

CALIFORNIA

HIGHWAYS AND PUBLIC WORKS



*Completed portion of new State
Highway in Feather River Canyon
between Belden and Tobin.*

Official Journal of the Department of Public Works
SEPTEMBER ... 1936

CALIFORNIA HIGHWAYS AND PUBLIC WORKS

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

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400 Projects Improve Traffic Service on 3630 Miles of Highways

By T. H. DENNIS, Maintenance Engineer

AN important feature in the record of accomplishment by the Division of Highways during the current biennium (July 1, 1935-June 30, 1937) will be the number and extent of small improvement projects carried out by maintenance forces and paid for out of regularly budgeted funds.

The extent and value of this work from a travel point of view is not generally realized. During the current biennium some 400 projects have been set up in this program, covering more than 3630 miles of State highway. Many of these projects have been completed and, with very minor exceptions, the remaining ones will be finished by December 1, or earlier.

The prime purpose is to complete the work well in advance of the winter season so that traffic may secure the maximum benefit from the improved highway facilities.

This program of projects is made necessary because under present conditions, the "upkeep and replacement in kind" theory of road maintenance does not meet the road and traffic situation as it exists today in California.

This is mainly due to the fact that a considerable mileage of roads recently added to the State system was constructed either to fill the need of horse-drawn traffic, or, was built before the present volume, speed and weight of traffic could be foreseen or provisions made to accommodate it.

In order to meet the demand and safeguard traffic as well as possible until the time when such sections of roadway can be reconstructed, a fund is provided in the

budget setup which may be drawn against to finance relatively small improvement projects.

This work is distinguished from the so-called "minor-improvement" work to the extent that it may be performed on the existing highway alignment even though the eventual location may later require its abandonment.

Likewise, the type of work is developed to best take advantage of the local situation if adherence to recognized practice unduly increases the cost. The test of the projects is traffic need, safety, and reduction in maintenance cost.

This work is programmed under supervision of the Maintenance Engineer and is mainly carried out by the maintenance organization either directly on the day labor projects, or by control of the inspection on portions handled under contract.

The jobs are well distributed throughout the State with projects in each county. Some of the projects extend over considerable distances.

One contract in the Eureka district covers furnishing and stockpiling in windrows of road mix surface material on 21.5 miles of the Redwood Highway, routes 1

and 48 in Mendocino, Humboldt and Del Norte counties. The spreading and compacting of the windrowed material is handled by the maintenance forces.

A second job covers reinforcement of portions and application of penetration dust oil on 32 miles of route 73 between Joseph Creek and New Pine Creek in Modoc County.

Variety of Projects Built Under Maintenance During Biennium

	Miles		Projects where mileage does not apply
	Traveled way	Shoulders	
1. Widening -----	55	60	--
2. Drainage improvement	--	--	28
3. Bridges (widening, strengthening or replacement) -----	--	--	120
4. Grading and dust oil application -----	115	--	--
5. Reinforcing -----	35	--	--
6. Dust oil application	1,200	10	--
7. Reinforcing and sealing -----	40	4	--
8. Road mix oil treatment	710	500	--
9. Plant mix surfacing--	280	123	--
10. Seal coat -----	285	80	--
11. Nonskid application--	80	30	--
12. Road mix oil treatment of beams and gutters -----	30	--	--
13. Guard rail installation	--	--	1
14. Miscellaneous projects	--	--	5

Governor Merriam Opens Unique Salinas Underpass

THE Salinas Underpass was opened to traffic on Friday, August 28th, when Governor Frank F. Merriam cut the ribbon and officially dedicated the new structure to highway service.

Governor Merriam, Director of Public Works Earl Lee Kelly and federal, county and city officials attended the dedicatory ceremony and spoke briefly to a large audience.

This subway is located at the north end of the main business district of Salinas in an area of very heavy motor vehicle traffic. North Main Street and Monterey Street intersect

and contribute their quota of vehicles from the Monterey Peninsula and coast points.

The former grade crossing at this location was one of the most important crossings on the State Highway System. It was not only dangerous because of the heavy rail and vehicular traffic, but caused serious delay to motor vehicles because of the fact that it is located at the head of the Southern Pacific Company's yard tracks and switching movements are very numerous.

In addition to eight regularly

The structure is unique in that it is the only one in the state in which two main traveled arteries meet in the depressed portion of a subway and are carried under railroad tracks through the subway structure.

Many complex problems arose in connection with the design and construction which materially added to the cost of the project. Because of the proximity of ground water at this location it was necessary to design the subway against hydrostatic uplift. This was accomplished by providing a heavy waterproofed section of con-



Dangerous old grade crossing in city of Salinas with a daily average record of 35 rail and 7500 vehicular movements across intersection.

at the point of crossing of the Southern Pacific railroad track, forming a wye at the point of intersection.

THREE HIGHWAYS CONVERGE

Monterey Street is the State Highway route through Salinas on the Coast Highway from San Francisco to Los Angeles. Over 7500 vehicles pass this location daily. In addition to the local traffic and the main through traffic on the State Highway from Los Angeles to San Francisco, two other important state highways, State Route 117, from Monterey to Salinas and State Route 118 from Watsonville converge at this point

scheduled passenger trains and two freight trains daily there are an average of 25 switching movements over this crossing. Since 1926 there have been 16 accidents which were of such serious nature that railroad equipment was damaged and consequently the accidents were reported to the State Railroad Commission.

TRAFFIC GREATLY DELAYED

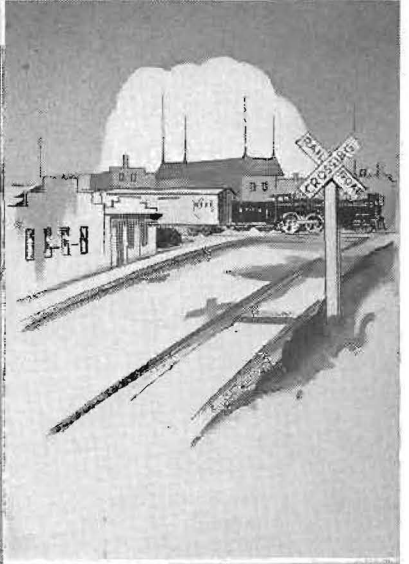
The actual vehicle minutes delay due to stops because of passing trains in a 24-hour period was 409—or the equivalent of one car being delayed at the crossing 6 hours and 49 minutes out of the 24-hour period.

crete below the roadway area of sufficient weight to offset the floating effect of the ground water.

LAKE STREET RELOCATED

In order to effect a saving in providing against this hydrostatic pressure it was found more economical to raise the railroad track than to lower the street grade a greater distance into the ground water area. Accordingly, the railroad tracks were raised approximately two feet. Because of the raise in elevation of the tracks it became necessary to re-grade and pave adjoining streets to meet the new elevation of the railroad tracks.

(Continued on page 17)



Views of the new Salinas underpass opened by Governor Merriam August 28th. At top, south approach where two arterials separated by triangular parking converge in subway. Below, the north approach accomodating traffic from Coast Highway and local street intersection. Official group at ribbon-cutting, left to right, Highway Commissioner H. R. Judah; Assistant Public Works Director Justus Craemer; Miss Muriel Adams; Councilman Wm. Jeffery; Secretary Fred. McCarger, Chamber of Commerce; Governor Frank F. Merriam and Director of Public Works Earl Lee Kelly.



Niles Project Includes Six Grade Separation Structures

By
JNO. H. SKEGGS,
District Engineer

ONE of the outstanding grade separation projects undertaken by the Division of Highways of the Department of Public Works is under way in the town of Niles, Alameda County.

In few localities outside of metropolitan districts are there to be found as many dangerous traffic situations as exist in the small area embracing this project.

The entire project consists of six grade separation structures, a concrete bridge 430 feet long, minor structures and nearly three miles of grading, paving and surfacing. A contract for the construction work in the sum of \$453,169.82 has been awarded. The State's share of the entire improvement, including costs of detours and other necessary expenditures, will amount to approximately \$611,000.

An important feature of this grade improvement to the highway and railroad facilities in Niles will be the construction of a new high standard reinforced concrete bridge over Alameda Creek to replace the present inadequate old structure which would, in any case, have required reconstruction in the very near future.

HAZARDOUS GRADE CROSSINGS

Niles is situated at the lower end of Niles Canyon about 23 miles southeast of the city of Oakland. The trunk lines of the Southern Pacific Railroad and the Western Pacific Railroad enter the canyon at Niles and other branches and spurs of both rail systems join there the main trunk lines.

A primary State highway, Route 5, passes through the town and has junction with the former county road known as "Niles Canyon Road," entering Niles from the east, and with the county road from Newark and Centerville, known as the "Centerville Road," approaching Niles from the west.

These county roads were taken into the State highway system in 1933 by legislative act. They now are parts of Route 107.

Route 5 is the main highway connecting East Bay metropolitan dis-

tricts with territories and cities to the south and at Niles its traffic is largely increased by reason of junction with Route 107, bringing connections to territories east and west.

Up to the present time, this traffic has had to run the gauntlet of five rail and highway grade crossings on the State highways through Niles and one grade crossing on a county road — all of which crossings now are in process of elimination by relocation and construction of approximately three miles of new road in the vicinity of the town of Niles.

The new location is on high standards. On Route 5 it leaves the present highway where that road turns to underpass the Southern Pacific Railroad at the westerly entrance to Niles, and traverses the northerly outskirts of the town to underpass successively the Southern Pacific main line, the Western Pacific main line, and the Western Pacific San Jose branch.

SIX NEW STRUCTURES PLANNED

Reconstruction on Route 107 for the Niles Canyon connection replaces the present dangerously low and narrow subway of the Southern Pacific San Jose branch with a suitable standard structure which is approached on straight alignment.

For Route 107 (Centerville connection to Route 5) the new construction is on good alignment and provides two underpasses, one for the Southern Pacific branch to San Jose and one for the wye connection between the Southern Pacific branch roads to Centerville and to San Jose.

This improvement, therefore, includes six new structures underpassing railroads whereby traffic on Route 5 will be accommodated with provision for four lanes of traffic and on Route 107 there will be two lanes.

In addition to the subways, the project includes the major structure bridging Alameda Creek, which will be a reinforced concrete bridge, 430 feet long, 44 feet clear width between curbs, with a 5-foot sidewalk on each side.

All of the structures carry ample sidewalk provisions for pedestrians.

The new highway construction con-

necting these important structures will be built to a standard width of 56 feet on Route 5 and 36 feet on Route 107. For Route 5 a total of 2417 feet of the new grade will be paved with Portland cement concrete 40 feet wide. The balance of Route 5, about 9540 feet, will be surfaced with bituminous treated stone screenings, plant mixed, to a width of 31 feet, excepting where it is widened to 40 feet over the section approaching and leaving the Twin subways under the Western Pacific San Jose branch.

The 31-foot plant mix surfacing will be constructed 21 feet on one side of the center line and 10 feet on the other, so that the additional 10 feet to make a 40-foot width can be readily made when required to accommodate traffic needs.

On Route 107 the surfacing will be to a width of 22 feet and consist of bituminous treated crushed rock screenings, plant mixed. All pavement and surfacing will be placed upon crusher run base resting on select material in cuts and embankments.

SEPARATED TRAFFIC LANES

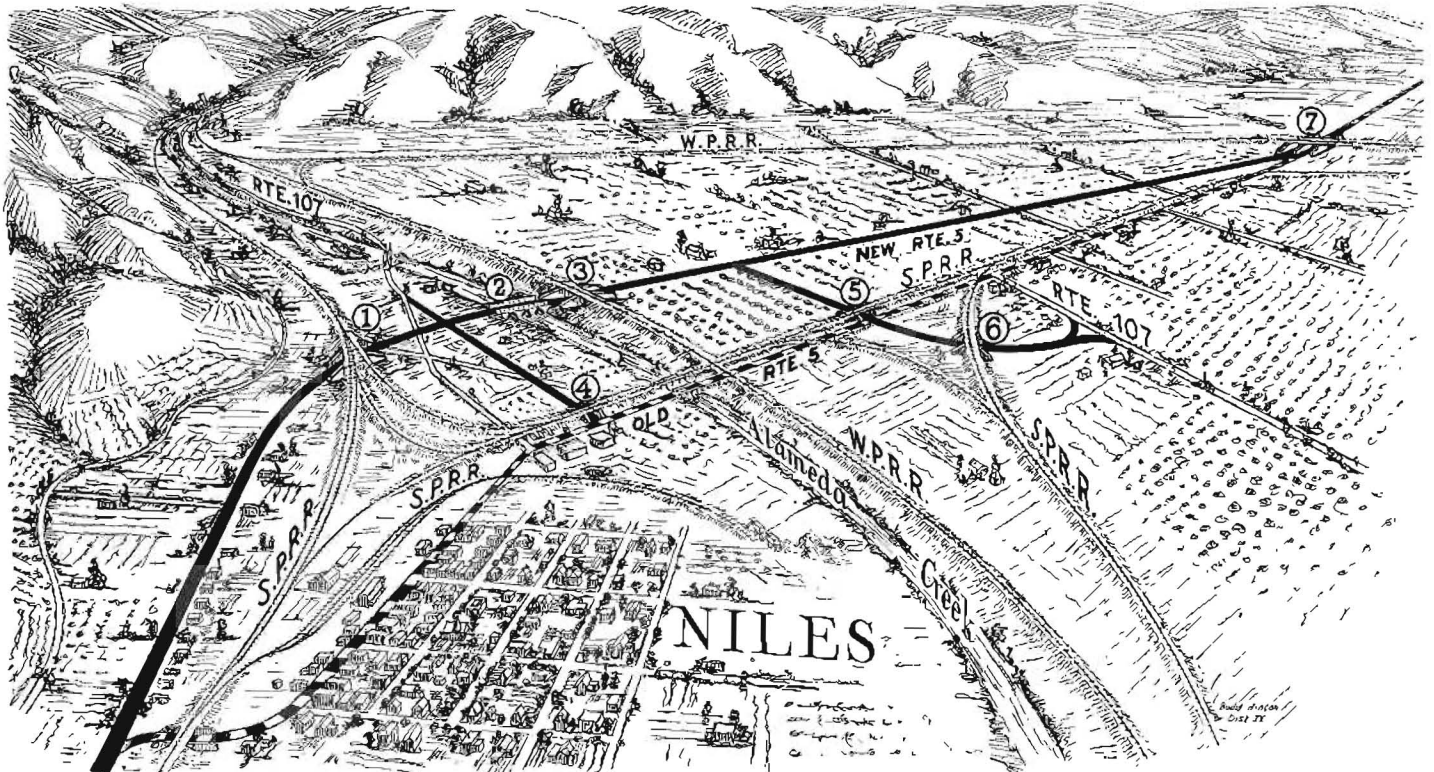
On Route 5 the new alignment is adapted to salvage the existing narrow two-way underpass of the San Jose branch of the Western Pacific, and this improvement is designed to carry southbound traffic only through the present subway. A new structure will be built adjacent to the existing one to provide for the northbound traffic. These two separated lanes of traffic will be marked by a curbed dividing strip extending several hundred feet on both sides approaching the subways.

The entire improvement will be financed by Federal allotments from the Works Progress Administration funds under the Emergency Unemployment Relief Act of 1935.

Elimination from the Niles area of congested major traffic hazards is the objective of this project, considered by the Department of Public Works to be one of the most important grade separation improvements it ever has undertaken.



View of Niles area in Alameda County where an extensive grade separation program is under way consisting of six underpasses, a concrete bridge and the relocation of approximately 3 miles of State Route 5, the Santa Cruz-Oakland-Stockton highway as shown by white dotted line.



Sketch map by Bud Hinton, draftsman-delineator of District IV, showing details of Niles grade separation and relocation project as follows: 1—Southern Pacific main line underpass for relocated Route 5 indicated by heavy black line. 2—Concrete bridge over Alameda Creek. 3—Western Pacific main line underpass. 4—Southern Pacific-San Jose branch underpass for Niles Canyon road. 5-6—Underpasses beneath Southern Pacific for State Highway 107 connection to Centerville. 7—Underpass of Western Pacific branch to San Jose. Dotted line shows present State Highway Route 5.

Paving American Canyon Cut-off With Concrete Mix

By R. E. PIERCE
District Engineer

CONCEIVED as a major highway project almost two decades ago, originally surveyed by the State in 1926, the American Canyon cut-off, on which the first shovelful of earth was turned by the contractor on October 9, 1933, is rapidly approaching completion. The present paving contract is expected to be finished by the end of November.

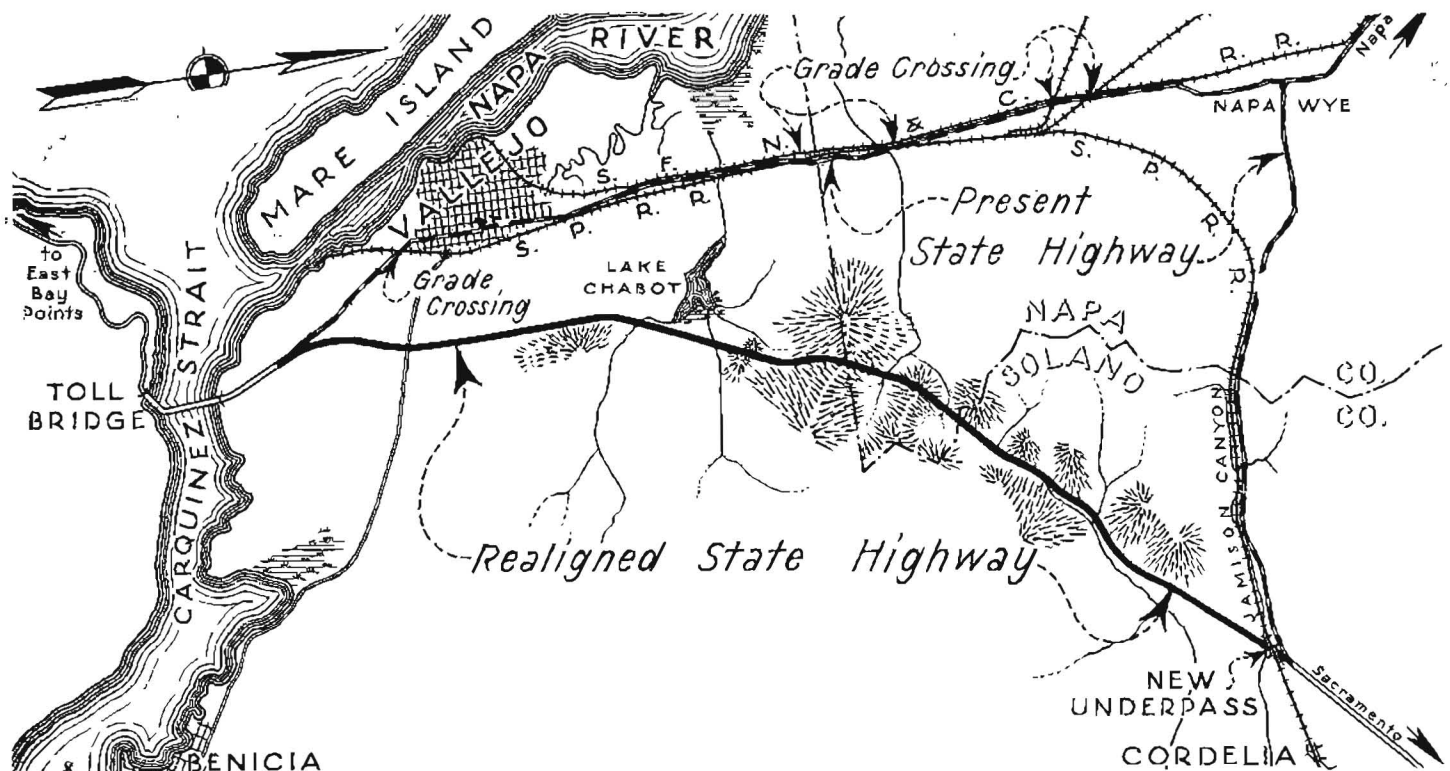
This project, involving roadway excavation of more than 1,475,000 cubic yards of material and difficult

three traffic lanes and 9.8 miles of 20-foot, two-lane pavement from the Benicia Road to the junction of Route 8 west of Cordelia has been completed.

The project provides modern standards with minimum radius curves of 2500 feet, and 6% maximum grades. The grading, drainage, etc., on this project was completed during 1934 at a cost of \$507,376. One cut on the project, about 2400 feet long, involved the excavation of 650,000

cubic yards of material, which was spread on subgrade 1 to 1.5 feet thick for the entire width of the roadway. The subgrade previously was sealed with one-fourth gallon per square yard of SCL-A liquid asphalt and three-eighths gallon per square yard of E grade asphalt.

Work was started on the concrete pavement last July. Preparation batching and delivery of aggregate to the mixers on the job was handled by the subcontractor, who established a permanent batching



Map of realigned State Highway through American Canyon, saving approximately six miles between Sacramento and San Francisco.

grading, will effect a saving of approximately six miles between Sacramento and San Francisco and will eliminate five railroad grade crossings on the present state highway route via Jameson Canyon to the Napa Wye and thence along narrow, congested city streets of Vallejo.

Concrete pavement operations are well under way. Laying of a Class "B" Portland cement concrete pavement, 30 feet in width, from a point about a mile east of the Carquinez bridge to the Benicia Road, a distance of approximately 1.4 miles, providing

cubic yards of material and has a maximum depth of 130 feet.

The major fill on this project is approximately 2500 feet in length and approximately 80 feet high, and involves about 900,000 cubic yards of material. This fill is broken in the center by a timber trestle on concrete abutments.

Sufficient time having been allowed for consolidation of the foundation material on the heavy fills, the Department of Public Works called for bids on November 13, 1935, for the paving of the new highway. On No-

vember 16, 1935, a contract in the sum of \$434,429 was awarded to the lowest of eight bidders for application of a seal coat, placing selected material insulating course and paving with Class "B" Portland cement concrete. Contingencies and supplemental work will bring the estimated cost of the paving project to approximately \$467,000.

Extensive work marked the preparation of the roadway for paving, involving the placing of 143,000 cubic

yards of selected material, which was spread on subgrade 1 to 1.5 feet thick for the entire width of the roadway. The subgrade previously was sealed with one-fourth gallon per square yard of SCL-A liquid asphalt and three-eighths gallon per square yard of E grade asphalt.

Work was started on the concrete pavement last July. Preparation batching and delivery of aggregate to the mixers on the job was handled by the subcontractor, who established a permanent batching



Paving scenes on the American Canyon cut-off relocation of State Highway No. 7 (U. S. 40) from 1 mile East of Carquinez Bridge to Cordelia. The several views show two pavement mixers operating side by side placing a 20 foot width of Portland cement concrete pavement, together with three mechanical tampers in addition to the necessary hand tamping and finishing equipment. A vibrator is being used from each side of the pavement ahead of the first finishing machine. Inset shows subgrade prepared and ready for paving.



The "Big Fill" of the American Canyon Cut-off showing paving operations under way placing a 20-foot concrete surface.

Paving American Canyon Cut-off With Concrete Mix

(Continued from page 6)

plant on the outskirts of Vallejo. Aggregate was delivered by railroad car, discharged into a track feeder and elevated by belt conveyor to the steel bunkers. The steel bins had a combined capacity of about 400 tons of aggregate. A shuttle belt along the tops of the bins provided for distributing the various grades of aggregate into the separate bins.

Aggregates were batched with weighing equipment operated automatically to prepare a 1 cubic yard batch. This entire batching sequence operates by one lever on the control board, and does not require any attention except for a change in the mix. Trucks load under the central batching hopper.

Under the paving procedure followed by the contractor on this job, A fleet of 25 to 30 trucks hauls the combined aggregate to the mixers. Subgrade preparation, placing of timber headers, and other work preliminary to paving, follows the usual standard practice.

Two mixers operate side by side on the 20-foot pavement, while on the 10-foot width, the two mixers operated in tandem. They are supplied by the aggregate trucks backing into position and dumping directly into the skips of the mixers. Mixing water is supplied through hose from a welded steel line laid along the length of the job. Sacked cement is in position along the sides of the

headers, ready to be emptied into the mixer skips. Between the mixers and the discharge from the buckets, the reinforcing steel, both transverse and longitudinal, is placed by a special steel crew.

FINISHING PROCEDURE

Immediately behind the mixers, a finisher with double screed carries out the first step in the finishing process. Mounted on the forward end of this machine are two gas driven concrete vibrators which are used continually in vibrating the concrete mass ahead of the first screed. Behind this first unit, a finisher machine operates to provide a second stage of the finishing process.

Some distance to the rear, a third finishing machine, with single screed, carries a small wave of grout for the final machine finishing operation. Behind the screed, this machine carries a groover which cuts a 2-inch mark along the longitudinal center line of the paving, and the machine operator places 10-foot lengths of steel reinforcing bar in this groove, to a depth of about 2 inches, as the machine progresses. Immediately behind the machine, two men using heavy transverse markers prepare a groove to a depth of somewhat over 2 inches, into which is inserted the $\frac{3}{4}$ x 2 inch steel strips, at the transverse weakened-plane joints.

The next finishing operation is the longitudinal tamping float, operated from timber bridges. Following this

is a crew of men operating transverse (bull) floats, followed by the finishers. In this last step, the steel at the weakened-plane joints is removed, and the reinforcing bar along the center line is also taken up, leaving a weakened-plane along the center of the slab. Following the last finishing step, the concrete placed during the day is kept sprinkled, and the next day covered with dirt, and water-cured in the usual manner.

EXPANSION JOINTS

On this project, $\frac{3}{4}$ -inch expansion joints were provided at 100-foot intervals with dummy joints at the intervening 20-foot intervals. The paving design provided for a weakened plane along the center line with 4-foot lengths of steel reinforcing tie-bars or tie-bolts spaced at 4-foot intervals supported on steel chairs on the subgrade. The pavement section for the 20-foot slab was 0.55 foot thick at the center, increasing to 0.75 foot at the edges in a distance of 2 feet.

Mr. A. N. Lund was the Resident Engineer in charge of the work for the State.

An old darcy was sent to the hospital, and one of the nurses put a thermometer in his mouth, to take his temperature. Presently, when the doctor made his rounds, he asked:

"Well, Mose, have you had any nourishment?"

"A lady done gimme a piece of glass to suck on, boss, but I'se still pow'ful hungry."

400 PROJECTS IMPROVE TRAFFIC SERVICE

(Continued from page 1)

A third project covers placing a one-foot strip of plant mix material along pavement edges at various locations over a distance of 79 miles on route 2, the Coast Highway, in Santa Barbara and San Luis Obispo counties.

Some fifty of the projects are fair sized contracts, but most of them range from a few hundred dollars up to about \$20,000. Funds are allocated north and south to primary and secondary routes in accordance with legal requirements.

BRIDGE STRUCTURES STRENGTHENED

The work outlined is not necessarily continuous for a given project. The widening work, for example, may consist simply of power shovel work at locations where the road width is restricted, sight distance too short or drainage poor. The excavated material is used to widen out embankments, etc., or the work may be done entirely with tractors, scarifiers and graders, or by importing material.

The drainage improvement may provide needed culvert pipe for cross drains or for the extension or deepening of the drainage ditches, cleaning of stream channels, etc.

There are some 250 bridges on the State system which are posted for a restricted load limit. Except for the work done through this improvement fund, many more structures would have a similar restriction. The replacement of bridges is expensive, and the type of improvement covered by this program can only care for relatively small widening, strengthening or replacement work.

Each project, however, increases the service value of the road to that particular community and frequently safeguards against a very real hazard.

ROAD SURFACING RESTORED

The surface treatments on both traveled way and shoulders are on sections where the existing surface has reached the end of its economic life. Usually it was inadequate when originally constructed and to replace it in kind would be expensive and of short benefit.

With the opportunity to widen the section, rework the surface and place additional material or change the

type, a distinct improvement can frequently be secured at comparatively small cost which will materially reduce the annual expenditure and provide an adequate service for a number of years.

At the end of the service life, if funds are not available for reconstruction, the surface can then be properly renewed in kind as an upkeep charge.

TRAFFIC SHOWS INCREASE

Traffic counts taken during 1935 and 1936 indicate that the slackening of traffic volume during the depression years has been fully overcome. The volume of traffic on the roads today is practically the same as would have been the case if the normal estimated six per cent increase per year had continued from 1929 to date.

Work of the kind described above is essential to fill the need on a large number of roads until major construction or reconstruction can be financed.

The work is particularly adaptable to the maintenance organization. For small projects experienced men and the necessary equipment are on the ground and there is practically no expenditure required for moving to or from the job, nor slack to take up in organizing a crew.

On projects of sufficient size to justify preparation for and handling by contract, the intimate knowledge possessed by the maintenance forces of sections where failures require excessive maintenance of the soil and local material situation, is applied to good advantage.

TIME ELEMENT FIGURES

It is the general policy of the Division to advertise for contract all work which can be so handled to advantage and particularly work requiring special or heavy equipment. Naturally, the time element has a bearing on such decisions as at least one month's extra time as compared to day labor, is required to get work under way by contract due to detail and legal restrictions. Even when the work is handled by day labor the contractors are benefited through the opportunities offered in rental of their idle equipment.

Under existing conditions it appears that continuation of improve-

ment work of the character now under way will be an essential part of the highway program for some time to come.

SAVED ACCIDENT VICTIMS

Superintendent T. W. Martin, District VII, tells of an automobile accident which might have resulted in fatalities had it not been for prompt work on the part of Foreman C. J. Ward and members of his maintenance crew.

"Ward, with several men, was patching the pavement on LA-62-B when he noticed rising dust on the slope of the road high above him. When the dust settled he saw an overturned car on the slope. He sped to the scene with two of his men and found two seriously injured women imprisoned in the wreck of their machine, which had gone over the grade. Using a cushion of the auto, Ward and his helpers carried the victims up to the road, a very difficult task. The women were rushed to a doctor. Both had suffered numerous bone fractures and other injuries and doubtless would have succumbed but for the quick work of Foreman Ward."

Village Prefers Bad Road

Flint Hill, little village in Rappahannock county, Virginia, wants bad roads, says a news dispatch. A delegation from the village visited Richmond to protest plans to route a modern highway through the town.

"A good road would menace our school children," the delegation told Governor George C. Peery. "Can't you arrange to run the road west of Flint Hill?"

"That means fight where I come from!"

"Well, why don't you fight then?"

"Cause I ain't where I come from."

—Williams Purple Cow.

Sandy joined a golf club and was told by the professional that if his name was on his golf balls and they were lost, they would be returned to him when found.

"Good," said the Scot, "put my name on this ball."

The pro did so.

"Would you also put M.D. after it?" said the new member. "I'm a doctor."

The pro obeyed.

"There's just one more thing," went on the Scot. "Can ye squeeze 'Hours 10 to 3' on as well?"



Two bridges and a system of four spacious ramp connections feature the extensive construction project separating the grades of the primary shows grading for the east ramp to the 3150 foot overhead alignment, and the new bridges over Coast Highway and Newport Channel. A

NEWPORT GRADE SEPARATION TO ELIMINATE

By L. R. McNEELY, Resident Engineer

ONE of the most important and, from an engineering standpoint, one of the most interesting, grade separation projects undertaken by the Division of Highways is nearing completion at Newport Beach.

No railroad crossing is involved. The separation is for highway traffic only. It is between the Newport-Santa Ana Road and the Coast Highway, State Route 60, and is designed to relieve traffic congestion that in recent years has become increasingly heavy and hazardous.

The Newport-Santa Ana Road is the main highway to the beach communities of Newport and Balboa. During the summer season week-end traffic has been congested at the intersection of the Newport-Santa Ana Road and the Coast Highway to such an extent that automobiles frequently have been held up for an hour or more in negotiating the intersection.

RAILROAD LINE ABANDONED

Work on the project was started on November 12, 1935. For thirteen years prior to this time the Coast Highway passed under the Southern Pacific railroad line at Newport Beach. Eight years ago it was proposed that the Newport-Santa Ana Road, then a county highway, intersecting the Coast Highway at Newport Beach, be lifted up to the level of the railroad viaduct and carried over the State highway.

This proposal was presented to the Southern Pacific Company and it developed that the corporation desired to abandon its Newport Beach line, some eight miles of trackage. After many, many months of negotiations, during which the Newport-Santa Ana Road was taken into the state highway system, the Division of Highways acquired for the State of California the abandoned Southern Pacific right of way and the realigned Newport-Santa Ana Road now occupies the old railroad right of way which carries it over the Coast Highway.

NEW VIADUCT BUILT

The original railroad bridge over the Coast Highway was removed and replaced by a viaduct which provides an underpass for the state highway and an overhead crossing for the Newport-Santa Ana Road.

The new overhead alignment is 3150 feet in length and is connected with the Coast Highway by four ramps, three of which are new construction and one of which is the existing Newport-Santa Ana Road. The connecting ramps will carry two-way traffic with right turns only into the main line traffic.

Overhead construction will be surfaced with 40 feet of Portland cement pavement, with connections to existing pavements surfaced with asphaltic concrete. The ramps will be surfaced with Portland cement concrete pavement from 20 to 24 feet in width.

Grading of the overhead has been completed.

Two bridges are being constructed, one carrying the Newport-Santa Ana Road over the present Newport channel consisting of 5 spans and 200 feet in length, and one over the Coast Highway consisting of 3 spans and 158 feet in length.

The Newport channel bridge has one removable span to comply with federal regulations governing navigable streams. Clear distance between curbs on the Coast Highway will be 64 feet. The bridge widths on the overhead are 44 feet between curbs.

A system of side road ramp connections will permit of a free flow of traffic in all directions whatever the destination may be of vehicles coming into the grade separation.

OLD UNDERPASS FLOODED

Work on the Coast Highway includes bringing the existing underpass to grade. The old underpass was drained by gravity into the Newport channel. The gravity drain was supplemented with a two-inch centrifugal pump. Storms sometimes occurred during high tide when there was some difficulty in keeping the sump clear for traffic.

The roadway will be surfaced with asphaltic concrete 40 feet in width.

A lighting system consisting of 32 standards will be included in the project, six lights being installed on each bridge.



Coast Highway and the secondary Santa Ana-Newport Highway at Newport Beach, a badly congested intersection. This construction scene white arrow marks location of latter bridge which is 200 feet long and has a movable span to comply with Federal navigation regulations.

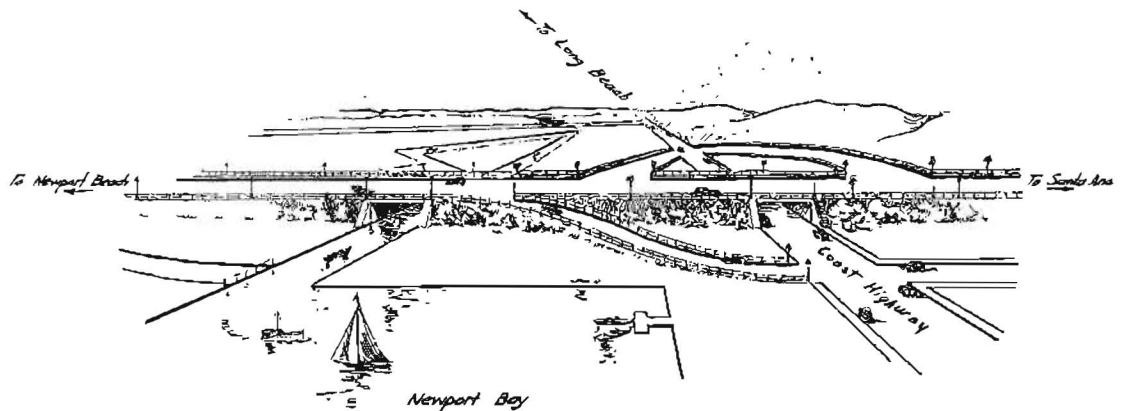
TRAFFIC BOTTLENECK ON COAST HIGHWAY

The slopes of the cuts and fill sections will be planted immediately after completion.

It is expected the entire project will be completed by the end of October. The estimated cost, including the highway overhead bridge, the channel bridge, all ramp connections and incidental work, is approximately \$170,000.

While this grade separation undertaking is not a costly one, it is considered important because of the large volume of traffic it will facilitate. Congestion of cars at the intersection has proved nerve-racking to motorists meeting there. Accidents have been frequent and numerous.

During the long delay in the start of construction pending negotiations with the Southern Pacific Company, Division of Highways engineers and other authorities on road building devoted themselves to exhaustive studies of the most modern methods of handling the problem presented. The result is that this grade crossing for highway traffic only is being constructed along the most up-to-date engineering lines, based upon study which would not have been possible had it been necessary to rush the project to completion.



Sketch showing ramp and overhead structure features of grade separation project on Coast Highway at Newport Beach.

Plans for State Highway Officials' Convention

ANNOUNCEMENT has been made by W. C. Markham, executive secretary of the American Association of State Highway Officials, of the appointment of Frank C. Balfour, Supervising Right of Way Agent of the State Division of Highways in Los Angeles, as director of enrollment and entertainment for the twenty-second annual convention of the association to be held in San Francisco December 7th-9th.

All members of the association are requested to expedite the opening of the convention by pre-enrolling with Mr. Balfour, who will make his headquarters at 500 Sansome street, San Francisco. All who plan to attend the December sessions of the associa-

tion are urged to forward their names to Mr. Balfour together with the names of the women and children who will accompany them.

The complete program for the convention will be published in the November issue of CALIFORNIA HIGHWAYS AND PUBLIC WORKS.

A feature of the program for Tuesday, December 8th, will be an illustrated address concerning the construction of the \$77,000,000 San Francisco-Oakland Bay Bridge by State Highway Engineer C. H. Purcell, who has directed the building of this monumental structure for the Department of Public Works. Mr. Purcell will describe in detail the work of constructing the bridge.

REFLECTORIZED PAVEMENT BUTTONS AN AID TO NIGHT DRIVING

By F. M. CARTER, Assistant Maintenance Engineer

EXPERIMENTAL installations of reflectORIZED pavement buttons have recently been installed by the Maintenance Department of the Division of Highways, marking the center line at dangerous locations on our highways, as an aid to safe night driving.

To determine whether these markers are efficient, economical, and a preventive of accidents, is a problem that is now being worked out.

First of all, we assume that if these markers do tend to reduce accidents, their use should be consistent. They should be positioned only on dangerous curves and locations where a known hazard exists.

RESTRICTED USE DESIRABLE

Experience with our traffic signs proves that the motoring public disregards such installations if used promiscuously and without definite necessity. An indiscriminate use of reflectORIZED pavement markers placed on straight stretches of highways will destroy their usefulness.

If these markers are positioned on straight stretches of streets or highways, it is evident that they will not return the same impression to the approaching motorist at hazardous curves.

UNIFORM SIGN POLICY

Our motoring public of today is not to be fooled or bluffed. In our new policy of signing, we have a definite position for each sign to give the same meaning wherever placed. Being uniform in position, shape, and color the motorist is learning that these signs mean what they say. We do not permit positioning of signs to bluff or fool the traffic. This policy should also be applied to reflectORIZED pavement markers, otherwise the benefit derived from their use is minimized.

Before installing these reflectORIZED pavement markers, this department conducted tests to determine how such markers should be placed, at what locations, how far apart, et

celera. These tests were made on plans in the office and then in the

Governor Merriam Urges More "Road Eyes" for Safety

August 20, 1936.

Hon. Earl Lee Kelly,
Director of Public Works,
Sacramento, California.

Dear Director Kelly:

In driving over the California highways, I have noticed recently that the center of the road on many curves and tunnels is marked with what appears to be an illuminated button or "eye." I am so greatly impressed with this device and its value in outlining the center of the highway for motorists, that I want to indorse its installation, and compliment the Public Works Department upon its good judgment in equipping the highways on curves with this reflector device.

The State should furnish every safety against reckless driving, and make the highways safe for motorists. Definitely marking the middle of the road with the white lines, and hazardous places with these "eyes," which stare at the driver, afford the greatest degree of warning yet devised. Speed the day when all parts of the highway, old and new construction, shall be so equipped.

It seems to me these installations are fully justified in the interest of safety, and in an effort to reduce automobile accidents.

Cordially yours,

(Signed)

FRANK F. MERRIAM,
Governor of California.

field at night by placing buttons on the pavement and observing their effect.

The results of these tests proved that when placed on sharp curves at certain locations these markers do assist the night driver.

MANY FAVORABLE REPORTS

Why are these markers receiving such favorable efficiency reports?

Most of you remember when the white center stripe was painted on the pavement, all motorists enthused over the assistance given them by such striping, they zealously remained on their side of the center stripe on tangents and around curves. This respect for the white striping is still the same. It has carried through because of its efficiency and consistent positioning.

For daylight use there is no comparison between the value of this white line and reflectORIZED pavement markers because the markers are not as visible even if made of polished metals.

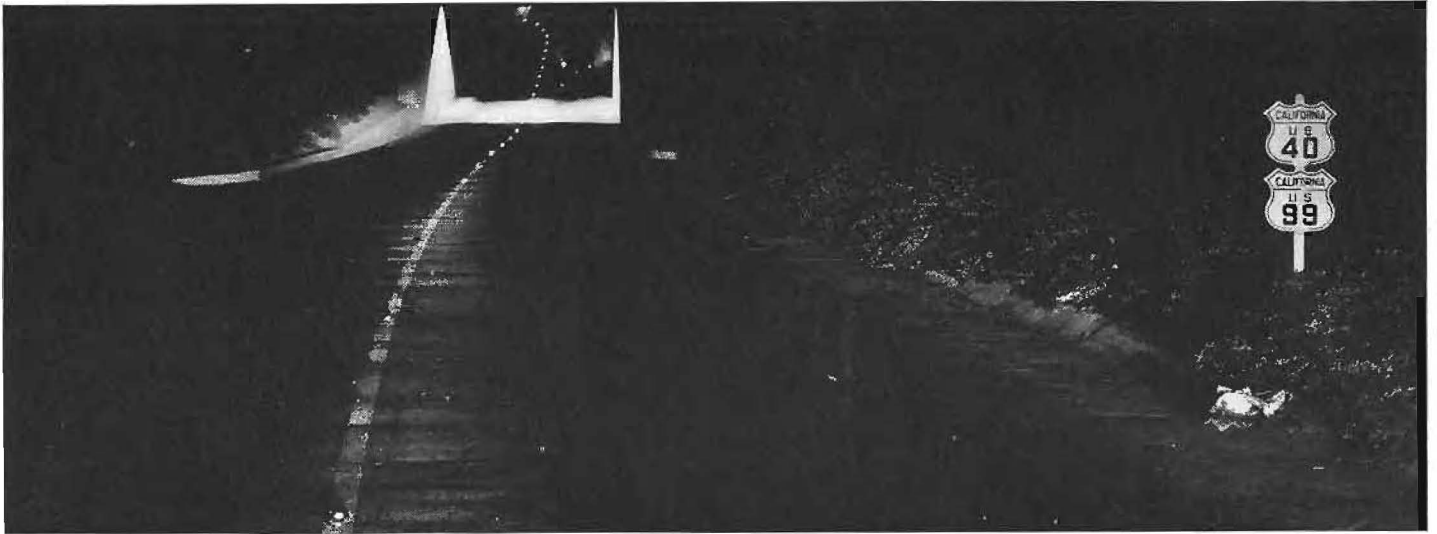
At night when new or when they are maintained properly, the reflector buttons do return a warning message in advance of the curve.

Most of us remember when the curve signs, placed in advance of the sharper curves, were reflectORIZED. The same enthusiastic comments and reports were received. Do the motoring public see and respect these reflectORIZED curve signs today? This department thinks they do. These signs are now always the same—their position in advance of the curve, their shape, and appearance.

CONSISTENT CURVE WARNING

When you see a reflectORIZED curve sign on the highway you know you are approaching a curve that from its design requires a slower speed. With this information correctly and consistently given, the wise motorist slows down and follows the white traffic stripe around the curve.

(Continued on page 24)



This night photograph illustrates how the line of reflectorized buttons or "road eyes" guides the motorist safely through an illuminated underpass in the center of an "S" curve that suddenly looms through the darkness as a brilliant patch of light.



Day photograph of the underpass pictured above shows a wealth of shrubbery and trees on the side slopes presenting a most pleasing arboreal setting as a result of the landscaping of the curved highway approaches over which traffic is guided by the center white line.



Types of reflectorized road buttons with which the Division of Highways is experimenting to test durability, visibility and maintenance cost. Replacement of buttons smashed or dislodged by heavy traffic and necessity for frequent removal of dust and mud accumulations are factors.

Laboratory Develops An Improved Joint Filler

By
THOS. E. STANTON, Jr.
Materials and Research
Engineer

JUST as the mightiest mountains are gradually leveled to the plains, all the works of man are doomed to eventual disintegration if not protected from the elements. Man is therefore constantly battling with nature to preserve what he has built. It may be a battle against chemical disintegration from rain or from running water containing alkalis or acids, or a fight against physical disintegration through the same elements or through alternations of heat and cold, or the impact of forces.

Structures expand with heat and contract with cold, swell when wet and shrink when dry. These alternations of temperature and moisture ultimately spell failure when the structure is under restraint against movement. Hence, we have bursting water pipes in freezing weather and the gradual disintegration of rock mountains with the alternate freezing and thawing of the moisture in cracks and bedding planes.

JOINTS TAKE UP STRESSES

So a pavement or bridge expands when hot or moist and contracts when cold or dry. Stresses resulting from these forces ultimately rupture the structure unless relieved in some way. For this reason all structures of any magnitude must be provided with joints permitting contraction and expansion. Concrete pavement slabs are no exception to the general rule and it is therefore customary to provide planes of weakness across the pavement at regular intervals, ranging from 20 to 30 feet, to insure the formation of shrinkage cracks in a uniform rather than haphazard and irregular manner. In addition to providing for shrinkage, openings from $\frac{1}{2}$ inch to $\frac{3}{4}$ inch wide are left across the slabs at intervals of 60 to 100 feet to permit expansion.

Failure to provide such expansion joints or an insufficient number sometimes causes blow-ups such as are frequently experienced following an extremely hot spell, particularly when the hot spell is immediately preceded by rains which have caused a swell-

ing or expansion of the concrete from moisture.

LEAKAGE SATURATES SUBGRADE

Unfortunately, however, the only cheap and practicable step to avoid destruction by relieving expansion and contraction stresses carries with it new elements of destruction. Concrete without cracks is practically impervious to moisture. However, as soon as cracks form, whether natural or artificial, a channel is provided for ready leakage of water through the pavement and into the subgrade.

Most soils when wet expand and then shrink on drying. While it is true that a partial solution of this difficulty lies in the use of subgrade soils with little or no swell, nevertheless, it is impracticable to entirely avoid this difficulty. Leakage saturates the subgrade adjacent to the crack thereby either causing the foundation to swell, or weakening its bearing power to such an extent that destruction frequently results under heavy traffic.

Moisture on the under side of the slab causes an expansion of that side greater than of the surface exposed to the atmosphere, particularly when dry on a cold day. This results in a warping of the slab and a roughness in riding qualities usually increasing with age. Whether this warping of the slab is the result of swell of the subgrade or unequal expansion of the top and bottom of the slab or any other cause, the results are decidedly objectionable as regards riding qualities and ultimately destructive of the pavement.

QUALIFICATIONS NECESSARY

To overcome these difficulties, highway engineers have for years been endeavoring to develop a crack filler which will effectively seal cracks against leakage. To prevent leakage, the filler must be impervious and must at the same time stick tight to the sides of the concrete. It must be elastic enough not to break away and open up cracks when the concrete shrinks.

Ordinary asphaltic cements have

been used extensively for the purpose with indifferent success. If the asphalt is hard enough not to flow out of the joint in hot weather, it is generally so brittle in cold weather, when shrinkage is usually the greatest, as to possess no resilience so that the joint filler breaks away from the sides of the concrete and cracks open up which readily admit rain water. If the bitumen is soft enough to remain resilient and ductile in cold weather, it becomes so fluid as to run out of the cracks in hot weather.

Studies on the subject therefore have largely centered around the development of a product which would be ductile at low temperatures and still sufficiently hard but sticky at high temperatures to retain a bond to the concrete throughout the entire range of climatic conditions and over a period of years, if not permanently.

BITUMIN-RUBBER COMBINATION

Within the last six months a product has been developed by the engineers of this department which appears superior to any product developed in the past. This product is a combination of bitumen and commercial rubber latex.

Unadulterated specially processed rubber products have been used with considerable success in recent years in one form or another but have the disadvantage of being quite expensive, which factor mitigates against their general use unless no equal or superior, and at the same time more economical, substitute is available.

The correct proportions of bitumen to rubber latex, determination of the proper grade of bitumen, and method of manufacture and placing described herein is the result of original research, and the purpose of this article is to outline the general problem, the method of attack, and the results to date.

Essential characteristics are stickiness combined with low flowability at high temperatures and high ductility at low temperatures. This quality in the finished product is determined by the grade of bitumen, the ratio of

rubber latex to bitumen, and method of manufacture.

The product must be fluid enough to be readily placeable under ordinary construction methods and yet not so fluid as to run out of the crack or joint either at the time of construction or during subsequent warm weather.

BEST MIXTURE PERCENTAGES

It was early determined that the best results are secured with a mixture of approximately 70% bitumen of the type used and 30% rubber latex, the quality of the rubber latex being fixed by the grade of material commercially available.

Though the bitumen is heated to between 150° F. and 200° F. at the time of mixing with the latex and the joints poured while still warm, it was found that if anything harder than a comparatively soft grade of asphalt road oil, such as SC4, was used, the mixture stiffened during mixing to such an extent that it was not readily workable with ordinary hand placing methods.

The mix adopted as a tentative standard therefore, consists of 70% SC4 oil and 30% rubber latex, although further studies are being made with cutback 90-95 road oil and E Grade asphalts. Mixing temperatures must be maintained at 200° F. or less in order to avoid foaming of the rubber latex which is an emulsion of water and rubber.

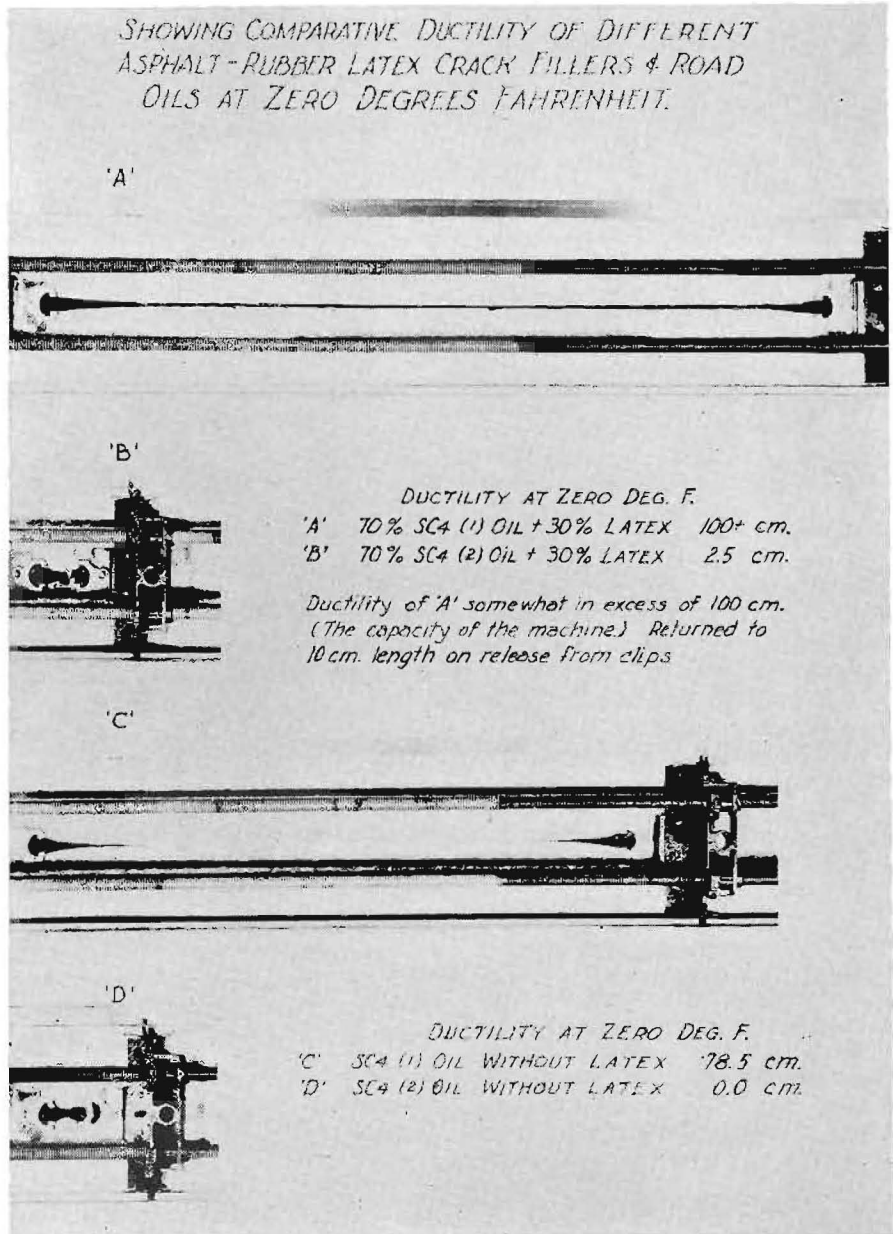
CAN NOT BE REHEATED

If the joint is to be placed by hand, the mixing must be done on the job and the joints poured while the mixture is still warm and of a workable consistency. It is impossible to subsequently soften by reheating a mixture which has been allowed to cool and harden before use.

The development of air pressure methods of placement may obviate this difficulty and permit the use of a tougher and stiffer hot or cold product.

This, however, is considered a refinement and improvement rather than a necessity, as success has been had with the product and method of placing developed to date.

Several grades of SC4 oil were tried and it was found that the grade, source of supply or method of refinement plays quite an important part. The first oil used gave excellent results. The product was sticky and ductile and yet showed little or no tendency to flow after placing. The next batch manufactured with oil of exactly the same grade but from a



Photographs showing results of comparative ductility tests of different crack filler materials.

different source flowed to an undesirable extent when placed at a workable consistency. A study of the two grades of oil developed the fact that the oil which gave success was quite sticky and ductile at low temperatures and at the same time did not develop objectionable fluidity at high temperatures, whereas the oil from the second source was much less ductile at low temperatures.

As the superior oil is readily obtainable, specifications have been built around this particular grade of oil which it is believed is the result of manufacturing processes rather than confined to a crude from any one field, although this phase is also under investigation.

A perfect bond and seal is attained at the time of installation and this bond has been maintained on all joints constructed to date, the oldest being five months old.

It is true that no cold or winter weather has been experienced since the first joint was poured and that the situation may be quite different after the first or subsequent winters. Therefore, it would be premature to claim that the problem has been 100% solved. It is evident, however, that we have a joint filler which appears to be superior to any so far developed and that if nothing better offers, a decided advance has been made.

The material was first tried on two old sections of pavement on the out-

skirts of Sacramento where the straight asphalt poured seals had failed. The expansion joints were cleaned to a depth of two inches and the new joint filler poured with such success that arrangements were made to pour a few joints on two new concrete pavement projects, one the Tejon Pass in District VI, and the other the American Canyon in District X, District Engineers Gillis and Pierce cooperating in the test.

FIRST PROCEDURE MODIFIED

The concrete on both jobs was cured with earth and water. It was therefore necessary to place the joint filler shortly after the concrete was poured and before the earth cover was placed. This condition caused certain difficulties on the Tejon Pass Project which necessitated a retrial using a modified procedure. On the first trial water in the cracks remaining from construction affected the stability of the fresh joint material and subsequently the earth covering, spread before the filler had a chance to stiffen, caused a partial displacement, thereby necessitating patching.

On a retest excess water was removed from the joints before pouring and the fresh poured seal was covered with paper strips to prevent displacement while green. This precaution is unnecessary on old projects or new work not covered with earth for curing, such as where the impervious membrane type cure is used. While the crack filler when green does not pick up readily under traffic, nevertheless, a light surface sprinkling with ground cork may be advisable.

COST OF MATERIAL

At \$180 per ton for rubber latex (when purchased in quantity) and approximately \$10 per ton for the



Placing improved filler by hand method at combined cost for labor and material of 65 cents per joint.

asphalt, the cost of material per ton of mix is as follows:

70% Bitumen by weight at \$10 per ton	-----	\$7.00
30% Rubber latex by weight at \$180 per ton	-----	54.00
		<u>\$61.00</u>

This is the cost per ton of crack filler or approximately 24.4 cents per gallon.

If the seal in the expansion joints is poured to a depth of 1½ to 2 inches, approximately a gallon of material will be required for each joint in a 20-foot-wide pavement at a cost of less than twenty-five cents per joint for the material alone.

In from four to six hours one man can readily mix and pour all joints in



Close-up of one-man pavement joint filling apparatus.

a day's placement run of twenty-foot pavement at a total average cost of not over forty cents per joint depending, of course, on the progress of the paving. At a combined cost of sixty-five cents per joint for labor and material, the cost per mile for expansion joints spaced 100 feet apart would be \$34.32.

The preceding analysis of methods of procedure and cost apply to expansion joints alone, which are usually from ½ inch to ¾ inch wide and re-

Table Showing Comparative Ductility

of

Different Grades of Joint Filler at Low Temperatures

Material	Ductility at 0° F.	Remarks
70% SC4 (No. 1) + 30% Latex	*100 + cm.	Returned 90 cm. on release of clip.
70% SC4 (No. 2) + 30% Latex	2.5 cm.	No appreciable return on breaking.
100% SC4 (No. 1) without Latex	78.5 cm.	No appreciable return on breaking.
100% SC4 (No. 2) without Latex	0.0 cm.	No appreciable return on breaking.

* 100 cm. maximum capacity of ductility machine. Maximum ductility considerably in excess of 100 cm.

quire a different treatment than ordinary shrinkage cracks. In order that the asphalt rubber latex crack filler may flow readily into shrinkage cracks, it has been found necessary to thin the filler with gasoline or other suitable solvent. No difficulty has been experienced in securing good penetration and thorough sealing of the cracks with this fluid material which stiffens as soon as the volatile constituents have evaporated or been absorbed by the concrete.

For crack filler the following combination is used:

70% SC4 cutback with gasoline or other suitable solvent to consistency desired, the desired consistency depending on the width of the cracks.

30% Commercial rubber latex.

In conclusion, it may be stated that a definitely improved crack filler has been developed but time alone will afford the answer relative to its durability and continued serviceability with age.

While cost is an important item, it is relatively unimportant if sufficient service beyond past methods can be secured to justify any added cost and difficulties of installation.

All of the development work on the material described herein was done by Mr. Harry S. Bennett, Asphalt Testing Engineer, and Mr. Robert Gillis, Chemical Testing Engineer, both with the Materials and Research Department.

CORPSE TAKES A WALK

While a lover of dogs, Foreman F. V. Phillips of District VII would like to get his hands on a certain unidentified canine that recently caused him considerable inconvenience. Phillips was enjoying restful slumber after a hard day when the sheriff's office telephoned him that there was a dead dog on the highway, that traffic was dodging the animal's body and as a result there had been several near accidents. He tumbled out of bed immediately and drove to the designated spot on the highway. After placing red lanterns on both the front and rear of his car, he placed the machine in position to load the carcass. As Phillips reached down to grab a leg of the dog the animal sprang up and ran off across a field.

HIGHWAY RESEARCH BOARD TO MEET

The Sixteenth Annual Meeting of the Highway Research Board of the National Research Council will be held in Washington, D. C., on November 18-20.

SALINAS UNDERPASS OPENED TO TRAFFIC BY GOV. MERRIAM

(Continued from page 2)

Lake Street, the first intersecting street north of and parallel to the railroad tracks intersected the subway at right angles in the depressed portion before the subway grade reached the normal street level. It was necessary to abandon this street and relocate it a considerable distance north of its former location in order that a connection could be made from Lake Street to the subway.

PARK SUPPLANTS BUILDINGS

The triangular block formed by the intersection of North Main Street, Monterey Street and Sausal Street was formerly occupied by buildings and service stations. It was necessary to raze the buildings in this triangular area because in depressing both streets to carry them under the railroad tracks, all access to such buildings would be severed.

This area was transformed into a park which adds greatly to the visibility of motorists meeting at the intersection of the two streets, increases the safety of the subway and adds to the aesthetic features of the project.

The structure provides for three tracks of the railroad and has a minimum roadway width for highway vehicles of 44 feet between curbs. A five-foot sidewalk is provided on each side. The abutments of that portion of the structure supporting the railroad tracks are founded on 160 treated Douglas fir piles, each approximately 30 feet long.

Two automatic electric pumps each capable of discharging 750 gallons per minute have been installed to take care of all surface drainage water which flows into the subway.

PARK NICELY LANDSCAPED

Landscaping the park area at the southeast corner of North Main and East Lake Street and the triangular area bounded by Monterey, Sausal, and North Main streets was done as a part of the project. This beautification work consisted of importing top soil and placing same in the planting areas and planting lawn, trees and shrubs. A complete water supply and automatic sprinkler system was also installed.

Previous to starting the design of this structure a complete model was made by the State Bridge Department showing the exact details of the subway and surrounding area as it would look when completed. This model was placed on display in Salinas for the purpose of acquainting all the local citizens of the extent and character of the proposed improvement.

The city of Salinas cooperated by purchasing all necessary right of way and assuming the cost of all property damage. This was financed by a \$140,000 bond issue which was voted by the citizens of Salinas on May 5, 1935.

The project provided employment for an average of 70 men for a period of 8 months or a total of 43,700 man-hours. The indirect employment for which the project provided work in the various mills and manufacturing plants can be visualized from the following quantities of some of the classes of materials used in the construction of the project:

Forty-five thousand sacks of Portland cement were used; 20,000 gallons of asphaltic cement, 2400 gallons of road oils, 7500 cubic yards of crushed stone, 4300 cubic yards of sand, 674,400 pounds of structural steel, 142,700 pounds of reinforcing steel, 135,000 board feet of lumber, 4350 lineal feet of piling, 1100 lineal feet of metal culvert pipe, 5300 pounds of cast steel, 1700 lineal feet of cast iron pipe, 1500 lineal feet of vitrified clay pipe, 5500 pounds of copper strips and 3800 lineal feet of galvanized pipe.

Funds for this project were made available by the Emergency Relief Appropriation Act of 1935, United States Works Program Grade Crossing Projects. The total construction cost was \$290,000.

The project was completed four months ahead of schedule.

FARMERS OWN 5,000,000 CARS

According to the most recent compilations made by the U. S. Bureau of the Census, farmers own more than one-fourth of all the motor vehicles in the United States.

The total number of motor vehicles owned by farmers exceeds 5,000,000.

Gratified by Many Going Contracts on Coast Route

IN THE NEWSLETTER for August published by the California Mission Trails Association, Ltd., General Manager C. M. C. Raymond writes:

"It is gratifying to see so many going contracts of highway improvement on the Coast Route in the Mission Trails territory. \$1,755,115 is the cost involved on seven of these. They are:

Location	Length miles	Approximate completion date	Approximate cost
Salinas Underpass	0.181	7-28-36	\$265,000
Soledad Underpass	0.525	9- 1-36	165,000
Soledad to Gonzales	8.264	10-15-36	146,163
Bradley to San Ardo	6.8	11- 1-36	343,534
No. and So. of Santa Maria	2.377	8-15-36	73,644
Tajiguas to Arroyo Hondo	3.126	11-15-36	226,874
Conejo Grade	-----	12-31-36	635,000

For several years, the existing Cuesta Grade, just north of San Luis Obispo on the Coast Highway, has presented an unwelcome interruption to the motorist. Now, the California Highway Commission has appropriated \$655,000 to cover the cost of rebuilding this winding highway over the Santa Lucia Mountains. For more than six years this Association has been one of the vital factors in championing and urging the reconstruction of this tremendously important piece of scenic highway, which will abolish sixty-three curves and provide safe and delightful traffic facilities for many years to come."

MANY JOBS ON U. S. ROADS

Full-time direct employment on Federal highway work during the fiscal year ended June 30, 1935, furnished 182,605 men with jobs, according to Thomas H. McDonald, Chief, U. S. Bureau of Public Roads.

Government highway activities for that period accounted for more than 5,000,000 man-months of direct and indirect employment, Mr. McDonald reports.

"You look all-in today, Bill. What's the trouble?"

Bill: "Well, I didn't get home until after daylight, and I was just undressing, when my wife woke up and said: 'Aren't you getting up pretty early, Jim?' In order to save an argument, I put on my clothes and came down to the office."

[Eighteen]

Realigned Road Saves Motorists \$23,000 Gas Bill

It is getting figures down to a fine point when state engineers calculate the amount of saving to thousands of motorists in the elimination of a half-mile or so of curves. In relocation of a portion of the Redlands-Colton highway, District Engineer E. Q. Sullivan has it all worked out on paper that operators of something like 700 trucks and 3000 cars that travel this route daily will save not less than \$23,000 in gasoline, oil, tires and, we suppose, patience. The new third lane has been opened to the public as far as the Santa Ana River bridge, greatly relieving traffic that was often blockaded without the middle passing lane. Next job will be to construct the link between this point and Colton, one of the most expensive jobs of the entire project between Los Angeles and Redlands. Already traffic has been speeded up enormously by improvements done within the last two months.

Redlands Facts.

CITY WAS OFFENDER

Frequently calls come to District Maintenance Offices that a truck is broken down on some bad curve or grade. A member of the maintenance crew at once rushes to the spot to flag traffic or place red lanterns. Recently Foreman H. E. Garris, down in District VII, late at night received a call from the police department of the city of Orange to the effect that a tractor and grader had been left at the pavement edge and was a menace to traffic. Garris investigated. He found that the offending tractor and grader were the property of the city of Orange and were parked on a portion of a State highway route maintained by the city. He placed red lanterns and then notified the police department that it had complained against equipment that belonged to its own city.

If all the automobiles in the world were placed end to end, 98 per cent of the drivers would start sounding their horns.—*From Better Roads.*

Bay Bridge Plaza to be Made Into Real Garden Spot

A CITY LOCALITY formerly very much "down at the heel" will soon be transformed into a true garden spot, thanks to the San Francisco-Oakland Bay Bridge.

This is the block at Fifth Street between Bryant and Harrison streets, the terminus of the main San Francisco approach to the bridge.

Under the direction of Chief Engineer C. H. Purcell and District Engineer Col. Jno. H. Skeggs, transformation of this block is now under way.

A total of 121,000 square feet will be planted with grass, trees, shrubs and flowers at an approximate expenditure of \$19,000.

IN "MOOD" OF BRIDGE

Motorists approaching the bridge will be brought into the "mood" of the great structure, for State Arboriculturist H. D. Bowers, who has designed the landscaping scheme, has carried out the feeling of the bridge in the types of plants he has designated.

Of the 121,000 square feet to be cultivated, 64,000 square feet will be planted in lawn of seaside bent. The remaining 57,000 square feet will be devoted to coniferous plants and flowers.

Two sturdy oak trees will carry out the motif of the bridge's great strength. The branches of eighteen redwood trees, grouped at either side of the approach, will continue in effect the design of the arching cables of the suspension spans which can be glimpsed as the autoist ascends the ramp.

SHABBY BUILDINGS SCREENED

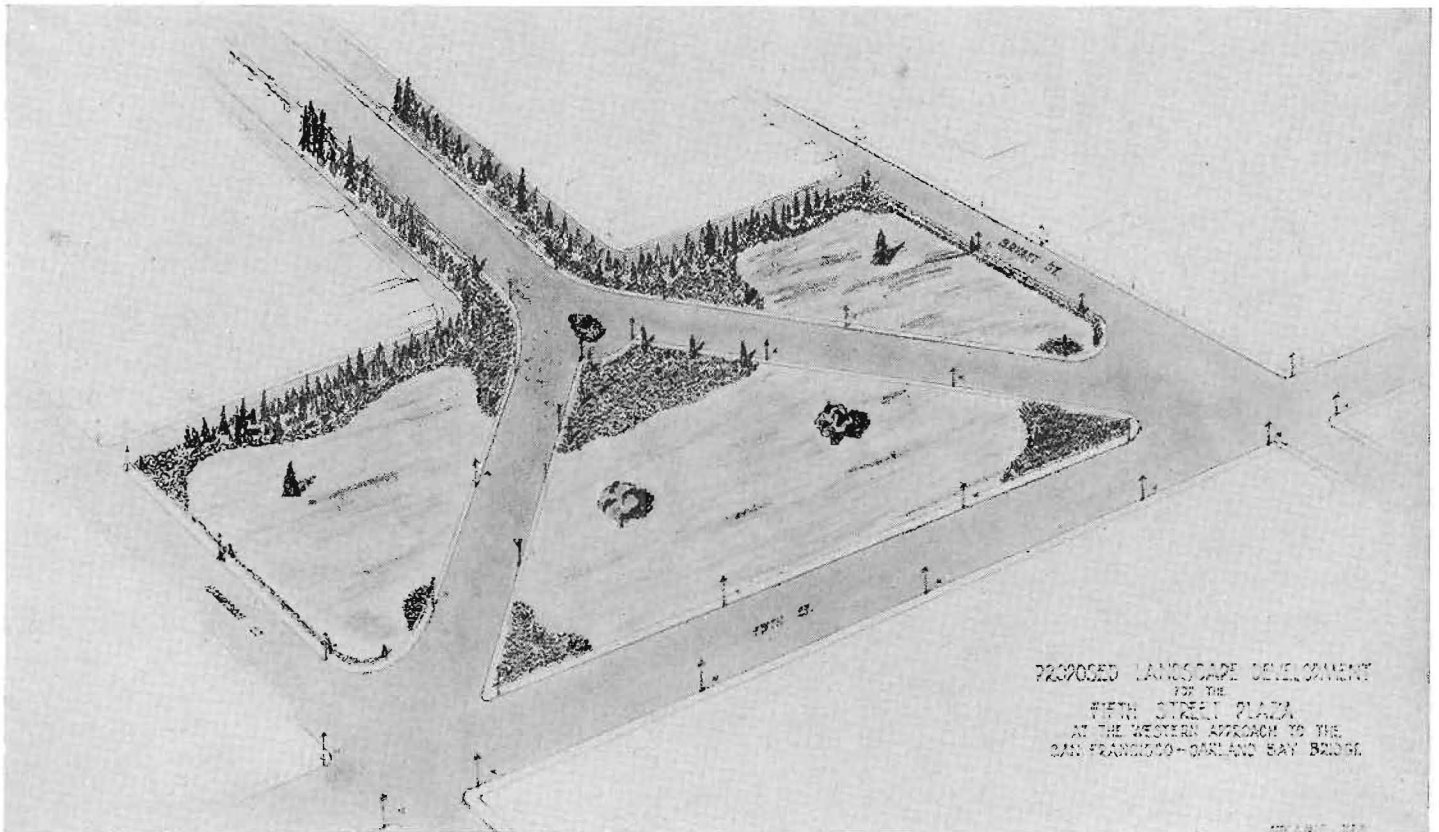
Then there will be 52 trees of the Lawson cypress variety to be planted as a background and serve as a screen for the shabby buildings of the surrounding streets as the motorist first enters San Francisco from the bridge.

Incense cedars (forty of them) will serve as the accent points and give a silhouette effect, while eighteen slender Irish yews will lend a more formal air to the landscape. English holly will provide color and highlight the scene, while a Japanese boxwood hedge will border the area.

In all there will be 26 coniferous varieties totaling 900 plants.



The Fifth Street Plaza terminal of the main San Francisco approach to the San Francisco-Oakland Bay bridge as it is now and as it will look when completed and opened to traffic, on November 12th next is shown in the two pictures presented on this page. The above photograph was taken looking toward the bridge approach across the eastern point of the Plaza triangle for which an attractive landscaping design has been prepared as illustrated below.



The Plaza landscaping plan provides for planting 121,000 square feet on a scale that will make a garden spot in the heart of downtown San Francisco. Of this footage 65,000 square feet will be put in lawn and 57,000 square feet will be covered with plants, flowers and trees. The latter will include sturdy oaks, redwoods, cypress, cedars and Irish yews. The area will be bordered with English holly and Japanese boxwood. The plantings will include 52 trees and 900 plants.

Highway Bids and Awards for August, 1936

AMADOR COUNTY—Construction of fence at Ione Maintenance Station, District X, Route 97, Section A. Standard Fence Co., Oakland, \$1,341; Pacific Fence Co., Los Angeles, \$1,757; Kamlan Fence Co., San Francisco, \$1,823. Contract awarded to Anchor Post Fence Co., San Francisco, \$1,294.28.

BUTTE COUNTY—Between Sacramento River and Chico, about 3.1 miles to be surfaced with gravel and seal coat applied. District III, Route 47, Section A. A. Teichert & Son, Inc., Sacramento, \$22,457; Reuben R. Carlson, Stockton, \$42,758. Contract awarded Claude C. Wood, Stockton, \$19,855.00.

CONTRA COSTA COUNTY—Between 3.5 miles west of Pittsburg and 5.5 miles north of Concord, about 3 miles to be surfaced with plant mix surfacing and shoulders to be constructed. District IV, Route 75, Section B, C. Pacific States Construction Co., San Francisco, \$23,799. Contract awarded to Jones & King, Hayward, \$23,262.50.

CONTRA COSTA COUNTY—Between Route 106 and Antioch, about 4.8 miles to be surf. with pl. mix. surf. District IV, Route 75, Section C. E. A. Forde, San Anselmo, \$40,233; Chas. L. Harney, San Francisco, \$49,583; Independent Const. Co., Ltd., Oakland, \$41,616. Contract awarded to Pacific States Const. Co., San Francisco, \$39,731.

COLUSA COUNTY—Between Williams and 2.7 miles east of Williams about 2.7 miles road bed to be widened and surfaced with gravel surface. District III, Route 15, Section A. Hanrahan Co., San Francisco, \$22,301; C. C. Wood, Stockton, \$24,580. Contract awarded to Clausen Embleton Co., Albany, \$21,161.50.

DEL NORTE COUNTY—Between Winton Corners and Oregon State line, about 5.7 miles to be gr. surf. with scr. grav. on grav. base and lim. brs. to be constructed. District I, Route 71, Section B. N. M. Ball Sons, Berkeley, \$135,879. Contract awarded to D. McDonald, Sacramento, \$131,143.10.

GLENN COUNTY—Bdry. About 2.8 miles to be graded surfaced with crusher run base and pl. mix. surf. and a reinf. conc. grid. br. constr. Dist. III, Route 7, Section C. Union Paving Co., San Francisco, \$105,429; Hanrahan Co., San Francisco, \$114,206. Contract awarded to N. M. Ball Sons & Larsen Bros., Berkeley, \$103,870.50.

HUMBOLDT COUNTY—0.07 miles between D and G Streets in city of Eureka, on Fourth Street. Surf. with bit. treated cr. gravel or stone. District I, Route 1, Section G, Eur. Contract awarded to Mercer Fraser Co., Eureka, \$3,657.80.

HUMBOLDT COUNTY—Clean and paint shop and maintain buildings at Eureka, California, District I, Route 1, Section G, Eur. Contract awarded to A. Camilli, Eureka, \$1,392.25.

HUMBOLDT AND TRINITY COUNTIES—Between 3.15 mile and 5.25 miles east of Blue Lake and at Gray Creek, about 0.7 miles to be graded and exist. tim. brs. rem. District I, Route 20, Sections B, C. A. T. Howe & Son, Santa Rosa, \$22,644; A. Soda & Son, Oakland, \$26,971. Contract awarded to Helwin Const. Co., Sebastopol, \$22,150.

HUMBOLDT-TRINITY COUNTIES—Between 1.3 mile and 18.1 miles east of Bridgeville and at Clear Creek about 0.6 mile to be graded and 3 timb. brs. const. District I, Route 35, Section C. D. A.

Mercer, Fraser Co., Eureka, \$57,283; Chas. Harlowe, Jr., Oakland, \$65,775; Heafey-Moore Co., Oakland, \$69,409; A. Soda & Son, Oakland, \$67,859; B. A. Howlins & Co., San Francisco, \$58,232. Contract awarded to A. T. Howe & Son, Santa Rosa, \$54,339.25.

IMPERIAL COUNTY—Between Meyers Creek and Dixieland, liquor asphalt to be applied to 17.5 miles. District XI, Route 12, Section A, B. Paulsen & March, Los Angeles, \$2,701; Lamb's Trans. Co., Long Beach, \$2,813; Morgan Bros., \$2,615; Square Oil Co., \$3,120. Contract awarded to Regal Oil Co., Long Beach, \$2,314.

INYO COUNTY—8 miles to 10 miles south of Keeler, liquid asphalt to be applied for a distance of 1.8 miles. Regal Oil Co., Long Beach, \$2,701; Paulsen & March, Los Angeles, \$3,095; Lamb's Transfer, Long Beach, \$3,148; Gilmore Oil Co., Los Angeles, \$3,287. Contract awarded to Square Oil Co., Los Angeles, \$2,513.40.

INYO AND MONO COUNTIES—Furnish and apply liquid asphalt, SC-2, to approximately 20.8 miles of existing roadbed, District IX, Route 63, Section B. C. A. Lamb's Transfer Co., Long Beach, \$4,234; Oilfields Trucking Co., Bakersfield, \$4,749; Paulsen & March, Los Angeles, \$5,370; Square Oil Co., Los Angeles, \$4,500. Contract awarded to Regal Oil Co., Long Beach, \$3,897.

KERN COUNTY—Kern River overflow channel and Calloway Canal, about 0.3 mile to be graded, road mix surf. treatment applied and two timber bridges with concrete decks to be constructed. District VI, Route 141, Section A. Contract awarded to Rexroth & Rexroth, Bakersfield, \$20,191.30.

KERN COUNTY—San Bernardino County line to Route 23, Applying Class "A" seal coat for approximately 35.2 miles. District IX, Route 145, Section A, B, C. Basich Bros., Torrance, \$14,504; Geo. Herz & Co., San Bernardino, \$15,537; A. S. Vinnell Co., Los Angeles, \$13,334. Contract awarded to Square Oil Co., Los Angeles, \$13,006.

LAKE COUNTY—Between Middle Creek and Raasmussen's Ranch, about 1.3 mile to be graded and surfaced with screen grav. on grav. base and const. 3 timber bridges. District I, Route 15, Section A-B. N. M. Ball Sons & Larsen Brothers, Berkeley, \$78,828; Charles Kuppinger, Lakeport, \$34,123; Heafey-Moore Co., Oakland \$99,563; A. T. Howe & Son, Santa Rosa, \$72,993. Contract awarded to Harold Smith, St. Helena, \$69,545.

LASSEN COUNTY—Between 2.5 miles south of Viewland and Secret Valley, about 13.8 miles to be graded and penetrate. Oil trmt. appl. District II, Route 73, Section B. Heafey-Moore Co., Oakland, \$163,365; Isbell Const. Co. Reno, \$114,589; Frederickson & Westbrook, Lower Lake, \$110,168; A. Tiechert & Son, Inc., Sacramento, \$118,133. Contract awarded to Harms Bros., Doyle, \$94,310.50.

LASSEN COUNTY—Between Westwood and Coppervale, about 6.6 miles to be graded and surfaced with crusher run base and plant mix surfacing. District II, Route 29, Section A. Isbell Construction Co., Reno, Nevada, \$110,515; A. Teichert & Son, Inc., Sacramento, \$114,327; Frederickson & Westbrook, Lower Lake, \$120,861; Geo. Pollock Co., Sacramento, \$127,166; Heafey-Moore Co., Oakland, \$133,557. Contract awarded to Union Paving Co., San Francisco, \$102,635.

LOS ANGELES COUNTY—Cerritos

Avenue between Firestone Boulevard and Telegraph Road, about 1.8 mile to be graded and paved with A. C. District VII, Route 168, Section B. United Conc. Pipe Corp., Los Angeles, \$91,509; So. Cal. Roads Co., Los Angeles, \$85,727; Griffith Co., Los Angeles, \$85,394. Oswald Bros., Los Angeles, \$83,191. Contract awarded to Geo. R. Curtis Paving Co., Los Angeles, \$74,467.60.

LOS ANGELES—Between Norwalk and Miraflores, about 12 miles to be graded and paved with A. C. P. C. C. and plant mix surf. District VII, Route 174, 178, Section B. A. and Ann. Geo. R. Curtis Paving Co., Los Angeles, \$233,770; Griffith Co., Los Angeles, \$233,416; Sander Pearson, Santa Monica, \$223,173; United Conc. Pipe Corp., Los Angeles, \$247,755; Gogo & Rados, Los Angeles, \$221,225; Oswald Bros., Los Angeles, \$221,267. Contract awarded to C. O. Sparks and Mundo Eng. Co., Los Angeles, \$209,322.

LOS ANGELES COUNTY—In Pasadena between Club Road and El Circulo, about 0.4 mile to be graded and paved with P. C. C. and a reinf. conc. subway str. constructed. District VII, Route 161, Section Pas. Contract awarded to J. E. Haddock, Ltd., Pasadena, \$89,449.80.

MENDOCINO COUNTY—Between Outlet Creek and Reeves Creek, about 4.5 miles to be graded and surf. with grav. base and scr. gravel. District I, Route 1. Section F. Peninsula Paving Co., San Francisco, \$213,632; George Pollock Company, Sacramento, \$244,055; Frederickson & Westbrook, Lower Lake, \$199,947; Isbell Construction Co., Reno, Nevada, \$223,273; Union Paving Co., San Francisco, \$209,325; N. M. Ball Sons & Larson Bros., Berkeley, \$190,853; D. McDonald, Sacramento, \$231,462. Contract awarded to Hemstreet & Bell, Marysville, \$180,546.20.

MODOC COUNTY—Between Thomas Creek and 2.5 miles west of Cedarville, 7.1 miles road-mix surfacing. District II, Route 28, Section C. Contract awarded to Frederickson & Westbrook, Lower Lake, \$14,300.

MONO COUNTY—Furnish and apply liquid asphalt, SC-2, to approx. 5.1 miles of existing roadbed. District IX, Route 40, Section A. Square Oil Co., Los Angeles, \$2,080; Lamb's Transfer Co., Long Beach, \$2,320; Paulsen & March, Los Angeles, \$2,626. Contract awarded to Regal Oil Co., Long Beach, \$1,882.40.

MONO COUNTY—Between Conway summit and 1 mile north of Bodie Road, about 7.8 miles to be graded and surfaced with bit. tr. sel. matl. District IX, Route 23, Section H. I. Morrison, Knudson Co., Inc., Los Angeles, \$248,673. Contract awarded to Isbell Constr. Co., Reno, Nevada, \$221,855.60.

MONTEREY COUNTY—Between Seaside Road and Salinas River, about 7.3 miles of rd. mix surf. treatment and seal coat to be applied. District V, Route 56, Section I. L. A. Brisco, Arroyo Grande, Calif., \$36,371; Earl W. Heple, San Jose, \$31,206. Contract awarded to Granite Construction Co., Ltd., Watsonville, \$23,556.

NEVADA COUNTY—Between Donner Lake and Truckee, about 2.4 miles to be gr. and surf. with cr. run base and pl. mix. surf. District III, Route 37, Section D. A. Teichert & Son, Inc., Sacramento, \$72,958. Contract awarded to Pacific States Const. Co., San Francisco, \$56,659.45.

NEVADA COUNTY—Between Grass Valley and Nevada City, about 2.9 miles to be

surfaced with plant mix surfacing. District III, Route 17, Section B. Pacific States Construction Co., San Francisco, \$39,162. Contract awarded to Independent Construction Co., Ltd., Oakland, \$36,250.

ORANGE COUNTY—Road mix surf. to be applied to shoulders Los Angeles County line to Santa Ana River, 12.2 miles. District VII, Route 179, Section A. A. S. Vinnell Co., Los Angeles, \$12,146; C. R. Butterfield, San Pedro, \$10,990. Contract awarded to So. California Roads Co., Los Angeles, \$10,732.50.

RIVERSIDE COUNTY—Between Hemet and Moreno and between Perris and National Forest boundary east of Hemet—about 36.2 miles. Apply road mix surf. front to shoulders. District VIII, Routes 64, 194, Section K, L. C. C. W. Wood, Stockton, \$53,700; Oilfields Trucking Co., Bakersfield, \$49,623; Basich Bros. Torrance, \$57,680; A. S. Vinnell Co., Los Angeles, \$50,299. Contract awarded to Sou. Calif. Roads Co., Los Angeles, \$47,555.25.

RIVERSIDE COUNTY—Between 2½ miles west of Beaumont and Beaumont, about 2.4 miles to be gr. and surf. with pl. mix surf. and a reinf. conc. br. to be const. District VIII, Route 19, Section D. Gibbons & Reed Co., Burbank, \$105,505; Match Bros. Elsinore, \$99,937; Dimmitt & Taylor, Los Angeles, \$95,860; Griffith Co., Los Angeles, \$101,814; C. O. Sparks & Mundo Engr. Co., Los Angeles, \$104,608. Contract awarded to Oswald, Los Angeles, \$34,781.79.

SAN BERNARDINO COUNTY—Between Amboy and 17 miles easterly. About 0.4 mile, construct two timber trestles, construct and surface approaches with salvaged surface material and apply cl. "B" seal coat. District VII, Route 58, Sections J and K. Contract awarded to Basich Bros., Torrance, \$22,569.70.

SAN BERNARDINO COUNTY—Between Mountain Pass and Nevada state line. About 15.4 miles to be gr. and bit. rd. mix surf. tr. appl. District VIII, Route 31, Section P. V. R. Dennis Const. Co., San Diego, \$405,201; David H. Ryan, San Diego, \$328,321; Wood & Bevanda, Stockton, \$358,459; Basich Bros., Torrance, \$393,761; Sander Pearson, Los Angeles, \$341,210; Gibbons & Road Co., Burbank, \$295,939; Isbell Const. Co., Reno, Nevada, \$317,393; Griffith Co., Los Angeles, \$311,889. Contract awarded to Geo. Pollock Co., Sacramento, \$285,202.70.

SAN BERNARDINO COUNTY—Between Cajon Pass Summit and Victorville, about 9.9 miles to be surf. with pl. mix surf. (S. C. type) and seal coat applied. District VIII, Route 31, Section C. Southwest Paving Co., Inc., Roscoe, \$35,343; Oswald Bros., Los Angeles, \$34,944. Contract awarded to Geo. Herz & Co., San Bernardino, \$31,813.60.

SAN BERNARDINO COUNTY—Between Upland and San Bernardino and between Redlands and National Forest boundary. About 18.4 to be surfaced with plant mix surf. (S. C. type) and seal coat applied. District VIII, Route 190, Section A, B, D. Geo. Herz & Co., a corp., San Bernardino, \$48,457. Contract awarded to Oswald Bros., Los Angeles, \$43,186.

SAN BERNARDINO COUNTY—Between Victorville and Barstow. About 36 miles. Apply rd. mix surf. tr. to shldr. District VIII, Route 31, Section D, E, F, C. N. Wood, Stockton, \$45,825; Oilfields Trucking Co., Bakersfield, \$43,663; R. W. Hazard & Sons, San Diego, \$40,662. Contract awarded to Match Bros., Elsinore, \$38,362.50.

SAN DIEGO COUNTY—Between Del Mar and Encinitas, about 6.6 miles to be graded and paved with A. C. District XI, Route 2, Section A. V. R. Dennis Const. Co., San Diego, \$297,835; W. E. Hall Co., Alhambra, \$285,007; C. O. Sparks & Mundo Eng. Co., Los Angeles, \$299,250;

Basich Bros., Torrance, \$282,644; David H. Ryan, San Diego, \$295,317; Daly Corporation, San Diego, \$237,450; Oswald Bros., Los Angeles, \$294,400. Contract awarded to Griffith Co., Los Angeles, \$279,221.95.

SAN DIEGO COUNTY—Reinforced concrete bridge across Las Chayas Creek at Main Street in San Diego, 3 30' sp's on conc. pile bents and conc. abuts. with timber pile tds. to be const. and approx. 0.19 mile of road to be graded and surfaced with plant mix surf. for detour. Dist. XI, Route 2, Section S. D. B. O. Larsen, San Diego, \$33,970; M. H. Golden, San Diego, \$39,725. Contract awarded to V. E. Dennis Const. Co., San Diego, \$33,723.59.

SAN FRANCISCO-OAKLAND BAY BRIDGE—Install sprinkler system in Harbor Piers 24 and 26. Rockwood Sprinkler Co. of Mass., San Francisco, \$113,420. Contract awarded to Grinnell Co. of the Pacific, San Francisco, \$106,194.

SAN FRANCISCO—Construction of the Yerba Buena Island garage of the San Francisco-Oakland Bay Bridge. Contract awarded to Alfred H. Vogt Co., Inc., San Francisco, \$14,633.

SAN LUIS OBISPO AND MONTEREY COUNTIES—Between Paso Robles and 0.2 mile north of San Luis Obispo-Monterey County line, about 10.8 miles, road-mix surface treatment to be applied to shoulders. Granite Constr. Co., Watsonville, \$14,067; L. A. Brisco, Arroyo Grande, \$10,837. Contract awarded to Oilfields Trucking Co., Bakersfield, \$10,764.20.

SAN MATEO COUNTY—Between San Mateo and Redwood City, about 7.3 miles surf. portions with bit. tr. surf. (pl. mixed) District IV, Route 68, Section C. Jones and King, Hayward, \$59,982; Peninsula Paving Co., San Francisco, \$59,982; Union Paving Co., San Francisco, \$62,612; Pacific States Const. Co., San Francisco, \$64,971; Chas. L. Harney, San Francisco, \$67,721; United Contracting Co., Portland, Ore., \$67,954; Hanrahan Company, San Francisco, \$76,964. Contract awarded to Leo F. Piazza, San Jose, \$59,925.

SANTA BARBARA COUNTY—Between 4.8 miles east of Guadalupe and Santa Maria River, about 4.6 miles in length, armor coat to be applied to existing base. District V, Route 148-56, Section A. E. Granite Constr. Co., Watsonville, \$12,490. Contract awarded to L. A. Brisco, Arroyo Grande, \$11,950.

SANTA CRUZ COUNTY—Bridges across Rodeo Gulch 1.7 mile east of city limits of Santa Cruz 2 60' pl. gird. sps. and 4 80' st. str. sp's with conc. deck on ex. conc. piers and abuts. District IV, Route 56, Section A. Lindgreen & Swinerton, Inc., Oakland, \$23,132; F. O. Bonnett Co., Campbell, \$28,821; Earl W. Heple, San Jose, \$25,302; W. J. Tobin, Oakland, \$24,808. Contract awarded to A. Soda and Son, Oakland, \$24,384.55.

SANTA CRUZ COUNTY—2 bridges, one across Fall Creek and one across San Lorenzo River at points approximately 8 and 14 miles, respectively, north of Santa Cruz. District IV, Route 116, Section A and B. F. P. Bonnett Co., Campbell, \$29,105; A. Soda & Son, Oakland, \$25,785; Lindgreen & Swinerton, Inc., Oakland, \$31,222; Earl W. Heple, San Jose, \$29,055. Contract awarded to W. J. Tobin, Oakland, \$22,053.

SANTA CRUZ COUNTY—In Santa Cruz on Ocean Street between Pryce and Water Streets and on Mission Street between Bay and Younglove Streets. About 0.8 mile widen portion with P. C. C. pavements, walk and curb and surf. port. with nat. rock asph. District IV, Routes 5. 56 Section S. Cr. Clausen-Embleton Co., Albany, \$18,810; L. C. Seidel, Oakland, \$21,969; Granite Const. Co. Ltd., Watsonville, \$18,959. Contract awarded to Earl W. Heple, San Jose, \$18,046.

SHASTA COUNTY—Between Sulphur Creek and Boulder Creek Hill and at Sul-

phur Creek Hill—about 1.8 mile to be graded and surfaced with r. mx. surf. on crush. run base. District II, Route 3, 28, Section B, A. Poulos & McEwen, Sacramento, \$140,084; A. Teichert & Son, Inc., Sacramento, \$147,251; Fredericksen & Westbrook, Lower Lake, \$106,464; Union Paving Co., San Francisco, \$139,280; D. McDonald, Sacramento, \$125,534; Hanrahan Company, San Francisco, \$125,780; George Pollock Company, Sacramento, \$149,613; Isbell Construction Company, Reno, Nevada, \$129,238; P. L. Crooks & Co., Inc., Portland, Ore., \$147,763; Dunn & Baker, Klamath Falls, \$133,500. Contract awarded to Guy F. Atkinson Company, San Francisco, \$103,728.

SHASTA COUNTY—Between Redding and Millville, 12.6 miles Class B, seal coat. District II, Route 20, Section C. C. F. Fredericksen & Sons, Lower Lake, \$10,268; Lee J. Immel, Berkeley, \$13,200. Contract awarded to Dunn & Baker, Klamath Falls, Oregon, \$10,256.

SIERRA COUNTY—Between Sierraville and Calpine, about 8.0 miles gravel blanket to be placed over the existing roadbed. District III, Route 83, Section B. Garcia Const. Co. Irvington, \$15,900. Contract awarded to Fredericksen & Westbrook, Lower Lake, \$13,875.

SOLANO COUNTY—Between Westerly boundary and Cordelia and between county hospital and Fairfield. About 2.7 miles to be graded and surfaced with bit. tr. surf. (plant mixed). District X, Routes 8, 7, Section A, B. Pacific States Constr. Co., San Francisco, \$54,963; Hanrahan Company, San Francisco, \$57,659; Louis Biasotti & Son, Stockton, \$59,956. Contract awarded to A. G. Kaisch, San Francisco, \$52,030.30.

SOLANO COUNTY—In city of Benicia, about 0.3 mile, to be graded and surfaced with plant mixed surfacing. Dist. X, Route 74, Section Ben. Independent Const. Co., Ltd., Oakland, \$11,538; Reuber R. Carlson, Stockton, \$13,879. Contract awarded to Louis Biasotti & Son, Stockton, \$9,709.70.

TIBHAMA COUNTY—Between Route 86 and Morgan Springs, about 3.8 miles untreated surfacing. District II, Route 83, Section A. Hein Bros. Basalt Rock Co., Petaluma, \$14,092. Contract awarded to E. B. Bishop, Orland, \$13,370.

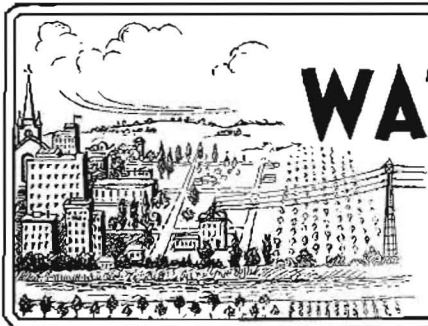
TULARE COUNTY—Between ¼ mile south of Strathmore and Valencia Street in Lindsay, and between Eastwood Avenue, in Lindsay and Cairns Corner. About 6.8 miles to be graded and surf. with pl. mix surf. on a crush. run base and appl. rd. mix surf. trmt. to shldr. District VI, Route 134, 129, Section B, C. Lindsay. Hanrahan Company, San Francisco, \$161,228; Union Paving Co., San Francisco, \$156,757. Contract awarded to N. M. Ball Sons & Larsen Bros., Berkeley, \$155,208.10.

TULARE COUNTY—Between Rte. 134 and Visalia. About 8.1 miles cr. run base bdrs. to be const. bit. seal coat appl. and rd. mix surf. trmt. appl. to shldr. District VI, Route 132, Section A. Stewart & Nuss, Inc., Fresno, \$36,587; John Jurkovich, Fresno, \$37,475; N. M. Ball Sons, Berkeley, \$39,050. Contract awarded to Union Paving Co., San Francisco, \$32,605.00.

TUOLUMNE AND MARIPOSA COUNTIES—Between Moccasin Creek Dam and 0.8 mile south of Counterville (X Tuolumne 65 B-A) about 11.5 miles in length. Liquid asphalt to be furnished and applied. District X, Route 65, Section B-A. Sheldon Oil Co., Suisun, \$8,474; Hayward Bldg. Material Co., Hayward, \$9,945. Contract awarded to Lambs Transfer Co., Long Beach, \$7,033.42.

VENTURA COUNTY—Grading and surfacing with plant-mixed surfacing between Clark and Sudden Barrancas, 0.23 mile. District VII, Route 79, Sec. A. Oswald Bros., Los Angeles, \$8,604. Contract awarded

(Continued on page 24)



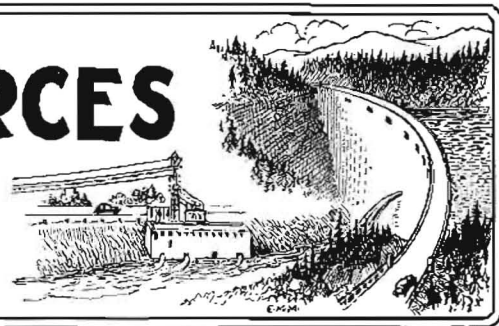
DIVISION OF WATER RESOURCES

OFFICIAL REPORT

FOR THE MONTH OF

August, 1936

EDWARD HYATT, State Engineer



COINCIDENT with preliminary investigations and exploration work at Kennett and Friant dam sites of the Central Valley Project by the United States Bureau of Reclamation, the Consulting Board of Engineers of the bureau, accompanied by the State Engineer and members of his staff made an inspection trip during August to view the progress of the work on the project.

The engineers inspected the Kennett, Baird and Table Mountain sites and Friant dam site.

IRRIGATION DISTRICTS

Resolutions have been received from the boards of supervisors of Fresno and Tulare Counties relative to the sufficiency of petitions filed for the organization of four irrigation districts in the San Joaquin Valley.

Field investigations were made during the month of the proposed Orange Cove, Ivanhoe, Exeter and Lindmore districts and feasibility reports on each, are now in preparation.

The proposal of Richvale Irrigation District to annex 3142 acres of land and to issue bonds for the purchase of additional water rights was investigated and reported upon to the District Securities Commission.

The plans of Sutter Water District to issue bonds, construct an irrigation system, and purchase water from Sutter Butte Canal Company were examined, and a field investigation was made of lands in the district.

DISTRICTS SECURITIES COMMISSION

At the regular monthly meeting of the Commission held in San Francisco, August 14, 1936, the following matters were given consideration:

Petition of Pacheco Pass Water District to hold an election for the purpose of authorizing a bond issue in the amount of \$180,000, to carry out a proposed plan of irrigation, was granted.

Application of Richvale Irrigation District for the approval of a bond issue in the amount of \$90,000, to finance the purchase of additional water rights and canals for recently included lands, was referred to the State Engineer for report.

Request of Sutter Water District for authorization to issue bonds in the amount of \$95,000, for the purpose of constructing a distribution system within the district, was approved.

Petition of Fair Oaks Irrigation District for approval of an expenditure of \$500, for employment of an engineer to report upon betterments to the water system, was granted.

FLOOD CONTROL AND RECLAMATION

Relief Labor Work

Clearing of the Feather River channel above Marysville in Yuba County has been continued with relief labor, and an average of 45 laborers have been employed. New applications have been submitted for WPA projects to clear in the Feather River channel, the American River overflow channel and the Upper Sutter By-pass. It is expected that the program for the use of relief labor will assume larger proportions than in any previous program, commencing in late fall and extending through the winter and spring.

Bank Protection Program

The maintenance bank protection program by the State and Federal Government under the agreement of June, 1932, has been ordered resumed by Major General Edward Markham, Chief of Engineers, and the schedule of work to be performed immediately has been approved. This will involve the expenditure of approximately \$400,000. The work is to be done by the U. S. War Department for the protection of the banks of the Sacramento River, the Federal Government paying two-thirds of the cost and the State one-third.

Sacramento Flood Control Project

Considerable work has been done at the request of the Reclamation Board on the incidental construction in connection with acquiring and clearing levee rights-of-way for levee units now under contract by the California Debris Commission. This is being done in 11 different locations, on both banks of the Sacramento River above Colusa and on the American River near Perkins. Approximately 35 men are employed on this work and a number of buildings are being moved under contract.

SUPERVISION OF DAMS

Application for approval of the amended application for construction of the Long Valley Dam of the City of Los Angeles, located on Owens River, was filed on July 21, 1936. Revised plans of the same have been submitted.

Application for construction of the Mono Dam of the city of Santa Barbara was filed

on July 27, 1936. This structure is being constructed in conjunction with the Forest Service for the purpose of controlling debris entering the Gibraltar Dam of Santa Barbara. The structure is of the ambursen type, 33 feet in height and storing 1500 acre-feet of water. The structure is estimated to cost \$123,271.

Application was filed on August 11, 1936, for approval of the plans for construction of the Putah Creek dam by the city of Winters. The dam is to be located on Putah Creek near Winters and is to be a concrete gravity dam with flashboards having a height of 11 feet and a storage capacity of 177 acre-feet. Its purpose is to replenish the underground water supply of the district. It is estimated to cost \$15,168.

Application for approval of the plans for the alteration of the Fern Lake dam of the Sonoma State Home was filed on August 7, 1936. The work contemplated consists in raising the crest elevation of the north dam, flattening the slopes of the same and reconstruction of the spillway lining.

Application was filed on August 12, 1936, for approval of the plans for repairs to the Pine Creek dam of the California Public Service Company at Alturas, consisting of enlargement of the spillway.

Application for approval of the plans for the construction of the Long Lake dam of the California Fruit Exchange, located on Gray Eagle Creek in Plumas County, filed on March 16, 1936, was approved on July 31, 1936.

Application for approval of the plans for alteration of the No. 2 Huntington Lake dam of the Southern California Edison Company located on Big Creek in Fresno County, filed on July 3, 1936, was approved on July 20, 1936.

In Southern California work is progressing satisfactorily on the San Gabriel Number 1 and Eaton Wash dams of the Los Angeles County Flood Control District. Work on the Cajalco dam of the Metropolitan Water District, and the Grant Lake and Long Valley dams of the city of Los Angeles, Department of Light and Power, is progressing. Repair to the Hodges Dam of the city of San Diego is proceeding rapidly and construction work on the Judson Dam of the California Water and Telephone Company is now well under way.

At Santa Barbara the Sheffield Reservoir enlargement is nearing completion.

In northern California many repair jobs are being prosecuted. Concrete is being poured in the lower levels of the O'Shaughnessy dam enlargement. Excavation for foundations is continuing at the Mad River dam of the city of Eureka. Work is progressing satisfactorily at the Arcata Dam for a water supply for Arcata. Work has been resumed on the Coyote Dam of the Santa Clara Valley Water Conservation District after a period of inactivity. The West

Valley Dam of the South Fork Irrigation District in Modoc County is nearing completion.

Repair and maintenance inspection work has been carried on as usual.

WATER RIGHTS

Supervision of Appropriation of Water

Twenty-seven applications to appropriate water were received during July; eight were denied and twenty-six were approved. Four permits were revoked and rights under fourteen permits were confirmed by the issuance of license.

Inspections were made during the month in Inyo, Mono, Mariposa, Calaveras, Alpine, Amador, El Dorado, Placer and Sacramento counties preliminary to the issuance of license or revocation.

Clover Creek (Shasta County)—A stipulation for substitution of parties covering ten changes in ownership is being circulated. Water master service in accordance with the stipulation for judgment was continued throughout the month.

Susan River (Lassen County)—The tentative plan of distribution, agreed upon for trial during the current season, was administered throughout the month. A stipulation for judgment is being circulated and has been signed by over eighty per cent of the parties involved.

Rader Creek (Modoc County)—Attorneys representing a majority of the parties in this case contemplate a re-reference to the Division covering all issues raised by the pleadings, instead of the limited reference originally made.

COOPERATIVE SNOW SURVEYS

During the past month work in the office, in addition to routine matters, has consisted of bringing up to date all records of precipitation using data received from stations maintained by the U. S. Weather Bureau, State, Districts, and Public Utilities. In the field a start has been made toward preparing for next winter's snow surveys and it is planned to make measurements again at all snow courses surveyed last winter.

In addition to extending further the range of snow surveys into areas where insufficient measurements have been made in the past, arrangements have been made for 23 new stations to be established and surveyed under State supervision and in accordance with adopted standards.

The necessary equipment for measuring the snow pack at these new stations is to be supplied by the Division of Irrigation, Bureau of Agricultural Engineering, U. S. Department of Agriculture. At twenty of the new stations the annual measurements will be made by rangers of the U. S. Forest Service and at the remaining three, in the vicinity of Hetch Hetchy, the surveys will be made by the City of San Francisco.

SACRAMENTO-SAN JOAQUIN WATER SUPERVISION

During the past month the activities of this office have been on routine detail so that a report may be made at the end of the irrigation season which will show the amount of water diverted from and returned to streams in the Sacramento-San Joaquin

area. It will also show the amount of land irrigated, the flow in the stream channels and the rate of advance and retreat of salinity in the delta.

The stream flow has about reached its minimum stage and by the end of the month an increase in stage should be noted. This increase will be due to lessened pumping and rice field drainage. Several large areas of rice are being slowly drained and the end of the month should see most of the fields in the process of draining.

The salinity in the Sacramento River Delta should not show any great increase over its present state but will remain about constant for about three weeks and then as the flow in the Sacramento River picks up will gradually recede. However, the salinity in the San Joaquin River Delta should continue to slowly increase for about a month and will not show any marked decrease until the flow in the San Joaquin River increases.

For purposes of comparison with last year, the following salinity data are given for a few key stations:

Station	1935		1936	
	Max.	8/14	Max.*	8/14
Point Orient -----	1720	1700	1640	1640
Bullhead Point -----	1260	1050	1060	1060
O and A Ferry -----	540	520	520**	440
Antloch -----	290	220	260	160
Collinsville -----	390	282	370	210
Jersey -----	56	---	75	24
Rio Vista -----	12	---	6	2

* Estimates from April Bulletin of California Cooperative Snow Surveys.
** August 10th.

TOPOGRAPHIC MAPPING

Mapping of Tobias Peak Quadrangle proceeded during the month in Tulare and Kern counties and progress was made in office work in connection with revision of the culture along the San Andreas Fault in San Bernardino County.

The following final quadrangle sheets became available during the month:

Antelope Plain in Kern County, covering a part of the Antelope Plain and Lost Hills area and published on a scale of 1:31,680 with 5 feet contours.

North of Oildale in Kern County, covering the Poso Creek area and published on a scale of 1:31,680 with 5 and 25 feet contours.

White River in Tulare and Kern Counties, covering a part of the White River and Deer Creek area and published on a scale of 1:62,500 with 50 feet contours.

El Rico Ranch in Kings County, covering a part of the Tulare Lake Bed area and published on a scale of 1:31,680 with 5 feet contours.

Del Sur in Los Angeles County, covering a portion of the Antelope Valley, Portal Ridge, Leonis Valley area and published on a scale of 1:24,000 with 5 and 25 feet contours.

Red Rock Mountain in Los Angeles County, covering part of the Angeles National Forest and published on a scale of 1:24,000 with 25 feet contours.

Warm Springs in Los Angeles County, covering part of the Angeles National Forest and published on a scale of 1:24,000 with 25 feet contours.

WATER RESOURCES

South Coastal Basin Investigation

Good progress has been made in the field

and office on the South Coastal Basin Investigation during the present month.

San Luis Rey River Investigation—San Diego County

The investigation and survey of San Luis Rey River in San Diego County for the purpose of securing data and preparing plans for flood control, rectification of the river channel and the conservation and utilization of the waters of the San Luis Rey River being made by the Division of Water Resources in cooperation with WPA, City of Oceanside, County of San Diego and Carlsbad Mutual Water Company will be completed during the middle or latter part of September, after which a report on the results of the survey will be prepared by the Division of Water Resources.

CENTRAL VALLEY PROJECT

Preliminary investigations and exploration work have been carried on during the month at Kennett and Friant dam sites and surveys continued along the Contra Costa Conduit and Friant-Kern Canal by the United States Bureau of Reclamation. Appraisers are working in the field evaluating lands and necessary rights of way required for the construction of the project. The Division of Highways has made studies of foundation conditions at the site of the combination highway and railway bridge across the Pitt River and the Division of Water Resources is conducting surveys and making investigations in the San Joaquin Valley preliminary to the acquisition of properties and water rights necessary for the construction of the project.

During the latter part of August an inspection trip of the project was made by the Consulting Board of Engineers for the United States Bureau of Reclamation. Kennett, Baird and Table Mountain sites were inspected and the work done to date by the United States Bureau of Reclamation reviewed. The Board then spent a few days in Sacramento going over the work of the project in the Sacramento office and proceeded to the Friant dam site to review the work done at that location. The Board was composed of Mr. Charles H. Paul of Dayton, Ohio, Professor W. F. Durand of Stanford University, Roy V. Meikle of Turlock, and Dr. Charles P. Berkey of Columbia University, New York. The Board was accompanied on its inspection trip by Mr. J. L. Savage, Chief Designing Engineer, and Mr. E. B. Debler, Hydrographic Engineer, United States Bureau of Reclamation, both with headquarters at Denver, Colorado. Mr. Walker R. Young, Construction Engineer in charge of the Central Valley Project for the United States Bureau of Reclamation, Mr. Edward Hyatt, State Engineer of California, and Messrs. Edmonston, Hawley and Waddell, engineers of the Division of Water Resources, also accompanied the Board on its inspection trip.

NO WALKS TO SCHOOL FOR THESE

Statistics gathered from school officials throughout the United States reveal that approximately 3,000,000 children are transported to and from school in more than 77,000 motor buses.

The motor vehicle industry in the United States last year consumed 885 million pounds of crude rubber.

PAVEMENT BUTTONS AN AID TO NIGHT DRIVING

(Continued from page 12)

Fortunately these reflectorized curve signs present equally consistent visibility day or night, and the positioning and use of these signs is directed through a central authority so that the same position and appearance is always presented to the motorist.

Our traffic striping costs from \$18 to \$25 a mile. Reflector button pavement markers at present prices cost \$150 for the smallest to \$405 per mile in place. The white pavement stripe is efficient at all times and is easily repainted when necessary because of new pavement or from being obliterated by oil from traffic or pavement.

MAINTENANCE COST QUESTION

The maintenance cost of the reflector button pavement markers has not been determined. Our present installations have been made to determine this cost. Accurate reports are being kept to show how often it is necessary to clean these buttons to maintain their reflecting power, to show the breakage, and the wear and tear on the markers. Observations to date are not sufficient to make any definite statement in answer to this maintenance question.

It has been found that some of the markers in certain locations require cleaning once a week to obtain the same efficiency as when installed. In one location of 20 markers, after two months of use, all but ten of the forty reflector buttons were broken or missing entirely. Some of the castings were badly worn so that the button, if replaced, would not have protection from traffic.

In another location 50 per cent of the button installations required replacement.

Assuming as stated that the use of these markers should be held to dangerous curves, it is readily seen that with no such locations on our new highways their use is largely restricted to our older highways.

Much study was made to determine the locations for the tests being carried on and the majority of the most hazardous locations now have these markers.

All of these installations have been made in the past few months. Dur-

ing this time we have enjoyed fair weather with a warm pavement. What will happen to the reflecting efficiency of these buttons in wet and foggy weather is a question to be answered from observation.

Experience with the reflector buttons in our present signs shows that condensation materially reduces the return reflection. Will the closeness to the pavement with the dust and moisture affect this return reflection to a point where daily maintenance would be required?

The question follows, are these reflector pavement markers an economical and efficient method of reducing traffic hazards? In the opinion of this department this question can be better answered after their use has been tested, their maintenance costs obtained, and a study made to see what will happen in wet and foggy weather.

This is the data that is being obtained and compiled from the present test installations.

HIGHWAY BIDS AND AWARDS FOR AUG., 1936

(Continued from page 21)

ed to Kovacevich & Price, Inc., South Gate, \$5,701.50.

VENTURA COUNTY—A reinforced conc. br. across San Antonio Creek, about 7½ miles north of Ventura, 3 55' and 2 26' gird. sps. on conc. piers and abuts. to be const. District VII, Route 138. Section A. Lindgren & Swinerton, Inc., San Francisco, \$41,425; R. R. Bishop, Long Beach, \$48,634; Heafey-Moore Co., Oakland, \$43,747; Byerts & Dunn, Los Angeles, \$44,604. Contract awarded to C. O. Sparks and Mundo Eng. Co., Los Angeles, \$39,476.

YOLO COUNTY—Between Willow Slough and Woodland, about 4.4 miles to be surf. with plt. mix. surf. and untr. cr. gr. or st. bdrs. const. District III, Route 7, Section A. Independent Const. Co. Ltd., Oakland, \$46,134; Pacific States Const. Co., San Francisco, \$49,928; A. Teichert & Son Inc., Sacramento, \$47,980; Heafey-Moore Co., Oakland, \$42,702. Contract awarded to E. A. Forde, San Anselmo, \$41,679.50.

YOLO COUNTY—Between Second Street and Elm Street in Woodland, about 0.2 mile to be paved with crusher run base, stabilizing base and plant-mixed bit. treated surfacing. District III, Route 7, Section Wd, Pacific States Construction Co., San Francisco, \$14,804. Contract awarded to A. Teichert & Son, Inc., Sacramento, \$13,974.45.

"How did you like those Chinese back-scratchers I brought you?"

"Is that what they were? Chinese back-scratchers! My wife's been making me eat salad with them!"

Gasoline Supply Assured for at Least 25 Years

PROVED petroleum reserves in the United State are 100 per cent greater than was estimated 10 years ago and, properly managed, are adequate to meet requirements at least for 25 years, with assurance that when needed a virtually unlimited supply will be available from coal and from oil shales.

This analysis of the outlook for the petroleum industry is contained in a report submitted to the board of directors of the American Petroleum Institute by the National Petroleum Trade Association's executive committee in answer to alarmists who claim this country faces a shortage of petroleum products and resultant scarcity of gasoline.

PLENTY OIL AVAILABLE

Improved methods of discovery, development and recovery will make available additional large supplies of oil not only from fields as yet undiscovered, but also of oil heretofore unrecovered from old fields, the report says.

At the time of the 1925 survey, known petroleum reserves were estimated at 5,321,000,000 barrels, with indications that additional reserves would be found. In the ten years since that calculation, 8,692,000,000 barrels of oil have been produced and consumed, yet more than 12,000,000,000 barrels of proved reserves are known to be still below ground.

"The fact that proved reserves of oil in the ground now are conceded by authorities to be well over 100 per cent greater than in the 1925 estimate has had no influence with the alarmists," the report states, and adds that as a result of the advances made by science, technology and invention, the reserves still to be located and developed are far greater than ever estimated before.

Husband—If there was any darned fool in love with you before we got married. I'm sorry you didn't marry him.

Wife—I did marry him—don't you remember your own wedding?

Small boy: Dad, what are the holes in the board for?

Dad: Those are knotholes.

Small boy (after due consideration): Well, if they're not holes, what are they?

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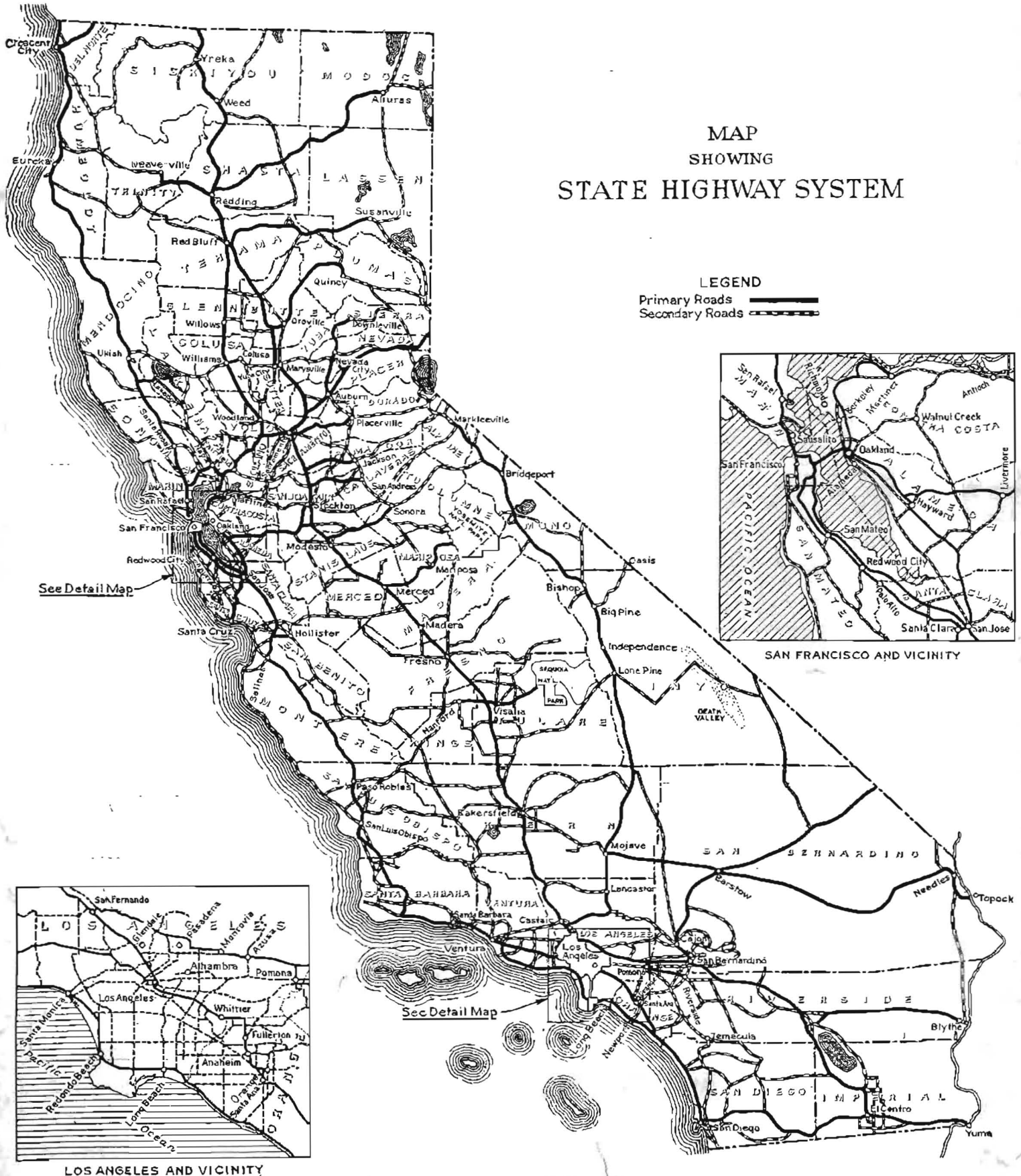
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MAP SHOWING STATE HIGHWAY SYSTEM

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See Detail Map

SAN FRANCISCO AND VICINITY

See Detail Map

LOS ANGELES AND VICINITY