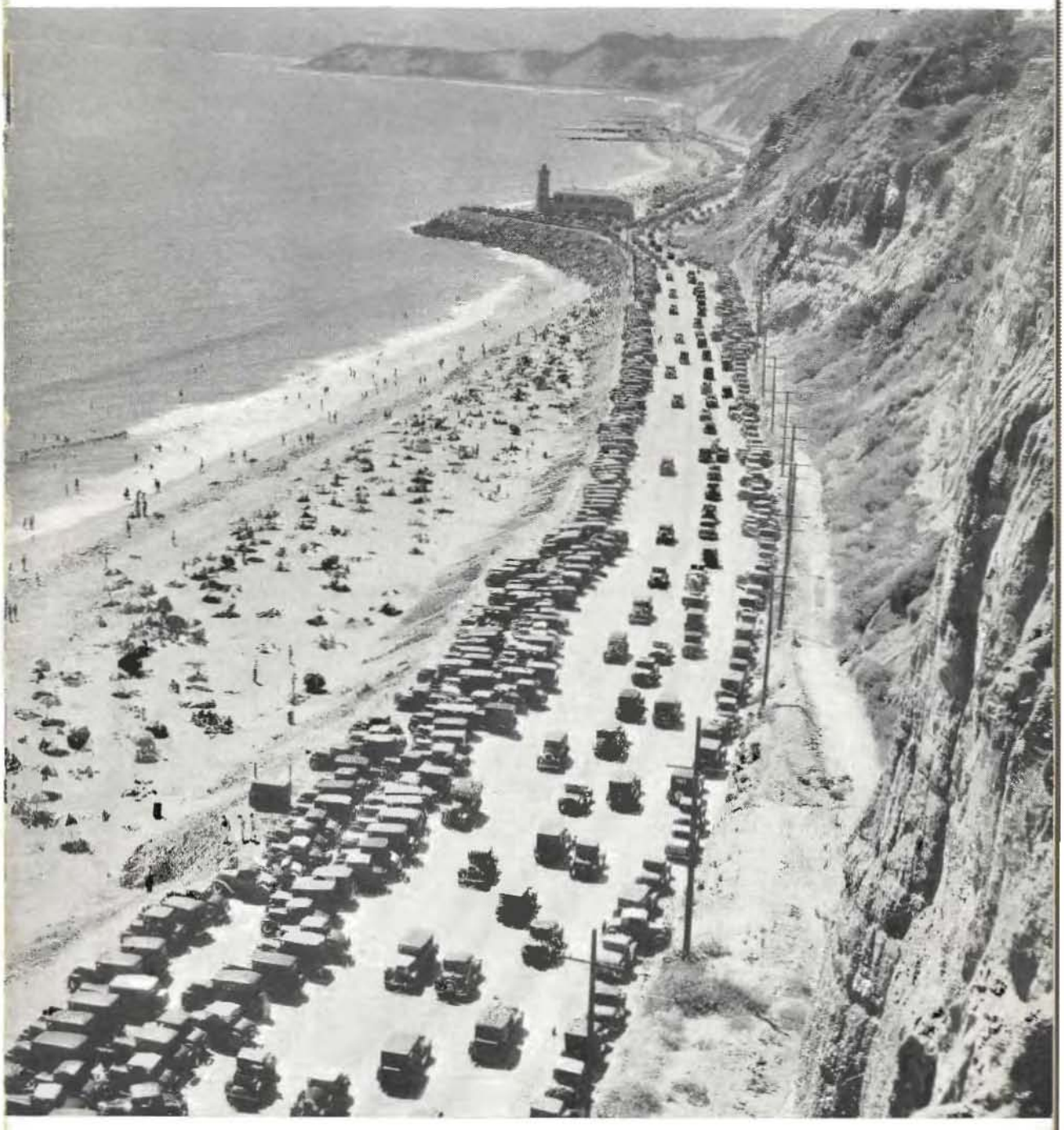
CALIFORNIA

HIGHWAYS AND PUBLIC WORKS



Scene on State Highway No. 60 Near Santa Monica

Official Journal of the Department of Public Works

MARCH ~ 1934

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$2,500,000 Deficit in Highway Budget Threatened by Gas Tax Revenue Loss

Shrinkage of 3% to 5% in Monthly Income Since July 1, 1933 Together With Increased Cost of Construction Portends Elimination of Major Projects

By **GEORGE T. McCOY**, Assistant State Highway Engineer

ADVANCEMENT of the State highway construction program by the Division of Highways for the current biennium is threatened with serious handicap by the continued decreased revenues from the State tax on gasoline. Revenues from this source have been falling from 3 per cent to 5 per cent below the estimated returns for each month since the beginning of the biennium on July 1, 1933.

This reduction in income can only result in curtailment of the State program for road construction, which has done so much for the relief of unemployment in California as well as providing much needed improvement to the 14,000 miles of roads which make up the network of the State highway system.

With the situation as it is, a timely review of the Division of Highways budget and the allocation of its funds to the various functions of the division will show the probable extent of the necessary reduction of the program.

GEORGE T. McCOY

The revised Division of Highways budget as adopted and approved by the California Highway Commission on August 5, 1933, provided for construction and maintenance and other functions such as purchase of rights of way on the State highway system amounting to more than $70,000,000 during the period from July 1, 1933, to June 30, 1935.

The budget was predicated upon estimates of revenues from the various sources of State highway funds, based upon studies of previous collections, and upon the Federal apportionment to California for State highway construction of funds appropriated by the National Industrial Recovery Act.

The revenues for the Division of Highways from State sources consist of the following:

1. One-half the net receipts of the motor vehicle license fees.

2. One-half the net re-receipts of the highway transportation tax.

3. Two cents a gallon from the net receipts of the motor vehicle fuel tax, of which one-quarter cent is directly apportioned to maintenance and construction projects within the city limits of incorporated towns and cities.

(Note.—The State motor vehicle fuel tax is three cents but one cent is now turned directly over to the various counties in proportion to the amounts collected within the limits of the particular county.)

ESTIMATED INCOME TOTALS

The anticipated income from the State and Federal sources was estimated at the following figures:

Motor vehicle fees	**$5,356,000**
Highway transportation tax	**600,000**
Motor vehicle fuel taxes	**48,180,000**
National recovery funds	**16,000,000**
Total	**$70,136,000**

While accounting procedure and statute require the monies for State highway pur-

(Continued on page 10)

New $2,119,000 L. A.–Pomona Arterial Will Save Traffic $876,000 Annually

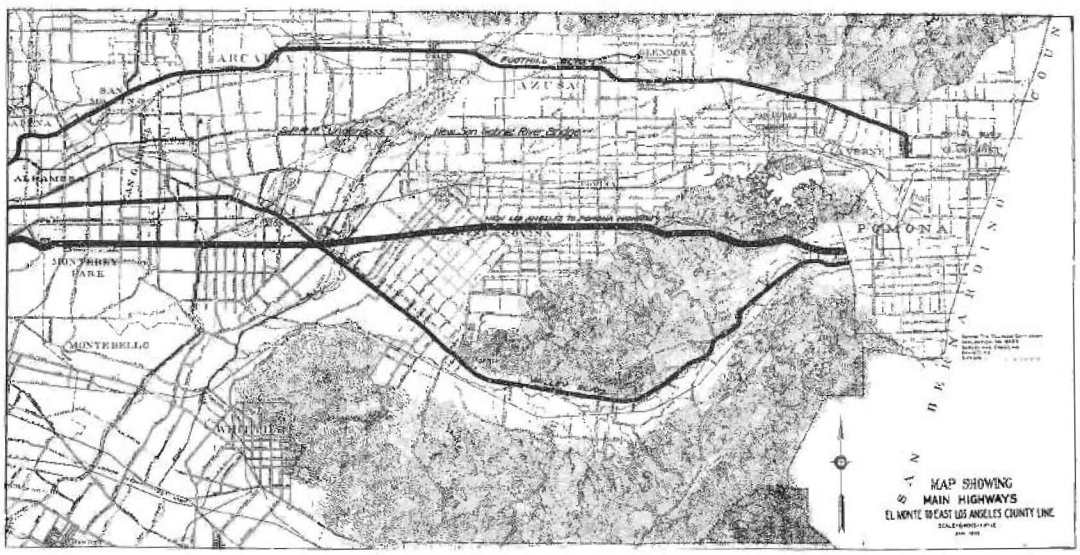
By **S. V. CORTELYOU**, District Engineer

IN THE NEAR future, Los Angeles will have a new State highway entrance from the east—one that will be unique in that the six miles through the suburban area from Monterey Park to the intersection of Aliso Street and Mission Road near the Civic Center of Los Angeles will be practically free from streets or railroads intersecting at grade.

This route will connect San Bernardino, Redlands and Riverside via Pomona and intermediate towns with Los Angeles. In 1931 the State Highway Commission adopted the new route from Pomona to Los Angeles via Holt Avenue and Garvey Avenue, as a State highway layout.

The object of this new route was to provide a main traffic artery on the most direct line easterly from the Civic Center in Los Angeles, utilizing existing highways wherever possible and constructing new sections wherever necessary to maintain direct alignment.

For a great many years, traffic between Los Angeles and Pomona has been carried by two principal routes, one the Foothill Boulevard, by which traffic is routed northeasterly from Los Angeles by way of Pasadena, Azusa, Glendora and Claremont, and finally southerly to Pomona; and the equally devious route known as the Valley Boulevard, by which traffic is carried northeasterly from Civic Center through a maze of intersecting streets and railroad grade crossings past Lincoln Park, thence on a gradual turn southeasterly through Alhambra, El Monte and Brea, and through the long pass between Puente Hills and San Jose Hills, swinging again to the northeasterly to Pomona.



DIRECT ARTERIAL ROUTE between Los Angeles and Pomona now under construction is shown by heavy black line. Lighter black lines indicate existing Foothill Boulevard and Valley Boulevard Routes.

"S" ROUTE BISECTED

This latter route has the shape of a huge "S" which deviates several miles from the direct line. The new route cuts across this "S" in practically a straight line, with a saving in distance of a little more than three miles. The section through San Jose Hills and Kellogg Ranch on the Pomona end, 6.06 miles in length, was let to contract in July, 1932, and completed in May, 1933. It extends from the city limits of Pomona to Barranca Street and connects with Arroyo

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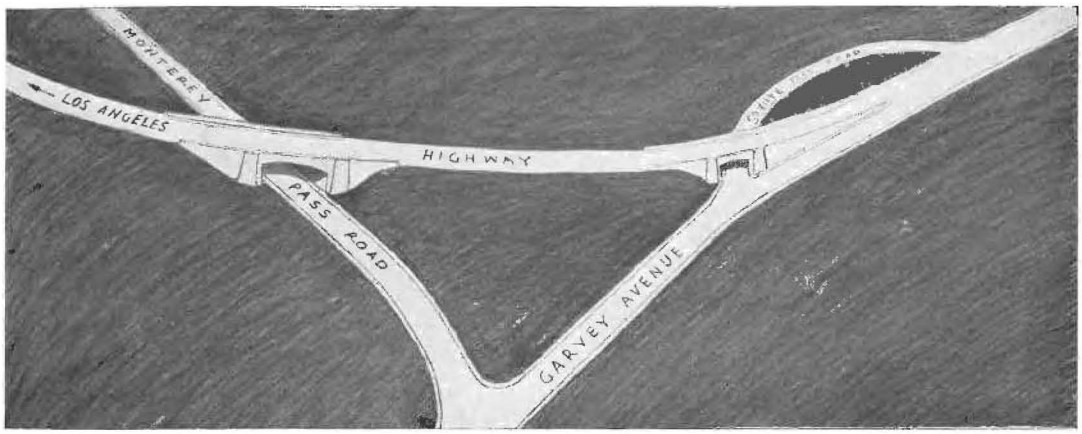
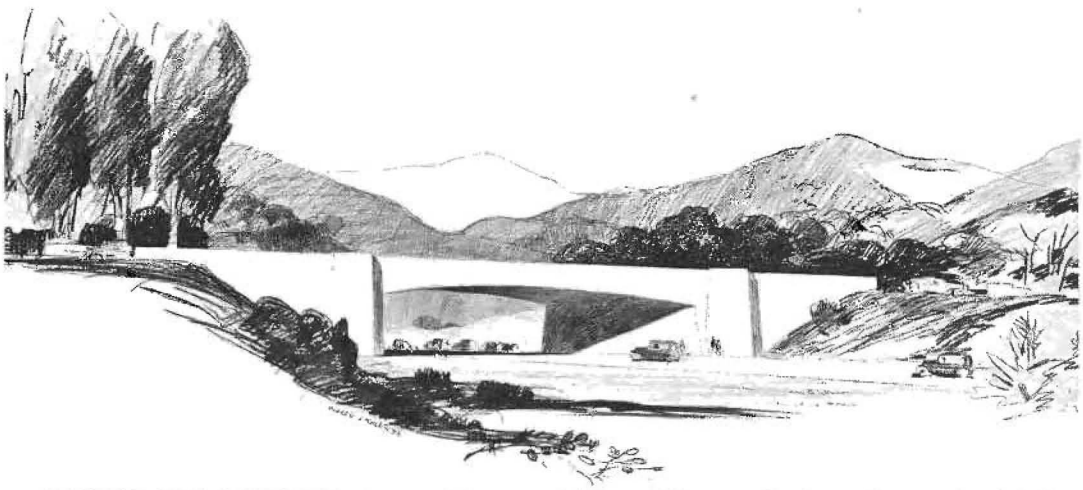


IDEAL GRADE SEPARATION plan of the new Los Angeles arterial permits six miles of modern high standard boulevard through suburban area without a grade intersection. Monterey Pass Road is crossed by an overhead structure and Coyote Pass traffic is handled by a partial separation as shown above, cars moving in southwesterly direction being diverted through an underpass to prevent a lefthand turn across traffic.



MISSION AND MODERNE at once. The graceful lines of the new Monterey Pass overhead bridge structure blend twentieth century engineering with the historic background of the southland.

TYPICAL SECTION of new Los Angeles airline arterial showing wide three-lane pavement with edges of fill protected by berms and white sight posts.

Redwood Puncheons Used for Fills on Realignment Eliminating 205 Curves

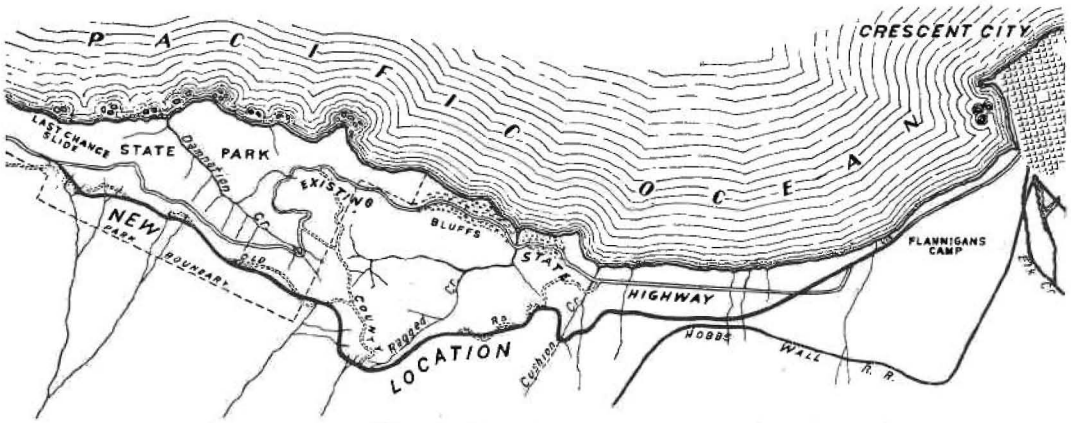
By **J. W. VICKREY,** District Engineer

THE RELOCATION and construction of 9.2 miles of the Redwood Highway in Del Norte County causes only a momentary interest by its cost of $713,683.95 in this day of gigantic engineering projects but elicits more than a cursory interest when the project is thought of as exemplifying the progress in highway transport, construction and beautification made in the past half century.

Forty-six years ago the supervisors of Del Norte County authorized the construction of a road from Crescent City southerly to Requa, on the Klamath River, to connect with a road from Eureka, some 65 miles to the south.

Mail destined for Crescent City was received by boat at Eureka; hauled to within six miles of the Klamath River and then packed on horses to the river. A rowboat transported it to the opposite shore where it was once more loaded on horses and packed to its destination over beach and mountain trail, a trip which in the stormy season required days to make.

Upon the completion of the Crescent City-Requa road, stages drawn by four- or six-horse teams were placed in operation. A fare of $5 was charged and the trip required ten to sixteen hours, dependent upon the weather.



	Length	No. Curves	Degrees	No. Circles	Radius Max.	Radius Min.
Present	10.31mi.	239	11076°	30.77	1000	50
Proposed	9.52mi.	34	1519°	4.22	6000	300

MAP SHOWING RELOCATION of 9.9 miles of the Redwood Highway between Last Chance and Flannigan's on the Del Norte County coast south of Crescent City.

This road, placed under construction in 1889 and completed six years later, permitted the first vehicular travel from Crescent City to Requa, at that time a thriving fishing and cannery town.

TRANSPORTATION BY ROWBOAT

Prior to the construction of this road, freight consigned to Requa was received at Crescent City by infrequent lumber schooners and unloaded into large rowboats, which were then rowed by as many as sixteen oarsmen down the coast to the Klamath River and thence to its destination.

The old landmark called "Tub Springs," near the road now under construction, was the stopping place for watering the horses as well as the lunching place for the passengers.

In 1910, an automobile touring car replaced the horse-drawn stage, though the lack of rock ballast frequently required the use of the stage teams to pull the auto-stage through the many deep quagmires. This resulted in the trip often taking hours, whereas now it is made in thirty minutes.

As travel increased, the necessity for some type of surfacing became apparent. Timber

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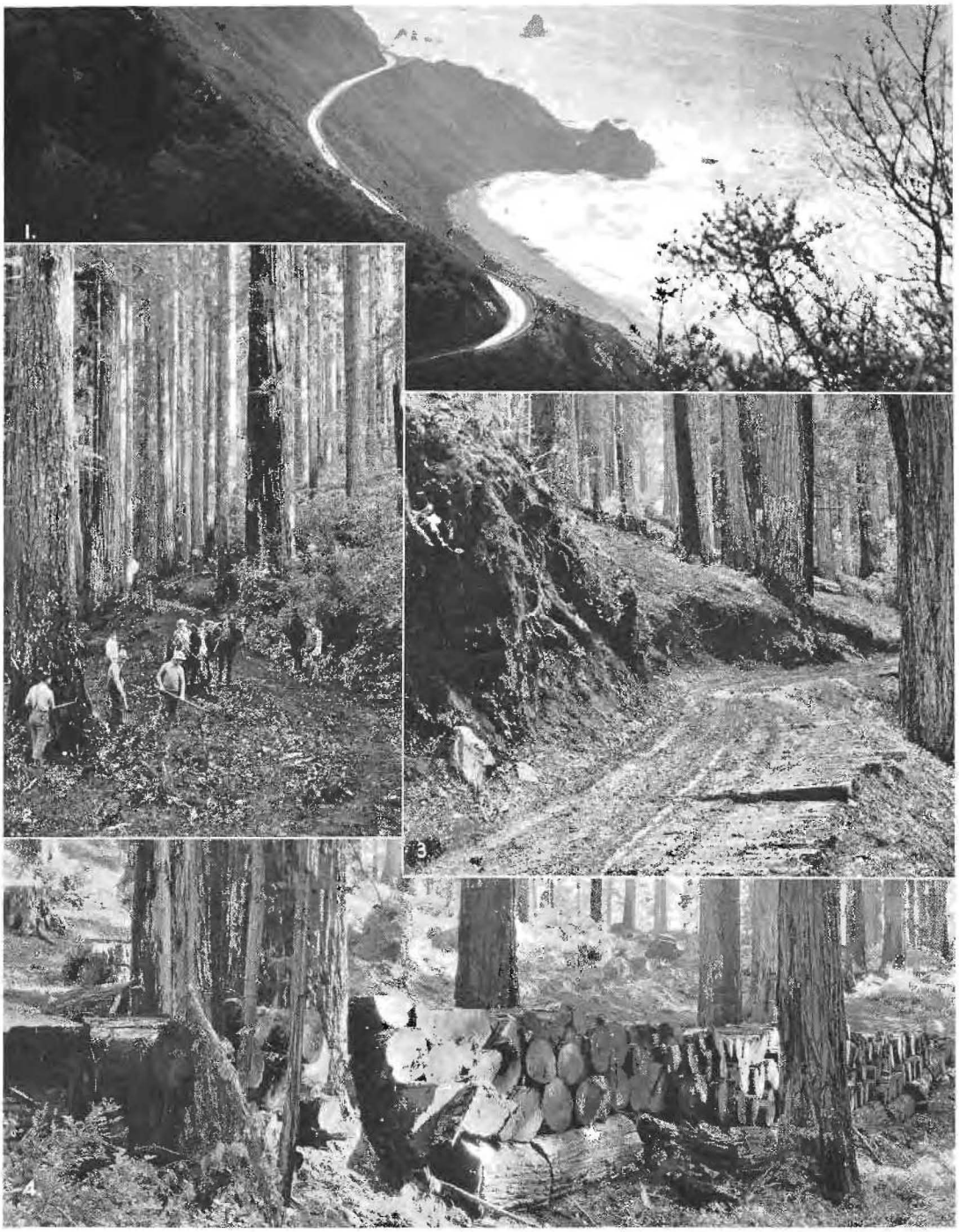

THROUGH REDWOOD FORESTS lies a portion of the relocated route for the Redwood Highway in Del Norte County. No. 1—Scene on the existing highway along the steep coast where slides occur making maintenance costs prohibitive on a road with too many sharp curves. No. 2—Highway crews are engaged in clearing operations for the new road through heavy timber. No. 3—Part of old Redwood puncheon road through Graves Park built twenty years ago and still in travelable condition. No. 4—Redwood puncheons are being used to take the place of earth fills on portions of the new road, thus utilizing the timber of the few trees it is found necessary to fell.

Winter Experiments in Curing Cement Concrete Result in Recommendations

By **C. S. POPE**, Construction Engineer

COLD weather curing of Portland cement concrete is not ordinarily a problem in California, but from time to time occasions arise where it is necessary to devise means for combating the effects of low temperatures on concrete construction.

During the winter months of 1929, 1931 and 1932, sufficiently cold weather prevailed to make necessary the protective measures described herein.

On a paving project in San Diego County in 1929, temperatures as low as 18 degrees Fahrenheit were successfully combated by the use of a blanket of dry earth three inches thick on the pavement, to which was added a covering of three-ply burlap. By this means the curing temperature was maintained at above 50 degrees Fahrenheit.

C. S. POPE

BITUMINOUS MEMBRANE USED

On paving in the Sacramento Valley during 1932, a different method of procedure was used. Curing was done by the use of bituminous membrane covering with the following additions:

The temperature forecast for the next 24 hours was obtained from the local weather bureau about 4 p.m. If the forecast indicated a minimum temperature above 32 degrees Fahrenheit, a single layer of burlap was used on the current day's run and bituminous curing membrane was applied the following morning. If temperatures below 32 degrees Fahrenheit were indicated, the current day's run was covered with double burlap and a bituminous membrane applied next day.

If the cold weather continued, a single layer of burlap was applied for the next two nights; if the temperature under the burlap was quite low, double burlap was used for three days. The above practice was acceptable only when temperatures of 32 degrees Fahrenheit or less did not exceed a 4-hour period; for such longer cold periods, the provisions of the Standard Specifications prevailed.

WINTER PAVING ON RIDGE

Certain experimental work in curing methods was done at Castaic on concrete paving, but was not conclusive because weather temperatures were not very low and protective measures were somewhat insufficient.

Paving was started on the Ridge Route Alternate on February 14, 1933, and the bituminuous membrane method of curing was used. From one to three-ply layers of burlap were used during cold weather to protect the concrete, and beam breaks were used to determine the proper time before pavement opening, the beams being subjected to the same temperature, etc., as the pavement itself. No concrete was laid on frozen subgrade, and in general the provisions of the Standard Specifications relative to cold weather concreting were complied with.

In connection with this subject, a recent article by H. F. Clemmer, Engineer of Materials at Washington, D. C., brings out the interesting fact that concrete laid in the morning with rising temperature attains greater strength than concrete laid in the afternoon with dropping temperature. In other words, increasing or decreasing temperatures cause increase or decrease in the rate of setting of the cement. He also states that beam tests furnish a valuable check on the quality of concrete.

The strength of concrete obtained under the above curing methods was checked by beam breaks and proved satisfactory.

SERIES OF EXPERIMENTAL TESTS

In view of the fact that information as to the above tests had not been recorded with any great care nor generally disseminated, a

A PAVING EXPERIMENT is here pictured as conducted on the Ridge Route Alternate last winter. Fourteen test sections of cement concrete were cured under different temperature conditions.

more ambitious investigation was undertaken early in 1933 in which the Materials and Research Laboratory and the Construction Department collaborated.

W. H. Mohr represented the Laboratory and prepared the report from which the data quoted is taken, while F. A. Read acted as observer for the Construction Department, the work being under the general supervision of District Engineer S. V. Cortelyou.

The site of the experiment was the Ridge Route Alternate in Los Angeles County. Experimental test sections were constructed at Chandlers during February, 1933. These test sections contained 80 cubic feet of concrete and were made up of two slabs each 4 feet by 20 feet by 6 inches, each slab containing seven divisions 4 feet by 2 feet 10 inches, a total of 14 test sections. Each section was cured under different conditions and observed hourly over a five-day period. The concrete materials used were the same as those in the proposed Ridge Route pavement; water came from Chandlers and was not heated.

THERMOCOUPLES IN CEMENT

Electro-thermocouples of copper and constantan wire were placed in 13 of the sections and the 14th was left exposed in an uncured condition. The ends of the thermocouples were buried about one-fourth inch in the concrete and a Leeds and Northrup Potentiometer was used to measure the potential of the thermocouples, the readings being converted into degrees of temperature. Three inch mercury thermometers were used to measure the internal temperature of the concrete, being imbedded about $2\frac{1}{4}$ inches in oil wells. The relative humidity was recorded by the use of a sling phychrometer.

Hourly observations of weather, wind, air temperature and humidity were made over a five-day period immediately following the pouring of the slabs.

The lowest temperature recorded was 19 degrees Fahrenheit at 6 a.m. and the highest temperature was 62 degrees Fahrenheit. Had the same temperature range persisted over the 35-day curing period which elapsed before cores were tested, the heat-hours at the time of test would have approximated 30,000 units.

VARIATIONS OF COVERING

The coverings used to protect the concrete were as follows:

1. Hopcloth, wet.
2. Burlap, 12-ounce, 1 layer, wet.
3. Burlap, two layers, wet.
4. No cure, dry.
5. Earth blanket, 2-inch, wet.
6. Earth blanket, 4-inch, wet.
7. Ponding, wet.
8. Bituminous membrane on surface and subgrade, dry.
9. Bituminous membrane, dry.
10. Bituminous membrane, 1-inch earth blanket, dry.
11. Bituminous membrane, plus 1 layer burlap, wet.
12. Impervious paper, Type A, dry.
13. Impervious paper, Type B, dry.

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Russian River Highway Costing $1,225,000 Will Be Opened to Public This Summer

By JNO. H. SKEGGS, District Engineer

One of the most scenic sections of the Russian River will be made accessible to motorists by the relocation of the Redwood Highway between Cloverdale and Hopland, eliminating the tortuous Hopland Grade with its many sharp curves and steep grades crossing seven summits. The new highway, following a water-level route along the Russian River, is now under construction and will not be opened to the public until it is entirely completed which, it is expected, will be next August.

THE RUSSIAN RIVER HIGHWAY now being constructed in Sonoma and Mendocino counties, between the towns of Cloverdale and Hopland, is a unit of the State's highway building program that is attracting great popular interest.

Many inquiries as to the type of construction, cost and possible date of completion of this major highway project have been received from the people, especially those of the North Bay counties, and they are looking forward to the time when the entire unit can be opened to traffic and thereby eliminate what has been for years one of the most serious obstacles to a full enjoyment of touring the Redwood Highway. Anyone who is familiar with the topography and scenic attractions of this region can well understand the interest people feel in the final completion of this new routing of the highway along the beautiful Russian River.

JNO. H. SKEGGS

The present traveled highway between Cloverdale and Hopland is over a rough mountainous area wherein the roadway traverses canyons, negotiating high elevations across ridges. The entire line is of very undulating grades and alignment quite inferior to our present day standards. Two major summits are attained, reaching an elevation of 1205 and 1275 feet respectively.

BUGBEAR OF MOTORISTS

The many blind curves and narrow roadway have made this highway sector a traffic barrier to motorists owing to the strain of trying to safely negotiate its many curves, the time consumed and the dangers of collision.

The hazards of passing vehicles and trucks of wide bodies require the constant vigilance of the automobilist to avoid danger, leaving very little time to observe the countryside and the mountain beauties of the interesting terrain.

The new routing along the river will be a great boon to the people of Mendocino County, in particular, because much of their freighting is carried over the highway, and this new road is a water-level grade, following the course of the Russian River. Its completion will remove all mountainous grades from the Redwood Highway.

GRADING COST $672,000

The county seat of Mendocino County, Ukiah, will be brought considerably closer to the San Francisco Bay region through the elimination of heavy grades and a meandering roadway.

Work on this relocation has been under way since February, 1932, when the first contract was awarded for grading 13.9 miles between Cloverdale and Hopland. The contract involved the moving of over 1,400,000 yards of dirt, together with small structures, involving a total cost in excess of $672,000. It was completed and accepted in September, 1933.

The above mentioned contract was only the beginning of the extensive work to be under-

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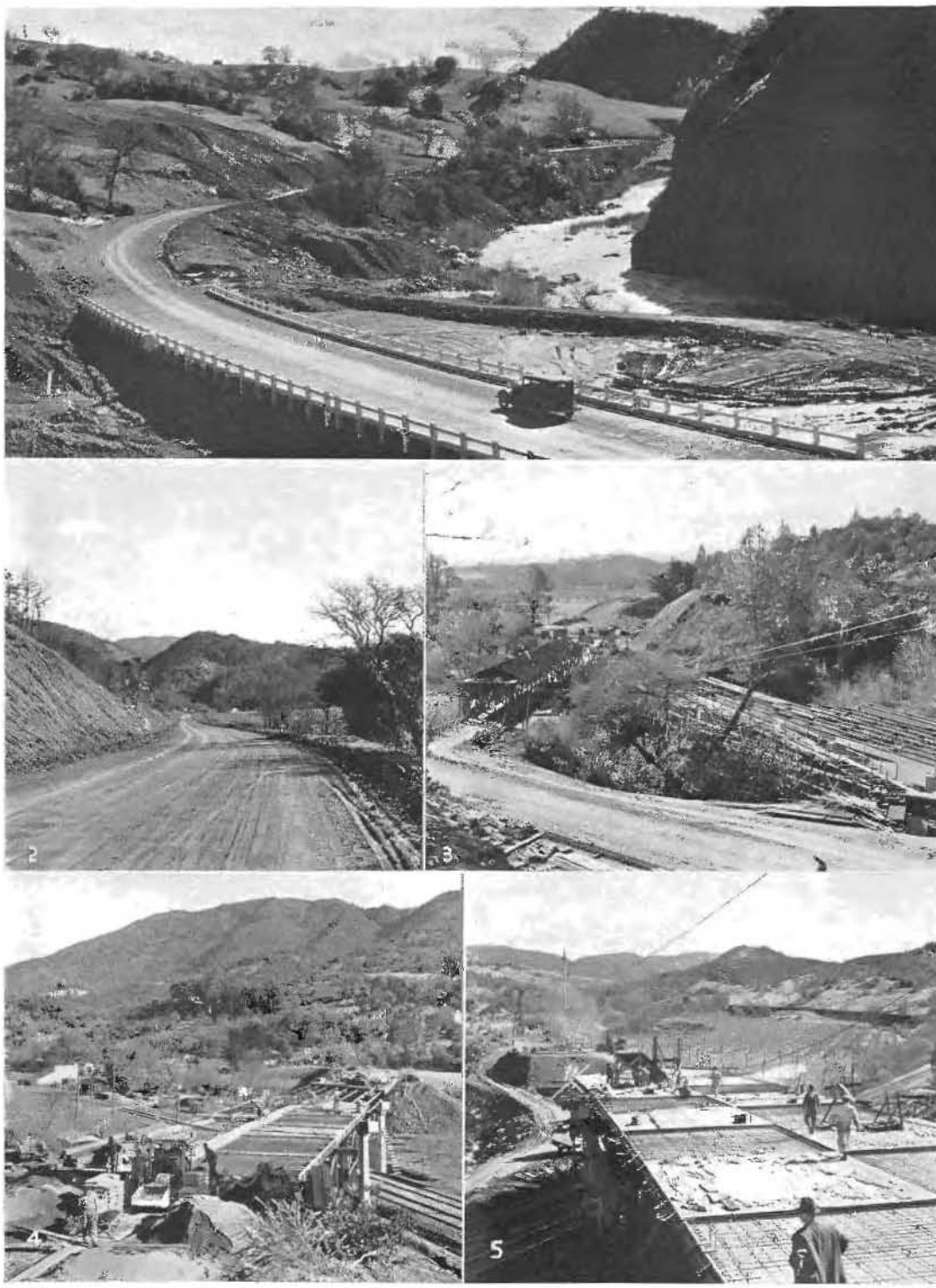

CONSTRUCTION PROGRESS is shown in the above scenes on the Russian River Highway relocation between Cloverdale and Hopland. No. 1—Redwood bridge at Squaw Rock slide. No. 2—Rough graded roadway near Pieta. No. 3—New Russian River bridge under construction showing old covered timber bridge at left. No. 4—Building the overhead crossing above railroad at Preston. No. 5—Hopland overhead crossing structure.

Construction Program Faces Revision

(Continued from page 1)

poses during the 85th and 86th fiscal years to be deposited into four funds prior to disbursement, and the budget as prepared and published is so divided, for the sake of simplicity consideration of the budget here will be based upon the whole without regard to the several funds.

In the preparation of the biennial budget for the Division of Highways the first consideration was given to the maintenance of the entire system. California now has a State road system composed of approximately 14,000 miles of highway and for the general administration and maintenance of this vast network of lines of communication, a sum of $17,000,000 was deducted from the total estimated revenue of $70,000,000.

DIVISION OF GAS TAX

In compliance with the act of the last Legislature alloting one-quarter cent of gas tax funds to cities for street improvement and maintenance, the approximate sum of $5,600,000 was set aside. When these sums were deducted an amount of about $47,500,000 remained for the various functions of construction and reconstruction on State highways.

In compliance with legislative requirements, proper apportionment of these funds is made between primary and secondary routes and between the 13 southern counties and 45 northern counties.

The various functions of highway construction for which funds were allocated are shown in the accompanying tabulation of the whole budget.

CALIFORNIA STATE HIGHWAY BUDGET

Maintenance and general administration	$17,000,000
One-quarter gas tax to cities	5,604,250
Rights of way	3,207,530
Betterments and minor improvements	3,722,000
Joint highway districts	544,635
Contingencies	1,844,627
Major construction projects, including preliminary and construction engineering	38,212,938
Total	$70,136,000

Right of way charges include all necessary expenditures incident to the acquisition of required rights of way. The items of betterments and minor improvements cover expenditures made for various small projects such as elimination of a sharp curve, guard rail construction, widening of short stretches of roadway and many small projects where unemployment relief crews are used.

CONSTRUCTION FUNCTIONS

Joint highway district expenditures cover expenditure of funds specifically allotted by the Legislature to projects coming under this classification and on direct contributions to county projects. Major construction projects include the important work of the Division of Highways in the construction of an adequate road system and which comprise the State highway recovery program.

Of the functions listed under the head of construction and improvement, preliminary engineering includes reconnaissance, surveys, investigations and preparation of plans and specifications for construction; construction engineering covers inspection and superintendence of construction.

From an inspection of the items which make up the budget it is easily discernable that any material decrease in revenue must be borne in the main by the major construction program.

The money budgeted for the construction of these major projects, divided by legislative enactment for work in the 45 northern counties and for the 13 counties of southern California, will probably be trimmed by an amount between $1,800,000 and $2,000,000 if the present decrease of from 3 per cent to 5 per cent of estimated revenue from the gas tax continues.

The $5,600,000 allotted to cities will, of course, bear its share of the reduction, but as this money is apportioned to the cities according to their population, the bulk of the reduction here will be carried by Los Angeles, San Francisco, Oakland, San Diego and Sacramento.

SHORTER WEEK, SAME PAY

In addition to the curtailment of the construction program by the decrease in esti-

30-Hour Week at Full Pay Adds $750,000 to Maintenance Cost

(Continued from preceding page)

mated revenues from the gas tax, the money budgeted for maintenance expenditures was based upon a 48-hour week, but in the effort to relieve unemployment and spread the work among a larger number of men, the working time of all men was reduced to a 30-hour week without a corresponding reduction in weekly earnings, thereby giving employment to more men but requiring approximately $750,000 additional to carry out the maintenance program.

With the decrease in revenue and the reduction in working time for maintenance crews in mind, the most optimistic forecast that seems possible is for a deficit of at least $2,500,000 in the revenues to support the budget for the current biennial period.

In the endeavor of the Director of Public Works and the State Highway Commission to conform to the wishes of the President of the United States in that all construction work possible be placed under contract immediately in order that the present emergency of unemployment be relieved to its fullest extent. practically all work budgeted for the biennial period from July 1, 1933, to June 30, 1935, is being placed under contract this year.

Unless an additional appropriation or allotment of Federal funds is made to this State by Congress, practically all State highway construction as financed under the present budget will be completed before next spring and there will be little or no construction work from that time until the next biennium funds are available in July, 1935.

HEAT TREATMENT OF CLAY SOILS

Experiments are under way in Queensland in the use of a traveling furnace for heating natural soils of heavy clay as it passes slowly over the road. The fusible constituents of the soil are melted. The soil is loosened or dug in front of the machine to a depth as much as 16 inches. After the heater passes, clay or other binder must be added and the surface can then be compacted. The machine in use prepares a strip 12 feet wide. Details of cost are not yet available.

George (attacking piece of chicken) : "This must be an incubator chicken."

Sam : "Why?"

George : "A chicken with a mother couldn't be so tough."

SUPER-HIGHWAYS ARE SUPER-ABUSED BY THE SUPER-CARELESS DRIVER

"The super-highway of every motorist's dream is hardly likely to materialize so long as our currently finest expressions of the highway designer's art receive such super-abuse in the form of bad driving."

This declaration of Harold G. Hoffman, New Jersey State Commissioner of Motor Vehicles, was made in commenting on the attitude adopted by many drivers, who when they find themselves on today's finest highways — the super-highway — simply become super-careless.

Commissioner Hoffman declares that this bad accident record, in evidence on Mt. Vernon Memorial Boulevard near Washington and many other famous highways, is to be overcome in New Jersey by a policy of stringent law enforcement. Through this campaign it is hoped, he says, that the "super-careless minority may be taught that the lid is not off with respect to the necessity for common sense and obedience to the rules of safety on even the super-highway."—*United States Daily.*

Workers Get 90 Per Cent of Tax Road Dollar

More than twice as many men were put to work on Federal road projects in the United States during the fiscal year ending June 30, 1933, than in 1932. This was due principally to the $120,000,000 emergency appropriation made in July, 1932, as an unemployment relief measure, according to a Federal report.

Up to June 30, 1933, 107,869 miles of the total of 206,277 miles in the Federal network were completed, while nearly all of the remaining mileage has been improved to some extent by the States.

Although total mileage of Federal-aid roads constructed during the fiscal year of 1933 was less than during the preceding year, it was greater than in any other year. Projects completed totaled 13,255 miles.

In addition to other miscellaneous work by the government Bureau of Public Roads, investigations were conducted in many States on transportation, physical conditions affecting modern highways, and road construction as an employment measure, which revealed that 90 per cent of the taxpayers' road dollar was eventually expended on workers' salaries and wages in addition to stimulating financially many widespread industries, the report states.

Court's Wage Scale Decision Releases $2,000,0000 of Highway Contracts

By **FRANK B. DURKEE**, General Right of Way Agent

An important event of last month affecting the continuance of the intensive program of the Division of Highways for putting men and money to work was the decision of Judge Peter J. Shields, of the Superior Court for Sacramento County, passing upon proper procedure for determining minimum rates of wages on highway projects. An injunction proceeding caused the Director of Public Works to withhold advertising on seventeen projects. No appeal having been taken from Judge Shields' decision denying an injunction, approximately $2,000,000 was released for immediate advertising on budgeted projects in northern California.

PROCEDURE provided by the National Industrial Recovery Act for "establishing minimum rates of wages" on contracts involving expenditure of grants for highway purposes prevails as against the prevailing rate of wages law of California or any schedule of wages set up under a code adopted pursuant to the provisions of the Supplement to the California Industrial Recovery Act.

This was the decision of Judge Peter J. Shields, of Department Two of the Superior Court for Sacramento County, in the case of J. R. Gerhart et al. vs. Earl Lee Kelly, as Director of Public Works, in a nine-page written opinion, filed February 16th. The motion of the plaintiffs for a restraining order was denied and the demurrer of the defendant sustained, with ten days' time granted plaintiffs to amend. Plaintiffs elected not to amend their complaint, and on March 8th filed a dismissal of the action with prejudice to all parties.

ASKED FOR INJUNCTION

The complaint was for an injunction permanently restraining the Director of Public Works from entering into a contract for the construction of a "feeder highway" in the county of San Mateo, and any other highway contracts which do not specify certain schedules of wages, as contended for by plaintiffs.

The complaint, in brief, alleged that on the twelfth day of September, 1933, the Chief of the Division of Corporations approved a code of fair competition for the Excavating and Dump Truck Contractors of Northern California; that the code had been adopted in accordance with chapter 1037 of the Statutes of 1933, commonly known as the supplement to the California Industrial Recovery Act; that set forth therein were schedules of minimum wages to be paid employees engaged in certain of the crafts needed to execute the project in question; that the Director of Public Works had not specified these schedules of wages in calling for bids for the construction of the highway in San Mateo County, but in some instances had specified other and different schedules than those set up by the code.

APPROVED BY U. S. BUREAU

The Director of Public Works had acted in accordance with the California prevailing rate of wages law and the schedule of wages determined upon by him had been approved by the Regional Engineer of the United States Bureau of Public Roads on behalf of the Secretary of Agriculture, as provided for in sections 204 and 206 of the National Industrial Recovery Act. In so acting the Director had taken into consideration the following language contained in section 4 of the "Supplement to the California Industrial Recovery Act":

"Nothing contained in this act shall, however, be construed to repeal or in any way modify the terms of any public works labor law now in effect in this State or heretofore approved, or of any other law for the protection of workers in this State. The provisions of this act shall instead be construed to supplement such laws."

This language, as well as the Federal character of the project, he had assumed, did not require as a matter of course adoption of the code rate of wages for particular highway projects.

The project in question provided for construction of a so-called "feeder highway" in accordance with the authorization of subpara-

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Highway Progress Record in February

Even though State highway work in nothern California was retarded for nearly a month when a court restraining order was served on the Department of Public Works in connection with the code of Excavating and Dump Truck Contractors, the Division of Highways advertised and opened bids on projects totaling over $1,800,000 during the month of February.

BIDS OPENED

County	Location	Miles	Type
Los Angeles	Across Monterey Pass Road and Coyote Pass Road, about one mile south of Alhambra		Grade Separations (2)
Los Angeles	State Street to Mission Street on Ramona Blvd.	1.0	Pavement
Los Angeles	Alameda St. to East City Limits on Serra-Oxnard Highway	0.8	Pavement
Los Angeles	Williams Ranch to 3.5 miles west of Acton Road on Los Angeles-Mojave Lateral	15.4	Pavement
Santa Barbara	Across Santa Ynez River and Santa Agueda Creek on San Marcus Road		Bridges (2)
Ventura	Westerly Boundary to Casitas Pass	2.9	Graded roadbed
Santa Barbara	Across Mission Creek in City of Santa Barbara		Bridges (2)

PROJECTS ADVERTISED

San Diego	Between 1 mile and 6 miles south of National City on Coast Route		Bridges (3)
Siskiyou	Moffett Creek to Forest House	7.5	Bit. tr. surf.
Sacramento	Across American River at Sacramento		Bridge widening (1)
Tulare	Visalia to Merryman	8.1	Pavement
Madera	Hawkins School to Oakhurst	4.1	Graded roadbed
Kern	At Delano on Valley Route	1.1	Bit. tr. surf.
Kern	Sivert to Haypress Canyon on Bakersfield-Mojave Road	6.1	Graded roadbed
Los Angeles	Across railroad spur at Hercules Powder Plant		Grade separation (1)
Stanislaus	Through Turlock	2.3	Pavement
San Bernardino-Riverside	Various locations	608	Traffic stripe
Alameda	East Bay Bridge Approach		Subway (1)
Ventura	Beetox to El Rio Maintenance Station	3.3	Pavement
Los Angeles	On N Street		Bridges (8)
Merced	Westerly Boundary to foot of Pacheco Pass Grade	3.3	Bit. tr. surf.

First Bay Bridge Steel Tower Now in Course of Construction on Pier II

ERECTION of steel began early this month on the first completed subaqueous pier of the San Francisco-Oakland Bay Bridge at the foot of Harrison Street, San Francisco, known as Bridge Pier No. 2. Upon this pier is being erected a 438-foot steel structure, the most westerly of the bridge towers, which with its concrete base will rise to the height of a 40-story building.

By the middle of the month nine huge segments of steel, weighing 1,500,000 pounds and rising 70 feet above the concrete pier had been placed in position.

The lower segments are hoisted into place and fitted on bolts protruding from the concrete. One segment for Tower No. 2 weighed 78 tons and necessitated a specially built steel frame car of heavy construction to transport it from the eastern mills where it was fabricated. This member is 7 feet square, 45 feet long and built of steel one inch thick.

RIVETING TO BEGIN

Each cellular segment fits into another and after several more have been erected riveting will begin. The start of the riveting process is expected by the end of this month, according to Chief Engineer C. H. Purcell.

This Bay Bridg tower consists of two legs of steel, joined and supported by cross bracing extending diagonally from one leg to another. The tower is erected in segments weighing more than 50 tons each. These segments of steel are divided into cells, the walls of which are 1⅛ inch thick.

Erection of the tower is achieved by a derrick, the main post of which extends up through the cells of a leg of the tower. The height of the derrick is increased as the tower rises. These towers are left hollow and are fitted with ladders inside so that workmen may climb them at any time.

RIVETS VIA PNEUMATIC TUBE

Each segment of the tower has hundreds of holes drilled into it through which hot rivets will be placed to bind the units into a common mass.

The quantity of rivets utilized on the San Francisco-Oakland Bay Bridge will total 650,000 pounds.

The rivet is shot in a pneumatic tube while red hot up to a riveter who, with a pneumatic hammer, drives it into position and crushes the head into the material riveted so that it is virtually welded into place. An inspector follows the riveter and cuts out defective rivets.

LARGEST IN WEST

This will be the largest steel job the West has ever seen, and the $22,000,000 worth of steel purchased for this bridge was the largest steel order ever placed in the United States, according to W. A. Irvin, president of the United States Steel Company, who recently inspected the bridge work in company with Director of Public Works Kelly and Chief Engineer Purcell.

Another of the huge compressed-air, cylindrical dredging-well caissons has been towed into place at Bridge Pier 5, 3400 feet west of Yerba Buena Island, which completes the line of piers in construction in the West Bay channel.

The West Bay crossing, according to the progress report filed with Governor James Rolph, Jr., chairman of the California Toll Bridge Authority, and State Director of Public Works Earl Lee Kelly by Chief Engineer Purcell, shows one subaqueous pier completed, one nearing completion, and three under construction.

BUILDING BIG FILL

The East Bay crossing, having a total of 39 subaqueous piers, now has one deep-water pier completed, two other deep-water piers under construction, four shallow-water piers, resting on piles, completed, and four shallow-water piers under construction.

In addition, work reports from District IV of the Division of Highways, under Colonel John H. Skeggs, show thousands of yards of sand and rock pumped and dumped respectively along the Key Route Mole on the Oakland tidelands to form the wide fill where both decks of the bridge will empty traffic onto a broad artery with 14 lanes of traffic at the toll houses.

A short answer seldom brings a long order—neither does a long-winded one.

UP IN THE AIR goes segment after segment of Tower No. 2 of the San Francisco-Oakland Bay Bridge as great derricks swing aloft the huge crate-like steel units and pile them up like blocks on top of each other. As they are dropped into the place they were made to fit, riveting crews soon fasten them together. Thus the tower is rising slowly and steadily to equal the height of a 40-story building. Nine segments weighing a total of 1,500,000 pounds and towering 70 feet above the concrete base off the foot of Harrison Street, San Francisco, had been placed by March 17.

New Highway Free of Grade Crossings

(Continued from page 2)

Drive which already extended for 3.78 miles through West Covina to Orange Avenue.

A second contract was awarded for constructing a new direct cutoff from Orange Avenue to Mountain View Road which is 4.31 miles in length and extends across numerous walnut and orange groves, the San Gabriel River, and the Southern Pacific Railroad near El Monte. This section connects with the east end of Garvey Avenue at Mountain View Road, a short distance east of El Monte.

14-SPAN BRIDGE BUILT

A new reinforced concrete girder and deck type bridge was constructed across the San Gabriel River on this new alignment. This bridge has an overall length of 964 feet, consisting of fourteen 65-foot spans and two 27-foot cantilever end spans. The width of roadway is 44 feet with two 3-foot sidewalks. Work is under way on an underpass railroad crossing under the Southern Pacific Railroad.

From the end of the latter new section, traffic will be carried on existing wide pavement on Garvey Avenue for 6.5 miles, including the portion within the City of Monterey Park to Atlantic Boulevard. From this point to the intersection of Aliso Street and Mission Road near the Civic Center in Los Angeles is the Ramona Boulevard project, which is actually the final connecting link in this new Pomona-Los Angeles route.

The first 3.8 miles from Atlantic Boulevard to the easterly city limits of Los Angeles is partly on new alignment through the southerly part of the Midwick Country Club, and partly utilizes existing portions of Ramona Boulevard, Cotton Avenue, and Harrison Street.

3-GRADE SEPARATION

On this section there will be three grade separations constructed under separate contracts. These consist of a subway under Eastern Avenue, an overhead bridge across Monterey Pass Road, and a partial separation at Coyote Pass Road where traffic going southwesterly along Coyote Pass Road will be diverted to the right and passed under the highway instead of making a left-hand turn across the traffic.

The first half mile within the city limits of Los Angeles utilizes the existing pavement on Harrison Street which was paved 48 feet wide by the city a short time ago, and extends to Fickett Street, where a new State contract, 0.63 mile in length, extends to State Street. From State Street to Mission Road, still another contract has been awarded for grading and paving a length of 0.96 mile. This contract will connect with Aliso Street at Mission Road, which in turn connects with the Civic Center of Los Angeles.

The alignment on these last two contracts follows along the southerly side of the Pacific Electric Railway the entire distance. By following along the line of the railroad, considerable advantage is gained. In the first place, the railroad is located on the most desirable alignment through this section. In the second place, there are five existing bridges over the railroad tracks at Lord Street, State Street, Cornwall Street, Marengo Street and Soto Street. By lengthening the structures they can be made to span the new highway as well as the railroad and thus serve a double purpose.

FIVE BRIDGES EXTENDED

By this plan, the new highway will have the tremendous advantage of entering the city and extending practically to the Civic Center without a single grade crossing. All of these extensions to existing structures are under contract and should be completed by the time the highway contracts are finished.

Starting at Aliso Street and Mission Road, the new highway will be 64 feet wide between curbs to Fickett Street with a concrete pavement 40 feet wide and 12-foot oiled shoulders. At Fickett Street connection will be made with the new concrete pavement constructed by the city on Harrison Street. This new pavement, 48 feet wide, extends one-half mile to Evergreen Avenue. From Evergreen Avenue to Atlantic Boulevard the improvement will consist of a 40-foot pavement with 20-foot oiled shoulders. From the intersection of Atlantic Boulevard and Garvey Avenue the existing wide pavement on Garvey Avenue will be utilized all the way through Monterey Park.

The new section east of Mountain View Road consists of a 30-foot concrete pavement with oiled shoulders. This standard continues all the way to the west city limits of Pomona where the city placed pavement on

MANY BIG CUTS on Los Angeles-Pomona Highway permit a direct route through hills and wide oiled shoulders give additional width to broad traffic lanes.

Holt Avenue 68 feet wide between curbs. The portion through West Covina on Arroyo Avenue is being constructed on a 100-foot right of way with 30-foot concrete pavement and oiled shoulders.

This new route will serve nearly all of the transcontinental traffic entering Los Angeles from the east, as well as the much larger volume of local traffic from the numerous small towns and communities to the east of Los Angeles.

The length of this route from Mission Road in Los Angeles to the city limits of Pomona is approximately 27 miles as compared with 30 miles on Valley Boulevard, the nearest alternative route.

The cost of the construction work either recently completed by the State or at present under State contract totals $1,742,000. Adding to this the esimated cost of bridge construction and road construction amounting to $377,000 to be undertaken by the State as soon as funds can be made available, which amount is not covered by budget items for the present biennium, will make the State's total expenditures for construction on this route, $2,119,000.

Nearly all of the right of way for this new route, although across highly improved and very valuable land, was donated by property owners. In such cases the State made payment to the owners for such things as productive fruit trees damaged or removed, moving and reconstructing existing buildings, irrigation lines or other private improvements, and payments to utility companies for moving and reconstructing their facilities where they have been located on private right of way at such locations as the highway construction made necessary their removal to new locations.

Since State highway work is done entirely without assessment against abutting property, the benefits occasioned to the property by construction more than offset damages to the property.

The area secured for right of way was so large and the property acquired so valuable that it is conservatively estimated that the market value of the right of way for this route from the Civic Center of Los Angeles to Pomona is $2,000,000.

Traffic studies indicate that the daily volume of traffic over this route in the vicinity of El Monte will be about 20,000 cars per day, with an even greater volume of traffic nearer Los Angeles. With the savings of three miles in distance which will be effected by this new route, and an average operating cost per car, including trucks and buses, of 4 cents per car mile, the annual saving to traffic will amount to $876,000, which would pay the entire construction cost of the project in less than two and one-half years.

The saving in cost of operating expense of cars due to shortening the distance is small compared to increased safety to traffic and the value in saving of time, due to the

(Continued on page 28)

CALIFORNIA HIGHWAYS AND PUBLIC WORKS

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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. 12 MARCH, 1934 No. 3

BETTER HIGHWAYS!

The Federal system of highways is by no means built up to a point that approaches public requirements. There is an impression to the contrary, but it is an erroneous impression.

As a matter of fact the job is only about half done. To finish and rebuild the existing Federal system of roads in accordance with present standards will require quite as much money as HAS BEEN INVESTED THERETOFORE UPON EXISTING MILEAGE.

We are far from completeness or even a tolerably advanced stage in the completion of our vaunted highway system.

Improved farm to market roads and roads designed to supplement transport in and through our municipalities DO NOT BEGIN TO BE WHAT THEY SHOULD BE.

Then there is the great and thoroughly practical conception of through highways from East to West, and North to South.

There is another aspect to this question.

Road building has been done, in the main, HONESTLY, contrasting in this respect with numerous other undertakings which have depended on the cooperation and support of the Federal Government.

As President Warden of the American Association of State Highway Officials recently said:

> **"If all the business in the United States in recent years had been conducted as honestly and had been as well done as this nationwide highway construction there would be no depression."**

Here is a field of public works where the government can proceed with permanent benefit and lasting service to all—both of the present and future generations.

Why not go "Full speed ahead"?

—San Francisco Examiner.

Unimproved Highways Throughout U. S. Still Total Huge Mileage

THE outlook for highways in this country was changed materially with the passage of the National Industrial Recovery Act, with its outright grant of $400,000,000 to the States for highways and its further provisions for grants and loans. Yet we must realize that the present Federal appropriations will have comparatively little effect on the ultimate completion of our system of public roads when we consider the huge mileage of *unbuilt* highways throughout the Nation. These appropriations will serve chiefly the purpose of giving emergency aid to the unemployed.

At first glance it might appear that the new funds would serve as an offset against the falling-off in local appropriations and funds for highway building. This, however, is not the case. In the middle-western agricultural States, for example, the drastic decline in agricultural commodity prices has resulted in the inability of many of our citizens to meet their obligations, and this has been translated directly into large losses in road funds, against which there are no offsetting balances. Similar conditions prevail elsewhere.

The retrenchment that has been going on is especially unfortunate in view of the standard of improvement of our local highways. The system of local highways, including feeder and farm-to-market roads, comprises 600,000 miles of surfaced highways—slightly more than 20 per cent of the total of 2,700,000 miles. Hard-surfaced mileage amounts to about 2 per cent of this total.

For the past five years the highway construction program in this country, including resurfacing and reconstruction, has amounted to about 55,000 miles annually. The average annual expenditure for this same period has amounted to $1,500,000,000.

The huge mileage of unimproved highways is being reduced by *less than 2 per cent annually*. Reconstruction and resurfacing are already important factors in the improvement program. Yet there are those who would see road expenditures still further curtailed.—*Better Roads.*

"Why do you wear rubber gloves when cutting hair?" asked the customer.

"For the purpose," replied the barber, "of keeping our celebrated hair restorer from causing hair to grow under my finger nails."—*The Excavating Engineer.*

Puncheon Fills Add Rustic Beauty

(Continued from page 4)

being plentiful and readily available, puncheon—planks hewn or split from redwood trees—were placed transversely to the road and served the purpose. This construction, though insuring a stable road surface, resulted in the roughest riding surface conceivable; a ride over it never to be forgotten.

Eventually, the greater portion of this road, within timbered areas, was surfaced with puncheon which at the present time shows little deterioration from its original condition. No difficulty is encountered in driving over the portions of the road in Graves Park. This road, though now relegated to the past, is to be maintained in its original condition as an interesting means of comparison between an old and a new highway.

The construction of a State highway between the county seats having been provided for by the Highway Bond Act of 1909, a highway between Wilson Creek and Crescent City was constructed and opened to traffic in 1920, resulting in the abandonment of the puncheon road that had served the citizens of this section for so long.

WORST REMAINING SECTION

In recent years it became evident that increased traffic on the Redwood Highway would result in an ever-increasing demand for the widening of this portion. During its construction, limited funds necessitated building a very slow standard, which at this time constitutes the worst remaining section of the Redwood Highway.

Reconstruction of the existing road to a standard adequate to present day and anticipated increases in traffic was found to cost more for actual construction than the routing finally adopted. Widening would also result in impairing the impressive beauty of the finest of redwood parks by destroying a great amount of the forest and luxuriant undergrowth.

The route adopted is estimated to cost from $430,000 to $670,000 less for construction and have a much lower yearly maintenance cost than any of the other tentative routes. In addition to avoiding slide areas on the present road along the coast that have increased maintenance costs to prohibitive figures, the new route has only 34 curves with a total of 1519 degrees of curvature having a maximum-minimum radius of 6000-300 compared to 239 curves on the present highway with a total curvature of 11,076 degrees and a maximum-minimum radius of 1000-50. The distance is shortened from 10.31 to 9.52 miles by the relocated routing.

PLAN TO PRESERVE TREES

Having decided upon the location, the design of a modern highway with methods of construction to create as little disturbance or damage to the trees and flora of the forest became of paramount importance.

The knowledge that redwoods buried by freshets or landslides for decades were in a remarkable state of preservation when finally exposed is reflected in the design of embankments in a manner unique in the annals of highway construction and probably never before attempted.

A few giant redwoods from two to seventeen feet in diameter and towering from 250 to 300 or more feet into the sky, that it was found necessary to fell, are being cut into sizes to permit placing of the logs into embankment by power equipment. These logs represent a quantity of lumber sufficient to build 725 six-room homes and when finally placed will be equivalent to more than 30,000 cubic yards of excavation.

The appellation "Redwood Highway" will indeed be applicable to this section upon its completion.

Embankments constructed of these logs merge into the adjacent forest and by eliminating long shallow fills occupy an area much less in extent than the conventional earth fill; also a complete disposal of the 9,800,000 board feet of lumber resulting from clearing operations can be made in the most economical manner.

SYLVAN BEAUTY ENHANCED

By rounding cut-slopes and covering them with top soil, to allow planting or the natural growth of native shrubs or flowers, the road, when completed, will not have destroyed the sylvan beauty of the forest Instead, it will

(Continued on page 29)

Governor Rolph Dedicates Improved State Highway Link Through Anaheim

ONE THOUSAND citizens and school children of Anaheim in Orange County greeted Governor Rolph and his party when he visited that city on February 14th to dedicate and officially open an improved link of State Highway Route No. 2, the Coast Highway, running through Anaheim.

The party was officially welcomed at the north city limits by Philip A. Stanton of Anaheim, member of the California Highway Commission; Mayor C. H. Mann; Assemblyman Ted Craig of Brea; George Reid, Secretary of the Anaheim Chamber of Commerce; Willard Smith, Chairman of Orange County Supervisors; Attorney Thomas L. McFadden and Lotus H. Louden in charge of program arrangements and other State, city and county officials.

The Governor's party included Earl Lee Kelly, Director of Public Works; Edward Rainey, State Superintendent of Banks; Rolland A Vandegrift, Director of Finance; Eric Cullenward, Deputy Director of Public Works; Col. Carlos W. Huntington, Director of Professional and Vocational Standards; E. Raymond Cato, Chief of the Highway Patrol; Joseph Smith of Santa Ana, State Real Estate Commissioner; D. Eyman Huff of Hewes Park, member of the State Fair Board; S. V. Cortelyou, District Engineer, State Division of Highways and William C. McCarthy, Secretary to Governor Rolph.

TRIBUTE TO PIONEERS

The party was escorted to the Elks Club where the preliminary program of speech making was held with the speakers making addresses from the club portico to the large assemblage gathered on the lawn.

Governor Rolph did not touch upon politics, speaking principally upon schools and to the children whom he urged "to take advantage of the opportunity being provided for you by your parents at such great sacrifices." He also paid tribute to the German pioneers who settled Anaheim.

"You will remember," said Governor Rolph, "That when I was elected Governor I promised to put a heart into the office and I can tell you that during the past three years nothing has been needed in that office so much as a heart. I have striven to put a heart into my work."

JOINT HIGHWAY PROJECT

The Governor and his party then proceeded to dedicate the highway improvement on North Los Angeles Street by cutting the tape, officially opening that State highway link to the public.

The highway improvement project consisted of the construction of one mile of asphalt concrete pavement between Sycamore Street and Romneya Drive at a cost of approximately $47,000 and was financed jointly by the City of Anaheim, Orange County and the State. The State contributed about $26,000 and the county and city divided the remaining cost of the project.

This contract was awarded on October 2, 1933, to a Los Angeles company and accepted by the Director on February 20, 1934. It provided for the construction of asphalt concrete pavement 50 feet wide and 0.17 of an inch thick, placed over the existing Portland cement concrete base, between Sycamore Street and La Palma Avenue.

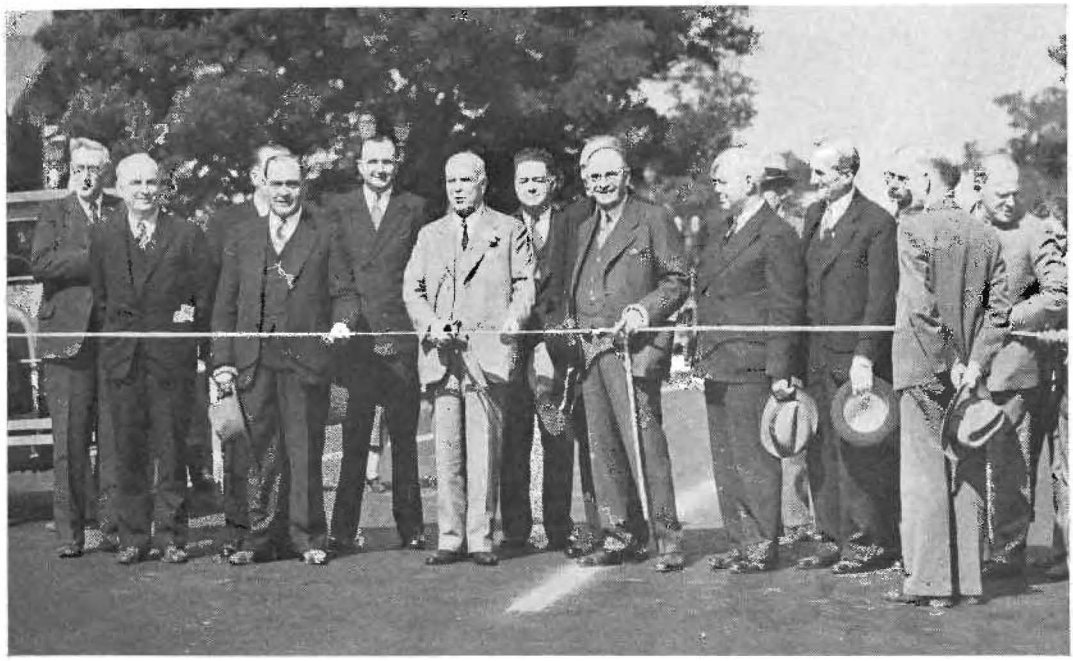
50-FOOT PAVEMENT

Between La Palma Avenue and Romneya Drive, asphalt concrete pavement 50 feet wide and 0.6 of an inch thick, decreasing to 0.5 of an inch in the outer 5 feet, was constructed with 3-foot by 0.5 of an inch Portland cement concrete gutters, a total width of 56 feet, and concrete curbs 1½ feet deep with a width of 0.5 of an inch at the top increasing to 0.81 of an inch at the bottom.

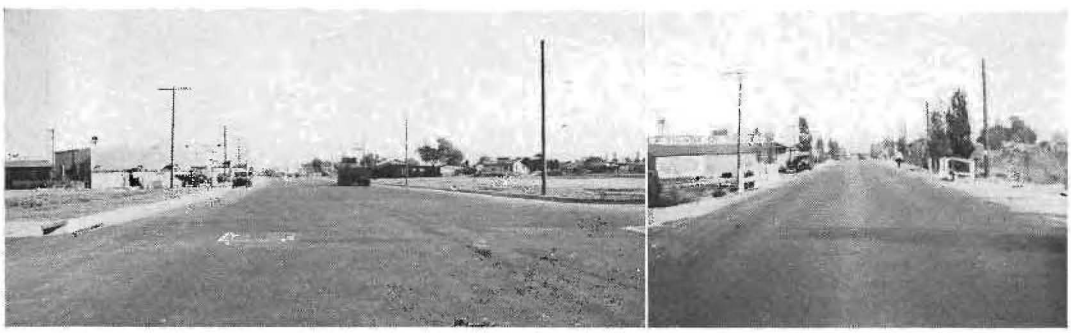
The asphalt pavement was laid in 25-foot strips, the actual paving being started on December 22, 1933, with a crew of about 50 men. One 3-wheel 12-ton roller and two 8-ton tandem rollers were used, with a 25-foot mechanical finisher. About 7600 tons of asphalt pavement was placed at a contract price of $3.63 per ton.

H. B. Lindley acted as Resident Engineer, representing the State, under S. V. Cortelyou, District Engineer.

Pompous Physician (to man plastering defective wall): "The trowel covers up a lot of mistakes—eh?"
Workman: "Yes, guv'nor—and so do the spade."



A CUTTING MOMENT is pictured above when Governor James Rolph, Jr., severed the tape across North Los Angeles Street in Anaheim officially opening an improved link of the Coast Highway through the city. At Governor Rolph's right is Assemblyman Ted Craig of Brea and at his left (the smiling gentleman holding a cane and cigar) is State Highway Commissioner Philip A. Stanton of Anaheim. Others in the group are Mayor C. H. Mann, Secretary Reid of Anaheim Chamber of Commerce, William McCarthy, Secretary to the Governor; Director C. W. Huntington of Professional and Vocational Standards, and District Engineer S. V. Cortelyou.—*Photo by Long Beach Press Telegram.*



BEFORE AND AFTER views of the improved link of State highway through the city of Anaheim. At left is the newly paved and widened North Los Angeles Street, now a fine broad thoroughfare. At right is the old street narrowed by encroachments and obstructions.

CANE MAT FOUNDATIONS FOR ROADS

A township in western Netherlands, which lies below sea level and where the soil is unstable mud of unknown depth, has had difficulty in getting permanent road beds to carry heavy traffic in the bulb districts. A trial section has been built using reed mats after their successful use in a railroad grade. The canes, or reeds, are very resistant to rot, having been used for roofs some of which have been in service for 250 years.

The reeds are impregnated with creosote, then woven into mats two inches thick. Drain tile are laid in the soil, a 2-inch layer of sand is placed on the subgrade, then the mats are placed and the surface is completed with brick filled with asphalt. The section of road will be opened in October and as there is heavy truck traffic, it is expected that the suitability of this type of road will be determined at an early date.

"Before we were married, Henry," said the contractor's wife reproachfully, "you always gave me the most beautiful Christmas presents. Do you remember?"

"Sure," said Henry cheerfully, "but my dear, did you ever hear of a fisherman giving bait to a fish after he had caught it?"—*Excavating Engineer.*

State Highway Winter Traffic Count Shows Marked Gain over 1933 Figures

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

THE TENTH annual winter traffic count on State highways was taken Sunday and Monday, January 14 and 15, 1934. In line with regular practice, the count was taken for a sixteen-hour period, from 6 a.m. to 10 p.m. each day.

The count this year was more extensive than any other ever taken. Some 400 stations were added to cover the 6041 miles of new secondary roads which came into the State highway system in August. In addition, some 1400 stations located on county roads and city streets were selected as part of a state-wide traffic study. The cities included in the count were as follows:

San Diego	Ventura
San Francisco	Eureka
Stockton	El Centro
San Luis Obispo	Bakersfield
Santa Barbara	Hanford
Palo Alto	Susanville
San Jose	Glendale
Santa Cruz	Huntington Park
Redding	Inglewood
Vallejo	Long Beach
Santa Rosa	Modesto
Alameda	Red Bluff
Woodland	Visalia
Berkeley	Marysville
Oakland	Los Angeles
Chico	Pasadena
Colusa	Pomona
Richmond	Santa Monica
Crescent City	South Gate
Fresno	Whittier
Riverside	Ukiah
Sacramento	Salinas
Needles	Orange
Redlands	Santa Ana
San Bernardino	Auburn

The work included not only the taking of density counts but also information from which to develop origin and destination details.

STATE-WIDE TRAFFIC STUDY

The state-wide traffic study is being carried on to develop information as to the comparative traffic use of the primary, secondary, and feeder roads in rural areas as well as in urban territory. This study will also include economic factors which affect the transportation problem. It is expected that the information developed will be of immense value in State planning for the future.

The study is being made under the direction of the Maintenance Department and the field supervision of the traffic counts is handled by the maintenance organization. The count was made possible only through the cooperation of the Federal government in furnishing some 10,800 C. W. A. men for a three-day period. The Saturday before the count was used in organizing and training this force. The State Chamber of Commerce, the automobile clubs and city and county governmental authorities have given their whole-hearted support to the project.

Plans are under way for another count to be taken April 1 and 2 at the same group of stations as in January. It is hoped, also, that another complete count can be taken in July. If Federal forces are not available at that time, counts will be taken at all of the State highway stations and at as many key stations on county roads and city areas as conditions will permit, in order to tie in the peak traffic period of the year.

TWO YEARS COMPARED

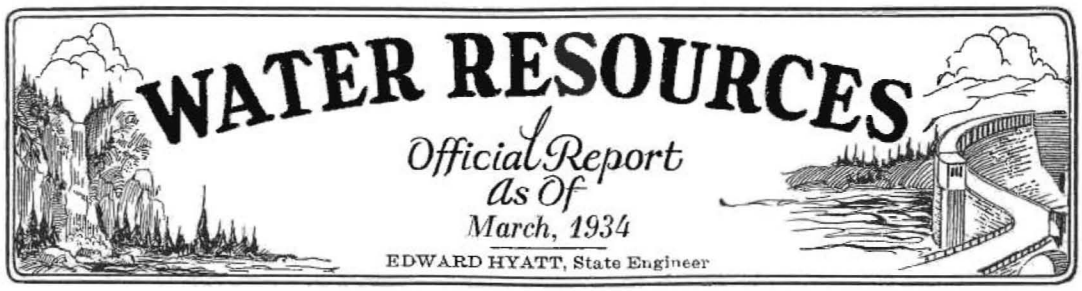
The analysis of the information is now under way employing 120 people, 79 of whom are furnished through a Civil Works project.

It is not possible at this time to give out any information as to the main study, but a summary presented herewith has been prepared in the usual form, giving the comparative winter traffic for 1933 and 1934 for the State highway system. The increase or decrease, with respect to various classes of routes, is given below for the old State highway system:

Per Cent Gain or Loss for 1934 Count as Compared to 1933

	Sunday	Monday
All Routes	+3.4%	+15.3%
Main North and South Routes	No change	+12.4%
Interstate Connections	+9.1%	+24.4%
Laterals Between Inland and Coast	—1.7%	+13.3%
Recreational Routes	+1.7%	+13.8%

(Continued on page 30)



Unless additional heavy rain and snowstorms of more than ordinary magnitude occur during this month of March the State faces a water shortage next summer according to information and data collected by the State Engineer's office.

A rough check of snow and precipitation to date in the Sacramento and San Joaquin valleys indicates water conditions in those areas will be very similar to the excessively dry years of 1924 and 1931. Similar conditions confront the southern parts of the State where the snowfall has also been meager.

Up to February 10th, the flow of the Sacramento River at Sacramento was 10,000 second-feet or less. Additional rainstorms in the latter part of February brought the flow up to 40,000 second-feet.

News of the irrigation districts, flood control and reclamation, dam investigations and other activities of the division are given in the monthly report of State Engineer Hyatt as follows:

At an election held February 9th on the formation of the North Fork Irrigation District, Modoc County, a majority of the votes cast was in favor of organization.

A $250,000 bond issue was voted by the West Stanislaus Irrigation District on January 2d. This issue is to be used to secure a Federal loan under PWA of funds for concrete lining and other work on the distribution system of the district.

FLOOD CONTROL AND RECLAMATION

Maintenance of Sacramento Flood Control Project.

Under CWA Project No. 502 in Sutter County, a gang of nine men and a foreman have been engaged in clearing drainage ditches and other incidental work, with one additional man in our Sutter shop caring for tools.

In Sacramento County under CWA Project No. 502, clearing in the American River overflow channel has been completed to the extent of 2400 man hours. On a recently approved application for continuance of this work for 3000 additional man hours, work was commenced on February 20th. This crew is working 24 hours per week on the reduced schedule.

Sacramento Flood Control Project—Bank Protection.

Work under the State-Federal cooperative program for permanent bank protection has continued under the U. S. Engineer Office at Sacramento. Work is now being done at Eldorado Bend in Reclamation District No. 108 and in Reclamation District No. 1500.

Sacramento Flood Control Project—Construction.

The work of removing certain portions of the old Feather River levee on the left bank between Starr Bend and Bear River has been temporarily discontinued on account of the weather, the work being approximately 90 per cent complete.

Russian River Jetty.

The weather has continued severe during this period, but no damage has been done to the jetty, although some sand has been washed on the track interfering with the operations. The crew under CWA Project No. SLF 70 has worked only 15 hours per week and was discontinued on February 15th at the termination of the program. Application has been made for a continuation of this work.

Mokelumne River.

Clearing in the channel of the Mokelumne River from New Hope bridge to Woodbridge in San Joaquin County has continued under the direction of this office, with a San Joaquin County CWA crew of 100 men.

Pajaro River.

It is expected that work will be commenced within the next few days on clearing in the channel of the Pajaro River under CWA Project No. 502, with a crew of 60 men, supervised by this office.

WATER RIGHTS

Supervision of Appropriation of Water.

During the month of January 37 applications to appropriate water were received, 15 were denied and 20 were approved. During the month 12 permits were revoked and the rights under 3 were confirmed by the issuance of license.

Included among the larger permits which were issued was one to Turlock Irrigation District allowing a diversion of 800 cubic feet per second from Tuolumne River at an estimated cost of $50,000 for the irrigation of 181,556 acres, and a second issue to Canyon Placers Incorporated allowing a diversion of 50 cubic feet per second from Canyon Creek in Trinity County at an estimated cost of $150,000.

SACRAMENTO-SAN JOAQUIN WATER SUPERVISOR

During the latter part of January and until about February 10th the flow of the Sacramento River at Sacramento was 10,000 second-feet or less. Since

(Continued on page 28)

Cement Concrete Tests Made on Ridge

(Continued from page 7)

Tests of covering 1 and 3 were made on 7-sack concrete.

Three cores from all specimens were taken for crushing at 35 days.

TEST OBSERVATIONS

Core strengths at 35 days show the following results listed in the order of breaking strengths.

Method of curing	Compressive strength lbs/sq. in.	Per cent
* 1. Hopcloth	4,243	106
8. Bituminous membrane on surface and subgrade	3,990	100
* 2. Burlap, 12-ounce, 1 layer	3,950	99
6. Earth blanket, 4-inch	3,845	97
9. Bituminous membrane	3,773	95
10. Bituminous membrane, plus 1-inch earth	3,492	88
5. Earth blanket, 2-inch	3,453	87
11. Bituminous membrane, plus 1 layer burlap	3,400	85
7. Ponding	3,286	82
12. Impervious paper, Type A	3,165	79
3. Burlap, 2 layers	3,050	76
13. Impervious paper, Type B	2,977	75
4. No cure	2,351	59

Tests marked thus * are 7-sack concrete.

BRIDGE DEPARTMENT METHODS

The problem facing the bridge department in cold weather curing is somewhat more difficult than the ordinary problem of protecting a paving slab, and the following description is therefore of interest:

Four bridges were constructed on the Ridge Route Alternate during the winter of 1932–33, prior to the construction of the thirty-foot pavement on this new route. At an elevation of 4000 feet on the old route, winter blizzards occurred during which automobile traffic was stalled in heavy snows having a maximum depth of five feet; on the new route, however, less than two feet of snow fell.

The bridges were steel deck plate girder spans on reinforced concrete piers and abutments, the piers varying from 39 to 67 feet in height, thus offering considerable surface exposure to cold weather.

HEAT PROVIDED BY FIRES

Heavy forms were used consisting of 2-inch T & G lumber built barrel stave fashion for each pier; concrete was poured in two days and forms removed the following day.

Mixing water was heated by passing pipes through wood fires, raising the temperature to about 150 degrees Fahrenheit and the concrete in the forms to about 65 degrees Fahrenheit, thus insuring proper chemical action in the setting of cement. Additional protection for curing was required, and tarpaulins hung on bracing scaffolds enclosed each pier. Heat was supplied by coke salamanders under the tarpaulins and thermometers were used to record the curing temperature. Heating was continued until the concrete developed about one-fourth of the required 28-day breaking strength.

For the concrete decks, curing methods developed on the adjacent paving project were used. A bituminous membrane was applied, covered with burlap, thus protecting the surface against evaporation and temperature drop. It was believed that the black bituminous membrane absorbed more heat from the sun's rays during the day than plain concrete, and the burlap helped prevent radiation of this heat during the night.

SATISFACTORY AT NIGHT

This method of curing was found satisfactory with night temperatures as low as 20 degrees Fahrenheit, during clear weather. Due to the exposed decks, the tarpaulins were allowed to hang over the edges, while the heating below by salamanders was continued until proper strength was developed as for the piers.

CONCLUSIONS REACHED AS RESULT OF TESTS

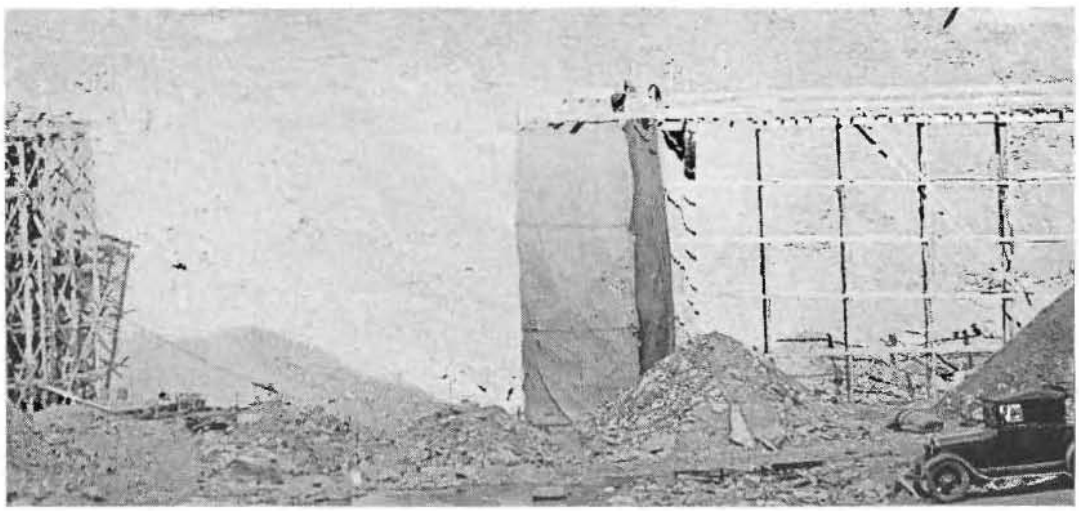
Unsatisfactory concrete will result under any method of curing tried in the above tests where concrete is placed in locations where the temperatures fall below 20 degrees Fahrenheit at any time.

Black curing membranes increase the heat absorbed by the concrete during the daylight hours, and where covered at night with an insulating medium such as dry burlap or dry earth, the heat is retained in the concrete and thus increases its strength.

Ponding or curing with wet burlap prevents the sun's rays from warming the concrete and induces evaporation which lowers the temperature and delays proper curing.

Piru Bridge Piers Cured by Fire Heat

(Continued from preceding page)



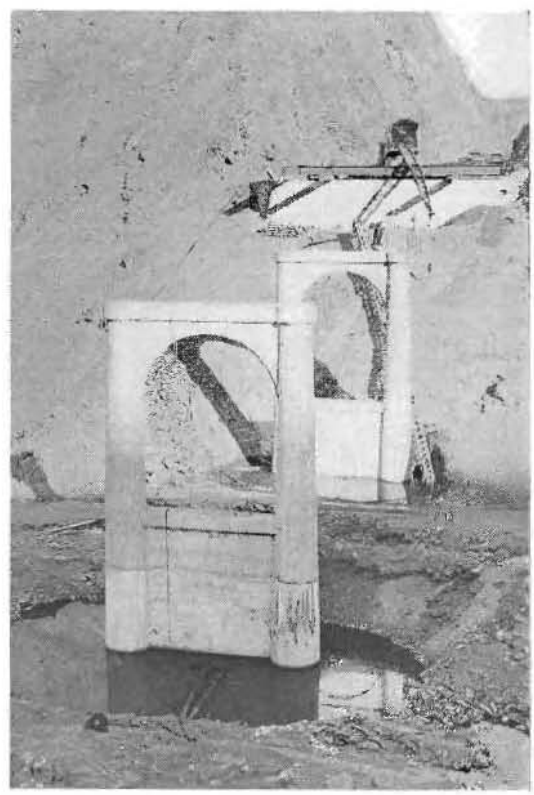
COLD WEATHER CURING by covering piers with tarpaulins and heating with salamanders.

RECOMMENDATIONS MADE

It is recommended that no concrete work should be planned for conditions where temperatures will go below 32 degrees Fahrenheit during the curing period. Under emergency conditions, means should be taken to insure heating the aggregates and the maintenance of sufficient warmth in the concrete during the first five days after laying to secure adequate curing. A usual method is to cover the concrete paving with impervious paper or canvas stretched over frames at a sufficient height to allow lanterns or other heating units to be placed under the blanket.

The standard specifications of the California Division of Highways provide that no concrete may be mixed or placed while the air temperature is at or below 35 degrees Fahrenheit unless adequate means are employed to heat the aggregates and water and satisfactory provision has been made for protecting the work.

All concrete must be effectively protected from frost action for a period of five days and it will not be accepted until after thirty days during which the temperature does not fall below 40 degrees Fahrenheit. All concrete which may become damaged by frost action shall, upon written notice from the engineer, be replaced by the contractor at his expense.



FINISHED PIERS after removal of tarpaulins

U. S. Law Controls Federal Fund Job

(Continued from page 12)

graph A (2) of section 204 of the National Industrial Recovery Act, and as such was to be financed in its entirety (except for certain rights of way) with Federal funds.

The Director, in response to the order to show cause why an injunction should not issue, demurred to the complaint and also filed affidavits setting up the facts, particularly that the proposed contract was to be financed by a Federal grant.

The complaint was filed originally in the Superior Court at San Francisco, but was moved to Sacramento by stipulation of the parties.

The case was argued before Judge Shields on January 29th and in addition to the oral arguments lengthy memorandums of points and authorities were submitted by both sides.

In support of the complaint, counsel for plaintiffs raised, among others, the following points:

PLAINTIFFS' POINTS

1. That the Director of Public Works, in fixing a wage scale different from that set forth in the code of fair competition for the Excavating and Dump Truck Contractors, acted contrary to the method prescribed by law for performing his duty, i.e., that since the code had the effect of law, the code rate of wages became the legal rate and was necessarily the prevailing rate of wages.

2. That since the California Industrial Recovery Act was by its provisions made supplemental to other labor laws of the State of California, it fixed additional requirements to be met by the defendant in determining what is the prevailing rate of wages.

3. That since the code of fair competition for the Excavators and Dump Truck Contractors contained a collective bargaining agreement as to wages, this agreement of employers and employees became binding upon the defendant as the prevailing rate of wages.

IRREPARABLE INJURY ALLEGED

4. That the defendant could be legally enjoined because his action in attempting to enter into the contract in question constituted a public nuisance under the supplement to the California Industrial Recovery Act.

5. That the plaintiff unions in their membership would suffer irreparable injury and destruction of property rights if defendant were not enjoined.

6. That a trade union is adversely affected and specifically injured by violation of a State code of fair competition.

As opposed to these contentions W. R. Augustine and Lucas E. Kilkenny, Deputy Attorneys General, and the writer, appearing as counsel for the Director of Public Works, urged, among others, the following objections to the action:

OBJECTIONS BY DEFENDANT

1. That all laws of the State of California inconsistent with sections 204 and 206 of the National Industrial Recovery Act have been specifically suspended by chapter 1041 of the California Statutes of 1933. (This chapter assented to and accepted the provisions of Title II of the Federal act and declared it to be the policy of the State of California to cooperate fully with the United States government in carrying out its provisions.)

2. That the California Industrial Recovery Act and the supplement thereto have no application whatever to the San Mateo project because of its Federal character.

ACTED AS FEDERAL AGENT

3. That the State of California is merely an agent of the Federal government in carrying out the purposes of the latter in connection with unemployment relief and that, therefore, a State court was without jurisdiction of the defendant or the subject matter of the action.

4. That the duty of predetermining the prevailing rate of wages, or a minimum rate of wages which would be "just and reasonable" and "sufficient to provide * * * a standard of living in decency and comfort" as required by the Federal law, devolved upon the Director of Public Works and that such determination requires affirmative action by him and must be made for the locality in which the work is to be performed.

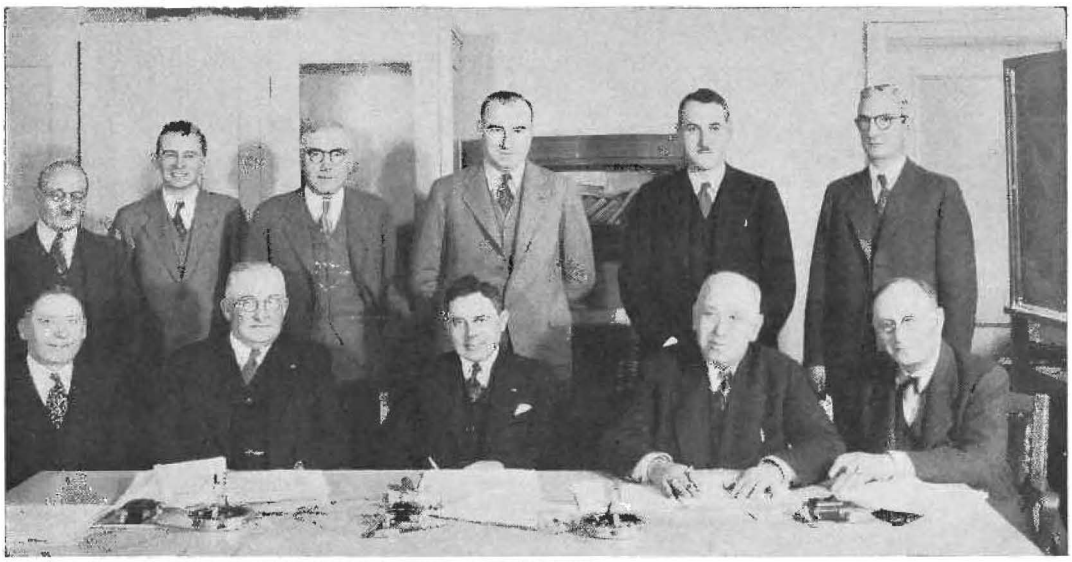
5. That the locality in which the work is to be performed referred, in the particular case, to the county of San Mateo; whereas the rate of wages set forth in Excavators and Dump Truck Contractors Code had been fixed for the entire northern portion of the State without reference to any particular locality.

APPROVED BY U. S. BUREAU

6. That the predetermination of the Director had been submitted to and approved by the United States Bureau of Public Roads on behalf of the Secretary of Agriculture, and that, therefore, a binding agreement relative to the project was in effect as between the State and the Federal government.

7. That the supplement to the California Recovery Act by its language specifically excepted the California prevailing rate of wages law from its operation.

Judge Shields' opinion was confined almost wholly to a discussion of the character of the relationship of the State and the Federal governments in connection with the expenditure of highway funds made available by the National Industrial Recovery Act. He expressed the view that, in such cases, the State is merely an agent of the Federal gov-



CELEBRATING THE TWENTY-FIFTH ANNIVERSARY of the passage of the act establishing the California Highway Commission, this picture was taken of the present commissioners and engineering personnel. Seated, left to right, Commissioners Dr. W. W. Barham, Frank A. Tetley, Harry A. Hopkins, Chairman; Timothy A. Reardon and Philip A. Stanton. Standing, left to right, Secretary John W. Howe, George N. Cook, Secretary Division of Highways; State Highway Engineer C. H. Purcell; Director of Public Works Earl Lee Kelly; Assistant State Highway Engineer G. T. McCoy and L. V. Campbell, Engineer of City and Cooperative Projects.

State Law Held Not Applicable

(Continued from preceding page)

ernment. Discussing this phase of the situation, the opinion reads, in part:

"It is not denied that 'provisions establishing minimum rates of wages' were 'predetermined by the State Highway Department.' It is not denied that the rates recommended to and approved by the Secretary of Agriculture were such as insured 'that all employees shall be paid just and reasonable wages which shall be compensation sufficient to provide, for the hours of labor as limited, a standard of living in decency and comfort.' The government was spending its own money. It required that fair and just treatment should be given to labor by any State agency disbursing its funds. It provided how such fair treatment might be arrived at through the fixing of minimum rates of wages.

Grave doubts exist in my mind as to the power of this court in a collateral proceeding at the instance of a citizen of this State to invalidate a Federal contract and to defeat a Federal project already organized under the provisions of an act of the Congress of the United States. * * * I do not believe that either the code schedule of wages or the 'public wage law' apply to this situation. * * *"

Further on in the opinion Judge Shields says:

That the State Highway Department was the agent of the Federal government in this matter is beyond question. * * *

Section 2 of chapter 1037, Acts of 1933, * * * authorizes the President of the United States to 'utilize such State officers and local officers, etc., as he may find necessary in the administration and enforcement of the said act, and prescribes their authorities, duties, and responsibilities' * * *. The Highway Department was 'utilized' and its 'authority' prescribed in sections 204 and 206 (of the National Industrial Recovery Act) above referred to; and in doing what it did, I am convinced that it was controlled only by these provisions. * * * Neither the defendant nor the Highway Department had anything directly to do in fixing the code rates. * * *

There is a conflict as to the means by which they (schedules of wages) are fixed between a code rate fixed by a group or industry and a rate to be fixed by the Department of Highways, either under the State 'public wage law' or as an agent of the Federal government. In such a case the State law is 'suspended.' * * *

If the Department of Highways is forced to submit to a rigid, inflexible rate prescribed by a code, and the Federal officials deem the rate too high or too low, or too high or too low in one particular, there is no room for adjustment; the Federal government must surrender its discretion at the mandate of a State law or for a small difference be obligated to abandon a vast and important project.

Water Shortage this Summer Predicted in Sacramento Valley

(Continued from page 23)

February 10th there has been an increase to about 40,000 second-feet.

Salinity sampling was reestablished at three stations early in February. These stations are Bullhead Point, Collinsville and Antioch. Tests of February 6th showed 8 parts chlorine per 100,000 parts of water at Collinsville and 5 parts at Antioch.

A rough check of snow and precipitation to date in the Sacramento Basin indicates conditions very little better than in the very dry years of 1924 and 1931. Therefore, if additional storms of considerable magnitude do not occur in late February and in March there is the prospect of a water shortage in the summer of 1934.

DAMS

The activities during the past month in the northern part of the State have been confined primarily to the regular maintenance inspections and the supervision of the repair work which is under way. In the south, in addition to this type of work, inspections have been made of the construction work on the following major projects: San Gabriel Dams Nos. 1 and 2, Pine Canyon Dam, Bouquet Canyon Dam and the El Capitan Dam.

Cooperative Topographic Mapping.

Horizontal and vertical control work were carried on during the month in Monterey and Kings counties and topographic mapping in Kings County. Some office work was done also on the Colfax and Lakeport Quadrangles in Nevada, Placer and Lake counties.

WATER RESOURCES

South Coastal Basin Investigation.

During the month field work continued in a routine way. Annual report on water levels was completed and is being mimeographed.

Bulletin 43 "Value and Cost of Water for Irrigation in Coastal Plain of Southern California" and Bulletin 44 "Water Losses Under Natural Conditions from Wet Areas in Southern California" came from the press. The former was prepared under a cooperative agreement between the College of Agriculture, University of California, and the Division of Water Resources. The latter is a report of a cooperative investigation on the above subject and is divided into two parts, the first being by the Division of Irrigation, Bureau of Agricultural Engineering, United States Department of Agriculture, and the second by the Water Resources Branch of the United States Geological Survey.

DECLINE OF HIGHWAY TRAFFIC

"Use of highways has declined less on account of the depression than almost any other activity. Returning business activity, increasing employment and generally improved economic conditions will result in an early and rapid increase in the demand made by the public on the highway facilities."—*Ohio Public Works.*

U. S. BUREAU REPORTS 17,647 MILES OF ROAD WORK UNDER WAY IN 1933

Thomas H. MacDonald, Chief of the U. S. Bureau of Public Roads, in summarizing the work undertaken to the end of 1933 on public works highways by the States under the supervision of the Bureau reported a total of 17,647 miles of construction at an estimated cost of $273,849,184. Of these roads, 9822 miles are on the Federal-aid system outside of municipalities, 964 miles are extension of such roads into and through cities, and 6861 miles are secondary or feeder roads. The mileage, by types of construction, is as follows:

Type	Miles
Graded and drained	4,149
Sand clay, treated and untreated	1,128
Gravel, treated and untreated	6,291
Macadam, treated and untreated	442
Low-cost bituminous mix	1,801
Bituminous macadam	461
Bituminous concrete	706
Portland cement concrete	2,521
Block	63
2431 bridges and approaches	72
159 railroad-highway and between-highway grade separations	13

Employment of men on this program, beginning in August, reached a total of 132,000 men continuously employed in November. The total number of men employed including labor turnover was 236,000. This does not take into account the auxiliary industrial employment.

L. A.—POMONA HIGH SPEED ROUTE

(Continued from page 17)

elimination of grade crossings and traffic delays on the new route. It is conservatively estimated that there will be an average saving of 20 minutes per car which would amount to an annual saving in time of 2,400,000 car hours. As the average car will probably contain more than two persons, the annual saving in time would amount to the time of one person for approximately 5,000,000 hours.

The result of this project will be to furnish a high speed highway from Pomona and intermediate points in practically a straight line to the city of Los Angeles, free from railroad grade crossings and with a minimum number of intersecting streets, which will provide the greatest safety and saving of time possible for such a route. The entire route should be opened to traffic by the first of next year.

Five Bridges Under Construction

(Continued from page 8)

taken, and with its completion the Commission proceeded to award five separate contracts for structures as follows:

FIVE BRIDGE STRUCTURES

1. A bridge across Russian River at Preston, 337 feet long, consisting of one 150-foot through steel truss span; two 38-foot 3-inch steel beam spans, and three 37-foot steel beam spans with concrete deck on concrete piers and one 5-foot sidewalk. This bridge replaces an old and narrow covered wooden bridge.

2. Overhead crossing over the tracks of the Northwestern Pacific Railroad at Preston, consisting of one 63-foot steel girder span over the tracks and 14 timber trestle approach spans all with concrete deck and 34-foot roadway.

3. A bridge across Russian River, two miles south of Hopland, 1136 feet long with 34-foot roadway and concrete deck, consisting of one 248-foot steel truss span on concrete piers and 21 steel girder spans supported by reinforced concrete pile bents and two concrete abutments.

4. Overhead crossing over Northwestern Pacific Railroad near Hopland, 341 feet long with 34-foot deck and concrete roadway, consisting of one 32-foot steel girder span on concrete piers and 15 timber approach spans on pile bents and framed bents with concrete pedestals.

5. A bridge across Feliz Creek at Hopland, 344 feet long, consisting of nine 38-foot steel stringer spans with concrete deck on concrete pile bents and 34-foot roadway.

Running concurrently with the building of these major structures, another contract was put under way covering the placing of crusher run gravel base on the previously completed graded roadway. This work has been somewhat restricted on account of winter rains, but at the present time it is approximately 30 per cent complete, and will be ready to receive the surfacing early in the spring.

READY FOR SUMMER TRAFFIC

Plans are now under preparation to let a contract for placing bituminous treated surfacing on the graveled sub-base over the entire length of the project. It is planned that this contract will be completed during the early summer months, at which time it is expected the last of the five structures will have been finished and this large section of highway will be thrown open, completed, for the heavy summer traffic on the Redwood Highway.

The Commission has invested a large sum of money in this unit. As hereinbefore stated, the original grading contract cost approximately $672,000; the going contracts, at this time, of placing the graveled surface and the five structures, approximate an additional $440,000; making a total amount covered by contract in excess of $1,112,000. It is expected that the bituminous surfacing soon to be placed will raise the total cost of the project to a minimum of $1,225,000.

SAVINGS FOR MOTORISTS.

This is a great expenditure, but it could have been far greater and at the same time economically justifiable on the basis of the savings secured to the traveling public; for the new road is over three miles shorter than the old (18%); it follows the grade of the river, thereby obviating seven summits with a rise and fall of 3500 feet on the old road, together with curvature on very short radii to the extent of nearly thirty-three complete circles eliminated.

The new road is a wide, high standard highway, with long tangents connected by curves of large radius laid close to the river, and with right of way widened to include many of the natural beauty spots adjacent to the road.

Aside from the physical values now capitalized by the new construction, by no means the least of the satisfactions coming to the motorist will be the knowledge that one of the worst and almost the last of the great obstacles to complete enjoyment of a trip over the Redwood Highway is forever removed.

PUNCHEON FILLS ADD RUSTIC BEAUTY

(Continued from page 19)

have enhanced its value, as motorists and visitors will be afforded an opportunity to enjoy vistas of the forest in its primal state heretofore available to none but the few.

This highway, when completed late this year, will be noteworthy, not because of the cost or the quantities involved in its construction, but as the culmination of an ideal in park highway construction.

The most blasé motorist or casual visitor passing through this area can not but stop and ponder over the majestic beauty of the cathedral-like appearance of these centuries-old monarchs of the forest.

Traffic Count Tabulations for 1934

(Continued from page 22)

(All routes as compared to 1932 Count ——18.5% —1.5%)

Gain or loss in traffic volume for State Highway Routes 1 to 81, inclusive, expressed as a percentage of the January, 1933, count, is as given below. No comparison can be made for Routes 82 to 202 as 1933 figures are not available.

Route	Termini	1934 Per cent gain or loss Sunday Gain	Sunday Loss	Monday Gain	Monday Loss
1.	Sausalito-Oregon Line		.66	7.61	
2.	Mexico Line-San Francisco		2.15	4.77	
3.	Sacramento-Oregon Line		2.03	17.24	
4.	Los Angeles-Sacramento	4.89		25.01	
5.	Santa Cruz-Jct. Rt. 65 near Mokelumne Hill		.83	1.94	
6.	Napa-Sacramento via Winters		2.42	.74	
7.	Benicia-Tehama Jct.		12.23	5.11	
8.	Ignacio-Cordelia via Napa		8.34	8.26	
9.	Jct. Rt. 2 near Montalvo-San Bernardino	24.17		58.71	
10.	Rt. 2 at San Lucas-Sequoia National Park	3.55		27.47	
11.	Jct. Rt. 75 near Antioch-Nev. State Line via Placerville		13.13	7.76	
12.	San Diego-El Centro	32.87		36.95	
13.	Jct. Rt. 4 at Salida-Jct. Rt. 23 at Sonora Jct.	11.05		17.98	
14.	Albany-Martinez		1.6	6.48	
15.	Rt. 1 near Calpella-Rt. 37 near Cisco		14.74	12.83	
16.	Hopland-Lakeport		10.55		2.42
17.	Jct. Rt. 3 at Roseville-Jct. Rt. 15, Nevada City	25.35		21.24	
18.	Jct. Rt. 4 at Merced--Jct. Rt. 40 near Sequoia		15.15		30.15
19.	Jct. Rt. 2 at Fullerton-Jct. Rt. 26 at Beaumont	24.47		58.02	
20.	Jct. Rt. 1 near Arcata-Jct. Rt. 83 at Park Bdy.	16.95		20.42	
21.	Jct. Rt. 3 near Richvale-Jct. Rt. 29 near Chilcoot, via Quincy	6.37		15.07	
22.	Jct. Rt. 56, Castroville-Jct. Rt. 29 via Hollister	50.95		14.93	
23.	Saugus-Rt. 11, Alpine Jct.	10.78		40.35	
24.	Jct. Rt. 4 near Lodi-Nevada State Line	3.14		16.45	
25.	Jct. Rt. 37 at Colfax-Jct. Rt. 83 near Sattley	12.19		39.11	
26.	Los Angeles-Mexico via San Bernardino		1.16	11.48	
27.	El Centro-Yuma	8.06		11.31	
28.	Redding-Nevada Line via Alturas		6.22	34.64	
29.	Peanut-Nevada Line near Purdy's		1.01	18.2	
31.	San Bernardino-Nevada State Line	4.37		43.92	
32.	Jct. Rt. 56 Watsonville-Rt. 4 near Califa	.28			2.04
33.	Rt. 56 near Cambria-Rt. 4 near Famosa			19.84	
34.	Jct. Rt. 4 at Galt-Rt. 23 at Picketts Jct.	22.02		40.02	
35.	Jct. Rt. 1 at Alton-Jct. Rt. 20 at Douglas City	19.18		16.95	
37.	Auburn-Truckee	13.68		10.55	
38.	Jct. Rt. 11 at Mays-Nevada Line via Truckee River	57.36		10.55	
39.	Jct. Rt. 38 at Tahoe City-Nevada State Line	49.66		16.97	
40.	Jct. Rt. 13 near Montezuma-Jct. Rt. 76 at Benton	16.29		29.00	
41.	Jct. Rt. 5 near Tracy-Kings River Canyon via Fresno		3.73		3.58
42.	Redwood Park-Los Gatos	2.83		.79	
43.	Jct. Rt. 60 at Newport Beach-Jct. Rt. 31 near Victorville	16.34		34.06	
44.	Boulder Creek - Redwood Park	28.54		42.42	
45.	Jct. Rt. 7 at Willows-Jct. Rt. 3 near Biggs		6.99	9.06	
46.	Rt. 1 near Klamath-Rt. 3 near Cray	5.26			5.59
47.	Jct. Rt. 7 at Orland-Jct. Rt. 29 near Morgan	17.80		19.28	
48.	Rt. 1 near McDonalds-Rt. 56 near Albion	5.39		6.11	
49.	Napa to Jct. Rt. 15 near Sweet Hollow Summit		21.85		1.65
50.	Sacramento-Jct. Rt. 15		19.65	3.75	
51.	Jct. Rt. 8 at Schellville-Sebastopol		1.85	3.24	
52.	Alto-Tiburon	23.77		30.78	
53.	Jct. Rt. 7 at Fairfield-Jct. Rt. 4 at Lodi via Rio Vista		3.84		3.92
54.	Jct. Rt. 11 at Perkins-Jct. Rt. 65 at Central House		16.01	11.06	
55.	Jct. Rt. 5 near Glenwood-San Francisco		29.77		15.43
56.	Jct. Rt. 2 at Las Cruces-Rt. 1 near Fernbridge	21.36			.31
57.	Rt. 2 near Santa Maria-Rt. 23 near Freeman via Bakersfield	11.88		35.96	
58.	Rt. 2 near Santa Margarita-Ariz. Line near Topoc via Mojave and Barstow	16.69		32.24	
59.	Jct. Rt. 4 at Baileys-Jct. Rt. 43 at Lake Arrowhead	25.13		38.34	
60.	Jct. Rt. 2 at Serra-Jct. Rt. 2 at El Rio	8.33		42.31	
61.	Jct. Rt. 4 S. of Glendale-Jct. Rt. 59 near Phelan		55.04	187.12	
63.	Big Pine-Nevada State Line	10.19		3.78	
64.	Jct. Rt. 2 at San Juan Capistrano-Blythe	25.49		20.84	
65.	Jct. Rt. 18 near Mariposa-Auburn	1.55		3.19	
66.	Jct. Rt. 5 near Mosdale-Jct. Rt. 13 near Oakdale	.25		.79	
67.	Pajaro River-Rt. 2 near San Benito River Bridge		10.90		12.61
68.	San Jose-San Francisco		.12	.94	
69.	Jct. Rt. 5 at Warm Springs-Jct. Rt. 2 San Rafael		9.39		10.01
70.	Ukiah-Talmadge		4.82	21.74	
71.	Crescent City-Oregon Line	25.30		.50	
72.	Weed-Oregon Line	.79		52.67	
73.	Rt. 29, near Janesville-Oregon Line	15.88		48.23	
74.	Carquinez Bridge - Napa Wye		18.89	12.91	
75.	Oakland-Jct. Rt. 65 at Altaville		2.59	11.58	
76.	Jct. Rt. 125 at Shaw Ave.-Nev. State Line near Benton	17.68		66.41	
77.	San Diego-Pomona	15.26		13.59	
78.	Jc. Rt. 12 near Descanso-Jct. Rt. 19 near March Field	25.58		22.69	
79.	Jct. Rt. 2 at Ventura-Jct. Rt. 4 at Castaic	10.45		49.36	
80.	Jct. Rt. 51 at Rincon Ct.-Rt. 2 near Zaca		2.29	11.51	
81.	Rt. 1 near Hioushi Br.-Rt. 71 near Smith River		3.44	7.69	

Bridge Workers Find Bones of Mastodon 180 Feet Under Bay

ONCE upon a time, so long ago that we can not remember whether it was 25,000 or 1,000,000 years back, a huge, hairy, elephant-shaped mastodon lay down and died on the shores of the San Francisco Bay.

Many thousands of years passed and the Sacramento River went on carrying silt from way up by Kennett and deposited it on top of the mastodon's bones.

As the bay filled up with silt, it spread out over a larger area and finally the bones of this mastodon were covered by 130 feet of clay and 50 feet of water.

TOMB IN MID-BAY

The spot where the mastodon left all that was mortal of him was directly beneath Pier E-5 of the San Francisco-Oakland Bay Bridge, almost midway between Yerba Buena Island and the end of the Key Route Mole.

This mastodon bedtime story might have happened as narrated, or it might have been this way:

Perhaps the mastodon was roaming in the upper Sacramento Valley at an age when it was increasingly difficult for this huge creature to find enough to eat of the vegetation which had been rank and thick in growth but which was getting sparse.

Discouraged with life in the Pleistocene Age, the mastodon lay down and died and the Sacramento River washed his bones down into San Francisco Bay and deposited silt on top of him 150 feet deep.

HIGHLY POLISHED MOLARS

Something like this did take place. The proof of it is that last month engineers of the San Francisco-Oakland Bay Bridge Division of the State Department of Public Works pulled out of the bay-bottom 180 feet below water under Pier E-5, a 10-pound mastodon tooth.

The grinding surface of the molar was still as bright and highly polished as when the mastodon was roaming in what was then the dense vegetation on this coast, before the increasing coldness came.

The top of the tooth was approximately 8 inches long by about 4 inches wide and, while the root was broken off, the tooth still had a height of more than 8 inches.

"ALAS, POOR YORICK, or whatever your name was," says this Bay Bridge worker apostrophizing the tooth of a mastodon, perhaps the first prehistoric commuter who met his fate in the ooze of San Francisco Bay where his bones were unearthed under Pier E-5, 180 feet below the surface.

POSSIBLY FIRST COMMUTER

Professor R. W. Chaney, of the Department of Paleontology of the University of California, was given the tooth by Chief Engineer C. H. Purcell for examination, and it was Professor Chaney who supplied, not only the identification of the tooth as that of a mastodon, but narrated the probable beginnings of this early California settler.

Scientists say it is possible that this mastodon was the first commuter and that he drowned in the attempt.

Apparently this first commuter was followed by others because since discovery of his tooth the jawbone of some prehistoric bison has been unearthed under Pier E-4, 500 feet west of Pier E-5.

However this may be, the scientists and paleontologists will have to settle it by guess work for Chief Engineer Purcell, and Director of Public Works Earl Lee Kelly, and Governor James Rolph, Jr., head of the California Toll Bridge Authority, have all declared that the paleontologists will not be allowed to up-end this 180-foot bridge pier to hunt for othe. fossils in search for further history of this mastodon commuter.

1st Skinner: "Have you and your boss ever had any difference of opinion?"

2d Skinner: "Yes, but he doesn't know it!"

Highway Bids and Awards

FOR FEBRUARY

ALAMEDA COUNTY—A structure consisting of 22 reinforced concrete piers with timber piles, 10 reinforced concrete spans for the lower deck highway and interurban traffic and 6 reinforced concrete spans for the upper deck highway, located in Oakland immediately east of the East Bay Crossing of the San Francisco-Oakland Bay Bridge. District IV. McDonald-Kahn Company, Ltd., San Francisco, $269,692; Healy-Tibbitts Construction Co., San Francisco, $337,500; W. J. Tobin, Oakland, $346,010; Bridge Builders, Inc., Oakland, $358,000. Contract awarded to Clinton Construction Co., San Francisco, $253,665.

CALAVERAS COUNTY—Two bridges between 6 and 7 miles south of San Andreas, one across San Antonio Creek consisting of five 30-foot steel stringer spans on concrete pier and abutments, the other across San Domingo Creek consisting of five 30-foot steel stringer spans on concrete piers and abutments. District X, Route 65, Section B. Holdsener Construction Co., Sacramento, $25,608; Nelson & Wallace, Escalon, $24,695; F. O. Bohnett, Campbell, $22,791; Baldwin & Butler, Berkeley, $23,273; M. B. McGowan, Inc., San Francisco, $23,427; Fredrickson & Watson Construction Co., and Fredrickson Bros., Oakland, $23,124. Contract awarded to Poulos & McEwen, Sacramento, $22,511.

LOS ANGELES COUNTY—Between Williams Ranch and Summit, 15.4 miles grading and paving. District VII, Route 23, Section C,D. Gibbons & Read, Burbank, $179,799; Oswald Bros., L. A., $174,229. Contract awarded to Griffith Company, L. A., $168,587.25.

LOS ANGELES COUNTY—In the city of Los Angeles between Alameda Street and easterly boundary, 0.8 of a mile grading, and paving with asphalt concrete. District VII, Route 60, Section L.A. Griffith Company, Los Angeles, $66,672; Sully-Miller Contr. Co., Long Beach, $70,504. Contract awarded to Oswald Bros., Los Angeles, $63,923.50.

LOS ANGELES COUNTY—In city of Los Angeles between State Street and Mission Street 1 mile grading, paving with P. C. C. District VII, Route 26, Section L.A. Oswald Bros., Los Angeles, $193,549; Griffith Company, Los Angeles, $204,092; United Concrete Pipe Corp., Los Angeles, $211,657; M. J. Bevanda, Stockton, $212,875; Jahn & Bressi Const. Co., Los Angeles, $197,074; P. J. Akmadzich, $238,549; Southern Calif. Roads Co., $192,171. Contract awarded to C. O. Sparks & Mundo Engr. Co., Los Angeles, $181,791.

LOS ANGELES COUNTY—About 1 mile south of the city of Alhambra, 2 reinforced concrete girder bridges; Monterey Pass Road, 87-ft. span; and Coyote Pass Road, 65-ft. span and two 32½-ft. girders. District VII, Route 36, Section D. George Mittry, $108,612; Theo. A. Beyer Corp., L. A., $119,002; Byerts & Dunn, L. A., $99,572; H. Mayson, L. A., $104,877; Sharp & Fellows Contracting Co., L. A., $105,083; Herbert M. Baruch Corp., L. A., $97,756; Bannister-Field Co., Ltd., Fred E. Potts Co., L. A., $115,781; Andy Sordal, Long Beach, $104,732; R. H. Travers, L. A., $106,865; Jahn & Bressi Const. Co., L. A., $105,947. Contract awarded to Clinton Const. Co., L. A., $93,019.50.

LOS ANGELES COUNTY—Bridge in the city of Los Angeles across Ramona Boulevard at Cornwell Street consisting of 2 reinforced concrete steel spans about 50 feet long, 2 timber spans about 19 feet long and grading and surfacing roadway approaches with crushed rock and oil. District VII, Route 26. Herbert M. Baruch Corporation, Ltd., Los Angeles, $32,445; Byerts & Dunn, Los Angeles, $31,895; R. H. Travers, Los Angeles, $31,035; Jerome K. Doolan, Pasadena, $28,613; Andy Sordal, Long Beach, $28,647. Contract awarded to Joseph Maiser & David J. Reed, Los Angeles, $27,458.

MONTEREY COUNTY—Four timber bridges across Prewitt Creek, Wild Cattle, Mill, and Kirk Creeks. Between 32 and 36 miles north of San Simeon. District V, Route 56, Section B. Theo. M. Maino, San Luis Obispo, $66,805; M. B. McGowan, Inc., San Francisco, $67,797. Contract awarded to W. J. Tobin, Oakland, $66,171.30.

SAN DIEGO COUNTY—Between one mile north of San Ysidro and National City, about 7.3 miles to be paved with asphalt concrete. District XI, Route 2, Section F. Sander Pearson, Santa Monica, $208,361; Griffith Co., Los Angeles, $185,731. Contract awarded to V. R. Dennis Const. Co., San Diego, $168,044.

SAN DIEGO COUNTY—Two reinforced concrete girder bridges, one across San Marcos Creek consisting of four 40-foot spans, and one across Agua Hedionda Creek consisting of four 40-foot spans on concrete bents and abutments. District XI, Route 2, Section B. Frank Doran, San Diego, $74,366; Lynch-Cannon Engineering Co., Los Angeles, $69,167; Dimmitt & Taylor, Los Angeles, $79,928; Byerts & Dunn, Los Angeles, $76,152; Weymouth Crowell Co., Los Angeles, $68,475; R. H. Travers, Los Angeles, $75,624. Contract awarded to Bodenhamer Const. Co., Oakland, $67,505.

SAN MATEO COUNTY—Between Edgemar Rd. and Rt. 2, 2 miles grading, paving with asphalt concrete. District IV, Route Junipera Serra Boulevard. The Fay Improvement Co., S. F., $210,782; Union Paving Co., S. F., $197,926; Basich Bros., Torrance, $220,178; Chas. L. Harney, S. F., $244,527; Eaton & Smith, S. F., $219,997; Fredrickson Bros., S. F., $197,843; S. H. Palmer, S. F., $241,164; Peninsular Paving Co., S. F., $190,769. Contract awarded to D. McDonald, Jones & King, & R. O. Bohnett, Sacramento, $178,545.50.

SANTA BARBARA COUNTY—In Santa Barbara between Mission Street and Hollister Avenue, about 2.7 miles to be graded and paved with asphalt concrete on a Portland cement concrete base. District V, Route 2, Sections P,K. Sander Pearson, Santa Monica, $214,375; United Concrete Pipe Corporation, Los Angeles, $199,390; Griffith Co., Los Angeles, $224,296; M. J. Bevanda, Stockton, $206,844. Contract awarded to J. E. Haddock, Pasadena, $198,426.

SANTA BARBARA COUNTY—Two bridges, one across Santa Ynez River consisting of eleven 65-foot reinforced concrete girder spans and two 25-foot cantilevers, the other across Santa Agueda Creek consisting of two 44-foot reinforced concrete girder spans and two 26-foot cantilevers on concrete bents. District V, Route 80, Section A. R. R. Bishop, Long Beach, $89,414; Bodenhamer Const. Co., Oakland, $98,332; Byerts & Dunn, Los Angeles, $94,313; H. Mayson, Los Angeles, $97,395; Herbert M. Baruch Corp., Ltd., Los Angeles, $95,402; Clinton Const. Co. of California, Los Angeles, $97,815; Andy Sordal, Long Beach, $109,121; Gist & Bell, Arcadia, $99,952; M. B. McGowan, Inc., San Francisco, $94,902; Theo. A. Beyer Corp., Los Angeles, $136,005; Sharp & Fellows Contracting Co., Los Angeles, $92,511; Dimmitt and Taylor, Los Angeles, $92,647; Lynch Cannon Engineering Co., Los Angeles, $104,712. Contract awarded to J. J. Munnemann Co., Santa Barbara, $84,411.

SOLANO COUNTY—At Cordelia, 0.63 of a mile grading and 2 concrete abutments for undergrade Xing. District X, Route 7, Section H. Biasotti, Willard & Biasotti, Stockton, $49,230; Granfield, Farrar & Carlin, and Sam Sciarrino, S. F., $43,440; J. R. Reeves & Lord & Bishop, Sacramento, $38,581; M. A. Junkins & C. A. Baker, Sacramento, $40,560; A. H. Vogt Co., Inc., S. F., $47,355. Contract awarded to F. O. Bohnett, Campbell, $34,904.

VENTURA COUNTY—Between Ventura and Mussel Shoal, about 8.5 miles to be graded and paved with asphalt concrete. District VII, Route 2, Sections D,E,F. Sharp & Fellows Contracting Co., Los Angeles, $431,163; Griffith Co., Los Angeles, $448,640; Jahn & Bressi Construction Company, Inc., Los Angeles, $442,895. Contract awarded to Basich Brothers, Torrance, $430,172.

VENTURA COUNTY—Between westerly boundary of county and one-half mile east of West Casitas Pass, about 2.9 miles to be graded and treated with fuel oil. District VII, Route 151, Section B. von der Hellen & Pearson, Castaic, $110,818; Gist & Bell, Arcadia, $148,890; Daley Corp., San Diego, $144,284; Chas. L. Harney, San Francisco, $136,271; Yglesias Bros., San Diego, $129,436; Lang Transportation Co., Los Angeles, $122,866; Fredrickson & Watson Const. Co., and Fredrickson Bros., Oakland, $138,992; Macco Const. Co., Clearwater, $170,118; Sharp & Fellows Contracting Co., Los Angeles, $124,545. Contract awarded to C. W. Wood, Stockton, $105,530.

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