

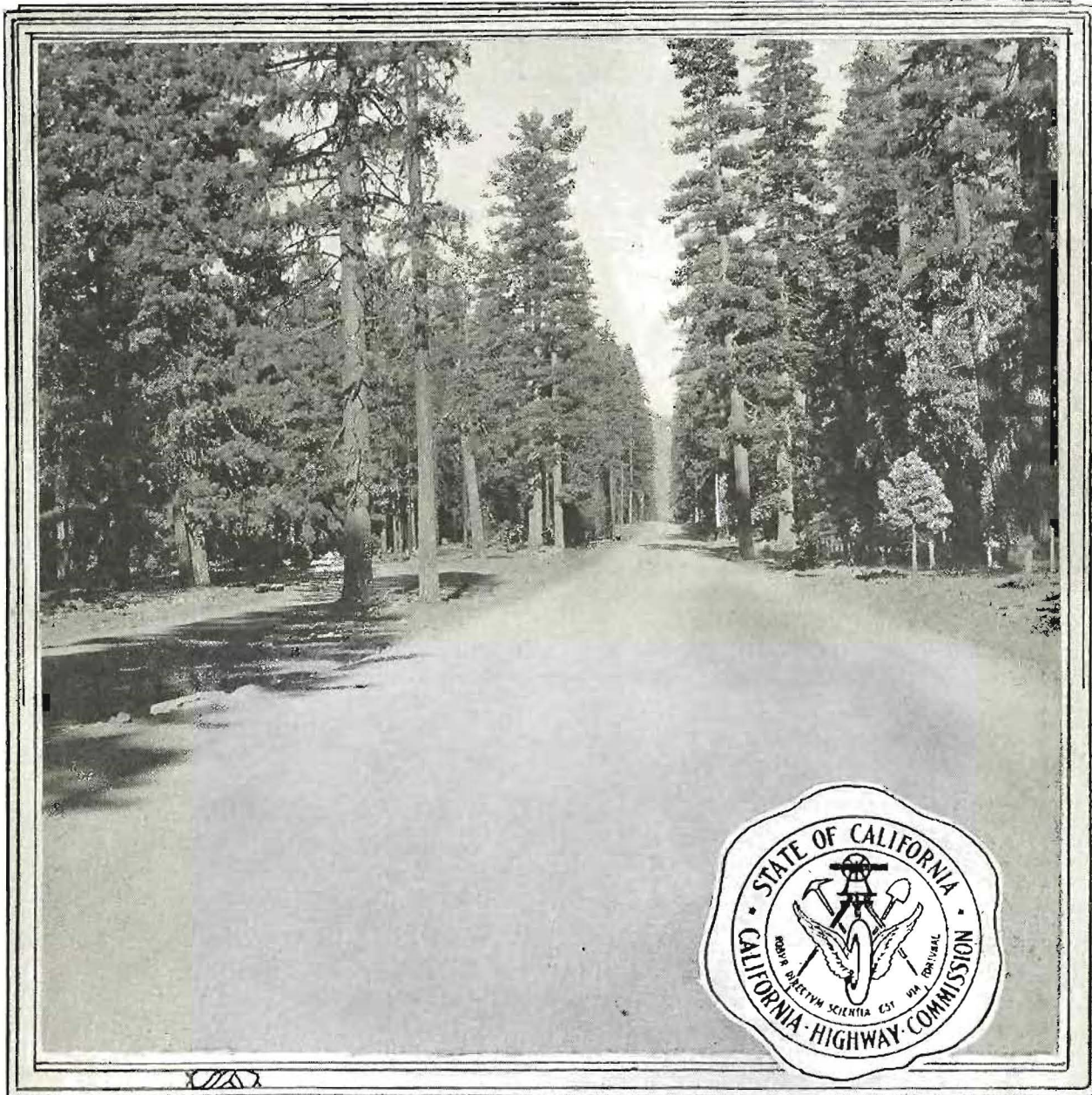
# CALIFORNIA HIGHWAYS

A BULLETIN ISSUED BY THE CALIFORNIA HIGHWAY COMMISSION FOR THE  
INFORMATION OF ITS EMPLOYEES AND THE PUBLIC

Vol. 2

OCTOBER, 1925

No. 10



THROUGH THE PINES—View on a recently completed section of the Red Bluff-Susanville lateral in Lassen County. A wide, rock surfaced highway on good alignment serves the land of Peter Lassen.—Thompson Studio, Susanville, photo.

*In this issue:* THE FIRST OF A SERIES OF INTERESTING ARTICLES PRESENTING RESULTS  
OF WORK OF THE RESEARCH DEPARTMENT.

# CALIFORNIA HIGHWAYS

HARVEY M. TOY, Chairman;

N. T. EDWARDS and LOUIS EVERDING, Commissioners.

ROBERT M. MORTON, State Highway Engineer.

W. F. MIXON, Secretary.

We are pleased to permit publication of any of the matter contained herein or to loan cuts and this privilege is extended newspapers and periodicals without restrictions.

FRANK B. DURKEE Editor  
P. O. Box 1103, Sacramento, California.

Vol. 2. OCTOBER, 1925. No. 10

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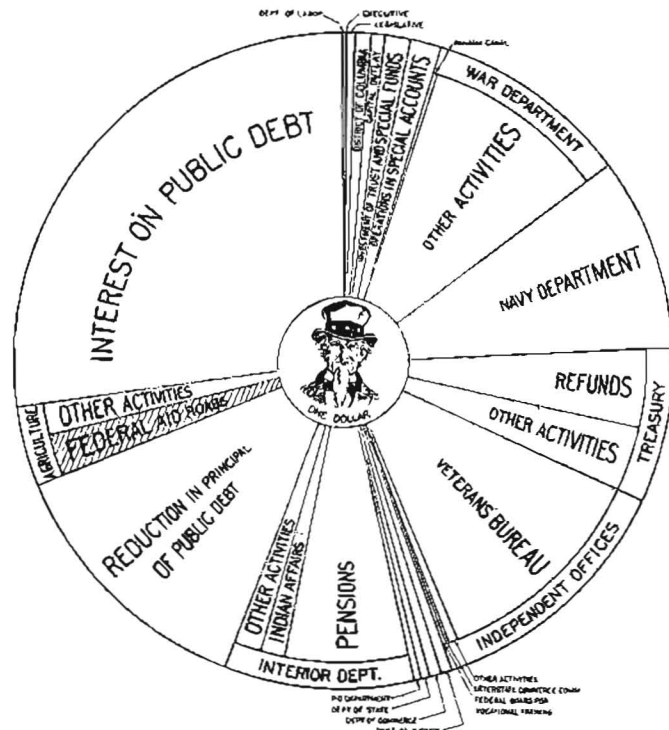
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### "MAKING OF GOOD ROADS."

But I can see no merit in any unnecessary expenditure of money to hire men to build fleets and carry muskets when international relations and agreements permit the turning of such resources into the making of good roads, the building of better homes, the promotion of education and all the other arts of peace which minister to the advancement of human welfare.—From the address of President Coolidge before the National Convention of the American Legion.

## ONLY 2.3 CENTS SPENT FOR ROADS



THE FEDERAL EXPENDITURE DOLLAR  
SHOWING THE DIVISION OF THE FEDERAL EXPENDITURE  
FOR THE FISCAL YEAR 1924  
AS REPORTED BY THE BUDGET BUREAU

UNCLE SAM'S TAX DOLLAR—Federal aid for roads gets 2.3 cents out of every 100. Look at the diagram and try and find another federal expenditure that is contributing more directly and to a greater degree to the progress and prosperity of the nation. Will it be real economy to discontinue this 2.3 cents for roads?

## WILL THE FEDERAL AID PROGRAM BE CONTINUED?

(From New Hampshire Highways.)

**T**O CURB our present progress in road construction as some trouble makers would have us do would be a national calamity, for who pays for the waste resulting from poor roads? There is but one answer, the cost as it affects each producing individual is passed on to the consuming public. Therefore, each of us contributes his share to this preventable waste.

Thomas B. MacDonald, Chief of the United States Bureau of Public Roads, has truly said: "The use of the principal highways is so extensive that the people pay for adequate highways whether they have them or not and they pay less if they have them than if they have not."

Why this opposition to federal aid? Simply this: the willingness of the American people to accept thoughtless criticism and their unwillingness to ascertain all the facts concerning recent highway development. The federal aid highway program is a work too

tremendous and too far reaching for the American people to stand idly by while its wrecking is accomplished by a few political critics who base their arguments on an alleged invasion of "state rights," unfair competition against the steam railroads or unequal taxation, since the bulk of income taxes is collected in a few cities like New York, Chicago or Boston and a proportion of this revenue is directed toward highway improvement.

It has also been argued that federal aid in highway construction is unnecessary and road building is up to the various communities through which the roads pass. Before the general acceptance of the motor vehicle as a means of public transportation, this statement would have been an accepted fact but now that the motor vehicle is depended upon for the transportation of the public as well as many of the commodities that are essential for the public welfare, the building of interstate highways must not and can not be left to the whims of local political leaders.

## FIELD STUDY TO COORDINATE MAINTENANCE WORK

(An announcement by Mr. Morton.)

**M**AINTENANCE Engineer G. R. Winslow has detailed R. S. Badger to field work as representative of the Headquarters Maintenance Department. Mr. Badger will study in each division the various features of maintenance. His duty will be to examine methods in use by especially efficient foremen and take steps to introduce them, where adaptable, to other divisions.

It is the intention of the maintenance engineer that the maintenance men in each division shall be kept fully informed of the methods employed in other parts of the state. They will be invited to discuss with Mr. Badger the relative efficiency of the various materials and equipment. This interchange of ideas between the various maintenance units of the ten divisions should encourage the adoption of the best methods throughout the state.

### Many Problems to be Considered.

Many maintenance problems are not yet satisfactorily solved. For example, the prevention of washouts on mountain roads is now handled by various methods in different divisions. The most suitable grades of asphalt are not always chosen for patching work in each locality. The distribution of suitable equipment is an ever present problem. The solution of these and other matters will be sought by Mr. Badger.

No phase of state highway activities is so important as maintenance. It is the feature of the work which comes continually to the attention of the public. Mr. Badger should have the cooperation of all maintenance employees, for the scope and difficulties of his assignment are great.

## STATE MAKES IMPROVEMENTS ON GENERALS' HIGHWAY

**T**HE RECENT dedication by the National Park Service of that section of the Generals' highway within the Sequoia National Park serves to call attention to the extensive improvements on this route completed recently by the California Highway Commission. The Generals' highway leads from the San Joaquin Valley trunk highway at Visalia, Tulare County, easterly through the beautiful Lemon Cove and Three Rivers orange districts into the Sequoia National Park. Eventually, it will be extended to a connection with the General Grant National Park, thus connecting the General Sherman and General Grant sequoias, the largest living trees in the world.

The section from Visalia to the Sequoia Park boundary is thirty-seven miles in length. It was added to the state highway system by the bond issue of 1919 and taken over by the highway commission in January, 1923. Previous to its acquisition by the state, that portion of the highway between Visalia and Three Rivers, thirty-one miles in length, was paved by Tulare County with cement concrete. The remaining six miles from Three Rivers to the park boundary was graded and surfaced in 1923 by the state.

### Original Grade Widened.

Not anticipating the increase of traffic into the Giant Forest region which would result from the building of better highways, that section of the county pavement between Lemon Cove and Three Rivers was placed on a narrow and crooked grade altogether inadequate as a park entrance. Since its acquisition by the state, \$27,000 has been expended in straightening curves and grade widening and for the improvement of drainage, as shown in the illustrations. Other minor improvements have been made in connection with general maintenance. When funds are available, additional reconstruction will have to be done before the road can be considered finished.

The six miles of grading completed in 1923 was built upon high standards at a cost of \$156,400. The section has been surfaced with decomposed granite and excellently maintained, a permanent maintenance station having been established at Lemon Cove, where a maintenance foreman's cottage and storage warehouse for equipment have been erected.

## BRIDGE DEPARTMENT CONDUCTS INTERESTING TEST— LUMNITE CONCRETE PILE DRIVEN 24 HOURS AFTER CASTING

By HARLAN D. MILLER, Bridge Engineer.

**A**N INTERESTING test, which may prove of great value in reinforced concrete pile foundation construction, has just been completed by the bridge department at Pismo, San Luis Obispo County, where two state highway bridges are under construction. A concrete "test" pile was cast using Lumnite cement instead of ordinary Portland cement. Twenty-four hours after the pile was cast it was driven forty-five feet in the ground to refusal. The test was one of the first made by the California Highway Commission with this special cement.

In this instance Lumnite cement seems to have developed, at twenty-four hours, a greater strength than most Portland cements at twenty-eight days. It requires about the usual time to "set," but, after "setting," Lumnite develops maximum strength very rapidly. One of its principal raw materials is aluminum ore.

### Great Strength Developed.

It was not possible to have made a strength test of the concrete used in the pile at the age of twenty-four hours, but two 6 x 12-inch sample cylinders of the concrete were tested within forty-eight hours after casting. The 200,000-pound state testing machine did not break either of the test samples, indicating a strength in excess of 5,600 pounds per square inch. This test concrete, after forty-eight hours, had a strength at least equal to ordinary Portland cement concrete at an age of three months.

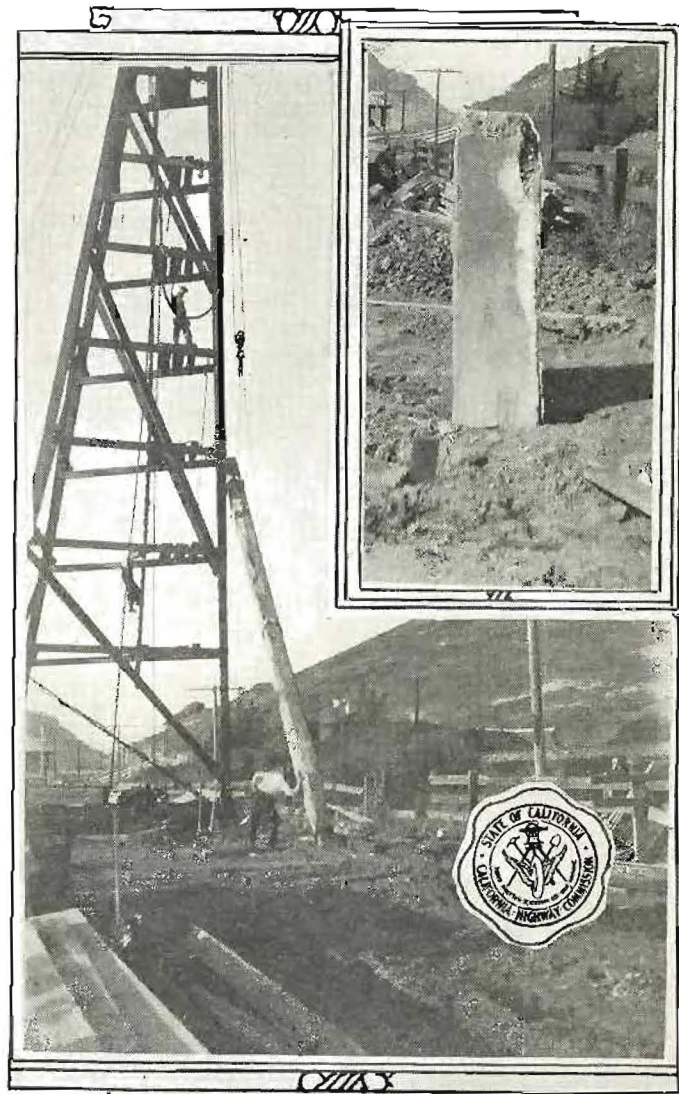
A number one Vulcan steam hammer was used to drive the test pile, which was forty-seven feet long and eighteen inches square. The usual time of curing before driving concrete piles is twenty-eight days, but the pile used at Pismo was driven exactly twenty-four hours after casting. It required 643 blows of the hammer to drive the pile forty-five feet in the ground to refusal. The pile apparently was not injured in any way by the rough treatment to which it was subjected, except that under the blows of the hammer there was a little spalling at the top.

### Value of Test.

The value of a test of this kind is obvious. In the future, whenever concrete piling is to be used in the construction of bridges or other structures, a "test" concrete pile can be driven on short notice and exact conditions determined upon. This is not always possible with wooden test piles, which are generally used to obviate waiting twenty-eight days for a concrete pile to cure. Wooden test piles are sometimes unsatisfactory because of the difference in size and penetrating power. The driving of such test piles frequently gives the wrong impression, and concrete foundation piles are cast an improper length as a result.

The use of a concrete pile as a "test" pile is a true guide for determining the proper length for other concrete piles. This

experiment of the bridge department may be the means of effecting a considerable saving in the future.



CONCRETE TEST PILE—Hoisting a concrete test pile twenty-four hours after casting at Pismo bridge site; inset the pile after being driven to refusal by 643 blows of the hammer. Lumnite cement was used for the experiment. (Photos by Bridge Department.)

## MEETING OF WESTERN OFFICIALS

**A**T SAN FRANCISCO on November 9th and 10th, and in conjunction with the All Western Road Show, will be held the annual meeting of the Western Association of State Highway Officials. This meeting was called by President Geo. W. Borden of Nevada, and is being held for the purpose of discussing mutual problems, the future of federal aid and other matters. This western association is the official organization of the executive officers of the highway departments of the eleven western states and in the past has accomplished much in the way of federal aid legislation and uniform policies of procedure among the states.

## Drill 'em Out.

**T**WO colored convicts who were anticipating a fight prefaced the bout with the following preliminaries:  
 "Colored boy, ah comes from a tough breed; my ole man used to manicuh his nails wif a meat axe, an bresh his teef wif a file."  
 "Hell, that aint nothin'," said the second one. "My ole man was so tough he shaved hissself twiced a week with a jack-hammer."

In one of the convict camps there is a radio, and No. \_\_\_\_\_ of the audience, who was qualified to know from previous musical experience in Sing Sing, said: "Why that piece is two strikes for the wop."  
 "What d'ye mean?"  
 "Oh, the Second Hungarian Rhapsody."

# INVESTIGATION OF REASONS FOR DIFFERENCE IN STRENGTH OF CONCRETE FROM TWO PAVING PROJECTS.

By C. L. McKesson, Testing and Research Engineer.

The testing laboratory has under way and has completed in recent months a number of important research investigations, which undoubtedly will be of interest not only to the engineers of the department but to others engaged in the building of highways. Reports of these investigations are being prepared and one or more will be published monthly in the Bulletin. The first of these reports appears this month.

STATE HIGHWAY ENGINEER.

THE highest average strength of field concrete from a California paving project, laid and tested during the season of 1924, was about 5000 pounds. The lowest average strength from a project built during the same season was about 2700 pounds. On each project, the same amount of cement per cubic yard was used.

Believing a study of the reasons for this wide variation in strengths would be of value in connection with efforts of the department to produce uniformly good concrete, liberal samples of materials used on each project were secured and a complete series of laboratory tests, which seem most illuminating, have been completed.

In the following report of this research the paving project having the higher strength will be designated as Number 1, and the one with the lower strength as Number 2. Materials used on the two projects likewise will be designated by the same numbers; Sand Number 1, Gravel Number 1, and Cement Number 1 being those used on project Number 1, and Sand Number 2, etc., referring to the materials used on the lower strength project Number 2.

The projects were many miles apart and all of the materials were from different sources. All of the materials, however, tested within our specification limits and therefore were acceptable.

### Many Investigations Necessary.

To remedy defects in the design of concrete, the various elements must be investigated, one at a time. Therefore, in this series of tests, specimens were made using cements and aggregates in all possible combinations in order to show clearly the variation in strength due—

1. To the difference in the quality of the sand.
2. To the difference in the quality of the gravel.
3. To the difference in the quality of the cement.

In mortar tests, Number 1 sand, as used in the paving work, gives a strength ratio of 123. Number 2 sand, used as in pavement, had a strength ratio of 104. This difference in strength ratios is reflected in the tests of concrete, as shown in the following table:

TABLE 1.

Variation in strength of concrete due to difference in quality of sand.

Made with	No. 2 Sand	No. 1 Sand	Pounds No. 2 weaker than No. 1
No. 2 Cement, No. 2 Gravel	3141	3382	241
No. 2 Cement, No. 1 Gravel	3431	3739	308
No. 1 Cement, No. 2 Gravel	4202	4438	236
No. 1 Cement, No. 1 Gravel	4260	4711	451
Average	3760	4070	310

Number 2 gravel, partly crushed, recorded a loss of 19 per cent in the shot rattler. Number 1 gravel, not crushed, in the shot rattler shows a loss of 10.2 to 11.5 per cent. A somewhat higher rattler loss is expected with partly crushed gravel, but the test indicates that Number 2 gravel is somewhat weaker than Number 1 gravel. That there is a difference in strength of concrete made with each gravel, is apparent from the following table:

TABLE 2.

Variation in strength of concrete due to difference in quality of coarse aggregates.

Made with	No. 2 Gravel	No. 1 Gravel	Pounds No. 2 gravel weaker than No. 1
No. 2 cement, No. 2 sand	3141	3431	290
No. 2 cement, No. 1 sand	3382	3739	357
No. 1 cement, No. 2 sand	4202	4260	58
No. 1 cement, No. 1 sand	4438	4711	273
Average	3790	4035	245

The following table shows the difference in strength of concrete on the two jobs directly attributable to the difference in quality of cement:

TABLE 3.

Variation in strength of concrete due to difference in quality of cement.

Made with	No. 2 Cement	No. 1 Cement	Pounds No. 2 cement weaker than No. 1
No. 2 sand, No. 2 gravel	*3141	4202	1061
No. 2 sand, No. 1 gravel	3431	4260	831
No. 1 sand, No. 1 gravel	3739	**4711	972
No. 1 sand, No. 2 gravel	3382	4438	1056
Average	3423	4402	980

\*This cement, sand, and gravel gave average strengths of 2675 pounds on paving project Number 2.

\*\*This cement, sand, and gravel gave average strengths of about 5000 pounds on paving project Number 1.

### Conclusion.

1. Of the difference in strength of concrete on the two projects: Table 1 shows sand to be responsible for 290 lbs. sq. in. 18% Table 2 shows gravel to be responsible for 241 lbs. sq. in. 15% Table 3 shows cement to be responsible for 1060 lbs. sq. in. 67%

Total difference traceable to material 1591 lbs.

Actual difference in concretes made in laboratory with accurate control of water and uniform manipulation.....1570 lbs.

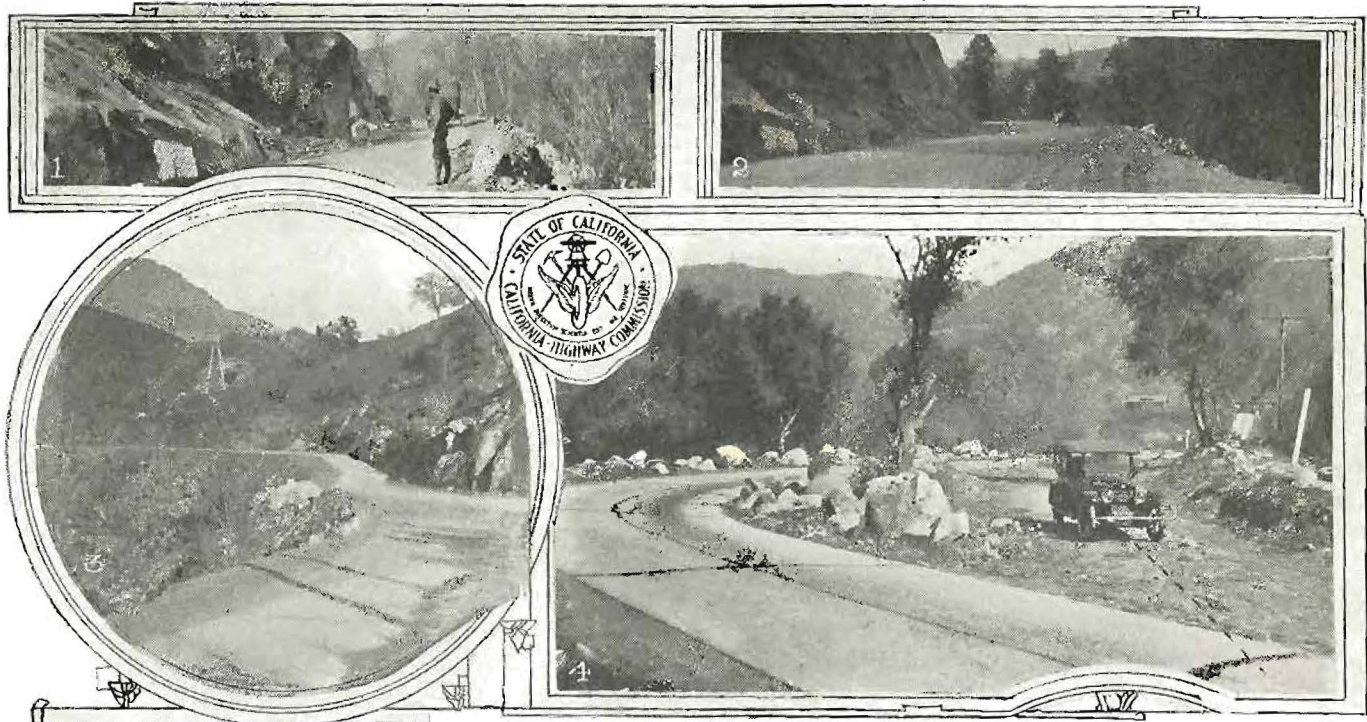
Actual difference in field concretes from the two jobs about .....2300 lbs.

Difference due to excess water and other variations about 700 lbs.

2. By regrading the sand to a coarser curve, some of the difference due to low strength ratio of sand might have been eliminated. (Reference in this connection is made to tests of materials for another paving project, recently reported, in which 200 to 300 pounds was added to the strength of sand by regrading to a coarser curve.)

3. Number 1 sand and gravel can be considered of as good a quality as can reasonably be expected under favorable conditions. By bringing the quality of sand and gravel on the Number 2 job up to the quality of project No. 1 material, and by most accurate control of water in the mixture, the strength might have been increased about 1230 pounds. By substituting a stronger cement 1060 pounds might have been added.

4. This series indicates it is possible to predetermine the quality of concrete to be produced with any given combination of aggregates of a known quality. It also indicates the water cement ratio and the fineness modulus are not the only considerations in the proper design of concrete.



STRAIGHTENING COUNTY-BUILT APPROACH TO SEQUOIA NATIONAL PARK—The road from Visalia to Sequoia Park originally was paved by the county. After it became a state highway, it was widened and straightened by Division VI to take care of the increasing travel into Giant Forest. (1) and (2), before and after views. The others show dangerous curves eliminated. Additional sections of pavement will be necessary before the work is completed.

## THE GENERALS' HIGHWAY

(Continued from page 3.)

Recent traffic counts on this section indicate an average traffic of over 300 vehicles per sixteen-hour day.

### Government Dedication.

The new government road within the park leads from the end of the state highway to Giant Forest by way of Hospital Rock and the Middle Fork of the Kaweah River, eliminating the steep and dangerous road through the North Fork of the Kaweah,

previously the main entrance to the Big Trees. This highway, although incomplete, was dedicated by Stephen T. Mather, Director of National Parks, on September 5th, the ceremonies taking place at the park entrance above Three Rivers.

The work necessary on the Sequoia Park entrance is similar to problems confronting the commission in many sections of the state. Standards of a few years ago are inadequate to meet present and future traffic. Thousands of dollars must be expended for reconstruction, widening and straightening of these county-built highways before large numbers of motorists can travel them in pleasure and safety.

## NOVEMBER 1 CLOSING DATE FOR CIVIL SERVICE TESTS

THE STATE Civil Service Commissioner has extended, until November 1st, the time for filing applications by those wishing to take the examinations for positions in the engineering service.

The following examinations are open to American citizens between the ages of eighteen and sixty-one, who have the education and experience required for the various grades of positions:

Junior Engineering Aid, Grade 1

Rank A—No previous experience.

Rank B—With experience.

Civil Engineering Aid, Grade 2.

Junior Civil Engineer, Grade 3.

Assistant Civil Engineer, Grade 4.

### Promotive Examinations Scheduled.

In order to give state employes an opportunity to advance by promotive examinations will be held in the near future for positions of Associate Highway Engineer, grade 5; and Highway Engineer, grade 6, and also for the following positions:

Civil Engineering Aid, Grade 2.

Junior Civil Engineer, Grade 3.

Assistant Civil Engineer, Grade 4.

These promotional examinations have been requested by the State Highway Engineer and are open only to state employes who have civil service standing in the engineering service.

Applications should be filed immediately with the State Department of Civil Service, Room 331, Forum Building, Sacramento. The dates for the examinations will be announced in the future.

### Gasoline Tax Aids Road Construction in Mexico.

Effective April 1, a tax of 3 centavos (about 1½ cents) per liter is being levied on the domestic consumption of gasoline in Mexico. The proceeds, which it is said will amount to about 4,000,000 pesos (about \$2,000,000) yearly, are to be devoted to road building.

—Engineering News-Record.

"Dinah," said the mistress, "I hear you are married."

"Yassum, I got a good man now."

"Does he provide for you all right?"

"Yas, he's a good provider. but I'se skeered he going to be coched at it."—Everybody's Magazine.

# A FEDERAL AID CATECHISM

United States Bureau of Public Roads--California Highway Commission

## 1. WHAT IS FEDERAL AID?

Federal aid consists of appropriations made by congress to be apportioned among the several states to aid highway construction on a system previously proposed by the states and approved by the Secretary of Agriculture.

## 2. FROM WHAT SOURCE IS THIS MONEY DERIVED?

From taxes paid the federal government. Internal revenue taxes on automobiles, accessories, etc., it should be pointed out, greatly exceed federal aid appropriations.

## 3. HOW MUCH FEDERAL AID IS APPROPRIATED?

This depends upon congress. The last appropriation was \$75,000,000 per year for the fiscal years 1926 and 1927.

## 4. HOW MUCH FEDERAL AID IS APPORTIONED TO CALIFORNIA?

Approximately \$2,472,636 per year under the present appropriations.

## 5. HOW ARE THE FEDERAL AID APPROPRIATIONS HANDLED?

By the United States Department of Agriculture through the Bureau of Public Roads and in cooperation with the state highway departments.

## 6. WHAT IS THE BUREAU OF PUBLIC ROADS?

It is an organization of experienced highway engineers charged with the administration of federal aid and the location and construction of forest highways. The headquarters of the Chief of Bureau are in Washington, D. C., with a regional office at San Francisco; and twelve district offices, each in charge of a district engineer. District No. 2, with headquarters in San Francisco, administers federal aid in California, Nevada and Arizona.

## 7. HOW ARE THE FEDERAL AID ALLOTMENTS DETERMINED?

One-third in the ratio of the area of the state to the total area of all the states;

One-third in the ratio of the population of the state to the population of the entire country as determined by the latest available federal census;

One-third in the ratio that the mileage of rural delivery and star mail routes of the state bear to the total mileage of rural delivery and star mail routes in all the states.

## 8. WHAT IS THE PERCENTAGE OF FEDERAL PARTICIPATION?

The government pays 50 per cent of the cost of the project, BUT NOT TO EXCEED \$15,000 PER MILE, except that in the public land states this percentage is increased in proportion to one-half the percentage of public lands, excluding national forests.

## 9. DOES THIS MEAN THAT THE TOTAL APPORTIONMENT OF FEDERAL AID TO THE STATE IS INCREASED?

No. The public land states do not get a cent more federal aid in proportion than the other states. They can, however, match the federal funds with smaller local appropriations.

## 10. WHAT IS THE PERCENTAGE OF FEDERAL PARTICIPATION IN CALIFORNIA?

In California the federal government pays 60.05 per cent, or a maximum of approximately \$18,000 per mile. No matter how costly a federal aid project may be this is all the government advances toward its cost.

## 11. ON WHAT ROADS CAN FEDERAL AID BE OBTAINED?

Only for projects on the federal aid highway system.

## 12. WHAT IS THIS FEDERAL AID HIGHWAY SYSTEM?

It is a connected system of arterial highways that will provide continuous highway transportation between important

centers and will give access to main highways within or connecting the states. The Federal Highway Act of November, 1921, provided for the establishment of such a system, the mileage of which was based on the mileage of all existing roads of record in the states. Each state certified to this mileage and 7 per cent of the total within the state was designated as the federal aid system.

## 13. WHAT IS THE LENGTH OF THE FEDERAL AID SYSTEM IN CALIFORNIA?

The total is 4,493 miles.

## 14. CAN THIS MILEAGE BE EXTENDED?

Only upon completion of the federal aid system as now approved.

## 15. DOES FEDERAL AID APPLY TO MAINTENANCE?

No. These funds so far have been appropriated for construction only.

## 16. WHAT TYPES OF HIGHWAYS MAY BE BUILT WITH FEDERAL AID?

There is no restriction in the selection of the type so long as it is adequate to serve traffic on the particular road under improvement. It may be either graded and drained, or of any type involving surfacing, either gravel, asphaltic or cement concrete. The type of improvement depends upon the amount of traffic, materials and funds available.

## 17. WHAT IS THE USUAL PROCEDURE IN HANDLING FEDERAL AID?

The route is designated by the state and approved by the Secretary of Agriculture as a part of the federal highway system. Actual location is then made by the state, subject to approval of federal engineers. Plans and estimates are next prepared by the State Highway Department, which enters into an agreement with the Secretary of Agriculture for government participation in the cost. Construction is under direct supervision of the state, subject to inspection and recommendation by the federal engineers. The federal government pays its share of the cost to the state only as the work is completed. **THE GOVERNMENT DOES NOT TURN OVER THE FUNDS IN ADVANCE.**

## 18. IS THE MAINTENANCE OF FEDERAL AID PROJECTS BY THE STATES AFTER COMPLETION A REQUIREMENT OF THE LAW?

Yes. All project agreements specifically provide that the state will maintain the highway upon completion. Failure to do proper maintenance may result in the Secretary of Agriculture refusing to approve additional projects for construction until maintenance is brought up to the required standard.

## 19. IS THE CONDITION OF MAINTENANCE RECEIVING THE ATTENTION OF THE BUREAU OF PUBLIC ROADS?

Yes. Frequent examination is made of completed projects, and unsatisfactory conditions are brought to the attention of the State Highway Department. Repairs must be made within a reasonable time.

## 20. WHAT IS THE WIDTH OF SURFACED HIGHWAY REQUIRED UNDER THE LAW BEFORE THE 7 PER CENT SYSTEMS ARE CONSIDERED COMPLETE?

The final improvement must have surfacing at least 18 feet wide. Some projects are being constructed without surfacing, the agreements in such cases provide for future surfacing when needed. In California, pavements are being built 20 feet in width.

## 21. WHAT IS THE MAXIMUM GRADE NOW APPROVED BY THE BUREAU OF PUBLIC ROADS ON FEDERAL AID PROJECTS?

The maximum grade is 6 per cent. In extreme cases, where to adhere to this grade would cause an expenditure of money

# LASSEN COUNTY BRIDGES SURFACED WITH EMULSIFIED ASPHALT

By H. CARTER, Resident Engineer, Bridge Department.

**O**WING to the remote locations and the difficulty and expense entailed in bringing in a plant and roller equipment for a hot mix, the California Highway Commission decided, as an experiment, to surface with cold asphalt seven timber deck bridges over Pit River and overflow channels. The structures are located on the Alturas lateral in Big Valley, Lassen County. The surfacing used was an emulsified asphaltic material, known as "Laykold." It was shipped in in barrels of approximately 400 pounds net weight. Sand and rock were obtained locally.

In preparing the cold asphalt for the mixer, one man with a large paddle first partly mixed the material in the barrels. It was then dumped into large mixing boxes, and worked with a hoe until thoroughly broken up. To avoid delays, two of these mixing boxes were used.

### Equipment Used.

The equipment used for the surfacing consisted of a one-sack Jaeger Mixer, two tight mixing boxes (each large enough to hold two barrels of Laykold), one box to hold mixed materials, one hand tamper 22' x 4" cut to crown of bridge, two wheel barrows, a one-ton truck, and one 750-pound hand roller.

The labor required was as follows: One mixer operator, two laborers mixing Laykold, three men to wheel and shovel aggregate, two spreaders and two tamperers.

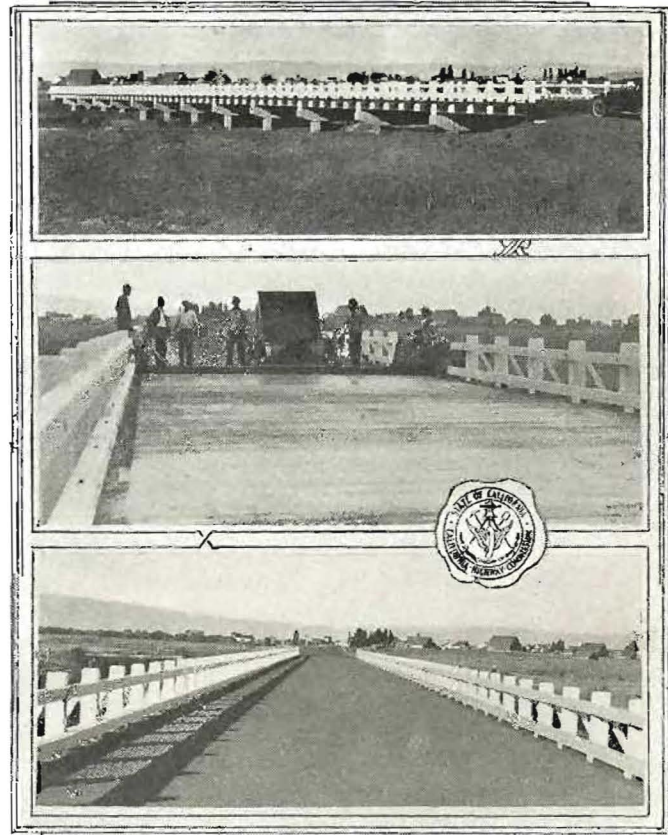
**Mixing**--The mixer was first charged with Laykold, and aggregate and sufficient water added to make a good mix. The batch was held in the mixer from 1½ to 2 minutes until thoroughly mixed. It was then dumped into a box, shoveled into a truck and hauled to the bridge.

### Method of Placing.

**Placing**--Before the material was placed, the bridge was swept clean and a coat of two parts water to one of Laykold was broomed over the surface. The surfacing material was then dumped onto the bridge, and spread and tamped in the same manner as concrete. After two to four hours, it was rolled with a 750-pound hand roller. When thoroughly dry, a seal coat of one part water and one part Laykold was spread over the surface and a coat of coarse screenings drifted over it.

This was again rolled and a smooth, easy-riding surface was the result.

Owing to the short time these bridges have been in use, the suitability of this type of curfacing can not be determined, it is announced by the bridge department.



NEW TYPE OF BRIDGE FOR LATERAL ROADS—Views of recently completed structures over Pit River and its overflow channels on the Alturas lateral in Big Valley, Lassen County. These bridges have concrete piles and bents and a heavy wooden deck with an asphalt floor. The cost was considerably less than for an all-concrete structure but amply strong for the traffic of a lateral road. Center view shows method of placing cold asphalt surfacing.

## EDITOR MAKES CORRECTION

**T**HE ACTION of L. W. Wigmore of the *Orland Register*, in correcting misstatements appearing in his publication alleging lack of care of highway trees in the vicinity of Orland by the California Highway Commission, is appreciated by the department and is indicative of the desire of newspaper editors generally to give the people the truth.

Persons, who were not properly informed, asserted to the *Register* that trees planted along the highway in northern Glenn County were dying from lack of water and proper care. The facts were that the trees had been watered at regular intervals during the summer by F. R. Garrison, Division III maintenance foreman in charge, and had been given care equal to that of trees anywhere on the system. A few of the weaker plantings had died, due to soil conditions and borers to which European Sycamores are particularly susceptible during the first years of growth.

When these facts were brought to the attention of Mr. Wigmore, he readily published a signed correction giving the facts as stated.

Replacements will be made next winter under the direction of

W. E. Glendenning, the commission's tree expert, who has inspected regularly the Glenn County plantings.

### Motor Car Version.

Lives of tourists should remind us  
As their trails we often see,  
Not to leave tin cans behind us,  
Paper, food and such debris.

## NEED WIDER BRIDGES

(From the *Whittier News*.)

**P**ROFITING by the experience of the past, the State Highway Commission is causing to be erected over the San Gabriel River the widest bridge in the entire state system. This new bridge is to be forty feet wide, with additional walks on both sides for pedestrians. Narrow bridges act as the neck of a bottle, and impede traffic. Bridges constructed two years ago on some of the major highways have already proven too narrow.

The various committees and road promoters should profit by the experience of the State Highway Commission and where bridges are needed for the new boulevards, insist on the wide bridges, something that will not impede traffic.



## A FEDERAL AID CATECHISM

(Continued from page 7.)

beyond reason, short sections of steeper grade may be employed.

### 22. DOES THE BUREAU MAINTAIN A LABORATORY FOR TESTING MATERIALS ENTERING INTO CONSTRUCTION OF HIGHWAYS AND BRIDGES?

Yes. A testing laboratory is located in Washington where materials used in highway construction may be tested to establish the fact that they comply with specifications. This service is free to the states desiring to have materials tested. In addition, most of the states have testing laboratories. California has a very complete testing laboratory.

### 23. ARE OTHER FEDERAL FUNDS AVAILABLE FOR ROAD CONSTRUCTION?

Yes. Appropriations by congress for roads and trails within the national forests, Indian reservations, national parks, etc.

### 24. ARE THESE FUNDS EXPENDED FOR CONSTRUCTION ON THE FEDERAL HIGHWAY SYSTEM?

Not necessarily. The Federal Highway Act of 1921 also provided for a system of forest highways. The forest highway system is selected, subject to approval by the Secretary of Agriculture, by representatives of the United States Bureau of Public Roads, state highway departments and forest service. It involves the improvement of roads within or adjacent to the national forests. The forest highway system agreed upon for California includes 2,045.5 miles, 1,321.5 miles of which are also state highways, and 724 miles county highways.

### 25. HOW ARE FOREST HIGHWAY FUNDS HANDLED?

By direct expenditures through the Bureau of Public Roads. On forest projects the federal government pays up to 100 per cent of the cost of construction, or in a reduced percentage, depending upon the amount of cooperation received from the state, county, or local subdivision.

### 26. WHO HAS CHARGE OF SUCH FOREST HIGHWAY CONSTRUCTION?

The Bureau of Public Roads makes location surveys, design and estimates and directs construction of forest highways and major forest development roads where the cost amounts to more than \$5,000 per mile. The forest service has charge of the survey and construction when the cost is \$5,000 or less per mile.

### 27. HOW MUCH MONEY IS PROVIDED FOR NATIONAL FOREST ROADS?

This depends upon congress. The appropriation for the fiscal years 1926 and 1927 is \$7,500,000 for each year. Of the yearly appropriation, \$4,500,000 is directed to be expended for construction of major highways and development roads within the national forests, and \$3,000,000 for minor roads and trails.

These funds, of course, are divided among all the national forests of the country. Under these appropriations, California is receiving approximately \$500,000 per year for the forest highways.

## PROTECTING THE HIGHWAYS

PROPER protection and adequate maintenance of existing state highways is as necessary as the construction of new ones. The added importance of maintenance is being continually emphasized by engineers of the California Highway Commission, as highways constructed, in many instances, more than a decade ago, are called upon to bear a constantly increasing traffic.

In 1912, when the first state highway contracts were awarded, there were 75,000 registered motor vehicles of all classes in California. Trucks, compared with those of today, were light in weight and capacity and comparatively few in number. Heavy duty trucks today outnumber the total registration of ten years or twelve years ago.

The public is coming to an understanding of the necessity for reasonable truck regulation and weight limits. The economic wealth of the state can not supply funds sufficient to build highways that will stand up under unregulated truck traffic.

Cotton and rice are two crops moved extensively over state highways. Both have been developed since the building of state highways began. Gasoline is now being moved over the state highways in large quantities in tank trucks. These are only some of the problems which the highway commission must meet in its program for maintenance of constructed highways and the designing of new pavements.

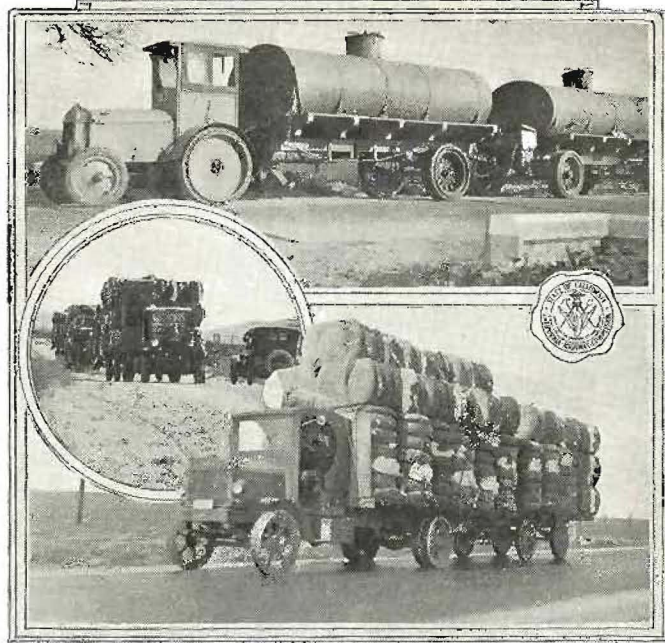
### Editorial Comment.

Discussing this phase of the highway problem, and the necessity for adequate maintenance, the *Los Angeles Express*, in a recent editorial, said:

The importance of saving and preserving in good condition the splendid highways of California becomes increasingly important as greater numbers come to enjoy them and traffic flows in volume. In consequence a new watchfulness over the roads, to see they are not misused, is being established, by the state highway commission and the motor vehicle department acting together.

Heavy trucking is responsible for most injury to the paved roads. Soon after freight hauling by motor truck became an established practice, and the effect on the roads was seen, it was found necessary to limit by law the weight of load which might be carried. But not all observe the law. Therefore patrols are being established over the state, the men equipped with loadmeters, with which they are able to ascertain in a few minutes the exact weight of any truck they believe may be overloaded.

Of course, this entails added expense on the highway department, and should not be necessary. Those whose business depends so much for success on the condition of the roads ought to be more anxious than anybody to protect the roads from injury, either by themselves or others. Many of them do feel that way. And those that refuse to cooperate voluntarily will feel the weight of compulsion. The highway commission and motor vehicle department are determined to put a stop to use of the roads by overloaded trucks. They deserve praise for the work they are doing.



TRUCK TRAFFIC ON THE STATE HIGHWAYS—Views showing the kind of traffic which must be taken care of by California state highways. ABOVE, truck tank cars transporting products of the Coalinga oil fields over the state highway to Fresno; CENTER, trucks loaded with cotton on the way from Imperial Valley to Los Angeles; BELOW, cotton truck photographed on the state highway in Kern County.

By a majority of eight to one, Marin County voters have approved a bond issue of \$1,250,000 for the improvement of ninety-six miles of county highways. It is expected that the roads to be improved, together with state highways within the county, will carry 90 per cent of the county's traffic.

## GOODBYE WATER BREAK—ANCIENT PRACTICE DISCONTINUED

By F. W. HASSELWOOD, Acting Division Engineer.

TRAVELERS over the Sierra this fall by way of Placerville and Echo Summit or by Auburn and the Donner grade are missing a thrill familiar to all who heretofore have traveled these roads in the late fall or early spring. *The water breaks are missing.* Some 270 of these high diagonal ridges, which, about the first of October, have been built across the roadway at frequent intervals, have been replaced by flat-top wooden culverts built flush with the road surface, as shown in the accompanying illustration.

A water break, as customarily built in the high Sierra, was a formidable obstacle. It was constructed by placing a small log or row of rocks diagonally across the road and covering them with a mound of earth about two feet high and four feet wide. When compacted, this formed a ridge from twelve to fifteen inches high.

Contrary to popular opinion, these water breaks were not installed for the deliberate purpose of wrecking cars, even though the strategic location usually was just around a blind curve. They were constructed solely as a drainage device.

On the steep, unsurfaced mountain grades that are closed during the winter by a heavy blanket of snow, a water break served a peculiar drainage requirement that was not met by the usual type of culvert. In the spring when the snow begins to melt, not from the top but from its contact with the ground, the water starts down the grade following depressions made by the last vehicle in the fall, and quickly accumulates in volume and increases in velocity. Unless diverted at intervals, the flowing water will carry away all of the fine materials of the road surface. The water break intercepted this flow, as well as that from the side ditch, and diverted it away from the road.

Water breaks, therefore, in their appropriate season, formed an integral part of the mountain roads; so much so that they have been considered a chronic affliction. They have been constructed each fall as maintenance crews worked down the mountain ahead of the storms, and have been removed each spring as soon as the roads were cleared of snow. This work was not only an annual expense of considerable magnitude but occupied the time of the crews when they were needed on other work.

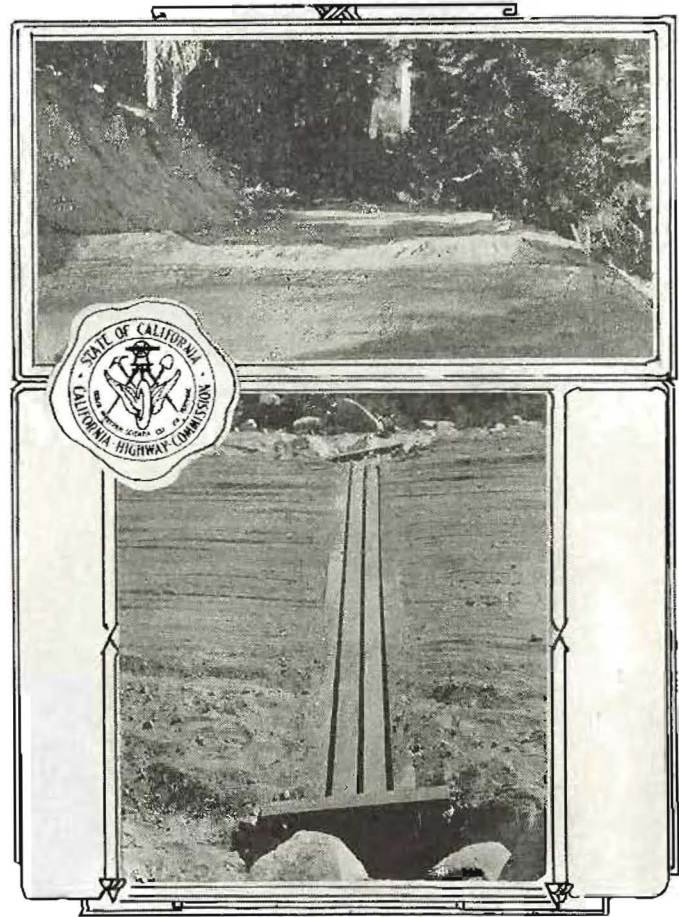
### Experiment Proves Success.

Last year two experimental culverts were built by Division III near Emigrant Gap. They proved so successful that some 270 have been installed this fall.

There is nothing new about these culverts except their extensive use. They are ordinary wooden box culverts with tops built of three or four timbers four inches by four inches and spaced one inch apart. The top is set flush with and parallel to the grade of the road. Roadside drainage is carried through and surface

drainage intercepted by the culvert. The top is removable to permit cleaning the culvert of fine material with which it may become filled during the course of summer maintenance. The cost of the new culverts is but little more than the cost of constructing and removing a water break and their annual maintenance cost should be insignificant.

Travelers on the mountain roads late this season have commended the innovation which permits usual speed and hauling of normal loads.



GOODBYE TO THE WATER BREAK—Above, the ancient but unhonored water break, curse of travelers on mountain roads since early days; below, type of open drainage culvert adopted by Division III as a substitute for the water break. (Photos by Division II.)

## FEDERAL AID ENDORSED

AT ITS RECENT annual convention in St. Louis, the National Sand and Gravel Association, after discussing the subject of federal aid, adopted a resolution which reads, in part, as follows:

"Federal aid law and federal highway appropriations have been the stimulating force behind the country's effort to provide adequate and needed highways, both as a measure of national defense and facility of commercial transportation."

Officials of the association announce that this resolution places their organization squarely on record behind the federal aid principle. Congress was petitioned to continue the present policy. In announcing the adoption of the resolution, the association representative said:

"There are signs today that certain possibly uninformed persons are endeavoring to eliminate the policy of federal aid, but their efforts will come to naught when the facts are brought forth for examination."

## JUDGED BY HIS ROADS

(From the Placerville Mountain Democrat.)

In California a county supervisor is judged by the roads he builds. It is a peculiar test of efficiency but is the one in general use. That being true it now behooves all supervisors to become as intimate as possible with the engineering department of the State Highway Commission.

**FAMOUS LOS ANGELES ENGINEER  
COMMENDS MAINTENANCE METHODS**

**M**AINTENANCE of desert highways, particularly the work being done by Division VIII on the Mecca-Blythe Highway, was favorably commented upon recently, following a trip to Blythe, by William Mulholland, chief engineer and manager of the Bureau of Water Supply of the City of Los Angeles. In a letter to the Bulletin, Mr. Mulholland, who has been familiar with desert conditions for many years, expresses the opinion that proper and intelligent maintenance will provide good, serviceable roads in many sections of the desert.

Discussing the work that is being done by the commission on the route between Shaver's Summit and Blythe, the famous Los Angeles Engineer says:

"A year or so ago the best time that could be made over the ninety miles was five hours. I have recently covered this same distance in the same make of machine in three and three-quarter hours without effort and with complete comfort.

"This accomplishment is due to the recognition of the natural character of the road bed coupled with intelligent treatment of same and I am glad to notice the same policy is being pursued with other good roads in this state."

**IRRIGATION WATERS MUST  
NOT STAND ON HIGHWAY**

(From the Glendora Gleaner.)

**I**RRIGATION waters allowed to stand on the highway caused a suit against two farmers in the San Joaquin Valley. The case was heard in Stockton and the farmers were given heavy sentences. The State Highway Commission were the prosecutors. They claimed there was no excuse as the farmers were warned before the water was to be turned on and again when the ditch broke. They made no effort to get the water off and the roadbed was damaged. The case is said to be the first one of its kind in the state, and that the state won is encouraging. Roads cost too much money to be destroyed by carelessness.

**CHEERFUL NEWS**

(From the Santa Cruz Sentinel.)

**I**T IS cheerful news that comes from the State Highway Commission that \$10,000 has been apportioned from the motor vehicle fund for continued improvement on the road between Boulder Creek and the Big Basin.

The engineer's specifications call for making a 24-foot roadway, taking out curves and cutting down several grades. It is estimated by those who have kept tab on park travel that fully 65 per cent of the people who visit the park go in via the Boulder road owing to the steep climb from the Saratoga side.

With the state park yearly becoming more popular, especially with southern California people, it is important that the road be put in the best possible condition and the \$10,000 will go a long way toward completing the work which got a good start this summer.

**THE CONSTITUTION OF THE UNITED STATES OF AMERICA.**

Article I, Section 8—The Congress Shall Have Power to Establish POSTOFFICES and POST ROADS.

AN ACT OF CONGRESS. Chapter 9—An Act making all public roads and highways Post Routes: Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That all public roads and highways, while kept up and maintained as such, are hereby declared to be Post Routes. Approved March 1, 1884, U. S. Statutes, 1882-1885.

"Willie," asked the teacher, "what was it Sir Walter Raleigh said when he placed his cloak on the muddy road for the beautiful queen to walk over?"

Willie, the ultra-modern, gazed about the classroom in dismay, and then, taking a long chance, replied:

"Step on it, kid!"

Eleven

**HERE'S A REAL SUBSIDY**

**T**HE Land Grant of 1864 to aid the construction of the Northern Pacific Railway conveyed approximately 40,000,000 acres of government land to the railway company. From this land great sales aggregating \$136,000,000 have been made by the Northern Pacific Company up to 1917. The Nation's total gift to the railroads to aid in their development was 158,293,736 acres of land from the public domain. At ten dollars an acre this vast empire had a potential value of over one and one-half billion dollars.

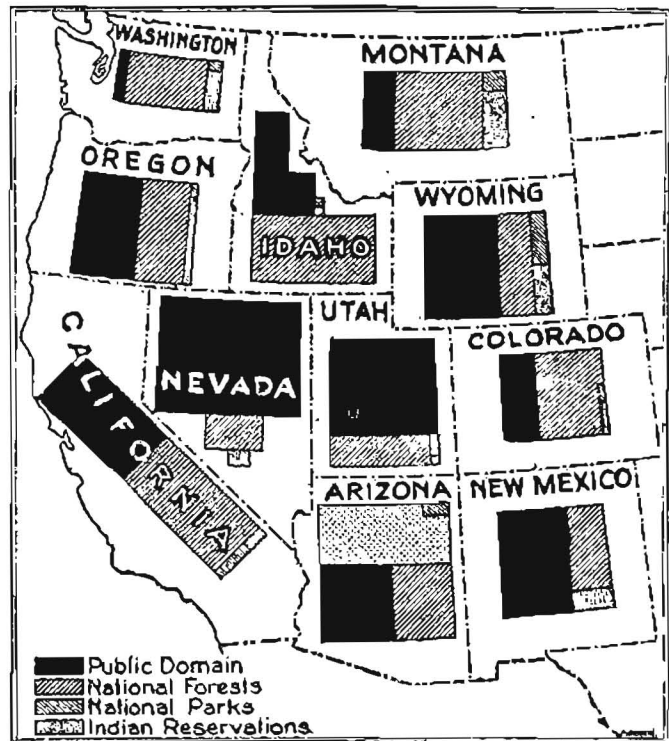
This was a means of encouragement of transportation development, and in view of these conditions the amounts being appropriated by congress in the form of federal aid in highway building seem little enough to encourage the most modern form of transportation which is of vital interest to every citizen and every community.—*Nevada Highway News.*

**UNAPPROPRIATED PUBLIC LANDS**

The interior department announces vacant and unappropriated public lands in the United States exclusive of national forests and other reserved areas total 184,716,846 acres, of which 129,606,234 have been surveyed.

The largest areas are in Nevada, with 52,456,837 acres, and the smallest areas are in Louisiana with 10,701.

Arizona has 13,578,760; California, 18,946,582; Colorado, 7,464,208; Idaho, 9,887,139; Montana, 6,081,750; Nebraska, 29,797; New Mexico, 16,222,744; North Dakota, 131,455; Oregon, 13,251,000; South Dakota, 264,861; Utah, 28,583,778; Washington, 823,716, and Wyoming, 16,447,935.



**GOVERNMENT HOLDINGS IN PUBLIC LAND STATES**—More than half the land in these eleven states is held by the federal government. The 42,000,000 acres of government mineral lands (containing coal, oil, potash and minerals) are not included in the map, as they are not confined to the eleven public land states. The West believes the federal government should assist in building transcontinental highways across these great areas of untaxable public lands.

Building of interstate highways brings with it a distinct social benefit of which the United States are greatly in need. This is a powerful reason for federal aid.

WHAT THE DIVISIONS ARE DOING

**DIVISION II.**

HEADQUARTERS, REDDING.

H. S. COMLY, DIVISION ENGINEER.

Counties of Siskiyou, Modoc, Trinity, Shasta, Lassen, Tehama, and northern Plumas.

**G**RADING on the reconstruction contract of the Nevada Contracting Company, covering the section between Half Way Creek and Dog Creek, has progressed to a point where the highway has been thrown open to traffic for twenty-four hours daily.

Grading of a new section of state highway between Constantia and Purdy, in eastern Lassen and Plumas counties, has been completed. Lassen County cooperated with the state in financing the project.

Bids have been received for grading a four-mile section of the Alturas lateral through Big Valley, Lassen County. When completed, this work will shorten the distance between Redding and Alturas two miles. The new grade also will make usable seven new bridges across Pit River and its overflow channels, eliminating twenty-three county-built wooden structures.

**DIVISION III.**

HEADQUARTERS, SACRAMENTO.

F. W. HASELWOOD, ACTING DIVISION ENGINEER.

Counties of Butte, Colusa, El Dorado, Glenn, Nevada, Placer, southern Plumas, Sierra, Sutter, Yuba, and northern Sacramento and Yolo.

**T**HE IREY and Holden contract for grading from Boca to Floriston, in the Truckee River Canyon, has been extended to include 0.4 of a mile in the vicinity of Hinton crossing. The work will be done during the winter. This section was left out of the original contract because it could not be undertaken prior to the construction of the bridge at Hinton, now nearing completion.

Twelve miles of the Tahoe-Ukiah highway from Williams westerly to Venado are expected to be in good condition throughout the winter as a result of grading and surfacing work recently completed.

Four miles of grading has been completed by IreY and Holden on their contract for the grading of 5.8 miles east of Camino on the Placerville route to Lake Tahoe, and one mile of surfacing has been placed. The work is progressing satisfactorily.

The two subways between the American River bridge and the Globe Iron Works, at North Sacramento, are nearing completion and paving of the ground level highway will start soon. The Kaiser Paving Company has sublet the paving to Lord and Bishop, builders of the underpasses.

**Tahoe Highway Improved.**

A 400-foot cut has been completed at the top of the Emerald Bay grade, Lake Tahoe, greatly improving the alignment of the highway at this point. Extensive rubble masonry walls, also a part of this project, have been completed. The grading is being done by state forces.

In addition to placing surfacing on the recently graded section of the highway between Magra and Gold Run, Giddings and Whyte, contractors, have been authorized to do surfacing work between Forebay and Emigrant Gap and between Donner Lake and Truckee. State forces are placing disintegrated granite on a two-mile section above Placerville, improving a section that is slippery when wet.

The construction of a 30' by 100' storage building has started on the recently acquired maintenance station site at Truckee. It will be completed in time for the storage of equipment during the coming winter.

**DIVISION VI.**

HEADQUARTERS, FRESNO.

J. B. WOODSON, DIVISION ENGINEER.

Counties of Fresno, Madera, Merced, Mariposa, Kings, Tulare, and Kern, north of the Tehachapi.

**T**WO reconstruction projects were completed in Division VI during October as follows:

Six miles of flush concrete shoulders and rock borders placed on the trunk highway north of Fresno by Stewart and Bland; and the placing of ten miles of rock shoulders on the Pacheco Pass lateral, east of Los Banos, by the Kaiser Paving Company.

Three miles of Willite pavement has been authorized, as an experiment, in connection with the widening to twenty feet of eight miles of the trunk highway north of Bakersfield. The concrete base is being widened and thickened with asphalt concrete.

**DIVISION VII.**

HEADQUARTERS, LOS ANGELES.

S. V. CORTELYOU, DIVISION ENGINEER.

Counties of Los Angeles, Ventura, Orange, San Diego, and eastern Kern, south of Mojave.

**T**HE construction of the underpass under the tracks of the Union Pacific Railroad east of Montebello, on the Whittier Boulevard, Los Angeles County, is progressing at a rapid rate and this dangerous crossing soon will be a thing of the past. The state, Los Angeles County, and the railroad company have joined in financing the project.

Placing of pavement in connection with the widening of the boulevard in the vicinity of the under pass is going ahead satisfactorily.

The extension of the Whittier Boulevard reconstruction for 1.9 miles easterly from Philadelphia street is now well under way.

**Reconstruction Contract Completed.**

Placing of concrete on the 5.6 mile contract for "second story" work between San Juan Creek and Galivan, Orange County, has been completed by Jahn and Bressi. The same firm has the contract for the reconstruction of the coast highway north of Oceanside. Grading and culvert work on this latter section are well under way.

On the Coast Boulevard, north of Santa Monica, grading is now in progress on the long fill across Malibu Creek flat. Culvert work, a part of the state contract, is about completed. Los Angeles County has agreed to construct the bridges on this section, and is expected to begin work soon.

An important line change between Laguna Summit and Pine Valley on the San Diego-El Centro highway, in San Diego County, has been completed by state forces. Improvement of the alignment is now progressing easterly from Laguna Summit toward Cottonwood Creek. The crew has surfaced four miles of roadway in the same vicinity, using disintegrated granite.

Dewey and Rawson soon will start work on their contract for placing flush concrete shoulders on the foothill boulevard between San Fernando and La Canada.

**DIVISION VIII.**

HEADQUARTERS, SAN BERNARDINO.

E. Q. SULLIVAN, ACTING DIVISION ENGINEER.

Counties of San Bernardino, Riverside, and Imperial.

**D**IVISION VIII recently completed drilling a well to a depth of 153 feet in Open Valley, in the Imperial County sand hills, which recorded a flow of 500 gallons per minute for six days of pumping. It is hoped this well will provide water for mixing

concrete for the proposed pavement to be placed on the Sand Hill section. It caused a sensation because of the unusual flow.

**Cloud Burst Tests New Grade.**

The new highway recently completed east of the Sand Hills, Imperial County, was given a thorough test recently when a heavy cloud burst occurred in that vicinity. The grade was flooded but little damage resulted. Regular maintenance crews removed what sand was washed into the road and reshaped the grade, which is now compacted better than ever. There was no interruption of traffic.

Excellent progress is being made on the placing of a "second story" pavement between San Bernardino and Redlands, where a county pavement is being rebuilt to a width of twenty feet by the state.

Grading between Victorville and Hicks, on the National Old Trails Highway, also is progressing at a rapid rate. The work is about finished between Victorville and Oro Grande. A rock crushing plant has been established at Oro Grande and surfacing operations are being carried on from this point.

**Work Resumed in Imperial.**

Moderation of the hot summer weather has made possible increased activity on the three grading contracts under way in the Imperial Valley between Brawley, El Centro, Holtville and High Line canal. Large forces of men are now at work.

One of the most scenic sections of state highway in Division VIII will be the new grade along Big Bear Lake, a contract for grading having recently been awarded to the Ross Construction Company.

**DIVISION IX.**

HEADQUARTERS, BISHOP.

F. G. SOMNER, DIVISION ENGINEER.

Counties of Inyo, Mono, and eastern Kern County, north of Mojave.

**R**ESTORATION of roads damaged by frequent cloud bursts during the summer months, between Mojave and Olancho, has been completed.

Preparations are now being made for grading, by contract, Ricardo to crossing of Southern Pacific Railroad near Little Lake, a distance of 36.7 miles, to a width of 30 feet.

Surfacing of eight miles with crushed volcanic cinders between Deadman and Rush Creek in Mono County, is nearly completed. George Clarke is the contractor.

Securing of rights of way is now in progress for the proposed construction from Mojave to the Kern-San Bernardino County line, a distance of 31½ miles.

Miss Margaret Peel has succeeded Miss Musa Patterson as stenographer at the Bishop office. Miss Patterson has entered the University of Texas.

C. E. O'Connell, formerly clerk in the headquarters office, has succeeded M. L. Wilson as Division Clerk at Bishop. The latter has transferred to headquarters.

State Highway Engineer R. M. Morton and Commissioner N. T. Edwards recently made an inspection trip over Division IX, crossing the high Sierra at the Somora Pass.

**DIVISION X.**

HEADQUARTERS, SACRAMENTO.

J. C. McLEOD, DIVISION ENGINEER.

Counties of Amador, Calaveras, Alpine, Tuolumne, Stanislaus, San Joaquin, Solano, and southern Sacramento and Yolo counties.

**C**ONTRACTOR J. F. Knapp has completed the placing of concrete between the Stanislaus River and Turner Station, in San Joaquin County, and opening of the new pavement to traffic should take place not later than November 1st. The commission has agreed to pave a twenty-foot strip through the city of Manteca, in connection with this project.

Surfacing with crushed rock of the recently graded section of the Alpine Highway, east of Jackson, to a width of eighteen feet has been completed and Contractor R. N. Murdoch has moved his shovel to a section of the Mother Lode Highway, between Amador City and Central House. The state is doing the grading and Amador County the surfacing.

An assessment district is being formed among local property owners on the Stockton Boulevard, at the southern entrance to Sacramento, to pave the street to a width of fifty-three feet. The state is now engaged in paving two twelve-foot strips on either side of the nine-foot strip to be paved by the Central California Traction Company, which is moving its tracks to the center of the street.

**Work by Maintenance Forces.**

State forces, under specific allotment, are widening the Red Lake grade between Carson Pass and Hope Valley, on the Alpine Highway.

Similar work is under way on the Big Oak Flat road into Yosemite, where widening is being done between Bucks Meadow and South Fork.

A mile of rough county-built oil macadam east of Clements, on the San Andreas lateral, San Joaquin County, is being rebuilt.

**BRIDGE DEPARTMENT NEWS**

HARLAN D. MILLER, Bridge Engineer.

John C. Wilson has been assigned to the Willow Brook Bridge in Sonoma County, as resident engineer.

Nate Lovelace, contractor, has completed the construction of a 160-foot reinforced concrete girder bridge across Salt Creek, in Shasta County. This structure is a part of the reconstruction program on the Pacific Highway.

M. L. Hyde has returned to work in the drafting office and H. M. Sturges has succeeded him as assistant resident engineer on the Truckee River bridges.

M. J. Dwyer has been added to the department's designing force. With the exception of the paving and the installation of sumps, construction of the North Sacramento underpasses has been completed.

H. Carter has been appointed resident engineer on the San Mateo Creek bridge in San Diego County, succeeding O. P. Dodds, resigned.

Construction of a reinforced concrete bridge across Big Sycamore Creek, in Ventura County, is nearing completion. The work is being done by the county. J. M. Lackey represents the state as resident engineer.

The Polaris Crossing across the Truckee River and the Southern Pacific railroad near Polaris, in the Truckee River Canyon, is the first of five handsome structures in the canyon to be completed.

A. B. Willett is now resident engineer on the reinforced concrete girder bridge on concrete pile bents across the Coachella storm-water drain near Indio, Riverside County.

**All in a Lifetime.**

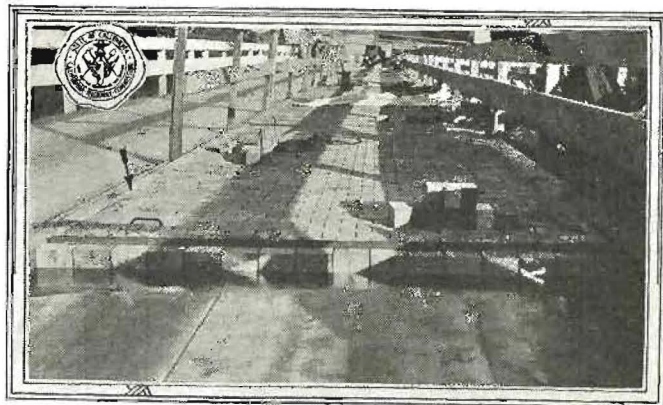
"Stop, look, listen!"

The reflective man stopped to read the railway warning.

"Those three words illustrate the whole scheme of life," said he.

"How?"

"You see a pretty girl; you stop; you look; after you marry her you listen."



**FLOORING A BRIDGE**—View showing methods used in placing a new floor of redwood blocks on a Redwood highway bridge. Traffic was kept moving by completing half the asphalt surfacing, at a time. Note the raised row of blocks in the center, to act as a traffic guide. (Bridge Department Photo.)

## STATE HIGHWAY FUND CONTRACTS (Bond Funds, Including Federal Aid)

Cont. No.	Di- vision	County	Route	Sec.	Location	Miles	Type	Contractor	Estimated cost	Date contract awarded	Con- tract time, days
456	III	Colusa.....	15	E	<b>COMPLETED AND ACCEPTED SINCE SEPT. 3, 1925.</b> Mountain House to Williams.....	7.36	Grade and Gravel Surface.....	Giddings and Whyte.....	\$80,947 67	Oct. 6, 1924	
482	VII	San Diego-Imperial.....	12	H-A	<b>AWARDED SINCE SEPTEMBER 3, 1925.</b> Mountain Springs Grade.....	1.90	Grading.....	A. R. McGrath.....	\$74,250 00	Sept. 21, 1925	125
483	VII	Orange.....	60	C	Laguna Beach to San Juan Creek.....	7.42	Grade and Gravel Surface.....	Chas. G. Willis and Son.....	198,516 60	Sept. 21, 1925	250
484	II	Lassen.....	28	A	Bieber to 4 miles West.....	3.80	Grade and Gravel Surface.....	D. McDonald.....	46,475 89	Sept. 21, 1925	325
					Sub-total.....	13.12			\$319,242 49		
					<b>PENDING AWARD.</b> None.						
					Total State Highway Fund Contracts Awarded and Pending Award.....	13.12			\$319,242 49		

NOTE—Primary construction covered by the above contracts does not include funds obligated on cooperative forest highway projects, prison road camp activities, or day labor jobs not being done under contract.

## STATE HIGHWAY MAINTENANCE FUND CONTRACTS (Including Gasoline Tax Fund)

Cont. No.	Di- vision	County	Route	Sec.	Location	Miles	Type	Contractor	Estimated cost	Date contract awarded	Con- tract time, days
M-60	X	Amador.....	34	C	<b>COMPLETED AND ACCEPTED SINCE SEPT. 3, 1925.</b> Jackson to 3 miles east.....	2.62	Grade and Gravel Surface.....	R. N. Murdoch.....	\$27,228 11	Jan. 14, 1925	
M-62	III-X	Yolo.....	6-7	A	Southerly Boundary to Woodland and Davis.....	12.79	Concrete Shoulders.....	Kaiser Paving Co.....	167,304 02	Mar. 12, 1925	
M-69	VI	Fresno.....	4	C	2 miles north of Fresno to Herndon.....	6.94	Concrete Shoulders.....	Stewart and Bland.....	54,429 97	April 15, 1925	
M-87	V	Monterey.....	2	G	San Ardo to San Lucas.....	11.00	Rock Borders.....	Fred Neighbourt.....	84,860 63	June 17, 1925	
					<b>AWARDED SINCE SEPTEMBER 3, 1925.</b> Big Bear Dam to Fawnskin.....	3.27	Grading.....	M. S. Ross.....	\$32,609 54	Sept. 21, 1925	60
M-100	X	Sacramento.....	4	B	Sacramento to one-half mile south.....	.47	A.C. Pavement.....	A. Teichert and Son.....	22,680 66	Sept. 21, 1925	50
M-101	VII	Los Angeles.....	9	A	San Fernando to La Canada.....	15.10	P.C. Concrete Widening.....	Dewey and Rawson.....	174,990 38	Sept. 21, 1925	250
M-102	IV	Sonoma.....	1	C	Across Willow Brook.....		R.C. Girder Bridge.....	Lozier and Carr.....	17,997 50	Oct. 9, 1925	100
					Sub-total.....	18.84			\$248,277 98		
					<b>PENDING AWARD.</b> Summerland to Montecito.....	1.40	Grade and Rock Surface.....		\$74,796 60		100
					Total State Highway Maintenance Fund Contracts Awarded and Pending Award.....	20.24			\$323,074 48		

NOTE—The above obligations charged against the State Highway Maintenance Funds do not include funds from these sources obligated for general maintenance and for specific betterments being done under day labor authorization.

## HIGHWAY NEWS NOTES

### Division III Changes.

L. A. VANCE, formerly maintenance foreman at Gridley, Butte County, has been transferred to similar work in Sacramento County. He has been succeeded at Gridley by Chester Butz, formerly assistant to Foreman Dan Breuning at Nevada City.

F. R. Bakers is resident engineer on the North Sacramento paving project.

H. B. La Forge, assistant resident engineer, has been transferred to Division V for duty at Santa Barbara.

### Division VII.

It is with deepest regret that the Bulletin learns of the death of Earl Sheridan, two-year old son of E. T. Scott, Maintenance Superintendent, Division VII. The little fellow passed away at the Los Angeles Children's Hospital after a short illness.

C. V. Kiefer, assistant resident engineer, Division VII, is recovering from an appendicitis operation.

Homer B. Lindley and Winthrop Aldrich have been assigned to paving and grading projects along the Orange County coast, as assistant resident engineers.

Herbert Cooper, Division VIII announces, has been assigned to the Big Bear Lake grading project as resident engineer.

### Division X.

The modesty of Grant P. Merrill, popular maintenance foreman located at Woodfords, Division X, kept him from announcing the arrival several months ago of his third son, who is now nearly seven months old.

Miss Hazel McBeth, formerly with headquarters, is now with the clerical department of Division X.

C. M. Butz has been transferred to the Bridge Department as resident engineer on the West Sacramento subway.

Mrs. Daisy M. Nugent, typist, has left Division X and is now residing at Folsom.

### Headquarters.

Mrs. May J. Caruthers, mother of W. S. Caruthers, for many years associated with the engineering forces of the commission, passed away in Sacramento, October 11th. Mrs. Caruthers was a native of Jackson, Tenn., aged 90 years.

H. D. Stover of the bridge department is a member of a committee which has in charge a tennis tournament for state employees residing in Sacramento.

## EDWARDS MAKES GOOD

(From Laguna Life.)

NELSON T. EDWARDS of Orange, State Highway Commissioner, informed the people of Laguna Beach through *The Life* last fall that the contract for the grading for the Coast boulevard from Laguna Beach to Serra would be let some time during 1925. Bids have been called for September 7 and it is likely that the contract will be let within two weeks of that time.

At the time he gave out the interview, Mr. Edwards said that he had talked with the other commissioners and they were of one mind in the matter of finishing the link of highway between Laguna Beach and San Juan Creek. The only delay would be a matter of funds. This year federal aid money was divided equally between northern and southern California and the road from Newport Beach to Serra was allotted its share for grading and surfacing. Mr. Edwards has made good his promise.

### Why He Went Faster.

A foreign young man purchased an automobile and was seen driving down the street about 60 miles an hour. A policeman yelled at him to stop, but instead of slowing up he increased his speed. When the officer finally caught up with him he roared:

"Why didn't you stop? Didn't you hear me holler back there?"  
"Oh, was dat you dat yelled? I thought it was somebody I run over."

## "THE ENGINEERING IS PERFECT"

(From the "People's Safety Valve," San Francisco Chronicle, September 19, 1925.)

Editor, The Chronicle:

SIR—Having just returned from a motor trip over the Redwood Highway to Crescent City, may I have a few comments on the road, the road signs and the people?

The scenic beauty of the road is wonderful and awe-inspiring, the engineering is *perfect* and the people one meets are kindly and courteous. But why the damage-to-the-mind road signs? Every small, easy curve is heralded as "Danger," "Sound Horn," "Slow Down to 15 Miles an Hour," and other such advice. To the timid occupant of a back seat these signs strike terror to the heart, although one's fears are soon allayed by finding the curves (with few exceptions) wide and easy to traverse.

However, these signs are like the little boy crying, "Wolf, wolf!"; sometimes a driver, knowing the sign language by past experience, does not slow down and grief comes.

A highway engineer from another state, instrumental in making a wonderful scenic road, would not allow the word "danger" on a single road sign. He said that if a curve were dangerous it should not be so marked.

However, it is a wonderful drive, which will long remain in our memories.

Mrs. ASTOR.

Santa Maria, September 16, 1925.

## WORK APPRECIATED

(From the Placerville Mountain Democrat.)

The people of El Dorado County fully appreciate the additional funds recently allotted by the Highway Commission for reconstruction and maintenance work on the highway between Placerville and Fresh Pond and along the shores of Lake Tahoe near Emerald Bay. We are especially thankful to Mr. Montfort, the engineer in charge, who is thoroughly sold on this highway and is trying to make it what it should be. He realizes that in a few years all roads combined will be used to capacity to accommodate the travel to and from Lake Tahoe.

## POET'S VIEW OF FEDERAL AID

(Oscar H. Fernbach in the San Francisco Examiner.)

"Oh, the East, in divers sly ways,  
In occulted schemes, and by-ways,  
Now is plotting 'gainst our highways  
In the West:

Poor their future vision waxes,  
As they grind their verbal axes  
'Gainst our use of federal taxes  
To protest.

Their own loss they are abetting  
When against the help they're fretting  
That from Uncle Sam we're getting

For our roads:  
Their own interests gainsaying  
When the highway plans they're flaying—  
All they think is, they are paying—  
And it goads.

Let us stop such foolish chatter  
And the foes of progress scatter!  
We can show them, in this matter,  
That they're wrong:

At expense why be complaining  
When in pocket one is gaining?  
For the roads that knit the nation  
Make it strong!"

CALIFORNIA HIGHWAYS.



STATE OF CALIFORNIA  
CALIFORNIA HIGHWAY COMMISSION




MAP SHOWING  
**FEDERAL AID HIGHWAY SYSTEM**

R. M. MORTON, STATE HIGHWAY ENGINEER  
COMMISSIONERS  
HARVEY M. TOY, (Chairman)  
LOUIS EVERLING  
N. T. EDWARDS

STATUTE MILES  
0 10 20 30 40 50

1925

**LEGEND**

-  Primary Federal Aid Highways
-  Secondary Federal Aid Highways.
-  State Highways not on Federal Aid System.

The above map shows the federal aid highway system of California in its relation to other state highways. The roads shown on this map constitute the present state highway system, except in one or two minor particulars where the federal aid system includes short sections not designated state highways.

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