

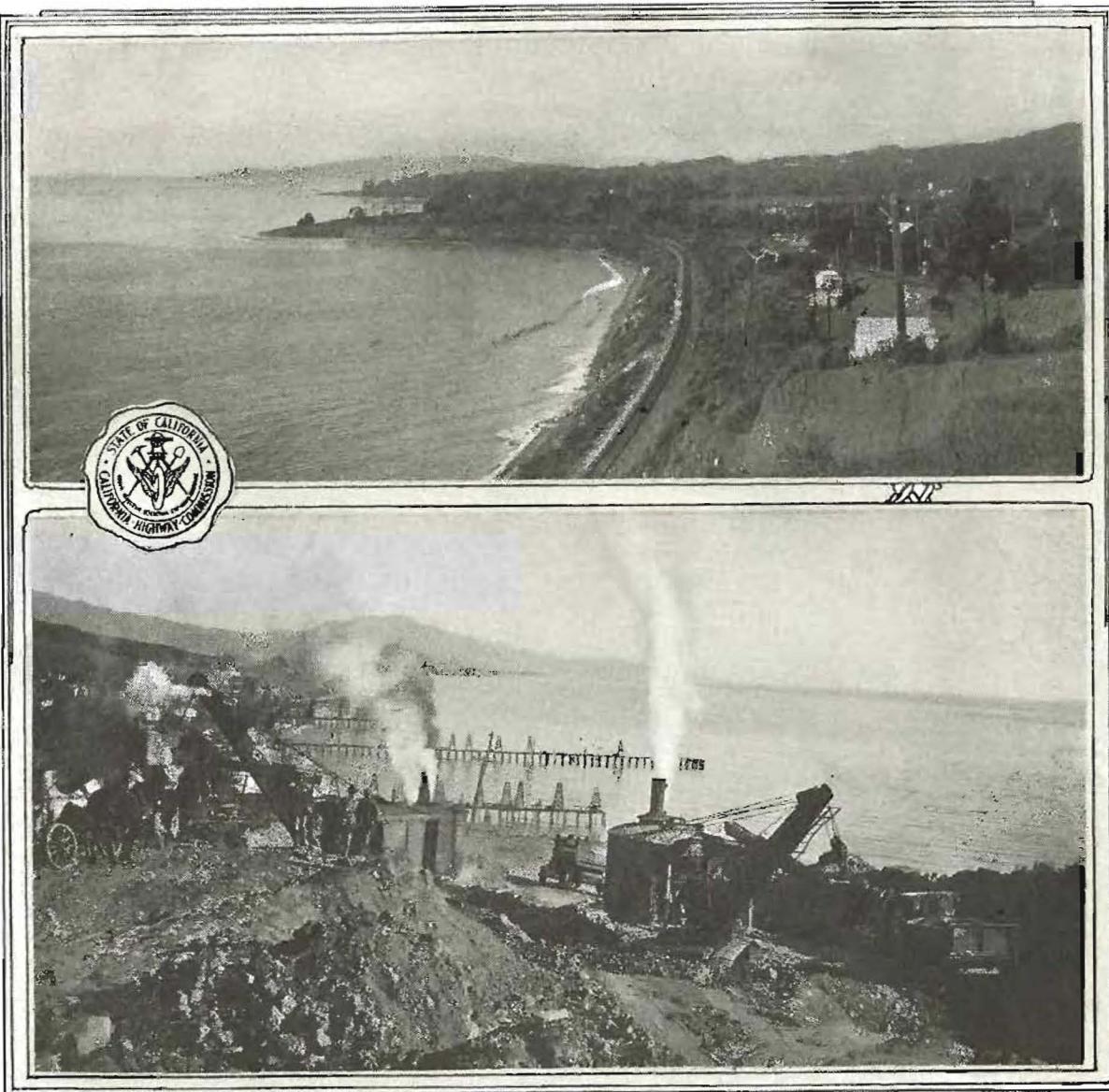
CALIFORNIA HIGHWAYS

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

Vol. 3

FEBRUARY, 1926

No. 2



SHOVELS CONQUER ORTEGA HILL.—A wide, safe highway soon will cross this historic elevation a few miles east of Santa Barbara. The views give an idea of the magnificent panorama of ocean and shore awaiting motorists. *Above*, looking westward toward Santa Barbara, fill for new highway at right; *below*, looking eastward over Summerland with its oil wells in the surf. See article and cut on page 3. (Photo by Division V.)

In this issue: CONCRETE MIXING TESTS—TIME AND CAPACITY STUDIES

CALIFORNIA HIGHWAYS

HARVEY M. TOY, Chairman;
N. T. EDWARDS and LOUIS EVERDING, Commissioners.

ROBERT M. MORTON, State Highway Engineer.

W. F. MIXON, Secretary.

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

Vol. 3 FEBRUARY, 1926. No. 2

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AMERICAN BANKERS BODY ENDORSES FEDERAL AID

FEDERATION OF LABOR IN NATIONAL CONVENTION ALSO FAVORS POLICY.

THE highway building program of the United States, as established by the Federal Highway Act, has received the unqualified support of both the banking and organized labor interests of the country.

The American Bankers Association during its recent annual session went on record against any cessation of the government's cooperative policy with the states in the construction of interstate roads, until the system as now laid out is complete. The support of the federal aid policy was expressed briefly in the following resolution:

"It is the judgment of this convention that the federal government should continue its cooperative policy with the several states in road construction until such time as the interstate system of highways laid out by agreement between the federal government and the states has been completed."

Labor Takes Action.

Following the action of the bankers, the American Federation of Labor, also in annual session, adopted resolutions urging the completion of the highway system undertaken by the states with the support of the federal government.

In its resolution the labor body expressly stated that

"the federal government should continue in this work with the states until such time as the system is completed, according to the agreement heretofore entered into."

"It is interesting to note," says a statement issued by the American Association of State Highway Officials, "that support for the government's present policy in road development is backed by two classes of income taxpayers, since there are large numbers in the ranks of organized labor, as well as among bankers, who are contributors to the government's internal revenue from which funds for road building are appropriated."

Uncle Ezra is a hundred, he hasn't any scars,
He never rides in autos, he sticks to trolley cars.

Relocation of the Highway Over Historic Ortega Hill

RELOCATION of the state highway over historic Ortega Hill is the second reconstruction project to be undertaken by the California Highway Commission in Santa Barbara County, east of the city of Santa Barbara. Work now under way will eliminate for all time the steep and winding grades over this elevation which, for generations has impeded traffic on the El Camino Real. The section under improvement joins the recently widened pavement through Montecito.

The general location of the highway, which, in this vicinity, was a county road in the days before the state system was established, is limited by the comparatively narrow bench extending southeasterly along the coast at the foot of the steep Santa Barbara Mountains. When taken over by the state, the existing road followed more or less closely the route established by the early Spaniards.

Need for Change Evident.

It is not surprising, when demands of an increasing motor vehicle traffic are considered, that there is need for changes in grade and alignment. A number of such improvements, some quite radical, as in the case of Ortega Hill, some minor, are being made or are planned for the future.

The present highway crosses Ortega Hill at a saddle about a half mile back from the ocean. It is narrow and crooked with steep bluffs above and below the road, and grades up to a maximum of 8.80 per cent. The new location follows an almost straight line (2400-foot minimum radius) across the bluff directly facing the ocean. The maximum grade will be reduced to 6.40 per cent and the distance cut about 700 feet.

When open to traffic, the view of the Santa Barbara Channel to be obtained from this new summit, both east and west, will be one of the most beautiful along the Coast highway. For this reason, instead of passing through the hill on a thorough cut, as would ordinarily have been done, the grade has been established high enough to permit "daylighting" of the outer bank, that is, its entire removal on the ocean side.

Public to be Benefited.

The old location was so poor, and the traffic to be provided for so heavy, that the old relocation adopted is well justified,

particularly in view of increasing property values. The new highway crosses several oil wells and a number of residences and other buildings had to be moved. The local inconvenience, however, is more than compensated for by the advantage to the general public.

In addition to Ortega Hill, a bad situation exists, immediately to the east, through the town of Summerland. The street on which the 15-foot pavement was placed has a width of only about 30 feet. On one side are business buildings, on the other the tracks of the Southern Pacific Railroad, while traffic through this congested section often exceeds 4,000 vehicles per day.

Condemnation Suits Necessary.

A new right of way has been secured by taking over a residence street one block back from the present location. A width of 80 feet was acquired by purchasing frontages of adjoining lots and moving several buildings.

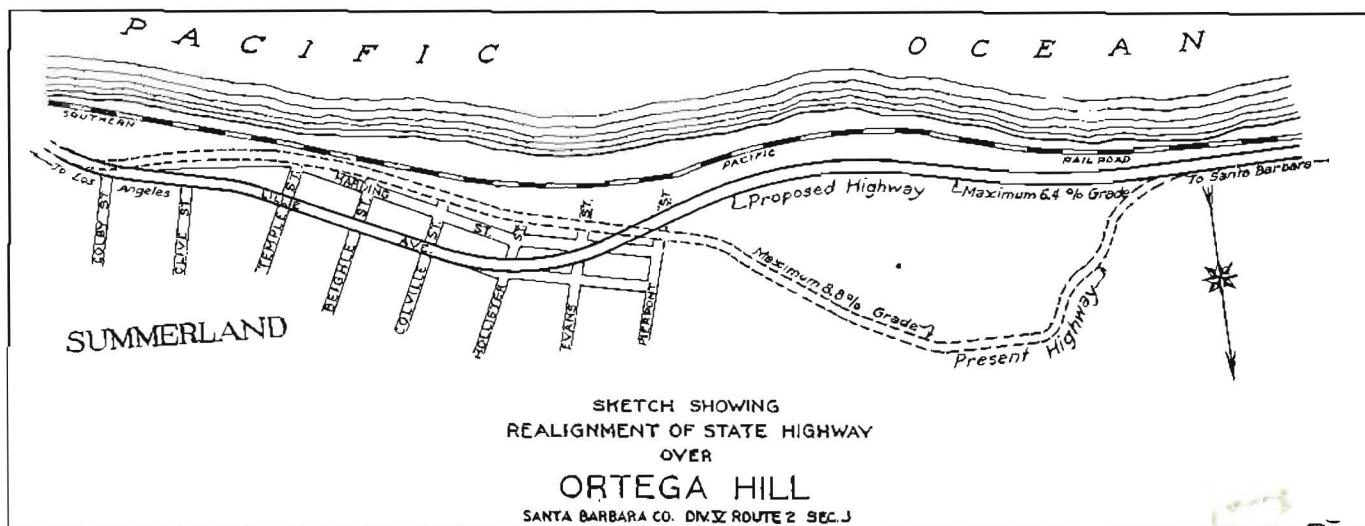
Condemnation suits had to be filed, however, before rights of way could be obtained through Summerland and also over Ortega Hill. Originally there were nearly 200 defendants in these suits but through friendly negotiation most of the needed property has been purchased without court trials. It is hoped the compensation to be paid by the state in each instance can be determined by similar action.

An order of possession from the superior court of Santa Barbara County has permitted the work to proceed, and McCray Brothers, of Los Angeles, the contractors, have made rapid progress with the grading over Ortega Hill. It will not be long before the new highway will be opened to traffic, and the old road returned to the jurisdiction of Santa Barbara County.

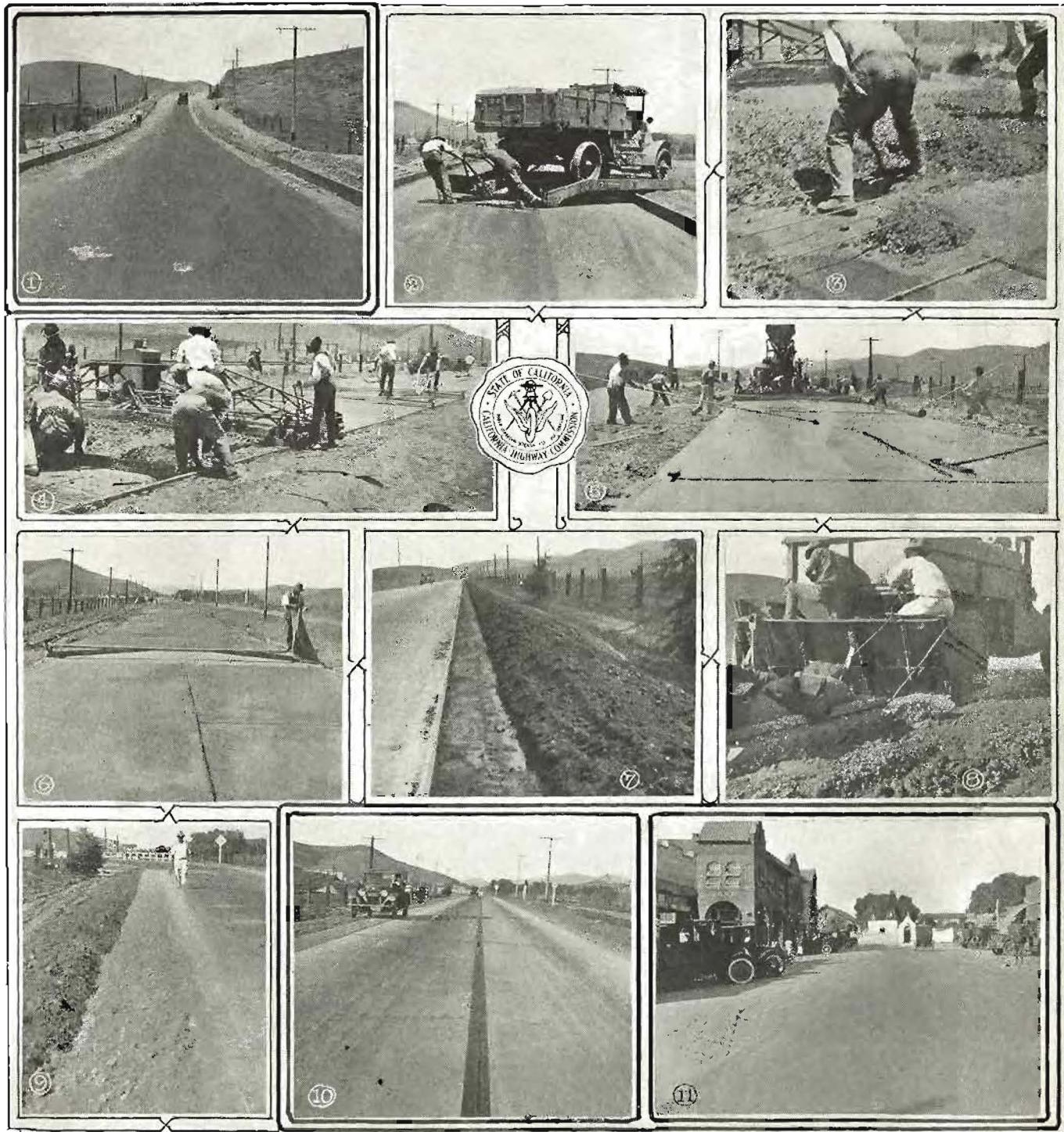
Hill Named for Early Spaniard.

Added interest will be taken in this project by those who delve into the romantic past of California, because Ortega Hill is understood to have been named for Captain Jose Francisco Ortega, often called the "Kit Carson" of early Spanish expeditions into California. He was active in colonization work for thirty years and died near Santa Barbara February 3, 1798.

This splendid reconstruction project is being financed with gasoline tax funds. It is under the direction of Division V; L. H. Gibson, division engineer. E. B. Brown is resident engineer.



A "SECOND STORY" GAS TAX JOB IN PICTURES



GALIVAN-SAN JUAN RECONSTRUCTION PROJECT, ORANGE COUNTY, DIVISION VII—(1) Headers in place along old fifteen-foot four-inch pavement for placing new 20 foot slab with minimum five-inch center and nine-inch edge; (2) turntable to turn trucks without interference with header boards; aggregate dumped directly into mixer; (3) placing concrete; note steel bars to reinforce new slab over edge of old pavement; (4) laying pavement; mechanical tamper in operation; (5) finishing the surface; note many operations required to provide smooth riding surface; (6) placing heavy moist burlap, first step in curing; after initial set of pavement, earth dykes are constructed and pavement flooded with water; (7) two-foot trench, five inches deep, cut along edge of new pavement and ready for placing rock border; (8) spreading and dragging rock border in single operation; (9) the completed rock border; (10) a traffic stripe painted down the center joint of the new pavement; (11) new pavement through San Juan Capistrano; historic San Juan Mission at end of the street. (Photos by Division VII—Jahn and Bressi, contractors.)

Concrete Mixing Tests—Time and Capacity Studies

By C. S. POPE, Construction Engineer, and C. L. MCKESSON, Materials and Research Engineer.

DETERMINATION of the time required for mixing and the effect of time of mix upon the strength of concrete has been the subject of numerous studies by research agencies; some of the test series have been of rather extensive proportions. In the tests made by the California Highway Commission, and herein described, the time of mix is involved only in an incidental way, the primary consideration being the capacity of concrete mixers.

The Standard Specifications of the California Commission define the capacity of a concrete mixer in the following terms:

"The total volume of all mixed materials used per batch shall not exceed the manufacturer's catalogue rated capacity of the mixer or a rating to be fixed by the engineer based on measurement of the water level capacity of the drum."

The time of mixing, after all ingredients are placed in the drum and before discharge of any portion of the batch, is specified as one minute for all concrete except that to be used in reinforced structures. Concrete for use in reinforced structures is mixed $1\frac{1}{2}$ minutes.

It occasionally happens that the capacity of the mixer is the limiting element in the contractor's equipment and in such cases it is economically desirable that the mixer be loaded to the maximum capacity at which it will operate efficiently. Sometimes maximum capacity is desirable to make the size of batch fit transportation equipment.

California Experiments Described.

This latter consideration led to the first series of experiments described herein, made in June and July, 1924.

The mixer in use was a Koehring 32 E paver. The normal rated capacity of this mixer is 32 cu. ft. of mixed concrete, the maximum capacity, according to the manufacturers, is 36 cu. ft. How closely this rating checks the results of our tests will be apparent later. On this project it was found that a 10-sack batch (45 cu. ft. of mixed concrete) was desirable, if thorough mixing could be had, due to capacity of batch boxes on industrial cars.

In the earlier stage of the work, 10-sack batches were run, the time of mix being increased from 1 minute to $1\frac{1}{2}$ minutes to compensate for the additional size of batch. The drum and bucket were large enough to carry the oversized batch without wastage.

The test series run to check up on the capacity of the mixer consisted of the casting and testing of 48 6x6-12" prisms. Four prisms were cast from each batch, two being taken from the front of the batch or the portion first discharged from the mixer, and two from the back or last of the batch.

The twelve batches sampled were as follows:

- 3 10-sack batches, 1-minute mix, 12 specimens.
- 3 10-sack batches, 2-minute mix, 12 specimens.
- 3 8-sack batches, 1-minute mix, 12 specimens.
- 3 8-sack batches, 2-minute mix, 12 specimens.

The mix (approximately 1-2-4) was uniform throughout and water was fairly well regulated, although the mix was somewhat wetter than our present practice. Slump tests were made on concrete taken from the front and back of each batch. In all cases the slump of concrete from the front of the batch was greater than from the back.

Except for the 2-minute, 8-sack batches, there was a noticeable surplus of mortar in the front of the batch, and a corresponding deficiency in the back. The 2-minute, 8-sack batch was uniformly workable throughout.

The results of the tests are shown in Table 1 and are graphically shown in figure 1.

The 1-minute mix with an 8-sack batch was found in this test to have highest compressive strengths although, as noted above, the 2-minute mix had somewhat better workability and uniformity. The 8-sack batch corresponds with the manufacturers maximum capacity rating and the tests showed conclusively that the mixer had been honestly and accurately rated by its designing engineers.

The outstanding feature of this test was the failure of additional time of mix to compensate for the overloading of the mixer. It

(Continued on next page.)

July 10-11, 1924.

TABLE No. 1.
TIME OF MIX AND SIZE OF BATCH.
Made on X-Sac-4-B.

11-day and 28-day specimens from front and back of each batch.
Specimens 6" x 6" x 12" tested for compressive strength.
1:2:4 Mix.

Batch No.	Time of mix min.	Size batch sacks	Size batch cu. ft. conc.	Slump Front	Slump Back	Strength 11 days		Strength 28 days		(F) Front of batch	(B) Back of batch	
						Front	Back	Batch Aver.	Front	Back		
1	1	10	45	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1963	1760	1861	3036	3030	3033	(F) Plenty of mortar (B) Very rocky
2	1	10	45	2 $\frac{1}{2}$	1 $\frac{1}{2}$	1890	1540	1715	2540	2862	2701	(F) Plenty of mortar (B) Very rocky
3	1	10	45	1 $\frac{1}{2}$	2 $\frac{1}{2}$	1660	1840	1750	2527	2585	2556	(F) Plenty of mortar (B) Rocky and hard to compact
Group average						1837	1713	1775	2701	2826	2763	
4	2	10	45	3 $\frac{1}{2}$	3 $\frac{1}{2}$	1480	1340	1410	2227	2318	2272	(F) Surplus of mortar (B) Extremely rocky, almost impossible to compact
5	2	10	45	1 $\frac{1}{4}$	3 $\frac{1}{2}$	1730	1690	1710	2735	2721	2728	(F) Surplus of mortar (B) Very rocky
6	2	10	45	2 $\frac{1}{2}$	3 $\frac{1}{2}$	1710	1760	1735	2950	2830	2890	(F) Plenty of mortar (B) Rocky
Group average						1640	1597	1619	2637	2623	2630	
						2030	1930	1980	2900	2544	2722	Plenty mortar front and back
7	2	8	36	2 $\frac{1}{2}$	1 $\frac{1}{2}$	1910	1910	1910	2722	2450	2586	Plenty mortar front and back
8	2	8	36	2 $\frac{1}{2}$	2 $\frac{1}{2}$	1980	1930	1955	3227	3066	3146	Plenty mortar front and back
Group average						1973	1923	1948	2949	2686	2818	
9	1	8	36	3	2 $\frac{1}{2}$	2400	2320	2360	3033	3330	3181	(F) Plenty of mortar (B) Lack of mortar
10	1	8	36	1 $\frac{1}{2}$	2 $\frac{1}{2}$	2540	2580	2560	3458	3219	3338	(F) Plenty of mortar (B) Lack of mortar
11	1	8	36	2 $\frac{1}{2}$	2 $\frac{1}{2}$	2160	2110	2135	3111	3016	3063	(F) Plenty of mortar (B) Lack of mortar
Group average						2367	2336	2351	3201	3188	3194	

will be noted that the 2-minute mix in each instance gave slightly lower average strengths than the 1-minute mix. No reason is apparent as to why this phenomena should have occurred, but the test did show conclusively that this mixer was properly designed to produce thorough mixing in one minute as specified so long as the batch is within the rated capacity.

Results Compared.

It is interesting, in the consideration of time of mix, to make some comparisons of the results of these tests with tests made by Professor D. A. Abrams and reported in a paper presented to the American Concrete Institute in June, 1918.

The Abrams tests included a large number of different mixtures and consistencies and an analysis of his report indicates that time of mix does not bear a constant relation to strength for different mixtures and consistencies. Curves which he presented, as drawn, indicated a general increase of strength with increase in mixing time up to 10 minutes. As the tests made by the California Highway Commission involved only paving mixtures of normal

Professor Abrams' tests and the California tests in Table 1 were made on concrete of similar mix and consistencies, but Professor Abrams in his work, used a $3\frac{1}{2}$ cu. ft. Smith Mixer, while California experiments were made with a paving mixer having 10 times that capacity. It may be a mere coincidence that in all of these tests, by Professor Abrams and by the California Highway Commission, there is a slight drop in strength between 1-minute and 2-minute mix. It is also possible there may be some segregation during the second minute of the mix. On this point the writers do not care to venture an opinion. Figure 1 shows the relation of time of mix to compressive strength as brought out in these tests.

Some other tests made by Professor Abrams on concretes of richer and leaner mixes and with wetter consistencies showed in some cases increases between one and two minutes, but our tests and those by Professor Abrams indicate that for 1-2-4 concrete of normal consistency no additional strength may be expected from the second minute of mixing.

CONCRETE MIXING TESTS SIZE OF BATCH AND TIME OF MIX

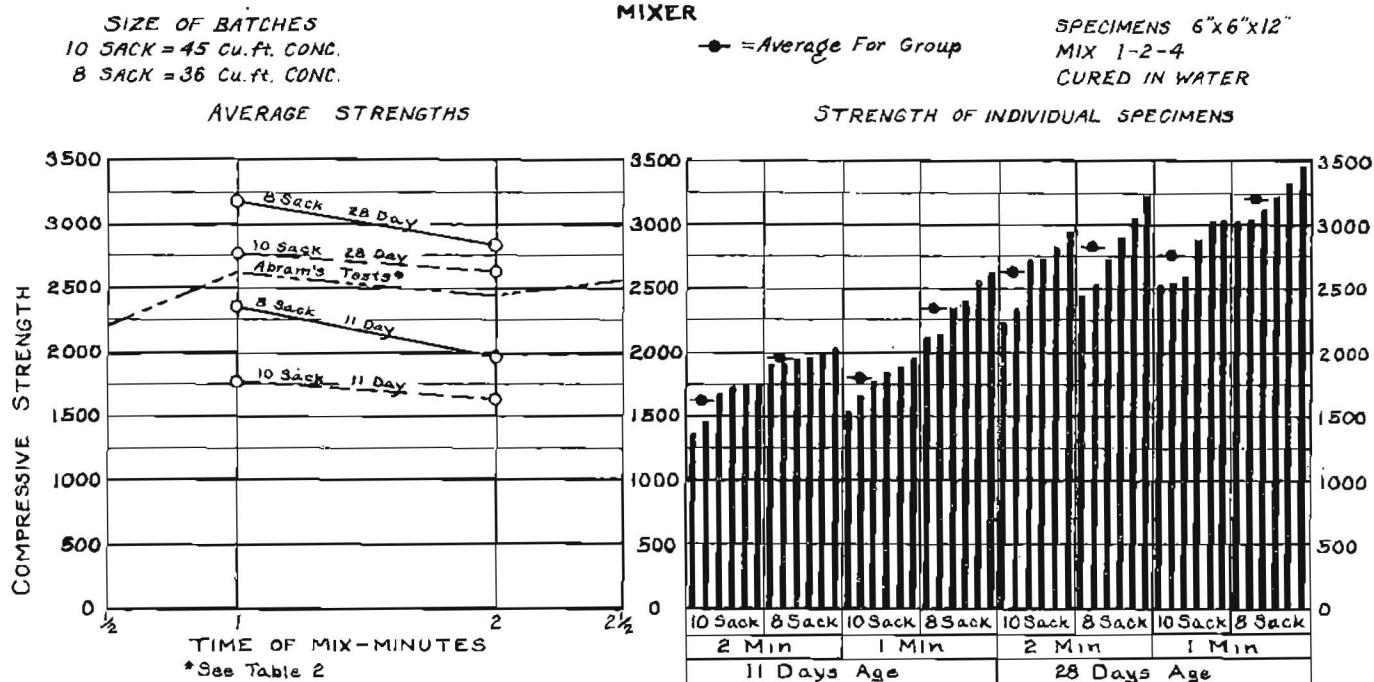
Fig. 1

USING A KOEHRING 32E MIXER

• = Average For Group

SPECIMENS 6" x 6" x 12"
MIX 1-2-4
CURED IN WATER

STRENGTH OF INDIVIDUAL SPECIMENS



consistencies, a comparison is made in Table 2 with the results obtained by Professor Abrams on similar concrete.

TABLE No. 2.

Comparison of Tests by Professor Abrams with those made by California Highway Commission.

	Water Cement Ratio	Mixing Period Mins.	28-day tests				
			Approx. batch in 8- sack mixer	1-2-4	Mix	2 Min.	1 Min.
C. H. C. 10-sack batches in 8-sack mixer	80	1-2-4			2763	2630	
Abrams tests*	.80	1-2-4			3194	2818	
Abrams tests**	.80	1-4	2060	2520	2300	2900	2860
	.725	1-4	2210	2780	2800	3520	2930
	.655	1-4	3180	3750	3440	4020	4370
Abrams tests**	.81	1-4	2060	2320	2310	2730	2380
Average C. H. C. tests	.91	1-5	1490	1670	1370	2340	2600
Average Abrams tests					2978	2724	
					2200	2608	2444
					3100	3028	3100

*Effect of time of mixing on strength of concrete by Duff A. Abrams, (Table 7), paper before American Concrete Institute, June, 1918.

**Table 8. Same paper.

Additional Tests.

Another mixer test was recently completed for the purpose of verifying the manufacturers rating and of determining the effect of an oversized batch.

The recent test was made on a 21 E Rex Paver. This mixer is rated on the basis of a 5-sack batch for a 1-2-4 mix.

Seventy-seven 6" x 12" cylinders were cast from 5- and 6-sack batches on a paving job. The specimens were cured in the laboratory under standard conditions and tested at 28 days. The batches were measured in a central proportioning plant in which all materials were proportioned by weight. Corrections were made for moisture in aggregate and amount of water was well controlled. The time of mixing in these tests was one minute after all materials were in drum. The mixer drum was in first-class condition as to blades and buckets. The drum held the 6-sack batch without slopping over.

The work was distributed over three days to secure average conditions and to equalize the possible effect of variations in

CALIFORNIA HIGHWAYS.

temperature of mixing water and air. An equal number of 5- and 6-batch specimens were cast during forenoons and afternoons.

The results of 28-day tests of these specimens are shown in Table 3 and in figure 2.

TABLE No. 3.

CONCRETE MIXING TESTS.

Effect of Size of Batch in a Rex 21 E Paver.

Mix 1:1.65:3.8 (6 sacks per cu. yd. concrete).

Date	Time of day	Five-sack batch			Six-sack batch		
		Slump	Str., lbs. per sq. in. 6" x 12" Cyl.	Group average	Slump	Str., lbs. per sq. in. 6" x 12" Cyl.	Group average
Nov. 23	A.M.	1 1/2	3844		P.M.	5 1/2	3925
		1/2	3619			1/2	3796
		1 1/2	4272			1/2	3626
		1 1/2	4128	3966		1 1/2	3637
Nov. 27	P.M.	1/2	3918*		A.M.	1 1/2	4051
		1/2	4394			1 1/2	4051
		2	4456			1/2	3659
		1 1/2	4833			1 1/2	4486
		1 1/2	4324			1/2	3848
		1 1/2	4342			1/2	4338
		1/2	4342			1/2	4021
		1 1/2	5316			1/2	4003
		1/2	4748			1	3368*
		1/2	4442			1 1/2	3541*
		1/2	4726			1/2	4604
		1/2	4187			1 1/2	4416
		1 1/2	4988			1/2	3774
		1/2	4770			1	4235
		1 1/2	3238*			1/2	4360
		1/2	4512			1 1/2	4221
		1/2	5445			1/2	4268
Nov. 28		1/2	4427	4641		1/2	4073
		1/2				1/2	4150
	A.M.	1 1/2	5670		P.M.	1 1/2	4678
		1	4692			1/2	4818
		1/2	4512			2	4357*
		1 1/2	4242			1 1/2	4364*
		1 1/2	4333			2	4644
		1	4105			1/2	4393
		1 1/2	4796			1/2	5283
		1/2	4312			1/2	5729
		1	3792*			1/2	5441
		1/2	3726*			1/2	5253
		1/2	5731			1/2	4858
		1	4962	4772		1/2	
							5032
Av. 30 5-sack specimens		1595	Av. 29 6-sack spec.	4368			

*Low breaks. Not included in averages.

From these tests it appears that the mixer was properly rated by the manufacturers as having a 5-sack capacity on 1-2-4 concrete and that an oversized batch results in a decreased average strength.

The studies so far completed seem to indicate that any increase in time of mix for any mixers now in common use between one minute and some undetermined time more than two minutes and less than five minutes is of no particular value so far as increase in strength is concerned.

Professor Abrams' studies indicate that there is a slight increase in strength of concretes due to increased speed of rotation of mixers from 15 R. P. M. up to 30 R. P. M. and it may be that better design of the internal mechanism of mixers will result in a decreased time of mix.

It must be borne in mind, however, that any decrease in mixing time would require a re-arrangement of the whole line of supply by which the mixer is fed.

Construction Department Practice.

The modified standard practice of the Construction Department at this time with regard to mixer capacities is as follows:

(1) Preliminary capacity rating is computed by measuring the water level capacity of the mixer in the position in which it is to run and adding thereto 1/3 to 1/4 of the capacity of the pick-up blades. The volume in cubic feet divided by 4.5 gives the number of sacks required for Class A concrete.

(It is to be noted that if the mixer is to be operated on a grade, the water level measurement will be decreased.)

(2) The mixer must carry the concrete without slopping over when operated on any grade on which it may be used.

(3) The spreader bucket must hold the concrete without spilling, leaking or overloading and without segregation of stone.

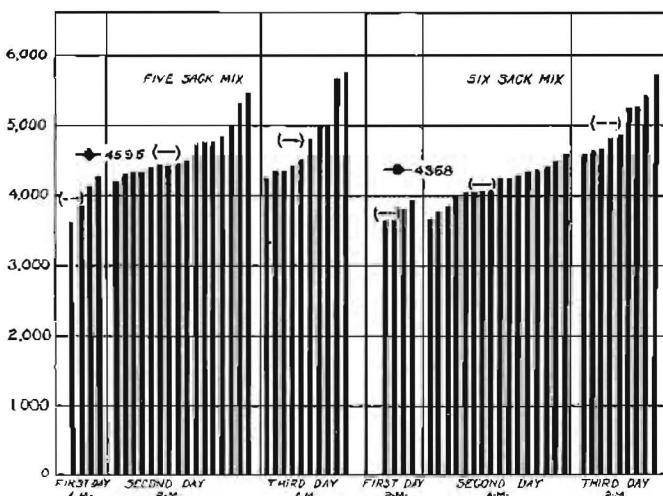
(4) With loaded bucket at the end of the boom the mixer must be perfectly stable.

TEST
CONCRETE MIXER CAPACITY
Effect of Size of Batch on Compressive Strength
Using A Rex 21 E Paver.

Fig. 2.

Individual Breaks of 6"x12" Cylinders Grouped For Each Day
In Order Of Relative Strengths.

(—) = Average strength daily groups.
(- - -) = " " " 5 Sack Batches.
(- - -) = " " " 6 Sack Batches. Specimens Tested at 30 Days



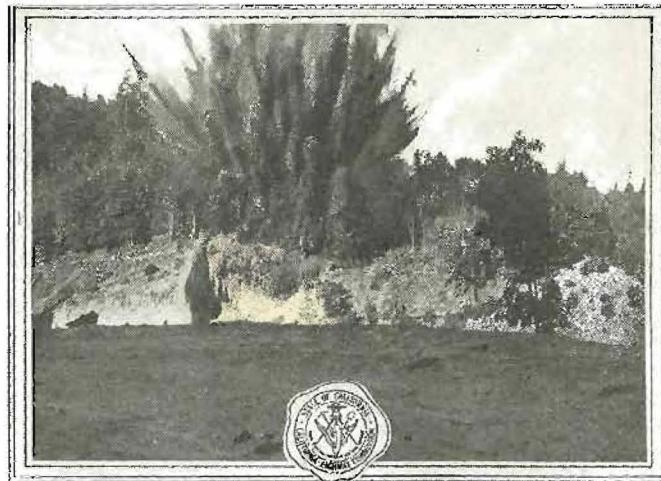
(5) The mixer shall be charged with such amounts and operated in such a manner and for such a time that the concrete produced will be the strongest which can be obtained from the materials and the proportions used.

The requirement of paragraph 5 modifies all other requirements and is the true basis on which all mixers are rated in case of a controversy.

The field tests described were conducted under the supervision of Mr. Earl Withycombe, Assistant Construction Engineer, with the cooperation of field engineers.

Cohn pulled out his pistol and put it in Rosenstein's face. Just as he was about to fire, Rosenstein asked: "How much do you want for the gun?"

Cohn, in telling the story said: "And how could I kill a man when he was talking business?"



RECONSTRUCTION IN SANTA CRUZ COUNTY—Blast in connection with rebuilding of the state road leading to the California State Redwood Park. (Photo by H. W. Schreiber.)

SECOND SAN JOAQUIN COUNTY PROJECT COMPLETED



MANTECA, SAN JOAQUIN COUNTY, is proud of its new full width new concrete pavement extending north and south on the state highway.

concrete streets recently completed in cooperation with the state and of the
This was the major reconstruction project of the past year in Division X.

WHEN the state highway system was first layed out, some eighty miles in San Joaquin County already had been improved with various types of surfacing, asphalt macadam predominating. These improved roads were accepted as state highways and came under state maintenance with the result that only limited funds were expended within the county for primary construction.

These early pavements are now becoming inadequate for the increased traffic of the present and their reconstruction is being undertaken. Funds for this purpose were not available prior to the enactment of the gasoline tax law.

The second of these reconstruction projects recently was completed by Division X. It is a section on the valley route between Stanislaus River and Turner Station in the southern part of the county. South of Manteca, 2.67 miles of 15-foot concrete pavement was widened to 20 feet with flush concrete shoulders, 7 inches thick. The remainder of the project, 8.88 miles, was improved with a standard cement concrete pavement 20 feet wide with edges and center thickened to 9 inches. The minimum thickness is 6 inches.

County Cooperates.

A considerable part of the right of way on this section, as originally accepted from the county, had a width of only 40 feet. Homes and other improvements, including irrigation ditches, had been planned to conform to this altogether too narrow width.

Material assistance in furthering the project was extended by

RANCH OWNER THANKED FOR DEDICATING RIGHT OF WAY

FOR nearly twenty miles the coast highway in San Diego County passes through the Santa Margarita ranch properties of Jerome O'Neill of Oceanside. At the approaches to San Mateo and San Onofre creeks are sharp turns and steep grades which are being eliminated by a relocation of the highway.

New rights of way for a line change at these points and for improvement of the alignment at other places were dedicated by the owner without cost to the state. His cooperation in bringing about this important betterment is appreciated by the Commission, and, at a recent meeting, Secretary Mixon was directed to send Mr. O'Neill the following letter of thanks:

Mr. Jerome O'Neill,
Oceanside, California.

January 20, 1926

Oceanside, California.

The fact that you h

The fact that you have dedicated a right of way for state

the county which secured and deeded to the state additional property to provide a uniform right of way of 60 feet. Fences, ditches, pole lines and buildings had to be moved, but in nearly every case this was agreed to in a friendly spirit because of the general recognition of the necessity for a wider highway.

After the clearing of the right of way, the asphalt macadam surfacing was removed and piled to one side for later use in the construction of shoulders. A new roadbed 30 feet in width was graded for the placing of pavement. The rock in the former surfacing provided a shoulder on either side of the new pavement with a minimum width of two feet. In many places it is as wide as five feet.

Full Width Through Manteca.

Through the municipality of Manteca, the commission paved a strip 20 feet in width on both the north and south and east and west state highway routes. Property owners completed the work to the curb line providing a paved street with a width of 44.5 feet of high class pavement.

Division X is expecting the Manteca project to compare favorably with other similar work throughout the state, when a compilation of vialog and strength tests for 1925 pavements is completed by the construction department.

J. F. Knapp of Turlock was the contractor. C. W. Springer was resident engineer for the state. The project cost approximately \$278,000.

highway purposes through your property, approximating 20 miles in length, was brought to the attention of the California Highway Commission at a recent meeting in Los Angeles.

Your valued cooperation with the Commission in eliminating many dangerous points by permitting realignment over the present road, can only result in a great deal of benefit to the traveling public, as well as to conserve life, limb and property.

The Commission thoroughly appreciates the splendid cooperation you have given in establishing the location of a highway on good engineering lines.

Again expressing appreciation of your cooperation, we remain,

Yours very truly,
CALIFORNIA HIGHWAY COMMISSION,
By W. F. Mixon,
Secretary.

Note.—Mr. O'Neill died in Los Angeles on February 17th after an extended illness.

CONTRACTORS APPROVE USE OF PRISONERS ON ROADS

FOLLOWING an address by Julian H. Alco of San Francisco, a member of the State Board of Prison Directors, the Contractors Association of Northern California at its recent annual convention adopted resolutions approving the use of prison labor on state highways. Alco explained in detail the law under which the road camps are operating, particularly the pay feature added by the legislature of 1923. The contractors expressed accord with the point of view of the prison directors who favor the prison camp system.

Resolutions Adopted.

Resolutions adopted approving establishment of camps under the direction of the California Highway Commission are as follows:

WHEREAS, It has been vividly pointed out in the able address to this convention by Mr. Julian H. Alco, member of the California State Board of Prison Directors, that a great number of the inmates crowded in our state prisons are misguided youths rather than hardened criminals and that their preparation for return to useful lives in society rather than their punishment will best conserve the interest of all; and

WHEREAS, The plan has been worked out in California whereby deserving prisoners are given an opportunity for training in useful work in road camps which have been established under the direction of the California Highway Commission for a few months prior to their discharge; now, therefore, be it hereby

Resolved, by the Contractors Association of Northern California in convention assembled this nineteenth day of December, 1925, that this association approve of a limited use of state prisoners in highway construction camps; and be it further

Resolved, That the secretary of this association be and is hereby instructed to transmit a copy of this resolution to Mr. Julian H. Alco and to Mr. R. M. Morton, State Highway Engineer of California.

COMMISSION ENGINEERS ON HIGHWAY BODY COMMITTEES

THE American Association of State Highway Officials, through its Washington office, has announced the appointment of standing committees for 1926. The California Highway Commission is represented by appointments to seven of the committees, as follows:

R. M. Morton, state highway engineer, Committee on Design; Harlan D. Miller, bridge engineer, Committee on Bridges and Structures; C. L. McKesson, materials and research engineer, Committee on Non-bituminous Testing Problems; E. T. Maddock, testing engineer, Committee on Bituminous and Chemical Testing Problems; Thomas E. Stanton, Jr., assistant state highway engineer, Committee on Maintenance; C. E. Malm, accountant, Committee on Accounting; Russell H. Stalnaker, equipment engineer, Committee on Equipment.

Committees of the association are engaged in studies of problems of highway building. Results of their investigations are reported upon at the annual conventions of the association and disseminated to highway departments of all the states.

A contractor who professed to be very fond of children became very angry because some little fellow stepped on a new pavement before it was dry.

His wife rebuked him. "I thought you loved children," she said.

"I do in the abstract, but not in the concrete," he replied.

LAYMAN'S DESCRIPTION OF A ROAD BUILDER'S PLAYTHING

(From an article by Al G. Waddell in the San Francisco Chronicle.)

SINKING its fangs deep and clamping its great jaws, the huge monster reared its head. There was a vicious growl, followed by a succession of grunts as the enormous brute wheeled around and vomited earth and stone into the waiting motor truck. The great animal snapped its jaws like an Allosaur licking its chops. There was a prolonged hissing, broken at intervals by wicked snorting, and again the fangs ground deep and the jaws locked.

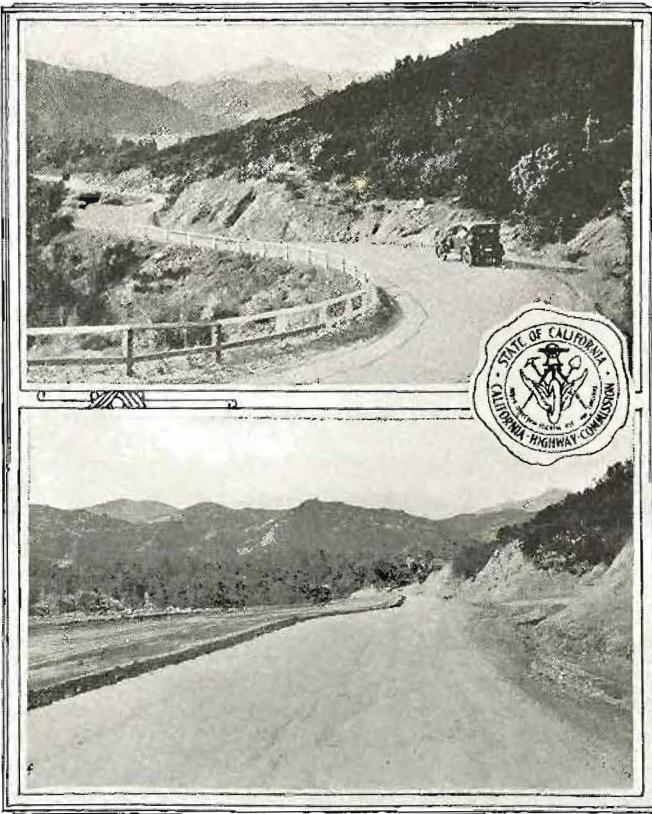
Three times, the steel mastodon ground its teeth into the mountain side. Three times, the huge mouth opened over the motor truck. Then, the truck was filled to overflowing with almost five yards of "muck."

The monster rested for a period, throbbing with the joy of conquest and defiantly belching forth steam and smoke and fire. It was like mighty Moloch of the Amalekites, chuckling with glee.

Mr. Waddell's clever pen picture of a steam shovel in operation was written after his recent visit to the Merced Canyon prison camp operations in Division VI. He has made a steam shovel a living, breathing thing. Engineers will admire his ability as a writer fully as much as he evidently admires the modern road building machinery operated by the California Highway Commission.

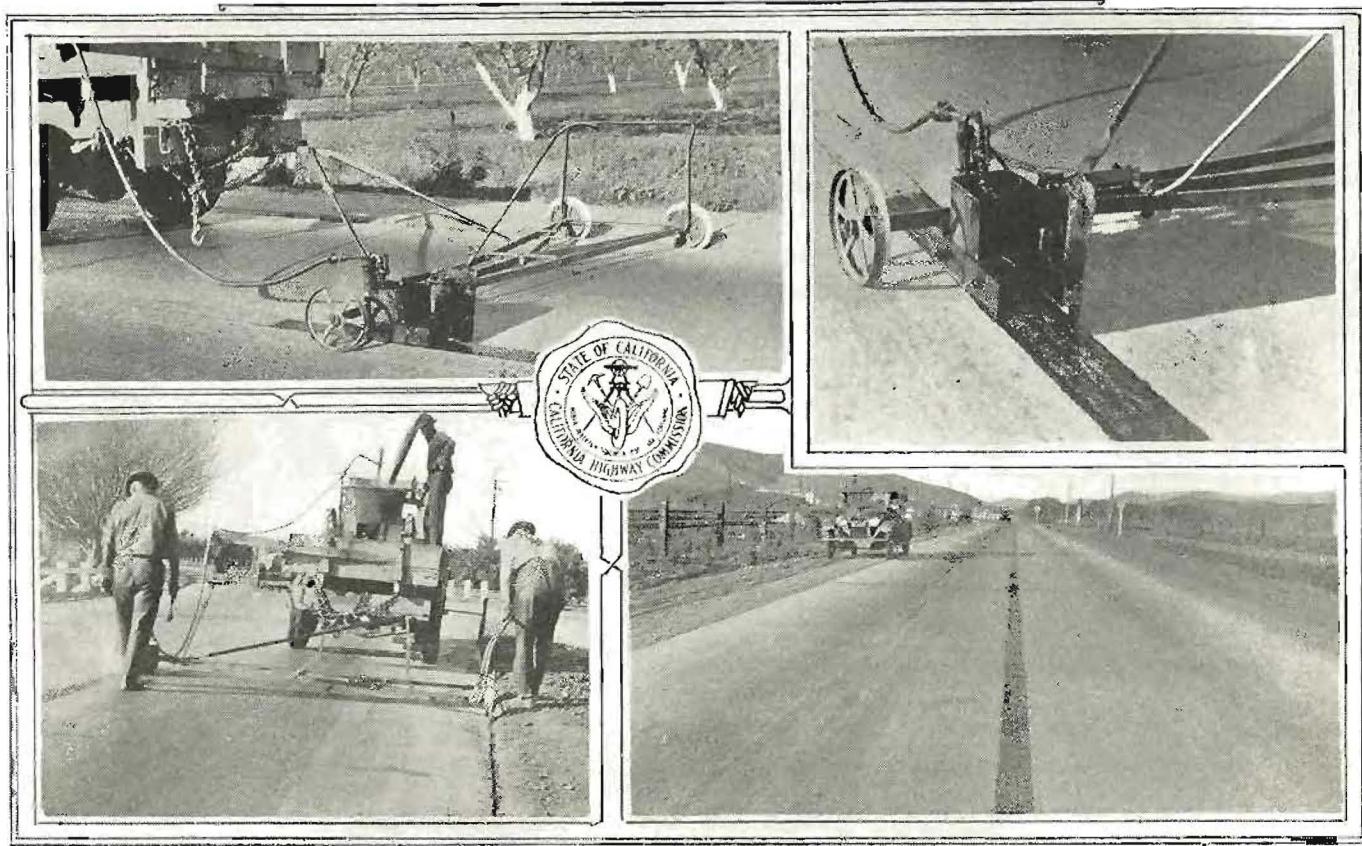
Fire Prevention Slogan.

"A cigarette may be down, but it's never out—till you step on it."



BORDERLAND HIGHWAY STRAIGHTENED—Before and after views between Pine Valley and Laguna summit, San Diego County, where forces of Division VII have widened and straightened sections of the San Diego-El Centro state highway. The lower view shows the improved highway.

DIVISION VII DEVELOPS NEW TRAFFIC LINE MARKER



SOUTHERN DIVISION DEVELOPS NEW FORM OF TRAFFIC GUIDE MARKER—*Upper left*, method of attaching marker to truck. *Upper right*, spray box and runner, together with hose and nozzle support. *Lower left*, outfit under way showing details of operation. *Lower right*, stripe painted on new 20-foot concrete pavement. (Photos by Div. VII.)

By I. S. VOORHEES, Assistant Maintenance Engineer.

Maintenence forces are finding need for an efficient means for marking traffic lines on highways. Experience has shown that a stripe that clearly indicates the center of the highway or that divides wider highways into traffic lanes promotes the safety and efficiency of pavements.

Division VII has been seeking such a device, and other divisions have been experimenting along the same line. Painting of such lines by hand is too slow and expensive. Many difficulties are in the way and where traffic is heavy workers are constantly in danger of injury by passing vehicles. Extensive marking of traffic lines by such methods is impossible.

Public approval of lines already placed in Division VII has prompted further efforts along this line. To meet this demand for an extension of the markings, Foreman Hugh Henry of the Santa Ana district recently developed, at small expense, a mechanical marker that has produced results. Under nearly all conditions it has painted a neat and accurate line at a cost that is quite reasonable.

Marker Described.

Other divisions may be interested in the following description of Mr. Henry's device:

The machine here described was built for a 20-foot width of pavement, but could be made adjustable for use on other widths.

Three $1\frac{1}{2}$ " x 10" steel wheels (second-hand wheels from a beet-planting machine, costing \$1 each) are attached to a

light frame work of structural steel made up largely of $\frac{1}{2}$ " x $1\frac{1}{2}$ " bars and braced at essential points. To two of the wheels, 13-inch discs (worn-out discs from a disc plow) were bolted to act as a flange or guide along the edge of the pavement. At this end there was also welded a $\frac{3}{4}$ -inch pipe extending upward approximately 27 inches from the axle in the form of an inverted "U." When in operation, one man grasps this pipe handle and holds the flange against the edge of the pavement to secure a uniformly straight line.

The Spray Box.

Ten feet from the inside of the flanges is the four-sided spray box, open top and bottom. It is $5\frac{1}{2}$ " wide, inside measurement, by 8" high by 6" long, and made of $\frac{1}{8}$ " metal. (Photographs show a three-sided box, but it has been decided to enclose the fourth side to protect the spray from the wind.)

Fitting loosely over the bottom of the spray box is the spray box runner made of two steel plates, $\frac{1}{8}$ " thick, by 15" long, by 3" high, bolted loosely together with two $\frac{1}{8}$ " by 8" bolts, spaced approximately 6" on centers. This spray box runner slides up and down freely, so that in its vertical position the runner is independent of the spray box, but its horizontal position is fixed. The runners are, therefore, always resting on the pavement exactly below the spray box. This prevents the asphalt from spraying beyond the limits of the runner. By bending in the rear of the two runner plates, any excess of asphalt dropping down from the plates is spread back on the line.

For the preliminary experiments we used a truck on which was mounted a Baker oil heater with a capacity of approximately 15 gallons of asphalt oil. The flexible hose resting

on convenient supports feeds the oil into this center spray box, the four sides of which prevent distortion of the spray by the wind.

Description of Nozzle.

An ordinary oil spray nozzle proved too large and a special nozzle was designed with a 3/32-inch opening. Over this, with openings nearly matching, is placed a 1/4-inch cut washer, with a sloping trapezoidal cut, flaring from a width of 1/16 inch at the front to approximately 3/32 inch at the back. On top, acting as a lip or baffle plate, is fastened a 1/2" x 3/4" washer about 3/8" thick. These are assembled with a 1/4" cap screw. Installed in the line back of the special nozzle is a 1/2" pipe cut-off valve.

In order that the machine may be towed behind a truck, a tongue approximately 6 feet long is bolted in two places to the marker frame, and an inch hole in the front end of the tongue permits coupling to 3/8" x 18" rod fastened with 5/8" eye bolts to the right rear end of the truck. Sufficient side play is possible to permit flexibility in operation and overcome irregularities in the pavement or driving of the truck.

One man can lift the marker into a truck for transportation from place to place. Its cost for material and labor was approximately \$35.

Works Well on Try Out.

The machine was tried out recently on the Jahn and Bressi contract in Orange County. It was successful from the start, painting an unusually straight traffic stripe 5 1/2 inches wide and operating as well on curves as on tangent.

As a guide for the truck driver, a short stick with hanging strip of tin was attached to the running board of the truck so that the tin follows along either center joint or edge of pavement, whichever is most easily visible from the driver's seat. However, as already explained, the accuracy of the guide line is not dependent on the exact position of the truck.

Gilmore 95 per cent asphaltic road oil was used in the marker. This was heated and strained three times before operations began to reduce the danger of clogging the fine nozzle. The hose and nozzle were first heated by feeding the hot oil through the hose into a 5-gallon bucket. This prevented cooling of the oil after work was started.

Sanding not Necessary.

At first the line was sanded, but it soon became apparent that this was unnecessary. Traffic crossing the thin film of oil

immediately after its placing did not pick it up or track it over the pavement. However, if it becomes necessary to guard against such a possibility, a light truck can follow approximately 200 feet behind the marker. The line dries rapidly and it will be necessary to keep traffic off but a few minutes.

It was found by actual test that the outfit has a possible speed of two miles per hour. Recharging of the tank and other delays, however, will cut the net progress to about one mile per hour. If a tank with larger oil capacity, say 50 gallons, were used, the mileage painted could be somewhat increased.

If white traffic lines on asphaltic pavements are desired, it is believed a paint-spraying outfit can be substituted for the oil-heating kettle and brushes attached to follow the spray box.

Costs to Operate.

Thirty gallons of road oil were used per mile when marking concrete pavement. On a basis of 8 miles per day and use of one light truck, costs were as follows:

	Total	Per mile
Labor—Foreman and 5 men	\$26 27	\$3 28
Truck rental and gas and oil	7 50	.94
Material—30 gal. 95% asphaltic road oil		2 .85
Total		\$7 07
If additional light truck is used to protect line and act as supply truck, add		1 .81
Total cost		\$8 .88

Operating force.

Above costs are based on the following force: Foreman with five men (sixth man needed in case extra truck is used), such force being distributed as follows:

Foreman following marker device, watching line critically and supervising oil feed.
1 laborer guiding flange wheel.
1 truck driver driving truck.
1 laborer at oil pot pumping.
1 laborer ahead with bar opening up and cleaning a shallow groove at edge of pavement.
1 laborer brooming off pavement and groove.

The machine was used recently in Division VIII with generally satisfactory results, according to a report of the division engineer. Costs there were slightly higher than in Division VII. We of the latter division are of one mind on the Henry marker. The machine is not perfect but it is by far the most efficient device for painting traffic lines yet tried by our maintenance crews.

EQUIPMENT DEPARTMENT TO FINANCE EXPERIMENTS

Announcement by R. H. STALNAKER, Equipment Engineer.

THE constant improvement in road building and maintenance equipment has been due in no small part to the inventive genius of the men actually using it. In the past, many highly successful devices have been developed by Commission employees, but there has been no systematic effort to encourage such developments.

With a view to stimulating the improvement of existing equipment and the perfection of new devices to facilitate the economical handling of highway work, the State Highway Engineer has

authorized the setting aside from Equipment Department funds of the sum of \$10,000 to be expended in experimental work of this nature, in cooperation with the divisions.

While there are some accounting details yet to be worked out, it may be stated that it is the purpose of the Equipment Department to provide the necessary funds for the development, in the several shops, of all ideas for new devices which seem to have sufficient merit to warrant the expenditure, and to make up for use in the divisions where needed duplicates of all successful devices so developed.

the commission for work in this vicinity, the latest covering reconstruction of the highway through the town of Carpinteria and for two miles south.

An asphalt concrete pavement thirty feet wide is being placed through the business district; the remainder will be twenty feet in width. A wider roadbed and improved alignment are also a part of the project.

Work has been begun by the Cornwall Construction Company of Santa Barbara, the contractors.

WHAT THE DIVISIONS ARE DOING

DIVISION I.

HEADQUARTERS, WILLITS.

T. A. BEDFORD, DIVISION ENGINEER.

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

THE Mercer-Fraser Company of Eureka is making preparations to begin construction of the 4000-foot trestle across Big Lagoon, Humboldt County, the contract for which was recently awarded by the commission. It is hoped this trestle and the necessary approaches may be completed and opened to traffic before another winter. Completion of the project, 1.4 miles in length, will shorten the Redwood highway by two miles and eliminate a bad section as well.

H. W. Rohl, San Francisco contractor, has begun excavation work on his contract for the grading and surfacing of two miles of the Redwood highway at the southern approach to the Klamath River bridge, in Del Norte County. It is expected that this work will be completed in time to open the new road and bridge to traffic during the latter part of the 1926 touring season. Opening of the Klamath River bridge to traffic will eliminate the old free vehicle ferry at Requa, the greatest hindrance to traffic on the entire Redwood route.

The Butterfield-Sears Company has completed the rough grading on its 6.3-mile contract for the widening and straightening

of the Leggett Valley section of the Redwood highway in Mendocino County. One shovel is now on the job for the removal of slides. Placing of a crushed rock surfacing will begin in the spring and should be completed by the latter part of the coming summer. The new alignment shortens the old road by .8 of a mile. Many sharp curves have been eliminated.

Slide removal was the most important activity of the division during February. Several serious slides south of Eureka closed the Redwood highway to traffic during the early part of the month.

DIVISION II.

HEADQUARTERS, REDDING.

H. S. COMLY, DIVISION ENGINEER.

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

MAINTENANCE forces of Division II have begun work on a number of sections of county road taken over for maintenance on January 1st. Within a few months' time the division expects to be making a good showing on these routes.

The Nevada Contracting Company has practically completed its grading and surfacing contract between Halfway Creek and

(Continued on page 13.)

DIVISION II FINDS CONCRETE CRIB CHEAPER THAN MASONRY

DIVISION II recently completed a section of retaining wall on the Pacific highway in the vicinity of Weed, Siskiyou County, that has a number of interesting features.

The wall is made in the form of a crib composed of precast reinforced concrete members which interlock one with the other, to form a stable structure. The alternating layers of headers and stretchers are each made up of members 5 inches square and 8 feet long, with necessary lugs for interlock cast at either end.

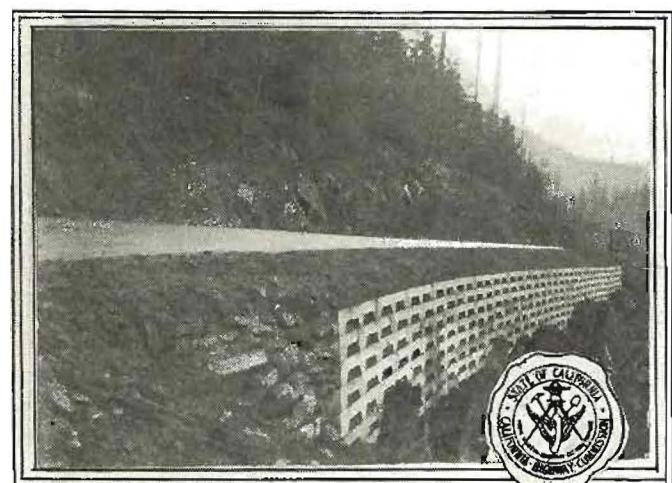
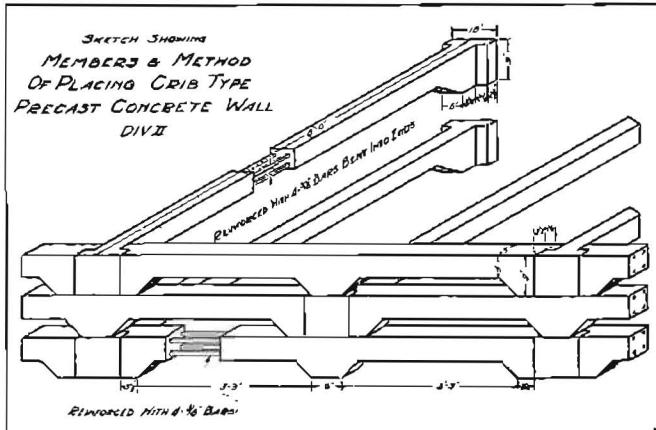
This particular wall is 165 feet long, varying in height from 4½ to 7 feet. It serves to retain the roadway slopes at a point where the location is on a hillside, immediately above the Southern

Pacific Railroad. The crib type was chosen because of the difficulty encountered in securing a safe foundation for the usual type of masonry or concrete wall, and because of the necessity for ample drainage at this point.

Cheaper Than Masonry.

Due to its lighter weight and flexibility, this type of wall has many advantages and can be placed on foundation material that would not support a gravity wall. Water from behind it drains out freely, eliminating another danger.

Eighteen cubic yards of concrete were used in casting the members of the wall in question. The total cost of the structure, in place, including backfill, was \$1,179.45, as compared with an estimated cost of \$1,700 for a rubble masonry retaining wall. All of the work can be done by common labor, while walls of other types often require high-priced skilled labor.



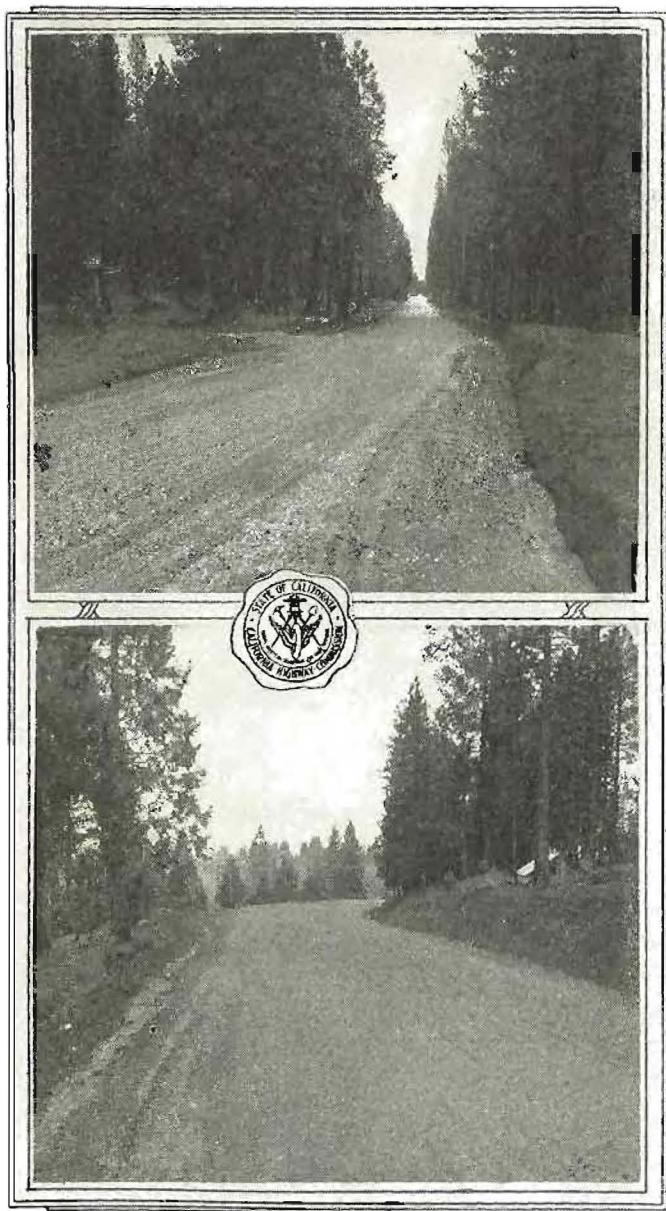
WALL IN DIVISION II—Crib type wall on Pacific Highway built of precast concrete members.

DIVISION REPORTS

(Continued from page 12.)

Dog Creek, in the Sacramento canyon. Weather conditions have been slowing up final completion of the work, which should take place not later than March 1st.

It was necessary to detour traffic around the Salt Creek cut for short periods. The five-mile detour was placed under state maintenance and the inconvenience to traffic was not great. This cut, which is a part of the Nevada Company's contract, is now about 100 feet deep from bottom to top of the slope break and is probably one of the deepest highway cuts in the United States. It greatly improves the alignment and considerably shortens the distance at the Salt Creek divide.



BEAUTY PRESERVED—Views on the new section of graded and realigned highway above Placerville on the route to Tahoe. Removal of dangerous curves has not destroyed the beauty of this historic state road. (Photo by Division III.)

DIVISION III.

HEADQUARTERS, SACRAMENTO.

F. W. HASELWOOD, Acting DIVISION ENGINEER.

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

DESPITE adverse weather conditions, the Nevada Contracting Company is ahead of schedule on the grading of the six-mile section between Floriston and the Nevada line in the Truckee River canyon. Three miles of rough grading has been completed. A force of eighty men and four power shovels are at work at the present time.

The Irey and Holden contract for grading work between Boca and Floriston, 5.3 miles, has been completed and work is now progressing on the extension of the contract for the building of the approaches to the Hinton bridge.

El Dorado Project Completed.

The contract of Irey and Holden for the grading and surfacing of 5.8 miles of the state highway above Placerville, from Camino to two miles east of Sportsmen's Hall, was completed on January 4th, the exact date scheduled under the contract. This is the first major reconstruction project on the old state road east of the asphalt macadam pavement in the vicinity of Camino. The sharpest curve on the new road has a radius of 550 feet and there are no grades in excess of 6.3 per cent. It is on new right of way most of the distance east of Sportsmen's Hall. A total of 37,900 cubic yards of material was moved. Motorized equipment was used throughout. H. R. Church was resident engineer for the commission.

Removal of the wooden trestle at North Sacramento has been begun. The macadam surfacing is being used as rip rap to protect the slight fill on which the new ground level pavement was placed. Except for minor finishing, the project was completed several weeks ago.

Bridges Opened.

Timber trestle bridges across Walker Creek on the Willows lateral in Glenn County and across sloughs west of Chico on the Chico-Orland road have been completed, except for the asphalt surfacing, which will not be placed until spring.

An informal contract has been awarded to Joseph Birkett of Grass Valley for the placing of 610 feet of cement concrete pavement eight feet wide and six inches thick on the state highway at the approach to Grass Valley. The new section will complete a full width street where a car track was removed.

Maintenance Begun.

Division III has started improvement of several sections of county road taken over for maintenance on January 1st. Superintendent Dan Bréuning is working on route 15, west of Grass Valley, Nevada County; Foreman C. G. Sackett on route 65, south of El Dorado, El Dorado County; Foreman J. E. Stevens on route 15, east of Long Bridge, Sutter County; and P. Forrest has charge on the same route west of Williams, Colusa County.

Superintendent H. L. Montfort is placing disintegrated granite surfacing on sections of the highway east of Placerville.

DIVISION IV.

HEADQUARTERS, SAN FRANCISCO.

JOHN H. SKEGGS, DIVISION ENGINEER.

Counties of San Francisco, Marin, Sonoma, Napa, Contra Costa, Alameda, Santa Clara, Sanis Cruz, and San Mateo.

COMPLETION and acceptance of the first contract for grading on the Bay Shore highway in San Mateo County shows

DIVISION REPORTS

that the quantity estimates of Division IV came within three per cent of the actual yardage moved.

The estimate for the construction of the 5.2 miles of embankment, 60 feet wide and approximately 5 feet in height, was 702,000 cubic yards, 162,000 cubic yards to be obtained by canal excavation and 540,000 to be secured from a borrow pit and hauled to the fill. Final quantities show 159,000 cubic yards of excavation and 520,000 cubic yards of borrow, or 22,900 yards less than the estimate.

Much study and thought was given this project by the Division. Valuable data were obtained from the Southern Pacific Railroad, which maintains fills across adjacent marsh lands where conditions are similar. Borings also were made along the line of the highway in connection with the studies of probable shrinkage and settlement. Fifty per cent was added to the preliminary estimate based on the survey of cross section quantities.

The fill can not be opened to traffic until it has thoroughly dried out and a surfacing of rock has been placed. This unusual project was completed by D. A. Foley & Company of Los Angeles prior to the recent storms.

Slides on Skyline.

Heavy rains of recent weeks have resulted in numerous slides on the recently completed section of the Skyline boulevard which was closed to traffic during the early part of the month. Maintenance crews have much work to do between Bear Gulch and La Honda road.

Stormy weather has delayed final completion of the widening work on the Peninsula highway between Cypress Lawn Cemetery and San Bruno. This section, however, is now open to traffic for its entire length.

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 of cement concrete pavement on Whittier boulevard in Los Angeles County is complete from Montebello to Philadelphia street. Whittier, and good progress is being made on the pavement east to Michigan avenue. This is a major reconstruction project.

Nearly six miles of "second story" concrete pavement have been completed on the reconstruction of the highway in San Diego County between Oceanside and San Onofre. On the important line change between San Onofre and San Mateo Creek, the concrete pavement has been completed and the construction of shoulders is now in progress.

Good progress is being made on the contract for improving the alignment on the Mountain Springs grade in San Diego and Imperial counties. Two shovels and two rock drilling outfits are in operation.

Work on Coast Route Progressing.

Progress is reported on the grading of the Coast highway between Laguna and Serra, in Orange County. This seven and four-tenths-mile section of highway, when graded, will be surfaced with crushed gravel.

Grading operations are well under way on the reconstruction of the highway in Ventura County between Camarillo and Ventura. Double-decking of the old fifteen-foot pavement with cement concrete has been started.

A day labor camp has been established on the Coast highway near Point Mugu, in Ventura County, for the purpose of quarrying and placing heavy riprap rock along embankment slopes where the ocean waves are causing damage to fills. Considerable work of this nature must be done as a result of recent storms.

DIVISION IX.

HEADQUARTERS, BISHOP.

F. G. SOMNER, DIVISION ENGINEER.

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

HARRY Wilson is making rapid progress on his grading contract for work on Route 23 in Kern and Inyo counties,

distance 36.7 miles. That portion lying between Ricardo and Indian Wells, 22 miles, has been opened to travel.

The forty-foot roadway now being graded on the state survey between Mojave and Kramer by Supervisor J. I. Wagy of Kern County is nearing completion. It will be taken over by state maintenance forces as soon as the grading is completed.

Division IX was visited recently by J. K. Kinsman and W. E. Peck of the Equipment Department, who are in charge of plans for the new shop building to be constructed at the Bishop maintenance yard.

M. E. Mihills, transferred from Division III last month, is now in charge of equipment at the Bishop shop.

Research engineers from Headquarters, W. J. Stonebreaker in charge, recently inspected metal culverts in this division in connection with the state-wide study.

The division headquarters was visited recently by C. E. Malm and Carl Smith of the accounting department.

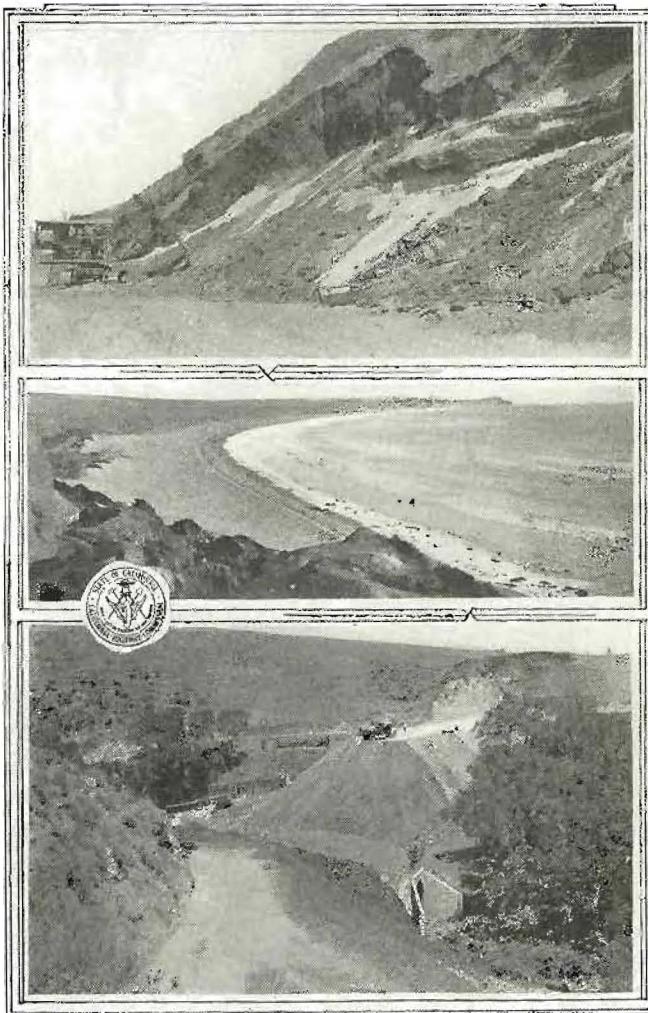
The Little Tourist.

Betty was taking her first ocean voyage, and for the first three days the sea was smooth as glass. On the fourth day out, a squall came up and the good ship bounced around like a broncho.

"Mother," finally said Betty, "What's the matter? Are we on a detour?"

Solomon's 777th Wife: "Sol, are you really and truly in love with me?"

Solomon: "My dear, you are one in a thousand." And she snuggled closer.



PROBLEMS ON THE MALIBU—Above, grading along the Los Angeles County coast made difficult by alternating layers of sand and clay in the material to be excavated. Center, a beach to be made accessible. Below, crossing a ravine by means of a deep fill. (Photos by Div. VII.)

BRIDGE DEPARTMENT NEWS

HARLAN D. MILLER, BRIDGE ENGINEER.

ACCORDING to reports from engineers on the ground, completed sections of the Ventura seawall were undamaged by the terrific tides and high seas which pounded the coast line of the southern counties during recent storms. The concave surface of the wall threw back the waves and proved the effectiveness of the design. The storm, the worst in years, is considered a severe test of the new wall.

The new 432-foot reinforced concrete bridge over San Gabriel River, between Los Angeles and Whittier, and the subway under the tracks of the Union Pacific Railroad on the same route are about completed. They represent important projects authorized during 1925. The San Gabriel bridge is forty feet wide, with sidewalks in addition, the widest bridge on the state highway system to date.

C. M. Butts has been named resident engineer for the Big Lagoon project on the Redwood highway, in Humboldt County. The long pile trestle will consist of 209 spans each 19 feet long. Cedar piling will be used while the remainder of the structure will be of redwood. Work has been begun by the Mercer Fraser Company, contractors.

The San Juan Creek and San Onofre Creek bridges on the Coast highway in Orange and San Diego counties have been completed and accepted. The latter is a part of an important realignment project.

QUICK ACTION COMMENDED

DIVISION III was informed recently by the Sutter County Chamber of Commerce that the flash signal at the Lomo crossing at the Southern Pacific was not working properly. The light was immediately adjusted and as a safety measure a reflector was placed in front of each signal. A culvert at this point also was improved.

The president of the Sutter body made the following comment upon these improvements:

SUTTER COUNTY
CHAMBER OF COMMERCE
Yuba City, California,
January 22, 1926

Mr. F. W. Haselwood,
Acting Division Engineer,
California Highway Commission,
Sacramento, California.

Dear Sir:

Your letter of January 21 in regard to the flash lights and culvert ending at Lomo has just come.

The improvement that you mention—placing Redflex Reflectors in front of each flash signal, and extending the present pipe will, I am sure, eliminate the hazards that I reported to you.

I am very glad that you have taken up these matters so decisively and consider your doing so another illustration of the efficient handling of your State Highway affairs.

Very truly yours,

(Signed) P. T. Hincks,
President.

CALIFORNIAN HONORED

Thomas E. Stanton, Jr., assistant state highway engineer, has been elected a member of the executive committee for 1926 of the highway division of the American Society of Civil Engineers. Mr. Stanton is the only member of the committee to be chosen from the western section of the country.

"Boy, Ah comes fum a tough family. My ole man done cut his nails wif an axe, and brush his teef wif a file."

"Huh, that ain't so tough. My ole man am a plumah and he done shave hisself wif a blowto'ch."

HIGHWAY NEWS NOTES

WHILE on an inspection trip over highways in Division I, State Highway Engineer R. M. Morton was tendered a dinner by the board of supervisors of Humboldt County and citizens of Eureka, following which he delivered an illustrated talk on the highway system. Mr. Morton was accompanied by Maintenance Engineer G. R. Winslow.

Charles Talsma and Stanley Dunsmire, clerks in the division office at Willits, recently took unto themselves brides in the persons of two Willits school teachers.

Division II Changes.

T. A. Roseberry and W. L. Templeton, assistant resident engineers, have been transferred from Division II to Division VII. R. E. Halter, instrument man, has been transferred to Division VIII and A. W. Williams, J. A. Williams, and H. S. Marshall are doing survey work for Division I in Lake County.

H. S. Comly, division engineer at Redding, has been acting as a member of a civil service examining board in several of the divisions.

R. E. Ward, resident engineer, has been transferred to Red Bluff as maintenance superintendent succeeding E. L. Stump, resigned.

Transferred to Division VIII.

F. R. Baker, for many years resident engineer in Division III, has been transferred to Division VIII.

W. H. Miller, maintenance foreman Division III, is now with the equipment department in charge of Shop III, succeeding M. E. Mihills who has been transferred to the shop at Bishop, Inyo County.

The Style in Division V.

Girls seem to be all the rage in Division V. Recent fathers of daughters are E. B. Brown, resident engineer, Summerland; C. P. Sweet, assistant resident engineer, Pismo; and W. P. Inman, draftsman, San Luis Obispo.

Headquarters Given Surprise.

Miss Margaret Stewart, stenographer, formerly with the equipment department, gave headquarters a thrill recently when she announced that for some time she had been in reality Mrs. Edward Phipps. The wedding took place in Carson City, Nevada.

Engineers Have Misfortunes.

Misfortune befell two well known engineers of Division VIII recently. H. O. Ragan, resident engineer on the Riverside-Ontario paving project, was painfully injured in an automobile collision near Riverside and was removed to a hospital in that city and later to his home.

The home of Resident Engineer T. R. Goodwin, at Winterhaven, Imperial County, was destroyed by fire. It was reported Mrs. Goodwin narrowly escaped death, leaving her bedroom just in time to escape the falling ceiling. All property in the home was lost including memoirs which Mr. Goodwin gathered when he piloted a 28-foot yacht from New York to Italy. These included papers signed by the King of Italy, letters from Caruso, and other valuables which can not be replaced.

CALIFORNIA HAS 5.68 PER CENT OF WORLD'S MOTOR VEHICLES.

CALIFORNIA, on January 1st, had 5.68 per cent of all the motor vehicles of the world. The total world registration on that date was 25,973,928, according to a report of the Department of Commerce. The registration for the United States was 19,999,436, or 77 per cent of the world's total. The California registration was 1,475,913.

Californians own more than a twentieth of the world's cars and 7.38 per cent of the number registered in the United States. Only New York exceeded the golden state among the states of the union.

The value of all motor vehicles registered in the United States, the Commerce Department estimated at \$11,000,000,000. At this rate, the value of California-owned cars would be \$811,800,000.

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

Cont. No.	Division	County	Route	Sec.	Location	Miles	Type	Contractor	Estimated cost	Date contract awarded	Contract time, days
466	VII	San Diego.....	2	D	COMPLETED AND ACCEPTED SINCE JAN. 18, 1926. Across San Onofre Creek.....		Reinforced Concrete Bridge.....	Fluer Construction Co.....	\$62,118 28	May 4, 1925	---
493	X	Yolo.....	5	C	AWARDED SINCE JAN. 18, 1926. Fifth St in Washington to the M St. Bridge.....	0.25	Grading.....	H. V. Tucker Co.....	\$17,640 00	Feb. 8, 1926	90
					Sub-total.....	0.25			\$17,640 00		
					PENDING AWARD—None. Total State Highway Fund Contracts Awarded and Pending Award.....	0.25			\$17,640 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.	Division	County	Route	Sec.	Location	Miles	Type	Contractor	Estimated cost	Date contract awarded	Contract time, days
M-68 M-70 M-94 M-112	III VII VI VI	Sacramento..... Orange..... Fresno..... Kern.....	3 2 4	B A F	COMPLETED AND ACCEPTED SINCE JAN. 18, 1926. Western Pacific R.R. Crossing..... Across San Juan Creek..... City of Fresno..... One mile south of Delano to 1.8 miles south of Delano.....	0.75	Underpass..... Bridge..... Maintenance Shop Building..... Asphalt Concrete Pavement.....	Lord and Bishop..... Stevens Bros. and Haas..... J. P. Williams..... Warren Construction Co.....	\$44,881 88 28,773 68 32,953 50 16,635 38	April 15, 1925 April 15, 1925 July 29, 1925 Dec. 14, 1925	----- ----- ----- -----
					AWARDED SINCE JAN. 18, 1926—None.						
					PENDING AWARD—None.						

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