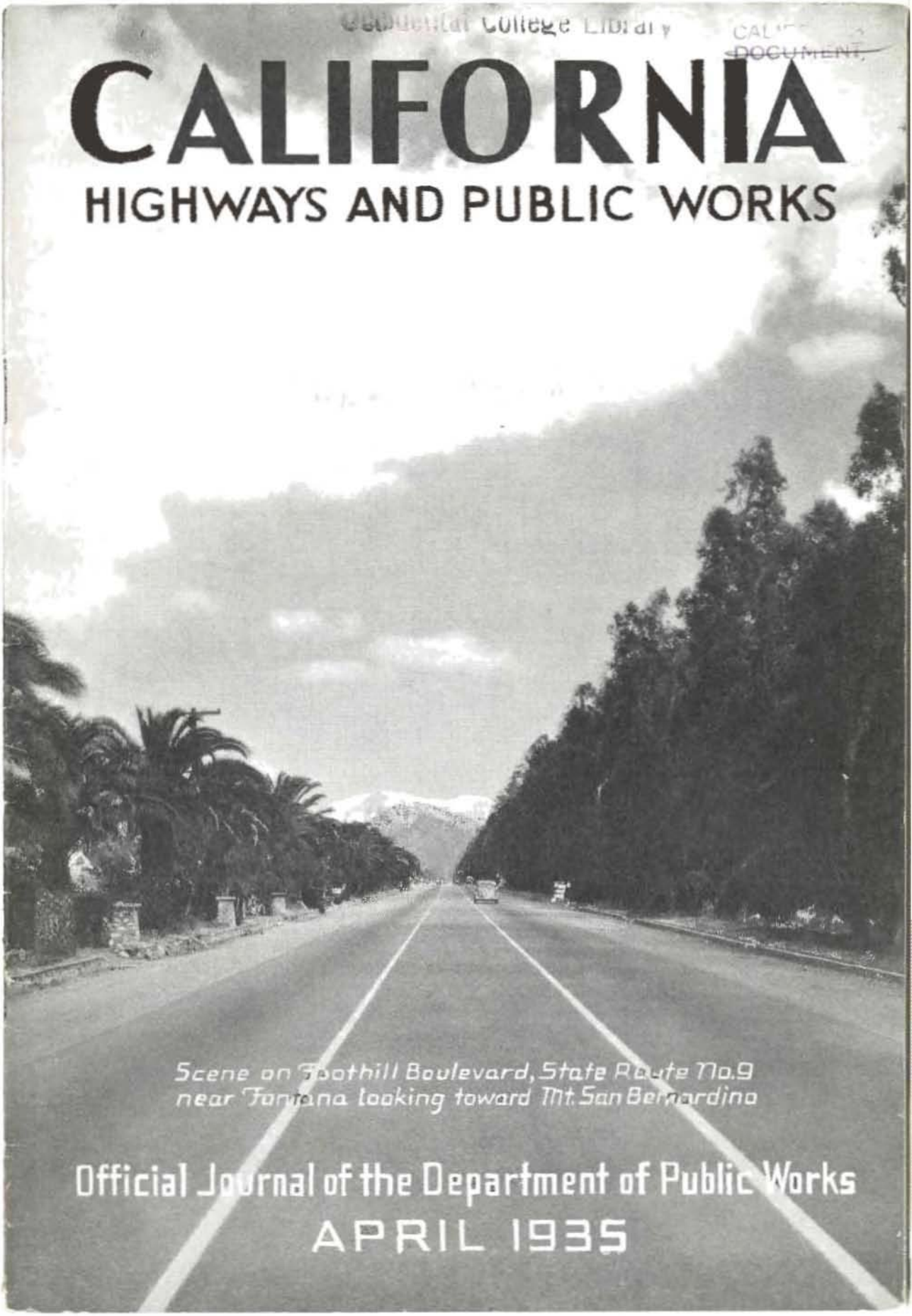
CALIFORNIA

HIGHWAYS AND PUBLIC WORKS



Scene on Foothill Boulevard, State Route No. 9 near Fontana looking toward Mt. San Bernardino

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Governor's Road Plan Would Have Cut Taxes $60,000,000 in Last 5 Years

Records Disclose Supervisors Spent on County Highways an Average of $12,000,000 per Year Above their Gasoline Tax and Vehicle Fee Revenues with which State Proposes to Administer Unified Systems

By **EARL LEE KELLY**, Director of Public Works

GOVERNOR Frank F. Merriam, presented a long and carefully considered message to the Legislature on the State's finances at the January session. This document in every part contained important proposals for improving the economic security and governmental efficiency of the State of California. Not the least of the proposals of Governor Merriam's message was that relating to California's highways.

Briefly and simply stated, Governor Merriam's road bill is a tax reducing measure. The Governor proposes to abolish county road taxes against real and personal property and to place the burden of county roads, as well as State highways, upon the State gasoline tax.

This means that the gasoline tax will foot the entire highway construction and maintenance cost in California.

This means that should the Governor's road bill be adopted by the Legislature, taxes against homes and farms, real estate, and personal property, estimated at more than $16,000,000 a biennium, will be saved to the taxpayers and a study of county records and the results of the recently completed California Transportation Survey shows that in putting the figure at $16,000,000 Governor Merriam was more than conservative in estimating possible savings. Will the county roads that have been maintained by these real estate common property taxes suffer in the loss of this revenue?

EARL LEE KELLY

The answer of the State Department of Public Works which, under the Governor's bill, will take over the administration of the county roads, is that they will be as well, if not better, maintained, than they are now and without any taxes other than the pennies paid as a gasoline tax.

The reason the State Department of Public Works can do this work for less money than is now spent, is that one unit can always function more effectively than many units.

Today we have in California fifty-eight counties, one of which is the consolidated city and county of San Francisco. Each of the other fifty-seven have county road departments levying taxes to maintain and build county roads. These fifty-seven road departments have duplicate machinery, duplicate overhead, and they cannot hope, with fifty-seven varieties of overhead, to function as efficiently as one specialized State Division of Highways.

We believe the time has come for all of California's roads, State highways as well as

(Continued on page 8)

Governor Merriam Formally Opens Reconstructed American River Bridge

FOR MANY YEARS the northerly entrance to Sacramento has been greatly restricted by a narrow, two-lane bridge across the American River at Sixteenth Street on U. S. Highway No. 40. In addition to carrying a daily traffic of from 12,000 to 14,000 vehicles the bridge had a 65-foot radius curve approach with a 6½ per cent grade at the Sacramento end that made driving very dangerous and resulted in numerous bad accidents.

This bottleneck bridge, built twenty years ago, has been transformed by the State from a two-lane, 22-foot structure into a four-lane, 44-foot structure with 5-foot sidewalks on either side and wide, easy approaches, at a cost of $135,000. It was formally opened by Governor Frank F. Merriam March 24, 1935, with gala dedicatory ceremonies sponsored by the North Sacramento Post of the American Legion at which Governor Merriam and Director of Public Works Earl Lee Kelly were the principal speakers.

The ceremonies, featured by a colorful parade, were attended by a large throng of citizens and city, county and State officials and began with the playing of the National Anthem by Post 61 band, followed by a flag raising ceremony and invocation by Rev. Newton M. Moats.

SNIP GOES ANOTHER TRAFFIC BOTTLENECK as Governor Frank F. Merriam cuts the ribbon officially opening the American River bridge at Sacramento assisted by Earl A. Dart (left), master of cermonies, Director of Public Works, Earl Lee Kelly and North Sacramento Sea Scouts.

SPEAKERS ON PROGRAM

The speakers included: Commander Eric Austin, Earl A. Dart, master of ceremonies; Mayor Arthur Ferguson of Sacramento; Mayor Bert Burgess of North Sacramento;

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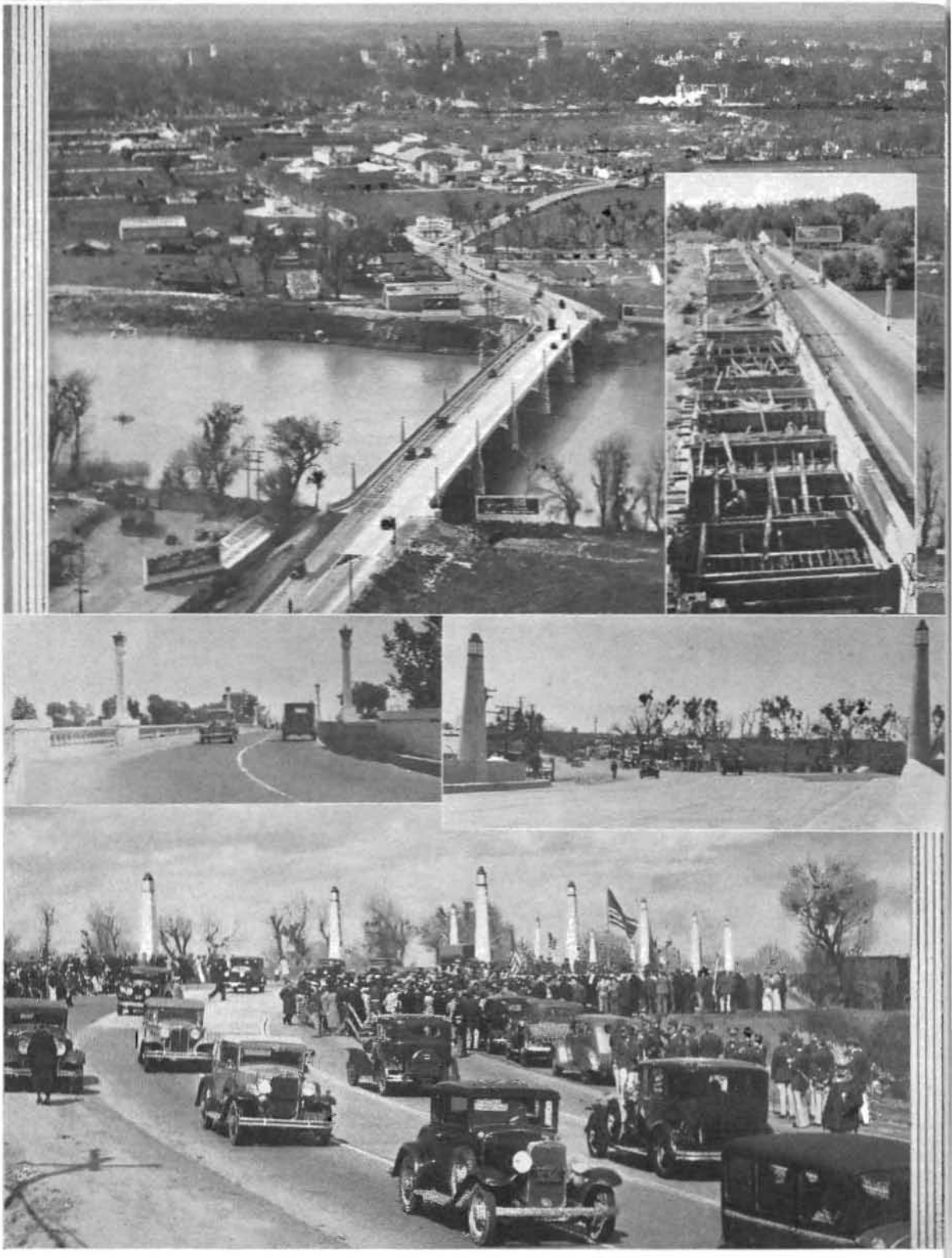

AMERICAN RIVER BRDGE at Sacramento as transformed by the State Department of Public Works from a narrow, traffic bottleneck structure is pictured at top in photo by Hansaker of Bee from Barker-Witney Flying Service plane. White roadway area on upstream side indicates part added by widening operation and inset shows work under construction. Center photos show the old two-lane roadway and 65 foot radius curve approach on 6½ per cent grade compared with the new 600 foot radius curve approach and 3 per cent grade. Bottom scene shows crowds gathering for the dedication ceremonies on March 24th, when Governor Merriam formally opened the reconstructed bridge to traffic.

Grizzly Dome Drops 75,000 Yards of Granite into Feather River Canyon

By **F. W. HASELWOOD**, District Engineer

THERE is a familiar saying that when a dog bites a man it is of no interest, but if a man bites a dog it is news.

When a river spends centuries cutting a canyon through solid rock, that is of little interest, but when the mountain towering above the river bed reverses the process and falls into the river channel, that is news—and big interesting news.

On March 26, from Grizzly Dome in Feather River Canyon some 75,000 cubic yards of rock dropped without warning into the river.

Grizzly Dome is a huge rounded and solid mass of granite rising a thousand feet above the canyon of the North Fork, that has stood, a rugged and magnificent sentinel of the Sierras through countless ages. It has seen the North Fork, through thousands of years, cut deeper and deeper through the rocky canyon at its base. During man's brief knowledge, the great dome has been taken as a matter of fact part of the scenery, a rugged fixture, always inspiring, in its massive, towering bulk as one of nature's marvels.

ALWAYS CONSIDERED STABLE

To the Division of Highways, with its plans to build a highway across the steep slope of granite some five hundred feet below the dome, and to the Pacific Gas and Electric Company, who had planed a dam in the river directly below the dome, this sudden, great slide of rock from the face of the mountain was news of vital importance.

The huge mass of solid granite rising from the river bed, with slopes ranging from forty degrees to vertical, had always been considered as stable as the rock of ages. The dome-shaped formation from which the name originated towers one thousand feet above the stream. No apprehension was felt as to the safety of the proposal to construct a highway by cutting a notch in the solid face of the slope far below the dome, and no work had been done on that section but two major movements of rock occurred when a part of the dome broke off and crashed into the river below.

SKETCH SHOWS location of Grizzly Dome relative to proposed highway route and fan area of slide.

The vertical, broken face of the dome that remains is over five hundred sixty feet wide at its base and two hundred ninety three feet high and has an area of more than two acres. The huge mass broke into fragments as it fell, and spread in a fan shape until it reached the river.

At its crossing of the highway survey, one hundred twenty feet above the river, the breadth of the area swept clean by the falling rock was eight hundred feet wide. The North Fork channel was filled for a length of eight hundred feet to a depth that raised the water level thirty feet. The amount of rock that fell from the dome is estimated at approximately 75,000 cubic yards.

The broken face of the dome shows several

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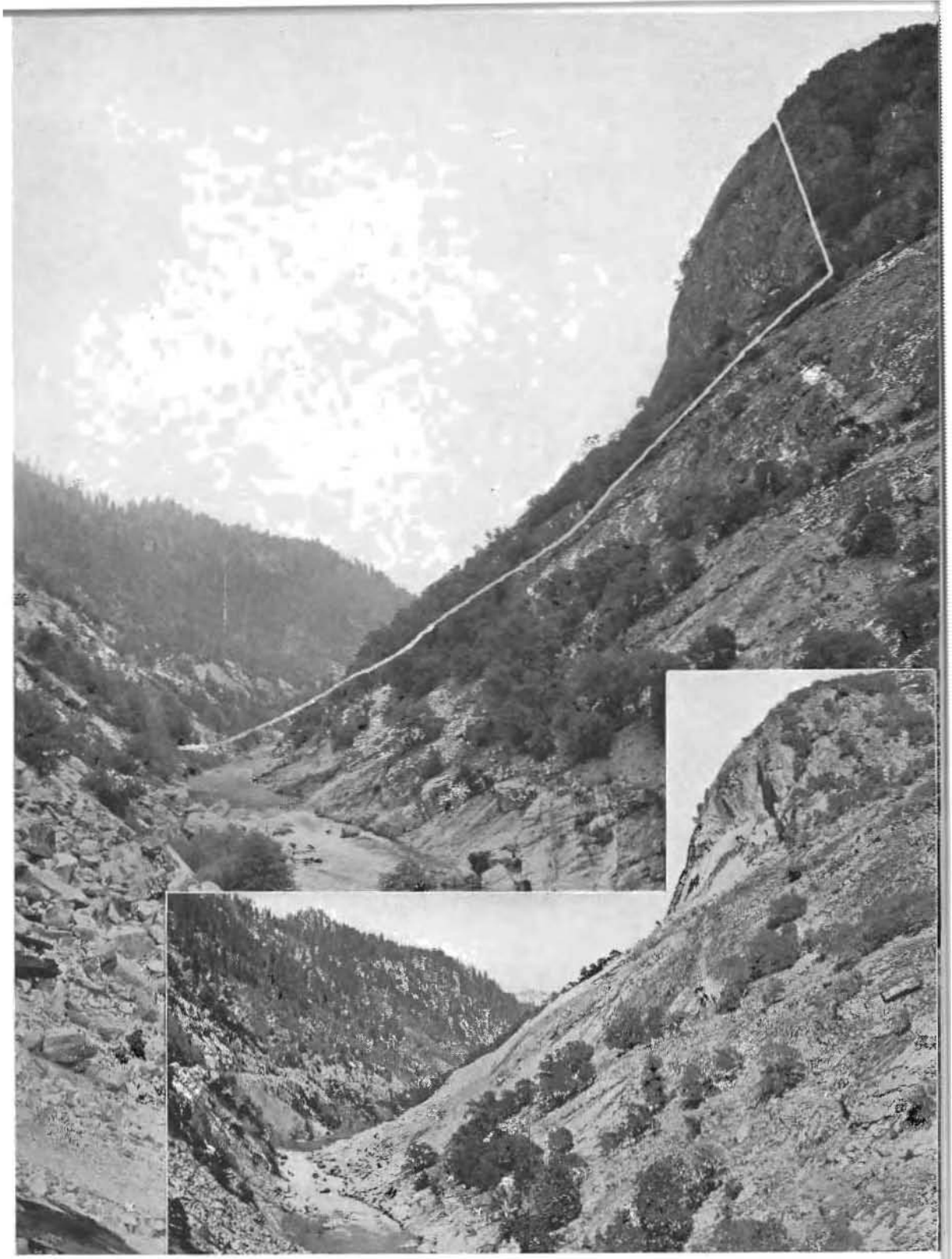


MOUNTAIN BREAKS AND PRODUCES A DAM—The large picture shows Grizzly Dome a mountain of solid granite as it looked before it suddenly dropped 75,000 cubic yards of its face into the North Fork of the Feather River along the line of the proposed State Highway. The debris dammed the river to a height of 30 feet drying up the stream temporarily and producing white rapids when the water rose over the dam. The lower photo shows where the large piece of the dome fell away and the resultant change in the scenery.

16 Roadside Planting and Landscaping Projects on State Highways for 1935

By H. DANA BOWERS, Landscape Engineer

SIXTEEN roadside development projects financed from Federal aid funds are being rushed for this year's planting throughout the State. Federal requirements that ½ of 1 per cent of California's apportionment of United States highway funds be expended on beautification have presented the opportunity to carry out many development plans that have been pending for some time due to lack of funds.

The allocation of Federal funds, combined with the use of part-time labor, has speeded up the progress of roadside development in California by leaps and bounds. Projects ranging from the planting of trees in the desert to the construction of typical architectural features at city entrances are included on the program and vary in cost from the nominal sum of $200 to as much as $30,000.

MUCH DONE LAST YEAR

In addition to the 1935 planting program, approximately $190,000 was expended in 1934 on roadside improvement, such as slope rounding, construction of rubble masonry walls, cleaning up roadsides through forest areas, development of scenic viewpoints, and many other worthwhile items that are important in themselves but are perhaps less noticeable to the motorist than the items on this year's program will be. The projects for 1934 include:

1. **SACRAMENTO COUNTY**—Planting trees and shrubbery, including installation of water line, to improve the north entrance to Sacramento on U. S. 40 from North Sacramento to Ben Ali.

2. **SACRAMENTO COUNTY**—Planting to frame the approaches to the American River Bridge, also on U. S. 40.

SCREENS OF GREENERY

3. **YOLO COUNTY**—Construction of curbs and sidewalks, installation of water lines, well and pump for water supply, and an intensified planting of trees and shrubbery to screen out unsightly areas along the west entrance to Sacramento over the new M Street Bridge on U. S. 40.

4. **SACRAMENTO COUNTY**—The landscaping of the McConnell Subway south of Sacramento on U. S. 99.

5. **SANTA BARBARA COUNTY**—An intensified landscape treatment of the new Truck Boulevard from the west city limits of Santa Barbara to Montecito. Trees and shrubs in groups will be planted the length of the entire route to screen the railroad. Water lines to facilitate maintenance are included.

PAYS DIVIDENDS

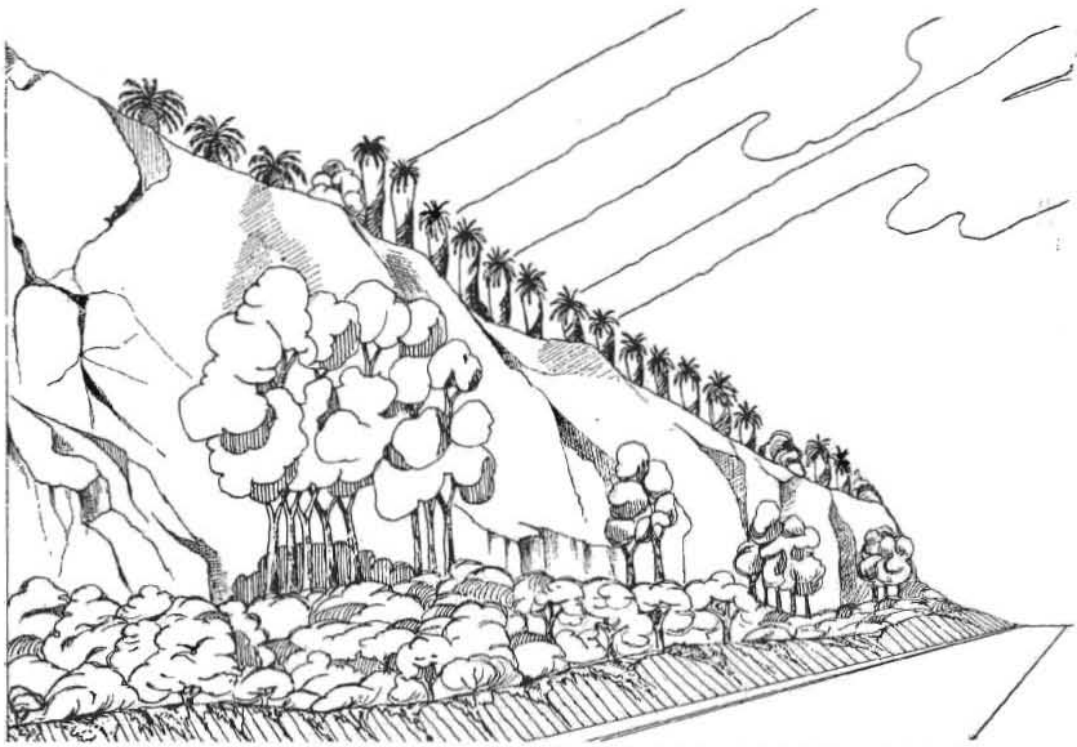
Cut slopes that tend to erode so severely in that section are to be terraced and planted to ground covers and hardy native shrubs. **The initial cost of this type of work is high, but it pays large dividends from a maintenance point of view as it eliminates erosion.**

6. **SANTA BARBARA COUNTY**—From the west city limits to Hollister Avenue, west of Santa Barbara City. A naturalistic planting will be adopted here that will harmonize with the surrounding terrain. Ground covers will be planted to eliminate fire hazard and to eradicate weed growth.

A SLOPE EXPERIMENT

7. **SANTA BARBARA COUNTY**—In Solomon Canyon south of Santa Maria. A worthwhile experiment is under way to determine the best method of treating sand slopes. It is proposed to widen the section to its ultimate width and flatten the slopes back to 2 to 1. A covering of top soil will be placed over the sand and indigenous native shrubbery will be planted.

The outcome of this project will decide more or less the future treatment of that section when it becomes necessary to widen the road to accommodate future traffic increase.



TYPE OF TREATMENT ALONG SANTA MONICA BLUFFS

8. **SAN BENITO COUNTY**—At the intersection of the Prunedale Cutoff and the new Rocks Road entering San Juan Bautista.

A most unusual type of roadside development is being planned at this point in that it includes Spanish type architectural features, such as the Campanile, placed in a setting of adobe walls and landscaped in a true Mission style with varieties of plant material brought in by the Padres in the eighteenth century.

SHADE TREE GROUPS

9. **KERN COUNTY**—North of Bakersfield. Over this arid section, trees are being planted in naturalistic groups to afford shade and create a point of interest in an otherwise scenically monotonous area.

10. **VENTURA COUNTY**—From Ventura to Mussel Shoal, 8 miles north. The road here traverses directly along the ocean edge and Palm trees are to be planted so that interesting ocean vistas will be created.

11. **LOS ANGELES COUNTY**—In Santa Monica along the famous Santa Monica Bluffs. Here the use of SERA workers will furnish the labor for this most difficult of beautification projects, the State furnishing the materials and supervision.

THIS PROJECT IS IMPORTANT FROM AN ECONOMIC AS WELL AS AN ESTHETIC POINT OF VIEW IN THAT PROPER PLANTING WILL REDUCE THE GREAT AMOUNT OF EROSION THAT TAKES PLACE ON THE SLOPE AT THE BASE OF THE BLUFFS DURING HEAVY RAINS.

PALMS WILL BE PLANTED

12. **SAN BERNARDINO COUNTY**—At the west entrance to San Bernardino. Palm trees and native shrubbery will be planted to beautify the city entrance.

13. **SAN BERNARDINO COUNTY**—Between Pomona and Ontario. Here the road traverses between orange groves and it is planned to plant the graceful

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Bill Abolishes County Road Taxes

(Continued from page 1)

county roads, to come under one unified system, carefully engineered and with branches reaching out to even the most remote rural communities of the State where petitions may be placed by the people for road improvements. For these county roads, which bear only approximately 11% of the traffic of the State, the counties receive 33 1/3% of the entire State gasoline tax. This is in addition to the real estate taxes levied for county road purposes.

The Governor's road bill would:

First, declare all the present county roads to be State highways to be administered as such by the State. The present gas tax would carry the entire burden of this cost.

Second, repeal all laws permitting counties to levy taxes for highway purposes in any way whatsoever. This would save rural common property at least $6,000,000 per biennium.

Third, double the amount of gas tax moneys now allocated by law to the cities. This gives an additional $6,000,000 for relief of city taxpayers each biennium.

PRESENT FINANCING PICTURE

For a better understanding of the bill let us consider the present picture of highway financing in California. Four cents is collected on each gallon of gasoline you purchase, one cent of which goes to Uncle Sam. The remaining three cents is known as the State gasoline tax, but of this three cents, the State has in the past received only one and three-fourths cents, or a little more than half. The remainder has gone, one cent to the counties for the county roads, and one-fourth cent to the cities.

The counties, with one-third of the total gasoline tax plus such levies against real and personal property as they might make for road purposes, have supported roads which bear, as I said, 11% of the traffic of the State. These are the local feeder roads not in the State highway system either as primary or secondary highways and many of them are subject to irregular maintenance at rare intervals.

On the other hand, the State Department of Public Works maintains 14,000 miles of primary and secondary highways including all the trunk line traffic through both counties and cities upon which 47% of all traffic in California flows.

To do this work, the State has received but one and three-quarters cents of the three cents gas tax or a little more than half.

Of the total State traffic 42% is in the cities. In recognition of this large volume of traffic, the Governor's road bill doubles the amount which cities will receive from the gas tax fund.

PLAN ABOLISHES BONDS

The counties have heretofore issued highway bonds on which this year's principal and interest will total more than $6,000,000. Under the Governor's proposed plan, in the future, county bonds for highway purposes with corresponding increase in taxes will not be permitted.

In several portions of the State, almost unbearable burdens of taxes are being borne by real estate and home owners, due to the use of the special assessment scheme of financing highway improvements. Under this new plan, no more special assessment districts in rural areas can be created.

During the past six years in the fifty-seven counties, supervisors have spent $202,324,000 on county roads, of which 41% came from allotments in the form of Federal aid or State gasoline tax and motor vehicle fees, and the remaining 59% was raised from taxes against homes, farms and all forms of real and personal property. Of the latter sum, 7.6% was raised in the form of bond sales and 51.4% was direct taxation for county roads.

BOND TAXES UNNECESSARY

Under the Governor's plan counties, which are not now using any of the State allocations for the purpose of retiring county and special assessment district bonds, will be able to use a portion of such money therefor, and it is estimated that a further saving of a half million dollars annually will thereby be made to local property taxpayers.

Under the existing law, the counties which borrowed money from the State under the provisions of the Unemployment Relief Bond Act of 1933 will be required to start repaying such money in 1938. That means that new taxes will have to be raised or that the amount of work now being done by the counties on highways will have to be curtailed. Under the plan proposed, considering the saving which can be effected, neither of these alternatives will be necessary.

The expenditure of all moneys raised by the State for highway purposes, subject to the full control of the Legislature, will produce much greater results than the expenditure of the same amount of money on the existing basis. The reasons therefor are apparent.

(1) Proper engineering experience will be furnished for all highway problems, whereas at present, many of the counties handle their road problems without benefit of engineering advice.

(2) Wholesale buying will have been substituted for retail buying in purchase of all supplies and equipment.

(3) Heavy equipment will be used to near capacity instead of standing idle a great proportion of its time, as is necessarily the case when owned and operated locally by the counties.

(4) Needless duplication of services with attendant overhead expense will have been eliminated. At present, the State is maintaining a widespread system of State highways, running through every county. Fifty-seven county road departments are also being maintained, and most of these are again broken down into five separate agencies, each under control of one supervisor.

(5) Expenditures will be subject to the analysis made possible by accurate, uniform cost records and budgetary control.

NO GAS TAX DIVERSION

The gasoline tax has proved itself to be an efficient, cheaply collected and painless method of maintaining California's highway supremacy. Both the Governor and I, as head of the Department of Public Works, are vigorously opposed to the diversion of the gasoline

Homes and Farms Paying $12,000,000 Per Year for Roads

tax for any purpose other than that for which it was determined by a vote of our people, namely, the maintenance and construction of highways.

The people of California confirmed this viewpoint a little more than a year ago when they voted overwhelmingly against diverting gas tax revenues to any purpose other than highways. But if we are to maintain intact gasoline tax revenues for highways exclusively, we must see to it that the gasoline tax finances all the highways and that it is efficiently and economically expended.

Unbeknown to most of our citizens, the gasoline tax does not now nor has it previously ever financed all the highways. The gas tax has financed all State highways, all State highways through cities, but it has not paid the whole bill for maintaining the county road systems.

Homes and farms have been contributing to the upkeep of county roads to the extent of millions of dollars a year. It is estimated that during the past five years, an average of $12,000,000 a year was taken in taxes from homes and farms, real estate generally, as well as personal property such as furniture and savings accounts to build county roads. This money would have been saved under the Governor's road plan.

$40,000,000 FROM GENERAL FUNDS

An examination of the reports which the counties are required to file annually with the State Department of Public Works discloses the amazing fact that in the past five years from $5,000,000 to $11,000,000 taken from county general funds has been spent by the supervisors on county roads each year in addition to the regular county road taxes and State gasoline tax and motor vehicle fee allotments.

The law permits a 40c road tax against real estate and personal property, but in addition to this revenue the Boards of Supervisors have gone into the general county funds for more than $40,000,000 in the five years between 1929 and 1933 inclusive.

The special and district road taxes collected during this period total $16,060,214.71. Moneys taken from the general funds in the same period amounted to $44,565,218.72, making a total of $60,625,533.43 or an average of $12,125,106.68 per annum for the five year period, which the supervisors found necessary to supplement the State gas tax and motor vehicle fee allotments in order to meet their expenditures for construction and maintenance of the county road system.

FALLACIOUS ARGUMENTS ANSWERED

Some arguments have been advanced against the Governor's plan, many of which are the result of misinformation or lack of information.

1. It is said that desirable local control will be lost because the districts into which the State is divided for present State highway purposes are so large that any one interested in a local road problem will have difficulty in securing attention to it.

The fallacy in this argument is that it assumes the State would administer the enlarged mileage on the same basis as the old. The obvious thing which must be done, and which we plan to do, is to provide additional maintenance units under each district engineer for the purpose of meeting local highway problems. The men in charge of these units will be located at convenient points in the counties and not in the district office.

2. It is said that the funds will be insufficient to properly care for the local roads.

This is not a sound argument against State administration, but is an argument against doing away with the power to levy taxes or create local indebtedness for highway purposes. The fact remains, regardless of the amount of money to be expended on highways, that the State can do the job more efficiently and better than at present with the use of gas tax funds alone.

COUNTY CITIZENS DO WORK

It is obvious that this is not the time to provide additional revenues for highway purposes, and that under present conditions, common property taxpayers can not continue to bear the present burden for those purposes. I submit that legislation whereby relief can be afforded to such taxpayers without impairing the highway service furnished to the people is both constructive in purpose and in keeping with the necessities of the times.

3. The third argument advanced against this plan is that it will take employment out of the county as the State will bring in outside men.

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3,410,000 MOTOR TRUCKS USING HIGHWAYS IN U. S.

A recently published report on the automotive industry in the United States for 1934 shows that 21,430,000 motor cars and 3,410,000 motor trucks are using the highways of the Nation. Other interesting statistics are as follows:

Motor vehicles registered in U. S.	24,840,000
Motor cars	21,430,000
Motor trucks	3,410,000
Passenger cars on farms	4,134,675
Motor trucks on farms	900,385
Motor vehicles on farms	5,035,060
Miles of surfaced highways	960,000
Total miles of highways in U. S.	3,040,000
Highway and street expenditures	$1,600,000,000
Motor buses owned	112,200
Buses in revenue service	46,200
Buses in local or transit service	17,500
Consolidated schools using motor transportation	23,500
Buses used by consolidated schools	65,000
Buses used by street railways	11,000
Street railways using motor buses	210
Steam railroads using motor buses	62
Total car and truck dealers	36,900
Garages, service stations and repair shops	98,293
Total retail outlets, duplications eliminated	105,944
Wholesalers	5,759
Retail gasoline outlets	317,000

Nojoqui Grade Realignment Abolishes 33 Curves and Saves Nearly a Mile

By **LESTER H. GIBSON,** District Engineer

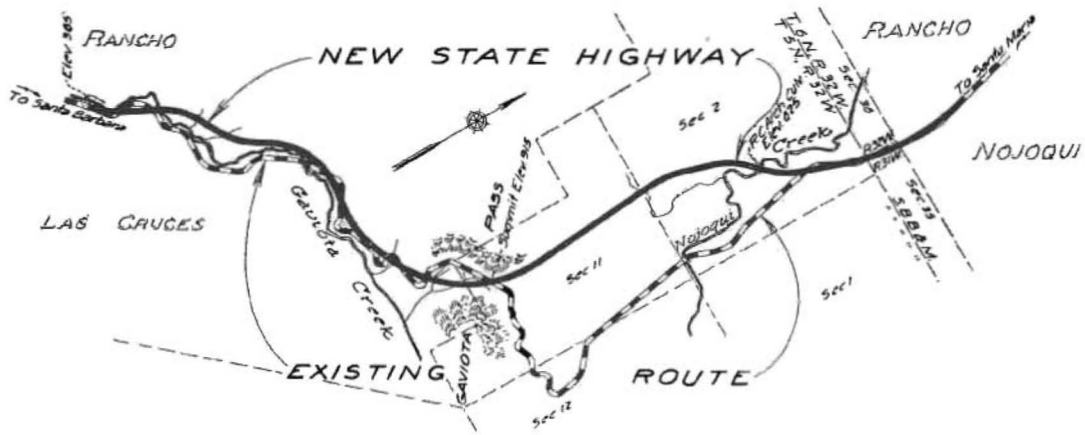
RECONSTRUCTION operations are now in full swing on the Nojoqui grade realignment on the Coast Highway (U. S. 101), in Santa Barbara County, where one of the few remaining barriers, or bottlenecks, to the coastwise motorist is rapidly being eliminated in favor of a modern high-speed highway.

When the motorist has traveled about 30 miles westerly from Santa Barbara over El Camino Real, he swings northward from the Pacific Ocean and passes through the historic Gaviota Gorge, and along Gaviota Creek to Las Cruces. From this point on for the next 4.5 miles, travel is on the Nojoqui grade over curves of 1500 feet. The vast improvement of this new road over the old is evident by the following comparative features:

Feature	Present	New
Total number of curves	44	11
Number of curves 1000' radius or less	42	None
Number of curves 500' radius or less	36	None
Minimum radius	100	1500
Total delta	2305°	373°
Maximum grade	7%	6%
Minimum vertical sight distance	315'	670'
Saving in distance	0.877	miles

HEAVY GRADING PROJECT

The project is characterized by heavy grading, some 581,000 cubic yards in the 3.7 miles



SKETCH MAP shows route and curves of present Nojoqui grade compared with new alignment

Gaviota Pass, where an ascent of about 550 feet and a descent of about 300 feet are made over an exceedingly crooked road, and on grades ranging up to 7 per cent.

SCENE OF FREQUENT ACCIDENTS

This stretch of road has always been of much annoyance and delay to the motorist, as well as the scene of frequent accidents, and it has long ago outlived its usefulness to the ever-increasing flow or traffic accompanied by the higher speed of travel.

In November, 1934, operations started on a major project of realignment and reconstruction of this grade on the basis of a modern main line highway with minimum radius of length. This is in part due to the new road at the summit being in thorough cut over 40 feet lower than the present road. This large cut had its slopes benched to prevent erosion and major slides. The excavation in this one cut totals 160,000 cubic yards. All heavy excavation is being handled by 12-cubic-yard carryall scrapers, with bulldozers employed on light work.

Another feature of the work is the use of an imported borrow, or selected material subbase. This material is placed under the pavement to a minimum nine-inch thickness and on the shoulders to a depth of six inches. Prior to placing the selected material, a subgrade is prepared by rolling and then sealing

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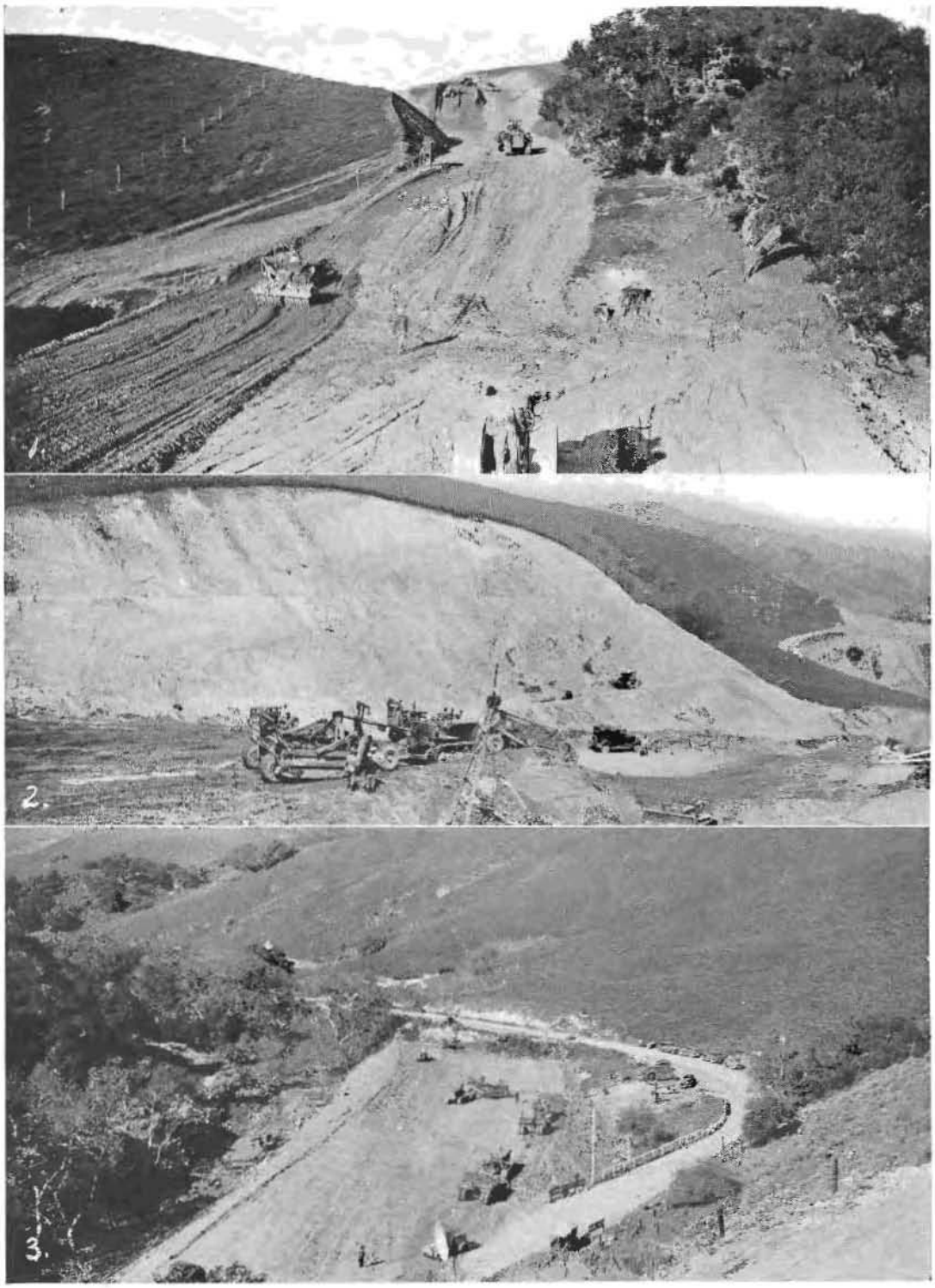


NOJOQUI GRADE REALIGNMENT of U. S. 101 through Gaviota Pass in Santa Barbara County involves some heavy grading, 581,000 cubic yards as shown in pictures 1 and 2 and elimination of 33 curves as in No. 3.

How Huge Steel Bridge Cables Will Be Spun Across San Francisco Bay

By **C. H. PURCELL,** Chief Engineer, San Francisco-Oakland Bay Bridge

BEFORE the suspension cables of the San Francisco-Oakland Bay Bridge can be spun, it is necessary to build walk ways which will follow the general line the cable is later to follow.

There will be two catwalks, each 10 feet wide, one under each of the two cables. The walks will hang from four 2¼ inch ropes, each rope having a strength of 480,000 pounds.

The surface of the walk will be made of two layers of wire mesh, the lower layer made of chain link fabric, and the upper of "hardware" cloth with mesh about ½ inch square. This mesh is laid on timber cross beams which are supported from the wire ropes at intervals of 10 feet. The walks will have handrails consisting of a single 9/16 inch wire cable.

CROSSWALK CONNECTIONS

The catwalks will be connected together by crosswalks, of which there will three in the center span and one in each of the side spans. These are for the purpose of bracing the two walks together and also to permit the workmen to cross from one catwalk to the other.

To add to the rigidity of the system, especially in times of storm, the storm cables are added. These consist of two one-inch lines in each span which are connected to the towers about 100 feet above the water, curve upwards, and are connected to the footwalk cables with wire hangers in such a way as to hold the footwalk cables in place.

Two cables for each footwalk have been placed between the San Francisco anchorage and Pier W-1 and two ropes for each walk between Towers W-2 and W-3. The next operation will be to raise the four ropes for each walk from Pier W-1 to Tower W-2, crossing the Embarcadero. Then the four ropes between the center anchorage and Tower W-3 will be placed. The final operations will be placing the last four ropes between Towers W-2 and W-3, and between the San Francisco anchorage and Pier W-1. With ropes all in place, the crosswalks will be erected.

CONSTRUCTING WIRE MESH

The next operation will consist in starting at Tower W-3 and putting the wire mesh construction simultaneously on each side of the tower from Tower W-3 to the center anchorage, and from Tower W-3 to the center of the 2310-foot span. These sections are erected to platforms near the top of the tower, connected to the cable, and then slid along the cable to the final position. Upon completion of this operation, these platforms will be transferred to Tower W-2 and the same operation repeated.

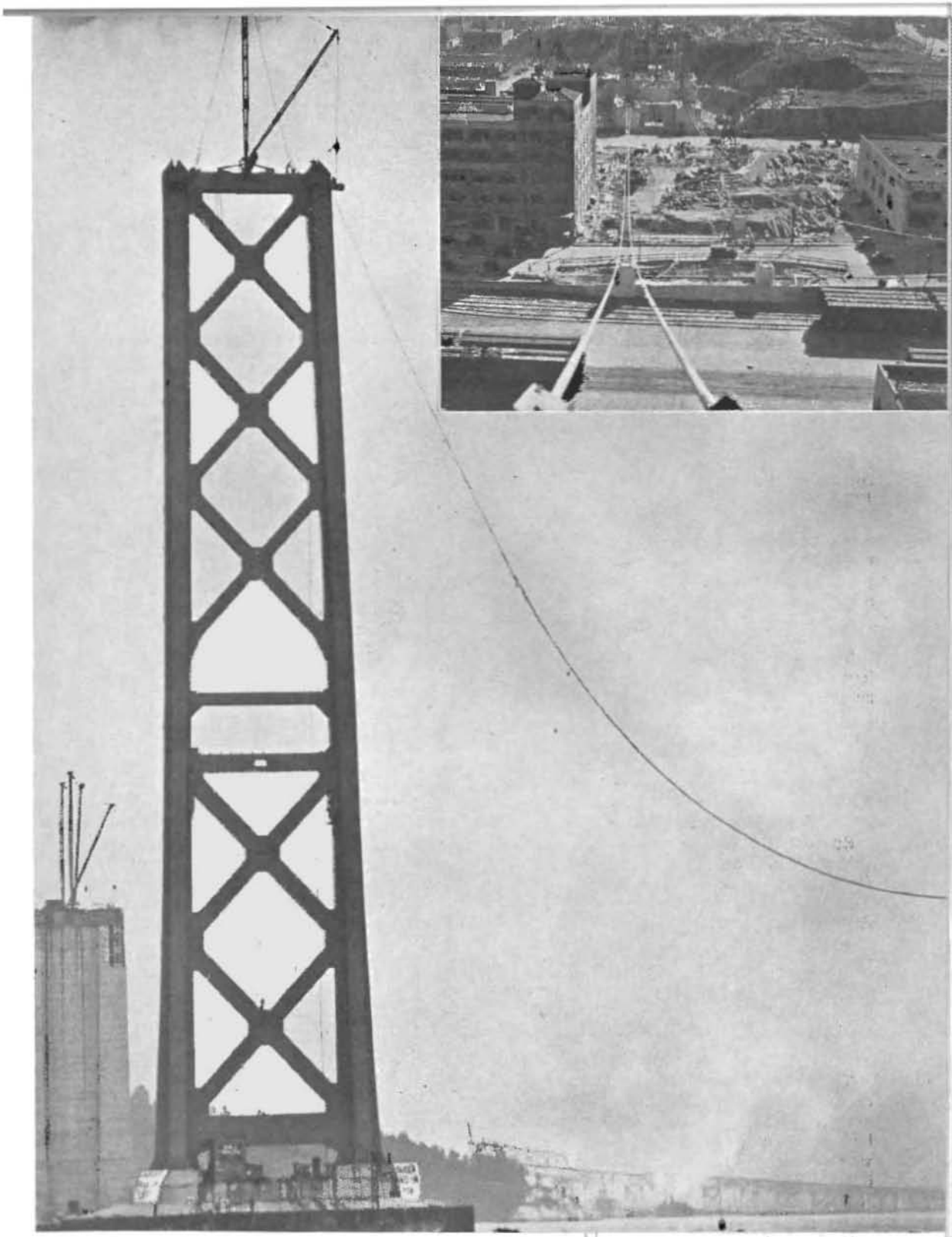
C. H. PURCELL

After the wire mesh is all in place, it will be tightened to reduce the "spring" in the wire as much as possible. The storm cables will then be placed, completing the catwalks.

Following this, gallows frames will be erected. These consist of rectangular frames above each catwalk, at intervals of about 230 feet and at the towers, and to each are secured the haulage lines for the actual process of spinning the cable.

This haulage system consists in principle of an endless rope between the San Francisco

(Continued on page 15)



THE FIRST SAN FRANCISCO-OAKLAND BAY BRIDGE CABLE is seen being drawn across the waters of the bay on April 4th by a "messenger line" to Tower W-3 off the San Francisco shore. It is a 2¼ inch "catwalk rope," four of which will support a walkway for workmen during the big cable spinning job. Behind the tower, the camera has caught the great concrete mass of the Center Anchorage backgrounded by Yerba Buena Island and illusive tracings of the East Bay Superstructure making it appear almost completed. The inset shows four catwalk cables in place between Pier W-1 and the San Francisco Anchorage.

State Highway Winter Traffic Count Shows Slight Gain Over 1934 Figures

By **T. H. DENNIS**, Maintenance Engineer

THE regular semiannual count of traffic on the State highways was taken on Sunday and Monday, January 13 and 14, 1935, and covered the sixteen-hour period from 6.00 a.m. to 10.00 p.m. each day.

While it was, of course, impossible to man all of the points covered in the California Highway Transportation Survey of 1934, information developed by that study indicated the desirability of establishing some additional stations to those regularly used in the semiannual counts during the past eleven years. The results from these additional stations are included in this report.

TWO YEARS COMPARED

The following tabulation shows the gain or loss for the various classifications of roads, as compared with 1934:

Per Cent Gain or Loss for 1935 Count as Compared with 1934

	Sunday	Monday
All Routes	**—1.53**	**+2.41**
Main North and South Routes	**—4.23**	**+1.44**
Interstate Connections	**+8.91**	**+6.79**
Laterals Between Inland and Coast	**—0.04**	**+2.42**
Recreational Routes	**—6.15**	**+1.01**

In the aggregate, there is very little change from 1934, a small loss in Sunday traffic due to bad weather being balanced by a slight gain for Monday. In each road classification, Monday traffic registers a gain over the preceding year.

The greatest relative gain or loss occurred on recreational routes and interstate connections. The recreational routes show a loss of 6.15 per cent for Sunday, while there was a gain of 8.91 per cent on the interstate connections.

BAD WEATHER PREVAILED

Sunday traffic is greatly influenced by the weather. As shown below, inclement weather prevailed over the greater part of the State in 1935. This condition is in direct contrast to that of 1934, when fine weather was general.

District	**I.**	**Rain or snow, both Sunday and Monday.**
District	**II.**	**Rain or snow, both Sunday and Monday.**
District	**III.**	**Unsettled Sunday; rain Monday, with snow at higher altitudes.**
District	**IV.**	**Rain Sunday and Monday.**
District	**V.**	**Cloudy Sunday; rain Monday.**
District	**VI.**	**Fair Sunday; rain Monday.**
District	**VII.**	**Cloudy Sunday; rain Monday.**
District	**VIII.**	**Cloudy Sunday; fair Monday.**
District	**X.**	**Unsettled Sunday; rain Monday, with snow at higher elevations.**
District	**XI.**	**Cloudy; rain over eastern portion on Monday.**

The gain or loss in traffic for State Highway Routes 1 to 80, inclusive, expressed as a percentage of the January, 1934, count, is given below:

Route	Termini	1935 Per cent gain or loss Sunday Less	Sunday Gain	Monday Loss	Monday Gain
1.	Sausalito-Oregon Line	9.78	.....	5.55	.....
2.	Mexico Line-San Francisco	8.53	.....	.79	.....
3.	Sacramento-Oregon Line	2.90	.....	3.67	.....
4.	Los Angeles-Sacramento	.....	1.88	.....	4.31
5.	Santa Cruz-Jc. Rt. 65 near Mokelumne Hill	.....	11.87	.61	.....
6.	Napa-Sacramento via Winters	.....	1.18	.....	9.33
7.	Benicia-Tehama Jc.	1.43	.....	.....	11.28
8.	Ignacio-Cordelia via Napa	8.04	.....	4.13	.....
9.	Jc. Rt. 2 near Montalvo-San Bernardino	14.26	.....	4.38	.....
10.	Rt. 2 at San Lucas-Sequoia National Park	.....	44.08	5.83	.....
11.	Jc. Rt. 75 near Antioch-Nev. State Line via Placerville	.....	8.42	.....	.68
12.	San Diego-El Centro	7.20	.....	9.32	.....
13.	Jc. Rt. 4 at Salida-Jc. Rt. 23 at Sonora Jc.	.....	43.37	.....	7.91
14.	Albany-Martinez	.....	7.67	.....	12.52
15.	Rt. 1 near Calpella-Rt. 37 near Cisco	.....	4.02	3.89	.....
16.	Hopland-Lakeport	1.19	.....	4.71	.....
17.	Jc. Rt. 3 at Roseville-Jc. Rt. 15, Nevada City	.....	10.45	.....	13.04
18.	Jc. Rt. 4 at Merced-Jc. Rt. 40 near Sequoia	.....	9.34	.....	10.85
19.	Jc. Rt. 2 at Fullerton-Jc. Rt. 26 at Beaumont	5.87	.....	.....	6.27
20.	Jc. Rt. 1 near Arcata-Jc. Rt. 83 at Park Bdy.	6.72	.....	15.15	.....
21.	Jc. Rt. 3 near Richvale-Jc. Rt. 29 near Chilcot via Quincy	42.05	.....	37.61	.....
22.	Jc. Rt. 56, Castroville-Jc. Rt. 29 via Hollister	.....	5.85	1.50	.....
23.	Saugus-Rt. 11, Alpine Jc.	.....	8.35	.....	10.42
24.	Jc. Rt. 4 near Lodi-Nev. State Line	.....	35.60	.....	13.85
25.	Jc. Rt. 37 at Colfax-Jc. Rt. 83 near Sattley	.....	24.43	1.14	.....
26.	Los Angeles-Mexico via San Bernardino	.....	6.27	.....	12.76
27.	El Centro-Yuma	18.32	.....	22.87	.....
28.	Redding-Nevada Line via Alturas	.....	10.17	32.19	.....
29.	Peanut-Nevada Line near Purdy's	30.86	.....	29.96	.....
31.	San Bernardino-Nevada State Line	.....	51.17	.....	6.23
32.	Jc. Rt. 56, Watsonville-Rt. 4 near Califa	.....	20.09	.....	12.37
33.	Rt. 56 near Cambria-Rt. 4 near Famosa	.....	27.34	.....	28.89
34.	Jc. Rt. 4 at Galt-Rt. 23 at Pickett's Jc.	.....	8.45	4.19	.....
35.	Jc. Rt. 1 at Alton-Jc. Rt. 20 at Douglas City	2.59	.....	7.33	.....
37.	Auburn-Truckee	.....	17.10	4.58	.....
38.	Jc. Rt. 11 at Mays-Nevada Line via Truckee River	1.20	.....	.....	15.25
39.	Jc. Rt. 38 at Tahoe City-Nevada State Line	11.59	.....	.....	.....

Monday Traffic Gains Reflect Effect of Bad Sunday Weather

(Continued from preceding page)

1935
Per cent gain or loss

Route	Termini	Sunday Loss	Sunday Gain	Monday Loss	Monday Gain
40.	Jc. Rt. 13 near Montezuma-Jc. Rt. 76 at Benton	.....	72.81	.....	12.98
41.	Jc. Rt. 5 near Tracy-Kings River Canyon via Fresno	.....	10.93	.92	.....
42.	Redwood Park-Los Gatos	.....	15.28	.....	21.81
43.	Jc. Rt. 60 at Newport Beach-Jc. Rt. 31 near Victorville	.....	8.19	.....	11.67
44.	Boulder Creek-Redwood Park	.....	15.76	.....	25.32
45.	Jc. Rt. 7, Willows-Jc. Rt. 3 near Biggs	8.52	.....	.....	13.83
46.	Rt. 1 near Klamath-Rt. 3 near Cray	22.56	.....	13.26	.....
47.	Jc. Rt. 7, Orland-Jc. Rt. 29 near Morgan	16.74	.....	.....	21.36
48.	Rt. 1 near McDonalds-Rt. 56 near Albion	56.56	.....	34.41	.....
49.	Napa to Jc. Rt. 15 near Sweet Hollow Summit	13.99	.....	10.04	.....
50.	Sacramento-Jc. Rt. 15	.....	18.40	.....	4.59
51.	Jc. Rt. 8 at Schellville-Sebastopol	19.80	.....	.....	8.32
52.	Alto-Tiburon	22.60	.....	19.40	.....
53.	Jc. Rt. 7 at Fairfield-Jc. Rt. 4 at Lodi via Rio Vista	.....	.04	.02	.....
54.	Jc. Rt. 11 at Perkins-Jc. Rt. 65 at Central House	6.74	.....	12.50	.....
55.	Jc. Rt. 5 near Glenwood-San Francisco	4.87	.....	.13	.....
56.	Jc. Rt. 2 at Las Cruces-Rt. 1 near Fernbridge	13.50	.....	6.44	.....
57.	Rt. 2 near Santa Maria-Rt. 23 near Freeman via Bakersfield	.....	30.84	.....	28.89
58.	Rt. 2 near Santa Margarita-Ariz. Line near Topoc via Mojave & Barstow	.....	33.39	.....	36.20
59.	Jc. Rt. 4 at Baileys-Jc. Rt. 43 at Lake Arrowhead	.....	18.17	.....	20.85
60.	Jc. Rt. 2 at Serra-Jc. Rt. 2 at El Rio	20.14	.....	1.75	.....
61.	Jc. Rt. 4 S. of Glendale-Jc. Rt. 59 near Phelan	18.30	.....	.....	2.15
63.	Big Pine-Nevada State Line	.....	22.77	.....	59.85
64.	Jc. Rt. 2 at San Juan Capistrano-Blythe	7.24	.....	.....	9.24
65.	Jc. Rt. 18 near Mariposa-Auburn	.....	14.49	.....	.72
66.	Jc. Rt. 5 near Mossdale-Jc. Rt. 13 near Oakdale	.....	16.31	.....	9.04
67.	Pajara River-Rt. 2 near San Benito River Bridge	2.06	.....	4.90	.....
68.	San Jose-San Francisco	.....	4.04	.....	10.58
69.	Jc. Rt. 5 at Warm Springs-Jc. Rt. 2, San Rafael	.....	6.91	.....	9.86
70.	Ukiah-Talmage	.....	2.69	.....	1.42
71.	Crescent City-Oregon Line	13.78	.....	13.57	.....
72.	Weed-Oregon Line	.....	21.88	.....	73.13
73.	Rt. 29 near Jamesville-Oregon Line	3.57	.....	15.35	.....
74.	Carquinez Bridge-Napa Wye	.68	.....	12.89	.....
75.	Oakland-Jc. Rt. 65 at Altaville	.....	5.45	7.37	.....
76.	Jc. Rt. 125 at Shaw Ave.-Nevada State Line near Benton	.....	10.89	9.13	.....
77.	San Diego-Pomona	9.95	.....	.....	6.57
78.	Jc. Rt. 12 near Descanso-Jc. Rt. 19 near March Field	5.73	.....	.....	3.11
79.	Jc. Rt. 2, Ventura-Jc. Rt. 4 at Castaic	1.09	.....	.....	4.64
80.	Jc. Rt. 51, Rincon Creek-Rt. 2 near Zaca	2.27	.....	.....	8.00

TAX URGED ON ALL MOTOR FUELS

Improvements in internal combustion motors are making it possible for more and more motor vehicles to use fuels other than gasoline. Such fuels are not subject to the Minnesota gasoline tax. It is obviously unjust to tax the gasoline used in most motor vehicles and not tax a different fuel used in other motor vehicles transporting commodities on the public highways. Remedial legislation is needed.—*Minnesota Bulletin.*

Betsy—My husband is a hateful wretch.

Peggy—What's he done now?

Betsy—He pretended to believe me last night when he knew I was lying to him.

17,464 Wires Used in Building Up Every Bay Bridge Cable

(Continued from page 12)

anchorage and the center anchorage. Two spinning wheels, five feet in diameter, are placed on this rope over each footbridge; also, at each anchorage are located the drive for this machinery and a system of towers with sheaves, or grooved wheels, over which the cable wire passes so as to maintain a uniform tension on the wire.

The cable wire is being brought from eastern mills in 5-foot diameter coils, each coil containing 350 pounds, or about 3500 feet of wire. The steel company has installed at its Twentieth Street plant a reeling set-up in which the wire is taken from these coils and placed on reels, each reel containing 32,000 pounds, or nearly 60 miles, of wire.

For the west suspension bridge, 50 per cent of these reels will be taken to the San Francisco anchorage, 50 per cent to the center anchorage, and placed in the reel stands.

SPINNING WHEEL OPERATION

In the spinning operation, starting at the San Francisco anchorage, a bight, or loop, of wire is taken from the reel, passed around the spinning wheel, the haulage machinery is set into operation, and the wheel passes from the San Francisco anchorage to the center anchorage, carrying this bight, or total of two wires. Arriving at the center anchorage, this loop is removed from the spinning wheel, passed around the strand shoes, a new loop taken off one of the reels at the center anchorage, and the journey repeated.

In place of the single loop the contractor is planning to take two loops, thereby placing four wires per trip of the spinning wheel.

Each cable strand contains 472 wires so that each strand requires 236 trips of the spinning wheel. Except for the center, or nineteenth strand, which is laid up by itself, the strands are spun in sets of four, each set being adjusted to correct elevation before starting succeeding strands. There will be 37 strands, or a total of 17,464 individual wires.

SPINNING STARTS MAY 15

The question is often asked how we know that there is an equal tension in all wires. This may be answered by the statement that we adjust all wires to the same sag, and that

(Continued on page 24)

Russian River Bridge at Monte Rio in Redwood Empire Formally Dedicated

OVER three thousand people gathered among the redwoods and along the shore of the Russian River to participate in the colorful ceremonies surrounding the formal dedication of the new bridge spanning the Russian River at Monte Rio, on Sunday, March 31st.

The bridge was built as a Joint Highway District project initiated by the Boards of Supervisors of Sonoma and Mendocino Counties at a total cost of $125,000. The California Highway Commission, with the approval of the Director of Public Works, participated in the construction of the bridge and was represented at the dedication by Highway Commissioner Timothy Reardon of San Francisco, in whose district the Russian River is located.

The Monte Rio Bridge celebration was initiated by the Monte Rio Chamber of Commerce, with the support and cooperation of the Redwood Empire Association.

CHRISTENED WITH VODKA

Speakers on the program included: Governor Frank F. Merriam; H. G. Ridgway, chairman Events Committee, Redwood Empire Association; Highway Commissioner Timothy A. Reardon; Edward J. Neron, Deputy Director State Department of Public Works; Senator Herbert Slater; Assemblyman Hubert Scudder; Supervisor A. M. Brown, Jr., of San Francisco and Supervisors Tom Ferguson, Charles Perkins and Willard Cole, directors of the Joint Highways District in charge of construction of the bridge; J. B. Piatt, Chief Engineer for the Bridge District; Miss Margaret Hess, granddaughter of a pioneer family in the Russian River section.

High light of the ceremonies was the christening of the new bridge by Miss Irene Pershime, descendant of one of the earliest Russian settlers of Fort Ross on the Sonoma County Coast in 1812, who cracked a bottle of old Russian vodka; followed by Miss Ruth Sheridan, granddaughter of the late Captain Sheridan, Russian River pioneer, who settled near the site of the new steel and concrete span in 1860. Miss Sheridan broke on the bridge railing a bottle of champagne made on the Russian River. This ceremonial was presented by State Railroad Commissioner Wallace L. Ware.

ENTERTAINED AT LUNCHEON

William Healy, president of the Monte Rio Chamber of Commerce, presided as toastmaster. During the program he introduced numerous other State officials and civic leaders and presented scions of pioneer Russian River families.

Preceding the celebration, official guests were entertained at a luncheon by the Ladies Auxiliary of the Chamber of Commerce and the Chamber directors.

Other State highway officials participating included: L. V. Campbell, Engineer Cooperative Projects, Division of Highways, and T. H. Dennis, Maintenance Engineer, Division of Highways.

Governor Merriam delighted his audience with his refreshing humor, pleased them with his expressions in favor of united, cooperative effort by chambers of commerce and civic organizations in requesting and securing appropriations for highway construction and improvement and enthused them with his optimism and progressive thought.

GOVERNOR MERRIAM LAUDED

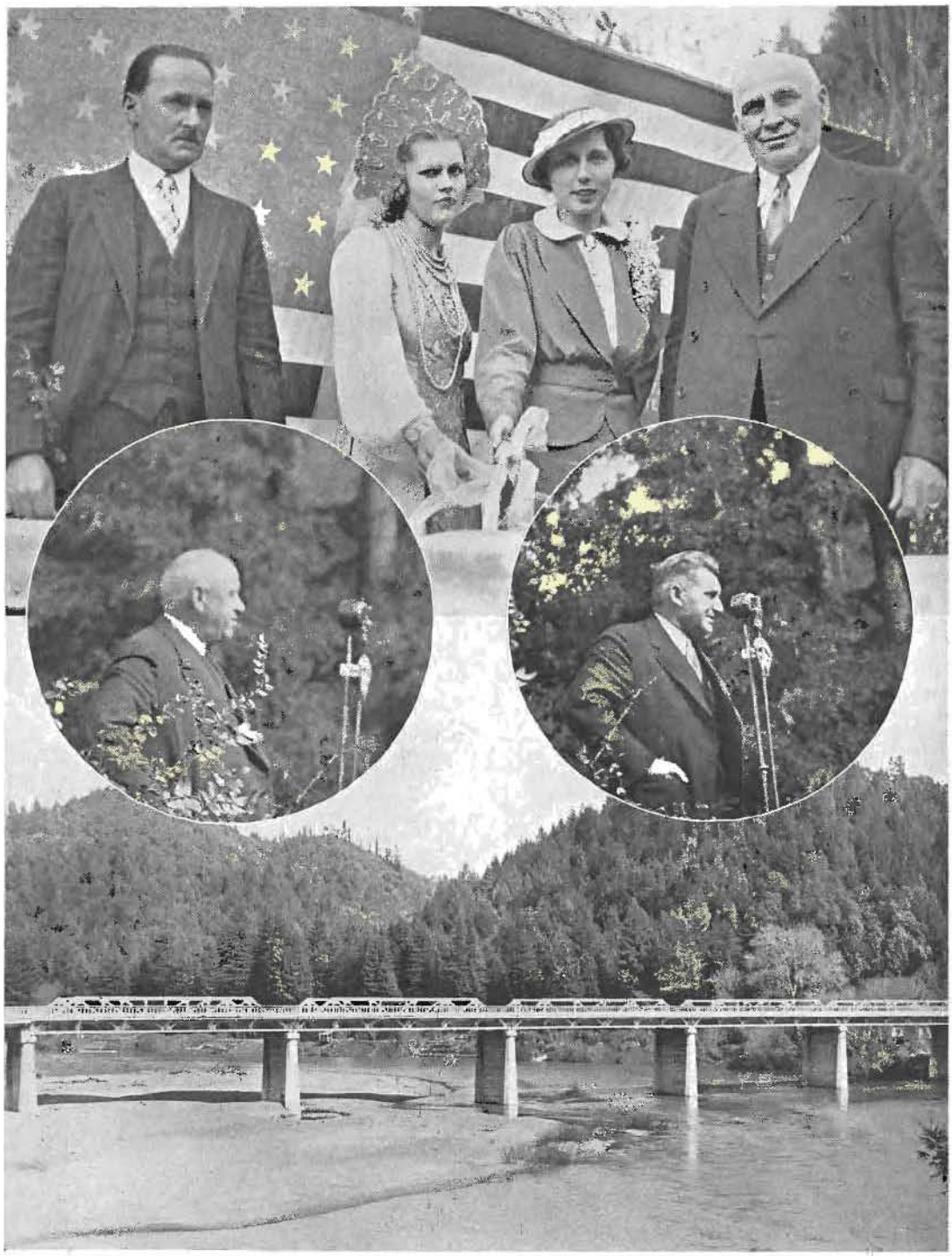
Other speakers on the program lauded Governor Merriam for his stand against diversion of the gas tax and for his progressive attitude toward State highway construction.

Preceding the Governor's address, the Analy High School Band of Sebastopol, which entertained the celebrants during the program, dedicated an Iowa State song to Governor Merriam.

A bevy of Russian River lassies, in vacation attire, brought gifts in a Russian River canoe and presented them to the Governor, in the form of Sonoma County products.

Highway Commissioner Timothy A. Reardon pointed out the need for making possible ingress and egress to various parts of the Redwood Empire—in greater comfort and safety and with the expenditure of less time—by improving State highways therein. He lauded the work of civic organizations such as the Redwood Empire Association, Chambers of Commerce and others in cooperation with

(Continued on page 18)



DEDICATING THE RUSSIAN RIVER BRIDGE at Monte Rio, Governor Merriam was assisted in the ceremonies by President William Healy of the Monte Rio Chamber of Commerce; Irene Pershime, descendant of Russian pioneers who christened the bridge with vodka while Miss Ruth Sheridan descendant of American pioneers broke a bottle of Sonoma champagne on the structure. Deputy Director of Public Works, Edward J. Neron is at the microphone in the right inset and Highway Commissioner T. A. Reardon, at left. The bridge cost $125,000.

County Road Costs Treble State's

(Continued from page 9)

A proper amendment has already been introduced, making it mandatory upon the State that men shall be employed from the county in which the work is to be done.

4. The objection has been raised that counties which did not borrow money from the State under the provisions of the Unemployment Relief Bond Act of 1933 will be deprived of a portion of their road fund alotments in order to assist borrowing counties in repaying loans in 1938.

This is not true. Under Governor Merriam's bill as amended, the State is obligated to spend in each county the same proportion of gas tax and motor vehicle fees as the county now receives. The provisions permitting boards of supervisors to retire general county bonds or to pay unemployment relief loans out of the State-raised revenues are not mandatory, but are merely permissive. If any board is of the opinion that the retirement of its bonds or the payment of the relief loans is of first importance, the money will be turned over to the supervisors for that purpose by the State and will be deducted from the allotment for highway purposes to that county without imposing a burden on any other county.

SAVING PROPERTY TAXES

The keystone of the Governor's proposal is that common property taxpayers shall be afforded relief without increasing taxes elsewhere. The saving is to be made by the sound business principle of eliminating unnecessary duplication of investment and equipment.

It should also be distinctly understood that the Governor's suggestion to levy an additional one-cent per gallon gasoline tax was specified by him as an emergency measure for the purpose of providing necessary funds for unemployment relief, and is in no way associated with, or necessary to, his proposal for the consolidation of the State and county highway system.

The California transportation survey makes available facts which show how very conservative is the Governor's estimate of a $16,000,000 biennial saving under his plan.

We now know that had the Governor's road bill been in effect since the inception of the gas tax almost $40,000,000 a biennium would have been saved to the common property tax payers in road levies alone.

HIGH COUNTY COSTS

The survey also shows that the State now spends 4.6 mills per vehicle mile on constsruction and maintenance of State highways, where the counties spend 12.6 mills on the county roads. Thus, the supervisors spend three times as much as the State upon roads which carry but 11% of the traffic of California.

The figures of the cost for vehicle regulation and highway costs and maintenance per vehicle mile in 1933 in California by the three governmental units are as follows:

State	$0.0046
Counties	.0126
Cities	.0040

Apart from the tax reducing feature of the Governor's road bill, its importance lies in the fact that it improves, unifies and renders more efficient California's system of highways so that their gasoline tax pennies do a maximum amount of work with a minimum of waste.

We therefore commend for the earnest consideration of all Californians the highway unification measure recommended by Governor Merriam. This road bill will abolish road taxes against property and make the gas tax pay the whole road bill for which it is collected and will place all county roads into the State highway system to be maintained by the Department of Public Works.

Construction of highways will proceed as usual. It will be under State supervision and employment of men will continue as now, the men being taken from the county in which the road work lies.

RUSSIAN RIVER BRIDGE AT MONTE RIO DEDICATED

(Continued from page 16)

State Senators and Assemblymen and supervisors in connection with highway improvement projects.

GREETINGS FROM DIRECTOR KELLY

Edward J. Neron, Deputy Director of the Department of Public Works, extended the greetings of Director Earl Lee Kelly and complimented the citizenry of the Russian River, Sonoma County and the Redwood Empire as a whole on their progressive attitude toward highways.

H. G. Ridgway, chairman of the Events Committee of the Redwood Empire Association, thanked Mr. Reardon and other members of the Commission, also Director Kelly and the Governor for the allocations in favor of the Monte Rio Bridge and other sectors of the Redwood Empire system of highways and pointed out that the association was actively engaged in opposing bills calling for the diversion of the gas tax.

Supervisor Arthur M. Brown, Jr., of San Francisco, thanked the Governor and State officials for allocations in favor of the approach to the Golden Gate Bridge and presented San Francisco's greetings to guests and citizens of the Northbay counties.

American River Bridge Widened to Provide Four Traffic Lanes

(Continued from page 2)

President Harold J. McCurry, Sacramento Chamber of Commerce; President W. H. Pimentel, North Sacramento Chamber of Commerce; County Executive C. W. Deterding; Supervisor Ollie Mapes, and Clyde L. Filbert, general chairman.

In the reconstruction of the bridge, which was done without interruption of traffic, a new alignment was established with the center line out three feet from the old upstream rail and the curve on the Sacramento approach lengthened out to a radius of 600 feet and a 3 per cent grade.

The specifications called for a 44-foot roadway with five-foot sidewalks and 12-foot curbs for the protection of pedestrians, the widening to be done on the upstream side of the old bridge. This widening caused an eccentric load on the foundations necessitating the use of 40-pound, 8-foot steel H beams for piling in the new footings which proved very satisfactory, for at elevation —35.0, a cemented gravel formation gave excellent bearing value.

PIERS WERE WIDENED

The piers and abutments were widened on the upstream side and additions made to the downstream side for conformity in design. In cooperation with the Division of Architecture of the Department of Public Works the new piers were designed to stream line into the light pylons which extended 18 feet above the roadway elevation.

New arches were constructed independent of the old structure and the roadway slab was supported by walls carried on the arches. A six-inch spandrel face wall was used for architectural reasons. Both sidewalks were of a cantilever construction with three-foot modernistic step-back rails.

On the old portion of the bridge, the existing pavement was removed and replaced with new concrete to conform with the new portion as to alignment and grade.

ARTISTIC PYLON LIGHTS

The lights capping the pylons are of opalescent glass set in bronze frames three feet in height and designed to conform with the pylons. 300-watt globes are being used, giving ample light for pedestrians and being diffused by the opalescent glass, there is no glare to the motorist.

HAULING COSTS REDUCED FROM $1.00 TO $0.03 PER TON MILE BY GOOD HIGHWAYS

How the decline in the cost of road transportation has kept pace with the progress of highway development is illustrated in the comprehensive motor traffic survey recently completed by the Division of Highways.

The report cites the business done by the Pioneer Stage Line on the Placerville route to Carson City and Virginia City in 1861 and 1862. During that period there were 93 hotels on the road and the stage company employed 50 men and 600 horses. The estimated amount of business done annually on this mountain route in 1861 and 1862 was:

30,000 tons of freight @ $100 per ton	$3,000,000
36,500 passengers @ $30	1,095,000
Meals and express	125,000

Indicative of the bearing good roads have on transportation expense the report notes the following comparative costs of hauling at different periods since 1862:

Year	Costs per ton mile
1862	$1 00
1894	25
1922	10
1932	03

The approaches were widened to a 40-foot concrete pavement with 9-foot shoulders on the south to the junction of 16th and 12th streets, and on the north to an approximate distance of 300 feet, where the new four-lane pavement was flared into the existing three-lane pavement.

The modernistic design is very pleasing and has been the cause of much favorable comment. The added roadway width and realignment has relieved the traffic congestion to such an extent that a State Traffic Officer stationed at the junction of 12th and 16th streets has been removed.

This bridge site has been associated with California history ever since Jedediah Strong Smith, a trapper, and his companions camped by these waters in 1827, to be followed by the '49ers who used a gravel bar as a fording place on their way to the gold fields.

In the middle fifties, a ferry was operated and when, in 1858, it became inadequate, a pile trestle bridge was constructed. It was operated as a toll bridge by J. B. Haggin. In 1886, the franchise was purchased by the county for the sum of $2,500 and the bridge was then opened to the public.

In 1887, the bridge was condemned as unsafe and replaced by another wooden bridge with three 198-foot wooden trusses supported

(Continued on page 32)

CALIFORNIA HIGHWAYS AND PUBLIC WORKS

Official journal of the Division of Highways of the Department of Public Works, State of California; published for the information of the members of the department and the citizens of California.

Editors of newspapers and others are privileged to use matter contained herein. Cuts will be gladly loaned upon request.

EARL LEE KELLY.....Director
JOHN W. HOWE.....Editor

Address communications to California Highways and Public Works, P. O. Box 1499, Sacramento, California.

Vol. 13 APRIL, 1935 No. 4

A Mile of Highway

To build a mile of modern highway, two long trainloads of materials must be gathered together and sent to the site of the new road.

That, in a nutshell, summarizes the broad expanse of employment that goes with the construction of roads and streets.

As you pass a construction project in your community, you do not see anywhere near all the workmen that are engaged on it. For every man employed on the road job itself, the equivalent time of one to one and a half men is needed behind the lines supplying equipment and material.

What does this mean to you or your local business men? Two things:

1. Local men have a means of livelihood; they are receiving pay checks that flow through their pockets to pay bills and taxes, to buy food, clothing and other necessities.

2. The equipment and materials used in that local project are produced in your vicinity or elsewhere, providing widespread employment that not only gives men jobs but provides a general business activity.

Road and street construction, therefore, pumps money from worker to worker, both locally and over a wide area.

From 85 to 90 cents of the dollar spent by the contractor quite promptly goes into the pockets of labor, according to surveys of the U. S. Bureau of Public Roads. Workmen in a variety of industries are benefited; men in mines, quarries, mills, factories, in sand and gravel plants and on the railroads, all get a share of the road dollar. Then there are the men on the road job itself who directly get a large share.—*Florida Public Works.*

Autos in California Averaged 601 Gallons of Gasoline in 1934

OPERATORS of motor vehicles in California who do not keep a record of the amount of gasoline their cars consume will be interested to know that it is approximately 601 gallons annually.

At least, this was the average amount of gas used by owners of passenger and freight automobiles in this State last year, according to an estimate, based on an investigation made during compilation of an extensive road transportation survey by the Division of Highways.

There were registered in this State in 1934 a total of 1,712,000 passenger motor vehicles. In making the highway transportation report, drivers of 108,000 of these cars were questioned concerning yearly gasoline consumption and mileage per gallon.

It was learned that the average passenger car obtained 15.25 miles of travel per gallon.

TRUCKS AVERAGED 10.64 M. P. G.

A truck survey which covered 32,400 of these vehicles or approximately 11 per cent of the total of 288,409, disclosed an average of 10.64 miles per gallon.

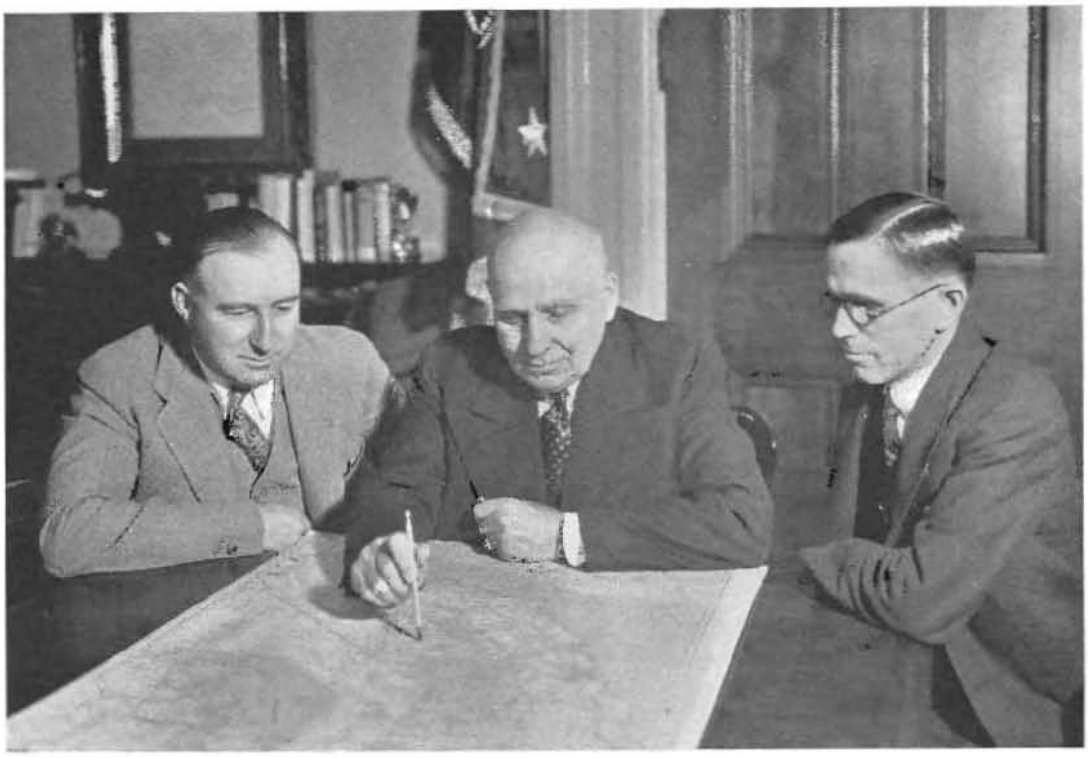
The average mileage developed per gallon of gasoline, computed for all vehicles on the basis of the total annual vehicle miles in the State, was 13.86 miles per gallon.

Gasoline consumed annually from 1924 to 1931 increased steadily and at a more rapid rate than the increase in motor vehicle registration. Beginning in 1932, there commenced a decline in both motor vehicle registration and gasoline consumption which continued until 1933. Registrations and gasoline consumed in 1934 slightly exceeded comparable figures for 1933.

CONSUMPTION SHOWS INCREASE

The gasoline consumed per vehicle throughout these two periods of increase and decrease in vehicle registrations is considered of interest, for in this period the annual gasoline consumption per vehicle increased from 533 gallons in 1924 to 611 gallons in 1932. There was a slight drop to 603 gallons in 1933, and a further drop to 601 gallons in 1934.

"The relatively small decrease in the use of vehicles during a period when return value for expenditures is very carefully considered," the report says, "is striking proof of the worth of motor transportation."



A $170,000,000 CONFERENCE—Governor Merriam, Public Works Director Earl Lee Kelly and State Engineer Hyatt (right) discussing Central Valley Water Project before latter's departure for Washington.

State Water Plan Urged in Washington

Anticipating the passage of President Roosevelt's $4,880,000,000 emergency relief appropriation bill and the possible allocation of a part of that fund to California for construction of the Central Valley Water Project, Governor Merriam, after a conference with Director of Public Works Earl Lee Kelly and State Engineer Edward Hyatt, dispatched the latter to Washington April 2d to confer with Federal officials.

Mr. Hyatt will discuss with them the outstanding features of the great project for restraining salt water encroachments in the Sacramento-San Joaquin delta and furnishing water to lands in the San Joaquin Valley now under cultivation for which the water supply is being rapidly depleted.

Having received the approval of Federal agencies after exhaustive investigation it is believed the project stands a chance of early participation in the President's fund.

The first authorization for Federal aid to the project is contained in the Rivers and Harbors bill passed by the House of Representatives Tuesday, April 9th, and sent to the Senate, providing a $12,000,000 contribution for construction of Kennett Dam by reason of its flood control, navigation, and saline control benefits, as recommended by U. S. water department engineers.

The cost estimates of the physical works of the Central Valley project are as follows: Kennett Dam, including relocation of the Southern Pacific Railroad, afterbay dam, and two power houses, $84,000,000; transmission line, $14,000,000; industrial conduit, $2,500,000; San Joaquin pumping system, $20,000,000; Friant Dam, $14,000,000; canals leading from Friant Reservoir, $30,000,000; total including miscellaneous items between $165,000,000 and $170,000,000.

In addition to the $12,000,000 provided for Kennett Dam in the Rivers and Harbors bill application of the California Water Project Authority asks for a grant of 30 per cent of the cost of labor and materials on the balance, amounting to $37,000,000 and for the Public Works Administration to accept revenue bonds to the extent of $116,000,000 for the remainder of the financing.

Skilful Work of Engineers Saved Highway in 200,000 Cubic Yard Slide

By **COL. JNO. H. SKEGGS**, District Engineer

IN THE construction of a new State highway in Marin County between Sausalito and San Rafael, which offered a saving of four miles in an original distance of twelve miles, a series of low spurs radiating from Mount Tamalpais had to be crossed, one of them just north of Alto.

A pass was found through this spur that permitted excellent alignment with short runs of maximum grade and with a summit cut about thirty feet in depth on centerline and nearly one hundred feet deep on the upper slope.

This terrain, being a part of the Coast Range, is geologically one of Nature's last-born and has many of the characteristics of a spoiled child, particularly in its disposition to wander from its ancestral home.

SLIDE CONDITIONS EXPECTED

Surface indications and some acquaintance with the behavior of similar formations led us to expect slide conditions and during the construction period in 1929 this was taken into account and a series of steps were cut into the slopes where it seemed warranted, for the purpose of relieving pressure on the cut slope and providing storage space for minor slides, thus preventing them from reaching the roadway.

We rather prided ourselves on this achievement, and little trouble was experienced in this thorough cut, except the ordinary mud slides from long slopes during rainy weather, until late last fall (1934) when an enormous mass on the west side of the road commenced moving from the higher hills into the cut.

The movement was at such a rate and involved such large quantities that it was a moral certainty the road would be closed within a very short period unless immediate steps on a large scale were undertaken to prevent this condition. The necessary authorization and allotment was approved and within a few weeks a contract was let, heavy equipment assembled, and the work commenced.

It was planned to remove the material in a series of giant benches, and this method was followed as closely as possible. However, the movements taking place destroyed the benches almost as soon as they were graded, and the ultimate appearance of the cut is quite different from the symmetrical planned cross section.

Many sections of the slide were quite rocky and when first exposed had the appearance of solid masses. It was soon discovered, however, that the movement had sheared the rock into small fragments that could be easily loaded by the shovel without the necessity of blasting.

It was necessary to remove approximately 200,000 cubic yards of material, which was utilized to widen the roadbed for a distance of several miles on each side of the slide. Traffic was carried through the work at all times, and there was seldom any delay.

EXACT CAUSE UNDETERMINED

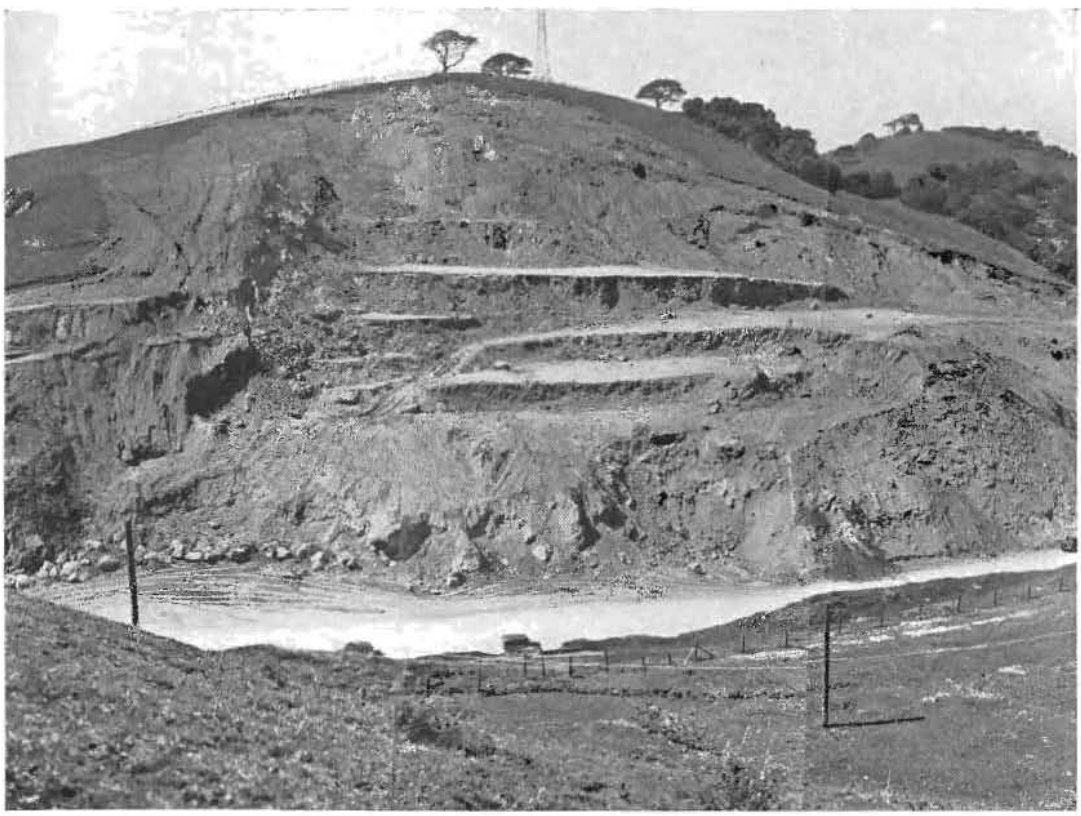
As stated above, the movement started late in the fall before the above-average rainfall of last winter set in, and therefore the movement can not be ascribed to heavy rains as the rainfall for the past several years has been considerably below normal.

The exact cause of these major slides is difficult to determine, being a combination of moisture, instability of soil, steep inclination of strata, and a rock incapable of carrying the load when lateral restraint is removed, such as happens when a large thorough or sidehill cut is made. The immediate cause may very well have been a series of light earthquakes which occurred shortly before the new extensive surface cracks were noted.

AUTOS TO USE OLD TROLLEY TUNNEL IN NEW YORK CITY

The old New York City Park Avenue trolley tunnel, through which the Madison Avenue cars used to pass between Thirty-second Street and Forty-second Street is being converted into a vehicular tunnel for automobile passenger traffic. This utilization of the tunnel for vehicles will increase the traffic capacity of Park Avenue below Forty-second Street by adding a new northbound and a new southbound lane, both underground and free of intersections or traffic stops between the end of Fourth Avenue at Thirty-second Street and the mouth of the tunnel in front of Grand Central Station.—*Roads and Streets.*

AN OMINOUS CRACK APPEARED after a rain period in a low spur of Mt. Tamalpais in Marin County and a great mass began moving down upon the highway cut.



GIANT BENCHES WERE CUT for the removal of the slide material but the movements destroyed them almost as soon as they were graded. A total of 200,000 cubic yards of material was moved and the highway kept open at all times. Height of slide can be judged by comparison with size of the automobile on the highway in foreground.

Tree Planting Project for Montecito

(Continued from page 7)

Cocos Palm which is becoming so typical in the Orange Belt.

14. **SOLANO COUNTY**—The landscaping of the Cordelia Subway on State Route No. 7.

15. **SAN DIEGO COUNTY**—Between Encinitas and Oceanside. Cypress trees are being planted in groups where the highway runs along the top edge of the ocean bluffs and is subject to hard prevailing winds.

OLD TREES SAVED

A great deal of expense was involved on this construction project for the sole purpose of saving a row of old Eucalyptus and Cypress trees. Extra right of way was purchased in order to make it possible to lay two lanes of pavement separated by these trees.

Flowering types of shrubbery are to be planted along this section and the project is being rushed in order to be completed before the opening of the Exposition in San Diego.

EXTENSIVE LANDSCAPE PROJECT

16. **LOS ANGELES COUNTY**—Between Monterey Park and Mission Road in Los Angeles. This project represents the State's first comprehensive landscape project. Water lines have been laid the entire length of the job to care for the planting of trees and shrubbery and no expense was spared in an endeavor to make this major traffic artery an example of correct roadside planting.

A small but very important landscape project has just been completed by State forces through Montecito from Olive Mill Road to the east city limits of Santa Barbara. This section of Montecito was designated as a business zone by the Santa Barbara County Planning Commission.

During construction it was found necessary to remove the beautiful old Blue Gum Eucalyptus trees that produced a quaint and rural atmosphere for this section. The removal of these trees is a great loss to Montecito, but the danger of the limbs falling during wind storms and the fact that the large trunks obscured the various business enterprises from the road made it best, in the long run, for all concerned, that they be removed and replaced by a more slender trunk type of tree planted on both sides of the road and placed at locations that would not interfere with business.

The situation here was unusual, particularly for an area zoned for business, in that the property owners concerned were very insistent that the old trees be removed because of their condition, size, and location; and yet on the other hand, when approached regarding the selection of non-interfering locations for new trees, their enthusiasm and desire was surprising, and every effort was made by these people to cooperate with the State to illustrate that a business street need not necessarily be void of beauty. In other words, Montecito business people appreciate the value of attractive roadsides and realize the magnetic attraction of trees.

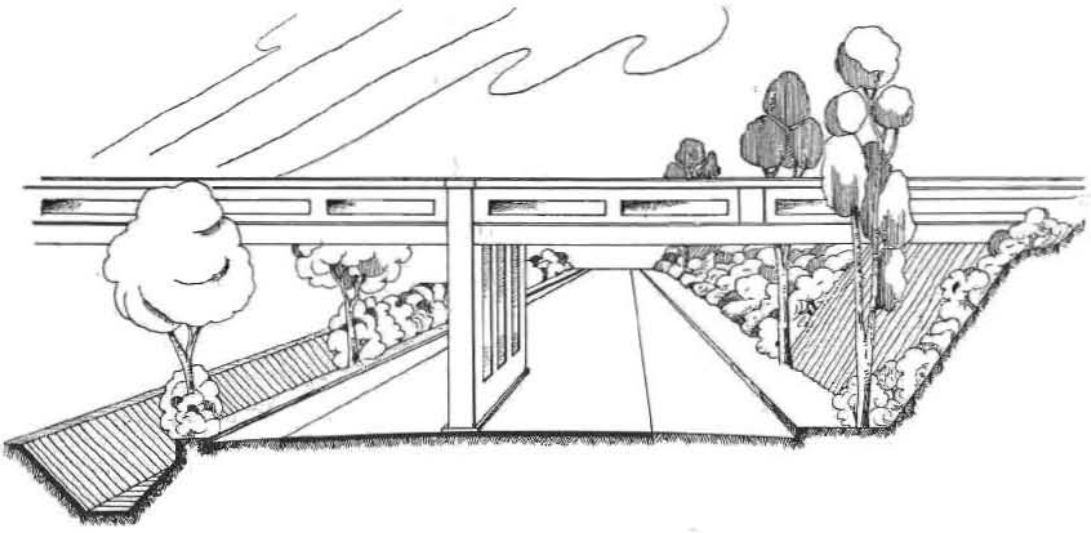
HOW HUGE CABLES WILL BE SPUN FOR BAY BRIDGE

(Continued from page 15)

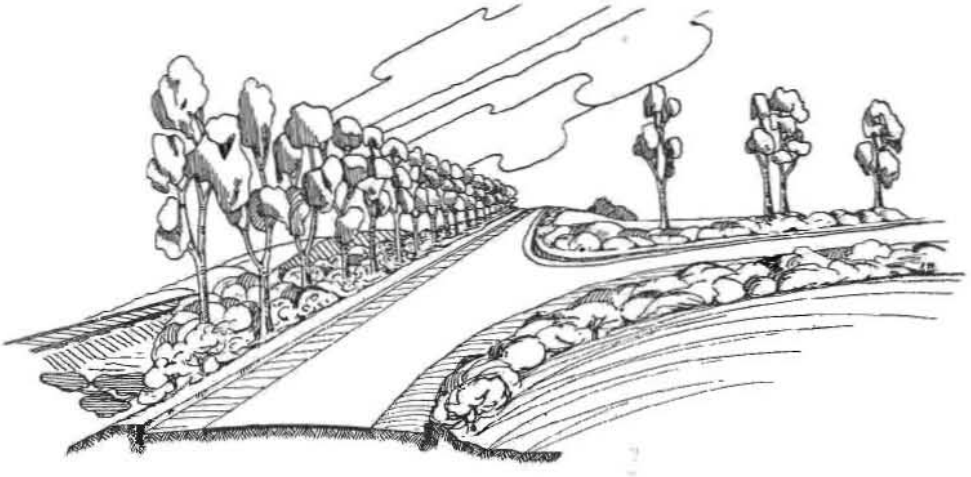
this automatically results in even stress on each. The first operation is to place in the cable saddles a carefully measured guide wire. The measurements of this wire consist in accurate surveys to establish the desired sag. When the first wire of any strand is spun, this guide wire is placed in the saddles alongside the permanent wire being placed, and the sag of the permanent wire made the same as that of the guide wire. Also, in adjusting the first strands, very careful instrumental observations are made to obtain the calculated sag. Later strands are adjusted so that they have the same sag as the first ones spun.

Cable spinning is scheduled to start shortly after May 15, 1935. After all the 17,464 wires have been laid and bound into 37 strands of 472 wires each, the cable will be squeezed into a true circle, coated with red lead paste, and bound with a spiral wrapping of wire to protect it from the elements.

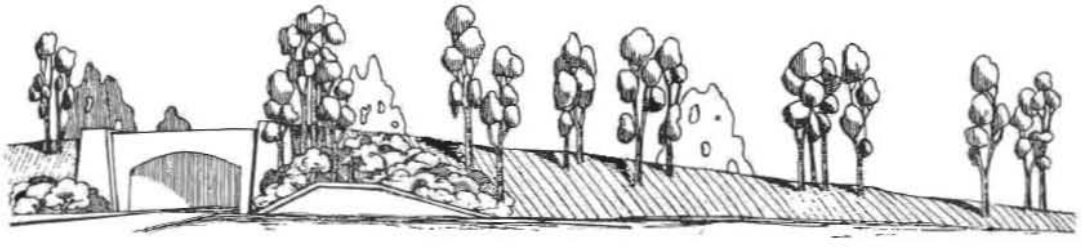
All the cable spinning on the bridge will be accomplished in the year 1935, according to the schedule.



PERSPECTIVE OF TYPICAL DEVELOPMENT AT BRIDGES ON RAMONA BLVD



PERSPECTIVE NEAR MIDWICK COUNTRY CLUB ON RAMONA BLVD.



COYOTE PASS OVERHEAD APPROACH NEAR MONTEREY PARK ON RAMONA BLVD.

At the meeting of The Water Project Authority of California held in Sacramento on March 4, 1935, the executive officer rendered a report reviewing the work done and activities undertaken in connection with the Central Valley Project since August 1, 1934, and in particular for the period from the last meeting of the authority on December 20, 1934. His report sets forth the status of the project in the Federal Public Works Administration, the National Resources Board and the Federal Power Commission, and reviews National and State legislation introduced to effect the early construction of the project.

Surveys are under way for relocation of the State highway and Southern Pacific railroad which will be necessitated by construction of the Kennett Dam. A contract has been entered into with the Southern Pacific whereby the company will make the necessary surveys and estimates of cost for a relocation of the railroad. A field party of the Division of Water Resources has been in the field for some time making topographic surveys to be utilized in relocation studies for the highway and railroad.

Our representatives in Washington are following the project closely and due to the clear and sound presentation of the completeness of the plan, which fully meets the requirements of the President's program, it is receiving the serious consideration of all the committees and Federal agencies interested.

IRRIGATION DISTRICTS

Elections were held in the following irrigation districts and bonds voted to secure RFC loans as follows:

	Amount of RFC loan	*Amount of bonds to be retired*
Merced, Merced County	$8,600,000	$16,190,000
Oroville-Wyandotte, Butte County	402,500	1,095,000
Beaumont, Riverside County	159,000	205,100
Santa Fe, San Diego County	394,500	686,000

FLOOD CONTROL AND RECLAMATION

Maintenance of Sacramento Flood Control Project

As a result of several moderate storms occurring during this period, it has been necessary to operate the three Sutter drainage pumping plants almost continuously since February 26th. The streams rose to low flood stage and water passed over all weirs except the Sacramento weir. No damage was caused.

SERA Relief Work

The SERA relief projects under our direction continued during the period, with remarkably little interference by bad weather. The projects for clearing and leveling spoil banks in the American River By-pass were completed. The Butte, Tisdale and Sutter by-passes were covered with water for practically the whole period and no work was accomplished there.

During the period February 16th to March 15th, a total of 24,983 man-hours was worked. The total man-hours of relief labor worked to March 15th are as follows:

	Man-hours
Federal Transient Service, upper Sutter By-pass	6,708
Federal Transient Service, Tisdale By-pass	2,989
Federal Transient Service, lower Sutter By-pass	15,490
SERA Project No. 35-B14-27, American River clearing	61,918
SERA Project No. 58-B14-15, Feather River north of Marysville, construction	44,004
SERA Project No. 58-B14-15, Feather River, maintenance	15,985
SERA Project No. 58-B13-35, Feather River south of Marysville	35,705
SERA Project No. 57-B14-4, Sacramento By-pass	9,472
SERA Project No. 35-B14-222, leveling spoil bank, American River	6,733
SERA Project No. 51-B13-10, Bear River	3,840
Federal Transient Service, seepage canal	630
SERA Project No. 51-B14-39, Butte Slough By-pass	322
SERA Project No. 35-B14-40, Mokelumne River	7,376
Total	211,172

The use of SERA relief labor has been in general very satisfactory. The Reclamation Board today made an allocation of an additional sum of $15,000 to continue the support of SERA projects on flood channel clearing work. To date the cost of carrying these

Flood Waters Spill Over Two Weirs

(Continued from preceding page)

projects has averaged 4.55 cents per man-hour of relief labor, including all costs except powder.

FLOOD MEASUREMENTS AND GAGES

A storm of moderate intensity occurred from February 26th to March 2d, which brought the valley streams to low flood stage, the crest reaching 24.0 feet on the Colusa gage at midnight of March 2d. Water commenced spilling over Tisdale weir at 6 p.m. on March 1st and continued until March 12th, the greatest depth being 2.3 feet, with a measured discharge of 10,553 second-feet. The water spilled over Moulton weir for a short period at a depth of about one foot, and over Colusa weir for about two days with a maximum depth of about two feet. The maximum gage height reached at Knights Landing was 27.5 feet. No water flowed over the Fremont weir. The river at Sacramento crested at 19.2 feet, on March 6th, indicating a discharge of about 50,000 second-feet. This storm was marked by unusually heavy valley rains and heavy rains on the Coast Range mountains.

Another mild storm, also marked by heavy valley rains, commenced on March 6th and lasted about two days. No water spilled over the Moulton and Colusa weirs, but a few inches spilled over the Fremont weir. The maximum gage height at Colusa was 20.4 feet, at Knights Landing 28.0 feet, and at Sacramento 21.1 feet. The maximum flow at Sacramento was about 57,000 second-feet.

At the commencement of the first storm there was 56 inches of snow at Norden, and at the conclusion of the second storm snow had reached a depth of 151 inches.

DAMS

The revised plans and specifications for the construction of the Coyote dam of the Santa Clara Valley Water Conservation District were approved on March 18, 1935. The dam will be a composite earthfill and rockfill structure located on the Coyote River, 100 feet in height and storing 30,000 acre feet of water. It is the main storage dam for the district.

Work on the construction of the Calero dam has been progressing slowly due to weather conditions. Clearing of the site at the Stevens Creek dam is under way and preliminary work at the Almaden dam has been started. Bids have been received for the construction of the Guadalupe dam. These structures are being built by the Santa Clara Valley Water Conservation District.

Placing of the timber facing on the San Gabriel No. 2 dam of the Los Angeles County Flood Control District is progressing.

The repair work on the Los Verjels dam on Dry Creek in Yuba County has progressed. It is expected that the work will be sufficiently advanced at an early date to permit of regulated storage for irrigation use during the ensuing season.

The construction of the Verdugo Wash Debris dam of the Los Angeles County Flood Control District has progressed to the stage where use can be made of the storage. Authorization for the use of the structure was issued on March 18, 1935.

SACRAMENTO-SAN JOAQUIN WATER SUPERVISOR

The flow of the Sacramento River at Sacramento increased from 19,000 second-feet at the end of February to 58,000 second-feet on March 9th. Since the latter date, the discharge has slowly dropped to about 32,000 second-feet on March 18th.

On March 10th there were no samples from delta stations showing salinity greater than 7 parts of chlorine per 100,000 and Suisun Bay was practically fresh as indicated by a sample taken at Bulls Head Point showing 10 parts.

Salinity at Upper Bay and Delta Stations on March 10, 1935

Station	*Salinity in parts of chlorine per 100,000*
Point Orient	880
Point Davis	260
Bulls Head	10
O and A Ferry	3
Collinsville	1
Emmaton	2
Antioch	5
Jersey	5
Central Landing	2
Dutch Slough	7
Rindge Pump	2
Middle River	5

WATER RIGHTS

Supervision of Appropriation of Water

During February, 41 applications were received to appropriate water, 10 were denied and 18 were approved. It would appear probable that the filing of applications is being somewhat stimulated by the recent decision of the Supreme Court in the case of Peabody v. Vallejo which affects the validity of many claims by riparian owners which have heretofore been asserted.

WATER DISTRIBUTION

Four new water master districts have been created by order of the State Engineer in accordance with Section 37 of the Water Commission Act; namely, Pine Creek near Alturas and Hot Springs Valley (Modoc County) and Big Valley and South Fork Pit River (Modoc and Lassen counties).

New Nojoqui Grade Road Being Financed With NIRA Funds

(Continued from page 10)

with a bituminous membrane of Grade "E" asphalt to prevent moisture or water percolating upwards into the selected material subbase.

LARGE CULVERT ACROSS CREEK

The roadbed is of the standard 36-foot width and surfacing is 20'x0.75-0.55'-0.55'-0.75' section Portland cement concrete reinforced at the customary expansion and weakened plane joints, but with no longitudinal reinforcing.

Other features in the contract are the construction of numerous large and special design reinforced concrete box culverts and cattle passes, as well as the construction of a 14 by 16-foot reinforced concrete arch culvert across Nojoqui Creek.

Over the southerly half of the project new construction closely parallels the existing road and the adequate handling of traffic required the construction of several stretches of detour road. These detour roads are 24 feet wide with the central 20 feet made up of selected material surfacing and oil mixed.

This project embraces the most costly per mile piece of construction yet undertaken on the primary highways in District V, the cost approximateing $115,000 per mile.

DISTANCE SHORTENED A MILE

When the work is completed, which is scheduled for September, 1935, the present inadequate road will have been eliminated and the traveling public will have an up-to-date, wide and safe road, free from the congestion and delay of trailing behind trucks with length of travel shortened by almost a mile. This improvement should have a definite influence in encouraging increased traffic on the coast highway.

The project aggregates a total construction cost of about $425,000 financed and governed by the National Industrial Recovery Act, and provides maximum labor from the nearby communities.

The work is under contract, and M. H. Hubbs is Resident Engineer for the State.

Wild: "Do you remember when a girl was proud of having a wasplike waist?"

Wedmor: "I ought to remember it; that was when I got stung."

Grizzly Dome Drops 75,000 Yards of Rock Into Feather River

(Continued from page 4)

large, stained areas indicating old and well defined cleavages. Water also flows from crevices in the broken face. These are the only clues pointing to probable contributing causes of the fracture. There is no certainty that the movement is completed, although the face of the fracture, with minor exceptions, appears as solid and enduring as did the original dome.

A cleavage or fracture of indeterminate depth is known to exist back of the broken face, but until this and other characteristics are examined and interpreted by a geologist, the effect of this possibility of further rock movement on the construction of the highway or on the construction of a dam immediately below are problematical.

Work on the Feather River highway had not yet reached the vicinity of the slide. The nearest operation was work on the portal of a tunnel at Grizzly Creek, some fifteen hundred feet away. This tunnel will be through solid granite unaffected by the slide and not subject to the same influences that caused the large section of the dome to break off.

FRANCE EXPERIMENTS WITH ROSIN RESURFACING MIXTURE

In France the Ministry of Public Works is experimenting with the use of rosin for resurfacing roads. A report of these experiments that have been made in the Department of Landes says:

"Two methods are being observed; one consists of incorporating 5 to 10% of gum in an emulsion of bitumen; the other process utilizes 10% of dark rosin to replace the same quantity of tar in tar emulsions; the experiments being made in the city of Dax and on National Highway No. 10 from Mont-de-Marsan to Dax.

"A definite opinion as to the value of using rosin as an ingredient of the resurfacing material can only be arrived at by prolonged observation after the roads have undergone heavy traffic and bad weather."

Reduced cost, improvement of the anti-skid quality, absorption of a larger quantity of gravel, and a more rapid drying are values claimed for the rosin ingredient.

U. S. TO PROVIDE "WAYSIDES"

Interior Secretary Ickes has just disclosed that part of the $25,000,000 "submarginal land program" fund will be used to provide "waysides" of 20 to 50 acres for use "by the traveler or family groups seeking a day's outing."

Highway Bids and Awards

FOR MARCH

DEL NORTE COUNTY—Between Foot of Oregon Mt. and Oregon State line, 8.7 miles; surface with Cr. Run Base and Seal Coat. Dist. I, Route 1, Sec. E. Pacific States Construction Co., San Francisco, $92,723; Hemstreet & Bell, Marysville, $66,825; Hein Bros. Basalt Rock Co., Petaluma, $73,222. Contract awarded to E. B. Bishop, Orland, $63,822.50.

GLENN COUNTY—Between 3 miles N. of Willows and Orland; 10.0 miles; Gr. Surf. with Cr. Run Base and Bit. Tr. Cr. Gr. or St.; widen and borders. Dist. III, Route 7, Secs. B and C. C. W. Caletti & Co., San Rafael, $55,979; Hemstreet & Bell, Marysville, $59,905; A. G. Raisch, San Francisco, $59,758; A. Teichert & Son, Inc., Sacramento, $55,947; Hanrahan-Wilcox Corp., San Francisco, $62,924; Peninsula Pav. Co., San Francisco, $61,268; Pacific States Const. Co., San Francisco, $54,866; Chas. L. Harney, San Francisco, $66,116; E. A. Forde, San Anselmo, $63,148. Contract awarded to Tiffany Construction Co., San Jose, $53,084.

IMPERIAL COUNTY—Between East Highland Canal and Sand Hills; 21.0 miles; grade shoulders; Bit. Tr. Scr. Gr. or St. Borders. Dist. XI, Route 27, Sec. A. Griffith Co., Los Angeles, $45,742; V. R. Dennis Constr. Co., San Diego, $58,668; Dimmitt & Taylor, Los Angeles, $49,796. Contract awarded to Oswald Bros., Los Angeles, $45,547.

IMPERIAL COUNTY—3.7 miles east of Brawley, a bridge across Alamo River, eight 19' timber trestle spans. Dist. XI, Route 187, Sec. C. Miracle Co., San Diego, $13,199; V. R. Dennis Const. Co., San Diego, $14,724; R. E. Hazard Const. Co., San Diego, $14,392. Contract awarded to Parish Bros., Los Angeles, $11,689.

IMPERIAL COUNTY—1½ miles N. of Calexico; 2 bridges and 0.2 mile grade and surface with Bit. Tr. material, road mixed. Dist. XI, Route 26, Sec. J. Parish Bros., Los Angeles, $16,752. Contract awarded to R. E. Hazard Contracting Co., San Diego, $16,568.

INYO COUNTY—Between ½ mile S. of Nly. Bdy. and Nly. Bdy.; 0.7 mile, grade Sel. Mat. Surf., and Bit. Tr. Dist. IX, Route 23, Sec. F. Gogo & Rados, Los Angeles, $14,430. Contract awarded to Tiffany Construction Co., San Jose, $14,203.50.

LOS ANGELES COUNTY—About 4.25 miles northwest of San Fernando. A reinforced concrete culvert to be extended. Dist. VII, Route 4, Sec. L. A. Tomei Const. Co., Culver City, $9,528; S. M. Milovich, Montebello, $10,259; Geo. J. Bock & Son, Los Angeles, $10,975; Dimmitt & Taylor, Los Angeles, $12,137; J. R. Lippincott, Los Angeles, $13,307; Harry F. Miller, Los Angeles, $14,436. Contract awarded to E. S. and N. S. Johnson, Pasadena, $9,154.

LOS ANGELES COUNTY—In Long Beach and Signal Hill, between Stanley Ave. and Loma Ave., 0.7 mile, grade and P. C. C. and A. C. Pav. Dist. VII, Route 60, Sections L.Bch & Sig. Hill. Griffith Co., Los Angeles, $57,868; Oswald Bros., Los Angeles, $59,784; Geo. R. Curtis Paving Co., Los Angeles, $60,598; United Conc. Pipe Corp., Los Angeles, $66,711. Contract awarded to Sully-Miller Contr. Co., Long Beach, $56,149.80.

LOS ANGELES COUNTY—At Ocean Ave. and Colorado Ave., R. C. Tunnel Arch and 0.2 mile P. C. C. and A. C. Pave. District VII, Route 60, Section S. Mca. M. B. McGowan, Inc., and C. W. Caletti & Co., San Francisco, $185,733; Fredrickson & Watson Const. Co. and Fredrickson Bros., Oakland, $195,909; J. F. Knapp, Oakland, $197,850; Bent Bros., Inc., Los Angeles, $196,521; Bodenhamer Const. Co., Oakland, $197,208; Griffiths Co., Los Angeles, $227,478; R. H. Travers, Chas. G. Willis, C. G. Willis & Sons, Inc., Los Angeles, $207,585; Mittry Bros., Const. Co., Los Angeles, 249,701; Bates & Rogers Const. Co., Oakland, $209,967; Mundo Engineering Co., Los Angeles, $206,921; Daley Corp., San Diego, $223,435; Clinton Const. Co. of California, Los Angeles, $206,248; Bannister-Field Co., Fred E. Potts Co., Los Angeles, $196,491; United Conc. Pipe Corp., Los Angeles, $219,670; J. E. Haddock, Ltd., Pasadena, $225,215. Contract awarded to Sharp & Fellows Contracting Co., Los Angeles, $190,723.25.

LOS ANGELES COUNTY—Between Winter Canyon and Los Flores Canyon, 3.4 miles Grade and P. C. C. Pave. Dist. VII, Route 60, Sec. A. Griffith Co., Los Angeles, $127,965; Dimmitt & Taylor, Los Angeles, $123,340; Sharp & Fellows Contr. Co., Los Angeles, $117,535; P. J. Akmadzich, Los Angeles, $117,426; Geo. R. Curtis Paving Co., Los Angeles, $124,068; United Conc. Pipe Corp., Los Angeles, $118,131; Oswald Bros., Los Angeles, $134,205. Contract awarded to L. A. Paving Co., Inc., Los Angeles, $111,222.

RIVERSIDE COUNTY—Across San Jacinto River, 1½ miles east of Elsinore, bridge consisting of 19–14' 0" Conc. slab spans on creos. pile bents. Dist. VIII, Route 77, Sec. B. Byerts & Dunn, Los Angeles, $16,854; Dimmitt & Taylor, Los Angeles, $18,956; V. R. Dennis Const. Co., San Diego, $19,995; Oscar Oberg, Los Angeles, $21,765. Contract awarded to Carlo Bonglovanni, Hollywood, $17,036.08.

RIVERSIDE COUNTY—San Gorgonio Wash. Reinforced concrete girder bridge to be widened. Dist. VIII, Route 26, Sec. C. Paul R. Hughes and Koopman-Wright Co., Long Beach, $7,226. Contract awarded to Matich Bros., Elsinore, $6,831.

SACRAMENTO COUNTY—Between Rio Vista Bridge and Freeport; 0.3 mile. Riprap slope protection. Dist. XIII, Route 53-11, Secs. A-E. Basalt Rock Co., Inc., Napa, $17,615; Hutchinson Co., Oakland, $17,714; Blake Brothers Co., San Francisco, $19,940. Contract awarded to Healy-Tibbitts Const. Co., San Francisco, $17,361.

SAN BERNARDINO COUNTY—Between Riverside Ave. and Colton; 2.0 miles Grade and P. C. C. Pave. Dist. VIII, Route 20, Sec. D. United Conc. Pipe Corp., Los Angeles, $66,641; Mundo Engineering, Los Angeles, $68,070; Griffith Company, Los Angeles, $74,093; Geo. R. Curtis Pav. Co., Los Angeles, $74,064; Sharp & Fellows Cont. Co., Los Angeles, $70,509; Geo. Herz & Co., San Bernardino $70,548; E. L. Yaeger, Riverside, $74,564; Oswald Bros., Los Angeles, $67,942. Contract awarded to B. G. Carroll, San Diego, $64,147.50.

SAN DIEGO COUNTY—Between Emerald Ave. and East City Limits of El Cajon; 0.8 miles; grade and AC. Pave. Dist. XI, Route 12, Sec. E. Cj. R. E. Hazard Cont. Co., San Diego, $39,525; Daley Corp., San Diego, $39,912; Griffith Co., Los Angeles, $43,234. Contract awarded to V. R. Dennis Const. Co., San Diego, $38,999.25.

SAN JOAQUIN COUNTY—An undergrade crossing under A. T. & S. F. Ry. near Stockton. F. Kaus, Stockton, $10,008; John Hachman, Stockton, $11,174. Contract awarded to Lord & Bishop, Sacramento, $8,835.

SAN MATEO COUNTY—Between Thornton and Daly City, 1.7 mile grade and surface with Bit. treated Cr. Gr. or St. on Cr. Run Base, Dist. IV, Route 56, Section E. Union Paving Co., San Francisco $117,345; Healy Tibbits Const. Co., San Francisco, $139,084; The Fay Improvement Co., San Francisco, $123,886; Hanrahan Wilcox Corporation, San Francisco, $119,330; Bayshore Const. Co., Inc., San Francisco, $117,210; C. W. Caletti & Co., San Rafael, $118,265; N. M. Ball, Berkeley, $117,907; Granfield, Farrar & Carlin, San Francisco, $122,094; Chas. L. Harney, San Francisco, $124,597; Fredrickson & Watson Construction Co.-Fredrickson Bros., Oakland, $119,246; A. Teichert & Son, Inc., Sacramento, $133,921; A. J. Raisch, San Francisco, $129,784. Contract awarded to Peninsula Paving Co., San Francisco, $114,834.10.

SOLANO COUNTY—Through Fairfield; 0.7 mile. Grade and Bit. Tr. Cr. Gr. or St. Surf. (plant mix). Dist. X, Route 7, Sec. Frfd. A. Teichert & Son, Inc., Sacramento, $23,679; Chas. L. Harney, San Francisco, $20,750; Ransome Company, Emeryville, $20,187; Unified Contracting Co., Portland, Ore., $22,441; Peninsula Paving Company, San Francisco, $20,194; Lee J. Immel, Berkeley, $22,552; A. G. Raisch, San Francisco, $19,795; E. A. Forde, San Anselmo, $23,199. Contract awarded to Pacific States Construction Company, San Francisco, $19,745.85.

TEHAMA COUNTY—At south entrance to city of Red Bluff; 10 miles grade and Bit. Tr. Cr. Gr. or St.

(Continued on page 32)

Traffic Densities on State and County Systems Reported

CLASSES of traffic carried by the various types of California roads present some interesting comparisons in the motor vehicle transportation survey made by the State Division of Highways.

In a review of this particular phase of the investigation, Director of Public Works Earl Lee Kelly calls attention to the fact that there are three types of highway surface—high, intermediate and low. High includes Portland cement concrete, oiled concrete and asphaltic concrete pavements; intermediate includes bituminous macadam, and metal bases with oiled tops—either sealed, plant mixed or road mixed; and low includes gravel, earth and natural soils either with or without dust oil applications.

THREE CLASSIFICATIONS

Traffic density is designated as light, medium and heavy. Light traffic is less than 500 vehicles per day; medium traffic ranges from 500 to 2000 vehicles a day, and heavy traffic is over 2000 vehicles a day.

On the State highway system, 47.7 per cent of the mileage carries light traffic, 32.8 per cent medium, and 19.5 per cent heavy traffic. Two-thirds of all the light traffic is carried on the low-type surface; practically all the medium traffic on the intermediate and high-type surfaces; and seven-eighths of the heavy traffic is on the high-type surface.

COUNTY SYSTEM FIGURES

On the county highway system, 90 per cent of the mileage carries light traffic; 8 per cent medium, and 2 per cent heavy traffic. Seven-eighths of all the light traffic is carried on the low-type surfaces; three-fifths of the medium traffic is on the intermediate-type surfaces, and one-third of the heavy traffic is on the high-type surfaces. In other words, some 6200 miles of county roads out of a total of 65,130 miles, carry all the medium and heavy traffic for the county road system.

"When I put the ball where I can reach it," said the stout golfer, when asked how he liked the game, "I can't see it, and when I put it where I can see it, I can't reach it."—*Smith's Weekly (Sydney)*.

Restaurant Patron (crossly): "Waiter, what are those black specks in my milk?"

Waiter: "I dunno, suh—unless dey's some ob dem vitimins dey's talkin' so much about."—*Pathfinder*.

Windrow Sizer for Road Mixed Surfaces Developed by Engineers

IN THE construction of oil mixed surfaces by the road mix method, it is essential to secure an accurate spread of material in order to insure a correct proportioning of oil to the volume of material on the road.

One method is to spread a ribbon of road material of uniform thickness on well defined subgrade, but it is rather difficult to ascertain the exact cross-section of such a body of material.

The most acceptable method is to blade the material up into a windrow of as uniform cross-section as possible and then by cutting out a section of known length through the windrow, the weight per lineal foot of material can be determined by weighting this small quantity and the proper amount of oil can be proportioned to the size of the windrow.

DEVELOPED ON JOB

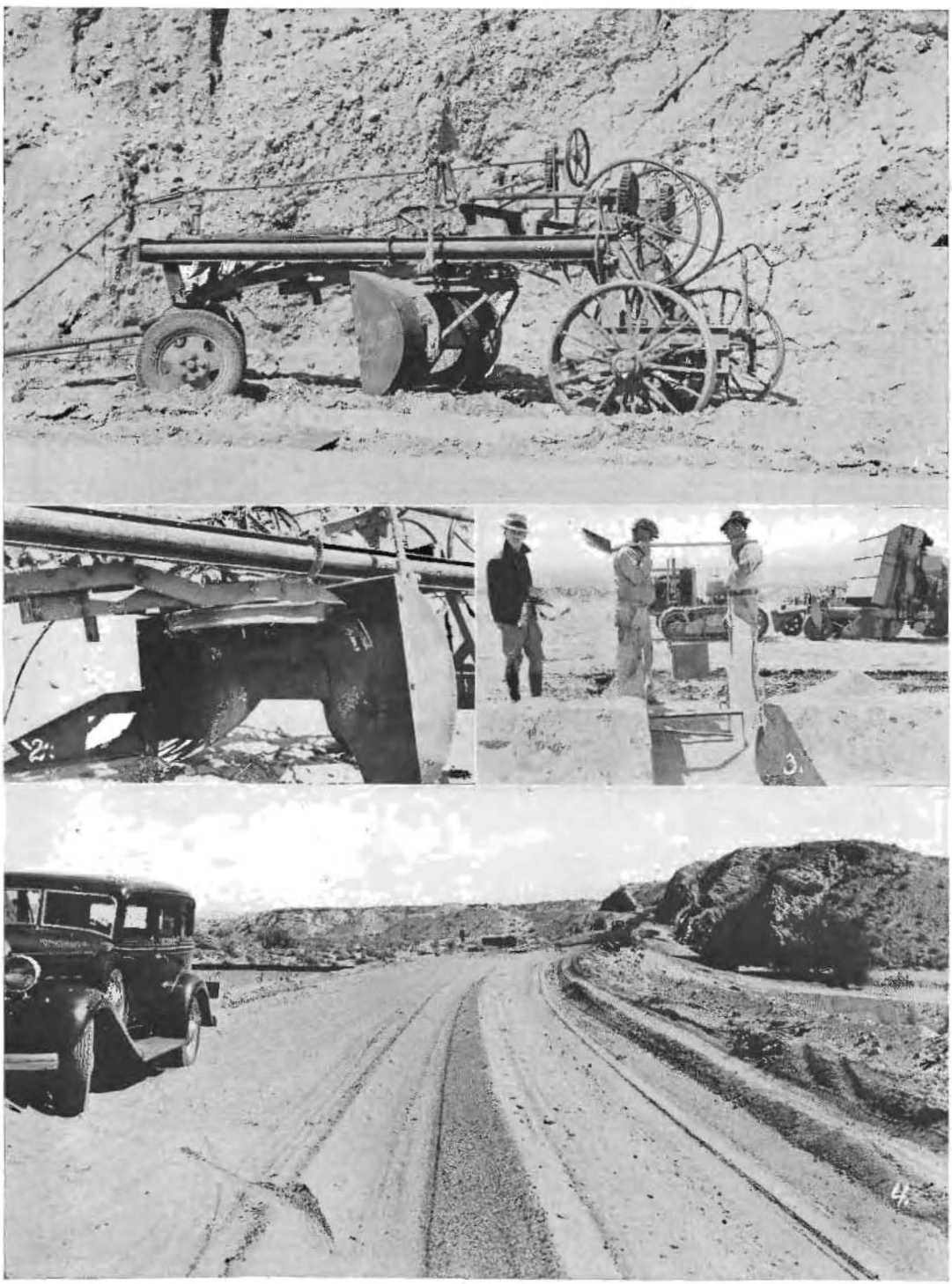
Since it is difficult to blade up a windrow of exact and nonvarying cross-section, various devices have been used by different contractors for accomplishing this purpose. The most recent, perhaps, is the one developed on the surfacing project now under construction between Indio and Shavers Summit in Riverside County.

This windrow sizer, as it is called, is the joint development of Resident Engineer Evans and of Gardner Bros., who have the subcontract for mixing the road mixed surfacing.

The equipment consists of a bowl attached to a nine-foot blade grader. The back of the bowl is cut out into an orifice the desired shape of the windrow. At the top of the orifice is an adjustable plate to vary the amount of material deposited in the windrow

On one end of the bowl is a long wing riding on a shoe to clean up the material on one side of the windrow, and on the opposite end of the bowl is a straight opening to permit the excess to roll out to one side only of the windrow.

The excess on the first windrow is deposited on the interior of the roadway to be used in sizing the second windrow. The excess in the second windrow will be spilled on the outer side and swept onto the shoulder with a blade. This is the most promising method of sizing a windrow yet developed.



A MECHANICAL WINDROW SIZER has been invented by engineers on a State job in Riverside County. A blade grader equipped with the sizer is shown in No. 1 and a close-up of the sizer in No. 2. Note adjustable plate at top of orifice. Excess flows out wing on left. No. 3—Blocking out and weighing windrow section to determine percentage of oil. No. 4—Completed windrow showing excess on left.

Car Speeds of Today Demand Large Margin of Safety in Roads

"MAIN highways must be built with an adequate safety factor for speed," declares Frank T. Sheets, former State Highway Engineer of Illinois.

"Modern cars make speeds of 50 and 60 miles an hour effortless, yet in too many cases such speeds are dangerous on obsolete roads with high crowns, narrow widths and sharp curves," Mr. Sheets states.

"A glance backward to the speeds of travel and related design policies of only 15 years ago reveals how far we have come and how inadequate for present traffic conditions are the roads designed then," he said.

"While no one can predict that speeds of 100 miles an hour will become common, nevertheless roads which will supply reasonable safety at that speed are needed to insure adequate safety for present-day common road speeds. Bridges and other structures are built with a factor of reserve strength under the heaviest expected loads. Similarly, highways must be built to be safe at speeds much greater than will be generally traveled.

"People know what the modern motor car can do," concludes Mr. Sheets, "and there is evidence enough that they are not going to be satisfied with highway facilities that seriously limit the capabilities of the car as used by the average driver. That means continued development and modernization of our highway facilities."

HIGHWAY BIDS AND AWARDS FOR THE MONTH OF MARCH

(Continued from page 29)

on creek run gravel base (road mix). Dist. II, Route 3, Sec. B. Hein Bros. Basalt Rock Co. and Sidney Smyth, Petaluma, $19,071; A. G. Raisch, San Francisco, $16,920; E. A. Forde, San Anselmo, $23,804; A. Teichert & Son, Inc., Sacramento, $17,274; Kennedy Const. Co., Oakland, $19,372. Contract awarded to Hemstreet & Bell, Marysville, $16,736.30.

TULARE COUNTY—Between 1 mile and 7 miles E. of Tulare; 6.1 miles Cr. Run Base Borders and Bit. Tr. Surfacing. Dist. VI, Route 134, Sec. B. E. A. Forde, San Anselmo, $21,906; Peninsula Pav. Co., San Francisco, $23,981; Granite Constr. Co., Ltd., Watsonville, $25,930; A. Teichert & Son, Inc., Sacramento, $25,672; Stewart & Nuss, Inc., and John Juckovich, Fresno, $23,810; Basich Bros., Torrance, $23,490; Gogo & Rados, Los Angeles, $20,247. Contract awarded to L. A. Brisco, Arroyo Grande, $19,263.25.

YUBA COUNTY—Widen 7 R. C. bridges between Wheatland and Marysville, Dist. III, Route 3, Secs. A, B. M. B. McGowan, Inc., San Francisco, $39,136; Campbell Construction Co., Sacramento, $53,537; C. W. Caletti Co., San Rafael, $48,916; E. T. Lesure, Oakland, $65,172; Lord and Bishop, Sacramento, $47,490. Contract awarded to M. A. Jenkins, Sacramento, $42,148.40.

In Memoriam

I. S. VOORHEES, who for the past sixteen years has been in charge of maintenance of all State highways in District VII with headquarters in Los Angeles passed away on March 14th at the Pasadena Hospital after an illness of about one week.

Mr. Voorhees was born in New York State in 1872, and graduated in civil engineering from Brooklyn Polytechnic Institute in 1901. He engaged in railroad work as chainman and draftsman until 1903, when he entered the employ of the United States Reclamation Service. He was employed largely on dam and canal design and construction work with this service until 1915, when he went to work for the California Highway Commission as Office Engineer in the Los Angeles District, being changed to District Maintenance Engineer in 1919.

Mr. Voorhees was a hard worker, exceptionally conscientious, and a thoroughly competent engineer. He was a corporate member of the American Society of Civil Engineers and a member of the Phi Kappa Psi fraternity. He was held in high esteem, not only by the engineering and highway organizations but also the general public. His passing will be a distinct loss to the State highway organization as well as to his many friends in that service. He is survived by his wife, Jennie L., and two daughters, Edna Elizabeth and Madeline.

GOVERNOR MERRIAM OPENS AMERICAN RIVER BRIDGE

(Continued from page 19)

on four-foot steel cylindrical piers filled with concrete. It had a roadway width of eighteen feet and was erected at an elevation above that of high water.

DEMOLISHED IN 1914

This bridge served the public for 27 years, when, in 1914, having been found inadequate, it was demolished and a new bridge was constructed downstream about twenty feet. The contract was let for the erection of a patented "Luten" earth-filled reinforced concrete arch bridge for $130,000. It consisted of two 112-foot arches, two 117-foot arches and one 125-foot arch, with four concrete piers and two abutments having wood pile foundations. There was a 21-foot 3-inch roadway with a 4-foot sidewalk on the downstream side and a spindle balustrade on each side.

After a few years use, it became too narrow to accommodate the greatly increased traffic and the roadway was filled up to the sidewalk level and the sidewalk used as a part of the roadway, making it extremely dangerous for pedestrians. It remained in this condition until reconstructed into the present bridge.

STATE OF CALIFORNIA

Department of Public Works

Headquarters: Public Works Building, Eleventh and P Sts., Sacramento

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Port of San Jose—Not appointed

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STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

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