

CALIFORNIA HIGHWAYS and PUBLIC WORKS

*Scene on State Highway No. 11
in the American River Canyon*



Official Journal of the Department of Public Works
State of California

JUNE

1932

inches

D50 Illuminant, 2 degree observer

1	38.12	65.43	49.87	44.26	55.56	70.82	63.51	39.92	48.55	97.06	11.1(A)	12	87.34	82.14	72.06	62.15
2	13.24	18.11	23.24	13.80	9.82	33.43	34.26	11.61	48.07	-0.40	0.29	13	-0.75	-1.06	-1.19	-1.07
3	19.07	19.72	28.29	23.89	27.88	50.89	59.07	19.51	19.51	1.13	0.29	14	0.21	0.43	0.29	0.19
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Density

Golden Thread

16 (M)	49.25	36.62	28.86	16.19	8.29	3.44	31.41	72.48	72.55	29.37	54.91	43.96	82.74	52.79	59.87	26.16
17	-0.10	-0.10	0.54	-0.05	0.81	-0.23	20.96	-26.45	18.83	13.06	-38.97	52.00	-27.17	-27.17	-27.17	-27.17
18	0.31	0.34	0.83	0.19	0.19	0.49	19.43	59.53	89.89	-19.43	59.53	89.89	-19.43	59.53	89.89	59.53
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centimeters

Don Williams

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Governor's Water Commission Reports Plan to Solve State's Great Problem

Thirteen Recommendations Include Constitutional Amendment, Bond Act, Central Valley Project, Permanent Commission, all Projects Self-sustaining, Self-liquidating

GOVERNOR ROLPH received on June 21, 1932, the report of the California Water Resources Commission which had been appointed by him in August, 1931, under authority of the Legislature and headed by the Honorable Matt I. Sullivan, former Chief Justice of Supreme Court of California, to study and report on the water problems of California.

The Governor was well pleased and gratified with the report and stated: "This Commission has rendered a great public service to which the people of California should justly be proud."

The Governor has taken a keen and active interest, a broad and state-wide viewpoint and has exhibited outstanding leadership in evolving a plan for the solution of the State's most important and pressing problem. In his inaugural address on January 5, 1931, he stated:

"I stand ready as Governor to give the Legislature and the distressed localities all the assistance in my power toward finding a practicable solution of these pressing problems. * * * Distinctly the duty of relieving the acute situation caused by the uneven distribution of our water resources and the growing demand on them is mainly the business of the State and not solely of the affected localities."

The Governor realized from the beginning that there was a Federal interest in Cali-

fornia's water problem to the solution of which the Federal Government should contribute financially in a substantial degree. Within a month after his inauguration he dispatched, in accord with the recommendation of the Federal-State Water Resources

Commission, a committee, composed of State officials, legislative representatives and citizens, to Washington, D. C., to make immediately public a War Department report on the Sacramento-San Joaquin Valley project and to arrange for a congressional committee to visit California and study the water problems of the State. He was successful in both of these objectives.

When the Governor appointed the California Water Resources Commission he also appointed honorary advisory committees to assist them, representative of all inter-

ests and localities in the State, including former governors, and California members of United States Congress.

The Governor kept in intimate touch with proceedings of both the California Water Resources Commission and those of the California Joint Legislative Water Committee by attending many meetings and at all times lent his assistance and support.

SENT TO WASHINGTON

On June 20, 1932, he authorized a committee of the California Water Resources Com-

(Continued on page 10)



JAMES ROLPH, Jr.
Governor of California

Truck Traffic on California State Highways as Shown by Joint Survey

By T. H. DENNIS, Maintenance Engineer

Rural-owned trucks make a greater use of our State road system than city-owned vehicles. The majority of trucks on the highways are owned and operated by the load owners. Foreign truck traffic is less than 5 per cent of the daily total. These are some of the interesting facts disclosed by a joint survey made by the Federal Bureau of Public Roads and the California Division of Highways as told in this second of two articles by T. H. Dennis, analyzing the results of the survey. The first article appeared in the May issue.

TRUCKS constitute 9.5 per cent of all motor vehicles operated on California's State highways. Of this number 23.1 per cent are trucks of three tons and over capacity.

A segregation based on ownership and use indicates that 93 per cent are owner-operated; that is, both load and truck are owned by the same agency; 3 per cent are contract operated under hauling agreements with a few agencies; 3 per cent common carriers operating intrastate for hire over a fixed route on regular schedule and at published rates and 1 per cent common carriers operating interstate on the same basis as the intrastate trucks.

The above statements are facts ascertained through the joint survey conducted by the Bureau of Public Roads, United States Department of Agriculture and the California Division of Highways during the period September, 1929, to October, 1930. This cooperative survey extended to and was participated in by the State Highway Departments of the 11 western states. The investigation was undertaken in order to obtain essential facts about the present density, type, capacities and distribution of traffic units as a basis for planning highway development to serve present and future traffic.

TRUCK DISTRIBUTION

The most outstanding trucking areas in California are southern California, the San Francisco Bay section, and the Sacramento and San Joaquin valleys. In the south the heaviest truck traffic on State highways operates in and out of Los Angeles to San Diego, Santa Barbara, Bakersfield, Pasadena, San Bernardino and the Imperial Valley over U. S. Routes Nos. 101, 99 and 66.

The greatest concentration is on U. S. No. 101 between Los Angeles and Whittier, there being nearly 1400 trucks per day, of which 350 are trucks of greater than 3-ton capacity. Between Whittier and San Diego on the same route there are only 400 trucks per day, of which 100 are in the heavy class.

Trucking between Los Angeles and Santa Barbara on U. S. No. 101, as well as between Los Angeles and Bakersfield on U. S. No. 99 reflects the demands of the oil industry, the average daily number of heavy trucks on the former route being 200 per day, while on the latter route 100 out of 300 trucks fall within this classification.

Truck traffic on U. S. No. 66 and U. S. No. 99 from Los Angeles to Pasadena, San Bernardino, and El Centro reflects the commodities handled, namely citrus fruits and farm products, there being but 100 trucks of three-ton and over capacity out of the 400 trucks which daily use this route.

NORTH HOLDS RECORD

San Francisco and Oakland occupy a position similar to Los Angeles in the production of truck traffic on the State highways. The heaviest trucking in this area is over U. S. No. 101, between San Francisco and Gilroy, there being an average of 800 trucks daily, of which 150 are of more than three-ton capacity.

The greatest volume of truck traffic in the State was recorded on this route between Santa Clara and San Jose, an average of more than 2272 trucks per day, of which approximately 300 were heavy trucks. A great portion of this movement is caused by the transportation of fruit in the Santa Clara Valley to rail heads.

There is also a considerable volume of truck traffic on U. S. No. 101 between San Francisco and Healdsburg, resulting prin-

(Continued on page 14)



TRUCK TRAFFIC, an important service of the highways, is carrying the fruits of industry in large volume from producer to market or consumer throughout California as shown in the above scenes taken on State routes. No. 1, produce hauling on the Bayshore Highway near Burlingame. No. 2, trucking oil pipe on Ridge Route. Nos. 3 and 4, traffic on State Route 5, near San Jose, and on the Bayshore underpass, South San Francisco. No. 5, lumber loads on Route 4 E, near Newhall, Nos. 6 and 8, loads of grain on the Peninsula Highway. Nos. 7 and 9, Hauling case goods and grain on Golden State Highway, San Joaquin Valley. No. 10, Milk going to market in Alameda County. Nos. 11 and 12, hauling for gasoline and oil industry in southern California.

Highway Being Pushed 35 Miles Into Rugged Wilds of Kings River Canyon

IT IS still possible to find enough variation in certain road-building projects to prevent the life of engineers and road builders from becoming a monotonous and humdrum existence. An example of such a project is Fre-41, the new State highway into the Kings River Canyon, now being constructed.

This work extends from General Grant National Park, in the high Sierra of Fresno County, back into a region less well known because of its past isolation and inaccessibility, a distance of approximately 35 miles.

The third winter of camp life has been spent in this region by approximately 130 men, and the predictions of the "old timers" in the vicinity regarding a hard winter recently came true.

Some 50 miles of county-built mountain road connect the National Park and the beginning of the State highway construction, with civilization. As the snow piled up, during the past winter, trucks and tractors with snow plows, and, finally, a rotary plow were resorted to in an effort to maintain communication.

DEEP SNOW PACK

Near Grant Park the mountain road, usually wide enough for two cars, became a narrow one-way pass in a vast expanse of snow pierced by the great Sequoia trees. A sled pulled by a caterpillar tractor was the favorite freight carrier and snow-shoes were sometimes the only sure means of human locomotion.

Construction was interrupted during the winter only when work was impossible, and the crew was then often used in prevention and repair of storm damage to the constructed portion, which now extends about 12 miles. It is expected to extend the portion open to public travel, to a point about $7\frac{1}{2}$ miles from the beginning of the project, during the summer.

At this location a turn in the road exposes suddenly to view the junction of the Middle and South Forks of the Kings River, a sight extremely beautiful and impressive because of the grandeur of the canyons and the enormous expense visible at one gaze.

The construction camp has recently been moved to a location at the junction of Indian

and Ten Mile Creeks, about 12 miles east of Grant Park. As an indication of the wildness of this country, it was recently necessary to alter the water supply of the camp because of the large number of deer which had been killed in the vicinity by mountain lions—the carcasses making the water unfit for use.

Progress of construction (considering quantity of material moved) is to be more rapid in the future, as a third Diesel shovel was recently added to the power equipment. The distance constructed will increase at a slower rate, however, for the work has now reached the heaviest construction on the entire 35-mile project. The location requires a roadbed, mostly benched, along an almost vertical granite cliff in the South Fork Canyon.

The main canyon of South Fork, about seven miles long with nearly vertical walls in many places rising to a height of half a mile, has been compared to the Yosemite Valley. Like this famous national park, a multitude of mountain lakes feed the river which made the canyon and these will be accessible as the road penetrates the region.

It is expected that about one-third of the entire project will be completed by the first of July.

California Shows Gain In General Car Slump

California maintained a leading position among states in automobile supremacy last year, it is indicated in reports from the Bureau of Public Roads.

According to the Bureau, last year there were 731,178 fewer motor vehicles on the highways than in 1930, when the registration for the country was 26,545,281. This is a national average decrease of 2.7 per cent from the previous year.

California, however, did not share in this decrease in number of vehicles, but on the contrary showed an increase of .38 of one per cent.

The automobile industry in the United States consumed last year eighty-three per cent of the rubber manufactured in the country.



ROAD TO PARADISE for the lover of scenic grandeur would fittingly describe the Kings River Canyon Highway now under construction. No. 1 shows the present "end of the trail." No. 2, a blasting operation for new construction. No. 3, grading equipment at work. No. 4, unloading gasoline at "the front" for motor and camp use.

Fiscal Advisory Board Named for San Francisco-Oakland Bay Bridge

WITH final designs being rapidly completed on the San Francisco-Oakland Bay Bridge, the Department of Public Works is turning its attention to consideration of fiscal problems. Governor James Rolph, Jr., at the request of Colonel Walter E. Garrison, State Director of Public Works, has appointed an "Advisory Fiscal Committee" in connection with the Bay Bridge project. The committee, which is composed of financial, civic, and labor leaders representing both sides of the bay, includes the following:

Harrison S. Robinson, Oakland attorney and civic leader; **George T. Cameron**, publisher of the *San Francisco Chronicle* and a member of the Hoover-Young Commission; **Joseph Carlston**, President of the Central Bank of Oakland; **Charles O. Conrad**, Vice President of Alameda County Building Trades Council; **W. W. Crocker**, Vice President of the Crocker First National Bank of San Francisco; **Leland W. Cutler**, President of the San Francisco Chamber of Commerce; **E. B. DeGolia**, President of the California State Automobile Association; **R. M. Fitzgerald**, member of the law firm of Fitzgerald, Abbott & Beardsley, Oakland; **Herbert Fleishhacker**, President of the Anglo & London Paris National Bank of San Francisco; **A. P. Giannini**, Chairman of the Executive Board of the Bank of America and Transamerica, San Francisco; **R. H. Glassley**, President of the Oakland Chamber of Commerce; **E. Clarence Holmes**, President of the Executive Board, Bureau of Governmental Research, Berkeley; **Joseph R. Knowland**, Vice President, State Chamber of Commerce, Oakland; **Frank C. McDonald**, President of the State Building Trades Council of California, San Francisco; **P. H. McCarthy**, well known labor leader and former Mayor of San Francisco; **J. H. Quinn**, President of the Alameda County Building Trades Council, Oakland; **John P. Symes**, **R. H. Moulton & Co.**, San Francisco; and **George Tourny**, President of the San Francisco Bank, San Francisco.

MET AND ORGANIZED

The committee held its organization meeting, presided over by Colonel Garrison and

attended by Chief Engineer Charles H. Purcell, and elected Harrison S. Robinson president, Leland W. Cutler vice president, Charles H. Purcell secretary, and D. V. Nicholson, administrative assistant, assistant secretary.

Colonel Garrison outlined the purpose of the committee, as follows:

I—To assist in bringing about an agreement between the interurban lines for the use of the bridge; and analysis of data already prepared by both the interurban companies and State authorities on the interurban fiscal phases of the Bay Bridge.

II—To advise State authorities on all financial problems involved.

III—To advise on the question of bond interest and discount, and the term of bond best adapted to the particular case; also as to the necessary steps to be taken to submit this data to bankers; and as to the checking of income data by a firm of financial advisers.

PLANS APPROVED

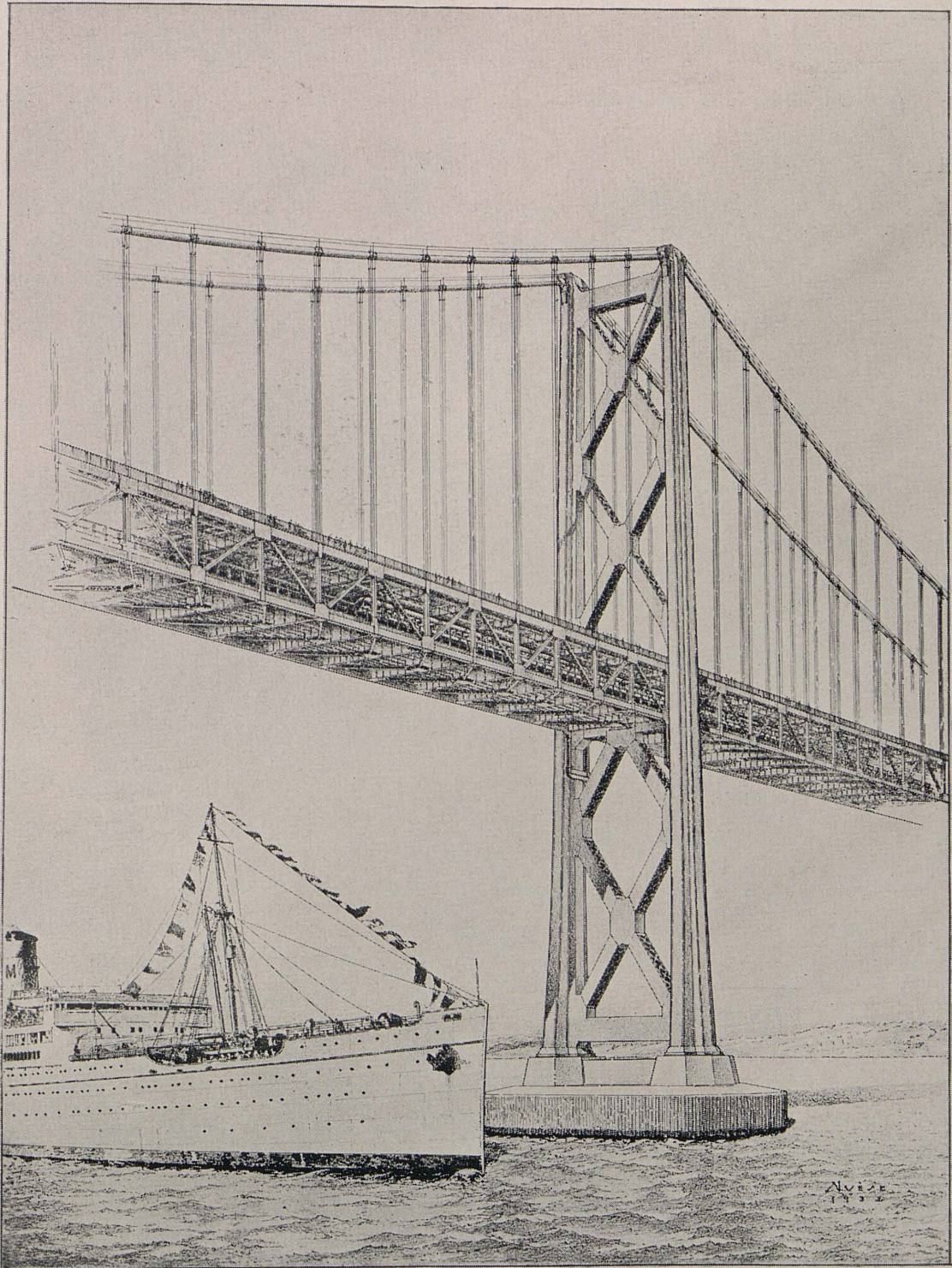
State Highway Engineer Purcell and his two assistants, Chas. E. Andrew, bridge engineer, and Glen B. Woodruff, engineer of design, recently spent five days in New York conferring with Messrs. Moran and Proctor and their staff in connection with foundation details. The general foundation plan already has the approval of the Consulting Board of Engineers, headed by Ralph Modjeski.

The bridge engineering staff has completed final design for tower No. 3 of the Bay Bridge. This design calls for the expenditure of \$1,250,000 for the steel tower and \$1,750,000 for pier and fenders.

This tower will be located 2300 feet off San Francisco pierhead line at Pier 24, situated just south of Harrison Street. The concrete pier which will be sunk 220 feet to bedrock, will be 70 feet by 140 feet. With fenders, the overall dimensions will be 100 feet by 180 feet. This tower will rise 214 feet to the deck and 505 feet to the top of the tower.

WILL CARRY BEACONS

A second tower of similar height and clearance and two others 460 feet each in



BEAUTY OF SYMMETRY and strength is shown in this final design for Tower No. 3 of the San Francisco-Oakland Bay Bridge. It will stand in the West channel 2300 feet off the San Francisco pier line. Drawn to scale the picture shows the S.S. Mariposa, with a total height of 145 feet, passing beneath the bridge deck with plenty of room to spare. The tower will be 505 feet high.

Highway Users Pay Largest Portion of Nation's Road Costs

ALTHOUGH property taxes are frequently credited with bearing most of the cost of building roads, the real burden is borne by motorists, an accurate survey of road costs shows, according to a recently published article by an authority on road matters.

"At present motorists are paying 94.5 per cent of the cost of building state highways and one-fourth of the cost of building local roads," says the article. "Altogether motorists are paying about two-thirds of the cost of building state and local highways.

"In 1930, the last year for which complete figures are obtainable, \$1,423,164,000 was available for state highway construction. But of that sum \$286,500,000 was left over from the previous year; Federal Aid contributed nearly \$92,500,000; bonds and notes financed by gasoline tax money accounted for \$22,288,000; miscellaneous income brought in \$17,000,000 and \$60,600,000 was transferred from local authorities for state highway construction.

PAYING THE MOST

"So the actual amount of money coming from tax sources is \$744,229,000. Of this only \$43,318,000 came from property and \$700,911,000 came from gasoline taxes and motor vehicle license fees. This latter amount is 94.5 per cent of the total from tax sources.

"In addition to paying nearly all of the costs of state roads, motorists are also paying one-fourth of the costs of building local roads. Tax sources in 1930 produced \$656,656,000 for local roads. Of that motorists paid \$162,022,000.

"For both local and state roads, tax sources paid \$1,400,884,000. Of that sum property taxes paid \$537,951,000 and motorists paid \$862,933,000, or approximately two-thirds.

"It is logical and reasonable that motorists pay nearly all of the cost of state roads and also fair that they should contribute in part to the improvement of local roads, say economists. At present motorists are paying a just share, the figures indicate. In general one-fourth of the income from gasoline taxes and motor license fees revert to local roads. This is coincidental with the traffic local roads carry—one-fourth of the nation's total is over the local roads."

PARK RECORDS INCREASE

National parks and monuments have steadily increased in popularity, according to reports by the United States Department of Parks. More than a quarter of a billion persons have visited these national playgrounds since 1916 and, with one exception during the world war, each succeeding year has shown a new record in number of visitors.

TO CURB SIGN VANDALS

Strong support to the campaign against vandals who wantonly destroy road signs erected for the guidance and protection of motorists has been signified by E. Raymond Cato, Chief of the California Highway Patrol. Cato has just issued an order enlisting the full force of the patrol in combating the sign vandal menace. Members of the patrol have been instructed to be on the alert for instances of sign destruction and to arrest the offenders.

Years Add Beauty to Capitol and its Wonder Park

WITH ITS dome towering high above its granite walls, the Capitol of California typifies the strength and beauty of an incomparable State. It stands like a fortress against the inroads of time, and so forward looking were the builders that even its massiveness has been made responsive to every modern service. The building was first planned in 1860—in fact, F. M. Butler, architect, was selected for the service only thirty-five days after the historic battle at Sumter.

The Capitol's tremendous weight, resting on foundations built under the handicaps of early day construction, have never surrendered one inch to the settling process, and today its firm lines are an object of admiration by modern builders. The cost of construction up to 1869 was \$2,600,000. Since that time alterations and changes have added many hundred thousand dollars to the cost.

MUSEUM OF TREES

Many states have buildings of which their people are proud, but no state has a capitol centered in a picture of such natural magnificence. Only in California is it possible to assemble the trees, the shrubbery and the flowers from the four quarters of the globe and have them flourish in their native beauty. There are 33.5 acres in the park; its various sections are a succession of wonders to those who love the beauties of an Eden. At the last count, there were 317 species of trees and shrubbery. The flowers cover the whole range of nature's floral laboratory. Trees have been brought from South America, from Australia, from Africa and the uttermost parts of the earth. Even the foothills of the Himalayas have been searched for varieties of cedar which grow to magnificent proportions under the gentle skies of California. It is an evergreen park. In summer it has its many bowers of shade, while in winter friendly sunshine plays upon unfading green.

BATTLEFIELD GROUP

One very interesting plot is that set aside for trees taken from the principal battlefields of the republic—a memorial sponsored by the ladies of the Grand Army of the Republic.

There are larger parks in the world; there are parks to which skilled landscape artists may have wrought more artificial wonders; but there is no other park in the world that provides such an exposition of natural wonders from all the continents and isles of the sea. The people of California are justly proud of this splendid property, which is open for their enjoyment and pleasure under most liberal rules.

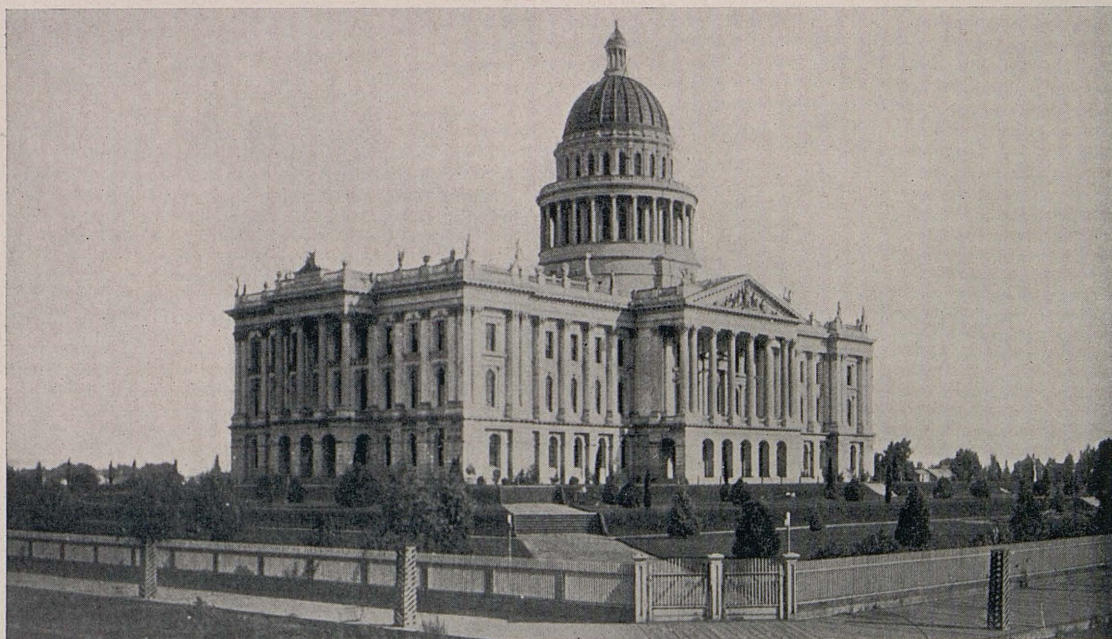
The picture on the adjoining page shows the old Capitol as it stood on the terrace in 1875, and before the trees were even well started toward the magnificent size they have now attained. The lines look rather severe but they are honest and enduring lines and have been jealously preserved by the succeeding generation.

The second picture showing the Capitol and that portion of the park immediately surrounding it is a suggestion of the scene today.

Then there is the city kid who went to the country to see his grandmother for a visit and saw some ducks walking around and shouted, "Oh, granny, lookit the birds that just got out of a rumble seat!"

Time's Flight Pictured on Capitol Hill

1875



IN LONELY GRANDEUR the Capitol stood on its terraced hill, surrounded by a picket fence, a board sidewalk, a few shrubs and saplings when this picture was taken a year after completion.

1932



CAME THE AKRON on May 20, 1932, and looked down upon a Capitol surrounded by a beautiful thirty-three acre park filled with hundreds of giant trees and thousands of citizens and automobiles.

No Area to be Deprived of Water

(Continued from page 1)

mission, in accord with the recommendation of the Commission, to proceed to Washington, D. C., to make an appeal before the Board of Engineers for Rivers and Harbors on June 27 and 28, 1932, from the conclusions of the Division Engineer, Pacific Division, in his report to the War Department on the Sacramento-San Joaquin Valley project. At the hearing, the State Department of Public Works submitted a brief prepared by the Division of Water Resources.

The committee was authorized, also, to contact the proper Federal officials and to inform itself relative to the possibility and merits of financing California's water projects through the Reconstruction Finance Corporation.

On June 22d, following receipt of his Commission's report, the Governor invited the people of California to a meeting on July 11th at Oakland, for the purpose of obtaining the views of the people on the recommendations of the California Water Resources Commission and the California Joint Legislative Water Committee and on the advisability of calling a special session of the Legislature to consider and act upon the proposals of those two bodies so that any resulting legislation could be submitted to the vote of the people at the general election in November of this year.

GIVEN BIG JOB

The California Water Resources Commission was authorized by the 1931 Legislature in chapter 90, Statutes of 1931, and the Joint Legislative Water Committee in chapter 71 to study and report on the State Water Plan, and to prepare and submit such proposed legislation, resolutions and constitutional amendments as might be necessary and advisable to carry into effect a coordinated plan for the conservation, development and distribution of the water resources of the State.

In accord with this authorization, the California Water Resources Commission, consisting of nine citizens, and six State officials as ex officio members, was appointed by Governor Rolph, and the California Joint Legislative Water Committee, consisting of seven members of the Assembly and seven members of the Senate, was appointed by the Speaker of the Assembly and the President of the Senate, respectively. The latter body reported in April.

The report of Governor Rolph's Commission is comprehensive, treating all phases of the water problem of California, namely—engineering, economics, finances, legal and administrative. Appended to and part of the report are a proposed constitutional amendment, a proposed act for creating a permanent Water Resources Commission, and a proposed bond act for construction of the Central Valley project.

THIRTEEN RECOMMENDATIONS

The principal findings, conclusions and recommendations of the report are as follows:

(1) The State should now carefully formulate, adopt and carry out in an orderly manner, a comprehensive plan for the conservation, distribution and utilization of its available water resources.

(2) The engineering reports as prepared by the State Engineer are sufficient for the present for formulating a general program for a State Water Plan.

(3) No project should be constructed or encour-

aged at present looking to the development of any new lands.

(4) Each project constructed by the State should be self-sustaining and self-liquidating.

ALL AREAS PROTECTED

(5) The State in carrying out its water program should not at any time deprive any area of any water required for the full maintenance and development of such area.

(6) The State should, under proper safeguards, extend the aid of its credit to cities and districts in aid of financing water development, where such water is used in whole or in part for agricultural purposes.

(7) The State shall have power, and it is mandatory upon the Legislature, to levy and collect an ad valorem tax on all classes of property, with certain exemptions, within the exterior boundaries of a State agency, which has defaulted in its contract with the State.

(8) The creation of debts or liabilities of the State, contingent or otherwise, in carrying out a water program should be submitted to a vote of the people for their approval.

CENTRAL VALLEY PROJECT

(9) The construction of the Central Valley project should be undertaken by the State.

(10) The State should extend the benefit of its credit to the project of the Metropolitan Water District of Southern California, if such aid is requested.

(11) Every effort should be made to obtain cooperation and financial aid from the Federal Government for the development of the State's water resources.

(12) There should be created a permanent Water Resources Commission in order that there may be a proper and continued investigation of the water problems of the State, an orderly, well planned development of those resources and adequate administration of such water projects as are constructed by the State.

(13) A constitutional amendment, an act creating a permanent Water Commission and an act authorizing the construction of the Central Valley project should be adopted, not only to establish the fundamental principles upon which the State water program should proceed, but to enable a start to be made on the construction of that portion of the work which appears to be most urgently necessary.

MAJOR PROJECTS

The report treats of the engineering, economic, financial, legal and administrative elements of the problem in detail. The Central Valley project and the bringing of water from the Colorado River into the southern coast counties are recognized as of major importance demanding first consideration and action in any solution of the water problems of California.

These two projects by no means include all that will have to be done for the conservation of water in California as the years advance. "Many other areas of the State are facing increasingly difficult water situations and we reiterate that the need now is to lay out the fundamental principles of a

Aid Available for South on Request

(Continued from preceding page)

broad and comprehensive plan sufficient in scope to lend itself to the solution of those difficulties in an orderly manner. In no other way can the development of this State proceed in its expected course."

The Commission, after giving consideration to various financial plans, proposes financing the Central Valley project by issuance of general obligation bonds of the State, the total amount of bonded indebtedness to be reduced by whatever amounts are appropriated by the Federal Government in aid of the flood control,

substantial agreement in most of their findings and recommendations. Through cooperation and the medium of the joint sessions, certain fundamental principles were developed upon which to base the broad foundation of a state-wide water conservation program. Each has recommended that an amendment be made to the constitution of the State as the first step in carrying out such a program. The two proposed amendments are almost identical.

Four basic principles are incorporated in the proposed amendment. The first is a "pay-back" principle.



CALIFORNIA WATER RESOURCES COMMISSION members shown in the picture are, left to right, Edward Hyatt, State Engineer; D. K. Barnell, Merced; Harry L. Heffner, Los Angeles; Jesse Poundstone, Grimes; Shannon Crandall, Los Angeles, vice chairman; James M. Burke, Visalia; Governor James Rolph, Jr.; Hon. Matt I. Sullivan, San Francisco, chairman; A. B. Tarpey, Fresno; Francis Carr, Redding. Standing, A. M. Barton, chief engineer State Reclamation Board. Member not present, Commissioner R. C. Harbison of San Bernardino.

navigation and other features of the project. If adequate contributions from the Federal Government for these justified benefits can be secured, the Commission believes the Central Valley project can be made self-sustaining and self-liquidating, and recommends that the proper officers of the State and interested citizens pursue, vigorously and continuously, negotiations to secure the largest possible direct and other contributions from the Federal Government.

AID FOR SOUTH

Recognizing the bringing of water from the Colorado River into the southern coast counties as of state-wide importance, the Commission believes and recommends that should the Metropolitan Water District of Southern California request the State to underwrite or guarantee its bonds under the provisions of the proposed constitutional amendment, such request should be granted.

Both the Commission and the committee are in

No project shall be constructed until the State has firm contracts for the sale of water, power or other facilities from the project sufficient to pay back to the State within not more than seventy years all money expended for construction of the project, including interest, and all expense of operation, maintenance and making the necessary replacements. A further safeguard in case of default makes mandatory on the Legislature the levying and collection of an ad valorem tax on all property, with certain constitutional exemptions, within the entity contracting with the State.

TO HELP AGRICULTURE

The second principle is the loaning of credit of the State to State agencies, defined in the proposed constitutional amendment, as any county, city and county, municipality, or other public corporation or public district, to assist them in development and utilization of water resources which are used

(Continued on page 24)

Tetrahedrons Taming the Colorado to Prevent Flood Damage at Ehrenburg

THE DIVISION OF HIGHWAYS has recently completed additional protection work at the interstate bridge across the Colorado River near Ehrenburg. The project was financed jointly by California, Arizona, and the Palo Verde Irrigation District.

This bridge is the California gateway for transcontinental traffic over U. S. 60 from Phoenix, Arizona, via the Sunkist Trail and the Mecca-Blythe road. In addition, it carries much local traffic between Palos Verde Valley and neighboring Arizona points. The structure was built by a private corporation and opened to traffic in March, 1928. It was operated as a toll bridge for several years before the states of California and Arizona purchased it in 1931.

PIER UNDERMINED

During June, 1928, the flood waters of the Colorado undermined one of the piers, with the result that one span of the bridge collapsed and had to be rebuilt. It was reopened in March, 1929.

Some protection work along the banks was done at that time to hold the flood waters in the river channel and prevent scouring action. The Division of Highways began additional protection work early this year which was financed jointly by California, Arizona and the Palos Verde Irrigation District, the latter interested in limiting flood damage to lands in the district.

The work consisted of construction of tetrahedrons made up of railroad rail and fastened together with wire cable. At times of flood these obstacles catch the drift and thus obstruct the force of the current and cause gradual deposit of material at the critical point. This type of construction has been found a very effective and economical method of directing a stream in the desired channel when the deflectors are properly placed.

METHODS USED

Work of this character has been carried on during the past few years at many points when the State highways or bridge structures were endangered. The type of work depends, of course, on conditions.

A few of the measures taken are outlined briefly:

1. Tetrahedrons constructed either of reinforced concrete, or made up of railroad rail, as above.

2. Parallel rows of woven wire fencing. The rows are placed four feet apart, and the fencing is supported by galvanized pipe posts. These posts are driven ten to fifteen feet into the ground, and the fencing extends about three feet below the ground surface to insure against washing out. The space between the two rows is filled with brush weighted down with rock. This type of protection has been found effective where fairly shallow streams were eating into valuable land, or encroaching on highway right of way.

3. Where banks are too high to permit use of the fencing type, piles are driven and tied together with cable and barbed wire.

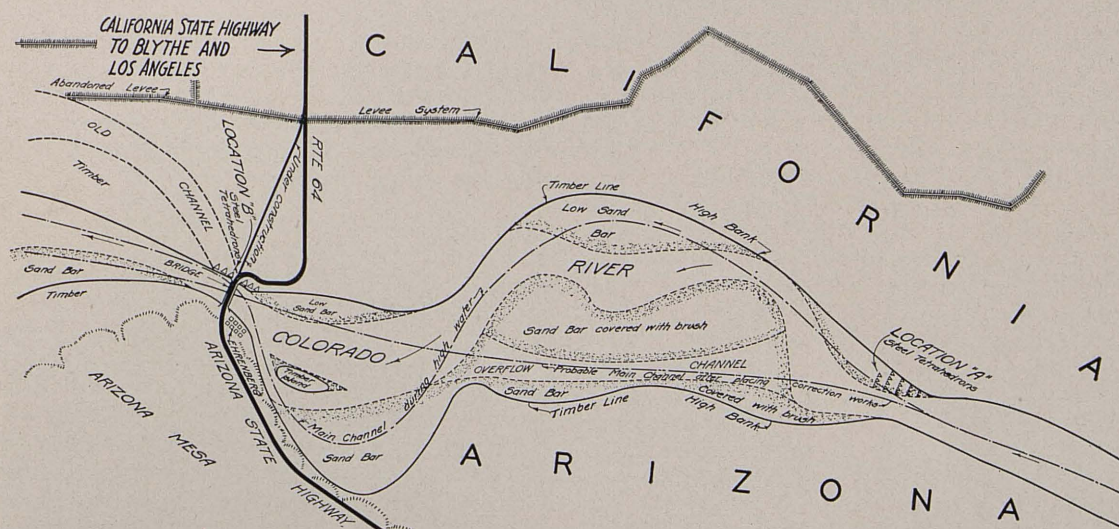
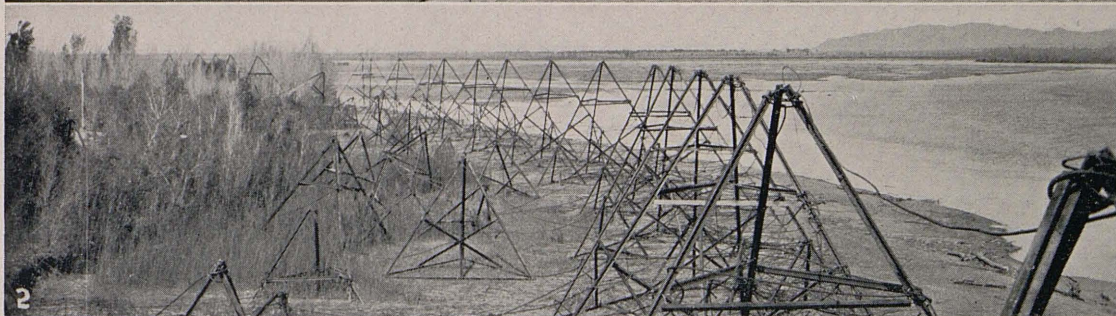
4. The use of sacked concrete has been found economical as slope protection at certain locations.

Other methods of protecting highway slopes and embankments from the gulleying effects of storm waters that the Highway Division has used with good success are:

1. Drainage of slide areas has been carried out successfully by using perforated metal pipe in ditches properly backfilled with graded rock.

2. In desert locations dips provided to carry off cloudburst overflow have been protected by extending the slope paving well below the surface. Dykes of proper design and in proper locations have materially reduced damage to the highways by diverting flood water to protected crossings.

It's a good thing, come to think about it, that graveled roads spread themselves out to more than just the main highways before we commenced paving or else we would be having to do a lot of driving on mud roads instead of over graveled detours, as we are able to do now when paving operations close a main route. And mud roads for the present-day driver are actually dangerous. Drivers in the days of all-dirt roads learned the advisability of going mighty slow on mud, but not so the driver of today who can't be comfortable at anything under 50 miles an hour. There could be things a lot worse than a good graveled detour.—*Crookston Daily Times*.



BEFORE TETRAHEDRONS were erected along the shoreline of the Colorado at Ehrenburg flood waters scoured away the west bank as shown in picture No. 1. The row of tetrahedrons seen in No. 2, by trapping drift flotsam and slowing up the current forces it to deposit banks of sand. No. 3 shows the protective barrier near the international bridge. The map indicates placement of tetrahedrons.

Rural Trucks Use Highways Most

(Continued from page 2)

cipally from the transportation of farm products. Other routes in the bay section carrying a large volume of trucking are those from Hayward to San Jose and Stockton, and Oakland to Sacramento.

HEAVIEST TRAVEL

In the Sacramento Valley important trucking routes radiate from Sacramento north to Marysville, southward to Stockton, and cities of the San Joaquin Valley, and southwest to Oakland and San Francisco.

U. S. No. 99 from Los Angeles through the San Joaquin Valley is the most heavily traveled route in the State, and the volume of truck traffic throughout this route is uniformly large.

In addition to long haul truck traffic between northern and southern California, there is a great deal of local trucking between cities of the densely populated San Joaquin Valley. From Bakersfield north to Stockton and the San Francisco Bay section the average daily volume of trucks varies from 400 immediately north of Bakersfield to more than 1000 at Fresno. In general, it may be stated that farm or their allied products constitute the majority of truck-hauled commodities.

TRUCK MILEAGE

The report indicates considerable variation in the daily mileage traveled by trucks, 75 per cent of all trucks traveling less than 140 miles per day, 90 per cent less than 200 miles per day with an average of 107 miles per day for all trucks. The daily average also varies for different routes, being 120 miles on U. S. No. 101 between Los Angeles and San Francisco, 135 miles on U. S. No. 80 between San Diego and Phoenix, Arizona, and 140 miles on U. S. No. 99 between Los Angeles and San Francisco.

These figures represent the arithmetic average. A median distance, which eliminates the undue effect of extremely long daily mileage by a few trucks, is more representative. This distance is 85 miles as compared to 107 miles above.

The following table shows the relative number of trucks of the various capacities observed on the State highways during the course of the survey and percentages.

Percentage Distribution of Trucks by Capacities Observed on California's State Highways

Capacity Group	Per cent
$\frac{1}{2}$ to $\frac{3}{4}$ tons.....	16.8
1 to $1\frac{1}{2}$ tons.....	41.8
2 to $2\frac{1}{2}$ tons.....	18.3
3 to $3\frac{1}{2}$ tons.....	9.7
4 to $4\frac{1}{2}$ tons.....	2.2
5 to $5\frac{1}{2}$ tons.....	4.5
6 to $6\frac{1}{2}$ tons.....	1.8
7 to $7\frac{1}{2}$ tons.....	.4
Over $7\frac{1}{2}$ tons.....	4.5
Total	100.0

Summary of Light and Heavy Trucks

Under 3 tons capacity.....	76.9 per cent
3 tons and over capacity.....	23.1 per cent
Total	100.0 per cent

HIGHWAY USE

The joint traffic survey has developed many interesting facts about our State highways, one of which is their use by various classes of motor vehicle owners. Vehicle ownership is divided into three classes—farm, village, and city, a city being a place of 2500 or greater population, and a village one of less than 2500 population. This division is identical with that of the United States Bureau of Census, except that cars of rural ownership are subdivided into owners living in rural communities, and those actually living on farms.

The following table would indicate that while the passenger vehicle use was proportional to the split in population, the rural-owned trucks on this same basis were enjoying a greater use of the State highways than the city-owned trucks:

Percentage Distribution According to Situs of Ownership

	Farm Owned	Village Owned	Combined Population	City Owned	Population
Trucks	16.7%	17.2%	26.7%	66.1%	73.3%
Passenger Vehicles	13.4%	13.4%	-----	73.2%	-----

Several factors affect the proportion of light and heavy trucks, the most important being the demand for type of goods. In general, goods which are transported by heavy trucks are mineral products, forest products and certain heavy industrial products. The transportation of furniture, fabricated steel, casing for oil wells and heavy

Foreign Traffic Has Minor Part in Daily Total of Mileage

(Continued from preceding page)

machinery are examples of the latter classification.

Farm products are usually transported to market by light trucks, and this is almost invariably the case where the truck is owned and operated by the farmer. However, there is a considerable movement of farm products in heavy trucks operated as "pickup" trucks by dairies, canneries, and packing companies.

On the basis of the survey data and figures it would appear that the movement of farm products in California is responsible for the heavier percentage of lighter capacity trucks.

FOREIGN TRUCK TRAFFIC

There is a considerable interstate movement of trucks, California contributing 47.5 per cent of Arizona's foreign truck traffic, 54 per cent of Nevada's, 29.2 per cent of Oregon's and 9.1 per cent of Washington's.

The makeup of some 86 per cent of California's foreign truck traffic is as follows:

Oregon	37.5%
Washington	11.3%
Arizona	7.8%
Nevada	7.0%
Northeastern States	13.9%
Central Plains States	8.7%

The range of foreign truck distribution is apparent from the fact that the survey shows a daily mileage of 181 miles for foreign trucks operating on California's State highways, as against a similar average of 106 miles for local trucks.

FOREIGN CAR TRAFFIC

Foreign traffic plays a relatively unimportant part in producing California's daily vehicle mileage, being responsible for but 4.9 per cent of our daily total. Out of a total of 411,600 foreign daily vehicle miles 71 per cent are produced by vehicles from west of the Mississippi River, 25 per cent from east of the Mississippi River and the remaining 4 per cent by machines from foreign states and counties.

As a matter of fact, California machines contribute 1.7 times as many vehicle miles in the 10 western states as we receive in the aggregate from all foreign sources. The extent of this visiting by Californians

LIGHTNING FLASH SETS OFF 15-SHOT BLAST

A rather unusual accident recently occurred in Fresno County Convict Camp No. 27. A series of 15 holes had been drilled and loaded, and wires had been fastened together and grounded, but had not been connected to the lead wires, nor was the battery anywhere near.

A severe thunder shower occurred and immediately following a flash of lightning the entire series of loaded holes exploded, set off by the lightning.

Fortunately nobody was in the immediate neighborhood and no injury was done to any person. However, this might have been a very serious accident, and indicates the need for care in blasting operations when thunder storms are threatening.

amounts to 692,400 daily vehicle miles or 7.7 per cent of the total daily vehicle miles traveled on our own State highways.

The following comparison measures the ratio of traffic exchange with our neighboring states:

The travel of California vehicles in Washington is 1.16 times that of Washington in California.

The travel of California vehicles in Oregon is 2.5 times that of Oregon in California.

The travel of California vehicles in Nevada is 4.0 times that of Nevada in California.

The travel of California vehicles in Arizona is 8.5 times that of Arizona in California.

An item of possible interest to Californians is the fact that our foreign daily vehicle mileage would be increased 23 per cent if the Central Plains states used our State highways to the same extent they do those of either Colorado, New Mexico or Nebraska.

The following basic statistics as set forth in the survey may offer a ready means of estimating the potential value of this foreign traffic.

The report shows that the average daily mileage for foreign vehicles is 247 miles, which is 65 per cent more than that of our State vehicles. To operate, this mileage will require 17 gallons of gasoline as the weighted average of both truck and passenger vehicle is 14.51 miles per gallon of gasoline. The number of visitors might safely be assumed at 2.27 per vehicle, which is the average number of occupants of passenger vehicles in California.

Conclusion: This digest of the joint survey as well as that of the preceding article in the May issue applies only to the State highways in which the data was gathered. The data itself is necessarily based on the laws of averages.

Portable Drilling Machine Developed For Bridge Foundation Investigations

By A. C. NORTH, Assistant Bridge Construction Engineer

A DESIGNER or a builder of bridges, no matter how great an artist or technician he may be, can never know that the product of his skill will successfully serve its purpose without an accurate determination of the material upon which the bridge is to be built.

In the Scriptures we read that rock was known to be a more satisfactory foundation material than sand, but no record has been found of any bearing value having been assigned to any other material, such as sandy clay saturated with water and full of small stones.

It is, therefore, with these more difficult materials that the present day foundation investigator is more deeply concerned in order that proper provision may be made for bridge foundations and the dollars spent for structures constitute a more lasting and secure investment.

FOUR GROUPS

Materials upon which bridges are built group themselves naturally under four classifications:

1. **Solid rocks which have a naturally high foundational value.**
2. **Softer rocks. These may be of sedimentary origin or an alteration of harder rocks, to which a much lower bearing value should be assigned.**
3. **Strata of comparatively recent sedimentary origin, whose natural bearing capacity must be determined and may have to be aided by driving piles into it.**
4. **Soft material which is not safe for bearing and requires that piles be driven through it to more solid material at an unknown depth.**

PROBLEMS INVOLVED

The first class offers few problems to the investigator other than the depth of the soft or decomposed material overlying it, so that the footings may be placed deep enough. The problems afforded by the second are greater than the first, as there may be caves and soft spots in it, or the material may disintegrate when exposed to water, air or sunlight. It is, however, the third and fourth classes which involve 90 per cent of the problems that confront the investigator.

It is necessary to assemble all the data

obtainable as to the consistency, texture and hardness of the earth and rock below the surface, so that the designer may determine the type of footing necessary to support the proposed structure.

It is economical and advisable, in large structures like the San Francisco Bay Bridge, to make very exhaustive and expensive studies of the material upon which such a large and costly bridge will rest, on account of the fact that the relative cost is small compared with the great loss that would result from a failure.

MANY INVESTIGATIONS

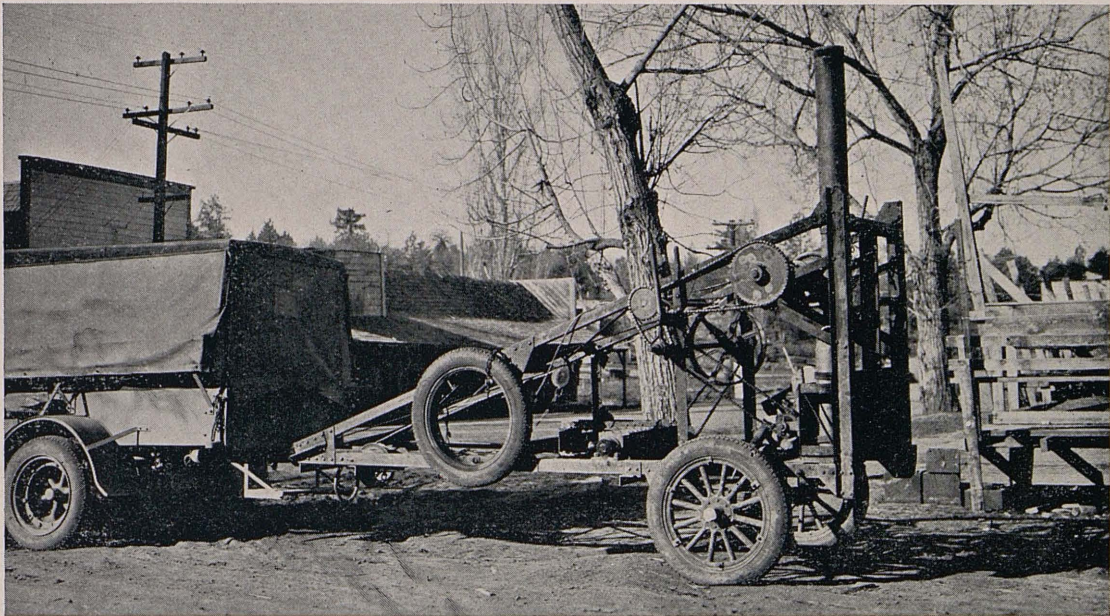
The multitude of small bridges, however, which constitute a large percentage of the structures undertaken each year by the Division of Highways present the same foundation problems in a lesser degree.

It is often found necessary to drill holes to a depth of as much as 50 feet into the ground at the bridge site, and bring the material to the surface for study. This requires a drilling machine driven by power, heavy enough to withstand hard usage, and still light enough to be transported easily at maximum speed. It must often be let down into rather inaccessible locations by a small operating crew.

The present Bridge Department Drill Rig, which is shown in the accompanying photos, is driven by a 3 h.p. air-cooled motor connected with a revolving gear wheel and has sufficient strength to twist an inch and a half water pipe in two. It furnishes the power to operate augers of a variety of shapes which penetrate the substrata and permit material to be withdrawn for study.

By means of a small hoist, at the back of the rig, a sand pump or a 450-pound churn drill can be used in sand or to test solid rock. When it is found desirable to line the hole to prevent caving, a 200-pound hammer, hoisted and dropped into a specially constructed driving head, is used to drive standard well casing.

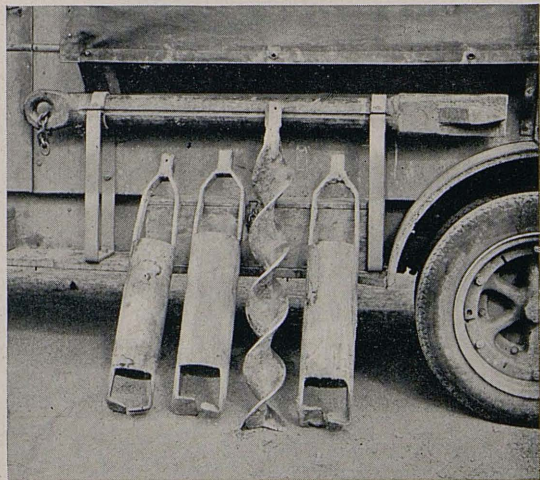
The rig is furnished with two wheels and can be fastened on to the rear of the survey party's truck as a trailer. When it is to be operated as a drill all that is necessary is to tip it up into a vertical position and start drilling.



QUICK ACTION is possible with this power drill rig for testing foundation materials at bridge sites. It is hauled to locations as a trailer by the survey party's truck. The machine was designed and developed by Assistant Construction Engineer A. C. North of the Bridge Department.



ON THE JOB, the trailer, up-ended operates as drill, sand pump or 200 pound trip-hammer hoist.



VERSATILE MACHINE operates these augers and drills.

TEXAS GOES COLLEGIATE

Automobile license plates for 1933 will be in collegiate colors, according to specifications of the State Highway Commission. Orange and white, University of Texas colors, have been selected for the plates. Texas A. & M. colors, red and white, were selected for truck license plates.—*Texas Highways*

"Bothered much by hitch-hikers when you're out riding?" "Not now. Tried a new plan. As soon as I get out of town I show the sign 'Taxi' on my car."—*Boston Transcript*.

Thirteen Road Jobs, Five Bridges on Advertising Program for the Month

C. H. PURCELL, State Highway Engineer for California, reported to Colonel Walter E. Garrison, Director of the Department of Public Works, that during the month of June the Division of Highways planned to advertise 18 major projects for construction on State highways at an estimated cost of \$3,600,000.

These projects include 13 road jobs and five bridges. The road projects cover work on approximately 71 miles of State highway, amounting to some \$3,000,000, and the proposed bridges are estimated to cost about \$600,000. The work is distributed well over the State and involves work in 13 counties.

The projects planned for advertising before July 1, in carrying forward the 1932 State highway construction program are as follows:

In Imperial County an important improvement is to be made to the interstate highway which enters California at Yuma. This project proposes the reconstruction of nearly eight miles of this highway between the easterly end of the Sand Hills to Araz Junction. The new road will be constructed parallel to the present oiled gravel road but on an improved alignment.

DEFIES STORM DAMAGE

The grade across the mesa, which is subject to cloudbursts, will be protected from storm damage by a series of dikes and ditches, similar to the construction used so successfully on desert highways in Riverside and San Bernardino counties. The project provides for placing a 20-foot asphalt concrete pavement.

The new pavement will connect at its easterly end with the recently completed pavement between Araz and Yuma. The completion of this pavement will provide motorists with a paved highway from El Centro to Yuma.

In San Diego County it is planned to advertise two projects between Rose Canyon and Sorrento Creek. These two projects are units in the State's share of the cooperative reconstruction of the entrance of the Coast Route into the city of San Diego. The work will comprise placing Portland cement con-

crete pavement and asphalt concrete pavement on the graded roadbed which has just been completed by the city of San Diego.

OBVIATES FAMOUS GRADE

The new highway connects with the Rose Canyon cut-off and will provide two one-way 20-foot pavements to the Torrey Pines reservoir: The existing pavement is to be widened to 20 feet and a new asphalt concrete pavement 20 feet wide is to be placed on the new grade which was constructed easterly of the existing highway. From the reservoir the highway will be on a new alignment into Sorrento Canyon which will obviate the use of the notorious Torrey Pines grade. This section of new pavement will be of Portland cement concrete 30 feet wide.

An improvement to the popular highway, known as the Crest Road which connects San Bernardino with the scenic recreational region around Lake Arrowhead and Big Bear Lake, is to be made between Camp Waterman and the entrance to Waterman Canyon near Arrowhead Springs station. This project involves the reconstruction of 4.5 miles of road and includes drastic improvements to both line and grade.

The new alignment will be in keeping with modern standards of mountain highway construction and the maximum gradient on the new road will be 6.4 per cent as against the 20 per cent maximum on the existing road. The project calls for a bituminous treated crushed rock surface 20 feet wide and will connect with the two miles of new highway constructed two years ago from the pass between Waterman Canyon and Devil's Canyon to Camp Waterman.

IN SECONDARY SYSTEM

One of the projects which mark the beginning of work on the secondary highways incorporated in the State road system by the last Legislature is an improvement to the Pomona-Fullerton road from Pomona to Brea Canyon in Los Angeles County. This project provides for the construction of a new highway from Fifth Street at the westerly city limits of Pomona to a connection with the Brea Canyon road northerly of the head of the canyon.

(Continued on page 27)

Work Planned for Bids in June

Projects scheduled by the Division of Highways to be advertised for bids prior to July 1, included eighteen major projects in thirteen counties. The proposed work comprised 71 miles of State highway and five bridges at an estimated total cost of \$3,618,300 as follows:

DETAILED LIST OF PROJECTS

County	Location	Miles	Type
San Diego	Rose Canyon to Sorrento Creek	4.4	P. C. C. Pave.
San Mateo	South of South San Francisco	0.6	P. C. C. Pave.
Los Angeles	Barranca St. to Pomona	6.0	P. C. C. Pave.
Alameda	Castro Hill to Stanton Ave.	2.4	P. C. C. Pave.
Los Angeles	Brea Canyon to Pomona	6.2	P. C. C. Pave.
San Diego	Rose Canyon to Torrey Pines Reservoir	2.1	Asph't Con. Pave.
Imperial	Sand Hills to Araz Junction	7.9	Asph't Con. Pave.
San Bernardino	Halloran Summit to Mountain Pass	16.5	B. T. Cr. Rk. Surf.
Amador	Amador City to Martell	4.8	B. T. Cr. Rk. Surf.
Shasta	Canyon Creek to Hat Creek Summit	10.2	B. T. Cr. Rk. Surf.
San Bernardino	Camp Waterman to Waterman Canyon	4.5	B. T. Cr. Rk. Surf.
Mendocino	Little Dann Creek to Stacey's Place	1.6	Untr. C. Rk. Surf.
Monterey	San Remo Divide to Carmel River	3.7	Graded Roadbed
Monterey	Across Wild Cat Creek		Stone-faced Arch
San Joaquin- Stanislaus	Across Stanislaus River		Conc. and Steel
San Joaquin	Across Paradise Cut		Steel Stringer
Ventura	Across Ventura River		R. C. Girder
San Diego	Across Tracks of A. T. & S. F. Ry. at Sorrento Canyon		R. C. Gir. Overhd.

SUMMARY

Type	Miles	Amount
Portland Cement Concrete Pavement	19.6	\$1,076,500
Asphalt Concrete Pavement	10.0	458,900
Bituminous Treated Crushed Rock Surfacing	36.0	1,180,200
Untreated Crushed Rock Surfacing	1.6	74,600
Graded Roadbed	3.7	176,600
Bridges	(5)	651,500
Totals	70.9	\$3,618,300

Final Link of Waterman Canyon Improvement Eliminates Switchbacks

By E. Q. SULLIVAN, District Engineer

SOON to be constructed is the final section of the State highway which will link with a high gear road, the San Bernardino Valley, and the San Bernardino Mountains—a play ground for all of southern California.

This final link will eliminate completely the treacherous old "switchbacks" which offer grades as steep as 22 per cent. The new section begins at the Indian Archway which marks the entrance to the world-famed Arrowhead Hotel Hot Springs and extends to Camp Waterman, where it joins the high gear road completed last year.

The present road was constructed in 1901 by the Arrowhead Reservoir and Power Company for the purpose of hauling up materials for the construction of the dam which now forms beautiful Lake Arrowhead. It was a toll road chartered by the county and closely followed the route of the historic old Mormon lumber road constructed in 1851.

PIONEER HISTORY

The accounts of the old Mormon lumber road, taken from letters written home to Salt Lake City, describe the efforts of the pioneers. After the first buildings were constructed in San Bernardino of willow and cottonwood, to temporarily house the settlers, it was decided that lumber of better quality from the mountains was needed. The Mormons also hoped to establish a profitable trade in producing lumber for the Los Angeles market.

After the first harvests were gathered, it is recorded that all able bodied men were called together to participate in the building of the road to the mountain forests. One thousand days' labor was required to complete the task. Saw mills were installed in the valley.

So steep was this old lumber road and so heavily loaded with logs were the clumsy wagons, that trees were dragged behind the wagons to serve as additional brakes. The place can still be pointed out where these trees were untied from behind the wagons—the "Drag Yard" it was called, for the settlers soon learned to come to saw these drag trees into fire wood, and the place became a community center of activity.

The new State highway location will not follow closely the old location along the

Waterman Creek stream bed, but will follow along the west wall of the canyon to avoid the steep grades and sharp curves of the old toll road.

From an elevation of 1850 feet at the start, the new highway, together with the upper portions finally climbs to an elevation of over 7000 feet with ever changing magnificent views of the entire valley. Snow capped peaks rise in the distance and the valley floors look like a geometric pattern with cities, orange groves, and farms in panorama.

On some exceptionally clear days the great metropolitan area of Los Angeles can be seen with the Pacific Ocean and Catalina Island in the distance.

The most timid driver will have easy access via the new State highway to the vast mountain playgrounds including the Crestline district, the Los Angeles city park, the exclusive Arrowhead district, and the many resorts along the mountain crest to the popular Big Bear Lake region. There are also thousands of private mountain homes along the highway.

MECCA FOR MOTORISTS

The bright sun and cool breezes of the high altitudes, the pine trees, and mountain vegetation with views of both the desert on the north and cultivated valleys on the south, and the highly developed playground facilities make this region a mecca for all persons.

This final highway link is 4½ miles long. It will have a roadbed 24 feet in width, surfaced with oiled mixed material.

The State budget provides \$650,000 for this project, but in view of the decreasing costs since the budget was formulated, it is possible that the cost will be less.

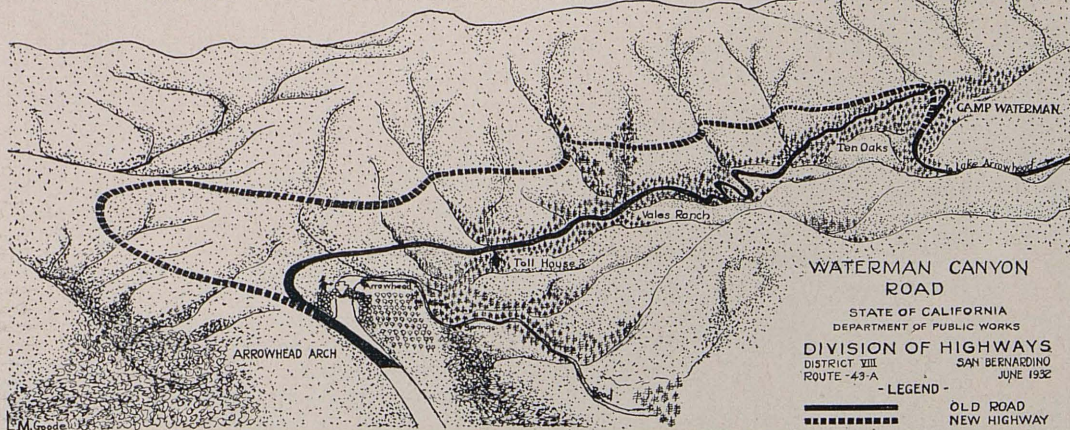
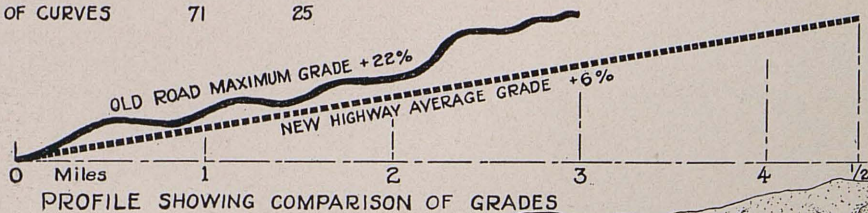
QUITE A ROADWAY

A wealthy New Yorker the other day suggested the construction of an eight-billion-dollar toll highway across the United States. His highway would be 500 feet wide, from coast to coast. It would have 10 traffic lanes in each direction, with the speed limits on certain lanes ranging up to 100 miles an hour. It would be lined with 300 modern hotels and tourist camps, and what with one thing and another it would be quite a roadway.

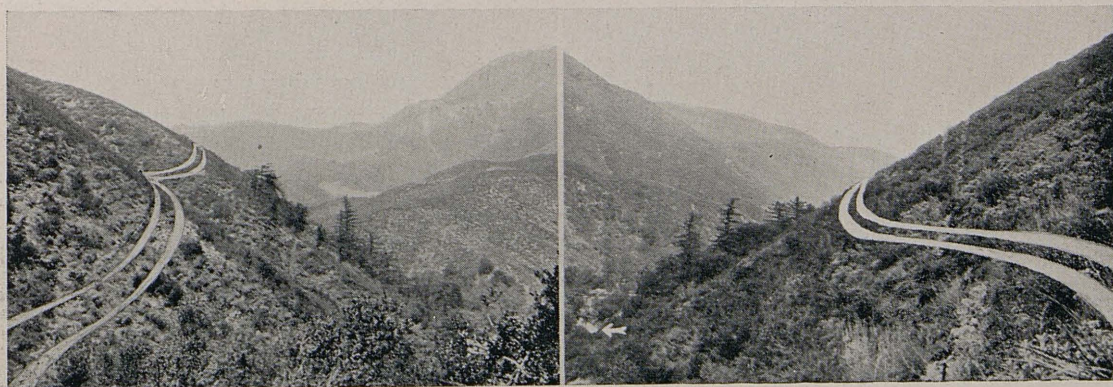
Wife (on their return from the party): "Do you realize what you did?"
Husband: "No; but I'll admit it was wrong. What was it?"—*Borrow Pit*

Steep Grades, 45 Curves Abolished

	OLD ROAD	NEW HIGHWAY
LENGTH IN MILES	3	4½
MAXIMUM GRADE	+22%	+6.4%
MINIMUM RADIUS CURVE	25'	250'
NUMBER OF CURVES	71	25



YOU TAKE THE HIGH ROAD up Waterman Canyon to the Rim o' the World and Lake Arrowhead areas when this last link of the high gear State highway route is completed leading to the San Bernardino Mountain resorts. It eliminates the steep switchbacks on the old Mormon trail route as shown in this revealing sketch map by draftsman Maynard Goode of District VIII headquarters staff.



OUT OF THE DEEP canyon bottom along Waterman Creek, the new route will take the highway far up along the slopes of the foothills to a final elevation of 7000 feet on the upper portion. The white lines indicate the course of the new location and a glimpse of the present road in the canyon below is caught by the camera.

CALIFORNIA HIGHWAYS AND PUBLIC WORKS

Official journal of the Division of Highways of the Department of Public Works, State of California; published for the information of the members of the department and the citizens of California.

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

COLONEL WALTER E. GARRISON.....Director
JOHN W. HOWE.....Editor

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

Vol. 10

JUNE, 1932

No. 6

PROFITABLE INVESTMENT

Good roads are a good investment.

How very good may be seen in the fact that, based on a saving of one and one-quarter cents per mile in reduced fuel and motor vehicle operating costs, California's State highways, up to June 30, 1930, after deducting all maintenance, interest and depreciation charges, earned \$54,000,000 on a capital investment of \$172,000,000.

Dollar for dollar, what constructive enterprise in the country can make a better showing?

But these figures, as taken from the current issue of California Highways and Public Works, official organ of the State Department of Public Works, tell only a part of the story.

They do not include the tourist income so largely increased by the publicity given to our network of smooth, broad State highways, which are themselves an additional attraction to the scenic beauties of California.

Good roads are good tourist business, which means good business for everybody.

The more smooth highways the more holiday visitors, and the visiting vacationist pays ready cash.

In southern California in the year 1928-29 he spent no less than \$317,000,000.

In 1930 in the ten southern California counties he paid State gasoline tax to the tune of \$3,196,000.

But for our good roads he would have come as an explorer or as single spies.

With good roads he comes in whole battalions.

They are a good investment.—*Los Angeles Examiner.*

It is said that the automobile is wrecking the younger generation; maybe so, but what is the younger generation doing to the automobile?

870,000 Employed by Highway Work in 1931

"That public work, such as road building, is one of the best ways for the country to furnish employment is shown in the actual employment figures in 1931," declares W. C. Markham, Executive Secretary of the American Association of State Highway Officials.

"An average of approximately 290,000 men had road jobs on Federal Aid and State projects during 1931," Mr. Markham asserts. "It is conceded by those who have studied the subject that for every man working directly on the roads there is employment given two men who are preparing or transporting materials."

On that basis the Federal Aid and State work alone was responsible for the employment of an average of 870,000 men throughout 1931. Local road work and street building brings the total number of men employed, directly and indirectly, in the improvement of automobile facilities to well over two million workers.

"To furnish work it is not necessary to avoid the use of machinery," Mr. Markham says. "While it is true that the highest proportion of manual labor is found in hand-labor projects, it is also true that about nine-tenths of the road money spent for high type pavements also goes to labor. This is so because no intrinsically valuable materials go into roads; the hand of labor plays the major part in preparing these materials, in building equipment and in transporting these supplies to the project.

"The Federal government, the State and the local community can feel that when it makes a dollar available to road construction that it will be a dollar well spent, a dollar invested mostly in labor."

FIRST METAL BRIDGE

America's first metal bridge, built a century ago, is still in use, according to the U. S. Army Recruiting News.

The bridge was erected by Army engineers over Dunlop Creek, near Brownsville, Pennsylvania, during the building of the old "Cumberland Road," also called the "National Turnpike." It is of cast iron tubular construction.

The structure has carried traffic for 83 years. During the flourishing days of the Cumberland Road stage coaches and Conestoga wagons rumbled over it in a constant stream. Then for a half century the road was little used. Now again an endless procession of automobiles and trucks pass over the bridge at greater speeds and carrying greater loads than the Army designer ever dreamed of its being subjected to. And in addition to these impact loads, the old bridge is being subjected to a dead load consisting of two 5'-10" concrete sidewalks.—*New Mexico.*



OLD AND NEW methods of extracting drill steel stuck in the hole are shown above. The old, lengthy and laborious sledge-hammer method has been eliminated by the Jumbo steel puller invented by Camp Superintendent Edward Rawson.

Highway Camp Chief Invents an Improved Drill Steel Puller

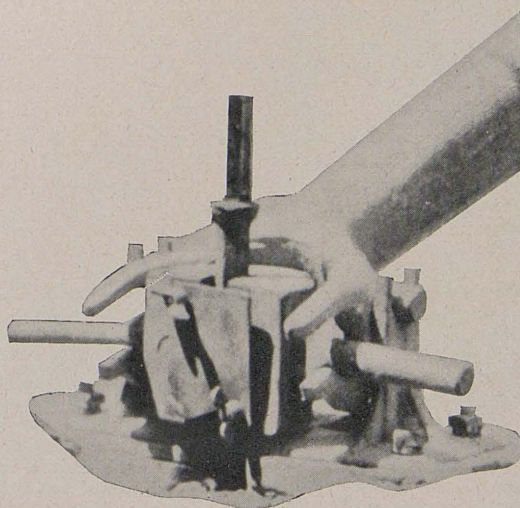
By C. S. POPE, Construction Engineer

SUPERINTENDENT EDWARD RAWSON, in charge of the convict camp at West Branch, east of Oroville in Butte County, has invented an improved device for pulling out drill steel that becomes stuck in the hole when drilling for blasting operations in rock formations on highway work.

Heretofore, whenever the drill steel stuck, the usual procedure to dislodge it was by means of a steel goose neck and sledge hammer, a method which often proved inefficient and wasteful of time, labor and material, some times requiring several hours time, or the loss of both drill and hole. Since the progress of each highway construction crew is dependent on the work of a preceding unit, whenever the drill crew is held up by stuck steel, the progress of the entire job may be delayed.

QUICK AND EASY

The Jumbo drill steel puller devised by Mr. Rawson has eliminated this excessive and expensive waste, and reduced a trying task to a few minutes work. It consists essentially of a clamping block, a fulcrum chair, and a forked lever, all of cast steel. The operation of the device is as follows: The fulcrum chair is set in position circling the stuck drill, the clamping block is fixed to the steel, and pulling pressure is applied to the arms of the clamping block by means of the forked lever resting on the fulcrum chair.



A CLOSE-UP of Jumbo steel drill puller showing clamping block, fulcrum chair and forked lever.

Drill steel is seldom stuck for a distance greater than two feet, and the average time required for setting up the steel puller and lifting the steel is from five to ten minutes. The machine is strong and compact and has been thoroughly tested out and used successfully on State highway construction work.

An automobile traveling at 60 miles per hour has the same capacity for inflicting damage that the same automobile would have if it were driven off a ten-story building, 120 feet high.—*Maine Highways*.

Murphy: "What's that in your pocket?"

Pat (in whisper): "Dynamite. I'm waiting for Casey. Every time he meets me he slaps me on the chest and breaks me pipe. Next time he does it, he'll blow his hand off."—*The Earth Mover*.

Water Law Changes Unnecessary

(Continued from page 11)

or to be used, in whole or in substantial part for agricultural purposes.

The loaning of the credit of the State for such water projects would be safeguarded by a provision in the proposed constitutional amendment that each particular project must first receive the approval and recommendation of the proposed permanent Water Commission and be passed by the Legislature before submission to the vote of the people. The safeguard of requiring the levy and collection of an ad valorem tax in case of default is provided for in loaning of credit of the State.

The third principle is the prohibiting of the taking of water by the State under any project constructed by the State itself, from any area where such water is required for the full maintenance and development of that area.

The fourth principle is the requirement that all debts or liabilities of the State, contingent or otherwise, created under the provisions of this amendment, must first be voted upon and approved by the people as provided in section 1 of Article XVI of the Constitution.

EMBODIES BASIC PRINCIPLES

The Commission states in regard to the constitutional amendment that:

"We believe that this constitutional amendment embodies fundamental principles which are necessary to be written into the constitution of the State as a firm foundation for the future development of a State water program. It contains what we believe are necessary limitations and safeguards to provide against unsafe or unwise expenditure of public moneys upon projects which will not be self-sustaining and self-liquidating; and it further provides adequate protection to areas having surplus water, that they will always be assured by the State of a supply of water adequate for their complete development. Moreover, this constitutional amendment provides for the possibility of cooperation between the State and Federal governments in the construction of water projects."

The Commission recommends that any project constructed under present economic agricultural conditions should be designed for the preservation and maintenance of improved lands, threatened with destruction or great damage through a deficient water supply. There should be no development of new lands and rigid safeguards in investigation and administration should be adopted and enforced to insure this condition.

GREAT ENTERPRISE

The Commission recommends the creation of a permanent Water Resources Commission as the proper governmental machinery for administration of a state-wide water program, and submits a proposed form of act to create such commission. "The duty of such Commission will be to investigate and recommend projects, recommend plans of financing them, negotiate and arrange all contracts with reference to them, and generally supervise their construction and operation.

"A State water program if carried out will be a great business enterprise. It can only be successfully conducted by well qualified men giving it constant attention. Moreover, if the development of a State plan is to be progressive and compre-

hensive, as we believe it must be, then it should receive continuous investigation and planning."

A form of act authorizing the construction of the Central Valley project, after approval of a bond issue by the people and the obtaining of the necessary contracts to make it self-sustaining and self-liquidating in accordance with the proposed constitutional amendment, is attached to and made a part of the report. It is recommended for adoption.

NO SPECIAL COURT

In regard to the creation of a special court or tribunal with exclusive jurisdiction to hear and determine controversies as to water rights, the Commission states in its report:

"We have carefully considered this suggestion. A majority of the members of this Commission are of the opinion that no necessity exists for the creation of such court or tribunal and that it is not advisable to authorize its creation. It is believed that our courts, as at present constituted, are capable and best qualified to continue adjudicating water rights.

"Nor do we recommend any changes in the present law of waters. Such changes, either substantive or procedural as experience may demonstrate to be necessary to carry out a State water plan, may and should be left to future legislatures."

COMMISSION MEMBERS

The membership of the Commission is:

Hon. Matt I. Sullivan, chairman, San Francisco.
Shannon Crandall, vice chairman, Los Angeles.
D. K. Barnell, Merced.
James M. Burke, Visalia.
Francis Carr, Redding.
R. C. Harbison, San Bernardino.
Harry L. Heffner, Los Angeles.
W. B. Mathews,* Los Angeles.
Jesse Poundstone, Grimes.
A. B. Tarpey, Fresno.

Ex officio members to aid Commission:

A. M. Barton, Chief Engineer, State Reclamation Board.
Walter E. Garrison, Director of Public Works.
Edward Hyatt, Secretary, State Engineer.
Edward Rainey, Superintendent of Banks.
Rolland A Vandegrift, Director of Finance.
U. S. Webb, Attorney General.

LEGISLATIVE COMMITTEE

The California Joint Legislative Water Committee met and organized on July 3, 1931. It has worked diligently on a solution of the problem, studying all the legislative reports, reports of the Division of Water Resources, State Department of Public Works and of the Federal Government. The committee has held many public hearings and cooperated and collaborated with the California Water Resources Commission. Further, it met with the subcommittee of the U. S. House of Representatives Appropriation Committee, dealing with appropriations for the Department of Interior.

* Commissioner Mathews died December 9, 1931. Harry L. Heffner appointed Commissioner by Governor Rolph on January 21, 1932, to fill the vacancy.

Joint Committee Report in Accord

(Continued from preceding page)

The membership of the committee is:

Senator B. S. Crittenden, chairman, Stockton, San Joaquin County.

Assemblyman Robert P. Easley, vice chairman, Antioch, Contra Costa County.

Assemblyman Robert L. Patterson, secretary, Bakersfield, Kern County.

Senator C. C. Baker, Salinas, Monterey County.

Senator Ralph H. Clock, Long Beach, Los Angeles County.

Senator Frank W. Mixer, Exeter, Tulare County.

a State coordinated water conservation plan," certain definite recommendations have been made in its report.

FAVOR AMENDMENT

Recommendation No. 1. That the initial step should be a general constitutional amendment authorizing the Legislature to enact such legislation as may be necessary in carrying out a comprehensive state-wide water program and the amendment, general in form, as recommended should be submitted by the Legislature to the people of the State.



JOINT LEGISLATIVE WATER COMMITTEE members shown in the picture are: front row from left to right, Assemblyman Edward Craig, Assemblyman Chester M. Kline, Senator B. S. Crittenden, chairman; Assemblyman Harold C. Cloudman, Assemblyman Robert L. Patterson. In the back row, left to right, are Senator C. C. Baker, Senator Frank W. Mixer, Assemblyman Robert P. Easley, Joe Nolan, sergeant-at-arms; Assemblyman Frank S. Israel, Senator Andrew R. Schottky.

Senator W. P. Rich, Marysville, Yuba County.

Senator Andrew R. Schottky, Merced, Merced County.

Senator Ralph E. Swing, San Bernardino, San Bernardino County.

Assemblyman Harold C. Cloudman, Berkeley, Alameda County.

Assemblyman Edward Craig, Brea, Orange County.

Assemblyman John E. Frazier, Gridley, Butte County.

Assemblyman Frank S. Israel, Linden, San Joaquin County.

Assemblyman Chester M. Kline, San Jacinto, Riverside County.

The committee concluded its studies and filed a report with the President of the Senate and the Speaker of the Assembly on April 20, 1932.

In accord with the views of the Committee that "its primary duty was to consider and report upon legislation which would enable the State to carry out

Recommendation No. 2. That the general constitutional amendment, as recommended, be adopted and that if the Governor deems it advisable, a special session of the Legislature be called, in order that the proposed amendment may be placed on the ballot at the general election to be held in 1932.

Recommendation No. 3. That in event the Governor should elect to call the Legislature into special session, with respect to the water conservation question, his call for such special session be sufficiently broad in scope so as to permit of legislation for the submission to the vote of the people of a bond act for the construction of the great Central Valley project.

The constitutional amendment proposed and recommended by the Legislative Committee for adoption is in accord and practically identical with that recommended by the California Water Resources Commission. This desirable and favorable result was effected through the medium of many joint sessions and subcommittee meetings of the two bodies.

(Continued on page 36)

Highway Bids and Awards for May

BUTTE COUNTY—District II, Route 21, between Pulga and Cresta about 4.2 miles to be graded. Force Const. Co. and C. T. Malcom, Piedmont and Walnut Creek, \$447,664.25; Morrison Knudsen Co., Los Angeles, \$429,910; McDonald, Inc., San Francisco, \$365,247.50; Kern & Kibbe, Portland, Oregon, \$309,262.50; Von der Hellen & Pierson, Castaic, \$351,187.50; Haas Doughty & Jones, San Francisco, \$599,117.50; Meyer Rosenberg, San Francisco, \$319,102.50; Utah Construction Co., San Francisco, \$320,989; Mitty Bros. Const. Co., Los Angeles, \$317,314; S. H. Palmer and J. P. Holland, Inc., San Francisco, \$330,829.50; Frederickson & Watson Const. Co. & Frederickson Bros., Oakland, \$307,987.50; Geo. Pollock Co., Sacramento, \$369,322; Clark & Henery Const. Co., San Francisco, \$379,953.25. Contract awarded to Hemstreet & Bell, Marysville, \$297,509.25.

CALAVERAS AND ALPINE COUNTIES—District X, Route 24, between Big Trees and Lake Alpine, about 20.2 miles in length to be treated with fuel oil as a dust palliative. C. W. Wood, Stockton, \$4,699.50; A. Teichert & Sons, Inc., Sacramento, \$4,680; Basalt Rock Co., Inc., Napa, \$4,290; A. Mitchell, Sacramento, \$5,409.50; Edw. A. Peres, Richmond, \$4,223; Tiffany-McReynolds-Tiffany, San Jose, \$4,610. Contract awarded to Consumers Oil Co., Los Angeles, \$3,787.

HUMBOLDT AND TRINITY COUNTIES—District I, Route 20, dust oiling between Blue Lake and Salyer, about 30 miles in length. A. Teichert & Son, Inc., Sacramento, \$8,013.50. Contract awarded to Skeels & Graham Co., Roseville, \$7,341.40.

KERN COUNTY—District IX, Route 57, between Weldon and junction of routes 57 and 23 near Freeman, about 30.7 miles of existing roadbed to be treated with asphaltic road oil as dust palliative. Fred W. Nighbert, Bakersfield, \$12,600; John Jurkovich, Fresno, \$14,700; J. G. Donovan & Son, Los Angeles, \$15,050; C. A. Ladeveze, Los Angeles, \$14,000; Pacific Tank Lines, Inc., Los Angeles, \$15,680; Paulson & March, Inc., Los Angeles, \$13,580; Clyde W. Wood, Stockton, \$14,700; Stewart & Nuss, Inc., Fresno, \$13,090. Contract awarded to Oilfields Trucking Co., Taft, \$11,970.

KERN COUNTY—District VI, Route 4, between Grapevine Station and Bakersfield, 22 miles of asphalt concrete surface to be planed. Standard Road Planning Co., Los Angeles, \$21,516.71. Contract rejected.

KERN COUNTY—District VI, Route 58, between junction of Arvin road and west city limits of Tehachapi, about 19.5 miles of dust oiling. Oilfields Trucking Co., Taft, \$10,834.20; Fred W. Nighbert, Bakersfield, \$10,880.50; Hartman Construction Co., Bakersfield, \$10,417.50; Consumers Oil Co., Los Angeles, \$11,621.30; John Jurkovich, Fresno, \$9,908.20. Contract awarded to Granite Construction Co., Ltd., Watsonville, \$8,843.30.

KERN COUNTY—District VI, Route 57, between Democrat Springs and Weldon, about 30.6 miles of dust oiling. Stewart & Nuss, Inc., Fresno, \$12,541.95; Oilfields Trucking Co., Taft, \$10,617.30; Granite Construction Co., Ltd., Watsonville, \$12,140.10; Fred W. Nighbert, Bakersfield, \$11,632.50; Hartman Construction Co., Bakersfield, \$14,805; Consumers Oil Co., Los Angeles, \$12,605.40. Contract awarded to Street Improvement Co., Los Angeles, \$8,037.

LOS ANGELES COUNTY—District VII, Route 4, at points between 4 and 8 miles south of Gorman Station, construct 3 bridges. Byerts & Dunn, Los Angeles, \$62,109.50; Lynch Cannon Engineering Co., Los Angeles, \$56,572.50; Morrison Knudsen Co. & McDonald & Kahn Co., Ltd., San Francisco, \$54,768.10; Oberg Bros., Los Angeles, \$61,997. Contract awarded to Dimmitt & Taylor, Los Angeles, \$47,458.25.

MENDOCINO COUNTY—District IV, Route 48, furnish and apply light fuel oil to portions of the roadbed between McDonald and Flynn Creek, as a dust palliative, about 15 miles. C. F. Frederickson & Sons, Lower Lake, \$4,280; Edw. A. Peres, Richmond, \$3,640; Basalt Rock Co., Inc., Napa, \$3,760. Contract awarded to Chas. Kuppinger, Lakeport, \$3,600.

MONO COUNTY—District IX, Route 23, between foot Conway Grade and 2 miles west of Bridgeport, about 18.8 miles treat existing road with fuel oil. Oilfields Trucking Co., Taft, \$19,668.75; George Herz & Co., San Bernardino, \$21,189.80; C. A. Ladeveze, Los Angeles, \$22,973.10; Southwest Paving Co., Los Angeles, \$25,333.35; Clyde W. Wood, Stockton, \$22,

553.50. Contract awarded to Basalt Rock Co., Inc., Napa, \$18,777.10.

ORANGE AND LOS ANGELES COUNTIES—District VII, Routes 43, 60, between Newport and Orange-Riverside Co. line; between Long Beach and Seal Beach and at Lomita, about 24.9 miles treat earth shoulders with fuel oil. Sander Pearson, Santa Monica, \$19,628; Southwest Paving Co., Los Angeles, \$13,669.50; Oilfield Trucking Co., Taft, \$15,702.40; C. A. Ladeveze, Los Angeles, \$16,683.80. Contract awarded to Martin Bros. Trucking Co., Long Beach, \$12,057.20.

ORANGE COUNTY—District VII, Route 2, moving and altering 13 buildings in Doheny Park. E. W. Smith, Santa Ana, \$9,492; Clark & Campbell, Los Angeles, \$12,500; E. G. Bowen & Co., Ltd., Los Angeles, \$14,517. Contract awarded to Harry Friedman, Los Angeles, \$9,455.

ORANGE COUNTY—District VII, Route 60, between Laguna Beach and Dana Point, about 4.9 miles to be graded and paved with P. C. concrete. Mitty Bros. Const. Co., Los Angeles, \$311,991.40; Jahn & Bressi Construction Co., Inc., Los Angeles, \$289,577.75; Sander Pearson and Dimmitt & Taylor, Los Angeles, \$336,516.25; Sharp and Fellows Contracting Co., Los Angeles, \$324,922.30; Griffith Company, Los Angeles, \$283,587.50; Frederickson & Watson Construction Co., Frederickson Bros., Oakland, \$302,185.75; United Concrete Pipe Corporation, Los Angeles, \$316,166.65. Contract awarded to Daley Corporation, San Diego, \$282,681.80.

ORANGE COUNTY—District VII, Route 2, moving and altering 13 buildings in Doheny Park. Harry Friedman, Los Angeles, \$9,455; E. W. Smith, Santa Ana, \$9,492; Clark & Campbell, Los Angeles, \$12,500; E. G. Bowen & Co., Ltd., Los Angeles, \$14,517. Contract rejected.

PLUMAS COUNTY—District II, Route 21, reinforced concrete girder bridge across Western Pacific R. R. tunnel near Keddie. Whited and Whited, Santa Rosa, \$2,477; J. P. Brennan, Redding, \$2,649; Rolla Ar buckle, Anderson, \$2,845; Chigris & Sutsos, San Francisco, \$2,882.50; John Burlinger, Orland, \$3,655; J. W. Halterman, Willows, \$3,718.50. Contract awarded to F. H. Nielson, Orland, \$2,237.40.

PLUMAS AND LASSEN COUNTIES—District II, Route 21, furnishing and applying fuel oil on portions of State highway in Plumas County and Lassen County, between Delleker and a junction with State highway route 29, near Chat. Skeels & Graham Co., Roseville, \$8,712. Contract awarded to Basalt Rock Co., Inc., Napa, \$8,712.

SACRAMENTO COUNTY—District X, Route 4, between McConnell and Sacramento, about 11.9 miles to be graded and existing rock borders to be bit surf. treated. Clyde W. Wood, Stockton, \$103,462.65; Frederickson & Watson Construction Co., Frederickson Bros., Oakland, \$118,379.65; A. Teichert & Son, Inc., Sacramento, \$121,346.35; Hemstreet & Bell, Marysville, \$136,396.45; M. J. Bevanda, Stockton, \$120,699.80; Hanrahan Company, San Francisco, \$116,234.20; S. H. Palmer and J. P. Holland, Inc., San Francisco, \$150,688.10; J. R. Reeves and Lord & Bishop, Sacramento, \$105,400.40; L. G. Kipp, Sacramento, \$117,703.25; Bundeson and Lauritzen and Delta Dredging Co., Pittsburg, \$121,235. Contract awarded to Force Construction Co., Piedmont, \$102,985.30.

SAN BERNARDINO COUNTY—District VIII, at District VIII headquarters, San Bernardino, the erection and completion of an addition to the District Office Building. Martin Green, San Bernardino, \$4,379. Contract awarded to Bakker and Robinson, San Bernardino, \$3,739.

SAN DIEGO AND IMPERIAL COUNTIES—District VII, Routes 12, D, E, F, 12-H, 12-A, 2-F, 47.3 miles shoulders to be treated with fuel oil; 0.9 miles seal coat to be applied. Miracle Co. (O. U. Miracle), San Diego, \$22,553; V. R. Dennis Const. Co., San Diego, \$25,959. Contract awarded to R. E. Hazard Contracting Co., San Diego, \$10,732.

SAN DIEGO COUNTY—District VII, Route 77, between San Diego and San Diego-Riverside County line, about 60.2 miles, treat earth shoulders with fuel oil. Miracle Company, San Diego, \$37,469.90; Oilfields Trucking Company, Taft, \$43,537.90; R. E. Hazard Contracting Co., San Diego, \$32,463.80; Clyde

Extensive Highway Oiling Contracts Among May Awards

(Continued from preceding page)

W. Wood, Stockton, \$50,819.50; Martin Bros. Trucking Co., Long Beach, \$41,717.50. Contract awarded to Southwest Paving Company, Los Angeles, \$30,188.30.

SAN LUIS OBISPO COUNTY—District V, Route 56, between San Luis Obispo and Morro, about 11.8 miles to be treated with heavy fuel oil on each side of existing pavement. Oilfields Trucking Co., Taft, \$7,557; Walter B. Roselip, San Luis Obispo, \$6,831; Santa Maria Construction Co., Santa Maria, \$6,055; Granite Construction Co., Ltd., Watsonville, \$5,973; Tiffany-McReynolds-Tiffany, San Jose, \$6,435. Contract awarded to Stewart & Nuss, Inc., Fresno, \$5,874.

SAN MATEO COUNTY—District IV, Route 68, between San Mateo and Redwood City, about 7.3 miles to be surfaced with bituminous treated crushed gravel or stone. Fred W. Nighbert, Bakersfield, \$134,003.10; Union Paving Co., San Francisco, \$136,026.50; A. Teichert & Son, Inc., Sacramento, \$169,046.50; Jack Casson, Hayward, \$147,756; C. W. Wood, Stockton, \$161,718; Granite Construction Company, Ltd., Watsonville, \$131,870.90; Valley Paving and Construction Company, Fresno, \$164,753.80; Clark & Henery Construction Company, San Francisco, \$151,920.80; Peninsula Paving Company, \$138,695.50; Jones and King, Hayward, \$148,379.90; Frederickson & Watson Construction Co., Frederickson Bros., Oakland, \$154,552.50; Heafey-Moore Co., Oakland, \$143,718.60; Hanrahan Company, San Francisco, \$129,934; Tieslav Bros. and A. Mitchell, Sacramento, \$141,300.60. Contract awarded to Basich Brothers, Torrance, \$112,910.

SANTA CLARA COUNTY—District IV, Route 2, furnishing and applying light fuel oil to earth shoulders each side of existing pavement between northerly boundary and Santa Clara, about 13.7 miles. Pacific Truck Service, Inc., San Jose, \$1,488; Lee J. Immel, Berkeley, \$1,618.80; Tiffany-McReynolds-Tiffany, San Jose, \$1,500. Contract awarded to Palo Alto Road Materials Co., Ltd., Palo Alto, \$1,342.80.

SANTA CRUZ COUNTY—District IV, Route 5, Santa Cruz, between Inspiration Point and Vine Hill road, about 5.1 miles, clear and grub highway right of way. Moore & Washburn, Santa Cruz, \$34,000; Arthur Mitchell, Sacramento, \$41,650; L. C. Seidel, Oakland, \$47,430; Meyer Rosenberg, San Francisco, \$41,820. Contract awarded to J. E. Ely, Oroville, \$28,900.

SHASTA COUNTY—District II, Route 20, near Towerhouse, 17 miles west of Redding, about 0.3 mile in length to be graded and surfaced with untreated crushed gravel or stone. Milton A. Purdy, San Francisco, \$9,687.45; Chas. N. Chittenden, Napa, \$8,783.70; Skeels & Graham Co., Roseville, \$11,516.60; J. P. Brennan, Redding, \$10,268.65; G. K. Paulos & A. R. McEwen, Sacramento, \$8,918.35. Contract awarded to H. H. Boomer, San Francisco, \$6,997.05.

SOLANO COUNTY—District X, Route 53, at Rio Vista, about 0.8 to be graded and paved with P. C. concrete. Delta Dredging Co., Pittsburg, \$28,778.42; N. M. Ball, Porterville, \$24,818.97; Valley Paving and Construction Co., Fresno, \$29,798; S. M. McGaw, Stockton, \$31,347.90; Hein Bros., Basalt Rock Co. and J. V. Galbraith, Petaluma, \$28,249.05. Contract awarded to Clyde W. Wood, Stockton, \$23,926.

TUOLUMNE COUNTY—District X, Route 13, between Sonora and $\frac{3}{4}$ mile east, about 0.6 mile to be graded and surfaced with crushed gravel or stone. Force Construction Co., \$22,207.95; Bundesen and Lauritzen, \$26,221.25; A. Teichert & Son, Inc., \$21,834.20; A. Mitchell, \$28,853; L. G. Kipp, Sacramento, \$21,172.70; Poulos and McEwen, Sacramento, \$25,362.18; Clyde W. Wood, Stockton, \$20,332; Hemstreet & Bell, Marysville, \$21,371.70; Willard-Biasotti & Lovotti, Stockton, \$20,727.25.

VENTURA AND LOS ANGELES COUNTIES—District VII, Route 2-79, between Conejos Grade and Calabasas and between Ventura and Castaic Junction, about 40.3 miles shoulder oiling. Sander Pearson, Santa Monica, \$24,640.55; Southwest Paving Company, Los Angeles, \$21,664.60; H. E. Cox & Son, Pasadena, \$26,262; Oilfields Trucking Company, Taft, \$28,568.37; Western Motor Transfer, Inc., Santa Barbara, \$28,150.51; C. A. Ladeveze, Los Angeles, \$30,617.52. Contract awarded to Kemper Construction Co., Ltd., Los Angeles, \$19,712.94.

18 Major Projects on Schedule to be Advertised in June

(Continued from page 18)

The work will involve constructing a roadbed 40 feet and 50 feet wide and placing a Portland cement concrete pavement 20 feet wide. The new alignment of this portion of this route will shorten the distance considerably and will greatly facilitate travel between the section in the vicinity of Pomona and the beaches along the coast south of Long Beach.

On the Carmel-San Simeon Highway, which skirts the rugged bluffs along the coast line of San Luis Obispo and Monterey counties, 3.9 miles is to be improved from San Remo Divide, through Carmel Highlands, to the Carmel River in Monterey County. This project includes the realignment of the highway on this section and improvement to the grade.

It is proposed to construct a graded roadbed 30 feet and 36 feet wide and to surface the entire roadbed with decomposed granite. A similar project is now under way just to the south of the proposed work between Rocky Creek and San Remo Divide.

SCENIC COAST

The alignment on the present section has been determined with much care, so that the natural beauty of this interesting coastal region will be preserved. Under a separate contract, but included within the limits of this project, a three-arch span reinforced concrete bridge is to be placed across Wild Cat Creek just south of the Highlands. This structure is to be faced with native stone and its design and finish will blend with the surrounding rocky and wooded country.

In Alameda County part of the budgeted improvement to the Dublin Canyon road is to be set in motion this coming month with the advertising for bids for placing Portland cement concrete pavement 40 feet and 30 feet wide from Stanton Avenue to the top of Castro Hill. This new pavement will carry the improvement made last year between the Foothill Boulevard and Stanton Avenue through the Castro Valley. This suburban section of the Santa Cruz-Stockton lateral carries a large volume of heavy trucking as well as passenger traffic and the present improvement will greatly facilitate the movement of traffic. The section proposed for the present project is about 2 $\frac{1}{2}$ miles in length.

ELIMINATES GRADE

The construction of the second section of the new alignment between Burney and Fall River Mills includes grading and surfacing with bituminous treated crushed rock on the 10 miles between Canyon Creek and Hat Creek Summit in Shasta County. Work has just begun on the 8.9 miles between Hat Creek Summit and Fall River Mills. These two projects, together with bridges across the Pit River, Hat Creek and Fall River, are to be constructed on new alignment and grade on this 20-mile section of the Redding-Alturas lateral and will eliminate the existing tortuous road which winds through the lava country over many small summits. At Fall River Mills these improvements will connect with some 66 miles of recently improved highway.

In Mendocino County north of Rattlesnake Summit it is proposed to grade and surface the approaches to the bridges now under construction across Little Dann Creek and Cedar Creek.

Mono Snow Conquest an Epic of Heroic Effort Tinged With Tragedy

By F. G. SOMNER, District Engineer (Retired)

On the eve of his retirement, after twenty years of outstanding work as the pioneer district engineer in the State highway service, F. G. Somner, of District IX, was faced with one of the hardest tasks of his arduous career when blizzards buried the Mono Basin region under 130 inches of snow last January. He tells a vivid story of the pluck and fortitude of the highway relief crews and the saving of two lives, characteristically giving all the credit to others.

THIS narrative does not treat of snow removal under systematic preparation. There was neither time nor opportunity for the provision of steam-heated quarters for men and machinery, similar to the Donner Pass organization, nor for the assembling of modern snow fighting equipment.

The line of action extended for a distance of 105 miles along the base of the east slope of the High Sierra, the thermometer registering from zero to 43 degrees below, accompanied from time to time by driving blizzards.

The task covered the Conway and Deadman passes, elevation over 8000 feet, the highest summits on which snow removal has been in progress, involving the longest stretch and the most difficult task of the kind ever undertaken in California, and it may be added, within the most remote region of the State.

TRAGEDY AVERTED

In the latter part of December, 1931, when the call came for relief to the marooned residents of Mono Basin and vicinity, there were no snow plows available, and the task of opening Route 23 of the State highway from Mono Basin to Bishop, over two summits, was too formidable a task for the equipment at hand, so the opening of the McPherson Grade, which connects with the Bishop-Montgomery Pass, State highway route 76, was selected as an expedient affording at least temporary relief.

If any conjectures ever existed as to the dire necessity for the prompt assignment of State maintenance forces to this task, they have been long ago set aside, owing to the fact that the lives of two persons were thereby saved. The facts from the statements of the survivors of their escape from an awful death are as follows:

SURVIVORS' STORY

Mary J. Morrison and nephew, John M. Curtin, on December 23d, while en route to

Leevining, having planned a Christmas surprise visit to Supervisor J. A. Mattly and family, encountered a severe snow storm on the McPherson Grade, when their car was stalled in the drifts 27 miles from their destination. There was no recourse but to occupy the car for protection from the intense cold and blizzards.

The storm continued with increased fury until January 1, and the car at times was prevented from being buried in the snow only by the most laborious efforts, with attending exposure to the fury of the elements. Snow shoes were improvised from sign boards found nailed to the trees, and John Curtin valiantly each day, in desperation, attempted to reach assistance. Two egg sandwiches with a small piece of cheese can not sustain life very long, particularly under such strenuous conditions, and for these unfortunates, snow was chiefly their food and drink.

DESPERATE HEROISM

On the night of January 2, after 10 days of waiting, hoping and suffering, Curtin, starved and exhausted, but with the heritage of indomitable courage still alive within him, made his final attempt to reach assistance. The fears of aunt and nephew were at all times intensified by the knowledge that no one knew of their plight; Curtin had in his mind at every step the impending fate of his beloved relative, whose life was dependent upon his survival.

With the screams of coyotes and the lurking tread of other wild animals waiting for their prey within hearing distance, adding to her terror, Mrs. Morrison, alone in the car, exhausted in mind and body, awaited what appeared to be inevitable death.

Twenty hours after Curtin left the car, and seventeen miles away, Paul Peak, with his snow fighting crew, met a staggering

(Continued on page 30)



AFTER THE STORM scenes in relief of Mono Basin: No. 1, a "muck stick" crew breaking road between Mono Lake and Bridgeport. No. 2, Snowplow operating along Rock Creek, north of Bishop. No. 3, "The Lonesome Trail"—snowshoe party taking in mail and supplies by sled. No. 4, Mono Lake in winter setting. No. 5, battling drifts near Convict Creek in Long Valley. No. 6, Piling it high with steam shovel equipment. No. 7, John Curtin, navy man, hero survivor of tragic rescue journey. No. 8, Mrs. Mary J. Morrison, aunt of Curtin, saved from perishing by his heroism.

Relief Crews Battled 50 Miles of Snow

(Continued from page 28)

human being, speechless and demented, with his life ebbing at every step.

With frozen feet, John Curtin presented a pitiable sight, the sad remains of a marvelous specimen of physical manhood. Paul Peak measured up to his responsibility in usual fashion, and to him and his hardy crew too much credit can not be given for their prompt action in the rescue of Mrs. Morrison and the speeding of John Curtin and his aunt to a physician's care.

STILL IN HOSPITAL

Thus endeth the story—a most worthy chapter in the epics of the achievements and fortitude of men and women. John Curtin, aged 28, still lies at this writing in Ward No. 7, Naval Hospital at Mare Island, having suffered the loss of several of his toes. He is first musician, Orchestra U. S. S. Flagship Pennsylvania.

Mrs. J. Morrison, his aunt, is a registered nurse, having served in the Spanish War and Philippine insurrections. This brave woman still suffers in mind and body from the effects of the terrible ordeal.

The opening of the McPherson Grade, a connecting road with the Montgomery Pass highway, provided relief for the time being only, as continued storms soon again closed this road to travel.

Importunities of the marooned, scattered residents between the Mono Basin and Owens Valley led for the second time to the intervention of Governor Rolph, prompted by the efforts of Senator Joe Riley of Bishop, resulting in the organization on February 25, by P. L. Fite, maintenance engineer, of a snow removal crew, comprised of twenty men, with a snow plow, tractors, bulldozers and "V" plows.

OPENED FIFTY MILES

For twenty-four hours a day, in eight hour shifts, along the east slope of the High Sierra, Paul Peak, with an experienced crew inured to hardships, plowed a path from Sherwin Hill to the Mono Lake Basin, a distance of fifty miles. A maximum depth of 131 inches of snow had already fallen when the work was started, which had become packed and frozen, with no sign of a road anywhere in sight.

Although there was no opportunity for the installation of proper accommodations in advance, suitable quarters were found for the

men. The equipment did not fare as well. The strain occasioned by adverse conditions, caused continuous breakdowns, with arduous repair tasks, and attendant loss of time. Hampered by extreme cold and backing up, occasioned by driving blizzards covering up progress, the task was a gruelling one.

It is traditional of the Deadman Hills that the strongest and the bravest have been conquered. The job demanded its pound of flesh from the hardy men who braved its perils, but it was accomplished.

NORTH END BATTLE

Meantime, extreme conditions prevented further progress of the mail carriers on snow shoes, sleds and horseback from Bridgeport to Mono Lake, a distance of twenty-five miles, creating the necessity of immediate relief to the residents of Bodie and Mono Lake, who were getting short of supplies.

With tractors, teams, graders and shovels, the State and county forces, under the direction of Dwight Wannacot, maintenance superintendent, comprising sixty men, surmounted this difficulty. Snow removal had been in progress all through the winter months from Bridgeport to the Bodie Junction, a distance of seven miles, in order to alleviate the difficulties of mail delivery.

At times the thermometer in this locality registered forty-three degrees below zero at night and fifteen degrees at midday, undoubtedly the coldest weather prevailing in California. Snow removal under improved conditions was completed in short order from Bridgeport to Coleville, a distance of thirty-five miles, and on April 10, an open road was declared from Los Angeles to Reno.

BIG PARADE OF 1932

A report just issued for last year by the Department of Motor Vehicles reveals that visiting motorists who toured the State in their own cars during 1931 came not only from every State in the Union, but from Alaska, Belgium, Canada, China, Cuba, England, France, the Island of Guam, Haiti, Hawaii, Holland, Italy, Japan, Mexico, Nova Scotia, Panama, The Philippine Islands, Porto Rico, Prince Edward Island, San Salvador, Samoa, and Trinidad.

Due to the Olympic Games to be held in Los Angeles this summer, it is believed that a new record will be established both for motorists from foreign countries, and from the eastern states, as inquiries from prospective motor caravans are coming in large numbers to motoring organizations.



General water conditions continue to show an improvement over last year, according to the report of State Engineer Edward Hyatt, covering activities of the Division of Water Resources for May. A low flood state has been reached in the San Joaquin River due to melting snows, and increased stream flows are recorded in the Los Angeles, San Gabriel and Santa Ana basins. Details concerning dam projects, irrigation districts, snow surveys, water resources investigations, and the State Water Plan are included in the report, as follows:

Conditions with respect to an ample water supply for the season continue to be promising and hopeful with prospects exceedingly better than the season of 1931. A number of the irrigation districts began distribution of irrigation water at earlier periods than heretofore in view of the sufficiency of water supply and the problem apparent to landowners and producers will be to secure a financial return for crops which will be commensurate to costs of production.

The economic problems confronting irrigation districts were the subject of comment and discussion during the meeting of the California Irrigation Districts Association which was held in Fresno on May 12 and 13. The meeting of the association was attended by an excellent representation of individuals in behalf of many irrigation districts and one session thereof was attended by the State Engineer.

REPORTS RENDERED

Conforming to the general policy of rendering financial statements for the information and review by the State Engineer, the following irrigation districts have rendered reports:

Banta-Carbona	Montague Water Conservation
Big Springs	Naglee Burk
Camp Far West	Newport Mesa
Carpenter	Owens Valley
El Dorado	Riverdale
Fresno	Stinson
Glenn-Colusa	West Side
Grenada	West Stanislaus
Imperial	

The city of San Diego is excavating for the foundation of the El Capitan Dam on the San Diego River which will save 118,000 acre-feet for domestic consumption which would otherwise run to waste.

The city of Pasadena recently commenced work on Pine Canyon Dam in the San Gabriel River. This will be a large dam of concrete gravity type, storing 40,000 acre-feet of water.

The State Engineer has commenced issuing certificates of approval of dams built prior to August

14, 1929, in accordance with the requirements of the Dam Act, which makes it mandatory that he either issue certificates of approval of such dams by August 14, 1932, or orders directing such work as may be necessary to make them safe. Field investigations and office studies have enabled the department to reach conclusions on over 400 dams and certificates will be issued for these as rapidly as necessary procedure will permit.

FLOOD CONTROL AND RECLAMATION

Maintenance of Sacramento Flood Control Project.

Practically all of the equipment and material previously stored at various points of the project in Sutter County, has been concentrated at the new headquarters near Sutter City, and the work of putting this material in order has continued. Also, considerable of the property stored in the Sacramento warehouse has been moved to Sutter City.

The earth dam across Gilsizer Slough has been materially strengthened and raised, so that it will be less likely to wash out each year. Willows have been planted for its protection. The water has been held up in the east levee borrow pit for the benefit of the willows planted for bank protection.

Fire guards have been made around a number of the timber structures of the project by removing inflammable weeds and grass, and this work is being continued. Repairs have been made on a number of bridges, principally on the floors. In some of our bridges the floors are subject to excessive wear, on account of the passage of tractors and farm machinery.

Emergency Flood Protection and Rectification of Rivers.

All active work of this class recently under way has been completed. An examination was recently made of banks requiring protection on the Mad River, Yager Creek and Van Duzen River, in Humboldt County. It appears necessary to do work which will cost at least \$6,000, on these streams, in cooperation with local interests, and the necessary arrangements are now being made.

Sacramento Flood Control Project—Bank Protection.

No work of this class is under way at the present time, and activities are limited to the care and upkeep of equipment.

REFUNDING DISCUSSED

On May 20, in lieu of a regular meeting of the California Districts Securities Commission, an informal discussion was conducted by members of the commission with respect to the refunding of bond issues by several California irrigation districts under certain conditions of refinancing.

South Active in Building of Dams

(Continued from page 31)

DAMS

To date 805 applications have been received for approval of dams built prior to August 14, 1929; 94 for approval of plans for construction or enlargement and 264 for approval of plans for repair or alteration.

Application was received from the city of San Jose for approval of plans and specifications for construction of an earth fill dam across the East Fork of Penetencia Creek in Santa Clara County to form a lake for recreational purposes.

Applications Received for Approval of Plans for Repair or Alteration.

DAM	OWNER	COUNTY
Suisun	Town of Suisun	Solano
Pine Grove	San Juan Ridge Mutual Water Company	Nevada
Filoli	Filoli, Inc.	San Mateo
Bear River	Pacific Gas & Electric Company	Amador
Baldwin	Pacific Gas & Electric Company	Shasta
Bidwell Lake	Bidwell Water Company	Plumas
San Pablo	East Bay Municipal Utility District	Alameda
Puddingstone	L. A. County Flood Control District	Los Angeles
Lower Feather	Feather River Improvement Company	Plumas

Plans Approved for Construction.

DAM	OWNER	COUNTY
La Patera	Sherman P. Stow Company	Santa Barbara
Patrick Reservoir	Santa Catalina Island Company	Los Angeles

Plans Approved for Repair or Alteration.

Eleven such applications were approved during this period.

There is considerable activity at the present time in dam building in the southern part of the State. The Los Angeles County Flood Control District has started work on San Gabriel No. 2 Dam in the West Fork of the San Gabriel Canyon, a large rock fill structure.

The city of Los Angeles has started work on Bouquet Canyon Dam which will be an earth fill structure capable of storing 36,200 acre-feet of water.

Russian River Jetty.

Inasmuch as the weather conditions from now until December first will be favorable, it is proposed to start work in the quarry on about June first and to commence depositing rock in the jetty by June fifteenth.

Flood Measurements and Gages.

A low flood stage has been reached in the San Joaquin River on account of melting snows, and discharge measurements have been made at Mossdale bridge, Paradise Cut and Vernalis. A discharge measurement was also made on the Bear River at Wheatland at a low flood stage, in connection with the preparation of a rating curve. The routine work of maintaining the continuous water stage recorders has been continued, and the compilation of records has proceeded in the office.

WATER RIGHTS

Applications to Appropriate.

A complete list of the applications to appropriate

water received and approved during the month of April will be found elsewhere in this issue. Twenty-seven applications were received, 12 were denied, 13 were approved and 34 licenses were issued.

Inspections of projects under permit and investigations of protested cases were made during the month in San Diego, Los Angeles, Riverside, San Bernardino, Ventura, Santa Barbara, San Luis Obispo, San Benito, Monterey, Santa Cruz, Napa, Lake, Sonoma, Mendocino, Humboldt, and Trinity counties.

ADJUDICATIONS

Shasta River (Siskiyou County)—Case pending in the Superior Court of Siskiyou County.

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.

North Cow Creek (Shasta County)—The North Cow Creek case (*Charles L. Lemm et al. vs. John Rutherford et al.*) referred to the Division by the Superior Court of Shasta County by Order of Reference dated April 25, 1923, was terminated by a decree entered by the court on April 29, 1932. The decree adjudicates water rights to the extent of 30.63 cubic feet per second for the irrigation of 1332 acres and a small amount of municipal use at Ingot, and 7.50 cubic feet per second for power purposes. The water rights defined are appurtenant to 49 property tracts which are served by 46 diversion conduits.

Oak Run Creek (Shasta County)—The Division's report as referee in the Oak Run Creek case is in the course of preparation.

Clover Creek (Shasta County)—Action on the case in the Superior Court of Shasta County is pending the outcome of negotiations for settlement by stipulation.

Deep Creek (Modoc County)—The schedule of allotments adopted by the water users for trial distribution during the 1932 irrigation season was administered by a water master throughout the month.

Franklin Creek (Modoc County)—The schedule of allotments for trial distribution for the 1932 irrigation, adopted by the water users on March fourteenth, was administered by a water master throughout the month.

New Pine Creek (Modoc County)—The stipulation for judgment submitted to the water users at a conference held at New Pine Creek on March 16, 1932, has been signed by all parties at interest, except one.

Eagle Creek (Modoc County)—The waters of Eagle Creek were distributed throughout the month in accordance with the plan for trial distribution adopted by the water users on March fifteenth.

South Fork Pit River (Modoc County)—Field work on the South Fork Pit River Reference was carried on throughout the month, including distribution of the waters of the stream system in accordance with the schedule of allotments adopted for the 1932 season.

Stream Flow Estimate Increased

(Continued from preceding page)

Pine Creek (Modoc County)—The water users have agreed to a plan of distribution to be tried out during the 1932 season; and the waters of the stream were distributed in accordance with such plan during the month.

Cottonwood Creek (Modoc County)—The case of *Oliver vs. Robnett, et al.*, involving the rights to the use of the waters of Cottonwood Creek in Goose Lake Valley, was referred to the Division by the Superior Court of Modoc County by an Order of Reference dated May 19, 1932. The determination covers an irrigated area of approximately 1000 acres.

WATER DISTRIBUTION

Hat Creek (Shasta County)—Water master service for the 1932 season was commenced on Hat Creek on May first.

Pit River in Big Valley (Modoc and Lassen counties)—Supervision of diversions from Pit River in Big Valley for the 1932 season was commenced on May first.

Cedar, Davis, Deep, Eagle, Emerson, Franklin, Mill, New Pine, Owl, Pine and Soldier creeks and South Fork Pit River (Modoc County)—Water master service on these streams was continued throughout the month.

SACRAMENTO-SAN JOAQUIN WATER SUPERVISOR

Field work comprising the measurements of all diversions, return flow, use of water, salinity, etc., throughout the Sacramento-San Joaquin territory, has increased during the past month in proportion to the increase in the diversions of water with the advance of the season. In the office, work has continued in completing the report for the 1931 season and the special report on losses in 1931 due to salinity and water shortage. Sampling at the permanent salinity stations in the upper bay and delta region and operation of the tide gages has been maintained. Recent salinity tests show the following:

Salinity Tests, Upper Bay and Sacramento-San Joaquin Delta, May 10, 1932

Station	Salinity in parts of chlorine per 100,000 parts of water
Point Orient.....	920
Point Davis.....	380
Bullshead.....	80
Bay Point.....	2
O and A Ferry.....	2
Collinsville.....	1
Antioch.....	1
Jersey.....	2
Central Landing.....	2
Middle River P. O.....	4

At present the major streams supplying the Sacramento-San Joaquin valleys are showing the effects of the melting snow and the flow of the Sacramento River at Sacramento on April sixteenth was 43,000 cubic feet per second.

CALIFORNIA COOPERATIVE SNOW SURVEYS

Although the principal snow surveys as a basis for stream flow estimates were made at the last of March and reported in the April first bulletin, additional surveys were made in the latter part of April at the key snow courses to furnish information for possible modification of earlier estimates in accordance with the addition to or melting of the snow pack since April first. These later surveys complete the seasonal record of monthly surveys, February to May, for the key snow courses.

The recent surveys showed that melting has occurred at all measured snow courses below 8000 feet but above that elevation, six out of sixteen courses on the western Sierra slope showed an increase in the pack and water content over the April first measurements. In general, for a given elevation below 8000, the results indicated an increase in the percentage of melting in going from northern to southern basins of the Sacramento-San Joaquin drainage. For the 8000-foot elevation the average per cent of melting appeared to increase, north to south, from about 5 to 20 per cent; for 7000-foot elevation from about 15 to 30 per cent; for 6000, from about 35 to 75 per cent; and for 5000, from about 65 to 100 per cent. In 1931 the corresponding data indicated melting at all measured courses; varying from 5 to 70 per cent for those above elevation 7500 and practically 100 per cent or no snow for all courses below 7500.

INCREASED STREAM FLOW

As was the case on April first, the average precipitation to May first in per cent of normal showed, in general, a progressive increase in going from northern to southern stream basins of the western Sierra slope, with a variation from about 80 per cent in the north to 130 per cent in the south. The Los Angeles, San Gabriel and Santa Ana basins showed a variation from about 115 to 140 per cent and the basins of the eastern Sierra slope varied from about 100 per cent in the Truckee and Tahoe basins to about 140 per cent in the Owens basin.

The above normal April precipitation in northern basins combined with the small percentage of melting or actual increase of the snow pack at the higher elevations seemed to warrant a slight upward modification of the estimates given on April first for seasonal stream flow in these basins. On this basis the estimate of the seasonal stream flow in per cent of the 40-year average (1889-1929) for the entire Sacramento basin including tributaries was increased from 75 to 80 per cent. In San Joaquin basins, the barely normal or subnormal April precipitation combined with the greater percentage of melting and lesser actual accretions to the high elevation snow pack appeared to warrant no change in the April first stream flow estimates and the estimate of the 1932 seasonal stream flow for the entire Sacramento-San Joaquin drainage remains at 90 per cent, the April first figure.

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All Clear for the Olympiad With Big Highway Program Completed

BETWEEN July 30th and August 14th the Tenth Olympiad will be held in Los Angeles. During the summer California will be host to the thousands who are making their way to the southwestern metropolis to witness the foremost sport classic of the world. That the visitors within the boundaries of the State may be granted every facility for travel, the Department of Public Works has rushed work on the main State highways leading into Los Angeles.

The following paragraphs present brief descriptions of some of the more important work on these arterials which has been rushed to completion in the past few months and projects now being finished in order that they may be ready by the time set for the opening of the Olympic games.

NEW TUNNEL OPENED

On the Victory Highway, important improvement has been completed in Placer County with the placing of Portland cement concrete pavement between Newcastle and Auburn and in the opening of the new tunnel under the town of Newcastle. Work on this section of transcontinental highway has been under way for the past eighteen months and the new pavement presents a section of modern highway through the Auburn ravine, and the tunnel under the Newcastle hill obviates the heavy grade and crooked alignment through the business portion of that town.

Four major projects have recently been completed on the Golden State Highway which connects the capitol city of Sacramento with Los Angeles via the broad and fertile San Joaquin Valley.

Between Turner Station and Stockton in San Joaquin County, five miles of Portland cement concrete pavement 20 feet wide have been placed and the remaining two miles surfaced with a bituminous non-skid surface. This project called for widening the old narrow roadbed and required the construction of nine bridges and the widening of two. This improvement brings to modern standards of high-speed highway construction the seven miles immediately south of Stockton.

Further south, the narrow twenty-year-old

bridge across the Fresno River at Madera has been replaced with a modern steel stringer bridge composed of twelve 41-foot spans on steel pile bents. The new structure and the new paved approaches were placed on an improved alignment at this river crossing and provide an improvement which can adequately care for the heavy traffic borne by the central artery of the State's highway system.

In Tulare County the roadbed of the highway between Goshen and Kingsburg has been widened to a full 36 feet and the entire 12 miles paved with asphalt concrete 20 feet wide and a 30-foot pavement placed through the town of Kingsburg.

In conjunction with the road work on this section of the Los Angeles-Sacramento arterial four reinforced concrete girder bridges were constructed and two existing bridges widened. All of the structures on this portion of the route now provide a clear roadway width of 34 feet.

CROSSINGS ELIMINATED

The seven and a half miles of highway just south of Tulare have been constructed on an alignment entirely on the easterly side of the tracks of the Southern Pacific Railroad, thereby eliminating from the State road system the grade crossings at Tipton and Tulare. This new construction meets the requirements of modern thoroughfares with its 20-foot Portland cement concrete pavement and eight-foot shoulders. Five bridges were required on this section, all providing a clear roadway 34 feet wide.

On the main interstate highway connecting Los Angeles and Salt Lake City work has been pushed forward so that as great a mileage as possible on this important entrance into southern California be graded and surfaced to modern standards.

Two contracts covering construction on nearly 37½ miles have been completed this spring. One included the highway from the Cronise Valley to six miles west of Baker and the other contract extended from six miles west of Baker to Halloran Summit. Of the 193 miles of this route between San Bernardino and the State line near Jean,

(Continued on page 39)

Giant of Forest Laid Low; Victim of an Insect Pest

THE CALIFORNIA Department of Public Works is always reluctant to sanction the cutting down of trees. The policy is to preserve them whenever practically possible and encourage the planting of them along State highways. Occasionally circumstances make the removal of a tree necessary as happened in the case of a giant yellow pine, long a landmark on the Big Bear road, in San Bernardino County. The facts are given as follows by Assistant Highway Engineer B. A. Switzer of District VIII:

"During the fall of 1931 it was noticed a huge yellow pine tree, alongside the State highway on the recreational road to Bear Valley, was dying through an attack of the Western Pine Beetle. The tree died during the winter and in order to prevent infection to adjacent areas and to remove a possible hazard from the State highway, it was decided to cut the tree down.

"The tree was removed with unemployment relief workers in May. It was found to be 157 feet in height and over six feet in diameter.

"The tree was cut 12 feet above the ground surface in order that a sort of memorial might be left and admired by the traveling public. Four hundred and seventy-five annual rings were counted at this cut, which gives an age of over 500 years for this ancient monarch of the forest. This tree was located at Deer Lake approximately 28 miles from San Bernardino on the San Bernardino-Bear Valley highway."

There are more than 7850 motorcycle traffic officers in the United States, according to a report on a nation-wide survey. Nearly three-fourths of these officers are in the service of municipal police departments. Approximately 2000 are members of state highway patrols and state police.

FISCAL ADVISORY BOARD NAMED FOR SAN FRANCISCO-OAKLAND BAY BRIDGE

(Continued from page 6)

height will be used in the west bay channel structure in addition to the center anchorage.

Each of the four towers in the west bay structure will be topped by airplane beacons with navigation lights marking clearance and fenders.



"WHAT A FALL was there, my countrymen," when this 157-foot giant yellow pine, killed by disease, smote the earth.



FIVE HUNDRED YEARS it withstood all vicissitudes of the elements on a San Bernardino Mountain slope only to fall victim to an insect pest. It measured six feet in diameter at the butt.

The piers under the two 460-foot towers will cost \$1,750,000 and \$2,750,000, one being sunk 100 feet to bedrock and the other to 175 feet. The center anchorage, to which the cables from each side structure will be secured, will cost approximately \$4,500,000. The center anchorage as designed will be 110 feet by 220 feet, and will rise 300 feet above water and will extend 210 feet below water to a solid foundation in thoroughly tested bedrock. It will be of concrete and steel.

Vital Statistics on Dam Construction

Applications for approval of dams built prior to August 14, 1929, filed with the State Department of Public Works, Division of Water Resources, during the month of May, 1932.

INYO COUNTY—Tungsten, Upper Dam No. 704. J. V. Baldwin Motor Co., Los Angeles, owner; rockfill, 33 feet above streambed with a storage capacity of 8 acre-feet, situated on Deep Canyon tributary to Horton Creek in T. 7 S., R. 31 E., M. D. B. and M. For storage of tailings.

INYO COUNTY—Tungsten, Upper Dam No. 704-2. J. V. Baldwin Motor Co., Los Angeles, owner; sand, 27 feet above streambed with a storage capacity of 2 acre-feet, situated on Deep Canyon tributary to Horton Creek in T. 7 S., R. 31 E., M. D. B. and M. For storage of tailings.

LASSEN COUNTY—Ward Lake Lower Dam No. 227-2. Gibson Land Company, Litchfield, owner; earth, 18 feet above streambed with a storage capacity of 900 acre-feet, located in Sec. 5, T. 29 N., R. 14 E., M. D. B. and M. For storage purposes for irrigation use.

LASSEN COUNTY—Meadow Brook Farm Dam No. 229. L. R. Cady and Frank Coffin, Susanville, owners; masonry, 20 feet above streambed with a storage capacity of 10 acre-feet, situated on Baxter Creek tributary to Honey Lake in Sec. 26, T. 29 N., R. 12 E., M. D. B. and M. For storage purposes for irrigation and recreation use.

SIERRA COUNTY—Kanaka Dam No. 299. Kanaka Mines Syndicate, San Francisco, owner; log crib, 30 feet above streambed with no storage capacity, situated on Kanaka Creek tributary to Middle Fork Yuba River in Sec. 5, T. 18 N., R. 10 E., M. D. B. and M. For diversion purposes for mining and milling use.

LASSEN COUNTY—Ward Lake Upper Dam No. 227. Gibson Land Company, Litchfield, owner; gate, located in Sec. 32, T. 30 N., R. 14 E., M. D. B. and M. For storage purposes for irrigation use.

Applications for approval of plans and specifications for repair or alteration of dams filed with the State Department of Public Works, Division of Water Resources, during the month of May, 1932.

SHASTA COUNTY—Baldwin Dam No. 97-85. (Removal.) Pacific Gas and Electric Company, San Francisco, owner; earth, 19 feet above streambed with a storage capacity of 100 acre-feet, located in Sec. 33, T. 31 N., R. 1 E., M. D. B. and M. For storage purposes for power use.

PLUMAS COUNTY—Bidwell Lake Dam No. 273. Bidwell Water Company, Greenville, owner; earth and rock, situated on North Canyon Creek tributary to Indian Creek in Sec. 15, T. 20 N., R. 9 E., M. D. B. and M.

ALAMEDA COUNTY—San Pablo Dam No. 31-6. East Bay Municipal Utility District, Oakland, owner; earth, situated on San Pablo Creek tributary to San Francisco Bay in Lot 5 Rancho El Sobrante.

LOS ANGELES COUNTY—Puddingstone Dam No. 329. Los Angeles County Flood Control District, Los Angeles, owner; earth, situated on Puddingstone Creek tributary to Walnut Creek in Sec. 15, T. 1 S., R. 9 W., S. B. B. and M.

PLUMAS COUNTY—Lower Feather River Dam No. 282-2. Feather River Improvement Co., Blairsden, owner; earth, situated on Middle Fork tributary to Feather River.

TRINITY COUNTY—Lower Stewarts Fork Dam No. 212. La Grange Placers, Ltd., Weaverville, owner; rock masonry, situated on Stuarts Fork tributary to Trinity River in Sec. 3, T. 36 N., R. 10 W., M. D. B. and M.

PLANS APPROVED

Plans for the repair or alteration of dams approved by the State Department of Public Works, Division of Water Resources, during the month of May, 1932.

NEVADA COUNTY—Pine Grove Dam No. 312-2. San Juan Ridge Mutual Water Association, Marysville, owner; earth, situated on unnamed creek tribu-

tary to South Yuba River in Sec. 19, T. 17 N., R. 8 E., M. D. B. and M.

SAN MATEO COUNTY—Filoli Dam No. 617. Filoli, Inc., San Mateo, owner; earth, situated on branch of Laguna Creek tributary to San Mateo Creek in Sec. 30, T. 5 S., R. 4 W., M. D. B. and M.

AMADOR COUNTY—Bear River Dam No. 97-61. Pacific Gas and Electric Company, San Francisco, owner; rock, situated on Bear River tributary to North Fork Mokelumne in Sec. 9, T. 8 N., R. 16 E., M. D. B. and M.

MARIN COUNTY—Belvedere Dam No. 33-4. Marin Municipal Water District, San Rafael, owner; earth, located on south slope of Tamalpais.

SHASTA COUNTY—Baldwin Dam No. 97-85. Pacific Gas and Electric Company, San Francisco, owner; earth, 19 feet above streambed with a storage capacity of 100 acre-feet, located in Sec. 33, T. 31 N., R. 1 E., M. D. B. and M. For storage purposes for power use.

PLUMAS COUNTY—Bidwell Lake Dam No. 273. Bidwell Water Company, Greenville, owner; earth and rock, situated on North Canyon Creek tributary to Indian Creek in Sec. 15, T. 26 N., R. 9 E., M. D. B. and M.

ALAMEDA COUNTY—San Pablo Dam No. 31-6. East Bay Municipal Utility District, Oakland, owner; earth, situated on San Pablo Creek tributary to San Francisco Bay, located on Lot 5 Rancho El Sobrante.

LOS ANGELES COUNTY—Puddingstone Dam No. 32-9. Los Angeles County Flood Control District, Los Angeles, owner; earth, situated on Puddingstone Creek tributary to Walnut Creek.

MODOC COUNTY—McBrien River Dam No. 152-6. McBrien Estate and Mrs. E. G. McConnell, Alturas, owners; buttress, situated on Pit River tributary to Sacramento in Sec. 16, T. 42 N., R. 11 E., M. D. B. and M.

PLUMAS COUNTY—Feather River, Lower Dam No. 282-2. Feather River Improvement Co., Blairsden, owner; earth, situated on Middle Fork Feather tributary to Feather River.

Governor Rolph's Water Commission Reports

(Continued from page 25)

Relative to its Recommendation No. 2, the committee states:

"From personal observation and knowledge we concede the acute situation existing in the counties of Tulare and Kern, where a constantly increasing number of farms and homes are being abandoned from the effects of the continued lowering of their water levels, and the necessity for salinity control in the Sacramento-San Joaquin delta area. Therefore, we deem it essential that every possible means be put into force to expedite as soon as possible the necessary structures and works to alleviate these situations."

Appended to the main report are a statement by Senator Ralph E. Swing, and a minority report by Senator W. P. Rich, Senator Ralph H. Clock and Assemblyman J. E. Frazier, setting forth their views and objections to certain features of the report.

"Well," said the customs inspector at the Canadian border to the dusky driver of the ancient Ford. "Have you any dutiable stuff?"

"No, sah," said the dusky driver. "I got me a couple bottles o' gin, but that ain't no duty; at's a pleasure."—*The Earth Mover*

May Water Applications and Permits

Applications for permit to appropriate water filed with the State Department of Public Works, Division of Water Resources, during the month of May, 1932.

NEVADA COUNTY—Application No. 7250. William F. Bickel, Box 294, Nevada City, for 25 c.f.s. from South Fork of Little Deer Creek tributary to Deer Creek and Yuba River to be diverted in Sec. 2, T. 16 N., R. 10 E., M. D. B. and M., for mining and domestic purposes.

PLACER COUNTY—Application 7251. W. C. Ham-matt, 1004 Hearst Bldg., San Francisco, for 120 c.f.s. and 50,000 acre-feet per annum from Middle Fork American River tributary to Sacramento River to be diverted in Sec. 36, T. 15 N., R. 13 E., M. D. B. and M., for power purposes (5460 h.p.).

MODOC COUNTY—Application 7252. F. A. Neasham and Lloyd Neasham, c/o A. F. Neasham, Bidwell, for 6 c.f.s. and 400 acre-feet per annum from Lieberman Creek tributary to Upper Alkali Lake to be diverted in Sec. 9, T. 45 N., R. 17 E., M. D. B. and M., for irrigation purposes (480 acres).

SISKIYOU COUNTY—Application 7253. Chas. E. Hudson and R. E. Colburn, c/o Chas. E. Hudson, 321 Bush street, San Francisco, for 12 c.f.s. from South Fork of Clear Creek tributary to Klamath River to be diverted in Sec. 21, T. 15 N., R. 6 E., H. B. and M., for mining purposes.

TUOLUMNE COUNTY—Application 7254. State of California, Dept. of Public Works, Division of Highways, District X, for 0.005 c.f.s. from Blue Spring tributary to Sullivan Creek, thence Woods Creek and Tuolumne River to be diverted in Sec. 19, T. 2 N., R. 16 E., M. D. B. and M., for recreational purposes. Estimated cost \$300.

EL DORADO COUNTY—Application 7255. B. W. Stone, 16 California St., San Francisco, for 500 c.f.s. and 125,000 acre-feet per annum from (1) Rubicon River (2) Pilot Creek (3) Gerle Creek (4) Loon Lake (5) Buck Island Lake (6) Rock Bound Lake (7) Little South Fork Rubicon River, tributary to American River Drainage area to be diverted in Sec. 9, T. 13 N., R. 16 E., M. D. B. and M., Sec. 11, T. 12 N., R. 12 E., M. D. B. and M., Sec. 24, T. 13 N., R. 13 E., M. D. B. and M., Secs. 11, 31 and 34, T. 14 N., R. 14 E., M. D. B. and M., Sec. 4, T. 13 N., R. 15 E., M. D. B. and M. and Sec. 2, T. 13 N., R. 14 E., M. D. B. and M., for municipal purposes.

LOS ANGELES COUNTY—Application 7256. United States, Angeles National Forest, 501 Brownstein-Louis Bldg., Los Angeles, for 0.003 c.f.s. from Fisher Spring tributary to Piru Creek Watershed to be diverted in Sec. 19, T. 6 N., R. 17 W., S. B. B. and M., for recreational and fire protection purposes. Estimated cost \$100.

KERN COUNTY—Application 7257. F. A. Jung-kuit, 4100 Cromwell Ave., Los Angeles, for 3.0 c.f.s. from Antelope Creek tributary to Tehachapi Creek to be diverted in Sec. 28, T. 32 S., R. 33 E., M. D. B. and M., for irrigation purposes. Estimated cost \$150.

RIVERSIDE COUNTY—Application 7258. Stuart D. Allen and Sarah D. Allen, Box 28, Star Route, Redlands, for 0.5 c.f.s. from Whitewater River tributary to Salton Sink to be diverted in Sec. 24, T. 3 S., R. 3 E., S. B. B. and M., for irrigation purposes (40 acres). Estimated cost \$2000.

ALPINE COUNTY—Application 7259. State of California, Department of Public Works, Division of Highways, District X, for 0.005 c.f.s. from unnamed spring tributary to Kirkwood Creek, thence Cables Creek, Silver Fork of South Fork American River, South Fork American River and American River, to be diverted in Sec. 22, T. 10 N., R. 17 E., M. D. B. and M., for recreational purposes. Estimated cost \$250.

PLACER COUNTY—Application 7260. A. A. Gorman, Michigan Bluff, for 3.0 c.f.s. from Peavine Creek tributary to North Fork of Middle Fork American River, Middle Fork American River, American River and Sacramento River to be diverted in Sec. 14, T. 14 N., R. 12 E., M. D. B. and M., for mining and domestic purposes. Estimated cost \$3,000.

HUMBOLDT COUNTY—Application 7261. Carl O. Rothermund, Dyerville, for 3 c.f.s. from (1) and 3 c.f.s. from (2) 6 c.f.s. total, from (1) Ball Creek and

(2) Cuneo Creek, tributary to Eel River to be diverted in Sec. 36, T. 1 S., R. 1 E., H. B. and M., for industrial purposes (fish hatchery and fish ponds). Estimated cost \$400.

SISKIYOU COUNTY—Application 7262. George H. Cory, c/o Albert F. Stone, Box 61, Callahan, for 3 c.f.s. from Little Carmen Creek tributary to Grouse Creek and East Fork Scott Creek to be diverted in Sec. 29, T. 40 N., R. 7 W., M. D. B. and M., for power and domestic purposes (25.56 h.p.).

SISKIYOU COUNTY—Application 7263. George H. Cory, c/o Albert F. Stone, Box 61, Callahan, for 3 c.f.s. from Little Carmen Creek tributary to Grouse Creek and East Fork Scott River to be diverted in Sec. 29, T. 40 N., R. 7 W., M. D. B. and M., for mining and domestic purposes.

TUOLUMNE COUNTY—Application 7264. Alice Meyer, W. H. Wilson and E. J. Bartlett, c/o Alice Meyer, Groveland, for 2 c.f.s. from South Fork Tuolumne River to be diverted in Sec. 29, T. 1 S., R. 13 E., M. D. B. and M., for power purposes (8 h.p.). Estimated cost \$1,000. (Tributary to Tuolumne River.)

MONO COUNTY—Application 7265. Helen Patterson, Bishop, for 200 gallons per day from Rock Creek tributary to Owens River to be diverted in Sec. 33, T. 4 S., R. 30 E., M. D. B. and M., for domestic purposes. Estimated cost \$25.

SAN BERNARDINO COUNTY—Application 7266. W. C. Hay, 555 S. Flower St., Los Angeles, for 3.0 c.f.s. from Arctic Canyon Springs tributary to Arctic Canyon thence Mojave to be diverted in Sec. 20, T. 3 N., R. 1 E., S. B. B. and M. for power and domestic purposes (102 h.p.). Estimated cost \$25,000.

SAN BERNARDINO COUNTY—Application 7267. W. C. Hay, 555 S. Flower St., Los Angeles, for 3 c.f.s. from Arctic Canyon Springs tributary to Arctic Canyon thence Mojave Desert to be diverted in Sec. 20, T. 3 N., R. 1 E., M. D. B. and M., for mining and domestic purposes. Estimated cost \$25,000.

LOS ANGELES COUNTY—Application 7268. United States, Angeles National Forest, 501 Brownstein-Louis Bldg., Los Angeles, for 0.005 c.f.s. from Artesian Spring tributary to Boquet Canyon thence Santa Clara River to be diverted in Sec. 33, T. 6 N., R. 14 W., S. B. B. and M., for recreational and domestic purposes. Estimated cost \$50.

LOS ANGELES COUNTY—Application 7269. United States, Angeles National Forest, 501 Brownstein-Louis Bldg., Los Angeles, for 0.002 c.f.s. from White Spring tributary to Piru Creek to be diverted in Sec. 29, T. 6 N., R. 17 W., S. B. B. and M., for fire suppression purposes. Estimated cost \$40.

MONTEREY COUNTY—Application 7270. State of California, Department of Public Works, Division of Highways, Public Works Bldg., Sacramento, for 0.0008 c.f.s. from Little Soda Springs Creek tributary to Pacific Ocean to be diverted in Sec. 25, T. 24 S., R. 5 E., M. D. B. and M., for recreational purposes. Estimated cost \$235.

MONTEREY COUNTY—Application 7271. State of California, Department of Public Works, Division of Highways, Public Works Bldg., for 0.0008 c.f.s. from Redwood Creek tributary to Pacific Ocean to be diverted in Sec. 23, T. 24 S., R. 5 E., M. D. B. and M., for recreational purposes. Estimated cost \$250.

MONTEREY COUNTY—Application 7272. State of California, Department of Public Works, Division of Highways, Public Works Bldg., Sacramento, for 0.0008 c.f.s. from Spruce Creek tributary to Pacific Ocean to be diverted in Sec. 4, T. 24 S., R. 5 E., M. D. B. and M., for recreational purposes. Estimated cost \$250.

SIERRA COUNTY—Application 7273. C. E. Brewer, P. O. Box 1411, Station "C" Los Angeles, for 3 c.f.s. from unnamed stream tributary to South Fork of North Fork of Yuba River to be diverted in Sec. 32, T. 20 N., R. 11 E., M. D. B. and M., for mining purposes. Estimated cost \$600.

TEHAMA COUNTY—Application 7274. H. H. Ham-mer, Red Bluff, for 3 c.f.s. from South Fork Cotton-wood Creek tributary to Sacramento River to be diverted in Sec. 12, T. 26 N., R. 8 W., M. D. B. and M., for irrigation and domestic purposes (5 acres).

Water Permits and Applications in May

(Continued from page 37)

Permits to appropriate water issued by the Department of Public Works, Division of Water Resources, during the month of May, 1932.

MENDOCINO COUNTY—Permit 3887, Application 7176. Harold H. Wonacott, Fort Bragg, May 6, 1932, for 2.00 c.f.s. from Digger Creek tributary to Pacific Ocean in (1) Sec. 24, T. 18 N., R. 18 W., M. D. B. and M., and (2) Sec. 19, T. 18 N., R. 17 W., M. D. B. and M., for industrial purposes on trout farm. Estimated cost \$1,000.

ALPINE COUNTY—Permit 3888, Application 6971. Division of Highways, District X, Sacramento, May 7, 1932, for 0.016 c.f.s. from unnamed spring tributary to Stanislaus River in Sec. 35, T. 6 N., R. 20 E., M. D. B. and M., for domestic and fire protection purposes. Estimated cost \$1,000.

TEHAMA COUNTY—Permit 3889, Application 7156. Department of the Interior, Lassen Volcanic National Park Mineral, Tehama County, May 7, 1932, for 0.50 c.f.s. from unnamed spring tributary to Battle Creek and Sacramento River in Sec. 25, T. 29 N., R. 3 E., M. D. B. and M., for domestic and fire protection purposes.

SAN JOAQUIN COUNTY—Permit 3890, Application 5807. Woodbridge Irrigation District, Woodbridge, May 9, 1932, for 300 c.f.s. from Mokelumne River, tributary to San Joaquin River in Sec. 34, T. 4 N., R. 6 E., M. D. B. and M., for domestic and irrigation of a total of 23,985.81 acres. Estimated cost \$51,600.

TRINITY COUNTY—Permit 3891, Application 6918. Trinity Loop Mining Co., 1448 Webster St., Oakland, May 14, 1932, for 10 c.f.s. from Hawkins Creek tributary to Trinity River in Sec. 21, T. 6 N., R. 6 E., H. B. and M., for mining and domestic purposes. Estimated cost \$6,000.

MONTEREY COUNTY—Permit 3892, Application 6285. Edward S. Moore and Santa Lucia Corp., Ltd., c/o Agnew & Boekel, Attys., Federal Reserve Bank Bldg., San Francisco, May 16, 1932, for 12.2 c.f.s. from West Fork Lime Kiln Creek, Vicente Creek, Big Creek, South Branch Rat Creek and tributaries, tributary to Pacific Ocean in Monterey County, in vicinity of Lucia, Cal., for domestic, recreational and subdivision purposes. Estimated cost \$500,000.

MONTEREY COUNTY—Permit 3893, Application 6570. Edward S. Moore and Santa Lucia Corp., Ltd., c/o Agnew & Boekel, Attys., Federal Reserve Bank Bldg., San Francisco, May 16, 1932, for 7.0 c.f.s. from West Fork Lime Kiln Creek and North and South Forks of Big Creek, in Sec. 9, T. 22 S., R. 4 E., M. D. B. and M., and Secs. 19 and 29, T. 21 S., R. 4 E., M. D. B. and M., for domestic purposes and the irrigation of 598 acres. Estimated cost \$500,000.

LOS ANGELES COUNTY—Permit 3894, Application 6821. Gus Wissendorf, Swartout, May 18, 1932, for 1.25 c.f.s. from Mine Gulch tributary to Prairie Fork, thence San Gabriel in Sec. 17, T. 3 N., R. 8 W., S. B. B. and M., for mining and domestic purposes. Estimated cost \$2,000.

AMADOR COUNTY—Permit 3895, Application 6505. Preston School of Industry, State of California, Waterman, May 19, 1932, for 10 c.f.s. and 2500 acre-feet per annum from Sutter Creek tributary to Mokelumne River via Dry Creek in Sec. 1, T. 6 N., R. 10 E., M. D. B. and M., for power purposes (309.8 h.p.). Estimated cost \$75,000.

AMADOR COUNTY—Permit 3896, Application 6506. Preston School of Industry, Waterman, May 19, 1932, for 8.3 c.f.s. and 2500 acre-feet per annum from Sutter Creek, tributary to Mokelumne River via Dry Creek in Sec. 1, T. 6 N., R. 10 E., M. D. B. and M., for domestic use and the irrigation of 958.82 acres in Secs. 13, 14, 23, 24, 25, and 26, T. 6 N., R. 9 E., M. D. B. and M. Estimated cost \$75,000.

SAN DIEGO COUNTY—Permit 3897, Application 3304. Coronado Water Co., San Diego, May 21, 1932, for 7.74 c.f.s. and 614 acre-feet per annum from the flood and surplus underground waters of Tia Juana Valley Basin, tributary to Pacific Ocean in Sec. 4, T. 19 S., R. 2 W., S. B. B. and M., for irrigation of 4194.35 acres. Estimated cost \$508,375.

INYO COUNTY—Permit 3898, Application 5289. Baxter Brothers Co., Independence, May 23, 1932, for 0.25 c.f.s. from Lower Lead Canyon Spring, tributary of Saline Valley via Lead Canyon in Sec. 7, T. 12 S.,

Report of Water Resources June 1, 1932

(Continued from page 33)

WATER RESOURCES

Pit River Investigation (Modoc and Lassen counties).

Work on the report covering the three-year investigation on the Pit River has progressed during the month.

Napa Valley Investigation.

Regular weekly readings were made during April of gages and additional measurements were taken of the flow on Dry Creek and Rector Creek. In the office assembly of the data began preparatory to issuance of a report.

Santa Clara Investigation.

Such wells as could not be read for various reasons at the time of the regular March readings were read during April. Further percolation tests were made on Campbell and Los Gatos Creek and Kirk Ditch to supplement those made earlier in the season when bank seepage was a disturbing factor, and gages have been read regularly on San Antonio Creek, San Tomas Creek, Penitencia Creek and Berryessa Creek. These streams have continued to flow into the valley throughout the month and such water as has not been withdrawn by pumping will sooner or later reach the general ground water supply. Preparation of rating curves and computation of total discharges for the various stations maintained during the season is in progress.

Miscellaneous Investigations.

Good progress is being made, and work is proceeding along routine lines in the South Coastal, Ventura County, Salinas Valley and Mojave River investigations.

"A bore had been talking for over an hour about himself and his achievements.

"I'm a self-made man, that's what I am—a self-made man!" he gloated.

"You quit work too soon," came a weary voice from the corner.—*No. Dakota Bulletin*

R. 37 E., M. D. B. and M., for mining and milling purposes. Estimated cost \$150.

SIERRA COUNTY—Permit 3899, Application 7189. J. K. Latta, Downieville, May 24, 1932, for 0.50 c.f.s. from unnamed ravine tributary to North Fork Yuba River in Sec. 6, T. 19 N., R. 10 E., M. D. B. and M., for mining and domestic purposes. Estimated cost \$200.

PLACER COUNTY—Permit 3900, Application 6983. Brockway Land and Water Co., 125 S. Grand St., Pasadena, May 26, 1932, for 1 c.f.s. from Griff Creek, tributary to Lake Tahoe, in Sec. 18, T. 16 N., R. 18 E., M. D. B. and M., for domestic use and the irrigation of 80-acre golf course.

MENDOCINO COUNTY—Permit 3901, Application 7095. Harold H. Wonacott, Fort Bragg, May 26, 1932, for 4000 gallons per day from South Fork Digger Creek, tributary to Big Digger Creek, thence Pacific Ocean in Sec. 19, T. 18 N., R. 17 W., M. D. B. and M., for domestic purposes.

SISKIYOU COUNTY—Permit 3902, Application 7123. William M. Clark, Happy Camp, May 28, 1932, for 1 c.f.s. from Tanner Gulch, tributary to South Fork Indian Creek thence Indian Creek and Klamath River in Sec. 11, T. 17 N., R. 6 E., H. B. and M., for mining purposes. Estimated cost \$100.

Coast Route Projects Rushed to Finish

(Continued from page 34)

Nevada, nearly 156 miles have been brought to modern standards of 36-foot roadbed and 20-foot bituminous treated crushed rock surface leaving only 37 miles yet to be improved.

ALONG COAST ROUTE

Approaching Los Angeles from the south, contracts for construction on the Coast Route connecting San Diego and Los Angeles have been forwarded which greatly improve this main highway. In San Diego County a reinforced concrete girder bridge and approaches consisting of eleven 54-foot spans on concrete piers and abutments and having a 40-foot roadway and two 4-foot sidewalks has been completed across the San Dieguito River one mile north of Del Mar. The bridge and approaches are on a revised alignment which is a marked improvement over the old line at this crossing.

Another paving contract in San Diego and Orange counties has recently been completed between San Mateo Creek and Serra. This work was an important improvement to the San Diego-Los Angeles arterial north and south of the town of San Clemente. The project involved placing 5.5 miles of pavement consisting of widening the old pavement to 30 and 40 feet with asphalt concrete and Portland cement concrete and placing new Portland cement concrete pavement 30 feet wide.

An important feature of this improvement was the construction of a 20-foot shoulder between the pavement and the Serra Bluffs, north of San Clemente, and the construction of adequate drainage facilities to care for the large volumes of water which pour over these cliffs during storm periods.

PAVEMENT WIDENED

Between Fullerton and the Los Angeles County line 4.7 miles of this southern coast route have been widened from a 23-foot pavement to 30 feet, with asphalt concrete and Portland cement concrete pavement and a new 30-foot asphalt concrete pavement has been placed on portions. This project includes improvements to line and grade, notably the flattening of the old sharp curve at Pickering corner.

On the Coast Route which connects San Francisco with Los Angeles several contracts

have been rushed to completion and it is fully expected that the pavement on this entire route will be open to traffic prior to the Olympic games.

Probably the most important improvement to be made in many years to this heavily traveled artery is the rerouting of the road between two miles north of Salinas and the Santa Clara County line in Monterey and San Benito counties, eliminating the tortuous climb over the notorious San Juan grade. The new highway lies to the west of the old road and passes through San Miguel and Langley canyons.

CURVES REDUCED

The number of curves in the 16½ miles of the new road are only 15 as against 62 over the San Juan grade. Portland cement concrete pavement 20 feet wide has been placed on a 36-foot roadbed throughout the entire project and a 300-foot steel deck truss bridge is being completed across the San Benito River and an 80-foot reinforced concrete girder bridge across San Juan Creek.

Where the Coast Route crosses the Salinas River at Bradley the new 840-foot steel deck truss bridge with its 810 feet of reinforced concrete girder approach spans and the new roadway approaches to the structure have been completed, replacing an old, narrow bridge built in 1888, and eliminating two dangerous curves at the approaches.

In San Luis Obispo County six miles of the Coast Route have been reconstructed between Los Berros Creek and Arroyo Grande and paved with Portland cement concrete 20 feet wide. Two reinforced concrete girder bridges were constructed. The old road had a pavement only 15 feet wide and had 32 curves, many of which were excessively sharp; the new alignment has only 11 curves and they are all easy to negotiate at modern speeds.

ROUTE SHORTENED

South of Santa Maria 15.7 miles of new cement concrete highway is now rapidly nearing completion. This project has involved the relocation of the route between Los Alamos and Santa Maria through the Solomon Hills via Solomon Canyon, reducing the distance by five miles and is a pronounced improvement in line and grade to

(Continued on page 40)

TRIBUTE TO HIGHWAY MEN

Though proud to say I've traveled o'er
'Most all of our great State,
Its many wonders I'll not here
Describe or enumerate.

I want to speak of the highway men
Who made my trips come true,
Who built the roads so broad and smooth
For me to use—and you.

They've moved great hills to straighten out
Some very dangerous curve,
To make the traveling safer
For the public that they serve.

They've flattened grades, built highways new
And widened narrow roads,
And added noble bridges that
Are safe for heaviest loads.

They keep the roads in good repair
When the first hard work is done,
That motorists all may carry on
Their business and their fun.

So let us pause on our joyous way,
A word of thanks let's give
To the men who make our wonderful State
A better place to live.

—Doris Dickson.

Second Santa Clara Water Investigation Report Published

EDWARD HYATT, State Engineer, announces release by the Division of Water Resources, Department of Public Works, of the second progress report on Santa Clara Investigation covering the period October 1, 1930, to September 30, 1931. It is a mimeographed report of 47 pages and four plates dealing with precipitation, stream flow, percolation, and ground water storage in Santa Clara Valley, Santa Clara County, California.

The Santa Clara investigation was initiated by the Division of Water Resources in January, 1930, at the request of Santa Clara Valley Water Conservation District and is of a cooperative nature, the two agencies contributing equally to the cost. It has as its object a general survey of the water resources of Santa Clara Valley and was prompted by local apprehension arising out of the continued retreat of ground water throughout the valley, the average depth to ground water having increased from 33.4 feet in 1915 to 63.4 feet in 1921, and to 97.9 feet in the spring of 1930.

The report indicates there was a further recession of 12.1 feet between the spring of 1930 and the spring of 1931, which would mean a depletion of ground water storage during the year amounting to 112,000 acre-feet bringing the total depletion since 1915 up to 712,000 acre-feet.

Data in the report indicate that precipitation throughout the valley varied between a minimum of 42 per cent and a maximum of 93 per cent of the averages for the periods of record, which of course accounts for the abnormally low stream discharge.

Safety Experts Urge Enforcement of Laws

“It is not more laws that are needed to cope with the traffic accident problem in California, but more enforcement.”

This was the general conclusion reached at the recent convention of the California Committee on Public Safety held in Santa Cruz, when traffic experts and State, county and municipal officials assembled to seek a remedy for the rising toll of traffic deaths and injuries on city streets and State highways.

Some of the highlights among the results of the convention's deliberations were:

Intensified enforcement of the law is needed; there must be a greater certainty of adequate punishment for offenders.

Traffic tag “fixing” or “squaring” was denounced by a resolution.

A stricter examination should be given to those seeking a license to operate a motor vehicle.

There should be more licenses revoked for persistent and flagrant violations of the California Vehicle Act, and the powers of the Motor Vehicle Department should be extended in this respect.

The careless use of speed causes more accidents than speed itself.

Continuous streets designated as boulevards and protected by boulevard stop signs are of doubtful value from the standpoint of safety.

COAST ROUTE PROJECTS RUSHED TO FINISH

(Continued from page 39)

the old road via Orcutt. The improvement includes a 320-foot steel and reinforced concrete bridge across San Antonio Creek about one mile north of Los Alamos.

The last unit in the reconstruction of the highway through Gaviota Canyon between Gaviota and Las Cruces in Santa Barbara County has been completed with the opening to traffic of the new reinforced concrete arch bridge across Gaviota Creek. The new bridge has replaced a structure built in 1916 on an inferior alignment before the requirements of modern traffic were realized.

In Ventura County two new bridges have just been completed on this Coast Route. The one, a 120-foot reinforced concrete girder structure, across Calleguas Creek near Camarillo and the other, a steel deck plate girder bridge 1806 feet long, across the Ventura River near Montalvo.

STATE OF CALIFORNIA

Department of Public Works

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COLONEL WALTER E. GARRISON-----Director

JAMES I. HERZ-----Deputy Director

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 R. H. STALNAKER, Equipment Engineer
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 J. J. HALEY, Jr., Administrative Assistant
 HAROLD CONKLING, Deputy in Charge Water Rights
 A. D. EDMONSTON, Deputy in Charge Water
 Resources Investigation

R. L. JONES, Deputy in Charge Flood Control and Reclamation

GEORGE W. HAWLEY, Deputy in Charge Dams
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 C. A. HENDERLONG, Assistant Mechanical Engineer
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C. C. CARLETON, Chief
 FRANK B. DURKEE, General Right of Way Agent
 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

1931

LEGEND
Primary Roads 
Secondary Roads 

inches

1 2 3 4

0 1 2 3 4 5 6 7 8 9 10 11 (in) 12 13 14 15

centimeters

0 10 20 30 40 50 60 70 80 90 100 110

D50 Illuminant, 2 degree observer

L*	39.12	65.43	49.87	44.26	55.56	70.82	63.51	39.92	52.24	97.06	92.02	87.34	82.14	72.06	62.15
a*	13.24	18.11	-4.34	-13.80	9.82	-33.43	34.26	11.81	48.55	-0.40	0.80	-0.75	-1.06	-1.19	-1.07
b*	15.07	18.72	-22.29	22.85	-24.49	-0.35	59.00	-46.07	18.51	1.13	0.23	0.21	0.43	0.28	0.19

Density

0.04	0.09	0.15	0.22	0.36	0.51
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Golden Thread

16(M)	17	18(B)	19	20	21	22	23	24	25	26	27	28	29	30
49.25	38.62	28.86	16.19	8.29	3.44	31.41	72.46	72.95	29.37	54.91	43.96	82.74	52.79	50.87
-0.16	-0.18	0.54	-0.05	-0.81	-0.23	20.98	-24.45	16.83	13.06	-38.91	52.00	3.45	50.88	-27.17
0.01	-0.04	0.60	0.73	0.19	0.49	19.43	55.83	65.80	19.99	30.77	50.01	51.29	52.72	32.46

Colors by Munsell Color Services Lab

Don Williams