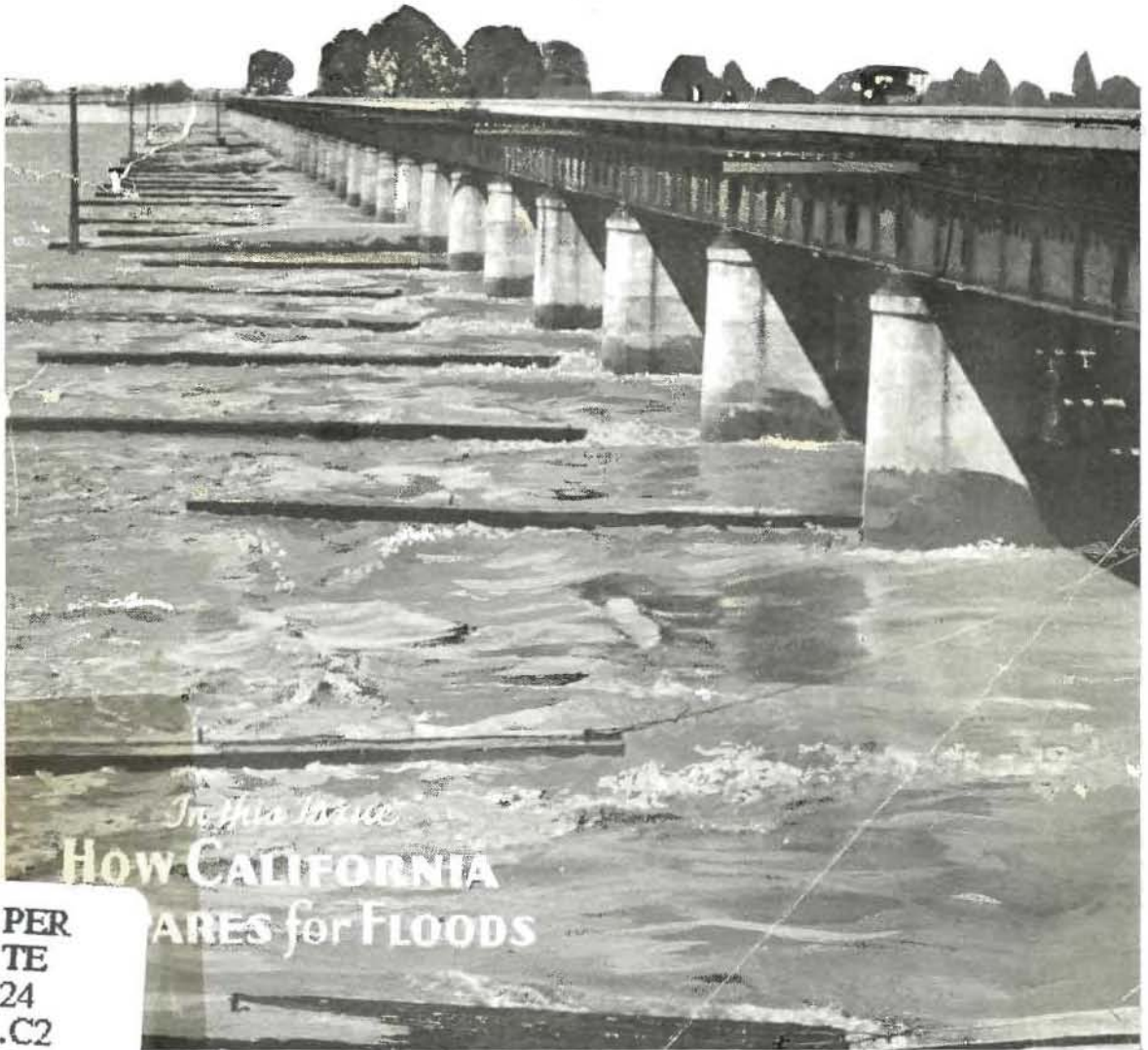


CALIFORNIA HIGHWAYS and PUBLIC WORKS



In this issue
**How CALIFORNIA
PREPARES for FLOODS**

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Official Journal of the Department of Public Works
State of California

JANUARY

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How California Prepares for Floods

By R. L. JONES, Deputy State Engineer in Charge of Flood Control and Reclamation.

THE State of California has materially increased its direct interest and activity in the maintenance of flood control works in the Sacramento Valley, where, in a large region of the state, a comprehensive system of flood protection is an accomplished fact. This has been brought about



R. L. JONES.

in connection with the revised flood control project plan, and the recent legislation of the state and the United States, in which the financial participation of both governments in the project has been substantially increased. The assumption of responsibility by the state, for a limited period, for the maintenance of flood control works, is a part of

an active program of the state government for relieving the financial difficulties of the landowners within the project. It looks toward the liquidation of the large outstanding indebtedness, which has deeply involved the lands for a number of years.

Legislation and Appropriations.

As a matter of information, the arrangement being comparatively new, the details of the state legislation and appropriations in respect to this maintenance are set out rather fully below.

The Sacramento and San Joaquin Drainage District includes the lands in the Sacramento and San Joaquin valleys subject to inundation by flood waters and was created by the legislature in 1913. In 1927 the legislature, by the enactment of chapter 774, directed that the operation and maintenance of certain units or portions of the flood control works within the Sacramento and San Joaquin Drainage District in the Sacramento Valley shall be under the direction and control of the Department of Public Works and that the cost of such operation, control and maintenance shall be defrayed by the state. The act was amended slightly in chapter 387, Statutes of 1929, which provides that this arrangement shall continue for eight years, or until August 14, 1937.

The flood control works specifically placed

in charge of the Department of Public Works are as follows:

(1) The east levee of the Sutter By-pass north of Nelson Slough.

(2) The levees and channels of the Wadsworth Canal, the intercepting canals draining into the same, and all structures incidental thereto.

(3) The collecting canals, sumps, pumps and structures of the drainage system of Project No. 6 east of the Sutter By-pass.

(4) The by-pass channels of the Butte Slough By-pass, the Sutter By-pass, the Tisdale By-pass, the Yolo By-pass, and the Sacramento By-pass with all cuts, canals, bridges, dams, and other structures and improvements contained therein and in the borrow pits thereof.

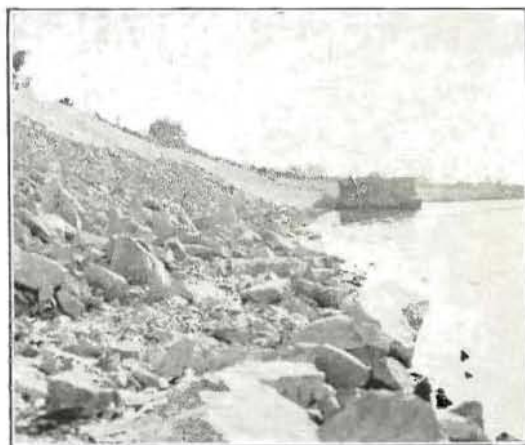
(5) The levees of the Sacramento By-pass.

(6) The channels and the overflow channels of the Sacramento River and its tributaries within the Sacramento and San Joaquin Drainage District.

(7) The Sacramento River outlet enlargement project below Cache Slough to the extent of the state's liability therefor.

These acts further state:

The Sacramento and San Joaquin Drainage District and the Reclamation Board and the members thereof, during said period, are hereby relieved of all responsibility or liability for the operation or maintenance



Levee revetment of quarry rock.

of all levees, overflow channels, by-passes, weirs, cuts, canals, pumps, drainage ditches, sumps, bridges, basins, or other flood control works within or belonging to the Sacramento and San Joaquin Drainage District.

The passage of this law places upon the Department of Public Works the entire responsibility, so far as the state is concerned, for the maintenance of the physical works of flood control. It imposes upon the Department the duty of maintaining and operating

the specific project units enumerated, which include, as near as the segregation can be practically made, all of the works of the Sacramento and San Joaquin Drainage District constructed for flood control purposes as distinct from reclamation. It was the intention to limit the expenditure of state funds to the maintenance of "flood control works."

Section 7 of the Reclamation Board Act was amended by chapter 343, Statutes of 1925, to include the following paragraph:

The operation, control and jurisdiction of all weirs on the Sacramento River, so far as the State of California is concerned, shall be under the direction of the Division of Engineering and Irrigation, Department of Public Works.

This has special application to the Sacramento Weir, which is the only one now built



Sutter By-pass, 300-h.p. vertical motor driving a 42-inch pump.

on the project requiring operation, the others functioning automatically. The maintenance of the weir structures is cared for by the Federal Government through the California Debris Commission.

The sum of \$150,000 to defray the cost of flood control project maintenance, was provided by chapter 766, Statutes of 1927, "to be expended by and under the direction of the Department of Public Works in the operation and maintenance of such of the flood control works of the Sacramento and San Joaquin Drainage District as by law may be imposed on the State of California." This appropriation was expended from September, 1927, to July 1, 1929.

Provision of funds for maintenance and operation for the current biennium is made



Timber toedam to prevent undercutting of levee.

in the budget appropriation act of 1929. This act provides as follows:

For maintenance, operation and emergency protection of the Sacramento flood control project, including the purposes contained in section 2, chapter 774, Statutes of 1927—two hundred thousand dollars (\$200,000).

Funds for emergency protection and cooperative bank protection work on the Sacramento River system are obtained from the above maintenance appropriation. It is contemplated in the revised project plan, which is the report of the California Debris Commission, dated January 5, 1925, that the cost of maintenance shall be divided practically as is the cost of the project, that is, one-third each to the state, the United States and the local property owners. The state appropriation of \$100,000 per year matches an equal amount made available by the Federal Government to the California Debris Commission for maintenance, both including bank protection work. It is presumed that local interests will expend an equal amount, making a total of \$300,000 per year. Whether or

(Continued on page 25.)



Tree current retard or deflector.

The Why of Your License Plate; It's Easy Now to "Get Your Number"

By B. A. TRAVIS, Assistant Chief Clerk, Division of Motor Vehicles.

THERE'S a story behind the yellow and black automobile license plates which have begun to make their appearance in such large numbers on California highways since the Division of Motor Vehicles began its final license renewal drive.

These plates may not appeal to you as being either dainty or even pretty. The rather crude black letters stand out boldly against a background of deep yellow, giving a lasting impression, but rather lacking in artistic appeal.

They are not meant to be pretty. Their function is not to ornament the car displaying them, but to identify it. More than any other thing, have they served in the year just past to bring the "hit and run" driver to justice.

EXPERIMENTS MADE

Recognizing the inadequacy of the style of plate being used at the time he assumed office, Chief Frank G. Snook undertook a series of experiments to determine what style would provide the greatest degree of visibility.

Up to that time a small, rather aristocratic-looking plate had been used. When registrations increased beyond the million mark it became necessary to put seven numbers on one plate. The old plate was rather pretty, but it took a keen-eyed traffic officer to read it on a



The new and the old system of numbers, showing the greater visibility of the new system.

moving vehicle for a distance of more than fifty feet.

"Hit and run" accidents were frequent with the old plate. A few feet away and the driver was safe because no one could read his number.

GOVERNOR APPROVES PLATE

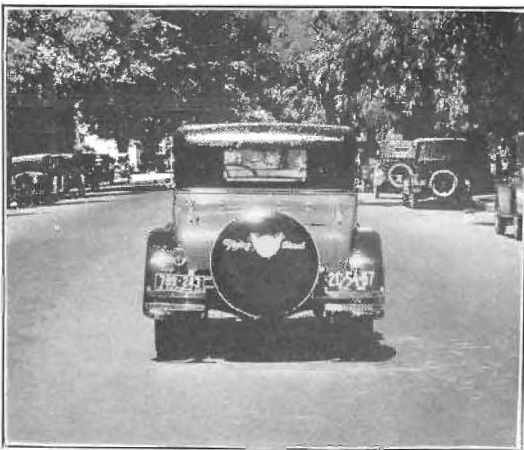
After casting about for several months Snook chose a plate modeled closely after the style adopted in New York. The choice met with the enthusiastic approval of Governor C. C. Young and the plate was adopted.

Colors of deep yellow and dull black were chosen as the combination with the greatest visibility. Yellow letters with a black background were used in 1929. These colors were reversed this year, providing a yellow background with black letters. Next year they will be reversed again to provide the same arrangement as in 1929.

The new plate is much larger than the old one, being 13 $\frac{3}{4}$ inches in length and 6 $\frac{1}{2}$ inches in width. It is of much heavier steel, and the old border that formerly detracted so much from visibility has been replaced by an inverted bead that will provide greater rigidity.

LETTERS CHANGED

The big change is in the lettering system. If you watch cars on the roads closely you will



Comparative visibility at 50 feet distance; old plate on left of auto, new plate on right.

observe no plate has more than six characters on it. Memory training lessons are not necessary for officers any more.

By using the combination of letters and numerals it is possible to provide for a registration of 2,070,000 without exceeding six characters on the plate.

Under the new system, the lowest number issued by the state has three characters. The first plate is number 1A1. They run from that to 9A9-999. The series then shifts to 1B1 and go up to 9B9-999 and so on through the alphabet to 9Z9-999.

The letters I, O and Q were left out because of their resemblance to the numbers one and naught.

NUMERALS ARE LARGE

These letters and numerals purposely are big enough to fairly shriek the identity of the driver. They are three and three-quarter inches in height.

There is a reason for putting the words "Cal" and "30" in inconspicuous positions. They were made small purposely so as not to detract from the visibility of the numbers.

Actual tests made on the roads show the new numbers can be read nearly three times as far away as the old ones.

Traffic officers reported a larger number of arrests of hit and run drivers last year than ever before. Fewer mistakes were reported in the reading of numbers. Drivers naturally reckless were made more cautious by the knowledge that they could be identified more easily.

Realizing this, lawbreakers have resorted to the practice of smearing their plates with grease and mud to make them illegible. Others conceal them partly behind spare tires or bumpers. Officers of the California Highway Patrol have been ordered to watch for such violations and to arrest any person caught driving with dirty or obscure plates.

KEEP PLATES CLEAN

In this connection, the division has issued a warning calling the attention of the motorists to a section of the law requiring that plates be exhibited on the car at a point not less than 24 inches from the ground.

Plates must also be fastened to the car in horizontal position. It is not legal to display them in a vertical position or at an angle, and they must be securely fastened.

It is now illegal to drive on any public highway with 1929 plates unless the driver can show he has made application for new plates.

After January 31st, drivers who have not applied for the new plates will have to pay

double. In the case of an ordinary passenger car this means a fee of \$6 instead of \$3. For commercial vehicles it means much more.

Motorists who have not done so should lose no time, therefore, in applying for new plates.

The renewal season now closing will exceed all previous records.

MUST PAY FEE

Another requirement for registration is that motorists must pay the \$1 transfer fee if they have made the final payment on the car during the year and have become the legal owner. Signing over of the pink certificate by the finance company or dealer actually means that ownership of the car has been transferred and this must be noted in the records of the division of motor vehicles.

Besides its main office in Sacramento, the division has six branch offices located, respectively, in Oakland, San Francisco, Fresno, Los Angeles, Long Beach and San Diego. This year's run of plates has been so apportioned to these branches that it will be almost possible to tell where a motorist is from by the letter and number of his license plate.

For example, a half million plates, running in numbers from 1A1 to 5F9-999 have been assigned to Sacramento for immediate delivery while numbers from 6F1 to 9F-999 have been assigned to the same office for open or later deliveries.

PLATES ASSIGNED

Numbers from 1G1 to 6H9-999 go to Oakland, while San Francisco will get numbers from 7H1 to 7K9-999. Fresno gets numbers from 8K1 to 9L9-999.

Los Angeles where the counter registrations are heaviest received everything from 1M1 to 9X9-999. Long Beach received numbers from 1Y1 to 9Y9-999.

The Z numbers, that is, everything from 1Z1 to 9Z9-999, of which there are 90,000 will be distributed to San Diego motorists.

California's example in adopting license plates that can be read is being followed in many other states.

Everywhere, state officials are reaching the conclusion that number plates have but one purpose—to identify the owner and driver of the vehicle.

A Chicagoan visiting Fond du Lac, Wis., had occasion to call Appleton. Upon asking what the charge was, he was told fifty cents.

"Fifty cents. For that distance? Great Scott! In Chicago you can call hell up for fifty cents."

"Possibly," coolly answered the operator, "It's in the city limits."

Problems in Road Building that California is now Investigating

By T. E. STANTON, Member A. S. C. E., Materials and Research Engineer.

THE comparatively recent advent of the motor vehicle occasioned the development of the new science known as "Modern" road building.

Road building, as such, is one of the oldest sciences. In the days of the horse drawn vehicle and slow transportation, however, the need and demand for good roads was relatively limited. The great increase in the wealth of the country and consequent astounding increase in volume and speed of vehicular traffic has occasioned a demand for good roads. The volume of expenditures and importance of the work justifies a thorough investigation and study of improved methods of construction to the end that greater ultimate value may be received for each dollar expended.

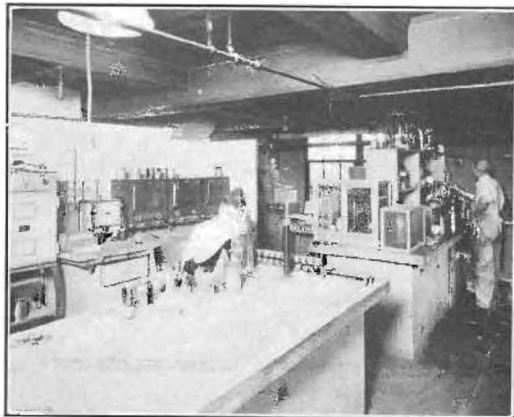
We are living in an era of Highway Research, and California, through its State Highway Department, has contributed its share towards the successful development of improved methods of construction and maintenance.

In carrying out this program over sixty special lines of investigation have been carried on during recent years. Many important investigations are now under way.

Some of the most important of these active investigations are the following:



Coarse aggregate department, showing abrasion, crushing and screening equipment.



One end of the asphalt testing department.

1. Study of Concrete Curing Methods.

The accepted method of curing concrete has been by keeping it moist with water usually for a period of ten days or more. Curing by water, however, frequently offers considerable difficulty and expense. Alternative methods of curing by means of an impervious membrane of asphalt, paper-sodium silicate, etc., have been offered and are being thoroughly investigated by this department. Pavements are cured by the different methods and cores cut and tested to determine, if possible, the relative strength secured. A number of sections have been constructed and are now under close observation. In order that the results may be comparable close control must be kept of the proportioning, mixing, and curing operations. Complete records must be kept of slump of the concrete and of the atmospheric conditions during and subsequent to construction.

2. Study of Metal Culvert Performance.

Four years ago a study was commenced of the condition of the corrugated metal culverts which have been installed on the State Highway System. The condition of some 5000 culverts was investigated at that time. This study has been continued and will be continued in the future to determine, if possible, the probable life of culverts made of

metals of different chemical composition. Methods of installation, maintenance, climatic conditions, etc., are being thoroughly studied.

This study has already brought about improved methods or culvert construction and maintenance which will materially increase the life of metal culverts, thus amply justifying the cost of the investigation.

3. *Admixture Tests.*

Extensive laboratory and field investigations are being conducted to ascertain the effect of various percentage admixtures of silica dust, pumicite, tale, and diatomaceous earths.

Advantages claimed for admixtures are improved workability and strength of concrete.

4. *Reinforcement in Concrete Pavements.*

Several test sections have been constructed and are now under observation.

5. *Impact Tests for Rock and Gravel.*

Studies are being made to devise an improved method of determining the quality of coarse aggregate for pavement construction.

6. *Studies of Hydration and Causes for Disintegration of Cement Concrete.*

This investigation is being conducted by our chemical department and is of particular importance in connection with concrete dam construction.

7. *Expansion Joint Materials.*

There is need of an efficient and durable expansion joint. Progress is being made in this direction.

8. *Development of a Quick Hardening Concrete.*

There is frequent need of opening concrete pavement to traffic at an early period after construction. Investigation is being made of the different special brands of cement on the market for this purpose and also relative to methods of using standard local brands for the same purpose.

9. *Study of Light Oil Mix Surfaces.*

Studies are being made relative to the best design of an oil mix as regards grading, oil content, etc.

The successful application of this relatively cheap method of construction has made possible the early improvement of many miles of desert roads at a low cost.

10. *Stability Tests of Asphaltic Concrete Mixtures.*

A great deal of thought at the present time is being given to the design of asphaltic concrete mixtures and the devising of methods of making accelerated laboratory tests which will determine the probable stability of such mixtures. Properly designed asphaltic mixtures should give many more years of service without excessive maintenance as compared with improperly designed mixes.

11. *Development of Accelerated Tests for Determining Quality and Durability of Traffic Line Lacquers.*

Work done to date has resulted in specifications for a high grade of traffic line lacquer with a resultant material saving in renewal costs.

12. *Development of Equipment for Measuring the Relative Coefficient of Friction in Bridge Expansion Plates Due to Differences in Finish and Character of Metal.*

Considerable progress is being made in this work. There is promise of development of procedure which will result in an ultimate saving both in original construction and subsequent maintenance and reconstruction costs.

13. *Non-Corrosive Coatings for Steel Bridge Members.*

An investigation is being made of the value of the various so called noncorrosive metal paints on the market. These tests are being made under adverse field conditions in a location close to the sea.

14. *Fillers for Asphaltic Concrete.*

Lime rock dust or Portland cement have, in the past, been specified as fillers in asphalt mixtures. Investigation is being made relative to the merits of other commercial fillers with a possibility of saving in construction costs.

15. *Miscellaneous Investigations and Studies of a Relatively Minor Nature Which Are Under Way May Be Mentioned as follows:*

(a) Comparative strengths of different brands of California cements.

(b) Field tests for determination of adverse soils.

(c) Strain gauge design and studies.

(d) Development of method for analysis of graphite paint pigments.

(Continued on page 27.)

Making the Prisons Safe at Night

By W. K. DANIELS, Deputy Chief of the Division of Architecture.

THE problem of the control of prisons is a twofold one, involving two very separate and distinct situations.

There is the problem of day discipline, when prisoners are assigned to various tasks, and when of necessity the measure of their liberty is greatly increased.



W. K. DANIELS.

Then there is the problem of night control, a problem much easier of solution than that of day control of prisoners, but which nevertheless presents difficulties of a character peculiar to itself.

It is in the problem of housing criminals that the Division of Architecture enters.

Prior to the housing of the criminal, there is, of course, the period of his capture and trial.

Radio equipped police stations may have had a part in the capture of the criminal, and cruisers and scout cars have patrolled the city in his search. The man hunt is well under way in a few minutes time. Capture of criminals is so certain that arrangements for their housing must be made months in advance of their crimes.

Housing of criminals demands their safe custody. The problem of their safe custody at night has been better solved than that of day control. It is noteworthy that the numerous prison riots and attempted "breaks" that have occurred in various parts of the country recently have taken place during the daytime. Why? Because when the prisoners are locked up for the night, they stay locked.

The Division of Architecture plays an important part by planning cell houses to make good this factor of night safety. At this particular time, the state through the Division of Architecture, is constructing a new unit at the Folsom State Prison. This

unit consists of a cell block, hospital and administration building.

During the daylight hours and in fair weather, all prisoners except those in solitary confinement, are released from the cell house and are detailed to work, some to constructions, others to the quarry, power house, gardens, grounds, etc. One finds prisoners incarcerated for various crimes ranging from petty larceny to murder scattered to all parts of the institution grounds. During this period of the day, escapes are prevented by the river and high walls, which are commanded by elevated towers containing armed guards.

When night comes the whole prison population is placed in cells and locked up. It



New cell block hospital and administration unit, Folsom State Prison.

is obvious that these cell buildings must be escape-proof for here you have a concentration of several hundred men, many of them desperate characters.

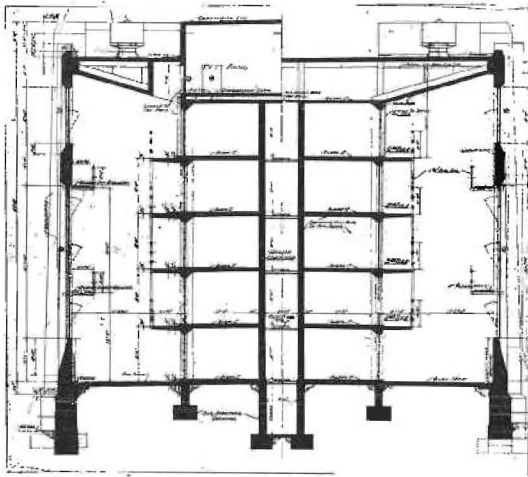
What might they not accomplish toward destruction and death under cover of darkness, if the cell buildings were not given thorough study as to planning and construction of absolute soundness and escape-proof?

A cell block is composed of a series of tiers erected inside of a fully enclosed building and constructed of heavily reinforced concrete. Should by any chance a convict free himself from his cell he would still be confined within a strong building.

The new cell block at the Folsom State Prison when completed will contain 310 cells being in tiers of five high and with a distance of 8 feet from tier to tier. The cells are constructed back to back having a utility chamber

separating them which contains the various plumbing pipes and ventilation ducts. The cells are 4 feet 6 inches wide and 11 feet long. Each contains a bed, lavatory and toilet fixture and each cell has mechanical ventilation. The cell fronts are built of heavy steel grilles having a grille door. Entrance to the cell is from balconies along the cell fronts, which serve the stairways at each end of the tiers. The cell doors, besides having a separate lock on each door, are securely locked by a heavy continuous steel bar dropped down in front of the door at the top which is free from any attempted tampering from the cell. This bar is controlled with a lever arm at one end of the tiers and secures all doors simultaneously.

The windows in the building covering the cell tiers are constructed of steel sash and



Section through new cell block, Folsom State Prison.

frames giving an abundance of natural light. By reason of the fact that certain sections of the windows open with awning type operators, plenty of air can be admitted when desired. It is needless to say that heavy steel bar grilles, embedded in the concrete walls on the outside, protect these window openings from any possible escape.

On the interior of the walls of this building completely surrounding the cell tiers are two guard galleries, constantly patrolled at night, which makes possible observation and control of the cells at all time. The guard galleries can not be reached from the cell balconies.

Convicts as other persons require medical attention, so a hospital building is very important and is a part of the unit comprising the new cell block. The Division of Architecture has planned a new modern

prison hospital which is being constructed. The plans for this hospital unit have been drawn to permit the best arrangement for dental, medical and surgical care, bearing in mind also the safety of the attendants handling the convicts while confined to the hospital.

This building is also constructed of heavily reinforced concrete being a three-story structure. The first floor contains a pharmacy, a laboratory with a vault for the storing of narcotics, etc., record room, doctor's office, clinic containing operating table, dentist chair, sterilizers, dark room, etc. On the second floor is a medical ward, kitchen, diet kitchen and serving pantry, dining room and quarters for nurses and attendants. On the third floor are two operating rooms having in conjunction with them an instrument room and sterilizing room, an acute surgical ward, a fracture room, doctor's washup and dressing rooms and rooms for fluoroscopy and radiography.

The present Administration Building was constructed prior to the year 1900. Not only has it become obsolete, but it is not located in the proper position that an Administration Building should be. This is due to the growth of the prison beyond the original plan.

The 1929 legislature approved an appropriation which authorized the construction of a new Administration Building. This construction is now being accomplished, as a unit of the new cell block and hospital building, comprising an extension of the same.

The new location is closer to the main entrance gate of the prison proper. The extension portion will be a two-story structure of the same type of construction as the other parts of the unit. The administration quarters will be on the first floor and will include an entry and reception room, warden's office, office for the secretary to the warden, board room, office for clerk of the board, room for narrative writers, files, barber shop, visiting room and prisoners' tank separated with a steel grille and screen to prevent a personal contact between visitors and prisoners, a mail department, telephone exchange, room for auditor, and a room for auditor's clerks having a file room and vault.

The second floor portion will be an extension of the hospital and will contain a medical ward, pulmonary ward, dining room and eight cells. A portion of this structure will contain a basement where the morgue will be located as well as an execution chamber.

The hospital and administration units are served with an elevator, stairways and corri-

(Continued on page 16.)

New Location on The Ridge Route Unsurpassed for Mountain Alignment

A DECISION to relocate a section of the Ridge Route on the state highway between Los Angeles and Bakersfield, which has reached its maximum economic travel capacity, and which has proved excessively hazardous to travel, was announced by the California Highway Commission at its December meeting. Bids will be asked within the next few weeks on the first section of the relocated highway.

The decision to relocate the highway was reached after exhaustive studies by the Department of Public Works, showing that the

ment is evidenced by the fact that it will have a total of 7500 degrees of curvature against a total of 35,140 degrees on the present route.

While the capacity of the present road is overstressed by 1500 vehicles daily, due to its numerous grades, its almost continuous and sharp curvature, the large volume of slow moving heavy hauling traffic that uses it, the new road will have a safe and comfortable capacity of 12,000 or more a day, and its alignment standard will be such that when traffic justifies increased width it can be done without distorting that standard.

COMPARISON OF PRESENT HIGHWAY AND PROPOSED ALTERNATIVE

	Proposed route	Present highway	Difference favoring new route
Length	28.5 miles	35.8 miles	7.3 miles
Highest elevation.....	3550 feet	4234 feet	684 feet
Total rise.....	3350 feet	4630 feet	1280 feet
Adverse grade.....	940 feet	2220 feet	1280 feet
Minimum radius curve.....	1000 feet	70 feet	
Maximum grade.....	6% compensated	*6% uncompensated	
Minimum width roadway.....	36 feet	25 feet	
Total central angles in curvature.....	7500 degrees	**35,141 degrees	

* 6% grade has been greatly exceeded in short stretches where realignment has cut distances on curves.

** This is original alignment data. Reconstruction has probably reduced angles about 25%.

traffic load on the present location was costly of maintenance and operation; that the accident record on it was excessively high; that it fails to meet the traffic requirements of the present; and that these conditions could not be remedied by further expenditures on the same location.

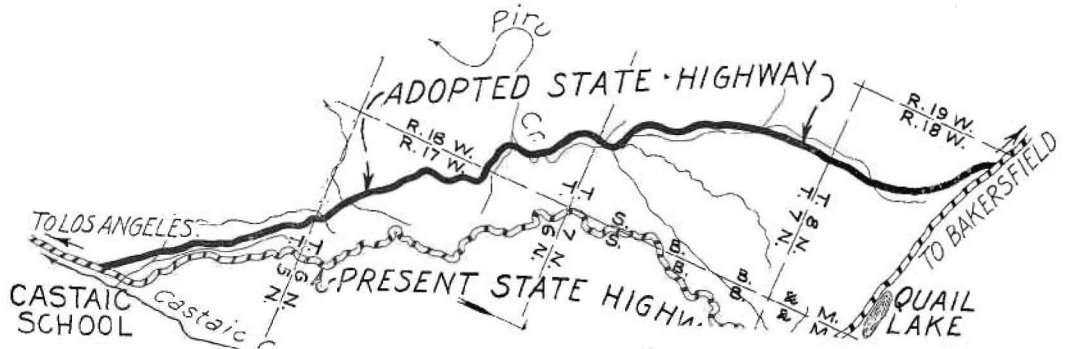
ALIGNMENT UNSURPASSED

The new highway will be built to modern standards of construction with low maintenance cost and capable of meeting present and future traffic requirements. Engineers of the Department of Public Works state that its alignment for mountain construction will be unsurpassed by any in the United States. This remarkable character of the new align-

ment is evidenced by the fact that it will have a total of 7500 degrees of curvature against a total of 35,140 degrees on the present route. Engineers of the Department of Public Works report that the new route by reason of its lesser distance, better grades and alignment and the greater ease and facility that it affords travel, will pay the total cost of construction in three years time.

PROVIDES SAFE ROADWAY

An important factor in determining upon relocation at the present time was the excessively high percentage of accidents on the Ridge Route, due to alignment and an overstressed travel condition. In addition to remedying these faults, the new location will be free from much of the fog, sleet and snow with which present routing contends. It lies in average lower and more protected position.



Upper heavy line shows new route adopted for state highway on Ridge Route; lower barred line shows present location.

Under agreement with the board of supervisors of Los Angeles County, the present route will be taken into the Los Angeles County road system, and with the opening of the alternate route, the state will be relieved of further maintenance costs upon it.

The change has been approved by Attorney General Webb.

LOCATION OF NEW SECTION

The termini of the relocated road will be at Castaic on the present highway to a reconnection with the state highway at Gorman, near Tejon Pass, a distance of 26 miles, and will effect a saving of 7.3 miles over the present route.

Exhaustive engineering study demonstrated that the most practicable location for this important artery connecting northern and central California and the region south of the Tehachapi Range is controlled by the Tejon Pass. The new location south of this pass differs from the present location by following drainage courses for a more direct southerly descent instead of traversing the ridges from which sudden descents must be developed on inferior grade and curvature. Thereby distance, curvature, adverse grades and steep grades are all reduced.

The grades on the alternate route are far more uniform and will have 1280 feet less elevation in rise and fall than the existing highway. The grade rates will be satisfactory for high gear operation.

The minimum radius of curvature will be 1000 feet, a sweeping alignment satisfactory for legal speed limits. This curvature gives long distance with consequent safety and relief from the strain of guarding against surprises on the sharp curves that characterize the present road, on which a number of curves are built with a radius as sharp as 70 feet.

Traffic census shows a 40 per cent increase in travel over this section in the past three

years, greatly overstressing the maximum economic capacity of the road. It is estimated that present travel will increase 175 per cent in the next ten years.

The Ridge Route was constructed in 1914 as one of the first projects undertaken by the California Highway Commission. The total motor vehicle registration of the state in that year was 125,516 as compared with a present registration of 2,015,418. The road follows the combs of the mountain ridges, adhering to contour alignment for economy in grading, in keeping as near as possible to the top of the ridges, several false summits are encountered on the route. Attempts to improve alignment have been made in the past at heavy cost, but the improvements have failed to do more than temporarily remedy defects, inherent in the original location. On the present routing, it has been found impossible to eliminate the general character of the continuous swing of reverse curves. The road is a marked example of the impossibility of adequately modernizing a location in a heavy mountain district with maximum grade on tortuous alignment. The condition of the road makes it unnecessarily detrimental to the proper flow of travel between northern California and the San Joaquin Valley on the one hand and Los Angeles and southern California on the other.

The new route lies west of the present Ridge Route. It starts near Castaic Post Office. After crossing a flat country for several miles, it begins its ascent on the west side of the canyon to pass over a saddle into Violin Canyon. The route crosses Violin Canyon to Violin Summit; thence it crosses Canton Creek and Oso Creek, and ascends Piru River and Liebre Creek to the divide between Liebre and Alamos Creeks. Thence it follows valley up Alamos Creek to a point 3 miles north of Bailly Patrol Station on the present road. It effectually eliminates the portion of the Ridge Route containing the worst features of that road.

U. S. Supreme Court Okehs California Tax Laws on Gasoline-Motor Vehicles

THE UNITED States Supreme Court on November 25, 1929, handed down a decision upholding the legality of California's gasoline tax laws.

The decision, which was rendered by Justice McReynolds, was as follows:

By acts approved July 11, 1916, chapter 241, 39 Stat. 355, and November 9, 1921, chapter 119, 42 Stat. 212 (23 USCA § 1 et seq.), Congress provided for aid to the states in roadmaking and directed that "all highways constructed or reconstructed under the provisions of this act shall be free from tolls of all kinds." 23 USCA § 9. California assented to the provisions of these acts and under them received large sums of money from the United States.

By the motor vehicle fuel tax statutes, chapter 267, Acts 1923, chapter 359, Acts 1925, and chapters 716, 795, Acts 1927, the California Legislature defined motor vehicle fuel, and directed that all distributors of it should be licensed and pay taxes to the controller of the state, amounting to three cents per gallon sold, less an allowance of 1 per centum. These statutes further provide for reimbursing purchasers of fuel not used for operating vehicles upon public highways.

Appellants, along with thousands of other citizens and taxpayers of California, operate motor vehicles along the highways. They have procured and must hereafter procure the necessary fuel from licensed distributors at prices enhanced by the amount of the three-cent tax.

The original bill, filed in the District Court of the United States, August 4, 1928, names as the only defendant the State Controller—the officer charged with the duty of enforcing the motor vehicle fuel tax statutes. It proceeds upon the theory that those statutes, under the form of taxing dealers from whom appellants and all other operators of motor vehicles must buy, in effect exact tolls for the use of the highways, also grant certain favors to the distributors, and deprive all such purchasers of their property without due process of law. Therefore, it is said, they conflict with the Fourteenth Amendment, the Federal Highway Acts, and the Constitution of California. The prayer is for a decree declaring their invalidity and for an injunction restraining defendant from attempting to enforce them, etc.

In the court below—three judges sitting—the bill was dismissed, without written opinion.

(1) Appellants may not undertake to test the validity of the questioned acts by a proceeding of this character. *Frothingham vs. Mellon*, Sec'y of the Treasury, 262 U. S. 447, 487, 488, 43 S. Ct. 597, 601, 67 L. Ed. 1078, announces the applicable doctrine:

"The administration of any statute, likely to produce additional taxation to be imposed upon a vast number of taxpayers, the extent of whose several liability is indefinite and constantly changing, is essentially a matter of public and not of individual concern."

The Federal courts have no power *per se* to review and annul acts of state legislatures upon the ground that they conflict with the Federal or state constitution. "That question may be considered only when the justification for some direct injury suffered or threatened, presenting a justifiable issue, is made to rest upon such an act."

The decree below is affirmed.

The Chief Justice, Mr. Justice Van Devanter and Mr. Justice Butler are of opinion that the appellants' status is such as entitles them to test the validity of the California statutes in question; that these statutes do not exact tolls for the use of highways within the meaning of the limitation contained in the Federal Highway Acts, and are not subject to the other objections urged against them; and that for these reasons the decree below should be affirmed.

TRANSPORTATION TAX UPHELD

On the same day the Supreme Court of the United States also upheld the legality of the tax imposed by California on carriers by motor vehicles over regular routes. In this decision the Supreme Court held that "A state statute imposing upon common carriers engaged in transporting freight by motor vehicles along public highways between fixed termini and over regular routes a tax of 5 per cent of their gross receipts, in lieu of all other taxes, is not unconstitutional as class legislation, though other freight carriers, common and private, by motor vehicles, are subjected to different and less burdensome taxation."

TEXT OF DECISION

The decision in full follows:

Appellants, as common carriers, are engaged in transporting freight by motor vehicles for hire along public highways between fixed termini and over regular routes within California. The 1926 amendment to the constitution and the statutes of that state lay upon such carriers a tax of 5 per cent of their gross receipts in lieu of all other taxes, while other freight carriers, common and private, by motor vehicles, are subjected to different and, it is alleged, less burdensome taxation. Cal. Const. art 13, § 15; March 5, 1927, chap. 19, 1927 Cal. Stat.

By this proceeding, instituted July 21, 1928, appellants ask that the constitutional amendment and the statute which undertake to lay such tax upon them be declared discriminatory and in conflict with section 1 of the fourteenth amendment; also, that an injunction issue against the State Comptroller, forbidding him from attempting to enforce payment.

Upon motion, without written opinion, the district court—three judges sitting—dismissed the bill. The

(Continued on page 13.)

Epochal Grade Crossing Decision Rendered by State Railroad Board

THE most important grade crossing decision in the history of California was handed down on December 7, 1929, by unanimous decree of the State Railroad Commission. The decision involved a grade crossing on the Bayshore Highway over a spur track of the Southern Pacific near San Mateo.

The California Highway Commission and the Department of Public Works opposed any grade crossing on this highway. The Southern Pacific held that the fact that the track was simply a spur track removed objection to its presence.

The issue was submitted to the Railroad Commission by agreement between the parties.

The decision of the Railroad Commission completely upheld the contention of the state that the Bayshore Highway should be kept free of all railroad grade crossings.

The mooted question of the priority of highway and railroad rights at the particular crossing was settled by the Railroad Commission distributing the cost of the overhead railroad structure, ordered by it between the state and the Southern Pacific on a fifty-fifty basis.

TEXT OF DECISION

The decision of the California Railroad Commission in full follows:

The Department of Public Works of the State of California, through its director, raised the question as to whether or not this Commission could afford the department any relief in connection with a controversy which had arisen between it and Southern Pacific Company, in connection with the construction of a new state highway (Bay Shore) over a disconnected spur track built by Southern Pacific Company near the southerly limits of the city of San Mateo. Thereupon the Commission, on its own motion, instituted an investigation into the installation, maintenance, protection and operation of said crossing. Hearings were held at San Francisco on October 18th and 20th, at which time both parties agreed to submit to the Commission, for determination, the question as to how the projected crossing between the railroad and highway should be effected and apportion the cost of the same.

The Bay Shore Highway is being constructed for the purpose of providing, in advance of development, a thoroughfare which can be maintained as a permanent high-speed artery to ultimately connect the city of San Francisco with San Jose by a route along the westerly shore of San Francisco Bay, which is, in general, at some distance from the built-up section of the peninsula. With the intense development of this

territory the need of this artery will be far greater than at present and it has been located so as to avoid the delays incident to travel over El Camino Real, the present state highway. If this purpose is to be accomplished, there must be a minimum of obstructions by the cities en route and by other agencies.

The highway has been constructed and is now open to travel between San Francisco and Fifth avenue, in the city of San Mateo. Beyond Fifth avenue, the proposed route follows a dedicated public street for a short distance and then continues across private property, known as the Emma Rose Estate. The state, at the present time, owns no right of way across the Emma Rose property but, on April 16th of this year, filed a condemnation suit against Emma Rose and Southern Pacific Company. It has declared its intention to construct the highway southerly from Fifth avenue to Palo Alto during the next year.

Southern Pacific Company has, for some time, carried on negotiations with the Emma Rose Estate for the construction of a spur track into the property to be developed for industrial purposes. On March 18, 1929, a fifty-foot right of way for a spur track, connecting with the main line of Southern Pacific Company near its Leslie Station, was deeded to Southern Pacific Company and immediately Southern Pacific Company laid approximately 1400 feet of skeleton track on this right of way, a portion of this construction being across the proposed routes of both the Bay Shore Highway and the Western Pacific California Railroad Company, a subsidiary of The Western Pacific Railroad Company. This skeleton track does not connect with any track of Southern Pacific Company and, at its nearest point, is 2200 feet distant from the nearest operative track. The ties on which the rails are spiked are widely spaced; no ballast has been applied and the entire construction is such as to be incapable of being subject to railroad operation even if it were physically connected to operative trackage.

The Commission can not recognize a mere intention of the state or other political body, to acquire a right of way and construct a public thoroughfare, as constituting a public road such as referred to in section 43 of the Public Utilities Act, nor, on the other hand, can it consider a few connected rails and ties, which are incapable of being operated over as a railroad, as being the track of a railroad referred to in that section. In the present case, however, a full and complete record as to the necessity, hazards, terms of installation and manner of crossing, has been developed and, since both parties have submitted the matter to this Commission for decision, it appears appropriate that the Commission finally determine the crossing matter at this time, particularly since it is apparent that both the highway and spur track will be constructed in the near future.

While the evidence in this case shows that for some time to come the switching operations over the railroad would not seriously interfere with the full use of the new highway, yet, if the purpose of the state

in the construction of this highway is to be realized, the greatest caution should be used in permitting the establishment of any obstacle to the flow of traffic.

From the record in this proceeding, it is apparent that a grade separation is physically feasible and can be constructed at a cost ranging between \$75,000 and \$115,000, depending on the type of structure used. The most feasible manner appears to be to carry the railroad track over the highway and depressing slightly the grade of the highway.

It is my opinion that this crossing should be constructed at separated grades in the above manner but the details as to the type of structure and the fixing of the grades should be worked out between the parties or, if the parties fail to agree, the Commission can then decide as to these details. In fixing the grade lines, attention should be given to the crossing of the spur with the proposed track of the Western Pacific California Railroad Company.

If the area proposed to be developed as an industrial area does reach the full development of which it is capable, the cost of a separation of grades will be very nominal when compared to the revenue derived from freight or the increased value it will give the land to be served. On the other hand, the moving factor in this grade separation is the greater convenience and safety for the automobile using public.

After carefully considering the record in this proceeding, it seems to me that the cost of constructing said separation should be equally divided between the Department of Public Works of the State of California and Southern Pacific Company.

The following form of order is accordingly recommended:

ORDER

The Commission having instituted an investigation on its own motion in the above entitled matter, hearings having been held and both the Department of Public Works of the State of California and Southern Pacific Company having submitted the matter to the Commission for determination as to the manner of constructing the crossing and apportionment of the cost:

It is hereby ordered, that if and when the Department of Public Works of the State of California and Southern Pacific Company, or either of them, desire to construct the crossing of a state highway and a spur track, in the vicinity of engineer's station 725 as shown on sheet 6 of Exhibit No. 1, entitled "Plan and Profile of Proposed State Highway in San Mateo County," filed in this proceeding, said crossing shall be constructed subject to the following conditions and not otherwise:

(1) Said crossing shall be constructed at separated grades and said separation of grades shall be effected by constructing the railroad track above the state highway.

(2) Said crossing shall be constructed with clearances conforming to the provisions of General Order No. 26 C.

(3) Before undertaking the construction of said crossing, a complete set of plans of the grade separation construction, together with profiles of the highway and the railroad, shall be submitted to the Commission, to be subject to its approval.

(4) The cost of effecting said separation of grades, including the approaches on the railroad and any excavation which may be necessary in connection with the change in grade of the highway, shall be borne 50 per cent by Southern Pacific Company and 50 per cent by the Department of Public Works of the State of California.

(5) Within sixty days from the date of this order,

U. S. SUPREME COURT OKEHS CALIFORNIA TAX LAWS ON GASOLINE-MOTOR VEHICLES

(Continued from page 11.)

cause is here by direct appeal; and the only matter for our determination is the validity of the challenged classification.

The power of a state in respect of classification has often been declared by opinions here. We are unable to say that there was no reasonable basis for the one under consideration; the court below reached the proper result; and its decree must be affirmed.

Appellants voluntarily assumed the position of common carriers operating between fixed termini and enjoy all consequent benefits. That a marked distinction exists between common and private carriers by auto vehicles appears from *Frost & F. Trucking Co. vs. Railroad Commission*, 271 U. S. 583, 70 L. Ed. 1101, 47 A. L. R. 457, 48 Sup. Ct. Rep. 605, and *Michigan Pub. Utilities Commission vs. Duke*, 266 U. S. 570, 69 L. Ed. 445, 36 A. L. R. 1105, 45 Sup. Ct. Rep. 191. Sufficient reasons for placing common carriers, operating as appellants do, in a special class, are pointed out by *Raymond vs. Holm*, 165 Minn. 215, 206 N. W. 166 (Dec. 4, 1925); *State vs. Le Febvre*, 174 Minn. 248, 219 N. W. 167 (April 13, 1928); *Iowa Motor Vehicle Assn. vs. Railroad Comrs.—Iowa*,—, 221 N. W. 364 (Sept. 28, 1928); *Liberty Highway Co. vs. Michigan Pub. Utilities Commission* (D. C.) 294 Fed. 703. Their use of the highways probably will be regular and frequent and, therefore, unusually destructive thereto. Also it will expose the public to dangers exceeding those consequent upon the occasional movements of other carriers.

Although relied upon by counsel, and said to be almost identical with the case at bar, *Quaker City Cab Co. vs. Pennsylvania*, 277 U. S. 389, 72 L. Ed. 927, 48 Sup. Ct. Rep. 553, gives no support to claim of undue discrimination. We regard the controversy as not open to serious doubt, and further discussion of it seems unnecessary.

said Southern Pacific Company shall notify this Commission as to whether or not it intends to construct said crossing.

(6) If said separation is effected, Southern Pacific Company shall, within thirty days after the construction thereof notify this Commission, in writing, of the completion of this work.

(7) If said crossing shall not have been installed within two years from the date of this order the authorization herein granted shall then lapse and become void unless further time is granted by subsequent order.

(8) The Commission reserves the right to make such further orders relative to the location, construction, operation, maintenance and protection of said crossing, as to it may seem right and proper and to revoke its permission if, in its judgement, the public convenience and necessity demand such action.

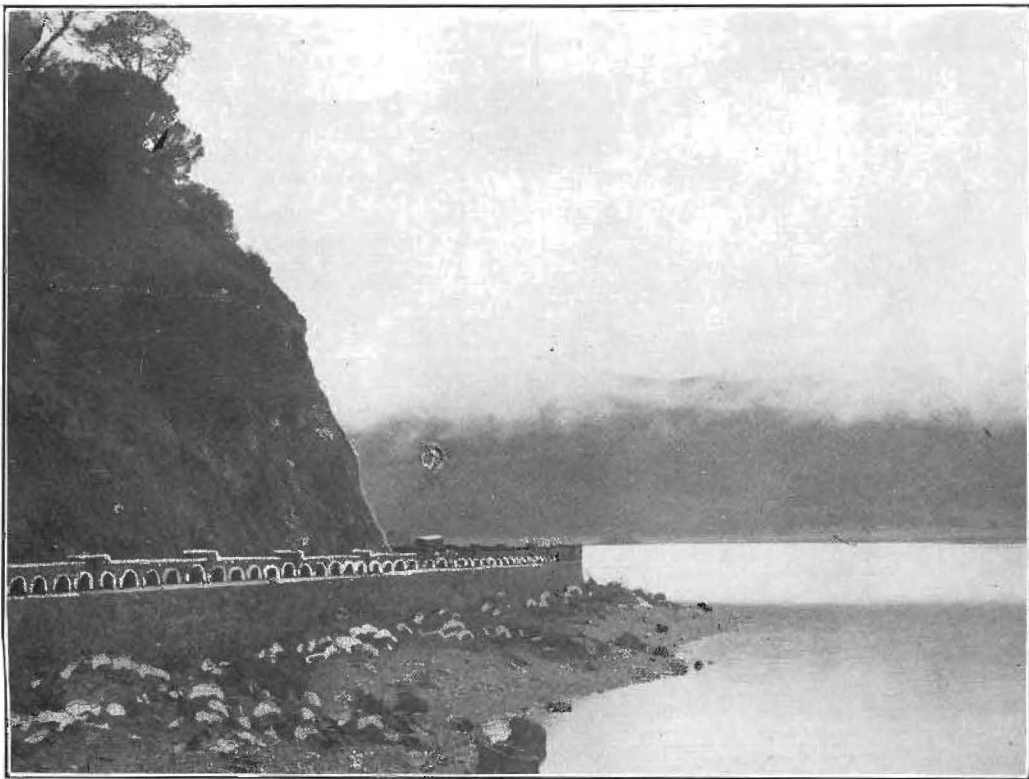
The effective date of this order shall be twenty days from and after the date hereof.

The foregoing opinion and order are hereby approved and ordered filed as the opinion and order of the Railroad Commission of the State of California.

Dated at San Francisco, California, this seventh day of December, 1929.

THOS. S. LOUTTIT,
C. L. SEAVEY,
EZRA W. DECOTO,
LEON O. WHITSELL,
W. J. CARR,
Commissioners.

New Highway Along Clear Lake



View on new highway bordering Clear Lake.

THE new section of state highway between Clear Lake Oaks and Lucerne was thrown open to travel on December 14, 1929. An elaborate program had been prepared to celebrate the opening of the road, but heavy storms forced its curtailment. Despite the rain, however, the occasion was duly feted at a banquet held at Lucerne. Robert Austin of the Redwood Empire Association presided as toastmaster, and felicitatory messages were received from many distinguished citizens, including a message of congratulations from Governor C. C. Young.

While the contract had not been entirely completed when thrown open to travel, grading and surfacing was practically completed. The section is a part of the Tahoe-Ukiah Highway.

The length of the section is 10.6 miles, and its cost is approximately \$285,000. The contractors are von der Hellen, Pierson and Logan of Medford, Oregon.

It has required one year to complete this construction, the contractor having started his work December 11, 1928. The highway as completed is graded 24 feet wide and surfaced with untreated crushed gravel 20 feet wide by 6 inches thick, which will be oil-treated during the coming summer. The material for surfacing was obtained locally.

Approximately 225,000 cubic yards of roadway excavation was required in this construction.

W. G. Tinney was resident engineer in charge of the work for the state.

This portion is the first unit of the Tahoe-Ukiah road completed between Ukiah and Williams.

The completion of this unit, together with other projects under way, will make the country in the vicinity of Clear Lake easily reached by highway transportation, the value of which is reflected in the desirability for existing and proposed residences and resorts along the lake.

The State Highway Patrolman

By B. B. MEEK, Director, State Department of Public Works.*

THE purpose of highways is to serve travel.

This being so, the safety, the convenience and the comfort of traffic must ever be uppermost in the minds of highway builders. The highway must be planned to make its use safe. It must be designed to make travel economical. And with these factors of safety and economy, there must always be included the additional factors of comfort and enjoyment in highway use.

But with all the care, the thought and the money road engineers and road builders can put into the highway, their entire effort will fail, if travel using the road is careless and reckless in such use.

The careless motorist can make the safest highway dangerous. In a moment's time a reckless motorist can undo all the months of effort and time and can bring to naught the millions of dollars that have been expended in the attempt to make our highways safe.

Proper regulation and control of traffic are accordingly as essential to a GOOD highway system as are proper plans for its building and the use of proper materials in its construction.

Engineers and builders are the men behind the line in the battle for good roads. Maintenance forces and traffic officers are the men on the firing line. The maintenance engineers must see that roads once built are maintained in adequate condition for travel. Traffic officers must see that travel uses these roads properly.

This latter task is by no means a small one. I had occasion recently to summarize the job somewhat as follows:

California law permits a driver of an automobile to travel, under favorable conditions, at a rate of 58½ feet a second. The automobile manufacturers and distributors have seen to it that a large portion

of the machines on the highway are capable of traveling easily at the rate of 75 or even 90 feet a second. The hand and eye and mind of man can be coordinated by education to a marvelous degree but a 3000-pound automobile, traveling at a lawful speed of nearly 60 feet a second, or 40 miles an hour, is a force to be reckoned with at any time.

Multiply this by the hundreds of thousands of cars traveling our highways, each operating on its own schedule, coming and going, backing into and crossing traffic, as desire or necessity may dictate, and you have something of the picture of the problem that confronts the men who build and maintain highways, and those who seek to control their operation.

The problem of controlling traffic, however, is by no means, unsolvable. An assisting force in the fight for better highways is the fact that an overwhelming majority of motorists desire to be careful and to do the right

and fair thing by fellow motorists. The problem these drivers present is to bring to them a realization of the great, everpresent and immediate danger that lurks behind the least act in careless driving. The traffic officer becomes here a professor in the College of Safe Driving, the students of which extend over the world and are literally numbered by

THE TRAFFIC OFFICER A "COP" NO LONGER

The successful traffic officer accordingly must possess a rare combination of qualities.

He must be patient, even where impatience would seemingly be justified; he must be courteous, even to those who may not be courteous to him. He must be kindly without sacrifice of firmness. He must be both a teacher and an officer, his attitude instructive toward those who desire to be instructed, and his control courteous but immediate and certain, toward those who refuse instruction.

the millions.

Unfortunately there is a very small minority of motorists who either are congenitally reckless or who for some reason known only to themselves refuse to be careful. This class of drivers must be controlled with both firmness and sternness. Every moment that they are on the road, they constitute a menace to the life of other travelers. In this class belongs the drunken driver. Toward these drivers the attitude of the traffic officer must be that of a policeman, exercising his duties without fear and without favor.

The successful traffic officer accordingly must possess a rare combination of qualities.

He must be patient, even where impatience would seemingly be justified; he must be courteous, even to those who may not be

* Reprinted from the 1929 convention yearbook of the State Highway Patrolmen.

courteous to him. He must be kindly without sacrifice of firmness. He must be both a teacher and an officer, his attitude instructive toward those who desire to be instructed, and his control, courteous but immediate and certain, toward those who refuse instruction.

It may be an idle dream, but I have been hoping, since I knew the Division of Motor Vehicles was to become a part of the Department of Public Works, that we may be able to change both the attitude of some, not all, traffic officers toward the motoring public, and the attitude of the motoring public toward traffic officers.

It seems to me that the chief function of the traffic officer should be to expedite the movement of traffic with safety; that arrests should be made only as a last resort to accomplish this; that the "gas station" traffic officer and the one who lurks behind a tree to pounce out upon the unwary motorist will have to go; that the traffic officer should be a friend of the motorist aiding him in distress and assisting in making his travel safe and pleasant.

To accomplish this would mean that a traffic officer would patrol the highways, always in sight, and distinguishable to the traveling public by the color of his car and uniform. Color of car and uniform, however, will not of themselves accomplish the transformation. The attitude of some of our officers, although I am happy to say, not all of them, toward the motorist would have to change.

I have also hoped that we may be able to change the attitude of the motorist toward the traffic officer.

My observation has been that some men, who are normally courteous and considerate, lose every sense of obligation toward their fellow men when they get behind the steering wheel of an automobile. Happily again this does not apply to all drivers, but rather to a small minority. Their attitude seems to be that they are not only the sworn enemies of the traffic officer but also that they owe no obligation to show consideration for the other fellow's rights and the other fellow's welfare. I have sometimes thought that we should amend the slogan "safety first" to read **Safety FIRST For the Other Fellow**. It seems to me that a great many things come before safety first for ourselves. Honor should come first, and consideration for the safety and the wellbeing of the other fellow. Then safety for all would follow. A motorist should not feel angry when stopped by a traffic officer. He should feel ashamed. Let me suggest that if motorists would force themselves, just for

one day, to be courteous and considerate to fellow motorists, they would get so many thrills in that one day that they would never return to the old practices and the old ways.

If the motorist and traffic officer would both play on the same side, the old game which has existed so long between the two would no longer have any zest.

I have the utmost confidence that the California Highway Patrol will come to be known the world over for the possession of those qualities and the exercise of those duties I have attempted to outline in the foregoing paragraphs. I believe that there will be added to the reputation that California highways now enjoys for comfort and beauty, the further encomium that they are the safest in the world, and credit for this will belong to the California Highway Patrol.

MAKING THE PRISONS SAFE AT NIGHT

(Continued from page 8.)

dors of ample width for safe and quick access, and all floors have the necessary baths, toilets, storage spaces and accessories.

The exterior of the structure is designed in a modernistic style of concrete construction and has a military appearance.

The completion of this unit comprising the cell block, hospital and administration quarters will represent an expenditure of \$313,000 including furnishings and equipment.

The State of California in addition has also prepared to care for the expansion in our prison population by appropriations from the legislature of 1929 for a prison for first offenders and a new women's prison. These institutions will be entirely new ones and when proper sites have been selected and approved the Division of Architecture will be called upon to study and plan buildings and auxiliaries to cope with the exceptional housing problems.

With the exception of a superintendent of construction and a foreman to lead in the various trades involved, all labor on these new buildings is performed by the prisoners. We are sometimes asked if we do not have difficulty in handling the convicts during construction. The answer is "not very often," for insolence and disobedience will not be tolerated and such cases are referred at once to the proper prison authorities. If the offense is repeated the prisoner goes into the "hole," which means solitary confinement.

No Loafing For
Gasoline Cash

Detour Praised by
Tracy Motorist

Convict Camps Keep
Meal Costs Down

Clippings, Letters and Comment

Dealing With State Highways

Redwood Empire
Praises Highways

Federal Aid Roads
Further Improved

Mountain Roads in
North Kept Open
Despite Storms

No Loafing For Gasoline Cash.

The speed with which the administration program is progressing to give employment to labor and to give roads to communities is revealed by the balances in state highway funds.

On November 30th cash balances in these funds were at their lowest point since April, 1927, which was before the one-cent gasoline tax became effective through the signature of Governor Young. The balances in the various highway funds on that date totaled \$3,656,917.52.

On the same date there were construction and improvement work orders outstanding amounting to \$10,668,427.15, practically all of which were contracts, and which exceeds the cash available by \$7,011,509.63. Total work order obligations including maintenance and preliminary surveys and plans, right of way and construction engineering totaled \$16,716,166.30, or \$13,059,248.78 in excess of cash available.

Therefore, even after the apportionment of gas tax revenue early in December amounting to \$11,710,898, there were work orders outstanding in excess of cash by \$1,348,350.78.

This policy of putting every dollar at work on the roads as fast as its receipt is assured will be continued.

* * * * *

Detour Maintenance Wins Praise.

The following letter speaks for itself:

Tracy, California,
December 11, 1929.

California Highway Commission,
Sacramento, California.
Dear Sirs:

Re: The highway between Tracy and Mossdale.

I think that the Highway Commission and also the contractor, Clyde W. Wood should be commended for

the speed with which this project has been completed and for the fine job that has been done.

The detour which was in use during construction was kept in the best condition of any detour over which I have ever traveled.

I am just sending this little word of praise because I know that probably words of criticism are more often received, and that you might enjoy some show of appreciation.

Very truly yours,

J. F. DOUGHTY, M.D.

* * * * *

Sounds Incredible But It's True.

Attached is a menu of one of the highway convict camps which has consistently kept its costs from 25 to 27 cents per meal:

BREAKFAST

Eggs, Fried
Hot Cakes and Syrup
Mush, Hominy, Gritz
Apple Sauce
Bread and Butter
Coffee and Milk and Sugar

LUNCH (In Camp)

Roast Rib Beef and Brown Gravy
Baked Potatoes—Beans
Asparagus
Lettuce Salad
Bread and Butter—Pie (Pineapple)
Coffee, Milk and Sugar

LUNCH (Sandwiches for Grade)

Bread and Butter With Pork Sausage, Frankfurters
and pickle filling
Cake and Fruit (Oranges)
Coffee, Milk and Sugar—Taken out while hot by truck

DINNER

Beef Stew and Rice
Lettuce Salad
String Beans
Potatoes (Boiled)
Coffee, Tea, Milk and Sugar
Bread and Butter
Doughnuts

Another Sign of Progress.

We quote in part from a letter received on December 3d by the California Highway Commission:

"Would you grant me a permit to build a new kind of college, hotel, airship port, automobile service station and hot dog stand on the state highway?"

Cornell Magazine Tells of California Highways.

W. F. Faustman, Assistant Engineer in the Division of Highways contributed the feature article to a recent issue of *The Cornell Engineer*. Mr. Faustman's article was entitled "Recent Progress in construction of California State Highways."

Federal Aid Roads Further Improved.

The following dispatch from Washington tells of the year's progress on federal aid roads:

WASHINGTON, Nov. 30.—More than 7400 miles of the Federal Aid Highway System were initially improved by the forty-eight states and Hawaii in cooperation with the National Government during the fiscal year 1929. Thomas E. MacDonald, Chief of the Bureau of Public Roads, announced in his annual report today. Initially improved highways are those upon which no federal aid funds have previously been expended.

Advanced stages of improvement, involving the surfacing of roads previously graded and drained, were completed on 1988 miles of the system. At the close of the fiscal year initial improvements were in progress on about 8358 miles and advanced stage construction was under way on 1167 miles. On that date the actual length of improved roads was 78,096 miles, or about 41 per cent of the total of 188,857 miles in the system.

The cost of the year's improvement was \$195,298,168, of which the Federal Government paid \$82,736,878 or 42 per cent.

Resolution Commends State Highway Work.

The following resolution was unanimously adopted at the ninth annual convention of the Redwood Empire Association:

WHEREAS, The California Highway Commission and the State Department of Public Works have rendered accessible the Redwood Empire counties in safety, comfort, and with pleasure and convenience, by improving the Redwood Empire system of highways during the past year, and

WHEREAS, The Director of the State Department of Public Works, also members of the California Highway Commission, also engineers and attorneys and other officials of the Commission, have cooperated with the Nine Counties Highways Committee of the

Redwood Empire Association at all times in working out the schedule of budget allotments and highway improvements, and

WHEREAS, These highway improvements and budget allotments have made possible the greatest influx of tourist traffic ever had by the nine Redwood Empire counties, which has added to the wealth and prosperity of the Redwood Empire as a whole, as well as to the Redwood Empire communities individually; now, therefore, be it

Resolved, That the officers, directors and the entire constituency of the Redwood Empire Association, including boards of supervisors, the press, chambers of commerce and all interests in the nine counties, do hereby express their hearty appreciation and their thanks to the State Department of Public Works and the California Highway Commission, and

Be it further resolved, That copies of this resolution be transmitted to all interested parties, and to the press.

Mountain Roads in North Kept Open Despite Storms.

The exceedingly heavy rains occurring in the mountainous districts in northern California between December 8 and 17 caused considerable damage in the way of slides and minor washouts.

Rains which reached the volume of cloud bursts occurred in the Sacramento Canyon district and caused many small slides. Only one or two large slides occurred and while they threatened for a time to close the road to traffic, the prompt attention on the part of the maintenance crews kept the road open continuously for traffic.

In Lassen County cloud bursts caused high water which damaged the road to a considerable extent near Doyle. In the vicinity of Chester the Feather River was out of its banks on a short portion of the old county road which is still under state maintenance, making it necessary to detour traffic around the lower end of Lake Almanor for several hours.

Reports coming in from other sections in the same general area show that while the rain was exceedingly heavy, no serious damage resulted.

KENTUCKY—A total hard-surfaced construction program of 200 miles, costing \$700,000, is outlined for counties in the western part of the state for 1930.

KANSAS—The Jayhawk state had a 1929 construction program with a total of 1875 miles, which included 800 miles of grading, 1000 miles "sand and gravel" and 75 miles hard surface.

MASSACHUSETTS—Under the direction of Jas. H. Taylor, highway landscape supervisor, the Department of Public Works is undertaking extensive and permanent beautification of the roadsides on state roads.

Salinity and
Barrier study

Investigation on
Many Streams
Now Under
Way

Review of December Activities In the Division of Water Resources

EDWARD HYATT, Chief of Division

State Dam
Supervision

Reclamation

Irrigation

Flood Control

WATER RESOURCES

Salinity Investigation

The regular 76 salinity observation stations that were maintained during the summer have been reduced to 30 of which 26 will be continued as all year 'round stations as agreed at the conference of the Advisory Engineering Committee held on September 24, 1929. The regular drainage water stations are to be maintained until further notice. Additional tidal cycle salinity measurements were taken at locations where the desired salinity content and tidal characteristics could be obtained. Due to deficiency of precipitation the river has not increased in flow to an extent that warranted additional tidal cycle stream flow measurements in the various channels. The maintenance of the tide gages has continued and will be maintained throughout the winter. Analytical studies of stream flow and tidal data on relation of salinity thereto have been continued. Statistics on the growth of storage developments on the Sacramento and San Joaquin rivers have been completed.

Salt Water Barrier

A program covering the investigation and study of the economic as well as the physical aspects of the Salt Water Barrier below the confluence of the Sacramento and San Joaquin rivers has been tentatively adopted. However, the final set-up of procedure will not be determined until it has been reviewed and adopted by the joint State-Federal Commission.

The tentative program is designed to include:

1. An investigation and study of other possible sites and types of structure.
2. A study of the relation of the proposed barrier at the several sites to industrial, irrigation and reclamation developments; domestic water supply; flood control; navigation; fish industry; and other items in order to determine the benefits or detriments that would accrue in each particular instance.
3. An analysis to determine the economic feasibility of the barrier in relation to the various elements enumerated above.

The entire plan of the investigation is prepared with a view of evaluating the benefits that would be derived from the barrier and determining whether they would be commensurate with its cost. Until these economic features are thoroughly analyzed the relative value of a salt water barrier located below the confluence of the Sacramento and San Joaquin rivers as a unit in the state-wide plan of water development remains undetermined.

Six men are now employed on this investigation, five men in the office and one in the field. The field work has consisted of the collection of data on reclamation and irrigation developments in the area tributary to Suisun and San Pablo bays.

Bulletin No. 17, Southern California

Preliminary draft of five chapters of Bulletin 17 has been prepared and submitted to the consulting board, which will meet on December 17th in Los Angeles for the purpose of reviewing the report. If these chapters receive the approval of the committee they will be forwarded to the print shop immediately. One chapter yet remains to be drafted and submitted to the consulting board.

Santa Ana Investigation

The work on measurement of percolation from rainfall on the valley floor, measuring of stream runoff, rising water and losses in the stream and the work on transpiration from seeped areas, cultivated areas and areas in native vegetation has continued. In addition to this work it appeared on further study of the legislative enactment of the legislature of 1929 that further investigations into the plan of conservation of the water of the Santa Ana River were authorized and it was decided to take up the matter of spreading on the Santa Ana cone and on the various cones westward thereof belonging to the small creeks discharging on to the Cucamonga plain. Only work of a preliminary nature has been done to date, but a survey party will be in the field shortly to take topography, and it may be necessary to do some aerial mapping on the smaller streams.

Mojave River Investigation

Aerial survey of the entire area involved has been completed. Gaging stations on the two upper forks and at the lower site have also been completed. A map is being prepared of the valley.

Santa Maria River

Stations have been established on Sisquoc River, Cuyama River above the mouth of Huasna Creek and on Huasna Creek. The matter of a more general investigation into the ground water conditions in the valley has been further investigated and a program involving the expenditure of \$2,000 a year in addition to the maintenance of the above stream gages has tentatively been laid down.

Salinas River

Stations have been established on San Antonio Creek near the mouth and on Salinas River near the city of Salinas. The previous intention to place a gaging station on Nacimiento Creek was changed because it was difficult to get a station on that creek, and San Antonio Creek will, it is believed, give a similar unit run off, enabling an estimate of the water supplies from the west side to be made from the records as well as such an estimate could be made from the Nacimiento Creek records.

Santa Margarita Creek

Maintenance of the stations at Nigger Canyon and Temecula Canyon have been taken over as a part of the water resources investigation.

San Luis Rey River

Gaging station has been established at Bonsall and an additional one near Oceanside.

Gaging Stations in San Diego County

Discussions have been had with Mr. H. M. Savage, hydraulic engineer, city of San Diego, and it was agreed that the state would contribute \$75 per month toward the maintenance of stations at or near the international boundary on Campo, Tecate and Cottonwood creeks if the remainder would be contributed by the city of San Diego. However, these stations have not been established because it is felt desirable to secure the approval of the Mexican authorities on any sites for gaging stations which may be selected.

Whitewater River

A station was established on Palm Canyon Creek. In addition to this station, stations have been established on Whitewater River at the upper highway crossing and also below Indio. No attempt is to be made to meter the discharge of these two stations.

Kern River

The matter of gaging stations at Monache and on the North Fork near Whitney was taken up with the Federal Power Commission, but no decision has been reached by that organization to date.

Santa Clara Valley Investigation

November 5th the Santa Clara Valley Conservation District was approved by the voters and request was made to the state for a general hydrographic investigation of the entire Santa Clara Valley, of which San Jose is the principal city, by the State Division of Water Resources. The water plane in Santa Clara Valley has been dropping for many years past and the permanent ground water supply appears to be very much overdrawn by pumping. The program for conservation will consist in its first stages of spreading the runoff from the streams and causing it to sink underground, and probably at some future date in building reservoirs to iron out the peaks of the floods. The investigation desired is similar to those which the State Division of Water Resources has conducted in other coastal basins of the state. A tentative program for such an investigation was outlined, and as a part of the water resources investigation of the state it was agreed that one-half the cost of the investigation could be paid by the state under the appropriation of \$390,000 for water resources investigations made during the last legislature, if the district could advance the remaining half. This was agreed upon by the district and the investigation is being started.

San Joaquin Valley Investigation

About 20 miles of San Joaquin-Kings River Exchange Canal have been retraced and marked with pipes. Topography has been completed on about 6 miles.

About 60 miles of line have been located on the Kings River-Kern River Canal, cross sectioned, and special topography taken at stream and other crossings. The work during the last month has been particularly slow and tedious because of the location passing through the many orange groves in that vicinity. There remains about 5 miles of this type of work before the line emerges into the open country on the tule delta.

The U. S. E. D. survey of the San Joaquin River from Mossdale to Mendota has been completely checked and revised.

Tracing of the topography of the Mammoth Pool reservoir site proper has been completed.

Estimates of the water supply of the entire San Joaquin Basin have been prepared for the period 1889 to 1929 and averages for each stream basin and for the entire basin for the past 40, 20, 10 and 5 years have been made.

The Kings River investigation has been continued in close cooperation with representatives of the Federal Power Commission in San Francisco.

Sacramento Valley Investigation

The preliminary draft of report on Feather River has been completed. Water supply studies of streams in the Sacramento Basin have been continued during the present month. Classification of land and survey of crops have been made on 2,750,000 acres determined from field survey and on 537,000 acres based on data available in the office. Data have been gathered on actual use of water for irrigation and the probable use for certain crops from all available sources.

DAMS

The activities of this subdivision are being directed first to the prosecution of the current work before the office and second to the development of personnel and methods necessary to adequately handle the duties imposed upon the Department by the law providing for the supervision of dams. Considerable time is also being devoted to coordinating this work with other activities of the division in which much attention is being given to the rearrangement of the file system and the establishment of a direct and adequate method of interoffice exchange of data.

During the present month applications have been received for one new dam, namely, the Hansen Dam of the Los Angeles County Flood Control District, and for the revision of two dams, Lake Hodges and Black Rock. Sixteen applications have been received requesting approval of existing dams and two for revisions and alterations of dams already built. The total amount of fees received for the inspection of dams to December 14, 1929, amounts to \$47,062.26.

A total of 32 field inspections of dams has been made since submission of our last report, and certificates of approval have been issued for four dams, namely, Lake Hodges, Lake Almanor, Shaver Lake and Bear Gulch. During the present month a check of the plans and spillway capacities of Sunset Canyon and Hansen dams of the Los Angeles County Flood Control District has been made.

The consulting board retained to investigate and report upon the San Gabriel Dam has made an investigation of the Mulholland Dam of the city of Los Angeles, and is now preparing a report upon its findings. There has been considerable comment as to the safety of this structure, and it was therefore deemed advisable to have this same board make an investigation of this dam.

An analysis of the stresses in this dam has also been made by the Division of Water Resources.

RECLAMATION AND FLOOD CONTROL

Maintenance of Sacramento and San Joaquin Drainage District

The project maintenance work on the Sutter Bypass system in Sutter County has, during the past period, been confined largely to routine maintenance

work, including the clearing of timber growth in the various flood channels. Arrangements have been made to operate a dragline excavator on a rental basis for cleaning out the Wadsworth Canal, the collecting canals and various intercepting canals.

Cooperative bank protection work is now under way on the jobs mentioned in the last report: Reclamation Districts Nos. 535, 673, 730 and 900; Robinson Bend on the Feather River; and Feather River at Nicolaus Bridge.

Emergency Flood Control and Rectification of Rivers.

The protection work at Lower Tyler Island for Tyler Island Farms and Libby McNeill and Libby has been completed.

Tentative arrangements for protection work in Reclamation District No. 317 on the San Joaquin River have been made; cost approximately \$8,000.

Sacramento Flood Control Project

Satisfactory progress has been made in the clearing work in Sutter and Butte Slough by-passes. A total of 140 men have been employed at four different places, and a contract for clearing 100 acres has been half completed. It has been necessary to discontinue most of this clearing work in the last few days on account of rain and flood water, but it will be resumed as soon as the weather permits. Two camps are in operation.

Contracts have been awarded for clearing in the Feather River channel above Oroville, as follows:

- (1) To August Dententer of Marysville, 56 acres, \$2,777.
- (2) To L. J. Fallon and A. Frandrup of Marysville, 26 acres, \$1,664.
- (3) To C. F. Rednall of Marysville, 34 acres, \$2,006.
- (4) To Robert Gisler of Marysville, 50 acres, \$3,200.
- (5) To J. E. Ely and W. D. Zervales of Oroville, 70 acres, \$4,480.

Work on these contracts commenced about December 1, but was discontinued on the 12th on account of flood water.

Reports have been prepared on a number of applications before the Reclamation Board, a number of orders respecting applications have been written, and rights of way for the West Intercepting Canal have been secured, in which two condemnation suits have been filed.

Russian River Jetty

The work on the jetty is now confined to placing quarry rock, which involves the operation of the quarry and railroad. Approximately 100 tons per day are being placed with a crew of 14 men. This work will be carried on in this manner without change for a considerable time.

Pajaro River Flood Control

The work of clearing the channel of the Pajaro River is complete, having been finished on December 7, at a total cost of \$3,600. The local people are pleased with the work done.

Mokelumne River Improvement

Work has been continued in the channel of the Mokelumne River in collaboration with San Joaquin County and is approximately 80 per cent complete. The recent rains have hindered the work considerably.

Flood Measurements and Gages

Preparations are complete to send out stream metering parties if this work becomes necessary, and all water stage gages are in operation.

IRRIGATION, WATER STORAGE DISTRICTS

During the month the financial and economic investigations made of the Naglee-Burk, Palmdale and Little Rock Creek Irrigation districts have been completed and reports prepared thereon. Further investigations have been made during the present month as to the feasibility of dissolving the following inactive irrigation districts of the state, namely, Dry Creek, South Capay, Baker, Feather River and Fullerton.

Investigation is being made of the water supply and susceptibility of the lands to irrigation in the proposed Dixon irrigation district located in Solano County, the sufficiency of its petition being approved by the County Board of Supervisors and filed with the State Engineer for investigation and report of feasibility.

Conferences have been held with the proponents of the proposed Feather, Richvale and Dixon irrigation districts and advice given them in connection with the projects proposed. Also, considerable time has been spent in assembling data relative to the financial status of various districts in the state, and a study of their ability to meet their obligations is being made.

The California Bond Certification Commission has under consideration the matter of the approval of the sale of the \$108,000 of bonds by the Nevada Irrigation District for construction purposes of the district from the second division of the second issue of bonds of this district.

WATER RIGHTS

Applications

During the month of November, 32 applications were received, 20 were rejected and 30 approved. 13 permits were revoked, 9 licenses issued and one license revoked.

Snow Surveys

The work on the snow survey investigation has consisted chiefly in completing the arrangements necessary in each basin for stocking shelter cabins and caching equipment in readiness for making the surveys, some of which will begin about January 1. Arrangements are practically complete for making the surveys in each major watershed of the Sierras.

DECEMBER REPORT OF DIVISION OF ARCHITECTURE

GEORGE B. MACDOUGALL, Chief

Contracts awarded from November 21st to December 16th total \$346,076. This includes contracts for general and mechanical work for the two barracks buildings at the Veterans' Home, totaling \$327,606, and minor projects at the Norwalk State Hospital and the Industrial Home for the Adult Blind.

During this same period bids were received upon which awards are pending for projects totaling \$20,900.

Projects now out for bids include the training school and power house at the San Diego State Teachers College and wrecking Strauss Hall at the California School for the Deaf.

MOTOR VEHICLE DIVISION REPORTS

FRANK G. SNOOK, Chief

STATE PASSES 2,000,000 MOTOR VEHICLE MARK

California for the first time has passed the two million mark in the registration of motor vehicles. The total vehicles registered as of November 30, 1929, numbered 2,015,418, an increase of 184,813 or slightly more than 10 per cent over the same period in 1928.

Beginning with March, 1909, when the first \$18,000,000 bond issue was proposed in the state legislature for a state highway system, the registration totals for motor vehicles in California has increased as follows:

1909 (March) -----	10,600
1914 -----	123,516
1919 -----	477,450
1924 -----	1,350,752
1929 -----	2,015,418

STATE PRESSING NEW YORK

A comparison with New York registrations shows that California is pressing that state hard for leadership in the nation in motor vehicle registrations.

The New York figures as of December 1, 1929, are as follows:

Total registration of New York -----	2,293,565
Passenger cars of New York -----	1,872,677
Passenger cars of California -----	1,872,099

New York accordingly has 578 more passenger cars than California.

California leads, however, in the per capita ownership of automobiles with 2.87 persons per automobile as compared with 6.56 persons per automobile—New York.

1930 PLATES

All counters were opened Monday, December 16th, for issuance of 1930 license plates.

Mail applications were invited effective December 1st, but the response has been small, approximately 25,000 having been received up to December 16th. Certificates for those received by mail were practically all typed and were ready for mailing, but were held until after Christmas at the request of the United States Postal authorities.

License plates and necessary supplies sufficient for the 1930 renewal were on hand at all distribution points.

Certification for anticipated extra employees for renewal period at all branch offices was requested through and furnished by the Civil Service Commission, and as the extra help is needed, they were called from such list.

"Miranda, whassat light shinin' in yo' eyes?"
"Tha's my stop light, Rastus."

REGISTRATION FOR DRIVERS

The Division of Motor Vehicles has registered 2,550,956 applicants, who have passed an examination as required by law to drive motor vehicles. This huge task was made possible by the splendid assistance and cooperation given this department by 500 outside agencies, comprised of chiefs of police, county sheriffs, constables, judges and operator examiners employed by the Division of Motor Vehicles.

Without the cooperation of the various chiefs of police and law enforcing agencies throughout the state, and without their aid, a solution of the problem provided by law could have only been accomplished by training a force of 500 operator examiners throughout the state at an annual cost of \$1,050,000. At no time during the peak of the examination did the state exceed 59 paid operator examiners and at the present time is carrying on this work with 26 men.

CALIFORNIA HIGHWAY PATROL

The organization of the California Highway Patrol is progressing as fast as possible. The Purchasing Department has asked for and received bids on the necessary automobiles and motorcycles and as soon as the purchases are completed, motor equipment will be assigned to each officer of the patrol.

STOP, LOOK AND LISTEN

The one sure remedy for grade crossing and highway automobile accidents is safe driving. Accidents generally result from carelessness or incompetence. Instead of burdening the people with compulsory insurance, legislation and tax issues to eliminate all grade crossings, educate the public and enforce practical traffic codes. Reckless and drunken drivers should not be allowed on highways. They are a constant menace to life and property. Those who dash across grade crossings and give no heed to traffic regulations should, after warning be deprived of licenses. The railroads of the country, in their great work to reduce accidents, have succeeded in every phase of the problem but grade crossing collisions. It takes an average of seven seconds for a train to pass any given spot. Yet every year thousands of people, unwilling to wait the seven seconds, lose their lives. Accident reduction is mainly a matter of teaching drivers when to step on the brake instead of the accelerator.—*Pillager Herald*.

Professor: "Take the sentence, 'The Indian sneaked silently into the wigwams.' What tense?"

Mimi: "His sweetie's, I suppose."

Young lady motorist—"It's snowing and sleeting and I'd like to buy some chains for my tires."

"I'm sorry—we keep only groceries."

"How annoying! I understood this was a chain store."—*Judge*.

The efficiency expert is worse than the statistician but he belongs to the same breed. He will tell you that if a farmer's boy can pick six quarts of cherries in an hour, and a girl five quarts, the two of them together will pick eleven quarts. But any farmer knows that the two of them together will not pick any.

Cross-Section of Highway Thought On Problems Affecting All States

A CROSS-SECTION of the view of state highway officials on state highway policies and problems of common interest to all the states was contained in resolutions adopted by the American Association of State Highway Officials at their annual convention in San Antonio, Texas.

California was represented at the convention by C. H. Purcell, State Highway Engineer, and a member of the Executive Committee of the association.

The resolutions adopted by the convention, and which appear in full in the January issue of *American Highways*, covers the following subjects:

FEDERAL AID

Because—

The rate of progress in construction of federal aid highways is not keeping pace with the increase in motor vehicle traffic; and the several states of the Union, in answer to urgent public demands, have to date built more miles of the Federal Aid Highway System without Federal Aid than with it; and during the past year less than 10 per cent of the funds used in construction of state trunk line highways was contributed by the federal government.

It is urged that—

Congress increase the Federal Aid Highway Appropriation to \$125,000,000 for each of the fiscal years 1932 and 1933 and that the present appropriation for the fiscal year 1931 be increased from \$75,000,000 to at least \$100,000,000.

Because—

The Federal Aid System, approved by the Federal Government in 1921, and which connects all the county seats and main market centers of the country, is still less than 50 per cent even gravel surfaced.

It is declared that—

It would be unwise at this time to appropriate funds for any further mileage and that this Association recommend that the federal funds be concentrated on the present federal aid system.

Because—

The present limitation of \$15,000 per mile placed on federal aid participation in highway construction is burdensome to many of the states, in that it has no relation to the actual cost of construction; and because the construction of important gaps in the Federal Highway System are frequently delayed due to this limitation.

It is recommended that—

Congress reserve the limitation of \$15,000 per mile and that the Secretary of Agriculture be authorized to fix a base of participation in all cases with the sole limitation that Federal Aid should not exceed 50 per cent of the cost.

FOREST HIGHWAYS

Because—

The progress being made in the construction of the United States Forest Highway System is lagging behind that being accomplished on other portions of the Federal Highway System in such states; and the improvement of the said United States Forest Highway System is essential from the standpoint of providing continuous important transcontinental highways at the earliest possible date, which would not otherwise be provided until many years after the completion of the balance of the Federal Highway System.

It was voted that—

A bill now pending in Congress be endorsed. This bill increases the authorization for Forest Highways for 1931 to \$10,000,000. The proposed legislation increasing the authorizations for 1932 and 1933 to \$12,500,000 per year, was also endorsed, said increase to be applied on those Forest Highways located on the Federal Highway System until such systems in the several states have been completed.

HIGHWAYS OVER PUBLIC DOMAIN

Because—

The desirability of expediting the construction of interstate highways across the public domain and the progress now being made indicates the urgent necessity for increased federal appropriations for the construction of important connecting links on interstate highways across the forest reservations, unreserved public lands, nontaxable Indian lands, and other federal reservations; and without a large increase of public funds for this purpose it will be impossible for many years to complete transcontinental highway systems; and as the federal government controls a very large percentage of the total area of the 11 western public land states and for that reason should rightfully accept the burden of ownership at least to the extent of building and maintaining roads across its lands,

It was decided that—

The Association of State Highway Officials should go on record in favor of the enactment of bills now pending in the Congress of the United States, S. 121 by Senator Oddie, and a companion measure, H. R. 1416, by Representative Colton, which bills are

designed to lay the foundation for larger appropriations for the purpose indicated herein.

GRADE CROSSINGS

Because—

Progress in the elimination of crossings at grade between highways and railways, one of the major hazards to traffic, is largely dependent upon equitable division of costs between the railroad companies and the state highway departments.

It is asked that—

All of the states should enact statutes requiring the railroads to participate in the cost of grade separation structures and in line with well established precedent, the share of the railroad companies in the total cost of such grade separations, including all necessary approaches and drainage structures, should not be less than 50 per cent; and that all wigwag or flashing signals be installed on the right side of the highway approaching the grade crossing, and that center installation of such signals be used only when side installation is utterly impracticable.

ROADSIDE BEAUTIFICATION

Because—

There is a growing realization of the fact that in the best highway development there is found, in addition to construction and maintenance, a recognition of the aesthetic values present on or near every highway and that it is a proper function of the state highway departments to engage in highway beautification and in the preservation and development of natural and scenic attractions and aesthetic values made available by the highways; and as the construction of highways through natural scenic areas often spells the doom of the natural beauty and attractiveness of the area by making it accessible for commercialization and denudation and realizing that certain highways are thereby robbed of the very features for which they were built; and as it appears practicable in many places to preserve roadside strips of natural country which may be held for the enjoyment of all the people; and as in many places the natural beauty of the countryside is made uninteresting or invisible by the presence of distracting advertising signs:

It was ordered that—

The Executive Committee of the association appoint a Committee on Roadside Beautification to deal with problems and studies relating to roadside parks, strips of natural timber screen, roadside advertising, and beautification.

TOLL BRIDGES

Because—

Private financial interests are still undertaking to commercialize and exploit the traffic on the roads of the state and Federal Aid highway systems by the construction and operation of toll bridges at points where traffic is concentrated as a result of the vast expenditure of public funds on the construction of these free highways; and these interests, in order to further their own schemes have actively opposed con-

struction and financing bridge programs of properly constituted public authorities; and, in spite of the fact that Congress has, during the past year, in granting franchises to privately owned toll bridge companies, strengthened the situation by making additional requirements of these toll companies to protect the public, there are still a number of features not included in the franchise forms used by Congress, and since the general bridge law, which was passed March 23, 1906, is deficient and the Congress should reenact laws covering the entire toll bridge situation;

It is resolved that—

The American Association of State Highway Officials, is unalterably opposed to privately owned and controlled toll bridges upon state and Federal Aid systems of highways, but is not opposed to publicly constructed, owned and operated toll bridges where adequate public funds are not available for immediate construction of the free bridges needed to complete the interstate and intrastate highway systems as planned; and

That before any additional franchises are granted, the general bridge law should be changed so that the following requirements should also be included in all future franchises granted:

1. All franchises should be effective only on state approval as to location, design, plans, specifications, etc.
2. State supervision of construction.
3. Limitation of amount of securities.
4. Any appreciable change in bridge plans should be subject to approval by the state and should require readvertising for bids.
5. State supervision of maintenance.

It was further resolved that the association recommend to the Committee on Interstate and Foreign Commerce of the Congress of the United States that it withhold its approval of any measure authorizing or consenting to the construction of a privately owned toll bridge on the state or Federal Aid highway systems unless after a thorough investigation the committee has determined that there is a lack of financial resources or intention of the proper political subdivisions to finance and construct a free or publicly owned toll bridge; and

That the association recommends that there be included in every congressional authorization or consent for the construction of privately owned toll bridges on the state or Federal Aid highway systems, a provision that the bridge, when completed, may be acquired by the public at any time by the payment of an amount not greater than its original cost less reasonable depreciation due to use and the cost of replacement of faulty construction and design.

MOTOR VEHICLE REGISTRATION

Because—

There is considerable variation in the practice of licensing motor vehicles in the several states, some states having an adequate fee which is in lieu of all other taxes, while others have a nominal fee supplemented by a personal property tax;

It is recommended that—

Such states as are issuing such licenses and license plates upon the payment of a nominal fee, that the applicant for a license be compelled to submit a tax receipt showing that all additional taxes contemplated by the laws of the states have been paid, before such licenses and license plates are issued.

HOW CALIFORNIA PREPARES FOR FLOODS

(Continued from page 2.)

not this amount will be found adequate and the division equitable through a period of years remains to be determined by experience.

Organization.

The duties of the Department of Public Works in respect to flood control and reclamation are delegated to the Division of Water Resources, which succeeds the old Division of Engineering and Irrigation. The activities of this division in connection with the maintenance of the flood control project were commenced in September, 1927, and have been carried on continuously since that time.

The routine of maintenance consists of keeping in repair and condition the various works, levees and channels under the direct care of the division, and is carried on during the entire year by an organization engaged exclusively on this work, which includes bank protection. During the flood season, this force patrols and inspects various levees and works, and is prepared to protect weak places as they appear and to make necessary repairs. Equipment, tools and supplies are kept available for immediate use in emergencies. Both the routine maintenance work and the special work which must be done each year during the flood involves work of many varieties, and the crew is so organized that it may be expanded rapidly, with the various gangs in charge of foremen experienced in the particular kind of work required to be done.

During the year the size of the maintenance force varies from about thirty to seventy men, except during emergency when the number may be considerably greater. The larger items of work in connection with the routine maintenance, particularly replacements and improvements, are usually done by contract, but the nature of the greater portion of the activities is such that it can best be performed directly by division forces. The bulk of the routine work is in connection with the Sutter-Butte By-pass Project No. 6 in Sutter County. This is in charge of a maintenance foreman with headquarters in Sutter City, which is also a central point for carrying on activities in the northern portion of the Sacramento Valley, extending from the vicinity of Marysville and Colusa north. All river bank protection work and work in the southern portion of the valley are done directly out of the Sacramento office of the division.

Routine Maintenance.

The levees are kept free of noxious weeds and burrowing animals and the roads on the levees are kept in repair. These roads are used to a considerable extent by the public, but during wet weather the levees are closed by gates so that the surface will not be cut by traffic, when the maintenance force only is permitted to pass along the levees. Willows have been planted along the east levee of the Sutter By-pass for a distance of eleven miles, to produce a growth which will protect the levee from wave wash. The by-pass channel at this place has a width of 4000 feet, and the levee is exposed to a strong wave action during heavy south and southwest winds. These willows are planted in five rows five feet apart at the base of the levee, and it is necessary to irrigate them in the same manner that an orchard is irrigated. It is expected that an effective growth will be produced along a greater portion of this length within a period of three years. At the present time, all of the project levees are in good condition and there are no known weak points.

Pumping plants are maintained and operated to care for the intercepted drainage east of the Sutter By-pass. There are three of these plants, with a total of nine pumps and electric motors of 1500 total horsepower. Drainage water is conducted to these plants through 46 miles of canals of various sizes. These canals are kept clean and the canal structures, which are mostly bridges, are kept in repair.

In the by-passes there are numerous structures requiring maintenance, including bridges, weirs, bulkheads, jetties and current controlling structures. These are mostly of timber and require continuous repair. Some of them have been built for a number of years and replacements are necessary from time to time, which is done as maintenance.

A telephone system consisting of 30 miles of line and 12 telephones connects various parts of the project in Sutter County with the headquarters at Sutter City.

By-pass Clearing.

One of the most serious and vexatious problems in connection with maintenance is that of keeping the by-passes and overflow flood channels clear of timber growth. No feasible and economical method has yet been devised to accomplish this, aside from cutting by hand labor. It is estimated that the area in the by-passes and the overflow channels on which there is a tendency for timber to grow exceeds

6000 acres, much of which has never been cleared.

The clearing of land which has once been cleared is a maintenance operation and approximately \$20,000 per year is spent on this work. It is hoped that eventually those areas in the by-pass which are suitable for cultivation will be put into crop of some sort to eliminate the cost of clearing each year.

Through a state appropriation for new flood control project construction, there has been made available to this office the sum of \$65,000 for clearing land in the Sutter, Butte Slough and Tisdale By-pass, and the sum of \$27,500 for clearing along the Feather River overflow channel. Up to the time it was necessary to discontinue work on account of flood waters, on December 13, three crews were engaged on clearing with a total of 180 men. These were in charge of our own foremen, and were mostly local people. The opportunity for employment on this work was of very great benefit to the citizens in Sutter County. One contractor is also operating a camp in Sutter By-pass with a force of 50 men. This division maintained two camps of 60 men each, and it is proposed to reopen these camps and continue the clearing work as soon as the weather permits.

The clearing work along the Feather River is all being done under contract, at an average price of \$60 per acre. Six contracts have been let covering 60 per cent of the total work to be done, and were all under way during the recent December storm, when work was temporarily discontinued.

It is difficult to picture the varied activities of this division in connection with flood control and reclamation without going into considerable detail. Bare mention can be made here of the numerous things now being done, and no attempt is made to cover the subject of the Sacramento Flood Control Project itself or new construction, in which there is an increasing activity. In this biennium the State of California is expending \$350,000 for new construction in a program involving a total expenditure of \$721,000, in which the Federal Government and local interests participate.

Flood Gaging and Measurements.

During the winter season this division operates 32 automatic water stage recorders in the flood channels and obtains readings from about 50 staff gages. Preparations are complete and the necessary equipment is assembled to send 12 parties of engineers into the field during flood at a few hours notice to measure the quantity of water flowing at

certain strategic points in the flood channels. At certain places rating curves are being established and measurements are taken at various times during the winter. Each season the results of these observations and measurements are compiled in a mimeographed report, making the data available to all who are interested. These data are of particular value in engineering studies relating to flood control, and are obtained primarily for this purpose.

Careful watch is kept on flood stages to give out warnings, to determine when measurements are to be taken, and to guide in the operation of the Sacramento Weir. The weir is lighted and patrolled continuously during the time water is against the gates. The gates have not been opened since March, 1928, when all of the 48 gates were opened for the first time.

Bank Protection.

For a number of years in the past, the state has made appropriation of funds for the use of the State Engineer in rectifying river channels, protecting river banks and performing emergency flood work. Expenditure of this money was usually made in cooperation with other agencies. During the biennium ending June 30, 1929, this cooperation has been required, in which the state usually paid one-third of the total cost. This was known as the "river fund" and is discontinued in the present biennium. The corresponding work for the rivers in the Sacramento system is done out of the flood control maintenance appropriation, and the work in the other rivers of the state is cared for out of a small appropriation for "emergency flood protection and rectification of river channels in cooperation with other agencies."

The protection of banks of the river channels is an essential preparation against floods. The division has recently done, is doing or preparing to do, bank protection work on the Sacramento project in cooperation with other agencies, as follows:

Feather River at Robinson Bend, in cooperation with Butte County and landowners, slough closure	\$8,000
Feather River at Nicholas, in cooperation with Sutter County, seven tree and steel current retards	13,000
Feather River at Nelson Bend, in cooperation with Southern Pacific and California Debris Commission, bank replacement and protection	67,000
Sacramento River near Princeton, in cooperation with Levee District No. 3, repairs to current retards	3,000
Sacramento River near Knights Landing, in cooperation with Reclamation District No. 730, nine tree current retards	19,000

Sacramento River at Chicory Bend, in cooperation with Reclamation District No. 900, quarry rock protection.....	\$3,200
Sacramento River at Oak Hall Bend, in cooperation with Reclamation District No. 535, quarry rock	3,000
Sacramento River near Isleton, in cooperation with Division of Highways, piling toe wall with bank pavement.....	17,000
Georgiana Slough on Tyler Island, in cooperation with Tyler Island Farms and Libby, McNeill and Libby, timber bulkhead.....	3,000

Most of the above work, especially the construction of bulkheads and current retards, is done by contract, but the placing of quarry rock and the smaller work are done directly by the division. The division has in service a river fleet consisting of seven barges, including mess and sleeping quarters, derrick work barge and pile driver, and also several launches. This outfit is used for certain classes of bank protection work, is well equipped, and may be moved in emergency to any point on the Sacramento project on navigable water.

Outside of the Sacramento Valley.

While the division's maintenance of flood control works is confined to the Sacramento Valley, cooperative bank protection and river rectification work may be done on other streams wherever local interests require it. A small amount of this work has been done regularly in the past few years on the Mad River in Humboldt County, on Yager Creek in the same county, and on the San Joaquin River. Assistance may be rendered at any place during emergencies in flood time.

As provided in chapter 447, Statutes of 1929, the division is improving the channel of the Mokelumne River in collaboration with San Joaquin County. The river and part of the overflow channel are being cleared of timber growth, and numerous snags are being removed, at a cost of \$12,500. The work will be completed by January 8, by a force in charge of a foreman of the division. It is expected that an equal amount will be available to continue the work next year.

In cooperation with the counties of Santa Cruz and Monterey, the channel of the Pajaro River at Watsonville has been cleared of timber growth at a cost of \$4,000, by authority of chapter 524, Statutes of 1929. This was completed on December 23 by a crew in charge of a division foreman, and is a continuation of work undertaken last year, when \$7,500 was expended. A protective district is being organized to control the floods of the Pajaro River from which there is now no protection other than a clean, natural river channel.

CALIFORNIA HIGHWAYS AND PUBLIC WORKS

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

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Vol. 8 JANUARY, 1930 No. 1

PROBLEMS IN ROAD BUILDING THAT CALIFORNIA IS NOW INVESTIGATING

(Continued from page 6.)

- (e) Asphalt emulsion tests.
- (f) Asphalt extractor.
- (g) Investigation of methods of casting concrete test cylinders to secure uniform results.

(h) Alternate designs of reinforced concrete cribbing members.

Many old studies which were presumably completed are still under observation and are being supplemented from time to time by subsequent information.

The making of new tests and the carrying on of special investigations frequently involves the design and manufacture of new equipment for the purpose. Such equipment is designed and built in the Laboratory and Equipment Shop at Sacramento.

Several such items of equipment may be mentioned:

- (a) California type of field beam breaking machine.
- (b) Asphaltic concrete stability testing machine.
- (c) Strain gauge.
- (d) Equipment for measuring friction of expansion plates.
- (e) Sticky machine for measuring stickiness of asphaltic oils.
- (f) Apparatus for determining soil compaction.

(g) Asphalt extractor (California design). When studies are completed or the preliminary information secured is of such a nature that it is deemed of value, articles are prepared and published from time to time describing the work done and results secured.

Sub: "Can you name the three orders in architecture?"

General: "Sure! First mortgage, second mortgage, and foreclosure."

WEATHER CONDITIONS IN DECEMBER

By R. L. JONES.

DURING the month of December, 1929, the weather in general throughout the state was not abnormal in most respects in comparison with December weather in past years. The only feature at all unusual was the concentration of rainfall, into the single storm of the month and over that portion of the state north of San Francisco and Stockton. During the month of November and to December 9th, no rain fell at any point in the state.

On December 9th the storm commenced, centering its rainfall in the drainage basins of the Sacramento and Feather rivers, and continued until the 15th, with light rains only falling for the next few days. Some rain fell during this storm over most of the northern part of the state. The heaviest recorded precipitation in 24 hours was at Kennett on the upper Sacramento River on December 12th, when 10.79 inches fell, followed on the next day by 3.14 inches. The storm extended into the lower San Joaquin Valley with light rains only. A fall of 11 inches was reported from Buck's Valley on the Feather River on the 11th.

On the North Pacific coast fairly heavy rains fell, but not out of the ordinary. The maximum at Eureka was 1.35 inches on December 14th. The heaviest rain at Santa Rosa was 3.32 inches on December 10th. There was no rain at Bakersfield, Los Angeles nor San Diego. December storms in the past have usually been more general, with some rain in southern California, and also have usually been spread out more evenly throughout the month.

At the beginning of the new year the precipitation throughout the state was far below normal, and in the northern part, where the only considerable rain fell, it is not more than two-thirds of normal, in spite of the fact that in some parts the December storm precipitated rain in excess of the monthly normal. At Sacramento the seasonal rainfall to January 1st has been 4.21 inches as compared with a normal of 6.32 inches. There is practically no snow in the Sierra Nevada, while normally there should be at least 5 feet, hard packed.

No direct general comparison of the weather conditions in the December just past can be made readily with Decembers in previous

years, on account of the unusual distribution of rainfall, both as to time and locality.

At the beginning of the storm all the rivers in the Sacramento Valley were at extremely low stage, but none of them reached dangerous heights. The highest water was in the Sacramento and Feather rivers. The gage at Sacramento read 23.0 as against 26.5 in the March, 1928, storm. The water reached 14.0 on the Marysville gage, while it was at 24.0 in March, 1928.

Water passed down the Sutter By-pass and Tisdale By-pass and discharged over Fremont weir about 2 feet deep. The tidal reclamation in the lower Yolo By-pass were flooded, as was Prospect Island. There was no need to open the gates of the Sacramento weir for this storm.

Why shouldn't husbands be left at home while wives go vacationing? Somebody must consume the sardine catch.

Who remembers the old-fashioned hick who felt real wicked and devilish while watching the Bloomer Girls play baseball?

How the pastor talked to the highwaymen who sought the cash that he did not have: "Ah, gentlemen, I might, indeed, have something to give you if only I had such energetic fellows as you to pass the plate now and then."—*Christian Register*.

"Yassah," said old Link, "business very good. Done bought a pig fo' ten dollars, traded pig fo' a barrer, barrer fo' a calf, calf fo' a bicycle, and sol' de bicycle fo' ten dollars!"

"But yo' don' make nothin,' Link!"

"Sho 'nough, but look at de business ah been doin'."—*Montreal Star*.

"Anatomically considered, laughter is the sensation of feeling good all over, and showing it principally in one spot. Morally considered, it is the next best thing to the Ten Commandments. Theoretically considered, it can out-argue all the logic in existence. Pyrotechnically considered, it is the fireworks of the soul. If a man can't laugh, there is some mistake made in putting him together, and if he won't laugh he wants as much keeping away from as a bear-trap when it is set."—*Josh Billings*.

An old colored woman who came to the Governor of Tennessee:

"Marse Govenah, I want my Sam pabdoned," said she.

"Where is he, auntie?"

"In de penitentiary."

"What for?"

"Stealin' a ham."

"Did he steal it?"

"Yes, sah, he suah did."

"Is he a good nigger, auntie?"

"Lawdy, no, suh. He's a pow'ful wo'thless niggah."

"Then why do you want him pardoned?"

"'Cause, yo' honoh, we's plum out of ham ag'in."

Congress Urged to Enlarge Road Aid

THE FOLLOWING article is from the *United States Daily*.

There are two schools of thought in congress regarding increased appropriations for federal aid to the states for the federal aid highway system throughout the country, Representative Kelly (Rep.), of Pittsburgh, Pa., stated orally October 11. The major element in congress in all probability, he said, favor augmented highway facilities. The opposition is on the ground that the more prosperous states are carrying on the burden of the less prosperous. Mr. Kelly is a majority member of the House Committee on Post Offices and Post Roads.

"I believe the sentiment of the country and of congress favors expansion of highway facilities," Mr. Kelly said: "I am in favor of the announced program of the chairman of the House Committee on Roads, Representative Dowell, of Iowa, for \$145,000,000, instead of \$75,000,000, annually for federal aid for highways and for \$10,000,000 instead of \$7,500,000 annually for roads and trails in the forest reserves of the United States. I would favor going even further than that increase, if it should be felt to be necessary and the federal government and the states could properly and economically make use of such augmented funds each year.

OPPOSITION NOTED

"I realize that there is opposition from some in the east. They take the position that we are taking out of the income tax revenues of the east to help carry the road burdens of states that do not contribute to any great degree to the income tax revenues of the federal treasury.

"But I do not agree to any such contentions with respect to the federal aid highway system that is now a part of the great system of communication between the whole country. The United States today is a nation—not just a community of states.

"American citizens in all sections are entitled to the benefits of good roads. On a recent trip through Yellowstone National Park I saw hundreds of Pennsylvania and New York cars on the roads and they were all through that part of the country. The same is true in other sections. We are envisaging the federal aid system as a national program of import to the country as a whole.

"Good roads mean advantages to American citizens and to American business—no matter what their particular state may be. We should continue along the lines already established by increasing our national expenditures, along with the state expenditures, in order to keep pace with the steadily advancing tides of business.

ROADS IN FORESTS

"As a broad-visioned permanent national policy of gauging national expenditures according to the growing needs of the country as a whole I hope and believe that congress will carry out the roads committee program of \$145,000,000 for federal aid roads and \$10,000,000 for forest roads and trails annually hereafter. The former is a proposed increase of

\$70,000,000 over the present regular annual federal aid funds. The latter is an increase of \$2,500,000.

"And the increase of the forest road construction program is also important to the nation's economic welfare. Both funds are to meet national needs.

"Road construction is an important part of the country's activities everywhere. I recall that the head of the Federal Bureau of Roads, Thomas H. MacDonald, just back from an important international road meeting in South America, told our House Committee on Appropriations within the past year that the federal aid highway system then approximated 188,000 miles, that there was a total of upwards of 85,000 or 86,000 miles approved for federal aid. Then he estimated that, as of the same date, the states had improved about 70,000 miles without the aid of the federal cooperative funds.

"There are innumerable ways in which the facilitation of highway traffic wherever it may be is just as important to the great stream of interstate travel as to the immediate residents of a given city or commonwealth."

COOPERATION SOUGHT

The Chief of the Bureau of Public Roads, Thomas H. MacDonald, in his last statement of views before a congressional committee, told of the demand for cooperation in road building reaching his Bureau. "There is an insistent and growing demand for an increase in the federal support of the annual road-building program" he told the House Committee on Appropriations in urging the appropriation for the current fiscal year 1930. "For about eight years the country as a whole has been spending from \$1,000,000,000 to \$1,500,000,000 annually for highway purposes. This has been roughly equally divided between work done under state supervision and that done under local supervision. The federal aid road system coincides with the state roads to the extent of about two-thirds of the total mileage of the latter system. The federal aid projects have constituted about one-half of the states' annual program, and the federal contribution has been about 17 per cent of the total expenditures supervised by the states, or only about 8 per cent of the whole of the annual highway expenditures.

"The most generous contributors to the highway program by far have been the local units, particularly the counties. So we find now that in many states the counties have about exhausted their credit for aiding the building of the roads which legally are state, or state and national responsibilities, and there are no funds left to build the feeder roads."

PENNSYLVANIA—Contractors engaged in state road work were employing 8134 men, according to the last report compiled by the Department of Highways. An additional 8294 were employed in road maintenance by the department.

TENNESSEE—The State Highway Department has opened a new 20.7-mile stretch of concrete pavement near Atwood. In the construction the contractor averaged 1000 feet per day.

U. S. is Seeking Low-cost Plan for Oiling Highways

LOW-COST METHODS of oil-treating hundreds of thousands of miles of gravel, sand-clay and topsoil highways in the United States are greatly needed, H. S. Fairbank, engineer of the Bureau of Public Roads, Department of Agriculture, stated October 30 in announcing that a detailed study of this problem would be inaugurated by the bureau.

In explaining highway needs before the recent asphalt paving conference at West Baden, Ind., Mr. Fairbank said that traffic on thousands of miles of dirt roads was such as to require a smooth, dustless surface, but was not great enough to warrant cementing or other costly systems of hard surfacing.

His discussion of research work to be conducted by the bureau is reported by the United States Daily as follows:

A joint technical committee created in March and representing the asphalt industry and the bureau proposes to make a detailed study of the results of the methods of bituminous treatment developed in many parts of the country, to study the efficacy of the methods of applying and mixing asphalt and aggregates, to analyze the asphaltic materials actually used in work done to date and all available materials which might be used, and to build and study experimental roads of various types. Some of this work has been under way for some time.

A detailed analysis of the methods, materials, cost, and service of the various types of low-cost surfaces thus far developed in various localities will be made. Among the types to be studied are the sand-clay and topsoil surface treatments in the southeastern states; sand-asphalt surfaces in Massachusetts, North Carolina, and other states; bituminous treatments of clay roads in Illinois, and elsewhere; the retreated method of Indiana and somewhat similar treatment of stone roads in other states; the so-called blotter treatment of gravel roads in Minnesota and adjacent states; oiled sand roads in California, Nebraska, Nevada, and elsewhere; and in the mixed-in-place treatment of fine-crushed rock and gravel surfaces, which has reached its highest development in the western states.

Studies have already been made of surfacing treatments of sand-clay and topsoil in Florida and South Carolina, and also of oil treatments of clay roads in Illinois and of the retreated method in Indiana. The data gathered by engineers of the bureau, the asphalt industry, and the respective states, are being analyzed and reports on the three types will be published shortly.

Studies of the efficiency of construction methods and equipment are being conducted by the bureau with the advice and assistance of the asphalt industry. These studies are similar to those previously made by the bureau in grading and concrete and bituminous pavement construction.

The study and analysis of the available bituminous materials is the particular responsibility of the industry, under the plan of cooperation that has been agreed upon.

The construction and study of experimental roads has been started and will be actively prosecuted, mainly by the Bureau of Public Roads, in cooperation with several of the state highway departments, but always with the active assistance and advice of representatives of the asphalt industry.

THREE EXPERIMENTS IN PROGRESS

Three experiments are now in progress. One is the continuation of surface treatments of topsoil in South Carolina; another is a series of experiments in California involving the treatment of fine crushed rock and gravel surfaces with several types of bituminous materials by surface treatment and mixing in place; the third is a series of experiments in the treatment of sandy soil in the sand-hill section of Nebraska with various asphaltic materials.

There is today a need for low-cost methods of improving hundreds of thousands of miles of highways in the country, consisting of gravel, sand-clay, and topsoil and graded and drained earth roads. The traffic on these roads is such as to require a smooth, dustless year-round surface, but not great enough to justify the costlier high-type surfaces.

DUST NUISANCE COMBATED

About six years ago the bureau first became interested in the development of low-cost surfacings, using bituminous materials to lay the dust and reduce the loss of surfacing material. At that time, increase in traffic on the forest roads, which had been constructed under supervision of the bureau, gave rise to a dust nuisance and loss of surfacing material. The forest roads had a surfacing of finely crushed rock or gravel, which had been adequate for traffic up to that time. A similar type of surface had been adopted by a number of the western states and a rather considerable mileage had been built.

Oregon and California took the lead in the experimental use of petroleum oils by various methods. Later the bureau joined with the California highway department in an investigation of the various methods that had been tried with a view to ascertaining what methods or combination of methods and materials would afford the greatest relief. At about the same time the bureau was cooperating with the highway commission of South Carolina in similar experiments of topsoil roads.

"A task without a vision is drudgery,
A vision without a task is a dream,
But a task with a vision is the hope of the world."
—Cornelia Adair

BUT NOT OLD CARS

Our house contained some furniture
That we had thought were freaks;
An antique dealer came along,
And said they were antiques.
And for a chair and an old settee
He paid a sum that staggered me.
I said: "This system's very fine—
It ought to work on cars;
My bus is old and very rare—
I'll take it down to Starr's";
The sum he offered was immense,
It staggered me—'twas thirty cents.

—Georgia Highways.

"I can't marry you," said the justice of the peace to the nervous bridegroom. "If this girl is only seventeen you will have to get her father's consent."

"Consent!" yelled the groom. "Say, who do you think this old guy with the rifle is, Daniel Boone?"

People differ on all the essentials to success except one, and on that one they all agree—it is **HARD WORK**.

State Highway Progress Reports

ALAMEDA COUNTY

Hanrahan Company of San Francisco, contractors, have the 8.8 miles of state highway reconstruction between Hayward and Niles well under way. The concrete shoulder and asphalt surfacing, including a small portion of 30-foot concrete pavement, is rapidly progressing, a considerable portion of the Portland cement concrete having already been placed. The asphalt concrete surfacing has commenced and a large portion of the base course has been laid. The placing of the surfacing course is now under way and the contract should, in a very short time, present a nearly complete appearance. A considerable portion of the grading of shoulders is yet to be done, together with the construction of side road approaches, before the road can be thrown open to full use of traffic. All structures are completed; which include the widening of a number of concrete structures and the widening of corrugated pipe culverts.

Considerable improvement is to be made at the north end of the town of Niles. The plan here was the reconstruction of the curved road approaches using the longest possible radii, giving the greatest visibility and throwing the intersection with the counter road to Niles Canyon some 200 feet northeasterly of the underpass. The underpass formerly had a 5-foot sidewalk on split grade along the westerly side. This sidewalk is to be torn out, as a pedestrian underpass has already been installed under the railroad tracks west of the underpass structure. This improvement, while a seemingly minor one, is a particular advantage to traffic, as it increases the roadway width in the clear to 28 feet.

During the interim all local and through traffic is being handled along the work.

ALPINE COUNTY

Widening operations between Markleeville and Woodfords have just been completed and surfacing with crushed gravel is under way and will be completed by January 1, 1930, placing this section in good shape for winter travel.

AMADOR COUNTY

Hemstreet and Bell have completed placing crushed rock surfacing on the newly graded section of the Mother Lode Highway between Dry Town and Amador City. This rock surfacing will be armor coated next spring. Jess Cole was the resident engineer on the grading and surfacing.

BUTTE COUNTY

The contract from Oroville to Feather River, a distance of four miles on the Feather River lateral, Ariss Knapp Company, contractors, is proceeding

normally. The work will probably be completed late in January unless exceedingly bad weather conditions prevail.

CALAVERAS COUNTY

The new grade on the Mother Lode Highway between Mokelumne Hill and San Andreas has been surfaced with crushed gravel by the Adams Company.

FRESNO COUNTY

The old Herndon Bridge, which served traffic for 25 years, has at last been demolished, having been replaced by the modern structure on the west side of the Southern Pacific tracks, which was completed early last summer, eliminating two dangerous grade crossings.

Tieslau Bros. has completed its contract for surfacing with premixed oil and rock from Coalinga to 7 miles west on the Sierra-to-the-Sea Highway.

Convict Camp Number 19 in the Kings River Canyon is making good progress and already some four or five miles of completely graded highway provides an excellent example of what this modern mountain scenic highway is to be. The entire personnel, including free men and convicts, are taking a keen interest in their work and are endeavoring to make not only the highway but also the reputation of Camp 19 somewhat above the average.

IMPERIAL COUNTY

Los Angeles-Imperial Valley Route—Contractor A. M. Peck of Los Angeles is starting work on a 10.4-mile Portland cement concrete paving project from Brawley to 4 miles west of Westmoreland. The new pavement will be 20 feet wide and will be laid on a sand cushion placed on top of the existing oil-treated surfacing.

Borderland Highway—Bids will be opened for paving from El Centro to Holtville on January 22. The improvement will consist of a 20-foot pavement laid on a sand cushion over the existing oil-treated surfacing.

A contract has been awarded to R. E. Hazard Contracting Company of San Diego for asphalt concrete widening and resurfacing from Dixieland to Seeley.

Bids will be opened January 15 for alignment improvement and cement concrete pavement from Myers Creek Bridge to 3 miles west of Coyote Wells. The pavement destroyed by floods in December, 1926, will be replaced with this project. Over part of this project the roadbed was constructed under a previous contract.

KERN COUNTY

State forces have placed 8 miles of nonskid surface on the slippery portions of the long tangent south

of Bakersfield and are now engaged in placing sand and gravel borders and oil-mixing same. It is hoped that this work will reduce the number of accidents on this road.

Hartman Construction Company was successful bidder for two miles of realignment and macadam surface on the Cholame Lateral between Wasco and Lost Hills. This work will be started at once and will eliminate two very dangerous right angle turns.

Force-Currihan & McLeod, Contractors, have completed grading and surfacing with oil-treated crushed gravel 11.5 miles of State Highway Route 57 from east city limits of Bakersfield to within one mile of the mouth of Kern Canyon on the Kern River road. A portion adjoining the city of Bakersfield was graded to a wide turnpike section in view of the fact that a considerable proportion of adjacent land is subdivided into lots and built into a residential section. The remainder of the route is a 24-foot roadbed with a 20-foot oil-treated surfacing. The easterly three miles has been changed radically from the former highway, the curvature has been radically reduced and about 0.5 mile of distance saved. Construction of a line change involved a large cut and fill each with a maximum depth and height of 70 feet, involving about 70,000 cubic yards. The resulting highway has caused much favorable comment.

KINGS COUNTY

Day labor forces under Foreman Milford are widening the roadway west of Lemoore and covering the adobe soil on the roadsides with a sand surface, which will remedy the slippery condition heretofore encountered after every rain.

LASSEN COUNTY

The contract between Goodrich and Coppervale, Doveri & Company and J. A. Maddox, contractors, is proceeding. While the long dry spell this fall was a great boon to these contractors, they will be unable to complete their work this year under normal conditions. However, the job is in such condition that it will carry traffic without difficulty during the winter months as all of the newly graded road which will be used by traffic has been surfaced.

Hein Brothers and Chittenden, who have a contract from Susanville to Milford, for surfacing and stockpiling screenings, are nearing completion of this contract. It is anticipated that with the weather holding good they will finish about January 10.

LOS ANGELES COUNTY

The contract for a line change immediately north of the Newhall Tunnel has been awarded to McCray Co. Normal progress is being made on this work. It is expected that this contract will be completed next June.

The work of grading the Newhall Alternate Line between Tunnel Station and the Santa Clara River is completed. LeTourneau and Lindberg were the contractors. It consisted of grading a 46-foot roadbed, 8.6 miles long, and eliminates from this route the Newhall Tunnel and several dangerous curves in the vicinity of Newhall and Saugus. Work is to be started immediately on paving this section with Portland cement concrete, 30 feet wide.

The first contract on the La Canada-Mt. Wilson Highway for grading 2.6 miles of 40 foot roadbed was awarded to H. W. Rohl Company on August 14th. Rough grading is in progress on one and one-half miles.

LOS ANGELES AND VENTURA COUNTIES

A contract for oil mix shoulders between Calabasas and Conejo Summit has been awarded to the Southwest Paving Company. It is expected that this contract will be finished in April.

MADERA COUNTY

A. Teichert & Son, Contractors, have completed about half of the surfacing on their contract for widening and resurfacing with asphaltic concrete from Califa to the north county line.

The Valley Paving Company has completed the paving from Califa to Berenda.

The subway connection and wyes connecting with Route 32 are still to be paved. This work, together with that of A. Teichert & Son, adjoining, and the subway at Califa, will, when completed, furnish a modern, 20-foot highway free from grade crossings between Merced and Fresno.

Otto Parlier has the contract for the subway at Califa, which connects the above two jobs and his work will be completed shortly after the pavement is finished.

MARIN COUNTY

Marin County has been the scene of considerable highway activities during the past year. A very large sum of money has been expended in the reconstruction work along Route 1 (the Redwood Highway). Some of the more important jobs have been the reconstruction of the Point San Quentin Road from San Rafael to San Quentin, a distance of three miles, where the roadbed was raised to an elevation above high water and widened, a portion of it being constructed 40 feet wide. This new section affords the East Bay cities an adequate connection to the Redwood Highway.

In line with the Commission's policy of reconstructing the state highway obviating the dangerous Corte Madera grade and the numerous small towns adjacent to the existing road, the contract awarded May, 1929, to Granfield Farrar & Carlin, is now practically completed in so far as the grading of the new way is concerned, which, by way of direction, extends very nearly in a straight line from Alto to San Rafael. This new aligned portion has not been opened to traffic, nor will it be, until the completion of the surfacing contract, which will be let in the near future.

Contracts have been recently awarded to:

1. Bids for the construction of an overhead crossing of the Northwestern Pacific Railroad at detour, about one-half mile south of Greenbrae, were recently received.

2. A second contract has been awarded to Fredrickson & Watson for the construction of an overhead crossing of the Northwestern Pacific Railroad's main line tracks at California Park. Here an extensive structure is contemplated, including a long steel truss span with approach steel beam spans and timber trestles on pile and frame bents.

3. A contract has but recently been awarded to the Butte Construction Company of San Francisco for the construction of the Corte Madera Creek bridge, including a small bascule span approximately 40 feet of clear width of opening.

These three structure contracts are planned to be completed by July 1, 1930, together with the surfacing contract from San Rafael to Alto, when they all can be opened to carry the heavy Redwood Highway traffic. At the southerly end at Alto, we have recently reported the completion of the overhead crossing of the Northwestern Pacific Railroad at Alto, together with approximately 0.6 mile of approaches, which completes that portion of Route 52 at the westerly termini at Alto. This new connection will also serve as a temporary connection with the new reconstructed highway which eventually is to extend from Sausalito to San Rafael, funds for which have been provided in the present budget; and it is hoped that the construction will be under way during the early summer of 1930.

Immediately north of San Rafael, the Commission has under way a contract 1.8 miles in length from Gallinas Creek to San Rafael, Granfield Farrar & Carlin of San Francisco being the contractors. This project covers the construction of heavy graded roadway which will be surfaced with bituminous macadam and Portland cement concrete on the excavated sections. This work is progressing rapidly and the contractor is endeavoring to get as much grading work done as possible prior to the heavy rains, in order to take advantage of the settlement of the fills.

The heavy cuts on the contract just north of San Rafael have been opened and much material moved. This work does not interfere with through travel as most of it is on an extensive line change and the old road is open to traffic with no obstructions. It is expected that a contract will soon be let to construct an overhead crossing over the tracks of the Northwestern Pacific Railroad at Forbes and that the completion of roadway will coincide with the completion of the overhead crossing and allow the section to be opened about the middle of the year.

MARIN AND SONOMA COUNTIES

In order to complete the reconstruction of the highway between Petaluma and San Rafael, the 11.9-mile section between one mile south of Petaluma and Ignacio is under reconstruction by Hanrahan Co., contractors. Grading is approximately three-fourths complete with construction of concrete boxes, corrugated metal pipe culverts and cattle passes practically completed. With the settlement of the new fills during the winter rains, a bituminous macadam surface will be placed on all new alignment and second story concrete pavement will be placed on the old road wherever practicable. The concrete bridge and stream approaches on the new line at Novato Creek have recently been completed by W. L. Proctor, contractor. The improvement of this section, together with the previously noted section just north of San Rafael, will furnish a 20-foot roadway from San Rafael to Petaluma and should be ready to carry the mid-summer heavy traffic. At San Antonio Creek on a line change and to take the place of the structure on the old road, a contract has been awarded to McDonald & Maggiora of Sausalito for the construction of a reinforced concrete bridge on a new line which will materially shorten the distance over the existing roadway.

An outstanding saving in the highway activities in

Marin-Sonoma counties is the shortening of the distance by the reconstruction work. The present distance from Santa Rosa to Sausalito is approximately 52 miles and, upon the completion of reconstruction, will be reduced nearly 5 miles when the last section from Alto to Sausalito will have been completed during 1930-1931.

MENDOCINO COUNTY

The construction of three timber bridges with approaches and several line changes on the McDonald-to-the-Sea road is practically complete. The contractor, W. C. Colley of Berkeley, has a little finishing work yet to do; the graded sections are surfaced and this section will be much appreciated by the traveling public when the rains are finished and free use of the road is possible.

MERCED COUNTY

Day labor forces under Superintendent Nelson are widening three narrow bridges on the main Valley Highway north of Merced. This work will remove the last "bottleneck" on this road.

The Pacheco Pass Road west of Los Banos is being widened by maintenance forces under Foreman Berry. Material is being hauled from the narrow cuts and the roadway graded to a 30-foot width.

NAPA COUNTY

Fredrickson & Watson Construction Co. and Fredrickson Bros. have brought their contract on the road from Napa Wye to Solano County line so close to completion that a week of good weather will finish it. Traffic is enjoying this section together with the adjacent section to the north as recently completed by the same contractor, and as this road is one of the principal connections between the bay cities and Sacramento and the central and northern sections of the state, these improvements are a benefit to both tourist and business traffic.

ORANGE COUNTY

The contract for a line change 0.7 of a mile in length between Serra and San Juan Capistrano was awarded to Match Bros. on August 12th. This work consists of constructing a 40-foot graded roadbed with Portland cement concrete pavement, 20 feet by 7 inches. Work is nearly completed.

A contract for paving one-half width between Santa Ana and Anaheim was awarded on June 11th to Griffith Company. This section is 4.9 miles long. The paving work is being done in cooperation with Orange County, the state paying for a strip of pavement 28 feet by 7 inches and the county paying for a like amount. The state's portion of this highway is completed, and work is in progress on the county's portion.

A contract for widening the roadbed between Sunset Beach and Newport the entire width of the 90- to 100-foot right of way, and the placing of an additional 10-foot strip of Portland cement concrete has been awarded to the Macco Construction Co. When this work is completed the pavement will be 30 feet

wide for the entire distance. Work is getting under way on this contract.

PLUMAS COUNTY

A contract in Plumas County from the westerly boundary to two and one-half miles southwest of Chester was completed in October by Charles Harlowe, Jr., contractor. The section immediately to the west of this contract between the county line and Morgan Springs in Tehama County was completed about the same time by Johnson Brothers of Portland, under the direction of the Bureau of Public Roads. These two jobs eliminate the high summit at Feather River Meadows and make it possible to maintain this road during the winter months with greater ease, owing to the lower level and the lighter snowfall. Since the completion of these two jobs, arrangements have been made to handle the snowfall during the coming winter, and equipment is on the ground awaiting the first fall.

PLUMAS AND TEHAMA COUNTIES

A contract was recently awarded to E. B. Bishop and covers the construction of a primary highway from a point two and one-half miles southwest of Chester to the Lake Almanor causeway, and also, the production of screenings for next season's armor coat work from Morgan Springs to Lake Almanor causeway. It is doubtful if the work will start before the spring.

RIVERSIDE COUNTY

Riverside-Ontario Route—Bids will be opened January 22 for grading and paving through the new undergrade crossing under the tracks of the Union Pacific Railroad Company.

Plans are being prepared for the widening of three narrow bridges between Riverside and Ontario.

SACRAMENTO COUNTY

Due to the lack of rain this fall, the grading and surfacing job between Arno and McConnell, the main Valley Highway south of Sacramento, has practically been completed. The firm of Larsen Brothers is the contractor. A. K. Nulty is resident engineer.

SAN BERNARDINO COUNTY

Foothill Boulevard—The Steele Finley contract for widening and resurfacing the Foothill Boulevard from the east city limits of Claremont to Cherry avenue is now complete. The work consisted of widening the existing 18-foot pavement to 30 feet.

Arrowhead Trail—The Gist and Bell contract for realignment of approximately 4 miles near the summit of Cajon Pass is nearing completion.

The George Herz Company is making excellent progress with the grading on their contract between Barstow and Yermo. This contract includes the laying of oil-treated plant-mixed surfacing 20 feet wide.

The Dillon and Boles contract for grading and oil-treated surfacing from Yermo to Dunn has been completed.

National Old Trails Highway—A contract for grading and plant-mixed oil-treated surfacing from 4 miles west of Hector to 2 miles west of Argos is complete. This work was done by the Allied Contractors, Inc.

Two new contracts have been awarded to the New Mexico Construction Company, extending the improvement of the Old Trails Highway from 2 miles west of Argos to 1½ miles west of Siberia and from 1½ miles west of Siberia to 6½ miles east of Amboy. The contractor has started work on both projects.

Crest Route—A contract has been awarded to Lewis Construction Company for completion of the gap between 4½ miles west of Running Springs Park and Squirrel Inn.

SAN DIEGO COUNTY

Work is nearly completed on constructing oil rock borders on portions of the Coast Route between the city limits of San Diego and Oceanside. The R. E. Hazard Contracting Company of San Diego are the contractors.

A contract for grading the Rose Canyon road between Balboa avenue and Torrey Pines road was awarded on August 13th to the R. E. Hazard Contracting Company. This section is 5.4 miles long and is to be a 46-foot graded roadbed. About two miles have been graded to date.

The contract for grading a roadbed 36 feet wide and placing of Portland cement concrete pavement 20 feet by 7 inches is nearly completed between Pine Valley and Kitchen Creek on the San Diego-El Centro Highway. Basich Brothers are the contractors.

A contract for 4.5 miles of 38-foot graded roadbed between La Posta Creek and Miller Creek on the San Diego-El Centro Highway was awarded on May 27th to the Nevada Contracting Company. Grading is completed for a distance of about four miles.

A contract for grading 3.9 miles of 36-foot roadbed from Kitchen Creek to La Posta and paving with 20 feet by 7 inches Portland cement concrete was awarded on June 25th to Basich Bros. About three miles of rough grading is completed, and grading is now in progress on about one mile. This section is on the San Diego-El Centro Highway.

SAN JOAQUIN COUNTY

The lack of the usual fall rains has enabled two contracts in San Joaquin County to be much nearer completion than would normally have been the case. Contractor C. W. Wood has completed laying the concrete pavement between Banta and the San Joaquin River on the main road between the San Joaquin Valley and the bay region. This job eliminates a dangerous stretch of narrow old county built macadam. The shoulder grading alone remains to be done.

The two line changes on the Hogan Road on the main Valley Highway south of Stockton have been graded and surfaced by the firm of Lilly, Willard & Biasotti. This job is nearly complete.

SAN MATEO COUNTY

H. W. Rohl, contractor on the section of the Bayshore Highway, San Francisco to South San Fran-

cisco, has completed his work with the exception of the section through the deep cut at Sierra Point where extensive slides prevent finishing roadway. Also, the Spring Valley Water Company's pipe line as situated on the hillside above the cut, is to be relocated to lie in the roadway, digging of trench being under way.

In the meantime a small amount of the contractor's equipment is being kept to care for the cut during the rainy season.

A contract is being advertised to continue the Bayshore Highway construction by building the section from San Mateo to Redwood City, for which bids will be received on January 8th.

SAN MATEO, SANTA CLARA AND SANTA CRUZ COUNTIES

The section of the Skyline Boulevard between the La Honda Road and Saratoga Gap has been completed.

Twohy Bros. Co. and J. F. Shea Co., contractors on grading and surfacing, have completed their work and Tieslau Bros. having furnished screenings, the state forces have constructed an armor coat oil surface. This opens the boulevard from San Francisco to the gateway into the California Redwood Park and allows of another through route to Santa Cruz. Due to the fact that California Redwood Park Road is an unsurfaced, graded roadway, it will be closed to traffic during the winter of 1929 and 1930.

SANTA CLARA COUNTY

The program for the improvement of the Peninsula Highway between Palo Alto and Santa Clara is proceeding satisfactorily. The section between Sunnyvale and Santa Clara has been completed by Contractor N. M. Bail and he is just completing a channel change of Calabazas Creek under day labor contract. This change is of major importance as the stream paralleled the roadway on the easterly side for over 3000 feet and was so close to the pavement as to forbid widening on that side, and even threatened the existing work, causing heavy maintenance with a permanent type of retaining structure necessary in the near future. After many attempts to come to an agreement with property owners, permission was obtained to continue Calabazas Creek across the property to the east, and following the eastern boundary of the property, empty into the channel of Campbell Creek about one-fourth mile east of the present connection. The original channel is being filled with material from neighboring dykes and from a private borrow pit.

The section from Palo Alto to San Antonio avenue is being advertised for bids to be opened January 8, 1930, and the connecting section, San Antonio avenue to Sunnyvale, is to be advertised early in the spring, so that the end of 1930 should see the entire 13 miles from Palo Alto to Santa Clara completed with Portland cement concrete widening and asphalt surface, a total width of 30 feet as compared to 20 feet existing.

The pavement of that portion through Palo Alto from San Francisquito Bridge to the south city limits of Mayfield (Palo Alto) is to be 40 feet wide.

SHASTA COUNTY

Grier and Taylor who have a contract for furnishing and hauling surfacing material from the end of the

pavement to La Moine, are setting up their plant at Pollock and will be ready to operate about January 10. Their plan is to supply all of the material from this one plant as it is centrally located and will speed up the job by eliminating additional setups although a much longer haul is involved.

SHASTA AND TRINITY COUNTIES

The contract for surfacing and screenings from Weaverville to Tower House on the Trinity Lateral was completed by A. Milne, contractor, on December 10, just in time to escape the delay incidental to the heavy rain immediately following.

Contractors in this district, as well as over the entire state, have been especially fortunate this fall with weather conditions. Normally, road work is hampered by stormy weather early in October. In higher altitudes it is necessary to close down most jobs on account of snow. However, with the exception of the stormy period between December 8 and 17, the weather has been warm and dry and ideal for highway construction.

SISKIYOU COUNTY

The contract of T. M. Morgan Paving Company, contractors, between Shasta River and Gazelle, is nearing completion. The 7-mile stretch of pavement which was under construction on this job was completed last month and was opened to traffic on December 10. The opening of the pavement was very opportune as the detour which was in use between Edgewood and Gazelle was through adobe country on which only a light coat of surfacing had been placed to carry the traffic through summer months. During the week following the opening of the pavement, this detour undoubtedly became impassable although no traffic was routed over it. Unless bad weather conditions prevail, the Morgan Company will complete their contract during the month of January.

The contract for reconstructing a short piece of pavement 0.6 of a mile in length at Spring Hill near Mt. Shasta City has been completed and was opened to traffic on December 8. This reconstruction eliminates a very dangerous 200-foot radius curve at the foot of Spring Hill where numerous accidents have occurred during the past few years. The grading for this improvement was completed by Young Brothers, contractors, earlier in the year, following which the paving contract was let to the Mathews Construction Company, who have now completed their portion of the work.

Beerman and White have been awarded a contract for the producing of surfacing material and screenings between Gazelle and Yreka. They have one plant operating at Gazelle and will start another plant on the Yreka end about January 10. The hauling of the material is being handled by O. McKeenolds on a separate contract.

SOLANO COUNTY

A serious traffic hazard on a heavily traveled highway has been eliminated by the completion of the grading and asphalt macadam surfacing of the stretch of road from the Napa County line easterly through The Jameson Canyon. This is the highway connecting

the Napa Valley and Redwood Highway country with the Sacramento Valley. The firm of Fredrickson & Watson and Fredrickson Brothers was the contractor. The moving of several miles of pipe line supplying the city of Vallejo was also involved.

TEHAMA COUNTY

A. F. Giddings has completed his setup near Battle Creek on the Red Bluff-Susanville lateral and is ready to operate. The surfacing will be spread westerly from the plant to Paynes Creek during the winter as it is desired to have this portion well compacted for next summer's oil program. The remainder of the surfacing and stockpiling from the plant to Morgan Springs will follow during the spring months.

TRINITY COUNTY

Recent rearrangements of the convict forces employed on construction in the state have resulted in a reduction of forces at Camp 12, located in Trinity County 25 miles west of Redding, to a force of 55 men. The work of this camp will be concentrated upon the completion of the section in Shasta County immediately west of the Buckhorn Summit. This work is now completed to within about a mile of the summit and its use will eliminate a very long, heavy climb several miles in length on the existing county road. This work should be completed during the coming season and will enable traffic to make use of the new construction next winter. As the road on the Trinity side is on comparatively light grades, work on it will be delayed until a later date.

TULARE COUNTY

The Valley Paving Company is making rapid progress on its contract for widening and resurfacing on the Golden State Highway between Delano and Pixley. H. B. La Forge is Resident Engineer for the state.

Bids will be opened January 2d on a contract for resurfacing from Pixley to Tipton on Route 4.

TUOLUMNE COUNTY

The Adams Company has been awarded the contract for surfacing the newly graded section of the Mother Lode Highway between near Shaws Flat and the Columbia-Sonora Road. This lies a short distance north of Sonora. Work has started.

Just east of Sonora a grading and surfacing job between Sonora and Sullivan Creek has been completed by Lilly, Willard and Biasotti. This road carries a heavy traffic for a mountain road and the improvement is much appreciated by the local people.

VENTURA COUNTY

A contract for second story paving with asphaltic concrete from Conejo Creek to Carmarillo has been awarded to Griffith Company. Work is just starting on this contract.

Record of Bids and Awards

HIGHWAY BID OPENINGS AND AWARDS

From Nov. 27 to Dec. 26

IMPERIAL COUNTY—Between Brawley and 4 miles west of Westmorland grading and paving with Portland cement concrete 10.4 miles. Dist. VIII, Rt. 26, Secs. H and A. Griffith Company, Los Angeles, \$338,519; E. Paul Ford, San Diego, \$353,319; R. E. Hazard Contracting Co., San Diego, \$353,785; McCray Co., Los Angeles, \$341,908; Jahn & Bressi, Los Angeles, \$326,737; Basich Brothers, Los Angeles, \$349,140; George Herz & Co., San Bernardino, \$335,115; Watson & Sutton, San Diego, \$395,195; T. M. Morgan Paving Co., Gazelle, \$365,637; Sander Pearson, Santa Monica, \$333,048; J. F. Knapp, Oakland, \$349,477. Contract awarded to A. M. Peck Company, Los Angeles, \$312,057.05.

IMPERIAL COUNTY—Between Dixieland and Seeley, 5 miles to be graded and paved with asphalt concrete. Dist. VIII, Rt. 12, Sec. C. Basich Bros., Los Angeles, \$113,522; V. R. Dennis Const. Co., San Diego, \$135,922; Gibbons & Redd, Burbank, \$140,818; Ben Pearce Const. Co., San Diego, \$129,910. Contract awarded to R. E. Hazard Contracting Co., San Diego, \$110,426.30.

LOS ANGELES COUNTY—Reinforced concrete arch bridge across La Canada Canyon 1½ miles northeast of La Canada. Dist. VII, Rt. 61, Sec. A. E. S. Johnson, Pasadena, \$33,933; George J. Ulrich Const. Co., Modesto, \$43,788; Oberg Bros., Los Angeles, \$32,061; Sharp & Fellows, Los Angeles, \$46,388; John Simpson Co., Los Angeles, \$35,951; William J. Shirley, Los Angeles, \$38,182; A. R. and C. O. Bodenhamer, Hemet, \$42,828; Sydney Smith Contracting, Los Angeles, \$37,182; Carpenter Bros., Inc., Beverly Hills, \$34,717. Contract awarded to Whipple Engineering Company, Monrovia, \$31,419.75.

LOS ANGELES COUNTY—Between Tunnel Station and Santa Clara River, 8.5 miles to be paved with Portland cement concrete. Dist. VII, Rt. 4, Sec. F. Will F. Peck Company, Los Angeles, \$277,270; J. F. Knapp, Oakland, \$287,560; McCray Company, Los Angeles, \$288,366; Basich Brothers, Los Angeles, \$280,975; Fredrickson & Watson, Oakland, \$324,435; Griffith Company, Los Angeles, \$293,836; Wells and Bressler, Santa Ana, \$282,044; O. A. Lindberg, Newhall, \$329,864. Contract awarded to Jahn and Bressi, Los Angeles, \$253,126.

ORANGE COUNTY—Between Dana Point and Serra, 0.2 of a mile to be graded and paved with Portland cement concrete. Dist. VII, Rt. 60, Sec. C. Chas. and George K. Thompson, Los Angeles, \$13,543; Western Construction Company, \$14,725. Contract awarded to Match Bros., Elsinore, \$12,583.

SAN BERNARDINO COUNTY—Between 4.5 miles west of Running Springs, and Squirrel Inn, 6.7 miles to be graded. Dist. VIII, Rt. 43, Sec. B. W. H. Hauser, Oakland, \$253,513; Isbell Const. Co., Fresno, \$225,299; Triangle Rock & Gravel Co., \$232,012; Kern Contracting Co., Bakersfield, \$251,641; Yglesias Bros., Inc., San Diego, \$270,709; Gist & Bell, Arcadia, \$238,465; J. G. Donovan & Son, Los Angeles, \$202,920; Wm. C. Horn Co., Puente, \$228,649; Mutual Income Properties, Los Angeles,

\$244,303; J. F. Knapp, Oakland, \$251,219; Nevada Contracting Co., Fallon, Nevada, \$244,647; O. A. Lindberg, Newhall, \$213,510. Contract awarded to Lewis Construction Company, Los Angeles, \$189,687.

TEHAMA COUNTY—6 timber bridges at various points east of Red Bluff, total length approximating 665 feet, bridge decks to be surfaced with bituminous macadam. Dist. II, Rt. 29, Sec. A. Brunk and Case, Corning, \$24,970; E. B. Skeels, Roseville, \$25,616; Lord and Bishop, Oroville, \$24,990; A. Young, Yreka, \$27,125; R. B. McKenzie, Red Bluff, \$23,925; J. P. Brennan, Redding, \$26,103; M. A. Jenkins, Sacramento, \$24,865; M. B. McGowan, San Francisco, \$25,990. Contract awarded to F. H. Nielson, Orland, \$22,504.

TEHAMA-PLUMAS COUNTIES—Between Morgan Springs and Lake Almanor. Grading and surfacing with untreated crushed gravel or stone, 21.7 miles. Dist. II, Rt. 29, Secs. C and A. Contract awarded to E. B. Bishop, Sacramento, \$59,265.

YUBA COUNTY—Buildings, appurtenances, and utilities to be moved from within to without the limits of the state highway right of way at Wheatland. Dist. III, Rt. 3, Sec. A. William Grebe, Sacramento, \$4,649; McDaniels & Burroughs, Marysville, \$3,029. Contract awarded to O. F. Brown, Sacramento, \$2,347.

ACCEPTANCES OF HIGHWAY CONTRACTS

AMADOR COUNTY—Contract for producing and placing untreated crushed rock surfacing between Drytown and Amador City, Mother Lode Highway, 2.7 miles, at an approximate cost of \$28,100. Hemstreet & Bell of Marysville, contractors.

EL DORADO COUNTY—Contract for surfacing with untreated crushed gravel between Logtown and 4 miles southerly, about 4 miles, approximate cost \$12,850. Hemstreet & Bell of Marysville, contractors.

FRESNO COUNTY—Contract for placing pre-mixed oil-treated surfacing on crushed gravel base from three miles east of Parkfield Junction to Coalinga, 6.7 miles, at an approximate cost of \$53,800, has been satisfactorily completed in accordance with the plans and specifications. Tieslau Brothers of Berkeley, contractors.

HUMBOLDT COUNTY—Contract for producing and stockpiling broken stone and screenings between Mill Creek and Little River, Redwood Highway, 6.4 miles, approximate cost of \$18,100. Wm. C. Elsemore, Eureka, contractor.

HUMBOLDT COUNTY—Contract for constructing an overhead crossing and 7 timber bridges at points between one and 3½ miles north of Arcata, Redwood Highway, at an approximate cost of \$57,500. Mercer-Fraser Company, Inc., of Eureka, contractors.

HUMBOLDT COUNTY—Contract for constructing a graded roadbed and placing a crushed rock surfacing from Arcata to a point 0.3 of a mile north of Mad River, Redwood Highway, a length of about 3 miles, at an approximate cost of \$92,700. H. J. Kennedy and Daniel Bayles of Oakland, contractor.

KERN COUNTY—Contract for constructing graded roadbed and placing oil-treated crushed rock surfacing between Bakersfield and 1½ miles east of Cottonwood Creek, 11 miles, approximate cost \$186,800. Force, Curran & McLeod of Oakland, contractors.

LOS ANGELES-SAN BERNARDINO COUNTIES—Contract for grading roadbed and placing asphaltic

concrete pavement between Claremont and Cherry avenues, 10.4 miles, at an approximate cost of \$334,000 has been satisfactorily completed and accepted. Steele Finley of Santa Ana was the contractor.

MARIN COUNTY—Contract for constructing an overhead crossing over the tracks of the Northwestern Pacific Railroad near Alto, Redwood Highway, approximate cost of \$38,400. Contractors, Tibbitts Construction Company of San Francisco.

MONTEREY COUNTY—Contract for constructing a graded roadbed and placing asphalt concrete pavement between Chualar and Salinas, Coast Route. The Peninsula Paving Company of San Francisco, contractors.

ORANGE COUNTY—Contract for constructing a graded roadbed and placing Portland cement concrete pavement westerly of San Clemente, about 0.2 of a mile, at an approximate cost of \$10,100. Match Bros. of Elsinore, contractors.

SACRAMENTO-EL DORADO COUNTY—Contract for constructing oil-treated crushed rock borders on both sides of existing pavement between Folsom and Placerville, 28 miles, approximate cost \$77,800. W. H. Larson of Sonoma, contractor.

SAN DIEGO COUNTY—Contract for constructing a bridge across Pine Valley Creek, approximate cost \$48,700. Contractor Linderman and Dueker, Inc., of Harbor City.

SAN JOAQUIN COUNTY—Contract for constructing graded roadbed and placing untreated crushed gravel or stone surfacing between a point 2½ miles north of Turner Station and the Mariposa Road, 1.1 miles, approximate cost of \$38,400. Lilly, Willard and Biasotti of Stockton, contractors.

SAN LUIS OBISPO COUNTY—Contract for constructing a bridge across Graves Creek about 2 miles south of Templeton, at an approximate cost of \$11,000. William Lane of Paso Robles, contractor.

SHASTA COUNTY—Contract for constructing bridge across Mears Creek about 5 miles south of Castell, approximate cost of \$20,000 has been completed. Carlson Bros. of Turlock, contractors.

SISKIYOU COUNTY—Contract for placing a Portland cement concrete pavement at Spring Hill near Mount Shasta, distance of 0.6 of a mile, at approximate cost of \$22,800. Mathews Construction Company of Sacramento, contractors.

TEHAMA COUNTY—Contract for constructing untreated crushed rock shoulders between southerly boundary and Red Bluff, 10.8 miles, approximate cost \$11,600. Hemstreet & Bell of Marysville, contractors.

TRINITY AND SHASTA COUNTIES—Contract for placing crushed stone surfacing between Weaver-ville and Tower House, 22.2 miles, approximate cost of \$81,400 has been satisfactorily completed, etc. A. Milne, Portland, Ore., contractor.

MISSOURI—This state has built 1291 miles of all types of highways this year and will follow next year with 917 miles more, giving it a total of 2876 miles hard surfaced.

NEW MEXICO—All oil surfaced highways built in the future will be twenty feet wide, the State Highway Department has decided, to increase the success of the oil surfacing type of road and to insure its durability. The move to widen roadways has been made in order to overcome shoulder breaks. The greater width of road will combat the tendency, and from experience in other states, will eliminate it.

WATER PERMITS AND APPLICATIONS

Applications for Permit to Appropriate Water, Filed with the State Department of Public Works, Division of Water Resources, During December, 1929.

DEL NORTE COUNTY—Application 6503. C. R. Ward and J. L. Ward, Crescent City, for 0.15 c.f.s. from unnamed creeks tributary to Smith River to be diverted in Sec. 19, T. 17 N., R. 2 E., H. M., for domestic purposes. Estimated cost \$2,000.

SUTTER COUNTY—Application 6504. Frank Berry, Yuba City, for 0.5 c.f.s. from Feather River tributary to Sacramento River to be diverted in Sec. 14, T. 14 N., R. 3 E., M. D. M., for irrigation purposes. Estimated cost \$1,100.

AMADOR COUNTY—Application 6505. Preston School of Industry, State of California, Waterman, for 10 c.f.s. from Sutter Creek tributary to Mokelumne River via Dry Creek to be diverted in Sec. 1, T. 6 N., R. 10 E., M. D. M., for power purposes. Estimated cost \$75,000.

AMADOR COUNTY—Application 6506. Preston School of Industry, State of California, Waterman, for 8.5 c.f.s. and 3750 acre-feet per annum from Sutter Creek tributary to Mokelumne River via Dry Creek to be diverted in Sec. 1, T. 6 N., R. 10 E., M. D. M., for domestic and irrigation purposes. Estimated cost of \$75,000.

SAN BERNARDINO COUNTY—Application 6507. Joseph J. Campbell, Glendale, for 0.02 c.f.s. from underground water tributary to Lake Arrowhead to be diverted in Sec. 21, T. 2 N., R. 3 W., S. B. M., for domestic purposes. Estimated cost \$150.

INYO COUNTY—Application 6508. W. B. Grey, Beatty, Nevada, for 5 c.f.s. from (1) Jail, (2) Birch, (3) Tuber Springs tributary to Jail, Birch and Tuber Dry Gulches to be diverted in Sec. 21 projected, T. 20 N., R. 45 E., M. D. M., and Sec. 20 projected, T. 20 N., R. 45 E., M. D. M., for mining purposes.

NEVADA COUNTY—Application 6509. Nevada Irrigation District, Grass Valley, for 100 c.f.s. from Auburn Ravine tributary to American River to be diverted in Sec. 13, T. 12 N., R. 6 E., and Sec. 22, T. 12 N., R. 6 E., M. D. M., for irrigation purposes.

SAN DIEGO COUNTY—Application 6510. Ed Fletcher, 1020 9th St., San Diego, for 0.15 c.f.s. from unnamed spring tributary to Los Chocos Creek to be diverted in Sec. 13, T. 15 S., R. 1 E., S. B. M., for irrigation and domestic purposes.

LOS ANGELES COUNTY—Application 6511. Ernest E. Pettinger and Ralph Wagner, Saugus, for 0.05 c.f.s. from Drippy Spring tributary to Haskell Canyon Creek to be diverted in Sec. 25, T. 5 N., R. 16 W., S. B. M., for irrigation and domestic purposes.

SONOMA COUNTY—Application 6512. Joe M. Fernandez, Box 490, Sonoma, for 0.22 c.f.s. from Sonoma Creek tributary to San Pablo Bay to be diverted in Sec. 13, T. 5 N., R. 6 W., M. D. M., for irrigation purposes.

TRINITY COUNTY—Application 6513. Trinity Farm and Cattle Company, Redding, for 15 c.f.s. from Trinity River tributary to Klamath River to

be diverted in Sec. 9, T. 36 N., R. 7 W., M. D. M., for irrigation and domestic purposes.

SISKIYOU COUNTY—Application 6514. A. F. Westover, care Geo. G. Underhill, Etna Mills, for 140 c.f.s. from (1) Trail Creek, (2) Fish Lake Creek, (3) E. Br. 6 Mile Creek, and (4) W. Br. 6 Mile Creek tributary to E. Fk. of Salmon River to be diverted in Secs. 23, 15 and 16, T. 39 N., R. 10 W., M. D. M., for mining purposes.

SAN FRANCISCO COUNTY—Application 6515. Karl Brehme, Hobart Bldg., San Francisco, for 200,000 acre-feet from Cache Creek tributary to Sacramento River to be diverted in Sec. 5, T. 10 N., R. 2 W., M. D. M., for industrial and domestic purposes. Estimated cost \$12,000,000.

PLACER AND NEVADA COUNTIES—Application 6516. Bear River Water & Power Co., care J. L. Rollins, Colfax, for 111,020 acre-feet from Bear River and its tributaries tributary to Feather River to be diverted in Sec. 22, T. 15 N., R. 9 E., and Sec. 27, T. 15 N., R. 9 E., M. D. M., from either or both for power purposes. Estimated cost \$2,500,000.

SHASTA COUNTY—Application 6517. Frank Rausch, Dunsmuir, for 0.011 c.f.s. of 7200 g.p.d. from unnamed spring tributary to Sacramento River to be diverted in Sec. 1, T. 38 N., R. 4 W., M. D. M., for domestic purposes. Estimated cost \$275.00.

MODOC COUNTY—Application 6518. Irwin C. Everly, Davis Creek, for 700 acre-feet from Fletcher Creek and Drainage area of Reservoir tributary to Clear Lake Reservoir to be diverted in Sec. 16, T. 47 N., R. 12 E., M. D. M., for irrigation purposes.

MONO COUNTY—Application 6519. W. O. Garner, 450 S. Kenoak, Pomona, for 150 g.p.d. from unnamed spring tributary to Mammoth Creek and Owens River to be diverted in Sec. 9, T. 4 S., R. 27 E., M. D. M., for domestic purposes. Estimated cost \$100.

LOS ANGELES COUNTY—Application 6520. Candido Herreres, R. 2, Box 1134, San Fernando, for 1,240,000 gallons per annum from underground water developed from Muerte Canyon tributary to Little Tujunga Canyon to be diverted in Sec. 34, T. 3 N., R. 14 W., S. B. M., for irrigation and domestic purposes. Estimated cost \$2,000,000.

Permits to Appropriate Water, Issued by the Department of Public Works, Division of Water Resources, During December, 1929.

STANISLAUS COUNTY—Permit 3386, Application 6393. Issued to Lloyd B. and Elizabeth M. Crow, San Francisco, December 2, 1929, for 7.5 c.f.s. from San Joaquin River in Sec. 17, T. 6 S., R. 9 E., M. D. M., for irrigation on 480 acres.

SAN DIEGO COUNTY—Permit 3387, Application 6445. Issued to Harold S. Kibbey, Lakeside, December 2, 1929, for .05 c.f.s. from unnamed spring in Sec. 5, T. 15 S., R. 1 E., S. B. M., for domestic use. Estimated cost \$1,000.

SUTTER COUNTY—Permit 3388, Application 6454. Issued to Austin Kramer, Knights Landing, December 3, 1929, for 1.3 c.f.s. from Sacramento River in Sec. 29, T. 12 N., R. 2 E., M. D. M., for irrigation on 104.3 acres. Estimated cost \$5,000.

SAN JOAQUIN COUNTY—Permit 3389, Application 6397. Issued to W. H. McFall, Manteca, December 3, 1929, for 1.47 c.f.s. from Lone Tree Creek in Sec. 14, T. 1 S., R. 7 E., M. D. M., for irrigation on 117.36 acres. Estimated cost \$1,000.

PLUMAS COUNTY—Permit 3390, Application 2186. Issued to Feather River Power Company, San Francisco, December 4, 1929, for 70,000 acre-feet from Bucks Creek in Sec. 25, T. 19 N., R. 3 E., M. D. M., for irrigation on 44,314 acres. Estimated cost \$3,209,500.

SIERRA COUNTY—Permit 3391, Application 6395. Issued to Belle C. Brown and Wm. S. Brown, La Porte, December 5, 1929, for 65 c.f.s. from Whiskey Creek and Unnamed Ravine in Sec. 16, T. 22 N., R. 10 E., M. D. M., for mining. Estimated cost \$2,000.

SIERRA COUNTY—Permit 3392, Application 6396. Issued to Belle C. and Wm. S. Brown, La Porte, December 5, 1929, for 5 c.f.s. from North Branch of Slate Creek in Sec. 21, T. 22 N., R. 10 E., M. D. M., for mining. Estimated cost \$1,000.

BUTTE COUNTY—Permit 3393, Application 6449. Issued to Holly Citrus Land Company, Hollywood, December 6, 1929, for 1.25 c.f.s. from two unnamed streams in Sec. 6, T. 18 N., R. 5 E., M. D. M., for irrigation on 100 acres. Estimated cost \$2,500.

EL DORADO COUNTY—Permit 3394, Application 5989. Issued to E. C. Sawtelle and Mrs. Bess Lewis, Roseville, December 7, 1929, for .01 c.f.s. from unnamed stream in Sec. 24, T. 11 N., R. 16 E., M. D. M., for domestic use. Estimated cost \$200.

EL DORADO COUNTY—Permit 3395, Application 6431. Issued to V. A. Palmer, Sacramento, December 7, 1929, for .01 c.f.s. from unnamed stream in Sec. 24, T. 11 N., R. 16 E., M. D. M., for domestic use. Estimated cost \$200.

EL DORADO COUNTY—Permit 3396, Application 6440. Issued to C. H. Parrott, Roseville, December 7, 1929, for .01 c.f.s. from unnamed stream in Sec. 24, T. 11 N., R. 16 E., M. D. M., for domestic use. Estimated cost \$200.

MONTEREY COUNTY—Permit 3397, Application 6420. Issued to George P. Tolman, Watsonville, December 9, 1929, for .01 c.f.s. from unnamed spring in Sec. 6, T. 20 S., R. 5 E., M. D. M., for domestic use. Estimated cost \$200.

TRINITY COUNTY—Permit 3398, Application 5925. Issued to R. S. Gurley, Hyampom, December 14, 1929, for 1.0 c.f.s. from Allen and Backham Creeks in Secs. 13 and 23, T. 4 N., R. 6 E., H. M., for irrigation on 80 acres. Estimated cost \$1,000.

SANTA BARBARA COUNTY—Permit 3399, Application 6259. Issued to 4 H Club of Santa Barbara, Goleta, December 16, 1929, for 0.1 c.f.s. from Arroyo Burro Creek Canyon and 2 springs in Sec. 12, T. 5 N., R. 28 W., S. B. M., for domestic use. Estimated cost \$2,500.

RIVERSIDE COUNTY—Permit 3400, Application 6400. Issued to O. P. Sanders, Riverside, December 16, 1929, for .025 c.f.s. from unnamed spring in Sec. 8, T. 4 S., R. 2 E., S. B. M., for irrigation on 20 acres. Estimated cost \$750.

SAN JOAQUIN COUNTY—Permit 3401, Application 6430. Issued to C. B. Orvis, Stockton, December 17, 1929, for 12 c.f.s. from State Canal in Sec. 15, T. 4 N., R. 5 E., M. D. M., for agricultural purposes on 960.5 acres. Estimated cost \$6,500.

MONO COUNTY—Permit 3402, Application 6270. Issued to Champion Sillimanite, Inc., Merced, December 18, 1929, for .025 c.f.s. from Dry Creek in Sec. 10, T. 4 S., R. 33 E., M. D. M. for agricultural purposes. Estimated cost \$1,500.

MONO COUNTY—Permit 3403, Application 6271. Issued to Champion Sillimanite, Inc., Merced, December 18, 1929, for .025 c.f.s. from Dry Creek in Sec.

10, T. 4 S., R. 33 E., M. D. M., for agricultural purposes.

MONO COUNTY—Permit 3404, Application 6272. Issued to Champion Sillimanite, Inc., Merced, December 18, 1929, for .05 c.f.s. from Dry Creek in Sec. 10, T. 4 S., R. 33 E., M. D. M., for mining purposes. Estimated cost \$1,500.

PLUMAS COUNTY—Permit 3405, Application 6241. Issued to Feather River Power Company, San Francisco, December 19, 1929, for 120 c.f.s. direct diversion 6,000 acre-feet from Mills Ranch and Bucks Creek tributary to North Fork Feather River in Secs. 5, 6, 7, 12, 18, 19, 20, 29, 32, 34, T. 24 N., R. 6 and 7 E., M. D. M., for power purposes. Estimated cost \$9,531,000.

SACRAMENTO COUNTY—Permit 3406, Application 6434. Issued to Golda G. Whipple, Sacramento, December 19, 1929, for .31 c.f.s. from dry Creek in Sec. 33, T. 10 N., R. 5 E., M. D. M., for irrigation on 25 acres. Estimated cost \$450.

ORANGE COUNTY—Permit 3407, Application 5910. Issued to Rome Miller, Los Angeles, December 20, 1929, for 0.15 c.f.s. from Six Springs in Secs. 9 and 10, T. 5 S., R. 7 W., S. B. M., for domestic purposes. Estimated cost \$3,000.

ORANGE COUNTY—Permit 3408, Application 5911. Issued to Rome Miller, Los Angeles, December 20, 1929, for .05 c.f.s. from an unnamed spring in Sec. 15, T. 5 S., R. 7 W., S. B. M., for domestic purposes. Estimated cost \$500.

VENTURA COUNTY—Permit 3409, Application 6294. Issued to Topa Topa Company, Ojai, December 21, 1929, for 1 c.f.s. from two wells in Sec. 34, T. 5 N., R. 22 W., S. B. M., for irrigation on 122 acres. Estimated cost \$18,000.

HUMBOLDT COUNTY—Permit 3410, Application 6152. Issued to Wm. Campbell, Salyer, December 21, 1929, for 5 c.f.s. from Madden Creek in Sec. 21, T. 6 N., R. 5 E., H. M., for mining purposes. Estimated cost \$2,000.

TRINITY COUNTY—Permit 3411, Application 6373. Issued to Aaron Willburn, Zenia, December 23, 1929, for .56 c.f.s. from West Branch of Bluford Creek in Sec. 5, T. 3 S., R. 6 E., H. M., for irrigation on 45 acres. Estimated cost \$200.

COLUSA COUNTY—Permit 3412, Application 6333. Issued to Northern California Duck Club, Sacramento, December 23, 1929, for 3 c.f.s. from Lurline Creek in Sec. 19, T. 16 N., R. 2 W., M. D. M., for irrigation on 440 acres. Estimated cost \$1,000.

SAN BERNARDINO COUNTY—Permit 3413, Application 6374. Issued to L. C. Wylie, Maywood, December 24, 1929, for 0.1 c.f.s. from two unnamed springs in Glen Canyon in Sec. 23, T. 2 N., R. 6 W., S. B. M., for irrigation on 15 acres. Estimated cost \$900.

TRINITY COUNTY—Permit 3414, Application 3222. Issued to Chester A. Freeman, Salyer, December 24, 1929, for 1 c.f.s. from springs in Sec. 27, T. 6 N., R. 6 E., H. M., for mining purposes. Estimated cost \$400.

TRINITY COUNTY—Permit 3415, Application 6263. Issued to C. A. Freeman, Salyer, December 24, 1929, for 1.0 c.f.s. from unnamed springs in Sec. 2, T. 5 N., R. 6 E., H. M., for mining purposes. Estimated cost \$100.

TRINITY COUNTY—Permit 3416, Application 5770. Issued to W. P. Anderson et al., Weaverville, December 24, 1929, for 1.5 c.f.s. from North Fork Trinity River in Sec. 24, T. 35 N., R. 12 W., M. D. M., for power purposes.

(Continued on page 40.)

Contracts Provide Improvements of Major Character

A NUMBER of important improvements on the state highway system are assured in awards of contract made during the past 30-day period by B. B. Meek, Director of the Department of Public Works. Some of the more important projects included in these awards are the following:

SAN BERNARDINO-EL CENTRO HIGHWAY—A contract was awarded to the A. M. Peck Company of Los Angeles to grade and pave with Portland cement concrete 10.4 miles between Brawley and 4 miles west of Westmoreland. The contract price was \$312,057.05, making it one of the largest contracts awarded during the year. The roadbed is to be graded to a width of 36 feet and the paving will be 20 feet in width, thus providing for two 10-foot travel paths. The grade of the road is being raised and wide drainage ditches constructed on each side of the highway to eliminate flooding of the roadside from irrigation overflow. The new concrete pavement is to be laid on a sand cushion over the present oil-treated gravel surfacing, thus affording a more adequate roadway for the heavy produce trucking that this artery is called upon to carry.

H. E. Hazard Contracting Company of San Diego received the contract for grading and paving with asphalt concrete 5 miles between Dixieland and Seeley. This pavement will be 20 feet wide and will be placed on sand cushion over the existing oiled surface. The project will construct wide drainage ditches which will eliminate any danger from flooding. Contract price is \$110,423.30.

PACIFIC HIGHWAY—A contract small in amount, but one that will be welcomed by travel inasmuch as it marks an improvement of the highway route through Wheatland in Yuba County was awarded to O. F. Brown of Sacramento for \$2,347. The contract calls for moving buildings, appurtenances and utilities from within to without the limits of the state highway right of way.

CREST ROUTE DRIVE—The Lewis Construction Company of Los Angeles was awarded the contract to grade 6.7 miles from a point west of Running Springs Park to Squirrel Inn. This section is located in the mountains north of San Bernardino and leads to the popular recreational district around Lake Arrowhead and Big Bear Lake. The improvement connects the recently graded highway from the head of Waterman Canyon on the westerly end with the oiled surfaced road to Big Bear on the east. The roadbed will be graded to a width of 28 feet and on a high standard of alignment. The contract price is \$189,687.

RED BLUFF-SUSANVILLE LATERAL—A contract was awarded to E. B. Bishop of Sacramento for grading and surfacing with untreated crushed gravel or stone from Chester to $2\frac{1}{2}$ miles south of Chester, and stockpiling screenings along highway from Morgan Springs to Chester, 21.7 miles in all. This project will complete a continuous improved highway from Dale's Ranch 17 miles east of Red Bluff to Millford, 26 miles east of Susanville. The contract price of this project is \$59,265. This project lies in Plumas and Tehama counties.

ARROYO SECO HIGHWAY—A contract for the construction of a reinforced concrete arch bridge across La Canada Canyon was awarded to the Whipple Engineering Company of Monrovia. The bridge will consist of one 96-foot span and two 25-foot approach spans on concrete abutments with wing walls. The contract price was \$31,419.75.

WATER PERMITS AND APPLICATIONS

(Continued from page 39.)

SOLANO COUNTY—Permit 3417, Application 6444. Issued to A. C. and Minnie T. Sullivan, Winters, December 27, 1929, for 0.37 c.f.s. from Miller or pleasant Valley Creek in Sec. 12, T. 7 N., R. 2 W., M. D. M., for irrigation on 30 acres. Estimated cost \$1,400.

LOS ANGELES COUNTY—Permit 3418, Application 3808. Issued to H. Hay as trustee and San Dimas Water Co., Covina, December 28, 1929, for 16.8 c.f.s. from Pudding Stone Canyon in Sec. 15, T. 1 S., R. 9 W., S. B. M., for irrigation on 4422.21 acres. Estimated cost \$60,000.

SHASTA COUNTY—Permit 3419, Application 6424. Issued to Laura Chandler, Castella, December 31, 1929, for .025 c.f.s. from Mullin's Gulch in Sec. 22, T. 38 N., R. 4 W., M. D. M., for irrigation on 2 acres. Estimated cost \$250.

DEL NORTE COUNTY—Permit 3420, Application 6456. Issued to Russell Reid, Klamath, December 31, 1929, for 0.3 c.f.s. from Branch Creek in Sec. 28, T. 14 N., R. 1 E., H. M., for irrigation on 24 acres.

AWARD OF CONTRACTS DIVISION OF ARCHITECTURE

Dec. 4 to Dec. 22, 1929

NORWALK STATE HOSPITAL, Norwalk, for construction of assistant physician's residence. Contract awarded to T. R. Hyatt of Alhambra; price, \$6,439.

INDUSTRIAL HOME FOR ADULT BLIND, Oakland, for construction of a sales building, and office and addition to warehouse. Contract awarded to J. B. Bishop of Oakland; price, \$13,031.

JUST THINK

Every minute—
A baby is born.
Two husbands get shot.
Three fires break out.
Four girls leave home.
Five girls come back.
Six automobiles wreck.
Seven cashiers go out walking.
Eight people get hurt.
Nine men need automobiles—and—
Ten salesmen are after 'em.—*Exchange.*

She had done everything wrong. She had disregarded the signal lights, then stalled in the middle of the street, and before starting, had taken out her powder puff and started to apply it to her face. An irate traffic cop rushed up: "Say, lady, do you know anything at all about traffic rules?"

"Why, yes, what is it that you want to know?"