

CALIFORNIA HIGHWAYS and PUBLIC WORKS

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California Scores High Among States for Economy of Road Expenditures

Sixth in Population and Second in Registrations,
State is 37th in Highway Costs per Capita
and 47th in Cost per Car for 1931

FORTY-EIGHT states constructed nearly 50,000 miles of State roads during 1931 at a cost of \$1,038,090,101.

The state of New York spent \$75,744,000 on state highways during 1931, and Illinois was second with expenditures amounting to \$54,000,000.

How about California?

The American Association of State Highway Officials has compiled figures on State highway construction in all of the forty-eight states for 1931 and a comparative tabulation of their findings was published in the January issue of *American Highways*, the association's official quarterly publication, for the current year.

REVEALING FIGURES

A study of this tabulation reveals that, proceeding under its orderly Ten Year Plan for the addition of highways, California—pioneer in highway development, a leader in high standards of construction, sixth among the states in population, but second in area and motor vehicle registrations—is twenty-third in total mileage of State highways constructed in 1931; thirty-seventh in per capita cost to its populace for all State highway improvements during the year and forty-seventh, or next to the lowest State in the Union, in the expenditure rate per registered car.

Nearly one-half of the forty-eight states built more mileage of State roads in 1931 than were constructed by California. Minnesota led with a total of 3281 miles, Pennsylvania followed with 3022, and the mileage of other states tapered from these, with California at 807 miles.

In the placing of high type pavement on the State highway systems, New York was out in front with 960 miles of paving for the year and Louisiana's 900 miles placed the Creole State in second place. California ranked 20th with 218 miles of pavement.

In the placing of bituminous treated crushed rock surfacing California was ex-

ceeded by ten states. But though our 408 miles of treated surfacing placed California in eleventh position, it should be noted that Pennsylvania, the leading State in this phase of highway construction, laid over five times as much bitumen bound surfacing, with a total of 2146 miles.

For bridges built on the State road systems California is well up in the running, being third in the number constructed and eighth in expenditures for this department of construction. Our State built 207 bridges at a total cost of \$3,217,000. Only New York, with 514 and Missouri with 410 built a greater number and of the seven states with higher expenditures Indiana led with \$15,000,000 and New York was second with \$7,500,000. A comparison of numbers of bridges does not mean a great deal, as a bridge may be 20 feet long or many thousand feet, but the expenditures for major structures on a State road system are barometers of progress in modernization.

TENTH IN TOTAL

In comparative total expenditures on all types of highway construction, California ranks tenth with a total of \$38,073,273 expended during 1931. The Empire State in the lead with \$75,744,000 was followed by Illinois with \$54,000,000, Pennsylvania with \$52,500,000, New Jersey, \$48,000,000; Michigan, \$46,500,000; Texas, \$42,163,806; Minnesota, \$40,752,564; Louisiana, \$40,000,000; Iowa, \$39,902,000; California, \$38,073,273; Missouri, \$31,920,238; and South Carolina, \$31,000,878.

In the case of Pennsylvania, that State took over 20,000 miles of county roads and is engaged in improving them with an inexpensive type of oil surfacing which makes its mileage of 3022 show a cost per mile lower than other states putting in a higher standard modern surface.

It is readily noticed from the facts recited that California with its vast area, large population, and high position in automobile regis-

New Scenic Shasta Gorge Highway Boasts 5 Major Bridges in 4.5 Miles

By F. W. HASELWOOD, District Engineer

ONE of the outstanding scenic road improvements recently completed and opened to traffic by the Highway Division of the Department of Public Works is the relocation of the Shasta River Canyon Highway, an important link of the Pacific Highway, an important link of the Pacific Highway section of U. S. 99 between Yreka and the Klamath River. To attain modern highway standards, this project involved lifting the route from a tortuous water-level course following bends of the river to a new alignment high up on the slopes.

The accomplishment of this objective entailed many interesting engineering features and problems including the construction of five major bridges within a distance of 4.5 miles, making Shasta Canyon the most

The formation through the Shasta Canyon is principally rock. It is seamed and broken and difficult to excavate to well defined lines. The country is precipitous and steep and the location lies along the slopes of the canyon, well above the streambed, passing through many formidable bluffs and rocky slopes.

Considerable difficulty was encountered in the construction work. Due to inaccessibility it was necessary in a number of instances to build temporary roads extending from the existing highway to the new road to get shovels and other equipment and supplies into the work.

In some instances stockpiles of aggregate and cement, form lumber, steel and concrete, were placed at locations accessible to



Diagram Map Showing Relocation of Shasta River Canyon Highway

thickly bridged section of any part of the California highway system.

The necessity for this improvement, in addition to meeting the demands of traffic with a modern, shorter and more direct highway, was made imperative by the constantly increasing number of accidents on the dangerous old road.

This old roadbed had a width of 16 feet with a minimum radius curvature of 50 feet and a maximum gradient of 7 per cent. There were three narrow bridges crossing the Shasta River and one over the Klamath River. The original work was to a very low standard of alignment entirely obsolete at the present time, even for secondary roads. The grade line for the most part was easy with only a few stretches of 6 and 7 per cent. Some adverse grade was included in order to avoid expensive construction through several heavy rock bluffs.

the existing road and transported across the canyon by means of cableways.

The reconstruction project extends from a point 1.5 miles north of Yreka through the Shasta Canyon, terminating a short distance above the Klamath River Bridge. About 95 per cent of the entire project lies in the Shasta and Klamath canyons on Route 3, Pacific Highway, the remainder being the connections it was necessary to build to properly join the new alignment and grade to Route 46, Klamath River Lateral, extending down the Klamath River to the coast. The actual length of reconstruction on Route 3 is 7.19 miles as compared with 9.37 miles on the old road.

RAISED 350 FEET

The new construction reaches an elevation at its highest point of approximately 350 feet above the streambed of the Shasta River.

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Klamath River Bridge
near mouth of Shasta River
8 miles north of Yreka



Dry Gulch Bridge
5 1/2 miles north of
Yreka



Middle Crossing or
Shasta Bridge No. 2
300 feet above canyon
floor - 280 feet
long - 6 miles
north of Yreka



Crossing No. 3 of Shasta
River about 7 1/2 miles north
of Yreka, Siskiyou Co.



Shasta Bridge No. 1
5 1/2 miles north of Yreka



Army Report Recommends \$11,370,000 U. S. Contribution to State Water Plan

By A. D. EDMONSTON, Deputy State Engineer

IMPORTANT developments in the solution of California's Water Problem have occurred during the past month.

The Federal Government's interest in the state-wide plan of water conservation is evidenced by a telegram received by Colonel Walter E. Garrison, State Director of Public Works, from United States Senator Hiram W. Johnson. The Senator stated that an appropriation of \$20,000 for investigation of the project had been approved by the Senate Committee on Irrigation and Reclamation and placed upon the Senate calendar for final action.

If passed by the Senate, a subcommittee of the Irrigation and Reclamation Committee will inspect conditions in California next summer in order to secure first hand information on the water question.

Last summer an important subcommittee of the House of Representatives Appropriations Committee spent twelve days in studying the water needs and local conditions, visiting the key points and consulting with interested people. The delegation was escorted throughout the State by State officials and was received by Governor Rolph in Sacramento. The members of the party were greatly impressed with the merits of the program and of the necessity for prompt action. They stated that any overture from California would be given a most sympathetic reception by them.

To Inform Congress

The scheduling of visits of these committees are some of the results accomplished by Governor Rolph's Water Conservation Committee, which went to Washington, D. C., in February, 1931. This committee, as part of its special mission, was to arrange for Congressional committees to visit California and become acquainted with the water conditions in this State. In its report to Governor Rolph, the committee stated: "The executive departments are well informed and are sympathetic to Federal cooperation on the California Water Plan. Congress, on the other hand, is not informed and much educational work will be necessary."

The advantages gained by having these Congressional committees personally study and investigate the need for water conservation here are self-evident. Should the State at any time go to Congress to request Federal cooperation, the members of these important committees will have a complete picture of the entire project and will be able to readily determine the degree to which the United States Government should participate in the project.

On March 14, 1932, Colonel Thomas M. Robins, Division Engineer for the Pacific Division, War Department, announced that the final report on the

Great Central Valley project had been made. He stated:

Favorable Report

"If the State and/or other responsible local interests will construct the proposed Kennett Reservoir and operate it so as to reduce high water flows on the Sacramento River and to maintain a low water flow of not less than 6000 second-feet between Chico Landing and Sacramento, the report finds that a Federal contribution of about \$7,370,000 to the first cost of the reservoir will be justified in the interest of navigation and flood control.

The report also finds that, in the interest of navigation, the proposed transfer of water by pumping from the Sacramento Valley southward should be required to be made through a series of navigable pools in the San Joaquin River between Stockton and Mendota, with suitable locks installed at the dams forming these pools. If this is done the United States will be warranted in contributing about \$4,000,000 to the first cost of the locks and dams and in assuming their maintenance and operation."

This important report will be considered by the Board of Engineers for Rivers and Harbors, and reported on by it to the Chief of Engineers, U. S. Army. The Chief of Engineers will transmit the report with his recommendations to Secretary of War who in turn will transmit it to Congress.

Amendment Drafted

Both the Governor's Water Commission and the Joint Legislative Water Committee have been actively working on a draft of a proposed constitutional amendment. The legislative committee has adopted a draft of an amendment designed

as an enabling act to permit the State to embark upon a state-wide program of water conservation, and is preparing a report to the Governor.

Two important provisions are proposed in the draft to the committee. First, that all indebtedness incurred by the State on any water conservation project would be authorized by a vote of the people, and second, that the entire plan would be based upon a payback principle, whereby the State must have firm contracts for the repayment of all indebtedness incurred, before any construction work would be started. Repayment would be further safeguarded by the provision that any district or area contracting with the State for service would be subject to an ad valorem tax levied by the State in event of default by the contracting agency.

The Commission still has a few principles under consideration and has not reached its final conclusion



A. D. EDMONSTON



GOVERNOR ROLPH'S COMMISSION officially titled the California Water Resources Commission as it appeared at a joint hearing in southern California with the legislative committee is shown in this photograph. The members are: (front row, left to right) A. B. Tarpey, Vice Chairman Shannon Crandall, Chairman Matt I. Sullivan, James M. Burke, W. B. Matthews. In the rear row (left to right) are Jesse Poundstone, R. C. Harbison, Francis Carr, Major A. M. Barton, State Engineer Edward Hyatt, Jr.



JOINT LEGISLATIVE COMMITTEE members who participated in water hearings in the south are shown above. In the front row, from left to right, are 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 P. Schottky.

regarding a draft of a proposal constitutional amendment. The Commission has held three meetings lasting a total of ten days within the past month, and expects to meet again during the early part of April.

Important Bulletin

The Division of Water Resources of the State Department of Public Works announces the release of

Bulletin No. 28, a report on the "Economic Aspects of a Salt Water Barrier below Confluence of Sacramento and San Joaquin Rivers." This is one of the series of reports prepared on the State Water Plan.

The salt water barrier has been proposed for the purpose of damming off and preventing the annual recurring up-stream movement of salt water from the ocean into the channels of upper San Francisco Bay

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Here's a Catechism Covering Many Questions on State Highway System

By C. C. CARLETON, Chief, Division of Contracts and Rights of Way

THE California Highway Commission and the Department of Public Works are constantly receiving inquiries from citizens and various organizations as to the make-up of the State Highway System; how it was planned, organized and developed; how the gas tax revenues are applied and used; how new roads are added to the system, and many other similar questions.

To supply this and similar information in a succinct form covering all points on which inquiries have been made, the following questionnaire with answers is published:

Q. How are State Highways created?

A. Only by act of the Legislature or by vote of the People on a proposition submitted to them at a state-wide election.

Q. Has the California Highway Commission, itself, authority to create a State Highway?

A. No. It is limited to determining the engineering location or relocation of a State Highway between the key points or the termini designated by the act of the Legislature or the measure voted by the People.

Q. What is the mileage of the State Highway System of California at the present time?

A. 7,388 miles.

Q. How are the State Highways of California classified?

A. Primary and Secondary.

Q. What governmental agency makes this classification?

A. The Legislature.

Q. What are Primary State Highways?

A. The Legislature of 1927 declared the main trunk State Highways together with county seat, national park and certain interstate State Highway connections, specifically described in Chapter 794, Statutes of 1927, as Primary State Highways. There are 40 Primary State Highway Routes designated by the Legislature.

Q. What are Secondary State Highways?

A. All State Highways now or hereafter included within the State Highway System other than the 40 Primary State Highways are and shall be classified as Secondary State Highways.

Q. What is the principal distinction between Primary and Secondary State Highways?

A. The Primary are considered of greater importance and, therefore, entitled to greater construction expenditures thereon.

Q. How much of the Three-cent Gas Tax in California can be used for new State Highway construction?

A. One cent.

Q. How is this One-cent Gas Tax provided for new State Highway construction divided?

A. 75% thereof goes to Primary State Highways, 22½% thereof to Secondary State Highways and 2½% thereof to meet assessments against the State in the construction of joint county district highways in cooperation with counties under the Joint Highway District Acts.

Q. How are the Primary State Highway moneys redivided?

A. The State is divided into two groups of counties by legislative act. The 45 northern counties compose one group. The 13 southern counties compose the other group.

Each group receives the proportion of the money that the number of miles of Primary State Highways within its own limits bears to the total number of miles of Primary State Highways designated by law.

Thus: the total mileage of Primary State highways fixed by law is 4287.1 miles.

In the 45 northern counties there are 2345.7 miles thereof, or a proportion of 54.7%.

In the 13 southern counties there are 1941.4 miles thereof, or a proportion of 45.3%.

Therefore, the northern group is entitled to 54.7% of the primary road moneys and the southern group 45.3%.

Q. How are the Secondary State Highway moneys divided?

A. The law provides that they shall be divided equally between the two groups of counties, each receiving 50% of the funds.

Q. What new State Highway policy did the Legislature of 1929 adopt?

A. The policy of adding new roads to the State Highway System, only after engineering and economic studies had been duly made by the Cali-



C. C. CARLETON

Procedure to Bring Before Commission

(Continued from preceding page)

for California Highway Commission and the State Department of Public Works.

Q. Did the 1931 Legislature follow this policy?

A. Strictly. 800 miles of Secondary State Highways were added to the system by the 1931 Legislature upon recommendation of the California Highway Commission and the State Department of Public Works.

No new mileage was added to the Primary State Highway System.

Q. Did the 1931 Legislature adopt the same policy for the attention of the 1933 Legislature?

A. Yes. Senate Concurrent Resolution No. 10 (Statutes of California, 1931, p. 3111) sets forth the requirements of eligibility of roads not now in the State Highway System for addition to the System.

Q. What are these requirements?

A. The Legislature specified that additions to the Secondary State Highway System shall not be recommended to the 1933 Legislature totaling more than 15% of the theretofore existing Secondary State Highway System, said mileage to be added in the ratio of not less than three nor more than four miles in the southern group of counties to one mile in the northern group of counties.

Q. Why is the southern group of counties allowed a greater portion of additions to the Secondary State Highway System than the northern group of counties?

A. Because, while the Secondary State Highway moneys are divided equally between the two groups, the Southern Group as yet has only 1134.3 miles in the Secondary State Highway System to 1957.9 miles for the Northern Group. The Legislature has adopted the policy of equalizing the mileage as soon as it can reasonably be accomplished.

Q. What other conditions did the Legislature of 1931 impose as prerequisites to inclusion of new roads in the Secondary State Highway System?

A. The California Highway Commission and the State Department of Public Works are instructed to study and recommend to the 1933 Legislature Routes not now in the State Highway System which, either by reason of the large volume of State traffic that they are now carrying, or by reason of the relief that they would afford to heavy traffic upon present State Highways, or as highways serving as important interstate links, might properly be included and added to the State Highway System; and in planning the State Highway System to give due consideration to the development of the natural resources of the State and the improvement of agricultural marketing facilities as well as traffic needs.

Q. When is the study of the California Highway Commission to be completed?

A. August 1, 1932.

Q. How are roads brought before the California Highway Commission and the State Department of Public Works for study as to their qualifications for inclusion in the Secondary State Highway System?

A. Either upon the initiative of the State Highway authorities themselves or on Application for such consideration presented by county supervisors, municipal authorities, civic organizations or interested individuals.

Q. What mileage of new Secondary State Highways has the Legislature of 1931 indicated for recommendation to the 1933 Legislature for inclusion in the Secondary State Highway System?

A. 345 miles, with a division of about 259 to 276 miles for the Southern Group of Counties and about 69 to 86 miles to the Northern Group of Counties.

Q. In what form should an Application for the study of any proposed new road be presented by its proponents?

A. A written Application should be addressed to the California Highway Commission and the State Department of Public Works (no printed blanks have been prepared for the purpose) concisely stating the salient facts and factors which the proponents believe bring the proposed new road within the requirements for eligibility for inclusion in the Secondary State Highway System as hereinbefore set forth.

Also, suitable maps should accompany the Application graphically delineating the proposed new road and its relationship to the present State Highway System.

If the proponents desire to present oral arguments, arrangements should be made with the Secretary of the California Highway Commission, Sacramento, California, for a hearing.

Q. What action do the State Highway authorities take if interested in the proposed new road?

A. They instruct the State Highway Engineer to make a study of the engineering, economic and traffic facts and gather essential data in order that the eligibility of the proposed New Road may be determined before they make their final recommendation of roads to be included in the Secondary State Highway System to the 1933 Legislature.

Q. Is the California Highway Commission authorized by law to locate and construct portions of State Highway within municipalities?

A. Yes. An act passed by the 1931 Legislature (Section 365f of the Political Code, Chapter 807,

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Highway Division to Reflectorize Signs at Important Intersections

By T. H. DENNIS, State Maintenance Engineer

LARGE, reflectorized directional signs will shortly be installed by the Division of Highways at several important road intersections on the State highways. This service will gradually be extended to other points as traffic warrants.

The signs will be installed either at the side of the road in advance of the intersection, or at its gore, depending upon the grade of approach and angle of divergence between the two roads. Only two names with directional arrows will be shown on the signs, one for each road.

The letters and arrows, outlined with crystal reflectors, will be white against a black background, thus providing both day and night service. These signs, mounted high enough to clear intervening machines, will, on the darkest night, apprise the motorist some 500 to 700 feet in advance of his turn, thus eliminating the delay and hazard of stopping.

RESULT OF STUDY

The manufacture and installation of these signs by the two automobile clubs marks the conclusion of an interesting study conducted by the Maintenance Department on reflector type signs. It was noted that the directional signs in common use were illegible at any distance beyond 150 feet.

With our present high speed roads, directional signs at important intersections should be legible at distances of from 500 to 700 feet, depending upon the conditions to be met.

Believing that reflector units would provide this legibility, several signs were made up, designed on available data covering the size and spacing of both units and letters.

The results were very unsatisfactory and a search for authentic information on these points proved unavailing.

Early in March, 1931, Assistant Maintenance Engineer C. F. Woodin was assigned the task of experimenting with the various types of reflector units to determine the effect of color and size, effective spacing, reflective range, both distance and angularity, and the composition of an alphabet, as standard sign letters were not suited for use in a reflector type sign to be read beyond 300 feet. The

information reached after a month's study has been embodied in the construction of these signs, and while by no means final, is by reason of the lack of any available data, representative of considerable advancement.

EIGHT CONCLUSIONS

The conclusions reached may be briefly summarized as follows:

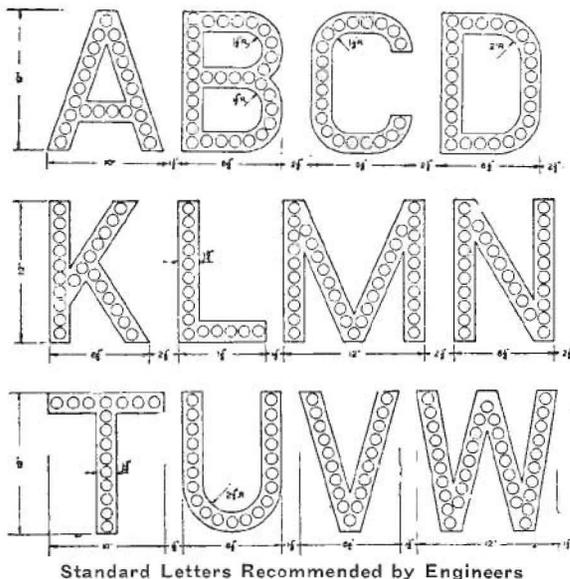
1. Of the four sizes of reflectors tested, the 1-inch size gives best results, with the $\frac{7}{8}$ -size very satisfac-

tory. The $\frac{5}{8}$ -inch and $1\frac{1}{8}$ -inch sizes are not adaptable to directional signs.

2. For best results, reflectors should be placed at the minimum spacing.

3. Crystal reflectors reflect light with greater intensity than yellow reflectors.

4. Single lines of reflectors in letters are better than doubles lines because of the greater separation afforded the line of reflectors. For good legibility it is important that the contrast between the reflectors and the background be sharp and clear. Parallel strokes in a given letter should be separated as far as possible within reasonable limits to provide this contrast.



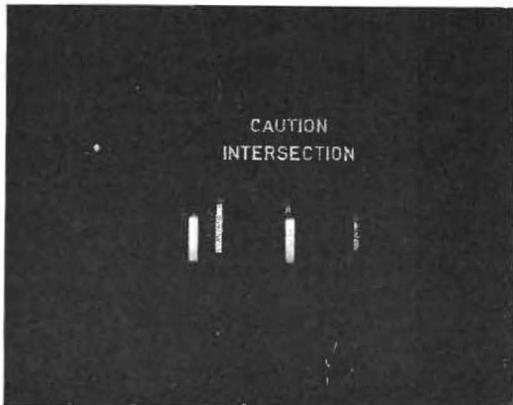
Reflector Study Evolves Better Type

(Continued from preceding page)

5. A 12-inch letter of proper proportions is visible at about 700 feet distance and easily readable at 500 feet. An 18-inch letter of the same proportions is visible at about 800 feet and can be read at 650 feet.

6. Certain types of reflectors have sufficient intensity when 10 feet above the ground as to render a letter legible for as great a distance as when the reflector is located at headlight height, provided the atmospheric conditions are favorable.

7. The spacing between letters for the 12-inch height should be about $2\frac{1}{2}$ inches; and for the 18-inch letters, should be increased to 3 or $3\frac{1}{2}$ inches. Of course adjacent letters shaped to increase the size of the intervening space may have a smaller minimum



AT NIGHT the letters seemingly jump out of the air as car approaches.

interval as prompted by the rules of sign composition.

HEIGHT IMPORTANT

8. The height at which the sign should be placed will be governed by the conditions encountered. Grade, alignment, roadside development and obstructions will all be influencing factors. Sufficient height that the driver of each car may read above another car traveling ahead, is a distinct advantage. Obviously the closer the reflectors are to the direct beams of the headlight, the greater the intensity of the reflection. In the event of unfavorable atmospheric conditions, the reflector of the greatest intensity will give the best service. Signs should



DAYLIGHT appearance of reflectorized warning sign showing method of erection.

therefore be placed as low as possible to give the best visibility. Heights up to 10 feet have been found satisfactory. Before any installation is made, trial reflector letters should be set up in several locations to determine the best location under the conditions encountered.

9. The failure of existing directional signs is due to several causes, namely:

(a) The signs are constructed on enameled metal of high gloss and almost as reflective as the reflector. A dead, nonreflecting background is most desirable.

(b) The letters are too small for legibility at any distance beyond 300 feet.



NO CHANCE to go wrong with this large directional sign glaring out of the darkness.

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How Sacramento Flood Control System Protects Vast Valley Area

Flood waters, like war, are wasteful, wanton, ruthless in destruction of life and property. Engineering science has developed adequate defenses against wild waters that control them and prevent their depredations. Such is the system of weirs and levees, known as the Sacramento Flood Control Project. Not yet completed, it has functioned successfully for some years. The scope and operation of the system is described in the following article:

By R. L. JONES, Deputy Engineer for Flood Control

THE Sacramento flood control project is designed to secure the orderly control of floods in the Sacramento Valley so that the individual reclamation units may maintain their protective works safely and without destructive competitive construction. The project is cooperative between the landowners, the State and the Federal government, each bearing approximately one-third of the total cost. Although only about 75 per cent complete, construction of the main units has progressed to such a point that reasonable protection is afforded the greater portion of the valley lands against a flood of 600,000 cubic feet per second.

The outstanding feature of the Sacramento flood control project, and the main principle of design, is the system of by-passes, extending practically its whole length, which carries the surplus water after the level in the leveed river channels has reached what is considered to be the highest safe and economical stage.

The surplus spills into the by-passes over the weirs, of which there are five: Moulton, Colusa, Tisdale, Fremont and Sacramento, the last named three of which are complete, the Moulton weir being now under construction and the Colusa scheduled for completion within a year.

PERMANENT SILLS

These weirs are permanent sills over which the water passes without erosion when a height is reached in the river requiring relief. The Sacramento weir is the only one provided with gates and requiring operation, the action of the others being fixed by the elevations of the crests. The excess water, after passing over the weirs, is carried down through the by-passes which are artificial channels formed

on the natural ground by levees on either side, to discharge into Suisun Bay through the enlarged portion of the lower Sacramento River extending from Cache Slough to Collinsville.

The purpose of holding the water in the leveed river channels to the greatest safe height is to induce scour and removal of mining debris to improve the channels for navigation, and to maintain their flood-carrying capacities.

The by-pass principle has been incorporated in the great plan for flood control on the Mississippi River now under construction by the Federal government.

2000-FOOT STRUCTURE

The Sacramento weir is located on the west side of the Sacramento River at the entrance of the Sacramento by-pass, about three miles upstream from the mouth of the American River, and was completed in 1917 at a cost of \$336,000. In times of flood it will discharge into the Yolo by-pass the excess waters of the Sacramento and American rivers which can not be safely passed in the Sacramento River below Sacramento.

The structure is of concrete 2000 feet in length, upon which are superimposed a concrete highway trestle and a steel girder bridge for the Sacramento Northern Railway. The weir proper consists of 48 waterways 36 feet in width fitted with collapsible gates, each gate being made up of 36 wooden needles, 3 inches by 12 inches, 6 feet long, the lower ends of which are hinged to the concrete sill of the weir. When the gate is closed the needles are in a vertical position, the upper ends forming the crest of the weir at elevation 31.0 feet, U. S. E. D. When the gate is opened the needles fold downstream, lying flat on the

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RAGING FLOOD WATERS are shown rushing through the Sacramento Weir into the Yolo by-pass in the top picture. The scene illustrates the operation of the weir when the gates were opened during the flood period of 1928. It is a 2000 foot concrete structure carrying a highway trestle and steel girder railroad bridge. The weir during normal river stages is pictured immediately below viewed from the by-pass. Lower right picture shows the Tisdale weir. The small picture shows barge fleet maintained for bank protection and emergency work.

Two Highway Relief Camps Prove Success; Benefit Both Men and State

SUPPLEMENTING other activities for the relief of unemployment, the Department of Public Works has carried during the winter an average of 600 men in its two highway work camps. About 250 men have been cared for in Camp Rich (Feather River), and as many as 350 have worked out of Camp "G" at Needles. Most of those at Rich were drawn from the bay district. Those at Needles came from southern California.

The work crews out of these camps have no connection with the three-day maintenance work in which 4400 men have been engaged.

Practically all of the men in the camps were itinerants and unmarried. Fully 90 per cent of them were new arrivals in California.

GOOD RESULTS

The success of the camps has been much better than was expected. There have been two especially agreeable results. The men themselves have behaved well and have assisted the camp officers in maintaining discipline, and they have delivered work in full value for board and lodging in lieu of pay.

An inspector reports: "For strictly hand-work, a surprising amount of yardage has been moved. The men have worked cheerfully and seem to have taken real pride in the progress made. They have worked six hours each working day. The superintendent tells me that if he were starting a contract job, he would be glad to recruit his laborers from the men in camp."

The work of the men at Camp Rich is being done between the north fork of the Feather River and a point about two miles east of Rich. Although the crews did not get on the job until December 15, about 11½ miles of rough grades have been graded to an 8-foot width involving the moving of approximately 25,000 cubic yards of rock and dirt. This included a clearing of the right of way, drilling, blasting, and hauling. All of this has been straight hand excavation.

CONNECTING LINK

The new road is to connect with a similar one being constructed by the prisoners in Camp 23 at Virgilia.

Work at Needles has been in progress on road SBd-58-P. It is more directly in the vicinity of Stations 662, 670, 751, and 773.

About 10,000 cubic yards of excavation have been done to date, and with it considerable grade work that does not so register. The work has included drilling and blasting, and some unusually heavy rock work has been done.

In both camps the sanitation has been especially good. There has been practically no sickness.

It is believed that the work returned to the State will go far in compensating its expenditure.

WELL HOUSED

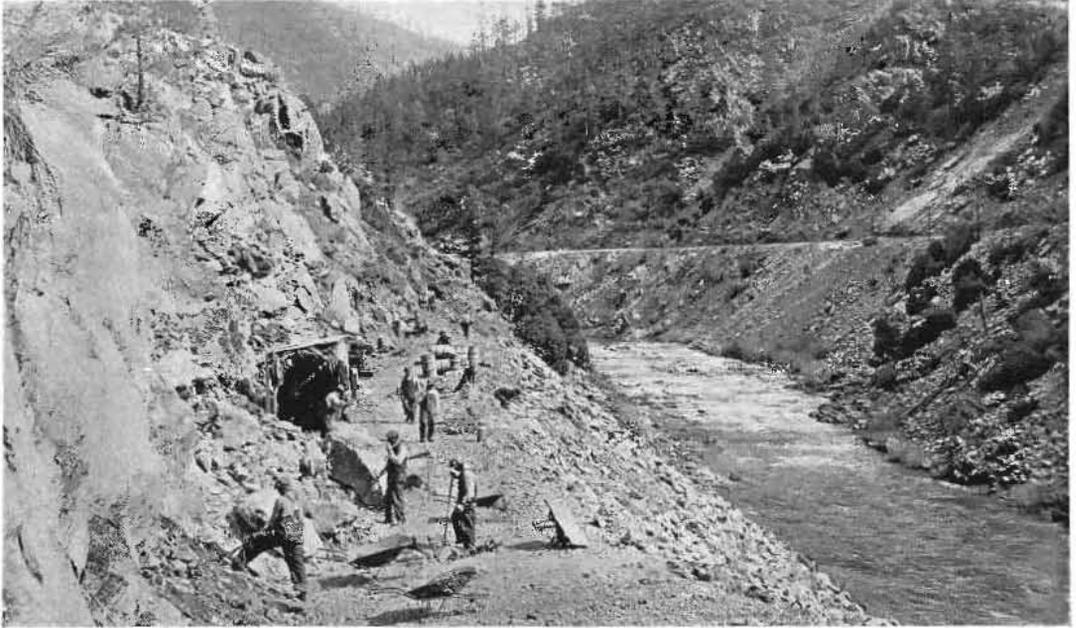
At Camp Rich the men are housed in the large two-story bunk houses that were constructed for the unemployment relief camp in 1931. There are 32 men in each house. The houses have electric lights and hot water. Community buildings include a large dining room, a clean kitchen, and a camp hospital.

Three good meals are served each day. The menu will compare favorably with that of any first-class construction camp. The housing and feeding has been cared for by the Highway Department, but at Needles the mess service was under contract with a Los Angeles firm.

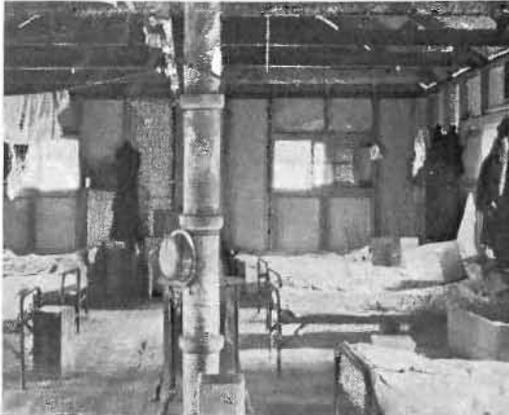
The southern camp is equally well equipped for service and sanitation. The difference is that the men sleep in army squad tents with side walls and wooden floors. They have army cots and plenty of warm blankets. As a rule there are six men to a tent.

Another agreeable surprise has been in the disposition of the men to cooperate in eliminating trouble makers. A camp officer tells of an incident where a new arrival at his first meal disregarded his knife and fork. He began to eat with his fingers. This was noticed by several of the other men, and one of them called out "Kangaroo Court." The officer says that he took pains not to observe too closely what happened, but that thereafter the man needed his knife and fork.

In addition to the relief they have brought to these detached laborers, the camps have served to ease the unemployment situation in the cities. They were created to meet at



WORKING WITH A WILL for food and lodging, these men of the Rich highway camp for relief of single unemployed itinerants, laboring six hours every working day since December 15, moved 25,000 yards of rock and dirt in widening $1\frac{1}{2}$ miles of Feather River road trail by handwork.



COMFORTABLE QUARTERS were provided in bunkhouses like this at Rich and in tent houses at Needles.



HEAVY ROCK WORK was also done by the men of the Needles camp on southern California roads.



CAMP "G" AT NEEDLES, in San Bernardino County, accommodated as many as 350 men in tent houses arranged as orderly and precise as an army camp.

Highway Construction Season Starts With Advertisement of 21 Projects

THE construction season of the Department of Public Works was ushered in March 1st with the announcement by Col. Walter E. Garrison, Director of Public Works, of a program of projects to be advertised during the month. The program includes 21 separate projects located in 15 counties involving the improvement of 87.5 miles of highway and the construction of seven bridges. The estimated total cost is approximately \$4,000,000.

The following summary and detailed list of projects clearly show the scope of the work:

The grading and surfacing of 8.9 miles between Hat Creek and Fall River Mills in Shasta County involves the relocation of the easterly half of the distance between Canyon Creek, east of Burney, and Fall River Mills. A call for bids for the improvement of the westerly half will be published later in the year, as will be the call for bids for the construction of bridges across the Pit River, Hat Creek and Fall River.

ELIMINATES CURVES

These improvements to this section of the Redding-Alturas lateral will eliminate the existing tortuous road which winds through the lava country over many small summits. The proposed present improvement will connect at Fall River Mills with some 66 miles of recently improved highway.

On the Feather River Highway the large steel arch bridge spanning the river gorge at Pulga is rapidly nearing completion and the project for constructing a graded roadbed from Pulga Crossing to Cresta in Butte County will carry the construction of this new route nearly to the Plumas County line and will involve extremely heavy grading and rock excavation.

The relocation of the section of the Merced-Yosemite lateral in Mariposa County, between Orange Hill school and Mariposa is now under way as far as Pain Flat. The proposed relocation from Pain Flat to Mariposa lies to the north of the existing road and will be built to the standards of modern highway construction so necessary to the safety and convenience of the thousands of tourists who

yearly enter the Yosemite by this route. The new alignment leads directly into Mariposa by the same entrance as the existing highway.

SHORTENS DISTANCE

The State highway which leads into the Sequoia National Park from Visalia is to be constructed on new location from Lemon Cove, 19 miles east of Visalia, to the town of Three Rivers. This relocation covers some 8.5 miles of State road in Tulare County and will eliminate a section of sharp curves and broken grades. The total curvature on the existing routing is 3798 degrees while curvature on the new location amounts to only 534 degrees.

There will be a saving of about 1.1 miles in distance by the relocation, as the highway will be constructed along the Kaweah River from a point about two miles easterly of Lemon Cove to the end of the project. The new construction will consist of a 24-foot roadbed with a bituminous treated surfacing 20 feet wide.

The bridge across Rocky Creek in Monterey County is to be a unit of the Carmel-San Simeon Highway and will be a structure of major proportions. It will be located about 17 miles south of Carmel at the southerly end of a grading contract which is now under way between Rocky Creek and the San Remo Divide. The structure will be a reinforced concrete arch and marks another step towards the completion of this scenic highway which clings to the rugged coast of Monterey and San Luis Obispo counties.

NEW ALIGNMENT

Another improvement to this route is proposed for approximately 10 miles between Cambria and San Simeon on the southerly portion of the road in San Luis Obispo County. The project calls for a relocation of this stretch of highway which will involve straightening the alignment, easing the gradient and providing a 20-foot bituminous treated surface on a 30-foot graded roadbed. The new alignment will be far superior to the existing road in every phase of design and construction; in general it will follow closer to the ocean and will shorten the distance by

(Continued on page 34)

Work Offered for Bids in March

SOUTHERN COUNTIES

County	Location	Miles	Type of Surface
Orange	Newport to Corona Del Mar	4.8	Port. Cem. Con. Pave.
San Diego	Bostonia to Chocolate Creek	7.5	Port. Cem. Con. Pave.
Riverside	Avenue 62 to Avenue 74	8.3	Port. Cem. Con. Pave.
Riverside	Avenue 74 to Southerly Boundary	6.0	Port. Cem. Con. Pave.
Orange	Laguna Beach to Dana Point	4.9	Port. Cem. Con. Pave.
Los Angeles	Santa Ynez Canyon to Santa Monica	2.4	Asphalt Con. Pave.
Los Angeles	Santa Ynez Canyon to Santa Monica	----	Groynes
Kern	Oak Glenn to Grapevine Station	3.7	Bit. Treat. Crush. Rock
Riverside	Blythe to Ehrenberg Bridge	3.7	Bit. Treat. Crush. Rock
San Luis Obispo	Cambria to San Simeon	9.7	Bit. Treat. Crush. Rock
Tulare	Lemoncove to Three Rivers	8.5	Bit. Treat. Crush. Rock
Orange	Across Anaheim Bay	----	Widen Stl. & Con. Br.
Los Angeles	Across Los Alamos & Gorman Creeks	----	3 Stl. & Con. Brs.
Mono	Across West Walker River	----	Reinf. Con. Bridge

NORTHERN COUNTIES

County	Location	Miles	Type of Surface
Glenn	In Willows	0.4	Asphalt Con. Pave.
Shasta	Hat Creek Summit-Fall River Mills	8.9	Bit. Treat. Crush. Rock
Placer	Lincoln to Sheridan	6.7	Bit. Treat. Crush. Rock
Butte	Pulga Crossing to Cresta	4.4	Graded Roadbed
Mariposa	Pain Flat to Mariposa	7.6	Graded Roadbed
Santa Clara	Across Stevens Creek	----	Rein. Con. Bridge
Monterey	Across Rocky Creek	----	Rein. Con. Arch Br.

SUMMARY

Type	Miles
Portland Cement Concrete Pavement.....	31.5
Asphalt Concrete Pavement.....	2.8
Bituminous Treated Crushed Rock Surfacing.....	41.2
Graded Roadbed.....	12.0
Bridges	(7)
Total	87.5

Salt Water Barrier Plan Rejected

(Continued from page 5)

and the Sacramento-San Joaquin Delta, and thereby creating and maintaining a fresh water lake from which water supplies now available or hereafter made available from the Sacramento and San Joaquin rivers might be utilized by industries, municipalities and agricultural developments in the upper bay and delta regions.

The report contained in Bulletin No. 28 presents the results of a comprehensive investigation as to the economic aspect of a salt water barrier. This investigation has involved a survey and study of the upper bay and delta regions, with particular reference to manufacturing industries, industrial water front structures, irrigation, reclamation, flood control, navigation, fishing, municipalities, sewage and industrial waste disposal, and the effect of a barrier thereon. Estimates have been made of immediate future and ultimate water requirements for all purposes. An essential feature of the investigation has been a study of alternate plans, with and without a barrier, to provide the basic requirements of salinity control.

The following are some of the conclusions of the investigation:

1. It would be physically feasible to construct a salt water barrier at sites in Carquinez Strait and at Point San Pablo. Foundation conditions at the Chipps Island site are not as favorable for constructing a barrier at this location. The capital cost of a barrier would vary with the location and type of structure from \$40,000,000 to \$75,000,000 and annual cost corresponding to the same would vary from \$3,300,000 to \$5,600,000.

2. The amount which might be contributed from highway funds towards the building of a barrier, by reason of present facilities and savings effected, is small in comparison with the total cost of a barrier, and can not be considered a controlling factor in selecting the site, methods of financing or time of construction; and the combination of a highway crossing with a salt water barrier is not economically warranted.

3. The furnishing of an adequate and dependable cheap fresh-water supply for industries, municipalities and agricultural lands in the upper San Francisco Bay region would benefit these developments and stimulate their growth. * * * In so far as fresh-water demands of the upper bay region are concerned, the essential requirements would be the furnishing of adequate fresh-water supplies by the consummation of the most practicable and economical plan which can be devised.

4. * * * A barrier in itself would not create the water supplies required either for present or future needs of the area. The usable storage capacity would be insufficient to supply even the water required for barrier operation and unavoidable losses from a barrier lake. Only a small percentage of the tributary run-off could be conserved in a barrier lake. Therefore, the necessity and desirability of a barrier as a means of controlling salinity and serving the fresh-water demands of the upper bay and delta region must be determined on the basis of the comparative cost of a plan of salinity control and water service with a barrier and an alternate plan without a barrier providing equivalent service and accomplishments.

5. The control of saline invasion, so that water supplies now or hereafter made available in the

delta from the Sacramento and San Joaquin rivers could be maintained fresh and utilized for all purposes in the upper bay and delta region, could be provided with equal certainty without a barrier by means of fresh water released from mountain storage reservoirs to supplement the available stream flow. With salinity controlled by this means at the lower end of the delta, not only would the delta be fully protected and its water requirements satisfied, but also a fresh-water supply equivalent in dependability and quality to that in a barrier lake could be made available in the delta channels for use in the upper bay area and not far distant therefrom.

6. A barrier is not necessary for the exportation of water from the Sacramento River to the San Joaquin Valley above the delta. * * *

7. A barrier would not be essential to the feasibility of reclaiming the marshlands adjacent to Suisun and San Pablo bays.

8. A barrier would probably effect substantial savings in the capital and annual costs of water front structures in the barrier lake above, but such savings would be more than offset by the losses suffered in delays to navigation, additional costs of drainage and levee maintenance in the delta and bay marshlands, possible increased cost of navigation channel maintenance, and possible damage to the fishing industry. Moreover, construction of a barrier would precipitate a sewage and industrial waste disposal problem which would require substantial expenditures for construction of disposal and treatment works for its solution.

9. The proposed alternate plan, with salinity controlled by means of stream flow without a barrier, providing conduits from the delta to serve the fresh-water demands of the upper bay area, additional works of channel enlargement between the Sacramento River and San Joaquin River Delta and works for the reclamation of the upper bay marshlands, could be consummated for a capital and annual cost of less than half that required for a plan of equivalent scope and service with a barrier. It would have the additional advantage of requiring immediate expenditures of but a small fraction of the cost of a barrier for initial conduit units that would amply serve the needs of the immediate future. * * *

10. All present and ultimate fresh-water requirements and the complete development of the ultimate potentialities of industries, municipalities and agricultural lands in the upper San Francisco Bay region would be provided for under the proposed alternate plan of development and service, with salinity controlled to the lower end of the delta by stream flow supplemented with fresh-water releases from mountain storage. The plan would include main conduits extending westerly from the delta along the north and south sides of the bay, located and designed to serve the fresh-water demands in the upper bay area. The upper bay channels would continue to serve as outlets for sewage and industrial waste and as a source of supply for cooling and condensing water for industries, with advantages resulting for both purposes. Preliminary designs and studies of the proposed plan demonstrate its physical feasibility and eco-

AN APPRECIATION

Dear Sir:

This communication is prompted by the writer's very favorable experience with two men under your supervision, Messrs. Maudsley and Heaschman, on a recent Sunday evening, when my car was partially inundated by a minor landslide approximately one mile south of Oakwild. Soon following my mishap, the above named gentlemen passed and requested that the writer and his companion share their food and lodging for the night. The invitation was accepted and we were shown every expression of courtesy. Early Monday morning with the aid of one of your crews they freed my car from the accumulated soil.

If this is the type of treatment an unfortunate traveler can expect while in the mountains, it seems but reasonable that some effort be made to bring the favorable facts to the attention of those to whom these men are responsible and who govern the welfare of their positions.

Very truly yours,
(Signed) J. E. EDWARDS,
California Bank, Los Angeles.

"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.*

BULLETIN PRESENTS FINAL CONCLUSIONS

(Continued from preceding page)

nomical advantage and give assurance of satisfactory service. * * *

11. Water in the amounts that might be saved in controlling salinity with a barrier would be available and could be furnished at considerably less cost from mountain storage reservoirs. The conservation efficiency and value of a barrier would be small in comparison with the cost.

12. The final conclusion of this investigation of a salt water barrier located at any of the three typical sites is that this structure is not necessary or economically justified as a unit of the State Water Plan.

In addition to the main report, Bulletin No. 28 includes several supplementary reports on special investigations each made with special reference to a salt water barrier, which are presented as appendices to the main report, and comprise the following:

The bulletin was prepared under the direction of A. D. Edmonston, Deputy State Engineer, by Raymond Matthew, Hydraulic Engineer, with E. E. Blackie as principal assistant. The field work in connection with the investigation of salinity was under the immediate direction of Harlowe Stafford, Hydraulic Engineer. J. J. Haley was administrative assistant to State Engineer.

The bulletin was outlined and prepared with the advice of, and in consultation with, an advisory committee of consulting engineers. The personnel of the committee was: G. A. Atherton, G. A. Elliott, B. A. Etcheverry, C. E. Grunsky, A. Kempkey, C. T. Leeds, C. D. Marx and T. H. Means.

Erratic Oil Valve Causes Impromptu Skidding Tournament

AS THE cold gray dawn was making a belated appearance on January 12th last motorists on the Newhall Tunnel Road suddenly began skidding and squirming all over the highway. Their cars gyrated crazily, entirely out of control like things bewitched. One car skidded and did several flipflops. Others mingled promiscuously in several minor accidents but fortunately nobody was hurt.

The paved highway had been turned into a sliding pond with a good coating of light oil all the way from Castaic Junction to Oak Glen and cars couldn't make the Newhall Grade without getting out on the dirt shoulder.

An investigation revealed that an oil company's truck and trailer had done the road-greasing job when a valve on the trailer came open and unknown to the driver distributed 900 gallons of light fuel oil over the road.

Foreman Charles Harbey of District VII Division of Highways, stationed at Saugus, was notified by the sheriff's office and quickly got out his crew. Some were equipped with red lanterns and sent up and down the road warning all traffic to proceed with caution, while others hauled truckloads of sand to spread on the curves and grades.

Twenty-eight men and five trucks worked from 6.15 in the morning till about 2.30 in the afternoon hauling and spreading 130 tons of rock dust over the miles of slick pavement. The bill sent the oil company totaled \$396, exclusive of the oil lost, and all through the failure of a valve to do its duty.

FORESTS BRING CASH

California gets the largest returns received by any state from its national forests, according to advices reaching the Automobile Club of Southern California. The return, including the fiscal year 1931, will be \$4,311,456, representing 25 per cent of the gross revenues.

The teacher explained to the class, "Words ending in 'ous' mean full: as, 'joyous' means full of joy. 'Vigorous' means full of vigor. Now will some one give another example of such words?"

The boy with the scratch on his nose raised his hand. "Pious," he answered.—*The Kalends.*

As a hint to motorists whose driving is liable to get them into trouble, an eastern town has been utilizing posters bearing the legend: "Free parking—for careless drivers." Below is a convict sitting on the edge of his cell in the posture of the famous statue, "The Thinker."

State Tenth in Highway Expenditures

(Continued from page 1)

tration, is far behind comparable states. California, in comparison with the other great states of the Union, is investing a minimum amount in its State highway system and if the system is to adequately serve the California motorists and is to provide satisfactory lanes of travel throughout the State, that investment must be jealously guarded and judiciously expended.

ROADS ADDED

California has adopted a systematic and economic plan for State highway improvement known as the Ten Year Plan by which the funds will be adequate under the present law to improve the State highway system, as it existed in 1930, to a standard adequate to serve traffic in 1942. This plan does not provide, under the present financial set-up, for the construction of mileage added by the last Legislature, or that may be added by future legislation, without further provision being made for increased revenue. Progress toward the goal set by the Ten Year Plan is well under way.

If the California motorist were to demand the speeding up of work on State highway development and the completion of the proposed 10-year program at an earlier date, an increased revenue would have to be provided, and in this connection let Californians remember that in 1931 there was only one State in all of the forty-eight with a lower per car expenditure rate for State highways than California. The state of Ohio spent only \$17.05 per car while California spent only \$18.65 per car. Louisiana's expenditures per car were the highest, being \$145.31, and Nevada was second with \$145.05. The average for all states amounted to \$39.14, so that the cost per car licensed in this State was less than one-half the average for the forty-eight states.

In per capita expenditures on its highways California ranked thirty-seventh in 1931 with \$6.71 expended per person of population. Nevada's per capita expenditure was the highest of any of the forty-eight states at \$47.22, and the average for the entire United States was \$8.47.

Cooperative Plan an Aid to Cities

(Continued from page 7)

Statutes 1931) authorizes the improvement by the State from State Highway funds at the option of and on a routing determined by the California Highway Commission of portions of State Highway within city limits, where "the natural course of a State Highway or State Highway System passes into or through any municipality or contiguous municipalities."

Q. Has the California Highway Commission adopted a policy in this regard?

A. Yes. A cooperative plan. Upon the request of the city authorities by proper resolution, the California Highway Commission will investigate the location of a routing connecting the State Highways on either side of a municipality to form a continuous highway or highway system as will be of the greatest benefit to traffic upon the State Highway; will, if the State and City authorities reach a cooperative agreement, adopt and take over such routing; and will construct or improve such connecting portion to the same width or to the same standard as the State Highway on either side of such municipality, paying for such improvement with State funds appropriated or available for such purpose.

Q. Are the cities expected to aid?

A. Yes. On State Highways which are main traffic routes the municipality is required to furnish to the State a right of way with a minimum width of 80 feet, providing for an ultimate development of highway 76 feet wide between curbs. Sidewalk space, if desired, is to be provided by the municipality in addition to and outside the 80-foot right of way.

On State Highways of less importance and carrying a limited volume of traffic, sidewalk space may encroach on the 80-foot right of way but only to the extent that a 56-foot ultimate width of roadway is provided.

Construction of curbs and sidewalks and the improvement by paving or surfacing of the remaining width of roadway between curbs not improved by the State, will be an obligation of the municipality and should be defrayed from municipal funds available for such purpose. Installation, removal, or renewal of water, sewer, gas, and such other facilities under municipal jurisdiction shall be done at the expense of the municipality.

Upon completion of the improvement of the routing, the city is to resume jurisdiction and take back the improved routing and maintain the same.

Committee to Ask New Codification of Motor Vehicle Act

THE 1931 Legislature appointed a special committee of five of its members composed of State Senators William E. Harper of San Diego and Ray W. Hays of Fresno, and Assemblymen William B. Hornblower and Joseph P. Gilmore of San Francisco, and Bert B. Snyder of Santa Cruz, to study motor vehicle legislation during the legislative recess and recommend to the 1933 Legislature such revision of or additions to such laws as they may find to be necessary and proper.

The organization meeting of this committee was held at Los Angeles March 18, 1932, and was attended by officials of the State Departments of Finance, Motor Vehicles and Public Works, the State Railroad Commission, city and county officials and representatives of the automobile clubs, motor car dealers, truck and stage operators, motor car users and other interested groups.

Assemblyman Hornblower acted as chairman of the conference, which will hold another public meeting in the new State Building at Los Angeles on May 27, 1932, to receive suggestions of changes in the motor vehicle act and to receive the reports of the subcommittees on different phases of the licensing and operation of motor vehicles on the public highways of California.

It was decided by the conference to request the Legislative Counsel Bureau to draft a new codification of the act in due season for consideration at the next Legislature, including the amendments finally proposed by the special legislative committee.

Million Tourists Will Find Clean Roadsides

A million automobiles from east of the Rocky Mountains will be driven to the Pacific Coast in 1932, according to an estimate based on a nation-wide survey received by the touring bureau of the Automobile Club of Southern California. This will be more than double the normal number of motorists reaching the State, as it is assumed that practically all of these tourists will come to Southern California because of the Olympic Games.

It is further estimated that the average trip for motorists to the Pacific Coast and back will consume approximately 22 days,

TOAST TO THE ENGINEER

HERE on the open roadway,
With none but the pines to hear,
I give you a toast to the Builders,
To the Highway Engineer.

To the men with sun-tanned faces,
To the Poets of Curve and Line,
To the Sculptors who work in concrete,
To the Artists of Bridge Design.

Have you seen them, dirty and sweating,
Pounding their stakes on the hill,
Squinting keen eyes through the transit,
Planning the "cut" and the "fill"?

Have you passed them, perhaps, on some
detour,
A strong-limbed, clean-eyed crew,
Chief of Party and rodman and chainman,
In a car of the Highway blue?

Cutting their noon hour to finish a shot,
Plotting their notes at night,
The youngest "S. I." writing home
By the flickering lantern light.

Tolerant, genial and kindly,
Helping each other along,
Dusty and tired and sunburned,
Building your roads with a song.

So I pause on the open roadway,
Where none but the pines can hear,
And I give you a toast: To the Builders,
To the Highway Engineer!

GLADYS CRAIG POTTER.

(Wife of C. A. Potter, Maintenance Superintendent, Placerville, California.)

The number of automobiles registered in the United States last year was 25,840,000, according to figures gathered by the Automobile Chamber of Commerce. There were 22,450,000 motor cars and 3,490,000 trucks.

Recognizing the impossibility of removing all traffic hazards to children going to and coming from school, the California Committee on Public Safety will seek the support of school authorities in a policy of locating school buildings at other points than on boulevards and similar main arteries of travel.

and the average expenditure per car will be approximately \$23 per day. These cross-country motorists will spend approximately \$500,000,000 in the cities and towns and along the roadside on the main highways to the Pacific Coast.

More than one progressive city stirred by proper pride in their State have been cleaning up and beautifying the highways in their vicinity to the end that California's natural attractions shall not be spoiled for the visitors by unsightly roadside. Many unemployed men are being given work by certain cities in this way while in other communities steps are being taken to prevent the dumping of tin cans and other refuse on vacant lots along the highways.

Safety on Highways to Be Discussed at Joint Group Session

“**H**OW may we reduce our traffic accidents,” will be the principal theme of a joint meeting extending over three days to be held by the California Committee on Public Safety and the Municipal Traffic League of California at Santa Cruz May 5 to 7.

Leading officials and traffic experts from all parts of the State will join in considering all aspects of the problem and try to work out a state-wide plan of action.

The two groups are composed of State, county and municipal officials from all parts of California, as well as citizens and representatives of motorists' organizations and other elements interested in promoting traffic safety.

In 1931 the number of persons injured in traffic accidents in California was 48,077. Many were maimed for life and 2591 deaths resulted. This was an increase of 16.6 per cent over 1930 in the number of injured and an increase of 8.7 per cent in fatalities. The increase in accidents was 12.9 per cent.

The California Committee on Public Safety and the Municipal Traffic League have each heretofore held their own separate annual conventions.

Four Forces Road Builder Must Fight

Abrasion. Suction. Shear. Impact. Wherever vehicles move on roads, they exert these four destructive forces which must be met and overcome by the road builder. How these four forces work was shown in a series of posters by the Bureau of Public Roads at the recent Road Show at Detroit.

Abrasion is the force which grinds down the road surface if permitted. But abrasion has been conquered by fitting the former steel shod grinders with rubber shoes.

But though rubber tires vanquished abrasion, they brought suction, the force which lifts into the air and disperses the finer particles of surfacing material. This force made the old water-bound macadam roads useless, and it quickly destroys gravel roads. It is cheaply prevented by treatment with bituminous material.

Shear is best illustrated by a solid-tired wheel cutting ruts through an earth road softened by rain. Rigid pavements of concrete or other materials on a concrete base have ample strength to resist shear.

Impact is the pounding of wheels on the road surface. A slight roughness of the road, or small obstacles, may cause an impact much greater than the actual weight of the load.

Olympic Visitors Will See Many Public Works in Progress

MOTORISTS from other states who tour California during the Olympic Year will not find the southland all play, as there will be many enormous construction projects under way while the leading athletes of the world are competing for sports supremacy, says a statement issuing from the Automobile Club of Southern California.

A recent survey indicates that there will be approximately three-quarters of a billion dollars worth of improvement work being done in this region. These projects include dams, breakwaters, railway terminals, flood control projects, power development, factories, state and federal buildings, harbors, canals and aqueducts.

The largest among these developments is the Los Angeles-Colorado River Aqueduct, which will cost in the neighborhood of \$220,000,000. The All-American Canal in Imperial Valley has been authorized at an expenditure of approximately \$34,000,000.

Modern Social Life Depends on Highways

Most anyone will admit that highways play an important part in the social and business life of the Nation. Questioned as to just how the benefit is derived, most people are hazy.

Just suppose there were no highways, or that the road you now use either did not exist or perhaps was full of bumps and mud holes. What would you do about the poor road—or no road?

Out of six million farms in the United States, three million are on unimproved roads and two million more have only a dirt road according to Chester H. Gray, of the American Farm Bureau Federation, in testifying before a United States Senate committee on roads. Only about one-sixth of the farms of the United States are on surfaced highways.

Good roads have done more to aid living conditions in the country than any other agency. The highway is as essential to agriculture and merchants who sell the farmers supplies as the railroad and steamboat are to industry, Mr. Gray believes.

Chairman Kelly of Highway Board Made Tax Bureau Chief

A NEW honor came to Earl Lee Kelly, of Redding, chairman of the California Highway Commission on March 21 when Governor James Rolph, Jr., appointed him director of the State Tax Research Bureau, a creation of the 1931 Legislature. Mr. Kelly will continue as chairman of the Highway Commission, an unsalaried office, in which he has made an outstanding success.

His appointment completes the organization of the tax bureau which is charged with making a report to the 1933 Legislature on the results of research work covering methods for an equalization of State taxes. In naming Mr. Kelly to the directorship, Governor Rolph cited his successful career as an organizer and tax expert resulting from a wide knowledge of tax matters gained through long association with the abstract and title business as president and general manager of a large Shasta County company.

Mr. Kelly spent his boyhood days in Humboldt County, graduating from the Eureka High School. He is a graduate of the law department of the University of California, class of 1915.

After returning from service in the World War, Mr. Kelly engaged in the title and insurance business in Redding. In addition to becoming a leading business figure of that city, Mr. Kelly took an active and prominent part in the civic and political life of that community.

He has served Redding both on the City Council and as Mayor of the city. He has also been prominent in State political affairs, and is an active member of the Republican State Central Committee.

During his life-long residence in northern California, Mr. Kelly has become exceptionally well versed in State Highway problems and policies. He brings to these problems a seasoned and successful business judgment, gained both in the conduct of his own business, and in the course of his official service for city and State.

As chairman of the California Highway Commission, Mr. Kelly has personally inspected nearly every mile of highway in the State system spending many hours and days of arduous travel in the conscientious effort to thoroughly familiarize himself with the highway needs of all sections of the State.



EARL LEE KELLY

\$1,611,580 for Forest Fire Prevention Aid

I NTERESTING to motorists and others concerned with the protection and preservation of scenic areas and natural resources is a report received from Washington, D. C., regarding forest fire prevention measures now before Congress.

"To date, every appropriation bill has been thoroughly scanned and a great many cuts have been made here and there" says the report. "In this connection, the Clarke-McNary Bill, providing for government cooperation with the states in fire prevention, has been cut from \$1,750,000 to \$1,611,580. It will be readily seen that the decrease is in no sense serious. The annual appropriation of \$100,000 for fire prevention work by the forest service is unchanged.

"The Department of the Interior appropriation bill usually carries an item of \$80,000 for fire prevention in the national parks and \$40,000 for lookout stations. The bill now pending in the House carries the \$80,000 for fire prevention, as heretofore, but the \$40,000 has been reduced to \$10,000."

Riverside Fetes Governor and Highway Officials at Rubidoux Bridge Dedication

THREE interesting events gave to the city of Riverside the atmosphere and importance of the State Capital, for two days March 28th and 29th, when the California Highway Commission held a regular meeting in the Riverside County Court House and Governor James Rolph, Jr., with other members of his executive family, participated in dedication ceremonies attending the acceptance and official opening of Buena Vista Avenue and Rubidoux Bridge at the westerly entrance to the city.

Riverside was gaily decorated and in festal spirit during the two days, and State officials were entertained at numerous functions extended by city, county and civic body officials.

Riverside is the home of State Highway Commissioner Frank A. Tetley, who took a leading part in arranging and supervising the program of events. The commissioner was diligently active in securing the improvement of both bridge and avenue and donated a stately 40-foot Cocos Plumosus palm tree that Governor Rolph planted at the entrance of the bridge in honor of the occasion.

TETLEY HONORED

In appreciation of these services Commissioner Tetley was made master of ceremonies at a dual celebration that was marked by military pomp and civic pageantry.

A military parade escorted the official party to the scene of the ceremonies, led by motorcycle officers with Governor Rolph and Commissioner Tetley at the head of the procession. A band and detachment from the U. S. Army Post at March Field; Company "C" of the 185th Infantry, California National Guard; an R. O. T. C. band and battalion and a detachment and band from the Sherman Institute Indian School composed the escort.

Upon arrival at Rubidoux Bridge Governor Rolph reviewed the parade from the official platform and then proceeded to plant the palm tree in a specially prepared niche on the bridge approach.

Introduced by Commissioner Tetley, Governor Rolph made the principal dedicatory address at the bridge ceremony and also officiated at the dedication of an ornamental drinking fountain, donated by the Lions Club, and located in a picturesque setting at the foot of Mt. Rubidoux opposite the entrance to the bridge.

OFFICIAL LUNCHEON

Following the ceremonies the parade reformed and escorted the official party back to the Mission Inn where a luncheon was given by Mayor John S. Long, the City Council and Board of Supervisors of Riverside County, with Governor Rolph as the guest of honor and principal speaker.

After the luncheon Governor Rolph visited March Field stopping en route to make a brief talk to the students of Junior College. On arrival at the army reservation, the Governor was given a 17-gun salute and officially received by Colonel Arnold, commanding officer. The military program that followed included an exhibition and review of 100 bombing planes.



FRANK A. TETLEY

On his return from March Field, Governor Rolph inspected the University of California Citrus Experiment Station.

In the evening the Governor was guest of honor at a dinner given by the Present Day Club and addressed this body of 500 prominent citizens of Riverside.

The improvement of the westerly entrance to Riverside has been a project in which city and State have cooperated. The city of Riverside carved the splendid, wide Buena Vista Boulevard out of the rocky hillside. It is a fine road, an easy riding road, a safe and beautiful road with probably the most beautiful entrance of any city in the State, leading to the bridge across the Santa Ana River. The hillside has been terraced, an ornamental railing has been built, an attractive stone arch separates highways that cross.

BRIDGE REMODELED

The road has been lighted. Trees and shrubs have been planted. At the side of the road there is a



RUBIDOUX BRIDGE, at the foot of famous Mount Rubidoux, spans the Santa Ana River with five graceful concrete arches and carries the State highway over a 45-foot roadway to the western portal of the city of Riverside, beautiful Buena Vista Boulevard. The widening and rebuilding of both bridge and boulevard by State and city was celebrated with dedication ceremonies at which Governor Rolph and city officials officiated on March 29.



HIGH ART in landscaping and roadbuilding is exemplified in this beautiful Buena Vista Boulevard, the western gateway to the city of Riverside leading from the newly completed Rubidoux Bridge. It sweeps up from the Santa Ana River around the foot of famous Mount Rubidoux in a broad, easy curve of fine wide roadway. The sides are terraced and embellished with rock work and planted shrubs and trees add arboreal beauty to the ensemble.

lovely waterfall and a fish pond. The artistic palm niche with benches adds to the attraction of the spot.

The State has taken the old narrow bridge with its five graceful concrete arches which headed directly into the mountain side, and remodeled it to fit the new road. The sharp right-angular turn has been replaced with a long sweeping curve. The deck width has been doubled and a sidewalk has been added. The tall pylons or towers which graced the portals of the

old structure, have been moved bodily to fit the new bridge width. A beautiful railing of Indian pattern, similar to that used by the city, has been placed upon the bridge. Ornamental light posts have been installed.

This new structure, 500 feet in length, composed of five arch spans, now has a width of 45 feet. The south abutment is founded on rock. The balance of the bridge is founded on concrete piers extending 20 feet into the ground, supported on piling.

U. S. Bureau Traces 90 Per Cent of Highway Dollar Into Workers' Pockets

AT LEAST 85 per cent and possibly more than 90 per cent of the money expended for a concrete pavement is ultimately paid out as wages and salaries, according to the Bureau of Public Roads of the U. S. Department of Agriculture.

This conclusion is reached as a result of studies of typical concrete construction jobs and it is believed to be approximately true for other high-type pavements. Expenditures were traced back through various channels by the Bureau until the money went into personal use.

About 15 per cent of the cost of concrete pavements is paid to men employed directly on the construction jobs, the report says. About 12 per cent is paid to men employed in quarries, sand pits, mills and factories where the materials are produced, and about 14 per cent is paid to men employed by the transportation companies (principally the railroads) for hauling these materials to the jobs.

WIDELY SPREAD

Part of the cost is paid to the men who build the machinery and equipment used in constructing highways. Even more is paid to the men who build the machinery and equipment used in the sand pits, the quarries, the cement mills and the steel mills where road materials are produced and to those who build the equipment of companies that deliver these materials. Some is paid to the miners, the men who work in the refineries, and those who work on the pipe lines and in the oil fields—the industries which provide the fuel that produces the power used in producing materials, in transporting them, and in working them into finished pavements.

A part of the cost of high-type roads goes to those industries which furnish the supplies used all along the line. Some goes to the men who make blasting powder; some to those who make hand tools, and even the very minor items, such as cotton waste and the sheet of emery paper with which the mechanic smooths a joint on a machine he is repairing, absorb a bit of the cost at which pavements are built.

About 75 per cent of the cost of a high-type pavement filters back through the trans-

portation companies and through industry to men who work for salaries and wages at points distant from where these highways are built. Most of these men are city workers employed by the transportation companies or in the mills and factories—men who may never see more than a few of the highways their efforts help to build but who, taken together, receive several times as much in salaries and wages as is paid to the men who are directly employed in building them.

The Bureau's studies further show that out of every \$100 paid to the contractors who build concrete pavements—and much the same thing is true of high-type highway construction generally—more than \$40 passes through the hands of the transportation companies (principally railroads) and assists these companies in maintaining a profitable volume of business. Approximately \$13 is paid to the producers of aggregate (sand, gravel, broken stone and slag); about \$24 goes to the cement mills. At least \$16 ultimately goes to the manufacturers of machinery and equipment including trucks, railroad cars, locomotives, etc.

ADDS BUSINESS VOLUME

Some is paid to the manufacturers of explosives; some to the producers of coal; some to the gasoline refineries; and much to manufacturers who contribute in lesser degree by supplying materials used by those who produce the materials used in highway construction, and those who transport them or who build the equipment used at some point in the long series of processes out of which highways result.

From these facts it is apparent that the construction of highways, particularly those of the higher types, not only provides work for those employed on the job but that it provides a great deal more work for men employed in industry and in transportation; and that, in addition to this, it supplies a large volume of business to those industries through which the materials that must be used are collected, worked and reworked before they become a part of a finished pavement.

Historic Gaviota Pass Widened and Paved; Scenic Beauties Conserved

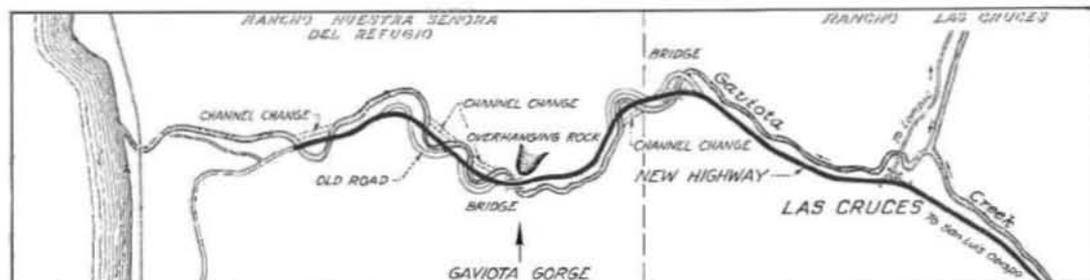
By G. A. TILTON, Jr., District Construction Engineer

GAVIOTA Gorge in Santa Barbara County has been noted as a point of historical interest ever since General Fremont's military forces, marching to the aid of the Los Angeles Garrison in December, 1847, were forced to detour that canyon and travel via San Marcos Pass.

General Fremont, marching south, received word that the Californians and Indians were hiding in the narrow defiles of Gaviota Gorge and planned to open an ambush attack by rolling large rocks from the high cliffs. He avoided the ambushade by going over San Marcos Pass and was able to capture Santa

Original highway construction in Gaviota Gorge was performed in 1915, which served adequately until the increase in volume of traffic on the Coast Route, known as U. S. Route 101, demanded reconstruction. This was completed during October, 1931, and as built provides a permanent highway with increased safety and convenience to the traveling public.

The new pavement is of reinforced concrete 20 feet wide, the graded width being 36 feet as contrasted with the 21-foot width that formerly existed. Mixed oil shoulders eight feet wide are on each side of the pavement.



Map of improved highway through Gaviota Pass

Barbara without bloodshed, while the enemy awaited him 35 miles away.

NOTED FOR SCENERY

Not only is this natural pass to the Santa Barbara Coast of historical interest, but it is also famous for its characteristically beautiful scenery and fantastically-shaped natural rocks. It is the gateway to the coast that has been used by coastwise traffic since the earliest days of California history.

When the reconstruction of three miles of highway through Gaviota Canyon was planned, it was only natural that the residents of Santa Barbara County should be greatly concerned lest the scenic attractions of that area should be destroyed. Only after State Highway engineers held numerous conferences on the ground with officials of the Santa Barbara County Planning Commission, the State Park Commission and principal owners, was it possible to allay their fears to the extent of accepting the State plans.

It was necessary to make several major changes in the location of Gaviota Creek to avoid bridge construction and build several heavy concrete retaining walls to sustain and protect the roadbed.

Top soil was placed over the slopes of rock fills to promote a more rapid growth of vegetation. Planting of native trees and shrubs will be done by the State.

The project includes one bridge at the Gorge and cost the State \$270,000, or \$90,000 per mile. This marks it as one of the most expensive sections of highway in Santa Barbara County.

It is evidence of the fact that the California Highway Commission recognizes that natural scenic attractions *must* not be destroyed and expressions of opinion on the part of the people of Santa Barbara County have been very complimentary. It is generally stated that the traveler through Gaviota Canyon may now see more scenery than he ever could before.



CALIFORNIANS HID in this picturesque Gaviota Pass in 1847, seeking to ambush General Fremont marching to the aid of U. S. forces in Los Angeles but he detoured over San Marcos Pass and fooled them. The view shows a part of the newly improved State highway through this famous old gateway to the coast.



A NATURAL AMBUSCADE was provided by this overhanging rock at the narrowest part of the pass where the Californians planned to roll boulders down upon the American troops. A bridge carries the new highway over Gaviota Creek at the foot of the rock.

Cars Averaged 300 More Miles in 1931

MOTORISTS throughout the country averaged 300 miles more of travel per car last year than in 1930. This conclusion is based on the gasoline consumption, which was 500,000,000 gallons more than the preceding year. This showing is made in the face of a reduction of 1,000,000 cars in the production for 1931.

The average tax paid by motorists in 1931 exceeded \$40 per vehicle, or approximately 18.3 per cent of the value of the average car.

Motor vehicle registrations dropped in nine of the ten states having the highest average taxes. Normal increases in auto registrations occurred in nine of the ten states having the lowest taxes on vehicles.

According to a statement from the president of the Automobile Chamber of Commerce, thousands of families were willing to sacrifice luxuries and even so-called necessities in order that they might not be denied the use of their cars.

Warning of Flood Stage Broadcasted

(Continued from page 10)

concrete sill of the weir, forming a lower crest at elevation 25.0 feet, U. S. E. D. The project flood plane at the weir is at elevation 34.5 feet.

EASILY OPENED

The gates are simply and easily opened by releasing the timber beam which holds the needles upright; but the process of closing the gates is slow, cumbersome and costly. Investigation has been made as to the desirability of replacing these gates with ones of a type which can be operated more easily, but it has been concluded that as the gates are seldom operated and the installation of new gates would necessitate remodeling the weir at a heavy cost the change would not be justified.

The official project capacities of the channels affecting the Sacramento weir are: Sacramento River above weir, 107,000 second-feet; Sacramento weir, 112,000 second-feet; American River, 128,000 second-feet; Sacramento River below Sacramento, 110,000 second-feet. These are theoretical quantities and the apparent excess of inflow over outflow of 13,000 second-feet is assumed to be eliminated by the probable flattening of flood crests by channel storage.

The Sacramento weir actually discharged 131,000 second-feet in March, 1928, at a height 1.7 feet below the theoretical maximum height. The works of the American River Flood Control District are designed for a flow of 180,000 second-feet in the American River.

SCHEDULE APPROVED

The operation, control and jurisdiction of the Sacramento weir are under the direction of the State Engineer, as provided in Chapter 343, Statutes of 1925. The present schedule under which the weir is operated was approved by the California Debris Commission in 1926 and has been reapproved for each calendar year since that time. This schedule provides:

That no gate shall be lowered while the U. S. Weather Bureau gage in the Sacramento River at the Southern Pacific bridge reads less than 26.5 feet; that any gates lowered be raised promptly when their lowering has served its purpose; and that the operation be conducted so that a safe stage of 28.3 feet on the above mentioned gage shall not be exceeded, if possible.

This schedule is designed to hold the water height at Sacramento about three feet below project height for the protection principally of the North Sacramento territory which is now without levees.

During flood, the flood control and reclamation section of the Division of Water Resources has a crew available at all times which can commence opening the weir gates upon notice of one-half hour, and can complete the opening in one hour thereafter. The gates are closed by hand, a tractor derrick being used to lift the heavy timbers. This operation requires about three days. During floods when water is against the gates the weir is patrolled to prevent unauthorized opening of gates and is lighted at night.

WARNING GIVEN

The main consideration in the operation of the weir is to determine the proper time to open the gates and the number to open. This is done by obtaining

continuous reports of the gage heights on the Sacramento, Feather and American rivers, with reports of rainfall, and by means of curves previously prepared, the quantities of water to be expected from the various tributaries and the times of arrival at the vicinity of Sacramento can be predicted with considerable accuracy. The curves used are based upon actual measurements of flood flows in previous years.

No hard and fast rule can be applied as to opening the gates on account of the number of variable factors to be considered and the final determination is a matter of judgment. The public's knowledge of the conditions are so vague that during the flood excitement the office is besieged with urgent requests to open the gates at unsuitable times. When it appears flood stage will be reached in the Sacramento River and that the weir gates may be opened, warning will be broadcast by telephone and radio.

The area chiefly affected by the opening of the gates is in the Yolo by-pass, at the southerly end of which there are several tidal reclamations always flooded by the released waters if they have not already been flooded by waters reaching the Yolo by-pass from other sources, such as the west side streams and over the Fremont weir.

OPERATION IN PAST

On December 14, 1922, at 2 a.m., seven of the 48 gates were opened for the first time, at a gage reading of 25.4 feet.

Forty-four gates were tripped on February 6, 1925 at 27.5 feet gage height, which was effective in holding the stage to 28.0.

On February 18, 1927, six gates were tripped and remained open until noon on the 21st when 24 more were tripped by 4 p.m. These 30 gates were able to hold the water to a gage height of 27.3 for the four-day period.

During March, 1928, a sharp and rapid flood, chiefly in the Feather, Yuba and American watersheds, developed suddenly, requiring the gates to be opened with little notice. This was ordered at 11 a.m. on March 25, 1928, when the gage read 26.5 feet. Twenty-four hours previously the gage head read 18.5 feet. At 1.30 p.m., 18 gates had been opened and the water was held at 27.1, the reading when the opening began. The opening of gates continued, 47 being opened by 3 a.m., when the river crested at 29.5 feet.

The flow in the American River reached the greatest of record, 184,000 second-feet at Fair Oaks, causing considerable damage in North Sacramento where the overflow was two feet higher than in 1925. The closing of the gates began on March 29 and was completed on April 5.

The Division of Water Resources has charge of project maintenance, as provided in Chapter 309, Statutes of 1931.

The levees and other works, maintained by the Division are in excellent condition and no difficulty is anticipated should a flood occur this season. This Division is prepared with organization and equipment to assist in emergency levee protection work on other parts of the project in case dangerous conditions develop during high water.

Heights up to Ten Feet Found Best for Reflector Signs

(Continued from page 9)

(c) The letters are too slender, that is, the width is too narrow for the height.

(d) The letters should be white on a black background. In the daytime reflectors appear white. With black letters on a white background, the reflectors reduce the amount of black to such an extent as to render the letters almost invisible except at very short distances.

CONDITIONS GOVERN

It is not to be presumed that these experiments prove that the reflector type sign may replace the electrically illuminated sign entirely. Under certain conditions of alignment, density of traffic, or roadside light competition, the reflector type will be useless. Each location will require a separate study; and, inasmuch as the signs, whether of the reflector or illuminated type, are, as recommended, quite expensive, the study should be thorough and complete.

However, in an illuminated sign the size and proportion of the letters, as well as the general composition of the sign, should be governed by the same principles used in the makeup of the reflector type signs. As mentioned heretofore, letters to be legible should have sufficient width and open spaces as to allow the letters to stand out from the background.

Letters such as "W," "A," "M," etc., should be wider than those commonly used. A square effect given the letter "O" makes it difficult to differentiate it from a "D." Both should be more rounded. Likewise, "S," "C," "G," should be curved, with longer radii than has heretofore been the practice.

LEGIBILITY TESTS

A sketch showing the recommended composition of a typical directional sign is included herewith. Legibility tests show that a sufficient vertical distance between the two lines of letters is less confusing. By the same token, the arrow should be sufficiently removed from the letter. It is considered that by placing the arrows as shown with the indicated proportions, no difficulty will be experienced in determining the direction as soon as the sign becomes legible. An arrow at the end of a word tends, at a distance, to con-

Roads Not Keeping Pace With Increase of Motor Vehicles

THE number of motor vehicles has increased 40 per cent in the past five years while the amount of road building has shown a growth of only 13 per cent, according to W. R. Smith, president of the American Road Builders' Association. He believes the need for making up the deficiency in highways is urgent both from the standpoint of economy of travel and safety on the public roads.

"Taxes on land for highway purposes have been relieved in a large measure by motor vehicle taxes on highway users who pay as they ride," stated Mr. Smith. "It must be remembered that highway travel depends on the road as well as the motor vehicle—one is useless without the other. Money paid for freight and passenger fare on a railroad goes for upkeep of track as well as rolling-stock. Similarly, taxes on motor vehicles must be used on the highways since these taxes provide the main source of income for improvement and upkeep.

Increasing the shortage of highways will have a most depressing effect on the automobile industry which is looked upon as one of the leaders in renewing industrial activity. Congestion on the highways which is so evident to everyone clearly shows that if more motor vehicles are to be manufactured, more roads must be built over which they can operate," Mr. Smith concluded.

SPEEDING FARM PRODUCTS

There are now some 90,000 miles of concrete pavement running through the rural areas of the United States. These pavements directly serve millions of farmers and enable farmers several miles from the main highways to get to distant and profitable markets in jig time after they leave the local roads.

fuse the reader. If shapes of arrow or letters seem slightly out of proportion, it should be remembered that they were designed primarily for night visibility.

The principles set forth above will undoubtedly be embodied within the near future in all warning signs on the more important State routes, as many accidents are directly attributable to insufficient warning, conveyed by the present plain signs. A survey has recently been completed in conjunction with representatives of the two automobile clubs looking toward this change.

Highway Bids and Awards for February

CALAVERAS COUNTY—Between 3.4 miles north of Angels Camp and 1.8 miles north of Angels Camp, about 1.6 miles to be graded and surfaced with crushed gravel or stone. Dist. X, Rt. 65, Sec. B, J. R. Reeves, Sacramento, \$38,893; Chas. N. Chittenden, Napa, \$32,199; Milton A. Purdy, San Francisco, \$34,258; James Edward Johnston, Stockton, \$30,251; A. Teichert & Son, Inc., Sacramento, \$27,913; Hemstreet & Bell, Marysville, \$26,220; Willard & Biasotti, Stockton, \$27,048; Skeels & Graham Co., Roseville, \$42,779; R. L. Oakley, Palo Alto, \$33,509; Fred W. Nighbert, Bakersfield, \$31,955; Force Construction Co., Piedmont, \$32,575; C. W. Wood, Stockton, \$29,368; Hein Bros., Basalt, Rock Co., Petaluma, \$32,423; Contoules Construction Co., San Francisco, \$30,130. Contract awarded to Larsen Bros., Galt, \$25,507.

HUMBOLDT COUNTY—Benbow Bridge approaches about 0.4 mile grade and treat with untreated crushed gravel or stone. Dist. I, Rt. 1, Sec. A, Hein Bros., Basalt Rock Co. and J. V. Galbraith, Petaluma, \$24,774.33; Peter McHugh, San Francisco, \$32,239.20; Hemstreet & Bell, Marysville, \$25,469.99; Larson Bros., Galt, \$24,382.60; Meyer Rosenberg, San Francisco, \$34,195.10; F. C. Coats, Sacramento, \$26,115.90; Milton A. Purdy, San Francisco, \$27,949.75; Chas. N. Chittenden, Napa, \$25,630.80; Force Construction Co., Piedmont, \$28,164.80; Contoules Construction Co., San Francisco, \$24,410.50. Contract awarded to Rocca & Caletti, San Rafael, \$23,278.75.

IMPERIAL COUNTY—Between El Centro and Calexico, about 10.1 miles, oil treated crushed gravel or stone borders. Dist. VIII, Rt. 26, Sec. J, V. R. Dennis Const. Co., \$36,810. Contract awarded to R. E. Hazard Construction Co., San Diego, \$33,637.

IMPERIAL COUNTY—Between 3 miles west of Coyote Wells and Dixieland, about 14.7 miles to be graded and paved with asphalt concrete. Dist. VIII, Rt. 12, Secs. A, B, H. W. Rohl Co., Los Angeles, \$426,933; George R. Curtis Paving Co., Los Angeles, \$626,885; R. E. Hazard Contracting Co., San Diego, \$463,445; Daley Corporation, San Diego, \$466,319; Geo. Herz & Co. and Hall-Johnson Co., San Bernardino and Alhambra, \$512,039; Southern California Roads Co., Los Angeles, \$441,212; V. R. Dennis Construction Co., San Diego, \$436,463; Granite Construction Company, Ltd., Watsonville, \$439,839. Contract awarded to Griffith Co., Los Angeles, \$387,395.

LOS ANGELES COUNTY—Through Glendora, about 1.5 miles to be graded and paved with asphaltic concrete. Dist. VII, Rt. 9, Sec. H, Griffith Co., Los Angeles, \$52,956; P. J. Akmadzich, Los Angeles, \$62,474; Hall-Johnson Co., Alhambra, \$58,921. Contract awarded to Oswald Bros., Los Angeles, \$51,155.

LOS ANGELES COUNTY—Between Sepulveda Boulevard and Calabassas, about 10.4 miles to be graded and paved with Portland cement concrete. Dist. VII, Rt. 2, Secs. A, B, Basich Brothers, Torrance, \$170,265; Thomas C. Rogers, Monrovia, \$202,899; J. L. McClain, Los Angeles, \$166,205; Griffith Co., Los Angeles, \$169,109; Jahn & Bressi Construction Company, Inc., Los Angeles, \$189,728; McCray Co., Los Angeles, \$189,130; George R. Curtis Paving Co., Los Angeles, \$179,850; Ed. Johnson and Sons, Los Angeles, \$169,252; Gibbons & Reed Co., Burbank, \$189,823; Sander Pearson, Santa Monica, \$206,492; Southern California Roads Co., Los Angeles, \$174,810; Will F. Peck Co., Los Angeles, \$211,043. Contract awarded to Kovacevich & Price, Inc., South Gate, \$153,194.

ORANGE COUNTY—In Fullerton, about 1.9 miles to be graded and paved with asphalt concrete. Dist. VII, Rt. 2, Sec. F, L. A. Paving Co., Los Angeles, \$108,875.50; Hall-Johnson Co., Alhambra, \$102,671; Griffith Co., Los Angeles, \$95,328; Osborn Co., Pasadena, \$92,799. The Contract was awarded to Oswald Bros., Los Angeles, \$89,672.

PLACER COUNTY—Undergrade crossing under S. P. tracks near Towle, two concrete abutments with wing walls. Dist. III, Rt. 37, Sec. D, J. W. Terrill, Sacramento, \$19,928.50; Nelson Bros., Escalon, \$17,957.50; Lord and Bishop, Sacramento, \$18,485; C. W. Wood, Stockton, \$15,725; H. Sneed, Oakdale, \$20,703; Lang Transportation Co., Los Angeles, \$23,071; J. R. Reeves & O. G. Ritchie, Sacramento, \$21,073; B. A. Howkins & Co., San Francisco, \$16,810. Contract awarded to P. F. Bender, North Sacramento, \$16,380.50.

RIVERSIDE COUNTY—At the Santa Ana River

bridge at Riverside, grading and paving approaches. District VIII, Route 19, Sec. A, Pearson & Dickerson, Riverside, \$11,272; Hall-Johnson Co., Inc., San Bernardino, \$12,416; Byerts & Dunn, Los Angeles, \$11,113. Contract awarded to Byerts & Dunn, Los Angeles, \$11,113.

SAN BERNARDINO, RIVERSIDE AND IMPERIAL COUNTIES—About 570.8 miles of traffic stripe to be applied to pavement at various locations. Dist. VIII, Rts. 9, 12, 19, 26, 27, 31, 43, 58, 59, 64, 77, 78, Edwin Anderson, San Francisco, \$3,538; Essick & Co., Los Angeles, \$3,567; Kemper Construction Company, Ltd., Los Angeles, \$4,709. Contract awarded to B. G. Carroll, San Diego, \$3,019.

SAN BERNARDINO COUNTY—Through Upland about 2.2 miles in length furnishing and spreading fuel oil on shoulders. District VII, Rt. 9, Sec. D, Pacific Tank Lines, Inc., Los Angeles, \$1,087.20; Gilmore Oil Co., Ltd., Los Angeles, \$1,395; Paulsen & March, Inc., Los Angeles, \$1,331; Leonard C. Pulley, Long Beach. Contract awarded to Square Deal Oil Co., Inc., Los Angeles, \$1,023.

SAN DIEGO COUNTY—Between Sorrento Creek and Del Mar, about 0.8 mile long to be graded and paved with Portland cement concrete. Dist. VII, Rt. 2, Sec. A, Oberg Bros., Los Angeles, \$77,047.20; Frank Doran, San Diego, \$69,640.20; Macco Construction Co., Inc., Clearwater, \$76,490.50; Gist & Bell, Arcadia, \$78,158.10; C. R. Butterfield, San Pedro, \$66,218.10; Yglesias Bros., Inc., San Diego, \$73,655.50; Daley Corp., San Diego, \$72,158.20; Griffith Co., Los Angeles, \$79,946.30; V. R. Dennis Const. Co., San Diego, \$83,139.60; Jahn & Bressi Construction Co., Inc., Los Angeles, \$76,772; Basich Bros., Torrance, \$67,128.80. Contract awarded to C. R. Butterfield, San Pedro, \$66,218.10.

SANTA BARBARA COUNTY—Bridge across San Antonio Creek, 1 mile north Los Alamos 8-40' string beam spans with concrete deck on concrete pile bents and concrete abutments with wing walls on pile foundations. Dist. V, Rt. 2, Sec. M, Merritt-Chapman & Scott Corp., San Pedro, \$38,324; Theo. M. Maine, San Luis Obispo, \$37,400; Gist & Bell, Arcadia, \$36,473; Nead Const. Co., Wilmington, \$35,397; Oberg Bros., Los Angeles, \$39,403; M. J. Bevanda, Stockton, \$35,189; Lynch-Cannon Engineering Co., Los Angeles, \$41,693; Bodenhamer Const. Co., Oakland, \$35,725; Robinson-Roberts Co., Los Angeles, \$39,795; Neves & Hard, Santa Clara, \$36,790; M. B. McGowan, Inc., San Francisco, \$36,796.70. Contract awarded to Fredrickson & Watson Const. Co., & Fredrickson Bros., Oakland, \$34,260.

SANTA CLARA COUNTY—Between Union Avenue and Stephens Creek Road, about 3.4 miles to be graded and paved with Portland cement concrete and asphaltic concrete. Dist. IV, Rt. 5, Sec. B, Clark & Henery Construction Co., San Francisco, \$84,368; Valley Paving & Construction Co., Fresno, \$68,078; A. J. Raisch, San Jose, \$65,633; Healey-Moore Co., Oakland, \$66,192. Contract awarded to Union Paving Co., San Francisco, \$62,637.

SISKIYOU COUNTY—Near Beaver Creek, about 3 1/2 miles west of Gottville, about 4 miles to be graded and surfaced with untreated crushed gravel or stone. Dist. 2, Rt. 46, Sec. D, A. Young, Yreka, \$16,772; Clarence Young, Oakland, \$17,598; J. P. Brennan, Redding, \$17,271.40; Chas. N. Chittenden, Napa, \$16,931.50; Dunn & Baker, Klamath Falls, \$24,506.10. Contract awarded to Milton A. Purdy, San Francisco, \$14,437.50.

SONOMA AND MENDOCINO COUNTIES—Between Cloverdale and Hopland, about 13.9 miles to be graded. Dist. IV, Rt. 1, Secs. D, L, T. E. Connolly, San Francisco, \$643,070; Fredrickson & Watson Construction Co., and Fredrickson Bros., Oakland, \$543,910; The Utah Construction Co., San Francisco, \$661,611; A. Guthrie & Company, Inc., Portland, Oregon, \$745,698; Merritt-Chapman & Scott Corporation, San Pedro, \$554,555; George Pollock Co., Sacramento, \$596,023; Healy-Tibbitts Construction Co., and J. P. Holland, Inc., San Francisco, \$522,459; Kern & Kibbe, Portland, Oregon, \$530,322; MacDonald & Kahn Company, Ltd., San Francisco, \$591,299; Morrison-Knudsen Co., Los Angeles, \$640,565; Von der Hellen & Pierson, Castaic, \$541,417; Contoules Construction Co., and Schuler & McDonald, Inc., Oakland, \$652,946; A. Teichert & Son, Inc., Sacramento, \$672,282; E. C. Coats, Sacramento, \$500,919. Contract awarded to Granfield, Farrar & Carlin, San Francisco, \$463,264.

Ten Miles of Elm Trees Planted Along Golden State Highway

By W. A. SMITH, Assistant Maintenance Engineer

THERE is a continual interest taken by the public in roadside beautification. The most concrete evidence of that fact is shown by the tree planting projects which are undertaken each year—projects that are not financed by the State.

The individual or organization desiring the trees planted must pay for the original planting and for the upkeep cost for the first year.

This policy, adopted by the State in the early years of roadside planting, has been found a most necessary check on the over-enthusiasm of many worthy organizations. It insures that projects will be undertaken only after due consideration and with reasonable assurance that a worthwhile planting will develop.

The Division of Highways organization for its part advises as to the planting and, following the first year, assumes the entire expense of care of trees planted under its supervision.

POPULAR IN KERN

Kern County authorities long ago realized the advantages of such work. One of the early plantings on State highways was on the section of the Golden State Highway between Bakersfield and Grapevine Station.

Last year, trees were planted between the north county line near Delano to Famosa and this year some 550 Siberian elms were planted on the ten miles south of Famosa.

The State has participated in this work to the extent of shaping up the areas of the right of way as part of construction operations so that the trees could be planted in proper relation to the ultimate development of the roadway. In addition, the State forces have been filling in missing trees on sections south of Bakersfield. Some 200 Eucalyptus and Ash trees have been planted in this area.

TRYING PALO VERDE

In Imperial County, there is great interest in planting work and this season three trial plantings of Palo Verde trees are proposed to make sure how expensive the care of these trees will be under desert conditions.

The Lions Club of Yreka, Siskiyou County, recently planted thirteen black locust trees at the Pioneer Bridge north of Yreka. A plaque was placed at this structure when the bridge was dedicated to the pioneers last year and the planting will eventually make an attractive stopping place.

The Colusa Chamber of Commerce donated sufficient funds for the planting and care of fifty-four Chinese Elms on the Tahoe-Ukiah highway. The Women's Club of Williams, Colusa County, also donated funds for planting fifty trees between Williams and Arbuckle and eighteen trees on the Tahoe-Ukiah route west of Williams.

PLANTING CORK TREES

The Novato Chamber of Commerce has contributed funds for the planting of thirty-three Cork Oak trees on the Redwood Highway between that place and San Rafael.

In addition to the above plantings, the Division of Highways is replacing trees west of Tracy with

TWO QUESTIONS ANSWERED

The following letters asking information in regard to this publication are printed with answers for the purpose of answering similar questions that may be in the minds of other readers.

California Highways and Public Works,
Sacramento, Cal.

Gentlemen:

I have read several copies of the magazine you issue, "California Highways and Public Works." The booklet is very interesting and instructive to me as a native son, and would like to subscribe to the booklet.

I would appreciate a note in regard to the subscription rate as I see none listed in the booklet.

Thanking you,

HOWARD H. HART
c/o "Harthaven Ranch"
St. Helena, Napa County.

Editor's Note: There is no charge for California Highways and Public Works. It is mailed free to every citizen asking for it.

Colonel Walter E. Garrison,
Director of Public Works,
Sacramento, Cal.

I have just read the February issue of California Highways and Public Works and write to congratulate you, not only upon the splendid showing it presents of progress in the great highway and other State public works program, but on the publication itself.

The California Highway Program now showing real accomplishment, is magnificent. It is meeting with unstinted approval from people I meet everywhere throughout the State.

I am wondering how wide is the circulation of your department publication. It is one of the most interesting magazines which comes to my desk and I hope it is being made available to citizens everywhere.

Congratulations and best wishes on your fine work. Now if we can just get the water problem started, the picture will be complete.

JAMES M. BURKE
Visalia, California.

Editor's Note: This magazine is now being sent to some 9000 readers who have made requests for it.

Oleanders, as the heavy winds in that section prevent development of worthwhile trees.

On the Redwood Highway, some 2000 Toyons and Redwoods have been planted in Mendocino and Humboldt counties at abandoned portions of the old highway and on banks and fills as protection for the slopes to reduce maintenance.

A large amount of Ice plant has been planted on slopes in the San Francisco, San Luis Obispo and Los Angeles districts as protection work.

Twenty-five Departments Move in to New Los Angeles State Building

THE California State Building at Los Angeles has reached the stage of final completion permitting occupancy by many of the State departments that have been housed in rented quarters in private buildings.

The offices for a number of these departments have already been finished and present a busy moving day scene. It is expected that most of the departments will have been installed in this fine new building by April 1st, and that the end of April will see a completion of this imposing official migration of some 25 departmental division, bureaus and commissions.

In addition to these, the building will provide accommodations for the Supreme Appellate and Superior courts, quarters for the Governor and Lieutenant Governor, and a large assembly hall.

The disposition of the various State units is as follows:

FIRST FLOOR	FIFTH FLOOR
Division of Veterans Welfare	Compensation Insurance Fund
Division of Industrial Welfare	Division of Labor Statistics and Law Enforcement
Division of Athletics Superintendent's Office	Division of Housing and Sanitation
Franchise Tax Commissioner	SIXTH FLOOR
Department of Institutions	State Controller
Rehabilitation Bureau	Division of Industrial Accidents and Safety
Department of Education	SEVENTH FLOOR
SECOND FLOOR	Railroad Commission
Division of Building and Loan Supervision	Division of Banking
Division of Real Estate	Division of Fire Safety
Department of Agriculture	Department of Public Health
THIRD FLOOR	Department of Social Welfare
Department of Penology	EIGHTH FLOOR
Department of Natural Resources	Department of Public Works
Division of Fish and Game	NINTH FLOOR
Executive Offices	Department of Professional and Vocational Standards
Department of Finance	Inheritance Tax Appraisers
Board of Equalization	
FOURTH FLOOR	
Division of Corporations	

Division of Insurance
Attorney General

ELEVENTH FLOOR
Courtrooms and Justice rooms

TENTH FLOOR

Courtrooms and Justice rooms

TWELFTH FLOOR
Records and Clerks

THIRTEENTH FLOOR
Record Rooms

TWO WINGS ADDED

The history of the new building dates back to the Legislature of 1925 which passed an act later ratified by the people at a general election in November, 1926, authorizing a bond issue including \$1,250,000 for the construction and equipment of a State Office Building in the city of Los Angeles. Subsequently an additional sum of \$607,350 was appropriated by the 1931 Legislature to construct two additional wings made necessary by insistent demands for additional space.

The deed to the State for the portion of the site required for the actual building was finally executed in March, 1930. Mr. John C. Austin, architect of Los Angeles, was commissioned to prepare plans for the building on March 9, 1930, and contracts for its construction were entered into in October, 1930.

This property was deeded to the State free of cost by the county of Los Angeles and will be a part of the new Civic Center.

CIVIC CENTER UNIT

The building is located exactly in accordance with the comprehensive plan for the Civic Center which was adopted two years ago by the city and county governments. The architectural style of the building is in harmony with that of all of the other new buildings erected in the Civic Center notably the City Hall and Hall of Justice. The State therefore is conforming to the approved Civic Center scheme in every particular.

There will be other buildings erected before the Civic Center is complete among them the new County Court House, possibly a civic auditorium, a new Federal Building and a Health Center Building. The State made the contribution of its own building at a most opportune time in view of present unemployment conditions.



MONUMENTAL IN CHARACTER, this recently completed California State Building in Los Angeles is now being occupied by numerous departments of the State government hitherto located in rented quarters at an annual expense to the State of \$85,000. It is of Class A construction, thirteen stories high, built of reinforced concrete, structural steel, granite and terra cotta at a total cost of \$1,857,350. With its two wings it provides 135,000 square feet of floor space.

PAYING \$85,000 RENTALS

The imperative need for the building grows out of the fact that the State has been paying rentals for very inefficient office space in Los Angeles of approximately \$85,000 annually. The building will just about supply the present needs for floor space.

It is significant that approximately all of the material for the building except the structural steel was obtained in California and the fabrication of the structural steel was done in the city of Los Angeles.

The State Building is monumental in character, of reinforced concrete, structural steel, granite and terra cotta, Class "A" in construction and 13 stories high. There is about 135,000 square feet of floor space in the building.

The total number of motor trucks in use in the United States last year was 3,490,000.

The National Safety Council reports that trucks, buses, taxicabs and other commercial vehicles involved in fatal accidents decreased 31 per cent during the past four years while during the same period the number of private cars involved in fatal accidents increased 55 per cent.

Providing for Heavy Coast Traffic

(Continued from page 14)

about 1.3 miles, but will necessitate the building of four bridges.

Another unit in the construction of the Ridge Route Alternate in Los Angeles County will be put under way with the advertising for bids on the construction of three of the proposed seven bridges in this 27-mile revision of the central artery of the State highway system. Two of these three structures will be placed across Los Alamos Creek and the third will span Gorman Creek.

The bridge across Gorman Creek will be reinforced concrete of four 15-foot spans and the two across Los Alamos Creek will be three span steel beams on concrete piers, one bridge to be 128 feet long and the other 220 feet long.

This new alignment of the heavily traveled Los Angeles Sacramento artery across the Tehachapi follows the canyon to the west of the existing tortuous climb over the Ridge Route and will not only facilitate travel on this important route by presenting modern alignment and grade but will shorten the distance by nearly 10 miles.

COAST IMPROVEMENTS

Improvement to the Oxnard-Serra Highway, sometimes called the Coast Boulevard, which skirts the Pacific from Oxnard in Ventura County to Serra, just south of San Juan Capistrano in Orange County, will be advanced by the advertising of four projects. The 2.4 miles westerly from Santa Monica to Santa Ynez Canyon (Beverly Boulevard) is to be reconstructed and paved with a 40-foot asphalt concrete pavement and the roadbed constructed to a width of 76 feet.

This work involves straightening of the alignment—the minimum radius for curves on the new construction to be 1200 feet against 250 feet on the existing road—and the maximum grade at Beverly Boulevard will be reduced from 4 per cent to 1 per cent. This portion of the Coast Boulevard lies between high cliffs and a narrow beach and in connection with its reconstruction a project is to be advertised for building timber and steel sheet piling groynes along portions of the beach to build up the beach and keep the ocean back from the roadbed.

The other two projects on the Coast Route are located towards its southerly end. The one involves the placing of a 40-foot Portland cement concrete pavement on an 80-foot roadbed between Newport Beach and Corona del Mar. This 4.8 miles of new highway will connect the recently widened pavement from Long Beach to Newport Beach with the pavement now under construction between Corona del Mar and Laguna Beach.

HEAVIEST TRAFFIC

The fourth project will carry the Portland cement concrete pavement southerly from Laguna Beach to Dana Point where it will connect with the short strip of pavement placed three years ago between Dana Point and Serra on the Coast Route.

This highway along the southern California coast carries the heaviest traffic of any of the arterials of the State system and its improvement to super-highway standards is being rapidly advanced so that motorists will have ready access

to any one of the popular beaches which lie along the route.

Two projects in Riverside County planned for March advertising are on the El Centro-San Bernardino lateral, the chief connecting link between the fertile Imperial Valley and metropolitan Los Angeles. This lateral carries a large volume of produce trucking and commercial traffic. The two projects involve the reconstruction of 14.3 miles of this route to modern standards, with a 20-foot Portland cement concrete pavement, from the Imperial County line to Avenue 62. One of the projects is to extend from the county line to Avenue 74 and the other from Avenue 74 to Avenue 62 and they will complete the modern pavement on this route from El Centro to San Bernardino with the exception of some 15 miles of 16-foot paving between Whitewater and Banning.

RAISES GRADE

The 14-mile improvement will rectify alignment, eliminate the dips and raise the grade, making ample provision for proper drainage. The southerly end of this stretch of highway will connect with the new asphalt concrete pavement recently placed between the Arroyo Salado and the Imperial-Riverside County line.

Carrying out the general scheme of modernization for the important San Diego-El Centro lateral, another section is to be reconstructed covering the 7.5 miles between Bostonia and Chocolate Creek in San Diego County. The proposed work will straighten alignment, improve the grade and provide a 20-foot Portland cement concrete pavement on a standard 36-foot roadbed. This section of the existing road is a crooked one with sustained 7 per cent grades and a pavement only 15 feet wide on a roadbed about 24 feet wide. The present improvement will make many line changes with entirely new pavement and on the remainder of the project the existing roadbed and pavement will be widened. The project will begin at the easterly end of the recently completed Bostonia line change and extend to 3.5 miles west of Alpine.

ARCHITECTURAL AWARDS

For Month of February

Fresno State Teachers College—Library Building—Contract for general work to H. Mayson, Los Angeles, \$123,953; heating and ventilating to Thos. Haverty Co., Los Angeles, \$14,759; electrical to Guilbert Bros. Elec. Co., San Jose, \$16,309; plumbing to J. A. Fazio, Oakland, \$3,230.

Armory, Pasadena—For California National Guard—Contract for general work to Edwin G. Bowen Company, Ltd., \$32,050; plumbing and heating to Thos. Haverty Co., Los Angeles, \$3,563; electrical to R. R. Jones Elec. Co., South Pasadena, \$1,799.

Patton State Hospital—Drilling and testing water well awarded to Roscoe Moss Company, Los Angeles, \$6,570.

The oldest motorist in the United States recently passed a test for his automobile driver's license in Michigan. He is Thomas Gordon, 102 years old of Grand Rapids. Gordon never has had an automobile accident in many years of driving. His maxim is: "Always watch the other fellow no matter who has the right of way."



In addition to action taken by the California Districts Securities Commission on several important matters, State Engineer Hyatt's report for February tells of approval of plans from Los Angeles County for San Gabriel Dam No. 2, 240 feet in height and application by that county for approval of plans for Dam No. 1, 300 feet in height to store 64,000 acre-feet. Salinity has receded from practically all San Joaquin-Sacramento delta points. Precipitation reports indicate a high percentage above normal in all water basins of the State with no floods of magnitude except in Salinas Valley where floods exceed any records for the past fifteen or twenty years.

Other important matters are dealt with in the report as follows:

Bulletin 18-B, a revision of California irrigation district laws to 1931, published by the Department, has been completed and is now available. The bulletin contains the full text, as amended, of the following acts: Irrigation district, water storage district, water conservation district, California water district, county district; also the district securities commission act, and other general provisions affecting organizations under the various acts.

In connection with securing information desired by this office and required by the Districts Securities Commission the following districts were visited: West Side, Naglee-Burke, Tracy-Clover and Banta-Carbana irrigation districts, San Joaquin County; Cordua Irrigation District, Yuba County; Anderson-Cottonwood Irrigation District, Shasta County; and El Camino Irrigation District, Tehama County. At the request of landowners, an inspection was made of the Rio Oso section, south of Bear River, in Sutter County, for the purpose of assisting in obtaining an additional water supply for the orchards in that section. The present source of supply from wells is apparently being overdrawn.

SECURITIES COMMISSION MEETING

The regular monthly meeting of the California Districts Securities Commission was held in the offices of the Commission, State Building, San Francisco, on February 11, 1932. Consideration was given and action taken on the following matters:

Scott Valley Irrigation District.—Approval for exchange of \$69,000 face value of refunding bonds for an equal amount of outstanding bonds of the district.

Modesto Irrigation District.—Granted permission to destroy \$236,000 par value of unsold bonds of the 14th issue.

Lindsay-Strathmore Irrigation District.—Authorized to enter into contract for the purchase of one share of Wutchumne Water Company stock for \$7,000, and for the purchase of 44 shares of Consolidated Peoples Ditch Company stock for \$2,540.

At a special meeting of the Commission held in San Francisco on February 18, approval was given to the plan presented by the directors of the Palmdale Irrigation District for refunding the outstanding bonds of the district in amount of \$445,000.

DAMS

To date 791 applications have been received for approval of dams built prior to August 14, 1929; 93 for approval of plans for construction or enlargement and 237 for repairs or alterations.

Applications Received for Approval of Plans for Construction or Enlargement.

Dam	Owner	County
San Gabriel No. 1	Los Angeles Co. Flid. Con. Dist.	Los Angeles
Lindo Lake	County of San Diego	San Diego
Antioch	Town of Antioch	Contra Costa
Unnamed	Santa Catalina Island Co.	Los Angeles

The San Gabriel No. 1 Dam is to be a rockfill structure 300 feet in height from streambed to spillway crest and having a storage capacity of 64,000 acre-feet. It will be situated in the San Gabriel Canyon about two miles below the Forks of the Canyon.

Applications Received for Approval of Plans for Repair or Alteration.

Dam	Owner	County
Tinemaha	City of Los Angeles	Inyo
Lake Wyandotte	Oroville-Wyandotte Irr. Dist.	Butte
Medley Lakes	Pacific Gas & Electric Co.	El Dorado
Finnon	Pacific Gas & Electric Co.	El Dorado
Mill Creek	East Counties Gas & Elec. Co.	Santa Cruz
Millbrae No. 1	Mills Estate, Inc.	San Mateo

Plans were approved for the construction of the San Gabriel No. 2 Dam which is to be a rock fill dam about eight miles up the west fork of the San Gabriel Canyon from the Forks. It will be 240 feet in height and store 14,000 acre-feet of water, to be built by the Los Angeles County Flood Control District.

Plans Approved for Repairs or Alterations.

Dam	Owner	County
Upper St. Helena	Town of St. Helena	Napa
Cowell	Henry Cowell Lime & Cement Co.	San Mateo
Tinemaha	City of Los Angeles	Inyo
Taylor Lake	J. L. Robinson	Plumas
Lake Wyandotte	Oroville-Wyandotte Irr. Dist.	Butte

Protective Work to Start in South

(Continued from preceding page)

FLOOD CONTROL AND RECLAMATION

Maintenance of Sacramento Flood Control Project.

During the period work has been continued on maintenance clearing in the Butte Slough By-pass. On February 6 the clearing crew of 80 men was decreased to 30, and at this date the work is practically complete. A total of \$22,000 has been expended on maintenance clearing work this season.

Construction has proceeded on the maintenance headquarters near Sutter City. It is expected that the buildings will be so far completed by March 1 that our property may be removed from the four places now being rented.

The drainage pumping plants on the Sutter By-pass have been operated during parts of this period.

Sacramento Flood Control Project.

The Reclamation Board has made available for construction clearing in the Tisdale and Sutter-Butte By-passes the sum of \$5,600, primarily to aid the unemployed in Sutter and Yuba counties. A crew of 70 men will be employed at once.

Emergency Flood Protection and Rectification of Rivers.

Channel clearing on the Santa Ynez River near Lompoc in cooperation with the county of Santa Barbara has been completed.

Arrangements have been made for rectification and protective works on Bautista Wash, a tributary of the San Jacinto River, in cooperation with Riverside County and landowners, to cost \$1,500, on which work will commence next week.

River rectification work on the San Jacinto River has been completed.

Sacramento Flood Control Project—Bank Protection.

Tentative arrangements have been made for bank protection work in cooperation with Reclamation District No. 730 at Russell Bend, at a cost of approximately \$3,000.

Very little cooperative bank protection work has been carried out on the Sacramento River and its tributaries this season, no work now being under way. This is due to the financial condition of the various districts, although there are a number of places requiring attention. There are no places, however, in such critical condition that breaks are certain to occur in high water. This Division is ready to act promptly in rendering temporary protection should an emergency arise at any of these places.

Pajaro River.

Two small levee jobs have been completed on the Pajaro River near Watsonville, under Chapter 524, Statutes of 1929. This work was made necessary by the damage caused by the flood in December.

Russian River Jetty.

Work has proceeded in making repairs to the steel trestle and track from the quarry damaged by the storms last December, at which time damage estimated at \$7,000 was caused. No additional rock has been hauled into the jetty during this period.

Flood Measurements and Gages.

During this period certain streams in the valley reached stages at which discharge measurements were required, and measurements were made at the following points:

- American River, Middle Fork, near Auburn.
- Cosumnes River and Badger Creek, near Arno.
- San Joaquin River, near Vernalis.
- San Joaquin River, at Mossdale Bridge.
- San Joaquin River, at Paradise Cut.
- American River, at Rattlesnake Bridge.

WATER RIGHTS

Applications to Appropriate.

During the month of January, 18 applications were received to appropriate water, 6 were denied and 12 were approved.

Among the more important applications received were three for mining purposes; one being by C. H. Barkdull of Seattle, Washington, proposing an appropriation of 50 cubic feet per second from Mosquito, Ammon, and Bear Trap creeks and other tributaries of the South Fork of Trinity River; and the other two being by the Spanish Mining Company of San Francisco, proposing appropriations from Devil's Canyon Creek and Poorman's Creek, tributaries of the South Fork of Yuba River, at an estimated cost of \$17,000.

Among the applications approved were five by George N. Keyston and William F. Leib of San Francisco proposing appropriations from El Corte Madera Creek and Tunitas Creek in San Mateo County at an estimated cost of \$160,000, for irrigation and domestic uses of a subdivision.

A very good response has been received to the requests for reports of progress on the part of permittees and licensees, some 1500 of these reports having been received during the past three months.

ADJUDICATIONS

North Cow Creek (Shasta County). A decree defining the water rights on North Cow Creek, based upon the amended stipulation for judgment heretofore signed by all parties, is being prepared by the Division upon request of the Superior Court of Shasta County. The decree will issue at an early date.

Clover Creek (Shasta County). The hearing on the Clover Creek case before the Superior Court of Shasta County has been postponed indefinitely pending negotiations for settlement by stipulation.

Deep Creek (Modoc County) The Division's report covering the distribution of the waters of Deep Creek, in accordance with the trial schedule of allotments adopted for the 1931 season, is being circulated among the interested parties prior to a conference to be held with the water users on March 15, 1932.

Franklin Creek (Modoc County). A stipulation for consent judgment has been prepared and will be submitted to the water users at a conference to be held at Alturas on March 14, 1932.

Precipitation Shown Far Above Normal

(Continued from preceding page)

New Pine Creek (Modoc County). A stipulation for consent judgment has been prepared and will be submitted to the water users at a conference to be held at New Pine Creek on March 16, 1932.

Eagle Creek (Modoc County). The report on the water supply and use of water on Eagle Creek has been circulated among the interested parties and a schedule for trial distribution of the waters of the stream for the 1932 irrigation season will be submitted to the water users at a conference to be held at Eagleville on March 15, 1932.

SACRAMENTO-SAN JOAQUIN WATER SUPERVISOR

The work on this project during the past month has been chiefly in preparation of the 1931 annual report which will furnish the results of all measurements of diversions, stream flow, return flow, use of water, salinity, etc., for the Sacramento-San Joaquin territory. The work has continued on the special report of damage and crop losses in 1931 due to salinity and water shortage.

Routine maintenance of tide gages and salinity stations has continued. With the increased river flow due to recent storms, the salinity has receded from practically all delta points and on February 1st, the number of sampling stations was cut to nineteen. The sampling is permanently maintained throughout the year at this number of stations as well as at six stations where drainage water is sampled. A comparison of the salinity on January 10th and February 10, 1932, is shown in the following:

SALINITY—SACRAMENTO-SAN JOAQUIN DELTA

Station	Parts of Chlorine per 100,000	
	1/10/32	2/10/32
Bullshead	110	40
Bay Point	15	7
O. and A. Ferry	10	3
Collinsville	8	3
Antioch	11	6
Emmerton	4	3
Jersey	13*	6
Central Landing	3	4
Middle River P. O.	5	8

* January 18th

COOPERATIVE SNOW SURVEYS

Under the arrangements between the State and various cooperating agencies, the monthly surveys at key snow courses throughout the State were completed in the latter part of January and the results reported in the February 1st bulletin of Snow Survey and Precipitation Data. The bulletin reported as well all available data to February 1st from the precipitation stations of the State, districts, public utilities, and U. S. Weather Bureau in the foothill and mountainous regions of the various stream basins.

In general, the surveys indicated a water content of the snow on February 1st of this year exceeding

that on February 1st of last year by from three to four times from the Upper Sacramento to the Stanislaus Basin (except Mt. Shasta snow course which showed only 1.4 times); from two and one-half to three and one-half times in the Merced and Tuolumne basins; about four times as an average in the San Joaquin and Mono basins; from three to five times in the Kings, Kaweah and Kern basins; and anywhere from three to nine times in the Owens Valley drainages. Of four crest snow courses for which the period of record has permitted the development of normals, three, consisting of Blue Lakes on the Mokelumne-Carson divide, Rhinedollar Lake close to the Tuolumne-Mono divide, and Mammoth Pass on the San Joaquin-Owens divide, indicated a water content on February 1st amounting to between 80 and 85 per cent of the normal water content to be expected for the entire season (up to April 1st). The corresponding percentage indicated by the fourth course, Summit, on the Yuba-Truckee divide, was 116 per cent.

The data from the precipitation stations indicated, in general, that the precipitation on February 1st, was between normal and 10 per cent above normal in the Upper Sacramento, Pit, McCloud and Feather River basins; from 15 to 25 per cent above normal in the basins from Yuba to Stanislaus; between 40 and 50 per cent above normal from the Tuolumne to Kings basins; from 55 to 65 per cent above in the Kaweah and Kern basins; and from 40 to 60, with a general average of about 50 per cent above normal in the Los Angeles, San Gabriel and Santa Ana basins. Single stations in the Owens and Walker basins indicate a precipitation to February 1st of 69 and 106 per cent, respectively, above normal, and a general average of 30 per cent above normal was indicated for the Tahoe-Truckee Basin. A general average for the percentage above normal of precipitation to February 1st from the Sacramento to the Kern basins was estimated at about 35 per cent.

WATER RESOURCES

South Coastal Basin, Mojave, Ventura County and Salinas Valley Investigations.—The South Coastal Basin Investigation has continued in a routine way during the past month as have also the Mojave, Ventura County and Salinas Valley Investigations. In all of these areas there has been more than normal rainfall but this has not caused floods of magnitude in any but the Salinas Valley. In this valley severe floods have occurred, greater than anything for the past 15 or perhaps 20 years. The situation is such in all of these investigations that especially valuable data have been gathered which will enable a more conclusive report to be made than would have been the case had an ordinary season prevailed.

Pit River Investigation (Modoc and Lassen counties).—The report covering the three years investigation of the Pit River, October 1, 1928 to October 1, 1931, is approximately 85 per cent complete.

Santa Clara Investigation.—The copious rains which have occurred during January permitted further measurements at the points where streams were debouching into the Santa Clara Valley.

Snow Surveyors Lost on Ski Trip in Kings River Wilds Win Through Perils

By S. M. MUNSON, Assistant Snow Supervisor

A RECENT snow trip into Big Meadows and Horse Corral Meadows on the South Fork of the Kings River proved eventful for the members of a survey party of the Division of Water Resources.



PUZZLE PICTURE—Find the cabin. That round black object just sticking out of snow is the chimney and the roof is some feet below the ski party eager to "hole in."

The men left Sacramento on Friday, February 12th, and abandoned their car for skis and heavy packs at 10 p.m., six miles beyond Badger, which is out from Visalia. The start was made and the first night's camp pitched in the open three uphill miles from the car.

Next morning, progress was retarded by a persistent snow storm, so after five miles of uphill going, the party "holed in" at a cabin in the Whitaker Redwood Forest.

CAUGHT IN STORM

The following morning all members were out at 4.30 a.m. for the hard 10-mile climb to Big Meadows. The trip to the top of the hill, nine of the ten miles, was traveled successfully, but Old Man Winter had blanketed everything so thoroughly at the top, that the road and all landmarks were completely obliterated.

Nothing remained but white expanse in wooded country and a telephone line which

should have led to Big Meadows but didn't. The party followed this line for over three miles before realizing definitely that they were off the route.

It was then 3 p.m., foggy, and snowing. Considerable elevation had been lost and skiing made increasingly difficult by the falling snow. However, a course was laid out on the map and followed by compass over hills and down and up ravines until finally, at 10 p.m., the party arrived in Big Meadows, no one knew where.

CAMPED IN SNOW

No cabins of any description could be found, so a fire was started in the snow beneath a group of tamaracks. It afforded some degree of warmth and hot soup was made and eagerly consumed before the fire sank into the snow and disappeared. Luckily, the skies cleared about this time, bringing moonlight and zero temperature.

It was necessary to keep moving in order to keep warm. The party started off along the northwestern edge of the meadow and



TYPICAL SNOW COURSE showing sampling tube and scales. The scales record water content of snow in tube. In foreground is surveyor's dog companion and heavy pack.

finally discovered the peak of a Forest Service cabin just visible above the snow.

It was necessary to remove part of the gable before the men could get inside, but

Snow Covered Cabin Only Accessible via Peak of the Roof

(Continued from preceding page)

what a sight greeted them when they finally gained admission! A cheering ensemble of wood, stove, and bed springs, made it all worth while. Dinner was cooked and the long day ended at 2.30 a.m.

Monday was bright and clear and after some exploring, the Big Meadows snow survey cabin was found within a mile of the previous night's refuge. The cabin was dug out and the work accomplished at the snow course.

TOUGH TEN MILES

The 10-mile trip to Horse Corral Meadow via Boulder was made on Tuesday over all varieties of snow from powdery to wind-crusted. Several more or less spectacular tumbles were blamed on these conditions.

In order to reach Horse Corral, it was necessary to drop some 1100 feet into Boulder Creek Canyon. The opposite wall was steep and icy and the ascent was only possible by using rope ski socks and "side-stepping."

This is good exercise and guaranteed to produce an appetite for any kind of cooking, which was just as well, as shown later. On the party's arrival at Horse Corral, the cabin was found to be nothing more than a mound of snow. It was impossible to get a proper draft through the stove pipe, so the cooking had to be done in the open fireplace a la Colonial Dames. After the morning's experience, the food, although flavored with smoke and ashes, was enthusiastically received.

COMPLETED SURVEY

The survey at the Horse Corral snow course was completed and the return trip to Big Meadows made on Wednesday. On the following day, the party had an excellent ski down hill to the car, getting some good practice in making Telemark turns.

The night was spent at the State unemployment camp at Pinehurst. The organization of the men and their system of self-government proved very interesting and the party enjoyed three of their substantial meals.

A bumpy trip over four feet of tractor-packed snow from Pinehurst to General Grant National Park was made on Friday. The snow course there was surveyed and the party returned to Sacramento the same day.

When It's Hard to Keep Straight



SIDESTEPPING AN ART at which the ski runners of the Division of Water Resources must become proficient to negotiate mountain sides in their snow course work.

Gasoline Sales Show Effect of Good Roads

An indication of the influence of good roads on the increased volume of automobile travel is provided by the fact that the annual gasoline consumption by motorists is four times greater now than it was ten years ago, it is pointed out by the California State Automobile Association. The increase has been steady and the gasoline consumed last year by motor vehicles was more than 15,000,000,000 gallons.

While the number of automobiles in the United States has increased 2½ times during the past decade, the use of gasoline has quadrupled and this fact is generally attributed to the extensive growth of good roads.

A tourist was enjoying the wonders of California as pointed out by a native.

"What a beautiful grapefruit!" he said, as they passed through a grove of citrus trees.

"Oh, those lemons are a bit small, owing to a comparatively bad season," explained the Californian.

"And what are those enormous blossoms?" asked the tourist.

"Just a patch of dandelions," said the Californian. Presently they reached the Sacramento River.

"Ah," said the tourist, grasping the idea, "somebody's radiator is leaking!"

February Water Applications and Permits

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

INYO COUNTY—Application 7183. Mrs. Ruth F. Sherman, 459 N. Orange Drive, Los Angeles, for 200 gallons per day from Bishop Creek tributary to Owens River to be diverted in Sec. 32, T. 8 S., R. 31 E., M. D. B. and M., for domestic purposes.

FRESNO COUNTY—Application 7184. Division of Fish and Game, Department of Natural Resources, State of California, 310 Russ Bldg., San Francisco, for 3.0 c.f.s. and 20 acre-feet per annum from San Joaquin River tributary to San Francisco Bay to be diverted in Sec. 7, T. 11 S., R. 21 E., M. D. B. and M., for recreational (fish culture) purposes.

EL DORADO COUNTY—Application 7185. B. W. Stone, 161 Ellis Street, 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) Loom-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., Sec. 1, 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., Sec. 2, T. 13 N., R. 14 E., M. D. B. and M., for municipal purposes.

PLACER COUNTY—Application 7186. Robert D. Nicol and C. M. Carter, c/o C. M. Carter, 2325 Valley St., Oakland, for (1) 2.0 c.f.s. and (2) 600 and (3) 230 and (4) 4100 acre-feet per annum from (1) Big Granite Creek (2) East Fork Little Granite Creek (3) West Fork Little Granite Creek and (4) Big Valley Creek tributary to North Fork American River to be diverted in Sec. (1) 14 (2) and (3) 9 (4) 13, T. 16 N., R. 13 E., M. D. B. and M., for power and domestic purposes (490 h.p.), estimated cost \$500,000.

INYO COUNTY—Application 7187. Mrs. Mary Wilshire, 6707 Milner Road, Hollywood, for 400 gallons per day from Bishop Creek tributary to Owens River to be diverted in Sec. 29, T. 8 S., R. 31 E., M. D. B. and M., for domestic purposes. Estimated cost \$42.

TRINITY COUNTY—Application 7188. James G. King, Del Loma, for 2.0 c.f.s. from Canadian Creek tributary to Trinity River to be diverted in Sec. 26, T. 5 N., R. 7 E., H. E. and M., for irrigation and domestic purposes (75 acres). Estimated cost \$1,000.

SIERRA COUNTY—Application 7189. J. K. Latta, c/o R. F. Taylor, Downieville, for 0.5 c.f.s. from unnamed ravine tributary to N. Fork Yuba River to be diverted in Sec. 6, T. 19 N., R. 19 E., M. D. B. and M., for mining and domestic purposes. Estimated cost \$200.

TRINITY COUNTY—Application 7190. French Bar Mining Co., Del Loma, for 10 c.f.s. from Big French Creek tributary to Trinity River to be diverted in Sec. 29, T. 5 N., R. 8 E., M. D. B. and M., for mining and domestic purposes.

BUTE COUNTY—Application 7191. E. K. Davis, 2818 S. Normandie Avenue, Los Angeles, for 65 c.f.s. from South Fork Feather River tributary to Sacramento River to be diverted in Sec. 33 or 34, T. 20 N., R. 6 E., M. D. B. and M., for power purposes (740 h.p.). Estimated cost \$2,500.

BUTE COUNTY—Application 7192. Shelley F. Lee, Box C, Biggs, for 3 c.f.s. from Main South Canal of Reclamation District No. 100 tributary to Butte Creek and Sacramento River to be diverted in Sec. 14, T. 18 N., R. 1 E., M. D. B. and M., for irrigation purposes (149 acres). Estimated cost \$3,000.

CONTRA COSTA COUNTY—Application 7193. Bruno H. Gelboke, Concord, Contra Costa County, for 0.31 c.f.s. from Walnut Creek tributary to Suisun Bay to be diverted in Sec. 2, T. 1 N., R. 2 W., M. D. B. and M., for irrigation and domestic purposes (25 acres). Estimated cost \$1,000.

SOLANO COUNTY—Application 7194. James McNulty Estate, c/o Lola Dodini, R. F. D. No. 1, Box 26, Suisun, for 0.87 c.f.s. from Ledgewood Creek tributary to Suisun Bay to be diverted in Sec. 3, T. 5 N., R. 2 W., M. D. B. and M. for irrigation purposes (70 acres).

SAN DIEGO COUNTY—Application 7195. South Coast Land Co., a corporation, c/o Geo. O. Bauwens, consulting engineer, 112 Corona Avenue, Long Beach, for 1.50 c.f.s. from Agua Tibia Creek tributary to San Luis Rey River to be diverted in Sec. 31, T. 9 S., R. 1 W., S. E. B. and M., for irrigation and domestic purposes (120 acres). Estimated cost \$1,250.

AMADOR COUNTY—Application 7196. United States, El Dorado National Forest, Placerville, for 0.22 c.f.s. from unnamed spring at head of Silver Fork tributary to S. Fork American River to be diverted in Sec. 28, T. 10 N., R. 17 E., M. D. B. and M., for domestic purposes. Estimated cost \$600.

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

SANTA CLARA COUNTY—Permit 3850, Application 6653. Mrs. A. F. Cochrane, Morgan Hill, Santa Clara County, February 1, 1932, for 0.64 c.f.s. from Coyote River tributary to San Francisco Bay in Sec. 11, T. 9 S., R. 3 E., M. D. B. and M., for irrigation purposes on 51 acres of orchard.

SANTA CLARA COUNTY—Permit 3851, Application 6654. Mrs. A. F. Cochrane, Morgan Hill, Santa Clara County, February 1, 1932, for 0.025 c.f.s. from Coyote River tributary to San Francisco Bay in Sec. 11, T. 9 S., R. 3 E., M. D. B. and M., for domestic purposes. Estimated cost \$250.

SANTA CLARA COUNTY—Permit 3852, Application 6655. Mrs. A. F. Cochrane, Morgan Hill, Santa Clara County, February 1, 1932, for 0.22 c.f.s. from Coyote River tributary to San Francisco Bay in Sec. 13, T. 9 S., R. 3 E., M. D. B. and M., for irrigation of 18 acres of alfalfa. Estimated cost \$1,500.

SANTA CLARA COUNTY—Permit 3853, Application 6656. Mrs. A. F. Cochrane, Morgan Hill, Santa Clara County, February 1, 1932, for 0.12 c.f.s. from Coyote River tributary to San Francisco Bay in Sec. 11, T. 9 S., R. 3 E., M. D. B. and M., for irrigation of 9½ acres of alfalfa.

MONO COUNTY—Permit 3854, Application 6826. Dr. J. A. Jeffery, c/o Preston & Braucht, 309 Bank of America Bldg., Merced, February 4, 1932, for 1.00 c.f.s. from well in Milner Creek tributary to Hammit Valley & Owens River in Sec. 15, T. 4 S., R. 33 E., M. D. B. and M., for irrigation of 720 acres. Estimated cost \$2,500.

PLACER COUNTY—Permit 3855, Application 7096. Carrie A. Gladding, Lincoln, Placer County, February 10, 1932, for 3.00 c.f.s. from Coon Creek (No. 1 and No. 2) tributary to Feather River in Sec. 22, T. 13 N., R. 6 E., M. D. B. and M., for domestic purposes and irrigation of 740 acres (200 acres alfalfa and 540 acres of general crops). Estimated cost \$2,000.

INYO COUNTY—Permit 3856, Application 7131. Panyo Gold, Ltd., 427 S. McCadden Place, Los Angeles, February 10, 1932, for 1.00 c.f.s. from Jail Canyon Stream tributary to Panamint Desert in Sec. 14, T. 20 S., R. 44 E., M. D. B. and M., for mining, milling and domestic purposes. Estimated cost \$575.

SAN JOAQUIN COUNTY—Permit 3857, Application 7124. Hunt Bros. Packing Co., San Francisco, February 13, 1932, for 3.9 c.f.s. from Mormon Slough in Sec. 7, T. 2 N., R. 9 E., M. D. B. and M., for irrigation of 313.5 acres. Estimated cost \$5,000.

NEVADA COUNTY—Permit 3858, Application 6935. Central Pacific Railway Co., San Francisco, February 13, 1932, for 1.5 c.f.s. and 140 acre-feet from Donner Creek in Sec. 16, T. 17 N., R. 16 E., M. D. B. and M., for industrial and domestic use at railroad yards in Truckee. Estimated cost \$30,000.

SIERRA COUNTY—Permit 3859, Application 7120. Walter Hayter, Camptownville, February 18, 1932, for 3 c.f.s. from Big Humburg Creek in Sec. 15, T. 19 N., R. 9 E., M. D. B. and M., for mining and domestic use in Secs. 16 and 17, T. 19 N., R. 9 E., M. D. B. and M. Estimated cost \$1,500.

VENTURA COUNTY—Permit 3860, Application 7089. Evelyn Akin Robertson, P. O. Box 997, Ventura, February 26, 1932, for 0.35 c.f.s. from unnamed spring tributary to Cuyama River in Sec. 12, T. 7 N., R. 24 W., S. B. B. and M. for irrigation and domestic purposes on 20 acres. Estimated cost \$300.

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 February, 1932.

AMADOR COUNTY—Moore Mine Dam No. 479. Central Land and Trust Company, Patterson, owner; slab and buttress, 20 feet above streambed with a storage capacity of $\frac{3}{4}$ acre-feet, situated on unnamed stream tributary to Jackson Creek in Sec. 27, T. 6 N., R. 11 E., M. D. B. and M.

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

LOS ANGELES COUNTY—San Gabriel No. 1 Dam No. 32-19. Los Angeles County Flood Control District, Los Angeles, owner; rockfill, 300 feet above streambed with a storage capacity of 64,000 acre-feet, situated on San Gabriel River in Sec. 6, T. 1 N., R. 9 W., S. B. B. and M., for storage purposes, for flood control use. Estimated cost \$5,000,000, fees paid \$9,500.

CONTRA COSTA COUNTY—Antioch Dam No. 3. Town of Antioch, Antioch, owner; earth, 26 $\frac{1}{2}$ feet above streambed with a storage capacity of 570 acre-feet, situated on unnamed creek tributary to San Joaquin River in Sec. 35, T. 2 N., R. 1 E., M. D. B. and M., for storage purposes, for municipal use. Estimated cost of enlargement \$300, fee paid \$20.

SAN DIEGO COUNTY—Lindo Lake Dam No. 830. San Diego County, c/o G. S. Kibby, Lakeside, owner; earth, 8 $\frac{1}{2}$ feet above streambed with a storage capacity of 50 acre-feet, situated on Lindo Lake in Sec. 18, T. 15 S., R. 1 E., S. B. B. and M., for storage purposes, for recreation use. Estimated cost \$800, fees not yet paid.

LOS ANGELES COUNTY—Patrick Reservoir No. 778-4. Santa Catalina Island Company, Avalon, owner; earth, 36 feet above streambed with a storage capacity of 3.4 acre-feet, situated on small creek tributary to Grand Canyon in Sec. 32, T. 9 S., R. 14 W., S. B. B. and M., for storage purposes, for domestic use. Estimated cost \$3,000, fees paid \$30.

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 February, 1932.

INYO COUNTY—Tinemaha Dam No. 6-26. City of Los Angeles, Los Angeles, owner; earth, situated on Owens River tributary to Owens Lake in Sec. 25, T. 10 S., R. 34 E., M. D. B. and M.

BUTTE COUNTY—Lake Wyandotte Dam No. 63. Oroville-Wyandotte Irrigation District, Oroville, owner; earth fill, situated on North Honcut Creek tributary to Honcut Creek in Sec. 16, T. 19 N., R. 5 E., M. D. B. and M.

SANTA CRUZ COUNTY—Mill Creek Dam No. 96-2. Coast Counties Gas and Electric Company, Santa Cruz, owner; earth and crib, situated on Mill Creek tributary to Scott Creek in Sec. 29, T. 9 S., R. 3 W., M. D. B. and M.

EL DORADO COUNTY—Medley Lake Dam No. 97-57. Pacific Gas and Electric Company, San Francisco, owner; rock and earth, situated on South Fork American tributary to American in Sec. 30, T. 12 N., R. 17 E., M. D. B. and M.

SAN MATEO COUNTY—Millbrae Dam No. 618. Mills Estate, Inc., San Francisco, owner; earth, located in Buri Buri Ranch near Millbrae.

EL DORADO COUNTY—Finnon Dam No. 97-55. Pacific Gas and Electric Company, San Francisco, owner; earth, situated on Jay Bird Creek tributary to South Fork American in Sec. 16, T. 11 N., R. 11 E., M. D. B. and M.

ALAMEDA COUNTY—Bowles Dam No. 592. Claremont Pines Corp., Beverly Hills, owner; earth, situated on tributary to Temescal Creek.

EL DORADO COUNTY—Upper Cleese Dam No. 468-2. John P. Cleese, Placerville, owner; earth, situated on North Canyon tributary to South Fork American River in Sec. 36, T. 11 N., R. 11 E., M. D. B. and M.

SISKIYOU COUNTY—Hart Dam No. 181. E. C. & Kate C. Hart, Montague, owners; earth, situated on Martin Creek tributary to Little Shasta River.

PLANS APPROVED

Plans and specifications for the construction or enlargement of dams approved by the State Department of Public Works, Division of Water Resources, during the month of February, 1932.

SAN BERNARDINO COUNTY—Greenspot Dam No. 899. Western Fruit Growers, Los Angeles, owner; earth, 30 feet above streambed with a storage capacity of 1 acre-foot, situated on tributary to Santa Ana River in Sec. 8, T. 1 S., R. 2 W., S. B. B. and M., for storage purposes for irrigation and debris use.

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

INYO COUNTY—Tinemaha Dam No. 6-26. City of Los Angeles, Los Angeles, owner; earth, situated on Owens River tributary to Owens Lake in Sec. 25, T. 10 S., R. 34 E., M. D. B. and M.

PLUMAS COUNTY—Taylor Lake Dam No. 288. J. L. Robinson, Reno, Nevada, owner; rock and dirt, situated on Taylor Lake tributary to Hungry Creek in Sec. 35, T. 27 N., R. 11 E., M. D. B. and M.

BUTTE COUNTY—Lake Wyandotte Dam No. 63. Oroville-Wyandotte Irrigation District, Oroville, owner; earth, situated on North Honcut Creek tributary to Honcut Creek in Sec. 16, T. 19 N., R. 5 E., M. D. B. and M.

SANTA CRUZ COUNTY—Mill Creek Dam No. 96-2. Coast Counties Gas and Electric Company, Santa Cruz, owner; earth crib, situated on Mill Creek tributary to Scott Creek in Sec. 29, T. 9 S., R. 3 W., M. D. B. and M.

EL DORADO COUNTY—Medley Lake Dam No. 97-57. Pacific Gas and Electric Company, San Francisco, owner; earth and rock, situated on South Fork American River tributary to American River in Sec. 30, T. 12 N., R. 17 E., M. D. B. and M.

EL DORADO COUNTY—Finnon Dam No. 97-55. Pacific Gas and Electric Company, San Francisco, owner; earth, situated on Jay Bird Creek tributary to South Fork American in Sec. 16, T. 11 N., R. 11 E., M. D. B. and M.

EL DORADO COUNTY—Upper Cleese Dam No. 468-2. John P. Cleese, Placerville, owner; earth, situated on North Canyon tributary to South Fork American River in Sec. 36, T. 11 N., R. 11 E., M. D. B. and M.

SAN MATEO COUNTY—Millbrae No. 1 Dam No. 618. Mills Estate, Inc., San Francisco, owner, earth, situated on a creek located in Buri Buri Ranch.

ALAMEDA COUNTY—Bowles Dam No. 592. Claremont Pines Corp., Beverly Hills, owner; earth, situated on Edith Street tributary to Temescal Creek in Oakland.

High type roads save two cents a mile in car operation, according to a nationwide study reported to the California State Automobile Association.

Foreman: "Well, everything all right?"
New Night Watchman: "Yes, I haven't done so bad for the first night. I've checked off everything, and there's only one thing missing—the steam-roller."—*Dizie Contractor*.

Coming up town the other night, we saw ahead a woman bent by years of service to her family and community. Her step was slow and uncertain. Her eyes were dim, and the cold wind filled them with unbidden tears. Past us raced a car far from under control. As it bore down upon the good old lady, the horn shrieked its menacing warning. Seeking safety, she hastily stepped from the beaten path into the deep snow. We wanted to wring somebody's neck.

Winter calls for greater courtesy to pedestrians. Hell will never be hot enough for the speed demon who is unmindful of their entire safety.—*Deer River News*.

Highway Raised 350 Feet from Floor of Shasta River Gorge

(Continued from page 2)

It will be noted on the accompanying sketch that on either side of the middle crossing of the river two large bends have been crossed with a fairly direct line. The channel at these points was deflected during formation by hard rock leaving two flat-topped spurs with crests approximately 100 feet above the grade of the new road.

In order to pass through these ridges with the new construction, it was necessary to rise above the river level to a sufficient height to avoid excessive cuts as the two cuts average 100 feet in depth with the grade line at the middle crossing 250 feet above the channel bed. By placing the line in this location, it was possible, with less than a mile of new construction to eliminate approximately two miles of distance as compared with the old road. Practically all of the 2.2 miles of distance saved on this new work was accomplished at this point. The remainder of the saving is in minor deviations in the old road.

IMPRESSIVE STRUCTURES

Five bridges were erected under the direction of the Bridge Department on this project, all 24-foot roadway structures. Two of them are of a concrete girder type; two were concrete arches; and one a steel cantilever bridge. This latter is a very striking structure rising high above the river at the middle crossing, the road emerging from deep cuts on either side of it. Parking spaces have been provided at both ends of the structure in order that motorists may stop and admire it, and the view as well. A list of these structures and their costs follows:

	Type	Length	Cost
Upper Crossing	Concrete Girder	275 feet	\$28,540 00
Dry Gulch	Concrete Arch	345 feet	70,952 27
Middle Crossing	Steel Cantilever	794 feet	183,144 26
Lower Crossing	Concrete Arch	582 feet	99,308 57
Klamath River	Concrete Girder	464 feet	80,957 81

The grading and surfacing work involved the removal of 774,003 cubic yards of material. The oil processing was, of course, road mix type, and followed the completion of the contract.

The aggregate cost of grading, bridges and oil processing reaches a total of \$1,154,851.68, or \$164,978.81 per mile. As a matter of interest I am including below a tabulation showing various engineering features of the old and new construction in comparison.

	Length	Delta Total	Lin. Ft. Curvature	No. of Curves	Radius Max. Min.	Max. Grade
Original construction	9.37 Mi.	3659°	13,827	137	1500 50	7.00%
Reconstruction	7.46 Mi.	1205°	16,840	25	5000 400	4.14%

	No. of Bridges	Adverse Grade	Roadbed Width	Lin. Ft. Bridges	Cost Per mile
Original construction	4	248 ft.	16 ft.	885	\$8,670
Reconstruction	5	146 ft.	24 ft. and 30 ft.	2468	81,550

The scenic attraction of the new construction should not be overlooked. Lying high above the Shasta River along the slopes of the canyon, long vistas of the spectacular gorge are visible, the stream following a tortuous course between rocky precipitous walls, crossing and recrossing the old highway down on the

NEW OFFICIAL LIST OF CONTRACTORS ISSUED

More than 23,600 contractors are today licensed to do business in the State of California, according to information given out by Colonel Carlos W. Huntington, Registrar of Contractors, at Sacramento.

"The State next week will issue the new official list of these registered contractors in a complete volume which probably will be published in the future twice a year, in the spring and fall," said Huntington.

"This complete and only official listing is given both alphabetically and geographically, so as to make this State publication of worthwhile value to the construction industry of the State, together with a copy of the Contractors' License Law and other information affecting this vast industry.

"We are issuing the publication at as low a cost as possible so that it may be within the reach of all in the construction industry, and its allied lines. It will be sold by the State at cost. Those desiring a copy or copies of the publication may write the Registrar of Contractors at Sacramento. The volume will be off the press of the State Printer about April 1st."

RELIEF CAMPS A SUCCESS

(Continued from page 12)

least partially an obvious emergency, and they have in fact worked out better than was expected.

For its expenditure, the Department of Public Works has received considerable work, its particular value being in the fact that most of it was, by nature, handwork that would otherwise have had to be done by regular crews.

Many worthy men in distress have been carried through a period which otherwise might have resulted in their complete loss of the spirit of self-reliance.

canyon floor at three points and finally escaping into the turbulent Klamath.

Above the highway bluffs and outstanding rock formations continue to rise from the mountain slopes, in many places gashed and broken with enormous talus slides. The canyon slopes are barren of vegetation, being only sparsely covered with scrub oak and brush. During the spring of the year, the upper slopes are clothed in green, and in the summer and fall the landscape assumes a rusty brown like most of the California foothill country.

During the winter these slopes are occasionally clothed with a mantle of white but are not of sufficient altitude to remain in winter dress for long. At the lower levels, the dark gray of the barren rock bluffs predominates throughout the year.

The road itself is attractive from a scenic standpoint. It is visible for long stretches through the canyon, a broad ribbon of black winding along the slopes. Its generous width gives the traveler a feeling of security common to motorists on California roads.

Romance in the Life of a Bridge

By JAMES GALLAGHER, Assistant Bridge Engineer

BRIDGES, like humans, grow old. They outlive their usefulness. Then its the junk pile and oblivion. But not so with the old Folsom Bridge, in its youth acclaimed the finest bridge on the Pacific coast.

The vicissitudes of its life compose a veritable bridge romance—beauty and fame followed by old age and the discard; plans for a tour abroad to start anew in a foreign country blighted by war; a relapse into oblivion and decay; sudden recall to active duty and



LIKE A SKELETON of the past the abandoned span stood for years beside the modern concrete structure that relegated it to the discard.

a new lease on life in another locality 300 miles distant.

Such is the story of the steel span built across the American River at Folsom, Sacramento County, in 1893 and now on its way to bridge the Klamath River at Walker, Siskiyou County. The span is 380 feet long with a 17-foot 6-inch roadway. It served Sacramento County for 25 years and was abandoned when the present concrete arch was built about 100 feet down stream.

For years it remained in its original location, its slim girders vaulting 55 feet in the air, a steel wraith beside the modern concrete structure.

WAR INTERVENES

Finally a Roseville Japanese saw an opportunity for a shrewd business deal. Steel was high in Japan. He bought the bridge cheap from the county and prepared to ship it for use on a Japan river. War intervened and the deal was off.

Where the Pacific Highway makes its first crossing of the Klamath River near Walker, a single lane, light suspension bridge built many years ago, is reaching the end of its service life. It has been posted as not safe for loads in excess of five tons. The future improved highway will not cross the Klamath at this point but will continue down the river on the north side of the stream. However, the present condition of the suspension span will not permit of its continued use until finances are available for completing the next section of highway on the north bank.

It was therefore imperative that a new bridge be built and at the same time desirable to invest as little money as possible in the new structure since it will only serve State highway traffic till such time as the new highway is completed.

LONG SPAN NEEDED

To cross the Klamath requires a long span bridge and an inexpensive timber trestle was out of the question. A second-hand truss span offered the best solution for a long span structure at a cost within the limits of funds which could be economically allotted to this project.

The old Folsom span was carefully inspected by engineers of the State Bridge Department and the steel work found to be in very good condition considering the length of time it had been exposed to the weather without painting or other maintenance. It had no defects which could not be easily repaired at small expense and was found to be amply strong to carry full legal present day loads.

The State was able to purchase the span from the Japanese for \$250, much less than he paid for it. The steel in the structure would cost, new, several thousands of dollars.

A contract was let to dismantle the bridge in its present location, transport it to Walker on the Klamath River and erect it there. The contractor's false work for dismantling the span was quite ingenious.

The channel of the American River at this point is a deep, rocky gorge and on account of the danger



ON ITS WAY—Old Folsom span in process of being ingeniously picked to pieces and packed off to a new home on the Klamath River, 300 miles away.

from floods at this time of the year, it was necessary to span this gorge. The contractor constructed a timber truss span inside of the steel trusses but supported on suitable false work bents at either end. A traveler reaching above the highest point of the steel span was built on top of the timber truss.

Good Roads Paid High Dividends to California in 1931

FIGURES from National and State sources show that because of her fine highway system, California went steadily ahead during 1931 in general motoring activity and in volume of automobile ownership in spite of marked opposite tendencies that prevailed throughout the nation.

"Without a road an automobile is useless" says an authority of the automotive industry, "but as dollars are spent on road improvement, the value of the car increases and the investment in roads is returned many times over."

The truth of this statement is borne out by the following facts and figures for California:

Reports of touring bureaus as well as the state's gasoline tax receipts show that Californians made greater use of their cars in 1931 than in 1930.

Motor tourists from other states in California recorded a substantial gain.

Total motor vehicle registration in the State increased although in the nation as a whole there was a decrease.

The State total was 2,107,275, an increase of 7,982, or .38 of one per cent. While small, this increase is significant, considered in the light of a decrease of approximately 583,000 in total registration for the United States.

Cars bearing license plates of other states, which were checked as they passed into California through various border stations of the State Department of Agriculture, totaled 324,726, an increase of 31,336, or 11 per cent over 1930.

Motor vehicles in the State used 1,230,045,808 gallons of gasoline, an increase of 1.564 per cent over 1930.

DIDN'T HAVE LIGHTS

A late report tells of an Iowa team and farmer being killed while traveling along the pavement at night in that state. Did the owner have lights? Of course not! Not one in a hundred horse-drawn vehicles carries lights as it trundles along a dark highway, deliberately inviting death to its occupants, the team and to those in all passing automobiles. We can not think of any act more hazardous than that committed by a person who travels the highway at night in an unlighted vehicle.—*Albert Lea Tribune.*

During 1931 a total of 315,000 American motor vehicles were sold outside the United States, according to figures of the Automobile Chamber of Commerce. This included United States exports and the output of American-owned factories in Canada.

In Memoriam

CAPTAIN CHARLES A. NELSON, foreman of construction on the jetty at the mouth of the Russian River for the Division of Water Resources, was killed on March 2, 1932, while at work, by a fall from a cable.

Captain Nelson was in charge of this jetty work as foreman since August, 1929, and was an exceptionally reliable and capable man. By his death the State loses the loyal services of a man who was deeply interested in his work. He had a likable personality and quickly made friends with his associates and employees.

Born in Sweden near Gothenburg in 1867, Captain Nelson went to sea at the age of twelve, and qualified as master of sail by the time he was twenty-one. He followed the sea as mate and master until 1895, when he went into transportation business on San Francisco Bay and Sacramento and San Joaquin rivers, transporting building materials to the San Francisco Bay area and hauling hay and freight.

In 1915 he purchased a farm near Elk Grove which he operated until 1920, when he returned to navigation and the sand and gravel business. His search for gravel and sand deposits of good quality accessible by water to the Bay district led to his discovery of a satisfactory supply in the Russian River near its mouth in 1924.

Captain Nelson is survived by his widow, Mrs. Jenny Mariea Nelson; two sons, Harold and C. Norman Nelson; and three daughters, Mrs. George Nagle, Jr., Mrs. Thomas W. King and Lillian Nelson.

Federal Aid System Totals 323,000 Miles

When the first Federal Aid System map was published in 1923 the mileage on the system was about 169,000 miles. Since that time the mileage has been increased to 199,000. In 1923 the roads composing the State highway system, which also includes the Federal Aid System, totaled 203,000 miles and now the total is about 120,000 miles greater.

Much of this additional mileage on the State systems consists of roads taken over from counties and townships, which relieved them of a tremendous financial responsibility.

CATTLE RIDE TO MARKET

In 1931, 21,162,000 head of livestock motored to seventeen of the leading markets, a gain of one-fourth over the previous year when nearly 17,000,000 head were trucked. The 1931 motor truck shipments were more than 7½ times as large as the shipments of 2,765,000 in 1920, according to the studies of the Corn Belt Dailies. The average haul is now 65 miles.

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Department of Public Works

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Port of San Jose—Not appointed

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