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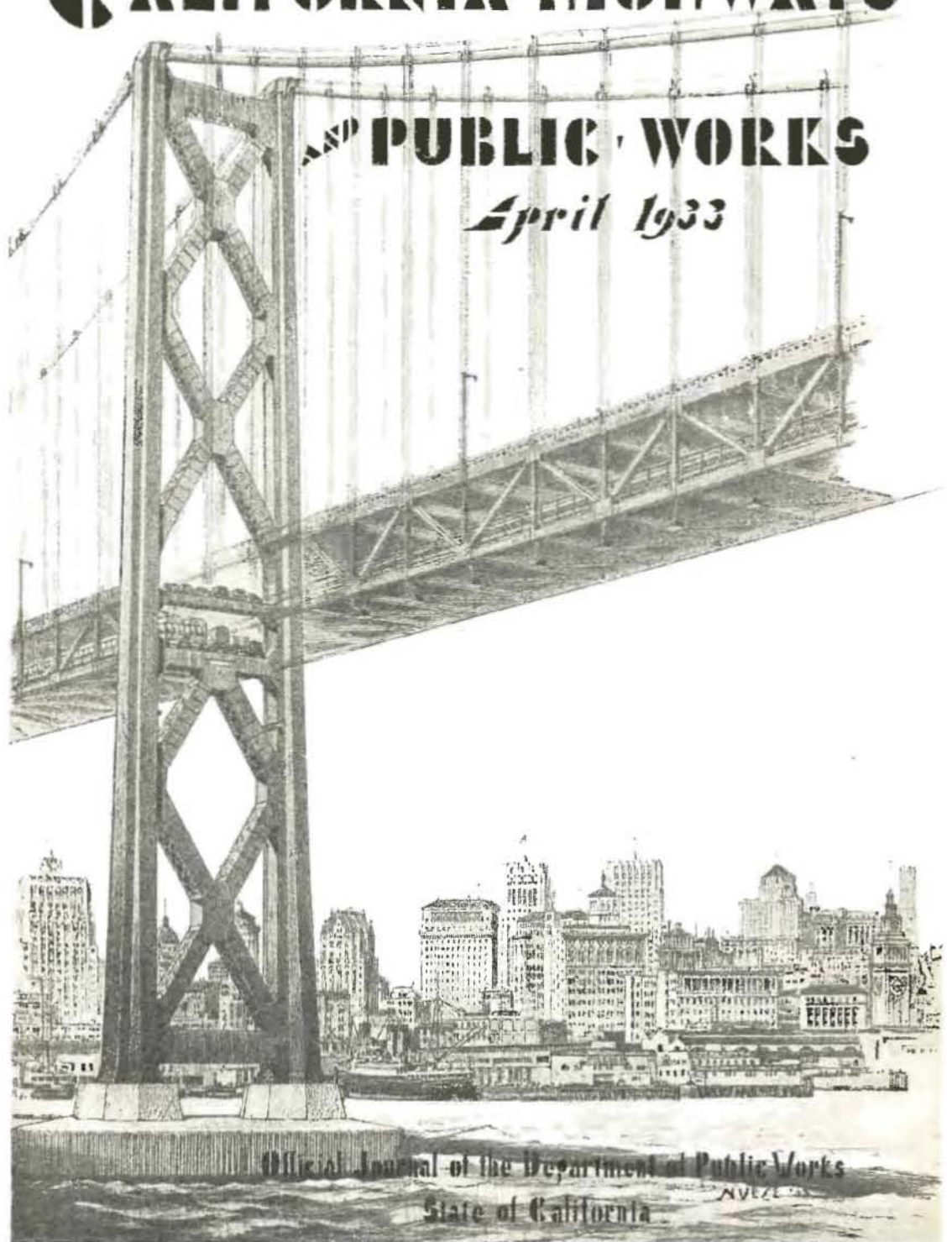
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CALIFORNIA HIGHWAYS

AND PUBLIC WORKS

April 1933



Official Journal of the Department of Public Works
State of California

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6600 Miles of Additional Secondary Roads Recommended to Legislature

Highway Commission and Public Works Report Allots
North 2902 Miles, South 3697. Alternative
Lesser Mileage Totals 2539 Miles

IN compliance with the requirements of Senate Concurrent Resolution No. 7, adopted at the January session of the Legislature, the California Highway Commission and the Department of Public Works submitted a report on March 15th recommending approximately 6600 miles of county roads for addition to the State's secondary highway system, including connections in and through cities, and a similar alternative report of a lesser mileage.

The resolution specifies that the additions shall be made in such a manner as to bring about an equality of secondary mileage between the northern and southern counties.

The two reports with accompanying lists of recommended roads and indexed maps were signed by Director Earl Lee Kelly of the Department of Public Works and Commissioners Harry A. Hopkins, chairman; Philip A. Stanton, Timothy A. Reardon, Frank A. Tetley and Dr. W. W. Barham.

EQUALIZES SECONDARY MILEAGE

The 6600-mile report adds approximately 2743 miles of county roads and 159 miles of city street connections for the north and 3435 miles of county roads with 262 miles of city street connections for the south, providing an equalized secondary mileage of 4844 miles for each section.

The lesser mileage report totals 2539 miles. It provides the same mileage of city street connections as the larger list and gives approximately 713 miles of county roads to the north and 1404 miles to the south, bringing the equalized mileage for both sections to 2813.7.

The following excerpts from the reports present explanatory data on which conclusions and recommendations were based:

* * *

The first principle enunciated in the Legislature's resolution imposes equalization of the

State secondary highway mileage in the north and in the south. The present secondary State highway system includes north 1941.5 miles, south 1146.8 miles, which shows a differential mileage of 794.7 miles in favor of the north. To equalize this difference in adding approximately 6600 miles would require addition in the north approximating 2900 miles and in the south about 3700 miles.

MOST IMPORTANT STEP

The second principle concerns the establishment of a connected and correlated system of State highways extending through municipalities so as to best meet traffic requirements.

The extension into or through municipalities of existing State highways to provide a connected and correlated system is a most important step in meeting traffic requirements.

The studies made by the Division of Highways in connection with this report show that the present State highway system connects with 203 cities. The natural course of these State highways into or through these cities to provide a connected system involves both primary and secondary classes.

MILEAGE IN CITIES

The studies show that 331.5 miles of primary connections and 90.1 of secondary connections should thus be included in the additional mileage for which State funds are to be made available for both maintenance and construction or improvement.

* * *

Considering the inequality of secondary State highway mileage in the north and south sections of the State, the mileage necessary to provide connected and correlated routings through municipalities and the total contemplated additional mileage of 6600 miles to be added to the State system the following tabulation may be presented to show the distribu-

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Quake Damage to Highways Slight; Mostly Confined to Tideland Fills

By S. V. CORTELYOU, District Engineer, District VII

EARTHQUAKE damage to the State highways in the vicinity of Long Beach resulting from the severe shock at about 6 p.m., March 10, and the following minor shocks, was not nearly so extensive as one might expect.

The effects of the quake extended to Santa Monica and beyond, several slides having been started along the coast road northwest of Santa Monica, and the palisades above the Santa Monica "Beach Road" showing numerous new cracks.

Damage to the State highway was largely confined to the portion of Route 60, known as the Roosevelt Highway between Long Beach and Newport Beach. It was particularly heavy in only a few widely scattered sections of a few hundred feet each and each of these sections was where the highway had been constructed over an old tidal slough or estuary.

BRIDGES WITHSTOOD SHOCK

The Hathaway Avenue cut-off from Anaheim Street to Seal Beach received some heavy damage. Wide longitudinal cracks opened up in the shoulders with a few large cracks in the light macadam surfacing. All of the way from Seal Beach to the Santa Ana overflow channel, a short distance southeasterly of Huntington Beach, the concrete pavement, though intact, was left in a more or less roughened condition, although in only a few spots was it badly damaged by settlement of fills in tidal sloughs. Except over these slough areas, the pavement was undamaged. The 10' strips of pavement in a few places were separated by as much as 8 to 10 inches.

Bridge approaches to the Alamitos Bay, San Gabriel and Anaheim bridges settled vertically from 6 to 12 inches, making them practically impassable for the time being. All three of these bridges suffered some damage as well as the pedestrian subway which crosses the highway at Surfside. None of them were weakened to such an extent as to make them dangerous in the least.

The whole surface of the ground within the area affected by the earthquake seems to have

undergone a severe undulating motion which left the pavement slightly rougher than before. Movements on adjoining strips of pavement did not always synchronize with the result that when the tremor was over, a depression would sometimes be left in one strip opposite a summit on the adjacent strip.

REPAIRS QUICKLY MADE

The earthquake occurred on Friday evening, March 10th, and early the next morning maintenance crews from the Orange and Doheny Park districts joined the regular maintenance crew at Seal Beach to quickly make the State Highway entirely safe for traffic, placing barricades wherever necessary to protect traffic and making such temporary repairs as would permit traffic to pass over the highway.

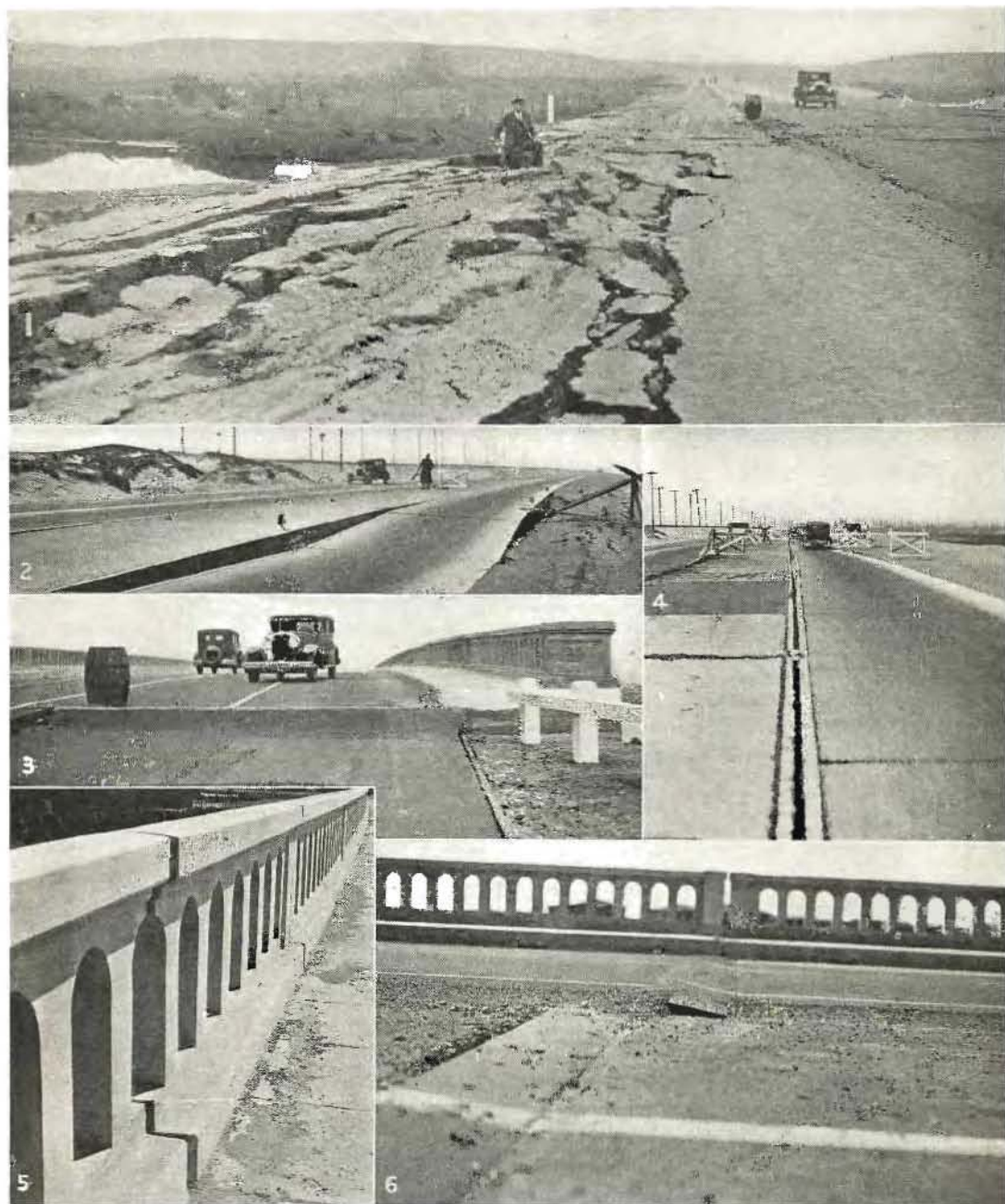
Arrangements were immediately made with owners of the nearest asphalt mixing plant, to start up their plant on Sunday morning, March 12th, and to furnish 500 tons of asphaltic premixed material to fill in the bridge approaches which had settled. On Sunday 294 tons of this material were hauled, an average of ten miles, with the result that by Sunday evening traffic could safely pass over the entire highway.

This work was continued through Monday and Tuesday, an additional 300 tons being hauled on those days. This material was used to lengthen bridge approaches which, although traffic could safely pass over them, were still rather abrupt, and also to equalize places where adjacent pavement strips were left at different elevations. So far there has been used 800 tons of the premix material, and as some further lengthening of bridge approaches is desirable, it is estimated that an additional 400 tons will be required.

SLOUGH FILLS CRACKED

The most spectacular damage to the highway was done on Hathaway Avenue along the east side of Long Beach and also near the Santa Ana River overflow channel, a short distance southeast of Huntington Beach. A portion of the former section which was completed about a year and a half ago, is across

(Continued on page 10)



SHIMMYING TIDAL FLATS doing an earthquake waltz were responsible for most of the damage done to highways in the Long Beach coastal area. No. 1 is a view on Hathaway Avenue the morning after the quake showing how the fill slope cracked badly while the sturdier macadam highway was but little affected. No. 2 shows slab displacement southeast of Huntington Beach near the Santa Ana Overflow Channel. No. 3—Anaheim Bay Bridge showing distortion of the southerly approach by the sinking of a portion of the roadway. This bridge was shortened 9 inches by pressure from the approaches. No. 4—A longitudinal joint opened in highway near the Santa Ana Overflow Channel. No. 5—Alamitos Bay Bridge showing lateral displacement of bridge deck at expansion joint. No. 6—View of displaced cover plate at a transverse joint on the southerly side of Anaheim Bay Bridge.

Savings of Over \$9,000,000 Shown in San Francisco—Oakland Bridge Bids

THE San Francisco-Oakland Bay Bridge, which is the State Department of Public Works' greatest project as well as the biggest job to be started in the United States this year, was advanced nearer to actual construction at the beginning of this month when bids were opened on two more major contracts, and the test suit was filed in the Supreme Court to validate the bridge legislation.

With the six major contracts totaling \$36,841,315.48 almost ready for award, State Director of Public Works Earl Lee Kelly and Chief Engineer C. H. Purcell are planning to go to Washington to request the Reconstruction Finance Corporation to say the word that will let actual construction start.

The low bidders on the six major contracts for the San Francisco-Oakland Bay Bridge, and the amounts of their bids, are:

Contract No. 2—Substructure, West Bay Crossing, The Transbay Construction Company	\$6,957,100.68
Contract No. 3—San Francisco Cable Anchorage, Healy-Tibbitte Construction Co.....	1,036,500.00
Contract No. 4—Substructure, East Bay Crossing, Bridge Builders, Inc.....	4,495,854.00
Contract No. 5—Yerba Buena Cable Anchorage, Tunnel & Viaduct, Clinton Construction Company of Calif.....	1,821,292.50
Contract No. 6—Superstructure, West Bay Crossing, Columbia Steel Company..	13,732,471.80
Contract No. 7—Superstructure, East Bay Crossing, Columbia Steel Company..	8,798,036.50

The results of bids received assure the California Toll Bridge Authority that there will be no necessity to request more money from the Reconstruction Finance Corporation, and that the \$62,000,000 estimated for the construction of the bridge proper, which the Reconstruction Finance Corporation has been asked to allow, will be more than ample for this work. Total savings on the six major contracts amount to \$9,768,086.52.

COVER PAGE ILLUSTRATION TELLS STORY IN PERSPECTIVE

The picture of the San Francisco-Oakland Bay Bridge that adorns the front cover page of this issue is carefully drawn with due regard to both artistic and engineering accuracy. It shows a great steel tower supporting the double-decked roadway with the picturesque San Francisco shoreline in the background. To illustrate the traffic capacity Artist Nuese presents a perspective cross-section revealing the six lanes of upper deck traffic and the railroad trains with three truck lanes on the lower deck.

The San Francisco Cable Anchorage will necessitate the construction of a huge block of concrete 108 feet wide, 181 feet long, and 200 feet high, into which the cables supporting the bridge will be anchored with steel eyebars.

CENTER MONOLITH

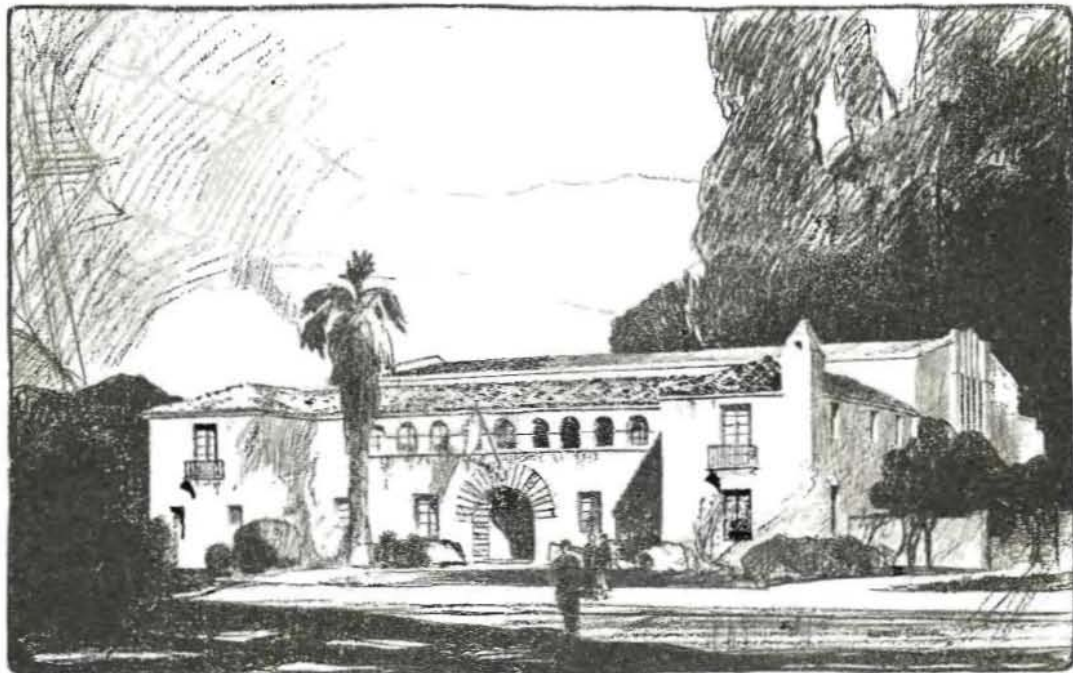
This block is a substitute for a rock cable anchorage, rock at this site being below the water level—as water exists under the streets of a great part of the San Francisco Bay shore.

The concrete weight into which the cables will be anchored will contain 68,000 cubic yards of concrete weighing 136,000 tons.

A new world's record will be established on Yerba Buena Island by the double deck vehicular tunnel, which is one sector of the San Francisco-Oakland Bay Bridge. This tunnel will be 76 feet wide, 58 feet high, and 540 feet long, lined with steel—the largest bore in the world. Into this tunnel a six-story building could be placed.

The cable anchorage on Yerba Buena Island will be set into hard rock. Each cable will be anchored in a tunnel comparable in size to the Stockton Street tunnel in San Francisco. Each tunnel will be filled with concrete around the separated strands of the cable, each strand being anchored with steel eyebars.

The west crossing of the San Francisco-Oakland Bay Bridge is similar to the George Washington Bridge across the Hudson River



MARS WILL REIGN over this beautiful new home for the Second Battalion, California National Guard, soon to be built in San Jose. It will provide companies E and H of the 159th infantry with a 75x100 foot drill hall in addition to office, club, locker and classrooms. Drawing by A. W. Eichler.

By **P. T. POAGE**, Assistant Chief Architect

WITHIN the next few weeks construction will start on the new armory building in San Jose which will be the permanent headquarters of the Second Battalion and the home of Companies E and H of the 159th Infantry, California National Guard.

The 159th Infantry is commanded by Colonel Wayne R. Allen with headquarters at Oakland. Lieutenant Colonel Clarence L. Mitchell is second in command and is the station commander at San Jose. Major Louis J. Van Dalsem is the commander of the Second Battalion.

Company H commanded by Captain Eugene W. Rideout is one of the older units in the State having been originally organized as the Hayward Guard on September 2, 1866. It was reorganized in 1909 and has seen service on the Mexican Border and in the World War. It is now a machine gun company.

Company E is a rifle company commanded by Captain George Barber and was organized on June 20, 1924.

The plans for this building have been prepared by the Division of Architecture of the State Department of Public Works with the

close personal attention of Adjutant General Seth E. Howard. The spirit of the exterior design is drawn from Mediterranean precedent interpreted in the simple manner of the early California architecture.

The new building will be built on a site donated by the city of San Jose on the east side of North Second Street just north of St. James Street. This location is in close proximity to both the business and major residence areas and affords the use of St. James Park and adjacent streets for outdoor drill purposes.

The portion of the building facing on North Second Street will be occupied by company offices and club rooms for officers and enlisted men on the first floor and locker rooms, showers and one classroom on the second floor. The office space and locker rooms are planned to provide space for the possible addition of a third company to the local unit.

LARGE DRILL HALL

Immediately back of the office section is the drill hall with a floor 75 x 100 feet. On the west side of the drill hall is a balcony seating approximately one hundred and thirty per-

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Roadside Beautification Report Sent to Legislature With Recommendations

THE Department of Public Works, has transmitted to Governor Rolph for presentation to the State Legislature a comprehensive report based on a survey of roadside beautification in California prepared by the Division of Highways.

The 1931 session of the Legislature, by Assembly Concurrent Resolution No. 34, directed the Division of Highways and the Division of Parks, with the cooperation of the San Francisco Regional Office of the United States Bureau of Public Roads, to formulate a suitable plan through which they might supply a definite leadership in roadside beautification and the development of small roadside parking and recreational areas and the making accessible to the public of such recreational areas.

COOPERATIVE WORK

The resolution also required that a report be submitted to the 1933 Legislature showing the progress made in carrying out the provisions of the resolution.

This progress report has been published as an attractive illustrated brochure and sets forth the results of an extensive survey of the roadside beautification phase of highway development. While the report was prepared and compiled under the immediate supervision of T. H. Dennis, Maintenance Engineer for the Division of Highways, it embodies the ideas of the Division of Parks and the United States Bureau of Public Roads and bears the approval of both of these agencies.

PLAN OUTLINED

The report reviews roadside beautification, parking areas, lookout points and drinking fountains as developed on the State highway system. It also outlines a limited plan for future beautification and development of recreational areas along the highways.

State highways are classified into commercial and recreational routes and included within the report are thirteen page-size detail maps of different areas of the State showing the types of beautification, such as tree or shrub plantings, existing and proposed roadside parks, lookout points and drinking fountains, on all State highways.

The report contains many half-tone cuts which illustrate and amplify the subject matter in the text dealing with various roadside conditions and types of beautification. The possibilities of recreational development and roadside beautification as a phase of highway construction and maintenance are by no means exhausted in the report but rather does it point the way to methods of future beautification work on existing highways and to the desirability of incorporating the features of aesthetic and recreational development into new highway location.

Accompanying the report are six large zone maps which show in detail the recreational routes of the California State highway system. On these maps, which were made from reductions of large maps composed of many United States Geological Survey quadrangles, the principal points of historic interest, scenic spots and general recreational areas are graphically depicted with appropriate notations.

The survey and the complete progress report which has just been published constitute the first effort of any of the major highway organizations in the United States to compile available information and propose definite plans for highway beautification work.

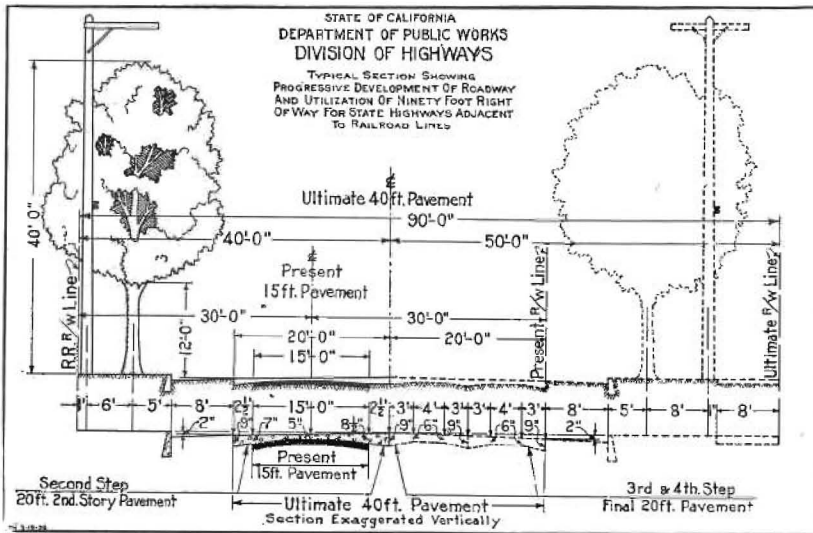
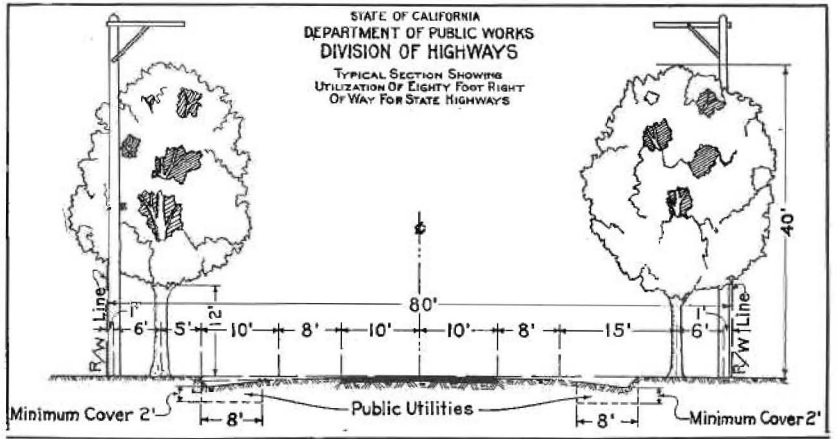
RECOMMENDATIONS MADE

The report makes seven recommendations as the result of the survey. The first three are as follows:

It is evident from studies made by the Division of Highways organization that all available and probable income is required to complete the present highway system within a reasonable period. Diversion of funds in any considerable amount to new projects will delay needed work on roads which would most benefit traffic and might well be questioned at the present time. Future crystallization of public sentiment may justify legislative consideration of such an eventuality.

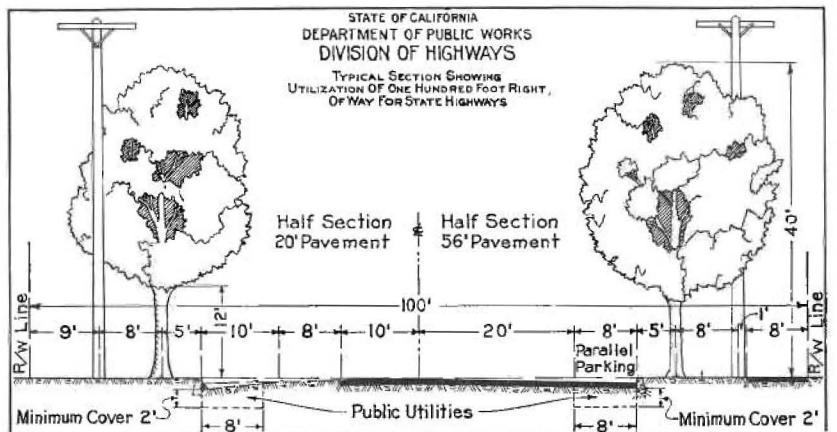
It is recommended, therefore, that no definite year by year program of roadside beautification be set up but that the work outlined in this report be carried out as

Typical section for 80 foot right of way. Standard sections have been adopted and improvements planned to fit in with the ultimate development and tree plantings.



Typical section for 90 foot Right of Way providing for the progressive development of a State Highway adjacent to Railroad lines with an ultimate 40 foot pavement.

Typical section for utilization of 100 foot Right of Way. Permits for Encroachments are controlled to provide least reasonable interference with existing and future plantings.



Safe School Buildings Assured by Rigid State Control of Construction

By **GEORGE B. McDOUGALL**, A. I. A. Chief of Division of Architecture

THE initial earthquake shock that occurred on March 10th last in the southern part of the State was of sufficient intensity to shatter poorly constructed buildings but was successfully resisted by buildings of sound construction. Later shocks caused additional damage.

Similar occurrences with similar results to buildings for similar reasons were experienced at San Francisco in 1906 and at Santa Barbara in 1925. It so happened in each case the catastrophe occurred outside of regular school hours. If it had been otherwise the loss of the lives of school children would have been appalling since in each case numerous school buildings were shattered.

Immediately following the recent disaster a popular demand arose that the construction of future school buildings throughout the State should be controlled by the State itself so as to wholly eliminate the possibility of a repetition of the destruction of such future buildings so far as possible, by securing under known and established principles of sound structural design and construction, the highest practicable resistance to horizontal earth movements due to such earthquakes.

GOVERNOR ACTS

In immediate agreement with this demand and responsive to it, Governor Rolph with legislators from the south, initiated the passage of an appropriate legislative act and on April 10, 1933, after passage in both houses of the Legislature, the Governor approved with his signature an urgency measure that immediately became effective as a statutory law.

This act for the protection of life and property, invests the Division of Architecture of the State Department of Public Works with authority under the police power of the State to prevent the commencement of construction of any new school building or if the estimated cost exceed \$1,000, the reconstruction or alteration of or addition to any school building, until full and complete plans and specifications for such work have been passed upon and approved by the Division of Architecture as to safety of design and construction.

The act also provides that the school boards or other agency for which the particular building work is to be done, shall arrange for competent, adequate and continuous inspection by an inspector satisfactory to the architect or structural engineer and to the Division of Architecture.

POWER TO ENFORCE

The Division furthermore is granted full power and authority to itself make such inspection of construction work as in its judgment may be necessary and proper for the enforcement of the provisions of the act and the protection of the safety of the pupils, the teachers and the public.

Moreover the architect or structural engineer and in cases where a structural engineer is employed by the architect, this structural engineer, also the inspector on the work and the contractor must each make to the Division of Architecture a duly verified report at such intervals of time as prescribed by the Division, showing that of his own personal knowledge the work during the period covered by the report has been performed and materials used and installed in every particular in accordance with the approved plans and specifications. The law makes any person making a false statement in any verified report or affidavit guilty of a felony.

The cost of the service of the Division of Architecture is to be paid by the school district, the amount in each case to be determined on the basis of a percentage of the total cost of the work.

Section No. 8 of the act provides that upon the request of the board of trustees of any school district the Division of Architecture shall make an examination and report on the structural condition of any public school building subject to the payment by the district of the actual expenses incurred by the Division. Provision is made for the waiving of the payment of these expenses in certain cases on the recommendation of the State Superintendent of Public Instruction as provided in the act.

C. H. Kromer, Principal Structural Engineer of the Division of Architecture, will be



FAULTY CONSTRUCTION was responsible for the collapse of some school buildings in the recent earthquake area. A type of construction incapable of resisting horizontal earth movements is illustrated in the above picture. The State has stepped in to prevent the erection of such school buildings in the future by rigid control of design plans, specifications and inspection.

in charge of the administration of the act, reporting to the State Architect.

Immediately following the southern catastrophe Mr. Kromer went to the stricken area remaining there about ten days principally for the purpose of rendering such assistance as he could to the local authorities but at the same time making careful observations of the conditions of various buildings, verifying the statements that destruction of buildings was due principally to poor construction.

During a period of five years, the work still not being entirely completed, under the auspices of the California State Chamber of Commerce at a large expenditure of money together with a very large amount of voluntary expert service by members of the architectural and engineering organizations of the State, a proposed uniform building code has been in process of compilation. Besides the uniform building code executive committee of the State Chamber of Commerce, there have been collaborating in this work the Northern and Southern California Chapter of the American Institute of Architects, the Northern and Southern California Structural Engineers Associations and representatives of the Building Departments of the cities of San Francisco and Los Angeles. Mr. Kromer has represented the Division of Architecture of the State Department of Public Works in this compilation.

While this code is not yet ready to be published as a whole the State Chamber of

Commerce has very kindly consented to the use by the Division of Architecture of such portions of it as apply, in formulating a code in accordance with which future school building work must be done.

Earl Lee Kelly, Director of Public Works, determined at the outset that if available, this uniform building code would be used in determining the character of construction of school buildings under the operation of the new law.

In addition to the code setting up structural requirements, the Division of Architecture will furnish to all applicants for permits to construct school buildings, a set of rules and regulations giving the procedure to be followed in complying with the law.

SAFETY ASSURED

Mr. Kelly has announced that in administering this law it shall be the policy of the Department of Public Works that approval will be given only to such designs, plans and specifications for school buildings and to such continuous competent supervision of construction as will absolutely assure the safety of the children of California who are in attendance in our public school buildings.

The new law vests the Division of Architecture with ample authority under the police power of the State to do this. The Division's approval of plans and specifications will be given only after the most careful check by its structural engineering

"Mudjack" Outfit Effective in Quake Area

(Continued from page 2)

a low tidal flat. Here longitudinal cracks opened up along the shoulders. On account of the unstable foundations, only a temporary macadam surfacing had been placed on this portion, and it showed several wide cracks.

As this type of surfacing lends itself readily to repair by the asphaltic permix material, the cracks were promptly filled leaving no visible evidence of damage to the surfacing. Sandy material was hauled in to fill the cracks in the shoulders, so that this entire section, including bridge approaches, is now in quite good condition.

The other locality just southeast of Huntington Beach where spectacular damage occurred, was a section of concrete pavement a few hundred feet in length, also located over an old estuary. Such violent undulations took place here that when the pavement finally came to rest after the temblor, the outside 10' strip on the landward side at one place was found to be as much as 14" lower than the adjacent strip. This area was immediately protected by barricades and steps were taken to repair the damage.

"MUDJACK" RUSHED FROM CAPITAL

The State highway "mudjacking" outfit made a rush trip from Sacramento, arriving on the ground on Monday evening, March 13th, and started work the following morning. This so-called "mudjacking" equipment has been used for some time on various portions of the State highway system to raise and restore to grade small sections of concrete pavement which have settled for various reasons.

Briefly, this equipment consists of an air compressor with jack hammer, a small mixer and pump and the necessary hose and connections. The air compressor and jack hammer are used to drill holes in the pavement slab to be raised. These holes are about 2½" in diameter and are spaced approximately 5' by 6'. The mixer is then used to mix the "mud" which consists of fine silt to which is added one sack of cement per cubic yard with enough water to bring it to a semifluid consistency.

RAISES PAVEMENT

This "mud" is then pumped under pressure into the holes in the pavement slab,

spreading out under the area to be raised. This equipment operates on the same principal as the hydraulic jack. The pressure exerted by the pump and carried through a hose and hole in the pavement slab, is transmitted to a much larger area where the semifluid material spreads out under the pavement.

This force raises the pavement and as there is sufficient cement in the mud to set, it forms and leaves solid material under the slab which is raised. The pavement is raised from ½" to ¾" at a time, each course of "mud" being allowed to set before the succeeding course is applied. This process is continued until the pavement slab has been raised to the desired elevation.

This method has proved to be so effective that the distortion of the pavement in the locality described above is now hardly noticeable. Although there are no extremely rough places which have not been repaired, it is planned to continue the "mudjacking" work where minor depressions have been left in the pavement all the way from Newport Beach to Long Beach.

SHOCK SHORTENED BRIDGE

The greatest damage to any of the bridges was that done to the Anaheim Bay Bridge near Seal Beach. An examination of this bridge revealed a few outstanding effects, the most notable being, on measuring the over-haul length of the bridge between faces of end paving notches, the bridge was found to be approximately 9' shorter after the earthquake than before. This shortening appears to have come practically all from the shifting of the south end of the bridge toward the north.

The effect has been to entirely close the 3½" and 4" gaps which were left on either end of the steel lift span and to take up some of the slack in the expansion joints on the other span. The movement has cracked the haunches on the outside girders of the east side of the bridge where they rest on cylinder piers. The south set of cylinder piers lean toward the north with a batter of approximately ¼" per foot, and all other bents between this pier and the south end of the bridge lean slightly in the same direction. All bents north of the lift span including the north

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Dust Oiling Program for 1933 Curtailed to About 666 Miles

THE program for dust oiling the rock surfaced and earth roads, while not as extensive this season as for the past two or three years, still represents a considerable amount of work. Plans are completed for oil treatment of some 666 miles of road.

Authority has been issued for the early advertising of ten projects from funds available in the current biennium set-up. The balance of the work must wait on approval of the budget as it is financed from 85th and 86th fiscal year funds. The work is distributed throughout twenty-seven counties. Some of the larger projects included in the program are as follows:

ALONG TRINITY RIVER

On the Redding-Arcata lateral from Weaverville in District II to Blue Lake in District I a total distance of about 95 miles. From Weed to Dorris in Siskiyou County about 59 miles. From Hot Creek to Alturas and the secondary north to Oregon line, all in Modoc County, a distance of about 45 miles.

From McDonald to Booneville in Mendocino County, 20 miles. Mt. Diablo Park roads in Contra Costa County, 19 miles. In Monterey and San Luis Obispo counties, 23 miles.

On the Carson Pass route from Dew Drop Inn to Picketts Junction and Route 23 from Alpine Junction to Hangman's Bridge, about 74 miles. From Laws to Nevada line in Inyo and Mono counties, 38 miles.

In addition a number of shorter sections in various parts of the State will receive treatment. The entire program covers portions of some twenty-six highway routes.

FARMERS WANT BETTER ROADS

The *Bureau Farmer* of the American Farm Bureau Federation says, "There seems ample justification in the continued development of our road building program. * * * The public gets more miles of road for its money than ever before. * * * In no other piece of public work does so much of the invested dollar go to labor as in building roads."

Because of the clamor for drastic reduction of all Federal appropriations, a real fight looms on highway aid. In the meantime less than one-half of the 200,000 miles on our main Federal highway system is surfaced in any way and less than 25 per cent is paved to carry heavy traffic.—*Concrete News*.

Willie (observing leopard at zoo): "Mother, is that the dotted lion the insurance man was telling you about when he loaned his fountain pen to you?"

State to Control all Construction Work on School Buildings

(Continued from page 9)

section has shown that they fully comply with all the requirements involved in the highest possible resistance to horizontal earth movements as provided in the governing code.

The importance of inspection while construction work is in progress can not be overestimated. Before construction work can commence the structural engineer of the Division of Architecture must approve the selection of the inspector to be employed by the school board with the approval of the architect and the structural engineer who has made the structural design of the building, and this approved inspector is to remain continuously on the work during its progress. The structural engineering section of the Division of Architecture will itself make such inspections of this construction work from time to time as in its judgment are necessary in each case to establish assurance that the approved plans and specifications are being accurately followed.

STATE WILL CONTROL

Whenever a school board determines there is doubt as to the stability of an existing public school building under its jurisdiction, to resist horizontal earth movements, the structural engineering section of the Division of Architecture will upon request of such board make examination and report on the condition of such public school building.

It will be apparent that the State itself has now stepped in to positively control school building construction.

As already indicated, experience in previous earthquakes and now in this one in 1933, has revealed the fact that if buildings are designed and built in accordance with known and firmly established principles of sound structural engineering, they are capable of resisting earth movements of the intensities of those which occurred during these three earthquakes and consequently of preventing loss of life and property. This law now effective will secure such construction in all the State's future public school buildings.

"Why does the State of Missouri stand at the head of mule-raising in this country?"

"Because the other end is too dangerous, sir."

Legislature Paves Way for Federal Aid in \$160,000,000 State Water Plan

DURING the past month constructive and forward steps have been taken by both the legislative and executive departments of the State toward the realization of the State Water Plan of California.

With President Roosevelt's announced intention of launching a vast public works program for the relief of unemployment, prompt action was taken by Governor James Rolph, Jr., to place California's initial Great Central Valley project of the State Water Plan within the program of works to be undertaken. Governor Rolph wired President Roosevelt and each one of California's representatives in Congress immediately after the publication of the President's announcement and mailed them full data on the subject.

He also requested Major General Brown, Chief Engineer of the U. S. War Department, who will make the final report on the plan and recommendations to Congress, to arrange for an investigation of the project by his chief assistant engineer, Brigadier General George B. Pillsbury, then inspecting War Department work on the Coast.

LEGISLATURE ACTS

The State Legislature also has been very active. On March 28th the Assembly passed by a decisive vote of 68 to 5, Assembly Constitutional Amendment No. 18, which provides for the enactment of the necessary legislation for the development of the water resources of the State. This proposed constitutional amendment was recommended in both the reports of the California Water Resources Commission and the California Joint Legislative Water Committee.

The amendment was introduced by Assemblymen Chatters, Anglim, Craig, Cloudsley, Cronin, Dempster, Maloney, Ross and Turner. An identical amendment has been introduced in the Senate by Senators Crittenden, Mixter, King, McColl, Allen, Sharkey, Schottky and Wagy. The amendment is now before the Senate for action. It grants specific authority to the Legislature to provide by general law the necessary and proper enactments for the carrying out of a State Water Program. It provides for the loaning of State

credit to public agencies on water development projects, for changes in the law of eminent domain and for the protection of areas of surplus water from being deprived by the State of water required for their ultimate development. The amendment further provides that all projects before construction must be definitely shown to be self-liquidating and that all liabilities incurred must be first voted upon by the people.

PROVIDES BOND ISSUE

One of the most important features of the amendment is that authorizing the Legislature to provide for State water development in conjunction with the United States Government. Companion bills which provide for the issuance of \$160,000,000 State bonds for the construction of the Central Valley project have been introduced also in the Assembly and Senate. The works which would be constructed under the bill include the Kennett Reservoir and power plants, Friant reservoir and power plant, San Joaquin-Kern County Canal, Madera Canal, Contra Costa County Conduit, and San Joaquin River Pumping System and a connecting channel between the Sacramento and San Joaquin rivers. The passage of this legislation would definitely pave the way for Federal financial assistance and participation in the State Water Plan and its consummation.

Pursuant to the request of the Governor, General Pillsbury spent three days making an inspection of the Great Central Valley Project. He was accompanied by the following officials of the U. S. War Department: Colonel Thos. M. Robins, Division Engineer, San Francisco; Captain J. G. Drinkwater, District Engineer, Sacramento; C. I. Grimm, Chief Assistant, San Francisco office, and O. G. Stanley, Chief Assistant, Sacramento office.

MET BY STATE OFFICIALS

The War Department party entered California by automobile from Oregon Sunday morning, March 26th, and was met at the Kennett dam site, near Redding, by Edward Hyatt, State Engineer; Major A. M. Barton, Chief Engineer, State Reclamation Board; Judge Francis Carr, member of Governor



SELLING UNCLE SAM on the merits of California's \$160,000,000 State Water Plan for inclusion in President Roosevelt's public works program for unemployment relief was the motive for a meeting of State and Federal officials in Governor Rolph's office March 27. In the front row, left to right, are Earl Lee Kelly, Director of Public Works; Governor James Rolph, Jr., and Brigadier General George B. Pillsbury, Assistant Chief Engineer, U. S. Army. In rear row, left to right, Colonel T. M. Robins, Division Engineer, U. S. Army; Major A. M. Barton, Chief Engineer, State Reclamation Board; Captain J. G. Drinkwater, District Engineer, U. S. Army, and State Engineer Edward Hyatt.

Rolph's Water Commission, of Redding, and A. D. Edmonston, Deputy State Engineer.

The party inspected the Kennett site in the morning and after lunch in Redding, proceeded to Sacramento by way of the Moulton, Colusa and Sacramento weirs, inspecting the navigation, flood control, reclamation and irrigation possibilities of the river.

Governor Rolph conferred with General Pillsbury and his party at the Capitol on Monday morning. At the conference were Director Earl Lee Kelly, of the Department of Public Works, State Engineer Edward Hyatt, Deputy A. D. Edmonston and Major A. M. Barton.

SUGGESTED LEGISLATION

General Pillsbury stated that if the program for unemployment relief outlined by President Roosevelt is carried out, he saw no reason why the California project should not be considered a very worth while part of that program. He expressed complete satisfaction with the engineering investigation made by the State and was particularly well impressed with the foundations of the Kennett dam site as revealed by the extensive exploratory work. He strongly recom-

mended that California immediately enact the legislation necessary to properly present its case to the Federal authorities.

After conference with the Governor, General Pillsbury continued his inspection tour, going to Merced, Exchequer Dam, and the Friant Dam site on the San Joaquin River near Fresno, in which city the party spent the night.

CANAL ROUTE VIEWED

Tuesday he inspected the area of pronounced water shortage from Fresno to Bakersfield, including Fresno, Tulare, Kings and Kern counties, and looked over the route of the proposed canal designed to relieve that area.

On Wednesday evening, a dinner-meeting was held in Sacramento in honor of General Pillsbury. It was attended by prominent State legislators, State and Federal officials and citizens interested in water matters. Senator Bradford S. Crittenden acted as toastmaster. Governor Rolph, Arthur B. Tarpey and Judge Francis Carr, members of the Governor's Water Commission, Senator Will R. Sharkey and Colonel Robins spoke. General Pillsbury responded. Immediately after the

(Continued on page 25)

Relics Found on Ridge Alternate Prove Ancient Tribe used Asphalt

SOME very interesting relics of an old Indian habitation were recently unearthed in Piru Canyon adjacent to the Ridge Route Alternate Highway, which is under construction in Los Angeles County. The discovery was made while excavating a major channel change in Piru Creek between French Flat and Liebre Creek, about thirteen miles north of Castaic School, the southern end of the project.

Excavation work was done with power shovels, the material being hauled away in trucks. The location proved to be the site of an old Indian village and burying ground. Unfortunately, the power shovels practically demolished the burials so that only fragments were left for inspection.

The Los Angeles Museum was notified of the find and a field party under the direction of Arthur A. Woodward, Curator of History for the Museum, made an inspection of the site and collected such fragmentary relics as they were able to find.

MADE USE OF ASPHALT

Several skeletons were found with what appeared to be a lump of asphalt buried in each grave. Further investigation indicates that these were the remains of old woven baskets which were waterproofed by lining them with asphalt. Apparently these baskets were buried with the owner.

A thin slab of rock was found which had been used as a base for mortars. A stone mortar was found placed in a depression in this slab and was fastened to the base with asphalt. A number of abalone shells were found which had been used for cups and ladles. Small holes in the edges of the shells were filled with asphalt. Numerous beads were uncovered, made from shells and soapstone.

Correlating this find with other Indian relics which have been unearthed both in the mountains and along the coast from San Luis Obispo to Topanga Canyon, just north of Santa Monica, Mr. Woodward was able to describe the division, characteristics and habits of these early inhabitants as well as tell the approximate date this village was occupied.

IDENTIFIED AS CHUMASH

All of the beads which were found had been made from shells and soapstone. None of the Venetian glass beads which were brought into this part of the country by the early Spanish settlers and traded to the Indians were found. It is therefore probable that the village was abandoned prior to 1769, although possibly not many years before that date.

From the characteristics of their burials and relics, these Indians were evidently of the Chumash Division, which once occupied a strip of the coast from fifteen to thirty miles in width from San Luis Obispo as far south as Santa Monica. This village site on the Piru Creek had evidently been selected on account of the water, a few scattering oak trees and the excellent hunting which the country afforded. These people were not agriculturalists but depended on wild game and such wild roots and plants as they were able to find.

Houses were in the shape of half oranges formed by ribs of wood bent to semicircular shape with each end fastened in the ground. The bases were circular with the ribs fastened together at the top. Around this framework loops of wood were fastened at intervals forming a fairly rigid framework. This frame was then woven with thatch which formed a comparatively comfortable house.

WERE BOAT BUILDERS

The presence of sea shells among the relics indicates that these people were in frequent communication with the coast and it seems probable they spent part of their time in the mountains hunting and part on the coast fishing. They were not a pottery-making people, but used Steatite or soapstone for cooking utensils, dropping heated stones into the vessels of food to heat them. As the Steatite deposit was on Catalina Island, it follows that they had seaworthy boats or canoes, or that they traded with other Indians who were equipped with boats.

The Chumash did make seaworthy canoes of thin plank bound together with leather and wedged with antler and bone wedges. These canoes were waterproofed with asphalt and were used principally for fishing.

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Suits Test Validity of Bay Bridge Bonds

(Continued from page 4)

in that it is anchored on one side in rock and on the other side in a concrete weight.

The east crossing is, of course, a cantilever structure.

The legal hurdles which are being overcome involve the necessary test suits to establish the legality of the Toll Bridge Authority Bonds, which are a first lien against the revenues of the San Francisco-Oakland Bay Bridge, and by the sale of which the San Francisco-Oakland Bay Bridge is to be financed. In order to accomplish the test it was necessary for State Director of Public Works Earl Lee Kelly to refuse, in his capacity as Secretary of the Toll Bridge Authority, to sign the bonds, citing as the basis of his refusal all of the legal points which the Reconstruction Finance Corporation desires court decisions upon.

The suit in the State Supreme Court will particularly test the legality of the construction of the approaches to the bridge from the gas tax fund, as well as the maintenance of the bridge as a part of the State Highway System.

BIDS SHOW SAVINGS

The attorneys for the California Toll Bridge Authority in this case are: Attorney General U. S. Webb; Deputy Attorney General Robert Harrison; Heller, Ehrmann, White & McAuliffe; Thomson, Wood & Hoffman of New York City; Hugh K. McKeivitt; C. C. Carleton and J. J. Dailey. Kelly is represented by attorneys F. B. Durkee and C. R. Montgomery of Sacramento.

Bids opened to date showed a great saving over engineering estimates, and indicate that the Chief Engineer's figures are safe and conservative, it was pointed out by State Director of Public Works Kelly at a recent bid opening.

RELICS FOUND ON RIDGE PROVE ANCIENT TRIBE USED ASPHALT

(Continued from page 14)

One of the striking features found in studying relics of these old tribes is the wide use to which they put asphalt. This material was used to fill holes in shells, making them serviceable as utensils for food. It was used for inlaying beads on stone mortars, waterproofing baskets and setting knife blades and arrowheads. In fact, asphalt was used for

In Memoriam

FRANK E. QUAIL, Assistant Maintenance Engineer, Division of Highways, died suddenly on March 10, at his home in Stockton.

For thirty-four years he had been identified with highway work in California, twenty-eight years of that time as County Surveyor for San Joaquin County, and six years with the Division of Highways.

Mr. Quail was born at Upper Sandusky, Ohio, sixty-five years ago. He was educated at Ohio Northern University. On coming to California in 1892 he engaged in general engineering practice for a short time at Stockton and later was with the City Engineer's office at that place for two years. In 1898 he was elected to the position of County Surveyor and was returned for successive terms until 1927. Within that period the road system of San Joaquin County became outstanding among the counties, particularly in the use of oil macadam type of pavement.

Late in 1926 he joined the maintenance organization of the Division of Highways, and was assigned to general field inspection of maintenance work. At that time light asphaltic oil was just coming into general use in dust oiling and preservation of rock surfaced roads, and Mr. Quail's experience proved of great value not only in the development of standardized practice but also in actual instruction of the men engaged on the work.

Mr. Quail was a man of fine habits, even tempered and friendly. His work took him to all parts of the State and his acquaintance with the working organization was wider, perhaps, than that of anyone else in the service. While he reported conditions exactly as he found them he could always be depended on to particularly emphasize good work and to give the extenuating circumstances when he found it necessary to criticize.

In the passing of Frank Quail the State lost a model citizen and the highway organization a faithful friend.

ROADS BUILT WITH WOOL

A road pavement of chemically-treated wool which is said to set as hard as concrete is being tested in New South Wales. Wool of inferior market grade is used.

practically every purpose which required a cementing material. It is evident that these people had access to at least one natural outcropping of this material.

There is evidence that the Chumash Indians traded with Indians who lived far in the interior, even as far as the Colorado River. When one sees the beads which were found in Piru Canyon and realized the infinite amount of work which has been required to grind them to shape, he can only conclude that these were a very industrious people.

CALIFORNIA HIGHWAYS AND PUBLIC WORKS

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Editors of newspapers and others are privileged to use matter contained herein. Cuts will be gladly loaned upon request.

EARL LEE KELLY.....Director
JOHN W. HOWE.....Editor

Address communications to California Highways and Public Works, P. O. Box 1103, Sacramento, California.

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ROAD CAMP EFFICIENCY

Butchers, bakers, and candlestick makers to say nothing of scientists, engineers, chefs, carpenters, barbers, tailors, plumbers, electricians, and scores of other skilled artisans are creating an unusual and colorful picture of humanity in kaleidoscopic groups at the State road camps now being used to furnish employment to nonworkers.

Those who have had opportunity to see these little villages along the highways realize how diversified are the talents of those human entities whose similarity ends with the exterior garb of overalls, heavy footwear, and a spade or a pick. The mental caliber, the spiritual plane, the physical condition of each man is as different as day and night, but together they create an efficient group of workers capable of carrying on the entire workings of their roadside villages.

Nourishing meals are prepared by those who are skilled in cooking, clothes are mended by former tailors, the barbers keep the men shaved and sheared, the cobblers take care of the shoe needs, and those not so skilled but physically unfit for the heavy road work are used as dishwashers, bedmen. The remainder, comprising the great majority, is armed with working tools each morning and it is they who add to the vast mileage of good roads which serves to attract thousands of tourists.

This State faces just a little different condition than any other of the forty-eight states of the Union, inasmuch as it is the mecca for thousands of itinerants who seek the golden west when winter fixes its hold in their home states. We can not let these wanderers starve, and yet it is not fair to our own people to feed them, consequently the best we can do is to provide employment with which they may pay board and room.

Forty Billion Dollars Invested in Highways and Motor Vehicles

THE largest "public utility" in America is the highway system and its rolling stock. It represents an investment that is 50 per cent greater than the next largest "public utility," namely, the railways, according to an article in *Roads and Streets*. The railway investment totals 27 billion dollars as compared with nearly 40 billions in highways, and highway vehicles, the article states. Of this huge sum about 17 billions are invested in roads and streets, and 23 billions in motor-vehicles, garages and filling stations.

"We include filling stations because they correspond with the fuel and water stations on railway lines," says the article. "In this estimate we aimed to secure a total highway industry investment comparable with that shown by the Interstate Commerce Commission as the total investment in railway plants. The latter includes large sums for right of way and terminal lands, but we have made no attempt to estimate the value of rights of way of highways. We have included an estimate of the cost of securing right of way easements.

"This 40 billion dollar highway 'plant' is perhaps the most remarkable development of modern times. During the 15 years ending in 1928 American motor-vehicles increased 19 fold in number. Road improvement lagged woefully behind this increase in rolling stock, for the mileage of 'surfaced roads' only doubled during those 15 years.

"A good many newspaper editors have spoken of so-called extravagance in road building without realizing that road building has lagged far behind the buying of automobiles. We have yet to read a single editorial condemning the public for buying too many automobiles. It would be a singularly foolish public that would invest more than 18 billion dollars in motor-vehicles and coincidentally fail to demand suitable roads over which to drive them.

"Including the new 1 ct. per gallon federal tax on gasoline, motor-vehicle owners would pay \$700,000,000 annually in gasoline taxes, based on the 1931 consumption. To this add \$350,000,000 in motor-vehicle license fees, and the annual 'toll' for the use of the highways becomes \$1,050,000,000. The annual cost of maintaining and repairing the roads is \$450,000,000, leaving \$600,000,000 as income, or 5 per cent on the 12 billion dollars invested in roads."

Roads in State Total 77,000 Miles

(Continued from page 1)

tion of the proposed additional mileage to arrive at an equality:

	North	South
Present secondary system	1941.5	1146.8
To be added (approximately 6600 miles)		
Routes within and through cities connecting present system:		
Primary connections	138.9	192.6
Secondary connections	20.3	69.8
Additional roads, including their connections into and through cities	2743.3	3434.8
Total additions	2902.5	3697.2
Total equalized mileage	4844.0	4844.0

The foregoing tabulation shows that in the contemplation of adding 6600 miles to the State highway system and at the same time equalizing mileage north and south, 2743.3 miles should be included in the north section of the State and 3434.8 miles in the south.
* * *

RELIEF FOR COUNTIES

In the preparation of this report, consideration has been given to such county roads which are now carrying or will serve a considerable volume of county or intercounty traffic, and which are connected with the present State highway system. Consideration is also given to the important question of offering substantial relief to the counties, which necessarily includes a State-wide distribution of such additional routes so that all parts of the State may realize such relief and benefit.
* * *

In the lesser mileage report the following tabulation shows the distribution of the proposed additional mileage to arrive at an equality on the basis of including 2539 miles:

	North	South
Present secondary system	1941.5	1146.8
To be added (approximately 2539 miles)		
Routes within and through cities connecting present system:		
Primary connections	138.9	192.6
Secondary connections	20.3	69.8
Additional roads, including their connections into and through cities	713.0	1404.5
Total additions	872.2	1666.9
Total equalized mileage	2813.7	2813.7

The large mileage of roads proposed for inclusion and the short time available for such study preclude the possibility of entering into a detailed investigation or the accumulation of such detailed data as have been prepared in reports previously made to the 1931 session of the Legislature and in the report of July, 1932, to this session of the Legislature. It was only because of the thorough and widespread study made by the Division of Highways in the preparation of these earlier reports that sufficient data and information is at hand

to make possible the presentation of a report and recommendation, including a mileage of such magnitude and conforming to the requirements and principles set forth in the legislative resolution. * * *

RELIEF FOR CITIES

The inclusion of routes connecting the present State highway system into and through cities will result in a connected and correlated system, provide better service for traffic and afford material relief to such municipalities in the maintenance of such routes.

It is inescapable that, in the centers of heavier population and adjacent to the larger cities, a larger mileage of roads is to be found. Roads so located carry much the larger volume of traffic as compared to those in far-outlying territory and are, consequently, a greater burden on the county to maintain to a standard which will adequately serve such traffic. Their removal to State jurisdiction will, therefore, offer a substantial measure of relief to such counties. At the same time, the taking over of the more important roads in counties of smaller population with lesser mileage of roads will also afford relief to these counties.

RECREATIONAL AREAS

Maintenance and improvement on such roads is more expensive than on minor roads in order to provide the proper measure of service to traffic. The inclusion of these roads in the State highway system also means that the property owner is protected against assessment for the improving or construction of the road in the future.

Access to the recreational areas, as represented by national and State parks, has also been given attention in the selection of these roads. Roads affording access to such localities have been included in both the north and south sections of the State. This class of road, however, should be limited to some extent in favor of more important commercial, intercounty and intercity highways.

The total public road mileage in the State is estimated to be approximately 77,000 miles; of this total 7350 are included in the State highway system, leaving approximately 69,500 miles which are county roads. Considering this total, the mileage proposed for inclusion may appear to be only a small part; but to draw the conclusion that it would afford an equally small measure of relief is erroneous.

TWENTY-TWO THOUSAND MILES SURFACED

Of this 69,500 miles of county road, about 47,500 are unsurfaced and unimproved roads. The large majority of this latter group carry very little traffic and require small maintenance or improvement expenditure. The remaining 22,000 miles are surfaced and improved in various ways, ranging all the way from gravel through waterbound macadam, bituminous macadam, to Portland cement concrete.

This smaller mileage, approximately 22,000 miles which have been surfaced, is the mileage which is probably requiring the larger expenditure on the part

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Highway Bids and Awards for March

ALAMEDA, SANTA CLARA AND MERCED COUNTIES—Oiling roadside vegetation, about 45.0 miles. District IV, Routes 5 and 32. Peninsula Paving Co., San Francisco, \$1,320; U. B. Lee, San Leandro, \$2,520; Dee Strong, Sacramento, \$1,152; Lee J. Immel, Berkeley, \$1,092; Pacific Truck Service, Inc., San Jose, \$1,350; Oilfields Trucking Co., Bakersfield, \$1,386. Contract awarded to Palo Alto Road Materials Co., Ltd., Palo Alto, \$1,008.

INYO COUNTY—Between Bishop and Round Valley Road, 7 miles to be graded and surfaced with bituminous treatment. District IX, Route 23, Section E. Hemstreet & Bell, Marysville, \$63,288; Southwest Paving Co., Los Angeles, \$65,070; C. O. Sparks, Los Angeles, \$68,653; Fred W. Nighbert, Bakersfield, \$79,596; Weymouth Crowell Co. & E. Penn Watson, Jr., Los Angeles, \$63,052. Contract awarded to Basich Bros., Torrance, \$54,193.

LAKE COUNTY—28 miles east of Mendocino County line, an existing timber bridge to be removed and a reinforced concrete slab bridge to be constructed across Morrison Creek. District III, Route 15, Section B. Alfred H. Voight Co., Inc., San Francisco, \$13,860; Fred J. Maurer & Sons, Eureka, \$16,900; Sam Sciamino, San Jose, \$8,500; A. F. Anderson, Sacramento, \$10,304; W. E. Lyons, Oakland, \$11,744; Smith Bros., Eureka, \$9,551; F. J. Main, Fairfax, \$13,591; M. B. McGowan, Inc., San Francisco, \$8,878; H. Sneed, Berkeley, \$10,356; E. T. Lesure, Oakland, \$9,196; Whited & Whited, Santa Rosa, \$7,900; Contract awarded to Thos. J. Doyle, San Francisco, \$7,757.

LAKE COUNTY—Between Manila Ranch and Bartlett Springs Road, about 3.2 miles to be graded and surfaced with crusher run base and bituminous treated crushed gravel or stone. District III, Route 15, Section B. Hein Bros., and Basalt Rock Co., Petaluma, \$62,931; Artukovich Bros., Hynes, \$78,136; D. M. McDonald, Sacramento, \$89,505; E. B. Bishop, Sacramento, \$68,340; Willard, Biasotti & Lovotti, Stockton, \$79,207; A. Teichert & Son, Inc., Sacramento, \$64,929; Heafey-Moore Co., Oakland, \$83,507; von der Hellen & Pierson, Castaic, \$79,995; Fredrickson & Watson, Oakland, \$64,877; A. J. Ralsch Co., San Francisco, \$60,723; Hemstreet & Bell, Marysville, \$63,561; Granfield, Farrar & Carlin, San Francisco, \$61,246. Contract awarded to Hanrahan Co., San Francisco, \$59,959.

LOS ANGELES COUNTY—Reinforced concrete girder bridge across San Gabriel River 2 miles east of El Monte. District VII, Route 26, Section B. Bodenhamer Construction Co., Oakland, \$124,473; Dimmitt and Taylor, Los Angeles, \$193,010; Oberg Bros., Los Angeles, \$119,144; Fredrickson & Watson Const. Co., and Fredrickson Bros., Oakland, \$128,898; M. B. McGowan, Inc., San Francisco, \$127,639; Herbert M. Baruch Corporation, Ltd., and Robinson-Roberts Co., Los Angeles, \$138,465; Weymouth Crowell Co., Los Angeles, \$118,634; Merritt-Chapman & Scott Corporation, San Pedro, \$126,114; Lynch-Cannon Engineering Co., Los Angeles, \$138,837. Contract awarded to Clinton Construction Company of California, Los Angeles, \$109,101.

LOS ANGELES, ORANGE, SAN DIEGO and IMPERIAL COUNTIES—Oiling roadside vegetation, approximately 79.4 miles. District VII. Consumers Oil Co., Los Angeles, \$2,874; Gilmore Oil Co., Ltd., Los Angeles, \$3,655; Bankosky & Oelke, Anaheim, \$4,086. Contract awarded to Square Oil Co., Los Angeles, \$2,752.

MENDOCINO, SONOMA, MARIN, SOLANO and NAPA COUNTIES—Oiling roadside vegetation, approximately 136 miles. District IV. Lee J. Immel, Berkeley, \$3,401; Peninsula Paving Co., San Francisco, \$3,726; Highway Builders, Ltd., San Anselmo, \$2,842; Oilfields Trucking Co., Bakersfield, \$3,780; R. M. Sheldon & Son, Suisun, \$3,672. Contract awarded to Basalt Rock Co. and Chas. Kuppinger, Napa, \$3,384.

MONTEREY, SAN LUIS OBISPO AND SANTA BARBARA COUNTIES—Oiling roadside vegetation, about 120 roadside miles. District V, Routes 2, 10, 57 and 80. Oilfields Trucking Co., Bakersfield, \$3,315; Western Motor Transfer, Inc., Santa Barbara, \$3,255; Peninsula Paving Co., San Francisco, \$3,450; Walter B. Roselip, San Luis Obispo, \$3,112. Contract awarded to L. A. Brisco, Arroyo Grande, \$2,850.

SACRAMENTO COUNTY—Between Mills and Nimbus, 4.5 miles to be graded and paved with asphalt concrete. District III, Route 11, Section B. A. Teichert & Son, Sacramento, \$112,848; Heafey-Moore Co. and J. A. Casson, Oakland, \$95,320; Fredrickson & Watson, Oakland, \$105,474; Peninsula Paving Co., San Francisco, \$99,555; Basich Brothers, Torrance, \$102,141; Hanrahan Co., San Francisco, \$107,270. Contract awarded to D. M. McDonald, Sacramento, \$90,676.

SAN DIEGO COUNTY—Deck plate girder bridge with concrete deck across San Diego River in San Diego, consisting of 8-80' spans on concrete piers and abutments with pile foundations. District VII, Route 2, Section E. M. H. Golden, San Diego, \$109,582; Merritt-Chapman & Scott Corporation, San Pedro, \$125,650; Dimmitt and Taylor, Los Angeles, \$115,787; Bodenhamer Construction Co., Oakland, \$104,941; M. B. McGowan, Inc., San Francisco, \$109,574; Lynch-Cannon Engineering Co., Los Angeles, \$116,545; Weymouth Crowell Co., Los Angeles, \$112,977; W. E. Kier Construction Co., San Diego, \$117,192; Frank Doran, San Diego, \$103,721; Walter Trepte, San Diego, \$109,820; Oberg Bros., Los Angeles, \$129,808. Contract awarded to B. O. Larsen, San Diego, \$99,683.

SAN DIEGO COUNTY—Between Barnett Avenue and Balboa Avenue, about 4.4 miles to be graded. District VII, Route 2, Section E. J. L. Conner and K. Kristieh, San Juan Capistrano, \$99,962; Walter Trepte, San Diego, \$113,093; Hall-Johnson Co., Alhambra, \$110,476; S. J. Groves & Sons Co., Los Angeles, \$127,586; V. R. Dennis Construction Co., San Diego, \$116,794; von der Hellen & Pierson, Castaic, \$151,051; Weymouth Crowell Co. & E. Penn Watson, Jr., Los Angeles, \$101,568; Basich Bros., Torrance, \$105,676; Guy F. Atkinson Co., San Francisco, \$116,826; Merritt-Chapman & Scott Corporation, San Pedro, \$99,749. Contract awarded to Daley Corporation, San Diego, \$89,940.

SAN MATEO COUNTY—Between San Francisco and South San Francisco, 3.3 miles grading and paving with Portland cement concrete. District IV, Route 68, Section A. Peninsula Paving Co., San Francisco, \$184,788; Eaton & Smith, San Francisco, \$203,153; The Fay Improvement Co., San Francisco, \$221,674; Fredrickson & Watson, Oakland, \$176,513; Hanrahan Co., San Francisco, \$169,710; N. M. Ball, Berkeley, \$176,432. Contract awarded to Basich Brothers, Torrance, \$166,161.

SHASTA COUNTY—Between Jenny Creek and Redding, 1.1 miles surfacing with crusher run base and bituminous treated crushed gravel or stone. E. B. Bishop, Sacramento, \$12,428; Hemstreet & Bell, Marysville, \$12,515; Peninsula Paving Co., \$13,493; Highway Builders, Ltd., San Anselmo, \$9,325; J. P. Brennan, Redding, \$1,191. Contract awarded to Tiffany, McReynolds & Tiffany, San Jose, \$9,163.

SISKIYOU COUNTY—Between Dorris and Oregon State line, about 3.9 miles to be graded and surfaced with untreated crushed gravel or stone and bituminous surface treatment. District II, Route 72, Section C. A. Teichert & Son, Inc., Sacramento, \$114,670; Granfield, Farrar & Carlin, San Francisco, \$117,440; Hemstreet & Bell, Marysville, \$193,210; Dunn & Baker and Johnson Bros. Co., Klamath Falls, Oregon, \$119,666; Heafey-Moore Co., and J. A. Casson, Oakland, \$152,430. Contract awarded to J. F. Shepherd, Stockton, \$85,909.

STANISLAUS, SAN JOAQUIN, CALAVERAS, SACRAMENTO and AMADOR COUNTIES—Oiling roadside vegetation, approximately 110.7 miles. District X. Lee J. Immel, Berkeley, \$14,664; R. M. Sheldon & Son, Suisun, \$1,336. Contract awarded to Dee Strong, Sacramento, \$1,364.

TUOLUMNE, CALAVERAS, AMADOR, STANISLAUS COUNTIES—Oiling roadside vegetation, approximately 161 miles. District X. Contract awarded to Dee Strong, Sacramento, \$1,692.

VENTURA AND LOS ANGELES COUNTIES—About 110.2 miles of roadside vegetation to be oiled. District VII. Western Motor Transfer, Inc., Santa Barbara, \$4,123; Paulsen & March, Inc., Los Angeles, \$4,208; Gilmore Oil Company, Ltd., Los Angeles, \$4,208. Contract awarded to Square Oil Company, Inc., Los Angeles, \$3,549.



There is little prospect of flood conditions this year in the streams of the Sacramento and San Joaquin valleys unless some unexpectedly heavy storms occur. The snow pack in the mountains is a great deal less than normal with a snow of small water content. In general, snow surveys indicated depth and water content in early March averaging from 40 to 60 per cent less than at that time a year ago with a general average of 40 per cent less for the major stream basins of the Western Sierra slope. Precipitation averages were below normal throughout the State up to March 1.

Mining activities continue to make largest demands for the use of water. News of the irrigation districts with details of dam investigations, reclamation and flood control projects are given in the monthly report of State Engineer Edward Hyatt as follows:

IRRIGATION DISTRICTS

Office work consisted in analyzing and checking annual irrigation district reports forwarded to the State Engineer pursuant to Section 54½ of the Irrigation District Act and in responding to requests for information relating to irrigation matters. The Irrigation Districts Association of California met in Sacramento on March 9, 10 and 11, devoting most of the time of the session to the discussion of legislation affecting irrigation districts. A. B. Tarpey, president of the Fresno irrigation district board, was elected president of the Districts Association, vice Wm. Durbrow, who had served the association continuously for ten years in that capacity, but declined to be a candidate for the ensuing term.

California Districts Securities Commission.

The following irrigation districts have declared that sufficient bonds have been pledged for exchange to make their refunding plans effective:

Grenada district, Siskiyou County: Principal amount of refunding bonds \$136,000; type serial, regular interest rate 6 per cent; interest rate to be adjusted until 1939 to amount the lands can pay, not exceeding the regular rate.

Nevada district, Nevada County: Principal amount of refunding bonds \$8,100,000; type sinking fund, regular interest rate 4 per cent.

Okdale district, Stanislaus County: Principal amount of refunding bonds \$2,300,000 in four divi-

sions; first division \$200,000 serial, regular rate of interest 5 per cent; second division \$960,000 serial, regular rate of interest 4 per cent; third division \$200,000 sinking fund, regular rate of interest 6 per cent; fourth division \$960,000 sinking fund, regular rate of interest 5 per cent.

At an election held on March 8, the West Stanislaus irrigation district, Stanislaus County, voted a refunding bond issue of \$1,160,000, which represents the bonds of the district in the principal amount now outstanding.

FLOOD CONTROL AND RECLAMATION

Maintenance of Sacramento Flood Control Project.

During this period only routine maintenance work with our regular crew has been performed in connection with levees, structures, pumping plants, drains and repairs to equipment. The crew has continued to work only part time, as it is thought inadvisable to commence any major item of work during the period when storms may be expected. There has been no requirement for ordinary winter activities on account of the lack of storms and flood flows. These activities usually consist of levee patrolling, clearing structures of debris, and performing emergency protection as required.

Sacramento Flood Control Project—Bank Protection.

The California Debris Commission has under way or has completed all of the items of the permanent bank protection program, with the exception of the length of 500 feet at Ministerial Bend in District No. 1500 and the work at Tyndall Mound, which was performed by this office. We have submitted to the District Engineer a tentative list of the items recommended to be included in the 1933-34 fiscal year program for bank protection, a total length of approximately 13,000 feet. The units selected comprise the places most in need of protection. The list as submitted will probably be extensively revised before it is approved by the California Debris Commission.

Emergency Flood Protection and Rectification of Rivers.

The camp set up near Lompoc by this Division, in connection with an unemployment relief project in cooperation with Santa Barbara County, has continued to operate under the direction of this office with a crew of 23 men. This camp is taking care of only single, unemployed men, residents of Santa Barbara County. Timber and brush are being cleared from the channel of the Santa Ynez River.

Russian River Jetty.

The funds available for maintenance on the jetty at the mouth of the Russian River are practically

(Continued on page 20)

Mining Gets Largest Water Permit

(Continued from page 19)

exhausted, and it is expected the work will be completely discontinued within one week. In the past two weeks only sufficient work has been done to repair current damage, which was occasioned by a series of fairly heavy storms.

Weather Conditions.

At this time there is little prospect of flood conditions occurring in the streams of the Sacramento and San Joaquin valleys. Storms are not expected in the immediate future, the low snow in the mountains has practically disappeared, and the main snow pack is a great deal less than normal with a snow of small water content. Rains occurring during the past week have raised the rivers slightly, but a flood condition does not exist in any of the streams. The Sacramento River has risen to a point where a small amount of water is discharging over Tisdale weir, but none of the other weirs of the system are operating.

WATER RIGHTS

Supervision of Appropriation of Water.

Seventeen applications to appropriate water were received during the month of February; three were denied and twelve were approved. During the same period eight permits were revoked and eighteen passed to license.

Mining continues to be the leading activity as reflected by applications received and acted upon, as has been the case for some months, the largest application received being that by Thomas Nelson McDaniel, 2004 Fourth Avenue, Seattle Washington, proposing an appropriation of 300 second feet from Willow Creek, a tributary of Trinity River, in Humboldt County, at an estimated cost of \$300,000 for mining purposes, and the largest permit issued being that to the Oregon Creek Company of Camptonville, California, allowing the appropriation of 50 second feet from Oregon Creek in Sierra County for mining purposes.

Since October 1st of last year, 1102 progress reports have been filed by permittees and 352 reports of use by licensees. Analysis of these reports has been completed and the various permits and licenses have been forwarded for appropriate action, as the circumstances dictated.

ADJUDICATIONS

Whitewater River (San Bernardino and Riverside Counties). Case pending in the Superior Court of Riverside County awaiting developments in regard to the proposed All American Canal from Colorado River.

Eagle Creek (Modoc County). A stipulation for judgment has been prepared for presentation to the interested parties at a meeting at Eagleville on March 22, 1933.

South Fork Pit River (Modoc County). The report covering the field work on the investigation of

the water supply and use of water on the South Fork Pit River is being circulated among the interested parties.

Hai Creek (Shasta County). The stipulation for judgment prepared by the division is being circulated by counsel among the interested parties.

Deep Creek (Modoc County). A stipulation for judgment has been prepared for presentation to the interested parties at a meeting at Cedarville on March 23, 1933.

Franklin Creek (Modoc County). A stipulation for judgment has been prepared for presentation to the interested parties at a meeting at Davis Creek on March 21, 1933.

Pine Creek in Surprise Valley and Cottonwood Creek (Modoc County). Reports on water supply and use of water on these streams have been completed and are being circulated among the interested parties.

SACRAMENTO-SAN JOAQUIN WATER SUPERVISOR

Office work under this project during the past month has comprised the computations and compilations in preparing the 1932 report covering the stream flow, diversions, return flow, use of water, salinity, etc., throughout the Sacramento-San Joaquin territory. Field work has included routine maintenance of tide gages and permanent salinity stations in the Delta and Upper Bays.

The flow of the Sacramento River at Sacramento is now 18,000 second-feet and the San Joaquin River near Vernalis about 4000 second-feet, making the combined flow of the two rivers to the Delta 22,000 second-feet. This is a small increase over the flow at the middle of February but during the past month there have been no storms of any magnitude to cause a rise in the rivers. Salinity has been forced well down into Suisun Bay but there has been no benefit, as in some seasons near the beginning of the irrigation season, of a sufficient peak river flow to flush the salinity as far down as the lower part of San Pablo Bay. The following table gives the comparative salinity at Upper Bay and Delta stations on March 6th in the 1931, 1932 and 1933 seasons:

Station	Salinity in parts of chlorine per 100,000 parts of water		
	3/6/33	3/6/32	3/6/31
Point Orient	1180	1320	1460
Bullshead	620	240	640
Bay Point	34	70	260
O and A Ferry	13	4	72
Collinsville	7	3	4
Emmaton	2	1	1
Antioch	7	3	6
Jersey	6	5	4
Central Landing	2	2	4
Middle River P. O.	5	5	9

CALIFORNIA COOPERATIVE SNOW SURVEYS

The regular monthly surveys at key snow courses throughout the State were completed in the latter

Precipitation Averages Below Normal

(Continued from preceding page)

part of February and early March and all results of these surveys together with all available data to March 1st from the precipitation stations in the foothill and mountainous regions of various stream basins were published in the bulletin sent out March 10, 1933.

In general, the snow surveys indicated depth and water content of the snow in early March averaging from 40 to 60 per cent less than at that time a year ago, with a general average of about 45 per cent less for the major stream basins of the Western Sierra Slope. Two marked exceptions were the Mount Shasta and Mount Lassen courses where the snow was respectively equal to and only 17 per cent less than last year in early March.

Of the few courses where the period of record of the surveys has been of sufficient length to permit the development of normals, four in the South Yuba basin showed an average depth and water content amounting to 68 per cent of the entire seasonal normal (up to April 1st) and Blue Lakes on the Mokelumne-Carson divide, Rhinedollar Lake close to the Tuolumne-Mono divide and Mammoth Pass on the San Joaquin-Owens divide showed percentages of the entire seasonal normal amounting to 56, 57 and 52 per cent, respectively. Last year in early March the corresponding percentages for these three crest courses were 112, 117 and 117, respectively, and for the four South Yuba courses, 122 per cent.

The data from the precipitation stations indicated in general, that this season's precipitation to March 1st averaged 45 to 55 per cent below normal from the Upper Sacramento to the Mokelumne River basin, 30 to 35 per cent below normal from the Stanislaus to Upper San Joaquin River basin, 5 to 15 per cent below normal in the Kings, Kaweah and Kern river basins, and about 20 per cent below normal as a general average in the Los Angeles, San Gabriel and Santa Ana basins. Tahoe-Truckee and Walker basin stations averaged about 40 per cent below normal, Mono basin 50 per cent below and Owens basin percentages varied from an average of 40 and 30 per cent below normal, respectively, for upper Owens and Bishop drainages to an average of 10 per cent below normal for three stations further south in the basin.

DAMS

Certificates of approval of 574 dams have been issued to date and 6 certificates of approval of removal.

To date there have been received 818 applications for approval of dams built prior to August 14, 1929, of which 689 are now under jurisdiction; 111 applications have been received for approval of plans for construction or enlargement; and 383 for approval of plans for repair, alteration or removal.

Twenty-five dams are under construction and 110 are under repair or alteration.

Applications Received for Approval of Alterations

Owner	County
City of Santa Barbara	Santa Barbara
Dam	
Sheffield	

Applications Received for Approval of Plans and Specification for Construction

Owner	County
O. R. Smith	Shasta
Dam	Los Angeles
Heart Lake	L. A. Co. Flood Control District
Eaton Wash	

Heart Lake, proposed to be built by O. R. Smith of Red Bluff, is to be an earth dam 38 feet high storing 1000 acre-feet. It will be located on North Fork of Digger Creek, tributary to Butte Creek in Shasta County, and will be used for irrigation and domestic purposes.

Eaton Wash, proposed by the Los Angeles County Flood Control District, will be located on Eaton Wash, tributary to Rio Hondo in Los Angeles County. It will be a rolled earth dam 37½ feet in height with a storage capacity of 1040 acre-feet. It will be used for flood and debris control and conservation.

Plans Approved for Construction

Owner	County
Heiser Crusade	Placers
Dam	
Ditch Creek	Tehama
Crib	

Plans Approved for Alteration

Owner	County
Littlerock & Palmcale	Irrig. Dists.
Dam	Los Angeles
Littlerock	

FEDERAL COOPERATION—TOPOGRAPHIC MAPPING

Horizontal and vertical control work was carried on under the cooperative program between the U. S. Geological Survey and the Division of Water Resources during the month in Orange, Riverside, San Bernardino, Sonoma, Napa and Lake counties.

Topographic mapping was carried on in Riverside, Kings, Kern and Fresno counties, the surveys of No. 39 and Treadwell quadrangles being completed in Kings and Kern counties.

WATER RESOURCES

Pit River Investigation (Modoc and Lassen counties). The work of compiling the data collected during the three years investigation and the analysis thereof, particularly in regard to the engineering and economic phases of plans for water conservation by the construction of several projected storage reservoirs, is rapidly coming to a conclusion. The final report will issue at an early date.

Salinas Valley Investigation. Work on a final report on the Salinas Valley investigation is now in progress.

South Coastal Basin Investigation. Report on the quality of water is now in press. Work on capacity of underground basins has been continued and report on the hydrographic data accumulated between January 1, 1932, and January 1, 1933, is in progress. Work on other phases of the investigation has continued in a routine manner.

(Continued on page 23)

Water Applications and Permits

APPLICATIONS FILED

Applications for permit to appropriate water filed with the Department of Public Works, Division of Water Resources, during the month of March, 1933.

SIERRA COUNTY—Application 7511. Alfred T. Burch, c/o R. F. Taylor, Downieville, Cal., for 25 c.f.s. from Middle Fork of North Fork of Yuba River, tributary to Yuba River, to be diverted in Sec. 13, T. 20 N., R. 10 E., M. D. B. and M. For mining purposes. Estimated cost \$10,000.

DEL NORTE COUNTY—Application 7512. A. D. Rutherford and Kathryn Rutherford, Crescent City, Cal., for 0.937 c.f.s. from springs tributary to Smith River watershed, to be diverted in Sec. 20, T. 17 N., R. 2 E., H. B. and M. For irrigation purposes. Estimated cost \$200.

DEL NORTE COUNTY—Application 7513. A. D. Rutherford and Kathryn Rutherford, Crescent City, Cal., for 0.93 c.f.s. from series of springs, tributary to Smith River watershed, to be diverted in Sec. 20, T. 17 N., R. 2 E., H. B. and M. For domestic purposes. Estimated cost \$300.

SAN DIEGO COUNTY—Application 7514. Albert M. Proctor and Mary Moore Proctor, P. O. Box 255, Chula Vista, Cal., for 0.1 c.f.s. from Pringle Canyon, tributary to Dulzura Creek, to be diverted in Sec. 22, T. 17 S., R. 2 E., S. B. B. and M. For power and domestic purposes. Estimated cost \$2,500.

MERCED COUNTY—Application 7515. Gustine Orchard Company, Gustine, Cal., for 15.6 c.f.s. from Los Garsos Creek (Garzas Creek) tributary to San Joaquin River, to be diverted in Sec. 15, T. 8 S., R. 8 E., M. D. B. and M. For irrigation purposes (131 acres). Estimated cost \$750.

EL DORADO COUNTY—Application 7515. B. W. Stone, 161 Ellis Street, San Francisco, Cal., for 590 c.f.s., 125,000 acre-feet per annum, from Rubicon River, Pilot Creek, Gerle Creek, Loom Lake, Buck Island Lake, Rock Bound Lake, Little S. Fork Rubicon River, tributary to American River Drainage area to be diverted in Sec. 9, T. 13 N., R. 16 E.; Sec. 11, T. 12 N., R. 12 E.; Sec. 24, T. 13 N., R. 13 E.; Secs. 11, 31, 34, T. 14 N., R. 14 E.; Sec. 4, T. 13 N., R. 15 E., and Sec. 2, T. 13 N., R. 14 E., M. D. B. and M. For municipal purposes.

BUTTE COUNTY—Application 7517. Franklin Baldwin, c/o James Hopkins, Oroville Inn, Oroville, Cal., for 3.0 c.f.s. from Dry Creek, tributary to Butte Creek, to be diverted in Sec. 1, T. 21 N., R. 3 E., M. D. B. and M. For mining purposes.

SACRAMENTO COUNTY—Application 7518. Frank Boniface, 1825 39th Street, Sacramento, Cal., for 0.05 c.f.s. from Chicken Ranch Slough, tributary to American River, to be diverted in Sec. 23, T. 9 N., R. 5 E., M. D. B. and M. For irrigation purposes. Estimated cost \$100.

LASSEN COUNTY—Application 7519. U. S. Plumas National Forest, c/o D. N. Rodgers, Supervisor, Quincy, Cal., for 0.025 c.f.s. from unnamed spring, tributary to Honey Lake, to be diverted in Sec. 1, T. 26 N., R. 14 E., M. D. B. and M. For domestic purposes. Estimated cost \$360.

INYO COUNTY—Application 7520. Dwight L. Sawyer, Gardena, Cal., for 1.0 c.f.s. from unnamed spring, tributary to Tuber Canyon, thence Panamint Valley, to be diverted in Sec. 4, T. 20 S., R. 44 E., M. D. B. and M. For mining and domestic purposes. Estimated cost \$1,500.

SANTA CRUZ COUNTY—Application 7521. Paradise Park Masonic Club, a corporation, c/o Simon M. Collins, Attorney, 14 Cooper Street, Santa Cruz, Cal., for 1.0 c.f.s. from 2 wells, tributary to San Lorenzo River, to be diverted in Sec. 2, T. 11 S., R. 2 W., M. D. B. and M. For domestic purposes.

ALPINE COUNTY—Application 7522. U. S. El Dorado National Forest, Placerville, Cal., for 3400 gallons per day from unnamed stream, tributary to Woods Lake, South Fork of American River, to be diverted in Sec. 28, T. 10 N., R. 18 E., M. D. B. and M. For recreational purposes. Estimated cost \$200.

SIERRA COUNTY—Application 7523. Cal Dodson (Ah Keong), c/o R. F. Taylor, Downieville, Cal., for 0.025 c.f.s. from Graveyard Ravine, tributary to N. Fork Yuba River, to be diverted in Sec. 26, T. 20 N., R. 10 E., M. D. B. and M. For domestic purposes. Estimated cost \$100.

SIERRA COUNTY—Application 7524. S. O. Mitchell and C. A. Scott, 1400 Chapman Building, Los Angeles, Cal., for 10 c.f.s. from First Ravine, tributary to Gibson Creek, Thence Slate Creek and N. Fork Yuba River, to be diverted in Sec. 30, T. 22 N., R. 10 E., M. D. B. and M. For mining and domestic purposes. Estimated cost \$2,000.

HUMBOLDT COUNTY—Application 7525. Thomas Nelson McDaniel, 2604 4th Avenue, Seattle, Washington, for 300 c.f.s. from Willow Creek, tributary to Trinity River, to be diverted in Sec. 11, T. 6 N., R. 4 E., H. B. and M. For mining and domestic purposes. Estimated cost \$300,000.

PLUMAS COUNTY—Application 7526. University of California, c/o N. Hovey, Purchasing Agent, Berkeley, Cal., for 5000 gallons per day, from Schneider Creek, tributary to Meadow Valley Creek, Spanish Creek and North Fork Feather River, to be diverted in Sec. 26, T. 24 N., R. 8 E., M. D. B. and M. For domestic and fire protection purposes. Estimated cost \$250.

EL DORADO COUNTY—Application 7527. Fred J. Kaeser, Rescue, Cal., for 2.5 c.f.s. from Wildcat Canyon, tributary to Webber Creek, thence S. Fork American River, to be diverted in Sec. 4, T. 10 N., R. 9 E., M. D. B. and M. For mining and domestic purposes. Estimated cost \$300.

LOS ANGELES COUNTY—Application 7528. George E. McCoy, 6161 N. Figueroa Street, Los Angeles, Cal., for 1.0 c.f.s. from unnamed spring (in shaft), tributary to Santa Clara River watershed, to be diverted in Sec. 18, T. 4 N., R. 15 W., S. B. B. and M. For mining and domestic purposes. Estimated cost \$70.

SISKIYOU COUNTY—Application 7529. Gertrude Dowling, Yreka, Cal., for 60 gallons per minute from Devil's Hole Creek, tributary to Scott River, to be diverted in Sec. 26, T. 44 N., R. 11 W., M. D. B. and M. For irrigation and domestic purposes. Estimated cost \$200.

PERMITS ISSUED

Permits to appropriate water issued by the Department of Public Works, Division of Water Resources, during month of March, 1933.

SACRAMENTO COUNTY—Permit 4072, Application 7414. Issued to U. L. Trussell, 2765 21st Street, Sacramento, Cal., March 8, 1933, for 0.125 second-foot of water from Hough Creek in Sec. 33, T. 26 N., R. 10 E., M. D. B. and M. For use for mining purposes.

TRINITY COUNTY—Permit 4073, Application 7407. Issued to Marion A. Miller, Zonia, Cal., March 14, 1933, for 0.6 of a second-foot from unnamed spring in Sec. 11, T. 3 S., R. 6 E., H. B. and M. For use for agricultural purposes on 30 acres. Estimated cost \$95.

SISKIYOU COUNTY—Permit 4074, Application 7246. Issued to Geo. T. Ostrom, Happy Camp, Cal., March 14, 1933, for 7.5 second-foot from T-Bar Creek, in Sec. 10, T. 13 N., R. 6 E., H. B. and M. For use for power purposes in the development of 383.5 horse power. Estimated cost \$10,000.

SISKIYOU COUNTY—Permit 4075, Application 7247. Issued to Geo. T. Ostrom, Happy Camp, Cal., March 14, 1933, for 7.5 second-foot from T-Bar Creek, in Sec. 10, T. 13 N., R. 6 E., H. B. and M. For use for mining purposes. Estimated cost \$10,000.

SISKIYOU COUNTY—Permit 4076, Application 7343. Issued to Edward C. Baker, Happy Camp, Cal., March 15, 1933, for 1 second-foot from West Branch Indian Creek, in Sec. 23, T. 18 N., R. 6 E., H. B. and M. For use for mining and domestic purposes. Estimated cost \$75.

DEL NORTE COUNTY—Permit 4077, Application 7026. Issued to Harry T. Wilkerson, 1130 West Boulevard, Los Angeles, Cal., March 15, 1933, for 50 second-foot from Hurdy Gurdy Creek, in Sec. 31, T. 16 N.,

Work Advanced to Bids in April

The following projects with an estimated total cost approximating \$532,700 were scheduled for advertising prior to May 1. These improvements comprise three road jobs and two grade separations in five counties.

DETAILED LIST OF PROJECTS

County	Location	Miles	Type
Tulare	Goshen to Plaza Garage	4.2	Pavement
Los Angeles	At Brea Canyon Summit	1.3	Pavement
San Bernardino	At San Bernardino	0.7	Pavement
Santa Clara	Near Morgan Hill		Madrone Crossing
Kern	At Minkler Spur		Separation Grade Separation

SUMMARY

Type	Miles	Amount
Permanent Pavement.....	6.2	\$297,700
Grade Sparations.....	(2)	135,000
Total		\$532,700

Water Applications and Permits

(Continued from preceding page)

R. 3 E., H. B. and M. For use for mining and domestic.

DEL NORTE COUNTY—Permit 4078, Application 7198. Issued to Harry T. Wilkerson, 1130 West Boulevard, Los Angeles, Cal., March 16, 1933, for 50 second-feet from Hurdy Gurdy Creek, in Sec. 31, T. 16 N., R. 3 E., H. B. and M. For use for mining and domestic. Estimated cost \$500.

MENDOCINO COUNTY—Permit 4079, Application 7409. Issued to Heath Angelo, Branscomb, Cal., March 17, 1933, for 0.45 of a second-foot from Elder Creek, in Sec. 29, T. 22 N., R. 16 W., M. D. B. and M. For use for irrigation and domestic purposes on 8 acres. Estimated cost \$500.

MENDOCINO COUNTY—Permit 4080, Application 7473. Issued to Heath Angelo, Branscomb, Cal., March 17, 1933, for 2.5 second-feet from Elder Creek in Sec. 29, T. 22 N., R. 16 W., M. D. B. and M. For use for power purposes in development of 2 horsepower. Estimated cost \$500.

LOS ANGELES COUNTY—Permit 4081, Application 7475. Issued to J. F. Hutak, Littlerock, Cal., March 23, 1933, for 0.01 of a second-foot from spring in Sec. 18, T. 4 N., R. 10 W., S. B. B. and M. For use for irrigation purposes on 10 acres. Estimated cost \$250.

SHASTA COUNTY—Permit 4082, Application 7445. Issued to Lovina E. Hull, Big Bend, Cal., March 23, 1933, for 3.0 second-feet from Pit River in Sec. 36, T. 37 N., R. 1 W., M. D. B. and M. For use for power purposes in the development of 3 horsepower. Estimated cost \$410.

PLUMAS COUNTY—Permit 4083, Application 7370. Issued to State Division of Highways, Sacramento, Cal., March 23, 1933, for 0.025 of a second-foot from unnamed spring in Sec. 16, T. 25 N., R. 9 E., M. D. B. and M. For use for industrial and recreational purposes. Estimated cost \$100.

SAN JOAQUIN COUNTY—Permit 4084, Application 7494. Issued to E. E. Hahn, Route 4, Box 153X, Stockton, Cal., March 23, 1933, for 0.5 of a second-foot from French Camp Slough, in Sec. 6, T. 1 S., R. 7 E., M. D. B. and M. For use for irrigation purposes on 30.1 acres. Estimated cost \$1,500.

PLUMAS COUNTY—Permit 4085, Application 7395. Issued to Joseph Perich, 2190 Meyer Street, Oroville, Cal., March 23, 1933, for 1.5 second-feet from Bellbar Creek, in Sec. 17, T. 23 N., R. 11 E., M. D. B. and M. For mining purposes. Estimated cost \$50.

HUMBOLDT COUNTY—Permit 4086, Application 7476. Issued to William Silva and Domingo Silva, Jr., Star Route, Arcata, California, March 23, 1933, for 3 second-feet from Mad River, in Sec. 7, T. 6 N., R. 1 E., M. D. B. and M. For use for irrigation purposes on 100 acres. Estimated cost \$3,000.

HUMBOLDT COUNTY—Permit 4087, Application 7459. Issued to Ralph Coleman, Salyer, Cal., March 31, 1933, for 0.01 of a second-foot from unnamed spring, in Sec. 16, T. 6 N., R. 5 E., H. B. and M. For use for domestic purposes. Estimated cost \$225.

PRECIPITATION AVERAGES BELOW NORMAL

(Continued from page 21)

Ventura County Investigation. Work on estimating reservoir capacities necessary has been continued throughout the month with particular reference to utilization of underground reservoirs in Santa Clara Valley, the Oxnard Plain and in the Ojai Valley. Estimates on comparative desirability of various surface reservoirs on Sespco, Piru and Matilija Creeks have been continued throughout the month.

"Son, you went to bed very early. How was that?"
"Well, daddy, I had a row with your wife."—*The Humorist.*

Anaheim Bay Bridge Nine Inches Shorter After Quake Shocks

(Continued from page 10)

cylinder piers seem to have been left in normal vertical position.

The greatest damage to the bridge is at the lift span, the haunches of the outside girder on the east side being badly cracked, allowing the deck slab to drop about 1" from its original position. There is evidently a heavy pressure on the south abutment of the approach.

PRESSURE AT APPROACHES

In order to make complete repairs, it will be necessary to relieve the end pressure by unloading the south abutment and bulkhead and placing concrete strut bracing. When this pressure is relieved, the gap may be jacked open and the lift span removed and repaired. Other work required will be making gunite repairs to cracks in various parts of the bridge and replacing the lift span.

As was the case with the Anaheim Bay Bridge, the Alamitos Bay Bridge was damaged principally from the pressure exerted on the bulkheads at the approaches, although not nearly so extensively. On the Long Beach end of the bridge the piles have been shoved in 4" to 6" toward the water.

Very little damage has been done the substructure, and what little damage was done the superstructure has been a little spalling and a few cracks at the lift span.

Comparatively little damage was done the San Gabriel River Bridge and only a small amount of gunite repair work will be required.

ENTIRE DAMAGE THIRTY-THREE THOUSAND
DOLLARS

Damage to the Surfside pedestrian subway consisted only of a slight displacement of construction joints which permits water to seep into the subway. This can be re-waterproofed at a comparatively slight expense.

It is estimated that the total cost of repairing the three bridges mentioned and the pedestrian subway will not exceed \$10,000.

Taken as a whole, the damage sustained by the State highways in the recent earthquake will be in the neighborhood of \$33,000.

This estimate takes into consideration the cost of elimination of 18,000 square yards

Vital Statistics on Dam Applications and Improvements

APPLICATIONS FILED

Application for approval of dam built prior to August 14, 1929, filed with the State Department of Public Works, Division of Water Resources, during the month of March, 1933.

PLACER COUNTY—Columbian Dam No. 321. E. & N Corp., Newcastle, owner; earth, 26 feet above stream bed with a storage capacity of 70 acre-feet, situated on a creek tributary to Auburn Ravine in Sec. 16, T. 12 N., R. 7 E., M. D. B. and M. For storage purposes for irrigation use.

Application for approval of plans and specifications for repair or alteration of dam filed with the State Department of Public Works, Division of Water Resources, during the month of March, 1933.

SHASTA COUNTY—Heart Lake Dam No. 224. O. R. Smith, Red Bluff, owner; earth, 38 feet above stream bed with a storage capacity of 1000 acre-feet, situated on North Digger Creek tributary to Battle Creek in Sec. 26, T. 30 N., R. 8 E., M. D. B. and M. For storage purposes for irrigation and domestic use. Estimated cost \$5,900; fee paid \$59.

Application for approval of plans and specifications for repair or alteration of dam filed with the State Department of Public Works, Division of Water Resources, during the month of March, 1933.

SANTA BARBARA COUNTY—Sheffield Dam No. 11-2. City of Santa Barbara, Santa Barbara, owner; earth, situated on Sycamore Creek in city of Santa Barbara.

PLANS APPROVED

Plans for the repair or alteration of dam approved by the State Department of Public Works, Division of Water Resources, during the month of March, 1933.

SANTA BARBARA COUNTY—Sheffield Dam No. 11-2. City of Santa Barbara, Santa Barbara, owner; earth, situated on Sycamore Creek in city of Santa Barbara.

HIGHWAYS AID AVIATORS

More than 500 miles of New Jersey highways have been marked with directional signs for the guidance of air traffic. Seventy signs have been placed at strategic points which show the route number, and indicate by an arrow the magnetic north or east.

"I'm sure I don't know where Betty gets her vile temper from," said mother. "It's certainly not from me."

"You're right, my dear," said father. "You have none of yours missing."—Answers.

of depressions in concrete pavement by "mudjacking," 1200 tons of asphaltic per-mix used on bridge approaches and in repairing macadam pavement, and miscellaneous work such as leveling pavement with plant mixed material, raising shoulders and resurfacing them with oil mix in addition to the necessary repair work to bridges.

When this work is completed, there will be no noticeable result of the earthquake other than possibly a slightly rougher condition of the pavement.

Congressman Makes Striking Presentation of Aridity Conditions

(Continued from page 13)

meeting the General departed for Washington, D. C., where he will report his findings to Major General Brown.

As the result of Governor Rolph's wires to Washington Congressman C. F. Lea called a meeting of California's representatives, who immediately gave their wholehearted support to putting the Water Plan Project into the program of public works for the relief of unemployment.

A striking presentation of the situation was made in the following paragraph of a letter sent by Congressman H. E. Stubbs of Santa Maria to President Roosevelt:

DRAMATIC PICTURE

"The state-wide water plan of California, as you know, would rehabilitate a great area, which now is slowly becoming an arid waste in what once was considered a veritable Eden. This is taking place slowly—if it were to happen overnight, the nation would become alarmed, the Red Cross and other emergency relief organizations would rush to the rescue, Presidential edicts would be issued hourly, and other emergency measures generally associated with a calamity of national import would be effected. It means nothing to millions in other states, Mr. President, but it means life to the residents of the great valley area."

The War Department already has rendered a partial report on the project and has recommended Federal participation in the interest of navigation. The final report of the Division Engineer, Colonel Robins, is now before the Board of Engineers for Rivers and Harbors that inspected the project in November, 1932. The report will be transmitted by that board with its recommendations to the Chief of Engineers, Major General Brown, for his review and recommendations. He will forward it to the Secretary of War for transmittal to Congress.

TUNNEL THROUGH MOUNTAIN

A tunnel 1085 feet long on a 2½ degree curve with a grade of 1 per cent was recently built on the Umpqua Highway in Oregon when it was shown that the tunnel alignment would give a length of 1.6 miles as compared with a length of 5½ miles and a climb of 3 miles of grade in crossing the ridge. This tunnel is on a 50-mile link that connects the Pacific Highway and the Coast Highway.

New State Armory to be Built in San Jose for 159th Infantry

(Continued from page 5)

sons which is designed primarily for observation and review of maneuvers on the drill hall floor. It will also serve the public during athletic games or other events held in the armory.

At the east side of the drill hall along the rear property line are located store rooms for the equipment of each company and on the second floor over the store rooms a rifle range for target practice.

With the exception of the steel trusses supporting the drill hall roof all structural portions of the building from the foundations to and including the roof slab will be of reinforced concrete. Inasmuch as there is no public auditorium in the city of San Jose at the present time the armory building will undoubtedly be used for public functions and the safety to the public afforded by the materials used and the soundness of the design are of primary interest.

When the building is completed the 159th Infantry will have headquarters unexcelled by any unit of its size in the State.

ROADSIDE BEAUTIFICATION REPORT SENT TO LEGISLATURE

(Continued from page 6)

funds permit and that due consideration be taken of highway construction and maintenance needs.

It is recommended that the present policy relative to tree planting and planting at approaches to towns be continued, to wit: That the individual or organization desiring the planting shall bear the expense of such planting and the cost of maintenance for the first year. After the first year the Division of Highways is to assume the entire cost of replacement and upkeep.

It is recommended that the present program of caring for and protecting native roadside trees be continued and expanded as funds permit.

Client: "I'm looking for a governess for my children."

Manager of Employment Bureau: "Didn't we supply you with one last week?"

"Yes."

"Well, madam, according to her report you don't need a governess. You need a lion-tamer."—*Tit Bits*.

Road User Pays Bill for the State

(Continued from page 17)



AN UNIMPROVED ROAD IN THE SIERRAS

ment of the connecting routings within and through cities will afford substantial relief to these cities. The routes connecting existing State highways and those portions of the additional roads proposed for inclusion which lie within the city boundaries, will constitute a considerable mileage of city streets. The total length of these routings within cities is 855 miles. * * *

Inclusion of additional roads must be considered on the basis of present revenues accruing to the State for highway purposes, since no additional revenues are to be provided for that purpose.

Actually the State highway revenues, as estimated for the next biennium, have already been reduced by 13 per cent in the loss of Federal aid. A reduction in traffic volume of the past several years, accompanied by a consequent decrease in gas tax revenues must also be considered.

It is perfectly evident from a study of highway finances that additional road mileage as proposed in the resolution can not be added if further reduction in highway revenues should be made in addition to the loss of \$8,000,000 of Federal aid which has already occurred.

Even the most elementary economic considerations

of the counties, not only for improvement but for maintenance also, because these are evidently the roads which must carry the larger volume of traffic.

The 2539 miles proposed for inclusion is 11.4 per cent of the total surfaced county road mileage, while the 6600 miles proposed for inclusion is 29.5 per cent. Considered in this light, a materially different picture is presented as to the measure of relief which may be afforded to the counties by the inclusion of roads in the State highway system.

In the same manner, the assumption of maintenance and improve-



DESERT CONDITIONS

lead to the conclusion that the State must protect the large investment it now has in its present State highway system. Maintenance of the roads alone will not offer this protection. It requires, in addition, a certain amount of reconstruction and rebuilding where the original old roads have failed and where maintenance would be entirely inadequate to restore the facilities and most certainly uneconomical.

The road user pays the bill for an improvement which is of benefit to the State as a whole. He is certainly entitled to some measure of adequate compensation for his contribution.

(Continued on page 27)

National Park Approaches Included

(Continued from preceding page)

It is estimated that maintenance and minor improvement of the roads proposed for addition will average approximately \$500 a mile per year. Some roads with better type of surface are in good condition, and traffic requirements can be met by general maintenance expenditure alone. However, many of the roads proposed for inclusion are in a condition requiring at least minor improvement to make them adequate for service.

SIX MILLION DOLLARS CITY COST

The cost of maintaining and improving city routings will approximate \$6,000,000 for the biennial period and will cause a corresponding reduction in the funds available for construction on State highways.

The roads recommended in the Commission's report tabulated by counties and showing the approximate mileage are as follows:

County	Description	Miles	County	Description	Miles
			Butte, Tehama	State Highway Route 3 near Chico to State Highway Route 29 near Deer Creek Meadows.....	56.0
			Colusa, Glenn	State Highway Route 15 near Colusa to State Highway Route 47 near Hamilton City.....	33.0
			Butte	State Highway Route 3 near Chico to State Highway Route 21 near Oroville	17.0
			Yuba, Butte	State Highway Route 15 near Marysville to State Highway Route 21 near Oroville	26.0
			Nevada, Placer	State Highway Route 37 near Colfax to State Highway Route 17 near Grass Valley.....	12.0
			Sierra, Nevada, Plumas	State Highway Route 21 near Blairsden to State Highway Route 38 near Truckee	47.0
			Sierra	State Highway Route 25 at Downieville to Blairsden-Truckee Road near Sattley	31.0
			Sonoma, Mendocino Lake	Russian River near Jenner to Westport.....	122.0
				State Highway Route 49 near Middletown to State Highway Route 15 near Upper Lake through Lakeport	42.0
			Yolo, Sutter	State Highway Route 7 near Woodland to State Highway Route 15 near Yuba City.....	38.0
			Sonoma	Coast road near Jenner to State Highway Route 1 near Cotati	38.0
			Sonoma, Napa Napa	Callistoga to State Highway Route 1 near Geyserville..	24.0
				State Highway Route 8 near Napa to State Highway Route 49 near Callistoga	28.0
			Sonoma, Napa Sonoma	State Highway Route 8 to State Highway Route 74..	12.0
				State Highway Route 1 near Petaluma to State Highway Route 8 near Shellville	19.0
				Sebastopol to State Highway Route 1 near Santa Rosa	7.0
			Napa, Yolo	Napa-Callistoga road near Rutherford to Winters..	40.0
Del Norte	State Highway Route 71 to State Highway Route 1 north of Smith River...	7.0			
Siskiyou	Etna Hills to Montague..	35.0			
Humboldt	State Highway Route 20 near Willow Creek to State Highway Route 46 near Weitchpec	27.0			
Shasta, Siskiyou	State Highway Route 3 near Mt. Shasta to Lassen National Park.....	93.0			
Lassen, Modoc	State Highway Route 28 near Alturas to State Highway Route 29.....	101.5			
Humboldt	State Highway Route 1 to State Highway Route 20 north of Mad River.....	2.0			
	Ferndale to State Highway Route 1 near Fernbridge..	5.0			
Trinity, Humboldt	State Highway Route 1 to State Highway Route 35 near Kuntz.....	52.0			
Trinity	State Highway Route 35 near Peanut to State Highway Route 20 near Douglas City.....	28.0			
Trinity, Shasta, Tehama Shasta	State Highway Route 35 to State Highway Route 3 near Red Bluff.....	65.0			
	State Highway Route 28 near Redding to Lassen National Park.....	50.0			
Tehama	Lassen National Park to State Highway Route 29 near Morgan.....	8.0			
Plumas	State Highway Route 29 near Deer Creek Meadows to State Highway Route 21 near Indian Falls.....	35.0			

(Continued on page 28)

Important Inter-State Links Added

(Continued from page 27)

County	Description	Miles	County	Description	Miles
Napa	State Highway Route 8 near Napa to the Rutherford-Winters Road	18.0	Alameda	San Leandro to Haywards. Mt. Eden road to State Highway Route 5 near Haywards	5.0 4.0
Yolo	State Highway Route 50 near Rumsey to State Highway Route 7 near Woodland	33.0	Santa Clara	State Highway Route 68 near Sunnyvale to Los Gatos-Saratoga Gap Road	8.0
Solano	State Highway Route 53 to State Highway Route 7 near Dixon	20.0	Santa Cruz, San Mateo San Francisco	Santa Cruz to San Francisco	92.0
Sacramento	State Highway Route 11 near Perkins to State Highway Route 54 near Michigan Bar	21.0	Santa Cruz	State Highway Route 5 near Santa Cruz to State Highway Route 42 near Waterman Gap	23.0
Sacramento, Yolo	Woodland to Sacramento ..	19.0	San Mateo	Coast Road near Half Moon Bay to State Highway Route 2 near San Mateo ..	9.0
Solano Yolo	State Highway Route 7 near Vacaville to State Highway Route 7 near Dunnigan	37.0	San Mateo	State Highway Route 55 to State Highway Route 2 near Menlo Park	14.0
Contra Costa, Sacramento	Antioch Bridge Junction to Sacramento	49.0	Contra Costa	State Highway Route 14 near Hercules to the Walnut Creek-Antioch Road ..	16.0
Placer	State Highway Route 3 near Lincoln to State Highway Route 71 near Newcastle	10.0	Santa Clara	State Highway Route 2 near Mountain View to State Highway Route 5 near Milpitas	11.0
Sacramento	State Highway Route 4 south of Sacramento to State Highway Route 3 near Ben All	13.0	Santa Clara	State Highway Route 55 near Saratoga Gap to State Highway Route 5 near Los Gatos	11.0
San Joaquin, Amador	State Highway Route 4 near Stockton to State Highway Route 54	38.0	Alameda, Contra Costa	San Jose to Richmond	39.0
El Dorado	State Highway Route 65 near Coloma to Marshall's Monument	0.8	Contra Costa, San Joaquin	State Highway Route 75 near Walnut Creek to Stockton via Antioch ..	58.0
	State Highway Route 11 near El Dorado to State Highway Route 11 near Placerville via Diamond Springs	5.0	Alameda, Contra Costa	State Highway Route 75 near Walnut Creek to Livermore-San Jose Mission Road near Scotts Corners	24.0
Mono	State Highway Route 23 near Bridgeport to the California-Nevada State line via Walker River ..	16.0	Alameda	State Highway Route 5 near Mission San Jose to State Highway Route 5 near Livermore	15.0
Alpine	State Highway Route 23 near Woodfords to the California-Nevada State line	7.0	Santa Clara	State Highway Route 5 near San Jose to Mount Hamilton	26.0
Mono	State Highway 23 near Coleville northerly to California-Nevada State line	11.0	Stanislaus, Merced, Tuolumne, Mariposa	West Side Highway near Westly to the Sonora-Mariposa Road via Modesto	73.0
Marin	Marin Peninsula to the Marin-Sonoma County line via the Coast Route ..	53.0	San Joaquin, Stanislaus	State Highway Route 4 near Manteca to State Highway Route 13 near Oakdale	21.0
San Joaquin, Calaveras	State Highway Route 4 near Stockton to State Highway Route 55 near Mokelumne Hill	43.0	San Joaquin, Stanislaus	State Highway Route 4 near Stockton to State Highway Route 13 near Knights Ferry	35.0

Death Valley to Get State Highway

(Continued from preceding page)

County	Description	Miles	County	Description	Miles
Stanislaus, Merced	West Side Highway near Newmans to State Highway Route 4 near Livingston	20.0	Monterey, Santa Cruz	State Highway Route 56 near Carmel to Santa Cruz	53.0
Merced	State Highway Route 32 west of Los Banos to West Side Highway near Centinella	3.0	Monterey	Coast Road near Catsroville to State Highway Route 2 near Prunedale	5.0
Tuolumne, Mariposa	State Highway Route 4 near Merced to Snelling	18.0	Santa Clara, San Benito, Monterey	State Highway Route 2 near Gilroy to State Highway Route 10 in Priest Valley	80.0
Merced	State Highway Route 40 near Moccasin Creek to State Highway Route 18 near Mariposa	39.0	Fresno, Madera	Fresno-Tracy Road near Kerman to State Highway Route 4 near Madera	15.0
Merced	State Highway Route 4 near Merced southerly to State Highway Route 32	15.0	Tulare	Corcoran to Bakersfield-General Grant Park Road	11.0
Mono	State Highway Route 23 via June Lake to State Highway Route 23	16.0	Tulare, Kings	Corcoran to Lindsay	33.0
Inyo	State Highway Route 23 near Mono Lake to State Highway Route 76 near Benton Station	45.0	Tulare	State Highway Route 4 near Tulare to Orange Cove	24.0
Inyo	State Highway Route 23 to Camp Sebrina	20.00	Fresno	Visalia to Woodlake	13.0
Mono	State Highway Route 23 to Mammoth Lakes	10.0	Fresno	State Highway Route 4 near Fresno to General Grant National Park	60.0
San Joaquin, Stanislaus, Merced, Fresno	State Highway Route 4 near Fresno to State Highway Route 5 near Tracy	127.0	Madera	State Highway Route 4 near Madera to Fresno-Yosemite Road	18.0
Fresno, Madera, Mariposa	State Highway Route 4 near Fresno to Yosemite National Park	75.0	Fresno, Tulare	State Highway Route 4 near Kingsburg to State Highway Route 10 near Lemoncove	39.0
Fresno	The Fresno-Yosemite Road near Lanes Station to Huntington Lake	60.0	Inyo, Tulare	Corcoran-Alpaugh Road, via Porterville to Camp Nelson and from Lone Pine to Mt. Whitney	73.0
San Benito, Monterey	State Highway Route 2 near Soledad to Pinnacles National Monument and Pinnacles National Monument to Hollister-Priest Valley Road in Bear Valley	16.0	Inyo	State Highway Route 23 near Owens Lake to Death Valley	118.0
Monterey	Monterey to State Highway Route 2 near Salinas	18.0	Kern, San Luis Obispo, Fresno, Kings	State Highway Route 56 near Moro to State Highway Route 4 near Fresno	125.0
Santa Cruz	State Highway Route 2 near Salinas to Coast Road near Castroville	9.0	Kern, Fresno, Kings	State Highway Route 57 near Maricopa to State Highway Route 10 near Coalinga	99.0
Santa Cruz	State Highway Route 67 near Chittenden to the Coast road near Watsonville	10.0	Tulare, Kings	Hanford via Corcoran and Earlimart to Bakersfield-General Grant Park Road near Ducor	59.0
Santa Cruz, Santa Clara	Coast Road near Watsonville to State Highway Route 2 in Santa Clara Valley via Hecker Pass	21.0	Kern, Tulare, Fresno	State Highway Route 4 near Bakersfield to General Grant National Park	109.0
San Benito	State Highway Route 22 near San Juan Bautista to State Highway Route 2 near The Rocks	3.0	Inyo, San Bernardino	State Highway Route 31 to Death Valley and connection to California-Nevada State line	117.0
			San Luis Obispo	State Highway Route 2 near Arroyo Grande to State Highway Route 2 near San Luis Obispo	12.0

(Continued on page 30)

San Joaquin Valley and Coast Linked

(Continued from page 29)

County	Description	Miles	County	Description	Miles
San Luis Obispo	State Highway Route 2 near Santa Margarita to Moro-Fresno Road near Creston	12.0	Santa Barbara, Ventura	Santa Barbara to State Highway Route 79 near Santa Paula	48.0
San Luis Obispo, Kern	State Highway Route 2 near Santa Margarita to State Highway Route 4 near Bakersfield	110.0	Santa Barbara, Ventura, San Luis Obispo	State Highway Route 2 near Ventura to State Highway Route 57 in Cuyama Valley	70.0
Kern	Taft to State Highway Route 4 near Greenfield ..	29.0	Santa Barbara	State Highway Route 2 near Montecito to State Highway Route 2 west of Santa Barbara via the Coast	9.0
	State Highway Route 4 near Delano to Bakersfield-General Grant Park Road	8.0		State Highway Route 2 near Carpinteria to the Carpinteria Beach State Park	0.5
	Taft-Greenfield Road to State Highway Route 33 near Wasco	25.0	Ventura	State Highway Route 2 near El Rio to Montalvo-San Fernando Road near Saticoy	4.0
	State Highway Route 4 near Bakersfield to State Highway Route 57 near Isabella via Glennville ..	66.0		The Montalvo-San Fernando Road near Saticoy to State Highway Route 79 ..	1.3
	State Highway Route 4 south of Bakersfield to State Highway Route 58 via Arvin	24.0	Santa Barbara	State Highway Route 80 to State Highway Route 3 via Pothill Road	8.0
	Arvin road near Weed Patch to State Highway Route 57 near Loma Park ..	10.0	Ventura	Hueneme to Sonis via Oxnard and Camarillo	18.0
	Cummings Valley State Institution to State Highway Route 58 near Old Town	7.0	Ventura, Los Angeles	State Highway Route 2 near Montalvo to State Highway Route 4 near San Fernando	51.0
	State Highway Route 4, via Brundage Lane and Oak Street to State Highway Route 4 near Beardsley School	6.0	Los Angeles	Lankershim Boulevard from State Highway Route 2 near Universal City to State Highway Route 4 ..	7.0
Inyo, Kern, San Bernardino	State Highway Route 31 near Cajon Pass to State Highway Route 23 near Little Lake	109.0		State Highway Route 4 near Cahuenga Park to State Highway Route 4 near Burbank	10.0
San Bernardino	State Highway Route 58 west of Needles to the California-Nevada State line	20.0		State Highway Route 4 near Glendale to State Highway Route 9 near Monrovia	17.0
Santa Barbara	The coast near Surf to State Highway Route 80 near Santa Ynez	34.0		State Highway Route 60 at Santa Monica to Colorado Boulevard in Los Angeles	21.0
Santa Barbara, San Luis Obispo	State Highway Route 2 near Las Cruces to State Highway Route 2 near Pismo	67.0		State Highway Route 4 near Burbank to Dayton Ave., Los Angeles, via Riverside Drive	10.0
Santa Barbara	Sisquoc to the Coast Road near mouth of Santa Maria River via Santa Maria	25.0		Los Angeles (Aliso Street) to State Highway Route 26 near Monterey Park via Ramona Blvd	6.0
	Harris to State Highway Route 2 near Los Alamos ..	9.0		State Highway Route 4 near Tunnel Station to State Highway Route 9 near San Fernando	8.0
	Orcutt to State Highway Route 2 south of Santa Maria	5.0			

San Bernardino Mountain Area Listed

(Continued from preceding page)

County	Description	Miles	County	Description	Miles
Los Angeles— Continued	State Highway Route 60 near Topanga Beach to Montalvo-San Fernando Road near Chatsworth.....	22.0	Los Angeles	State Highway Route 60 near Long Beach to State Highway Route 9 near Lamanda Park.....	27.0
Los Angeles, Ventura	State Highway Route 60 near Aliso Canyon to State Highway Route 2 near Triunfo.....	12.0	Los Angeles	San Pedro to State Highway Route 9 near La Canada via Figueroa Street.....	36.0
Los Angeles	San Fernando Road to State Highway Route 9 via Verduga Wash.....	9.0		State Highway Route 4 near San Fernando to State Highway Route 60 near Mines Field.....	29.0
Ventura	State Highway Route 2 near Newberry Park to State Highway Route 79 near Fillmore.....	21.0		Los Angeles, Indiana and Third Streets, to the Huntington Beach-Whittier Road near Santa Fe Springs.....	12.0
Los Angeles	State Highway Route 23 near Palmdale to Swartout Valley.....	39.0		Long Beach via Atlantic Boulevard to State Highway Route 26 near Monterey Park.....	28.0
San Bernardino	State Highway Route 9 near Etiwanda to State Highway Route 31 in Cajon Canyon.....	12.0		State Highway Route 60 at Torrance via Hawthorne Avenue to Mines Field-San Fernando Road.....	15.0
	State Highway Route 43 near Mt. Anderson to the Cajon Pass-Lake Arrowhead Road.....	16.0		Los Angeles, Boyle Avenue and Fourth Street, to State Highway Route 19 near Walnut Station.....	30.0
	State Highway Route 31 near Cajon Pass to State Highway Route 43 via Lake Arrowhead.....	32.0	Los Angeles, Orange	Long Beach-Santa Ana Road near Seal Beach via Santa Fe Springs, to State Highway Route 26 near West Covino.....	24.0
	State Highway Route 26 near Colton to State Highway Route 9 near San Bernardino via Mt. Vernon Avenue.....	2.0	Los Angeles, Orange	Buena Park to State Highway Route 9 near Azusa.....	21.0
San Bernardino, Los Angeles	State Highway Route 61 to State Highway Route 59 via Los Angeles County Park.....	50.0	San Bernardino	State Highway Route 77 via Euclid Avenue to Highland Avenue in Upland.....	13.0
Los Angeles, San Bernardino	State Highway Route 9 near San Dimas to State Highway Route 26 near Redlands via Highland Avenue.....	49.0	Riverside, San Bernardino	State Highway Route 43 near Santa Ana Canyon to State Highway Route 9 near San Bernardino (north of Santa Ana River).....	24.0
San Bernardino	State Highway Route 31 near Verdmont to Highland Avenue, San Bernardino, via Little Mountain.....	8.0	San Bernardino	State Highway Route 26 near Whitewater to the Cajon Pass-Baldwin Lake Road.....	70.0
	State Highway Route 26 near Redlands to State Highway Route 43 near Big Bear Lake via Barton Flats.....	45.0	Riverside, San Bernardino	State Highway Route 64 near Blythe to State Highway Route 58 near Needles.....	92.0
	State Highway Route 31 near Cajon Pass to State Highway Route 43 near Big Bear Lake via Baldwin Lake.....	47.0	Los Angeles Orange	Cerritos Avenue to State Highway Route 43 near Olive via Anaheim.....	18.0
	A highway around Big Bear Lake connecting State Highway Route 43.....	6.0	Los Angeles Orange	Los Angeles, near Compton, to State Highway Route 2 near El Toro.....	34.0

(Continued on page 32)

Southern Coast Extensions Planned

(Continued from page 31)

County	Description	Miles	County	Description	Miles
Los Angeles, Orange	State Highway Route 60 near Huntington Beach to Whittier.....	25.0	Riverside	Hemet to State Highway Route 19 near Moreno....	21.0
Los Angeles, Orange	State Highway Route 60 near Hermosa Beach to State Highway Route 43 in Santa Ana Canyon....	38.0	Riverside	State Highway Route 26 near Whitewater to State Highway Route 26 west of Mecca, south of White- water River.....	35.0
Los Angeles	State Highway Route 60 near El Segundo to Nor- walk	18.0	Imperial, San Diego	The Descanso - Temecula Road near Aguanga to Hemet	23.0
Los Angeles, Orange	Atlantic Avenue in Long Beach to State Highway Route 2 near Santa Ana..	17.0	Imperial, Riverside	Julian to State Highway Route 26 near Kane Springs	52.0
Los Angeles, Orange	State Highway Route 60 via Manchester Avenue to State Highway Route 2 near Miraflores.....	38.0	Riverside	State Highway Route 26 near Indio to State High- way Route 26 near Braw- ley via north shore of Salton Sea.....	75.0
Orange	State Highway Route 2 near Pickering Corners to State Highway Route 43 in Santa Ana Canyon..	11.0	Riverside	County line near Palo Verde to State Highway Route 64 near Blythe....	20.0
Orange, Riverside	State Highway Route 2 near San Juan Capistrano to State Highway Route 77 near Lake Elsinore....	32.0	Riverside, San Diego	State Highway Route 12 near Descanso to State Highway Route 77 near Temecula	86.0
Orange, San Bernardino	State Highway Route 19 near Brea to State High- way Route 77 near Chino	13.0	San Diego	State Highway Route 12 near El Cajon to the Descanso-Temecula Road near Santa Ysabel.....	37.0
San Diego	State Highway Route 2 near Oceanside to State Highway Route 77 near Vista	9.0	Imperial San Diego	Calipatria to Alamoria....	15.0
Orange	Santa Ana to Pickering Corners-Santa Ana Can- yon Road near Yorba Linda	11.0		Coronado Ferry in Coro- nado to State Highway Route 2 via Silver Strand	16.0
	State Highway Route 60 near Laguna Beach to State Highway Route 2 near Irvine.....	9.0		State Highway Route 2, Atlantic Street, San Di- ego, to Old Spanish Light House, Point Loma.....	8.0
	State Highway Route 2 near Orange to Orange County Park.....	7.0		State Highway Route 2 near San Diego to State Highway Route 12 west of Jacumba.....	66.0
	State Highway Route 60 near Corona del Mar to Santa Ana via Main Street	10.0	Imperial	The San Diego-Campo Road near Spring Valley to State Highway Route 12 near La Mesa.....	1.0
Riverside	State Highway Route 78 near Perris to State Highway Route 26 near Indio	33.0		State Highway Route 26 near Brawley to State Highway Route 27 near Holtville	21.0
San Diego	State Highway Route 2 near Oceanside to Julian- Temecula Road near Lake Henshaw.....	51.0		State Highway Route 26 near Calexico to State Highway Route 27 near Midway Wells.....	24.0
	State Highway Route 77 near Escondido to the El Cajon-Santa Ysabel Road near Ramona.....	18.0		State Highway Route 12 near Seeley to State Highway Route 26 near Calexico	18.0
				State Highway Route 27 near Holtville to Calexi- co-Midway Wells Road near Roads Corners....	9.0

STATE OF CALIFORNIA
Department of Public Works

HEADQUARTERS: PUBLIC WORKS BUILDING, ELEVENTH AND P STS., SACRAMENTO

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EARL LEE KELLY-----Director

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C. R. MONTGOMERY, General Right of Way Agent

DIVISION OF PORTS

Port of Eureka—William Clark, Sr., Surveyor
Port of San Jose—Not appointed
Port of San Diego—Edwin P. Sample

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

MAP
SHOWING
STATE HIGHWAY SYSTEM

LEGEND
Primary Roads ———
Secondary Roads - - - - -

