

CALIFORNIA HIGHWAYS

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

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DECEMBER, 1926

No. 12



In this issue: Biennial Report Tells of Progress on State Highway System.

CALIFORNIA HIGHWAYS

This Bulletin is published by the California Highway Commission for the information of its employees and the public. Editors of newspapers and others interested are welcome to use, without restriction, any of the matter herein contained. Cuts will be gladly loaned upon request.

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

Vol. 3. DECEMBER, 1926. No. 12

CALIFORNIA HIGHWAY DEPARTMENT

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THE CHRISTMAS SPIRIT AND GOOD ROADS.

The season of Good Cheer—that gladsome time when we discard the artificial and feel and act as human beings should toward one another—is once more at hand. It is the spirit of Christmas that for countless generations has been spreading slowly over the earth, building the foundations of a better civilization.

Transportation ever has been its helper as the Ideals of Good Will of nearly twenty centuries ago have been carried onward across new frontiers to the ends of the earth.

This is the season when Ignorance, Hate, Prejudice, Provincialism are forced into the background by the warm glow of the light of our better selves. The spirit of Christmas for a brief time, at least, dominates over its age-old antagonists. They were the enemies of the Great Teacher even as they are still the forces that thwart progress in our day.

Nothing has been of greater force through the ages in breaking down these barriers than improved means of transportation. And, today, transportation for the great mass of the people is interpreted in terms of better highways. So, when we build good roads, we are not merely earning our daily bread, we are providing means for a more widespread advance of the Spirit of Good Will.

This is an opportunity of service that comes to those who serve all the People in a worthy effort. Let us appreciate it and resolve to be honest and efficient; to make the Highway Department the outstanding service which the government of California renders its citizens; let us carry the spirit of Christmas through the year.

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EVERY employee of the highway commission has a direct interest in the improvement of the highway organization's methods and results, both engineering and clerical, office and field. To that end, the State Highway Engineer invites constructive criticism or suggestions from every employee.

Ideas as to the more economical and efficient handling of your job, or suggestions for elimination of waste will be welcomed. Criticism is also desired from persons outside the organization, who are in a position to give facts.

Send only signed communications addressed as follows: California Highways, P. O. Box 1103, Sacramento, Cal.

Commission and Engineer Submit Biennial Reports



EXPERIENCE OF RECENT YEARS CRYSTALLIZED IN RECOMMENDATIONS

RECORDING the accomplishments of the last two years in the administration of the State highway system, the California Highway Commission and State Highway Engineer have filed with the Governor, as required by law, their reports for the biennium ending June 30, 1926. The reports with the various appendices cover in thorough detail the work and investigations of the department. The experience of recent years, during which important changes have been made in highway procedure and standards of construction, have been crystallized in recommendations for needed legislation and future policies. The reports are as follows:

REPORT OF CALIFORNIA HIGHWAY COMMISSION

CONSTRUCTION WORK, in comparison with past biennial periods, has been limited * * * on account of lack of new construction funds. The three bond issues had been previously expended except a balance of \$3,000,000 and our only other available fund was federal aid, approximating \$2,500,000 per annum.

New Construction.

In the matter of *new* construction, we have maintained a policy of confining the work to extensions of improvement on *interstate* and *main line* highways, to the greatest possible extent.

This report will show that quite material progress has been made in that direction. Marked improvement is noted in our records, and by the motorist, on the Redwood highway, the Pacific highway, the Truckee highway, the San Diego-Yuma highway, Needles to Barstow, Mecca to Blythe and the Coast route in the southern part of the state.

A project of considerable importance, undertaken during this biennium, is the Bay Shore highway from San Francisco to San Jose. The funds thus far expended, practically \$500,000, have been supplied entirely by the city and county of San Francisco.

We regard the completion of the all-year road from Merced to the Yosemite Valley as of primary importance to the state. This project is an outstanding example of the effectiveness of convict labor.

Reconstruction.

Our program for reconstruction and maintenance has been aggressive.

In the *reconstruction* program, the recommendations of State Highway Engineer R. M. Morton have been based upon traffic congestion and condition of pavement, and we believe the best interests of the state as a whole have been conserved.

In conformity with the established policy, reconstruction work has been confined as nearly as possible to *main line* highways, such policy being justified by constantly increasing traffic. Reconstruction expenditures for the biennium, including overhead, total \$10,956,888.18.

Maintenance.

Most satisfactory progress has been made in maintenance. Under authority of the law enacted by the 1925 legislature, the commission was enabled to take over for maintenance approximately 1200 additional miles of roads legally in the system but never having had

REPORT OF THE STATE HIGHWAY ENGINEER

THE biennial period from July 1, 1924, to June 30, 1926, has been characterized by steady and systematic progress in all phases of state highway activities.

New Laws.

An event of major importance was the enactment by the 1925 legislature of a measure sponsored by the Highway Commission, which clarified many situations of legal ambiguity in previous measures concerning the state highway work. Provisions which simplify the condemnation of land required for rights of way, and creating the Highway Commission's right to acquire additional parallel right of way for the preservation of timber were included in the new law. Another important feature makes it mandatory upon the part of the state, upon request of the trustees of any city having less than 2500 population, to take over and maintain connecting streets through the municipality.

Probably the most important feature of this act is the one under which the Highway Commission is directed to undertake maintenance on all traversable state highways, whether constructed or unconstructed.

Revenues and Expenditures.

The revenue from the gas tax and motor vehicle license measures, passed at the 1923 session of the legislature, has been sufficient to permit a healthy activity on the part of the highway organization. The details of revenues and expenditures for each fiscal year of this biennium are shown in the following table:

REVENUES JULY 1, 1924, TO JUNE 30, 1926—

	July 1, 1924, to June 30, 1925, amount	July 1, 1925, to June 30, 1926, amount	Total for biennium, amount
Bond issues	\$3,181,500 00		\$3,181,500 00
Motor vehicle license fees	3,079,658 26	\$1,432,610 58	6,512,268 84
Gas tax apportionment	6,354,611 72	7,502,264 14	13,856,875 86
Federal aid	3,371,711 00	3,287,067 83	6,658,778 83
Contributions	493,935 09	375,733 09	871,668 18
Totals	\$16,483,416 07	\$14,597,675 64	\$31,081,091 71

EXPENDITURES JULY 1, 1924, TO JUNE 30, 1926—

	July 1, 1924, to June 30, 1925	July 1, 1925, to June 30, 1926	Total for biennium
Overhead	\$1,542,609 75	\$1,409,928 40	\$2,952,538 15
Maintenance	3,710,598 19	4,478,737 20	8,189,335 39
Reconstruction	4,008,045 32	5,789,430 23	9,797,475 55
New construction	6,518,622 68	4,367,133 51	10,885,756 19
Totals	\$15,779,875 94	\$16,045,229 34	\$31,825,105 28

STATE HIGHWAY COMMISSION MAKES RECOMMENDATIONS

(Continued from page 3.)

state service. A year's program of this additional service has resulted in a marked improvement in the traversable condition of these roads and has very considerably curtailed the pressure on the commission for more costly improvements:

System of Construction.

It has been the aim of the commission to establish a system of construction in accordance with the highest standards of engineering practice. Our research department has carried on investigations and compiled data which will have the effect of greatly prolonging the useful life of all types of pavement used by the state. The commission has a just pride in the beneficial results of the investigations of this department.

Convict Labor.

In our report of 1924 reference was made to convict labor. During the past biennium this labor has been employed in various localities.

The employment of convicts on state highway work is justifiable from every viewpoint. The cost of construction is at least no more than by contract and the state is relieved of the cost of maintaining a large number of men in prison, as they support themselves in camp. The state is also relieved in many instances of caring for minor children of prisoners, as the law provides that a portion of the convict's earnings shall be used for the support of dependents. One of the greatest benefits of the system is to the prisoner himself. It takes him away from prison environment and makes him self-supporting, thereby restoring his self-respect. At the end of his term it sends him out into the world hardened to toil, and with sufficient funds to support himself until he can place himself in some useful employment.

IN THIS CONNECTION WE RECOMMEND THE ENACTMENT OF A LAW PROVIDING AN ANNUAL APPROPRIATION FROM THE GENERAL FUND, NOT LESS THAN \$1,800,000, FOR THE ENLARGEMENT OF PRISON LABOR OPERATIONS.

This amount is the estimate of the cost to maintain 1000 convicts on highway construction. Such an appropriation would really cost the state little, as a substantial saving in maintenance cost of state prisons would be effected.

An enlarged program of prison camp work will result in the mountainous and recreational areas being provided with adequate highways many years in advance of what would be possible without convict road building assistance.

Bridges and Grade Separations.

A problem of pressing importance is presented by the urgent need of construction of many major bridges on the highway system and the intolerable grade crossing situation.

The State Highway Engineer, after careful analysis, estimates that it will cost fully \$15,000,000 to provide suitable bridge structures on the present highway system, of proper strength and width to care for the present and a reasonable increase in traffic. No such sum of money seems available during the period construction of these structures will become actual necessities, and some plan of finance, therefore, should be devised to meet the situation.

During the earlier period of highway construction it was the policy for counties to meet the cost of bridge construction, but with the present type of bridges, made necessary by expanded traffic, it has become an impossibility for most of the counties to finance their building. Considering the fact that many of the larger and more expensive bridges are located in counties of small assessable property valuation, our recommendation becomes the

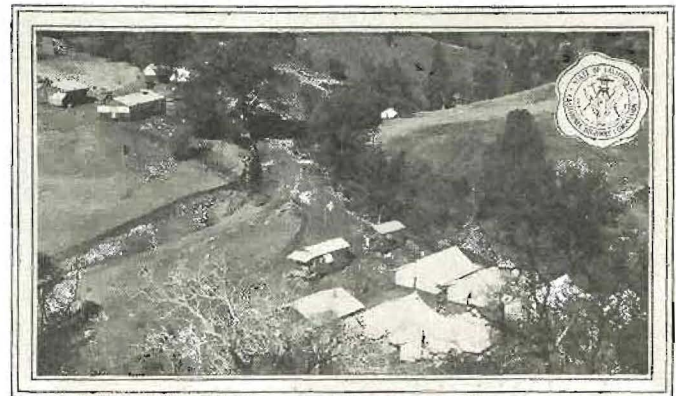
more important. At the present time there exists in one county alone a vital need for the construction of bridges which will cost \$750,000, an amount far beyond the financial ability of the county in question.

Grade Separations.

Scores of lives are forfeited and hundreds of accidents are being recorded every year at grade crossings. The only remedy for this greatest hazard of motor vehicle transportation is in separating the highway and railway grades. The State Highway Engineer has estimated the cost, and reports that it will involve the sum of approximately \$10,000,000 as the state's share. Here again, no fund seems available to meet the universal demand for this class of construction.

WE THEREFORE RECOMMEND A BOND ISSUE OF \$25,000,000 TO BE MADE AVAILABLE OVER A PERIOD OF YEARS, AT AN ANNUAL RATE SUFFICIENT TO PERMIT RAPID PROGRESS IN CORRECTING THE EXISTING SITUATION, AS RELATES TO BRIDGE CONSTRUCTION AND GRADE SEPARATIONS.

Other states are faced with and meeting the problem of grade separations. New York recently passed a bond issue of \$300,000,000 for the purpose. Of this sum \$75,000,000 is allocated as the state's share. Of the remainder, the counties or localities and the railroads will be afforded long term loans on a division of \$75,000,000 to the counties and \$150,000,000 to the railroads.



A prison road camp in the mountains in Lake County, Tahoe-Ukiah State highway.

In connection herewith we refer to the report of the Highway Advisory Committee of 1925, in which is incorporated a like recommendation. This committee reported after a thorough investigation of the subject.

Protection of Highways.

We reaffirm our statement made in the 1924 biennial report that police protection be given the highways. Overloading of trucks and excess of speed is a menace to both life of persons and lasting quality of pavements. The law providing a state police should be adequately fortified to the end that officials can exercise their authority without personal loss as is now the case. An amendment to the law is recommended to make this possible.

Payments to Counties.

It has become apparent that a number of counties with little assessable property and small automobile registration are badly handicapped in providing funds for the care of county roads which connect with the state highway system.

In many instances these roads are used and worn out more by automobile owners from the centers of population in visiting recreational areas than by the residents of the counties.

Counties now participate with the state in an equal division of the motor vehicle license fees and gas tax receipts in proportion

to the number of automobiles registered in the county. In a few instances the amount so returned is nominal and can be used to little advantage for permanent improvement.

AFTER FULL CONSIDERATION OF THIS SUBJECT THE COMMISSION RECOMMENDS THAT THE LAW BE AMENDED TO PROVIDE THAT EACH COUNTY SHALL RECEIVE AT LEAST \$15,000, THE REMAINING SUM SUBJECT TO DISTRIBUTION THEREAFTER BEING ALLOCATED ON THE PRESENT BASIS OF REGISTRATION OF AUTOMOBILES.

Such a change would cost the larger and richer counties very little and would be of material assistance to the smaller counties. The 1925 records disclose that nine counties would benefit and that only about \$100,000 would be involved out of a total distribution of approximately \$11,000,000.

Rio Vista Bridge.

This bridge, spanning the Sacramento River, was constructed



BRIDGE WHICH MUST BE REMOVED—Timber trestle across Sacramento River at Rio Vista which has been ordered replaced by the Federal government by permanent structure to facilitate dredging operations.

by the counties of Sacramento and Solano under permit and agreement with the United States War Department in March, 1917.

It was taken over by the state as part of the highway system by act of the legislature, as set forth in chapter 831 of the 1921 statutes. In the War Department permit for its construction is a clause as follows.

"5. That if and when the river is widened by proper authority, such work may be done across the site of the bridge, without delaying the progress of such work to provide for bridge crossing or to give notice thereof, and that such extra spans as may be necessary to fill the portions of the bridge crossing and approaches as may be thus destroyed, shall be built by the permittees, their assigns or successors, without claim of any kind against the United States for compensation."

The federal government is now engaged in widening and deepening the Sacramento River at the point of the bridge location and has called upon the state, through the Highway Commission, as successors in interest, to construct additional and permanent spans to conform to their plans. This being part of a legislative act highway, there is no fund available from which the cost of construction can be paid.

In view of the fact that the progress of the federal flood control program is being interfered with and the further fact that our obligation is unquestioned, it is imperative that immediate action be taken on the federal request. It, therefore, appears to be a matter for which special appropriation should be provided, and we recommend that an appropriation of \$200,000 be made from the general fund of the state for this construction, that sum being the cost as estimated by the State Highway Engineer.

CALIFORNIA HIGHWAY COMMISSION,
 HARVEY M. TOY, Chairman.
 LOUIS EVERDING.
 NELSON T. EDWARDS.

RESULTS OF OILING BRING DEMAND FOR MORE

DURING the past summer experimental oiling of rock surfaced state highways was carried on in most of the divisions, under varying conditions of soil and climate from the deserts of Imperial County to the damp redwood sections of Humboldt County. The results generally were satisfactory and much was learned that will be of value when additional, similar work is undertaken.

In Division I, some 118 miles were treated. While the work was under way motorists frequently refused to heed the warn-



A section of oiled highway on Redwood route, Division I. The public is now demanding more improvements of this kind on this route.

ing signs or obey instructions of maintenance forces, with the result that there was considerable complaint from those who spattered their machines with oil.

Work Now Commended.

Now that the beneficial results are apparent to all, the division is being commended and many inquiries are being received as to when and where additional work will be undertaken. While the inconveniences of the past summer are hardly behind them, highway users are asking for more oiling, the division reports.

Plans for this type of work for 1927 are now being made. From the experiences of last year, it is believed a way can be found to do oiling in the future without motorists becoming besmeared and disgruntled.

The view shows a section of oiled highway near Ukiah, Medocino County. Dust is eliminated and a hard, smooth surface has been provided. Successful oiling may make paving of such roads unnecessary for many years.

HIGHWAYS AID PROGRESS OF NATION.

Good roads have not been given the credit due them as the advance agent of civilization and human progress. The church, the public school, the printing press, the home, all these have played a part, but have not improved methods of communication accomplished even more?

Good roads built the Roman Empire. They made possible the mobilization of the French armies on the border overnight when German invasion threatened in 1914. They have solidified the people of England and filled its colleges and universities. And now they are working a miracle in the United States.

Hard surfaced roads stretching from state to state and from ocean to ocean and border to border are welding the American people into a solid, coherent nation, abolishing provincialism and sectionalism, destroying dialects and spreading tolerance and understanding everywhere.—*Kentucky Highways.*

New Type of Surfacing to Lessen Skidding Used on Stanislaus Project

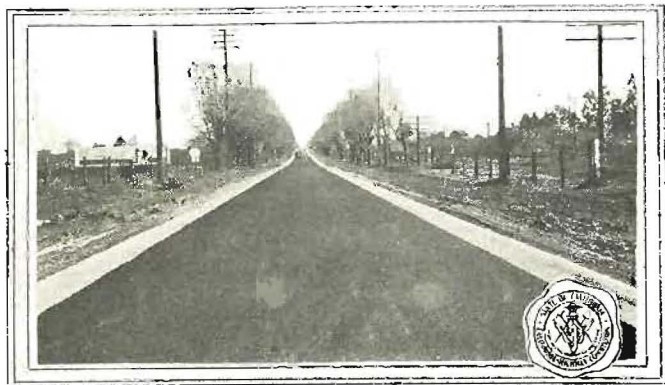
USE OF stone screenings as a finish for asphalt concrete surfacing was a feature of the Modesto-Stanislaus River reconstruction project (Stanislaus County, X-4-B), 7.8 miles of which has just been finished by the Valley Paving and Construction Company of Visalia. This is one of the first projects of any magnitude on which the new method of finishing, designed to prevent skidding, has been tried out. For this reason engineers of the department will watch with interest results on the Stanislaus job.

The original pavement was widened to 20 feet by cement concrete shoulders, 2.5 feet wide and 7 to 8 inches thick, placed on either side of the existing 15-foot base, which was surfaced with asphaltic concrete, averaging 2½ to 4 inches in thickness. Two-foot rock borders 4 inches in thickness, when compressed, also were placed along the concrete shoulders throughout the project.

Specifications for the finish read as follows:

"Screenings for the surface finish shall be thoroughly coated with asphalt cement in the mixer and shall be applied to the surface immediately after the first rolling."

The screenings used were such as would pass through a ¼-inch square screen with not less than 90 per cent of the total being



STANISLAUS PROJECT—View on recently completed widening project in Division X on which new nonskid finish for asphalt concrete surfacing is being tried out.

retained on a standard No. 10 screen. The amount applied averaged from 10 to 15 pounds per square yard.

The cement concrete shoulders were divided into 30-foot sections; expansion joints were filled with a bituminous composition and joined by steel dowels to prevent settling at the joints by action of traffic.

Traffic Hazards Removed.

Abrupt approaches to small bridges over irrigation canals, which long had been hazards to travel, were corrected by building long, vertical curves over these structures. Another important improvement was the elimination of several sharp curves at the approaches to Salida and at other points. These were replaced by long radius superelevated curves. Stanislaus County assisted the state by securing the additional right of way necessary to make the changes possible.

Grading was done as extra work, material being secured from borrow pits off the right of way and from the Southern Pacific Company, which permitted its right of way fence to be removed to facilitate the borrow for widening of shoulders.

All of the work on the main trunk highway under the contract of the Valley Company has been completed; and on November 30th, the company was relieved of further maintenance of this section, which was opened to traffic. The contract, however, has been extended to cover widening of about five miles of the Sonora

lateral from Salida to the McHenry road. The present 12-foot concrete pavement on this section will be widened to 20 feet with asphalt concrete shoulders and surfacing. This part of the project is now under way.

Division Engineer R. E. Pierce of Division X is proud of what has been accomplished on the new Stanislaus County section, which completes a 20-foot pavement from Modesto northward to Turner Station, in San Joaquin County, a distance of about 20 miles.

The cost for 7.8 miles, which is classed as reconstruction, was approximately \$163,500.

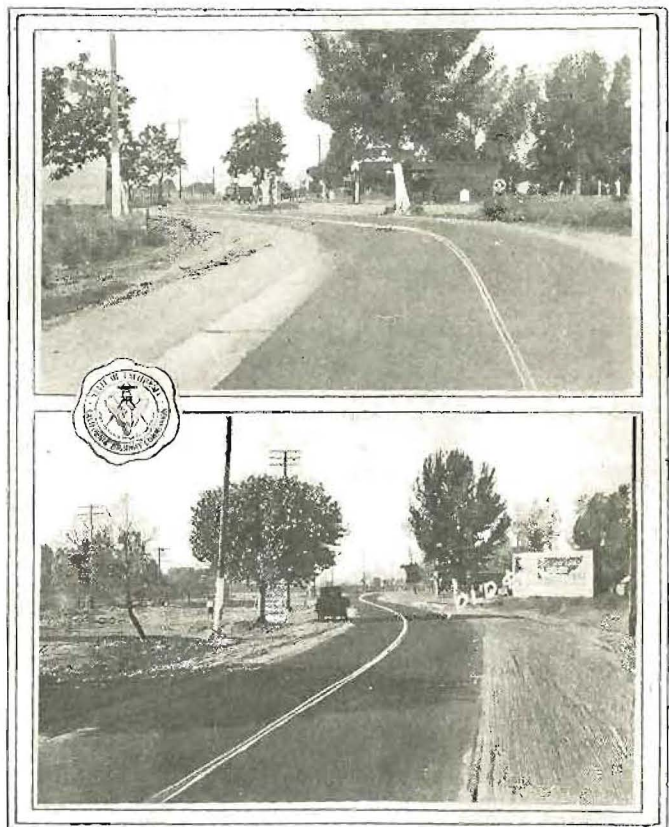
MALM COMPLETES REVISION OF ACCOUNTING SYSTEM.

A work of two years, during which he completely reorganized the accounting system of the California Highway Commission, has been finished by C. E. Malm, who has resumed his former position as assistant superintendent of accounts for the State Board of Control.

Malm was assigned to the task of studying and revising the accounting system of the department at the request of the highway commission. He began work on December 1, 1924.

In commenting on the reorganization, R. M. Morton, State Highway Engineer, said:

"Mr. Malm's vision of the proper accounting system for our equipment department has resulted in a system which gives far more data and gives it quickly and accurately. We are proud of the department and challenge any organization to bring forth a better system."



CURVE IMPROVEMENT—Above, view of trunk highway near Keyes, Stanislaus County, Division X, as originally built. Below, same location with abrupt curves improved and superelevated. Similar line changes are being made at other points in San Joaquin Valley.

STATE HIGHWAY ENGINEER
TELLS OF DEPARTMENT'S WORK

(Continued from page 3.)

Progress in Highway Construction.

Since July 1, 1924, the following mileages of highway, classified as to type, have been accepted by the Commission, including newly constructed highways and reconstructed highways:

HIGHWAYS CONSTRUCTED—

	New construction placed under contract		Total miles
	prior to July 1, 1924, miles	July 1, 1924, to June 30, 1926, miles	
Graded or rock surfaced	230	95	325
Bituminous macadam	10	—	10
Portland cement concrete	18	15	33
Asphalt concrete on macadam or bituminous base	—	2	2
Total new construction	258	112	370
	Reconstruction		
Graded or rock surfaced	26	33	59
Bituminous surface	6	7	13
Portland cement concrete	58	38	96
Asphalt concrete on macadam or bituminous base	3	11	14
Asphalt concrete on Portland cement concrete	14	18	32
Portland cement concrete pavement widening	8	35	43
Total reconstruction	115	142	257
Total new construction and reconstruction	373	254	627

In addition to the above, there have been accepted by the commission 65 bridges and grade separation structures, 24 of which were placed under contract prior to July 1, 1924.

Highways Under Construction.

On June 30, 1926, the following mileage of highways was under contract and in progress of construction:

	Miles
New construction	
Grading or rock surfacing	*169.52
Bituminous macadam	6.21
Portland cement concrete	10.27
Asphalt concrete on macadam or bituminous base	6.45
Subtotal	192.45
Reconstruction	
Grading or rock surfacing	28.75
Bituminous macadam	9.64
Portland cement concrete	38.85
Asphalt concrete on macadam or bituminous base	6.11
Asphalt concrete surface on Portland cement concrete	28.00
Subtotal	111.35
Total under construction	303.80

*Includes 56.9 miles under construction by United States Bureau of Public Roads with Forest Highway funds.

Contract Prices Show Decline.

Prices paid for highway work have shown a decline during this biennium. Some of the reduction may be attributed, perhaps, to a standardization of specifications, contracts and plans. In so far as possible, in accordance with state law, it has been endeavored to closely define all details of requirements which might be subject to variation, and the result has been to render state highway contracts more popular with reputable contractors, thereby tending to reduce bids. Average contract prices during this biennium as compared with the preceding, are shown below:

AVERAGE CONTRACT PRICES, JUNE 30, 1921, TO JUNE 30, 1926—

Year	Grading (per cubic yard)	Asphalt concrete including all materials (per ton)	Concrete pavement including all materials (per cubic yard)
June 30, 1921, to June 30, 1922—	\$0.71	\$7.92	\$14.29
June 30, 1922, to June 30, 1923—	0.74	8.10	13.18
June 30, 1923, to June 30, 1924—	0.75	7.27	13.49
June 30, 1924, to June 30, 1925—	0.59	6.43	10.85
June 30, 1925, to June 30, 1926—	0.44	5.13	10.58

Overhead Expense.

Diligent and continuous effort has been exerted to accomplish a reduction of overhead expense in the highway work. Work on preliminary surveys has been curtailed to the minimum necessary

Seven

to obtain proper data for preparation of plans. The machinery of preparing plans has been adjusted by standardizing details of the drafting work. Many contracts have been awarded on a basis of using preliminary estimates for final payment, thereby eliminating the expense of final surveys. Reports and other red tape of minor importance have been eliminated where possible, so that field men have more time to devote to their work.

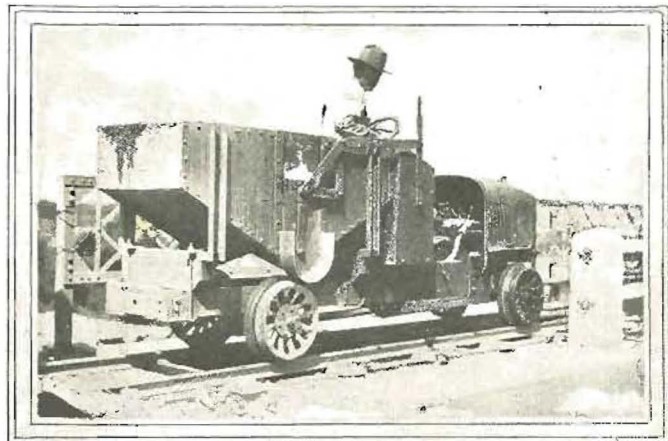
The number and size of day labor jobs authorized has been greatly reduced, and a practice has been inaugurated of taking informal bids in the locality for portions of day labor work susceptible of being done by contract.

Each department of our work is in charge of a responsible head, and close contact is maintained with the division engineers and field men. This tends to greater economy, both in overhead and in the construction expense.

Accounting System.

During this period the greater part of a study and modification of the accounting system was accomplished. This work was done at our request under the direction of the State Board of Control, which detailed one of its accountants to the work. A system has been devised, and on June 30, 1926, is ready for complete installation throughout all the offices, which has for its object the rapid accumulation of all accounting data soon after the last day of the current month.

The new system has as its basis the performing of the accounting work in the division offices, each functioning as a separate unit. The division reports are combined in the headquarters office to make up a monthly report for the operations of the entire organization.



Hopper for transporting concrete mix used on southern California bridge construction. It is operated on an industrial railroad by a Ford engine. Speed is one of its advantages.

Highway Advisory Committee.

During this biennium the Highway Advisory Committee, the appointment of which was authorized by the 1923 legislature, performed the major part of its work. Mr. Louis Everding, member of the Highway Commission, and the writer, as State Highway Engineer, served on this committee throughout its existence.

The committee was given free access to the highway files, and, at its request, an estimate of the cost of completing the state highway system as it then existed was prepared by the highway organization. Care consistent with the purpose for which it was intended was given to its preparation. In the absence of surveys and plans, and, in some cases, even traversable roads which facilitated inspection, it is not considered that the estimate is close or final.

Many uncertain factors were immediately foreseen when the period of duration of highway construction was considered; therefore, the detail of this estimate for any particular highway may later be found inaccurate.

However, it is believed that this work of the highway organization for the committee has been instrumental in bringing home to the people of the state a realization of the magnitude of the state highway project, and has impressed upon them the fact that its financing and orderly progress are matters of state-wide importance.

Prison Road Camps.

During this biennium, thirty miles of highway have been graded through prison road camps. The outlay has been \$1,882,900.

The transfer of state's prisoners from the confinement of the prison to the healthy atmosphere of the road camps is a branch of our work which is of inestimable benefit to the state as a whole.

When prison camps are organized, the Highway Commission, charged with the duty of expending state funds in the construction of highways, regards the road building activities of the camps as a major day labor operation of highway construction, and it becomes our duty to conduct the work economically so that the state will benefit by the accomplishment of construction at low cost in addition to the other benefits.

The economical performance of road work through these camps requires primarily that the work be in charge of superintendents and engineers of outstanding ability in the use of equipment and the handling of men. Large units of equipment are necessary on these jobs for the reason that no matter if men work only for their keep, they can not compete with modern earth-moving machinery in daily output. Rapid progress is necessary on work done by prison camps as well as by contract, particularly on primary roads.

Therefore, we find that our convict operations require not only man power, but also shovels, compressors, drills, pumps, trucks, etc.; materials and supplies such as powder and dynamite, drill steel and pipe; also, a considerable number of free men to act in supervisory capacities, as superintendents, foremen, time keepers, mechanics, truck drivers, and other skilled labor.

Analysis of the Briceburg job, where 17 miles of highway were graded between Briceburg and El Portal, and the Kern River job, where 8.3 miles of highway were graded westerly from Democrat Springs, is shown in the table below:

ANALYSIS OF BRICEBURG-EL PORTAL JOB.

		Per cent
Amount paid prisoners	\$334,678 27	32.8
Amount paid free labor	196,692 00	19.3
Supplies and construction material	299,807 12	29.5
Equipment rental	189,873 99	18.6
Totals	\$1,021,051 38	100.0

ANALYSIS OF KERN RIVER JOB

		Per cent
Amount paid prisoners	\$140,939 77	27.5
Amount paid free labor	134,733 83	26.3
Supplies and construction material	152,582 27	29.8
Equipment rental	84,254 49	16.4
Totals	\$512,510 36	100.0

From the above figures, it can be seen that to accomplish the work expeditiously, the prisoner expense is only a small part of the total.

We consider that our efforts to perform this construction economically have been attended by a considerable degree of success. Reports on the final cost of these two jobs are set forth below:

BRICEBURG TO EL PORTAL

VI-Mpa-18-E. F. G.

Item	Estimated cost	Actual cost
Excavation—unclassified, per cubic yard	\$0 84	\$0 90 1
Structure concrete, per cubic yard	35 00	43 43
Hauling and installing corrugated metal pipe culverts, per lineal foot	1 46	1 468

FIRST CROSSING KERN RIVER TO DEMOCRAT SPRINGS.

VI-Ker-57-G.

Item	Estimated cost	Actual cost
Excavation—unclassified, per cubic yard	\$1 00	\$1 00 4
Structure excavation, per cubic yard	3 00	2 67
Structure concrete, per cubic yard	35 00	57 50
Rubble masonry, per cubic yard	5 00	5 04
Riprap, per cubic yard	1 00	78
Hauling and installing corrugated metal pipe culverts, per lineal foot	1 76	1 273

The cost of performing the individual items of the work compares very favorably with prevailing contract prices for similar work. If prison road work can be conducted with costs as favorable as those shown above, it has justified its existence from an economical standpoint, in addition to the undisputed benefits to society.

Further analysis of the above figures shows that our cost of operating prison road camps is about \$6 per prisoner per day, including all charges.

Location of Prison Camps.

Prison road camps can perform work most economically in remote locations in heavy mountainous territory where the opportunities to escape are reduced to a minimum, and where the work is sufficiently heavy to not require the frequent moving of camps. The present state highway system offers few locations meeting these requirements on main line roads. The state should concen-

trate all possible funds upon primary roads until they are completed.

In view of this situation, it would seem that special appropriations for convict camp operation should be authorized by the legislature, so that the number of prisoners, the locations selected for work, the size of the camps and all other details, will not need to be considered in connection with the other funds of the Highway Commission, all badly needed to complete main roads.

Our financial situation is such that for the next fiscal year not over 250 men can be financed in road camps. These will be located in three camps as at present: the Crescent City camp on the Crescent City-Grants Pass road in Del Norte County, the camp on Route 15, Tahoe-Ukiah road in Lake County, and a small camp on the Briceburg road in Mariposa County. This number will cost about \$1,500 per day, or nearly \$40,000 of cash outlay per month.

One thousand men in prison road camps, which number has been advocated by many interested agencies, would, at the same rate, cost the state \$1,800,000 per year, and would probably result in completely grading 30 to 35 miles of highway per year.

Maintenance Stations.

During this biennium, the Maintenance Department has prepared a plan to be followed for the future location and equipping of maintenance stations. According to this plan, 112 stations are now owned, equipped and in use, and 111 additional stations will ultimately be required. It is our policy to gradually locate and acquire suitable sites, and construct the necessary facilities. During the past biennium, \$476,818 have been devoted to this purpose from the State Highway Maintenance Fund. The cost, as at present



Maintenance station at Crescent City, Del Norte County. The site was donated to the state by the county acting through the Board of Supervisors.

estimated, for acquiring and equipping all the sites which will be ultimately required, is \$694,400 additional.

Well-equipped maintenance stations, including foreman's cottage, established at locations convenient to the road sections, result in more satisfactory work and higher-class personnel, with better care of equipment.

Division Offices.

During this period, division offices and shop buildings have been constructed or arranged for at Redding, Division II; Fresno, Division VI; and San Bernardino, Division VIII. At each of these locations areas of about three acres were obtained, providing ample room for present needs and for expansion.

Shop buildings only have been constructed or arranged for at Lankershim, Division VII, and at Bishop, Division IX.

The physical equipment and facilities for doing work of the Highway Commission have never been in better condition than they are at present.

Encroachments.

During this period, a study has been started, which, when completed, will be the basis of systematizing the issuing of permits for encroachments on the state highways. It is planned to establish ultimate widths of improvement on all of the state highways, to be used in the issuance of permits for the necessary encroachments, such as pole lines, water and gas mains, tree planting, sidewalks, etc. When this plan is finally perfected and in operation, the issuing of permits and the relations with those desiring to make encroachments will be greatly simplified.

Research.

Under the Construction Department, Mr. C. S. Pope, construction engineer, and Mr. C. L. McKesson, materials and research

engineer, have aggressively carried on the routine testing work attendant upon highway construction, and also important research work.

In 1924, in conjunction with the Lewis Institute of Chicago, extensive investigation of the use of calcium chloride for curing concrete was made at our laboratory. The results of this investigation have already been published by the Lewis Institute, due credit being given to the California Highway Commission.

In 1926, in conjunction with the U. S. Bureau of Public Roads, a systematic investigation of the loss of material on rock surfaced roads was undertaken, including methods of preventing this loss by the use of asphaltic binders. This investigation is still under way. The Bureau of Public Roads is furnishing a corps of its technical field men and laboratory experts as their share of the project.

Under the direction of the Construction Department, aided by laboratory studies, the strength obtained in our concrete mixtures has steadily increased. The field men have been furnished data which familiarizes them with the essential principles governing the mixing of concrete.

Advances have been made in the proportioning of asphaltic concrete mixtures to increase density, weight, and stability under traffic. Experimental sections have been constructed with surfaces roughened by uniform applications of premixed and heated small rock, designed to keep an open texture of the surface, thereby decreasing possibilities of automobiles skidding.

New Construction Funds.

The amount of \$10,886,000, set forth in the beginning of this article, which has been expended for new construction during this biennium, checks closely with the receipts of federal aid from the



SOUTH OF CARPINTERIA—Division V reconstruction project; cement concrete shoulders and asphalt concrete wearing surface. New width 20 feet

United States government and proceeds from the sale of Third State Highway bonds during the same period.

The vastness of the highway system of California prevents progress satisfactory to everyone being made with this amount in construction and extension of good road facilities. The demands of modern traffic are such that makeshift improvements, built at low cost, are entitled to scant consideration from an economical standpoint. Our past experience with traffic increases, both in number and weight, which has forced upon us a heavy outlay for straightening, widening and thickening our already built roads, makes it seem folly, in a state as wealthy as California, for the Highway Department to now enforce policies of inadequate road

building. Our improvements must be planned with both eyes on the future.

Federal Aid.

It is believed that the United States government, in granting federal aid to this state, is interested primarily in the completion of the federal-aid highway system. The government has been most generous in permitting the state to collect federal aid on projects which are really reconstruction and widening of highways already classed as constructed.

It would be presumptuous for us to assume that this generous attitude will be maintained unless the people of the state provide money for that in which the government is primarily interested, namely, the extension and completion of the federal-aid highway system.

Ten million dollars per year is necessary to make a satisfactory showing of completed state highways, including the federal-aid system. We are unable to believe that the people of this state, who pride themselves on their good road system, are unwilling to authorize further state highway construction to this extent.

Respectfully,

R. M. MORTON,
State Highway Engineer.

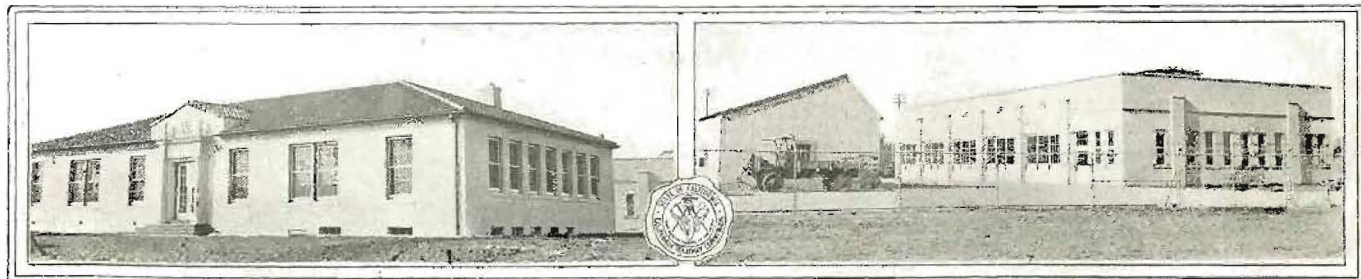
COORDINATING TRANSPORTATION FACILITIES

By W. M. JARDINE, Secretary of Agriculture.

MOTOR vehicles—both automobiles and motor trucks—which, with the public highways, constitute the facilities of modern highway transportation, do not need to plead for their place in the sun. Not long since they could perhaps be passed over as nonessential—a fad, if you please. But not so now. The motor vehicles have given to highway transportation a new usefulness and the public has expressed its belief in them in the most powerful way it knows how—by the investment of billions of dollars of its capital in the more than 15,000,000 automobiles and more than 2,000,000 trucks.

Cooperation and coordination are the keys to the maximum usefulness of the new highway transportation. They are, in fact, the prerequisites of improvement in our whole transportation system—and they are needed all along the line. Road builders and vehicle manufacturers must cooperate in order that the roads shall be built to carry the vehicles and that the vehicles shall not overburden the road. The road building authorities of the nation, the states, the counties and the municipalities must cooperate that the roads which know no political borders shall be properly coordinated.

Railroad, waterway and highway transportation should be coordinated in order that each shall be developed to its highest point of usefulness without taking from another the functions which the other can perform to the better advantage of the public. Shippers and officials of transportation agencies must cooperate to eliminate unnecessary handling and reduce the time and cost of transportation. And finally we must develop a spirit of cooperation between the public and those who are working to improve transportation whether it be railway, waterway or highway transportation, to the end that the public needs will be met to the fullest possible degree and that a fair return upon the invested capital shall be assured to the agencies of transportation.



NEW STATE BUILDINGS AT FRESNO—Left, new office of Division VI which was recently occupied. Right, shop building, headquarters in the San Joaquin Valley of the Equipment Department.

HOW USE OF VIALOG DURING CONSTRUCTION IS INFLUENCING SMOOTHNESS OF PAVEMENTS

By E. WILKINSON, Assistant Engineer, Construction Department.

IN THE latter part of 1925 the Construction Department began using the vialog during the progress of individual paving projects, to give the resident engineer and the contractor current information as to the smoothness of surface to be expected on the complete job. In carrying out this program, an effort is made to reach each project to make a preliminary record, as soon as a section is opened to traffic. These preliminary tests are followed by subsequent vialog records made during later inspections for the purpose of comparison with the previous work.

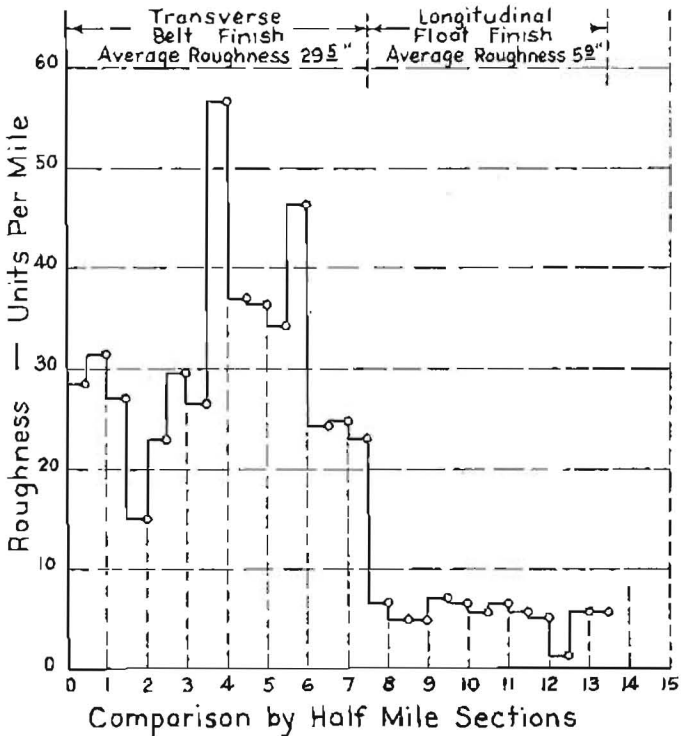
The result has been to keep foremost in the mind of the resident engineer, the incentive to develop more effective methods of improving smoothness of pavements. In this effort, it is pleasing to note, they have had the hearty cooperation of contractors.

Several typical projects of both Portland cement concrete and asphaltic concrete, constructed within the last year, have been

work was given a final finish *longitudinally* with the light wooden float, as is now common practice.

Due to the length of time necessary for curing Portland cement concrete prior to its opening to traffic, roughness of such pavements can not be detected with the vialog with the dispatch with which records can be made on asphaltic concrete. For this

PORTLAND CEMENT CONCRETE
Chart I

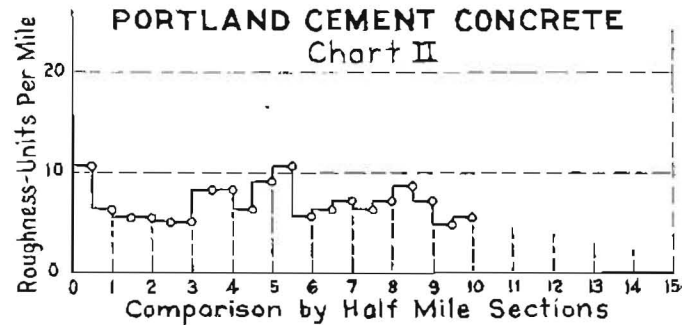


selected for preparation of charts showing roughness in each half-mile section from the beginning of construction to completion of the project. In each case, an improvement can be noted as the work progresses. A number of factors undoubtedly enter into this improvement but all are more or less influenced by comparisons brought out in the progressive vialog records.

What Charts Show.

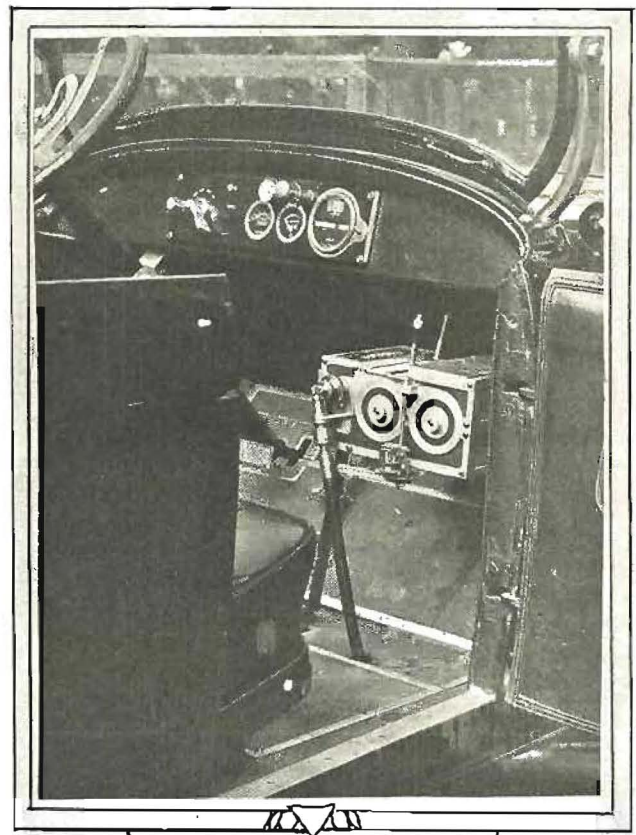
Charts I and II of this compilation give the progressive record of two Portland cement concrete resurfacing projects; Charts III and IV are of two asphaltic concrete resurfacing projects.

Chart I warrants a word of explanation in that the method of finishing was changed after the completion of the first 7.5 miles. Final finishing of the early part of the work was performed *transversely* with the canvas belt, while the latter half of the



reason necessary corrective measures can not be taken on the cement concrete type as soon as on asphaltic pavements.

The vialog is also utilized to a large extent in comparing methods of handling asphaltic and Portland cement concrete mixtures to determine the resulting smoothness. Likewise, these investigations lead to changes in the mixtures to increase their workability and result in smoother surfaces.

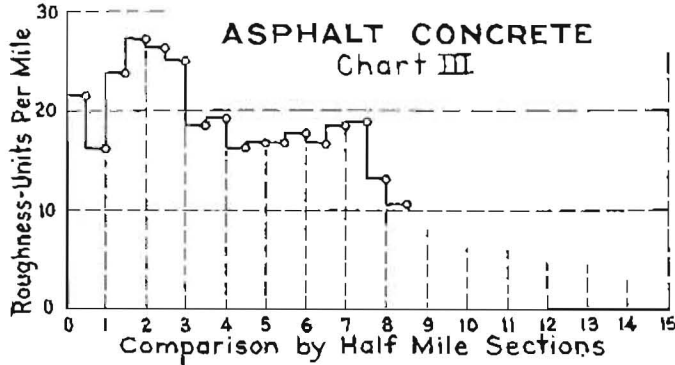


Vialog installed ready for use.

Readings Made Comparable.

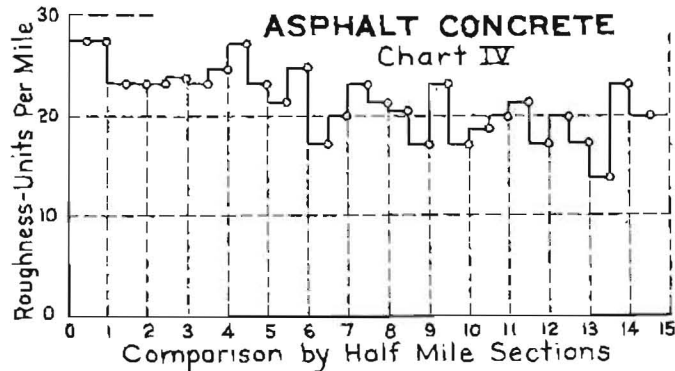
In order to secure records which are comparable with readings on different roads not only in this state but in other states, it is necessary to carefully calibrate the vialog before each test run. Every detail of the operation of the car carrying the vialog must be given attention to secure accurate results. Tires must be inflated to a standard pressure and only tires in uniformly good condition and of uniform resilience are used. The springs are oiled frequently and loading of the car is kept standard for all tests.

Local calibration is effected by running over a section of previously tested road, but standard calibration is obtained by



running over a section of road near Sacramento which has been adopted as the standard test road.

Standard roughness is measured by running over boards of standard width at a fixed speed. The state operates two roughness indicators, a vialog and a roughometer which have both been calibrated to the standard readings of the vialog, since that



instrument has been in use for a number of years and results so far available are recorded in vialog units.

Efforts are being made by the Materials and Research Laboratory to secure the adoption of standard methods and units in the several states in which these instruments are being used, to the end that a nation-wide comparison of results may be had.

"DOING CREDITABLE WORK."

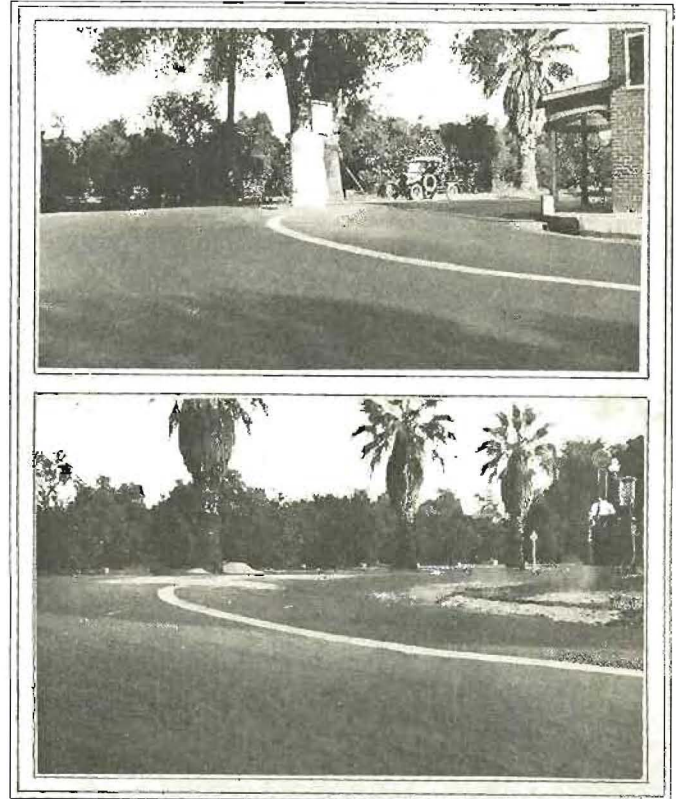
State Highwayman Charles Harbey, in charge of state highway work in the valley with headquarters just south of Lancaster, was here first of the week with his men unloading cars of road-building material with which he intends to improve several small spurs of road, which, when completed, will greatly assist motorists in making small curves. Mr. Harbey is doing splendid highway work, and is keeping the boulevard, which crosses Antelope Valley north and south, in first-class condition. As the feller said: "Harbey knows his onions."—*Palmdale Reporter*.

Eleven

DIVISION VII WINS LONG FIGHT FOR REMOVAL OF DANGER TREE

THE big oak tree that for a generation or more stood in the center of the roadway on a sharp curve at Duarte, on the Foothill boulevard, Los Angeles County, is now a thing of the past. From the days of the horse and buggy to the era of balloon tires, the old oak was a menace to the traveling public. So numerous were accidents at this point that the tree became known as "Hospital Oak."

For years engineers of Division VII made every effort to have the tree removed, but without success. The owner of the adjoining property claimed legal title to the oak and persistently refused to permit its removal.



DUARTE OAK NO MORE—Above, view of the famous Duarte Oak on Foothill Boulevard State highway, Los Angeles County, title of which was claimed by adjoining land owner. Below, oak removed as result of efforts of Division VII.

Wreck Brings Change of Attitude.

Recently the division received word that the property was to be sold. The prospective buyer was interviewed, and he expressed a willingness for the tree to be removed. About the same time a motorist traveling at night with his wife and six small children, hit the tree, so disabling his car that he was forced to camp on the roadside for two days while repairs were being made. The angry motorist found the owner and threatened to bring suit for damages.

Due to repeated efforts of Division Maintenance Engineer I. S. Voorhees, the property owner now began to show signs of weakening in his stand regarding the oak. When it became apparent that he would no longer actively oppose felling the tree, instructions were immediately given the district maintenance men, who were eager to see the dreaded hazard to life and property removed from the highway.

All that now remains to tell the tale of accidents innumerable is a patch in the macadam pavement where "Hospital Oak" once stood.

ENGINEER'S INVENTION MAY CHANGE CROSS-SECTIONING METHODS

Note.—An invention of W. T. Rhodes, Resident Engineer, Division VI, has been in use in that division on several projects and gives promise of revolutionizing methods of taking cross-sections. The following explanation of how it may lower survey costs has been prepared for the Bulletin by Fred J. Grumm, Engineer of Surveys and Plans.—Editor.

SURVEYING instruments such as the transit and level, except for minor improvements have, in many years, changed but slightly in form and principle. The methods, too, of obtaining information in the field from a well established procedure. As a result the rate of progress of a survey party is largely dependent on the ability and application of its personnel. To develop a device or instrument, therefore, which will effect a saving in time and consequently in the expense of surveys should be considered a meritorious accomplishment.

W. T. Rhodes, resident engineer on the Yosemite road, Briceburg to El Portal, has invented a device for cross-sectioning and slope staking which has proved effective in saving both time and labor. It consists of a simple arrangement of scales on a staff or rod, combined in such a manner that distances, vertically and horizontally, to a point are readily obtained graphically when the slope distance is found by measurement.

Horizontal and vertical distances, representing the base and altitude of a right-angled triangle, are read from scales founded on a movable arc revolving about a center of definite height. The slope distance, which is the hypotenuse, is found on the fixed vertical scale. Revolving the arc and sighting the point on which the elevation is desired determines the vertical angle.

Taking Cross-sections.

The operation of taking cross-sections consists of setting the instrument on a station or point whose elevation is known. It is plumbed by means of a rod level attached to the staff and steadied in this position by one man who also holds the tape. The observer sights on the point or rod held by the rodman, who holds the zero end of the tape. The arc is clamped in position and the slope measurement taken with the tape. Applying the slope measurement to the fixed scale, the observer then reads the vertical and horizontal distances directly from the respective scales on the arc.

The device can be used equally well for original or final cross-sections, setting slope stakes, reference points from center line, or reestablishing the center line from reference points. A three-man party can efficiently handle the work in mountainous and rugged country. Where work is light and the progress of cross-

sectioning more rapid, the addition of a note recorder is an advantage. Setting of slope stakes in light work is also expedited by the addition of a man to handle the stakes.

The instrument replaces the transit in the method of taking cross-sections by slope angles and slope measurements. Weighing less than ten pounds, it has the advantage of being lighter and more portable; it can be instantly set up. The device eliminates troublesome manipulations, determines elevation and horizontal distances with mathematical calculations, thus reducing possibilities of error. Its simplicity of design eliminates expensive repairs, and its operation does not require an instrument man with years of experience.

Great Time Saver.

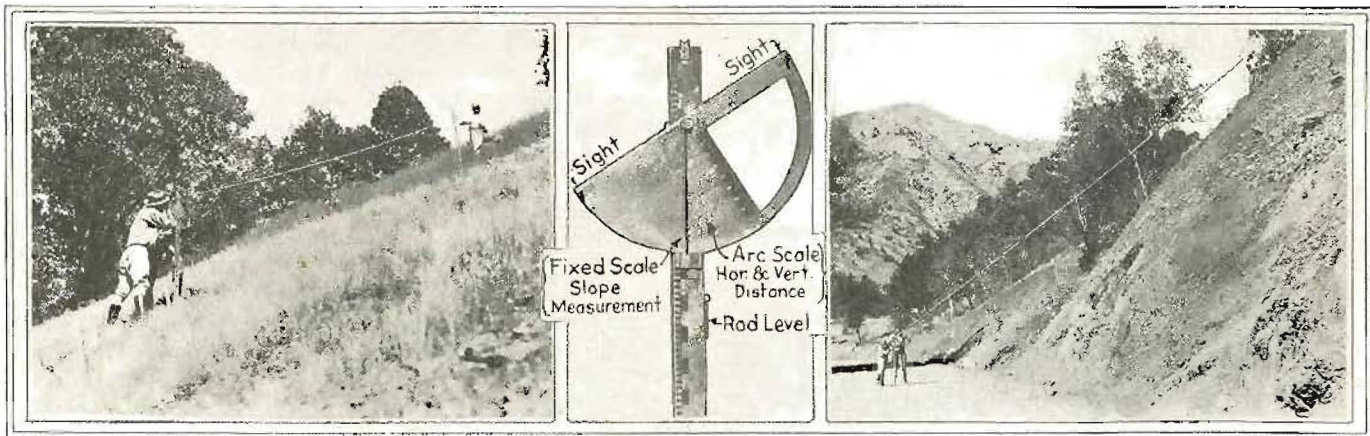
It is estimated by those who have used it, that the work of taking original cross-sections in rough country can be accomplished in one-half the time required by other accurate methods. It is obvious that in level country where side shots are within the limits of the level set up, the time saving is not so great, but where side shots must be obtained by use of hand level or slope angles, the elimination of the possibility of error and saving in time is a decided advantage.

In the work of taking final cross-sections in Kern Canyon, a nine-mile section, a saving of over \$300 was made because of the rapid progress possible and the reduction in the size of the party. Because of the simplicity of the notes the sections were easily and rapidly plotted in the field, and, as a result, the party was never held up while waiting for sections to be checked.

There is a reason to believe that the device worked out by Mr. Rhodes will be of considerable value to engineers and that it will change the methods and lessen the cost of obtaining cross-sections, particularly in mountainous country.

DO YOUR PART; PLAY SAFE.

People are shocked at the number of automobile accidents, but if a record were kept of the number of close calls—accidents avoided by a matter of inches—they would be appalled. People who insist upon their right to walk along or stand upon the heavy traffic roads at night take big chances. Drivers facing the glare of oncoming headlights can not see objects immediately in front of them. If you must walk on the highway, walk on the left side and face the traffic; if you must park, park on the extreme edge and keep tail light on; if you must drive a team at night carry lights. These precautions won't eliminate accidents, but they will prolong some lives.—*Belle Plaine (Minn.) Herald.*

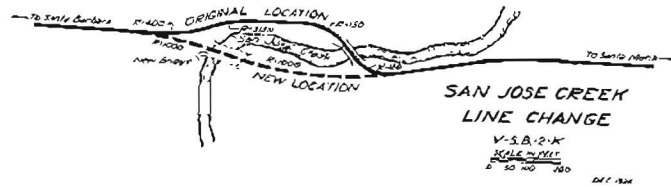


DIVISION VI INVENTION—Center, device of Resident Engineer W. T. Rhodes which is proving time saver on cross-sectioning and slope staking. Left, party using new device on preliminary work. Right, instrument in use for taking final cross-sections on Yosemite lateral. A three-man party does the work.

DIVISION V TAKING KINKS OUT OF COAST STATE HIGHWAY

THE Coast highway through Santa Barbara County traverses a hilly country, for the most part scenic, but presenting difficulties in the way of road construction such that the highway, as originally located, has comparatively poor alignment at a number of points. Three contracts are now in progress in Division V for the elimination of several of the most dangerous of these locations.

In Gaviota Canyon, a contract has just been awarded to Oberg Brothers, of Los Angeles, for the construction of a new reinforced



concrete bridge, 192 feet long, on new alignment eliminating an antiquated steel bridge and two very dangerous curves. The bridge was originally located by the county in the days before the state highway and its approach has been the scene of many accidents. A contract for grading the line change will be advertised shortly.

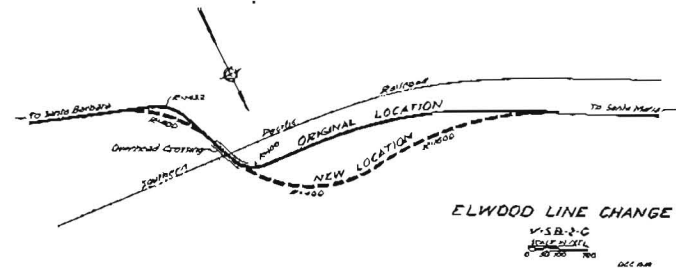
New Alignment at Elwood Overhead.

About twelve miles west of Santa Barbara, the highway crosses the Southern Pacific Railroad on an overhead concrete

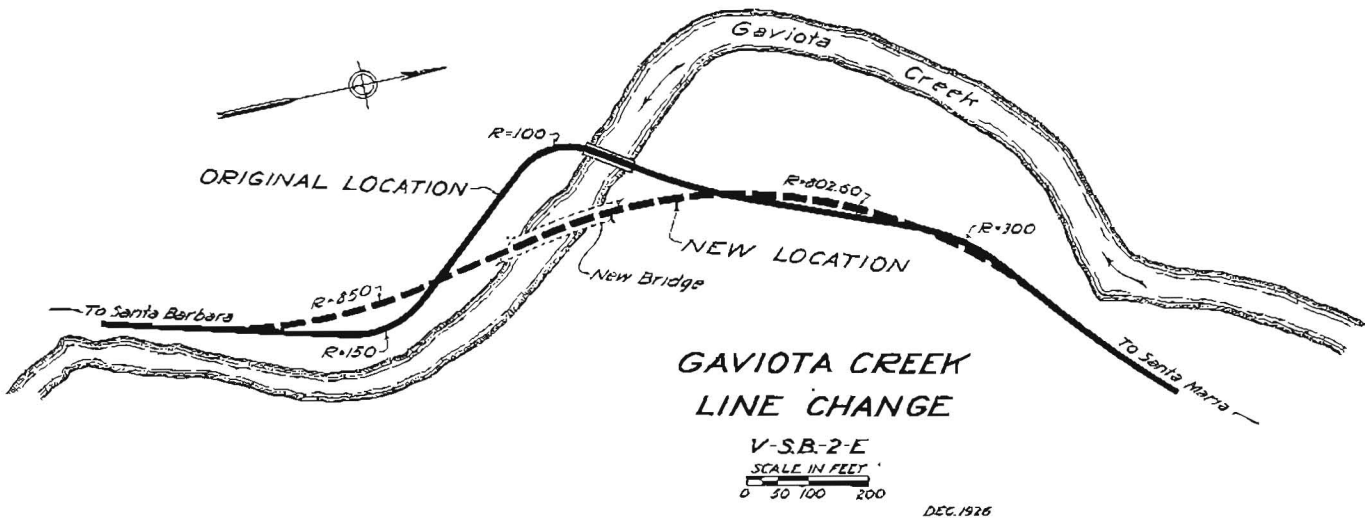
structure, near both ends of which sharp curves have existed. The alignment in the vicinity of this structure is being considerably improved under a reconstruction contract, which was recently awarded to E. Schelling of Los Angeles.

At San Jose Creek, about six miles west of Santa Barbara, the exceedingly sharp curves which existed at the ends of the present bridge have been the scene of numerous accidents. A new concrete bridge is being constructed by Mattock and Feasey, under Contract M-132, and the line which is to connect with the new structure is being graded and paved by the Cornwall Construction Company of Santa Barbara, under Contract M-122.

All of these changes are shown in more detail on the accompanying sketches. Their completion will increase the safety of



the State highway and will make it more nearly adequate for handling present day traffic. Another change which the division expects to have under way in the near future is at Rincon hill, just north of the Ventura County line.



DIVISION VI MOVES INTO PERMANENT NEW HOME

DURING the latter part of November Division VI moved from an uptown office building into its handsome new state-owned division headquarters building at Olive and Carruth avenues, Fresno, which will be its home in the future. From a suite of nine rooms with less than 2000 square feet of space, has been substituted a handsome one-story building, 45 by 85 feet, with 3825 square feet of floor space, and a large basement storage room.

The building has a concrete foundation with floors of the same material. The walls are of brick with a cement plaster finish; the roof is of tile.

After a few weeks in the new structure Division VI reports everybody well pleased with the new arrangement, which eliminates

office rent from the division overhead. Adequate quarters with plentiful storage space and a convenient arrangement of rooms and new equipment are expected to increase the efficiency of the staff.

New Shop Also Built.

On the same three-acre site on which the division office is located, there also was completed recently a modern shop building for the Equipment Department. This structure, of steel, tile and concrete construction, is well arranged for shop purposes. It has been equipped with modern machinery for repair of trucks and all manner of machinery and tools used on highway work throughout the San Joaquin Valley and adjacent mountain counties.

WHAT THE DIVISIONS ARE DOING

DIVISION I.

HEADQUARTERS, WILLITS.

T. A. BEDFORD, DIVISION ENGINEER.

Counties of Del Norte, Humboldt, Mendocino, and Lake.

H. W. ROHL has completed his contract for grading and surfacing two miles of new state highway at the southerly approach to the new Douglas Memorial (Klamath River) bridge.

With more than twenty inches of rain already this season, it has been difficult to complete the surfacing of the new grade down Richardson Creek. However, on October 29th, traffic was turned over the new section of highway and across the bridge, thereby eliminating the old county ferry at Requa, which has hindered and limited Redwood highway traffic for years.

Traffic counts in Division I for the last three years show the smallest traffic in the division to be at the Klamath River. A substantial increase is expected in next year's count.

DIVISION VI.

HEADQUARTERS, FRESNO.

E. E. WALLACE, ACTING DIVISION ENGINEER.

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

ON OCTOBER 21st, Kern County forces, under the direction of Supervisor J. B. McFarland, completed the rebuilding of the old county road between Democrat Springs and Bodfish in Kern River Canyon on the Walker Pass state highway. The formal opening was celebrated with a barbecue and program at Kernville. State Highway Commissioner Nelson T. Edwards and former Division Engineer J. B. Woodson were among the speakers.

This road, including the sections constructed by convict labor and by state contract, is a smooth, scenic route to the Walker Basin country in eastern Kern County. It is open via Walker Pass to a connection with Owens Valley trunk highway east of the Sierra.

Four miles of state highway between Famosa and Earlimart were under water during recent unprecedented floods. However, maintenance crews of Division VI, assisted by Kern County traffic officers, under the direction of Captain Snell, safely and expeditiously handled the traffic. Acknowledgment is made by the division to the men of the traffic force for their invaluable aid, and also for the willing spirit in which it was rendered.

As this incident demonstrates, the State Highway Commission is becoming more and more an operating as well as a constructing department.

DIVISION VII.

HEADQUARTERS, LOS ANGELES.

S. V. CORTELYOU, DIVISION ENGINEER.

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

PLACING concrete on the reconstruction of 3.2 miles of Whittier boulevard, extending westerly from the Orange County line, is now well under way. The pavement will be 30 feet wide with two-foot crushed rock shoulders. It is being placed in 10-foot strips.

Contractor Works Fast.

Good progress is being made on the reconstruction of the Coast highway westerly from Ventura. Otto Parlier, subcontractor on the construction of 1500 lineal feet of seawall, arrived on the job

on October 29th. He had a power shovel in operation on November 6th and was pouring concrete on November 15th. By the end of November he had placed 470 cubic yards of concrete and had 300 lineal feet of coffer-dam completed ahead of the concrete work.

On the recently completed 6.3-mile section of cement concrete pavement through the Malibu ranch, extending westerly from Las Flores Canyon, an exceedingly smooth surface was obtained. The vialog reading averaged 4.1 inches of roughness per mile. This may be the record for California for 1926 pavements.

Grading is practically completed and about a mile of headers for the concrete pavement have been set on the Oxnard-Hueneme road cutoff, the approach to the new Coast highway in Ventura County.



Type of railroad crossing warning in use in Division VI. The center is a Reflex lens.

DIVISION VIII.

HEADQUARTERS, SAN BERNARDINO.

E. Q. SULLIVAN, DIVISION ENGINEER.

Counties of San Bernardino, Riverside, and Imperial.

AS THIS issue of the Bulletin goes to press, Division VIII is bending every effort to the repair of widespread damage to the El Centro-Yuma and the El Centro-San Bernardino highways caused by rain and floods of unprecedented severity. The storm was declared the worst for over fifty years and very serious damage was done to pavements, roadbeds, and bridges.

Contract No. 491, known as the Sand Hills paving project, has been completed and recommended for acceptance.

It is expected that completion of the new division office will permit the forces of Division VIII to move from the San Bernardino City Hall to the new building, located at 247 Third street, within the next few weeks. Division VIII is very proud of its new building, and the employees are anxiously awaiting the order to move.

DIVISION IX.

HEADQUARTERS, BISHOP.

F. G. SOMNER, DIVISION ENGINEER.

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

SEVERE rain and wind storms early in the month halted only temporarily operation of the crushing plant engaged in the production of surfacing for the ten-mile section of State highway between Independence and Lone Pine, Inyo County.

Owing to a heavy fall of snow in Mono County, work has been discontinued on the grading of 3.65 miles of highway south of Bridgeport.

Blizzard Traps Crew.

Grading of a three-mile section of highway in Long Valley, Mono County, has been completed. The crew, subsequently engaged in preparing the mountain roads for winter, was caught in a blizzard and was forced to abandon its equipment, which was left on Deadman Summit. This was later recovered by state forces working under the commendable leadership of Foreman

Paul Peak and Ray Flynn, and returned to the Bishop maintenance yard.

The task involved grinding trips on snow shoes night and day, and bucking snow with tractors in isolated localities where the dangers are traditional.

Occupation of snow-bound roads by state employees and equipment was of valuable assistance to the Southern Sierras Power Company in the restoration of power and telephone service.

The State highway between Mojave and Bishop is rapidly being restored to normal following recent storms. North of Bishop the highway is closed by snow.

DIVISION X.

HEADQUARTERS, SACRAMENTO.

R. E. PIERCE, ACTING DIVISION ENGINEER.

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

UNDER contract No. 514 (road X, Yol-6-C), all cement concrete pavement and macadam pavement (approaches to the concrete pavement) have been completed by Contractor H. Brown. This job is now complete with the exception of constructing concrete sidewalks and hand rails through the new West Sacramento subway; and the placing of gravel borders on each side of the concrete pavement, from the M street bridge westerly, the completion of which, it is expected, will be accomplished before the first of the year.

Construction of gravel roads through the grounds of the Stockton State hospital and farm is under contract by Force, Curigan & McLeod for the Division of Architecture. Inspection of this work is in charge of the engineering forces of Division X.

Priest Grade Is Being Widened.

Maintenance Superintendent H. L. Montford has a 11/3 cubic yard power shovel at work on Priest's grade, where needed widening operations have been started. This work should prove popular with the public, as Priest's grade, with its many curves, has been feared by many motorists, who use the road on their trips to and from Yosemite via Big Oak Flat.

The narrow Mokelumne River grade on the Mother Lode highway, south of Jackson, Amador County, is being widened and sharp points are being blasted away to make possible better vision around curves. The work is being done jointly by Foremen H. S. Clark and Frank M. Walker.

Heavy rains followed by a cloudburst washed away a garage and six machines in Angels Camp, and water flowing down the creek reached a depth of five feet over the Angels Camp bridge. In spite of the heavy rains, which were more or less general throughout the division, no serious damage was done to State highways.

STATE ROADS IN GOOD CONDITION.

(From the Maricopa Review.)

Much praise is due the division maintenance man of the State Highway Commission, E. F. Allard, of the local division, for his efforts following the last rain here, when he immediately put drags and harrows on the unpaved roads of his district and has left them in good condition.

Mr. Allard is an expert road builder and the Commission has in him a man that is always alert to every possibility in bettering the roads under his supervision, which is more than appreciated by the people of this district.

Since coming here and taking charge of the surrounding roads under the state's supervision Mr. Allard has placed them in excellent condition, and is being complimented for his endeavor to keep them in a passable state during heavy rains and cloudbursts.

ILLINOIS ROAD MILEAGE.

Illinois now has 5966 miles of completed hard roads in its state highway system, according to the California State Automobile Association.

Vegetable Seller—"But why are you putting your hat on the cabbage, sir?"

Customer—"My wife told me to get one about as big as my head, so I'm seeing if the hat fits."—*Tarikatuven*, Oslo.

HEADQUARTERS AND DIVISIONS III AND X IN NEW BUILDING

AS THIS issue of the Bulletin goes to press headquarters and Divisions III and X are enjoying an appreciated Christmas present from the Board of Control—their permanent new home in the four-story Strub Building at Eleventh and P streets, two blocks from Capitol Park. In addition to the highway offices, the building houses on the first two floors the Division of Motor Vehicles and the Bureau of Criminal Identification.

The Highway Commission headquarters staff has the entire third floor, while the fourth floor is occupied by the offices of the two divisions having headquarters in Sacramento.

Larger and better lighted and ventilated quarters for the drafting forces and for the accounting department, as well as other departments, are only some of the many splendid features of the new building. There also is ample space for storage of supplies, something that was badly needed, and special rooms for the blue printing and photostating work, which has been transferred from the laboratory.

The building is of reinforced concrete construction with a frontage of approximately 160 feet on each street. It was planned and built for the particular use of the departments now occupying it. The State of California has a long-term lease on the property with the privilege of purchase, which may be exercised at the option of the legislature. Negotiations for the construction of the building, which was erected by San Francisco capital, were carried on by George G. Radcliff, chairman of the State Board of Control.

HIGHWAY NEWS NOTES

THE California Highway Department recently had as its guests two engineers from South Africa, I. B. Shannon, from the irrigation department of the South African government at Pretoria, and N. Shand, who is connected with the Capetown Corporation of Cape Town. The two men spent several weeks investigating highway construction in California.

Howard Noble, resident engineer of Division VIII, is now convalescing in a southern California hospital following a recent serious operation.

Eugene Sorin and R. W. Hanchette are new draftsmen who recently joined the forces of Division X. Sorin is from Eagle Rock.

Miss Beulah Francisco, popular headquarters personnel clerk, is now Mrs. James J. Doherty, following her recent marriage in Sacramento.

A. K. Forrest, maintenance superintendent, has been transferred from Division III to the headquarters maintenance office under T. H. Dennis.

L. I. Smith is now connected with the office of the State Purchasing Agent at the Capitol Building.

George Cook, secretary to the State Highway Engineer, has been away from the office recently because of illness.

Carl Tunison, an engineer formerly on the staff of the commission, passed away recently in a San Francisco hospital.

The removal of the Highway Department to its new building has resulted in the transfer of Mrs. Alice M. Nathan, for many years head telephone operator for the commission, to the central telephone office in the Capitol Building.

PUBLIC HIGHWAYS.

We wish to commend Mr. Somner, division engineer of the State highway, on his judgment and ability in the construction and maintenance of the State highway through Inyo County, and to express a desire that the road from Bishop to the Nevada state line by way of Laws be taken over by the state and taken care of in a like manner.—From the 1926 Report of the Inyo County Grand Jury.

Painter (airily)—"My dear fellow, I paint a picture in two days and think nothing of it."

Critical Friend—"I quite agree with you."—*Answers*, London.

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

Cont. No.	Di- vision	County	Route	Sec.	Location	Miles	Type	Contractor	Estimated cost	Date contract awarded	Con- tract time, days
COMPLETED AND ACCEPTED SINCE NOV. 18, 1926.											
490	I	Del Norte.....	1	A	Head of Richardson Creek to Klamath River.....	2.02	Grading and Rock Surfacing.....	H. W. Rohl.....	\$98,145 00	Dec. 14, 1925	
491	VIII	Imperial.....	27	B	Across the Sand Hills.....	6.45	Asphalt Concrete Pavement.....	Schmidt and Hitebeck.....	340,016 91	Dec. 30, 1925	
510	IV	Sonoma.....	1	A	Through Cloverdale.....	1.33	Portland Cement Concrete Pavement.....	J. V. Galbraith.....	58,570 31	July 14, 1926	
AWARDED SINCE NOVEMBER 16, 1926.											
517	I	Humboldt.....	1	G	Between Fernbridge and Loleta.....	2.10	Grading and Rock Surfacing.....	Kaiser Paving Co.....	\$97,530 01	Dec. 15, 1926	200
					Sub-total.....	2.10			\$97,530 01		
PENDING AWARD—None.											
					Total State Highway Fund Contracts Awarded and Pending Award.....	2.10			\$97,530 00		

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

STATE HIGHWAY MAINTENANCE FUND CONTRACTS (Including Gasoline Tax Fund)

Cont. No.	Di- vision	County	Route	Sec.	Location	Miles	Type	Contractor	Estimated cost	Date contract awarded	Con- tract time, days
COMPLETED AND ACCEPTED SINCE NOV. 16, 1926.											
M-111	VII	San Diego.....	2	B	Carlsbad Crossing of A. T. and S. F. R. R.....		Concrete Girder Bridge.....	Coon Brothers.....	\$29,668 25	Dec. 14, 1925	
M-128	IV	Santa Cruz.....	44	A	Between Boulder Creek and California Redwood Park.....		Concrete Bridge and Three Culverts.....	Noble Brothers.....	16,687 12	June 8, 1926	
M-140	VI	Fresno.....	4	B	Between Church Avenue and Cherry Avenue.....	0.60	Asphalt Concrete Surfacing and Wid.....	Cal. Road and Street Imp. Co.....	16,973 28	Aug. 23, 1926	
AWARDED SINCE NOVEMBER 16, 1925—None.											
PENDING AWARD—None.											

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

CALIFORNIA HIGHWAYS.

State

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