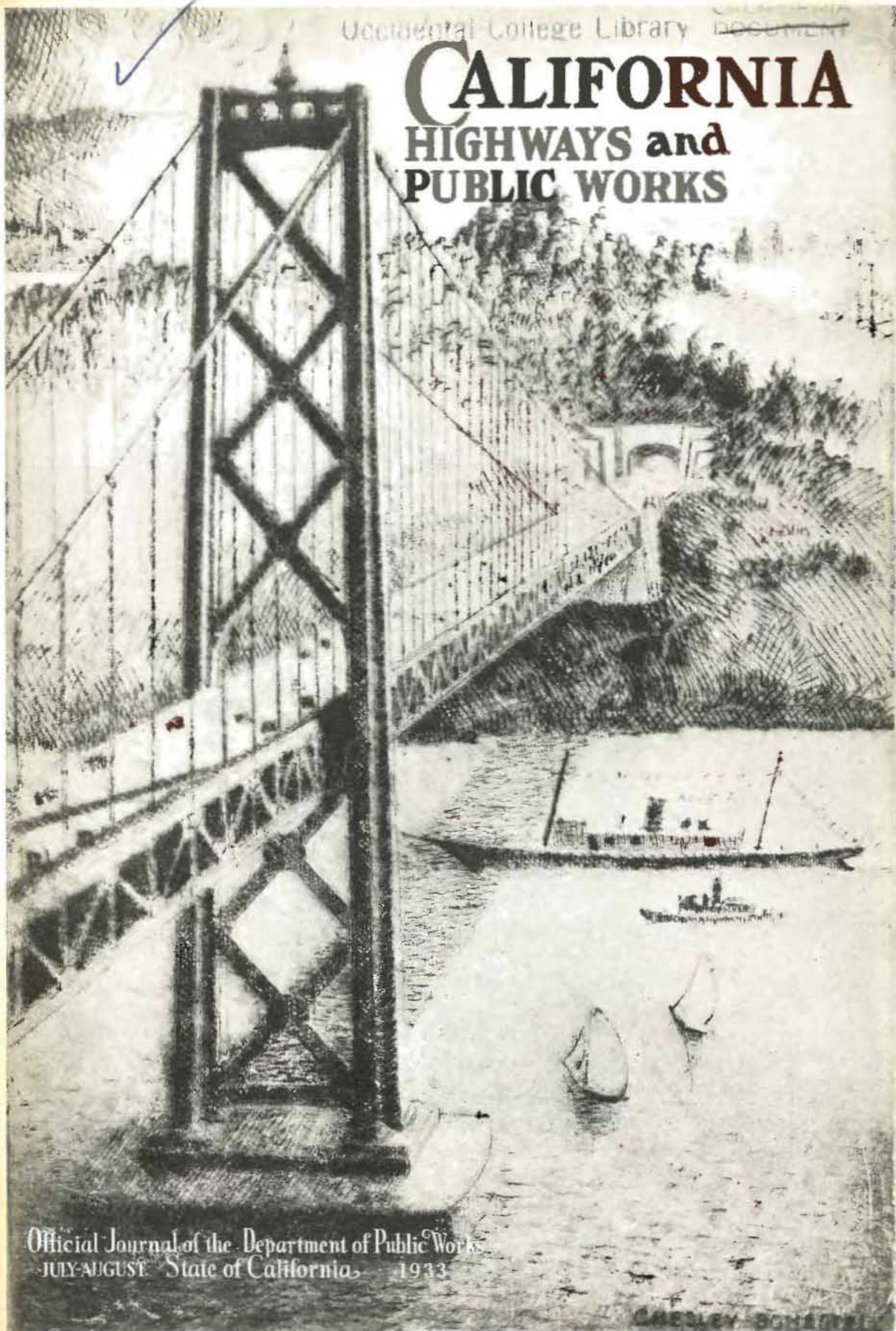


CALIFORNIA HIGHWAYS and PUBLIC WORKS



Official Journal of the Department of Public Works
JULY-AUGUST State of California 1933

Table of Contents

	PAGE
California's Greater Highway System.....	1
<i>By H. A. Hopkins, Chairman, California Highway Commission</i>	
Governor Rolph Starts Hundreds to Work on Bay Bridge.....	2
Scenes at Bay Bridge Ground Breaking Ceremonies.....	3
Bakersfield Realignment Eliminates Five Grade Crossings.....	4
<i>By Walter Benthel, Assistant Highway Engineering Draftsman</i>	
Illustrations of Bakersfield Rerouting Project.....	5
New Law Regulates Advertising Signs Along Highways.....	6
<i>By Morgan Keaton, Assistant Deputy Director of Public Works</i>	
3000 Public Works Employees Benefit by Full Pay Week.....	8
Governor Rolph's Letter Ordering Full Pay Week.....	9
Illustrations of San Francisco-Oakland Bay Bridge Activities.....	13
Tabulation of Highway Projects Advanced to Bids.....	15
Improved Highway Ends Accidents.....	16
Two New Highway Links and Armory Dedicated.....	18
<i>By A. T. Richardson, Secretary, Pomona Chamber of Commerce Road Committee</i>	
Scenes at Pomona Road Dedication Illustrated.....	19
Building Executives Confer on Recovery Act Code.....	20
Earthquake-Proof Buildings Possible.....	21
<i>By C. H. Kromer, Principal Structural Engineer</i>	
New Link of Bayshore Highway Completed.....	24
<i>By Jno. H. Skeggs, District Engineer</i>	
Views Along New Bayshore Highway.....	25
Water Resources Report of State Engineer.....	27
Tuolumne Bridge at Modesto Opened By Governor.....	30
<i>By R. E. Pierce, District Engineer</i>	
Scene at Tuolumne Bridge Dedication.....	31

California's Greater Highway System Marks New Era in Transportation

Addition of 6800 Miles Under Breed Act Permits
Continued Rapid Traffic Growth and Gives
State Sixth Mileage Rank in Nation

By H. A. HOPKINS, Chairman California Highway Commission

ON June 5th, this year in the council chamber of the State Capitol, Governor James Rolph, Jr., by affixing his signature to Senate Bill No. 563 made new history in the development of California's highway system.

Through the action of the 1933 Legislature there was added to the 7350 miles of highways in the State's system approximately 5900 miles of secondary highways making a total mileage now of about 13,250 miles. To this there was added approximately 900 miles additional of city streets that will provide through arteries connecting with State highways affording continuous routes with no dead ends.

Governor Rolph's signature brought into existence a law that will mean the realization of a hope and ambition on the part of the political subdivisions of the State constituting our cities and counties.

The benefits to the counties will accrue from the fact that they will be relieved from maintenance costs to the extent of nearly \$6,000,000 per annum and to the cities in that one-quarter cent of the gasoline tax

money taken from the State's 2-cent share will be expended on through streets with a yearly expenditure of approximately another \$6,000,000.

Another benefit accruing to the cities and counties will be the elimination of any necessity for assessments on city streets and district assessments to construct county roads.

The entire 6600 miles called for under the Senate concurrent resolution was recommended by the California Highway Commission upon suggestions by interested State organizations and boards of supervisors as well as those initiated by the State engineers and commission.

This recommendation was accepted by the State legislature with very few changes in the way of eliminations or additions because it was recognized that the county roads suggested for inclusion were the very best roads that could be selected

after thorough investigation and study by the State engineers and the holding of countless hearings by the commission at which projects were presented by delegations from every section of the State.



H. A. HOPKINS

Governor Rolph, Breaking Ground for Bay Bridge, Puts Hundreds to Work

By C. H. PURCELL, State Highway Engineer

GROUND has been broken. The first cofferdam is under construction.

Piles are being driven in the bay for caisson working platforms.

The cutting edge for the third giant steel and timber caisson has been launched at the Moore Dry Docks.

In short, the San Francisco-Oakland Bay Bridge is in construction.

Governor James Rolph, Jr., lifted the first spade of earth on Yerba Buena Island on Sunday, July 9, with a golden shovel donated by the San Francisco Motor Car Dealers Association, of which William L. Hughson is president.

President Roosevelt set off the first blast.

Former President Herbert C. Hoover took the spade from Governor Rolph and lifted the second shovel of earth.

MANY MEN AT WORK

Members of the Governor's Financial Advisory Committee, and Director of Public Works, Earl Lee Kelly all lifted shovels of the earth that broke the soil of the island for the bridge construction.

In accordance with Governor Rolph's mandate that work be started in many sectors of the bridge simultaneously, men are now working at Pier 24, San Francisco, at Rincon Hill, in boats and on barges on the bay, at Asiatic Wharf concrete mixing plant, on Yerba Buena Island, and at Moore Dry Docks.

The citizens organizations of northern California, in their eagerness for good news unconsciously bring pressure upon the officials in charge of the construction of the bridge to be placed in the light of boasting about this project. For that reason it is our belief that too much has been said about the great totals on this project and perhaps too little on the actual progress that is being made.

PROGRESS IS RAPID

This progress is not unimportant. As a matter of fact our progress history to date

COVER PAGE ILLUSTRATION SHOWS YERBA BUENA SPAN

The picture on our cover page is a reproduction of an etching of the San Francisco-Oakland Bay Bridge depicting the tower and span of the west channel crossing nearest to Yerba Buena Island. The view embraces the west anchorage on the island, the entrance to the tunnel and in the distant background a bit of Berkeley skyline on the left and a suggestion of the east channel structure and the city of Oakland on the right.

reveals that the engineering surveys, preliminary work, organization and financing, have progressed with remarkable rapidity for a project of such magnitude as the San Francisco-Oakland Bay Bridge.

Another gratifying feature is that the structural work is proving our preliminary engineering surveys, borings and specifications.

When the Transbay Construction Company, contractors on the \$6,957,100.68 contract for the substructure of the west bay half of the bridge, struck rock with a clamshell dredge at the tip of Pier 24 in San Francisco at a depth of 80 feet below the surface of the water, they verified the accuracy of our borings.

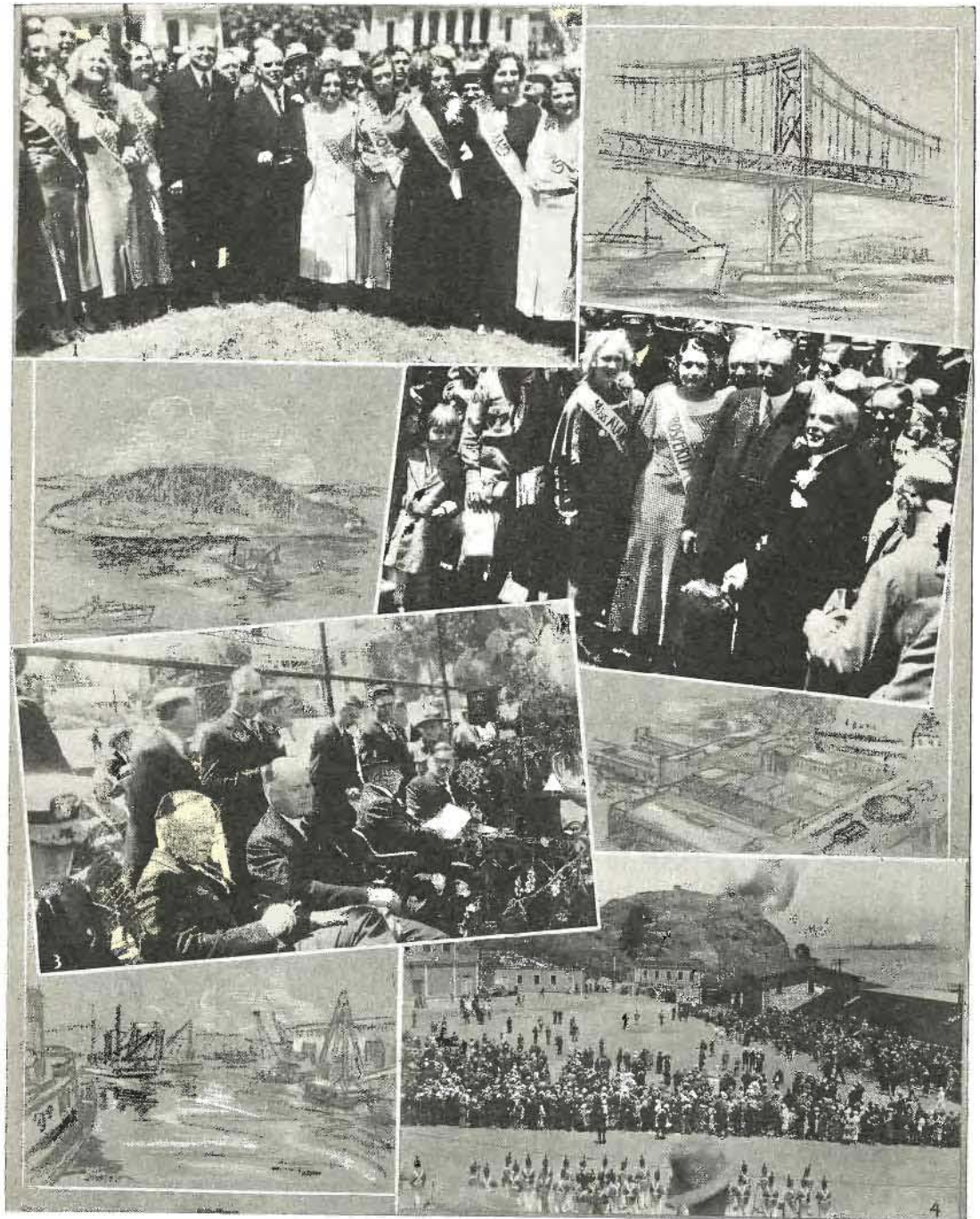
The substance of this rock also checked with our estimates and tests, which was gratifying to this division of the Department of Public Works.

COFFERDAM BEING SUNK

Since rock was reached at Pier 24 the framework and bracing for the cofferdam has been built at Moore Dry Docks, launched, towed across the bay, and set into position.

This cofferdam is now being built up and sunk, and the steel sheet piling will soon be driven in a stockade form around the framework of the cofferdam, and within a few weeks dump buckets will be laying concrete on the rock 80 feet below the surface of the water for the most westerly pier of the San

(Continued on page 12)



MAKING CALIFORNIA HISTORY—Governor James Rolph, Jr., turned the first shovel of earth at the ground-breaking ceremonies for the construction of the San Francisco-Oakland Bay Bridge on Yerba Buena Island July 9 in which the President of the United States, Franklin Delano Roosevelt, and ex-President Herbert Clark Hoover participated. No. 1—Governor Rolph and ex-President Hoover posed for the photographers with fair representatives of the bay cities. No. 2—Governor Rolph lifting the first spade of earth with A. P. Giannini on his right. No. 3—On the speakers' stand, Governor Rolph is seated between Governor F. B. Balzar of Nevada and ex-President Hoover. Behind the Governor stands Earl Lee Kelly, Director of Public Works. At left are Rear Admiral G. W. Laws and Harrison S. Robinson. No. 4—First blast set off by President Roosevelt by wire from Washington.

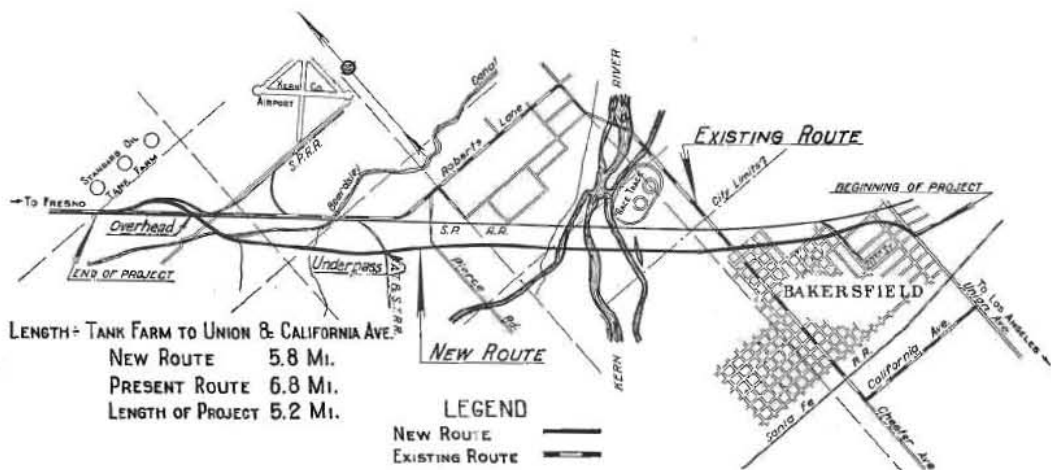
Bakersfield Realignment Cuts Out Five Grade Crossings; Avoids Traffic

By WALTER BEUTHEL, Assistant Highway Engineering Draftsman

IN past years, under legal and financial limitations, State highway construction ordinarily did not extend within the boundaries of incorporated cities. It was therefore not possible to greatly influence the routing through the larger cities and the through traveler was left at the city limits to find his way through a maze of local traffic and confusing signs to the place where he could again find a State Highway and proceed on his way. As the city streets were laid out for local traffic only, they usually formed neither the shortest nor the safest route for the stranger whose chief interest was to reach his destination.

The planning commission of Kern County and the city of Bakersfield furnished a complete analysis of the available routes in accordance with modern standards and compiled without prejudice to the rights of through traffic. This report was given careful consideration by the State engineers and the Highway Commission, who approved what is known as the "railroad route" on August 26, 1932. The decision selecting this route was made because of advantages with respect to distance, directness, curvature, service to business and residence districts and particularly, safety and service to the through traffic.

The saving in distance over the present



Recognizing that with the rapid improvement of highways proper service through cities was a necessity, this situation was remedied by legislation in 1931.

STATE COOPERATED

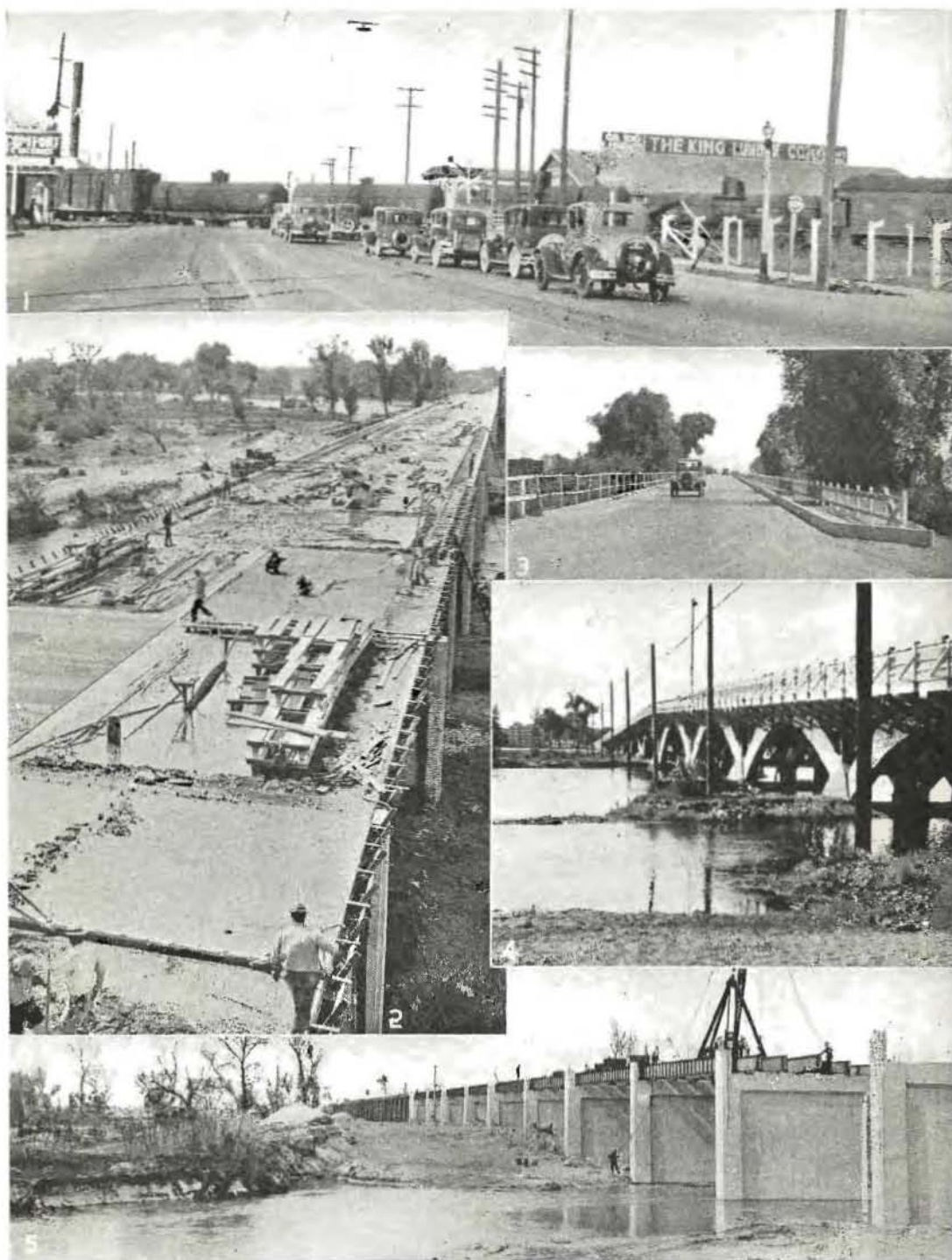
Bakersfield, just north of the "Ridge Route" on the Golden State Highway U. S. 99, was among the first of the cities to apply for the benefits of the State participation in the construction of highways within municipalities. In accordance with adopted policy based on the legislative enactment, the State cooperated with the city council and county supervisors in considering problems of rights of way and routing.

route is one mile and the length is one-half mile less than the next best route. The curvature has been reduced from 368° to 202° and the minimum radius increased from that required to turn in a city street to 1500 feet.

LOCAL CONGESTION RELIEVED

The new route serves the business, residence and suburban district well, crossing the main thoroughfare at the north end of the business district, and providing direct access to those desiring to stop in the city. By using a minimum of existing streets and constructing a new crossing of the Kern River, relief from local congestion is provided. The route parallels the railroad but at sufficient distance

(Continued on page 14)



PROFITING BY COOPERATION with the State in rerouting U. S. 99 through the city, Bakersfield will have a fine, wide arterial for through traffic, relieving city congestion and avoiding grade crossings. No. 1—Chester Avenue crossing of Southern Pacific that will be eliminated. No. 2—New bridge over Kern River showing wide concrete deck under construction. Nos. 3 and 4—Views of present narrow old concrete arch bridge at times inadequate for traffic. No. 5—Reinforced concrete piers of new bridge are 54 feet wide.

New Law Regulates Advertising Signs Along Highways as a Safety Measure

By MORGAN KEATON, Assistant Deputy Director of Public Works

The 1933 Legislature enacted a law effective August 21st providing for the regulation of advertising structures and signs on property adjacent to highways outside incorporated cities or towns. The Director of the Department of Public Works who is charged with the enforcement of the act has appointed Assistant Deputy Director Morgan Keaton to supervise the carrying out of the new law. Mr. Keaton analyses and explains the provisions of the act in the following article.

A NUMBER of States have heretofore passed laws intended to prevent the encroachment of signs and sign-posting structures and advertising devices on the State highways. In many instances these efforts have been abortive for various reasons and the end sought has only been partially attained.

The law passed by the 1933 Legislature known as Senate Bill No. 1198, introduced by Senator John B. McColl of Redding is pioneering legislation along these lines for

State outside the limits of incorporated cities and towns.

MUST PAY FEES

To carry out these purposes the act provides for the regulation and licensing of all persons, firms, or corporations engaged in the business of erecting and maintaining outdoor advertising structures and signs in unincorporated areas and the issuance of licenses and permits upon the payment of specified fees.

The administration of the act is placed



STYLE OF METAL PLATES showing number of permit that must be fastened upon the front of each advertising structure or sign.

California and in many respects it is considered a model law of its kind and a large measure of success is predicted for it. Its basic principles are:

1. That no sign or advertising medium of any kind shall be permitted on the State highway right of way except official direction, warning or information road signs.

2. That no sign or advertising structure shall be permitted adjacent to the highway that constitutes a menace to safe driving by obstructing the vision of drivers.

3. That the law shall provide an exclusive regulation of all advertising structures and signs within view of public highways of the

with the Director of the Department of Public Works, who is empowered to make all necessary orders and regulations for the enforcement thereof and to designate such agents or representatives in the various counties as he deems necessary and proper for the purpose of issuing the licenses and permits. The director is authorized to designate the Maintenance Department of the Division of Highways to enforce the provisions of the act.

LICENSES REQUIRED

Persons, firms or corporations engaged in the business of outdoor advertising as defined in the act must apply for and obtain a license

HOW GORGEOUS SHE BE!

Courtesy of San Francisco Examiner



to conduct such business, and are required to pay an annual license fee of \$50, payable in advance upon the first day of July of each year. Licenses must be renewed annually. When issued subsequent to the first day of July, the fee is apportioned according to the number of months remaining in the year for which the license is issued.

Section 2 of the act provides that certain types of advertising structures and signs are exempt from the provisions of the act, such as official notices, directional signs, real estate signs advertising for sale or lease the property upon which the advertising structure or sign is located, advertising structures or signs used to advertise goods produced or sold upon the property, etc.

No advertising structure or sign not exempt can be erected or maintained within the unincorporated areas of California unless a permit for each such advertising structure or sign is applied for and obtained from the Director of the Department of Public Works.

Permit fees are \$1 for each advertising structure and 25 cents for each sign, payable annually on the first day of January of each year. With each permit there shall be issued

a metal number plate which must be conspicuously fastened upon the front of the advertising structure or sign for which the permit is issued.

It is to be noted that a permit is necessary for each advertising structure or sign not exempted from the provisions of the act, although the person, firm, or corporation erecting or maintaining such advertising structure or sign may not be engaged in the business of outdoor advertising.

Reducing its provisions to concise form the act provides as follows:

Annual license fee of \$50 for carrying on business or occupation of outdoor advertising.
Annual permit fee 25 cents for each sign.
Annual permit fee \$1 each advertising structure.
Permit number and name of owner must be displayed on each sign and structure.

Signs and structures prohibited—general:

- (a) If within highway right of way.
- (b) If imitating warning, stop, or danger signals.
- (c) If in drainage channel.
- (d) If unsafe.
- (e) If with red or blinking light likely to be mistaken for a danger signal.

(Continued on page 29)

3000 Public Works Employees Benefit by Governor's Decree for Full Pay Week

MORE than 3000 per diem employees in the Department of Public Works are being placed on a five-day week basis without reduction in wages.

This was the decision made by Earl Lee Kelly, Director of the Department, following receipt of a letter from Governor James Rolph, Jr., ordering all departments of State government to cooperate 100 per cent with the President of the United States by stimulating employment.

Governor Rolph's letter which lead to Director Kelly's action is reproduced on the adjoining page.

Statisticians of the department are engaged in computing the average weekly earnings of per diem workers for the past year. From these figures will be established the average daily earning of per diem workers and pay schedules will be adjusted accordingly.

It is the intention of the department, says Director Kelly, to play its part in the National Recovery Act by shortening workers' hours without correspondingly decreasing their average weekly wage, to the end that the spending capacity of these 3000 employees may not be impaired and possibly a few additional men employed.

IMMEDIATE COMPLIANCE

"This department will comply immediately with Governor Rolph's request that 'my administration march 100 per cent with the President of the United States in this great offensive against depression'" said Kelly this morning.

"Prior to the passage of Assemblyman Michael Burns' bill calling for a five-day week for per diem workers in the State government," he continued "our maintenance men were working six days per week and our highway shop men five and one half days per week. Under the Governor's orders, with which we are in entire accord in this department, maintenance men will work five days per week at a per diem rate, which will accrue to them approximately the same weekly earning as they have enjoyed in the past. Shop employees will

work five days instead of five and one-half at the same average weekly earning as heretofore."

STRUGGLE FOR MANKIND

"Governor Rolph puts it most aptly in his letter when he says:

"Over this entire nation is sweeping a wave of patriotic fervor, a peace-time wave of unity and accord such as swept us to victory in the World War. In the latter we waged a struggle to the death against mankind. In the former we are waging a struggle to live for mankind."

"We shall proceed to rearrange our working schedule so that it can be put into effect as quickly as possible. Our department will comply with both the spirit and the letter of the law which states: 'in order that available work may be divided among as many employees as is practicable and consistent with State budget limitations and with proper living standards, the five-day week shall be adopted in State employment.

"This department has been bending every effort to relieve the unemployment situation during the past three years by arranging shifts of workers and alternating the shifts to give the greatest spread of employment. That principal will be continued and whenever, through the operation of the five-day week, additional shifts are found necessary to carry on work in progress more men will be given employment.

"The new law also states that it shall be the duty of each department head 'so far as practicable so to arrange and assign the work of his department that the employees therein shall not work more than five days in any calendar week.' From the very nature of our work we will have to make some exceptions in the application of this rule to certain classes of employees.

"It will be necessary for our office and engineering forces who are engaged on matters that deal with going contracts to continue on the regular five and a half or six-day basis as at present but the bulk of our maintenance and shop activities will be put on the five-day basis as soon as the matter can be worked out."



JAMES ROLPH, JR.
GOVERNOR

State of California

GOVERNOR'S OFFICE

SACRAMENTO

AUGUST 4, 1933

TO HEADS OF STATE DEPARTMENTS AND THOSE IN
AUTHORITY EMPLOYING STATE EMPLOYEES:

In initiating the five-day week for per diem workers in your department under the terms of the bill of Assemblyman Michael Burns which has now become law, please bear the following thoughts of mine in mind:

I am unalterably opposed to any adjustment of working schedules to meet the terms of the law that will reduce the weekly or monthly wage of the workers. In other words, I do not believe any self-supporting agency, nor any department paid out of the general fund, should arbitrarily reduce the working time of their employees and at the same time arbitrarily force a wage cut upon them—especially where funds are available which make such action unnecessary.

Over this entire nation is sweeping a wave of patriotic fervor, a peacetime wave of unity and accord such as swept us to victory in the World War. In the latter we waged a struggle to the death against Mankind. In the former we are waging a struggle to live for Mankind.

It is my demand that my administration march one hundred per cent with the President of the United States in this great offensive against depression. President Roosevelt asks shorter hours with no reductions in pay so that men may be employed without the purchasing power of the people being impaired. The entire nation is in agreement with him in the belief that if labor is returned to work at an equitable wage, the spending power of the state or nation necessarily will increase and prosperity be returned.

We would not be in step with the great leaders of the nation if we forced our state employees to work less time per week and at the same time took from them part of their earnings which now go for food, clothing and shelter for themselves and their children.

With kind thanks for your immediate cooperation and best personal regards, I am

Very sincerely yours

A handwritten signature in cursive script that reads "James Rolph, Jr.".

Governor

California Sixth in Highway Mileage

(Continued from page 1)

It accomplished the intention of equalizing the Secondary System between the northern and southern groups of counties whereby each group now has approximately 4900 miles.

In 1932 California was second among the States with about \$6,000,000 less than New York in total net receipts of gasoline tax and about 300,000 fewer automobiles and trucks. However, in motor vehicle receipts of \$4.76 per vehicle with a rank of 48th in the States; average gas receipts of \$18.32 with a rank of 39th among the States and average motor and gas receipts together of \$23.09 with a rank of 48th among the States, California now occupies sixth place in total number of miles in the State Highway System and fifteenth place in number of miles of all kinds of roads with a total of 76,964. This compares with Texas occupying first place with 188,539 miles and Rhode Island in last place with only 2739 miles.

The rapid increase in traffic on the highways of California is only second to the rapid growth of our cities and counties. This change during the past five years has developed so quickly that its recognition was the cause of adding mileage to the system and necessarily making radical changes in the legislation controlling the operation, maintenance and construction of our State highways and the activities of the California Highway Commission, Division of Highways and the Department of Public Works.

SUPPORTED LEGISLATION

In making these new laws the members of the State Legislature headed by Senator Arthur H. Breed, recognized as the "Father of Highway Legislation," had the support of the California Highway Commission, who first made the suggestion throughout the State in 1931, the Department of Public Works, the Automobile Club of Southern California, California State Automobile Association, Redwood Empire Association, California State Chamber of Commerce, California State Supervisorial Association, California League of Municipalities and other civic organizations.

In recognizing the fact that while centers of population effect and make necessary the development of highways we must not over-

look the influence of highways upon our governmental, social and community activities. Observance of this effect makes necessary a close study of many factors when considering the inclusion of a new route in our Secondary System.

It is not sufficient that consideration only be given to the relief to counties from high maintenance cost. The planning of a single highway route involves greater thought and effort than one who is not acquainted with the intricate details can realize. Any new route added to the present State system must qualify as follows: first, whether the traffic load demands relief upon the present system; second, is the traffic load on the present county road so great that maintenance costs are so high as to demand relief; third, interstate connections should at all times be provided that the systems of the States may be tied together.

NECESSARY CONSIDERATIONS

Following these basic requirements consideration must be given to the possibilities of the new route. What is its present use, and what are its future possibilities in the interests of trade and commerce? What are the opportunities for tie-in roads to protect land access and what are the possibilities for the best farm-to-market route for the transportation of commodities? What betterment is possible for general transportation so that it will handle to the best advantage through State traffic?

These are economic considerations but thought should also be given to the human factor that enters into highway construction. While modern commercial requirements for speed must be considered, comfort, convenience and safety are of paramount importance. The usefulness of the road which in a large part must be determined by past, present and future demands will control the costs, particular type, location and its eventual life but what are the possibilities for esthetic highway construction and marginal or roadside use? Can residential and commercial structures be controlled in the interests of roadside beautification?

Considerable thought must also be given the new route should its location extend through cities. Some municipalities are of



SIGNING THE NEW DEAL in highway development represented by the Breed Bill adding some 6800 miles to the secondary system. Standing, left to right, W. N. Frickstad, Berkeley; Mayor F. H. Heegler of Vallejo; H. J. Brunner, California State Automobile Association; Director Earl Lee Kelly; Supervisor J. E. Peyser, San Francisco; Supervisor W. O. Russell, Yolo County. Seated, left to right, Councilman G. W. C. Baker, Los Angeles; Senator Breed; Governor Rolph; Mayor Ament of Berkeley and Mayor F. W. Swanton of Santa Cruz.

the opinion that a State highway should follow their main business street. State highways are constructed fundamentally to handle through State traffic and while planning demands consideration be given local conditions yet the handling of through traffic is the big item.

CITY BODIES CONSULTED

Under the State law highways outside of municipalities can not be less than 80 feet in width. Traffic using a highway where a 30-foot pavement is necessary could not by any logical method or reasoning be dumped into a city where a 40-foot street exists.

While the California Highway Commission under the law can route the highway either through or around a city it has always given consideration to the wishes of the elective body of the city.

Reference was made in the early part of this article to necessary radical changes in the legislation that controls the operation of the Division of Highways. The new bill provides a highway fund in place of the general fund into which was placed money received from the Federal Government to be expended on the Federal Aid System and money received from other sources for special work, particularly from cities and counties; money

segregated into construction, reconstruction and maintenance.

The new law defines maintenance and limits expenditures. Maintenance includes the preservation and keeping of right of ways and each type of roadway, structure and facilities in the safe and usable condition to which it has been improved or constructed.

DISTRIBUTION OF FUNDS

For general administration of the Department of Public Works and the California Highway Commission there can not be spent an amount greater than that derived from one cent per gallon tax on motor vehicle fuel. Provision is also made for the Department of Public Works to spend one-quarter of one cent per gallon of fuel tax, after certain deductions have been made, within the incorporated cities based on population under four alternate methods. Under the bill a more intelligent distribution in the expenditure of the gasoline tax makes it possible for all sections of the State to have an equal opportunity to benefit from the results gained in developing our highway system.

Through a change in the division of the gasoline tax so that now funds can be equally divided between the primary and secondary roads with the privilege of drawing up to 50 per cent of the amount

(Continued on page 17)

Piers for Derricks Being Built in Bay

(Continued from page 2)

Francisco-Oakland Bay Bridge, that will rise from the edge of the city's water front.

Two "stiffleg" derricks have been purchased and set up on Pier 24 by Transbay Construction Company for the cofferdam operations.

These great structural steel derricks will drive the interlocking steel sheet piling which will form the wall of the 52 x 122-foot cofferdam.

HUGE CAISSON JOB

Transbay Construction Company are already preparing for their most interesting job—that of sinking the caissons for the deep water piers of the west bay crossing.

For the center anchorage, which we term **Pier No. 4**, Transbay Construction Company will build four semipermanent concrete caisson style piers to support stiffleg derricks to handle the job of sinking the great 92 x 197-foot caisson into an exact spot in the deep water of the west bay area for the concrete center anchorage.

For Pier No. 6, just west of Yerba Buena Island, heavy timber fenders are now being constructed on Pier 24 to protect the caisson from collision.

Barges will be anchored at the pier site carrying ballast weighing up to 100 tons, and on these barges are mounted "whirleys" for derricks which will operate clamshell dredges, dump buckets, and other devices for concrete pouring and excavating operations.

WORK FOR MINERS

The work on Yerba Buena Island is just now nearing the structural stage.

Clinton Construction Company will be driving piling on the west side of Yerba Buena Island any day now to build a small dock for the purpose of removing earth from the large bore tunnel.

Grouting, the process of forcing high quality cement under pressure into fissures or cracks in the rock of Yerba Buena Island above the tunnel to support the ceiling, will be started before the actual tunneling process.

Hard rock miners will be employed on the tunnel.

In the east bay, **Henry J. Kaiser, Incorporated**, who will supply ready-mixed



C. H. PURCELL

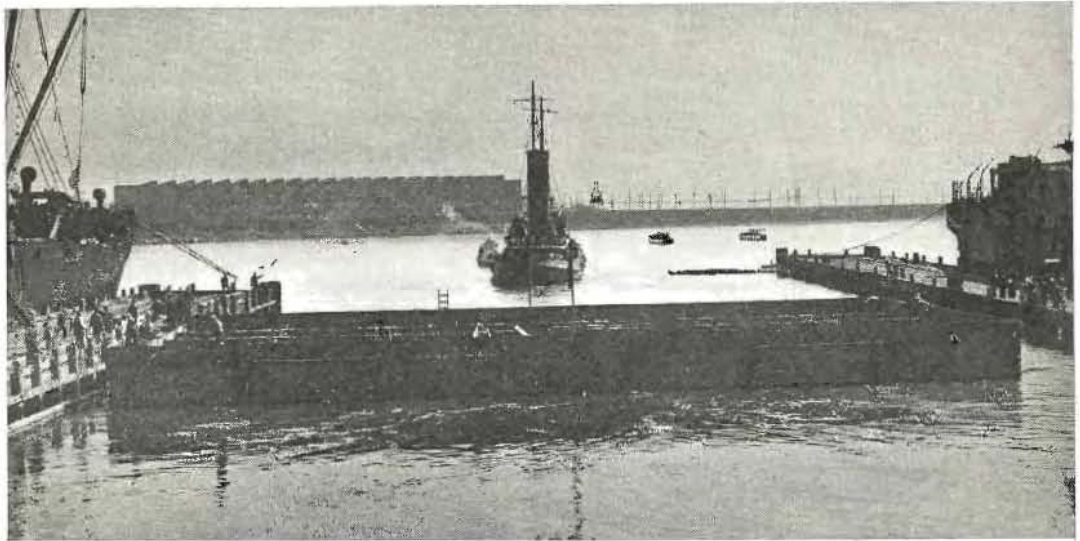
cement and aggregates to both the Transbay Construction Company, and Bridge Builders, Incorporated, contractors on the entire substructure of the bridge, is constructing a base of operations on Asiatic Wharf which will surpass any similar concrete mixing base built heretofore in California.

LAND PURCHASED

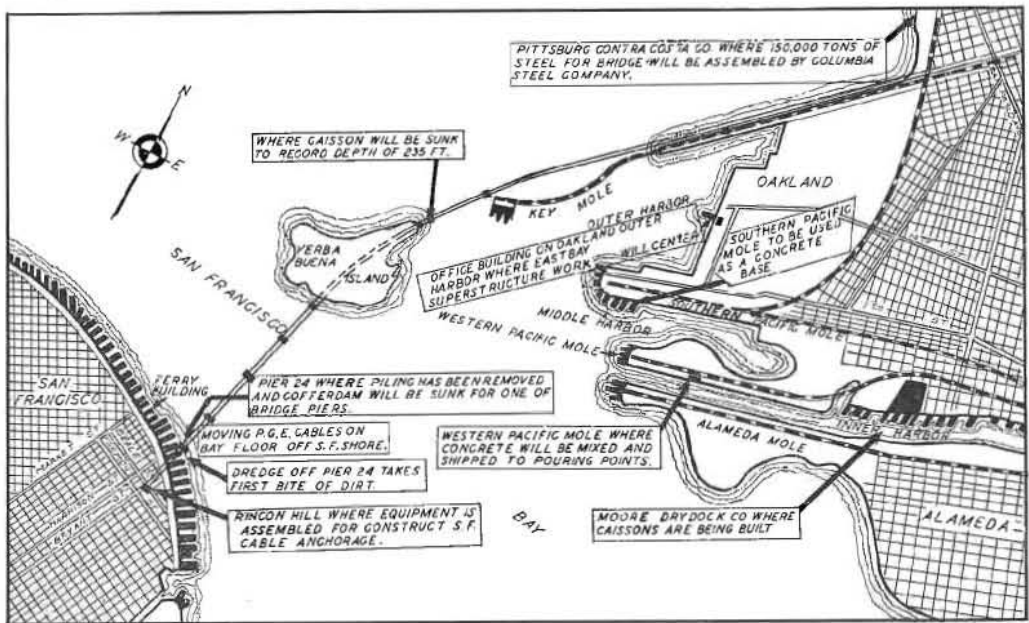
On Rincon Hill in San Francisco excavation is in progress, and the buildings have been wrecked for the San Francisco cable anchorage. This work is being done by Healy-Tibbitts Construction Company.

The first purchase of land by the State of California for the San Francisco-Oakland Bay Bridge was made on the site at Beale and Bryant streets within the past few weeks by our right of way agents.

Interesting work is also in progress at Moore Dry Docks in Alameda County on the steel cutting edges for the caissons of Piers 4 and 6. This construction is proceeding rapidly to hasten deep-water foundations.



FIRST LAUNCHING of a caisson cutting-edge for the Bay Bridge occurred July 26 when the great steel box was floated from Moore's Dry Dock and towed across the Bay to be prepared for sinking.



STRATEGIC POINTS at which fabricating and material plants have been located around the bay for bridge construction purposes are shown in this map. *Courtesy of Pacific Street and Road Builder.*

Probably 100 electric welders are now at work on these huge steel frames which have been compared in appearance to a one-dozen size egg crate with the bottom cut out.

One of these steel cutting edges, made buoyant by timber and compressed air tanks, was launched July 26 and towed across the bay to be turned over to the Transbay Con-

struction Company for the first pier work in the deep water on this bridge. The second will be launched this month.

SAND-HOGS BARRED

The great depth of our piers requires the caisson method of pouring concrete below water and eliminates the employment of "sand-hogs," or underwater pier workmen,

(Continued on page 26)

Main Line Railroad Crossings Eliminated by Two Structures

(Continued from page 4)

to allow industrial development and the necessary spur connections to be made between the railroad and highway.

Probably the most appreciated feature of the new route will be the freedom from main line railroad grade crossings. This will be accomplished by an overhead crossing of the Southern Pacific at the north end of the project near the Standard Oil tank farm, and a subway under the Minkler Spur of the Santa Fe. The result will be a route with no main line grade crossings and but one unimportant spur crossed at grade.

The route usually traveled at present requires the motorist to cross two dangerous main lines of several tracks and spur tracks at three other locations, all sources of delay and potential hazards to life. None of the existing highway route will be abandoned for public use but suitable connections will be provided so that a choice of routes will be available to traffic.

AN UNUSUAL FEATURE

The improvement is being made under two grading contracts, supervised by District VI, and four structure contracts, under the direction of the State Bridge Department. A feature of the project, somewhat unusual, is the construction of the bridges and box culverts before the roadway grading is done. This procedure was adopted to take advantage of the low water during the fall and early winter season and also to use excavated material from the structures to better advantage, thus avoiding excessive borrow. A portion of the material necessary for building embankments is to be secured by grading existing streets to meet the grade of the new highway.

The new Kern River Bridge, two smaller bridges and five box culverts are now practically complete. The large bridge is 2293 feet long, with a 40-foot roadway and two 4-foot sidewalks.

The entire route is to be paved 30 feet wide with asphaltic concrete. The more important street connections are to be paved by the State within the limits of the 110-foot right of way. This wide right of way, provided by the local Acquisition and Improvement Dis-

RESCUE BY HIGHWAY TRUCK IN A DESERT SAND STORM

Department of Public Works,
Division of Highways,
San Bernardino Office.

Gentlemen:

We wish to express our gratitude for service rendered by one of your employees, when we were returning from Boulder Dam.

A few miles east or north of Yermo we encountered a severe sand storm, in the midst of which our engine stalled. After our waiting about thirty minutes one of your trucks came along and towed us to a garage in Yermo.

We feel that only those who have been caught in a desert sand storm can fully appreciate such service as was rendered.

We learned at the above-mentioned garage that the name of our very pleasant and agreeable friend who refused remuneration for this service was Mr. Peacock.

We think the State of California is to be congratulated in having such men in the employ of the Highway Department, and we will be grateful if you will convey the contents of this note to Mr. Peacock.

Sincerely yours,

Mr. and Mrs. W. L. Larry.

trict, is ample for future widening and enlargement of highway capacity and avoids the congestion experienced on the present 60-foot right of way.

TO COST \$623,000

Through the functioning of its Planning Commission, Kern County will exercise control over the location of buildings along the route and road connections to the new highway. By the enforcement of a generous setback provision it will be unnecessary to utilize part of the State right of way for entrance drives.

The entire project, estimated to cost about \$693,000 is expected to be finished by May, 1934. This will be within the period estimated as required for the completion of the relocation and reconstruction of the highway between Los Angeles and Bakersfield including the Ridge Route alternate, which is expected to largely increase the traffic through Bakersfield by reason of the radical improvement in driving time and convenience over the mountain section of this route.

"You say that you are the sole support of a widowed mother, your father having recently been killed in an explosion. How did the explosion happen?"

"Mother says it was too much yeast, but Uncle Jim thinks it was too little sugar."—*Wisconsin Highways*.

Highway Projects Advanced to Bids

The following improvements, with a total cost of approximately \$521,700, were advertised during July or scheduled for advertising during August. The work includes four paving jobs, one bridge, and eight jobs involving miscellaneous improvements, with ten counties sharing in the benefits of the improvements. Bids have been opened on eight jobs with a total cost of \$335,427.34.

DETAILED LIST OF PROJECTS

County	Location	Miles	Type
*Los Angeles	Near Azusa	9.3	Oiled roadbed
*Calaveras	Westerly Boundary to Burson	6.5	Crushed rock surf.
*Marin-Sonoma	Ignacio to Fairville	10.0	Bit. surf.
*San Diego	Broadway to Harasthy St.	1.8	Pavement
*San Diego	Barnett Ave. to Balboa Ave.	4.4	Pavement
*Alameda	Mission San Jose to Warm Springs	1.9	Bit. surf.
*Los Angeles	Palomas Cr. to Whit-taker Ridge	6.8	Removing slides
*Los Angeles	Neenach School to Del Sur Road and Wet Canyon to Colby Cr.	25.7	Seal coat. Shoulder oiling
Ventura-Los Angeles	Ventura to Castaic Jct.	40.3	Seal coat on shoulders
Santa Barbara	At Elwood	0.9	Pavement
Los Angeles	Anaheim St. to Slate St.	0.8	Pavement
Inyo	Bishop to Owens R. Canal	3.5	Bit. tr. surf.
Madera	At Ash Slough		646' timber bridge

SUMMARY

	Miles	Cost
Permanent pavement.....	7.9	\$277,600
Bridges.....	(1)	38,000
Bituminous treated crushed rock surfacing.....	3.5	29,000
Untreated crushed rock surfacing.....	6.5	16,500
Miscellaneous.....	94.0	160,600
Total.....	111.9	\$521,700

NEW TOPOGRAPHIC SHEETS

The final topographic sheets covering Lancaster, Tierra Bonita, Saugus and Newhall quadrangles in Los Angeles County are now available. The survey work was done by the U. S. Geological Survey in cooperation with the county of Los Angeles. The field work was done in 1929 and 1930 and the maps were published on a scale of 1 to 24,000.

BRIDGE BENEFITS VENICE

The ancient, quaint island city of Venice has at last been linked by bridge with the mainland, giving convenient access to automobile travelers while preserving the individuality of the city. The bridge has also greatly aided the prosperity of the city by putting the ancient town in close touch with the modern part of Venice on the mainland.

Hospital Chief Says Improved Highway Has Ended Accidents

By A. D. GRIFFIN, Assistant Office Engineer

ON JUNE 18th I held an interesting conversation with Dr. B. B. Mason, who operates a hospital in Laguna Beach. Dr. Mason stated that since the new highway between Newport Beach and Dana Point had been graded 80 feet wide and paved with 30 feet of portland cement concrete upon new and improved alignment and grades, the serious accidents upon the State highway such as have occurred in the past have practically ceased.

Dr. Mason stated that in practically every case of serious accident on the State highway between Corona Del Mar and Dana Point, he would be called in as the other nearest hospitals are at Newport Beach, Santa Ana and San Clemente and that even if cases were taken to the other hospitals, he usually learned about them.

ONE HOSPITAL CLOSED

He stated that since the highway was first constructed at no time has he been without accident patients in his hospital until the present time, and that he understood that the San Clemente Hospital had been shut down largely because of decrease in their business due to State highway improvements.

When I pressed Dr. Mason for definite figures he stated as follows:

In an average year there would be 30 persons seriously injured in accidents upon the State highway between Corona Del Mar and Dana Point. By seriously injured, the doctor said he meant injuries which laid the victim up several months, often causing permanent crippling and where the bills for medical services and hospital care would run from \$700 to \$1,500.

In a year's time the doctor stated that the minor accidents which would require medical attention and lay up the person injured possibly as much as two or three weeks, would amount to approximately 100. From his knowledge of accidents that have occurred in the past, the doctor stated that the deaths from automobile accidents on the highway would run at least seven per year.

ACCIDENTS OBTIATED

He stated that probably the worst condition on the highway before final improvement was at Salt Creek, where, with considerable regularity, two deaths per year had occurred by reason of automobile accidents, with an increasing number of serious and minor injuries.

I questioned the doctor as to the effect of legalizing 4 per cent beer—whether he had noticed any increase in traffic accidents because of intoxication—and he stated that he believed that since the roadbed was now so wide that a slightly intoxicated driver had plenty of room in which to manipulate his vehicle, and also since other drivers had plenty of room in which to avoid accidents, the dangers to the traveling public from intoxicated drivers on this portion of the State highway between Corona Del Mar and Dana Point were entirely obviated.

There were 3,700,000 persons employed in the motor vehicle industry and allied lines last year in the United States.

In Memoriam

ALBURTUS ARIS HOPKINS, father of Harry A. Hopkins, Chairman of the California Highway Commission, died July 16, 1933, at his home in Los Angeles California, at the age of 86 years and 24 days.

He was born on a farm in what is now a part of Terre Haute, Indiana, June 22, 1847. At the age of thirteen years he enlisted as a bugler boy in the Union Army, but was taken out of the army by his father and sent to an uncle in Texas where he again enlisted in the United States Cavalry from Corsicana County, Texas. This was a short enlistment. He again enlisted at Springfield, Illinois, in the 152d Illinois Volunteer Infantry, under then Colonel Adlai Stevenson, who later became Vice President under Grover Cleveland. He served throughout the war, participating in some of the major engagements, as the Battle of Gettysburg, and Pea Ridge, where while on sentry duty, he was wounded by a rifle ball. He took part in Sherman's March to the Sea.

Following the war he served as a government scout under General Crook in the Southwestern Indian Wars, and was mentioned for bravery at the Battle of Ash Hollow, where, under showers of Indian arrows and rifle fire he succeeded in swimming the river and obtaining important information of the Indian strength.

As an early day prospector he had some success in wresting gold from California's mountains.

In the days of stages, he operated and drove stages between Los Angeles, San Diego, Santa Barbara and San Bernardino, San Luis Obispo and Bakersfield.

Of his marriage in Sutter County, California, to Elizabeth Schroeder, who preceded him hence on February 5, 1932, three children survive, being Benjamin F. Hopkins and Ray R. Hopkins of Los Angeles, who are engaged in business there, and Harry A. Hopkins of Taft and Sacramento.

He was an active member of the Odd Fellows, being one of the first members of America Lodge No. 325, and at the time of his death, its oldest member in point of age.

In addition to his three sons and their wives, he leaves three grandchildren, Inez M. Hopkins of Los Angeles, and Harry Hopkins, Jr., and Mrs. Zuvabelle Hopkins Fuller of Taft, as well as one great-grandchild, Lucille Hopkins of Taft.

SINGING VERSUS SNOOZING

Singing is one of various antisnoozing "recipes" suggested for drivers who are inclined to go to sleep at the wheel. "Pull off the highway and take a nap, sing as loudly as possible, or take a cool air tonic by holding the left arm out of the car window," is the advice given drowsy drivers.

The gasoline gauge, defines Robert, is the little "hickey" that points to "half full" when your motor wheezes and dies two miles from a gas station.—Mississippi Highways.

Highways Bring Benefits to Railroads

(Continued from page 11)

applicable to either type of highway in favor of one of the other types, the commission is enabled to expend money where need exists. In this connection there are many of our secondary highways that now exceed in importance some of our primary highways and should be developed.

Since 1927 the California Highway Commission has expended nearly \$4,000,000 on city streets in cooperation with the cities out of what was designated the cooperative fund. Nearly all the larger cities and many of the smaller ones have benefited through the use of this fund. Through the application of the one-quarter cent allocated to the cities they will have a freer hand in spending the money in that those cities that have the facilities can spend the money themselves in agreement with the Director of Public Works.

Besides providing for a unified highway system serving equally every part of the State it is said that the new method of operation should result in a saving to local taxpayers both urban and rural in an amount not less than \$7,000,000 annually, and make it possible to further tie together city streets, county roads and State highways in such a manner that their development can be more efficiently carried on.

GREATER USE OF HIGHWAYS

The development of an adequate highway system is brought about through the payment of the service fee on the part of those using the highways. This process of development has never harmed but has ever been the cause of great benefits. The present era in which we live is seeing a greater use of the highways in the United States in the interests of trade and commerce.

This is even so in the face of the effects of our ever changing economic conditions when the present cycle has a tendency to detract from the past conventional methods of transportation. History has repeatedly told the story, "From trail to road—road to rail—rail to highway," and in all this evolution highway transportation can not truthfully be accused of harming any other form of transportation. Even the railroads have benefited in this most modern development of our highway system.

According to J. L. Harrison, Senior Highway Engineer, Bureau of Public Roads, a total of 13,966 miles of pavement were built on the State highway systems of the nation as follows:

9664 miles of concrete pavements.
1161 miles of brick pavements.
749 miles bituminous concrete pavement.
1939 miles bituminous macadam pavement.
1453 miles water bound macadam pavement.

SOURCE OF REVENUE

All this was potentially a source of revenue freight on account of sand, stone, gravel, slag, asphalt base oils, and other materials used in constructing these surfaces. In addition to the above 16,801 miles of gravel and chert surfacing were laid and 3772 miles sand, clay or top soil surfaces. Normally these items do not yield much freight revenue, but drainage structures, bridges, etc., built in connection with these improvements yield a limited amount.

These items represent a total of 60,000,000 tons of aggregate of which 17,000,000 was sand.

A study of 375 Federal aid projects revealed that rails moved cement to 98 per cent of the projects, sand to 74 per cent, and other aggregates 72 per cent. In general 70 per cent of the aggregates used in highway construction during 1931 or 42,000,000 tons was moved by rail.

These facts are pertinent in view of the fact that during the period from 1928 to 1932, forty railroads with 22,417 miles of track and \$1,367,563,225 in bonds and stocks were placed in receivership. During the period from 1892 to 1896, 213 railroads with 56,403 miles of track and \$3,179,201,000 in bonds and stocks were placed in receivership and "there were no busses and trucks in the nineties."

Reference is made to the rails for the reason that the terms of allocation to highway departments of the States under the National Industrial Recovery Act mean so much to the railroads and transportation in having the provision whereby highways can be built to take the place of railroads under certain conditions.

Two New Highway Links Opened and Armory Dedicated at Pomona

By A. T. RICHARDSON, Secretary Pomona Chamber of Commerce Road Committee

TWO new sections of secondary State highways totaling more than 12 miles in length and built at a cost of \$572,566 were opened simultaneously July 15 when Governor James Rolph, Jr., officiated at ceremonies held just west of Pomona. Other State, Los Angeles County, Pomona and other city officials participated in the ceremonies which were followed by parades of automobiles over both routes into Pomona and another celebration at the new State armory and municipal patriotic hall.

The two new highways extend westward from the city limits of Pomona, one of them an entirely new route through the hills to Brea Canyon, and the other a realignment of the route through another range of hills to a point near Covina.

The first mentioned of these, known as an extension of Fifth Avenue in Pomona, is a link of State Highway No. 19. Many large fills and cuts, one of the latter being more than 100 feet deep, were involved in construction of this six and two-tenths miles of new highway. It lies almost entirely in the Puente hills and connects with the Brea Canyon secondary highway and also with the extension being built by Los Angeles County to link it eventually with metropolitan Los Angeles.

TWENTY-FOOT PAVEMENT

This new section of State highway No. 19 was built under a \$252,221 contract awarded by the State Department of Public Works. Paved with cement concrete 20 feet wide, with earth shoulders oiled, it was completed and opened to travel at the time of the ceremony July 15.

The other section of highway is six miles of the westerly extension of Holt Avenue, Pomona, past the W. K. Kellogg Institute of Animal Husbandry, a division of the University of California, and through the San Jose hills to Barranca Street, southeast of Covina. The former narrow, twisting hill road was realigned, involving a large amount of grading, and now carries traffic through the hills on easy grades and around curves of not less than 3000-foot radius. It has 30-foot cement

concrete pavement with earth shoulders and it, also, was built under State Department of Public Works contract for \$320,345. It was completed several weeks before the Fifth Avenue section.

It connects with Arroyo Avenue at Barranca Street. Four miles to the west on Arroyo Avenue is the start of another section of new State highway, now nearing completion, which will connect east of El Monte with Garvey Avenue, which extends into Los Angeles.

NEW ERA, SAYS GOVERNOR

Governor Rolph was the guest of honor and principal speaker at the highway opening ceremony held on the Holt Avenue route just west of Pomona and near the Kellogg Institute.

"These two new highways are evidences of progress," said the Governor. "They mean expenditure of money, employment of men, development.

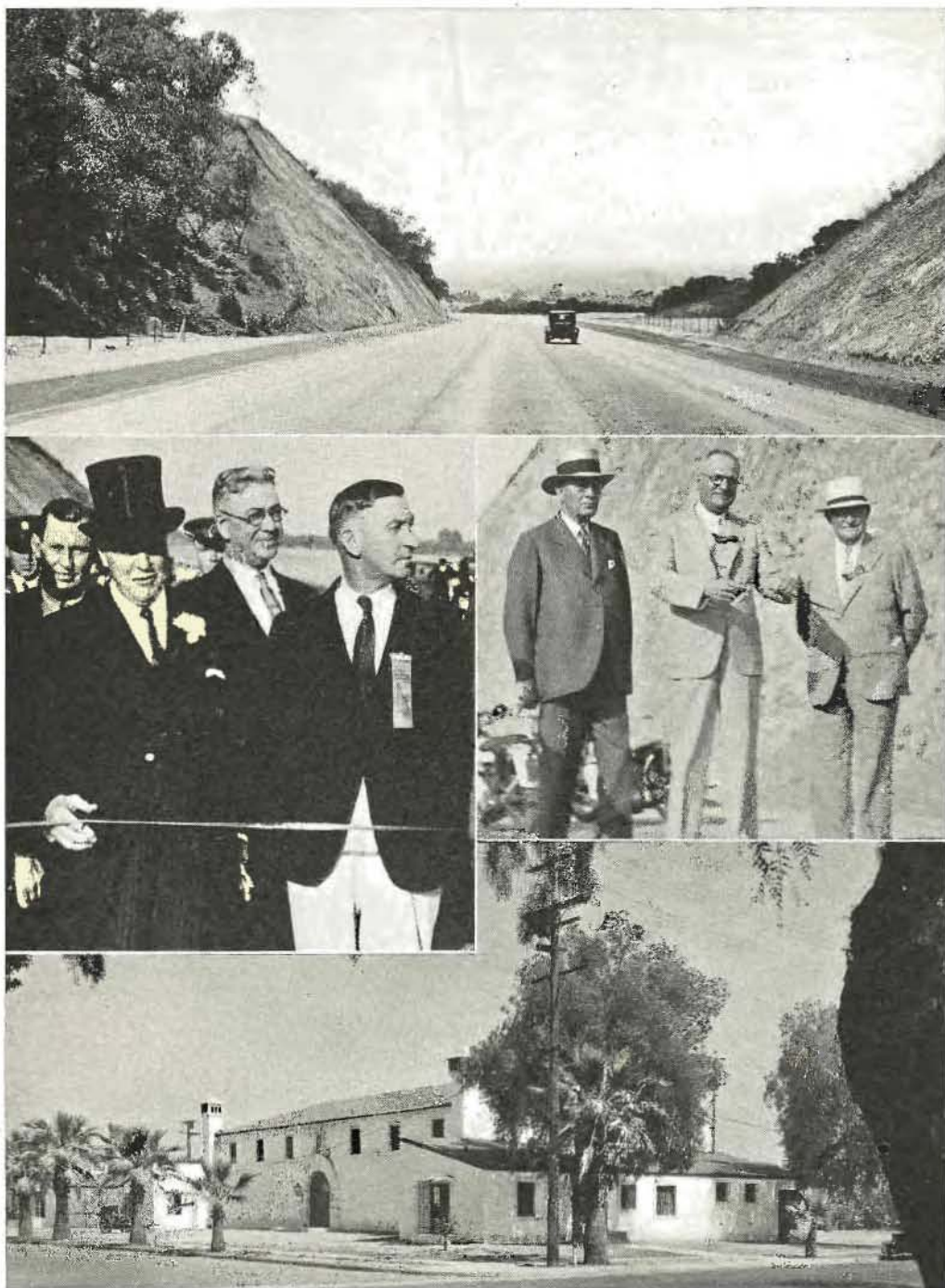
"You can see the tide has turned. We are coming into a new era and you can smile."

Governor Rolph stressed the importance of the two new links in the State Secondary Highway System in southern California in bringing communities closer together and relieving traffic congestion on existing State and county thoroughfares in that section of the State.

RIBBON BARRIERS CUT

At a signal, ribbons stretched across the two new highways were cut, the one across Holt Avenue by Governor Rolph and the other, across Fifth Avenue, several miles away, by Senator Nelson Edwards. Caravans of automobiles which had assembled on the new highways converged on Pomona, paraded through the city and to the new State armory, completed last winter for Company F, California National Guard, and the adjoining structure, Patriotic Hall, just completed by the city of Pomona, where Governor Rolph was given another enthusiastic welcome. He had been given a salute of 19 guns upon his arrival at the point on Holt Avenue

(Continued on page 29)



"THE TIDE HAS TURNED and these new highways are evidence of progress," declared Governor James Rolph, Jr., in dedicating two recently completed projects and an armory at Pomona July 15th. He referred to the extensions of Holt Avenue and Fifth Avenue westward from the city. At top—One of many big cuts on the Fifth Avenue extension, a link of State Highway 19. Left center—Governor Rolph cutting the Holt Avenue barrier surrounded by city and county officials. Right center—State Highway Commissioners Phillip A. Stanton at left and Frank A. Tetley at right assisting Senator Nelson T. Edwards in the official ceremony on the Fifth Avenue link. At bottom—New State Armory for Company F, California National Guard.

CALIFORNIA HIGHWAYS AND PUBLIC WORKS

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

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

EARL LES KELLY Director
JOHN W. HOWE Editor

Address communications to California Highways and Public Works, P. O. Box 1103, Sacramento, California.

Vol. 11 JULY-AUGUST Nos. 7-8

REDUCES TAXATION

Governor Rolph's signature on the 6800-mile highway bill means savings of millions to taxpayers on assessments in cities and levies in county territories that would ordinarily be paid for maintenance and improvement had these routes not been added to the State highway system.

Now such work on through city streets and connecting county roads added to the system will be paid for from the State highway fund.

In addition the bill provides that one-quarter of one cent out of the three cents tax collected in every gallon of gasoline will be used on main highways through incorporated cities. This is expected to prove of substantial benefit to the municipalities.

The law means also that the State now has a connected network of highways with no "dead ends." State highway mileage has increased from 7320 miles to approximately 13,920. This increased mileage will permit expenditure of highway funds where most needed, requiring also that at least one-quarter of a cent of gas tax money be spent in the maintenance and improvement of through State routes in cities.

It may be noted that the plan for increasing State mileage to provide for more efficient expenditure of funds by spreading them over the more heavily-traveled routes, to bring about an equality of secondary State highway mileage between the north and the south and to permit substantial, local and tax relief had the backing of nearly every county and city government and association.—*Van Nuys News*.

Recently published figures show that flying is decidedly cheaper than it was last year. Evidently the cost of going up is coming down.—*The Humorist*.

Building Executives Confer on Code for Recovery Act Plans

DECISION to formulate a series of codes of ethics and fair competition to regulate the construction and allied industries in every California city under the National Industrial Recovery Act, was reached at a recent meeting of building industry leaders, following a conference with State officials.

The codes are aimed to improve economic conditions in the various units of the construction industry, eliminate bid-peddling and other unfair practices, as well as regulate wage levels and hours of labor, and provide for the ethical conduct of the industry.

VARIOUS GROUPS AT WORK

With National codes for various units of the construction industry being formulated by President Roosevelt's recovery board, it was announced that state-wide, as well as regional codes would be drafted by each branch of the industry, these subordinate codes to be patterned after the National code finally approved by the government, and varying only as local conditions require.

These regional codes will be drafted by the industrial groups in their respective localities, and it was urged at the conference that organization meetings be held in each community by the various crafts and groups to expedite the drafting of codes.

Existing organizations, such as the Associated General Contractors, and the California State Builders Exchanges, are working on the problem, the former already having filed at Washington a proposed National or basic code.

ASSISTANCE PLEDGED

Colonel Carlos W. Huntington, State Registrar of Contractors and a member of Governor Rolph's cabinet, who sponsored the meeting pledged the cooperation of his department in aiding the industry in getting together and formulating a code. He said a skeleton code form would be drafted for the "sole purpose of aiding the various groups in the industry in this important undertaking."

The State Contractors License Act is based upon many of the principles which the President is seeking to establish as a means of stimulating employment and reviving industry, and may be used as a starting point in formulating the State code, it was announced.

Earthquake-Proof Buildings Possible With Right Construction and Materials

By C. H. KROMER, Principal Structural Engineer, Division of Architecture

A study and analysis, "made on the spot," of construction failures due to earthquake shock is presented in the following article by C. H. Kromer, Structural Engineer of the Department of Architecture. As the result of such studies there has been enacted a new State law governing building construction that will make future structure failure and hazard to life exceedingly remote.

AN EARTHQUAKE is a perfectly natural phenomena—just as natural as rainfall, or erosion, or as any of the other marvelous impelling forces that are continuously at work building up, leveling, and equalizing. Earthquakes vary from such slight tremors



C. H. KROMER

as to be hardly perceptible up to the most severe shocks and accompanying destruction. Nor are they exclusively confined to any particular areas. The general impression that they occur in only a few parts of the United States or that severity of damage from them is confined to California is quite erroneous, since there is probably no area where an earthquake has not at some time been experienced or where it may possibly be felt.

Severe earthquakes have been recorded in the St. Lawrence Valley, in various parts of New England, near New York City, in the Appalachian region from North Carolina to Alabama in the great Mississippi Valley region and many western states. The earthquake of 1811 centering near New Madrid, Missouri, was felt over two-thirds ($\frac{2}{3}$) of the area of the United States.

Earthquake history in California dates back to 1750, or one hundred and eighty-three years. More complete records, however, kept for the northern than for the southern part of the State.

In spite of the gaps in technical knowledge regarding the action of an earthquake shock upon a structure, much progress has

been made and it is possible to so design a structure that it will not fail from shock provided that the structural designer can control the shape and distribution of mass for the various units of the building and provided that the assumed earthquake acceleration is not exceeded.

It is, however, not possible to design a monolithic structure containing various units within itself with different periods of vibration and moments of inertia, especially where the units or elements of the structure form angles with one another so that there will be no crackage at the corners where the two units come together or for example, local failure of relatively low walls connecting with a high massive structure.

The action of an earthquake is that of an oscillating force applied at the base of the structure. The mass and inertia of the structure tend to resist this force. Every structure has a natural vibration period of its own which generally does not coincide with the period of the earthquake.

The earthquake of March 10th in southern California afforded engineers an excellent opportunity to study the various types of construction with relation to their earthquake resistive properties and to analyze the part that improper design and poor or shoddy construction had in the catastrophe.

My observation convinced me that where buildings were properly designed and constructed, using good materials and where competent conscientious workmanship was furnished, that modern American construction stood the test and that buildings as well as bridges and other structures were generally intact but that where the materials entering into the structure were inferior in character and the workmanship shoddy or indifferent or where established principles of good design were violated the structures

(Continued on page 22)

Class "A" Steel Buildings Resist Shock

(Continued from page 21)

were shattered and rendered dangerously unsafe and in all too numerous cases thrown down to the ground.

WITHSTOOD SHOCK

Class "A" buildings of steel frame construction were generally found to be structurally intact except for cracked plaster or tile partitions or for brick tile and filler walls.

These buildings being of more pretentious construction, with heavy foundation loads, and of a type of construction regarding which neither owner nor architect were willing to take a chance, necessitated the employment of engineers in their design and of more or less continuous inspection during their construction. As a result they successfully withstood severe earthquake shock while the smaller and simpler types of construction, not having the benefit of this technical supervision, failed.

Class "B" buildings of reinforced concrete construction were properly designed and where the concrete was of good grade, were left in as equally safe condition.

Violations of design, however, were all too prevalent such as lack of lateral bracing or of stiffening walls or struts, lack of knee braces or rigid connections at truss seats or at connections of beams to columns, wall sections too thin or improperly reinforced and with lack of buttresses combined with excessive openings for thickness of wall without compensating provisions.

Cement mortar gave a very good account of itself but was generally lacking. In this connection, two buildings that stood adjacent in a city street were observed. Both were of Class "C" or brick wall and wood floor joist construction. The one, a bank building, with brick walls laid up in very inferior mortar with an almost entire lack of ties had both the front and rear walls badly shattered with portions of these walls down.

Brick work for the other building alongside was laid up in a good grade of cement mortar and, although the roof covering immediately adjacent to the other building had been injured by falling brick from the first building, was practically intact and entirely without crackage of brick work.

POOR MORTAR RESPONSIBLE

Masonry buildings suffered the most from the effects of the shock and it was their failure that occasioned the principal loss of life. Damage was mostly confined to those built of a poor quality of lime mortar or of inferior and shoddy workmanship, and those which took no account of lateral forces in their design or in provisions for bonding and anchoring.

The mortar for all too many of these buildings appeared to be merely dry powder, even lacking properly slaked lime and when cement had been added, the mortar had the appearance of merely being tempered with cement. Header courses were conspicuous by their absence and when provided, were from seven to eight courses apart. Poor mortar, insufficient bonding and the absence of the necessary anchors, contributed in major part to the many failures.

Even when the masonry walls were fairly well

built, they were often battered down by the interior wooden frame, due to the fact that the walls were not properly tied and anchored to the framing. When concrete reinforced bond stone was built continuous around the building at the top of each story height and properly proportioned the masonry was generally intact.

BAD MASONRY WORK

By far the larger number of school buildings were constructed with masonry walls, large inside areas with high walls, as well as with extensive window openings, and with numerous parapets and architectural ornaments. They suffered serious damage not only because of inadequate provision for lateral stresses but in an important degree because of utter lack of competent or efficient workmanship. On the other hand, many masonry walls would have much better withstood the shock if advantage had been taken of cross stud walls by bolting them to the main brick wall, thereby providing lateral support.

Parapet or fire walls were undoubtedly the weakest and most dangerous element of building construction. They should hereafter be entirely eliminated but where architectural requirements control or where they are required by the Board of Fire Underwriters or by local ordinances, they should be so designed and reinforced that they will stay in place during an earthquake.

Face brick and brick veneer on wood studs gave a very bad account of itself due to the lack of ties and header courses. Even where the brick facing was secured to the backing by the customary metal ties, not only did the facing usually fall away from the backing but, in many incidences, the backing also failed. Ordinary brick veneer failures were quite common. On the other hand properly constructed veneering in numerous cases went through the shock without a dislodged brick. I am convinced that this type of construction can be built to stand up under shock only by making the facing integral with the main masonry wall by providing header courses at frequent intervals, or by using more rigid ties closely spaced for brick against wood sheathing and studs.

FELL BY TONS

Face brick fell into the streets by the ton and in other cases was left dangerously buckled. On the other hand, tooth bond in brick work showed failure in every case observed by splitting open at the vertical joint and slipping along the horizontal joint. Walls were observed where this joint slipped and opened three inches or more.

Where joint anchors were not provided or where walls were completely thrown down above the plate line, the joists of floors and roofs slipped off and dropped to the ground or to the floor below or were left supported dangerously close to the edge of the wall.

Steel beams set loosely on top of brick piers or wall corners constituted a very grave menace. These beams should never be thus placed without providing proper lateral support, tying back or anchoring to properly constructed and designed piers.

General Failure of Brick and Hollow Walls Encountered

(Continued from preceding page)

Hollow walls whether of brick or tile proved very unsatisfactory and in general were shattered. Interior walls of the better constructed buildings observed were in major part of tile—both terra cotta and gypsum. The speaker failed to find a single case where they were not cracked and in many cases badly shattered. Brick parapet walls, as well as brick chimneys, were universally thrown down. As a matter of fact all brittle material whether brick, tile, poor concrete or plaster suffered greatly. For the latter material, walls and ceilings were in many cases literally stripped clean to the lath and piled up on the floor. This, of course, was undoubtedly due to lack of keying of mortar to lath, again denoting the lack of good workmanship.

Even for Class "A" construction, the tile walls were badly cracked and in some cases failed locally. It was considerable of a surprise to find that even the exterior reinforced panel brick walls were cracked in numerous places although not seriously yet these buildings except for interior partitions and plaster were not otherwise injured.

HOW BRICK FAILED

Failure of brick walls was generally of the following character:

1. By diagonal crackage or fissures running from near the ground especially in the vicinity of stairways at an angle of about 45° starting at the corners and extending more or less diagonally up to the top of the wall. Buildings were still standing where the fracture was found to be from 1" to 3" in width. This diagonal crackage also occurred at corners of wall openings and was also found to have started at higher levels where the wall was unsupported laterally; for example at about the elevation of the store front spandrel beams.
2. Frequently, especially for the higher buildings of concrete as well as for the brick structures, "X" crackage occurred in the mullions or piers between windows. Another similar phenomena observed—and this was quite typical for the Ocean Center Building, a reinforced concrete structure fourteen stories in height—was in the fissuring of the spandrel between the head of the window for the story below and the sill of the window above.
3. Failure by horizontal slippage of one masonry course on the other, often in a number of different planes for the height of the building. This was frequently accompanied with buckling of the wall and was often severe enough to have caused collapse.
4. Failure by buckling of the wall, due no doubt to alternating points of resistance and weakness in the wall length. As a matter of fact this buckling occurred in both horizontal and vertical planes.
5. Throwing down of parapet walls and chimneys as before mentioned.
6. Failure of brick piers either by shattering, horizontal movement or buckling.
7. General shattering of the masonry.

No building restriction that does not take into account the lateral force (or acceleration) that acts

CITIES SEND THANKS FOR EARTHQUAKE REPAIR AID

The following letters from the cities of Compton and Bell are typical of many received expressing appreciation of the relief extended by the Division of Highways.

CITY OF COMPTON
California

June 23, 1933.

Division of Highways,
Department of Public Works.

Gentlemen:

Your letter of June 21st, addressed to Mr. Dickison, enclosing warrant No. D-22043 in the sum of \$5,308.60, has been received.

I take this opportunity of conveying to you our sincere appreciation of your efforts in this matter. The City of Compton was faced with a very serious financial situation regarding repair of earthquake damage, and with the help received from the Division of Highways we are able to take care of the situation very nicely.

Thanking you for your cooperation, I am

Yours very truly,

J. H. PARK,
City Manager.

CITY OF BELL
California

June 29, 1933.

Division of Highways,
Department of Public Works.

Gentlemen:

The City of Bell extends to you their thanks and hearty appreciation for your cooperation in the adjustment of finances, which adjustment was necessary in view of the recent earthquake.

Your warrant No. E-23068, in the amount of \$735.00, was duly received, and we thank you in addition for the early remittance that made it possible for us to include the same in our annual report as of June 30.

Yours Truly,

E. P. FOLSOM,
City Clerk.

against the structure due to the earth waves that are set up by the initial slippage of the earth will be of avail. It should, therefore, be mandatory that all structures be made earthquake resistive by designing them to withstand a definitely specified lateral force, this force to be dependent upon the character of the foundation soil and upon the height and type of the building.

The problem is complicated by the difficulty of making a rational determination of this force especially in the case of a high building since even more than in the case of a low or so-called rigid construction the structure will rock back and forth during the earthquake motion. Thus the upper portion of the structure does not move with the ground and its acceleration is unknown, so that the forces acting upon it can not be definitely computed. The problem is further complicated owing to the stress

(Continued on page 32)

Bayshore Highway Now Presents a 35 mile Ribbon of 40 foot Pavement

By JNO. H. SKEGGS, District Engineer

THE Division of Highways recently completed another link in the Bayshore Highway leading past the U. S. Naval Dirigible Base near Sunnyvale. The long vision of civic and county leaders is now realized in the completion of this section of the Bayshore Highway, which, with the magnificent Naval Air Base alongside, stands as one of the great monuments to the advancement of the Bay Region.

This newly opened section of the bayshore improvement was accepted by the State June 12th. It extends from Oregon Avenue in Palo Alto to Lawrence Station Road, eight and two-tenths miles (8.2) almost as the crow flies with 40 feet of pavement. The new pavement is bedded on a base course of gravel a foot thick. Oil treated gravel shoulders 10 feet wide provide an overall roadway 60 feet wide.

Such is this latest completed section of the great Bayshore Highway, which now reaches from the heart of San Francisco to many connecting roads in Santa Clara County.

HIGH TYPE SURFACING

From the San Francisco County line to the extremity of this new unit, the distance is 35.08 miles, all of which has been provided with high type surfacing including a small section of three miles at South San Francisco finished and opened July 13.

Structurally the new pavement of Portland cement concrete is placed in two 20-foot lanes; in design, each 20-foot lane is in two 10-foot slabs. As far south as Charleston Road, between Palo Alto and Mountain View, the pavement slabs are 9 inches in thickness for the middle 6 feet, increasing to 11 inches at the edges.

From Charleston Road to Lawrence Station Road, pavement is 8 inches through the middle 6 feet of each slab, thickening to 10 inches at the edges. Of the 8-10 inch pavement, that portion from Whisman Road to Lawrence Station Road has welded wire-mesh type of reinforcement, and the balance of Portland cement concrete has the steel bar type of reinforcement.

On the 8.2 miles of Bayshore Highway

south of Palo Alto, the contractor placed concrete at a rate of approximately 100 cubic yards in finished pavement each hour. On a six-hour day basis, this output produced a section of pavement 20 feet wide, 1033 feet long. This represents an efficiency improvement of about 500 per cent over similar work of 10 or 12 years ago.

At the same time, the present high standard pavement, of which this section is typical, is uniform in character; almost perfectly smooth in surface; and averages nearly 5000 pounds per square inch for compressive strength.

Withal, this high class pavement has been placed with a cost to the State of \$5.90 per cubic yard.

The quality of California State Highway pavement has been improving constantly from year to year, and the cost of its production has steadily declined. This is due primarily to the high development of road building technique growing out of scientific studies and methods of work fostered by the State and carried out by those executing the work under precise specifications. This progression, in turn, is chiefly due to the constant and orderly support of trained State forces and contractors' organizations.

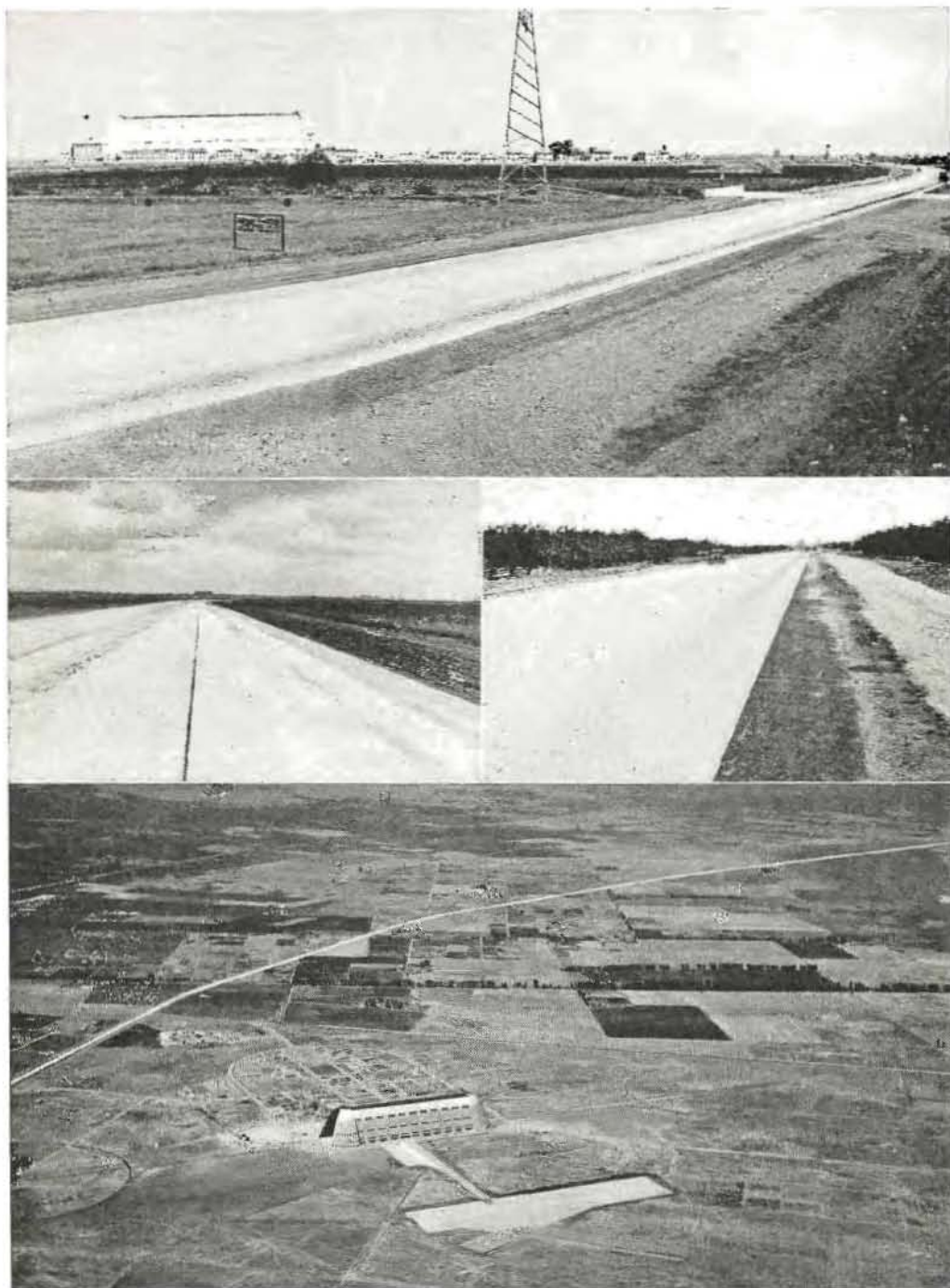
SALIENT FEATURES

Outstanding features of the Bayshore Highway are:

1. Its 125-foot right of way, which guarantees freedom from encroachment.
2. Direct alignment in which curvature is practically negligible.
3. Grades nearly level.
4. Location tributary to and bordering communities whose growth it will serve completely.

These features apply to all of the Bayshore location. This new section, however, has over a mile of frontage along the great Naval Air Base at Sunnyvale, and lies generally on ground high enough for desirable home sites. In all probability, adjacent large holdings will subdivide for homes and small business, as in the case of sections between Redwood City and Palo Alto.

(Continued on page 25)



SPEEDING TRAFFIC on its way to and from the heart of San Francisco along the bay side of the Peninsula, the Bayshore Highway has been lengthened by another link of fine wide concrete pavement extending 82 miles south from Sunnyvale Air Base. At top—Panorama showing the highway and the Navy's great dirigible hangar and airbase city in the background. In center—Typical sections of the four-lane pavement leading past fields and orchards. At bottom—A striking airview that depicts the highway stretching like a long white ribbon across the country past airbase and hangar in the foreground.

Bayshore Highway Aiding in Developing Community Growth

(Continued from page 24)

The general conditions are such that this great arterial will, on the one hand, promote an orderly expansion of community development, and on the other hand remain free from those hampering restrictions which such growth often imposes upon the functions of a trunk-line highway.

Many interesting construction details were carried out in building the high type pavement from the Embarcadero at Palo Alto to Lawrence Station Road. The fact that this entire section was over new rights of way, where soil conditions were not of the best, required careful analysis of materials. A gravel pit was secured, from which most excellent sub-base material was obtained, and a blanket of this material was placed over the marshy ground and adverse adobe soils.

To those who are familiar with the topography and general appearance of this section of the Peninsula, a trip over this splendid new highway brings a thrill of surprise, if not bewilderment.

OPENS NEW VISION

Where a few months ago was grazing land, a magic city now stands—the Naval Air Base of the Pacific Coast. The enormous hangar can be seen for many miles in all directions, and even from San Francisco on a clear day. Adjacent marsh lands and bare grain fields have been transformed into a city of administration buildings, barracks, huge helium gas containers, power plants, machine shops, and scores of other buildings—like another Boulder City grown up over night.

Wonderful and continuous growth for this favored region is no extravagant vision when one sees the transformation already made and under way. In addition, construction of this latest Bayshore section, 8.2 miles long, has provided substantial relief for the burden of unemployment, and has made great advancement toward complete realization of the major objectives of this notable highway.

INVISIBLE

Swave Auto Salesman: It runs so smoothly you can't feel it, so quietly you can't hear it, has such perfect ignition you can't smell it, and as for speed—you can't see it.

Londoner: My word! How do you know the bally thing is there?—*Motor Land*.

Board of Architects Designing Concrete Masses of Bridge

(Continued from page 13)

which is the most hazardous occupation in connection with bridge building.

An important feature of our work is the unification of our designs of huge concrete masses by the Board of Architects, consisting of Timothy L. Pflueger, Arthur Brown, Jr., and John J. Donovan.

The treatment which these architects are designing for the large blocks of concrete that will be visible above water and on land will make this bridge a thing of beauty to the residents of the bay region and those passing over the bridge.

We expect to announce in the near future the designs for these concrete masses.

TOWERS RISE IN 1934

Foundation work will occupy the balance of the year 1933 on this bridge with the exception of the island and anchorage work.

Early in 1934 steel construction on the first towers will be visible on the bay.

These towers will be completed in 1934 and the tremendously interesting task of spinning the cables will begin in 1935 and occupy all of that year until early in 1936.

By the middle of 1936 we estimate all the steel work to be completed, and by January 1, 1937, we expect to have the roadways laid and the bridge ready to be turned over to the California Toll Bridge Authority and opened to the public.

HIGHWAYS

Our State Highway Department has built some of the finest and most scenic highways in the world, and it should be encouraged in every possible manner. Roadways that the people dream of some day having in the middle west, our experts have built here. As little of their money as possible should be diverted away from them.

In Wisconsin they are proud of a mile or two of lakeshore highway at Milwaukee, while here in California we have miles of Pacific coast highway, especially near Santa Monica, Monterey and Santa Cruz. What other people dream of we have already accomplished out here.—*Hayward Review*.



Reductions of budget appropriations have materially affected the activities of this department according to the report of State Engineer Edward Hyatt for July. Co-operative snow surveys have been discontinued and all field and office work under the Sacramento-San Joaquin water supervisor was suspended July 1. Salinity is appearing at lower delta points owing to the decreasing flow of the Sacramento River.

Increasing activity is reported in the financial affairs of the irrigation districts. One district has completed purchase of a private utility system and is able to provide all its own service. Two other districts have perfected plans for refunding over two million dollars worth of outstanding bonds.

Details of dam construction, water distribution and other activities are given in the report as follows:

IRRIGATION DISTRICTS

A digest was prepared of some forty laws, affecting the California irrigation district and similar acts, passed by the 50th session of the Legislature prior to the June recess and approved by the Governor. Increased activity, especially in relation to the financial affairs of irrigation districts, has occupied the attention of the office during the past month.

In connection with information on various matters required by the districts Securities Commission and this office, the following districts were visited: East Contra Costa and Byron-Bethany irrigation districts, East Contra Costa County; Banta-Carbona and Woodbridge irrigation districts, San Joaquin County; West Stanislaus irrigation district, Stanislaus County; Paradise irrigation district, Butte County; Pacheco water district, San Benito County.

The Nevada irrigation district completed the purchase of the Gold Hill system in Placer County from the Pacific Gas and Electric Company and is operating the same. By the acquisition of this system the district is enabled to serve all of its land through its own works.

Plans for refunding the outstanding bonds of the East Contra Costa irrigation district were approved by the commission. The amount involved is \$1,153,000.

The refunding issue of the West Stanislaus irrigation District amounting to \$1,160,000 was approved for certification.

An agreement between the Lindsay-Strathmore and Tulare irrigation districts, Tulare County, stipulating as to water right matters which have been in litigation for many years was approved by the commission.

At request of the directors of the Beaumont irrigation district, Riverside County, an order by the commission consenting to the purchase of water bearing lands and rights was rescinded.

FLOOD CONTROL AND RECLAMATION

Maintenance of Sacramento Flood Control Project.

Routine maintenance has been performed during this period on levees, structures, drains and equipment. Repairs have been completed in the Parks bridge in the Sutter By-pass.

On the East Sutter By-pass levee squirrel and gopher poison is being put out. The operation of the four small pumping plants has been continued for the irrigation of willows planted for levee protection.

Emergency Flood Protection and Rectification of Rivers.

The camp near Lompoc operated by this Division in cooperation with Santa Barbara County as an unemployment relief project, for the clearing of the channel of the Santa Ynez River, has continued with an average crew of twenty-two men.

Arrangements have been completed for additional bank protection work on the Kelly estate on the Mad River in Humboldt County, to cost \$1,000, and for similar work on the John E. Kane ranch, to cost \$600.

Sacramento Flood Control Project—Construction.

This Division has been requested by the Reclamation Board to construct a water controlling weir in the East Intercepting Canal at Snake River, to cost \$2,675.

Russian River Jetty.

The sum of \$10,000 has been appropriated for additional work on the jetty at the mouth of the Russian River near Jenner, and this sum will be used in the late summer and fall to place additional rock in the jetty. The jetty is in good condition, showing no damage by storms during this period. A small crew has just completed tightening up the cable stays and other parts on the trestle structure.

WATER RIGHTS

Supervision of Appropriation of Water.

Thirty-four applications to appropriate water were received during the month of June, 12 were denied and 17 were approved. During the month 2 permits were revoked and 7 passed to license.

(Continued on page 28)

Snow Survey Activities Discontinued

(Continued from page 27)

Among the permits issued was one to the East Bay Municipal Utility District involving the appropriation of 750 cubic feet per second and 25,000 acre feet per annum on Mokelumne River at Middle Bar Reservoir site for power purposes at an estimated cost of \$800,000.

Mining continues to predominate as the major purpose for which appropriations are being made. During the six month period just closed 60 per cent of the applications received and acted upon were for mining purposes and if there be excepted three or four unusually large appropriations made and permits issued for irrigation and power purposes the amounts appropriated and allowed for mining purposes exceeded the combined appropriations for all other purposes.

ADJUDICATIONS

Shasta River (Siskiyou County). Action by the court on the motion to tax costs is pending the submission of briefs as ordered at the hearing held before the Superior Court at Yreka on April 21, 1933. The time for filing the reply briefs was extended to August 15.

Whitewater River (San Bernardino and Riverside Counties). Case pending in the Superior Court of Riverside County awaiting developments in regard to the proposed All American Canal from Colorado River.

Eagle Creek (Modoc County). The waters of Eagle Creek were distributed throughout the month in accordance with a schedule of allotments adopted by the water users for the 1933 irrigation season.

South Fork Pit River (Modoc County)—The schedule of allotments adopted by the water users for trial distribution during the 1933 irrigation season was administered by a water master throughout the month.

Deep Creek (Modoc County). The Division's report as referee has been prepared and a proposed decree has been submitted to the attorneys representing the parties in the action.

Franklin Creek (Modoc County). The Division's report as referee and a proposed decree have been prepared. The proposed decree has been submitted to counsel representing the parties involved in the case and no objections have been made within the 30-day period allowed by law.

Pine Creek in Surprise Valley (Modoc County). The waters of Pine Creek in Surprise Valley were distributed throughout the month in accordance with the plan for trial distribution adopted for the 1933 irrigation season.

Cottonwood Creek (Modoc County). The schedule of allotments adopted by the water users for trial distribution during the 1933 irrigation season was administered by a water master throughout the month.

Cedar, Davis, Deep, Emerson, Franklin, Mill, New Pine, Pine, Cottonwood, Owl and Soldier Creeks and South Fork of Pit River (Modoc County). Water master service on these streams was continued throughout the month.

Pit River in Big Valley (Modoc and Lassen Counties). Supervision of diversions from Pit River in Big Valley was continued throughout the month.

Hat, Burney, North Cow, Oak Run and Clover Creeks (Shasta County). Water master service on these streams was continued throughout the month.

SACRAMENTO-SAN JOAQUIN WATER SUPERVISOR

Due to the fact that no provision was made in the Budget for continuation of this work, all field and office activity was practically suspended on July 1st. However, regular salinity sampling in the Delta, the maintenance of Delta tide gages and the maintenance of water stage recorders on return flow measurements in the San Joaquin Valley have been continued in order to obviate a break in the records in the event that an appropriation is made available during the recessed session.

The report of all data and records for the 1932 season has been completed and is being sent out.

Within the past month the flow of the Sacramento River at Sacramento has dropped very rapidly and is now about 3000 second feet and still dropping. Salinity has begun to advance rapidly in upper Suisun Bay and is appearing in channels at the lower point of the Delta. Present stream flow and salinity conditions compare closely with those of 1929. A comparison of the salinity at upper bay and Delta stations on July 6th of this year with that on the same date in 1929, 1931 and 1932 is shown in the following table:

Salinity on July 6th at Upper Bay and Delta Stations in Parts of Chlorine Per 100,000

Stations	1929	1931	1932	1933
Point Orient	1680	1770	1180	1560
Bullshead	1030	1370	280	780
Bay Point	880	---	24	230
O and A Ferry	442	870	3	214
Collinsville	152	600	1	59
Antioch	104	540	1	57
Emmaton	20	365	1	5
Jersey	10	325	1	9

CALIFORNIA COOPERATIVE SNOW SURVEY

Activity under this project was discontinued on July 1st as no provision was made in the Budget for its continuation. Under the possibility that a small appropriation may be made available to continue the most important features of this work much of the equipment has been left with cooperating agencies and final arrangements with these agencies for complete discontinuance of the work have been held up until it is certain that no further funds will be available.

DAMS

To date there have been received 820 applications for approval of dams built prior to August 14, 1929, of which 600 are now under jurisdiction; 116 appli-

Two New Highway Links Opened and Armory Dedicated

(Continued from page 18)

where he severed the ribbon opening the new route.

Governor Rolph officiated and was the principal speaker at the ceremonies dedicating the new buildings. Clyde E. Houston, president of the Los Angeles County Fair at Pomona, introduced S. V. Cortelyou, State highway engineer, who spoke on the history of Fifth Avenue and what it will mean to the public when extended on into Los Angeles.

OTHER SPEAKERS

Other speakers included Mayor Chauncey C. Perrin, of Pomona; Supervisor Hugh A. Thatcher, Los Angeles County; A. E. Williamson, of the county regional planning commission; P. A. Stanton, Orange County, and Frank A. Tetley, Riverside, State highway commissioners, and others.

Among guests introduced were officials of cities and counties in the vicinity, chamber of commerce representatives and other civic leaders, National Guard officers, and various others.

A dinner and a ball, in which Governor Rolph led the grand march, concluded the festivities.

Law Will Regulate Advertising Signs Along Highways

(Continued from page 7)

Signs and structures prohibited—outside unincorporated areas.

(a) If within 300 feet of intersections.

(b) If obstructing a clear view of approaching vehicles for a distance of 500 feet along the highway.

MISCELLANEOUS PROVISIONS

The law further provides for certain information to be furnished by all applicants for licenses or permits, on forms to be supplied by the Director of the Department of Public Works. No advertising structure or sign may be erected or maintained unless the permission of the owner or lessee of the property upon which the structure or sign is to be located has first been obtained.

The act becomes a law of the State of California on August 21, 1933, and all persons, firms, or corporations coming within the scope of the act must comply with its terms.

Section 16 of the act provides that six months after the effective date of the act, all structures and signs in unincorporated areas of the State of California which have not complied with the terms of the law, become a public nuisance and are to be torn down or removed from the highways.

MAPPING COMPLETED FOR THREE QUADRANGLES

(Continued from preceding page)

cations have been received for approval of plans for construction or enlargement and 384 for approval of plans for repair, alteration or removal.

Twenty-three dams are under construction or enlargement, and 107 are under repair or alteration. Certificates of approval of 580 dams have been issued to date.

Application Received for Construction.

Dam	Owner	County
Desilting Basin No. 6	Cucamonga Basin Protective Association	San Bernardino

Desilting Basin No. 6 Dam is to be an earth and rock fill dam to provide for spreading of flood waters. The State is participating in the costs.

Application Received for Alteration.

Dam	Owner	County
San Andreas	City and County of San Francisco	San Mateo

Plans Approved for Alteration.

Dam	Owner	County
Kincaid	Pacific Gas and Electric Co.	Tuolumne
San Andreas	City and County of San Francisco	San Mateo

TOPOGRAPHIC MAPPING

During the month of June the Sonoma quadrangle in Sonoma County and the Cucamonga quadrangles Nos. 2 and 4 in Riverside County were completed and progress was made toward completing Dixie quadrangle in Lassen and Shasta Counties and Cucamonga quadrangle No. 1 in Riverside County. Control work was carried on in connection with the China Flat quadrangle in Humboldt and Trinity Counties.

The advance sheets of the Kern County quadrangle of the U. S. Geological Survey designated as "North of Oildale" have been published. The area covered is the valley area lying north of Oildale and east of Famoso. The field work was completed in 1932 and the final sheet will be published on a scale of 1:31680.

WATER RESOURCES

South Coastal Basin Investigation.

The budget for this investigation was reduced 60 per cent and about two-thirds of the personnel will be laid off during July and the early part of August. At the present time the force is working on capacity of underground basins.

Triple Celebration Marks Official Opening of Modesto Bridge Project

By R. E. PIERCE, District Engineer

THE completion of the rerouting of the Golden State Highway through the city of Modesto, which eliminates the dangerous Hatch Crossing of a railroad grade, the scene of several fatal accidents—also two other grade crossings was the incentive for a big celebration on the Fourth of July, with the triple purpose of observing Independence Day, dedicating the new Tuolumne River bridge and approaches built by the State and a dam built by the city. The dam was built immediately adjacent to the bridge to form Lake Modesto.

It is estimated that 20,000 people were present at the festivities which opened with a street parade at 10 a.m., led by a horse-drawn coach carrying city and county officials with Governor James Rolph, Jr., seated on the driver's seat.

CEREMONIES ON BRIDGE

Immediately upon the disbanding of the parade, the Governor, city and county officials and the specators repaired to the new bridge where a platform had been erected and loud speakers installed, that enabled the crowd, which completely filled the bridge from end to end, to hear the speeches.

The principal speakers were Governor Rolph, and two former mayors of Modesto—Sol. P. Elias and L. L. Dennett.

Following Governor Rolph's speech of dedication, the cutting of a ribbon, stretched across the bridge, by four-year-old Sarah Jane Paradis, formally opened the span which is the major feature of the Golden State Highway rerouting through Modesto.

Dedication of Lake Modesto created by the city built dam followed.

The rerouting of the highway through the city, has been the dream of certain public-

spirited citizens of Modesto for years. The question of the rerouting brought on a factional row between a group living on the west side of town, who favored the original routing, and the east siders who favored the Ninth Street rerouting. This was definitely settled by an election, which resulted overwhelmingly in favor of the Ninth Street rerouting.

COOPERATIVE PROJECT

An agreement between the city and the State was entered into, in which the State agreed to build the new bridge and approaches from the south and allocated \$15,000 toward the paving of Ninth Street. The city agreed to secure all the right of ways inside the city and eventually provide a 76-foot pavement the full length of Ninth Street.

Shortly after the completion of this agreement, the Federal government made available Federal aid money for unemployment relief, and this project being practically ready to go was put under way immediately and construction progressed rapidly.

This project consisted of three parts:

1. The bridge over the Tuolumne River, built under State contract at a cost of about \$245,000. This bridge is 2049½ feet long and is of concrete bent and steel girder construction. It has a concrete deck with a 30-foot roadway and a 5-foot sidewalk on each side. It is built entirely on a curve with a center line radius of 4800 feet. Electroliers have been placed each side of the bridge.

WIDE, PAVED APPROACHES

2. The approach from the south consists of grading and concrete paving for a distance of 7269 feet from Hatch Crossing to



New Tuolumne River Bridge



PATRIOTIC AND INSPIRING was the scene at the dedication of the new bridge over the Tuolumne River at Modesto on the Fourth of July. More than 20,000 citizens turned out to hear Governor Rolph make the official address from a platform erected on the bridge.

the bridge. The pavement is the standard cement concrete 9"-6"-9" section, 30 feet wide, laid in three 10-foot strips. This was built under State contract at a cost of about \$72,300.

3. The work on Ninth Street consisted of laying about 1517 linear feet of asphalt concrete, 30 feet in width or more—487 linear feet at south end of Ninth and 1030 linear feet at the north. The cost of the work was \$10,945.

ROADSIDE IMPROVEMENT CREED

E. Russell Bourne, of New York, in his recently published Creed for Conservation stressing roadside improvement, makes the following points: (1) The appointment of a first-class Landscape Architect to serve on every Highway Commission. (2) The broadening of the Law of Eminent Domain, under which land is condemned by the Highway Commissioner, to permit free purchase of land for highway purposes. (3) Widening of rights of way, known as Freeways, for all main arteries of traffic. (Through State ownership of the right of way, it is proposed to control gas stations, lunch stands, billboards, placement of electric light poles, proper planting of trees, and conservation of trees, and wild flowers.) (4) Planning of roads to increase scenic beauty. (5) By-passes for towns and villages to provide peace, quiet and safety. (6) Parkway development of main arteries of traffic with careful landscaping near cities and preservation of natural beauties outside urban areas. (7) Capitalization of highways as scenic assets of the State and community, to increase real estate values, rather than destroy values.—*Civic Comment.*

High Fuel Tax Cuts Down Registrations

The highest gas tax in the country is reported from an Alabama city which claims 12 cents per gallon from the motorist. The price of gasoline before the tax was 10 cents, according to a recently printed report.

Two States now have a 7-cent gas tax, says the statement, and the Federal Government collects another cent on top of that. Six States levy a 6-cent rate; eight a 5-cent tax; seventeen a rate of 4 cents; twelve, including California, charge 3 cents; while only three States and the District of Columbia charge 2 cents. In every case the Federal tax of 1-cent per gallon is additional.

Three States permit county gas taxes; and five permit municipal gasoline levies added to the State and Federal taxes.

Registration of passenger cars shows the largest decreases in States having 5-, 6-, and 7-cent gasoline taxes.

And now we hear about the street car motorman who, after clanging his bell irately behind an obstinate coal truck for two blocks, finally managed to get up alongside the driver, leaned out his window, and just looked. The truck driver brazenly asks, "Well?" Whereupon the motorman says, "I know what you are. I just want to see what you look like."

Safe Design Must Consider Vibration Point of Building

(Continued from page 23)

conditions that exist especially in a multi-storied frame and to the uncertain resistance offered by walls and partitions.

Consequently, if computations are even to be only approximately correct, the extent and character of this deflection must be calculated.

FLEXIBLE TYPE

Serious question has been raised regarding the flexible first story type of structure. The advocates of this type of construction propose that high buildings be constructed with a very flexible lower story, the idea being that the earthquake motion will be absorbed in this flexible story and that consequently the upper portion of the structure will not be subjected to the full earth acceleration and consequently need not be designed to resist the full lateral force of the earthquake. For this type of construction, however, to be able to withstand earth movement without failure it is necessary that the lower or flexible columns be sufficiently long and slender so that they can deflect the requisite amount without exceeding the elastic limit of the material of which they may be composed and without injury to the auxiliary construction.

This involves a thorough knowledge of elastic frame analysis on the part of the designer and of the forces involved as well as of the precautions that must be taken in order to insure its success. All tall buildings with a high first story tended to act in this manner in the recent earthquake. Due to the relatively great mass of the structure above the first story there is an appreciable lag in the movement of the upper portion with the result that this portion of the structure moves more sluggishly than the ground below and tends to set up an oscillating center near the tops of the first floor columns. In numerous cases observed there was actual failure of the top of these columns since they were too stiff to take the deflection imposed without failure.

FIRST STORY CRACKAGE

While the failure for the lower height buildings was in the nature of a general shattering, for the higher structures the inertia of the upper portion seemed to have set up a resistance to the earth movement which resulted, even for the better constructed buildings, as has before been pointed out, in visible horizontal crackage just below the line of the first floor beams, especially where the columns were of reinforced concrete or of steel fireproofed with concrete. These typical cracks were present at the tops of first story columns at about the line of the construction joints of columns and wall.

This movement was so severe for exterior walls that a number of columns tore loose from the concrete wall panels and spalled off concrete for a length of about three feet at the foot of the columns, exposing the main vertical steel as well as the hooping to the inside face of the vertical rods.

Frame buildings of the floor joist and stud wall constructed type came through the earthquake in excellent condition where properly constructed. This was no different from what was to be expected since experience has shown that this type of construction has proved to be generally satisfactory in earthquake areas.

WHAT CAESAR DID

When Caesar took a westward ride
And grabbed the Gauls for Rome,
What was the first thing that he did
To make them feel at home?
Did he increase the people's loads,
And liberty forbid?
No! he dug in and built good roads—
That's what old Caesar did.

He built good roads from hill to hill,
Good roads from vale to vale,
He ran a good-roads movement
Till Rome got all the kale;
He told the folks to buy a home,
Built roads their ruts to rid,
Until all the roads led up to Rome—
That's what old Caesar did.

If any town would make itself
The center of the map,
Where folks will come and settle down
And live in plenty's lap;
If any town its own abodes
Of poverty would rid,
Let it go out and build good roads—
Just as old Caesar did.

—From *Kansas City Journal-Post*.

With particular reference to the elimination of injury from earthquake, the above concepts are not so difficult of attainment as might generally be supposed. The principles involved are comparatively simple in themselves and briefly stated, the result desired may be obtained in design and construction by paying attention to the shape of the building so that the natural period of vibration is at not too great a variance for the different portions and that the shape of the structure be such as to be most easily adaptable to symmetrical bracing and of more or less equal strength about the center of mass of the structure, especially by avoiding the use of irregular or angular shapes with various masses and period of vibration, and by rigidity of construction.

As regards actual details of construction, the kind of material is not nearly so important as that it be of good quality; that the workmanship be competent, conscientious and thorough; and that the intent of the design be intelligently complied with. If these fundamental concepts are followed and safety of construction rather than its cheapness be the primary consideration, then the earthquake hazard, will be exceedingly remote, at least as far as the risk to life is concerned. Already such progress is being made that we can be encouraged to hope and in fact, can be confident that the hazard from earthquake will be gradually eliminated by building more safely in the future as well as by the gradual deterioration and removal of such existing structures as may now be unsafe.

CONNER QUADRANGLE COMPLETED

The final published sheet of Conner Quadrangle, Fresno County, has recently made its appearance. The scale is 1:31,680 and the contour interval is 5 feet. The surveys were made by the Topographic Branch of the U. S. Geological Survey cooperating with the State of California and the State Engineer's office. Copies may be obtained through the superintendent of Documents, Washington, D. C.

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 C. R. MONTGOMERY, General Right of Way Agent

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 Port of San Jose—Not appointed
 Port of San Diego—Edwin P. Sample

O R E G O N

CENTRAL VALLEY PROJECT OF STATE WATER PLAN

Scale of Miles
0 20 40 60 80

