile of highway with plant-mixed surfacing on untreated rock base and existing pavement to be surfaced with plant-mixed surfacing in the City of Oakdale. District X, Route 66. Beerman & Jones, Sonora, \$14,598. Contract awarded to M. J. Ruddy & Son, Modesto, \$12,469.

TULARE COUNTY—Between one mile south of Tipton and Tulare Airport, about 7.9 miles to be graded and 5 reinforced concrete bridges and miscellaneous structures to be constructed. District VI, Route 4, Section B. Guy F. Atkinson Co., South San Francisco, \$632,332; Fredrickson Bros., Emeryville, \$680,006; A. Teichert & Son, Inc., Sacramento, \$683,212; J. E. Haddock, Ltd., Pasadena, \$692,411; Peter Kiewit Sons Co., Arcadia, \$69,797; Charles MacClosky Co. and C. G. Willis & Sons, Inc., San Francisco, \$717,827. Contract awarded to N. M. Ball Sons, Berkeley, \$593,661.

YOLO AND SACRAMENTO COUNTIES—Between Woodland and Sacramento and south of Sacramento, about 7.5 miles to be surfaced with plant-mixed surfacing. District III, Routes 50, 99, 11, Sections E, F, B, F. McGillivray Construction Co., Sacramento, \$31,412; Brighton Sand and Gravel Co., Sacramento, \$32,432. Contract awarded to A. Teichert & Son, Inc., Sacramento, \$27,767.

F. A. S. County Projects

DEL NORTE COUNTY—Across Hunter Creek about 3 miles north of Klamath, a bridge and about 0.24 mile of approaches to be constructed. District I, FAS Route 984. Contract awarded to Baldwin Straub Corp. and Arthur B. Siri, Inc., San Rafael, \$56,767.54.

KINGS COUNTY—Between Kings River and Fresno County line, about 0.7 mile, imported borrow and crusher run base to be placed over existing roadbed and surfaced with plant-mixed surfacing. District VI, Route FAS 568. Browne and Krull, Palo Alto, \$43,890; Brown-Doko, Pismo Beach, \$44,110; Volpa Brothers, Fresno, \$50,174. Contract awarded to Anderson Co., Visalia, \$42,978.

MENDOCINO COUNTY—On Willis-Fort Bragg Road, between 5.8 miles easterly and 7.4 miles easterly of Noyo, a distance of about 1.6 miles, to be graded, imported base material to be furnished and placed and penetration treatment applied thereto. District I, FAS Route 982. Harms Bros. and C. M. Syar, Sacramento, \$92,519; John Burman & Sons, Fort Bragg, \$105,248; Huntington Bros., San Anselmo, \$108,079; E. C. Young & Co., Bakersfield, \$116,690; Tyson & Watters Co., Sacramento, \$119,422. Contract awarded to A. G. Raish Co. and Staring & Galbraith, San Francisco, \$82,465.

MONTEREY COUNTY—On San Juan-Watsonville Road between 4.89 miles and 6.45 miles east of Pajaro, about 1.6 miles to be graded and surfaced with plant-mixed surfacing on crusher run base. District V, FAS Route 595. Elmer J. Warner, Stockton, \$143,730; A. Teichert & Son, Inc., Sacramento, \$146,968; John C. Gist, Sacramento, \$184,603. Contract awarded to Granite Construction, Watsonville, \$128,354.

SAN BERNARDINO COUNTY—On Etiwanda Avenue, between Valley Boulevard and Foothill Boulevard, about 2.6 miles to be graded and surfaced with plant-mixed surfacing on imported borrow base. District VIII, FAS Route 698. R. A. Erwin, Colton, \$154,942; E. L. Yeager, Riverside, \$164,203; Griffith Co., Los Angeles, \$166,532; Peter Kiewit Sons Co., Arcadia, \$168,043; J. E. Haddock, Ltd., Pasadena, \$176,202; Silva & Hill Construction Co., Los Angeles, \$183,735; Morrison-Knudsen Co., Inc., San Francisco, \$193,048. Contract awarded to Match Bros., Colton, \$140,510.

SAN JOAQUIN COUNTY—On Peltier Road, between Davis Road and Bender Road, about 0.8 mile to be graded and surfaced with plant-mixed surfacing on untreated rock base. District X, Route 901. Gordon L. Capps, Stockton, \$51,439; Tyson & Watters Co., Sacramento, \$54,029; A. Teichert & Son, Inc., Sacramento, \$54,247; Louis Bissotti & Son, Stockton, \$55,470; Asta Construction Co., Rio Vista, \$56,971; Browne and Krull, Hayward, \$57,853; Munn & Perkins, Modesto, \$58,550; M. J. B. Construction Co., Stockton, \$59,828. Contract awarded to Claude C. Wood Co., Lodi, \$47,973.

TRINITY COUNTY—Between Route 20 in Weaverville and Brown's Mountain, 6.3 miles in length, seal coat to be applied. District II, FAS Route 1089. Clements & Co., Hayward, \$13,961. Contract awarded to Morgan Construction Co., Redding, \$13,087.

TULARE COUNTY—Across Peoples Ditch, about 4 miles north of Exeter, a bridge to be constructed. District VI, FAS Route 1140. Thomas Construction Co., Newhall, \$37,225; Chittenden & Chittenden, Auburn, \$42,826; Matthew & Jorgenson, Hughson, \$45,694. Contract awarded to Trewitt, Shields & Fisher, Fresno, \$34,739.

YOLO COUNTY—Across Cache Creek about one mile north of Rumsey, a bridge to be reconstructed. District III, FAS Route 1153. Grant L. Miner, Palo Alto, \$79,927; Chittenden & Chittenden, Auburn, \$80,425; Minton & Kubon, San Francisco, \$85,243; Matthew & Jorgenson, Hughson, \$86,942. Contract awarded to Chas. T. Brown Co., San Pablo, \$78,000.

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Governor of California

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Director of Public Works

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Acting Deputy Director

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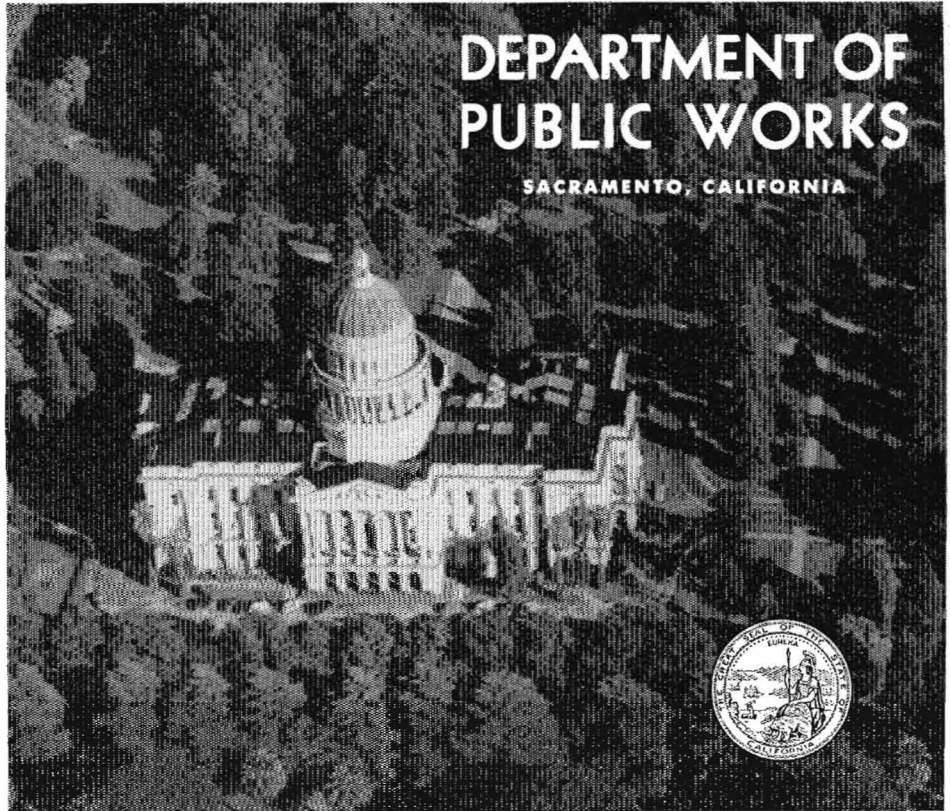
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**DEPARTMENT OF
PUBLIC WORKS**

SACRAMENTO, CALIFORNIA



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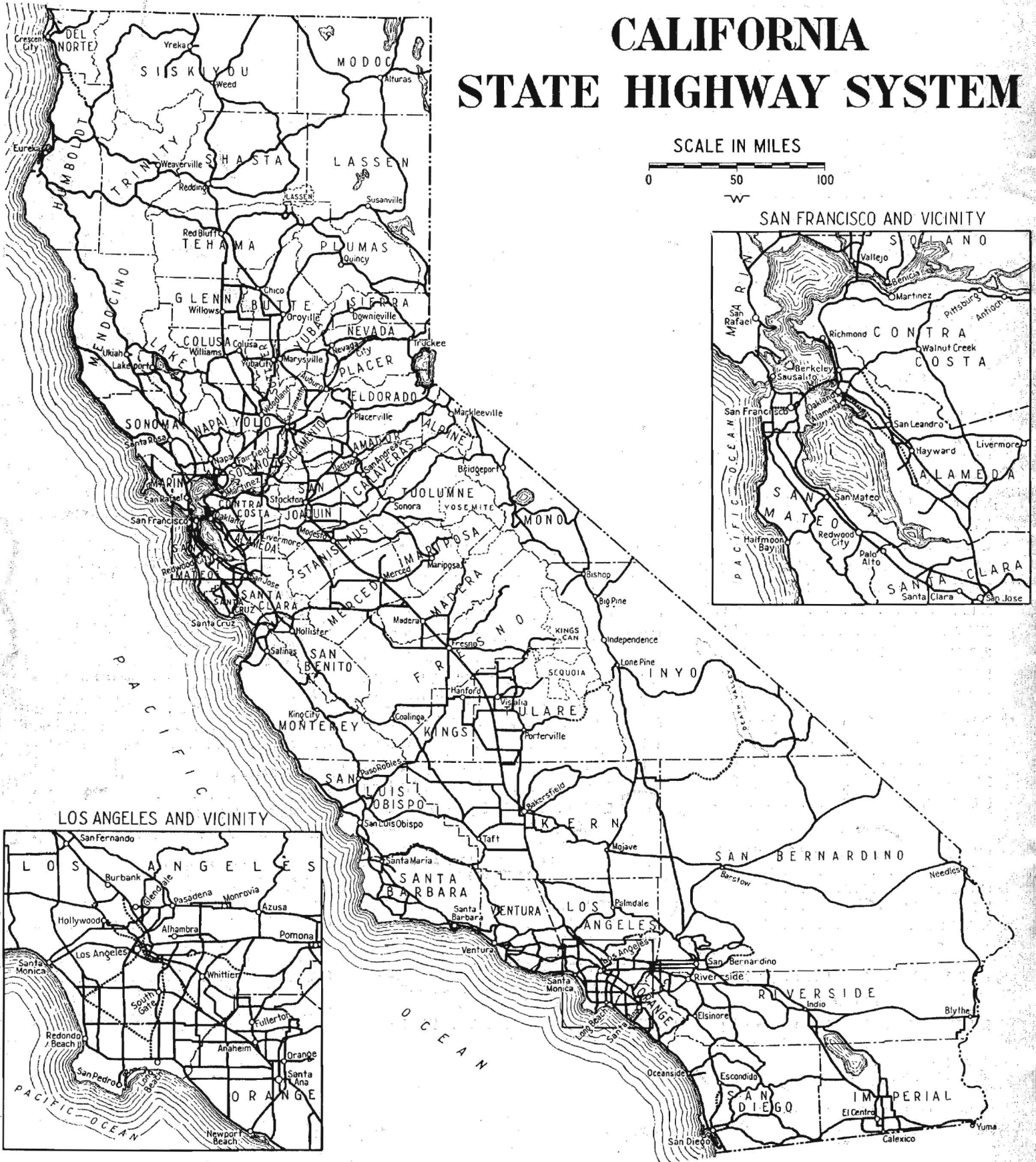
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W. K. DANIELS Assistant State Architect (Administrative)
P. T. POAGE Assistant State Architect (Design and Planning)

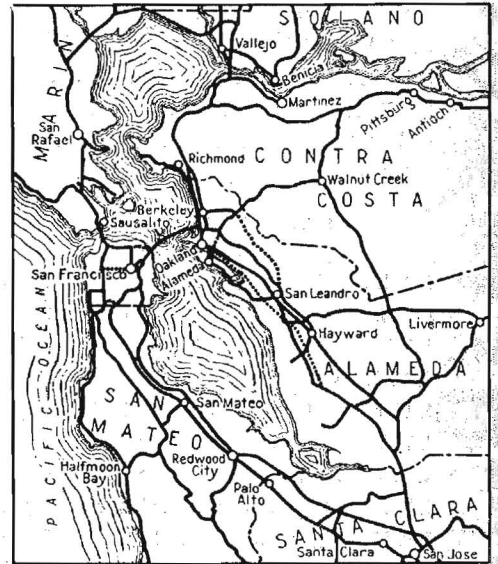
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CALIFORNIA STATE HIGHWAY SYSTEM



SAN FRANCISCO AND VICINITY



LOS ANGELES AND VICINITY

