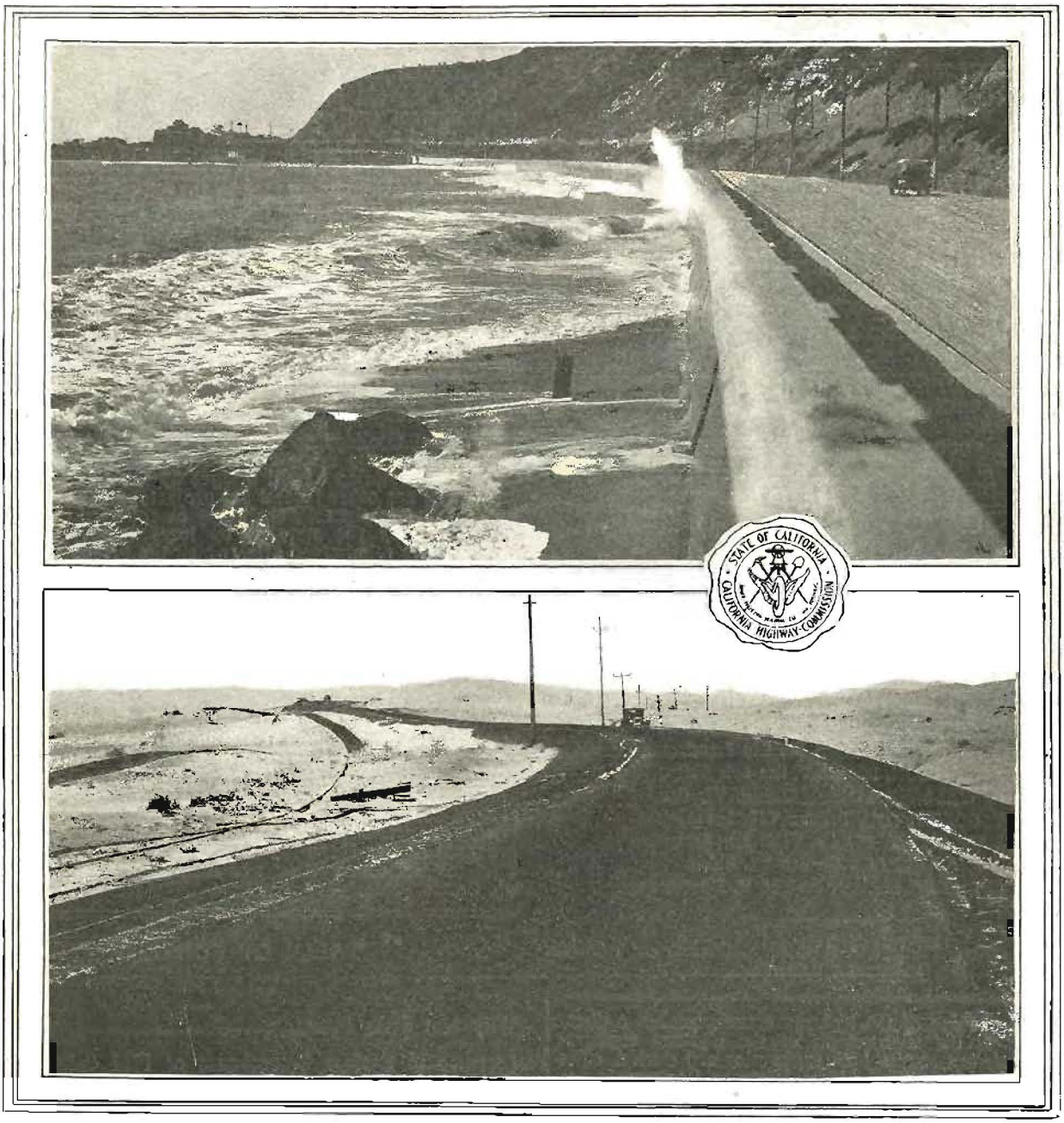
CALIFORNIA HIGHWAYS

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

Vol. 4 MARCH, 1927 No. 3



FIGHTING THE FORCES OF NATURE—*Above,* concrete seawall at Rincon, Ventura County, erected to protect Coast highway from ceaseless battering of ocean waves; *below,* asphalt concrete pavement on Yuma route across shifting dunes of eastern Imperial; heavy applications of oil on fill slopes prevent erosion of shoulders by wind action. Note old plank road on left.

In this Issue: WHY NOT STATE PLANNING—REVIEW OF PROGRESS DURING THE 1926 CONSTRUCTION SEASON.

CALIFORNIA HIGHWAYS

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

FRANK B. DURKEE - - - Editor

P. O. Box 1103, Sacramento, California.

Vol. 4. MARCH, 1927. No. 3

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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.

PROPOSED SUPER HIGHWAY

SENATOR T. COLEMAN DU PONT of Delaware has introduced in Congress a bill which would authorize a survey of a super-highway from the Atlantic to the Pacific Coasts, the highway to be constructed by a federal corporation to be created for that purpose.

The bill provides that the route of the proposed highway shall be as direct as practicable and that no part of it shall be located within any municipality having a population of 2500 or more. There would be facilities for two-way fast traffic and separate arteries for two-way truck and heavy traffic.

The bill would provide for a right of way of not less than 500 feet and the corporation would be authorized to lease the unused portion of the right of way until needed for road purposes. Senator du Pont estimates that the rentals from these leases will pay the upkeep and operating costs of the highway and eventually provide a balance to be deposited in the treasury of the United States to repay the cost of construction, and ultimately to be a source of income to the United States and the states.

Under the bill provision is made for tourist camps, the establishment and operation of emergency airplane landing fields, radio and other electrical communication facilities for air navigation approved by the secretary of commerce, subject to the requirements of the air commerce act of 1926.

Authority would be granted by the bill to construct, operate, and maintain any part of the highway within the borders of any state by or through the state highway department, state highway commission or other proper state officials.

FEDERAL AID LEGISLATION

W. C. Markham, executive secretary of the American Association of State Highway Officials, makes the following report on progress of federal aid legislation during the session of congress which ended on March 4th last:

President Coolidge on March 3d, signed H. R. 16551. This act authorizes the Secretary of Agriculture to grant federal aid for the building of toll bridges by the states in the same manner as are other federal aid projects under existing legislation, provided the tolls shall only be collected until the sums contributed by the state or by local subdivisions through the state are reimbursed after which the bridge shall be free.

The bill generally known as the Colton-Oddie bill passed the Senate on February 28th. Efforts were made on March 2d, to secure passage in the House but they were blocked by Garrett of Tennessee, Begg of Ohio and Black of Texas.

S. 4602, providing for federal protection of signs on United States highways; and eliminating the 60 per cent restrictions in the use of federal funds on primary roads, was also passed by the Senate on February 28th. It was not brought up in the House.

The Brazilian congress has passed a bill providing an increase in the import duty on gasoline of 60 reis per kilo (present duty 70 reis) and a 20 per cent increase in the present duties on automobiles, omnibuses, trucks, chassis, tires, tubes, motorcycles, bicycles, sidecars and accessories. The proceeds of this increased duty will be used to create a road fund for the construction and maintenance of the highways of Brazil.

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We Have City Planning—Why Not State Planning

CALIFORNIA is faced with the problem of expanding the state highways laterally as well as longitudinally. Not only are our pavements narrow, but we are in possession of thousands of miles of narrow right of way, 60 feet or less in width. Residents of the counties which have heavy intercity traffic know of the inadequacy of the pavement and roadbed widths, and of the program of widening which the state has under way. They can see the territory adjacent to these highways gradually losing its character as open farming land, surrounded by barb wire fences, beyond which is heard each season the hum of the mower and thresher.

The change taking place is the gradual settling up of the land by the additional population flowing into the state, and the expansion of towns to include more territory. The red and yellow flags of the subdivider float in the breeze along miles of landscape. the forerunner of more homes, business buildings, and other intensive improvements. Each flag means a new family, a new dwelling, a new garage and another automobile. Each automobile means more traffic on the highways.

Influence on Highways.

There is not a county in the Sacramento and San Joaquin valleys nor along the coast where the above description is not applicable. Do we realize what this means to the state and the county highway systems?

Due to the wise limitations of the law enacting the present gas tax, the State Highway Commission has, since 1923, been engaging actively in the widening and reconstruction of state highways. Much of this work has been concentrated around those centers of population where traffic has already overrun the previously built improvements. Therefore, the state's engineers are acutely aware of the changing status of our agricultural land. **We have seen many miles of state highways change in character from rural roads to city streets.**

The realization that this change is taking place more or less rapidly adjacent to many of our highways, resulted last year in the initiation of a study by our department to establish ultimate widths for each mile of state highway. This study is already bearing fruit, and we are beginning to crystallize our ideas in various locations as to what the state highway will have to be ten to fifteen years hence.

Wider Rights of Way Needed.

The main feature of this study, in so far as the present discussion is concerned, is that we know definitely that a 60-foot right of way will be insufficient to carry state highway traffic. Many of our main highways should ultimately have not less than 56 feet of pavement and probably they will be curbed and guttered. On a 60-foot right of way, this leaves two feet on each side for the placing of power and telephone poles, trees and sidewalks. This is impossible on 60 feet. **Therefore, we have determined that an 80-foot width of right of way is the least which should be accepted by the state. In many locations, a greater width should be acquired.**

This brings us to another angle of the matter—that is, the use made of the land adjacent to our 60-foot right of way.

The red and yellow flags of the subdividers are a trouble signal to the highway officials. At the 1925 session of the legislature, we endeavored to have passed an amendment to the subdivision act which would make it mandatory upon those subdividing land fronting on a state highway to obtain the approval of the State Highway Engineer prior to the filing of the map with the county board of supervisors. This bill was lost in the legislative shuffle, and never became a law.

We therefore launched a program of soliciting the cooperation of the boards of supervisors in aiding us to safeguard the future of the state highways by refusing to accept for filing maps of subdivisions fronting on a state highway, which had not been previously approved by the highway commission. Every county board was notified of this desire on the part of the highway commission, and we asked each county board to pass an appropriate resolution agreeing to such a procedure. We are glad to state that many of the counties, during 1925 and 1926, passed such resolutions, and, as a result, we have made considerable progress in obtaining the necessary increased width opposite subdivisions.

However, the situation is not always one that can be handled simply by an expression of desire on the part of the board of supervisors or on the part of the highway commission. While most subdividers are willing and anxious to cooperate with the officials who have to approve their maps, yet occasionally one is encountered who resents the interference. He is interested only in getting his map filed, and legally, he may be entitled to it. When an array of legal talent tells the board what their duty is, and when the district attorney can not advise the board otherwise, the supervisors are up against a hard question in refusing to accept subdivision plats for filing.

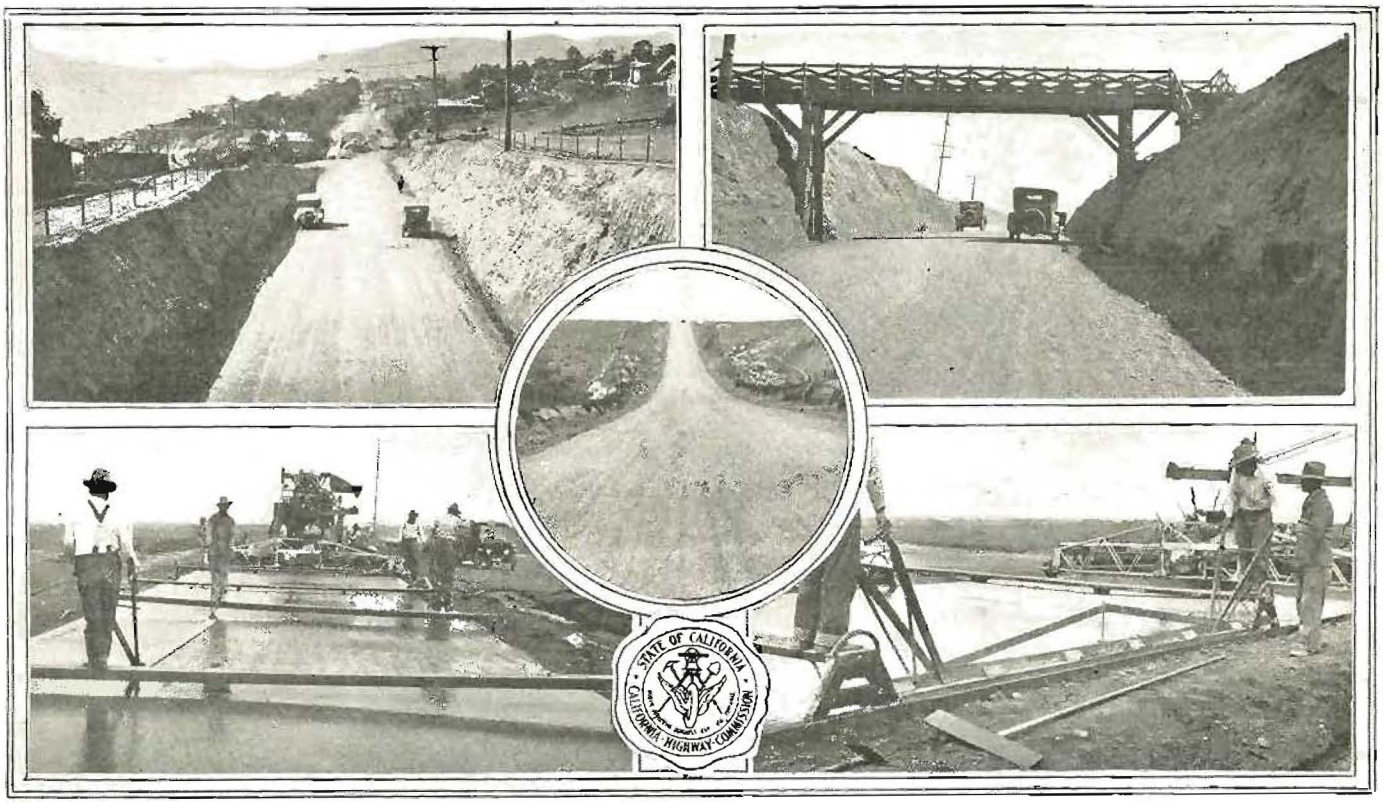
The section south of the Tehachapi does not have all the subdivisions; land adjacent to the state highways is being subdivided and sold everywhere, even in the remote northern sections. Only recently an active subdivider was able to convince a northern board that legally he was entitled to have his map filed. The state will probably have to take drastic steps in this case to obtain title to the land needed for widening the highway before the lots pass into the hands of a hundred different owners, and become built up with business blocks.

The commission is trying to develop a plan for the whole State of California. The relocation, realignment and widening features of our state highways all are a part of a magnificent scheme of boulevards which will gradually be finished and turned over to the traffic of California motorists and visitors from without the state, and to commercial vehicle traffic which is of increasing importance from the development standpoint.

Planning for the Future.

California cities are spending thousands of dollars for expert advice to secure plans for their future orderly growth and expansion. And in working out these plans one of the most difficult problems encountered is adequate provision for handling traffic—the problem of the motor vehicle. Millions of dollars are being expended for the widening of streets and

NEWPORT-LAGUNA BEACH COAST HIGHWAY VIEWS



NEW TRAFFIC ARTERY IN ORANGE COUNTY—*Upper left*, cut on new approach to Laguna Beach; *Upper right*, safety pedestrian crossing over highway built by commission; *Lower views*, finishing concrete on Newport-Corona Del Mar unit, smoothest section of pavement on state system; *Insert*, typical section of rock-surfaced highway on unpaved portion of recent contract.

boulevards, much of which could have been saved by a little systematic planning a few years ago.

But the cities are not alone in realizing the necessity for planning future development. We have county planning commissions and regional planning commissions, such as the organizations now functioning in Los Angeles and vicinity and in the bay district. It is but a step farther to an adequate state-wide traffic plan. Without realizing it, the highway commission has had forced upon it the duty of developing such a plan. But it is without adequate authority of law to properly undertake the responsibility. The urban centers are not the only areas in the state with traffic problems; every trunk line highway in California is carrying an ever increasing volume of traffic which must be cared for. **Due regard for the future welfare of the state, demands that we begin now to plan for the future of the highways as a state-wide traffic system. Delay means needless burdens upon the taxpayers of the future.**

In proposing a legislative measure, to facilitate securing of adequate rights of way, it is not the intention of the commission or its officials to confiscate land. The state and the counties are willing and able to pay where damage is done. In nine cases out of ten, the subdividers themselves see the financial self advantage of setting aside the width necessary to make a wide boulevard past their property. We will take our chances with the subdividers on the question of payment for the land involved and it will never be the policy of the state to strongarm anybody into donating right of way at a personal loss.

Accomplishments in this direction can already be seen in many counties. In San Luis Obispo County north of Pismo is an example of what has been done through the cooperation of the board of supervisors, our division engineer, and the subdivider. On the section between San Jose and San Francisco, in both Santa Clara and San Mateo counties, are several examples of provision being made by the subdividers for a future wide boulevard. On the Ventura boulevard north of Hollywood in Los Angeles County for long stretches we are not only cooperating with the subdividers in the setting aside of land for a wider street, but we have agreed to defray a certain portion of the street building cost, whenever the abutting property is organized to handle their share. Similar examples are found in San Diego County between San Diego and El Cajon.

We take the progress which has been made in this regard without express authority of law as evidence of the understanding of the boards of supervisors of the necessity for a state-wide boulevard plan, and as an example of what can be accomplished in this direction through cooperative efforts of public bodies.

The burden in this matter should not be carried by the boards of supervisors. We believe it to be highly desirable that proper laws be enacted which will place on the subdivider the burden of conforming to the plans for ultimate development formulated by the State Highway Commission.

Almost every growing town in the state has felt the necessity of a coordinated plan for city development. Why should not the state and the counties have a coordinated plan for highway traffic development? We have city and county planning, why not state planning?

INCREASE IN SURFACE SMOOTHNESS IS MOST IMPORTANT IMPROVEMENT IN 1926 CALIFORNIA PAVEMENTS

Reported by EARL WITHYCOMBE, Assistant Engineer, Construction Department.

A GENERAL increase in surface smoothness was the most important improvement accomplished during 1926 in the construction of California state highway pavements. This is the report of the Construction Department following a careful review of all projects placed under contract during the past season. Improvement is shown in both asphalt concrete and cement concrete pavements, which means not only improved riding qualities but less traffic impact and longer lived state highways.

Advantage has been taken during the year of every opportunity to improve construction practices and to better results by revisions of the specifications. Constructive criticism has been encouraged; and much credit is due the engineers in the field for suggestions and ideas that have contributed materially to the results of the year's work.

The following review of 1926 California state highway paving projects will be of interest to engineers:

Construction Methods.

PORTLAND CEMENT CONCRETE. Finishing of cement concrete pavements has been standardized by the adoption of the pliable wooden longitudinal float. This float, which replaces the push float, canvas belt, and rubber hose for final finishing, was introduced in California by Construction Engineer, C. S. Pope, and was developed largely by Resident Engineer, W. D. Eaton, of Division VII.

During the 1926 construction season, longitudinal joints have been built on almost perfect alignment and free from subsequent spalling by the development of what is known as the weakened plane type. This joint was introduced on state work by Division Engineer S. V. Cortelyou of Los Angeles and was perfected by Resident Engineer Eaton. It is made by driving a groove two inches in depth in the surface of fresh concrete on the center line of the pavement. Finishing is done with a hand tool that acts as a combined double edger and groover. This groover is handled in somewhat the same manner as the walking edger, a tool used adjacent to the side forms.

On second-story work this method of making the longitudinal joint has the added advantage of not leaving any unnecessary material in the slab. In the thickened center type of the pavement, to reduce the area of unbroken concrete, a wooden strip ½" by 4" is fixed in a vertical position on the subgrade directly under the line of the proposed groove. The groove is poured with asphalt to form a traffic guide line before the pavement is opened to traffic.

Expansion joint intervals have been reduced to 50 feet, and, in special cases, to 25 feet, without sacrificing any of the normal riding qualities of the pavement. This has been accomplished by the use of a prepared joint material, held in position during the placing of the concrete by means of steel plates cut to cross section in one continuous piece and suspended from the side forms. The joint material is slightly submerged to permit unbroken, continuous finishing. Desired alignment is secured immediately following the removal of the steel plates by truing up the joints to a chalk line.

To control the unsightly cracking which sometimes results from contraction, intermediate weakened plane transverse joints are now being placed between the regular expansion joints. Such weakened joints are made by driving an oiled steel plate, two inches in depth, to slightly below the surface of the freshly placed concrete. Finishing is carried on over the joint and edging is performed after the concrete has sufficiently set. Generally the plates may be removed after four hours. The opening is always filled with asphalt before the project is opened to traffic.

All regular expansion joints are now being doweled to prevent subsequent settlement at the ends of slabs.

A 5-mile section of pavement was built during the 1926 season in Ventura County with experimental sections of reinforcement. This project is described in detail in a special article on page nine of this issue.

No change was made during the year in the method of reinforcing second-story pavement of 20-foot width. Such slabs still carry bar or mesh reinforcement over the edges

(Continued on next page.)

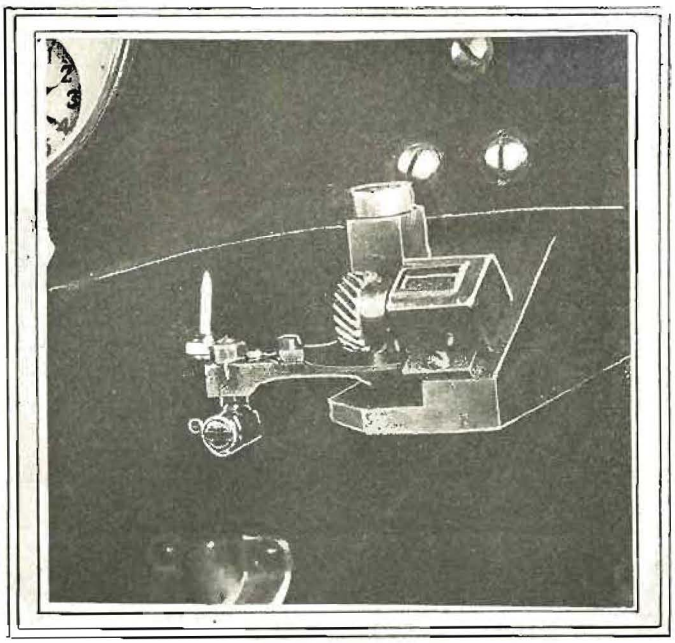
1926 CONSTRUCTION.

Division	County	Route	Section	Contract	Miles	Contractor	Resident Engineer	Ave. Strength of Concrete at 28 days, lb. sq. in.	Viabog Index of Roughness, Inches per mile	Ave. Interval of Designed Joints, ft.	Ave. Interval of Joints and Cracks, ft.	Ave. Variation in Cement Used per Day, %	Ave. Relative Specific Gravity, in %	Ave. Yardage or Tonnage Laid per Day
PORTLAND CEMENT CONCRETE PAVEMENT.														
IV	Sonoma	1	B	M-90 Ex	5.95	J. V. Galbraith	M. C. Fosgate	4,861	5.9	48.0	43 6	1.23		208
IV	Sonoma	1	A	510	1 25	J. V. Galbraith	M. C. Fosgate	5,158	5 0	47 2	45 8	1.79		167
VII	Los Angeles	2	D	M-85	3.20	Kuhn Bros.	A. N. George	3,888	11 2	83.8	55 6	1.60		224
VII	San Diego	2	C & D	M-93	14.20	Jahn & Bressi	W. D. Eaton	4,092	7.4	90 5	76 2	1.40		232
VII	Los Angeles	2	D	M-97	1.90	J. P. Benson	A. N. George	3,144	9 2	82.2	78.5	2.64		152
VII	Ventura	2	B & C	M-106	10 20	H. H. Peterson	A. D. Griffin	3,625	6.9	86 3	42.1	1.31		206
VII	Orange	60	B	479	3.90	Kavanagh & Twohy	R. L. Thomas	5,304	4.8	82 3	78.5			212
VII	Los Angeles	60	A	487	6 15	Ed. Johnson & Son	C. P. Montgomery	5,027	4.1	65 5	54 3	1.52		190
VII	Ventura	60	A	513	5 00	United Cone Pipe & Constr. Co.	A. D. Griffin	4,415	5.8	29.7	29.7	1 20		157
VIII	Riverside	26	B	M-105	3.00	Geo. Herz & Co.	R. C. Payne	3,800	15.4	101 0	40.6	0 90		202
X	Yolo	6	C	514	0 50	H. Brown	C. A. Potter	3,958	6.5	45.9	45.9	1 31		62
PORTLAND CEMENT CONCRETE SHOULDERS.														
IV	San Mateo	2	B	M-137	0 25	Municipal Imp. Co.	H. S. Payson	3,920	9.4			2.00		150
V	Santa Barbara	2	H	M-109	1.05	Cornwall Constr. Co.	E. B. Brown	2,110				1.20		60
V	Santa Barbara	2	K	M-122	1.00	Cornwall Constr. Co.	E. B. Brown	3,506	3.5			1 64		90
V	San Benito	22	A	M-124	6.90	Granite Constr. Co.	R. S. Badger	3,886				1 24		85
VI	Madera	4	A	M-120	2 09	Hanrahan Co.	P. L. Wilcox	3,254				1.72		34
VII	Los Angeles	9	A	M-101	15.10	Dewey & Rawson	J. B. Hodges	3,833				1 87		104
VIII	Riverside	26	E	M-96	11.43	Basich Bros.	J. M. Hollister	3,997				1 09		171
VIII	Riverside	26	D	M-126	17.30	Matich Bros.	R. C. Payne	3,934				1.63		154
X	Stanislaus	4	B	M-119	7.90	Valley Paving Co.	C. A. Potter	4,099				0.75		92

of the old pavement in the outer four and a half feet. On new work it has been the practice to reinforce the entire slab in areas where subgrade conditions are questionable.

A marked improvement has been made in the method of placing reinforcing steel by the use of a new device designed and patented by Resident Engineer Eaton. This device (described in the November, 1926, issue of the California Highways, page 11) suspends rather than supports the steel to insure its proper place in the slab After the concrete has been placed the supporting device is removed, leaving no unnecessary material in the pavement.

Concrete for California pavements is now being designed in the field to conform to the requirements of the particular materials available for use on the basis of the maximum density methods perfected by Construction Engineer Pope and Materials and Research Engineer C. L. McKesson. All



New type of vialog and recording device now in use by Construction Department for measuring pavement roughness

mixtures are similar in that the ratio of cement to volume of concrete in place is constant.

No wide departures have been made with respect to equipment, except that on one project two mixers were operated opposite each other on the shoulders to pour a 20-foot slab. On pavement widening, where a centrally mixed concrete can be used to advantage, a new type of plant with a pug mill mixer has been perfected. **From the result of tests made on this plant the usual mixing time of 60 seconds has been reduced to 45, with indications that the time may be reduced still further due to the rapidity of pug mill mixing.**

The policy of the department is to allow the contractor or equipment manufacturer to operate any mixer in a manner other than that called for by the specifications, provided the strength of the resulting concrete, as determined by compression tests, is equal to that produced with the equipment operating in the manner specified.

ASPHALTIC CONCRETE. Increase in smoothness of asphaltic pavements was accomplished solely by constant vigilance on the part of the field forces, as no changes in methods of finishing such pavements were made during the year. (A mechanical method of finishing similar to that in use on Portland cement concrete has been experimented with recently on other public work in California, and, although it is not, as yet, a complete success, the results indicate future possibilities.)

Results of experimental work in 1925 with mixtures containing a high percentage of limestone dust filler are encouraging. These studies were continued during the past season on four projects of considerable length in widely separated sections of the state. On these jobs pavements were placed with an increase of 50 to 75 per cent of filler over the normal amount required in the standard California mix for asphalt concrete.

The former practice of sealing the surface of asphaltic pavements with a coat of hot asphalt covered with hot stone chips has been discontinued, due to the slipperiness in wet weather of the resulting surface. Many pavements have been laid successfully simply by rolling hot stone chips into the freshly compacted open top surface.

During the past season another type of nonskid surface, giving much promise of permanent success, was laid on a number of projects. Hot stone chips, previously coated in the pug mill mixer with from 1½ to 2 per cent asphalt were applied to the surface and rolled in immediately after initial compression. Because of the dryness of the mixture now in use, it appears unlikely that this type of finish will be driven into the surface for some time. The nonskid qualities of this type of asphalt pavement finish, at the present time, are, apparently, superior to those of any other type. The department is indebted to Construction Engineer Pope for the introduction of this idea in California and to Resident Engineer H. B. La Forge for the field adaption. (For description of such a project see California Highways for December, 1926, page 6.)

No radical changes have been made in equipment in use on asphaltic concrete construction. Minor improvements have been made on mixing plants, the most notable of which is a lime dust proportioning device perfected by the Cornwall Construction Company of Santa Barbara. At this plant, lime dust is proportioned by weight on the ground level and conveyed to a storage hopper alongside the aggregate box from which it is shot into the center of the mixer along with other aggregates. This gives a maximum of efficiency with a minimum of labor. Asphalt plants, manufactured in California, have been perfected to produce 400 tons of mix per day with but one operator necessary on the platform.

Experiments during the season with the mixing time of asphaltic concrete in pug mill mixers led to a reduction in duration of mixing from 60 seconds per batch to 45 seconds. This has materially increased the average daily production, which is being reflected in decreased bid prices.

Results of Laboratory Analyses.

PORTLAND CEMENT CONCRETE. The average compressive strength of all Portland cement pavement and shoulder concrete for the 1926 season was 4145 pounds per square inch at 28 days. The mix was the California Highway Commission standard class "A," or six sacks of cement per cubic yard of concrete. Individual full width pavement strengths varied from 3144 pounds to 5304 pounds per square inch, while shoulder concrete ranged from 2110 pounds to 4099 pounds per square inch.

Wide range in compressive strengths is due somewhat to differences in structural strengths of aggregates from various sources and to a slight variation in strengths of cement.

ASPHALT CONCRETE. A change has been made in the laboratory method of determining specific gravity of compressed asphaltic pavements. Determination is made of the sample as received; it is broken down and the specific gravity is expressed as a percentage of the composite specific gravity of the aggregates. By this method the voidage in the pavement sample is made apparent at a glance.

Voids in surface mixtures laid during 1926 ranged from 4.2 per cent to 0.6 of one per cent, indicating that a remarkably dense and impervious pavement has been secured. Voidage in these mixtures is but one-third of that in present Portland cement concrete.

Field Comparison.

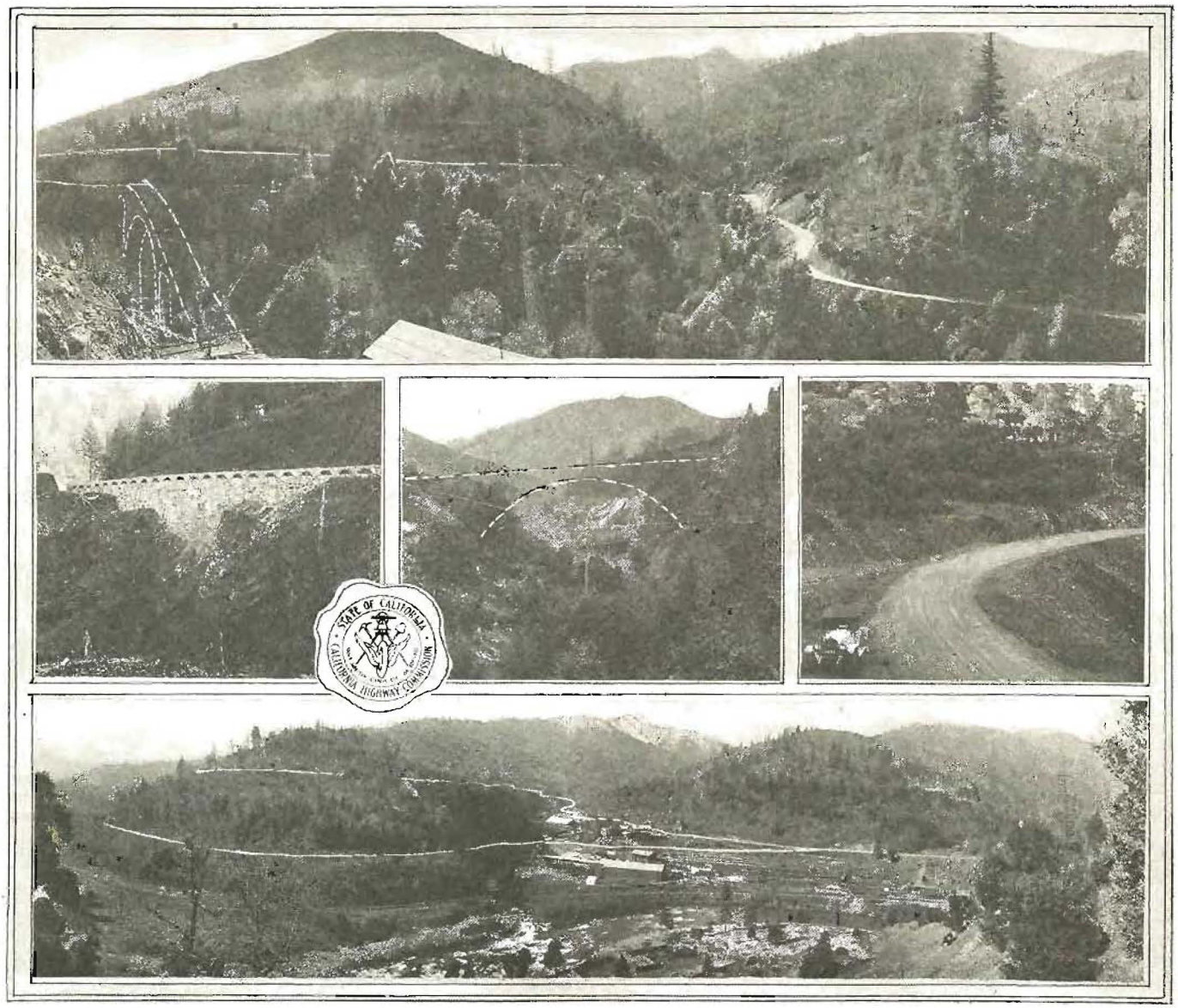
PORTLAND CEMENT CONCRETE. Surface roughness on cement concrete pavements, as determined by the vialog, decreased during the year from an average of 14.3 inches per mile in 1925 to 7.1 inches per mile in 1926, or 50 per cent. Credit for this result is due to careful field inspection and control and to the improved methods worked out for making the final finish.

A new type of surface finish also has been adapted on concrete shoulder construction with an exceptional increase in surface smoothness. The 1925 average of 26.7 inches of roughness per mile for shoulders was reduced, in 1926, to 4.7 inches per mile, a decrease of 82 per cent.

Early comparisons of crack intervals on newly constructed pavements has not been accepted as a correct indicative of the relative merits of the projects, with respect to resistance to cracking from temperature changes. A progressive study of the yearly condition is now believed to be the best index of this quality.

(Continued on page 13.)

DIFFICULTIES OVERCOME ON SACRAMENTO CANYON PROJECT



PACIFIC HIGHWAY RELOCATION—Views on Pollock contract in northern Shasta County; *above*, curves and grades to be eliminated by construction of high arch bridge position of which is indicated by dotted lines; *left*, masonry retaining wall on new section; *center*, position of Harlan D. Miller bridge across canyon of Dog Creek; *right*, section of finished highway eliminating sharp curve; *below*, relocation across Slate Creek at La Moine; upper line shows grades and curves of old road; lower line is new location which saves three-quarters of a mile of distance at this point; Sacramento River in foreground.

Reported by E. J. Bassett, Resident Engineer, Division II.

ANOTHER section of superb mountain highway—the Dog Creek-La Moine unit in the Sacramento Canyon—soon will be ready for acceptance by the California Highway Commission. This unit of 4½ miles is the third major reconstruction project to be undertaken in the canyon and its consummation will bring the mileage of highway reconstructed between Redding and Dunsmuir to approximately 59 per cent of the total.

The present contract, which has included some of the heaviest yardage on the Pacific highway in California, has been prosecuted on the same bold standards of alignment and grade that have made the work in the Sacramento canyon one of the outstanding reconstruction projects of the state. Completion of the great arch bridge over Dog Creek, scheduled for early in July, will make the entire 4.5 miles of the Dog Creek La Moine contract available for traffic and will effect a saving of 1.06 miles in distance as compared with the existing highway.

The contract will carry the relocation work through one of the most rugged parts of the Sacramento Canyon. The final reports will show the excavation to be approximately 54,000 cubic yards per mile. Elimination of a mile of light work, shows an average of 63,000 cubic yards per mile for the heavier sections.

The excavation was all accomplished with power shovels. Two of 1¼-yard and one of ¾-yard capacities were used, the smaller one being used principally on quarry work and slide removal. The average output for the two 1¼-yard shovels for five months' operations was 20,000 cubic yards per month each, or about 350 cubic yards per 8-hour shifts. The work was double shifted.

The existing road has been widened and straightened from a 16 foot to a 24-foot roadway with minimum radius curves

of 300 feet, and a maximum gradient of 6 per cent. A 6" x 20' crushed rock surface also has been placed.

The great improvement in alignment over the existing highway will be appreciated by an examination of the following comparative tabulation:

	Curves under 300' Rad.	Curves 300' Rad. or over	Curvatures in degrees	Total distance
Existing highway____	69	21	4386°	29,775 Ft.
Reconstruction _____	1	40	2037°	24,153 Ft.

It will be noted that in 5¼ miles on the former location, 1.06 miles in distance has been saved, while the number of curves has been reduced by more than one-half.

The topographical features of the canyon on the section covered by the Pollock contract made possible two line revisions of considerable magnitude, which depart radically from the old location and effect not only betterments in alignment, but a reduction in both adverse grade and distance.

The first of these changes is at the southerly end of the project. The new location swings away from the old road and drops down along the face of a rocky bluff to the southerly slope of Dog Creek, where prominent rocky formations draw the canyon into a deep, narrow gorge, an ideal location for an arch span. It is here that the Harlan D. Miller bridge, a handsome concrete arch structure, is now in course of construction. Long sweeping curves and nearly half a mile of flat tangent were possible on the new locations, against minimum radius curves, longer grades, uniformly heavier quantities, and 71 feet of additional rise and fall on the alternative route through Dog Creek canyon, the original location.

Of particular interest in connection with the new construction at this point, is the 550 feet of grade immediately south of the bridge crossing. The new line at this location is 60 feet below the old road and on the face of a nearly perpendicular bluff of lava basalt which overhangs the tracks and bridge of the Southern Pacific Railroad. **The near edges of the two roadbeds are separated but 90 feet horizontally and 125 feet vertically. The roadway for a distance of 450 feet is entirely in solid rock, and for the remaining 100 feet it is partly in embankment which is retained in place by a 23-foot masonry wall.**

Quantities in this cut totaled 12,750 cubic yards which was all waste. An average cut of 45 feet was required on the inner slope to secure an excavated width of 33 feet. To insure against slides and erosion of the slope between the highway and railroad, drainage is to be carried for 1150 feet in a gutter against the inner slope. Storm water from the mountain above the new construction will intercept on the old road above and be carried to a safe disposal, which puts to useful purpose the original grade. Progress on this cut has been slow, due to the fact that the excavated rock is being crushed in a nearby plant for surfacing the new grade. Occasional damage to the railroad tracks and to signal and telephone lines have marked the progress of the work, but, up to the present, no serious results have been occasioned by the blasting or shovel work.

Parking Space Planned.

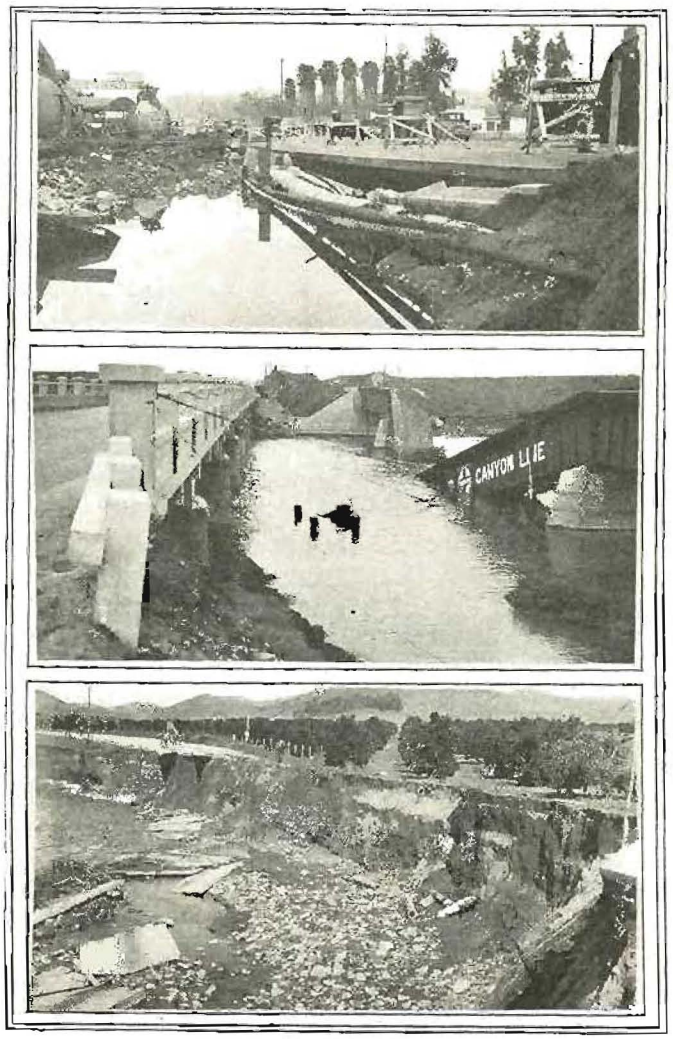
At northerly end of this cut overlooking Dog Creek canyon and the Miller bridge, the Bridge Department has designed an ornamental rubble masonry observation bay and parking space. It will be flanked by an ornamental coping along the outer edge of the roadway, where motorists may stop to view the work of both nature and man. In three directions are vistas of river, canyon, railway and highway, all overshadowed by towering mountains.

At the northerly end of the project, near La Moine, a new crossing of Slate Creek involves a relocation slightly over a mile in length. On this section, the old highway loops and winds along the canyon slope on a level grade for a half mile and then dives downward to cross far upstream, winding back to a point opposite the beginning of the descent. (Such locations are characteristic of most of the side canyon crossings throughout the original location in the Sacramento Canyon.)

The new location begins to descend far back on the contour section and follows a moderate grade to a lower crossing of Slate Creek near where it empties into the Sacramento River. Beside accomplishing a more moderate grade and easier alignment with better visibility on curves, this line lessens the distance ¾ of a mile.

As the total estimated saving in distance by the reconstruction of the highway through the Sacramento Canyon is 6.5 miles, the value of the La Moine-Dog Creek line change is readily seen. The saving on this one project is in excess of 11 per cent of the total. Only 2.25 miles of the unit is now open to travel because of unfinished bridges. Midsummer, however, should see the public enjoying the use of the completed structures and reaping the benefit of the improvements accomplished on the relocated highway. The contractor is the George C. Pollock Company of Sacramento.

WORK OF THE STORM



STORM DAMAGE IN DIVISION VII—*Above*, washout on Whittier boulevard in Los Angeles County; *center*, Santa Margarita River, San Diego County; state highway bridge, at left, intact but approaches damaged; *below*, on the Los Angeles-San Diego highway near Capistrano, Orange County.

COMMISSIONER IS SPEAKER.

Commissioner J. P. Baumgartner was one of the speakers recently before the annual convention in Sacramento of the County Supervisors' Association of California. He explained to the convention that a lack of finances will make 1927 one of the smallest construction years in the history of highway building in California, but predicated a resumption of work when the proposed Breed bills have become law. He also pointed out that maintenance and reconstruction have been generously cared for in the current budget of Governor Young.

Experimental Pavement Sections on Oxnard Route

Reported by A. D. GRIFFIN, Resident Engineer, Division VII.

A NEW SECTION of California state highway which in the years to come may take its place among the famous experimental highways of the country has just been completed on the Oxnard coast route in Ventura County, Division VII. (Contract 513, VII Ventura 60 A; Oxnard to Hueneme road). The type of pavement placed is cement concrete, 20 feet in width, the contract including also roadway grading and drainage structures.

The five miles of pavement comprise the connection between Oxnard and the coast in the direction of Point Mugu. The entire section is on new location through highly productive bean and sugar beet land on almost a direct line, shorter by two miles than the existing county road. The flat grades and straight alignment, with no breaks in the continuity of the pavement, and the almost uniformly sandy soil subgrade, presented an ideal opportunity for the Construction Department to work out its experimental sections.

The contract provided for twenty-one different pavement designs with respect to steel reinforcing and transverse joint spacing. Unlike the test roads at Pittsburg, California, and Arlington, Virginia, the Oxnard pavement has been built for practical every day use on a route that is certain soon to have a heavy traffic at all seasons of the year. The effect of this traffic on the various experimental sections should in time demonstrate which is the better design for the reinforcing of concrete pavement, and should provide highway engineers with information which will be valuable in the future in the refinement of pavement specifications.

It should be understood, however, that as far as the pavement as a whole is concerned there has been no radical departure from accepted practice; that the state's investment in high class concrete pavement has not been jeopardized.

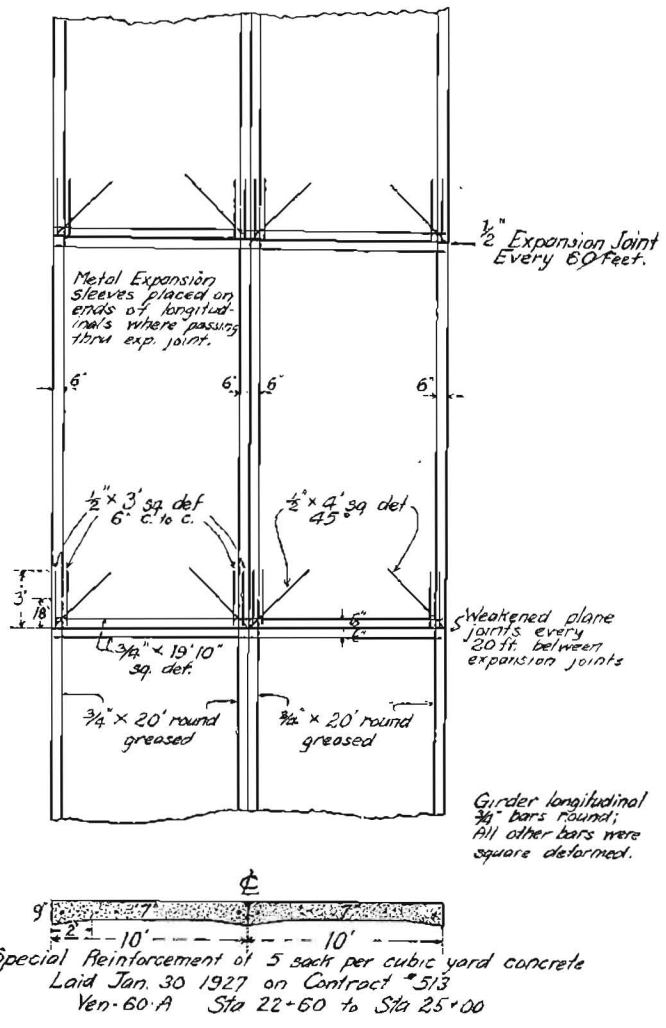
Because of the interest which has been taken in the effort of the Commission to initiate a comprehensive study of the reinforcement of cement concrete pavements, Resident Engineer A. D. Griffin has endeavored to present considerable of the details of the project. It is his thought that the following descriptive matter may be used as guide for subsequent inspections by interested engineers, who may not have easy access to official construction records.

INTRICATE PAVEMENT DESIGN. The pavement design, as may be observed from the accompanying chart and construction detail sheet, changed every 1200 feet, except for two longer sections at the beginning and end of the contract. Arrangement of the different sections is such that any effects due to possible variations in quality of the subgrade, or a heavier traffic in one direction than in the other, will balance one another, when the results for the entire five miles are combined and compared.

The centerline V-groove under which is placed a submerged wood strip and the transverse dowelled expansion joints, as used on this contract, are now standard California practice. The weakened plane transverse joints, to afford relief for tensile stresses by encouraging and localizing contraction cracking, are a new procedure, although a development of the same idea has been used by the city of Seattle. The concrete mix was all standard Class "A," six sacks of cement to the cubic yard, except for a short section which is subsequently described.

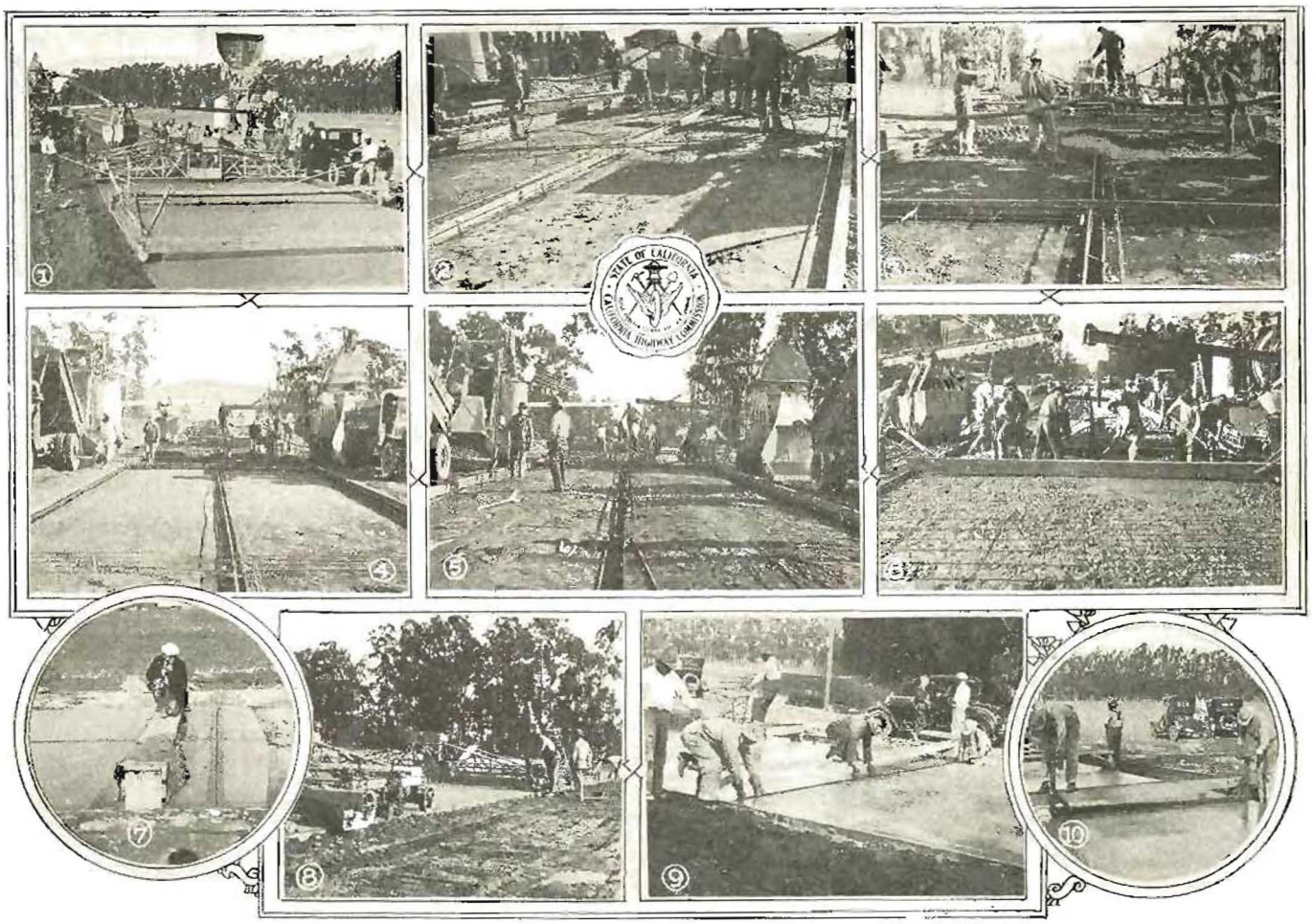
To guard against corner cracking where longitudinal edge and center bars were specified, the same type of reinforcing was carried transversely across the slab parallel to all expansion joints, except where slab reinforcement was used, when the precaution was considered unnecessary. A break in the longitudinal steel was always provided at all transverse expansion and weakened plane joints; no steel passed through the joints except the ¾" x 24" steel dowels. These were placed with slip-sleeves on one end to provide space for expansion. Ten dowels were used in each of the expansion joints, and four dowels in each of the weakened planes. In the latter instance the dowels were spaced 6" from the edges and center of the pavement. Dowels were held firm by wiring them to steel pines, ½" x 12", which were driven into the subgrade as supports. Placing of dowels was given particular attention throughout the project.

CONTRACTOR'S CONSTRUCTION PROGRAM. N. L. Basich and R. H. Richards, who represented the contractor, the United Concrete Pipe and Construction Company, appreciated the fact that the contract was unique in its variety of exacting requirements. They realized also the disadvantages of the usual method of hauling concrete paving materials and of conducting mixing operations on a subgrade composed of the prevailing sandy soil. Earth structures, 10 feet in width, had been planned for either side of the 20-foot pavement, which permitted two 5-sack mixers to be operated opposite each other, and entirely outside the pavement side forms.



Pneumatic-tired dump trucks delivered proportioned batches of rock and sand from the Saticoy Rock Company. All traffic was kept entirely off the subgrade, the hauling being done either along the shoulders or in the side ditches.

This arrangement made possible the lining up of pavement steel and transverse joints well in advance of the placing of the concrete. It also diminished confusion around the mixers and made for better progress. To further speed up operations, the contractor provided two Lakewood tampers which



EXPERIMENTAL SECTIONS OXNARD PAVING CONTRACT—(1) double mixer operation; (2) holding steel reinforcing with iron pins; (3) holding steel with movable braces; (4) holding steel with specialy fabricated wire supports; (5) ½-inch steel bars held in place by wire wickets; (6) placing slab reinforcement by two-course method; wire mesh on half width, with ⅜" square deformed bars on other 10 feet; (7) completed transverse weakened plane joint after edging and pulling of plate; (8) two tampers in operation; (9) submerging ¼" x 1½" by 19' 10" steel plate; finishing to be carried over top; (10) impressing V-groove tamper for a transverse weakened plane joint.

worked in conjunction with one another, except for short periods when repairs were necessary.

When weakened plane joints were being placed nine finishers were required to take care of a normal day's run. Adverse weather conditions prevented any record of exceptional progress on the job as a whole, but on many days over 400 cubic yards of pavement were placed. This is better than 900 linear feet.

STEEL REINFORCEMENT. Three methods were used for the support of longitudinal steel bars in the pavement slab:

(1) ½" x 12" steel pins which were driven into the subgrade and to which the longitudinal bars were wired;

(2) Movable braces, an invention of the contractor, which were taken out after the concrete had been spread and which were then reset;

(3) Stiff No. 8- or No. 10-gauge wire supports, bent and welded with stop bars and hooks, which were driven into the subgrade and the headers and left permanently in place.

The last mentioned method proved by far the most satisfactory. The wire supports made possible setting of the reinforcing well in advance of placing of concrete. The bars were held firmly in place not only vertically and horizontally, but also longitudinally which is particularly important where breaks in the reinforcing steel must be accurately spaced for weakened plane transverse joints. The wire supports when left in place also insured against movement of the reinforcing steel during tamping operations. All other methods of steel support have obvious disadvantages.

When slab reinforcement was accomplished with wire mesh or ⅜" steel square deformed bars, the procedure was as follows:

A layer of concrete was struck off with a template at the depth at which the reinforcement was to go for the full distance between expansion joints. The wire mesh sheets or the previously made up mats of steel bars were then placed and wired to position. The mixers were moved back and the top layer of concrete was deposited, tamped, and finished in the usual manner. Of the various methods tried other than the use of wire supports, the placing of the concrete mix in two layers appeared to give the best results from the standpoint of getting and holding the steel in its proper place. To meet objections to this procedure, dusty side roads were sprinkled, the first course of concrete on hot days was run slightly wetter, and burlap mats were provided on which workmen wiped their feet to avoid tracking dirt onto bottom course of freshly laid concrete while placing the steel.

WEAKENED PLANE TRANSVERSE JOINTS. Considerable difficulty was experienced in the construction of transverse weakened plane joints. The special provision of the contract showed the transverse V-groove to be the same as the longitudinal center-line V-groove. An effort to follow this requirement indicated that the resulting transverse joint would not be smooth; a clean-cut V-groove by this method seemed impossible of construction without making an objectionable depression.

A method developed by Resident Engineer E. B. Brown, of Division V, for shoulder construction, was enlarged upon and was finally adopted for full width pavement. Under this plan the V-groove tamper was impressed in the concrete after the heavy longitudinal float had passed. In this groove a ¼"x 1½"x 19' 10" steel plate, bent to roadway crown, tapered, and drilled with holes near the top to facilitate pulling, was placed about ¼" below the surface of the concrete. Longitudinal floating was then carried on until the pavement over the plate was as smooth as elsewhere. After the concrete had dried out sufficiently, an edger was run along both

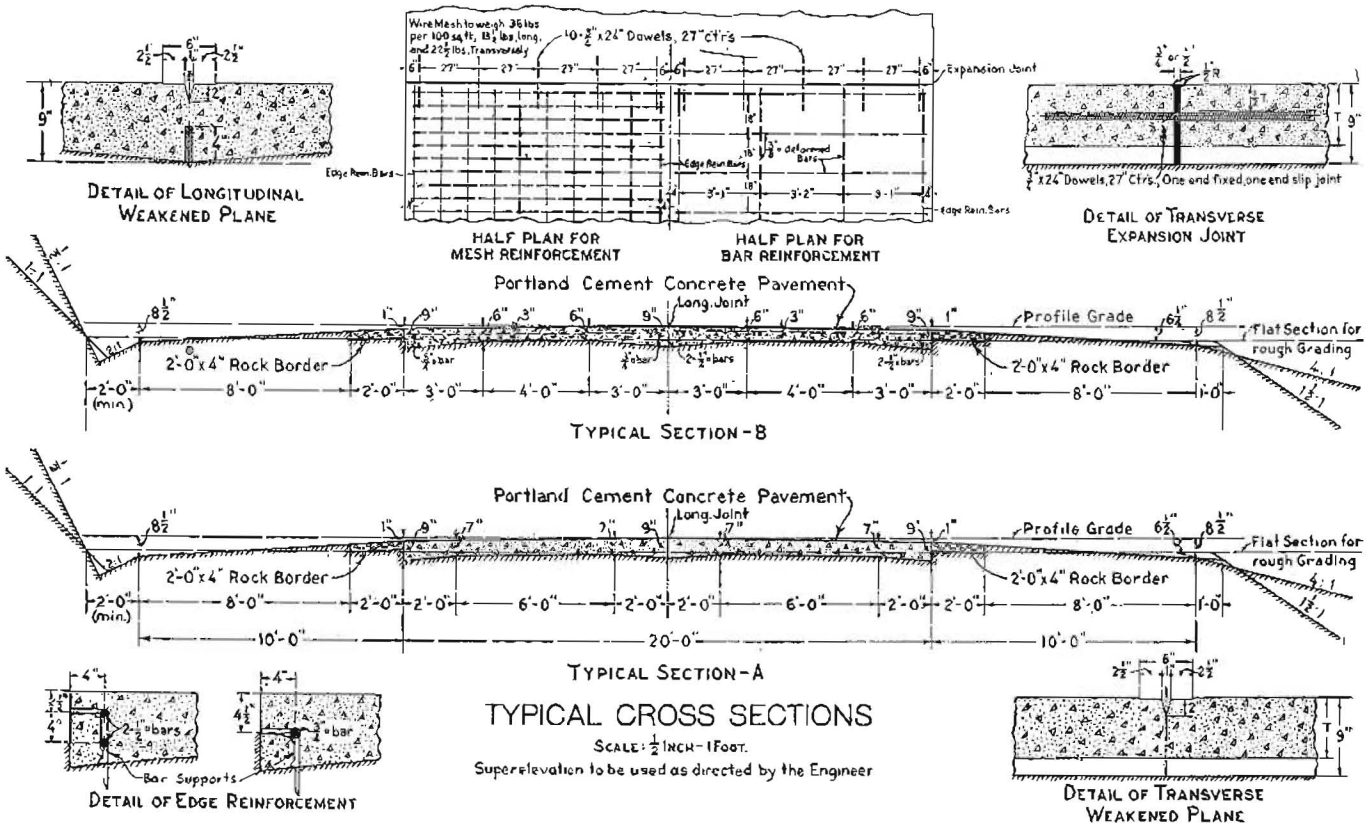
sides of the plate, giving it the appearance of an expansion joint. After about four hours the concrete was generally hard enough for the plate to be pulled and used over again. Great care had to be taken to keep the plates scrupuously clean and well oiled, as otherwise corners would be broken off in the pulling.

DEPARTURES FROM PRESCRIBED DESIGNS. Between Station 22+60 and Station 25+00, a part of typical section "A," the Construction Department directed that the concrete be poured five sacks to the cubic yard instead of six. Special reinforcement also was used as shown by the accompanying sketch. The ¾" smooth round longitudinal bars used on this section were greased in an effort to cause them to act as dowels over their entire length. Subsequent comparisons of this section with other sections which contain ¾" square deformed longitudinal bars, should determine whether or not the bonding of steel to concrete for the transference of tensile stresses is of as much importance as the dowelling action, in the absence of a bond between the two. This section should also prove or disprove the advisability of providing against corner breaking by placing bars at 45-degree angles.

membrane under the pavement. The first application was of oil with a 40 to 50 per cent asphaltic content, one quart to the square yard of subgrade; the second application was 80 to 90 per cent asphalt, in the same amount per yard. This oil treatment was also considered a protection against the shrinking and expansion of the subgrade; and, for this reason, a sand cushion between the subgrade and the pavement, which would otherwise have been placed on the northern half of this section, was eliminated. The soil was of an adobe nature having a linear shrinkage of from 5 to 8 per cent.

Station 199+00 to Station 210+00 was the first section constructed in which slab steel reinforcing was used. While building this unit the contractor was permitted to do some experimenting in the placing of the steel. For this reason the reinforcement on this section is more likely to be defectively placed than that used elsewhere on the project.

Except as above outlined, no other deviations were made in the original plans, nor do any further conditions come to mind which would seriously affect any conclusion which may be drawn from subsequent studies and comparisons of the various types of pavement design. As time goes on, it is hoped that



From Station 37+50 to Station 39+50 poor local drainage conditions decreased the bearing power of the subgrade. To overcome this condition an additional inch in the thickness of the concrete slab and additional steel were authorized. This consisted of deformed longitudinal bars ¾" square placed at the edge and center in the southwesterly half of the pavement and also standard reinforcement of ⅜" bars placed on both sides two inches from the top of the slab.

On the three northerly sections containing slab reinforcement, Station 42+00 to Station 54+00, Station 66+00 to Station 78+00, and Station 90+00 to Station 102+00, the steel was placed two inches from the top instead of three inches as originally designed. This change was authorized because it was thought that, by being placed nearer the top, the reinforcement might be more effective in taking up tensile temperature stresses and the flexural stresses of heavy concentrated traffic loads. After the highway has been in use, comparison of these sections with the three where the steel is in the center of the slab should be of interest.

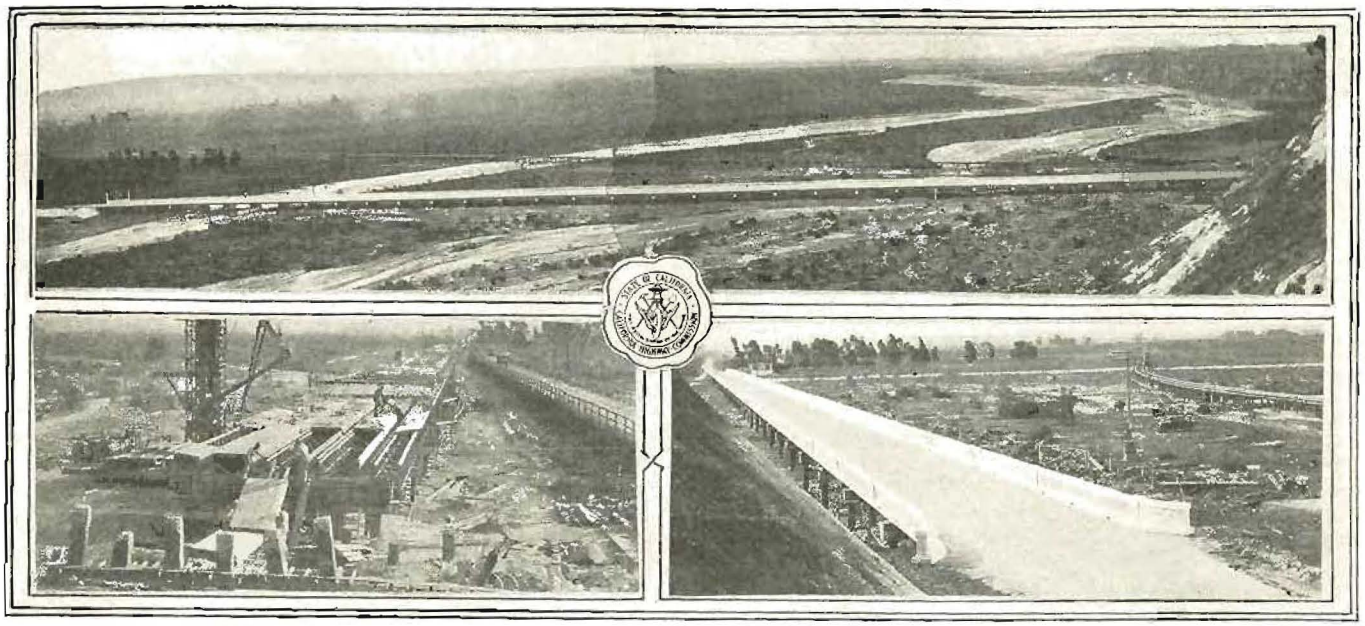
Because of high alkali content in the soil from Station 226+00 to Station 256+00, the completed subgrade was given two applications of asphaltic road oil to secure an insulating

these experiments may settle some of the moot questions regarding pavement design, steel reinforcement, and transverse joint spacing, which have not been as yet satisfactorily or conclusively answered.

Inspection parties who may go over this contract should have no trouble in picking up stations or in identifying the various sections, even without a copy of the layout plans. A different transverse joint spacing often marks a point of change in design. The contractor's stamp, placed at the beginning and the end of each day's run, also carries the station and the date. At points of change of design, the station number has been branded on either side of the expansion joint near the edge of the pavement.

There were also many visitors beside the state engineers; representatives of the steel companies and of the cement associations, city and county engineers, were frequent observers and valuable suggestions were received from these sources. A. D. Griffin, as resident engineer, was in general charge for Division VII. The inspection work was done by the following assistant resident engineers: W. I. Templeton, T. A. Rosebury, E. W. Taylor, O. W. Monroe, B. T. Thomas and J. P. McAndrew.

Santa Maria Trestle Interesting Bridge Project



NEW SANTA MARIA BRIDGE—Views of new structure, 1368 feet in length, across mouth of Santa Maria River on Coast highway, San Luis Obispo County. View at lower left gives comparison with former wooden trestle at this location.

A FURTHER improvement of the heavily traveled Coast highway is marked by the completion by the California Highway Commission of a reinforced pile trestle bridge (V-S.L.O.-2-F), two miles north of Santa Maria. Because of the length of the structure, 1368 feet, and other unusual conditions, the building of the bridge proved one of the most interesting problems coming under the supervision of the Bridge Department in recent months.

The new concrete structure replaces a wooden pile trestle built in 1913 by San Luis Obispo County. Heavy increases in weight and volume of traffic during its fourteen years of service caused rapid deterioration of the old trestle. Conditions also were unfavorable and in recent years the early structure became dangerous and obsolete. The new bridge is made up of thirty-six 38-foot, 4-girder reinforced concrete spans, with a 24-foot roadway, on reinforced concrete pile bents, with six piles per bent.

Various conditions introduced several interesting features in the construction. It was necessary for the department and the contractor to take into consideration flood conditions, the heavy traffic to be cared for, and the length of the structure to be built.

Flood Conditions Often Serious.

Santa Maria River, with the Cuyama, the Sisquoc and other minor tributaries, drains a mountainous, unforested catchment area of approximately 2500 square miles. The flow varies from no water at all in dry seasons to 100,000 second-feet after heavy storms, when rises are rapid and destruction often is serious in the sandy lowlands in which the bridge is situated. The present ¼-mile channel is in a new and apparently permanent course of the stream. The old channel, now flooded only at extreme overflow, is about 2000 feet south.

When a location was determined upon for the new trestle, the sites of the southern ends of the old and new bridges coincided, but the center lines diverged toward the north. Accordingly, to facilitate handling of traffic while construction was under way, a schedule of operations was prescribed in the contract.

The southerly 500 feet of old trestle, encroaching upon the site for the new bridge, was first removed and replaced by a plank road in a new location, which was connected to the northerly portion of the trestle by a ramp. The southerly 500 feet of new bridge was then constructed. Following the November rains, the river washed out the plank road and a short section of bridging was angled across so that traffic could use the completed portion of the new structure.

Contractor's Plant Layout.

The length of the trestle also presented a problem in plant layout which was met by the contractor in ingenious manner, as shown by the accompanying diagram.

A spur was run from the Pacific Coast Railroad to the center of the river bed, which brought the concrete and other materials direct to the storage and mixing plant. Tall aggregate bunkers were filled from the cars by endless chain bucket conveyors. Aggregates were discharged from the bunkers by chutes directly into measuring buggies located on a high mixing platform. The cement, brought in on flat cars, was stored in an elevated shed along side the track by means of a small car operated by cable and hoist engine.

A 2-bag, open-tilting Jaeger mixer discharged batches into a reservoir hopper supplying a ½-yard dump car operating on narrow-gauge tracks. The "locomotive" was a "home-made" contrivance resembling a railway "scooter.' An inventive combination of Ford transmission for forward speeds, and a Chevrolet transmission for backward speeds, gave efficient and flexible operation.

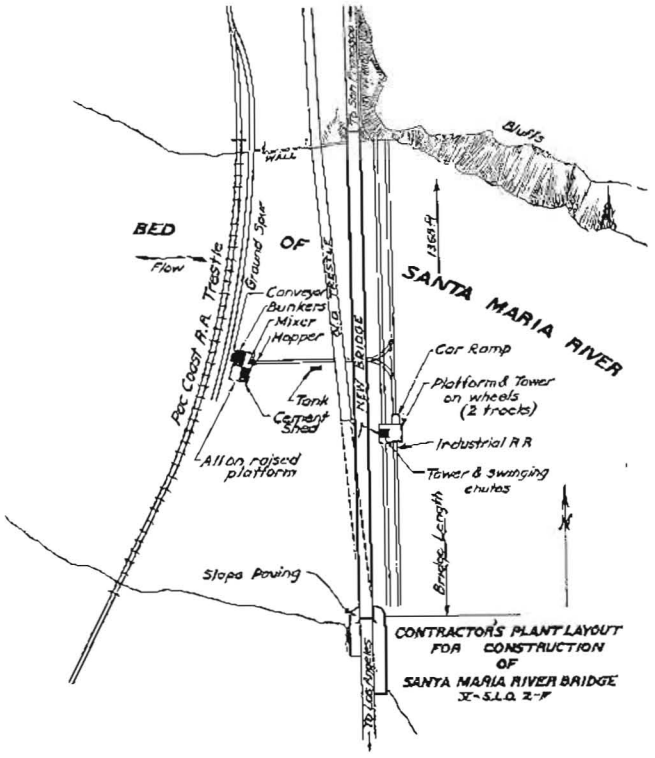
The narrow-gauge delivery ran to the center of the bridge, split, and paralleled the line of the structure on the upstream side. (See diagram.)

On the upstream side of the bridge a movable hoisting and chuting tower was built on a platform, which in turn was mounted on wheels and two separate tracks, one of which was the delivery line track. An inclined ramp track allowed the locomotive to push the car of concrete mix up to the hoist platform, where the contents were dumped sideways into a vertical skip in the tower. A gasoline engine, with cable

and drum, raised the skip which automatically dumped into a reservoir hopper above the chute. The flow from the reservoir was governed with a line-operated trip by the hoist engineer. A swinging boom allowed great flexibility in the operation of the two-piece chute which deposited the concrete at the spot desired.

Test Piles Are Placed.

The concrete piles were surface-treated to counteract the effect of alkali. All piles, except certain test and experimental piles, were given several coats of water gas tar paint, brush-applied. One coat was applied for full length before



driving, and, later, four additional coats were applied on all surface above the ground line and for two feet below the surface.

The test piles, for depth, were of lumnite cement concrete. Certain other piles designated for future investigation by the Testing and Research Laboratory were cast with (1) Class "A" (six-sack per yard concrete) (2) with "Laykold" Class "E" asphalt admixture, and (3), with "Biber" admixture. The remainder of the piles were cast with Class "F" (7 sacks per yard) concrete.

The contract also included grading and paving of the two approaches and constructing a concrete slope paving system on the south fill.

The cost of the Santa Maria trestle was approximately $120,000. The contractors were Rocca and Caletti of San Rafael. Resident engineers for the Bridge Department were J. C. Wilson and H. E. Fearnall.

A pedestrian has rights—yes. But too often they are the last sad rites.

—Tampa Tribune.

The Kaiser Paving Company of Oakland, a well known contracting firm that has built many miles of California state highway, has been awarded a contract for the constructing of some 120 miles of the new national highway of Cuba. The amount of the contract aggregates $20,000,000, the work to cover a period of five years.

INCREASE IN SMOOTHNESS

(Continued from page 6.)

Cement control on 1926 projects ranged from 2.64 per cent to nine-tenths of 1 per cent and averaged 1.49 per cent for all jobs; the general average for 1925 was 1.73 per cent. This indicates that, during 1926, the field men made good progress in maintaining the proper cement yield.

Concrete pavement yardage increased in daily average production from 179 cubic yards in 1925 to 186 cubic yards in 1926.

ASPHALTIC CONCRETE. Surface roughness on asphaltic concrete pavements for 1926 averaged 24.1 inches per mile as compared with 33.2 inches in 1925, or a decrease of 27 per cent.

Daily tonnages produced in 1926 varied from 69 tons to 388 tons and averaged 270 tons for all jobs. As the average for 1925 was but 214.4 tons, there was an increase in production during 1926 of 26 per cent.

SURFACE ROUGHNESS, ALL TYPES. Since the vialog was first brought into use for comparison of surface roughness, the yearly averages denote a steady improvement in the riding qualities of all types of completed pavements. The average for 1924 was 22.2 inches of roughness per mile; for 1925, 18.8 inches; and for 1926, 15.0 inches, a decrease of 20 per cent over the 1925 record.

California state highway pavements are becoming constantly smoother and therefore better. Elimination of the impact which results from vehicles passing over unnecessary roughness in the pavement surface means greater wearing qualities and a longer life for the highway surface. Much of the benefit which comes from added initial strength of pavements is lost without smoothness of surface.

MOUNTAIN SPRINGS GRADE

(From the Imperial Valley Press.)

THE control system is in force at present on Mountain Springs grade, between this city and Jacumba, causing motorists something of a delay while they wait for their turn to proceed in the direction in which traffic is allowed to move.

Caught in the jam Sunday, awaiting the signal to proceed, we were led to wonder if those who are thus held up, do any grumbling about the delay. Before the husky individual in charge of the control gave the signal to proceed, we, like most mortals, fumed at the delay. When the signal came, and we were soon on a stretch of pavement, on Mountain Springs grade, we felt ashamed.

Any valley resident who has been held in the control, will know why we were ashamed. To roll along smoothly even for a short distance, over what used to be dubbed "the worst road in southern California," is a real delight, worth waiting much longer than the control requires.

It gives one an idea of what pleasure it is going to be to go up or down the grade this summer, with pavement from Shepherd's bridge to the top.

Instead of fuming at the slight delay the control causes, we should be singing songs of praise, for the California Highway Commission, the engineers in charge of the work, and the laboring man who is making convenience and comfort for us.

The stretch of pavement now open is wonderfully banked, well constructed, and as smooth as a ball room floor. We can all well afford to be patient at present delays, and think only of the real enjoyment that travel westward from the valley is going to be in a few short weeks.

Five years ago a genuine mountain trail and in a short time it will be a boulevard! Its opening should give the valley a good excuse for a big celebration.

GOOD ROADS ITEMS.

"Wagner-St. Lukes—Owing to the condition of the roads in this locality, our regular weekly worship of Almighty God has been discontinued."

—South Dakota Churchman.

WHAT THE DIVISIONS ARE DOING

DIVISION I.

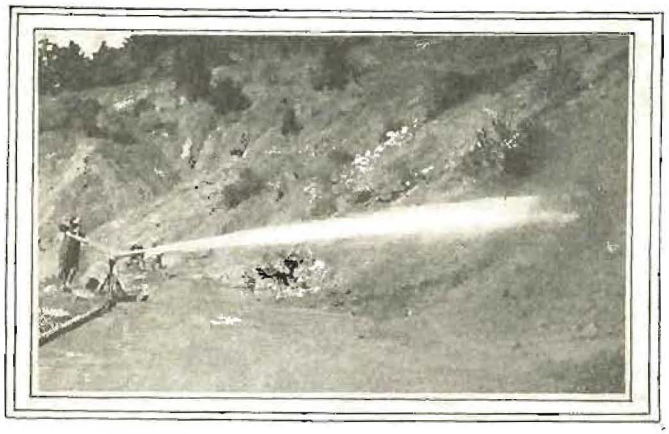
HEADQUARTERS, WILLITS.

T. A. BEDFORD, DIVISION ENGINEER.

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

DIVISION I, during the past month, has directed practically the entire time of its employees to removal of slides and repair of the highway, due to continued rains throughout the northwest counties. Many large slides, some new, others a continuation of former conditions, have damaged the Redwood highway to the extent of thousands of dollars. The temporary bridge at the convict camp on Smith River was washed away and considerable damage was done to other county-built timber structures at many places.

On March 18th, the rainfall at the convict camp had reached a total of 77.5 inches for the season and this record was



Slide removal by hydraulicking on Redwood highway near Garberville, Humboldt County. This method has proved most economical in many locations.

reported below that of the government station a little farther down the river. The road, however, is now open to travel and in fairly good condition.

Division I now has two ¾-yard, three ½-yard and five ⅜-yard power shovels operating on slide removal. Additional power shovels are expected to be put to work shortly in Smith River canyon, just south of the Oregon line.

Slide removal expense of Division I during January and February averaged $1,100 per day; during March it is expected to reach an average cost of $1,500 per day.

DIVISION VI.

HEADQUARTERS, FRESNO.

E. E. WALLACE, ACTING DIVISION ENGINEER.

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

DIVISION VI came through the recent heavy storms without serious damage to any highway. There were several rock slides on the Kern Canyon road, some very heavy boulders coming down, but there was only one complete washout on this section.

Route 10, west of Coalinga, suffered heavy slides and some erosion of newly made fills. Due to the numerous places where road is in the creek bottom, this route was impassable during the high water, but there was no major damage.

Travel over the Yosemite all-year highway was not interrupted at any time in spite of the heavy traffic (1600 cars daily) over this route, a portion of which is inadequately surfaced.

Considerable favorable comment has followed the shoulder widening and drainage improvement program for the trunk line which has been started between Tulare and Kingsburg, in Tulare County. For the first time since its construction, the Valley route between these points is this winter free from standing water. The roadbed has been graded and crowned to the fence lines.

DIVISION IX.

HEADQUARTERS, BISHOP.

F. G. SOMNER, DIVISION ENGINEER.

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

MAINTENANCE forces of Division IX have been busy making repairs of storm-damage, consisting of numerous washouts extending from Mojave to Lone Pine. Save for the occasional stalling of trucks and automobiles, traffic has been uninterrupted.

Motion picture companies have been fighting their way into the Mammoth Lakes country in Mono County, forty-five miles north of Bishop, to secure snow scene pictures. This has necessitated breaking a road through the snow at considerable expense. State maintenance forces have followed up their efforts in opening the road to travel.

Notwithstanding the heavy snow fall in Mono County, the division plans, with the facilities at hand, to open the highway for travel by May 1st, the date of the beginning of tourist travel. Sanding of the snow on Deadman grade to hasten melting is now in progress by state forces traveling on skiis on either side of the summit.

Improvements at Georges creek between Lone Pine and Manzanar have been completed, which include the relocation and surfacing with crushed rock of four miles of highway. Elimination of right angle turns and replacement of a timber structure with its dangerous approaches, at a crossing of the Aqueduct, with a steel bridge on new alignment built by the city of Los Angeles, is welcomed by the traveling public.

Surveys are now in progress for a relocation of the highway from Little Lake to Lone Pine, a distance of fifty miles.

Resurfacing with decomposed granite together with alignment changes, preparatory to oiling, is in progress between Fish Springs and Big Pine and south of Lone Pine.

Crews of Division IX breaking trail through snow between Sherman Hill and Mammoth Lakes, Inyo County.

HATS OFF TO R. L. THOMAS.

(From the Laguna Life.)

A rising vote of thanks should be given to R. L. Thomas, resident engineer for the State Highway Board, by the people of Laguna Beach. He has gone out of his way to serve the community, and his ability to meet an emergency has saved many an awkward situation. Mr. Thomas has used his authority intelligently, recognizing the fact that speed in the highway paving work will mean dollars in the pockets of Laguna Beach merchants next summer, and realizing that one delay gives an excuse for another.

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.

DIVISION X has completed the building of a section of temporary pile trestle approach to the Rio Vista bridge across the Sacramento River on Route 53. This was necessary to care for traffic following a washout of several spans of the old structure during the recent high water. A change in the current of the river, due to dredging at the lower end of Wood Island, caused a scouring out of the bed of the river until the piling under a section of the bridge, a county-built structure, was entirely free.

A permanent bridge at this point has become necessary because of the plans of the federal government to remove all of Wood Island. The present temporary bridge will serve until the permanent structure is completed.

The temporary trestle was economically built by removal of the deck of the old structure in sections to a position on the new piling. This was accomplished by use of a large crane mounted on a scow.

While traffic was held up the division operated a power boat with a twenty-five passenger capacity to carry persons across the river.

Big Trees Road Taken Over.

A 16-mile section of highway leading to the Calaveras Big Trees, on a route made a part of the state highway system by legislative act in 1925, was taken over by Division X on February 16th and will, hereafter, be under state control and maintenance. The construction of this section was under the direction of the Bureau of Public Roads. It was a forest highway project with the federal government and Calaveras County cooperating in the financing.

The new section is well surfaced with crushed rock and in excellent condition. Many motorists have taken this route in traveling to the snow line during recent months.

BRIDGE DEPARTMENT NEWS

J. M. CURRAN, who has been assistant resident engineer on the Harlan D. Miller bridge in Shasta County, has been transferred to work on the Del Mar Crossing and San Dieguito bridge in San Diego County. M. E. Whitney will be in charge of this latter work as resident engineer.

W. A. Douglass, who has just completed the work on the San Felipe Wash bridge, will be assigned as resident engineer on the construction of the new crossing of the Santa Ana Bridge Overflow Channel.

A. L. Richardson, having completed his work at the Santa Ana River bridge, will take up the duties of resident engineer on the bridge across Sonoma Creek on the Black Point Cut Off.

John H. Peterson, assistant to resident engineer Thompson on the South San Francisco underpass, has resigned to accept a position with Barrett and Hilp, contractors of San Francisco.

H. R. Lendecke has been assigned as resident engineer on the construction of the Kern River bridge sidewalk near Bakersfield.

EMPLOYEE KILLED IN SLIDE.

WHILE at work during the night of February 17th, C. A. Turner, an employee of Division I, was killed in a slide, which was being sluced under the highway at a point about five miles south of Scotia, Humboldt County. In some manner he was caught in the debris and carried for a distance of 100 feet, and buried beneath mud and rock. It was impossible to recover the body until the following day.

As all telephone and telegraph lines on the Redwood highway were down due to storms, news of the accident was sent out by St. Clair Adams by wireless and picked up in San Francisco and telegraphed to the division office at Willits. The cooperation of Mr. Adams is appreciated by the division.

The next annual convention, American Association of Engineers will be held at Tulsa, Oklahoma, June 6-8, 1927.

FIGHT OF MAINTENANCE MEN ON PUNCTURE VINE EFFECTIVE

EFFORTS of maintenance crews of the California Highway Commission to stop the spread of puncture vine along the highways are proving effective. This is evidenced by tests made during the past year by W. C. Jacobson, chief of the Bureau of Pest Control of the State Department of Agriculture.

Samples of burs that had been sprayed with oil were gathered from the highway right of way in the vicinity of Vacaville, Solano County, and sent to Sacramento for testing. No germination was apparent after a test lasting 206 days.

Superintendent Commended.

Commenting on this fact, F. B. McKevitt, Jr., well known fruit grower of the Vacaville district, wrote as follows to District Maintenance Superintendent C. L. Caine of Division X:

> I am enclosing, herewith, two copies of the germination test which were made by the State Insectary in Sacramento. You will note that there were absolutely no germination at the end of 206 days. This shows that your method of treating the puncture vine brought results.
>
> I want to congratulate you on your very efficient handling of the puncture vine proposition here. If all the work was handled in the same efficient manner, there would be a great decrease of the amount of the puncture vine along the highways.

A GOOD WORD FOR DIVISION I

THE following letter with reference to conditions on the Redwood highway has been received by the state highway engineer from L. L. Norris, of San Francisco, director of the touring department of the National Automobile Club:

> We recently received a detailed report on the condition of the Redwood highway from Mr. P. B. Carrington, our Eureka District Manager, and we believe that the following excerpt from his letter will be of interest to you.
>
> "The maintenance crews on this northern division are worthy of commendation; they are capable, and have fought the battle night and day regardless of conditions and weather. Those who have not traveled this road under hard storm conditions can hardly realize the difficulties which exist. The highway has been open and in far better shape through the past storms than has the railroad."

HIGHWAY NEWS NOTES

M. MALCOLM BERANGER, administrative director of the Societe La Bitume Liquide, of Paris, France, was a recent visitor at the Sacramento headquarters of the California Highway Commission. He was particularly interested in the work of Research Engineer C. L. McKesson. M. Beranger is in the United States as a representative of a corporation which is producing a new form of emulsified asphalt.

J. B. Woodson, former division engineer at Fresno and now of Los Angeles, has been appointed a member of the board of consulting engineers of the Los Angeles City and County Major Highways Committee and Traffic Commission.

Shop 5 reports the marriage of Miss Dorothy L. Kinsman, bookkeeping machine operator at the shop, to Mr. A. A. Gill of San Luis Obispo.

R. A. Reber, formerly with the Division of Water Rights, is now a member of the drafting force of Division X.

F. C. Hewett of Division X, who recently injured his knee while on reconnaissance work in Tuolumne County, is about to be released from the hospital. An operation on the injured limb was necessary.

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
					COMPLETED AND ACCEPTED SINCE FEB. 23, 1927—None.						
					AWARDED SINCE FEB 23, 1927—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.	Division	County	Route	Sec.	Location	Miles	Type	Contractor	Estimated cost	Date contract awarded	Contract time, days
					COMPLETED AND ACCEPTED SINCE FEB. 23, 1927—None.						
					AWARDED SINCE FEB. 23, 1927.						
M-160	VI	Kern	4	D	Kern River Bridge at Bakersfield		Sidewalk on existing structure	Peterson and Eissler	$8,413 31	Mar. 9, 1927	150
M-161	VI	Merced	4	A	Athlone to southerly boundary	4.51	P.C.C. Pave. Wid. and A.C. Surfacing	Allied Contractors, Inc.	105,706 13	Mar. 9, 1927	100
M-162	IV	Sonoma	8	A, B	Sonoma Creek Bridge			Proctor and Cleghorn	26,119 69	Mar. 9, 1927	150
M-163	VII	San Diego	12	A, B	La Mesa to El Cajon	3.69	P.C.C. Pavement	George Herz and Co.	154,223 57	Mar. 9, 1927	125
M-164	II	Siskiyou	3	A, B	Dunsmuir to Shasta River		Clearing right of way	J. P. Brennan	5,077 69	Mar. 9, 1927	75
						8.20			$299,540 39		
					PENDING AWARD—None.						

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

CALIFORNIA STATE PRINTING OFFICE
CHARLES A. WHITMORE, State Printer
SACRAMENTO, 1927

50541 3-27 4200