

CALIFORNIA HIGHWAYS

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

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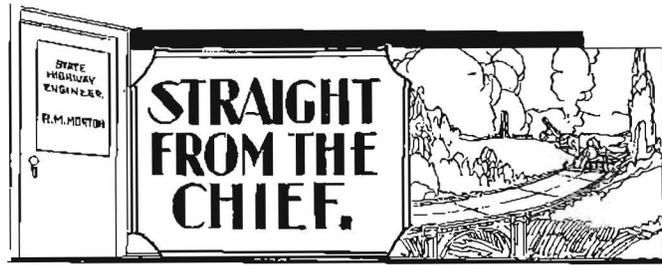
DEATH TRAP ELIMINATED—Former grade crossing on the Coast highway near Oceanside, San Diego County, and new subway which has taken its place. See article on page three.

In this issue: SAFETY BUILT INTO RECONSTRUCTION PROJECT—AIMS OF THE MAINTENANCE DEPARTMENT—LABORATORY EXPERIMENTS WITH BINDER MATERIALS FOR GRAVEL AND CRUSHED ROCK ROADS.

CALIFORNIA HIGHWAYS

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



Vol. 3 OCTOBER, 1926. No. 10

CALIFORNIA HIGHWAY DEPARTMENT

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General Headquarters, Fifth Floor, Forum Bldg., Sacramento, California.

ARE THE MAINTENANCE ENGINEERS AND FOREMEN PLAYING FAIR ON EQUIPMENT MATTERS?

THE new accounting system applied to the Equipment Department is now making possible accurate reports. The details of the experience of thirty months should be sufficient to draw conclusions regarding equipment matters.

When the equipment system was installed, it was the intention that the divisions should make their own equipment pay roll reports. It has never been contemplated to establish a system of espionage. The rentals were trial rates, and represented an average of the cost of operating the particular kind of equipment, taking into account the light use as well as the hard service. The department expects to lose money on the hard service, but to gain on the light service.

From the reports, it appears that some maintenance foremen (and it must be with the knowledge and consent of some supervisory engineers in the divisions) are "short changing" the Equipment Department in reporting on the use of equipment. This is borne out by the financial reports, which show too much difference in the use and earnings between divisions which are otherwise comparable.

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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.

Safety is Built Into Monumental Southern Project

DIVISION VII has just completed a project on the Coast highway in San Diego County (VII-S.D. 2-B, C, and D) which will stand for years as a monument to its builders, both engineers and contractors. Into the reconstruction of 14.93 miles of pavement between a point 2.5 miles south of San Onofre and Oceanside has been builded standards of alignment and grade and quality of pavement which exemplify, to a marked degree, the high character of work now being done by the California Highway Commission.

The safety of the highway has been effectively improved by numerous minor line and grade changes, and by two major line changes which involved the construction of subways under the tracks of the Santa Fe Railroad. Tangents and long radius curves have taken the place of blind curves and kinks, the cause of frequent serious accidents, while a grade crossing that has taken its toll of lives has been eliminated altogether. A new second-story cement concrete pavement, twenty feet wide, has taken the place of the old fifteen-foot slab.

The contract for this improvement was awarded by the commission on July 13, 1925, to Jahn and Bressi of Los Angeles and accepted as completed on September 14th of this year. It represents an expenditure of approximately \$550,000 of reconstruction funds and completes, with the exception of a few miles, a twenty-foot pavement from Los Angeles to the San Diego city limits.

Ransom Discusses Problems.

Many interesting problems were met and solved during the course of the work. How traffic was handled, how the grading of sand effected the strength of concrete, and other matters are discussed by Assistant Division Engineer L. M. Ransom of Division VII, as follows:

The original contract covered the reconstruction of 13.1 miles but later an addition of 1.83 miles was made at the southerly end, continuing the work to Eighth street in the city of Oceanside, a total of 14.93 miles.

This extension included the most important line change on the entire project and involved, in addition to grading and paving, the elimination of a dangerous grade crossing over the Santa Fe Rail-

road, the scene of many serious and some fatal accidents. (See front cover and map showing line change.)

The crossing was eliminated by building a subway which has removed danger to traffic and greatly improved the alignment. The new pavement approaches the under pass on curves of 1000-foot radius and the San Luis Rey River bridge on a tangent. This is in marked contrast to the original alignment which had two right-angle turns approaching the railroad crossing and a curve of 71-foot radius at the north end of the bridge.

New alignment to eliminate bad curvature also was adopted at the approach to the Las Flores subway (see map). This required the construction of a new subway and the abandonment of the one formerly in use, but the alignment secured has a 900-foot radius curve compared with a curve of 100-foot radius through the old under pass. The latter was the scene of numerous accidents due to blind and sharp curve conditions.

The Santa Fe Railway Company participated in the cost of the subway north of Oceanside as well as the new one at Las Flores.

On the entire project except on the line changes, the old 15-foot pavement was used as base for the new slab, which was placed twenty feet wide with a minimum thickness of five inches at the center, seven inches at the edges of the old pavement, and nine inches at the outside. The construction throughout was in accordance with the latest standards of the commission.

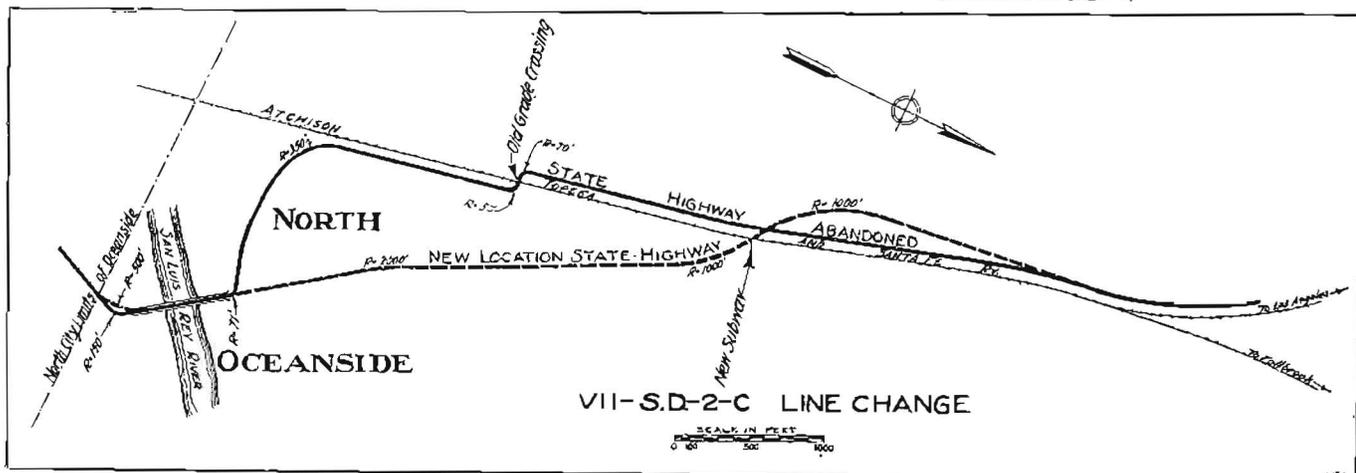
Importance of Sand Demonstrated.

In this connection it is interesting to note the effect on the concrete of the grading of the sand, as shown by laboratory tests of sand samples. At the beginning of the work the sand was so fine it barely passed the specifications. As the work progressed, the sand became too fine to be acceptable and a coarser grade from another source was obtained for the remainder of the work.

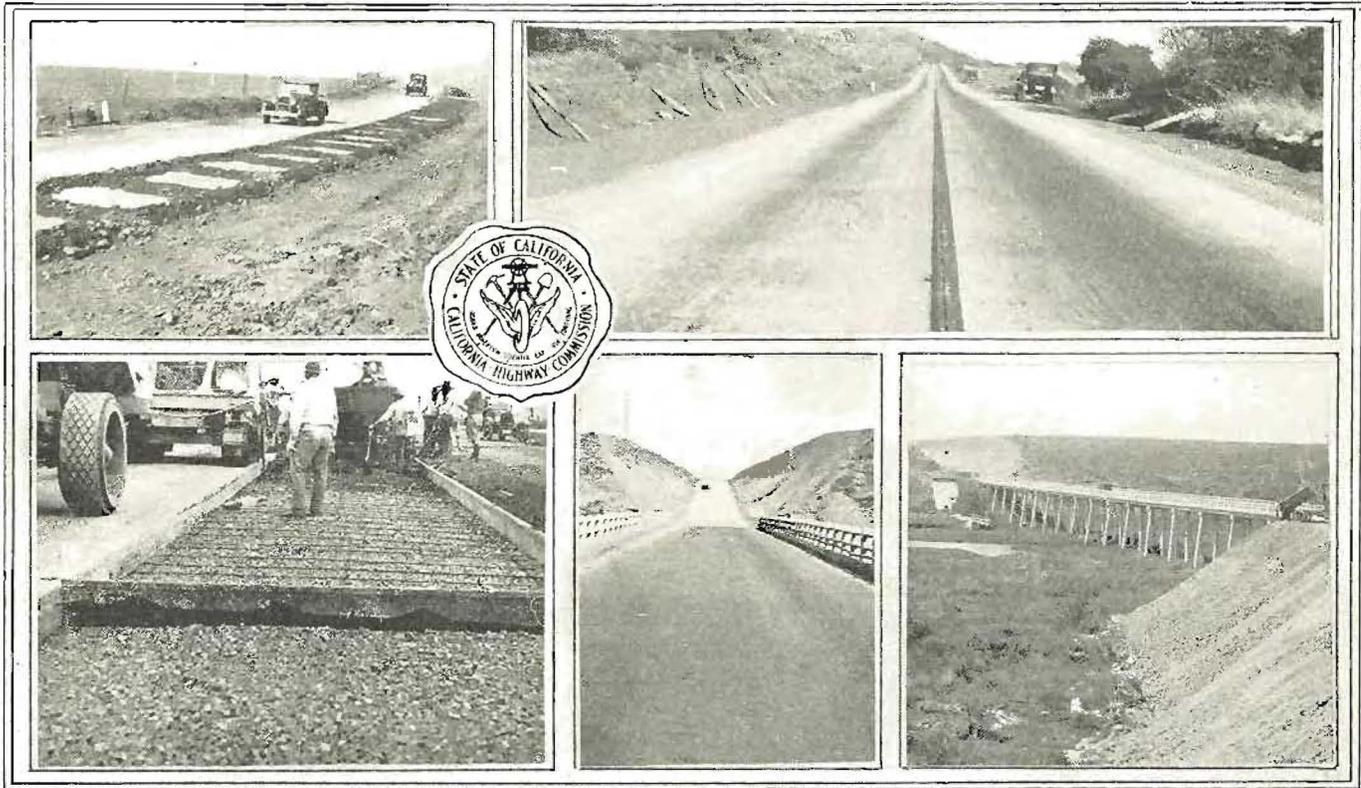
The average strength of concrete as shown by 28-day breaks of cylinders covering forty-five samples, using the fine sand, was 3293 pounds per square inch. The average strength of 103 samples containing the coarser sand was 5078 pounds per square inch. The average break for the entire contract was 4535 pounds per square inch.

The following sieve tests of the coarse and fine sand, with corresponding cylinder breaks, are of considerable interest.

(Continued on page 4.)



WHERE DANGERS WERE REMOVED FROM THE HIGHWAY



RECONSTRUCTION ON COAST HIGHWAY—Views on new section of Coast route in San Diego County recently rebuilt under direction of Division VII. *Upper left*, handling two-way traffic on improved shoulder while ten-foot strip of concrete cures; *Upper right*, completed section of new pavement, 20 feet wide; *Lower left*, rock subbase and reinforcing steel, where highway is on new alignment to eliminate curves; *Lower center*, looking north from San Luis Rey bridge, deep cut made to eliminate right angle turn into this structure, *Lower right*, earth used to make fill at south end of bridge to widen curve.

Daily report of January 8, 1926, shows following sieve test on sand:

Screen and sieves	Fine aggregate	
	2	Spec. Lim. 90-100
No. 3 (.263)	99	
No. 4 (.185)		
10	76	55- 80
20	52	30- 55
30	29	15- 35
40	19	10- 15
80	4	0- 10
200	1	0- 3

with a resulting 28-day break on test cylinders No. 28-B at 3680 pounds.

Daily report of August 6, 1926, shows following test on sand:

Screen and sieves	Fine aggregate	
	2	Spec. Lim. 90-100
No. 3 (.263)	98	
No. 4 (.185)		
10	68	55- 80
20	44	30- 55
30	25	15- 35
40	16	10- 25
80	4	1- 10
200	1	1- 3

with a resulting 28-day break on test cylinders No. 146-B at 6650 pounds.

Construction Details.

On the half width construction, it was necessary to set the header boards on the center line of the old pavement. This presented a rather difficult problem which was solved by drilling holes through the old pavement. To wooden stakes driven into these holes were nailed the 5-inch wooden header boards. A portable Ingersoll-Rand air compressor and a jackhammer were used for drilling holes 2½ to 3 inches in diameter and spaced 1½ feet from the ends of the header boards and not more than 4 feet apart on the intermediate stakes. The cost was \$350 per

miles, or about 6¾ cents per foot of headers. Stakes used were 2 inches by 2 inches, by 12 inches long.

The difficulty usually experienced in holding reinforcing steel in its proper position was another obstacle overcome on the latter part of this work. Resident Engineer W. D. Eaton and Assistant Resident Engineer W. T. Lamb perfected a supporting device which will be described in detail in a later issue of the Bulletin.

At several points on the job the subgrade was unsatisfactory. At these places a subbase of 8 to 10 inches of crushed rock was placed prior to placing of pavement. In addition to this rock cushion, a 6-inch clay tile drain was installed parallel to the highway with satisfactory results. The pavement also was heavily reinforced on these sections.

Two-foot shoulders of Corona quarry waste, 5 inches thick, were placed on either side of the pavement for the entire length of the contract. These shoulders were watered and rolled with a 12-ton, 3-wheel roller.

The vialog tests taken over completed pavement are indicative of the quality of the work. A reading of 7.4 units of roughness per mile, an excellent record, was recorded.

How Traffic Was Handled.

Handling of the heavy traffic over this route while construction was under way was another important feature of the project. Travel is heavy as indicated by a census taken on July 18th and 19th, 1926, near the south limits of Oceanside, which showed a count of 5842 and 3375 cars, respectively, per day.

To adequately handle this traffic entailed considerable additional expense for placing the pavement in ten-foot widths for the entire project. The difficulty of obtaining suitable bypass locations and danger of a traffic tieup on detours during the rainy season made such procedure imperative. By providing an additional width of

Aims of the Maintenance Department

By T. H. DENNIS, Acting Maintenance Engineer.

THE Maintenance Department has assigned to it the operation of 6590 miles of State highway, except sections now under contract or constructed by the Forest Service and still under maintenance by the Federal government, in daily use by 1,500,000 motor vehicles carrying some 3,000,000 passengers. The annual cost is approximately \$4,000,000, which expenditure, roughly, is divided into 50 per cent labor, 29 per cent equipment rentals, and 21 per cent materials and labor. In this task 1700 men are employed.

Direct field supervision of maintenance activities over the extensive territory of California, larger in area than some nations of Europe, is vested in the division engineers and their assistants, assigned to maintenance.

The aim of the maintenance forces in the performance of their duties should be:

First, high standard maintenance at a minimum of cost; and

Second, the cultivation of public appreciation and interest in the work of the department.

The attainment of these aims entails a definite purpose and organized effort, which purposes should be understood thoroughly by every individual within the organization.

High maintenance standards are synonymous with a maximum measure of safety and low vehicle operating costs, both popular with the public.

The cost of such maintenance is directly affected by the coordination of construction with maintenance and the effective combination of labor, equipment and materials. Failure in either will result in high costs. Construction projects involving additional maintenance to insure their readiness for use are not coordinated.

Occasional high pressure inspection by the directing heads, which neglects a detailed study of methods and results, is of no benefit and weakens the morale of the organization. Frequent, unhurried trips should be made in company with the foremen over their respective sections for a discussion on the ground of their many problems. On such occasions attention should be called to details of the work not receiving proper attention. Such trips also will give opportunity for discussion of the trend of traffic and the possibility of development affecting the highway.

Foremen should be impressed with the fact that minor improvements, where practical, should be of standard construction, to the end that they may be included in the road's ultimate cross-section.

Close study also should be made of the section's local material resources, for it frequently happens that combinations of available material prove more serviceable than their use separately.

Initiative Should Be Encouraged.

Since improvements in methods and devices are usually the outgrowth of practice, encouraging direction along lines of personal initiative should be given the foremen.

As the highways become more urban in aspect, the handling of permits is another duty of the Maintenance Department which assumes considerable magnitude. To prevent interference with future construction and to offer a common basis for handling, there is under way the establishment of theoretical curb lines within which no encroachment under permit will be granted.

No public service effort affords the same opportunity for judgment or public contact as does the maintenance work.

Construction, unless local, is not easily visualized by the motorist; distant projects, although of great moment, fail to compare in importance with the maintenance performed on

roads daily affecting his social and economic activities. The occupant of each passing vehicle feels an investor's interest in this work and demands as of right, not only consideration of his safety and convenience, but efficiency and economy in methods and costs. That he so observes and criticises is evinced by numerous letters received at headquarters, not all commendatory in tone.

Inasmuch as our work is an undertaking by and for the people, foremen should, by their work and attitude, deserve and maintain public commendation. Willful or thoughtless disregard of public safety or property by a foreman indicates failure to fully appreciate his part in the desired contact between the commission and the public.

It is the purpose of the Headquarters Maintenance Department, through its traveling representatives, to pass on all maintenance and specific improvements. Attention will be called to any deficiencies, either in methods or results, and instruction given for their improvement.

It will always be the endeavor of headquarters, where practical and possible and as funds permit, to aid in the building up of the local maintenance sections, to the end that the aims here briefly outlined may be realized.

T. H. DENNIS, ACTING MAINTENANCE ENGINEER, HAS RECORD OF STEADY PROMOTIONS.

T. H. DENNIS, who on August 1st was appointed by State Highway Engineer R. M. Morton to the position of acting maintenance engineer, has a record of steady promotions since he first entered the department as an instrument-



T. H. DENNIS.

man on April 1, 1912. His years of service in Divisions V and III, during which he worked his way upward to the position of principal assistant engineer, well fit him for the position he now holds.

Dennis was advanced from instrumentman to chief of party, then resident engineer, assistant engineer, and principal assistant engineer. Each promotion was the result of a civil service

examination, which advanced Dennis from the lower grades to a Grade V engineer, his present rating. He always studied the job ahead, and when a vacancy occurred he was ready for it; he is a product of the department. His last position as principal assistant engineer to F. W. Haselwood placed him in charge of the maintenance in Division III, where his work attracted a favorable attention.

Dennis has entered upon his new duties with characteristic vigor and is now engaged in a survey of the many and varied problems of climate and soil and weather conditions affecting maintenance on the far-flung highway system of California. He will never be satisfied until he familiarizes himself with every detail of the work in each division and until he knows every foreman by his first name.

Dennis was born in Wisconsin and is a graduate of the State University of that state. His aims and ambitions for the Maintenance Department are set forth in the accompanying article.

NIGHT TRAFFIC COUNTS

NIGHT traffic on the state highway, particularly in the San Joaquin Valley, appears to be growing. This conclusion is indicated by counts made during the summer by the maintenance forces of Division VI.

Traffic counts generally have been taken for 16-hour periods from 6 a.m. to 10 p.m. Studies made in California in 1922 by the Bureau of Public Roads indicated that traffic during these hours was 92 per cent of the total for the 24 hours.

Observing that motorists are using the highways more and more for night driving, Division VI during last July made counts at five stations in the San Joaquin Valley to determine the percentage of traffic using the highways for the eight hours from 10 p.m. to 6 a.m. as compared with the total for the 24 hours.

It was found that the night traffic, that is, the count from 10 p.m. until 6 a.m. totaled 16 per cent of the whole or double what it was in 1922. In view of the fact that this count was taken during the warmer weather in the San Joaquin Valley, it may be that the same percentage would not hold for all sections of the state. Nevertheless it is evident to observers that night driving, especially the movement of trucks, is on the increase.

Those Stenographers.

Headquarters Shop, R. H. Stalnaker, dictating a letter to a division engineer: "Your P and H shovel, etc." Stenographer transcribed as follows: "European and H shovel."

Heading on an invoice received from Shop II: "Headquarters Office—Bride Department."

"A WORD OF APPRECIATION"

A LOS ANGELES man, whose business takes him over many miles of the state highway system, writes State Highway Engineer R. M. Morton to express "a word of appreciation" of the work now under way. He evidences particular interest in the high standards of the reconstruction work and the Commission's policy of serving traffic by maintaining good travelable detours. His letter follows:

THE KAUFMAN COMPANY

Los Angeles

October 5, 1926.

Mr. R. M. Morton, Highway Engineer,
Sacramento, California.

Dear Mr. Morton:

Having been connected with the Highway Commission for a number of years, I am well aware of the large number of kicks and complaints registered against the Commission and its engineers, and I feel that a word of appreciation of good work well done will not be amiss.

I am continually traveling the state highways from one end to the other, and the vast improvements being made with regard to line changes, widening of curves, and elimination of railroad grade crossings make traveling a delight. This is especially noted on the Coast road to San Diego south of Los Angeles and on the Ridge road.

Another thing that a traveling public should appreciate is the well-maintained detours and the sign "Detour ahead" no longer is a veiled threat.

Very truly yours,

(Signed) A. V. SWARTZ.

SAFETY FEATURES BIG RECONSTRUCTION PROJECT

(Continued from page 4.)

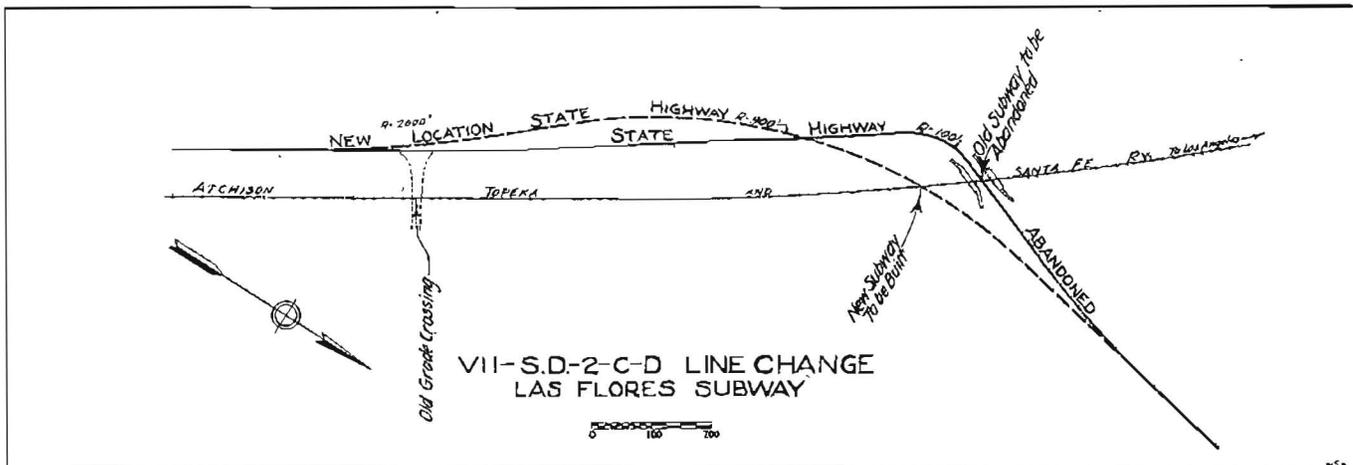
shoulder, it was possible to handle a double line of traffic on half of the old or new pavement and the adjoining shoulder, a minimum width of fifteen feet between edge of old pavement and toe of cut bank being maintained. During the wet weather, when the shoulder became too soft for travel, a control was established for one-way traffic on the half-width pavement.

Besides the additional grading required for the extra width of shoulder, it required approximately \$55,000 to provide the additional cost of pavement laid one-half width at a time, to build and maintain the bypass on the widened shoulder, and to provide the traffic control.

By reason of these precautions the unusually heavy rains of last winter caused little inconvenience to the heavy traffic over the highway; in fact, the commission was commended for the satisfactory manner in which traffic was handled.

Practically all of this project with exception of a small portion near Oceanside is within the famous Rancho Santa Margarita. This property was owned by the late Jerome O'Neill, who granted the state, without cost, rights of way for line changes and bypass privileges. Some additional right of way was required between the O'Neill ranch and Oceanside, which was secured without the necessity of condemnation proceedings.

The commission was represented on this contract by Resident Engineer W. D. Eaton and Assistant Resident Engineers W. T. Lamb, W. J. Nelson, O. W. Monroe, F. R. Belknap and H. B. Lindley. Credit is due to the resident engineer and his assistants and Jahn and Bressi, the contractors, for the efficient handling of the actual construction as well as of the difficult traffic problem involved. The accomplishment is one of which they may well be proud.



Tests of Binder Materials for Gravel and Crushed Rock Surfacing

C. L. McKasson, Materials and Research Engineer.

THE testing and research laboratory has been endeavoring for a considerable period to develop tests which will determine the relative efficiency and suitability of binder materials. The following description, which may be considered a progress report covering present practice, it is hoped, will be of particular value to field engineers in interpreting test reports issued from the laboratory.

Tests for cementing value of surfacing materials, as developed in the laboratory, already have been described in the April, 1926, issue of the Bulletin.

Proper selection of binders or fillers for the considerable mileage of gravel and crushed rock surfacing heretofore constructed, in locations where proper fillers or binders were difficult to obtain, has been the subject of considerable investigation.

On new construction rock and gravel intended for surfacing is sometimes found to be lacking in cementing properties, but otherwise to be suitable for use. To remedy the deficiency in binding or cementing properties, it has become the practice to add binding material by mixing it with the surfacing during construction or later by blading and mixing on the road.

Suitable binder material usually consists of disintegrated or weathered rock or clay and sand mixtures. The term "clay binder" is quite commonly applied to such material, but is not always an accurate description. So-called "sticky clay binders" have been tested which contained less than 25 per cent of clay and more than 75 per cent of sand and silt and which, therefore, fall entirely outside the class of soils known as "clays."

Fine Material Essential.

In general in making cementing tests of surfacing materials, it has been found that the road metal must contain at least 15 per cent of material passing a 100 mesh and 8 to 10 per cent of dust (removed in the washing test). These percentages are in terms of the portion of surfacing passing one-half inch circular opening screen. Except with very soft rock which grinds up rapidly under traffic, a less percentage of fines will usually result in a loose dusty surfacing. Some road metal does not show satisfactory cementing value even with larger percentages of fines, due to the inert nature of the material, but even with high cementing properties in the material *fines are essential in about the minimum quantities stated.*

Cementing tests on surfacing materials are made on the portions passing one-half inch screen with a minimum dust content as indicated above.

How Tests Are Made.

The sample is moistened and mixed as in the preparation of a concrete sample. The amount of water used varies with the character of the material, but an effort is made to approach the condition known in soil tests as moisture equivalent saturation. The same consistency in concrete would be defined as "stiff." With ordinary crushed rock surfacing material, the amount of water usually runs from 10 to 12 per cent. The material, after wetting, is tamped into a 4½-inch cubical mould and is placed in a warm oven at a temperature of about 100° F. until it has dried sufficiently to permit its removal from the mould. Drying is then continued until the specimen ceases to give off moisture, after which it is capped with plaster of paris and tested for compression in a Universal testing machine.

The cementing value is taken as the average compressive strength per square inch of three specimens. There is a wide

variation in results obtained with different materials, but fairly uniform results can be obtained in repeated tests of the same material. The strength developed ranges from zero to about 225 pounds per square inch. One hundred to 150-pound strengths are not unusual.

Binder materials are tested in a similar manner except that clean concrete sand all passing a one-half-inch screen is used as a basis, the binder material being added in an amount sufficient to bring the fines up to 15 per cent passing 100 mesh and about 10 per cent of wash. The clean concrete sand has no cementing value and the strength of specimens containing the mixture of binder and sand is, therefore, due to the presence of the binder, and represents the cementing value of the binder material.

In addition to cementation tests, binder materials are tested as soils for moisture carrying characteristics and for lineal shrinkage.

Practice in Binder Tests.

A recent study of the suitability of a so-called "clay" binder will serve as an example with which to illustrate our practice in binder tests.

The "clay" binder tested as a soil was found to contain 21 per cent of clay, 26 per cent of silt, and 53 per cent of sand. The moisture equivalent was found to be only 13 per cent, indicating it to be a soil which will not retain an excessive moisture content in wet weather. Lineal shrinkage was found to be only 3 per cent, showing it to be a stable soil not greatly affected in volume by alternate wetting and drying.

In the cementing test, with clean concrete sand, using 26 per cent of binder and 74 per cent sand, a compressive strength of 128 pounds was obtained. This was considered a satisfactory cementing value.

This binder material was used to cement a crushed gravel surfacing of granitic material which, with its own stone dust, had only 50 to 60 pounds of cementing value. This low cementing value rendered the material unsuitable for use.

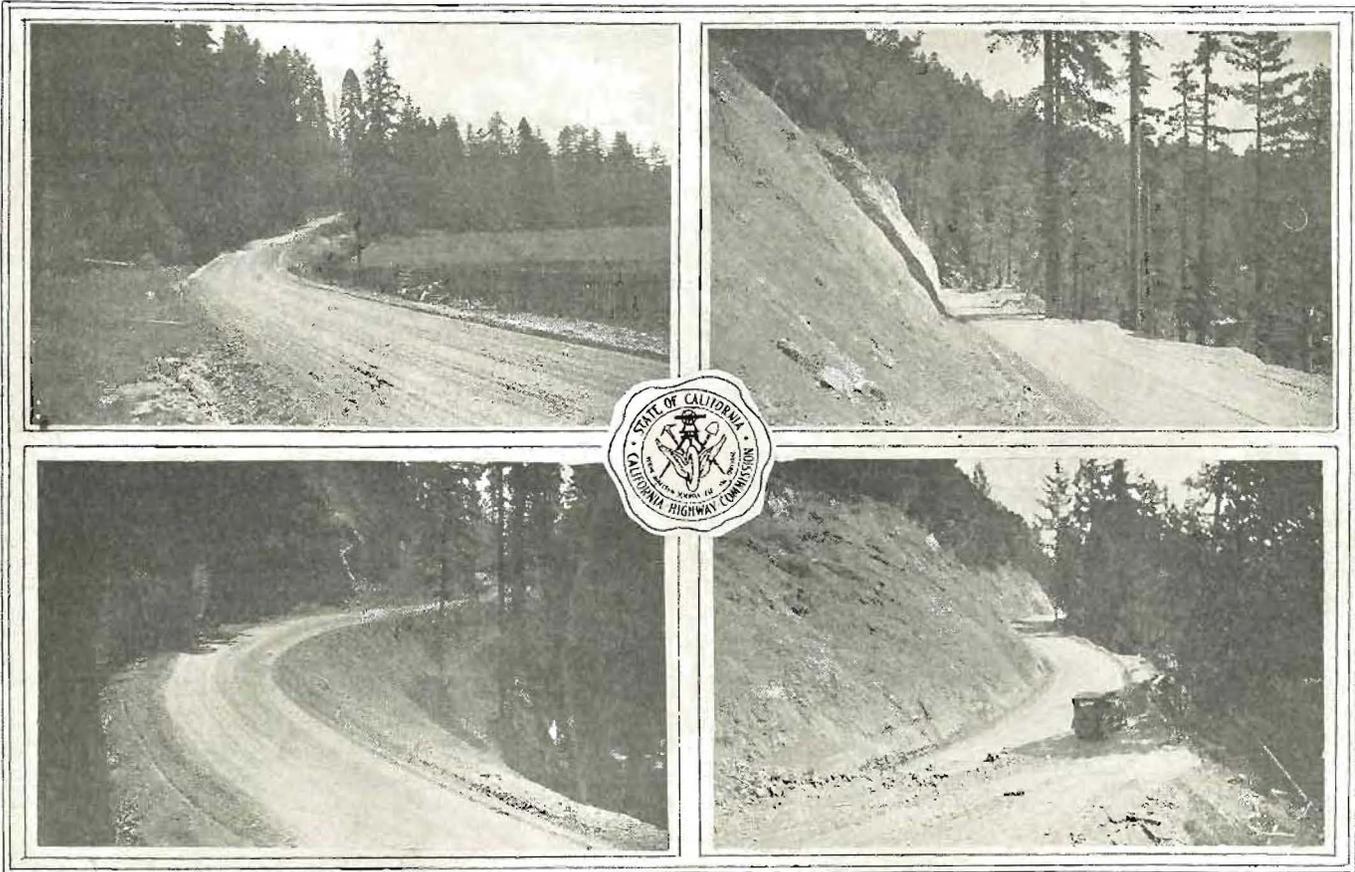
This surfacing material was mixed with the binder described above in the proportion of 85 per cent of surfacing rock including stone dust and 15 per cent of the binder. The cementing value on the mixture was 155 pounds per square inch and indicated that the addition of 15 per cent of binder was sufficient to insure satisfactory results. Subsequent tests on field samples of binder and crushed material as mixed and delivered to the work showed cementing values of 125 to 150 pounds.

Motor vehicle traffic has made the quest for a suitable and efficient binder for rock-surfaced highways one of the important tasks confronting highway engineers. Whatever the laboratory can contribute to that end it will gladly do.

THE WORKING BASIS.

The inevitable result of the National Highway program is to focus highway work and highway expenditures in the state highway departments. Even the federal money is spent under the direction of the state engineers, and each state has a contract with the federal government as to how the money shall be spent and how the work is to be done. If the power of a state can be used in such a fine spirit of cooperation, and if the government of the United States itself is willing to share its authority with the states on a mutual working basis, surely county and township authorities have nothing to lose by meeting their own state authorities half way, and the people who use the roads and pay for them have everything to gain.—*The Nation's Highways.*

RECONSTRUCTION PROJECT COMPLETED ON REDWOOD HIGHWAY



NEW SECTION OF REDWOOD HIGHWAY—Curves and other dangerous features of the original road have been eliminated by regrading six miles of the Redwood highway between Leggett Valley and two miles north of Rock Creek, Mendocino County. Above are views of the new work.

SIX MORE miles of the Redwood highway have been materially improved by the completion of the contract of the Butterfield-Sears Company for reconstruction, grading, and rock surfacing that portion in Mendocino County between Leggett Valley and two miles north of Rock Creek.

The old road, a decidedly crooked dirt road 14 to 18 feet in width, was originally constructed in 1917 by convict labor. It was the best road possible with the money available at that time and was located on the steep mountain slopes 100 to 200 feet above Eel River.

In general, the new highway conforms to present high standards of construction. It has a minimum 200 foot radius open, and 300 foot radius blind curves, and, except for a short stretch of 1000 feet, has a 6 per cent or less compensated grade.

Many Curves Eliminated.

The new work has eliminated many 50 foot radius curves, blind turns, sharp reverse curves and stretches of 7 per cent uncompensated grade. Due to the lessening of curves, the road has been shortened four-tenths of a mile in 6.4 miles. Crushed rock surfacing 20 feet wide has been placed throughout the length of the new section.

The Contractors encountered many difficulties before completing the project, which extended over two working seasons; only the rough grading was finished during the first summer.

Slides Hamper Progress.

Last winter many slides of large magnitude occurred, making it practically impossible to maintain an open road during the month of February. One of these unprecedented slides necessitated the use of a drag line and a high pressure pump to sluice

the sliding material down the mountain into Eel river. For 300 feet above the road, the mountainside, including massive trees with trunks two to five feet in diameter, slid into the newly graded road and it was necessary to expend approximately \$20,000 to remove slides in the vicinity of the project.

The completed work will cost approximately \$237,500, or nearly \$38,000 per mile. The total excavation, exclusive of slides classed as extra work, was 335,000 cubic yards, or 53,000 cubic yards per mile.

The Butterfield-Sears Company, the contractors, are to be complimented for the cooperation shown Resident Engineer M. H. Hubbs and Division Engineer T. A. Bedford. The company forced the work to completion within the time limit in the face of many difficulties.

A SOUTHERN VIEW.

Highways are owned by the public. The highway rolling stock, on the other hand, and everything concerned with it, is privately owned. These two conditions make highway financing much more complicated than railroad financing. But it is significant that the tendency is to insist on the users of the highway paying a larger share of the cost—*Arkansas Highways*.

"Make no little plans; they have not magic to stir men's blood and probably themselves will not be realized. Make big plans; aim high in hope and work, remembering that a noble, logical diagram once recorded will never die, but long after we are gone will be a living thing, asserting itself with ever-growing insistency. Remember that our sons and grandsons are going to do things that would stagger us. Let your watchword be order and your beacon beauty."

DIVISION II FORCES BUILD BRIDGE IN RECORD TIME

THE highway department is such a far-flung organization that many splendid accomplishments often go unnoticed. It was only a short while ago that accounts reached headquarters of the remarkable achievement of a maintenance crew of Division II, to which was assigned the task of opening the Klamath River highway to traffic following the destruction by fire of the suspension bridge at Orleans.

On June 13th last, a fire of unknown origin damaged this structure to such an extent that the cables on one side broke, wrecking all of the central span not already destroyed by the fire. The topography of the country and the depth of the river were such that a detour to other bridges or fords was impossible and an emergency crossing was imperative to serve traffic, it is explained by Division Maintenance Engineer S. W. Lowden.

Temporary Bridge Decided Upon.

It was decided that the quickest way to meet the emergency was to erect a temporary summer bridge. The job was assigned to a maintenance crew headed by Foreman Guy McMurtry, who has charge of about 100 miles of highway on this route.

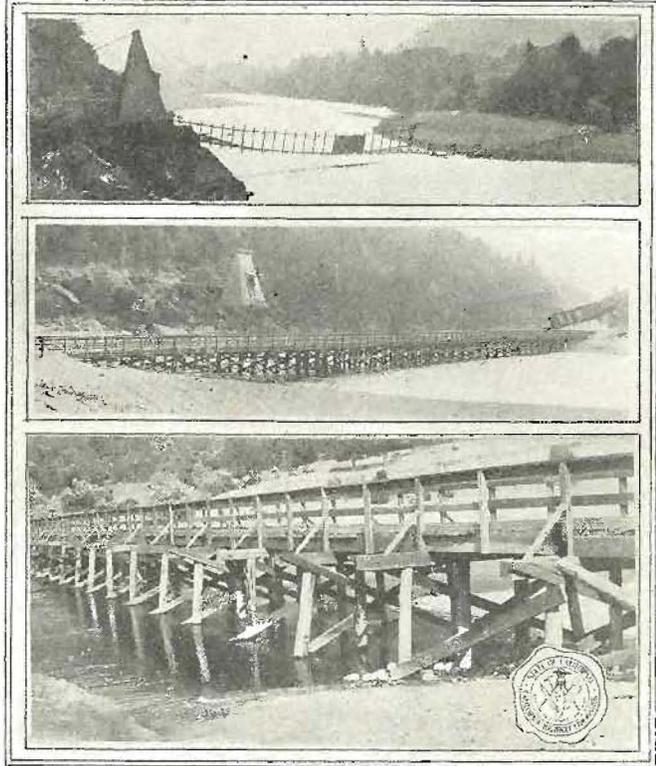
Suitable lumber could not be secured in the vicinity on short notice, but a small sawmill operated by a Fordson engine was located nearby and this was leased by the division for the production of necessary material. The crew began logging in the woods on June 15th, two days following the fire; the first lumber was ready for use on June 16th, and on June 28th, just thirteen days after the work started, traffic was resumed. A bridge, 470 feet long, had been built through flowing water seven feet in depth at a cost of \$2,044.67 or \$4.35 per lineal foot. This cost includes approaches and all incidental work and considering that two weeks before completion of the bridge the timber was growing in the woods and the crew was scattered along a hundred miles of highway, the cost is exceptionally low.

Ingenious Device Speeds Work.

An important factor which contributed to the speed with which the work was done was an ingenious traveler devised for placing bents and other heavy timbers. It is described by Engineer Lowden as follows:

This traveler consisted of two poles, each 40 feet long. On the front end was erected a 10-foot gallows frame from which the timbers were swung by means of blocks. The traveler timbers were kept well greased and moved over the

partially completed structure by means of a pair of double blocks. The traveler was approximately two and one-half times as long as the distance between bents, which made it possible to move it ahead sufficiently to have the gallows



BRIDGE THAT McMURTRY BUILT—Above, burned bridge across Klamath River at Orleans; Below, temporary structure, 470 feet long, erected by maintenance forces in thirteen days, including time necessary for felling trees and sawing timbers.

frame directly over the bent to be placed. The timbers were then placed and the operation repeated.

The suspension bridge is now being replaced as the low level temporary crossing will not serve during periods of high water.

“MEN WHO REFLECT CREDIT”

COOPERATION with the counties has been one of the watchwords of the present State Highway Engineer and Commission. Local officials always have been free to seek assistance whenever in need of help.

Recently, Colusa County sought the aid of the Maintenance Department and a man from Division X was assigned at the expense of the county to supervise pavement patching. The following letter from a member of the board of supervisors tells of the incident:

Maxwell, California,
September 26, 1926.

Mr. R. E. Pierce,
Division Engineer,
Sacramento, Calif.

Dear Sir:

Mr. M. D. Cuthbert, whom you loaned us from the Stockton Division for macadam patch work proved most satisfactory; and it is such men who *reflect credit on any organization*. I thank you very much for this favor; and kindly express my appreciation to Mr. Dennis for his interest in the matter.

Nine

When I can be of assistance to you kindly command me.

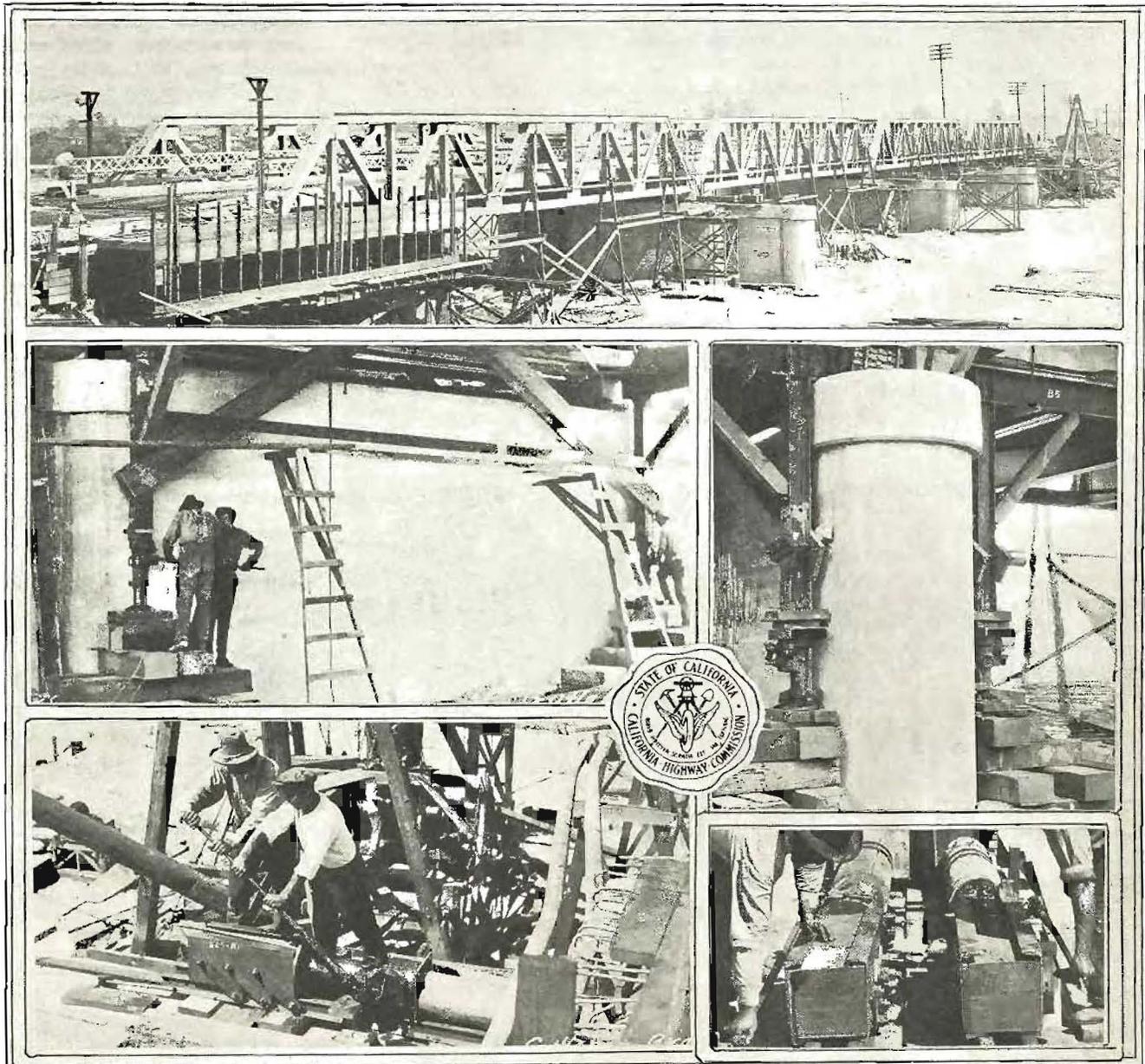
Very truly yours,

(Signed) LOUIS G. SUTTON,
Supervisor Fourth District, Colusa County.

THE MAN WHO COUNTS.

IT IS not the critic who counts; not the man who points out how the strong man stumbled, or where the doer of deeds could have done them better. The credit belongs to the man who is actually in the arena; whose face is marred by dust and sweat and blood; who strives valiantly; who errs and comes short again and again, because there is no effort without error and shortcoming; who does actually strive to do the deeds; who knows the great enthusiasms, the great devotions, spends himself in a worthy cause; who at the best knows in the end the triumph of high achievement; and who at the worst, if he fails, at least fails while daring greatly, so that his place shall never be with those cold and timid souls who know neither victory nor defeat.—Theodore Roosevelt.

TRAFFIC CONTINUES WHILE BRIDGE IS MOVED TO NEW POSITION



BRIDGE MOVES—Widening of Rio Honda bridge, Los Angeles County, necessitated by moving the existing structure to make room for an additional span of the same width. Views show how this was done by use of hydraulic jacks. Traffic continued uninterrupted while the bridge was raised slightly and moved over to its new position.

TO OBVIATE a detour of several miles for a heavy volume of traffic, the Bridge Department, cooperating with the contractors, worked out a plan which was successfully executed for the moving of the Rio Honda bridge on Whittier boulevard, Los Angeles County, up stream a distance of fifteen feet without interfering with travel. It is estimated 75,000 vehicles passed over the structure while the work was under way, unaware that the 400-foot steel bridge was moving or that they were being saved \$25,000 in operating expense because of the elimination of the detour.

For successfully moving the structure which weighs well over 1000 tons without stopping traffic, the state will pay Gutleben Brothers, the contractors, \$2,500.

The present structure is twenty-four feet wide, but with the widening of Whittier boulevard it has become too narrow to

safely handle the heavy traffic now using this trunk highway. To preserve good alignment, it was decided to move the existing bridge up stream fifteen feet and to erect alongside a second bridge of the same length and width. This will provide a twenty-four foot roadway for traffic going in each direction.

Because the present bridge is in first class condition, the erection of a second similar structure was deemed the most economical solution of the problem.

Plan For Moving Explained.

The moving of the four steel spans, each 100 feet long, was carried on simultaneously, it is explained by C. W. Jones in charge of the Bridge Department office in Los Angeles. With 75-ton hydraulic jacks placed under each support, the bridge was first raised eight inches to permit greased rails to be placed

DIVISION VII REPORTS EXPERIENCE IN PLACING RIPRAP

UNPRECEDENTED high tides and storms at sea during the early months of the present year caused unusual damage along the Coast highway north of Santa Monica, Division VII. Work of placing heavy riprap rock along exposed sections of the highway had been under way for two years and its effectiveness in protecting the highway embankment along the beach was demonstrated during the storms. Where the work had been finished there was no damage to the highway.

Quick work of maintenance crews was all that prevented even more serious damage. After the storm subsided, work of placing the heavy rock protection was resumed and has now been completed after five months' work.

Scott Outlines Methods.

Methods followed and costs on various types of equipment are outlined by E. T. Scott, superintendent of maintenance for the division, as follows:

A gas shovel and dump trucks were used to replace the highway embankment carried away by waves. As fast as the embankment was replaced, it was protected by placing blocks of riprap rock weight from 300 to 1500 pounds at the rate of from 2.5 to 4 tons per lineal foot.

The rock was shipped to Santa Monica Canyon on flat cars and was hauled on state owned trucks and placed at the foot of

the highway embankment. Due to lack of space at the siding it was necessary to have any hoisting machinery used to unload the cars, built on the trucks.

Four 5-ton trucks with flat racks, each equipped with a hoist for loading, unloading, and placing the rock were used. Two of the trucks each carried a stiff leg boom provided with chain block and stone hooks. On one truck a hydraulic hoist was used to operate the stiff leg boom and gave much better results than where chain blocks were used. The fourth truck was equipped with a drum hoist and this gave the best results.

Shops Construct Hoist.

All hoisting equipment was constructed and installed on the trucks at the division shops at Lankershim. While no mechanical difficulty or breakdowns were experienced with any of the hoists, there was a marked difference in their performance.

In the case of the truck equipped with drum hoist, the cost of handling the rock was 18 cents per ton for unloading the flat cars; 11 cents per ton for unloading the truck and partial placing, and 6 cents per ton to complete placing the cost of hauling figured from the time the trucks were loaded until the unloading started, was approximately the same for all trucks and averaged 9½ cents per ton mile.

For the truck equipped with hydraulic hoist, the cost of loading, unloading, and placing was 59 cents per ton; and for trucks equipped with chain blocks, it cost \$1.12 per ton. The cost of the rock f. o. b. Santa Monica Canyon was \$2.65 per ton.

beneath the shoes, which had been firmly bolted together. The bridge was then lowered onto the shoes between which struts had been placed to better distribute the load. The jacks were made to bear against each shoe on the down stream side, the thrust being obtained by strapping kick blocks to the rails. A crew of twelve men operated the jacks. A load of forty tons was required at the start and about twenty tons after the bridge began to move.

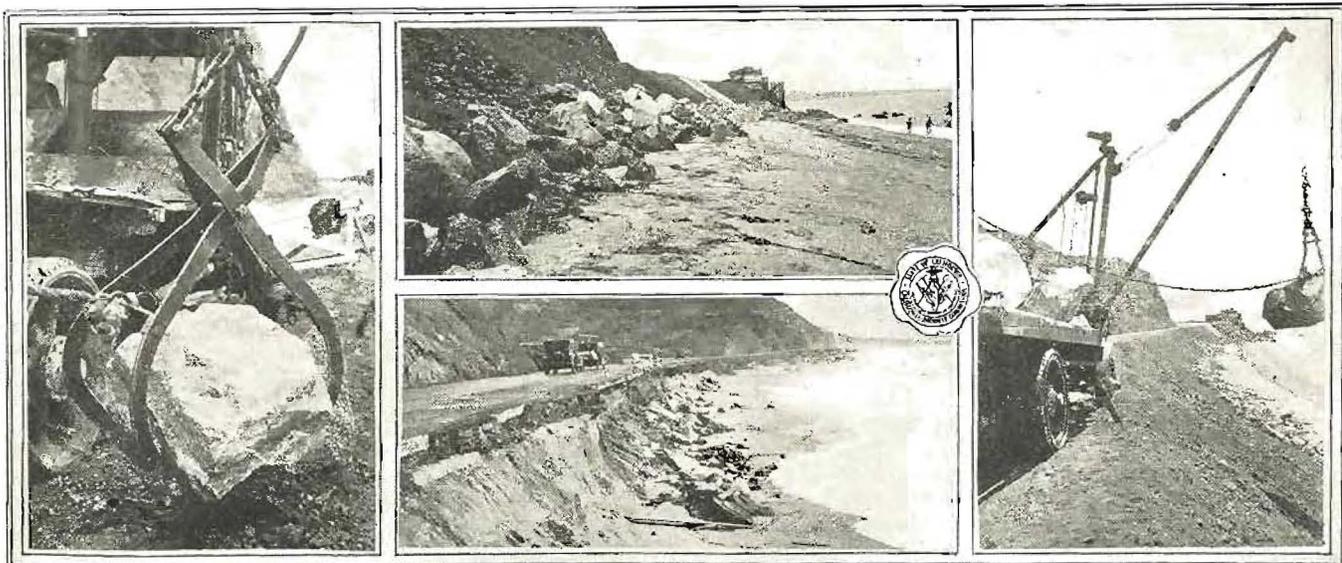
The foundation of the original bridge consists of concrete cylinders resting upon pile foundations, connected by thin diaphragms. Since the end reactions of the four trusses of the widened structure will come on this weak diaphragm, it was necessary that it be strengthened. Concrete beams twenty-two feet long, fourteen feet high, and twenty-one inches wide were built on each side of the diaphragms. Each of these beams will

have a central dead load of 133 tons when the additional spans are completed. The bridge is being built of steel with a floor of concrete.

A. S. Kennedy is resident engineer on this project. He is being assisted by H. R. Lendecke.

Give the Maintenance Man Right-of-Way.

Travelers should give highway workers the right of way whether it is to the right or the left. It makes bad work where the scraper or plow crosses the road. Often the maintainer or patrolman has two or more horses on the wide machine. Whether driving a motor vehicle or a team it is easier and quicker to give the road than to try to hold it. A little matter of courtesy and accommodation on the road, coupled with common sense, will save a lot of trouble sometimes, and also avoid endangering lives. Keep in mind that the highway employes are working for you—are in your pay.—*Arizona Highways.*



PLACING RIPRAP, DIVISION VII—Trucks equipped with derricks and grappling hooks are in use by maintenance forces of Division VII for placing protection along the coast highway north of Santa Monica. Lower center view shows damage wrought by wave action during storms.

FAITHFULNESS OF MAINTENANCE FOREMEN APPRECIATED

IN THE last issue of the Bulletin a letter from a highway user of Imperial County was published, complimenting Maintenance Foreman F. C. Davis of Westmoreland upon his efforts to serve traffic following a cloudburst in the vicinity of the Salton Sea which caused serious damage to the state highway. What was accomplished by Mr. Davis and other foremen of the division during the same period is outlined in a letter to headquarters from Division Engineer E. Q. Sullivan.

Mr. Davis was leaving on his vacation when the storm occurred. He returned and with his crew worked from 2 o'clock on the afternoon of August 6th to 8:30 o'clock on the evening of the 7th without rest or food, Mr. Sullivan reports. Warning barricades, red lanterns, and other danger signals were placed and traffic assisted over the damaged section, which covered fifty miles.

Foreman E. J. Potter of Thermal also was out with his men in the early hours of the morning, while T. R. Goodwin and G. Harp of Newberry, on the National Old Trails route, worked

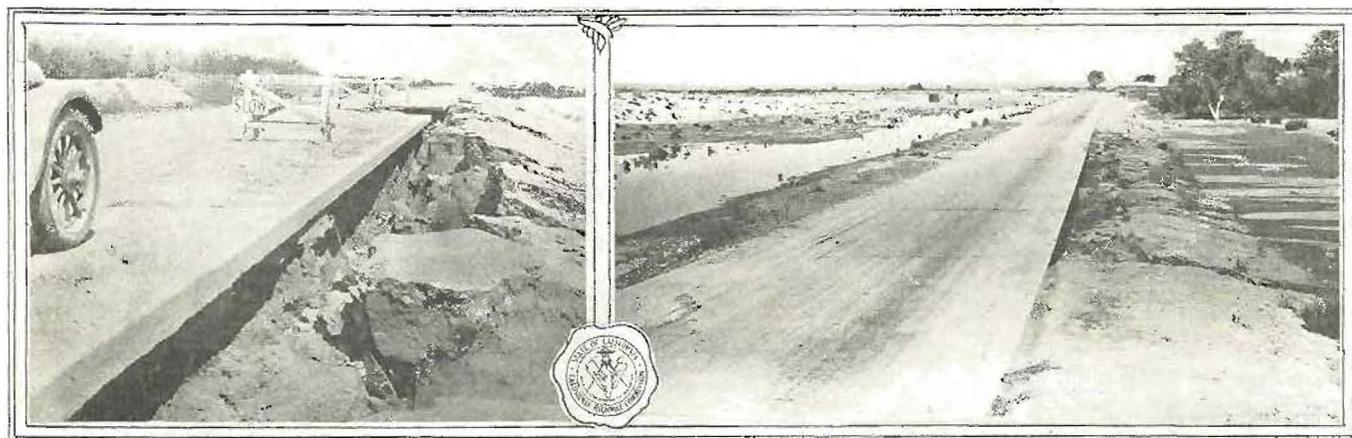
for hours with the state's tractors towing traffic through four miles of flood water. Such efforts are typical of the faithfulness of the maintenance forces of the commission.

Answering Mr. Sullivan's report, State Highway Engineer R. M. Morton said:

I have seen your letter of August 17th regarding the work of several of your maintenance foremen during recent flood conditions in your division.

Please express to these foremen the appreciation of the headquarters' office for their efficient work.

It is impossible for us to realize some of the efforts put forth by our employees as much as you do in the division office where you are more closely in touch with the conditions, but we know the important part of the highway work which devolves upon the maintenance foremen, and also the grief that can come to the whole organization when they do not do their utmost in serving the traveling public. I realize that we are too much inclined to take these efforts as a matter of course.



DESERT CLOUDBURST WORKS HAVOC—Scenes near Salton Sea, Imperial County, following recent summer cloudburst. State pavement was undermined and shoulders washed away for miles. It is impossible to anticipate damage by such storms, while repairs will cost thousands of dollars. (Photos by Div. VIII.)

STRAIGHT FROM THE CHIEF

(Continued from page 2.)

Some Have Inflexible Rule.

It is known that two or three of the divisions enforce an inflexible rule that if an article is taken out for use, even if only for one hour, a full day's credit is given to the Equipment Department. That is the kind of cooperation that is needed from all. In other divisions, the personal conscience is more elastic, and three or four days' minor use of equipment is reported as only one day.

If there is one fundamental in which an engineer must excel, it is in honesty. As the basis of his whole training is mathematical, he knows from repeated operations performed with figures that the answer to $2 + 2$ is always 4. In the very nature of things, he must be honest to be worthy of the name of engineer. For maintenance foremen without this intensive training in personal honesty, there may be some excuse for misstating equipment use records, but for the engineer, there is none.

Must Have Equality of Reports.

It is impossible for the Equipment Department and the rental system to be successful unless all divisions are on an absolute equality in reporting rentals. The only possible standard of absolute equality is that the rentals shall be reported in accordance

with the written rules and regulations, without deviation for any cause. This must be done throughout all the divisions; otherwise, the answer to the simple problem of $2 + 2$ will not be 4, but will be something false, abhorrent to the engineer.

It can not be tolerated that the Equipment Department should derive its support from those divisions which are honest in making equipment returns, and that the others should be carried by the honest ones. The rental rates can never be reduced unless everybody reports on the same high standard in accordance with the rules and regulations. It would avail nothing to raise the rates to bring the Equipment Department more money, for increased rates would be only additional incentive to falsify. It would do no good to place equipment rentals on an hourly basis, for equivocation, if that is the division's policy, would still be possible.

Commission Back of Rental Plan.

Maintenance engineers and foremen, think this over! If you need more money to handle your work on account of making truthful equipment returns, face the issue like men and step up and tell us. The basic idea of the Equipment Department is right, and the management of the Highway Commission is behind it absolutely. We would prefer to allot you more money for your work, or to change your equipment to articles having lower rental rates, rather than see you compromise with your conscience and stultify your training as engineers.

You are on your honor.

HARLAN D. MILLER

May 5, 1880—October 19, 1926

HARLAN D. MILLER, chief of the Bridge Department, passed away at his home in Sacramento at 7.30 o'clock on the evening of October 19th. For months he had faced death, bravely and without complaint, keeping in touch with the duties of his position almost until the day of his death.

His passing ended six years of service for the California Highway Commission; four years as assistant bridge engineer and two years as head of the department, a position to which he was advanced by State Highway Engineer R. M. Morton on February 1, 1924.

Mr. Miller's appointment was followed by the inauguration of the plan of the State Highway Engineer for the centralized design and construction of all bridges. The department was expanded to include not only design of bridges, but all other details connected with their planning and construction. Bridge building which heretofore had been done to a considerable extent by the counties was gradually taken over by the state, making the department one of the major activities of the commission.

Under Mr. Miller's leadership an efficient and loyal organization has been built up, and several million dollars worth of work constructed. A thorough study of the railroad grade crossing problem also was started, and there was inaugurated a program of elimination of grade crossings.

Mr. Miller's work as bridge engineer has been characterized by the beauty and boldness of his designs. He believed that California bridges should be substantial, but that in their building beauty should not be sacrificed. Bridges built under his direction will stand for generations as monuments to his skill.

He fully appreciated that bridge building in California had lagged behind highway construction because of policy and lack of funds, and he hoped for a financing policy that would provide funds for many urgently needed structures, including hundreds of grade separations.

He did not live to see the consummation of his plans, but he laid the foundation for a construction program, the execution of which will bring credit to the commission and the state. Expressions of regret because of his untimely death have come from engineers, contractors, and editors in many parts of California and none have been more sincere than those from his associates and from the men of his own department.

Mr. Miller was a graduate of the Case School of Applied Science of Cleveland, Ohio, from which he held two degrees in Civil Engineering. He was a member of the Sigma Xi, the scientific honor society, and of the Phi Delta Theta fraternity. His work as a bridge builder in New York and elsewhere gave him considerable standing in his profession before he came to California in 1915 with plans for the bridging of San Francisco Bay.

He was a native of Ohio, forty-six years of age. A widow, one son, three brothers and a sister survive.

The Sacramento Chapter of the American Association of Engineers on October 21st adopted resolutions expressing the esteem in which the deceased engineer was held by members of his profession, and extending to the family the sincere sympathy of the Chapter.

PACIFIC HIGHWAY BRIDGE TO BE RENAMED IN HONOR OF HARLAN D. MILLER.

THE massive reinforced concrete bridge now under construction across the canyon of Dog Creek on the Pacific highway, in northern Shasta County, will hereafter be known as the HARLAN D. MILLER bridge to honor the late bridge engineer of the commission.



HARLAN D. MILLER.

This action was suggested by Mr. Morton and gladly authorized by the commission at its meeting in San Francisco on October 12th, when the following vote was adopted:

Upon recommendation of the State Highway Engineer, it is VOTED, That the bridge now under construction across Dog Creek in Shasta County, road II-Sha-3-C, be designated as the Harlan D. Miller bridge, and

IT IS FURTHER VOTED, That a plaque bearing suitable inscription thereon be placed on the above named bridge.

On the afternoon of the day of his death, Mr. Miller wrote a letter to Chairman Harvey M. Toy thanking the commission for its action.

The HARLAN D. MILLER bridge will be over 400 feet long with a central arch 234 feet long and 125 feet high, making it one of the spectacular structures of the state highway system. It was chosen as typical of the work of Mr. Miller as head of the Bridge Department.

HIGHWAY CELEBRATION.

(From the Santa Ana Register.)

The coast cities have cause for celebration.

And all Orange County rejoices with them in the opening of the state highway.

Sometimes it takes years to do what is easily seen as an advisable thing to do. It was years ago that the movement to join the beach resorts with a highway was started. It was years after the start before the project really got under way.

It remained for State Highway Commissioner N. T. Edwards to push the project through to its present state. A celebration by the coast cities for the purpose of offering their thanks to Commissioner Edwards in itself is worth while.

The celebration is worth while as marking the beginning of a new era in the development of the coast. Linked together with this highway, they are bound to receive an immediate impetus, which will carry on into continued activity and prosperity.

CARL F. HEINTZE PASSES.

Carl F. Heintze, formerly with Division III and more recently engaged as a contractor, died of pneumonia in a Sacramento hospital on October 11th. His passing was a shock to his many friends in the highway organization, who recalled his years of faithful service for the state. He served as resident engineer, superintendent of construction, and assistant division engineer. During the war he was a lieutenant of engineers.

Mr. Heintze was born in New Jersey in 1886 and was a graduate of the Rensselaer Polytechnic Institute at Troy, New York. The Sacramento Chapter of the American Association of Engineers, of which he was a member, adopted resolutions extending its sympathy and condolence to the widow and members of the family.

WHAT THE DIVISIONS ARE DOING

DIVISION V.

HEADQUARTERS, SAN LUIS OBISPO.
L. R. GIBSON, DIVISION ENGINEER.

Counties of San Benito, Monterey, San Luis Obispo, and Santa Barbara.

A CONTRACT has been awarded to Sam Hunter of Santa Barbara for the construction of 4.5 miles of highway between Carpinteria and Summerland. The contract calls for construction of a 30-foot Portland cement concrete pavement on a 40-foot roadbed centering on an 80-foot right of way.

State Takes Over Cuyama.

Division V recently took over the maintenance of a 38-mile section of road in the Cuyama Valley. It was graded by the Cuyama highway district and forms a part of the Santa Maria-Bakersfield lateral. This route, within Division V, extends from the Kern County line a short distance west of Maricopa through San Luis Obispo and Santa Barbara counties. A 16-mile section in the Santa Barbara National Forest was also completed recently by the Bureau of Public Roads in cooperation with the State of California.

Oiling operations in accordance with the latest California standards are under way in Division V on some of the recently completed rock-surfaced roads. Initial applications were made on recent improvements on the main Coast highway, Route 2, at "Death Curve," south of Paso Robles, and on the Pismo line change south of Pismo Beach. Portions of the gravel shoulders placed some time ago through Salinas Valley are also being oiled.

DIVISION VI.

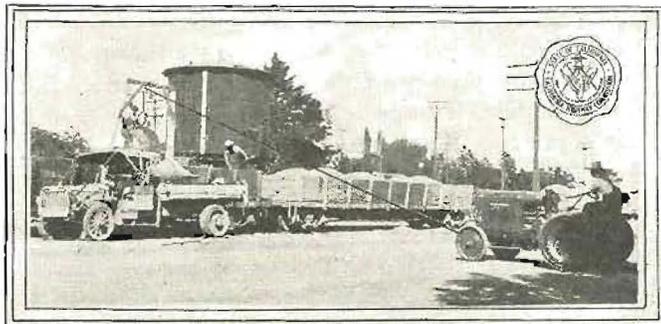
HEADQUARTERS, FRESNO.

E. E. WALLACE, ACTING DIVISION ENGINEER.

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

WITH the cooperation of the Gilmore Oil Company and the Coast Rock Company, Division VI is trying out a "non-skid" surface for an asphalt concrete pavement near Fresno. Two sections of rock and one of pea gravel, placed across an intersection and a street car crossing, are being carefully observed to determine the best size of material to use.

Nearly three miles of 20-foot asphalt concrete pavement through Delano (recently completed by the Warren Construction Com-



Labor saving arrangement in use in Division VI for unloading rock for building shoulders.

pany, contractors; H. B. LaForge, resident engineer), shows a vialog reading of 15.9 units of roughness per mile. This is the record for smoothness for this type of pavement on a state job to date, the Construction Department announced.

Kern County forces are still grading on a three-mile section of the Walker Pass highway, which they expect to complete next month. Where the state has taken over the road it is smooth, fast and safe.

DIVISION VII.

HEADQUARTERS, LOS ANGELES.

S. V. CORTELYOU, DIVISION ENGINEER.

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

GRADING work has been completed on the new coast highway between Laguna and San Juan Creek and placing of a 24-foot crushed rock surfacing is about finished.

Placing of crushed rock shoulders along the recently completed concrete pavement through the Malibu Ranch between Las Flores and Latigo creeks is nearing completion. The new pavement has not been opened to traffic as there are four bridges, now under construction by Los Angeles County, along this 6.3-mile section of highway.

Extending westerly from Latigo Creek to a connection with the completed Hauser contract in Ventura County, grading work, the only improvement contemplated at present, has been completed, except near the Arroyo Sequit where negotiations are under way to secure a right of way for a change of alignment.

Whittier Project Under Way.

The reconstruction of 3.2 miles of Whittier boulevard between Michigan avenue, Whittier, and the Orange County line is now well under way. Public utility lines have been moved to conform with the widening program, the right of way having been increased from 60 to 80 feet. The new pavement will be of cement concrete, 30 feet wide with two-foot crushed rock shoulders.

Jahn and Bressi, contractors, have commenced work on the paving of the famous Mountain Springs grade in San Diego and Imperial counties, where a 20-foot cement concrete pavement will be placed.

DIVISION VIII.

HEADQUARTERS, SAN BERNARDINO.

E. Q. SULLIVAN, DIVISION ENGINEER.

Counties of San Bernardino, Riverside, and Imperial.

SOUTHWEST Paving Company has started work in Riverside County where the section from Indio to six miles south of Coachella will be widened with Portland cement concrete and redecked with asphaltic concrete. The new width will be 20 feet. H. O. Ragan is resident engineer.

Widening of the pavement between Whitewater and Edom, also in Riverside County, has been completed. Cement concrete shoulders were placed to widen the section to twenty feet. The work was done by Matich Brothers and was completed well within the time limit. R. C. Payne was resident engineer.

Contract No. 491, commonly known as the Sand Hills job, is almost finished. The contractor has about completed oiling of shoulders and slopes as provided in the contract, but further oiling operations will be continued by the division maintenance forces. F. R. Baker has been resident engineer on this project.

DIVISION IX.

HEADQUARTERS, BISHOP.

F. C. SOMNER, DIVISION ENGINEER.

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

THE oiling program of Division IX "East of the High Sierra" has been completed. The work covered 38 miles of Volcanic cinders and decomposed granite surfacing between Lone Pine and Independence, including the main streets of Owen's Valley towns. Gilmore 60-65 road oil was used and the surface presents a decidedly improved appearance. Results so far are satisfactory.

A crushing plant equipped with primary and reduction crushers operated by two Cadillac power units has been installed near the crossing of the Los Angeles aqueduct between Independence and Lone Pine and a start has been made on the surfacing of a

10-mile section of the highway in this vicinity. Huston Cline is the foreman in charge. The installation of the crushing plant was supervised by W. E. Peck of the Equipment Department.

At Long Valley, in Mono County, grading of three miles of highway is now under way. Paul Peak is the foreman in charge. Fifteen men, twelve head of stock, a Bear Cat steam shovel, two tractors, and two rotary scrapers are employed on this job.

South of Bridgeport, Mono County, another section of 3.65 miles of road is under construction. Ray Flynn is the foreman on the job. Thirty men, a tractor, a rotary scraper, and 20 head of stock are employed.

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.

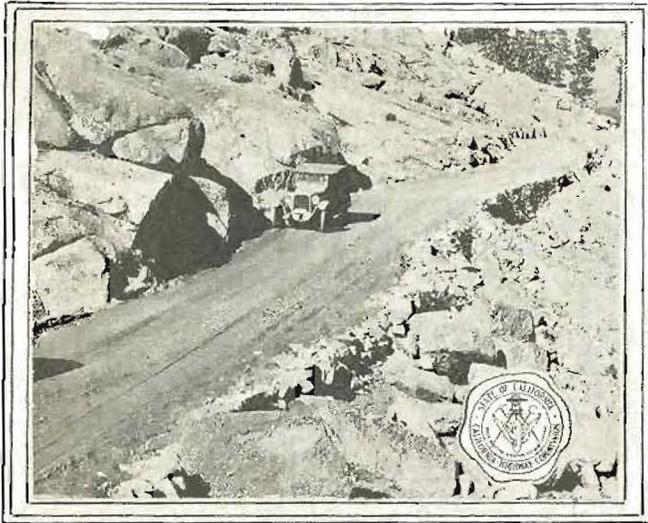
PLACING of asphalt surfacing on the Modesto-Stanislaus river section of the San Joaquin Valley trunk highway has been completed by the Valley Paving Company. The work included placing of cement concrete shoulders and an asphalt concrete surfacing, the new width being 20 feet.

Placing of a cement concrete pavement at the approach to the M street bridge, at West Sacramento, is now well under way and the new approach to Sacramento will be ready for traffic in the near future.

Division X is making a study of the problem of providing better highway entrances for the city of Turlock. Similar studies are being made for the elimination of the Hatch crossing south of Modesto.

Improvements on Sonora Pass.

Improvements for the year on the Sonora Pass route in the vicinity of the pass were completed by Division X on October 1st. The work during the summer was concentrated largely



Improvements on Sonora Pass highway, Division X. New grade up Blue Canyon of Deadman's Creek.

on a section of several miles in what is locally known as the Blue Canyon of Deadman's Creek. Hundreds of rocky reefs which formerly lined the road have been blasted out and the new grade surfaced with local material.

Until about two years ago it was necessary to use low gear in traversing the nine miles approaching the summit. After the improvements of this year were completed, Division Maintenance Engineer Clarence Bovey made a test trip over the road and was forced to use low gear for but 1.5 miles. The work was done under the direction of Superintendent Ed Harris.

Other Maintenance Work.

Superintendent H. L. Montfort is in charge of extensive widening operations on the Big Oak Flat road between Carl Inn and the Yosemite Park boundary. Graveling also is under way on several sections of this route.

HIGHWAY NEWS NOTES

J. Q. McAndrew, assistant resident engineer on the Granite Construction Company contract at Hollister, has recovered from a serious illness and has again resumed his duties.

R. H. Lapp was recently transferred to Division V from Division VII. He is acting as assistant resident engineer at Hollister.

W. E. Sutton, recently transferred from headquarters to Division V, has been assigned as assistant resident engineer on the Santa Barbara-Goleta paving contract. He is acting as inspector at the asphalt plant.

R. A. Westbrook has been transferred from Division VI to Division V as instrument man.

P. L. Wilcox, recently transferred from Division VI to Division V is now resident engineer in charge of the Cornwall contract for widening pavement from Santa Barbara to Goleta.

They're All Girls.

The draftsmen continue to be stenographers in the family of Charles Fonteneau, who announced on October 10th the arrival of Betty Louise, his third daughter.

Division VII Notes.

R. D. Kinsey, assistant resident engineer, having completed his work on the Chalk Hill line change, has been transferred to the Whittier boulevard job where he will be assistant to A. N. George, resident engineer.

W. D. Eaton, resident engineer, on the recently completed Oceanside to San Onofre reconstruction project, has been assigned to the Mountain Springs grade paving job.

Transferred to Division X.

Dean I. Piper, formerly of San Francisco, is now a draftsman with Division X.

Leslie E. Ford is assistant resident engineer on the West Sacramento paving project, Division X.

Lawrence D. Kelsey, a former employee of Division III, is now a member of a Division X survey party working in Solano County.

C. M. Rosenberg, resident engineer, has been transferred from Division VI to Division VIII.

L. E. McDougal of the Maintenance Department is back on the job after absence because of illness.

Two line changes in Alpine County, one just east of Ebbett's Pass and the other in Hope Valley, have been completed by Superintendent Grant P. Merrill. They eliminate steep grades and improve the alignment. Widening work also is being done on the famous Kit Carson Spur.

Superintendent J. H. Gates has moved his crew to San Andreas after completing the season's work on the Big Trees route.

Widening and other improvement work on the Silver Lake grade has been completed for the season by Foreman F. M. Walker.

A special examination was given to the college football star who was deficient in chemistry in order that his scholarship standing be sufficient to enable him to play on the team. A rating of 50 was required to pass the examination.

Chem. Prof. "What is the color of blue vitriol?"

F. B. Star. "Green."

Chem. Prof. "You are wrong. Now give the chemical formula for sugar."

F. B. Star. "I do not know."

The answer to the last question being correct F. B. Star was permitted to resume his duties on the team.

Say it With Punctuation.

Many people often say what they do not mean because they do not know how to punctuate. A woman wrote this sentence this way: "Woman without her man is a savage." This is what she meant: "Woman! Without her, man is a savage."

Obliging.

Pedestrian: "Say—you just missed me."

Flivvering Fool: "Gee—I'm sorry. Tell you what to do—stand right where you are and I'll try again."—Selected.

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 SEPT. 14, 1926.											
492	I	Humboldt.....	1	J	Across Big Lagoon.....	1.4	Grade and Surface and Timber Trestle.	Mercer Fraser Co.....	\$157,782 38	Jan. 18, 1926	-----
494	VI	Mariposa.....	18	E	Across Bear Creek at Briceburg.....		Concrete Girder Bridge.....	Smith Bros. Co.....	29,045 63	Mar. 17, 1926	-----
596	VII	Ventura.....	60	A	Between Point Magu and Little Sycamore Creek.....		Furnish and install Concr. Pipe Culvert.	Christ Thoren.....	13,616 27	June 28, 1926	-----
AWARDED SINCE SEPT. 14, 1926—None.											
PENDING AWARD—None.											

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 SEPT. 14, 1926.											
M-53	VII	Ventura.....	2	F, G	Sea Cliff to Rancho El Rincon.....	1.2	Rincon Sea Wall.....	J. H. Tillman Co. ⁴	\$429,855 31	June 11, 1924	-----
M-77	I	Mendocino.....	1	J	Leggett Valley to 2 miles north of Rock Creek.....	6.3	Grade and Rock Surface.....	Butterfield Sears Co.....	222,099 86	May 4, 1925	-----
M-123	VI	Kern.....	4	F	Between 1 mile S. of Delano and northerly boundary.....	2.77	Asph. Conc. Widening and Surfacing.....	Warren Const. Co.....	55,776 38	May 7, 1925	-----
M-126	VIII	Riverside.....	26	D	Between Whitewater River and Edom.....	17.3	P. C. C. Pavement Widening.....	Matich Bros.....	121,944 38	May 15, 1926	-----
M-129	VII	Sacramento.....	3	B	Between Globe Iron Works and El Camino ave.....	1.14	Asph. Conc. Widening and Surfacing.....	Clark and Henery Const. Co.....	32,446 88	June 8, 1926	-----
AWARDED SINCE SEPTEMBER 14, 1926.											
M-147	VII	Orange.....	2	C	Through Tustin.....	1.6	Grading and P. C. C. Pavement.....	Griffith Co.....	\$72,021 97	Sept. 28, 1926	155
M-148	IV	San Mateo.....	2	A	Between Colma and Cypress Lawn Cemetery.....	1.6	Grading.....	Kaiser Paving Co.....	128,262 24	Oct. 7, 1926	100
M-149	IV	Contra Costa.....	14	B	Between El Cierro and Valona.....	1.8	Grade and Rock Surface.....	Tieslau Bros.....	211,522 77	Oct. 12, 1926	175
M-150	VII	Los Angeles.....	4	E	Across La Piedad Creek.....		Two Concrete Slab Bridges.....	I. E. Lipp.....	17,926 54	Oct. 12, 1926	100
M-151	VII	Ventura.....	2	D, E, F	Between Venturs and Sea Cliff.....	8.4	P. C. Concrete Pavement.....	J. F. Knapp.....	459,258 73	Oct. 12, 1926	225
Sub-total.....						13.40			\$889,022 25		
PENDING AWARD.											
	V	Santa Barbara.....	2	G	At The Ellwood Overhead Crossing.....	0.3	Grading and Rock Surfacing.....		18,609 75		100
	VII	Orange.....	60	A	Santa Ana River Bridge, near Newport.....		Cleaning and Painting.....		2,323 75		75
Total State Highway Maintenance Fund Contracts Awarded and Pending Award.....						13.70			\$909,960 75		

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.

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