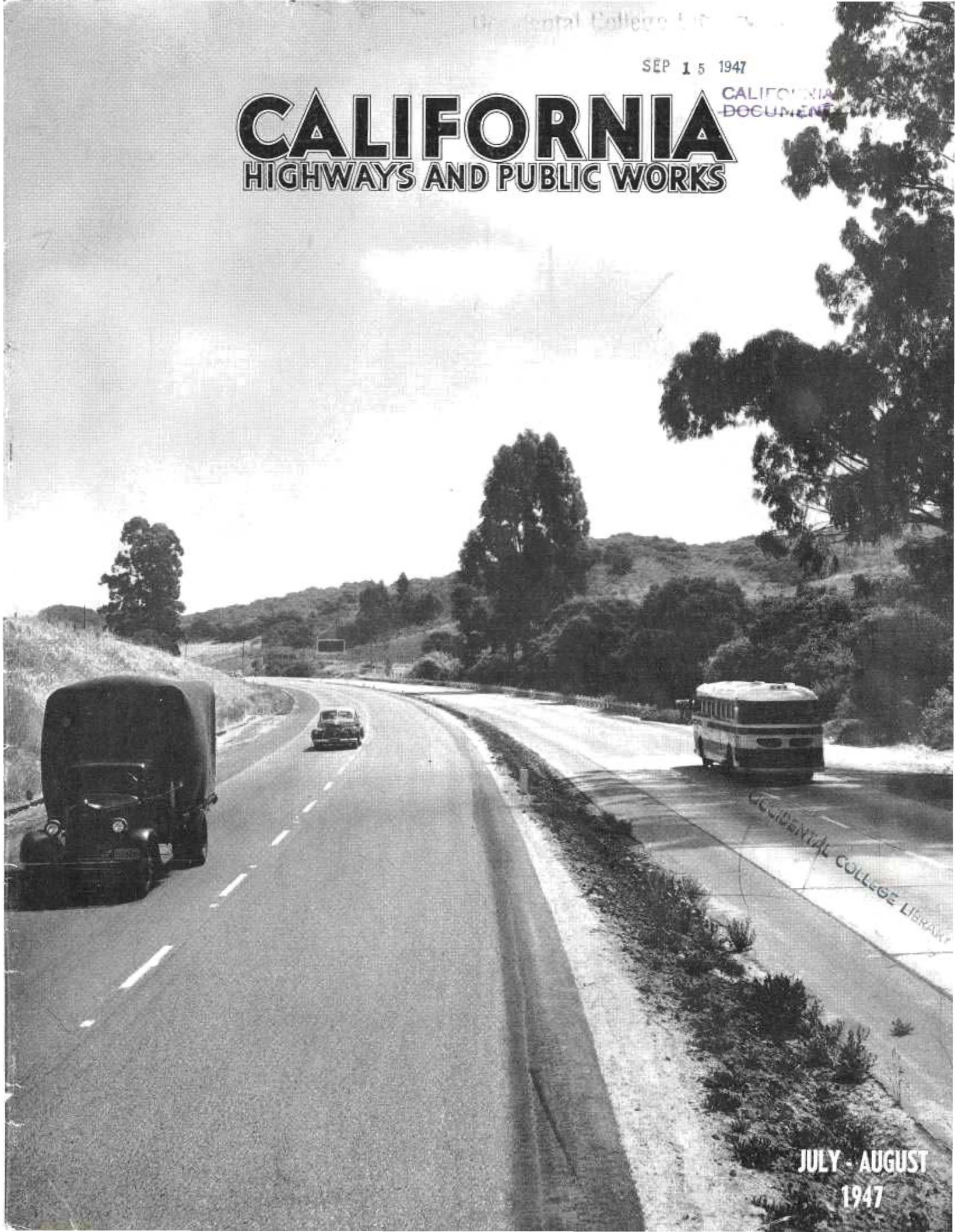
CALIFORNIA
HIGHWAYS AND PUBLIC WORKS



JULY - AUGUST
1947

CALIFORNIA HIGHWAYS AND PUBLIC WORKS

Official Journal of the Division of Highways, Department of Public Works, State of California [PRINTED IN U.S.A.]

C. H. PURCELL, Director | GEORGE T. McCOY, State Highway Engineer | K. C. ADAMS, Editor

Published in the interest of highway development in California. Editors of newspapers and others are privileged to use matter contained herein. Cuts will be gladly loaned upon request. Address communications to California Highways and Public Works, P. O. Box 1499, Sacramento, California

Vol. 26 | JULY-AUGUST 1947 | Nos. 7, 8

TABLE OF CONTENTS

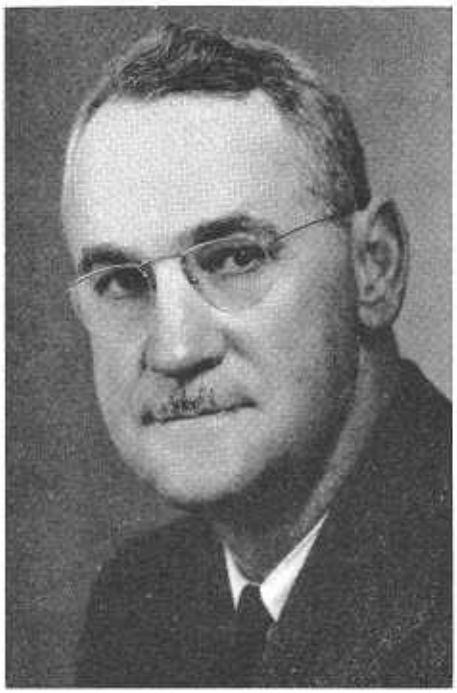
Legislation Provides $76,000,000 Annually For New Construction on California State Highway System

WITH the signing by Governor Earl Warren of the Collier-Burns highway financing bill, enacted by the Legislature in the closing hours of its 1947 Session, the Division of Highways is assured of approximately $76,000,000 yearly for new state highway construction.

In addition, the cities will receive $10,000,000 more annually for use on major city streets and the counties will get the same amount for the improvement of county roads.

The Collier-Burns Act increased the gasoline tax and diesel tax by 1½ cents per gallon and provides additional revenues from an increase in registration fees and weight fees and a driver license fee.

As a result of the new legislation, the Division of Highways will be enabled to build more urgently needed multiple lane divided highways which will reduce California's excessively high traffic accident toll.



Geo. T. McCoy, State Highway Engineer

Announcing that the Division of Highways has plans and specifications for two and one-half years of highway development prepared in advance and is in a position to launch its program without delay, Governor Warren said:

"The Collier-Burns Act can be considered an important milestone in the life of our State.

"I am sure it is legislation which the people of California will welcome for it will keep our State among the most progressive and forward looking states in the Union.

"This legislation will go far toward relieving highway congestion and taking California out of the category of having the worst traffic accident record in the country.

"Our highway program is an engineering program and it must be developed along sound engineering lines. It can not be made a political program. We are not going to have any too much money to do the important highway job which confronts us."

Commenting on the Collier-Burns Act, State Highway Engineer George T. McCoy said:

"During July, the first month of the current fiscal year, there was advertised

Looking northerly toward San Francisco from Crazy Horse Summit, Monterey County, on newly completed four-lane divided highway

Governor Warren signs Collier-Burns Highway Act. From left to right, standing: Assemblyman Albert C. Wollenberg, Richard M. Zettel, Assemblyman Marvin Sherwin, Senator T. H. DeLap, Assemblymen Michael J. Burns, Thomas A. Maloney, Randolph Collier, Jr., Senator James J. McBride, Assemblyman M. Philip Davis, Senator Randolph Collier, Assemblymen Thomas M. Erwin, Thomas W. Caldecott, Senators Chris N. Jespersen, Oliver J. Carter, Thomas McCormack, President pro Tempore Harold J. Powers, Assemblymen George Miller, Jr., Stewart L. Hinckley, Senators Charles Brown, Arthur H. Breed, Jr., Assemblyman Robert C. Kirkwood, Senator Jesse M. Mayo, Assemblyman John L. E. Collier, Senators Ben Hulse and George J. Hatfield. Seated—Governor Earl Warren

for contract bid a little more than $7,000,000 of state highway construction work. This gets off to an early start an accelerated program of highway construction in California. While the full effect of the increased income for state highways will not be apparent until the next (1948-1949) fiscal year, the increased gasoline and diesel tax and the driver license fee all took effect the first of July, 1947, which will provide funds for increased construction work during the last half of the present fiscal year.

"The work which is being awarded to contract early in the fiscal year is widely distributed throughout the State. When completed it will add to California's system of multiplé lane highways and will replace several currently inadequate and unsafe bridges.

ADVANCE PLANNING SPEEDED

"It has been estimated that under the provisions of the Collier-Burns Highway Act there will be available for state highway construction an average of $76,000,000 a year during the next 10 years.

"The entire act will not become operative, however, until January 1, 1948, and will not become fully effective until the next fiscal year.

"The Division of Highways has already speeded up advance highway planning that had been started shortly after the end of the war. A carefully worked out and orderly program of highway construction is being rapidly developed with the view of improving the critically congested sections of the State Highway System as rapidly as funds become available. At the same time a program of replacement of weak and inadequate bridges, as well as improvement of lateral and recreational highways, will be under way.

"California has already started upon the greatest highway construction program in its history. The improved motor transport service that will result from the construction of more and more miles of multiple lane highways, safe and adequate bridges, the improvement of highways into the State's recreational areas and providing access to untouched natural resources, and will provide spark and impetus to an ever expanding state economy."

(Continued on page 7)

Likes Our Highways

Freehold, New Jersey
June 28, 1947

Mr. C. H. Purcell, Director
Department of Public Works
Sacramento, California

Dear Mr. Purcell: I have made more than 50 trips to California; sometimes have spent more than a year there. I just returned from there. During my stay of about three months I naturally drove over many miles of your roads.

I often speak of your good roads. I would like to know more about your highways and desire to subscribe to your official journal. I may be able to help some of my friends emulate your ideas, and build and keep in repair good roads and better roads through the use by me of your Journal.

Yours very truly,

BENJ. C. WARNICK

Progress on Cabrillo Freeway

By EARL E. SORENSON, District Construction Engineer

SAN DIEGO is extremely fortunate in having, located in its geographic center, Balboa Park, 1,400 acres in area, a large portion of which is still in a semiprimitive stage.

Cabrillo Canyon and Powderhouse Canyon extend the full length of the park in a northerly and southerly direction with numerous short arroyos branching out at right angles to the mesas between. This natural terrain is peculiarly adapted to the economical construction of a freeway. The arroyos, combined with short structures for cross traffic, form a natural distribution system to all parts of the city.

The Division of Highways has had the long range planning of the completed freeway in mind for a number of years and all improvements made in the past, over the route from "A" Street to the north city limits, have been arranged to fit into the final completed improvement, which is now nearing completion.

CABRILLO ARCH BRIDGE

The only existing structure which could be utilized in the ultimate plan was the historic Cabrillo Arch Bridge on Laurel Street, built for the 1916 exposition. This bridge now forms the main cross-town artery.

The freeway project involved the construction of 15 additional bridges at the following locations: Date Street, Quince Street, Redwood Street, Upas Street, Robinson Street, University Avenue, Washington Street at Sixth, Washington Street at Tenth, Pascoe Street, Sixth Street, two structures on the Mission Valley interchange, two bridges across the San Diego River, and a bridge across Friar's Road.

The first bridge forming a part of the long range plan, was constructed across Washington Street at Sixth Street in 1940, and the final structures at the Mission Valley interchange will be completed this year.

PROGRESS HAS BEEN RAPID

Many of the salient features of these improvements, together with interesting photos showing construction oper-

Looking north across Mission Valley and showing interchange and San Diego River bed

Looking south toward Pascoe Street, Washington Street, and University Avenue bridges

ations at the start of the grading operations, were printed in the November-December, 1946, issue of California Highways and Public Works, when a discussion of the improvement of Route 77 was made by R. A. Hayler. Progress on the freeway portion since then has exceeded expectations in most phases of the work, with a few delays on special items due to shortage of labor and material. The accompanying photographs illustrate the magnitude of the work and also many of the special features.

One of these which we believe to be unique is the provision for equestrian traffic. Balboa Park Canyons and timbered hillsides form a natural setting for the bridle paths, which are used yearly by thousands of horseback riding enthusiasts. The Date Street Bridge provides a separate "fenced-in" lane for horses only. From here, the trail meanders over the hills of the West Park and again crosses the freeway over the Upas Street equestrian overpass built exclusively for equestrians and pedestrians and giving access to many miles of trails in the East Park.

The major portion of the earth moving, involving in excess of one and one-half million cubic yards was handled by tractors and scrapers. Basich Bros. employed scrapers of up to 32 yards in capacity on the northerly unit and in some cases moved earth a distance of 4,000 feet economically by this method.

Looking south from Laurel Street Bridge

Five thousand-gallon water trucks were used to supply water for compaction on the north unit, while a pipe line was used from University Avenue south. Both methods were successful and peculiarly adapted to the conditions where used. In both cases, water was introduced into the earth immediately following scarifying and prior to loading into the scrapers. This method resulted in better distribution and more uniform water content and also facilitated loading.

The installation of the sprinkling system, to water the planting from Washington Street south, is well advanced. The extent of this planting is indicated by the four-inch main supply lines which are needed to supply sufficient water to the numerous sprinklers and risers. It is anticipated that the planting will be completed and well propagated before the end of the year.

MOST STRUCTURES COMPLETED

As previously stated, the separation structures are completed with the exception of the two forming a part of the Mission Valley interchange. Scarcity of some critical materials are responsible for retarded progress, but


PACIFIC OCEAN
Mission Bay
LINDA VISTA
North City Limits
San Diego River
Interchange
Richmond Street
Laurel Street
Sixth Avenue
BALBOA
PARK
Boulevard
Park
U.S. NAVAL HOSPITAL
Ash Street

Upper—Looking south across Mission Valley. Friars Road Bridge in foreground

Lower—Concrete paving operations through Linda Vista

it is expected that this situation will be remedied in the near future. **The location of the structures are shown in the accompanying aerial photograph.** Another photograph shows the Mission Valley interchange bridges under construction and also the progress on other phases of the work at this location.

A central mixing plant for introducing cement into selected material, to form the four-inch cement stabilized base, has been constructed on the north end of the job. The plant, consisting of crushing and screening units and a Barber Greene mixing plant, has a capacity of 100 cubic yards per hour and has already completed the mixing of the stabilized material for over 50 percent of the section north of Mission Valley.

The selected material is obtained from a highway cut at the north end of the project and is giving excellent results, showing a strength of up to 500 pounds per square inch at seven days, using 4 percent cement and 12 percent moisture. The base course is being placed using a Barber Greene spreader with the strike-off screed controlled by a wheel attachment riding the side forms. No subsequent cutting or shaping is necessary and the emulsified asphalt seal is placed directly after the rolling and compacting has been completed.

This stabilized base course is being laid on eight inches of selected material or imported borrow, forming the support for an eight-inch slab of concrete.

POURING CONCRETE SLAB

Pouring of the concrete slab is now under way and about 75 percent complete from Mission Valley to north city limits. Aggregate is being produced from Mission Valley pits and batched to the mixer through bunkers and automatic scales. Bulk cement is being used, which is placed in the aggregate at the batching plant after being weighed by electrically controlled scales.

The mixing is done on the grade by a 1½-yard Multi-Foote mixer. After depositing the concrete on the grade, it is spread by a Jaeger screw spreader, tamped by a Lakewood tamper and finished by a Johnson power float. An innovation in edge consolidation has been worked out by operating two conventional vibrators through a power take-off from the engine on the Jaeger spreader. Excellent results in densifying the concrete along the headers is being obtained. Curing is by means of an earth and water blanket.

The number of side forms required to place both stabilized base and concrete pavement in a continuous operation, in the volume planned by the contractor, was so large that it was uneconomical and impractical to obtain them. The center dividing curbs and gutters are therefore being placed prior to stabilization and paving. The subgrade shaper, cement stabilized base spreader and concrete equipment are operated with the gutter supporting and gauging the one edge. This reduces the side forms required for each lane to one line and permits the contractor to extend his operations over sufficient distance to allow the various operations to continue smoothly without overlapping or delay. This method also eliminates the objectional lateral movement or rocking of the side forms due to lateral stresses, set up by the spreader screw and also the walking beams of the finisher. This trouble is often encountered when operating on two lines of side forms.

WORK EXPEDITED

In order to expedite the work and to operate more economically on paving operations, Basich Bros. Construction Company and Mittry Bros. entered into a joint agreement for handling the stabilizing and paving operations on the two adjoining contracts and this work will be accomplished without change in equipment or crews. This arrangement will also permit a wider selection of operating areas so that pavement can be placed, without intervening shut-downs, at locations as rapidly as they become available. Rapid progress is anticipated with an average production of 650 cubic yards of concrete per shift.

The intimate and overlapping nature of the construction operations on this series of projects and the fact that as many as six separate contracts have been carried on simultaneously have made necessary careful correlation of the work and very close cooperation between contractors. In view of this condition, as well as difficulties in securing materials and labor, the progress to date has been very gratifying and no appreciable overruns in the various completion dates are anticipated.

$76,000,000 Annually For New Construction On State Highways

(Continued from page 2)

The Collier-Burns Highway Act incorporated many of the major features of the original Senate Bill No. 5 introduced by Senator Collier as a result of the report made by the Joint Fact-Finding Committee on Highways, Streets and Bridges, following a two-year study as a legislative interim body.

The new law, like Senate Bill No. 5, establishes a primary system of county roads in each county, limited to not more than 50 percent of the total mileage of county roads, and designates the balance of county roads as "the secondary road system" in each county. It also requires each county to consolidate its road administration under a single road administrator, who must be a registered civil engineer or a person approved as qualified and competent by the board of supervisors. No allocation or payment of highway funds may be made to a county until such consolidation has been accomplished.

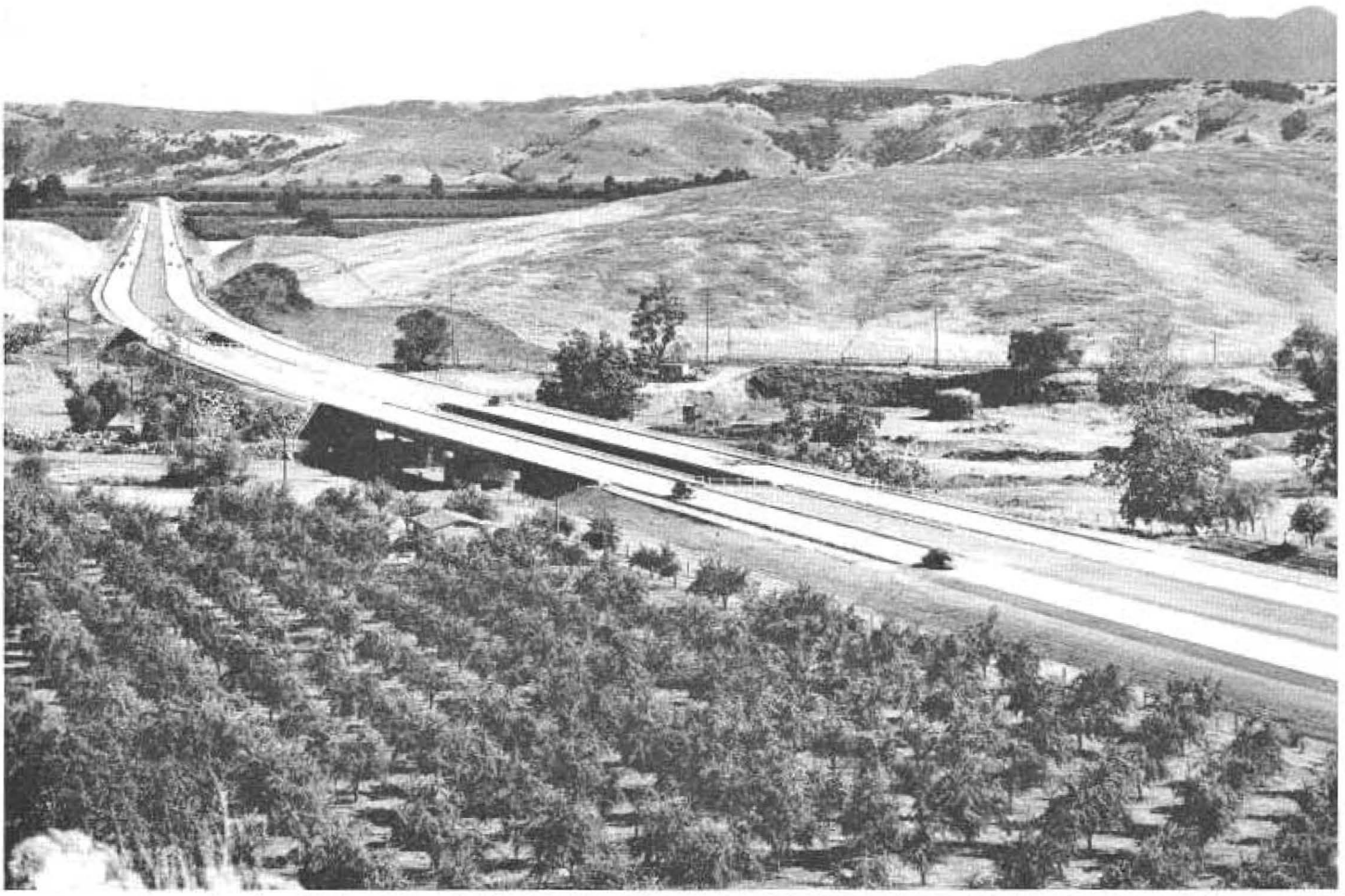
The new law also clarifies a system of major city streets in each city to consist of those streets of greatest general city importance, and places those city streets not included in the major city street system in the secondary city street system.

Proper accounting, reports and audits are required from both county and city authorities in the expenditure of highway funds allocated to them by the act.

Also retained from Senate Bill No. 5 is the feature creating the Highway Users Tax Fund, to which all highway revenues, after deducting administrative costs, will be assigned. Allocations from the Highway Users Tax Fund to cities, counties and the State will be made in accordance with a definite formula, embodied in the measure.

From the gasoline tax revenues, cities and counties, under this formula, will receive sums equivalent to the return from 2 cents of the state tax of

(Continued on page 26)



Near its southern end, where it joins El Camino Real at Ford Road seven miles south of San Jose's central business district, the New Bayshore Freeway Extension crosses Coyote Creek on a center-tiered span and then, at the far left, bridges Coyote Road

New Link of Bayshore Highway Through San Jose Is Officially Opened to Traffic

MEMBERS of the California Highway Commission joined with officials of Santa Clara County and of the City of San Jose in dedicatory ceremonies marking the opening to traffic on June 19th of the newly-completed eight-mile extension of the Bayshore Highway through East San Jose.

Constructed at a cost of $2,865,000, the new highway extends from East Santa Clara Street to Monterey Highway at Ford Road. It will relieve traffic congestion in the downtown section of San Jose.

Representing C. H. Purcell, Director of Public Works and Chairman of the Highway Commission, Harrison R. Baker, Commissioner from Pasadena, hailed the project as an important milestone in the State's postwar highway program.

"This highway," he said, "is part of an overall plan that will link San Jose to Oakland and San Francisco by two great Freeways—the Bayshore and Eastshore Highways."

The new road is a four-lane highway with a 36-foot dividing strip. Provisions have been made to eventually widen the highway to six or eight lanes.

Russell E. Pettit, manager of the San Jose Chamber of Commerce, was master of ceremonies at the highway opening. Taking part in the program were: E. O. Wool, chairman of the Santa Clara County Board of Supervisors; Frank M. Shay, chairman of the Central Coast Council, California State Chamber of Commerce; Edward V. McIntosh, president of the San Jose Chamber of Commerce, and Mayor Albert J. Ruffo participated.

Upper—Northbound motorists approaching San Jose must enter the Ford Road Interchange at the southern terminus of the new Bayshore Freeway Extension, where it joins El Camino Real. Here they have the alternative of turning left, under the overhead structure, toward the business district of San Jose, or proceeding straight ahead along the freeway extension, which passes through the outskirts of San Jose on the way to San Francisco or Oakland. Center—Approximately midway in the new Bayshore Freeway Extension, passing through the outskirts of San Jose to connect Bayshore Highway with El Camino Real south of the city, is this gentle, 3,000-foot radius curve. Lower—Near its northern terminus the new Bayshore Freeway Extension, skirting San Jose in connecting Bayshore Highway with El Camino Real to the south of the city, passes through the Santa Clara Avenue interchange structure. In this view, looking north, the freeway leads straight ahead to San Francisco and Oakland, while the road to the right joins Santa Clara Avenue leading west to San Jose's business district or east to Alum Rock Park

Portion of Bayshore Freeway Expected To Be Completed Early Next Year

By H. A. SIMARD, Associate Highway Engineer

THE GRADING and paving of a five-mile portion of the Bayshore Freeway between South San Francisco and Broadway Avenue in Burlingame, one of the largest single contracts ever let by the Division of Highways, amounting to $3,250,000, is progressing at a rapid rate with completion early next year being assured.

This project was originally planned as an expansion of the existing four-lane undivided Bayshore Highway. However, the City of San Francisco had under execution a $20,000,000 expansion program for its airport, Mills Field. After considerable negotiation between the city and the State, the present route for the freeway to the west of the present road was adopted. This allows an additional 2,600 feet westward for the expansion of the airport.

This freeway is being constructed as a six-lane divided highway. The division strip, 36 feet in width, is sufficiently wide to provide for two additional traffic lanes when traffic conditions justify. The pavement to be placed under this contract consists of two separate roadways 36 feet in width surfaced with four inches of asphalt concrete on eight inches of crusher run base.

MUD DEPTHS OVERCOME

In general, the project traverses reclaimed marsh and tidelands which have for a number of years been used for cattle grazing and the growing of hay crops. Underlying these reclaimed lands are mud depths varying from 0 to 60 feet so that throughout most of the project very unstable foundation conditions are encountered. Embankments for the new highway have an average height of seven feet. In order to accelerate the anticipated settlement of these embankments throughout the unstable areas, an overload of two feet above profile grade is being placed. This overload is removed after a minimum waiting period of 30 days in order that the subgrade can be prepared for the pavement.

In some of the deeper mud areas and at the approaches to proposed traffic interchange structures, the foundations for which are now being constructed under a separate contract, the sand drain method for consolidation of the underlying mud is being

Here a five-yard truck is spreading sand blanket over sand drains

Fan sprays on 4,500-gallon water truck mounted on Euclid truck unit in operation

used. In other structure locations or approaches where the mud depths are less than 20 feet the mud is being stripped before the placement of embankment material. Where no foundation treatment is being used the embankments are placed on the original ground at a slow rate so that it will consolidate without being displaced.

SAND DRAINS NECESSARY

The sand drains referred to in the above paragraph consist of a vertical hole 18 inches in diameter extending to relatively firm bottom and backfilled with a carefully graded sand. Firm bottom is generally defined as material having a moisture content of 25 percent or less. The drains, placed on 10-foot centers in order that there is a drain for each 100 square feet of fill area, are expected to provide a means of relief for the subsurface water as the fill loads are increased, thus permitting consolidation of the mud during construction; a consolidation which normally would continue after completion.

The total estimated quantity of vertical drains to be constructed is 235,000 lineal feet, with the depths ranging from a minimum of 15 feet to a maximum of 60 feet in the deepest marsh areas.

The method of installation on this project consists of driving an 18-inch diameter mandrel equipped with a bottom plate to the required depth and introducing the sand backfill by means of a hopper at the top. Air under pressure of 100 p.s.i. is then admitted at the top and as the mandrel is withdrawn, the backfill material is forced past the free hanging bottom plate and into the hole.

Pile driving rig for constructing sand drains

DRIVING OF MANDREL

Driving of the mandrel is accomplished by means of a crawler-mounted 2½ yard Lima crane, with six feet extra length added to the crawler tracks to take care of counterbalance, equipped with 80-foot leads and an air-driven hammer. Prior to placing sand drains, it was necessary to place a "working table" of selected material to a thickness of from 2 to 3 feet over the marshes in order to provide support for this equipment. Nevertheless, it was still necessary to use heavy timber mats under the rig in the deeper mud area at the northern end of the project.

After the completion of sand drains in each area treated, the next order of work is the placing of a 12-inch layer

of sand fill material over the entire width of fill at the tops of the vertical drains. The purpose of this blanket is to provide a means of release for the subsurface water brought up through the vertical drains. Embankments were constructed by placing subsequent lifts of selected material on the sand blanket.

The maximum rate of embankment construction was limited by specifications to one foot per day and three feet during any one week. The actual rate of loading in the areas treated with sand drains was determined through observations of results obtained by means of settlement platforms and pore pressure installations.

MARSH LAND PROBLEMS

The settlement platforms, 3 feet x 4 feet x 3 inch dimensions, were placed on the original marsh prior to the start of construction. A section of iron pipe was attached to each platform with the top of the pipe kept above the top of the fill by the addition of lengths as the fill heights were increased. The rate of settlement and total consolidation are readily obtained by means of elevations taken on the tops of the pipes. Permanent installations are planned which will permit future observations after completion of the project.

Hydrostatic pressures developed at various depths in the marsh areas underlying the embankments are observed by means of equipment designed and provided by the Materials and Research Department.

Briefly, these pressure measuring installations consist of well points driven to the desired depths and connected to compound gauges outside the toe of the fill by means of iron pipe and copper tubing.

Pressures as high as 10 p.s.i. are developed during loading of the embankments, gradually decreasing to normal as the subsurface water is released through the sand drains and drainage blanket.

MATERIAL IMPORTED

By correlating the rate of consolidation, as determined from the settlement platforms, with the pressures developed at the well points, the rate of application of additional lifts is determined, with the result that excessive pressures (and consequent later displacement or failure) should be avoided.

Since the area traversed by this freeway construction is marshy with no material within the limits of the right of way available for the embankment construction, it is necessary to import material for this purpose. At the time the preliminary report and special provisions for the contract were being written, Macco Corporation & Morrison-Knudsen Company, Inc., were hauling material to expand Mills Field Airport from a borrow pit approximately three miles west of the center of the proposed project over a private haul road which crosses El Camino Real, Southern Pacific Railroad and Bayshore Highway on overhead structures. This material deposited on Mills Field was being paid for by the cubic yard from cross-section measurements of the borrow pit.

50,000 TONS OF BORROW PER DAY

It appeared likely that this same construction company would submit a favorable bid for this freeway construction since it was sitting astride the project with materials and equipment at hand to do the job. It was, therefore, decided to pay by the ton for the approximate 2,000,000 cubic yards of borrow required in order to accurately segregate the material going to two jobs from the same source. The maximum amount of borrow hauled in any one 18-hour day was 50,000 tons.

This amount of material was hauled in large dirt moving units composed of Euclids netting 22 tons, Dixon wagons netting 25 tons and Peterbilts netting 47 tons. These dirt moving units are loaded at the borrow pit with 2½ cubic yard Northwest diesel and 6 cubic yard Bucyrus Erie electric shovels. Rooters are used at the pit to loosen the material, then it is pushed to the shovels with D8 Caterpillar tractors equipped with bull dozers. The maximum number of equipment units used at any one time was 35 Euclids, 18 Dixon wagons and 25 Peterbilts which were being loaded with three 6 cubic yard electric and two 2½ cubic yard diesel shovels.

MOUNTAIN IS REMOVED

It is interesting to note that although the borrow pit from which this material is being obtained was once a mountain, it is now a vast hole in the ground after the removal of some 12,500,000 cubic yards of borrow, some 10,000,000 cubic yards having been delivered to the San Francisco Airport at Mills Field. However, all excavations are made to an approved contour plan and about 243 acres of very valuable land will be made in a location formerly used only for grazing.

There are a number of large drainage structures on the project, the largest of which are being constructed as part of the proposed drainage system planned by the City of San Francisco to keep drainage waters away from the airport. A canal to collect these drainage waters is proposed all along the western side of the freeway between San Bruno Avenue and Millbrae Avenue, a distance of 2½ miles. At the northerly end this canal system crosses under the freeway through a triple 10 foot x 8 foot x 181 inch reinforced concrete culvert and through a triple 10 foot x 8 foot x 500 inch reinforced concrete culvert under the San Bruno Avenue cloverleaf ramps. At the southerly end the canal crosses under the freeway through a triple 10 foot x 6 foot x 155 inch reinforced concrete culvert.

There are also two large reinforced concrete boxes, 7 feet x 6 feet x 166½ inches, being constructed to carry utilities under the freeway to the airport.

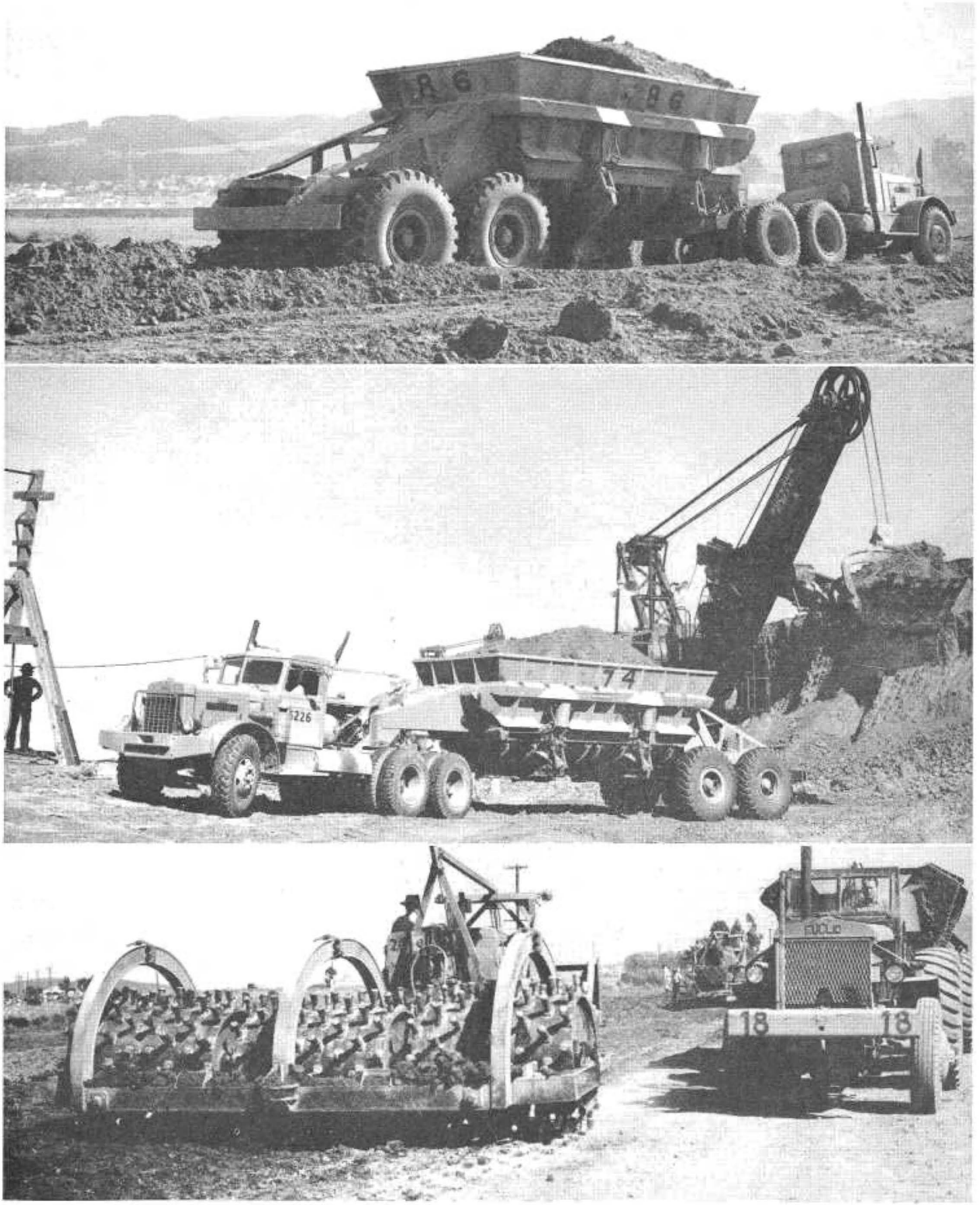
The project is being constructed under the supervision of Jno. H. Skeggs, District Engineer; R. P. Duffy, District Construction Engineer; and H. A. Simard, Resident Engineer, representing the State Division of Highways.

Macco Corporation & Morrison-Knudsen Company, Inc., are the Contractors on this $3,250,000 contract and are represented on the job by O. H. Tucker, Project Manager, and George Haensel, General Superintendent.

A separate Bridge Department contract is now under way for the foundations on the interchange structures at Broadway Burlingame, Millbrae Road, the San Francisco Airport connection and San Bruno Avenue. Carrico & Gautier are the contractors on this project.

The superstructures for these separations will be let to contract as soon as the critical steel shortage has eased.

On opposite page. Upper—This 30-cubic yard Peter truck is spreading imported borrow. Center — Electric shovel dipper loading 19-cubic yard Dixon wagons at borrow pit. Lower — Three section sheep foot tamper compacting fill


R6
86
74
226
18
18

Improvement on Trinity Lateral Is Under Way Through Rugged Mountain Terrain

By GEORGE F. HELLESOE, District Engineer

U. S. ROUTE 299, commonly referred to as the Trinity Lateral, connects with U. S. Route 101 near Arcata, and after crossing and traversing the low, though rugged coastal mountains easterly for a distance of 37 miles, enters the Trinity River Valley at Willow Creek. After leaving the comparatively small valley, it follows the precipitous canyon of the Trinity River to Junction City and then over the mountain into Weaverville and on to a connection with the Pacific Highway at Redding.

In general, this state highway follows the route of the early pack trails used in the gold rush days. These trails were established through information obtained by early explorers in search for the easiest route between the placer mines on the upper Trinity River and the coast. That this important transmountain route occupies the approximate location laid out by early trail blazers, is recognition of their adeptness in selecting the most feasible route through a then unexplored wilderness.

A portion of the present route, following the more rugged Trinity Canyon, was constructed by the Public Roads Administration in 1919. Connecting links were then constructed by the State and Humboldt County in 1924 to complete a through road, many portions of which are used to this day.

Upon completion of reconstruction of that portion between Weaverville and Prairie Creek in 1942 by the State, forces assigned to that work were transferred to District 1 and from a camp established near Burnt Ranch, work was started on constructing a standard road in the very rugged part of the canyon between Cedar Flat and Salyer.

In moving equipment to the new site of Camp 36, it was first necesary to move 100,000 cubic yards of excavation in widening various narrow portions of highway in order to transport the power shovel to the new work. While this work consisted merely of widening into the cut banks, it has provided a wider and safer roadbed for traffic use until such a time as the schedule permits its reconstruction to adequate standards. During the period of this widening, clearing and culvert construction preparatory to grading operations were started and carried on from Burnt Ranch, westerly.

During July, 1943, because of the uncertainty of continuing operations due to interference with the war effort, additional tractor and carry-all equipment was assigned to grading operations. This additional equipment permitted completion in September, 1943, of a section of narrow and tortuous road 1.12 miles in length between two minor sections of road previously improved under contract.

Because of the strategic military value of U. S. 299, authority was obtained during the latter part of 1943 to accelerate construction operations which had been dormant since September. Grading the narrow bluff sections easterly from Burnt Ranch to Cedar Flat was then undertaken. Grading of this 2.7 mile section of highway was completed during April of 1945.

In constructing this section, the new highway crossed the locally known China slide area. This slide, occurring in the late eighties, was the largest recent landslide in this section of California and its scars are still readily seen from the new highway. The slide is attributed to exceptionally heavy rainfall, combined with erosion of the banks of the Trinity. The immediate result of the slide was to dam the rising waters of the river, impounding an extensive lake some hundred feet in depth. Subsequently, upon failure of the dam, caused by the slide material, very high waters occurred in the lower Klamath to which river the Trinity is tributary.

It is told that Chinese miners, who flocked to this region after the white miners had removed the cream of Placer gold, saw a golden opportunity when the river was obstructed by the slide to mine the bed of the stream below. This they proceeded to do but failed to heed the danger of the rising waters above. When the obstruction was crested by the rising waters, causing disintegration of the slide dam, the unfortunate Chinese could not escape the immense rush of water. How many lives were lost is unknown, but ever since this catastrophe occurred this landmark of early day mining in California has been known as China Slide.

COMPLETION DATE NEXT YEAR

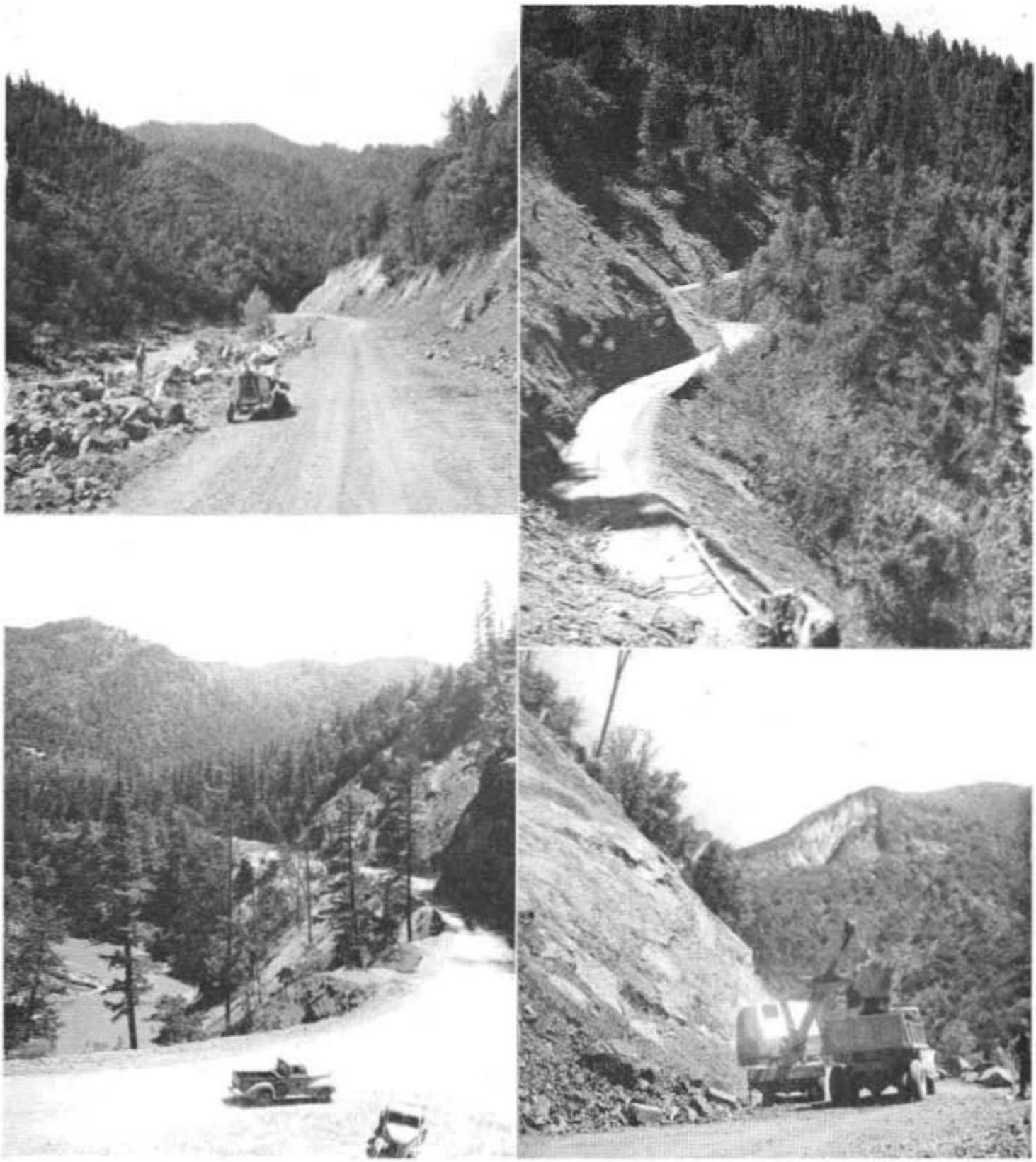
Since the summer of 1945 grading operations, except for one winter's work east of Cedar Flat, have been concentrated on providing a graded and oiled road from Burnt Ranch to Salyer, a distance of about 12 miles. This objective is now nearing realization and by the fall of 1948 it will have been completed.

The reconstruction of this portion of highway has been complicated by the necessity of excavating a bench section 26 feet in width across four rugged bluff sections now traversed by the existing one-way road. These bluff sections are steep and wet and though cursory inspection of their slopes indicates rock, this, upon proper investigation has been found to be shale and other unstable material.

Larger slides have consequently occurred which have made imperative the opening of a detour for traffic to by-pass the slide areas. The detour, known locally as the Hennessey Road, was constructed jointly by the county and state forces in 1945 and by-passes the highway from Salyer to Burnt Ranch. During the current grading season, it has been in use for only one day to provide uninterrupted travel on U. S. 299 for the convenience of the public.

Throughout the project rubble masonry retaining walls have been utilized, wherever economically justified, to secure the designed width of roadbed without undue disturbance of the unstable hillside or bluffs. These retaining walls of native stone blend well with the surrounding landscape and provide occassional vista points from which the rugged Trinity River canyon and the winding stream hundreds of feet directly below can be safely viewed.

(Continued on page 16)



Upper left—Rough grading is nearing completion on this rocky section of the Trinity River highway east of Cedar Flat, where much drilling and blasting is necessary. Lower left—Improvement of U. S. 299 across Gray's Bluff is about complete, except for oiling. Upper right—This winding, narrow section of U. S. 299 along Trinity River, near Salyer, is scheduled for early realignment and widening. Lower right—Steep, rocky bluffs are encountered in grading operations along much of the Trinity River Route

Appreciation

Tahoe Vista, California
Department of Public Works,
Division of Highways,
Marysville, California

Gentlemen: The large cedar tree, about 102 feet in height, located on the highway right of way in the Agate Bay Subdivision at Tahoe Vista, California, was removed a few weeks ago by your crew.

I want to commend very highly the work of Mr. A. J. Bellue who superintended the removal of the tree, as the work was done in an extraordinarily expert manner. The tree was enormous and was one which, if it had not been properly felled, would have caused considerable damage by falling over the highway or into the property here. Under the guidance of Mr. Bellue and with his excellent knowledge of his work, he and his crew felled the tree so that it fell just where they had intended it to fall.

A like tree fell across the highway up at Kings Beach, killing a man and perhaps injuring his wife and baby.

We appreciate very much the way this job was handled.

Very truly yours,

JAMES LAKESHORE RESORT
T. L. James

TRINITY LATERAL IS UNDER WAY

(Continued from page 14)

Arch culverts and other appurtenant drainage structures have been constructed of rubble masonry and since operations started in 1942 there have been constructed over 9,000 cubic yards of masonry. Roadway excavation quantities involved in constructing approximately 10 miles of graded road now exceed 1,000,000 cubic yards. Considering the terrain traversed, the average grading quantities per mile of 100,000 cubic yards is considered very reasonable.

R. C. McFarland is superintendent of construction and H. O. Ragan is Resident Engineer with the work being supervised by Charles P. Sweet, District Construction Engineer. The work is located in the Eureka District of the Division of Highways.

Visitors to State Fair Will Travel to Capital Over New Four-Lane Highways

VISITORS to the California State Fair to be held in Sacramento August 28th through September 7th will get a preview of the kind of highways that will one day be commonplace in California now that the Collier-Burns Highway Act is a reality.

Nearest to the capital and one of the foremost projects in the Division of Highways' postwar construction program is the North Sacramento Freeway, which is scheduled to be completed by September 1st.

This $1,800,000 project will provide a new route for U. S. Highway 40-99E around the City of North Sacramento in place of the old road that passed through block after block of the business district. The freeway, a four-lane divided highway, contains eight grade separation structures to insure complete freedom from all conflicting traffic.

NEW FOUR-LANE HIGHWAYS

A phenomenon peculiar to these divided highways is the way that heavy traffic on adjacent two-lane sections literally vanishes a few moments after reaching the divided sections. Visitors to the fair from the Bay area traveling via U. S. Highway 40 will enjoy this experience upon reaching Vacaville, for two contracts recently completed at a combined cost of $1,600,000 have extended the four-lane divided highway leading into Sacramento 12 miles westerly.

For six of the 12 miles the old pavement has been retained for the two west-bound lanes, but the other six miles are on new direct alignment that abandons the old dog-leg into Dixon.

All roads will lead to Sacramento during the fair, and motorists from the south will get several glimpses of highway improvements under way on whichever route they choose. Most of the southern visitors will converge on Stockton for the last lap to the capital, to ride upon another recently completed divided highway, the eight-mile, $800,000 four-lane section of U.S. 50-99 from the Calaveras River to Lodi. Probably none, however, will appreciate this particular improvement so much as local residents who for many years had to contend with the woefully inadequate two-lane road.

U. S. 50 IMPROVED

Consistent with the policy of the Division of Highways, the old road has been retained as half of the divided highway. And lest the bottleneck through Stockton be too fresh in mind to enjoy this new section, plans are being prepared for a cut-off from the Calaveras River to Mariposa Road south of Stockton which will avoid the city entirely.

Fair bound travelers coming into Sacramento from Placerville will ride on a new 3.4 mile section of U. S. Highway 50 between El Dorado and Shingle Springs recently completed at a cost of $272,000. The new road through the rolling foothill country, built entirely on revised alignment, is 0.4 mile shorter than the old.

By way of contrasting highway standards of yesterday and today, the old road, built in 1915 to standards adequate for that time, had 35 curves with central angles totaling 1,020 degrees and some radii as sharp as 100 feet. The new road, on the other hand, has only six curves with central angles totaling 142 degrees and a minimum radius of 1,500 feet.

U. S. 40 PROGRAM

It is not certain at this time whether the new limited access highway for U.S. 40 through Auburn will be opened to traffic by fair time. If it is, motorists will hardly recognize the town, for the new road avoids entirely the tortuous, steep and narrow route that leads through the business district.

The new highway consists of 2.6 miles of four-lane divided highway with a six-foot dividing strip. The entire project, including two street and one railroad grade separation structures built under separate contracts, will cost approximately $825,000.

Reconstruction of 3.6 miles of the Auburn-Grass Valley Road now under way in and adjacent to Auburn will complete the modernization of state highways in that city. This portion of Route 17, also to be a limited access highway, will be completed about November 1st.


Welcome to the
CALIFORNIA
STATE FAIR
SACRAMENTO
Via the World's Finest Highways
SAN FRANCISCO
OAKLAND
SANTA CRUZ
SAN JOSE
SALINAS
STOCKTON
MODESTO
MERCED
FRESNO
PASO ROBLES
SAN LUIS OBISPO
SANTA BARBARA
BAKERSFIELD
LOS ANGELES
LONG BEACH
RIVERSIDE
SAN BERNARDINO
BARSTOW
SAN DIEGO
EL CENTRO
BLYTHE
BISHOP
MARYSVILLE
OROVILLE
QUINCY
SUSANVILLE
CRESCENT CITY
WILLOWS
WOODLAND
SANTA ROSA
EUREKA
FORTUNA
FORT BRAGG
UKIAH
CLEAR LAKE
RED BLUFF
CHICO
PARADISE

Two-Way Mobile Radio System Installed On San Francisco-Oakland Bay Bridge

By H. C. SNEAD, Associate Electrical Engineer

ONE HUNDRED eighty-six thousand miles a second! Such is the speed with which messages are now dispatched to emergency service equipment on the world's busiest toll structure—the San Francisco-Oakland Bay Bridge.

Stretching out over land and water a distance of six miles from Fifth Street in San Francisco to the Toll Plaza in Oakland, it is, because of its very nature, without parking facilities. Hence, stalled vehicles must of necessity occupy a lane of the traveled way, offering an obstruction to the free flow of traffic.

With present traffic densities on the upper deck of 7,000 vehicles per hour during peak periods (4,200 one way in three lanes), vehicles accumulate behind a road obstruction with great rapidity. A stoppage of only a few minutes may, in adverse circumstances, result in congestion which will require a half hour or more to clear. The need of removing stalled cars without any delay is, therefore, of primary importance to the smooth and rapid mass movement of traffic.

Faced with the necessity of maintaining the orderly flow of traffic, which averages 70,000 cars per day and which, on June 20th last, reached a peak of 92,614, the Division of Highways turned to high frequency radio as a means of reducing to a minimum the delays in removing obstructions to traffic. With the equipment installed, tow cars or service vehicles enroute to or from a stalled car may now be redirected while moving, as the need arises. The necessity of returning to their station, or calling in from widely-spaced bridge telephones for assignment no longer exists.

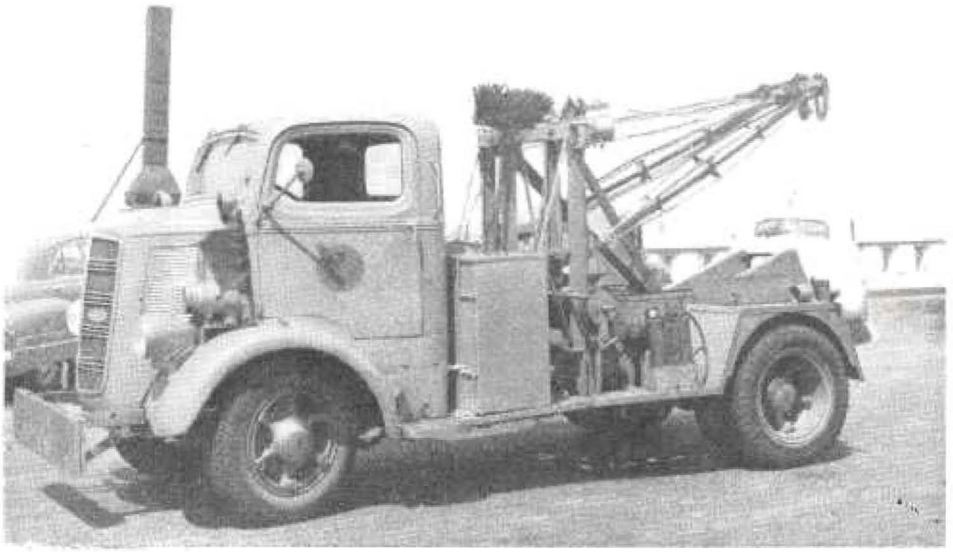
The former practice of telephone communication from the bridge deck in itself created an obstruction to the free flow of traffic and, at best, did not provide the close control of emergency vehicles necessitated by the changing situations arising during the peak hours of travel. The dispatcher may now sit at his microphone with a chart before him showing the position of all of his equipment at any instant and direct the various units, by radio, with the greatest efficiency.

"Coming in with stalled car," radios tow truck operator on San Francisco side of San Francisco-Oakland Bay Bridge. Seconds count on this 6 mile long bridge where a car breakdown can seriously hinder traffic which averages 70,000 vehicles per day. A mobile two-way FM radiotelephone in the truck permits instant communication with the dispatcher

An average day will find 35 cars stalled on the bridge requiring emergency service for various causes, but this figure has, on occasions, reached 80. In addition, emergency service vehicles render "standby" service to many other disabled vehicles. This service may consist of a push to get started, disentangling hooked bumpers, providing protection while a motorist changes his own tire, or the like.

While standby services may not appear in the records as an emergency roadside service, they require the dispatching and use of a piece of emergency equipment.

To cope with this condition, four state-owned tow cars are kept in constant readiness. During peak hours these are supplemented by four pickup trucks equipped to render most emergency roadside services, such as changing tires, supplying gasoline, and extinguishing fires; that is, all except actual towing operations. These, together with the electricians' truck, the fire engine, the fire chief's pickup, and the traffic engineer's sedan constitute the "radio" fleet.



Bay Bridge tow truck, showing radio cabinet mounted on running board

RADIO EQUIPMENT INSTALLED

Designed to operate in the 156 megacycle band, the radio equipment is frequency modulated. The equipment installed was manufactured by Motorola and was purchased under competitive bids on specifications prepared by the State. Installation of both fixed and mobile equipment was performed by the radio technicians of the California Highway Patrol and the electrician force of the San Francisco-Oakland Bay Bridge.

Assigned KKJW as call letters by the Federal Communications Commission, transmitters are licensed for 60 watts maximum input. Two separate frequencies are used for the fixed, or main, station and the mobile units. The main station transmits on 156.45 MC., and the mobile units transmit on 156.69 MC. With such an arrangement, communication between mobile units is not possible except through the main station operated by the dispatcher who thus maintains control of the movement of all equipment at all times.

Two-way radiotelephone under rugged conditions. Lower deck of San Francisco-Oakland Bay Bridge showing electric interurban train and radio-equipped tow truck emerging at east end of bridge. High frequency 160,000 kilocycle FM two-way radiotelephone equipment permits 100 percent radio coverage regardless of electrical interference or steel-enclosing structure

RANGE OF 20 MILES

Being in the very high frequency (VHF) classification, the radio system is in the "sight line" group and has a range of about 20 miles. Its effectiveness in penetrating normally inaccessible locations within this range, however, was demonstrated by tests prior to the purchase of the equipment. Radio waves of the frequency employed travel in a straight line but are redirected or reflected from solid objects such as building walls and cliffs. In fact, they may bounce several times before their useful strength is dissipated. As a consequence, the equipment installed successfully penetrates the entire length of the lower deck of the Yerba Buena Island vehicular tunnel, a feat not duplicated with lower frequencies.

Special cabinets were designed and installed for housing the radio apparatus on the tow trucks and the pickup trucks used in the emergency service.

SPECIAL CABINETS

In vehicles of these types, sufficient enclosed space for this purpose, such as is found in the luggage compartments of passenger vehicles, is not available. The cabinets were designed for quick and easy access. Covers are held in place by springs and catches

(Continued on page 26)

Red Rock Bridge Becomes Interstate Link on U.S. 66

By R. ROBINSON ROWE, Senior Bridge Engineer

WHEN the historic Red Rock Bridge was opened to highway traffic in June, a striking improvement was made in the interstate connection on U. S. 66 over the Colorado River near Topock, Arizona. Not only was the last posted bridge eliminated from California's part of this transcontinental route, but relocation of the approach permitted abandonment of its narrowest and crookedest stretch.

The degree of improvement will be evident from the following statistical summary for the entire relocation:

Highway Item	Before	After	Gain
Distance, miles	3.04	2.62	0.42
Curvature, degrees	1070	437	633
Ascent and descent, feet	710	110	600
Sharpest curve, degree	54	14	40
Bridge width, feet	17.0	19.0	2.0
Load limit, tons	11	All legal loads	

STATES SHARE COST

The cost of this improvement was $147,000, of which $71,500 was spent for replacing the rail deck of Red Rock Bridge with a concrete highway deck; $70,500 was the cost of widening and surfacing two miles of railroad grade for the California approach and $5,000 was used to grade and pave the connection in Topock. Each state built its own approach and the two states divided equally the cost of bridge reconstruction.

The opportunity for this low-cost improvement was presented April 20, 1942, when the Atchison, Topeka and Santa Fe Railway Company obtained federal approval of its project to build a new bridge cross the Colorado River 500 feet upstream from Red Rock Bridge, in order to straighten and double-track its line for streamliners and heavy freight traffic. A suggestion that the Red Rock Bridge be acquired by the states was answered by the obligation of Santa Fe to dismantle it within 90 days after its new bridge was completed, raze channel piers to river bed and turn the old steel in for scrap, which was then in desperate demand. Although Santa Fe expressed a willingness to donate the bridge to avoid the cost of demolition, this obligation to contribute to the Nation's scrap pile stopped the preliminary negotiations.

ARMY INTERESTED

Meanwhile the Army had been blocked in desert training maneuvers by the 11-ton limit on the highway bridge. It had sought permission to move heavier tanks and artillery across this slender arch, but the maximum permissible one-way passage one vehicle at a time was too restrictive for the military purpose. The Army became interested in the idea of converting Red Rock Bridge, which reopened the question of the scrap-steel obligation. A survey showed that scarcity of scrap would probably end before the old bridge could be contributed.

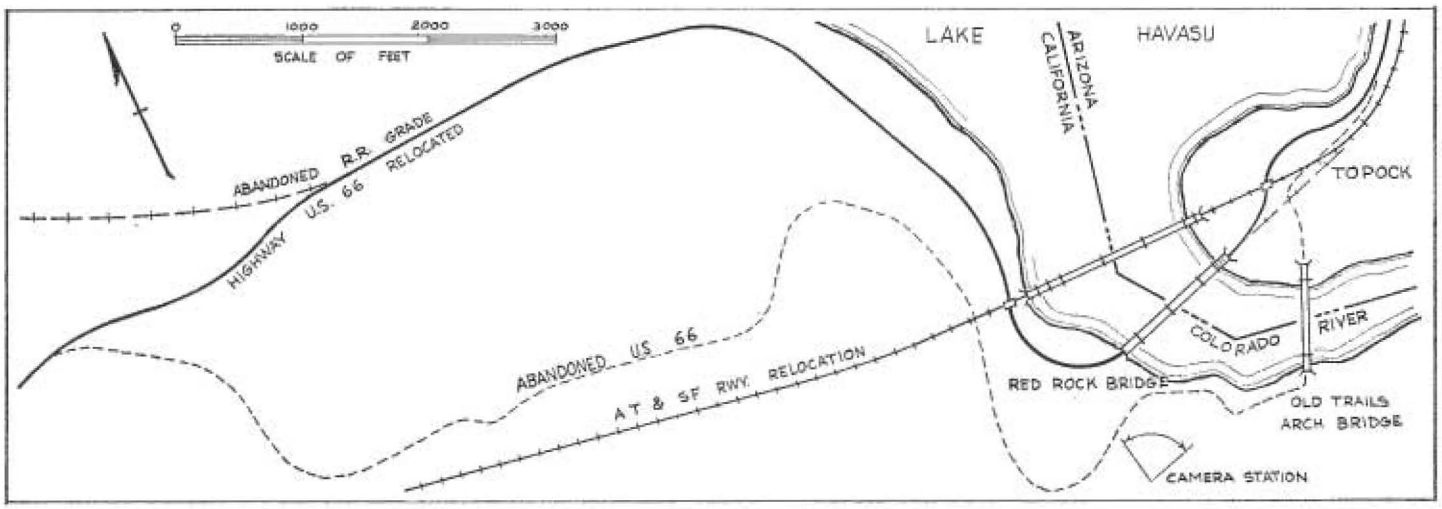
Negotiations were reopened and the railroad renewed its offer, with the addition of approach right of way over 1.5 miles of old railroad grade. The states accepted in a three-party agreement covering division of costs of reconstruction and maintenance, which was finally executed March 10, 1944. The year or so remaining before Santa Fe could release the old structure was spent in clearing up several legal points, which arose from the interesting history of bridges over the Colorado in this vicinity.

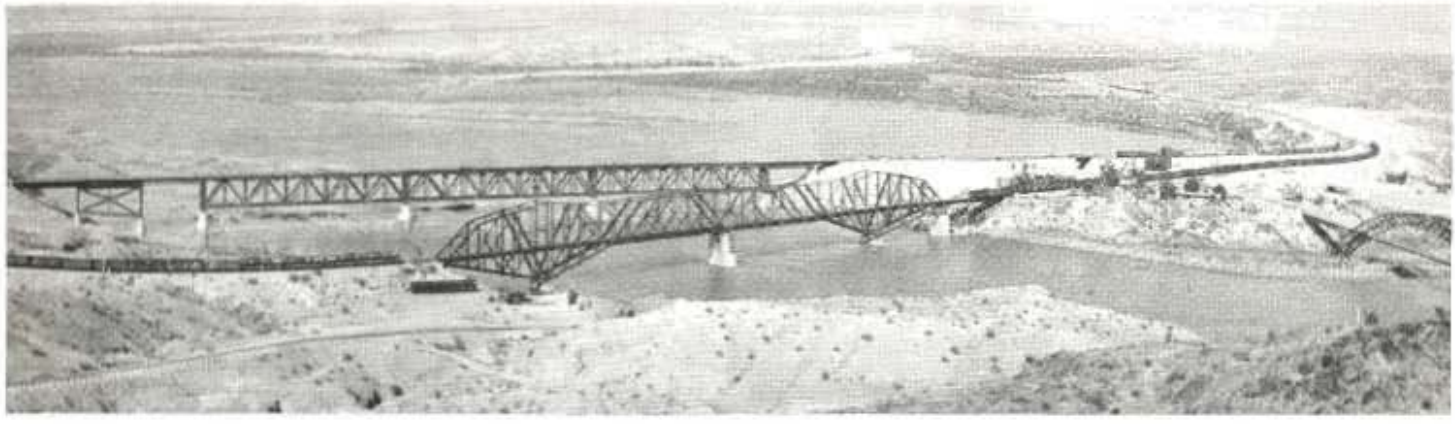
HISTORY STARTED IN 1866

Immediately after the Civil War railroad promoters started a race for a transcontinental line along the Thirty-fifth Parallel. The race ended August 13, 1883, on the Arizona bank of the Colorado River eight miles northwest of Topock when the Southern Pacific, pushing east, bridged the Colorado to connect with the Atlantic and Pacific Railroad Company. This bridge was destroyed May 4, 1884, and replaced by A. & P., which had leased Southern Pacific's line to Barstow.

This second bridge was soon threatened by the meandering Colorado River and A. & P. spent large sums to maintain it, including tribute of $500 per month to a steamboat company

Relocation of U. S. 66 via Red Rock Bridge and the old railroad grade





The last train crossing Red Rock Bridge (center span) March 8, 1945, after new Santa Fe Bridge (left-background) was completed. U. S. 66 crossing the river on the Old Trails Arch (far right) has since been relocated via Red Rock Bridge

when the main channel was diverted away from the draw span. For some time A. & P. had been operated jointly by the Atchison, Topeka and Santa Fe Railroad Company and the St. Louis and San Francisco Railroad Company after a foreclosure sale.

ACT OF CONGRESS

Under the Act of Congress of July 27, 1866 (14 Stat. 292, Chap. 278), authorizing the original location, these new owners built the Red Rock Cantilever Bridge at Topock. This site had also been selected in 1867 by the Kansas Pacific Railroad locators and foundations had been explored by borings in 1880, but this other company had abandoned its line.

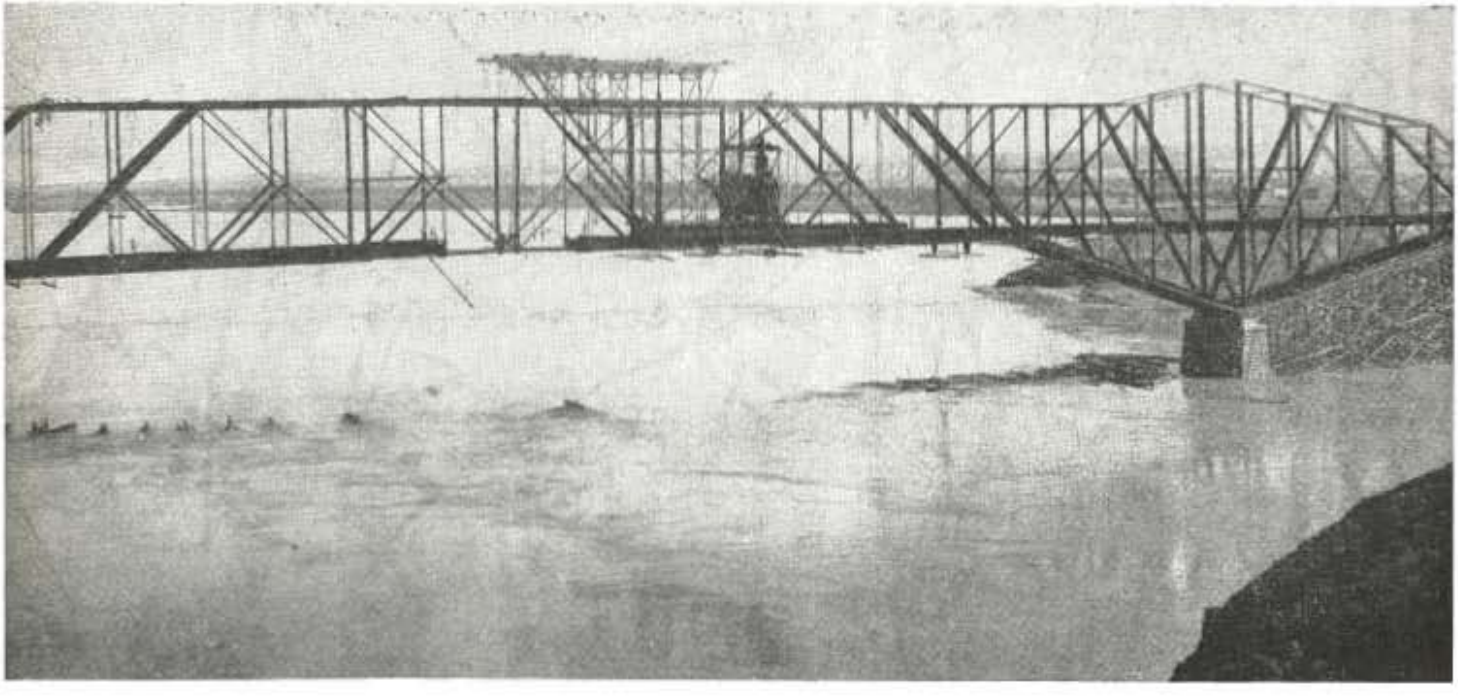
This third railroad bridge was completed June 25, 1890. However, the second bridge had washed out on May 9th, the day after the suspended span of the new bridge was pinned and swung. In a few hours the traveler engine was removed, track was laid through the legs of the traveler and trains were routed over the bridge without ceremony.

LEGAL QUESTIONS

The rights of the succeeding railroad companies to the bridge site derived from the authorization of the Act of 1866 "to lay out, locate, and construct, furnish, maintain and enjoy, a continuous railroad and telegraph line with appurtenances" from a point in Missouri to the Pacific, including a crossing of the Colorado River "at such point as may be selected by said company for crossing." Having no rights, for highway facilities, none could be conveyed to the states.

This was cured in part by the amended Federal Highway Act (42 Stat. 212), authorizing railroads "to convey to the highway department of any state any part of its right of way or other property in that state acquired by grant from the United States," and the Act of May 5, 1920 (41 Stat. 621), which eliminated the restriction to federal aid highways. Thus the railroad was within its rights in conveying physical property to the states, but it was not clear that the states had ac-

Old construction photo of Red Rock Cantilever Bridge nearing completion in 1890



quired thereby the right to maintain a *highway* bridge over a navigable interstate stream.

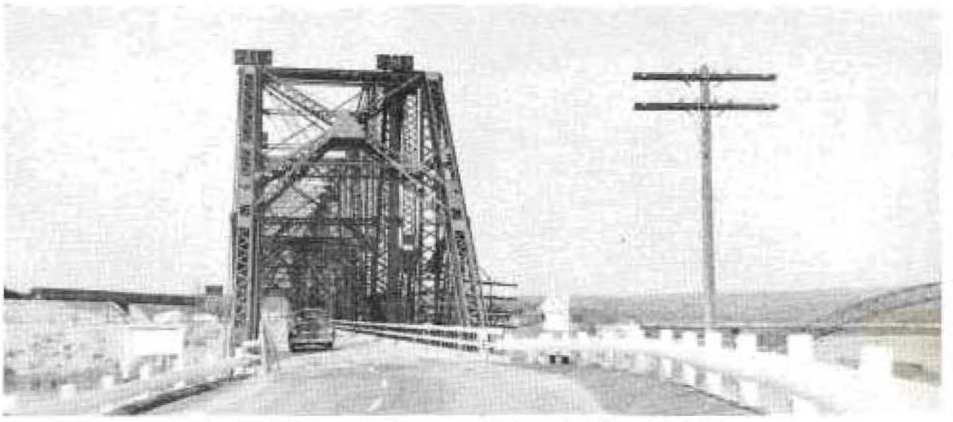
FEDERAL CONSENT OBTAINED

To avoid any question, federal consent was requested, and granted in December, 1944, by the following Act of Congress (Public Law 537, Chapter 688, Seventy-eighth Congress, Second Session):

"An act authorizing the Atchison, Topeka and Santa Fe Railway Company, or its successors, to convey to the states of Arizona and California, jointly or separately, for public highway purposes, an existing railroad bridge across the Colorado River, formerly known as the Red Rock Bridge, near Topock, Arizona.

"Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, that, in order to facilitate interstate commerce, improve the postal service, and provide for military and other purposes, the Atchison, Topeka and Santa Fe Railway Company, or its successors, is hereby authorized to convey to the States of Arizona and California, jointly or separately, the existing railroad bridge and approaches thereto, across the Colorado River, formerly known as the Red Rock Bridge, located near Topock, Arizona, which bridge has been or will be superseded by realignment of a portion of the Atchison, Topeka and Santa Fe Railroad and construction upstream from said existing bridge of a new railroad bridge.

"Sec. 2. The states of Arizona and California, jointly or separately, are hereby authorized to accept title to, and thereafter to construct, reconstruct, maintain and operate said bridge, as a free highway bridge, and approaches thereto in accordance with the provisions of the act entitled, 'An act to regulate the construction of bridges over navigable waters'."



California portal of Red Rock Bridge over Colorado River on U. S. 66. New Topock underpass at left and abandoned Old Trails Arch at right

HIGHWAY HISTORY

The highway crossing has an even longer and more varied history. Jebediah Smith forded the Colorado River 10 miles north of Topock in 1826 to trade with the native Indians and Capt. Sitgreaves for the same purpose in 1850. Whipple, making the Thirty-fifth Parallel Railroad Reconnaissance in 1854, and Beale, breaking the Thirty-fifth Parallel Wagon Trail in 1857, forded 25 miles upstream from Topock, at the north end of the same (Mojave) valley. Later in 1863 Captain Hardy established the first ferry at Hardyville, a little farther upstream.

In 1890 the Needles Ferry was inaugurated, but service was often interrupted by shoaling of the main channel or flooding of the bottom lands east of the river. It was abandoned in 1921.

The National Old Trails Highway, now U. S. 66, was being promoted in 1914 when a flood took out the Needles Ferry and reduced the Arizona approach to a four-mile quagmire. The States of Arizona and California, the County of San Bernardino and the United States Indian Service joined to build the highway arch bridge which is now being abandoned. Meanwhile Red Rock Bridge was planked for an emergency highway connection and maintained as such until the arch bridge was completed on February 20, 1916.

Located 800 feet downstream from the massive Red Rock Bridge, the Old Trails Arch Bridge was a delicate companion structure. Designed by J. A. Sourwine, it was for 12 years the longest three-hinged arch in the United States. Although it had been posted for a load limit of 11 tons with the warning "One Way for Trucks and Busses," neither was a serious restriction for light and infrequent traffic across the desert until wartime transport and desert maneuvers of heavy military equipment were blocked. Even that was recognized as a temporary demand, but the closure of Parker Dam March 4, 1938, backed Lake Havasu 45 miles up the river to submerge the abutments and lower hinges of the arch bridge. The stage is kept high, making inspection of these supports impractical, and future effectiveness of protection applied to steel surfaces was very uncertain.

Since Parker Dam was undertaken, studies of alternative highway routes have anticipated abandonment of the arch bridge. The Red Rock site remained the best bridge site. Three other sites south of Needles having some advantages were threatened by the delta forming upstream from Lake Havasu. Two others just north of Needles have been surveyed and more recently it has been proposed that U. S. 66 be relocated to cross on Davis Dam 30 miles above Needles. However acquisition of Red Rock Bridge will post-

Old Trails Arch (Bridge 54-18) over Colorado River before Lake Havasu flooded the lower hinges. Topock, Arizona, in background

pone need for a change far into the future.

DEVELOPMENT OF RED ROCK BRIDGE

The Red Rock Cantilever Bridge, as it was first called, was ordered from the Phoenix Bridge Company after submission of competitive designs. It was designed by Dr. J. A. L. Waddell, with Prof. Stillman W. Robinson as Consulting Engineer on superstructure. The project was daring for the times, it being one of the first steel bridges and at that time the longest cantilever bridge in the Americas. Samuel M. Rowe, was Chief Engineer at the site and was responsible for substructure, which included the sinking of a caisson to a record depth of 91.5 feet below high water. Albert A. Robinson, Chief Engineer of Atchison, Topeka and Santa Fe Railway Company, directed the project as a whole.

Proportions and significant data were:

Cost, dollars	$462,434
Gross length, feet	1,110
Suspended span, feet	330
Main span, feet	660
Width, c. to c. trusses, feet	25
Elevation of deck	504
Elevation of cutting edge	366

BRIDGE STRENGTHENED

Although designed for two 94-ton engines trailing 3,000 pounds per lineal foot, a load so heavy that equipment was not available for a test, the margin of safety dwindled as locomotives grew. The floor and lateral system were strengthened in 1901, but by 1911 no ordinary measures could keep the bridge in step with heavier rolling stock.

After considering alternatives of relocation and of new superstructure, a channel pier was added under the midpoint of the suspended span. The bridge was no longer a *cantilever,* and that part of the name was dropped. Reversals of stress required extensive reinforcement, particularly of tension members which were now compressed.

Since then locomotives have grown swifter rather than heavier and the bridge was obsolescent because of delay caused by the gauntlet track on the bridge and the nine-degree curve at its west approach. These, and not age or weakness, led to the development of the new railroad line and bridge.

The original 660-foot span of the bridge had required the spacing of trusses 25 feet apart for lateral stiffness, and this spacing made the bridge adaptable for highway purposes. Very little change of framework was necessary in the transformation because the trusses were more than adequate for legal-limit highway loads.

The deck was transformed by respacing the stringers to support 14-inch wide-flange 30-pound subfloor beams, on which the seven-inch reinforced concrete roadway slab was poured. A skid rail to protect truss members was built into the guard railing.

Contract for these alterations was let October 6, 1945, to H. L. Royden of Phoenix, but not completed until May 21, 1947, because of scarcity of steel and scheduling to avoid hot weather. As the work exposed the old steel, it was found to be in excellent condition. Tops of a few stringers had corroded to depths of three-eighths inch, or half way through the flange, because of accumulation of brine drip from reefers. However the remaining strength was sufficient for highway loads and these flanges were simply cleaned and protected.

Plans for alterations were under the direction of R. A. Hoffman, Engineer of Bridges and Dams for the Arizona Highway Department. California was represented in discussion of general plans by F. W. Panhorst, Bridge Engineer. Attorney Frank B. Durkee of the California State Department of Public Works, made the legal review and drafted the bill for congressional action.

FOLLOW THESE RULES TO PREVENT FOREST FIRES

Attention hunters, fishermen, campers, motorists, tourists! The United States Forest Service calls upon you to help prevent forest fires by following these rules:

Observe the no-smoking regulations in certain areas. Stop in safe places to smoke.

Crush out your cigarette, cigar or pipe ashes.

Never throw a burning object from the window of an automobile or railway coach.

After using a match, break it in two. When you can hold the burned end between your fingers, indicating that it is completely out, play safe anyway and use an ash tray instead of throwing away the pieces of the match.

If you must use a fire—first, ask if the law requires a permit; then, have help handy in case of emergency; last, kill every spark.

Controlled Access Express Highways Mean More Safety

COMMENTING upon the President's Highway Safety Conference held recently in Washington, D. C., to evaluate results of a year's nation-wide effort to reduce death and injury on the highways and to plan a further attack on highway accidents, Charles M. Upham, Engineer-Director of the American Road Builders' Association, said:

"The problem of highway safety affects each of us. Thirty years ago, the average American traveled 450 miles a year by all forms of transportation. Today, he travels 4,000 miles a year by motor vehicle alone.

"Thirty-four million vehicles—some new and some ready for the junk heap. Forty-four million drivers—some good and some bad. Millions of pedestrians. And each week, some 100,000 new vehicles join the millions on our 3,250,000 miles of roads and streets. Daily the battle against death on the highway becomes more complex.

"Vehicle mileage in 1947 will set a new record and most of it will be driven on inadequate and obsolete highways.

"Our roads have always lagged behind the vehicle. Not until 1920 did road building really get under way. We had 9,000,000 cars on the highways then. The volume of traffic multiplied six times between 1920 and 1940, and motor vehicles increased almost four times in number.

"Some 27,000 miles of federal aid highways and 60,000 to 80,000 miles of roads maintained by the states need rebuilding to safer standards. We have 14,000 miles of two-lane primary highways that are carrying four-lane traffic. Inadequate and congested roads and streets with hazards in every mile take their toll in human life.

"Our heavily traveled main highways with cross traffic and uncontrolled exits and entrances take a huge annual death toll. Safety demands that they give way to controlled access express highways with sufficient traffic capacity and freedom from congestion.

"Accident records on such highways in California, Connecticut, New York and New Jersey prove that improved highway design contributes large gains in highway safety."

Prunedale Freeway Cut-off Completed

THE PRUNEDALE Freeway Cut-off from Santa Rita to 0.8 mile north of Crazy Horse Summit in Monterey County has been recently completed and opened for the use of public traffic.

This improvement was accomplished by constructing two additional lanes adjacent to the existing two-lane section, thereby providing a modern four-lane divided, controlled access freeway. Traffic has been relieved of one of the most congested sections on the El Camino Real. This congestion was caused by the slowing up of trucks on the steep grades, thereby holding up faster moving automobiles and creating definite driving hazards where safe driving rules were not followed. The numerous curves also added to the restricted number of "no passing" zones.

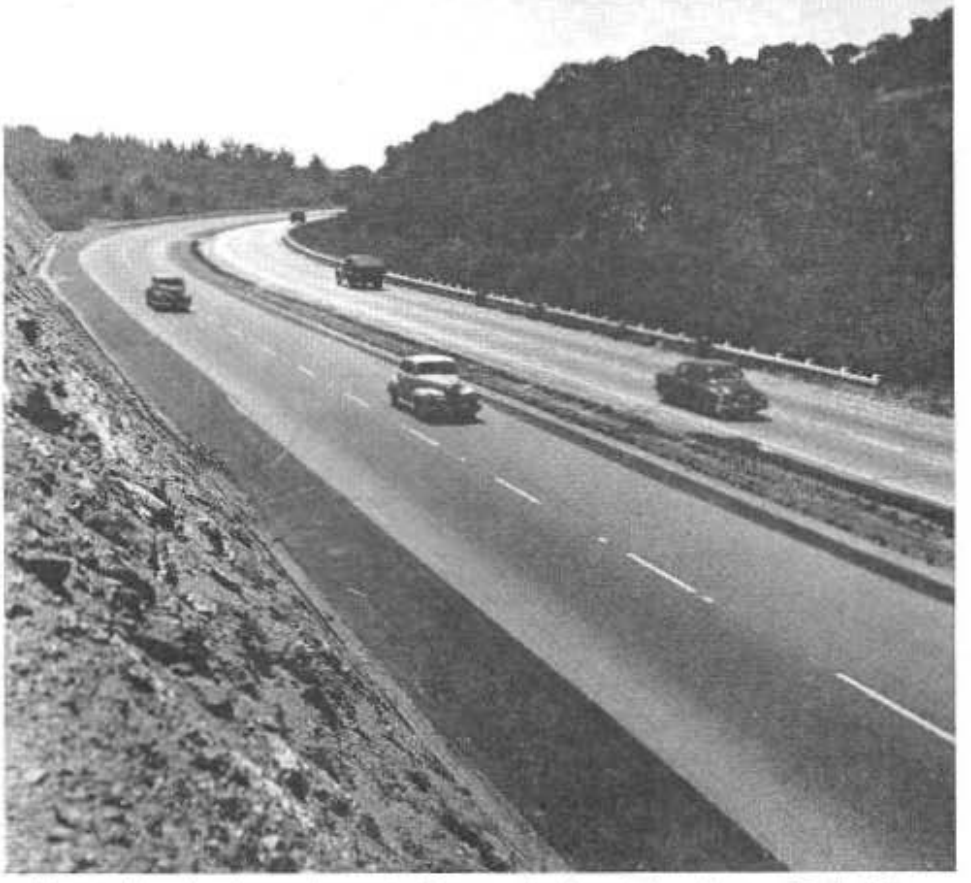
The existing 20-foot portland cement concrete highway, which now forms two lanes of the divided highway, was opened to traffic on July 20, 1932, and supplanted the narrow, twisting San Juan grade, which increased speed and volume of traffic had made obsolete after 17 years of service. The continued increase in traffic on the main arterial of the coast route between the metropolitan areas of San Francisco and Los Angeles, resulted in traffic rising from 3,000 to 4,000 vehicles daily in 1932 when the Prunedale Cut-off was completed, to traffic of 6,000 to 9,000 vehicles in 1941, of which over 10 percent were trucks and trailers.

The completed project is 8.4 miles in length and comprises the first unit of the freeway. The second unit, 6.7 miles in length, which has its northerly terminus at Chittenden Road near San Juan Bautista, is well advanced, completion being scheduled for early in October, 1947. The total length of the freeway will be 15.1 miles. The cost of the first unit was about $845,000 and the estimated cost of the second unit is approximately $770,000, making a total cost of $1,615,000. Limited access right of way was acquired at a cost of $155,000.

The construction consisted of grading a 39-foot roadbed for the two additional lanes and surfacing it with a three-inch thickness of plant-mixed surfacing on a one-foot thickness of crusher run base over a selected or imported borrow subbase having a minimum thickness of six inches and a maximum of 12 inches depending upon the quality of the underlying materials. The shoulders, gutters and inside face of the embankment dikes are surfaced with three inches of plant-mixed surfacing. A seal coat of asphaltic emulsion and medium fine screenings was applied to the plant-mixed surfacing on the 23-foot traffic lanes.

The construction crossed several unstable marshy areas composed of saturated, unstable, clayey sand, soft plastice clay and peat to depths of 3 to 14 feet. These areas were stabilized by removing the saturated unstable material to the underlying solid material, installing eight-inch perforated metal pipe underdrains and blind stone drains as required to carry off the seepage and back filling the excavated areas with material selected from roadway excavation or imported borrow. Materials excavated from these areas, which were suitable for use in constructing embankments, when not saturated were dried out and placed in adjacent embankments. Some of the fill treatment material was utilized to construct supporting fills against the previously con-

View of transitions on four-lane divided highway where existing concrete pavement changes from right to left set of lanes. Central dividing strip defined by traffic stripe and raised bars



Upper—View showing erosion protection on embankment slope. Lower—Typical view of new four-lane divided highway developed from existing two-lane highway

structed road embankments and the more humus material was used for topsoiling embankment slopes and division strips. The extent of this work is indicated by the fact that it involved 166,000 cubic yards of fill treatment excavation, 2,500 cubic yards of sand filling material, 4,000 cubic yards of filter material (underdrains), and 5,000 lineal feet of eight-inch perforated metal pipe underdrains.

The erosive nature of the materials on this project required that the embankment and cut slopes be treated to preclude excessive future maintenance costs. The excavation slopes were covered with topsoil removed from within the roadway prism. Six-ten-six fertilizer was mixed with the topsoil at the approximate rate of 20 pounds for each 110 square yards of slope area. Straw was spread over the excavation slopes and shoved into the loose surface. Humus topsoil was selected from the fill treatment excavation and placed over embankment slopes and the central dividing strip. The slope areas were seeded to provide an early protective growth of vegetation. Mesembryanthemum edule (ice plant) cuttings were planted on the excavation slopes, along the tops of the embankment slopes and in the central dividing strip.

The alignment and grade of the two new lanes, in general, followed along adjacent to the existing pavement. The only major deviation from this position is at the "Pinecate Rocks," a bandit lair in the early days, where the existing highway passed through a narrow gorge. The new lanes were located 600 feet northerly of the present road to avoid the destruction of the scenic and historical "Rocks." At the junction of Route 22 to San Juan Bautista, the new lanes were positioned away from the existing roadbed in order to require minimum alteration of the roadside beautification at this intersection. This beautification consists of a cross, campanile with mission bells and adobe walls and curbs around landscaped areas, which provide a historical land-

(Continued on page 31)

"Send Tow Truck," radios pickup truck operator on San Francisco-Oakland Bay Bridge. One minute later a tow truck arrived to haul away the car. Bridge traffic operations have been greatly expedited through the use of two-way FM radiotelephones

Two-Way Mobile Radio System Installed On San Francisco-Oakland Bay Bridge

(Continued from page 19)

against sponge rubber gaskets, making them weatherproof and yet easily dismantled. Transmitters and receivers on the tow trucks are mounted one above the other in their cabinets with adequate spacing to permit testing without the necessity of removing either unit from the cabinet. On the pickup trucks, the two units are mounted side by side. By mounting pickup truck cabinets on angle iron spreaders resting on the tops of the body sideboards, the full length of the pickup body is available for normal load.

Antenna assemblies, approximately 17 feet long, are mounted on the tops of the truck cabs. Co-axial lead-ins are concealed in cab walls and ceilings or are installed in one-fourth inch copper tubing wherever this is not possible. Wires and cables from the dashboard-mounted control units and battery to the transmitter-receiver assembly are installed in 1½-inch flexible steel conduit.

The main station is located at the Toll Plaza Administration Building. A triple-skirt, high-gain antenna is installed on the roof of the penthouse atop the building, approximately 60 feet above ground. The transmitter is mounted in the penthouse, requiring a very short lead-in. Two remote control units are used to operate the transmitter, one in the dispatcher's office on the ground floor, and the other at the tow car garage and firehouse on Yerba Buena Island, midway point on the bay crossing. Intercommunication between the remote control units is possible by the operation of a talk-listen key. Dispatching during daylight hours is done from the dispatcher's office at the Toll Plaza, and after dark from the firehouse on Yerba Buena Island.

The radio installation has been in service since April 25, 1947, and has proved to be all that was expected of it. Former communication problems involving matters of minutes may now be said to be matters of seconds. To this extent the orderly movement has been materially assisted.

$76,000,000 Annually For New Construction On State Highways

(Continued from page 7)

4½ cents per gallon, allocated in the proportion of five-eighths of a cent to the cities and 1⅜ cents to the counties. To the State will be allocated the revenue from the remaining 2½ cents for administration, rights of way, engineering, maintenance and improvements on the State Highway System and for construction of new state highways, including metropolitan freeways.

As to expenditure of funds allocated to cities, it is provided that three-fifths shall be expended for *construction* of major city streets and two-fifths for *maintenance* of major and secondary city streets.

Recognition is also given in the Collier-Burns Act to the need for developing metropolitan freeways. To this end the new law adds approximately 67 miles of city streets to the state highway system. It is presumed that much of this metropolitan state highway mileage will be improved to freeway standards as traffic conditions require, and as funds are available.

The act sets up a formula for expenditure of funds upon the critical deficiencies of the State Highway System in each county, so as to assure continuity in a state highway construction program on a state-wide basis. This formula applies to 50 percent of the state highway funds available for construction purposes during the first five-year period, 55 percent during the next five years, and 65 percent during the third five years.

The act further provides that the northern group of counties are to receive 45 percent of the revenue available for state highway construction, and the southern counties 55 percent.

The State Department of Public Works is required to make detailed reports to the Governor and the Legislature with respect to highway revenues and expenditures, and the Director of Finance is given budgetary control over the transfer of funds from one project to another.

In Memoriam

R. L. Young

DISTRICT Construction Engineer, R. L. Young, died June 20th in San Bernardino. Mr. Young is survived by his widow, Mary Elizabeth Young and his sisters, Elizabeth Young and Laura May Young Harper of Fredonia, New York.

Mr. Young was born April 17, 1882 in Fredonia, New York. He was a graduate of Syracuse University. Mr. Young was a star athlete at Syracuse University. He met and married Mrs. Young in the university town of Syracuse. Following his graduation he accepted the position of Athletic Director at Oklahoma Agriculture and Mechanical College, where he remained for two years. Following this, Mr. Young was employed by the Barbour Asphalt Company, New Orleans, and gained his first practical experience in the road construction industry. At a later date, he came to California and was employed by the City of Los Angeles as an engineer in the road construction department.

Mr. Young has been an employee of District VIII since the formation of the District in 1923. He was promoted to District Construction Engineer in 1928. He entered state service in 1921 in Los Angeles. Mr. Young's work for the State was of exceptional excellence. His genial, kindly manner, his firmness and integrity made him unusually well suited to the control of contract work under his jurisdiction. He was universally respected by everyone with whom he came in contact.

Mr. Young's work with the State was his entire life's interest. During his last illness, until the time of his death, his principal interest was in continuing to discuss the problems of highway construction.

Harry J. Johnstone

ON MONDAY, May 19, 1947, the Maintenance Department lost one of its most valuable employees, Harry J. Johnstone, who worked with the tree crew with headquarters at Petaluma.

Mr. Johnstone went to work with the department in 1931 and worked steadily since that time with tree crews in various parts of the State. He transferred from District V in 1943, and until the time of his death was a resident of Petaluma. He lost his life in the line of duty when he was struck by a passing vehicle on El Camino Real in South San Francisco.

Funeral services were held in Petaluma on May 22, 1947, and he is now resting at Calvary Cemetery in the same city. Besides his widow, Florence Johnstone, he leaves a daughter, Naomi, age nine. The district extends its heartfelt sympathy to those who survive him.

William Alva Rice

THE DEATH of William Alva Rice on April 6, 1947, came as a shock to his many friends and associates in the Division of Highways, in spite of his having been hospitalized for several months with heart trouble.

"Bill," as he was affectionately called, was born in Knoxville, Tennessee, on November 28, 1892. He received his early education in eastern grammar and high schools. He served his Country during World War I in the United States Navy as a Pharmacist Mate. In 1919 he entered the services of the Division of Highways and had been with District IV since 1922.

Mr. Rice became Resident Engineer in 1928 and faithfully carried out the duties of that position until he became ill. Among his many achievements during his career was his supervision of most of the construction and all of the paving of the entire Bayshore Highway between San Francisco and San Jose.

Mr. Rice was highly esteemed by his friends and fellow workers and by others who knew him. He was kind, yet firm to his subordinates and always a friend to the needy. His business associates admired him because of his honesty and frankness. He was a member of Theodore Roosevelt Post No. 21, American Legion, of Santa Rosa, California.

Mr. Rice is survived by his widow, Mrs. Theresa Pauline Rice, and one daughter, Lois Marion, who reside in San Rafael, California.

Clyde A. Graham

EMPLOYEES of District VII were shocked and deeply grieved at the sudden death of Clyde A. Graham, District VII Chief Clerk at his home in Los Angeles on June 14, 1947. Although his length of service in District VI was comparatively short, he became one of the most popular members of the district organization where his loss will be keenly felt, both as a friend and as an efficient and loyal worker.

Clyde was born in Kerrville, Texas, February 16, 1900. His parents moved to San Francisco in 1906, and thence to a cattle ranch in the vicinity of Auburn. After completion of his primary and secondary school courses he attended the University of California, and later the University of Nevada.

Clyde entered the state service in District I in 1922 as clerk, and was transferred to Headquarters Shop in 1928. He was later appointed Chief Clerk in District VI, and in 1944 was transferred to District VII in the same capacity.

He always felt a keen interest in railways and train equipment and at one time worked as a locomotive fireman for the Southern Pacific Company. He had as a hobby the construction of model railroads, locomotives and cars, and was an active member of the Metropolitan Railroad Club. Clyde was also an excellent golfer, and for some time was chairman of the Greens Committee of the Fort Washington Golf Club at Fresno.

He left many friends in nearly every part of the State, and the numerous expressions of sympathy to his family and to the district office give some indication of the high esteem in which he was held, both as an employee and as a man.

Mr. Graham is survived by his widow, Mabel Gammon Graham, a daughter Suzanne Graham, 14, and a son Thomas H. Graham, 11.

Zacharias Crespo

DISTRICT II is mourning the death of Zacharias Crespo, member of the Quarter Century Club of the Division of Highways. Mr. Crespo started work with the State in 1912 on a survey party. He later joined the Maintenance Department and was foreman with headquarters in Redding. He retired on account of illness during the year 1938 and died at the age of 60 of a heart attack on May 2, 1947.

Mr. Crespo was a World War I veteran, having served overseas. He is survived by his widow, Elen Crespo, and his son Maurice Crespo, who is soon to graduate from University of California as a civil engineer. He also leaves a sister, Mrs. Flora Silva, of Oakland.

He will be greatly missed by his many friends in District II and in Sacramento.

Highway Bids and Contract Awards for June and July, 1947

June, 1947

ALAMEDA COUNTY—Between Toll Plaza and Distribution Structure, about 0.9 mile, additional traffic lanes to be constructed of crusher run base and asphalt concrete and a timber trestle to be constructed. District IV, Route 5. Lee J. Immel, San Pablo, $152,-094. Contract awarded to Chas. L. Harney, Inc., San Francisco, $126,672.30.

ALAMEDA COUNTY—On East Shore Freeway, between one mile north of south city limits of Oakland and 0.3 mile south of High Street in Oakland, about 2.3 miles to be graded. District IV, Route 69. San Francisco Bridge Co., San Francisco, $1,094,020; Hydraulic Dredging Co., Ltd., Oakland, $1,124,465. Contract awarded to Johnson Western-American, Alameda, $897,185.

ALAMEDA COUNTY—Over East Shore Freeway at 23d Avenue in the City of Oakland, an overcrossing to be constructed. District IV, Route 69. Stolte Inc. & The Duncanson Harrelson Co., San Francisco, $469,-089; Clinton Construction Co., San Francisco, $482,682; Guy F. Atkinson Co., South San Francisco, $493,539; Chas. L. Harney, San Francisco, $495,785; Carrico & Gautier, San Francisco, $496,772; Parish Bros. & Lew Jones Construction Co., Benicia, $506,-785; S. J. Amoroso Construction Co., San Francisco, $509,343; Fredrickson & Watson Construction Co., Oakland, $525,857. Contract awarded to A. Soda & Son, Oakland, $468,346.84.

ALAMEDA COUNTY—Over East Shore Freeway at 29th Avenue in the City of Oakland, a reinforced concrete and structural steel overcrossing to be constructed. District IV, Route 69. S. J. Amoroso Construction Co., San Francisco, $158,402; A. Soda & Son, Oakland, $159,441; Carl N. Swenson Co., Inc., San Jose, $164,109; Leo Epp, San Francisco, $166,435; Stolte Inc. & The Duncanson-Harrelson Co., San Francisco, $167,-935; Carrico & Gautier, San Francisco, $169,982; Chas. L. Harney, Inc., San Francisco, $170,136; Dan Caputo & Edward Keeble, San Jose, $170,841; Earl W. Heple, San Jose, $171,072; Fredrickson & Watson Construction Co., Oakland, $183,652; M. & K. Corp., San Francisco, $195,570. Contract awarded to Lew Jones Construction Co., San Jose, $156,215.

ALAMEDA AND CONTRA COSTA COUNTIES—Between Hayward and Dublin and between Danville and 3.1 miles south, about 5.3 miles, portions to be repaired by placing plant-mixed surfacing over the existing pavement and a portion to be repaired by placing crusher run base and plant-mixed surfacing over the existing pavement. District IV, Routes 5, 107, Sections B, A. Lee J. Immel, San Pablo, $171,010; A. S. Jones, Napa, $179,830; N. M. Ball Sons, Berkeley, $158,858; W. C. Railing, Redwood City, $166,166; Independent Construction Co., Ltd., Oakland, $194,880. Contract awarded to J. R. Armstrong, El Cerrito, $158,462.83.

AMADOR COUNTY—In the vicinity of Jackson, about 2.3 miles to be graded and surfaced with plant-mixed surfacing and 3 reinforced concrete bridges to be constructed. District X, Routes 34, 65, Sections Jkn, C. Piombo Construction Co., San Francisco, $496,717. Contract awarded to Fredrickson Bros., Emeryville, $489,334.20.

AMADOR AND CALAVERAS COUNTIES—Repairing a bridge across Mokelumne River, about 4 miles south of Jackson, District X, Route 65, Sections C,A. Bos Construction Co., Oakland, $4,305; J. D. O'Brien, Stockton, $5,258; Moore Dry Dock, Oakland, $7,750; Lord & Bishop, Sacramento, $8,050; Fred D. Kyle, Pasadena, $8,771. Contract awarded to Chas. Scott, Stockton, $3,966.53.

CONTRA COSTA COUNTY—In El Cerrito and Richmond on San Pablo Avenue, between Stockton Avenue and McBryde Avenue, furnishing and installing traffic signal systems at 10 intersections. District IV, Route 14, Sections E.Cr., Rch. Abbett Electric Co., San Francisco, $72,067. Contract awarded to Severin Electric Co., San Francisco, $59,649.90.

EL DORADO COUNTY—Between Georgetown and U. S. Ranger Station, about 3.6 miles to be graded and surfaced with imported base material, and penetration treatment and seal coat applied. District III, Route 1099. Dix-Syl Construction Co. Inc., Bakersfield, $78,325.80; H. & D. Construction Co., San Anselmo, $82,289; Arthur B. Siri, Santa Rosa, $83,313; Louis Biasotti & Son, Stockton, $96,495; Chittenden & Chittenden, Auburn, $108,483; Claude C. Wood Co., Lodi, $109,512. Contract awarded to Miles & Bailey, Madera, $72,319.50.

FRESNO COUNTY—Between 400 feet south of Fresno city limits and San Benito Avenue at Broadway in Fresno, about 1.2 miles to be graded, paved with Portland cement concrete pavement and plant-mixed surfacing on cement treated base and grade separation structures to be constructed. District VI, Route 4, Sections B,Fre. Morrison Knudsen Co. Inc., San Francisco, $1,452,644; Bressi & Bevanda Constructors, Inc., Los Angeles, $1,533,563; A. Teichert & Son, Inc., Sacramento, $1,582,724; J. E. Haddock, Ltd., Pasadena, $1,686,454. Contract awarded to Guy F. Atkinson, South San Francisco, $1,341,822.

FRESNO COUNTY—On Highland Avenue between Kings County line and Elkhorn Avenue, about 3.3 miles to be graded and surfaced with plant-mixed surfacing on crusher run base. District VI, Route 568. Volpa Brothers, Fresno, $149,823; R. M. Price Co. & Rex B. Sawyer, Huntington Park, $157,-795. Contract awarded to Valley Paving and Construction Co. Inc., Fresno, $137,641.50.

HUMBOLDT COUNTY—Between Jordan Creek and South Scotia Bridge, about 1.2 miles, cement treated base to be constructed on a portion of the project and plant-mixed surfacing and seal coat to be placed on the cement treated base and existing surfacing. District I, Route 1, Sections D,E. Contract awarded to Clements & Co., Hayward, $30,644.

HUMBOLDT COUNTY—Across Redwood Creek, about 30 miles east of Eureka, a structural steel truss span bridge to be constructed. District I, Route 20, Section C. C. C. Gildersleeve, Douglas City, $17,483; James H. McFarland, San Francisco, $23,-760; W. C. Railing, Redwood City, $24,735. Contract awarded to Tom Hull, Eureka, $14,948.

IMPERIAL COUNTY—Between Junction Route 26, 1.5 miles east of Heber and 1.9 miles south of Calipatria and between 3.6 miles north of Bond's Corner and Alamorio, about 12.0 miles in net length, to be repaired by placing road-mixed surfacing over the existing surfacing and portions to be repaired with imported base material and road-mixed surfacing, District XI, Routes 201, 187, Sections ABC, ABC. Warren Southwest Inc., Los Angeles, $86,911; Cee-Tee Construction Co., Puente, $88,845; R. E. Hazard Contracting Co., San Diego, $89,176; Shea & Fisher Inc., Indio, $92,494; Dimmitt & Taylor, Los Angeles, $96,321. Contract awarded to MacArthur & Son, Palmdale, $79,577.

KERN COUNTY—Between Bakersfield and Snow Road, about 3.6 miles to be graded, paved with Portland cement concrete and with asphalt concrete and plant-mixed surfacing on Portland cement concrete base and on crusher run base, and four reinforced concrete bridges and two steel girder bridges to be constructed. District VI, Routes 4, 141, Sections Bkd, G,D,A. Morrison-Knudson Co., Inc., San Francisco, $1,334,419. Contract awarded to Griffith Company, Los Angeles, $1,210,040.

KERN COUNTY—Between 0.4 mile west of Cottonwood Creek and Cottonwood Creek, about 0.4 mile to be scarified and reshaped and "sub-oiling" treatment applied. District VI, Route 57, Section E. Contract awarded to James E. Anderson, Visalia, $4,105.

KERN COUNTY—Remove existing bridge across Kern River on Oak Street at Bakersfield. District VI, Route 58, Section L. George von KleinSmid, Bakersfield, $12,220; Phoenix Construction Co., Bakersfield, $12,440; Trewhitt-Shields & Fisher, Fresno, $15,973. Contract awarded to Rexroth & Rexroth, Bakersfield, $12,220.

KERN COUNTY—Between Wasco and Elmo Highway, about 6.1 miles to be graded and bituminous surface treatment applied. District VI, Route 889. Splicer Company, Los Angeles, $184,768; Dix-Syl Construction Co., Inc., Bakersfield, $185,893; Browne & Krull, Palo Alto, $188,886; Fredericksen & Kasler, Sacramento, $196,095; Frank T. Hickey, Inc., Los Angeles, $218,156; Oilfields Trucking Co., Bakersfield, $226,407; Claude C. Wood Co., Lodi, $227,158; Louis Biasotti & Son, Stockton, $236,205; W. C. Railing, Redwood City, $236,346. Contract awarded to Rand Construction Co., Bakersfield, $167,805.50.

LOS ANGELES COUNTY—On Whittier Blvd. between Goodrich Blvd. and Concourse Avenue, furnishing and installing traffic signal systems at eight intersections. District VII, Route 2, Section D,Mtbl. C. D. Draucker Co., Los Angeles, $35,375. Contract awarded to Econolite Corp., Los Angeles, $30,668.

LOS ANGELES COUNTY—At the intersection of Hollywood Parkway and Arroyo Seco-Harbor Parkway, a four level reinforced concrete separation structure to be constructed, approaches to be graded, and storm drains and sanitary sewers to be installed. District VII Routes 2, 165. Guy F. Atkinson Co., Long Beach, $1,427,700; Bressi & Bevanda Constructors, Inc., Los Angeles, $1,619,739; J. E. Haddock Ltd., Pasadena, $1,627,124; M. H. Golden Construction Co., San Diego, $1,638,540; Peter Kiewit Sons Co., Arcadia, $1,786,882; Winston Bros. Co., Los Angeles, $1,946,817. Contract awarded to James I. Barnes Construction Co., Santa Monica, $1,296,595.40.

LOS ANGELES COUNTY—Across San Gabriel River near Azusa, a portion of a bridge to be reconstructed. District VII, Route 9, Section G. Macco Corp., Clearwater,

$45,861; H. R. Breeden, Compton, $47,335; Jas. R. Mathews Excavating Co., Alhambra, $48,645; Oberg & Cook, Los Angeles, $50,425; T. M. Page, Monrovia, $53,446; C. B. Tuttle Co., Long Beach, $54,159; Oberg Bros., Ingelwood, $59,092; MacDonald & Kruse & Hensler Construction Corp., Glendale, $61,788; Dimmitt & Taylor, Los Angeles, $69,815; Byerts & Dunn, Los Angeles, $70,648; Catalina Construction Co., Covina, $71,133. Contract awarded to Bonadiman McCain, Inc., Los Angeles, $45,618.15.

LOS ANGELES COUNTY—In the City of Pomona on 5th Avenue and on Holt Avenut from Hamilton Blvd. to Reservoir Street, furnishing and installing traffic signal systems at 13 intersections and furnishing and installing modifications to existing traffic signal systems at three intersections. District VII, Routes 19 and 26. H. B. Nicholson, Los Angeles, $48,659; Econolite Corp., Los Angeles, $52,908; C. D. Draucker Co., Los Angeles, $53,450. Contract awarded to Prescott Electric & Mfg. Co., Los Angeles, $44,770.

LOS ANGELES COUNTY—On Garvey Avenue between San Gabriel Blvd. and Mountain View Road, furnishing and installing traffic signal systems at 13 intersections and reconstructing traffic signal systems at 2 intersections. District VII, Route 26, Sections A, B, E, Mte. Econolite Corp., Los Angeles, $53,495. Contract awarded to C. D. Draucker Co., Los Angeles, $52,170.

LOS ANGELES COUNTY—At the intersection of Holt Avenue and Bellevue Avenue, about 0.5 mile, existing pavement to be resurfaced with asphalt concrete and widened with asphalt concrete on Portland cement concrete base. District VII, Routes 26, 77; Sections C, B. J. E. Haddock, Ltd., Pasadena, $73,154; Silva & Hill Construction Co., Los Angeles, $75,911; Dimmitt & Taylor, Los Angeles, $90,540; MacDonald & Kruse & Hensler Construction Corp., Glendale, $116,342. Contract awarded to Griffith Co., Los Angeles, $69,281.70.

LOS ANGELES COUNTY—At the intersection of Holt Avenue and Bellevue Avenue, traffic signal and highway lighting systems to be furnished and installed. District VII, Routes 26, 77, Sections C, B. C. D. Draucker Co., Los Angeles, $30,470. Contract awarded to Econolite Corp., Los Angeles, $28,678.

LOS ANGELES COUNTY—In the cities of Arcadia and Monrovia, on Huntington Drive from Colorado Place to Mountain Avenue, furnishing and installing traffic signal systems at 11 intersections. District VII, Routes 161, 9. Prescott Electric & Manufacturing Co., Los Angeles, $39,992; C. D. Draucker Co., Los Angeles, $44,070; Econolite Corp., Los Angeles, $46,211. Contract awarded to Electric and Machinery Service, Inc., South Gate, $38,880.

LOS ANGELES COUNTY—In the cities of Lynwood and South Gate on Atlantic Avenue from Century Blvd. to Firestone Blvd., furnishing and installing traffic signal systems at 8 intersections and reconstructing traffic signal system at one intersection. District VII, Route 167. H. B. Nicholson, Los Angeles, $32,070; C. D. Draucker Co., Los Angeles, $32,500; R. E. Ziebarth, Long Beach, $38,000. Contract awarded to Econolite Corp., Los Angeles, $29,795.

MENDOCINO COUNTY—At Kibbesillah Creek, 11.6 miles north of Fort Bragg, about 0.5 mile to be graded, surfaced with road-mixed surfacing on imported base material, and a seal coat to be applied. District I, Route 56, Section F. John Burman & Sons, Eureka, $73,391; Guy F. Atkinson Co., South San Francisco, $73,851; W. C. Railing, Redwood City, $82,892. Contract awarded to Arthur B. Siri, Santa Rosa, $71,923.

MENDOCINO COUNTY—Across Noyo River, about one mile south of Fort Bragg, the superstructure for a bridge to be constructed. District I, Route 56, Section E. Guy F. Atkinson Company, South San Francisco, $472,205; George Pollock Co., Sacramento, $479,615; Columbia Steel Company, San Francisco, $471,335. Contract awarded to J. H. Pomeroy and Co., Inc., San Francisco, $459,532.50.

MODOC COUNTY—Furnishing and stockpiling mineral aggregate. District II, Route 28, Section A. Contract awarded to Harms Bros., Sacramento, $14,975.

MODOC COUNTY—Across South Fork of Pit River, at Likely, a reinforced concrete bridge to be constructed. District II, Route 73, Section C. Evans Construction Co. and Barton & Anderson, Berkeley, $48,288; Grant L. Miner, Palo Alto, $38,865. Contract awarded to T. A. Krale, Ojai, $34,885.

MONO COUNTY—Near Bridgeport, on Twin Lakes Road, about 3.9 miles to be graded and bituminous surface treatment applied. District IX, Route FAS 1093. Geo. E. France, Visalia, $63,280; Isbell Construction Co., Reno, $64,955; Jensen and Pitts, San Rafael, $75,109; Browne and Krull, Palo Alto, $96,268. Contract awarded to Dix-Syl Construction Co., Inc., Bakersfield, $47,384.50.

NEVADA COUNTY—Between East Broad Street in Nevada City and two miles northwesterly, about 1.9 miles to be constructed with a bituminous surface treatment on imported borrow. District III, Route 25, Section Nev. C. A. Jensen & Pitts, San Rafael, $59,428; A. Teichert & Son, Inc., Sacramento, $63,029; Arthur B. Siri, Santa Rosa, $74,033. Contract awarded to J. Henry Harris, Berkeley, $58,973.35.

NEVADA, PLACER & EL DORADO COUNTIES—Seal coat to be applied at various locations in District III, Routes 37, 38, 39, 11. A. Teichert & Son, Inc., Sacramento, $47,300; Fredericksen & Kasler, Sacramento, $48,493; J. Henry Harris, Berkeley, $50,462. Contract awarded to Granite Construction Co., Watsonville, $44,788.

ORANGE COUNTY—In the City of Laguna Beach on Coast Blvd. from Diamond Street to Myrtle Street, furnishing and installing fixed time traffic signals at five intersections and reconstructing fixed time traffic signals at six intersections. District VII, Route 60. Electric Machinery Service, Inc., South Gate, $22,615; R. E. Ziebarth, Long Beach, $24,950; C. D. Draucker Co., Los Angeles, $27,770. Contract awarded to Tri-Cities Electric Service, Oceanside, $20,825.

ORANGE COUNTY—Between one mile south of Galivan and 1.4 miles north of El Toro Road, about 6.7 miles, about one mile of the existing pavement to be resurfaced with plant-mixed surfacing, imported borrow to be placed on shoulders and bituminous surface treatment applied thereto; and about 2.4 miles imported borrow to be placed on shoulders and bituminous surface treatment applied. District VII, Route 2, Sections A, B. Sully-Miller Contracting Co., Long Beach, $18,222; Cox Bros. Construction Co., Stanton, $16,905. Contract awarded to Jesse S. Smith, Glendale, $15,015.

PLACER AND YOLO COUNTIES—At Sheridan, on the Yolo Causeway, and through Loomis, about 3.6 miles, to be resurfaced with plant-mixed surfacing. District III, Routes 3, 6, & 17, Sections B, B, A. McGillivray Construction Co., Sacramento, $16,812. Contract awarded to A. Teichert & Son, Inc., Sacramento, $15,586.

SACRAMENTO COUNTY—Across Three Mile Slough about 4.3 miles south of Rio Vista, the reinforced concrete substructure for a bridge to be constructed. District X, Route 11, Section C. The Duncanson-Harrelson Co., San Francisco, $246,660; H. F. Lauritzen, Pittsburg, $249,352; Healy Tibbitts Construction Co., San Francisco, $286,035; Ben C. Gerwick, Inc., San Francisco, $331,904; Butte Construction Co., San Francisco, $332,706. Contract awarded to Johnson Western Company, Alameda, $237,229.80.

SACRAMENTO COUNTY—On Marconi Avenue between Howe Avenue and Fair Oaks Boulevard, about 4.7 miles to be graded and crusher run base constructed, and plant-mixed surfacing, armor coat and penetration oil treatment to be applied. District III, Route 929. A. Teichert & Son, Inc., Sacramento, $109,093; Brighton Sand & Gravel Co., Sacramento, $114,221. Contract awarded to McGillivray Construction Co., Sacramento, $106,379.95.

SAN BENITO COUNTY—Between Route 2 and San Juan Bautista, about 2.2 miles to be repaired by placing imported borrow over the existing roadbed and applying bituminous surface treatment. District V, Route 22, Section C. Granite Construction Co., Watsonville, $35,780. Contract awarded to A. Teichert & Son, Inc., Sacramento, $32,993.

SAN BERNARDINO COUNTY—At 5 intersections in the City of Ontario, on "A" Street between San Antonio Avenue and Campus Avenue, traffic signal systems to be furnished and installed. District VIII, Route 26. Econolite Corp., Los Angeles, $23,994; C. D. Draucker Co., Los Angeles, $25,970. Contract awarded to Paul Gardner, Ontario, $23,829.25.

SAN BERNARDINO COUNTY—Between Etiwanda Avenue and Mulberry Avenue, about 1.0 mile to be graded and paved with Portland cement concrete, a reinforced concrete overhead crossing at Kaiser Spur and a steel beam span undercrossing at Kaiser Road to be constructed. District VIII, Route 26, Section D. Griffith Co., Los Angeles, $394,167; Winston Bros. Co., Los Angeles, $402,544; Peter Kiewit Sons Co., Arcadia, $410,928; J. E. Haddock, Ltd., Pasadena, $428,881; MacDonald and Kruse and Hensler Construction Corp., Glendale, $448,267; United Concrete Pipe Corp. & Ralph A. Bell, Baldwin Park, $486,421; Dimmitt & Taylor, Los Angeles, $500,487; Guy F. Atkinson Co., Long Beach, $522,000; Matich Bros., Colton, $522,569. Contract awarded to George Herz & Co., San Bernardino, $377,203.60.

SAN BERNARDINO COUNTY—Between 0.9 mile north of San Bernardino city limits and Panorama Maintenance Station, a distance of about 6.7 miles to be resurfaced with plant-mixed surfacing. District VIII, Route 43, Section A. Matich Bros., Colton, $28,650; Griffith Co., Los Angeles, $32,451; Jesse S. Smith, Glendale, $34,128. Contract awarded to George Herz & Co., San Bernardino, $23,489.10.

SAN DIEGO COUNTY—In Del Mar, Solana Beach, Encinitas, Carlsbad, and El Cajon, furnishing and installing traffic actuated signal systems at six locations, furnishing and installing highway lighting at five of the locations and constructing curbs at three of the locations. District XI, Routes 2, 12, Sections AB, ECj. C. D. Draucker Co., Los Angeles, $72,850; California Electric Works, San Diego, $72,939. Contract awarded to Tri-Cities Electric Service, Oceanside, $53,845.

SAN LUIS OBISPO COUNTY—Between San Luis Obispo and Cuesta Grade, about 2.7 miles to be graded, asphalt concrete pavement to be placed on crusher run base and on existing pavement, and plant-mixed surfacing to be placed on shoulders and other areas. District V, Route 2, Section D. Granite Construction Co., Watsonville, $784,497; A. Teichert & Son, Inc., Sacramento, $792,954. Contract awarded to Fredericksen & Kasler, Sacramento, $728,566.

SAN LUIS OBISPO COUNTY—Across Santa Rosa Creek about 9 miles east of Cam-

bria, a reinforced concrete slab bridge to be constructed. District V, Route 33, Section D. H. R. Breden, Compton, $19,735; O. R. Ochs & Son, San Luis Obispo, $20,930; Dinsmore & McCoy, Santa Barbara, $22,555; Grant L. Miner, Palo Alto, $24,876; Brown-Doko, Pismo Beach, $29,124; A. Madonna, San Luis Obispo, $30,591. Contract awarded to E. G. Perham, Los Angeles, $14,882.25.

SAN LUIS OBISPO COUNTY—Across Villa Creek, about one-half mile south of Pismo, a reinforced concrete slab bridge to be constructed. District V, Route 56, Section E. Dinsmore & McCoy, Santa Barbara, $29,129; Grant L. Miner, Palo Alto, $29,878; Brown-Doko, Pismo Beach, $31,869; O. R. Ochs & Son, San Luis Obispo, $37,006; Wheeler Construction Co., Oakland, $41,896; A. Madonna, San Luis Obispo, $49,870. Contract awarded to E. G. Perham, Los Angeles, $26,931.50.

SAN MATEO COUNTY—The superstructures for two overhead crossings over the tracks of the Southern Pacific Company (Main Line and Belt Line) in the city of South San Francisco, to be constructed. District IV, Route 68, Earl W. Heple, San Jose, $674,704; A. Soda & Son, Oakland, $675,695; Guy F. Atkinson Co., South San Francisco, $682,138; George Pollock Co., Sacramento, $694,348; Carrico & Gautier, San Francisco, $696,530; Leo Epp, San Francisco, $698,482; Chas. L. Harney, Inc., San Francisco, $698,909; Peter Sorenson & Harry J. Oser, Redwood City, $699,757; Carl N. Swenson Co., Inc., San Jose, $704,447; M & K Corp., San Francisco, $739,914. Contract awarded to J. H. Pomeroy & Co., Inc., San Francisco, $640,207.

SAN MATEO COUNTY—On Canada Road, between 2.5 miles north of Woodside and Ralston Avenue, about 4.7 miles to be graded and surfaced with crusher run base and armor coat applied. District IV, FAS 1048. A. Teichert & Son, Inc., Sacramento, $254,712; N. M. Ball Sons, Berkeley, $257,636; Westbrook & Pope, Sacramento, $281,239; Fredrickson Bros., Emeryville, $282,295; Piombo Construction Co., San Francisco, $286,936; Guy F. Atkinson Co., South San Francisco, $311,853; Louis Biasotti & Son, Stockton, $314,841; Morrison Knudsen Co., Inc., San Francisco, $316,925; Fredrickson & Watson Construction Co., Oakland, $326,245; Chas. L. Harney, Inc., San Francisco, $329,160; Peter Sorensen, Redwood City, $367,000; Eaton & Smith, San Francisco, $386,670. Contract awarded to Edward Keeble, San Jose, $235,857.

SANTA CRUZ AND SAN MATEO COUNTIES—Between Waddell Creek and Finney Creek, about 1.4 miles to be graded and surfaced with plant-mixed surfacing on crusher run base. District IV, Route 56, Sections C, A. Morrison-Knudsen Co. Inc., San Francisco, $511,914; A. Teichert & Son, Inc., Sacramento, $543,545; N. M. Ball Sons, Berkeley, $556,431; H. Earl Parker, Inc., Marysville, $573,293; L. A. & R. S. Crow, Los Angeles, $574,788; Fredericksen & Kasler, Sacramento, $582,749; George Pollock Co., Sacramento, $597,403; Guy F. Atkinson Company, South San Francisco, $644,346; Chas. L. Harney, Inc., San Francisco, $648,887; Fredrickson & Watson Construction Co., Oakland, $661,753; Fredrickson Bros., Emeryville, $671,973. Contract awarded to Eaton & Smith, San Francisco, $505,725.46.

SISKIYOU COUNTY—Between Fort Jones and 2.2 miles east of Moffett Creek, about 7.5 miles to be repaired with plant-mixed surfacing and shoulders to be constructed on portions of the project. District II, Route 82, Section D. Clements & Co., Hayward, $69,117. Contract awarded to Sheldon Oil Co., Suisun, $48,424.

SOLANO COUNTY—Furnishing and installing traffic signals in the city of Fairfield on Texas Street, at the intersection with Madison St., Weber Street and Union Avenue. District X, Route 7. L. H. Leonardi Electric Co., San Rafael, $16,350. Contract awarded to Ed. Pierce Electric Co., Vallejo, $8,075.

SOLANO COUNTY — Widening approach spans of bridge across Miner Slough about 12 miles north of Rio Vista. District X, Route 99, Section A. C. C. Gildersleeve, Marysville, $5,625. Contract awarded to Clifford M. Allen, Fairfield, $3,960.

STAUISLAUS COUNTY — Furnishing and installing intersection illumination and traffic actuated signal system and constructing traffic islands in the city of Ceres. District X, Route 4. R. Goold & Son, Stockton, $13,999. Contract awarded to L. H. Leonardi Electric Construction Co., San Rafael, $13,584.50.

STANISLAUS COUNTY—At Wildcat Creek, about 10 miles easterly of Oakdale, about 0.4 mile to be graded, surfaced with gravel, bituminous surface treatment applied and a double 168-inch field assembled plate culvert to be furnished and installed. District X, Route 13, Section B. H. Sykes, Patterson, $44,356; F. E. Young, Berkeley, $45,509; James E. Anderson, Visalia, $48,428; A. G. Raisch Co. and Staring and Galbraith, San Francisco, $53,637; Beerman and Jones, Sonora, $56,278; Elmer J. Warner, Stockton, $61,643; M.J.B. Construction Co., Stockton, $62,172. Contract awarded to Biasotti Construction Company, Stockton, $43,291.

SANTA CRUZ COUNTY—On Green Valley Road between Freedom and Holohan Road, about 0.5 mile to be graded and surfaced with plant-mixed surfacing on crusher run base, and a reinforced concrete bridge to be constructed. District IV, Route 1146. A. Teichert & Son, Inc., Sacramento, $67,607; Dan Caputo & Edward Keeble, San Jose, $67,827. Contract awarded to Granite Construction Company, Watsonville, $60,936.50.

SHASTA AND SISKIYOU COUNTIES—Between Junction Route 3 and Diddy Hill and between Junction Route 3 and five miles north, a distance of about 22.1 miles, seal coat to be applied. District II, Routes 28 and 72, Sections A, A. W. C. Railing, Redwood City, $25,422; Harms Bros., Sacramento, $27,067; Sheldon Oil Co., Suisun, $28,725; J. Henry Harris, Berkeley, $35,344. Contract awarded to Morgan Construction Co., Pleasanton, $21,227.

TEHAMA, PLUMAS AND LASSEN COUNTIES—Between south boundary of Lassen National Park and Westwood, about 29.9 miles, seal coat to be applied. District II, Routes 83, 29. W. C. Railing, Redwood City, $39,552; Morgan Construction Co., Pleasanton, $40,500; J. Henry Harris, Berkeley, $43,021; Harms Bros., Sacramento, $43,993; Sheldon Oil Co., Suisun, $49,202. Contract awarded to Clements & Co., Hayward, $38,760.

TRINITY COUNTY—About two miles west of Douglas City, the existing timber trestle bridge across Redding Creek to be widened. District II, Route 35, Section C. E. G. Perham, Los Angeles, $19,679; S. C. Giles & Co., Stockton, $20,960; James H. McFarland, San Francisco, $23,748; O'Connor Bros., Red Bluff, $26,320. Contract awarded to C. C. Gildersleeve, Marysville, $16,236.

TRINITY COUNTY—Between Route 20 in Weaverville and Brown's Mountain about 6.3 miles to be graded and surfaced with crusher run base; and at East Weaver Creek, about 0.2 mile to be graded and surfaced with road-mixed surfacing on crusher run base and a reinforced concrete box culvert to be constructed. District II, Routes 1089 and 20, Section A. H. Earl Parker Inc. & Clements & Co., Marysville, $262,851; Westbrook & Pope, Sacramento, $267,821. Contract awarded to N. M. Ball Sons, Berkeley, $243,345.40.

TULARE COUNTY—Across Kings River, approximately 5.5 miles west of Dinuba, a reinforced concrete girder bridge to be constructed. District VI, Route 1142. Trewhitt-Shields & Fisher, Fresno, $196,784; Dan Caputo, San Jose, $204,802; Bent Construction Co., Los Angeles, $213,082; E. H. Peterson & Son, Richmond, $226,536; C. B. Tuttle Co., Long Beach, $229,906; Butte Construction Co., San Francisco, $236,683. Contract awarded to Carl N. Swenson Co. Inc., San Jose, $194,700.

VENTURA COUNTY—On Pleasant Valley Road and Wood Road, between Ventura County Railroad and Ventura Blvd., about 6.5 miles to be surfaced with plant-mixed surfacing on existing surfacing and on imported borrow, and portions to be graded. District VII, Route 868. Jesse S. Smith, Glendale, $149,621; T. M. Page, Monrovia, $152,436; MacDonald & Kruse & Hensler Construction Corp., Glendale, $164,986; Silva & Hill Construction Co., Los Angeles, $168,522; J. E. Haddock, Ltd., Pasadena, $168,708; Griffith Co., Los Angeles, $176,413; Dimmitt & Taylor, Los Angeles, $179,086. Contract awarded to Frank T. Hickey, Inc., Los Angeles, $148,105.10.

YOLO COUNTY—Between 1.9 miles north of Solano County line and 1.6 miles south of Woodland and between 0.3 mile and 3.9 miles north of Woodland, a net length of about 4.9 miles to be repaired with plant-mixed surfacing and imported borrow to be placed on shoulders. District III, Routes 7, 87, Sections A,A. A. Teichert & Son, Inc., Sacramento, $48,295. Contract awarded to McGillivray Construction Co., Sacramento, $45,675.

YUBA COUNTY—Between Marysville and 0.4 mile south of Butte County line, about 9.6 miles to be repaired with plant-mixed surfacing. District III, Route 87, Section A. Contract awarded to Rice Bros., Marysville, $28,090.

July, 1947

AMADOR COUNTY—Between 3.7 miles easterly of Pine Grove and the North Fork of Mokelumne River, about 4.7 miles, to be graded and bituminous surface treatment applied. District X, Route 951. H. Earl Parker Inc., Marysville, $179,911; Johnston Rock Co. & Gordon L. Capps, Stockton, $183,963; Westbrook & Pope, Sacramento, $185,575; Claude C. Wood Co., Lodi, $213,735; Fredrickson & Watson Construction Co., Oakland, $227,254; Fredrickson Bros., Emeryville, $231,655; Piombo Construction Co., San Francisco, $237,000. Contract awarded to A. Teichert & Son, Inc., Sacramento, $177,915.70.

CALAVERAS COUNTY—Between State Highway Route 65 at San Andreas and Mountain Ranch, about 8.9 miles, to be graded and bituminous surface treatment to be applied to the central portion of the roadbed. District X, Route 952. J. E. Johnston, Stockton, $155,518; H. Earl Parker, Inc., Marysville, $159,735; A. Teichert & Son, Inc., Sacramento, $163,479; Dix-Syl Construction Co., Inc., Bakersfield, $163,522; Elmer J. Warner, Stockton, $168,271; Claude C. Wood Co., Lodi, $173,822; Piombo Construction Co., San Francisco, $215,234; Fredrickson Bros., Emeryville, $225,958. Contract awarded to Louis Biasotti & Son, Stockton, $155,073.

GLENN COUNTY—Between Willows and Athena, about 8.5 miles, a reinforced concrete slab span bridge to be constructed across Willow Creek, the existing asphalt concrete pavement on a portion of the project to be widened with gravel base, the remainder of the project to be graded and the entire project to be surfaced with gravel base and bituminous surface

treatment applied thereto. District III, Route 531. A. Teichert & Son, Inc., Sacramento, $122,977. Contract awarded to H. Earl Parker, Inc., Marysville, $121,951.85.

LASSEN COUNTY—Between Susanville and north side of Willow Creek Valley, about 17.6 miles, to be graded, imported borrow placed and a portion to be surfaced with road-mixed surfacing. District II, Route 988. Morrison-Knudsen Co. Inc., San Francisco, $348,313; H. Earl Parker, Inc., Marysville, $386,176; J. E. Haddock, Ltd., Pasadena, $567,708. Contract awarded to A. Teichert & Son, Inc., Sacramento, $283,421.

LOS ANGELES COUNTY—In the City of Los Angeles, on Santa Ana Parkway, between Aliso Street and Kearney Street, a total of about six acres to be prepared and trees, shrubs, ground cover and grass to be furnished and planted. District VII, Route 2. Crown City Nurseries, Pasadena, $11,749; Henry C. Soto & Co., San Pedro, $14,271. Contract awarded to Jannoch Nurseries, Altadena, $9,009.51.

LOS ANGELES COUNTY—On Arroyo Seco Parkway, between Bernard Street and Avenue 22, about 1.3 miles to be resurfaced with plant-mixed surfacing and portions to be widened with portland cement concrete pavement and plant-mixed surfacing on portland cement concrete base. District VII, Route 165. MacDonald & Kruse & Hensler Con. Corp., Glendale, $288,996; Dimmitt & Taylor, Los Angeles, $310,949. Contract awarded to J. E. Haddock, Ltd., Pasadena, $247,143.70.

LOS ANGELES COUNTY—Over Santa Clara River and the tracks of the Southern Pacific Company, about 18 miles east of Saugus, a structural steel girder bridge to be constructed. District VII, Route 830. W. J. Distell, Los Angeles, $208,222; Carlo Bongiovanni, Los Angeles, $222,870; H. B. Nicholson, Pasadena, $226,740; Catalina Construction Co., Covina, $231,983; C. J. B. Construction Co., Oxnard, $236,710; Guy F. Atkinson Co., Long Beach, $247,427; Spencer Webb Co., Inglewood, $249,465; Byerts & Dunn, Los Angeles, $273,950; Dimmitt & Taylor & K. B. Nicholas, Los Angeles, $274,880. Contract awarded to Bent Construction Co., Los Angeles, $205,140.

MARIN COUNTY — Across Lagunitas Creek in Samuel P. Taylor State Park, a structural steel beam span bridge to be constructed. District IV. Bos Construction Company, Oakland, $24,769; Louis Bermolini & Son, Novato, $28,490; Minton & Kubon, San Francisco, $29,800; Grant L. Miner, Palo Alto, $31,444; Marin Corporation, Sausalito, $31,651; Parish Bros. and Lew Jones Construction Co., Benicia, $33,695. Contract awarded to W. Lenkeit Construction Co., San Francisco, $21,930.

NEVADA COUNTY — About one mile north of Polaris, the existing bridge across Truckee River to be repaired. District III, Route 38, Section A. Joe Chevreaux, Auburn, $16,465; Evans Construction Co., Berkeley, $16,785; H. W. Ruby, Sacramento, $16,839; C. C. Gildersleeve, Douglas City, $20,660; Barton & Anderson, Oakland, $21,171; Bos Construction Co., Oakland, $21,261; Grant L. Miner, Palo Alto, $21,986; Nevada Constructors, Inc., Reno, $28,820. Contract awarded to Litchfield Construction Co., San Rafael, $10,894.83.

RIVERSIDE COUNTY—On Jurupa Avenue between Mira Loma and Sunnyslope, about 5.3 miles to be graded and surfaced with plant-mixed surfacing. District VIII, Route 699. E. L. Yeager, Riverside, $110,576; Matich Bros., Colton, $113,031; Griffith Co., Los Angeles, $113,154; George Herz & Co., San Bernardino, $114,217; J. E. Haddock, Ltd., Pasadena, $114,427; Catalina Construction Co., Covina, $118,964; T. M. Page, Monrovia, $129,169; Dimmitt & Taylor, Los Angeles, $139,364. Contract awarded to Peter Kiewit Sons Co., Arcadia, $105,203.

SACRAMENTO COUNTY—Between Sutter Street in Folsom and 3.7 miles east of Folsom, about 4.2 miles, plant-mixed surfacing to be placed over existing pavement and imported borrow to be placed on shoulders. District III, Route 11, Section Fol., A. McGillivray Construction Co., Sacramento, $36,067; E. A. Forde, San Anselmo, $38,150. Contract awarded to A. Teichert & Son, Sacramento, $36,023.75.

SAN DIEGO COUNTY — Between the south city limits and the north city limits of Chula Vista, about 2.3 miles to be surfaced with plant-mixed surfacing. District XI, Route 2. Griffith Co., Los Angeles, $55,123; Basich Bros. Construction Co. and Basich Bros. Alhambra, $56,600; Daley Corp., San Diego, $56,635; V. R. Dennis Construction Co., San Diego, $56,771. Contract awarded to R. E. Hazard Contracting Co., San Diego, $48,690.25.

SAN DIEGO COUNTY — Between San Diego and El Cajon, about 2.9 miles to be resurfaced with plant-mixed surfacing. District XI, Route 12, Sections A, LMsa, B, ECj. R. E. Hazard Contracting Co., San Diego, $42,355; Basich Bros. Construction Co. & Basich Bros., Alhambra, $45,108; Daley Corporation, San Diego, $45,581; V. R. Dennis Construction Co., San Diego, $45,733. Contract awarded to Griffith Co., Los Angeles, $40,393.

SISKIYOU COUNTY—Between Thompson Creek and four miles east of Seiad, about 11.9 miles to be surfaced with road-mixed surfacing. District II, Route 46, Sections B, C. Sheldon Oil Co., Suisun, $74,117. Contract awarded to W. C. Railing, Redwood City, $58,931.

TULARE COUNTY—About 3.5 miles west of Porterville, a reinforced concrete slab bridge across Tule River to be constructed. District VI, Route 1128. Dan Caputo, San Jose, $131,955; Bent Construction Co., Los Angeles, $135,667; R. M. Price Co. & Rex B. Sawyer, Huntington Park, $148,425; A. R. Coffeen Co., Corona, $149,997; Granite Construction Co., Watsonville, $150,871; C. B. Tuttle Co., Long Beach, $152,385; Northup Construction Co., Long Beach, $164,122; E. H. Peterson & Son, Richmond, $174,085. Contract awarded to Trewhitt-Shields & Fisher, Fresno, $123,296.50.

TULARE COUNTY—Between two miles west of Woodville and Poplar, about eight miles to be widened and surfaced with plant-mixed surfacing on imported borrow base and bituminous surface treatment to be applied to shoulders. District VI, Routes 1129, 1130. Brown-Doko, Pismo Beach, $180,488; Griffith Co., Los Angeles, $187,461; A. Teichert & Son, Inc., Sacramento, $199,433; N. M. Ball Sons, Berkeley, $207,512. Contract awarded to F. Gunner Gramatky, Fresno, $175,412.

YOLO COUNTY—At west side of Yolo By-Pass, about five miles east of Woodland, about 0.1 mile to be graded and bituminous surface treatment applied. District III, Route 50, Section E. R. A. Farish, San Francisco, $34,394; Jensen & Pitts, San Rafael, $34,708; H. Earl Parker, Inc., Marysville, $35,115; L. G. Lentz, Sacramento, $36,648; Harms Bros., Sacramento, $38,750; A. Teichert & Son, Inc., Sacramento, $43,822. Contract awarded to H. & D Construction Co., San Anselmo, $32,995.

VARIOUS LOCATIONS IN DISTRICT III—Seal coat to be applied to a net distance of about 41 miles. John C. Spaletta, Santa Rosa, $38,982; Fredericksen & Kasler, Sacramento, $39,380; Granite Construction Co., Watsonville, $41,970; J. Henry Harris, Berkeley, $46,814. Contract awarded to A. Teichert & Son, Inc., Sacramento, $37,677.75.

Prunedale Freeway Cut-off

(Continued from page 25)

mark to indicate to tourists that one of the famous old missions of California, Mission San Juan Bautista, is close at hand. This mission was founded by Fr. Presidente Ferman Francisco de Lasuen (as described in this magazine in the November-December issue of 1945).

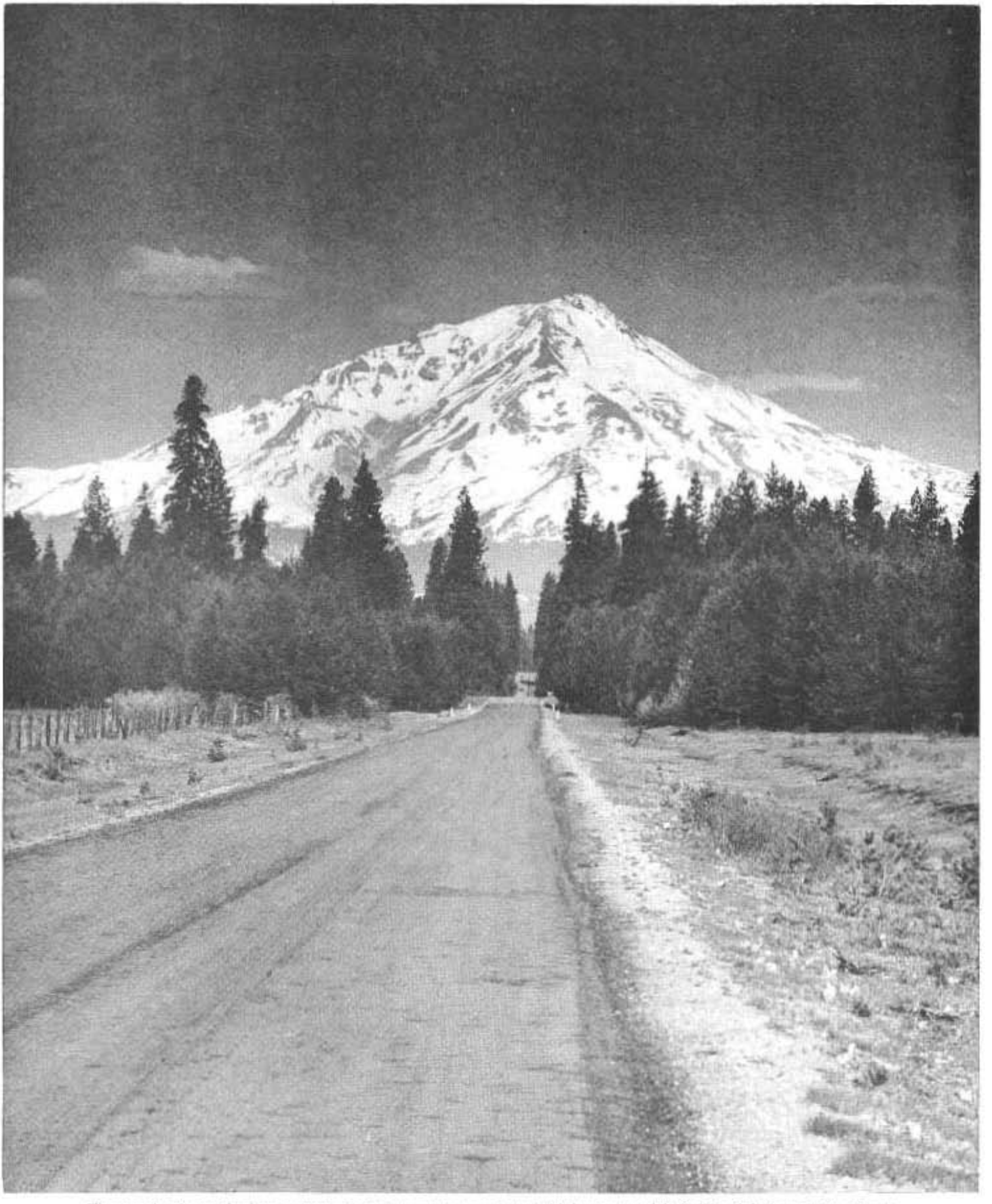
Both units of the Prunedale Freeway Cut-off were constructed by Contractor A. Teichert and Son, Incorporated, of Sacramento. As Resident Engineer Mr. V. E. Pearson turned in a commendable job for the State.

Harbor Parkway Contract In Los Angeles Awarded

C. H. PURCELL, State Director of Public Works, on June 25 announced the award of a contract to James I. Barnes Construction Company, Santa Monica, for constructing the four-level grade separation structure at the intersection of Hollywood Parkway, Arroyo Seco Parkway, and Harbor Parkway, approximately three-quarters of a mile northwest of the Los Angeles City Hall. The contract price is $1,296,595.

Plans are practically complete for a grade separation structure at Temple and Harbor Parkway. This project's tie-up with the proposed Memorial Auditorium in the vicinity of Fifth and Figueroa Streets and the fact that it is the fourth arm of a beltline of freeways encircling the business district makes it of unusual interest to the citizens of Los Angeles. Generally, it will lie west of Fremont Street, the first section extending from Sunset Boulevard to Olympic Boulevard, passing just west of the Jonathan Club at Sixth Street and Figueroa, crossing Kip Street, Bixel Street, and intersecting Olympic in the vicinity of Georgia Street.

Because much of the traffic using these two routes desires an interchange from one parkway to another at this point, and, because the site of the intersection made it impracticable to adopt the usual cloverleaf or other type of interchange requiring a large amount of space in a horizontal plane, it was decided by engineers of the State Division of Highways, cooperating with the Los Angeles City Engineering Department, to expand in a vertical plane.



Thousands of vacationists and out-of-state tourists travel state highways to visit California's famed Mt. Shasta

State of California

EARL WARREN, Governor

Department of Public Works

Headquarters: Public Works Building, Twelfth and N Streets, Sacramento

CHARLES H. PURCELL, Director of Public Works

A. H. HENDERSON, Deputy Director

HIGHWAY COMMISSION

C. H. PURCELL, Chairman
HARRISON R. BAKER, Pasadena
HOMER P. BROWN, Placerville
JAMES GUTHRIE, San Bernardino
F. WALTER SANDELIN, Ukiah
C. ARNHOLT SMITH, San Diego
CHESTER H. WARLOW, Fresno

DIVISION OF HIGHWAYS

GEO. T. McCOY, State Highway Engineer
FRED J. GRUMM, Assistant State Highway Engineer
J. G. STANDLEY, Principal Assistant Engineer
RICHARD H. WILSON, Office Engineer
T. E. STANTON, Materials and Research Engineer
R. M. GILLIS, Construction Engineer
T. H. DENNIS, Maintenance Engineer
F. W. PANHORST, Bridge Engineer
A. M. NASH, Engineer of Surveys and Plans
H. B. LA FORGE, Engineer, Federal Secondary Roads
L. V. CAMPBELL, Engineer of City and Cooperative Projects
R. H. STALNAKER, Equipment Engineer
J. W. VICKREY, Traffic Engineer
E. R. HIGGINS, Comptroller
FRANK C. BALFOUR, Chief Right of Way Agent

DISTRICT ENGINEERS

GEORGE F. HELLESOE, District I, Eureka
F. W. HASELWOOD, District II, Redding
CHARLES H. WHITMORE, District III, Marysville
JNO. H. SKEGGS, District IV, San Francisco
L. H. GIBSON, District V, San Luis Obispo
E. T. SCOTT, District VI, Fresno
S. V. CORTELYOU, District VII, Los Angeles
E. Q. SULLIVAN, District VIII, San Bernardino
S. W. LOWDEN (Acting), District IX, Bishop
PAUL O. HARDING, District X, Stockton
E. E. WALLACE, District XI, San Diego
HOWARD C. WOOD, Bridge Engineer, San Francisco-Oakland Bay Bridge and Carquinez Bridge

DIVISION OF WATER RESOURCES

EDWARD HYATT, State Engineer, Chief of Division
A. D. EDMONSTON, Assistant State Engineer
GORDON ZANDER, Water Rights Administration
T. B. WADDELL, Water Resources Investigations
G. H. JONES, Flood Control and Reclamation
W. H. HOLMES, Supervision of Dams
SPENCER BURROUGHS, Attorney
H. SEARANCKE, Acting Administrative Assistant
P. H. VAN ETTEN, Flood Damage Repair
J. H. PEASLEE, Irrigation Districts
R. L. WING, Topographic Mapping
T. R. SIMPSON, Water Rights Investigations
GEORGE B. GLEASON, Los Angeles Office

DIVISION OF ARCHITECTURE

ANSON BOYD, State Architect
W. K. DANIELS, Assistant State Architect, Administrative
P. T. POAGE, Assistant State Architect, Design and Planning

HEADQUARTERS

H. W. DEHAVEN, Supervising Architectural Draftsman
D. C. WILLETT, Supervising Structural Engineer, School Buildings
CARLETON PIERSON, Supervising Specification Writer
FRANK A. JOHNSON, Supervising Structural Engineer, State Buildings
C. A. HENDERLONG, Principal Mechanical and Electrical Engineer
WADE HALSTEAD, Supervising Estimator of Building Construction

DIVISION OF CONTRACTS AND RIGHTS OF WAY (LEGAL)

C. C. CARLETON, Chief
FRANK B. DURKEE, Attorney
C. R. MONTGOMERY, Attorney

printed in CALIFORNIA STATE PRINTING OFFICE 75288 8-47 20,500

California Highways and Public Works
Division of Highways
P. O. Box 1499
Sacramento, California
Return Postage Guaranteed

CALIFORNIA STATE HIGHWAY SYSTEM