

California Highways and Public Works

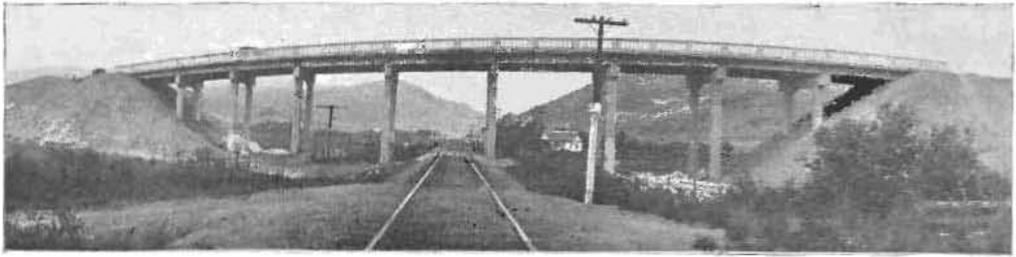
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Overhead crossing at Pismo Beach, San Luis Obispo County.

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Big Lagoon Trestle, Humboldt County.



One source of summer water supply. View of snow covered mountains in Mono County, showing a movie outfit on location caught in snow.

Outstanding Water Issues in State As They Developed in the Past Year

By EVERETT N. BRYAN, Deputy Chief of Division of Water Rights.

THE ACTION taken by the United States Supreme Court in the *Herminghaus* case, the passage of Assembly Constitutional Amendment No. 27, and the appropriation of water by the Department of Finance under Chapter 286, Statutes 1927, in furtherance of the so-called coordinated plan for the development of California's water resources were three outstanding events during 1927 affecting water rights.



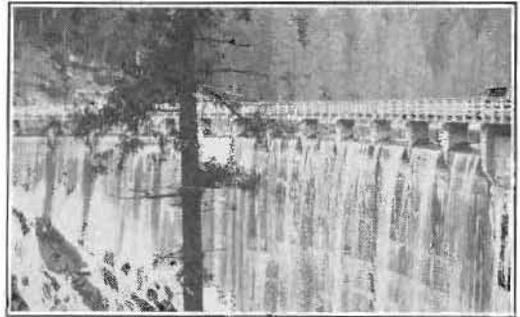
EVERETT N. BRYAN.

THE HERMINGHAUS CASE

By its action in the *Herminghaus* case the United States Supreme Court indicated that it did not deem the controversy in California over riparian and appropriative water rights invoked a federal

jurisdiction. This decision blasted whatever hope may have existed that relief might be found through the federal courts from the blighting effect upon development of California's water resources effected by the *Lutz vs. Haggin* decision and the train of decisions following which terminated in the now famous

case of *Herminghaus et al. vs. Southern California Edison Company*. It became plain that within the state itself must be found whatever relief was to be had from a situation which made the favored land owners bordering the streams of California the absolute owners of the water flowing therein, except in so far as prescriptive rights had already been acquired by others. This decision makes



Lost Creek Dam of Oroville-Wyandotte Irrigation District.

those landowners bordering streams flowing under such conditions as San Joaquin River the absolute owners of the water flowing therein, except in so far as prescriptive rights had already been acquired by others.

PROPOSED CONSTITUTIONAL AMENDMENT

Popular apprehension of this fact led to the enactment of Assembly Constitutional Amendment No. 27 which will be submitted to the electors at the general election next November.

By this constitutional amendment it is proposed that the people of California shall declare "that because of the conditions prevailing in this state the general welfare requires that the water resources of the state be put to beneficial use to the fullest extent of which they are capable and that the waste or unreasonable use, or unreasonable method of use of water be prevented." In other words it is proposed not to take away from the riparian owner his right to use water but that he shall be governed in his use of water by considerations as to reasonableness of use as is the appropriator.

STATE FILINGS

It is a generally recognized fact that geographically speaking also California's water resources are not evenly distributed throughout the state. In certain portions of the state there is an over-abundance of water. In other portions there is a deficiency. If the fullest practicable development of the state's water resources is to be realized it is imperative therefore that some system be evolved whereby the earlier developments will be prevented from placing any unnecessary obstacles in the way of those developments which are to follow. Chapter 286, Statutes 1927, was therefore enacted by the legislature enabling the Department of Finance to make such appropriations prior to May 29, 1928, as in the judgment of that department are or may be "required in the development and completion of the whole or any part of a general or coordinated plan looking towards the development, utilization or conservation of the water resources of the state." Pursuant to this enactment there were filed with the Division of Water Rights by the State Department of Finance on July 30, 1927, twenty-five applications for agricultural and power purposes affecting forty-two different streams.

TWO CHIEF PROBLEMS

Fortunately for the State of California it has but recently passed through an era of unprecedented water resource development and existing programs for further development of both power and agricultural projects are well in advance of present needs. As a result the state now finds itself in a position where it may safely pause for a moment to work out a solution of the two difficult water problems with which it is confronted—i.e., how best to dispose of the riparian rights question, and how best to lay a sane and appropriate foundation for the ultimate fullest possible realization of the bounteous water resource development of which the state is capable.

APPLICATIONS RECEIVED & ACTIONS SHOWN BY ANNUAL TOTALS

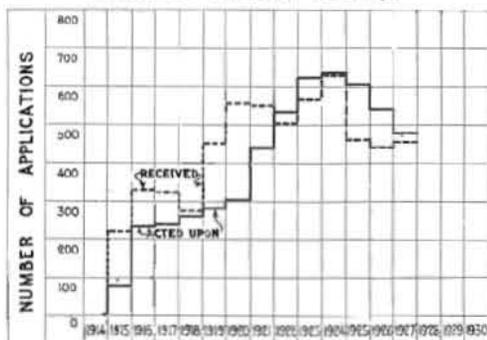


PLATE 1.

SECOND-FOOT APPLIED FOR AND ACTED UPON SHOWN BY CUMULATIVE TOTALS

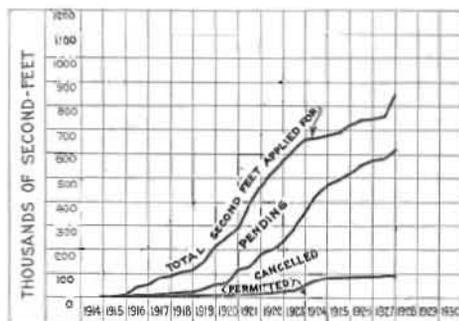


PLATE 2.

WHAT PLATES SHOW

The feverish activity in all lines of development during the years 1919 to 1923 included many large appropriations. Activity in smaller appropriations persisted during 1924 but since that time—until the large appropriations by the state were made in July, 1927—the activity in appropriations has continued more along the lines of a pre-war basis. These facts are well illustrated by analysis of plates 1 and 2.

Examination of the graph on Plate 1 indicates the reduction in rate of receipt of applications since 1924 and also the uniformity of rate of receipt since that time. It indicates furthermore that since 1922 actions have exceeded receipts, and a consequent reduction in the number of pending cases has resulted.

The inclination of the curve showing "total second-feet applied for" on Plate 2 indicates the rate at which appropriations have been made in terms of second-feet. The rapid rate

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State Highways Need State Vision

Commissioner Baumgartner Gives his Job the Once Over

By J. P. BAUMGARTNER, Member of the California Highway Commission.

“WITHOUT vision, people perish.” Likewise, without vision, no big long-drawn-out job can be well done. And even vision doesn't help much in public work unless the public as well as its employees get the vision. However much vision former highway commissions may have had, they have been seriously handicapped because either the people or their legislative representatives have not had the vision, or at least have not been successful in translating the vision into practical results in the way of providing an adequate and continuous flow of funds for highway work. Perhaps none of us at any time has looked far enough ahead or ever realized the tremendous growth in population and traffic that has come and is still coming.

Under the hitherto stop-and-start, never-know-what-to-expect-or-rely-upon system of financing, the California Highway Commissions of the past have done wonders, and the people of California should join the present Highway Commission in expressing its gratitude for what has been accomplished.

The job that this particular Highway Commission has on its hands is to plan for and at least make a good beginning toward the completion of the system of state highways to which the commonwealth is both morally and legally committed.

A large part of this commitment dates back many years, even to the beginning of state highways in California—that is to say, many state highways provided for by the first issue of state highway bonds have not yet been constructed. Only a little more than half of the 6500 miles of state highways provided for by the three bond issues and by

legislative action have been graded, and less than half have been paved. So it may readily be seen that the present Highway Commission and its successors for several years to come will have their hands full.

What the present Highway Commission mainly has been trying to do during the past year is to find out just what its job is and how best to do it. Of course it has also had to take care of a large amount of maintenance, reconstruction and new construction work. But owing to the practical exhaustion of funds available for new construction, and the fact that maintenance and, to some extent, reconstruction go on somewhat automatically through the engineering department, the Commission has been enabled to make a pretty thorough physical survey of the state highway system, and to study financial, engineering, population, traffic and other problems involved.

The Commission has felt that if it could plan and program pretty definitely the work to be done during its official incumbency, it would thereby establish a precedent of order, system and equitability that would not only mark its own administration with a fair degree of efficiency, but

would greatly smooth the pathway for succeeding highway commissions. To that end the Commission has conscientiously striven to vision the whole tremendous job of completing the entire system of state highways, and to have the public share that vision. Nor has it stopped there; it has looked far into the future and tried to visualize, with some measure of practicability, an adequate state highway system for a population and an industrial and social development approaching the saturation capacity of the Pacific coast.



J. P. BAUMGARTNER.

A good start on this work of plan and program has been made by the budget and allocation schedule under consideration by the Commission at the time this article is written, and which, no doubt, will have been officially revised, adopted and made public before this article is published.

In addition to this careful budgeting and allocation of a total revenue of \$15,100,000 for new construction during the seventy-ninth and eightieth fiscal years, it is my personal understanding and belief that the Commission has fully decided, with the hearty approval of the Director of Public Works, that it will try very hard to do certain things and that positively it will not do certain things.

It will exert every effort, consistent with good engineering and construction principles, and in proportion to the funds available, to begin to finish the state highway system as originally planned in the 1909 bond issue and succeeding measures.

It will build state roads only, and will not add or sanction—nor permit if it can prevent—the addition of other roads to the state system until all those now in the system have been built. Of course that will not be in our official day but we may reasonably hope and believe that there will be better men than we are to “carry on” when we beyond the official valed have passed.

Precedence in the order of road building will mainly be governed by present and prospective traffic requirements and necessities, rather than by ancient legislative action, though that is not saying that no consideration whatever will be given to existing theoretical obligations.

No state roads will be built on inadequate rights of way, and the yardstick by which adequacy is measured will be as long as the span of future years that human judgment can reasonably compass.

State roads in future will seek to avoid passing through cities and towns, and will strive towards the ideal of straight lines. Certainly they will not be turned and tortured and twisted by political or personal pull, or diverted by sectional rivalry or jealousy. They will not side-step heavy grading or expensive rights of way for the sake of immediate apparent economy at the expense of ultimate real economy. Under present and prospective traffic conditions often the road that costs the most is the most economical.

This enumeration might be extended indefinitely by going into details, but as it is, after all, mainly an expression of my own opinion—though I believe it is, essentially, also a fair interpretation of the attitude of

the Highway Commission and the Director of Public Works—it may well be ended without further elaboration.

One of the discouraging aspects of highway commission work has been—and, to a large extent, still is—the difficulty, almost the impossibility, of getting the average citizen to look far enough ahead or even to see the whole of the present picture. The Commission is absolutely deluged with requests, petitions, resolutions, even demands, on behalf of projects largely, and sometimes wholly, of a local character; and even when projects of state-wide importance are presented it is painfully apparent, in most instances, that the spotlights turned upon them are fueled almost wholly with the oil of local selfishness.

While it is notably and encouragingly true that many of those with whom we come in contact on tours of inspection and in public meetings are broadminded and fair in their attitude, and can and do bring themselves sincerely to the point of view that the interests of state-wide and interstate traffic are, in the last analysis, paramount to and promotive of the interests of local traffic, they are not aggressive, insistent and initiative, as are those who are obsessed with the conviction that the road that runs past their front gate is the most important road in the state. Until the broadminded view becomes more general and more aggressive, the Highway Commission will have a hard row to hoe; for it is thoroughly and irrevocably and completely committed to the proposition that state highways shall be really and truly what their name implies, and shall be planned and constructed with the interests of the entire state in fair and equitable comprehension.

Another factor in the problem of highway construction that must be clearly revealed to and comprehended by the public is that it costs about four times as much now as it did in the early days of state highways to construct a mile of road. In other words, we can now construct only one mile of highway with the money that used to construct four miles. For not only do labor and materials cost much more but roads must be wider and stronger and straighter and more nearly level to meet present day necessities, not to say demands, of traffic.

And this brings up another point on which the public should get the right point of view. Over and over the complaint comes to the Highway Commission that this or that road was provided for in this or that bond issue and has not yet been built. Superficially

The Highway Right of Way: How Wide Should It Be and How Should the Width Be Utilized?

By T. H. DENNIS, Acting Maintenance Engineer, California Division of Highways.

THE DEVELOPMENT of California's highway system has been marked by new problems periodically arising and frequently the result of the traffic that the roads themselves have created.



T. H. DENNIS.

Today probably one of the most important of these problems has to do with the proper width of the highway right of way, and its correlated problem, the proper utilization of that width.

This article has to do with the promise that the eighty-foot right of way offers for both

pavement development and adequate space reservation for trees, sidewalks and pole lines.

Let it be first noted that the eighty-foot right of way provides a pavement space between curbs that will permit of fifty-six-foot pavement developments.

This in turn provides for four ten-foot traffic lanes with an eight-foot space on either side reserved for parking. This parking space can also be utilized for the installation of underground service utilities. Their frequent installation and inspection at this location will present less interference with both auto and pedestrian traffic.

Based on the assumption that a four-lane road will carry approximately three thousand vehicles per hour and that the peak represents 10 per cent of the sixteen-hour traffic, this design should satisfy all but a few locations adjacent to the larger population centers, at which points possibly a parallel road would be necessary.

In the design trees are placed adjacent to the curbs, power and telephone poles at the right of way boundary, the space between being reserved for sidewalk purposes. While the relative position of the poles and trees and the proposed height of their development has

The proper utilization of the highway right of way to provide for the ultimate development dictated by traffic, and the accommodation of encroachments more or less associated with this development, such as trees, pole lines and service utilities, should be definitely determined.

The necessity and importance of this step will be understood when it is realized that present studies indicate traffic will more than double within the next fifteen years and that approximately 90 per cent of our right of way does not exceed sixty feet in width.

The design adopted should not only satisfy the major requirements, but the locations of the various factors in it should be along such lines and grades as will permit their inclusion when additional rights of way become necessary.

The determination of where additional rights of way are necessary should be made at once, as it is not unreasonable for an abutting property owner to require our plan of design in order that he may build with the assurance that his improvements are permanent.

invited the objections of various pole companies, I believe the design is sound, being dictated both by economic and aesthetic reasons.

The designation of our highways as boulevards by the various counties has done much to expedite the movement of traffic and it is hoped the adoption of this ordinance will become uniform as its general observance by drivers indicates its soundness.

The installation of gasoline pumps is no longer permitted within our right of way, as it invites congestion of traffic with its attendant hazards.

Signs within our right of way should be limited to warning and directional, their uniformity of type and location being such as to invite the driver's immediate attention and observance.

The growth of small business adjacent to our highways, while it astonishes, is no more than the natural trend induced by this traffic. Here each owner is a potential merchant, who, without the obligation of service, freights or rents, can market his products to customers who drive past his door. Competition is keen and advertising signs often

(Continued on page 15.)

The New Women's Penitentiary

By GEO. B. McDOUGALL, Chief of the Division of Architecture.

ALL female prisoners of the state are detained at San Quentin. Due to the entire inadequacy of the quarters for women originally provided there, provision was made for the construction of the present women's building which was completed and occupied about the middle of 1927.

So far as I have been able to learn this building is unique, there being no other such building in the country. There are federal and other penal institutions for women in the nature of industrial farms for women, but these are entirely independent and rather large institutions, housing inmates to the number of several hundred. The number of female prisoners at San Quentin is about 90 and this is the largest number the state has at any time had. The capacity of the women's building is sufficient to house about 120 inmates.

IS SEPARATE PRISON

So far as management and control are concerned, the women's building



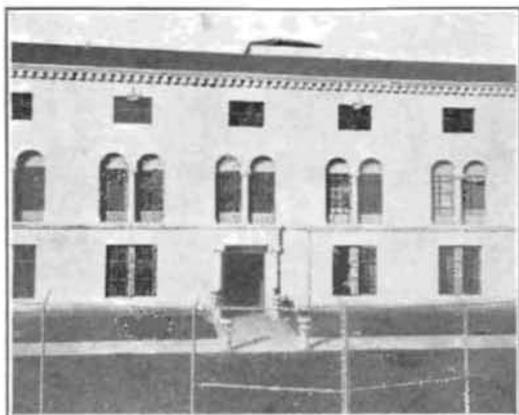
JAMES HOLCHAN,
Warden of San Quentin.

is a part of the State Prison at San Quentin which practically eliminates special overhead expense from the cost of its maintenance. Notwithstanding this the building is so placed on prison property as to be wholly separate from the remainder of the prison, as completely so as if it were located in another county, and is so planned as to building itself and its surroundings as to be entirely self-contained.

TYPE OF CONSTRUCTION

Due to the limited ground area available for its site, it was necessary to make the building as compact as possible. It is three stories in height and its over-all dimensions are about

125 feet by 142 feet. Its architecture is Renaissance, its appearance being pleasing notwithstanding an entire absence of any elaborateness of treatment. It is dignified and not severe, the only exterior evidence of its actual character as a prison being the steel



Front view of Women's Prison at San Quentin.

bar grilles in the openings. The building is what the San Francisco building ordinances describe as "Class B" construction. It has a reinforced concrete skeleton frame and reinforced concrete walls and floors including the ceiling of the third story. The main roofs are covered with slate. It is therefore of entirely permanent materials and so far as it is possible to make a building so, is fire and earthquake resisting. The building is so planned that all areas throughout are abundantly supplied with daylight, sun, and natural ventilation. The artificial heating and also steam for heating water are supplied by the boiler plant of the main institution.

There is no basement except a comparatively small area required for mechanical equipment.

ARRANGEMENT OF BUILDING

The first floor has two entrances from the outside, one in front and the other in the rear, the former for the admission of the public and of new inmates and the latter for the ingress and egress of the inmates and for the bringing in of necessary supplies. Adjacent to the main front entrance are six rooms for administrative purposes: a visiting room,

(Continued on page 31.)

Women Prisoners of San Quentin

IS THERE any distinctive criminal type among women?

What are the animating causes that lead to crime among women?

What do women prisoners most need?

These are the questions asked of Miss Josephine Jackson of the women's new prison at San Quentin, where women convicted of felony in California are incarcerated. For eleven years she has been superintendent in charge of the women prisoners at San Quentin. She has seen them come and go, talked to them and counseled with them, and knows as no other woman in the West the psychology of the woman prisoner. And here are some of her conclusions:

"There is no criminal type among women prisoners," says Miss Jackson. "They present no peculiar psychology. Crime among women generally follows an uncontrolled impulse, in which the women leave the usual path of life, make a detour into crime, without thought of the results that follow."

The predominant influences that leads to crime among women, Miss Jackson asserts, are two: First, love of finery, leading to larceny, embezzlement, or some crime involving an attempt to get money to buy the coveted finery; and second, revenge springing from jealousy.

Here are some further observations Miss Jackson makes:

Women prisoners are generally docile and there is no discipline problem among them. They show a great love for flowers, and are exceptionally kind to animals. They like to adorn their cells with curtains, pictures, and such ornaments as they can obtain.

On the other hand these same women will show an astonishing calmness in talking of the crimes that they have committed. She accounts for this in that the various preliminaries that precede their trial and the trial itself have accustomed them to the story and to a

certain extent calloused them to its details.

What the women of San Quentin chiefly need is work. And they plead for industries that are colorful and interesting. Such indus-



Miss Josephine M. Jackson, Superintendent of Women's Prison.

tries reawaken pride in the prisoners while drab industry deadens it.

Many of the women who come to San Quentin are girls who, for one reason or another, leave their homes at an early age, and start to drift around the country, working at various employments. Few of the professionally immoral type, she declares, are found in the penitentiary. This class is found more frequently in the county and city jails.

Most of the women prisoners who are released upon parole make good.

Just as the average age of the male prisoner is less than a few years ago, there has been a tendency for increasing crime among girls and young women. Thus on December 1, 1927, the women prisoners in San Quentin were classified as to age as follows: Under 20 years, 2; 20 to 24 years, 12; 25 to 29 years, 19; 30 to 34 years, 21; 35 to 39 years, 14; 40 to 44 years, 8; 45 to 49 years, 9;

(Continued on page 12.)



Interior view of cell in Women's Prison.

California's First Complete Highway Budget and Program

THE California Highway Commission at its meeting on January 12th adopted the budget for highway construction, reconstruction and widening for the biennial period extending from July 1, 1927, to June 30, 1929.

The Department of Public Works was requested by the California Highway Commission to prepare a budget for the allocation of \$1,000,000 federal aid money, this budget to be presented at the next meeting of the Commission, and to be accompanied by an opinion of Attorney General U. S. Webb as to the legality of its allocation. This budget is to contain \$350,000 for the Skyline boulevard and a proportionate allocation to southern California roads under the percentage requirement of the Breed bill, as follows: San Diego-El Centro, Mecca-Blythe, Daggett-Needles, Mojave-Bishop.

The budget thus adopted becomes the program for highway construction activities for the period it covers. It marks the first time in the history of California that a complete program of highway construction activities has been adopted and made public prior to the execution of the program.

The budget includes new construction projects made possible through the one-cent gasoline tax bill passed by the last legislature and approved by Governor Young. The first revenues available under this bill were paid into the state treasury in December. It also incorporates the widening and reconstruction budget adopted by the 1927 legislature, the projects in which are payable from the state's share of the previously enacted two-cent gasoline tax.

The allocation of construction funds payable from the one-cent gasoline tax funds is made under the terms of the Breed bill. The total revenue that it is estimated will be derived from this bill for the period of the biennium is \$15,100,000. The maintenance, widening and reconstruction program involves total estimated expenditures of \$27,100,000.

In addition to this, revenues derived from repayment on federal aid projects will be

devoted to convict camp work. The amount of federal aid thus received during the biennium is estimated at \$4,969,412. No specific allocation of funds to convict camp projects has been made, but it is planned to maintain convict camps on the following highways:

Trinity lateral; Red Bluff-Susanville-Purdy lateral; Redding-Alturas lateral; Tahoe-Ukiah highway (Lake County); Yosemite lateral; Carmel-San Simeon highway (Monterey County); Feather River lateral; Kings River Canyon and Ridge Route relocation.

Money will be allocated to the convict camps from time to time as the need develops and the work progresses.

The estimated total of highway expenditures for the biennium (July 1, 1927, to June 30, 1929), from all funds and including all purposes accordingly is \$47,169,512.

The California Highway Commission has allotted the \$15,100,000 that it is estimated the one-cent gasoline tax will raise during the biennium, to new construction projects, in northern and southern counties under the percentage terms prescribed in the Breed bill as follows:

Northern Counties.

For primary road projects (54.7% of 75% of money raised under bill)	\$6,104,775 00
For secondary road projects (50% of 25% of money raised under bill)	1,887,500 00
Total for north	\$8,082,275 00

Southern Counties.

For primary road projects (45.3% of 75% of money raised under bill)	\$5,130,225 00
For secondary roads (50% of 25% of money raised under bill)	1,887,500 00
Total for south	\$7,017,225 00

The Commission also instructed the secretary to inform city officials of San Diego that if that city would obtain rights of way and grade the Rose Canyon road to state standards the state would pave such road.

The budget was presented to the California Highway Commission by B. B. Meek, Director of the State Department of Public Works.

(Continued on page 35.)

Issues Involved in Highway Budgeting: Traffic Pressure or Political Pressure—Which?

By C. C. YOUNG, Governor of California.

FOR THE FIRST TIME in the history of California, a budget is being published in which a complete biennium's program of new highway construction is mapped out in advance of any call for bids or award of contracts.

The publication of this budget supplements and completes the highway portion of the 1927 legislative budget, which contained only items of highway reconstruction and is in accordance with the policy of budgeting every dollar of public expenditure, without the exemption of any state activity. This policy is based upon the premise that the state is the servant of the people, that the funds which are being spent are public funds, and that the people are entitled to every fact regarding any and all proposed expenditures in advance of their actual disbursement.

Before the inclusion of reconstruction and widening projects in the 1927 legislative budget, state highway expenditures had never been budgeted in any way whatever. Aside from possible political considerations, which, of course, should have nothing to do with a budget of this kind, the reason for this past omission probably was twofold.

First was a natural objection to budgeting, based upon the fact that the "stop-go" method of financing the partial construction or final completion of state highways made it difficult to promise specific projects with any certainty of performance.

A second objection was undoubtedly due to the fact that highway officials sought to avoid the pressure which they knew communities would exert to advance projects of local preferment, if public notice of a proposed highway program was given.

With continuous financing assured through the passage and approval of the one-cent gasoline tax for new highway construction, there is no longer the uncertainty which has existed in past years as to the state's ability to finance an orderly and definite program of road building.

This disposes of the first objection, but it remains yet to be proven whether the second objection to highway budgeting is a valid one.

Will the communities, cities and counties of the state, realizing that "the game is being played with all the cards face up on the table," accept the decision on the part of our highway authorities as to sequence and priority of construction, as representing an informed, fair and unbiased attempt to develop the state's highway system in a proper and businesslike manner?

Will the people be willing to substitute traffic pressure for political pressure as a basis for framing road programs?

I have faith enough in the people of California to believe that they will.

Two facts must be remembered:

The first of these facts is that the entire road system of the state can not be built in any one year, though it will all eventually be built. This budget for the present biennium having been adopted, studies will immediately be commenced to determine the next most pressing needs in preparation for the budget of next biennium. This new budget, moreover, will be prepared during the present year.

The second fact is that the gasoline tax assures the automatic replenishment of state road money, and should eliminate the fear which communities in the past have felt that highway bond funds would be exhausted before their particular roads got their share of the bond issue.

Be that as it may, the people of our state now for the first time have before them a complete highway budget, covering the first biennium of our new highway construction. This budget is the result of many months of intensive study and untold hours of careful weighing of comparative necessities. It represents the informed conclusions of those who are in a position to know best the needs of California's highway system.

Further than this, it represents an important step forward in an endeavor to bring knowledge of the government of California to the people of California concerning one of the state's most important functions. In this endeavor, to what extent may we count on the public's approval and support?

The Story of California's Change To Irrigation from Dry Farming

By J. J. HALEY, JR., Deputy Chief of the Division of Engineering and Irrigation.

CALIFORNIA, second in area, but first among the states of the Union in value of natural resources, satisfied the ever-increasing demand made upon it for its agricultural products, that occurred prior to 1885, almost entirely by dry farming additional areas of land each succeeding year.



J. J. HALEY, JR.

With 23,000,000 acres of arable land in the state, the extension of agriculture to new lands stopped at 12,000,000 acres. Since the demand for the products of the agriculturist continued to increase, and at an accelerated rate, after the expansion of the farming area had ceased, every circumstance and condition existed for the continuance of the extension of agriculture to new areas if it were possible. As a result of the unprofitable farming conditions obtaining on the remaining uncropped 11,000,000 acres, the area under cultivation did not further increase. The experience of the practical agriculturist limited the total area farmed to 12,000,000 acres. Statistics indicate that with the 12,000,000 acres cultivated, all of the state's agricultural area with sufficient natural moisture to mature a profitable crop had been brought into use, together with some additional areas having inadequate natural moisture, but for which accessory supplies were developed economically.

LIMIT REACHED IN 1885

This limit to the area in improved farms was reached in the year 1885. Prior to this, the tilled area had expanded in leaps and bounds from the great impetus given to farming enterprises that followed the worldwide movement to this state after the discovery of gold at the midway point of the last century. This enlargement of the farmed area continued at a rapid rate for a third of a century, then slackening, it ceased about 1885.

IRRIGATION BEGINNINGS

During the period that this area was being

brought under cultivation, 1850-1885, irrigation was practiced to some extent. As early as 1856 water was applied to supplement the natural soil moisture, but no great development in irrigation occurred until the early eighties, when dry farming had reached its limit. In 1885, there were less than 1,000,000 acres under irrigation, while in 1909, when the phenomenal growth in irrigation expansion began, there was approximately 2,600,000 acres under irrigation. This area has steadily increased until now we have nearly 6,000,000 acres of irrigated land in California.

This expansion in the irrigated area reflects the value of the scientific application of water to the soil for growing crops, and the vital importance of water in the economic development of California is forcibly presented in the history of the state's production, and the position it has attained among the wealth producing states of the nation.

AREA FARMED ABOUT SAME

The advance of California to so favorable a comparison in agricultural output with the other states of the Union has not been made by any material increase in the total area in improved farms, but rather by the application of water to areas deficient in natural soil moisture. Although there are 23,000,000 acres of land susceptible of agriculture within the state's borders, the enlargement of the area tilled ceased when but half of the total had been brought under cultivation. As a result of the unprofitable farming conditions obtaining on the remaining millions of acres, the area under cultivation did not further enlarge; the experience of the practical farmer limited the total cultivated to but half the agricultural lands. Some additional areas, having inadequate natural moisture, have since been added to the total area of improved farms by developing accessory water supplies, but the abandonment of other areas previously farmed have compensated in their summation so that the total acreage in improved farms has remained practically unchanged.

CREDIT DUE TO WATER

It may be thus seen that the phenomenal agricultural growth of California is due not to an increase in its cultivable acreage, but rather to irrigation, the scientific application

of water to the fertile agricultural soils already farmed to supplement the natural moisture. The abundant soil moisture obtained through the supplementary supplies has enabled the responsive soils of California to produce manifold under irrigation. In this way the state has continued to respond to the constantly increased demand for its farm products, and in this way the potent possibilities of California's farm lands are being invoked to a yield greater in value than in any other state of the Union.

IRRIGATION DISTRICTS

This rapid expansion of the irrigated area in California has largely been accomplished through the organization of irrigation districts formed under the state law commonly known as the Wright Act, originally passed in 1887. Many amendments have been made to this act, but the fundamental objections to it were not corrected until 1897, and it was not until 1909 that the organization, development and growth of irrigation districts in California began to increase at a rapid rate.

GUARDED BY STATE

The development of irrigation, and its related problems, which have and are now playing so important a part in the phenomenal growth of California, is the major function of the Division of Engineering and Irrigation of the Department of Public Works. Since 1885, the limit of the dry farming period, the State Engineer and his staff have

been closely connected with the development of irrigation in California, and even more will the future increase the magnitude of his duties and responsibilities in relation to this problem, in the development of which the state has played so important a part. California has spent many thousands of dollars in the investigation and study of irrigation problems and the development of scientific methods of applying water to the land,

making it possible for the California agriculturist to develop the fertile soils of the state to their maximum productivity.

In making available to the agriculturist the supplementary waters necessary for the intensive irrigation of his lands, it required the construction of diversion works, dams, reservoirs, canals and other works of such a magnitude that their initial cost prohibited their being undertaken by individuals. In order to construct these works and adequately finance them it has required associated effort, which has been made possible through the California Irrigation District Act passed in 1897, referred to above, further amended in 1913, and the California Bond Certification Act passed in 1913.

SAFEGUARDING BONDS

These acts provide for the approval of organization of districts and general supervision of their construction works by the State Engineer, and the approval and certification of the bonds as legal investments for savings banks by the Ca-

"EVEN MORE THAN IN THE PAST will the future be concerned in the expansion of irrigation to additional acres of land in California," writes J. J. Haley, Jr., Deputy Chief of the Division of Engineering and Irrigation, in this article. He tells here of the development of irrigation in California. Here are some of the high points in the story of the conversion of California from a dry farming state to a commonwealth of high yielding crops, the result of scientific irrigation.

Dry farming predominated in California up to 1885. The total area thus farmed was approximately 12,000,000 acres.

In 1885 when the limit of dry farming was reached there was less than 1,000,000 acres of land under irrigation in California.

By 1909 this had increased to 2,600,000 acres of land under irrigation. At the present time there are over 6,000,000 acres of irrigated land in California.

The total area of cultivated land in California still remains about 12,000,000 acres, the figure at which the dry farming limit was reached in 1885. But there has been an enormous increase in the value of the crops that this acreage produces, which reflects the development of scientific irrigation.

The great development of irrigation in California has been accomplished largely through the organization of irrigation districts. The first act for the organization of these districts was enacted in 1887, but it was not until 1909 that the act had been so amended that irrigation districts increased rapidly in number and area.

Experience has shown that state approval and inspection is necessary for the planning and construction of projects undertaken under the irrigation district law; that state certification is necessary in order to make the bonds of these districts safe and salable. The first of these functions falls to the Division of Engineering of the State Department of Public Works, the second to the California Bond Certification Commission, consisting of the Attorney General, the State Engineer, and the Superintendent of Banks.

There are now 114 irrigation districts in California with a total area of 3,999,150 acres and with a bonded indebtedness of \$140,000,000. This constitutes about two-thirds of the entire area under irrigation in California.

The Water Storage District Act of 1921 and the Water Conservation District Act of 1923 permit the organization of large areas in single enterprise that overlap areas already organized in irrigation and reclamation districts for the purposes indicated in the title of the acts.

ifornia Bond Certification Commission, consisting of the Attorney General, Superintendent of Banks and the State Engineer.



Typical Irrigation District Reservoir filled from pumping plant near Pomona.

Experience gained prior to 1913 demonstrated that for successful culmination of effort the formation of these water-developing projects required by the agricultural expansion of the state has needed state sanction; the bonds issued for salability and safety have needed state certification, and the adequacy of the water supplies to be developed, the safety of the structures erected, the merit of the entire proposals have demanded the state's stamp of approval.

ONE HUNDRED FOURTEEN IRRIGATION DISTRICTS

There are now seven active irrigation districts that were organized prior to 1897, but none originated during the years 1897 to 1909. Beginning in 1909, districts have been organized at an increasingly rapid rate until at present there are 114 irrigation districts in California, comprising a total area of 3,999,150 acres which have voted approximately \$140,000,000 of bonds for the development of their projects. This is about two-thirds of



Furrow irrigation in a cherry orchard in the Sacramento Valley.

the entire area under irrigation in California. The great bulk of this development has occurred since inclusions have been made in the law for state supervision in the organization of the districts and in financing and constructing their projects.

WATER STORAGE AND CONSERVATION

With the near completion of all the projects whose works consist for the most part of storage dams for the individual project, or of diversion dams and distribution canals, necessity has arisen for the organization of large areas in single enterprises that overlap areas already organized in irrigation and reclamation districts. The Water Storage District Act of 1921 and the Water Conservation District Act of 1923 have resulted.

Even more than in the past will the future be concerned in the expansion of irrigation to



Basin irrigation in a prune orchard in the Santa Clara Valley.

additional areas in California and the perfection of the supply for those lands now watered. It is therefore essential that state activities should be guided by thoughts for the orderly and economical development of its water resources, so that all the needs of civilization for water may be supplied while the predominant use for agriculture may expand to the full limit of its wealth-producing powers.

WOMEN PRISONERS OF SAN QUENTIN

(Continued from page 7.)

50 to 54 years, 4; 55 to 59 years, 3; 60 years and over, 2. This gave a total population in the women's prison of 94 prisoners, of an average age of 34 years.

On the same day there were 3667 men in San Quentin of an average age of 32 years.

A gasoline shortage is predicted for the year 2000, but by that time the cars will be so thick they can't move anyhow, so it doesn't matter.—*St. Paul Pioneer-Press.*

Teaching Landslides to be Good

THE "educated landslide" is one of the recent achievements of California.

Up in Humboldt County, District Engineer T. A. Bedford is training landslides in the way they should go instead of allowing them to clutter up the highways and block traffic to the great inconvenience of travel and the greater disgust of Mr. Bedford.



A monitor at work.

Mr. Bedford does not claim that he has one hundred per cent obedience from the landslides yet, but at least he can say that he is schooling them into a greater sense of the proprieties than they have shown in the past.

That credit should be given where credit is due, it should be said that the pioneers who first devised hydraulic mining pointed out the way that has been followed in schooling these northern landslides in better manners.

The story was told at the December conference of district engineers and department heads held in San Francisco.

Pictures were shown of the Big Blue Slide that so completely covered a portion of the state highway in Humboldt County so that in places not even an appearance of the highway was left. The slide area is a third of a mile long, a fourth of a mile wide, and 400 feet high. The material was disintegrating blue shale, marked with many cracks and fissures. It is estimated that there will be 200,000 cubic yards of this material to move in the next few years. It was up to the district engineer to find some way of moving it cheaply.

A 4-inch pipe line was brought from Fish Creek with a 200-foot fall, and half mile distant from the slide. Two deep trenches are sluiced into the mountain side, and so arranged that they converge into a sluiceway.

These trenches catch the slide as it comes down the mountain side and carry the material into the sluiceway, a six- by five-foot box with a lip on the upper end. These trenches also drain the water out of the slide.

The sluiceway was on a one-to-four slope, but Mr. Bedford recommends a one-to-three slope so that the slide will automatically dispose of itself without sluicing.

In the operations at the Big Blue slide two men were employed rolling in the bigger rocks into a sump which would hold several yards of material. The rush of water and mud carried these big rocks through.

Three men moved 300 cubic yards of material per day, at a total cost of 10 cents per cubic yard. This was distributed as follows: Wages, 4 cents; transportation, 1 cent; sluiceways, 2 cents; installation, 1 cent; supervision, etc., 1 cent; delays, 1 cent.

Mr. Bedford reports that when the trenches are dug and the slides "trained" to follow them, very little care is necessary. Last winter 25,000 cubic yards of material went through one of these sluiceways with very little attention.

The hydraulic method of slide removal is also being used by Mr. Bedford on the sand bluffs near Trinidad in Humboldt County. Thus far about 35,000 cubic yards of material has been moved at this point at an average cost of eight cents a cubic yard.

It is estimated that there are about 150,000 cubic yards of material there yet to move. The water was brought from a creek about 2000 feet away by a single stage centrifugal booster pump-driven



How material is collected and disposed.

(Continued on page 20.)

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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PRINCIPLES AND PROBLEMS IN HIGHWAY BUDGETING

On other pages of CALIFORNIA HIGHWAYS AND PUBLIC WORKS will be found a detailed statement of the state highway construction program and budget for the biennium of July 1, 1927, to June 30, 1929.

The budget represents many hours of thought and days spent in the collection of data upon which the highway program could be intelligently based. It may be of interest to tell something of the principles upon which California's first complete highway program has been based and the problems that confront the budget makers.

The first requirement naturally has to do with the income. Money must be available before it can be spent. How much money will be raised during the biennium by the various laws through which highway finances are provided is the first question that must be answered.

The budget makers, in their estimate of expenditures, must be governed by their estimate of income. And this latter estimate has to be conservative enough to assure income to meet all obligations for expenditure, and yet must guard against the accumulation of excessive, idle and unused balances.

The division of estimated income in accordance with the requirements of the Breed law, is the next step in the process of budget making. This requires a division of income upon the basis of 75 per cent to Primary roads and 25 per cent to Secondary roads. It then requires the distribution of these funds on the basis of 54.7 per cent of the Primary road money to northern counties and 45.3 per cent of such money to southern counties. The line between these two groups of counties is the northerly and westerly boundaries of San Luis Obispo, Tulare, Inyo and Mono counties. The Secondary road money is divided between the two groups of counties on a 50-50 basis.

Within these groups of counties, the distribution of the funds lies within the discretion

of the California Highway Commission. Recommendations are made to the Commission by the Director of the Department of Public Works, who in turn in preparing the budget recommendations is assisted and advised by the engineering department of the State Highway Commission.

Certain very definite principles prevail in the preparation of the budget and its adoption by the Highway Commission.

First, the character of state highway work requires its distribution over large areas of the state, to meet the road requirements of the state. This is necessary both to prevent undue disturbance with local labor and supply conditions in any part of the state, and to enable a balanced program of urban and rural highway construction to go forward in an orderly and economical manner.

Second, the allocation of funds to particular roads requires a most careful study of varying conditions that may prevail on that road to the end that the section or sections of the road chosen for first improvement will result in the greatest possible betterment to the whole road, and the greatest possible service to traffic on that highway. In other words the budget is based upon a plan for the progressive improvement of each road with priority to sections that most require attention.

The final budget represents a most comprehensive consideration of the whole state highway system, coupled with a most intensive study of each road within that system.

Governor Young, in an article concerning the highway budget that appears on another page of this journal, put the matter tersely when he wrote in the concluding paragraphs this statement:

The people of our state now for the first time have before them a complete highway budget, covering the first biennium of our new highway construction. This budget is the result of many months of intensive study and untold hours of careful weighing of comparative necessities. It represents the informed conclusions of those who are in a position to know best the needs of California's highway system.

Further than this, it represents an important step forward in an endeavor to bring knowledge of the government of California to the people of California concerning one of the state's most important functions.

In this endeavor, to what extent may we count on the public's approval and support?

CONTRACTORS BIDDING BELOW ESTIMATED COST

Interesting facts relative to contracting conditions are revealed by a study of the bids received by the California Highway Commission on jobs during the months of October, November and December of the year 1927.

A total of 32 jobs were offered for contract during the period, upon which 211 bids were received, or an average of 6.6 bids to the job.

The total estimate of the engineers on this work was \$1,664,819.31. The low bids received by the Commission totaled \$1,439,616.06 or \$225,203.24 below the engineer's estimates. Expressed otherwise the work was contracted for at an average of 13.5 per cent below its estimated cost.

ROADS MAKE SNOW SPORTS POSSIBLE IN CALIFORNIA

The cover design in this issue, contributed to CALIFORNIA HIGHWAYS AND PUBLIC WORKS through the courtesy of the Stockton Chamber of Commerce, shows a scene on one of the state's popular highways for autoists both in summer and winter. It reaches the higher recreational regions of the Sierras, being one of the main through mountain roads to Nevada and intermediate points such as Tahoe, Tioga Pass, Calaveras Big Trees, etc.

This particular section of the road shown in the photo was relocated, graded and surfaced by the State Highway Commission in 1926 making it an all-year road as far as the Big Trees of Calaveras. The new road eliminates many bad turns and grades and is so located that danger has been eliminated for winter travel making it possible to hold winter snow sports in the region traversed by the road.

In January of each year the Boosters Club of Angels Camp conduct a snow frolic at the Big Trees, the event taking place on January 15th, this year. Thousands of autoists made the trip on that day for the great diversity of sport afforded including tobogganing, skiing, bob sledding and snowballing.

RIGHT OF WAY WIDTHS

(Continued from page 5.)

employed. Our present policy permitting the use of signs, providing they are affixed or suspended from the owner's property, is rapidly establishing a precedent, the ultimate discontinuance of which will be productive of considerable bitterness.

I believe the time is opportune for the revoking of this privilege and the removal of those now in place, as their object is admittedly to attract the attention of traffic, thereby adding to its hazards.

The equity and approval of small business usurping the highway frontage to its peculiar use is a problem which might be settled by

setback lines established either by legislative action or conditional right of way deeds. The width of such an establishment should, to justify its purpose, provide service for a traffic more or less local in character, independent of the main through traffic. To accomplish this without a distinct separation of the traffic lanes is hardly satisfactory, due both to the intermittent flow of traffic and the tendency of local traffic to disrupt that of the main line. A fifty-foot establishment on either or both sides of the main highway would provide for two lanes of traffic with space reserved on either side adjacent to the curbs for parking. Light posts and sidewalks should be placed between the curb and property line. Trees have no place within this space unless the section is more residential than business. Such an establishment would permit the inclusion of the eighty-foot design, the present space reserved to sidewalks, trees and poles, providing a separation between the two lanes, with openings at frequent intervals to provide a ready contact with the main highway. The resulting main section would then assume the aspect of a superhighway devoted entirely to high speed traffic with parking limited to the side establishments.

We have within the highway system many recreational roads whose charm and appeal are largely dependent on the natural tree growth. Each year fire loss of this asset reminds us of the necessity for its protection. Rights of way through these areas should be increased to provide a ten-foot fire lane at least fifty feet on either side of center. This lane might be hidden from the roadway by proper tree screens and might usefully serve as bridle or foot paths. The clearing and burning of brush and fallen logs within this area would not only please the eye but remove a dangerous fire hazard.

To summarize my opinion on this subject:

The proper utilization of the highway right of way to provide for the ultimate development dictated by traffic, and the accommodation of encroachments more or less associated with this development, such as trees, pole lines and service utilities, should be definitely determined.

The necessity and importance of this step will be understood when it is realized that present studies indicate traffic will more than double within the next fifteen years and that approximately 90 per cent of our right of way does not exceed 60 feet in width.

The design adopted should not only satisfy the major requirements, but the locations of

(Continued on page 17.)

Legislative Water Committee Studies Areas Where State's Surplus Water Would be Used

FOLLOWING its first tour through the counties of northern California where surplus waters are reported to exist, the Joint Legislative Committee on the Coordination of the Water Resources of California visited areas in December where the report on the coordination of such water supplies declares a use for surplus water exists.

The trip of investigation, with its accompanying hearings, took the committee into the industrial areas along the Carquinez Straits and Suisun Bay; through the Delta region, and then down the east side of the San Joaquin Valley as far as Bakersfield.

The interest in the issue under consideration by the committee was shown by attendance at meetings and the open and frank discussion of the problems involved.

The problems of usage of these surplus waters as they developed during the progress of the December trip of the committee might be summarized as follows:

1. Industrial uses. This covered the question of encroaching salt water upon the extensive industries of the Carquinez Straits and Suisun Bay region; the question of the practicability of the solution of the problem by the erection of a salt water barrier; the investigation of the three sites proposed for such a barrier. These sites with estimated maximum and minimum costs depending upon the type of structure, methods of construction, whether or not a bridge is built over the barrier and other construction factors, are as follows: San Pablo Point, from \$60,000,000 to \$82,100,000; Dillon Point, from \$38,900,000 to \$97,100,000; Army Point, from \$46,300,000 to \$58,500,000.

2. Delta lands use. This covered an investigation of the salinity of the delta area of the Sacramento and San Joaquin rivers; a discussion of the effect of a salt water barrier upon levees in the delta region, and the consideration of the question of whether such a barrier would increase seepage to the extent of damaging delta lands. It appeared to be generally agreed that 3500 second-feet of water released into

the delta from the Sacramento and San Joaquin rivers would solve the salt water problem as far as delta lands were concerned. The question was also discussed as to whether water impounded in mountain dams and released during the summer for irrigation served to increase the fresh water flow into the delta region, or whether impounding of such water was detrimental to these lands.

3. Transportation use. This discussion centered around the effect upon river transportation of a salt water barrier and the probable attitude of the U. S. War Department relative to its erection. The matter also was discussed as to whether the constant opening of locks for vessels would not admit a dangerous

amount of salt water behind the barrier. Figures relative to the tonnage carried on the Sacramento and San Joaquin rivers, a tonnage larger than that of the Mississippi River, were submitted to the committee.

4. Irrigation use. This phase of the question became increasingly important as the committee progressed down the San Joaquin Valley. The discussion covered not only the practicability of the plan of bringing Sacramento River waters into the lower San Joaquin Valley, the willingness of present users with established water rights to "trade" their water for water "imported" into the valley; the adequacy of

present water supplies in the irrigation areas of the east side San Joaquin Valley; the extent to which the water table is being lowered in the southern San Joaquin Valley, and possibilities, if any, of replenishment from local sources.

Edward Hyatt, Jr., State Engineer, explained the coordinated water plan. He stated the report was tentative in its character, covering engineering phases of the problem. The purpose of the hearings was explained by members of the committee.

Mr. Hyatt outlined the report as far as the San Joaquin Valley was concerned as providing for a series of fourteen low lifts from the delta into which surplus waters of the Sacramento River would be brought into a series of reservoirs created by damming the San Joa-



Legislative Committee on Coordination of the Water Resources of California. Standing—left to right: Assemblyman Frank W. Mixer, Exeter; Assemblyman Van Bernard, Butte City; Senator H. C. Nelson, Eureka; Assemblyman E. G. Adams, Livingston; Senator Ralph E. Swing, San Bernardino; Assemblyman D. S. Crittenden, Tracy, chairman. Kneeling—Senator Edward A. Mueller, El Cajon, Senator William R. Sharkey, Martinez.

State Road Men Perfect New Machines

A PHASE of California highway work to which but little attention has been called is the improvement of road machinery and equipment, developing out of ability of men connected with the Division of



View showing new grading attachment.

Highways and the problems that confront them and require a practical solution.

In the accompanying article a description is given of two devices recently perfected by members of the Division of Highways. These improvements have been thoroughly tested and undoubtedly will be adopted by road builders generally.

GRADER IMPROVEMENT

In the past, considerable time has been lost in the process of shoulder grading due to the necessity of removing the material graded onto the pavement surface.

O. F. Georges, maintenance superintendent of District III, has devised an auxiliary mold board and leveling blade which removes this material from the pavement surface and levels it along the shoulder during the process of grading, thus affecting a saving of one trip with the equipment.

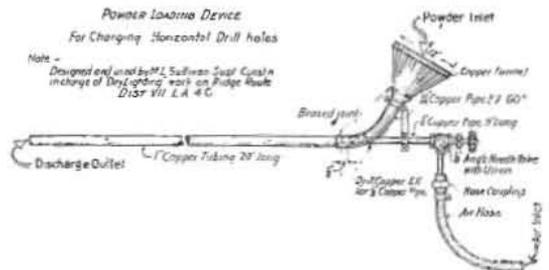
The attachment weighs approximately fifty

pounds and can be readily installed or removed. Headquarters' shop is prepared to make up this attachment for any type grader at a cost of approximately \$40.

Herein is a view of the "Georges Single Trip" attachment showing it in operation.

POWDER LOADING DEVICE

The accompanying sketch shows the design and operation of a powder loading device perfected by M. L. Sullivan, superintendent of construction, in charge of removal of blind curves on the Ridge Route.



This device was designed to overcome the difficulty of loading horizontal drill holes with black powder, and has proven very successful on this job. Twenty-five pounds of black powder have been placed in approximately one-half minute.

The method of operation is to pour the powder from the can into the funnel shown on sketch as "Powder Inlet." Then, on releasing the compressed air, furnished by the compressor on the job, through the one-eighth-inch bronze needle valve, the powder is carried through the 1-inch copper tubing to the bottom of the hole. As the hole is filled with powder the tube is gradually withdrawn.

Various devices have been tried out for loading powder by air, but this device appears to be the most perfect one yet developed.

RIGHT OF WAY WIDTHS

(Continued from page 15.)

the various factors in it should be along such lines and grades as will permit their inclusion when additional rights of way become necessary.

The determination of where additional rights of way are necessary should be made

at once, as it is not unreasonable for an abutting property owner to require our plan of design in order that he may build with the assurance that his improvements are permanent.

Ninety-five per cent of the automobiles in the world have either been manufactured in the United States or assembled in foreign branches of American plants.

Important Line Changes are Perfected

ON JUNE 29, 1927, a contract was awarded the A. Haidlen Company of Sacramento for the reconstruction, widening and straightening of 6.78 miles of highway in Shasta County, on Route 3, a primary road, between La Moine and Shotgun Creek. This unit is on the famous Sacramento Canyon route of the Pacific Highway, and is a continuation of the reconstruction which has been in progress during the past four years. The following account of the work is furnished by E. J. Bassett, resident engineer:

Location standards used on previous reconstruction on this route have been maintained on this unit; in fact, owing to peculiarities of the topography, both curvature and gradient are noticeably lighter than average. The existing highway, constructed in 1914-15, was one of the first mountain sections to be constructed in District II, and is characterized by sharp curves and heavy grades and many of them, which in comparison with the new work, might well be described as tortuous.

The work under contract is 6.7 miles in length, as against 7.47 miles of corresponding limits of the original highway. The greatest single saving in distance is accomplished at Pollard's Gulch, where the last of the four large bridges on this route is now under construction. The relocation required for the bridge crossing eliminates 1537 feet of crooked, narrow road, fraught with blind curves, along the slopes of a deep, precipitous canyon, where accidents have been both frequent and disastrous, and gives to the traveler, in its stead, a broad, sweeping boulevard with flat country on either side the bridge, and with the sight distance extended to hundreds of feet. At the extreme northerly end of the work the last few hundred feet lap over on another major change which will accomplish a substantial saving in distance on future work. The remainder of the decrease in distance is obtained in minor departures from the old line, and in longer radius curves.

The major contract items are: 207,800 cubic yards roadway excavation; 1070 cubic yards Class "A" concrete; 4822 lineal feet small culverts; 15,710 cubic yards crushed rock surfacing.

The job was well equipped. A brief outline of the major equipment follows: 4 Northwest power shovels, $1\frac{1}{2}$ cubic yard; 15 heavy duty trucks of various manufacture; 2 tractor and grader outfits; 1 one-man patrol; 4 $\frac{1}{2}$ to 2-bag concrete mixers; 1 Ames No. 4 gyratory crusher; 1 Symons disc crusher; 1 P. & H. power shovel, $\frac{3}{4}$ cubic yard (quarry).

The contractor's forces consisted of nine separate sub-contracting units.

Progress during the early weeks of the work was slow. Delays in getting the culvert work under way, and out from underfoot, made it impracticable to operate the full shovel force until September 14th. Some work was accomplished during this period of culvert delay, but the 29,000 cubic yards removed is small for the best working months of the season. The next two months produced 102,000 cubic yards of excavation, and also saw the culvert structures well out of the way, but early storms cut into operation so heavily that the third two-month period produced an output of only 28,000 cubic yards. There still remains 23 per cent of the yardage to be moved.

Surfacing of the roadbed is far behind schedule, but has progressed as fast as subgrade could be prepared. The contractor has, however, resorted to stockpiling base rock, and has built up a 2000 cubic yard reserve which can be put on the road without the usual delay in crushing.

This unit of work covers one of the most difficult sections of the canyon, as regards soil and water conditions. Clays, red, yellow and blue, and talc, all of which are difficult to work during wet weather, constitute the greater portion of the excavation, while lava boulder dykes and infrequent shale deposits occur in lesser quantity.

Throughout one continuous mile the work lies across an ancient slide composed of blue clay, talc and serpentine formations, where the whole canyon slope collapsed and slid to lower levels. Cut slopes through this formation were planned 1:1, yet, at present, with only 25 inches of rainfall, and no protracted or heavy storms or snow, several slides have formed and give promise of future difficulties.

Specifications prohibited opening up of the clay sections during the wet season except upon written authority. Due to the early delays, it was not possible to start excavation in the heavier clays until September 15th, and with the arrival of the wet season, October 26th, a large part of the work in this material remained to be done. Much has been accomplished by ballasting the clay roadbed with shaly material. By shifting planned hauls and by borrowing where shale deposits occurred, a layer of ballast, varying in thickness from six to eighteen inches, dependent upon the condition of the subsoil, has been spread over the clay, enabling the contractor to construct acceptable subgrade for the placing of the surfacing, as well as to operate his grading equipment where it would otherwise have been impossible. The contractor has on several occasions profited by our example, and has placed ballast at his own expense, and provided runways over soft roadbed for his trucks, and for maintaining traffic over temporary by-passes.

Throughout this unit heavy gutter ditches are being constructed, larger than are usually designed. During the winter and spring months seepage and

**Table Shows Extent of
Location Improvement
In Sacramento Canyon**

	Original	Recon- struc- tion	struc- tion
Number of curves...	143	42	
Degrees of curvature	5,794°	1,672°	
Length of curves...	12,368	22,027	
Number of tangents	171	19	
Length of tangents	27,089	13,761	
Radii	Min. 50	Min. 300	
	Max. 300	Max. 4,400	
Gradient	7%	6%	

springs exist throughout all of the clay sections, and in order to protect the subgrade, ditches $2\frac{1}{5}$ feet in depth, with 2-foot bottoms, have been commonly used. In a few cases the depth has been increased to 3 feet, particularly on that portion crossing the ancient slide.

REDWOOD HIGHWAY CHANGE.

Of interest to the public is the recent opening to traffic of a portion of the Redwood Highway in Humboldt County, between Fernbridge and Loleta, a distance of approximately two miles. W. W. Compton, resident engineer, has furnished CALIFORNIA HIGHWAYS AND PUBLIC WORKS with an account of this important change.

For several years the travel has been on the county road. This road, while wide, was not on good alignment and a dangerous railroad grade crossing existed at Singley, about one-quarter of a mile north of Fernbridge. The road practically paralleled the right of way of the Northwestern Pacific Railroad on the east to the grade crossing at Singley and then along the west side of the railroad, connecting with the paved state highway near Loleta. At Loleta the highway crosses the railroad right of way through an undergrade crossing.

CHOICE OF TWO ROUTES

Two routes were considered for the new construction: One, to cross the railroad by an overhead crossing at Fernbridge and then parallel the railroad on the west; the other, to stay on the east side of the railroad. On the west, the flood water of the Eel River was the problem to contend with and on the east, bluffs, susceptible to sliding. The bluffs were chosen as the lesser of the two evils and the railroad crossings eliminated.

RAILROAD ALIGNMENT CHANGED

In order to keep the new alignment to present standards, and to keep from "hit-

ting" the bluffs too hard, it would be necessary to encroach upon the railroad property in many places. An agreement was made with the railroad company whereby the state

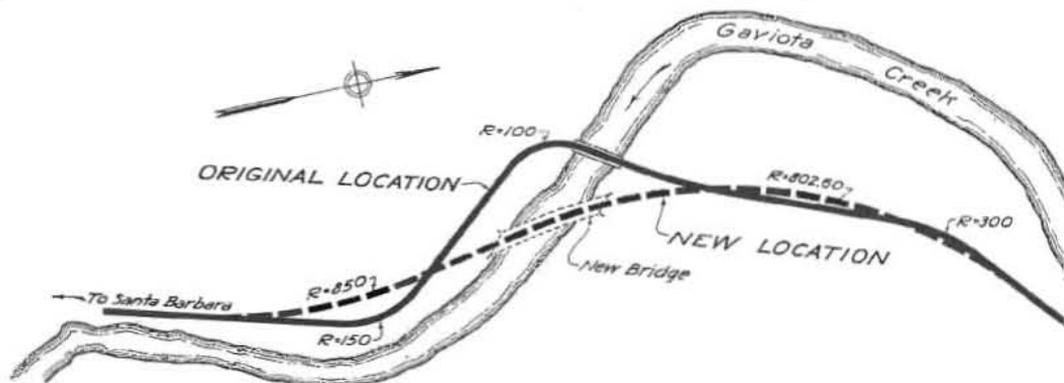


View showing line change on Redwood highway in Humboldt County.

was allowed to change the railroad alignment, move their stock corrals and other facilities at Singley, and the highway fill slopes were allowed to "catch" on the final railroad right of way, thus saving many cubic yards of excavation. At the same time an improvement was accomplished in the railroad alignment; thus the work included not only the grading of a new highway but the grading of a new railroad roadbed and a new site for the stock corrals.

The contract was awarded to the Kaiser Paving Company of Oakland in December, 1926.

The new Le Tourneau grading machines were used on this contract. These machines were used on highway work for the first time



Sketch of Gaviota Canyon change.

on San Francisco's "bottle neck" near Colma, and have been described in a previous issue of this publication.

IMPROVE EQUIPMENT

Several improved changes were made in these machines while on this contract. The machines were electrically operated and towed by a "50" caterpillar. Formerly the generator was located on the caterpillar with cables leading to the motors on the machine. This arrangement took too much power from the caterpillar while loading and in hard ground it was necessary to repeatedly start and stop to keep from stalling the caterpillar. To overcome this, a power unit, gas engine with generator, was installed on the grading machine and the caterpillar's power was only used for towing. After this installation the machines could load without stopping. Machines operated by hydraulic pressure were also tried on this work. The operator's control was compressed air valves near the caterpillar seat. This type of operation promises to be successful.

The railroad grade was even but the highway grade above was undulating. Much of the material from highway cuts was used in railroad fills. Long hauls were necessary in some cases.

CARE OF TRAFFIC

One of the problems was taking care of both motor and train traffic. The new highway occupied parts of the old railroad track and the new track occupied parts of the old road.

As is the case at times in this district, the contractor was racing to finish before serious storms started and was successful. The contract was completed in December.

GAVIOTA CANYON CHANGE

Early in December a line change was completed in Gaviota Canyon, including the construction of a new bridge and a quarter of a mile of new roadbed. This constitutes a distinct improvement in the alignment through the canyon. The bridge was constructed by Oberg Brothers under the supervision of the Bridge Department at a cost of approximately \$21,000, while the line change was graded and surfaced by Hodson and Carter under a district contract at a cost of about \$10,000.

"Yes," said the specialist, as he stood at the bedside of the sick purchasing agent, "I can cure you."

"What will it cost?" asked the sick man faintly.

"Five hundred dollars."

"You'll have to shave your price a little," replied the Purchasing Agent, "I had a better bid from the undertaker."

Visalia Contractor Heads Association of Northern Builders

J. S. Caldwell of Visalia, was chosen president of the Associated General Contractors of America, Northern California Chapter for 1928, at the final business session of the two-day annual convention held during December in San Francisco.



J. S. CALDWELL.

Caldwell, who is head of the Valley Paving and Construction Company, succeeds James B. Fraser of Eureka.

Paul B. Fay, head of the Fay Improvement Company, San Francisco, was elected

vice president. The following directors were chosen: J. L. Fairbanks, San Francisco; J. F. Knapp, Stockton; State Senator E. S. Berney, Fallon, Nevada; Adolph Teichert, Jr., Sacramento, and James B. Fraser, Eureka.

Earl G. Lloyd of San Francisco was reelected executive secretary and manager, and F. O. Booe, San Francisco, assistant.

More than 200 contractors were in attendance at the convention. It was the ninth annual meeting.

TEACHING LANDSLIDES TO BE GOOD

(Continued from page 13.)

by a Cadillac motor. It was pumped through 1000 feet of 5- and 4-inch pipe and raised 70 feet. It was then picked up by a 5-stage centrifugal pump and raised 90 feet through 1000 feet of 4-inch pipe. About 200 gallons of water per minute was delivered. With two pump runners and two nozzle men from 1000 to 1200 yards was moved per day at an average cost of eight cents a yard. This material was easily carried in suspension through a flume laid on a 10 per cent grade to the ocean below.

Where water is available it is planned to do considerable road widening through the sand bluffs by this method.

More powerful pumping plants delivering a larger volume of water under higher pressure will move the dirt still cheaper.

New Bridge Soon to Span San Joaquin

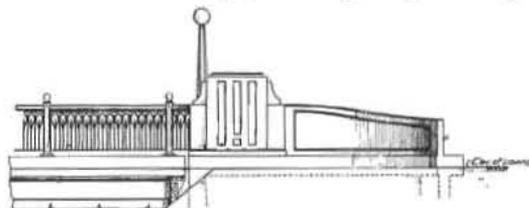
Plans are now complete and specifications are being prepared to advertise at an early date for the construction of a new bridge across San Joaquin River at Herndon near Fresno. This structure will consist of four 162-foot deck steel truss spans, two 83-foot deck girder spans, and one 66-foot deck girder span supported by concrete piers which in turn rest on a pile foundation. The deck and curbs and end post are to be constructed of reinforced concrete.

This structure will provide a 30-foot clear width of roadway, the truss being designed so that an additional 10-foot width of roadway may be added at such time as traffic conditions demand it.

This bridge is to be constructed on the south side of the railroad bridge thus eliminating the present grade crossing over the

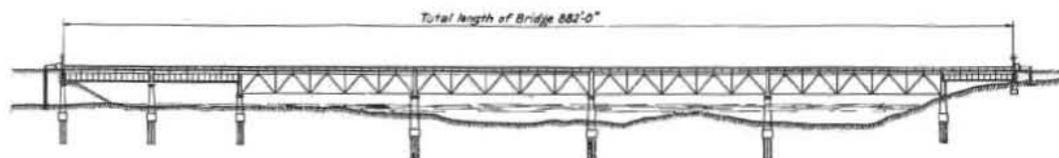
railroad tracks at each side of the river, and will replace the present narrow bridge across the river.

Special features of this structure are ornamental railings, the lighting arrange-



View showing detail of rail of new Herndon Bridge.

ments, and pedestrians' retreat at each end. The railing is to be constructed of iron and cast steel and will be used again when the bridge is widened.



Profile of new Herndon Bridge.

LEGISLATIVE WATER COMMITTEE

(Continued from page 16.)

quin River. The water would be taken back as far as Mendota by this method. From there it was planned to trade the Sacramento water for the San Joaquin water, diverting the San Joaquin water back into the area now irrigated by the Kings River. The Kings River in its turn would be diverted back to serve Tulare and northern Kern County, thus relieving the areas of deficient water supply there.

At Merced, Fresno and Hanford discussion centered chiefly on absolute assurance that if water was so traded that the present users in the areas mentioned would be certain of receiving the "traded" water without further expense to them.

At Porterville, Tulare, Delano and Bakersfield the discussion emphasized what was declared to be the necessity of importing outside water to redeem underground supplies of water.

At the Porterville meeting J. P. Lippin-

cott, consulting engineer who assisted the report on the coordination of the state's waters, declared that the construction of the Kennett reservoir would yield more water than would the Boulder Canyon dam. He further declared that the engineering difficulties involved in the coordinated plan were less than those in the Colorado River, substantiating this by statements that the Colorado project involved a lift of 1600 feet against a lift of 180 feet from the delta to Mendota, and that the Colorado project required some distance of tunnels against a series of low dams on the San Joaquin.

The legislative committee is planning hearings in February at which economic phases of the plan will be discussed.

Creation of a commission to study proposals for the establishment of a system of express highways to be built by private capital, and which would become public property after they were paid for out of toll charges, is proposed in a resolution introduced into Congress by representative Allen J. Furlow, of Rochester, Minn.

State Highway News and Comment

About three miles south of San Luis Obispo there is a wooden trestle on the main coast highway, about 500 feet in length. This



When oil and trestle mix.

trestle was built by San Luis Obispo County many years ago, and on the side of it there was supported an 8-inch oil pipe line leading from the large tank farm near San Luis Obispo to Port San Luis. On the morning of Friday, December 2d, the oil company owning this pipe line, attempted to weld a leaking collar and during the process the collar split, releasing a jet of oil which proved to be refining naphtha, which was being pumped through the line at the time. This immediately ignited, started the trestle burning and formed a burning pool of oil beneath the trestle.

The oil company immediately ordered out a large force of men to fight the fire and summoned fire fighting apparatus from San Luis Obispo, but approximately 280 feet of the trestle were burned before the fire could be put out.

The oil company immediately put on a large crew of men replacing the trestle and within three and one-half days they had traffic using it once again.

Fortunately a county road was available at this point as a convenient detour and the inconvenience to public traffic on account of this emergency was comparatively slight.

Truck Driver Fined For Destruction of State Highway Marker

As a result of evidence furnished by warehouse foreman, P. H. Ashley, the driver of a heavily laden Mack truck and trailer was found guilty by Judge Marks, of Needles, for

OLD INDIAN BURYING GROUND IS ENCOUNTERED ON PISMO CONTRACT

One of the steam shovels of Contractor Knapp, working on a line change about one-half mile north of Pismo Beach, recently encountered an old Indian graveyard. Four skeletons were exhumed, and the fact that mortars and pestles were found buried with the skeletons, denotes that they were undoubtedly the remains of Indians. Apparently the skeletons are very old for it was found that the bones crumbled on exposure to the air.

pulling up, defacing and completely mutilating one of the new state highway markers on the Old Trails Highway near Fenner.

The truck and trailer were found outside the traveled area of the highway. The driver was absent, evidently in search of help. The marker had been ground to splinters under the wheels in an effort to gain traction in the sand. A complaint was filed by maintenance foreman, E. C. Foust. The defendant plead guilty and was fined \$25.

The picture shows a traffic stripe in Kern County. The dash line is being used in preference to the solid line as it saves paint and also makes a distinct line.



Subway Is Completed

The motoring public will be pleased to learn that the Ben Ali subway under the Southern Pacific tracks in Sacramento County is now complete. This structure, together with the greatly improved alignment and widened roadway, eliminates a very dangerous railroad grade crossing and one which in the past has been the scene of a number of serious accidents.

Governor Young Makes Budget Pronouncement

A pronouncement by Governor C. C. Young as to the budget policy to be followed during the second biennium of his administration was the outstanding feature of the meeting of the Governor's Council held on December 21, 1927. Governor Young opened the meeting of the Council with the statement to the directors of the various departments that budget estimates for the next biennium must be kept within the present budget figures, except for irreducible fixed charges in schools, payments on bond issues and the like, and in those institutions where increasing population of the state brings an increasing number of persons and inmates for them to serve.

Riverside Resident Applies Golden Rule to State Dealings

Here is one resident of California who believes in applying the Golden Rule as applicable to the state as well as to individuals.

The following letter tells its own story and is said to be unique in state highway correspondence:

March Field, Riverside, Calif.,
December 25, 1927.

State Highway Commissioner,
Sacramento, California.

Dear Sir:

Last night while driving between Riverside and March Field, something happened to the steering mechanism in my car which caused me to run out of the road and collide with a fence on what I believe they call Box Spring Grade.

The damage to the fence must have been considerable and this is to advise you that I am willing to pay for the repair of that fence. I have no idea what is the custom in this state, but I am certain that this accident should have been avoided by me and for that reason I am quite willing to pay for all the damage.

Yours very truly,

CLARENCE HAYMES.

An investigation of the damage is being made by the state highway forces.

Every owner of a motor vehicle in Connecticut is required to maintain a windshield cleaner on his machine. Recently the owner of a truck was haled into court on a charge of having violated the windshield wiper law. Evidence was submitted which conclusively proved that he had no windshield wiper. The defendant himself admitted that he had no windshield wiper, and his defense was that he had no windshield upon which to attach and use a windshield wiper. It failed to secure his acquittal and a fine was imposed.

Instructive Highway Conference Is Held

A most instructive conference of the district engineers and heads of the departments of the California Division of Highways was held in San Francisco on December 13th. The following program indicates the subjects discussed in the conference:

Talk by District Engineer Bedford, followed by general discussion.

Subject: "Slide removal by hydraulic methods."

Talk by District Engineer Comly, followed by general discussion.

Subject: "Economic size of convict camps, etc."

Talk by District Engineer Skeggs, followed by general discussion led by District Engineer Haselwood and Principal Accountant Schleip.

Subject: "Financial control in the district offices of expenditure of allotments on contract and day labor work orders."

Talk by District Engineer Cortelyou, followed by general discussion.

Subject: "State vs. local responsibility in connection with securing rights of way, also general problems concerning rights of way matters."

Talk by Equipment Engineer Stalnaker, followed by general discussion.

Subject: "Equipment administration, etc."

Talk by Surveys and Plans Engineer Grumm, followed by general discussion led by Maintenance Engineer Dennis.

Subject: "Proper widths for rights of way and space to be allotted to each element of the improved cross-section, such as pavement, grade, curb and sidewalk, trees, etc."

Talk by Construction Engineer Pope, followed by general discussion.

Subject: "Standard vs. patented pavements."

Supper meeting at Whitcomb Hotel.

Talk by Materials and Research Engineer McKesson on his recent trip.

California Highways Lauded by Brisbane

Arthur Brisbane in his syndicated column "Today" writes:

No man knows what a state can do in road building until he has driven over a few thousand miles of California roads. New Jersey and other states have made a beginning—California shows the finished product.

Bring your car here, travel ten thousand miles and leave without a bump.

Parking space has been discovered at last. Afghanistan has one motor car for every 1,200,000 inhabitants.—*Wichita Eagle.*

Removing Snow From Mountain Roads

A NEW ROTARY snow plow has been purchased for use on the San Bernardino to Big Bear Highway. It was given a trial after a recent snow storm and there is every indication that it will be a success.

Heretofore, the equipment used for clearing snow from this route has consisted of trucks or tractors equipped with grader blades. This method is effective so long as the snow does not exceed a depth of 12 to 18 inches. Snow over this depth impairs the movement of the trucks or tractors and the accumulation on the edges of the roadway reduces the effectiveness of the clearing. The rotary plow by the propellor action of rapidly rotating blades throws the snow clear of the roadway, thereby gaining relief from this clogging effect. It is possible for this machine to plow through deep drifts, thereby opening the road when it would be necessary to wait until spring for clearance by the blade machines.

There can be no doubt that the winter season's use of this highway will be increased by the use of this new equipment.

SNOW REMOVAL METHODS

The following instructions to drivers has been worked up by Foreman E. M. Shelton, stationed at Mount Shasta City, and in charge of snow removal between Dunsmuir and the Shasta River. These, Mr. Shelton has found necessary in schooling new employees on this work. They are based on his five years' experience in keeping this road clear of snow, and apply particularly to snow removal by means of a Nash truck with snow plow attachment, as most of the snowfall has been removed by this means. It is only the more infrequent, heavy storms that require the use of the larger plows.

This draft, based on Mr. Shelton's experience, may be of interest to other foremen engaged on the same work:

Operators should familiarize themselves with the

road, so they will recognize the wide and narrow places when covered with snow.

Truck should be allowed to warm up at least ten minutes before leaving shed. Be sure you have two red flags, one red lantern, and a tow cable or chain.

Adjust plow one-half inch above pavement. Always keep a slight strain on chain used to raise and lower plow. This is very essential for many reasons—it will not remove the asphalt, and helps the efficiency of the truck.

When snow is more than four inches deep, give blade all the angle possible. This will fold the snow instead of pushing it ahead, and thereby clear its way more quickly, and again help the truck. In depths under four inches, blade may be almost square, as truck will handle it with ease, and you will have a greater width cleared.

Make all the speed possible with due regard to yourself, the truck and the traveling public. This is a great factor to be remembered, as it puts the snow from two to eight feet in the clear, and of course, you can get over more road. However, due precaution should be taken when passing or meeting cars, approaching stalled cars



A snow plow at work.

and bad curves, and other obstructions or dangerous points.

When pavement is not packed with frozen snow, always slow down for dangerous places in pavement and railroad crossings.

If snow is falling fast, do not stop to help anyone out, unless there are women and children or someone hurt, as you could do this all day and not get anywhere with your snow removal.

If, for any reason, you have to stop on bad curves or grades, send out flagmen at once. Do not wave flag violently, as the driver may become startled and get nervous and apply his brakes suddenly, which, on an icy road, might cause a serious accident.

When removing snow in cuts, with the bank near the pavement, keep center line of pavement about two feet to the left of end of plow, as you have no place to put the snow on that side, and ample room on the other. This will also help going up steep grades, as it will not put so much of a load on the truck the second trip, but will have more of a load coming down hill, which it will then handle easily. Likewise, on superelevations, keep to left of center line, when super is at your left. In other words, keep two feet past center line on super side.

Avoid getting truck off of pavement as much as possible, as shoulders are usually soft, and there is a very small clearance on the hook up beneath front axle.

Always put the rear end of truck off of the road when turning.

(Continued on page 28.)

U. S. Road Chief Tells Asphalt Men Road Needs of Nation

THOMAS H. MacDonald, chief of the United States Bureau of Public Roads, was the chief speaker at the Annual Asphalt Paving Conference held in December in Atlanta, Georgia.

Mr. MacDonald's address dealt with highways in the making, fundamental policies of the Bureau of Public Roads, damage to highways in flooded areas and various other pertinent matters.

ROADS WITHSTAND FLOODS

The speaker declared that observation and experience as a result of the floods along the Mississippi and in New England has strengthened confidence in the ability of modern highway construction to withstand unprecedented flood conditions. The losses on federal aid roads in Vermont, for instance, he said, was only 5 per cent in proportion to the federal funds invested. The federal aid roads in the flooded districts of the Mississippi Valley withstood the ravaging waters equally as well.

CAN NOT AFFORD BAD ROADS

"The program of this nation in building highways," said Mr. MacDonald, "has had no parallel in all past history. The cumulative loss to the nation now of inadequate highways is prohibitive." He continued:

TRAFFIC INCREASE

At the end of this year (1927) we estimate that there will be in service on the highways about 23,300,000 motor vehicles, an increase of about 6 per cent over last year. There will have been consumed during the year, according to our present estimates, 10,720,000,000 gallons of gasoline, an increase of 9 per cent over last year. If there was an average operation of 12 miles per gallon, the combined rural highway and city street costs for the year were about one cent per vehicle mile. At a retail price of 20 cents per gallon, the value of the fuel consumed is \$2,144,000,000, which is more than one-third the gross operating revenue for the fiscal year ended last June, of all the first-class railroads of the United States, constituting 95 per cent of the total railroad mileage. Also, it is double the income for all rural highway purposes. The use of gasoline by the individual motor car is estimated now at 460 gallons for the year, an increase of 3.6 per cent over last year. It appears, therefore, that in addition to a 6 per cent increase in the number of vehicles in use, the use of the vehicles themselves is increasing. The indicated total utilization of our rural highways and our city streets approxi-

mates, for this year, 128,000,000,000 vehicle-miles, a total so far beyond our comprehension that it fails to assist us greatly in visualizing the physical dimensions of the highway construction and maintenance necessities.

TOO MANY "UNNEEDED" ROADS

The tremendous mileage of two million miles of earth roads is composed largely of roads found along the section lines principally in the agricultural states. There is no question now but that a very large part of this mileage could be turned back into farm lands with corresponding public and private benefits. The traffic over the roads does not justify their existence as public highways. Surfacing has been applied to 274,910 miles. Of this, 82.3 per cent is of the lower types, which may or may not be transitory. In this class lie many miles of roads within metropolitan districts which will have to be improved to a high type.

PLANNING NEEDED

It must be evident from this discussion that two general policies are sorely needed in the management of local roads: First, planning commissions for metropolitan areas to lay out a system of roads for the area as a whole, although there will be found in such areas an astonishing number of civil jurisdictions. Cook County, Ill., and Cuyahoga County, Ohio, transitory surfaces sustain this fact; Second, rural planning commissions are needed to work in conjunction with the state highway department in the planning of county and feeder roads for the purpose of planning a system of public highways that will reach and serve the agricultural population with a minimum possible mileage.

NEARLY THREE BILLION PASSENGER MILES

The surfacing of the state systems is proceeding at the rate of approximately 20,000 miles per annum and the surfacing of the local roads is proceeding at the rate of about 25,000 miles per annum, but the percentage of the types are not changing materially. There are certain logical conclusions of particular interest to the asphalt industry which may be summarized as follows:

First, Based on an annual utilization of the highways of 128,000,000,000 vehicle miles, the annual passenger mileage is approximately 2,880,000,000 miles. This is not less than eight times the passenger mileage of the steam railroads in 1925, and is indicative of the predominating use of the highways by the people. The annual loss of surfacing from the low type roads, plus the dust nuisance, means that more effective materials must be found and more largely utilized both for holding these surfaces and for dust suppression. This is a field for bituminous construction.

SUPPLEMENTAL ROAD TYPE NEEDED

Second, There is such a tremendous mileage of roads initially improved on which the surface is not

(Continued on page 35.)

Report on Study of Low Cost Roads Is Made by Highway Research Board

THE CALIFORNIA Highway Commission has received a summary of a report on investigation of low cost improved roads prepared by C. N. Conner of the Highway Research Board, Washington, D. C., December 2, 1927.

INTRODUCTION

The investigation was conducted more in the nature of a survey of the low cost road situation than as a detailed and scrutinizing research. This procedure appeared advisable on account of the present need of a large mileage of low cost roads. Here are the conclusions set forth:

The subject must receive study and investigation if highway service is to keep pace with motor vehicle registration and the increasing radius of travel by motorists, for it has been truly said that we pay for roads whether we have them or not. The sum we pay for not having roads has never been estimated nor can all the benefits be stated in dollars and cents.

The public at large is interested only in improved road service, while the road builder is concerned with furnishing this service at a low cost for construction and maintenance.

The selection of type for these roads may be affected by character and intensity of traffic, interest on investment, cost of replacement, maintenance cost and that somewhat intangible item, cost of vehicle operation.

Calculations based on all of these items has indicated to some persons the selection of a high type surfacing.

However, in many of the west, middle west and southern states advantage can not be taken of the absolute and theoretical economics of the situation if transitory or even temporary service is to be given.

These sections of the country represent a tremendous area, they contain a small population per unit of area and they need a large mileage of serviceable roads.

Some of these states have no treated surfaces and less than 10 miles of pavement whereas some of the northeastern states have no untreated surfaces and several thousand miles of pavement in their state highway systems.

Within a few years many have constructed and are maintaining thousands of miles of low cost roads. Many of these roads furnish continuous service between objectives. Over them the public is traveling in safety and comfort, and at high rates of speed.

This has been made possible by extensive use of local materials and intelligent maintenance.

The successful low cost surface is a light traffic road, carrying less than 1500 vehicles per day as a maximum with an average of 600 or less. This may be mixed traffic with a fair percentage of light trucks and an occasional heavy truck.

Low cost roads of this type will adequately meet the needs of a large area of the country for many years to come, provided intelligent maintenance methods are perpetuated.

In order to determine which types of surfacing and what points of interest on these would be useful

to road builders, a canvass was made which showed the points of interest to be: 1. First cost. 2. Maintenance cost. 3. Traffic and service.

Other points included conditions of climate, salvage, soil and subgrade, construction and maintenance methods, typical cross section and topography.

Preference for types to be investigated was affected somewhat by the local conditions surrounding the persons questioned but the majority favored the following order of importance:

1. Bituminous surface treatments of gravel, stone, slag and miscellaneous materials.

2. Bituminous macadam and various types of bituminous concrete.

3. Untreated surfaces of traffic-bound stone or gravel, water-bound macadam, earth and sand clay.

4. Nonbituminous surface treatments of gravel, earth and sand clay.

The principal binders or admixtures are asphalts, tars, calcium chloride, lime and Portland cement.

The principal aggregates are gravel, sand, stone or slag, and sand clay.

In the asphalt field the slower curing asphaltic oils are becoming less popular. Cut back asphaltic materials appear to be gaining in popularity.

Hot asphalt or hot tar as a second application in dual treatment work satisfies several state highway departments.

Premixed asphaltic surfaces are generally hot mixtures. Cut backs are being tried for mixed-in-place, premixed surfacing and cold penetration macadam. Cold tars for surface treatment and mixed-in-place types of surfacing are giving good service in several states.

A new type of premixed surfacing is a cold patch tar mixed with stone in a concrete mixer.

Bitumens are the most widely used binder in the low cost surfacing field.

Calcium chloride to lay dust and prevent loss of binder is used extensively near its source of supply. Sulphite liquids are *not now* used to any appreciable extent.

Natural rock asphalt when near its source has entered the field of low cost surfacing.

Portland cement with local sand or local fine gravel as an aggregate is a departure from former standards. The possibilities appear good for obtaining a serviceable pavement with these aggregates, provided expansion and contraction are properly controlled.

Hard crushed stone or dense hard slag are preferred to sand and gravel in dual treatment work of the penetration type.

Softer and more friable crushed stone when used for this purpose is specified in larger than customary sizes of hard stone.

There is a general preference for crushed materials in surface treatment work.

Clean gravel and clean coarse sand for this purpose on account of availability and comparatively low cost, are still a popular cover material.

Aggregates for mixed-in-place surfaces are generally those in the roadway surfacing itself. Examples are the work in Wisconsin, California, Indiana and the test road in South Carolina.

Cold penetration macadam is being built in the United States with cut back asphalt or tar and in Europe with emulsions.

MAINTENANCE METHODS

There are three principal methods of keeping a road surface serviceable.

1. Addition of new materials which are similar to those in the existing surface.
2. Blading and dragging.
3. Patching.

All three methods including scarifying may be necessary on any one type of road.

COSTS OF CONSTRUCTION AND MAINTENANCE

Considering the costs and types of construction in the state highway systems only, the following table is made, for an assumed width of 18 feet:

Types costing less than \$10,000 per mile.

Type	Miles
Sand clay and top soil.....	11,395
Gravel, chert, shale, etc.....	79,286
(Treated and untreated.)	
Total	90,681

Types costing more than \$10,000 per mile (including base).

Type	Miles
Water-bound macadam.....	18,428
(Treated and untreated.)	
Bituminous macadam by penetration.....	12,927
Sheet asphalt and Bit. concrete.....	5,706
Portland cement concrete.....	31,936
Block pavements.....	3,380
Total	72,377

Surfaces costing more than \$10,000 per mile are about 45 per cent of the total, and less than \$10,000 are 55 per cent.

If we classify on a \$20,000 basis then water bound macadam with and without surface treatments come below this figure. We then have 33 per cent costing more than \$20,000 per mile, and 67 per cent costing less.

Selection of type is greatly affected by the availability of local materials.

SERVICE

Road service is frequently reckoned on the cost of maintenance per vehicle-mile or per ton-mile. There is no good reason for not including the cost of construction.

A few states are trying to make their selection of type on the cost of maintenance basis. Reports indicate that they have not made definite conclusions as a result of their observations.

Based on statements and claims made by highway engineers in responsible authority, the following data are presented:

Sand clay surfaces cost from \$1,000 to \$2,400 per mile, they will carry from 150 to 550 vehicles per day, including light trucks, at an annual maintenance cost of \$300 to \$600 per mile.

Gravel surfaces cost from \$4,000 to \$10,000 per mile and will carry from 250 to 550 vehicles per day including light trucks, at an annual maintenance cost of \$300 to \$600 per mile.

Untreated water-bound macadam surfaces cost more than gravel.

Traffic-bound stone, slag and gravel surfaces cost about \$2,000 per mile the first year, \$1,000 the second,

Rice Hulls Prove Help to Contractors in Handling Wet Material

Grading operations conducted in the winter months have caused contractors considerable expense and loss of time in handling wet materials. Certain soils and clays are more or less tenacious upon absorbing a small quantity of water, and, although passing through the bucket on the power excavating equipment without any great difficulty, once they are loaded into trucks or other hauling equipment and transported any distance the load often has to be reexcavated by hand before it will discharge.

Contractor Ariss-Knapp Co., who have a contract for grading and bituminous macadam surfacing between Dublin and Hayward in Alameda County, have adopted a novel procedure to overcome this difficulty. Rice hulls are being used to dust the beds of the trucks between each load. This light covering is sufficient to start the load and it discharges readily when the truck bed is raised.

These hulls are a waste product at all California rice mills and may be secured for the trouble of hauling away. On this particular work the source of supply at Oakland was approximately thirty miles from the work.

In case of an auto wreck, who should speak first? And should the man precede the lady through the windshield?—*Nebraska Avigean.*

and \$500 the third, they will carry 300 to 600 vehicles per day including light trucks.

Dual bituminous treatments on good substantial bases cost \$1,000 to \$3,500 per mile for the first year, and will carry from 700 to 1000 vehicles per day, including light trucks, at an annual maintenance cost of \$400 to \$1,000 per mile.

Mixed-in-place bituminous surfaces depending on their thickness are costing from \$1,000 to \$4,500 per mile, and are reported to be carrying about the same traffic as dual treatments at about the same maintenance cost.

They are smoother riding than dual treatments, and they should be more durable.

Premixed surfaces and penetration macadam cost from \$8,000 to \$15,000 per mile and will carry from 1500 to 2500 vehicles per day at an annual maintenance cost of from \$200 to \$500 per mile.

The data indicate that low cost improved surfaces will give road service at about the same cost per vehicle-mile for construction, maintenance and interest on investment as for higher cost surfaces.

Low cost road surfaces in the past have failed principally from overloading and the lack of intelligent maintenance.

With proper regulation of these two important factors low cost improved roads can be built and continued in service.

OUTSTANDING WATER ISSUES IN STATE AS THEY DEVELOPED IN THE PAST YEAR

(Continued from page 2.)

of appropriation during the period 1919 to 1923, inclusive, is easily noticeable as is also the sharp upward trend of the curve during the period July 1st, to December 31, 1927, caused by the appropriations by the Department of Finance on behalf of the state. This plate also indicates that roughly speaking only one second-foot out of every seven applied for is allowed. This latter fact is especially significant as indicating the service performed by the Division of Water Rights in removing definitely from the field of development enterprises which were undertaken but abandoned or for one reason or another were refused a permit.

THE YEAR'S RECORD

During the year 466 applications were received, 248 applications were approved, 237 applications were denied and 86 licenses were issued. Field investigations were made of some 325 projects and hearings were held upon 128 projects. Bulletin 5 with some supplemental memoranda, has been published covering the San Gabriel investigation and one new investigation has been undertaken—that covering the water resources of Ventura County.

ADJUDICATION PROCEEDINGS

Two new adjudication proceedings were initiated during the year—one involving the waters of Emerson Creek in Modoc County and one involving the waters of Los Alamos Creek in Santa Barbara County. In addition to surveys and investigational work on these two streams similar work on North Cow Creek, Oak Run Creek and Clover Creek in Shasta County and Butte Creek in Siskiyou County was continued. Preparation of findings in connection with Whitewater River and Shasta River adjudication proceedings has progressed. The Stanislaus River case still awaits action by the superior court of San Joaquin County.

The following streams were administered during the year—Owl, Soldier, Emerson and Cedar creeks in Modoc County, Hat, Burney, North Cow and Oak Run creeks in Shasta County, Butte Creek and Shasta River in Siskiyou County. Administration of Kings River continued during the year as did also the work of the Sacramento and San Joaquin Water Supervisor on the Sacramento River and San Joaquin River.

GRAVEL ROADS IN FEDERAL-AID SYSTEM

Gravel roads predominate in the 55,903 miles of Federal-aid roads constructed through the country, according to percentages recently published as follows:

	Per cent	Mileage
Gravel type	55.5	19,845.56
Graded and drained.....	23.2	12,969.50
Concrete pavement	22.0	12,298.66
Sand-clay	8.1	4,528.14
Bituminous macadam	5.6	3,130.57
Bituminous concrete	2.4	1,341.67
Water bound macadam and other types	3.2	1,788.90
Totals.....	100.0	55,903.00

During the past year there were improvements on 9,400 miles of the Federal-aid system, bringing the total improved highways in the system to 55,903 miles.

Vermont Votes Bonds

A bond issue of \$8,000,000 for highways and bridges has been voted by the legislature of Vermont, which was called in special session to consider plans for relief and reconstruction after the flood of last fall. Authority to borrow \$1,000,000 on short-time notes during the ensuing year was also granted. The bond plan was proposed by the governor and the vote in the legislature was unanimous.

Vermont had begun early in 1927 on an auspicious program of road construction, to be financed on a pay-as-you-go plan. The damage by the flood made it necessary to use current funds for road and bridge repairs and threatened to upset the construction program, but the bond issue will permit construction to continue through 1928 as originally planned.

Removing Snow from Mountain Roads

(Continued from page 24.)

Do not put chains on unless you absolutely have to have them, as they shake the truck violently, and you can not make any time. However, at times chains are needed for a mile or so. Put them on when necessary, and take them off as soon as you get through the ice.

When you return to shed, never leave until you have first filled your truck with gas and oil and checked your lights, so truck will be in readiness for the next run.

Large reservoirs of hydroelectric plants have proved their effectiveness as a means of flood control in at least two instances during the recent high waters in New England, according to Henry I. Harriman, president of the New England Power Company. In the extreme upper valley of the Connecticut River and in the valley of the Deerfield, one of its Massachusetts tributaries, he pointed out, there was a freedom from floods as impressive as the crushing flood damage in the Winooski and lower Connecticut valleys. This was attributed to the presence of reservoirs on the two former streams.

STATE HIGHWAYS NEED STATE VISION

(Continued from page 4.)

viewed, this does seem to be an injustice. Perhaps to some extent and in some instances it is an injustice, and the present Highway Commission is not unmindful or inconsiderate of these facts or aspects. But the public should bear in mind the more important fact that traffic requirements are the prime factor in road building, and that these requirements may be much more urgent and even necessary on roads not included in any of the bond issues than on those so included. Changed conditions, shifts of traffic, new developments, many elements enter into the relative values of highways as a means of meeting public requirements and necessities.

It is obvious, of course, that state highway construction and extension should serve the purpose of a well balanced development of the entire state, not merely geographically but with due and equitable regard to agriculture, mining, manufacturing, commerce, recreation and the tourist business. So there should be no conflict, but only a healthy rivalry, between or among any of these interests. When agricultural districts complain that their development is retarded or made wholly impossible because state highway money is expended on recreational or scenic roads instead of on roads that would enable them to get their products to the local markets, at least a partial answer is that without recreational and scenic roads there would be no local markets. And when recreational and tourist interests are disposed to over-estimate their importance, as compared with that of agricultural interests, they may be truly answered in large measure, by saying that they must be fed and serviced in a score of ways that are dependent on local agriculture.

Between the northern and southern parts of the state there can be no sensible or justifiable conflict of interests in highway construction. An equitable division of funds has been effected by both law and policy, and the average character of development in all parts of the state is essentially the same. Time was when recreational and tourist business was largely confined to southern California, and it is still more prominent and extensive in that part of the state than in the central and northern parts; but its development in the latter parts during recent years has been tremendous, and the unquestionable attractions and resources of these parts are such as to give assurance of the continuance of such

development on an ever increasing scale. Every mile of good roads built in northern California will benefit southern California almost if not quite equally with the very county in which it is built, and the same is true with respect to the benefits that will accrue to northern California by the building of good roads anywhere south of Tehachapi.

So, with all interests and all sections of our great and beautiful state catching the vision of its ultimate beauty and greatness, let us move forward toward our shining goal.

SUPPOSE

If all that we say
In a single day,
With never a word left out,
Were printed each night
In clear black and white—
'Twould prove queer reading, no doubt,
And then just suppose,
Ere one's eyes he could close
He must read the day's record through;
Then wouldn't one sigh,
And wouldn't he try
A great deal less talking to do?
And I more than half think
That many a kink
Would be straightened in life's tangled thread,
If one-half that we say
In a single day
Were left forever unsaid.

—Author Unknown.

"Mr. Florish," blabbed the great Badzib, emotionally, "I been drinkin', been in poker games two days an' now I gotta go home and face m' wife. I want shome flowers."

"A difficult situation," responded the florist. Still, some appropriate blossoms may assuage the lady's wrath. What would fit her general characteristics? Roses? Daisies? The delicate jasmine flower?"

"Gimme shome tiger lilies."

PEP

Vigor, vitality, vim and punch—
That's Pep!
The courage to act on a sudden lurch—
That's Pep!
The nerve to tackle the hardest thing,
With feet that climb and hands that cling;
A heart that never forgets to sing—
That's Pep!
Sand and grit in a concrete base—
That's Pep!
Friendly smile on an honest face—
That's Pep!
The spirit that helps when another's down,
That knows how to scatter the blackest frown,
That loves its neighbor and loves its town—
That's Pep!
To say "I will"—for you know you can—
That's Pep!
To look for the best in every man—
That's Pep!
To meet each thundering knockout blow,
And come back with a laugh, because you know—
You'll get the best of the whole darned show—
That's Pep!

—Grace E. Bostwick.

Exposition Exhibits

Show Devices to Aid to Motoring Safety

Gathered at the Chicago Coliseum last month were the products of 232 manufacturers of automotive service tools, accessories and replacement parts. These were on exhibition as a feature of the twelfth annual convention and ninth annual exhibit of the manufacturing members of the Automotive Equipment Association. Of outstanding interest to motorists were the items shown which will result in safer, more comfortable, and more economical motoring.

Brake equalizing machines are today of greater importance than ever before. Present high-speed traffic plus four-wheel brakes makes this so. One of the brake equalizing machines on exhibition consisted of a large steel rack on which the car is run. On this rack are two electric motors driving one pair of rollers at the rear of the car and another pair at the front. These rollers are located so that they are directly under the wheels of the car. Then they are set in motion by the electric motors. As the brakes are applied the resistance they set up is read on a separate dial for each wheel. In this way the service man can quickly get just the right adjustment, which results in quick stopping without skidding.

HELPS FOR REPAIRMEN

Greater accessibility of the under side of the present-day low-swung cars is assured by several interesting car hoists. Two of these are similar, in that the car is driven on the hoist, while it is flat on the floor. When the car is in place an electric motor raises a pair of parallel bars that engage the axles and hoist the car, leaving the wheels free for any needed adjustment.

Improved heating of automobiles is doing much to make motoring pleasant the year around. This year the show included more heaters than ever before, two steam, and one hot water type being unusual.

The steam heaters have copper units that are placed in the exhaust manifold. There is a liquid in these heating units that gives off steam almost as soon as the car starts. This steam rises to the heater in the car, and before the car has gone a quarter of a mile the heater is hot. The hot water heater takes the water from the engine, circulates it through the heater in the car and returns the water to the engine to be heated again. While this heater is slower to get hot, it will hold its heat longer when the car is parked.

SMOOTHING THE BUMPS

Shock absorbers of different kinds are offered to make riding smoother. In addition to several of the hydraulic types, there are a few new types operating on the snubber plan, while the kind that clamps to the spring leaves seems also to be gaining in favor.

The old hand methods of fitting bearings are obsolete. Reamers which work with the same precision used in production are now available to service stations. These reamers turn out better work in shorter time than is possible by any other method. By means of fine adjustments these reamers can work to limits as close as one-half of one-thousandth of an inch, or about one-half the thickness of a human hair.

We are told that "this year's world output of motor cars will run into millions." We are glad of this hint, and will try our best not to be one of those millions.—*Liverpool Weekly Post.*

Low Cost Roads to Assist Agriculture

The Highway Research Board of the National Research Council met on December 3d for the last important national highway meeting of 1927.

Highway officials heard important reports on the subject of highway construction, maintenance and operation. Among the most important of these reports was a report on low cost improved roads, with recommendations for the methods of construction of agricultural highways.

"The Highway Research Board will recommend the methods that may be used in the construction of thousands of miles of low cost roads throughout the United States," said Mr. Upham, director of the board. "The practicability of highways costing less than \$5,000 per mile has been conclusively proven where the amount of traffic to be handled is comparatively light.

The immediate construction of these roads is essential to the proper development and prosperity of American agriculture."

Excellent Progress Made by Convicts on Highway



The above photograph shows the progress of convict work on the state highway between Mariposa and Briceburg. This construction work is making a great improvement in the existing road by reducing curvatures and generally bringing the road nearer to present-day standards. Reports show that the work is progressing very satisfactorily and much improvement has been made since the camp was moved to its new location in September.

A new estimator in a contractor's office said to his boss, "Say, I've added these figures up ten times."

"That's fine," exclaimed the boss.

"Yes," said the estimator, "and here are the ten answers."

"A lady had taken her three-year-old son into the booth while her husband voted in that adjoining. When they met, after casting their ballots, the little chap said to his father:

"Daddy, mother must love all the politicians."

"How is that?" the father wanted to know.

"Well, I saw her mark kisses after a lot of their names."

THE NEW WOMEN'S PENITENTIARY

(Continued from page 6.)

a general office, an office for the assistant superintendent, an office for the superintendent, an examination room and a waiting room for inmates. A recreation room of ample size equipped with moving picture machine occupies the remaining space on the main or south front of the building on the first floor. Adjoining the spaces just described is a large area extending entirely across the width of the building which is available for carrying on various industries in which the women can advantageously be employed; this area is exposed to the east and west sides of the building, thus getting ample natural ventilation and in addition to the daylight from the exterior windows, gets light from two large skylights which are fed with light from two interior light courts which begin at the level of the second floor. The size and arrangement of this industrial space are such as to make it feasible to carry on several different kinds of industry at the same time; since this will involve dividing the women workers into several groups ample lavatory facilities have been provided in three different locations connected with this industrial area.

Next to the industrial area just described, in the rear portion of the first floor, are placed, on the east side, the main dining room, officers' dining room, kitchen, store room and cold storage spaces. These spaces are completely equipped so that the functions involved are so provided for as to be entirely self-contained as already indicated. On the west side of the building at the rear of the industrial space on the first floor are two units, one a completely equipped laundry, which will be operated by the inmates, and the other a lost privilege unit which contains four isolation cells.

There are two flights of stairs in the building, one near the front entrance, which is intended to be used chiefly by those in charge of the building, and the other near the rear entrance for the use of inmates. Both flights of stairs, however, at all story levels are closed and provided with steel bar doors which can be kept locked.

CELL ARRANGEMENT

The two upper floors contain the cells for the inmates, also a complete hospitalization unit. The cells are 7 feet by 9 feet, each to accommodate one inmate. The circulation corridors are adjacent to the exterior walls on all sides of the building except on the south

front of the second floor where the hospitalization unit is placed. There is also a central circulation corridor. All these corridors are 7 feet wide. The cell and other rooms except those of the hospitalization unit receive their natural light from two interior light courts, each 30 feet by 100 feet in size. Since these courts extend only two stories in height, they furnish an abundance of daylight, sun and air to the sleeping rooms, as already stated. These courts at the level of the second floor are available as outdoors rest and airing spaces for the inmates. Two day or sun rooms are provided, one on the second and one on the third floor; these day rooms are on the exterior walls of the building and accessible from the circulation corridors.

There is provision in the plan for an elevator should it be found desirable to install one at a future time.

HOSPITAL

The hospitalization unit on the second floor has the following rooms: Four isolation rooms for communicable diseases; a diet kitchen; a nurses' room with special plumbing; an eight-bed hospital ward with its bathroom; two sleeping rooms with bath for the superintendent and assistant superintendent; general clinic; drug room; sterilizing room; operating room; anesthetic room; doctor's office and doctor's wash-up room. In addition to these spaces there is special provision on the third floor for the treatment of venereal diseases with necessary waiting room.

Each cell is provided with its own plumbing fixtures consisting of a toilet, a wash basin and drinking fountain; each is individually heated with its own steam radiator; the window of each is controlled by the inmate, and the furnishings are such as to make the room as homelike as possible. Bathrooms are provided on both the second and third floors in separate units, each having three showers with dressing rooms and one tub. In addition there is a third bathroom with three showers and one tub on the second floor for the use of negroes.

The concrete floors in the corridors and in the hospitalization unit are covered with linoleum.

PRISON LABOR USED

The construction of the building was handled on what is called the day labor method, the Division of Architecture purchasing the necessary materials through the State Purchasing Department and employing a small percentage of paid labor; the major portion of the skilled as well as common labor

was performed by the prisoners themselves. The actual cost of the construction of the building was \$145,171 and the value of the labor of the inmates was estimated at about \$42,883, making the total value of the building to the state about \$188,054.

Code for City Tree Planting Issued by United States

Interest in making cities beautiful, which has led to a movement for landscaping urban streets, has brought tree planting to a position of some importance.

For the guidance of municipal authorities the United States Department of Agriculture has conducted a study of the adaptability of certain trees to certain purposes, and a code for town and city planting has been formulated. If a tree is to be a successful adornment of a city, it must be suited to the climate of the locality and have foliage healthy enough to withstand the dust and smoke; a root system not easily affected by unusual soil conditions, by restricted feeding areas or by pruning when street improvements are being made. It is important that the foliage should be light, open and airy and that in autumn the coloring should be vivid.

Spreading trees may be planted on broad streets, but tall, slender trees or small ones should be planted in streets that are narrow. Formal trees may appear on parking spaces in the middle of an avenue, but these should be balanced with appropriate planting along the sides.

For general urban purposes, oaks are said to be the best, though on account of their reputation for slow growth they have hitherto been little used. They are hardy and long lived and comparatively free from disease and insect attacks. Maples, on the other hand, are pronounced largely unsatisfactory. Throughout the United States, it is said, the silver maple, more than any other tree, is used for street planting; yet it is one of the least desirable, on account of its brittle wood, its shallow rooting and tendency to decay. Most of the other maples suffer from similar faults.

Poplars are not desirable for street planting, according to the study, except the tall, columnar Lombardy poplars for narrow streets. This family of trees is usually favored because it is easily propagated, easily transplanted and grows quickly; but it does not yield gracefully to the necessary pruning and its vigorous root growth near the surface works havoc with sidewalks and sewers. The cottonlike seed appendages of many varieties create a nuisance for street cleaners.

More favored by tree experts are elms, for sections where the elm leaf-beetle and the elm bark-louse have not penetrated; the honey locust, of large, open, round head and fine foliage; and the strong-growing sycamore, when given plenty of space. The basswood or linden is much admired, but often is not reliable on account of a common fungous growth that kills it. The ash and the hackberry have proved useful for street planting, the green ash being one of the few successful trees found in the arid regions of the prairie.

For the heart of the city the ailanthus, growing where nothing else will grow, is recommended. For formal effects, particularly for central parking where

taller trees are used on the sidewalk, the umbrella tree receives favorable mention; also some of the palms are suggested.

Snow Removal Program Of Eastern States

Snow removal activities of states in the snow belt, little known to Californians, are effecting an economic saving of millions of dollars to motorists, according to George S. Grant, manager of the Touring Bureau of the California State Automobile Association. Reports received by Grant from the touring department of the American Automobile Association, with which the state association is affiliated, show that more than 117,000 miles of highway are being cleared of snow and kept open to motor traffic this season. California snow removal problems are confined to the Sierra pass routes while some of the snow belt states must expend extraordinary efforts to keep main state routes open.

The roads making up the 117,100 miles to be cleared of snow are located in the thirty-six states which form the snow belt. The snow removal program of the states calls for the expenditure of more than \$5,000,000 this winter. The average per mile cost will be about \$45.

Every \$100 spent in snow removal yields an estimated saving of \$1,000 in more efficient transportation and business continuity. On the basis of these figures the communities which keep their streets and highways clear this year will reap an economic benefit in excess of \$50,000,000 this winter.

Practically 80 per cent of the nation's registered motor vehicles are in the snow belt, which means that on the basis of 17,700,000 motor vehicles registered in the snow area an investment of \$15,000,000,000 is dependent upon the problem of keeping the highways open for winter travel.

The cost of clearing the highways of snow averaged \$43.50 per mile last year and ranged from \$6.40 per mile in Virginia, on the southern boundary of the snow belt, to \$126.62 per mile in Wyoming, in the northwest.

WEED CONTROL IN HIGHWAYS

Control of obnoxious weeds within the highway right of way is each year becoming more of a burden on the maintenance organization of the State Highway Commission, officials in the Eureka branch office stated recently.

While formerly the Yellowstar thistle and mustard weed demanded the commission's attention, there has appeared within the last few years a more serious infestation known as the puncture vine.

As the activity of the State Highway Commission is necessarily limited to areas within the organization's right of way, unless full cooperation is had from the adjacent property owners and various county horticultural commissioners, the work of the highway body will avail nothing, as these areas will be reseeded from outside faster than the commission can eradicate.

United States Numbered Highways

For the Convenience of the Traveling Public a Limited System of State Roads Have Been Given Continuous Numbers Across the Country

FOR the past two years the state highway departments of the nation have been working on a plan, in cooperation with the Department of Agriculture, of designating certain through roads with numbers that would be carried continuously from coast to coast. Naturally this carries a limited mileage, but it is believed that the system approved takes care of the major part of interstate traffic.

The plan adopted provides that roads running north and south shall be odd numbers and roads running east and west even numbers. Necessarily there must be some diagonal routes joining these odd and even numbered routes. In laying out this system the highway officials felt that the simplicity of the plan adopted would be popular with the people, and in a large majority of the states the numbers chosen have already been erected. The total mileage involved in the routes selected is 96,626 miles. This includes the mileage through cities. In some instances, particularly in mountainous country, it is necessary, for short distances, that a road carry two numbers; but in such cases both numbers will be erected on the same post and it will not be at all confusing to the traveling public. The design adopted is the commonly known United States shield outline. The signs are being erected by the California State Automobile Association, and the Automobile Club of Southern California.

The following descriptions of routes having a California terminus have been received by the Department of Public Works. The roads designated by these numbers do not have any preference over other roads on the Federal-Aid Highway System, as far as construction and financing are concerned.

United States Highway No. 40

South. Total Mileage, 884

CALIFORNIA—Beginning at San Francisco, crossing the bay to Oakland, Martinez, Davis, Sacramento, Auburn, Truckee, via the Nevada-California state line west of Verdi.

NEVADA—Beginning at the California-Nevada state line west of Verdi to Reno, Sparks, Wadsworth, Fernley, Lovelock, Winnemucca, Golconda, Battle Mountain, Carlin, Elko, Halleck, Deeth, to the Nevada-Utah state line at Wendover via Wells.

UTAH—Beginning at the Nevada-Utah state line at Wendover to Mills, Salt Lake City, Kimball, Heber, Fruitland, Duchesne, to the Utah-Colorado state line at K Ranch via Vernal.

COLORADO—Beginning at the Utah-Colorado state line at K Ranch to Craig, Steamboat Springs, Rabbit Ear Pass, Kremmling, Hot Sulphur Springs, Berthand Pass, Denver, to the junction with No. 40 North and No. 40 South at Limon via Deertrail.

COLORADO—Beginning at the Kansas-Colorado state line west of Weskan via Cheyenne Wells, Hugo, Limon, Ramah, Colorado Springs, Lake George, Trout Creek Pass, Buena Vista, Leadville, Tennessee Pass, Wolcott, Glenwood Springs, Rifle to Grand Junction.

KANSAS—Beginning at Manhattan via Junction City, Abilene, Salina, Ellsworth, Russell, Hays, Wakeeney, Oakley, Sherron Springs to the Kansas-Colorado state line west of Weskan.

United States Highway No. 48

Total Mileage, 67

CALIFORNIA—Beginning at French Camp via Tracy, Hayward to San Jose.

United States Highway No. 50

CALIFORNIA—Beginning at Sacramento to the Nevada-California state line at the south end of Lake Tahoe via Placerville.

NEVADA—Beginning at the California-Nevada state line at the south end of Lake Tahoe to Glenbrook, Carson City, Leeterville, Fallon, East Gate, Austin, Eureka via Ely.

UTAH—Beginning at Thistle to Castle Gate, Price, Woodside, via Green River to the Utah-Colorado state line west of Mack.

COLORADO—Beginning at the Utah-Colorado state line west of Mack to Grand Junction, Delta, Montrose, Gunnison, Monarch Pass, Salida, Canon City, Florence, Pueblo, La Junta, Las Animas, to the Kansas-Colorado state line west of Coolidge via Lamar.

KANSAS—Beginning at the Kansas-Colorado state line west of Coolidge to Syracuse, to Garden City via Lakin.

United States Highway No. 66

Total Mileage, 2448

CALIFORNIA—Beginning at Los Angeles via San Fernando, San Bernardino, Victorville, Barstow,



Ludlow, Daggett, to the Arizona-California state line west of Topock via Needles.

ARIZONA—Beginning at the Arizona-California state line west of Topock to Kingman, Peach Springs, Seligman, Ashfork, Williams, Flagstaff, Winslow, Holbrook, Adamana, Navajo, to the New Mexico-Arizona state line west of Lupton via St. Michaels.

NEW MEXICO—Beginning at the New Mexico-Arizona state line west of Lupton to Gallup, Grant, Los Lunas, Albuquerque, Santa Fe, Romeroville, Santa Rosa, to the Texas-New Mexico state line west of Glenrio via Tucumcari.

TEXAS—Beginning at the Texas-New Mexico line west of Glenrio to Ontario, Amarillo, to the Oklahoma-Texas state line at Texola via Claude.

OKLAHOMA—Beginning at the Oklahoma-Texas state line near Texola to Sayre, Elk City, Clinton, Bridgeport, El Reno, Oklahoma City, Edmond, Chandler, Sapulpa, Tulsa, Claremore, Afton, Vinita, to the Kansas-Oklahoma state line south of Baxter Springs via Miami.

KANSAS—Beginning at the Kansas-Oklahoma state line south of Baxter Springs to Baxter Springs, to the Missouri-Kansas state line at Galena via Galena.

MISSOURI—Beginning at the Missouri-Kansas state line at Galena to Joplin, Carthage, Springfield, Lebanon, Rolla, Cuba, to the Illinois-Missouri state line at St. Louis via Pacific.

ILLINOIS—Beginning at the Illinois-Missouri state line at East St. Louis to Litchfield, Springfield, Bloomington, Dwight, to Chicago via Joliet.

United States Highway No. 80

Total Mileage, 2726

CALIFORNIA—Beginning at San Diego to Jacumba, to the Arizona-California state line west of Yuma via El Centro.

ARIZONA—Beginning at the Arizona-California state line west of Yuma to Yuma, Sentinel, Gila Bend, Hassayampa, Avondale, Phoenix, Mesa, Florence, Tucson, Tombstone, Bisbee, Douglas, to the New Mexico-Arizona state line west of Rodeo.

NEW MEXICO—Beginning at the New Mexico-Arizona state line west of Rodeo, Lordsburg, Deming, to the Texas-New Mexico state line south of Anthony via Las Cruces.

TEXAS—Beginning at the Texas-New Mexico state line south of Anthony to El Paso, Van Horn, San Martine, Pecos, Big Spring, Abilene, Eastland, Fort Worth, Dallas, Mineola, Longview, to the Louisiana-Texas state line east of Waskom via Marshall.

LOUISIANA—Beginning at the Louisiana-Texas state line east of Waskom to Shreveport, Minden, Arcadia, Ruston, Monroe, Royville, to the Mississippi-Louisiana state line at Delta via Tallulah.

MISSISSIPPI—Beginning at the Mississippi-Louisiana state line at Delta to Vicksburg, Jackson, Forest, Newton, Meridian, to the Alabama-Mississippi state line west of Cuba via Kewanee.

ALABAMA—Beginning at the Alabama-Mississippi state line west of Cuba to Livingston, Demopolis, Selma, Montgomery, to the Georgia-Alabama state line at Columbus via Tuskegee.

GEORGIA—Beginning at the Georgia-Alabama state line at Columbus to Talbotton, Knoxville, Macon, Jeffersonville, Dublin, to Savannah via Swainsboro.

United States Highway No. 91

Total Mileage, 1,888

CALIFORNIA—Beginning at Nevada-California state line south of Jean via Baker to Daggett.

NEVADA—Beginning at the Arizona-Nevada state line near Mesquite via Bunkerville, Glendale, Las Vegas to the Nevada-California state line south of Jean.

ARIZONA—Beginning at the Utah-Arizona state line north of Littlefield via Littlefield to the Arizona-Nevada state line near Mesquite.

UTAH—Beginning at the Idaho-Utah state line south of Franklin via Logan, Brigham, Ogden, Salt Lake City, Provo, Springville, Fillmore, Cave Fork, Parowan, Cedar City, St. George to the Utah-Arizona state line north of Littlefield.

IDAHO—Beginning at the Montana-Idaho state line at Monida via Dubois, Idaho Falls, Pocatello, McCammon, Preston to the Idaho-Utah state line south of Franklin.

MONTANA—Beginning at Great Falls via Wolf Creek, Helena, Boulder, Butte, Silverbow, Dillon, Lima to the Montana-Idaho state line at Monida.

United States Highway No. 99

Total Mileage, 1569

CALIFORNIA—Beginning at El Centro via Brawley, Indio, Redlands, San Bernardino, Pasadena, Los Angeles, Bakersfield, Fresno, Merced, Stockton, Sacramento, Davis, Woodland, Williams, Red Bluff, Redding, Dunsmuir, to the Oregon-California state line north of Hornbrook via Yreka.

OREGON—Beginning at the Oregon-California state line south of Siskiyou to Ashland, Medford, Grants Pass, Roseburg, Eugene, Junction City, Albany, Salem, to the Washington-Oregon state line opposite Vancouver via Portland.

WASHINGTON—Beginning at the Washington-Oregon state line at Vancouver to Kalama, Kelso, Chehalis, Olympia, Tacoma, Seattle, Everett, Mount Vernon, to the United States-Canadian International Boundary north of Blaine via Bellingham.

United States Highway No. 101

Total Mileage, 1896

CALIFORNIA—Beginning at the United States-Mexican International Boundary at Tia Juana to San Diego, La Jolla, Encinitas, Oceanside, Capistrano, San Juan, Santa Ana, Los Angeles, Ventura, Santa Barbara, Los Cruces, San Luis Obispo, Paso Robles, Salinas, San Jose, San Francisco, San Rafael, Santa Rosa, Ukiah, Willits, Eureka, Trinidad, to the Oregon-California state line south of Brookings via Crescent City.

OREGON—Beginning at the Oregon-California state line north of Smith River to Brookings, Port Oxford, Boudon, Coquille, Florence, Newport, to the Washington-Oregon state line at Astoria via Tillamook.

WASHINGTON—Beginning at the Washington-Oregon state line at Megler to Ilwaco, to South Bend, Raymon, Aberdeen, Humptulips, Forks, Port Angeles, Port Discovery, Duckabush, to Olympia via Shelton.

United States Highway No. 199

Total Mileage, 84.

CALIFORNIA—Beginning at Crescent City to Smith River to the Oregon-California state line west of Takilma.

OREGON—Beginning at the Oregon-California state line west of Takilma to Grants Pass via Kerby.

All signs will be placed square with the road to the right of traffic direction, either alongside of headwalls of pipe culverts or from two to four feet beyond the shoulder break on fills and the bank side of ditches in cuts. Where the shoulder break is not defined, it will be considered as the outer edge of that portion maintained as travelable road width.

U. S. ROAD CHIEF TELLS ASPHALT MEN NATION'S ROAD NEEDS

(Continued from page 25.)

now adequate that a low type of supplemental construction must be developed which can be adequately maintained. As indicative of the possibilities in this field, we have a demonstration of the finest crushed rock surfaces in the west. The processing with bituminous treatments gives promise of high class service under moderate traffic at a reasonable annual maintenance cost. Furthermore, a type of maintenance is possible that renews the original smooth-riding qualities of the road. It has already been demonstrated that these surfaces can be scarified and a small amount of additional material added, and that the work can be done on a quantity basis and, which is all important, at a low cost. There may be difficulties with this type of construction, but it gives such promise that the asphalt industry, both engineers and contractors, can well afford to devote thought and effort to its perfection.

RESEARCH WORK NECESSARY

Third. There are long mileages of both the state highway and local highway systems, particularly in the regions west of the Mississippi River, on which the only hope now apparent for first class highway service lies in the development of bituminous construction. Without criticising the efforts that are being made toward the perfection in detail of the standard asphaltic mixtures for pavement construction, the attention of the industry is directed toward the desirability and necessity of developing types of construction that can be laid more cheaply than the standard types and that will prove adequate. This may very well mean making a larger percentage of the product available for use in the lower types of construction, and to do this not only the processes but the equipment, and even the material itself, must be adapted to this purpose.

MILEAGE AT LOW COST

Fourth. Again, without thought of overlooking the desirability of the more durable types of construction which have long been established as standard, the attention of the industry is directed toward the overwhelming physical problem confronting the country, which can not be met quickly by the relatively small mileages of the high cost construction that may be built with the present income from year to year. It does not appear impossible to develop processes, and the bituminous processes seem most adaptable for the purpose, that lend themselves to complete overhauling, largely restoring the roads to their original condition without impossible expense. Students of highway finance must be impressed with the fact that it is the annual cost of providing adequate highway service that is the important item, and the field of possibilities in bituminous construction has been only partially developed.

Fifth. Finally the performance of many of the older bituminous macadam roads, particularly in the northeastern states and abroad, provides confidence that this type of construction can be used under heavy traffic, provided the design and maintenance are adequate. In this field there seems to lie the possibility of more closely controlled manufacturing processes, coupled with changes in design that would insure more uniform and more satisfactory results.

THE HIGHWAY CREW

By LILLIAN TREGENZA.

Sing a song of the Highway Crew,
Emblem the pick and the spade;
Dirty the work they have to do,
Well earned the wage they are paid.

Drag and truck and shovel,
Shovel and truck again;
Slides and choked-up ditches,
The curse of the Highway men.

Dust in the heat of the summer,
Mud through the winter and fall,
Remarks from each passing auto:
The "Highway" gets it all.

The road's as smooth as a carpet,
The work is done, and then—
A Sunday's quota of autos
And it's all to be done again.

Half of the road is finished;
Covered with rocks and tar;
A string of spattered autos—
And you know what they think you are.

Just a "Men at Work" sign
Or "Road is in Repair"
Changes any country highway
To a crowded thoroughfare.

So sing a song of the Highway Crew,
Emblem the pick and the spade,
And measure the depth of their service to you
By the miles of road they have made.

[EDITOR'S NOTE.—Mrs. Tregenza is the wife of George Tregenza, maintenance foreman in the Fourth State Highway District, headquarters, San Francisco.]

HAMLET TO DATE

To park or not to park, that is the question;
Whether 'tis better to drive on farther
And hope at least to find a one-hour parking limit,
Or slip into the place near the fire plug,
And, by parking, risk a warrant.
To park right here, 'tis true,
Would save much time, forsooth end my fruitless
driving

Around the block. But darn it all! There's that
Cursed hydrant. To stop—to park—to court!
Perchance to jail; ay, there's the rub;
For in that traffic court, what fines may come
When I have shuffled up before the judge—
He might say "thirty days." I'll risk it not.

—Exchange.

Rock Shoulders Installed

The contract for placing rock borders on twelve miles of highway from Williams to Delevan has been completed. Hemstreet and Bell were the contractors.

Do You Drive Safe? Auto-Analyze Yourself; Here is the Test

Perhaps motor accidents would be considerably reduced if owners of cars would consult a good psychoanalyst before taking their machines out on public highways. They may have complexes which need attention. Once these are removed, or at least treated, their driving efficiency might be greatly improved. At least they can give themselves a sort of self-analysis to check up on some of their tendencies, says H. Clifford Brokaw in the New York *Herald-Tribune*.

This suggests that one reason why there are so many automobile accidents may be because motorists have not subjected themselves to a study of their own capacities as drivers. It would not take much time or trouble for an automobile owner to check up on his present situation as a driver of a car. Having found out his present status he might try out for a higher ideal.

By way of self-analysis let each motorist answer honestly for himself the following questions: Have I at any time in the past been guilty of driving a car at an excessive rate of speed?

Have I ever driven on the wrong side of the street?
Have I driven recklessly in passing children?
Or taken chances in passing another vehicle?
Failed to stop when passengers were getting off street cars?

Foiled with other occupants of car while driving?
Failed to observe recognized automobile signals?
Failed to sound the horn, as is customary?
Started from the curb into heavy traffic without precaution?

Passed a street car on the left?
Driven through a safety zone?
Disregarded the traffic rules?
Failed to cooperate with the traffic officers?
Failed to go slowly by a school building?
Turned corners improperly?
Been reckless at a railroad crossing?
Driven a car with illegal lights?
Driven incautiously past blind corners?
Backed up without looking behind?
Driven with inadequate brakes?
Stopped suddenly without warning those behind?
Parked my car next to water hydrant?
Failed to look out for jaywalkers?
Parked my car in evening without lights on?
Left my car on incline without brakes properly set?
Driven with a faulty steering gear?
Ridden without chains or non-skid tires over wet pavement?

Followed another car too closely for safety?
Entered a garage at high speed?
Driven a car I did not know how to manage safely?
Driven in a don't-give-a-rap-about-the-other-fellow attitude?
Allowed a child to catch on for a ride?
Failed to watch out for obstructions in the highway?
Neglected to exercise proper caution on curves?
Driven a car not equipped with mirror for looking back?

Driven and flirted with girls on sidewalks at the same time?
Failed to give pedestrians a fair chance?
Tried to outguess the other fellow?
Slowed down at grade crossings?
Hogged more than my share of the road?
Observed the golden rule in motoring?

New Permit Forms

Two distinct permit forms have been prepared to replace the form P-102.

Form P-102 Rev. (Transportation Permit) is to be used where moving of special load equipment, buildings, tractors, etc., is desired.

Form P-202 (Encroachment Permit) is to be used for encroachments, or work by outside parties within the highway right of way limits.

The new forms should simplify the preparation of your permits and save time in typing and reviewing them as well as insuring uniform practice throughout the state.

State Highway Progress Reports

IMPERIAL COUNTY—Excellent progress is being made by Contractors Ward and Gabler, on the grading of 2.1 miles of highway on the San Diego-El Centro Highway at the lower end of Mountain Springs grade. This project is to replace that portion of the original highway destroyed by floods a year ago. At present traffic is routed over a temporary oiled road following the bed of the wash. This highway is of strategic importance to Imperial Valley since it is the principal means of commercial activity between the valley and the city of San Diego. Since a large percentage of the produce of the valley is perishable, continuous service is imperative. A possible repetition of last year's flood disaster will be eliminated when the present project is completed.

FRESNO COUNTY—The extension of all the narrow culverts in Fresno County on the Golden State Highway is being undertaken this month. The elimination of these "bottle necks" will greatly improve traffic conditions on this heavily traveled road.

The road through General Grant Park and into Hume is still open though covered with approximately 8 inches of snow. Chains must be used on the grades east of the park.

KERN COUNTY—Considerable widening has been done on the Maricopa grade into Cuyama Valley on Route 57 and on this road which also extends through Kern River Canyon and Walker's Pass, culverts are being installed and some shovel work is proposed to eliminate some of the more dangerous points.

Snow fell recently on the Ridge Route but not enough to seriously inconvenience traffic.

MARIPOSA COUNTY—Traffic into Yosemite Valley is increasing considerably over the holiday period. There is plenty of snow in the valley. Mirror Lake is frozen over and is being used for skating and sledding.

The state highway from Merced to the park entrance is in good condition though slightly slippery between the Merced County line and Mariposa, during rainy weather.

MERCED COUNTY—A much needed improvement on the Pacheco Pass Highway is 9 miles of crushed rock borders which are being placed through the adobe sections by Larsen Bros. of Livermore.

RIVERSIDE COUNTY—The Maintenance Department has started the oiling of 10.5 miles of sand shoulders on the Los Angeles-Imperial Valley Highway from Oasis north. The oiling is to cover a strip three feet wide along each edge of the pavement, thereby increasing the effective width of traveled way. This is one of the few improved highways in the state where the motorist is confined to the bare width of the pavement; due to the soft sandy shoulders, the edges of the pavement form lines outside of which he dare not turn his wheels. Vehicles having the maximum

legal width of ninety-six inches are common on this highway and must actually overhang the pavement edges in passing. Correction of this dangerous condition is the goal sought by the Maintenance Department in their present oiling project.

SAN BERNARDINO COUNTY—Foothill boulevard—The first 0.3 mile of the Foothill boulevard west of San Bernardino is under contract for reconstruction. The new pavement will be of asphaltic concrete 30 feet wide. Contractor Steele Finley is erecting his asphalt plant at Rialto preparatory to laying the pavement. His activities on the road up to the present time have been confined to the construction of the necessary drainage structures.

Another phase of the Foothill boulevard reconstruction is under way in the form of the construction of culverts at the Banana avenue intersection near Fontana. This is being done in cooperation with the Fontana Farms Company who are improving Banana avenue.

Redlands to the San Bernardino-Riverside county line—The preliminary work of grading and installing drainage structures on Match Bros. contract has been cleared away and the actual paving work begun. The new pavement is being constructed of Portland cement concrete 20 feet wide. Crushed rock shoulders 2½ feet wide will be placed along each edge of the pavement from material salvaged from the old oiled macadam pavement.

Crest route—The construction program on the new high gear road from San Bernardino to Big Bear Lake took new life on December 13th when the United States Department of Agriculture opened bids for grading 3.5 miles of mountain highway from Waterman Canyon toward Squirrel Inn. This project stands out among other projects of the Department of Agriculture as one of the heaviest mountain grading projects yet undertaken. The lowest bid on the 3.5 mile section as submitted by J. G. Donovan & Son, Los Angeles, was \$339,700. When this contract is completed there will remain approximately 2 miles of similar work to be done by the Division of Highways to complete the road to Squirrel Inn.

The improvement between Squirrel Inn and Running Springs Park is continuing as usual by the Division of Highways. The gas shovel which has been in operation since August, 1926, has advanced from the Running Springs end through the Allison Ranch in distance a little over four miles.

Banana avenue pavement and storm channel intersection—While engaged in our highway building program with the Department of Public Works, we often become aware of other "Builders of California" and we sometimes find it possible to cooperate with them to mutual advantage. These opportunities come to light through frank discussion of the needs of the highway and their relation to adjacent projects with a willingness to cooperate when a common benefit can be obtained.

An example may be cited in the recent agreement with the Fontana Farms Company who are among our neighbors along the Foothill boulevard west of San Bernardino. As a part of the Foothill boulevard improvement program, we are cooperating with them in constructing a storm water crossing and street connection at Banana avenue. This company is confining the storm waters to a single channel above and below the highway in a combination storm channel and street pavement. This work is beneficial to them in protecting their lands from storm water damage. Heretofore these storm waters have crossed the state highway pavement over a considerable width and the approaching channel was neither well defined nor permanent. The construction of culverts was therefore

impractical and traffic was subject to interruption during storms. Our cooperation consists in constructing the necessary culverts to meet the Fontana Farms Company storm drain and highway travel will no longer be interrupted during storms.

TULARE COUNTY—Dangerous curves on the Sierra-to-the-Sea Highway have been widened and surfaced with oil macadam and this road, which connects with the General's Highway in Sequoia National Park, is in good shape.

December Proceedings of Highway Commission

The California Highway Commission held its regular session for December on December 7 and 8, 1927, in San Francisco. The following business was transacted:

SMITH RIVER BRIDGE

The Director of Public Works was authorized to prepare plans and specifications, and, subject to the approval of the Department of Finance, proceed with a contract for construction of a bridge over the Smith River on Route 1, Del Norte County, east of Crescent City, at an estimated total cost of \$150,000, the state to be reimbursed by Del Norte County for a portion of the cost to the extent of \$60,000.

GRADE SEPARATION SOUTH OF SALINAS

Subject to the Department of Finance, the sum of \$50,000 was voted as the state's share of a grade separation on Route 2, located 5 miles south of Salinas in Monterey County.

COMPROMISE OF FORFEITURE

It appearing that J. F. Knapp on Contract M-151, Rineon highway, between Ventura and Santa Barbara, had permitted certain workmen employed by Mr. Knapp in construction of this highway, to labor more than eight hours for one calendar day, and it further appearing that such violation was in part due to extraordinary emergencies to prevent injury to life and property, and it being impossible to determine the exact amount of work performed, in violation of the law as distinguished from that performed under extraordinary emergencies, a compromise of \$1,000 was made as full settlement of all violations upon this job prior to the date of settlement. This compromise was suggested by the Chief of the Division of Labor Statistics and Law Enforcement of the Department of Industrial Relations and was acceptable to the contractor, J. F. Knapp.

IMPROVEMENT WORK—SAN MATEO COUNTY

The board of supervisors of San Mateo County were granted permission to do certain work adjacent to and along a portion of the El Camino Real in San Mateo County, commonly known as the State highway. The plans and specifications for the proposed improvement were approved by the California Highway Commission.

RIGHTS OF WAY

The Director of Public Works was authorized to obtain the right of way on the Bay Shore highway from Burlingame to San Mateo.

The sum of \$12,000 was voted toward the expense of securing additional right of way for the widening of the state highway along Price street in the unincorporated town of Pismo Beach, San Luis Obispo County, from the end of the Knapp reconstruction

project, southerly, approximately 2500 feet. Said contribution is to cover in full the state's contribution for moving back buildings to the new right of way line so as to provide a width of 81 feet between property lines; the reconstruction of the sidewalks and curbs to provide a roadway width of 65 feet between curbs. It was also voted to widen the present pavement between the above limits to a width of 30 feet, providing an improvement district was formed to include the widening of the right of way, reconstruction of sidewalks and curbs, and the paving of the 35-foot balance of the width between curbs, the state to extend all drainage structures to full length between curbs at its own expense.

Resolutions authorizing condemnation of lands for right of way were adopted as follows:

Road 7, Ventura 2-F at south end of Long seawall containing about 1/100 of an acre; District 8, Imperial County, Rt. 26, fifty-nine parcels of land between Trifolium canal and Salada wash.

CONFERENCES

A delegation representing the board of supervisors and civic organizations of Marin County appeared before the Commission urging the Commission's immediate attention to the improvement of both termini of the Redwood highway. The delegation was headed by C. J. Gardener, chairman of the board of supervisors, Thomas Boyd, Assemblyman Charles Reindollar, and A. O. Stewart, president of the Golden Gate Ferry Company, all of whom were principal speakers. They urged immediate realignment and reconstruction of the highway leading out of Sausalito so as to eliminate Corte Madera grade and reroute the present San Clemente grade. They also discussed the necessity of a highway wider than 15 feet, the present width. Mr. Boyd stated that the average daily traffic was over 8000 cars, and holidays and Sundays averaged from 15,000 to 20,000 machines. The matter of a toll causeway across Richardson Bay to be built by the Golden Gate Ferry Company came into the discussion when Mr. Meek, Director of the State Department of Public Works, asked if the people of Marin County would have any objection to a toll road with a proposed charge of 10 cents. Answering this, Assemblyman Reindollar stated that the people of Marin County would welcome a shortening of the distance by a toll road and would not object to the 10-cent charge. Widening of the Redwood highway to a greater width than 15 feet from San Rafael to the northern Marin County line was also urged.

JOINT HIGHWAY DISTRICT NO. 8

A delegation representing Joint Highway District No. 8, which plans the building of about 2 miles of highway to complete the Sears Point toll road connecting Ignacio, Marin County, with Vallejo, Solano County, appeared before the Commission. The district was represented by its engineer, Assemblyman Robt. E. McPherson; its attorney, Joseph M. Raines, and its secretary, C. B. Butler. Attorney Frank R. Devlin represented the city of Vallejo. Mr. Butler urged that the proposed road would reduce distances, especially from Marin County to Carquinez bridge. He stated that it would also lessen the distance from Marin County points to Sacramento and would give an ultimate route from Sacramento to San Francisco. The cost of the project he estimated under \$60,000, of which \$22,000 would be paid by Solano County and \$8,000 by Marin County. The district is pressing the state for the balance of \$30,000. In answering, the commissioners and director voiced objection to the state contributing to a privately owned highway. No form of action was taken.

JOINT HIGHWAY DISTRICT NO. 1

Representatives of Joint Highway District No. 1 appeared before the Commission relative to future work on the Skyline boulevard. In the delegation were Supervisor Charles P. Cooley, Santa Clara County; Supervisor J. W. Poole and Thomas L. Hickey, San Mateo County; Supervisor J. D. Rostorn, Santa Cruz County; A. J. Mason, Burlingame; Charles I. Anderson, San Francisco; Fred Cairns, Santa Cruz. The Skyline boulevard is completed from the Fleishacker pool, San Francisco, to La Honda, a distance of 33 miles. The committee urged that the unit for construction should be that portion from La Honda to Saratoga Gap, a distance of 13.9 miles.

CLOVERDALE TO HOPLAND—REROUTING

A committee representing the Redwood Empire Association requested a statement of the Commission's attitude on the rerouting on Redwood highway from Cloverdale to Hopland by way of the east side of the Russian River. Chairman Bull informed the committee that instructions had already been given for a survey of the proposed new routing.

BAY SHORE HIGHWAY MATTERS

A delegation representing the Bay Shore Highway Association appeared before the Commission to discuss matters relative to rights of way which are now being obtained in or near Burlingame. The committee was composed of J. E. McCurdy, city attorney, and Oscar Wisegerber, city manager of San Mateo; Miss Elizabeth Hole, secretary of the San Mateo Chamber of Commerce and J. S. James, city manager of Burlingame. They offered the cooperation of Burlingame in securing the right of way. Commissioner Fred S. Moody reported that he had a closed negotiation for the right of way through the Carolan Estate.

CALIFORNIA'S FIRST COMPLETE HIGHWAY BUDGET AND PROGRAM

(Continued from page 8.)

The construction program as formally adopted follows:

Santa Maria to Freeman via Bakersfield and Walker Pass.

KERN COUNTY—Maricopa to Valley route, grading, surfacing, oiling (portions), 12.5 miles, \$100,000. Bakersfield to Freeman, grading, surfacing and oiling (portions), 12.5 miles, \$100,000. Freeman to Walker Pass, grading, \$15,000.

Mojave to Arizona line near Topock via Barstow.

SAN BERNARDINO COUNTY—Daggett to Topock, grading, surfacing and oiling (portions), 45 miles, \$425,000. Daggett to Topock (Needles road), realignment, grading and surfacing, \$50,000.

El Rio to San Juan Capistrano.

LOS ANGELES and VENTURA COUNTIES—Santa Monica to Oxnard, surfacing and oiling, paving (portions), 25 miles, \$900,000.

LOS ANGELES COUNTY—Riprap protection along ocean shore, \$40,000.

VENTURA COUNTY—Riprap protections along ocean shore, \$40,000.

La Canada to Mount Wilson road via Arroyo Seco.

LOS ANGELES COUNTY—Flood protection walls, Arroyo Seco, \$25,000. La Canada via Arroyo Seco to Mt. Wilson road, grade and surfacing portions, \$200,000.

Mecca to Blythe.

RIVERSIDE COUNTY—Grading, surfacing and oiling (portions), 22.5 miles, \$225,000. Mecca to Blythe, realignment, grading and surfacing, \$50,000.

Auburn to Sonora (Mother Lode Highway).

CALAVERAS COUNTY—Mokelumne Hill to Angels, grading, surfacing, oiling (portions), 5 miles, \$100,000.

AMADOR COUNTY—Drytown to Martell, grading, surfacing and oiling (portions), 4 miles, \$75,000.

TUOLUMNE COUNTY—Shaws Flat to Sonora, grading, surfacing and oiling (portions), 1.5 miles, \$20,000.

Manteca to point near Mossdale store.

SAN JOAQUIN COUNTY—Mossdale to Manteca, grading, surfacing and oiling, 2 miles, \$50,000.

San Francisco to San Jose (Bay Shore Highway).

SAN MATEO COUNTY—Grading, surfacing and oiling, San Francisco to South San Francisco, 4.8 miles, \$625,500. Surfacing and oiling, South San Francisco to Broadway Station, 5.2 miles, \$150,000. Grading and surfacing, Broadway Station to San Mateo, 3 miles, \$180,000. Visitation Valley to South Francisco, crushed rock shoulders, \$15,000.

San Rafael to San Quentin.

MARIN COUNTY—Grading, surfacing and oiling, 3.1 miles, \$120,000.

Sierra-to-the-Sea.

FRESNO AND MONTEREY COUNTIES—Work on Mustang Grade, \$51,000.

San Francisco to Oregon line at Monumental.

DEL NORTE COUNTY—Hunter and Minot Creek bridges and approaches \$50,000. Grading and surfacing from south line of county to Richardson Creek, \$200,000. Grading for 0.83 miles and surfacing 7.23 miles, Klamath River to Wilson Creek, \$250,000. Completing grading and surfacing Elk Valley road to Smith River, \$46,000. Protection work, Adams Station to Oregon line (cooperative project) \$100,000. Surfacing, Patrick Creek to Oregon line, 17.6 miles, \$85,000. Oiling, Elk Valley to Oregon line, 39.6 miles, \$85,000. Oiling, Orick to Richardson Creek, 26.5 miles, \$35,000. Oiling and rocking, Wilson Creek to Crescent City, 15 miles, \$60,000. Southerly boundary to Wilson Creek, realignment, widening and surfacing, 10.6 miles, \$10,000.

HUMBOLDT COUNTY—Bridges over Lost Man and Prairie creeks, \$35,000. Grading and surfacing, Fortuna to Fernbridge, \$46,000. Eureka to Beatrice, widening and second story, 8.3 miles, \$125,000. Beatrice to Loteta, realignment, grading and surfacing, 4.3 miles, \$125,000. Robinson Ferry bridge, \$20,000. Orick to northerly boundary, realignment, widening and surfacing, 15.8 miles, \$20,000.

SONOMA COUNTY—Santa Rosa to Willowbrook, realignment, grading, widening, and second story, 11.4 miles, \$300,000.

MARIN AND SONOMA COUNTIES—San Rafael to Ignacio, grading, widening, surfacing, 10 miles, \$300,000.

MARIN COUNTY—Miller Creek bridge, \$21,000. Coyote bridge repair, \$10,000. Novato Creek bridge, \$20,000; from Alto to San Rafael, \$300,000; balance needed to complete work on this section to be allotted out of first money available.

San Francisco to San Diego

SANTA CLARA COUNTY—Sargent grade separation and approaches (state's share), \$70,000. Santa Clara, northerly, crushed rock shoulders and second story, 4.7 miles, \$200,000.

MONTEREY COUNTY—Spence grade separation and approaches (state's share), \$75,000. Salinas, northerly, widening and resurfacing, 1.9 miles, \$55,000. South of San Ardo, realignment, grading and surfacing, 0.6 mile, \$40,000. Bituminous top on pavement at intervals totaling 5 miles, \$30,000. Minor line change, \$35,000.

SAN LUIS OBISPO COUNTY—Pismo to San Luis Obispo, realignment, grading, second story, and resurfacing, 10.4 miles, \$450,000. Arroyo Grande to Pismo, realignment, grading, resurfacing 2 miles, \$100,000. Line changes north of San Luis Obispo, grading and surfacing 1.4 miles, \$50,000. Trestle over Santa Fe Creek, \$60,000.

SAN LUIS OBISPO AND SANTA BARBARA COUNTIES—Arroyo Grande to Zaca, macadam shoulders, 4.5 miles, \$135,000. Line changes, grading and surfacing, \$30,000.

VENTURA COUNTY—Rincon Creek bridge, \$40,000. Paving on Conejo grade, \$10,000.

VENTURA COUNTY—Paving on Conejo grade, \$10,000. Benham subway (state's share), \$40,000.

SANTA BARBARA COUNTY—Rincon Hill, realignment, grading and resurfacing 1 mile, \$110,000. Between Ellwood and Goleta, widening and resurfacing 3.44 miles, \$110,000. Montecito to Summerland, realignment, grading and paving 1.8 miles, \$100,000. Superelevating 33 curves, \$45,000.

ORANGE COUNTY—Fullerton to Anaheim, (cooperative paving) 0.8 mile (state's share), \$55,000. Galivan line change, grading and paving, 0.3 mile, \$30,000. Galivan, northerly, widening and second story, 5 miles, \$175,000. Santa Ana to Garden Grove avenue, widening and second story, 2.2 miles, \$100,000. Garden Grove avenue, to Anaheim, widening and second story, 2.8 miles, \$120,000. Galivan overhead, Santa Fe R. R., \$45,000. Irvine subway (state's share), \$75,000. Widening Aliiso Creek bridge, \$25,000. Widening two bridges on Irvine ranch, \$15,000. Line change north of Serra, grading and paving, \$30,000.

Sacramento to Oregon line via Marysville.

TEHAMA AND SHASTA COUNTIES—Stockton and Cottonwood bridges and approaches, \$140,000.

SHASTA COUNTY—LaMoine northerly, grading and standard surfacing, 10 miles, \$650,000. Polards Gulch bridge, \$110,000. Boulder Creek bridge, \$10,000. Shotgun Creek bridge, \$14,000.

SISKIYOU COUNTY—End of present pavement to Gazelle, widening 7.7 miles, \$100,000. Four short line improvements, \$25,000. Baily Hill subway under S. P. (state's share), \$50,000.

SACRAMENTO COUNTY—North Sacramento to Ben Ali station, second story pavement, 1.8 miles, \$75,000. Small bridges and line changes between Ben Ali and Sylvan school, \$35,000. Paving curve at Sylvan school, 0.3 mile, \$10,000.

SACRAMENTO AND PLACER COUNTIES—Sylvan school to Roseville, second story pavement, 2.9 miles, \$95,000.

PLACER COUNTY—Between Roseville and Lincoln, second story or resurfacing, 2.9 miles, \$95,000.

Improving reverse curves at railroad stations, (this also includes like work on Tehama to Benicia highway), \$35,000.

Sacramento to Los Angeles.

FRESNO AND MADERA COUNTIES—Herdon bridge, \$220,000.

LOS ANGELES COUNTY—San Fernando to Castaic, grading and paving, \$350,000. Through Newhall (cooperative paving) 0.6 miles (state's share), \$26,500. Ridge Route realignment, grading, \$150,000. Ridge Route paving, \$165,000. Bituminous resurfacing 3.5 miles, \$37,000. Realignment near Newhall tunnel, \$30,000.

MADERA COUNTY—Thersa to Borden, widening and resurfacing, 6.9 miles, \$145,000. Madera to Fairmead, widening and resurfacing, 10 miles, \$240,000. Berenda grade separation (state's share), \$40,000.

MERCED COUNTY—Widening culverts, \$30,000.

TULARE COUNTY—Southerly boundary to Earhart, widening and resurfacing, 8.5 miles, \$190,000. Two 20-foot bridges, \$20,000.

SAN JOAQUIN COUNTY—Cherokee crossing to Stockton, grading and surfacing, 2.4 miles, \$45,000. Cherokee crossing to Live Oak, widening and crushed rock shoulders, 7.6 miles, \$50,000. Bridge across the diverting canal, \$45,000. Cherokee crossing to Stockton, grading and surfacing, 2.4 miles, \$45,000.

SACRAMENTO COUNTY—Arno line change, grading and surfacing, 1.8 miles, \$32,500. McConnelly Station to Sacramento, crushed rock shoulder, 13.2 miles, \$30,000. Bridges between Galt and Arno, \$70,000. Bridge near Arno, \$20,000. Galt to McConnell, grading and second story, 5.5 miles, \$190,000.

STANISLAUS COUNTY—Approaches to Turlock, grading and paving, 1.2 miles, \$35,000. Realignment north of Ceres, grading and paving 0.2 mile, \$9,000. Stanislaus River bridge, south approach, \$20,000. Hatch subway, near Modesto, Southern Pacific Railroad (state's share), \$50,000. Widening two irrigation canal bridges, \$10,000. Widening four irrigation canal bridges, \$15,000. Turlock overhead crossing, Southern Pacific Railroad (state's share), \$75,000.

KERN COUNTY—Between Bakersfield and Delano, widening, surfacing with asphaltic concrete, \$450,000 (contracts already let and work in progress).

Stockton to Santa Cruz via Oakland.

SAN JOAQUIN COUNTY—French Camp to Mossdale, grading and second story, 7 miles, \$195,000.

ALAMEDA COUNTY—Dublin to Hayward, realignment, grading, and asphaltic macadam, 7.8 miles, \$390,000. Palomares Creek bridge, \$30,000. Alamo Creek bridge, \$12,500. Hollis Creek bridge, \$21,000. Call Creek bridge, \$40,000.

ALAMEDA AND SANTA CLARA COUNTIES—Warm Springs to Milpitas, widening, resurfacing and paving, 3.7 miles, \$160,000.

Sacramento to Woodland Junction.

YOLO COUNTY—East and west of causeway, rock shoulders, second story, 3 miles, \$50,000. M street bridge, widening roadway, \$30,000.

Tehama Junction to Benicia.

SOLANO COUNTY—Southwest to Vacaville, realignment, grading, paving, 1.5 miles, \$45,000.

COLUSA COUNTY—Arbuckle to northerly boundary, rock shoulders, 26.8 miles, \$80,000. Stone Corral bridge, \$10,000. Funk Slough bridge, \$8,000.

GLENN COUNTY—Willows southerly, widening and resurfacing 3.05 miles, \$60,000. Wilson Creek bridge, \$8,000.

Ignacio to Cordelia via Napa.

SONOMA COUNTY—Black Point cut-off, surfacing and oiling, 8.5 miles, \$75,000. Line changes, grading and surfacing, \$50,000.

SOLANO COUNTY—North of Cordelia to Napa County line, grading and surfacing, 3.5 miles, \$110,000.

San Fernando to San Bernardino.

LOS ANGELES COUNTY—La Canada to Pasadena, bridges, grading and surfacing (portions), 8.5 miles, \$157,500. Pasadena to Monrovia, grading and paving (portions), 3.6 miles, \$200,000. San Dimas line change, grading and surfacing, 1 mile, \$55,000. Monrovia to Azusa, realignment, widening and paving, 2.5 miles, \$150,000. San Dimas to Claremont, widening and resurfacing, 3 miles, \$150,000. Glendora to San Dimas avenue, realignment, grading and paving, \$150,000.

SAN BERNARDINO COUNTY—San Bernardino to westerly boundary, widening and resurfacing, 20 miles, \$425,000. Pacific Electric subway near Upland (state's share), \$50,000.

San Diego to El Centro.

SAN DIEGO COUNTY—Viejas Valley, easterly, realignment, grading, paving, \$425,000. Euclid avenue to east city limits of San Diego, cooperative paving, 1.5 miles (state's share), \$45,000. Disintegrated granite surfacing, \$25,000. Between Buckman's Springs and Tecate Summit, realignment, grading and surfacing, \$55,000. San Diego to La Mesa, realignment, widening and resurfacing, 2.5 miles, \$80,000.

IMPERIAL COUNTY—Grade separation and approaches (San Diego and Arizona Railroad), \$40,000. El Centro to Dixie Land, widening and resurfacing, 12.2 miles, \$225,000. New River bridge, Bullhead Slough bridge, West Main Canal bridge, \$55,000.

Sacramento to Nevada line via Placerville.

EL DORADO COUNTY—Slippery Ford, grading and surfacing (cooperative), 4.2 miles, \$75,000. Sportsman's Hall to Riverton, realignment, grading and resurfacing (portions), \$60,000.

SACRAMENTO COUNTY—Brighton subway under Southern Pacific railroad, \$45,000.

Salida to Alpine Highway at Junction.

TUOLUMNE COUNTY—Keystone to Jamestown, surfacing and oiling, 9 miles, \$60,000. Sonora, easterly, grading, surfacing and oiling (portions) (Big Oak Flat road), \$75,000.

Albany to Martinez.

CONTRA COSTA COUNTY—Rodeo to Albany, grading, surfacing and structures (portions), 3.4 miles, \$250,000. El Cerrito to Albany, widening and resurfacing (cooperative with El Cerrito and Albany), 0.8 mile, \$35,000. Wild Cat Creek bridge, approaches, realignment, grading and surfacing, 0.3 mile, \$25,000.

Wild Cat bridge, \$30,000. Richmond to San Pablo, widening and resurfacing, 1.4 miles, \$75,000.

Tahoe-Ukiah Highway.

COLUSA AND LAKE COUNTIES—Grading and surfacing (portions), \$260,000.

Roseville to Nevada City.

PLACER COUNTY—Between Roseville and Rocklin, second story or resurfacing, realignment, 1.5 miles, \$60,000. Antelope Creek bridge, \$7,500.

Merced to point near Sequoia.

MARIPOSA COUNTY—Westerly boundary to Cathay, realignment, grading and surfacing 9.6 miles, \$275,000. Cathay to Mariposa, realignment and grading 14.3 miles, \$50,000. Mormon Bar to Briceburg, rock surfacing 15 miles, \$65,000; widening culverts, \$40,000.

MERCED COUNTY—Santa Fe grade separation (state's share), \$60,000.

West of Claremont to Riverside.

SAN BERNARDINO COUNTY—Ontario to Pomona, realignment, grading and paving, 2.6 miles, \$100,000.

Redding to Redwood Highway, near Arcata via Weaverville.

TRINITY COUNTY—Indian Creek and Grass Valley Creek bridges, \$35,000.

Saugus to Alpine Junction.

KERN and INYO COUNTIES—Mojave to Bishop, grading, surfacing and oiling (portions) 30 miles, \$300,000.

KERN COUNTY—Between Mojave and Ricardo, pavement of dips, \$15,000.

INYO COUNTY—Cowan's Station to Olancha, grading 17 miles, \$50,000. End of present concrete pavement to Fish Springs, grading 2.4 miles, \$7,000. Realignment, grading and surfacing $\frac{1}{4}$ mile, \$1,000. Between Lone Pine and Manzanar, grading and surfacing 8 miles, \$60,000. Olancha to Cottonwood Creek, grading and surfacing 9.4 miles, \$30,000. Cottonwood Creek to Diaz, grading and surfacing 10 miles, \$40,000. Diaz to Lone Pine, grading and surfacing 6 miles, \$36,000.

MONO COUNTY—Between Sonora Junction and Coleville, widening and realignment, \$50,000. Guard rail, 2000 feet, \$2,000. Dogtown to Point Ranch, realignment, grading and surfacing, 3.65 miles, \$20,000. Realignment at Hilton Creek 1.6 miles, \$10,000. North and south of Tioga Junction widening and surfacing 6 miles, \$40,000. McGee Creek to Convict Creek, surfacing 3 miles, \$12,000. Small bridges, \$10,000.

Valley route to point near Silver Creek.

CALAVERAS COUNTY—Widening existing underpass near Valley Springs, \$10,000.

San Bernardino to El Centro.

IMPERIAL COUNTY—Brawley to El Centro, surfacing and oiling (portions, including town of Imperial), \$50,000. Trifolium Canal to Salada Wash, widening and resurfacing 21 miles, \$353,000.

SAN BERNARDINO COUNTY—Redlands to southerly boundary, realignment, widening and resurfacing 7.2 miles, \$200,000. Mission Drain bridge, Santa Ana River bridge, San Timoto bridge, Warm Creek bridge, \$85,000.

El Centro to Yuma.

IMPERIAL COUNTY—Araz underpass, San Diego and Arizona Railroad (state's share), \$25,000.

Redding to Nevada line via Alturas.

SHASTA and MODOC COUNTIES—Redding to Alturas, grading, surfacing and oiling (portions), \$250,000.

Red Bluff to Nevada line near Purdy.

TEHAMA, PLUMAS and LASSEN COUNTIES—Red Bluff to Susanville, grading, surfacing and oiling (portions, cooperative project), \$250,000.

PLUMAS COUNTY—Bailey and Rock Creek bridges, \$25,000.

LASSEN COUNTY—Grade separation between Susanville and Purdy (state's share), \$25,000.

San Bernardino to Nevada line near Jean.

SAN-BERNARDINO COUNTY—Daggett to Jean, grading, surfacing and oiling (portions) 30 miles, \$300,000. Daggett to state line near Jean (Nevada), realignment, grading and surfacing, \$50,000.

Califa to Gilroy (Pacheco Pass).

MERCED COUNTY—Ten miles east of Los Banos to easterly boundary, crushed rock shoulders, 9.8 miles, \$30,000.

Valley route near Bakersfield to Paso Robles (Cholame Pass).

KERN COUNTY—Wasco to Route 4 (Valley route), grading, surfacing, oiling and structures, 9 miles, \$150,000.

CHOLAME PASS—Realignment, surfacing, oiling (portions), \$200,000.

Valley route near Arno to Pickett's Junction.

AMADOR COUNTY—Jackson to Pine Grove, realignment, grading and surfacing 3 miles, \$9,500. Widening underpass east of Ione, \$5,000.

Auburn to Nevada line near Verdi.

PLACER AND NEVADA COUNTIES—Cisco to Soda Springs, grading, surfacing, oiling, structures (portions), 10.65 miles, \$350,000.

PLACER COUNTY—Six railroad separations and approaches (state's share), \$250,000.

NEVADA COUNTY—Donner Monument to Tahoe Junction, grading, surfacing, oiling, \$25,000.

Meyers to Nevada line via Truckee River.

PLACER COUNTY—Truckee River bridge and approaches, \$20,000.

EL DORADO and PLACER COUNTIES—Emerald Bay to Tahoe City, realignment, grading, surfacing, \$175,000.

San Bernardino, end of county pavement, to Bear Lake.

SAN BERNARDINO COUNTY—Crest Route, grading and surfacing (cooperative project), \$500,000. Crest Drive, grading, \$150,000.

Willows to highway near Biggs (Oroville-Willows lateral).

BUTTE and GLENN COUNTIES—Butte City to Biggs, grading and surfacing 7 miles, \$70,000.

Orland to Chico.

GLENN COUNTY—Hamilton City bridge approaches, surfacing and oiling (portions), \$50,000.

McDonald to Navarro.

MENDOCINO COUNTY—Bridges and approaches, \$60,000.

San Francisco to point near Glennwood (Skyline Boulevard).

SAN MATEO COUNTY—La Honda road to Saratoga Gap, grading, surfacing and oiling (portions), 7.5 miles, \$300,000.

December Record of Bids and Awards

DIVISION OF ARCHITECTURE

MENDOCINO STATE HOSPITAL—Plumbing and electrical work on attendants' building and garages. Bids opened Dec. 13th as follows: E. H. Grogan Co., Stockton, \$12,582; Latourrette-Fical Co., Sacramento, \$13,637; Luppen & Hawley, Sacramento, \$14,352; E. L. Guekow, Stockton, \$14,599. Contract awarded to E. H. Grogan Co., Stockton, \$12,582.

General work on attendants' building and garages. Bids opened Dec. 13th as follows: Carl N. Swenson, San Jose, \$51,746; William Martin, San Francisco, \$53,248; J. A. Bryant, San Francisco, \$54,217; Lamb & Bobick, Sacramento, \$54,270; Monson Bros., San Francisco, \$54,740; J. F. Shepherd, Stockton, \$55,337; J. S. Hannah, San Francisco, \$55,772; A. M. Hildebrandt, Santa Rosa, \$56,650; Peter Sorensen, San Francisco, \$56,983; Fred J. Maurer & Sons, Eureka, \$57,787; Mahony Bros., San Francisco, \$58,044; J. P. Brennan, Redding, \$58,259; Mathews Construction Co., Sacramento, \$59,573; Fredrickson & Watson, Oakland, \$60,427; Campbell Construction Co., Sacramento, \$61,536; R. S. K. MacMillen, San Francisco, \$61,911; Joe Pinsecki, San Francisco, \$62,463; M. B. McGowan, San Francisco, \$68,846; Leibert & Trobeck, San Francisco, \$69,443. Contract awarded to Carl N. Swenson, San Jose, \$51,746.

MAIN STATE BUILDING (San Jose)—Repairs to roof on main building. Bids opened Dec. 16th as follows: W. J. Porter, San Jose, \$1,387; Garden City Roofing Co., San Jose, \$1,917.50. Contract awarded to W. J. Porter.

PATTON STATE HOSPITAL—White tile and marble work in wards "C" and "D." Bids opened Dec. 16th as follows: H. P. Fischer Tile and Marble Co., Sacramento, \$1,136; Charles E. Clifford Co., Los Angeles, \$1,230; Averville Tile & Mantle Co., San Bernardino, \$1,410; Ben K. Rose, Los Angeles, \$1,437. Contract awarded to H. P. Fischer Tile and Marble Co.

PACIFIC COLONY (Spadra)—Refrigeration plant and equipment. Bids opened Dec. 20th as follows:

Creamery Package Mfg. Co., \$4,170; Refrigeration & Mech. Equipment Corporation, \$5,128; York Ice Machinery Corp., \$5,195; Western Refrigeration Co., \$5,285; Vulcan Iron Works, \$5,454; Cyclops Iron Works, \$5,550; Baker Ice Machine Co., \$6,156; Jensen Creamery Machinery Co., Los Angeles, \$6,564. Contract awarded to Creamery Package Mfg. Co., \$4,170.

STATE LIBRARY AND COURTS BUILDING—Furnishings and technical equipment. Bids opened Oct. 7, 1927. Recommendation and award of contract follows: Furnishing and installing 27 of the total of 199 items required, be awarded to the Purnell Stationery Company at this company's figures totaling \$11,535.75, the corresponding figures of McKee and Wentworth totaling \$14,105; and for furnishing and installing the remaining 172 items required be awarded to McKee and Wentworth at figures totaling \$56,577.50, the corresponding figures of the Purnell Stationery Company totaling \$58,381.38. Of the original 214 items called for 15 are omitted entirely.

DIVISION OF HIGHWAYS

AMADOR COUNTY—Grading, beginning at a point 3 miles east of Jackson and extending for 0.9 mile easterly. Dist. X, Rt. 34, Sec. C. Engineer's estimate \$11,653.93. Bids opened Dec. 20th as follows: Young Bros., Berkeley, \$15,438.16; Geo. E. Fimmel, Sacramento, \$12,939.66; C. T. Malcom, Walnut Creek, \$13,531.18; J. R. Reeves, Sacramento, \$16,259.50; G. D. Contoules, San Francisco, \$11,857.76; Mankel & Storing, Sacramento, \$16,438.11; P. Montague, San Francisco, \$12,321.98; M. J. Beranda, Stockton, \$17,325.68; Guerin & Ritter, San Francisco, \$14,106.95; A. J. & J. L. Fairbanks, Inc., South San Francisco, \$12,648.44; Nate Lovelace, Oakland, \$13,072.73; A. A. & H. A. Tieslau, Berkeley, \$18,720.06; J. F. Collins, Stockton, \$15,781; C. E. Murray, Modesto, \$14,455.83; C. W. Wood, Manteca, \$16,604.04. Award of contract pending.

CONTRA COSTA COUNTY—Between Richmond and San Pablo, grading and standard road surfacing approaches to Wildcat Creek bridge (0.25 mi.). Dist. IV, Rt. 14, Sec. A. Engineer's estimate \$7,431.50. Bids opened Dec. 6th as follows: John A. Casson, Hayward, \$7,825; C. W. Wood, Manteca, \$7,193; Lee J. Immel, Berkeley, \$6,923; Tieslau Bros., Berkeley, \$6,398. Contract awarded to Tieslau Bros.

LOS ANGELES COUNTY—Installation of pipe line, 21.4 miles long, between Nicholas Creek and Los Angeles, Dist. VII, Rt. 60, Sec. A-B. Engineer's estimate \$27,668. Bids open Dec. 5th as follows: P. L. Burr Co., San Francisco, \$42,529.15; Sidney Smith, Los Angeles, \$47,075; Kelley Pipe and Machinery Co., Los Angeles, \$34,523.25; Santa Fe Pipe and Supply Co., Los Angeles, \$31,537.25. Contract awarded to Santa Fe Pipe and Supply Co., Los Angeles, \$31,537.25.

MARIN COUNTY—Between Ross and Larkspur, asphaltic concrete base and surface and rock borders, 0.7 miles. Dist. IV, Rt. 1, Sec. B. Engineer's estimate \$12,872. Bids opened Dec. 6th as follows: Pacific States Construction Co., San Francisco, \$14,179; Albert G. Raich, San Francisco, \$14,362. Contract awarded to Pacific States Construction Co., San Francisco, \$14,179.

MERCED COUNTY—Widening eight bridges south of Merced, to 30-foot roadway. Dist. VI, Rt.

4. Sec. A. Engineer's estimate \$26,149.25. Bids opened Dec. 12th as follows: Holdener Construction Co., Sacramento, \$29,374; Lee J. Immel, Berkeley, \$24,000.30; Otto Parlier, Tulare, \$23,102.50; John P. Williams, Fresno, \$20,431.95; Noble Bros., San Jose, \$28,489; Geo. J. Ulrich Construction Co., Modesto, \$20,266.50; H. C. Whitty, Sanger, \$22,171. Contract awarded to H. C. Whitty.

PLACER COUNTY—Two undergrade crossings under S. P. R. R. near Applegate, Dist. III, Rt. 37, Sec. A-B. Engineer's estimate, \$55,932.28. Bids opened Dec. 5th as follows: W. A. Bechtel Co., San Francisco, \$43,209.15; Frederickson & Watson Construction Co., Oakland, \$47,975.95; H. C. Whitty, Sanger, \$59,652.15; Otto Parlier, Tulare, \$46,984.10; Sacramento Contract Co., Sacramento, \$46,011.25; Mathews Construction Co., Sacramento, \$53,414.50; C. W. Wood, Manteca, \$49,196.90; City Improvement Co., Los Angeles, \$56,181.40; Holdener Construction Co., Sacramento, \$46,528.65; Tieslau Bros., Berkeley, \$47,653.95; E. B. Skeels, Roseville, \$59,890.60; Noble Bros., San Jose, \$43,819.95. Contract awarded to W. A. Bechtel Co., San Francisco, \$43,209.15.

SAN JOAQUIN COUNTY—Removal of old Mossdale bridge, Dist. X, Rt. 5, Sec. B. Engineer's estimate \$4,000. Bids opened Dec. 6th as follows: Holdener Construction Co., \$5,200; Geo. A. Renner, \$2,300; M. B. McGowan, \$4,970; Olympian Dredging Co., \$14,850. Contract awarded to Geo. A. Renner, \$3,300.

SONOMA COUNTY—Between Fairville and Vineburg Junction, grading and standard road surfacing approaches to Sonoma Creek bridge (0.7 mi.). Dist. IV, Rt. B, Sec. A and B. Engineer's estimate \$14,808.50. Bids opened Dec. 6th as follows: Tieslau Bros., Berkeley, \$16,047.30; P. Montague, San Francisco, \$17,697; Guerin Bros., San Francisco, \$16,862; Chas. N. Chittenden, Napa, \$15,320.75; J. P. Holland, Inc., San Francisco, \$18,403.50; Chas. Harlowe Jr., Oakland, \$18,475; C. W. Wood, Manteca, \$17,452.50. All bids rejected.

STANISLAUS COUNTY—Widening six bridges, and extending six siphons and one culvert, at points between Turlock and northerly boundary, Dist. X, Rt. 4, Sec. A. Engineer's estimate \$19,760. Bids opened Dec. 19th as follows: Holdener Construction Co., \$18,202.20; E. W. Peterson, San Francisco, \$16,675.75; C. W. Wood, Manteca, \$18,533.60; George J. Ulrich Construction Co., Modesto, \$17,113.75; Guerin Bros., San Francisco, \$16,446; Noble Bros., San Jose, \$18,362.30; Otto Parlier, Tulare, \$16,269; Lee J. Immel, Berkeley, \$15,479. Contract awarded to Lee J. Immel.

TEHAMA COUNTY—For constructing a portion of the state highway east of Red Bluff, Dist. II, Rt. 29, Sec. A. Engineer's estimate \$10,900. Bids opened Dec. 5th as follows: E. B. Bishop, Sacramento, \$10,297.50; C. W. Wood, Manteca, \$14,935; Kaiser Paving Co., Oakland, \$15,352; Hemstreet & Bell, Marysville, \$16,040. Contract awarded to E. B. Bishop, Sacramento, \$10,297.50.

VENTURA COUNTY—Surfacing 11.8 miles with crushed gravel or stone (oil treated) between Little Sycamore Creek and Latigo Creek, Dist. VII, Rt. 60, Sec. A-B. Engineer's estimate \$181,800. Bids opened Dec. 5th as follows: Tieslau Bros., Berkeley, \$192,900; George Herz and Co., San Bernardino, \$149,600; Southwest Paving Co., Los Angeles, \$143,930; Nighbert and Carnahan, Bakersfield, \$148,500; John and Bressi, Los Angeles, \$153,500; Ed Johnson and Sons, Los Angeles, \$171,420. Contract awarded to Southwest Paving Co., Los Angeles, \$143,930.

WATER PERMITS AND APPLICATIONS

Permits

Permits to appropriate water issued by the Department of Public Works, Division of Water Rights, during the month of December, 1927.

MONO COUNTY—Permit 2929, Application 5514; issued to The Seymour Finance Corp., care of James H. Van Law, attorney, National City Bank Bldg., Los Angeles, December 6, 1927, for 0.1 cubic foot per second from two springs in section 14, T. 2 S., R. 20 E., for domestic use on 800 lots and hotel in section 14. Estimated cost \$1,500.

PLUMAS COUNTY—Permit 2930, Application 5166; issued to W. F. Drew, Blairsden, December 7, 1927, for 1.5 c.f.s. from Little Grey Eagle Creek in section 7, T. 21 N., R. 12 E., for power purposes, 12 t.h.p. to be developed. Estimated cost \$500.

SUTTER COUNTY—Permit 2931, Application 5696; issued to Commercial Investment Co., Sacramento, December 7, 1927, for 1.11 c.f.s. from Sacramento River in section 22, T. 12 N., R. 2 E., for irrigation of 80.21 acres. Estimated cost \$5,600.

SAN DIEGO COUNTY—Permit 2932, Application 5663; issued to Fred Lazz, San Diego, December 15, 1927, for 0.3 c.f.s. from Tubhead Spring Creek in section 24, T. 11 S., R. 5 E., for domestic and irrigation purposes on 100 acres. Estimated cost \$1,500.

SIERRA COUNTY—Permit 2933, Application 5552; issued to Chas. E. Herron, Los Angeles, December 19, 1927, for 109 c.f.s. from South Fork of North Fork Yuba River in section 31, T. 20 N., R. 11 E., for mining purposes. Estimated cost \$70,000.

SAN JOAQUIN COUNTY—Permit 2934, Application 5712; issued to Richard and Nellie C. Stevens, Ripon, December 19, 1927, for 1.25 c.f.s. from Lone Tree Creek in section 24, T. 1 S., R. 7 E., for irrigation of 100 acres. Estimated cost \$1,000.

NEVADA COUNTY—Permit 2935, Application 4309; issued to Nevada Irrigation District, Grass Valley, December 22, 1927, for 135 c.f.s. from South Fork Yuba River, Middle Fork Yuba River and Canyon Creek in sections 20 and 21, T. 17 N., R. 12 E., for power purposes, 40,883 t.h.p. to be developed. Estimated cost \$8,165,000. Permit 2936, Application 4310; issued to Nevada Irrigation District, Grass Valley, December 22, 1927, for 126 c.f.s. from South Fork Yuba River, Middle Fork Yuba River and Canyon Creek in sections 20 and 21, T. 17 N., R. 12 E., for power purposes, 16,852 t.h.p. to be developed.

SAN JOAQUIN COUNTY—Permit 2937, Application 5316; issued to McMullin Reclamation District, No. 2075, care of Harmon S. Bonte, San Francisco, December 22, 1927, for 48.75 c.f.s. from Stanislaus River in section 9, T. 3 S., R. 7 E., for irrigation of 3900 acres. Permit 2938, Application 5718; issued to Western Pacific Railroad Co., San Francisco, December 23, 1927, for 0.023 c.f.s. from Potato Slough in section 13, T. 3 N., R. 4 E., for railroad purposes in section 13.

LOS ANGELES COUNTY—Permit 2939, Application 5178; issued to U. S. Forest Service, Los Angeles, December 29, 1927, for 0.1 c.f.s. from Vasquez Creek in section 11, T. 2 N., R. 13 W., for irrigation of 25 acres. Estimated cost \$2,000. Permit 2940, Application 5301; issued to U. S. Forest Service, Los Angeles, December 29, 1927, for 0.25 c.f.s. from two branches of Clear Creek in section

S. T. 2 N., R. 12 W., for agricultural purposes on 40 acres. Estimated cost \$1,000.

INYO COUNTY—Permit 2941, Application 5478; issued to A. M. Johnson, care of E. S. Giles, Goldfield, Nevada, December 30, 1927, for 1 c.f.s. from Grapevine Canyon Spring in section 31, T. 10 S., R. 43 E., for power and domestic purposes. 28 t.h.p. to be developed. Estimated cost \$10,000.

PLACER COUNTY—Permit 2942, Application 5620; issued to Black Hawk Mine, care of L. C. Anderson, attorney, Roseville, December 31, 1927, for 2.5 c.f.s. from unnamed creek in section 4, T. 15 N., R. 11 E., for mining and domestic purposes. Estimated cost \$200.

Applications

Applications for permit to appropriate water filed with the State Department of Public Works, Division of Water Rights, during the month of December, 1927.

SAN DIEGO COUNTY—Application 5767; G. M. Jones, trustee, care of D. M. Baker, Los Angeles, for 10,000 acre-feet per annum from Coyote Creek tributary to Salton Sink, to be diverted in section 4, T. 10 S., R. 6 E., for domestic and irrigation purposes on 51,200 acres in Borega Valley.

PLUMAS COUNTY—Application 5768; Geo. P. Holman et al., San Jose, for 3 c.f.s. from Willow Creek tributary to Middle Fork Feather River, to be diverted in section 8, T. 23 N., R. 10 E., M. D. M., for mining purposes.

MADERA COUNTY—Application 5769; J. H. Wooden and J. R. Bawler, care of Everts, Ewing, Wild & Everts, attorneys, Fresno, for 2 c.f.s. and 200 acre-feet per annum from Jackass Lakes tributary to San Joaquin River, to be diverted in section 2, T. 5 S., R. 24 E., M. D. M., for power purposes at stamp mill for crushing gold ore. Estimated cost \$500.

TRINITY COUNTY—Application 5770; M. A. Senger, Weaverville, for 3 c.f.s. from North Fork Trinity River tributary to Trinity River, to be diverted in section 24, T. 35 N., R. 12 W., M. D. M., for power purposes. 375 t.h.p. to be developed. Application 5771; M. A. Senger, Weaverville, for 40 c.f.s. from North Fork Gulch, Baxter Gulch, Rapid Gulch, Thurston Gulch and Brown Gulch tributary to North Fork Trinity River, to be diverted in sections 1 and 24, T. 34 N., R. 12 W., section 36, T. 35 N., R. 12 W., section 30, T. 35 N., R. 11 W., M. D. M., for mining purposes. Estimated cost \$500. Application 5780; Robert L. Little and Geo. E. Waggoner, care of W. D. Ball, Los Angeles, for 25 c.f.s. from Stony Creek tributary to Stuarts Fork, to be diverted in section 23, T. 55 N., R. 9 W., M. D. M., for power purposes. 1400 t.h.p. to be developed. Application 5779; Robert L. Little and Geo. E. Waggoner, care of W. D. Ball, Los Angeles, for 75 c.f.s. and 10,000 acre-feet per annum from Stuarts Fork and Deer Creek tributary to Trinity River, to be diverted in section 3, T. 36 N., R. 10 W., and sections 19, 20, 31, T. 36 N., R. 9 W., for power purposes. 20,000 t.h.p. to be developed.

SAN BERNARDINO COUNTY—Application 5775; Henry F. Scholing, San Bernardino, for 0.24 c.f.s. from Sweetwater Canyon tributary to Devils Canyon, to be diverted in section 5, T. 1 N., R. 4 W., S. B. M., for irrigation purposes on 70 acres. Estimated cost \$55. Application 5781; Alice C. McRey-

nolds, care of Chapman & Chapman, attorneys, Los Angeles, for 0.001 c.f.s. from small unnamed stream sometimes known as Red Arrow Canyon tributary to Big Bear Lake, to be diverted in section 22, T. 2 N., R. 1 W., S. B. M., for domestic purposes. Estimated cost \$500.

EL DORADO COUNTY—Application 5782; Parrall Gold Mines Corp., Placerville, for 7.5 c.f.s. from Camp Creek tributary to Cosumnes River, to be diverted in section 15, T. 10 N., R. 13 E., M. D. M. for power purposes. 134 t.h.p. to be developed.

VENTURA COUNTY—Application 5783; Mrs. Glendora G. Reyes, Scheideck, for 0.35 c.f.s. from Alimio Creek tributary to Cuyama River, to be diverted in section 28, T. 7 N., R. 23 W., S. B. M., for agricultural purposes on 40 acres. Estimated cost \$35.

SANTA CRUZ COUNTY—Application 5784; The Paradise Park Masonic Club, care of Collins & Roan, attorneys, Oakland, for 0.5 c.f.s. from Eagle Creek tributary to San Lorenzo River, to be diverted in section 35, T. 10 S., R. 2 W., M. D. M., for domestic purposes. Estimated cost \$10,000.

FRESNO COUNTY—Application 5785; Miller & Lux, Inc., San Francisco, for 300 c.f.s. from San Joaquin River, to be diverted in section 30, T. 13 S., R. 15 E., M. D. M., for irrigation purposes on 54,000 acres. Estimated cost \$510,000. Application 5787; Miller & Lux, Inc., San Francisco, for 572 c.f.s. from San Joaquin River, to be diverted in section 12, T. 11 S., R. 13 E., M. D. M., for irrigation purposes on 45,745 acres. Estimated cost \$203,000.

MADERA COUNTY—Application 5786; Miller & Lux, Inc., San Francisco, for 206 c.f.s. from San Joaquin River, to be diverted in section 25, T. 13 S., R. 15 E., M. D. M., for irrigation purposes on 16,516 acres. Estimated cost \$75,000.

MONO COUNTY—Application 5776; Roy Booth, forest supervisor, agent for Crystal Crag Water and Development Association (proposed), Bishop, for 0.016 c.f.s. from Cold Water Creek tributary to Lake Mary and Mammoth Creek, to be diverted in section 21, T. 4 S., R. 27 E., M. D. M., for domestic purposes at Crystal Crag Lodge and the Lake Mary tract of summer home sites, Lots 1 to 26, inclusive. Estimated cost \$3,000.

SISKIYOU COUNTY—Application 5777; Dafodil Mining Company, Roseburg, Oregon, for 20 c.f.s. from Elliot Creek tributary to Applegate River, to be diverted in section 19, T. 48 N., R. 10 W., M. D. M., for mining purposes. Estimated cost \$2,500. Application 5778; Philip Philipe, Yreka, for 1 c.f.s. from Caeser Gulch tributary to Humburg Creek, to be diverted in section 6, T. 45 N., R. 7 W., for mining purposes in section 32. Estimated cost \$200.

AMADOR COUNTY—Application 5772; M. J. Pierre and Alice Plasse, Jackson, for 0.077 c.f.s. from unnamed springs tributary to west branch of west branch to south inlet of Silver Lake, to be diverted in section 17, T. 9 N., R. 17 E., section 18, T. 9 N., R. 17 E., for power purposes. Estimated cost \$1,000.

MODOC COUNTY—Application 5773; John P. Booth, San Jose, for 30 c.f.s. and 2450 acre-feet per annum from South Fork Pit River tributary to Pit River, to be diverted in section 10, T. 39 N., R. 14 E., M. D. M., for power purposes. 2036 t.h.p. to be developed. Application 5774; John P. Booth, San Jose, for 13 c.f.s. and 2450 acre-feet per annum from Mill Creek tributary to South Fork Pit River, to be diverted in section 28, T. 40 N., R. 15 E., M. D. M., for power purposes. 1216 t.h.p. to be developed.

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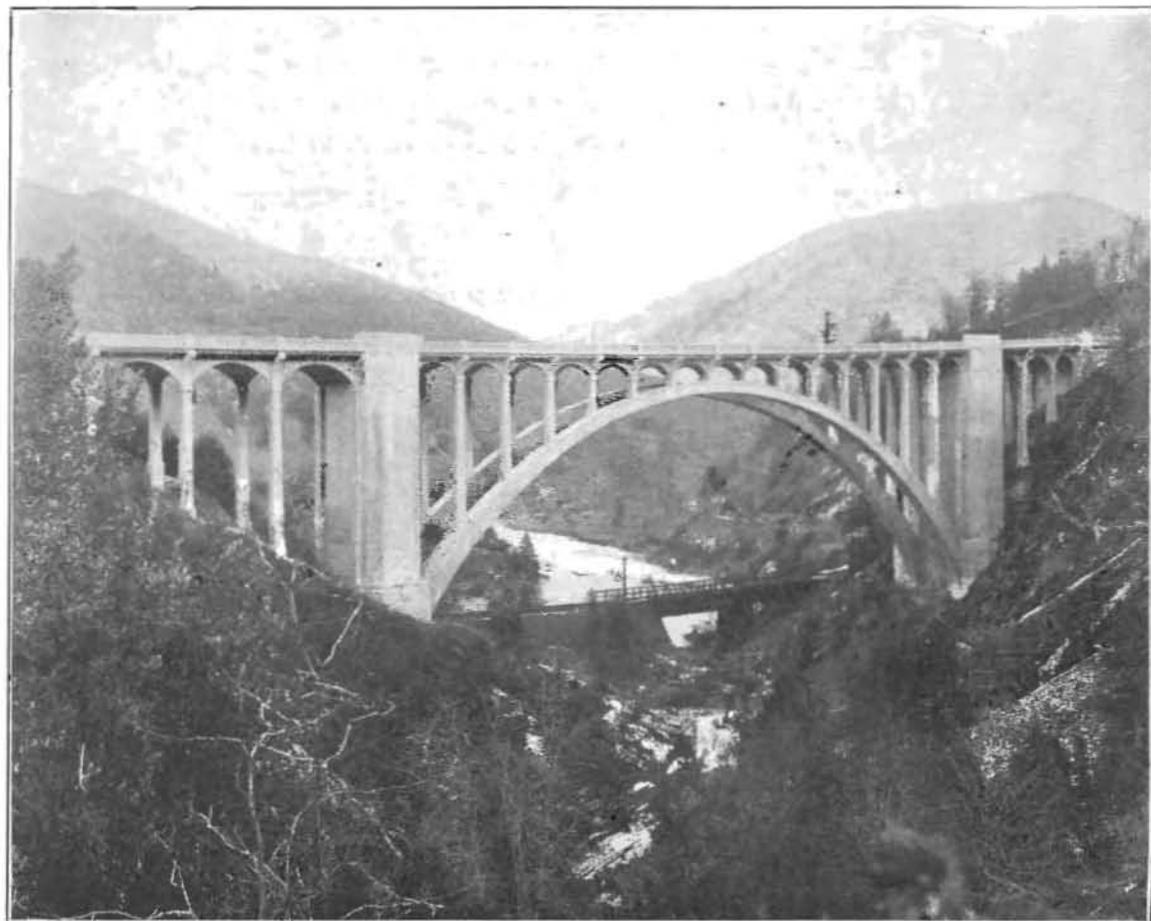
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BUILDERS THAT THOSE WHO COME MAY PASS IN SAFETY



Harlan D. Miller bridge on the Pacific Highway in Shasta County.

AN old man traveling a lone highway,
Came at the evening cold and gray,
To a chasm deep and wide.
The old man crossed in a twilight dim,
For the sullen stream held no fear for him,
But he turned when he reached the other side,
And builded a bridge to span the tide.



“OLD man,” cried a fellow pilgrim near,
“You are wasting your strength with
your building here,
Your journey will end with the ending day
And you never again will pass this way.
You have crossed the chasm deep and wide,
Why build a bridge at eventide?”

AND the Builder raised his old gray head,
“Good friend, on the path I have come,”
he said,
“There followeth after me today
A youth, whose feet will pass this way,
This stream, which has been naught to me,
To that fair-haired boy, may a pitfall be.
He, too, must cross in the twilight dim.
Good friend, I am building this bridge for
him.”

—Anonymous.

The Harlan D. Miller bridge on the Pacific Highway about forty miles north of Redding was opened to traffic on December 4, 1927. Mr. Miller, who was chief bridge engineer for the California Highway Commission, died on October 19, 1926. A few days before his death the California Highway Commission designated the structure as the Harlan D. Miller bridge in recognition of his service to the state.