

# CALIFORNIA

## HIGHWAYS AND PUBLIC WORKS

*Snow Surveyors Measuring  
Water Content Of  
Sierra Pack*

*(See Article on Page 4)*

**APRIL  
1939**

# CALIFORNIA HIGHWAYS AND PUBLIC WORKS

Official Journal of the Division of Highways of the Department of Public Works, State of California

FRANK W. CLARK, Director C. H. PURCELL, State Highway Engineer J. W. HOWE, Editor K. C. ADAMS, Associate Editor

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# California Highway Survey Shows Big Decline in Funds on Per Mile Basis for Roads

FUNDS on a per mile basis for State highway purposes, both in urban and rural areas, have declined to the level of 1927, when the gas tax was increased from two to three cents.

This has occurred despite Emergency Federal Aid appropriations, which, between 1932 and 1938, provided 13.2 per cent to 24.5 per cent of all State highway funds.

As a result of this declining revenue, replacement of the rural State highway system, due to obsolescence and depreciation, is falling behind at the rate of 151 miles of road surface and 38 bridges each year.

The financial situation will not improve during the coming biennium (July 1, 1939, to June 30, 1941) as the State's Federal Aid appropriation for this period has been reduced some 26 per cent.

These and other facts developed from the California State-Wide Planning Survey, conducted by the United States Bureau of Public Roads and the California Division of Highways, were submitted to Governor Culbert L. Olson in a report by Director of Public Works Frank W. Clark.

## DAILY TRAFFIC AVERAGES 14650

The rural State highway system carries 71.2 per cent of all traffic which occurs on rural roads, according to this report. Only 8.3 per cent of the mileage in the system carries less than 100 vehicles per day, the average for the remainder being 14,050 vehicles per day. This is in marked contrast with the county road system, where but 16.2 per cent of the roads has a traffic exceeding 100 vehicles per day, with an average of 392 vehicles for this portion.

With about twice the number of motor vehicles using the State highways last year as compared to the 1,368,205 motor vehicles registered in 1924, and with State highway mileage virtually doubled by legislative action since 1933, the State has only

## Survey Highlights

California ranks first among the states in total vehicle registration and forty-fifth in average motor and gas receipts per motor vehicle.

Funds on a per mile basis for State highway purposes; both in urban and rural areas, have declined to the level of 1927, when the gas tax was increased from two to three cents.

From 1924 to 1928 the average annual expenditure per mile on the State highway system was \$2,900; from 1929 to 1933 it was \$4,800, and from 1934 to 1938 it again was \$2,900.

The rural State highway system of 12,637 miles serves 71.2 per cent of all traffic on the rural roads.

On the rural State highway system, 11.7 of the bridges are restricted as to loading.

A total of 6549 miles, or 51.8 per cent of the rural State highway system, has a traveled way less than 20 feet wide.

\$2,900 per mile of State highway to expend, the same amount it had during the period 1924-1928.

The effect of changes in taxation, allocation of funds and increase of mileage on the State highway system for the years 1924 to 1938 may be considered as comprising three five-year periods.

Years	Average annual expenditure per mile on State highway system
(1) 1924 to 1928	\$2,900
(2) 1929 to 1933	4,800
(3) 1934 to 1938	2,900

During the first of the three periods, there was an increase in mileage. In the second period, the increase in gas tax was evident, and the

mileage remained practically constant. Within the third period, the mileage was approximately doubled, and available funds were curtailed by the allocation of one quarter cent of the gas tax fund to major streets in cities. An additional one-quarter cent of the gas tax funds, included in the total shown as expended on the State highway system, was also definitely earmarked for State highway routes within cities. As a result, the average funds available per mile of road for the State highway system, both urban and rural, have declined to the level of the 1924-1928 period.

On the basis of an engineering estimate of \$503,000,000 required for improvement and reconstruction of the State highway system, exclusive of right of way, a period of 25 years will be required to carry out the program with the present annual revenue.

## SURVEY STILL IN PROGRESS

The State-Wide Planning Survey has been under way since 1936 as a cooperative project with the United States Bureau of Public Roads. Similar surveys are being conducted in 46 States, following out a suggestion made by President Roosevelt to the Department of Agriculture in 1935.

The report is divided into two parts. Part I deals with all rural roads combined regardless of jurisdiction. Part II deals with the rural State highway system—that is, those State highways outside incorporated cities.

Six series of maps—namely, a base map and five special service maps consisting of general highway, postal routes, school bus routes, traffic map and common carrier routes—have been completed and are available. These maps are on a scale of 1 inch = 1 mile; and there are 303 sheets in each series.

The tabulation and collection of information in the form desired by the United States Bureau of Public

15. 86.1 per cent of the combined rural road system has a traveled way less than 20 feet wide. This portion carries 39 per cent of the total rural road traffic.

16. 79,137 miles, or 91 per cent of the county road system has a traveled way less than 20 feet wide.

17. 6549 miles, or 51.8 per cent of the rural State highway system has a traveled way less than 20 feet wide.

18. 80 per cent of all rural dwellings are concentrated along 25 per cent of the combined rural road system.

19. 84.4 per cent of all rural dwellings are located along surfaced roads.

20. There is an average of 4.57 dwellings per mile on the county road system and 3.39 dwellings per mile on the rural State highway system.

State	10.6%
County, including County Road and Joint Highway Districts	30.3%
Cities	42.3%

21. Road and street bonds outstanding in 1936 totaled \$167,209,442. This amount is divided between State, county, and city governments in the proportion 30, 30 and 40, respectively.

22. Bond interest and redemption required 24.1 per cent of the \$82,500,226 expended in 1936 for roads and streets.

23. The percentage of bond service included in the total road and street expenditures of each governmental unit is as follows:

24. \$9,890,890 of the \$89,184,288 available for road building in 1936 was apportioned for nonhighway purposes. Approximately two-thirds of the \$9,890,890 was for vehicle registration and regulation, and one-third for the State general fund; the apportionment to the general fund is in

ROAD AND STREET BONDS

11. 22 intersections of county roads have been improved with highway grade separations, and 10 highway grade separations have been effected on the rural State highway system.

12. 47.1 per cent of the combined rural road system in California is of the unsurfaced type.

13. 30,021 miles of the county road system and 1075 miles of the rural State highway system have higher

On rural State Highway System 22.1 per cent of bridges and 51.8 per cent of roads are less than 20 feet wide.



14. 2680 miles of the county road system and 2858 miles of the rural State highway system have a lower type of surface than the traffic war-rants.

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Roads to conform to the country-wide survey, is still in progress. The report contains information as to the present status of rural roads, the traffic thereon, and the funds available for their improvement and maintenance.

HIGHLIGHTS OF SURVEY

Highlights of the survey are presented herewith:

1. 73,939 miles of the 99,560 miles in the combined rural road system, that is, the rural State highway and county road systems, carry less than 100 vehicles per day.

2. 25,621 miles of a combined rural road system carry traffic from a minimum of 100 vehicles to a maximum of 28,500 vehicles per day.

3. The rural State highway system of 12,637 miles serves 71.2 per cent of all traffic on the rural roads.

4. The county road system of 86,923 miles serves 28.8 per cent of all traffic on the rural roads.

5. One-third of the combined rural road system has a curvature of 400 foot radius or less, and one-twelfth of the mileage has grades in excess of 7 per cent. Two-thirds of the mileage is classed as valley type road, and the remainder foothill or mountain type.

6. There are 220.9 miles of bridges in the combined rural road system made up of 11,606 individual structures of 20 feet or more in length.

7. 73.6 per cent of the bridges on the county road system and 22.1 per cent of those on the rural State highway system are less than 20 feet in width.

8. 11.7 per cent of the bridges on the rural State highway system are restricted as to loading.

9. There are 6025 railroad grade crossings in the combined rural road system, 5399 are on county roads, and 625 on the rural State highways.

10. There are 187 railroad grade separations on the county road system and 202 on the rural State highway system.



Traffic conditions require widening of 598 miles of 2- and 3-lane highways into 4-lane divided highways to eliminate accidents like the above.

addition to the \$4,095,950 allocated for bond interest and redemption of State highway bonds.

25. Each governmental unit raised the following percentages of the total road and street revenue:

Federal .....	11.33	
State .....	68.05	
County, County Road Districts, and Joint Highway Districts .....	8.72	
Cities .....	11.90	100.0%

26. The sources of revenue for roads and streets and the respective percentages raised were:

Vehicle Fees, Taxes, Etc. ....	70.09	
Sale of Bonds .....	.63	
Federal Aid .....	11.33	
General Property Taxes .....	17.95	100.0%

27. \$62,658,569 out of \$89,184,288, was expended for actual work on roads and streets. The percentage and type of work performed was as follows:

Construction .....	60.2	
Maintenance .....	31.1	
Administration .....	7.4	
Unclassified .....	1.3	100.0%

#### COUNTY TAXES DECREASED

28. General property taxes levied by the counties specifically for road construction and maintenance have steadily declined from \$8,075,473 in 1931 to \$2,451,636 in 1938.

29. \$2,800,429 of gas tax funds was diverted in 1938 by 21 counties to apply on 1933 and 1934 relief bonds.

30. Replacement of the rural State highway system due to obsolescence and depreciation is falling behind at the rate of 151 miles of road surface and 38 bridges each year.

31. There are 8062 locations on the main United States numbered routes where the sight distance is less than the safe passing sight distance recommended by the Design Committee of the American Association of State Highway Officials. At 4645 of these locations the sight distance is less than the recommended safe stopping distance at the maximum legal speed.

32. There are 2704 miles of intermediate type surface in the rural State highway system which should be paved to properly care for traffic.

33. There are 598 miles of two- and three-lane rural State highways which warrant widening to four-lane divided highway.

34. The improvement possible in the rural State highway system is evidenced by the shortening of 88 miles in the reconstruction of some 600 miles of road between 1933 and 1937.

35. California ranks first among the States in total vehicle registration and forty-fifth in average motor and gas receipts per motor vehicle.

#### CARTWRIGHT CALLS FEDERAL AID "INVESTMENT"

Speaking before the recent annual convention of the American Association of State Highway Officials, Representative Wilburn Cartwright of Oklahoma, chairman of the House Committee on Roads, made this statement: "Federal aid for highways is not a current expenditure, but rather an investment in a national capital asset."

**D**URING the last days of March and the first few days of April complete measurements of the California snow pack were made in all the watersheds of the Sierra Nevada. This survey is made each year to determine the water producing potentialities of the snow blanket that has been laid down at high elevations during the winter. As a general rule, at the first of April, the mountain snow pack has reached its maximum for the winter and the runoff is about to begin. From the measurements of snow depth, density and water content made by the snow surveyors, can be computed the amount of water that will flow down the snow fed streams of the Sierra during the months of

April, May, June and July as warmer weather creeps gradually up into the mountains and causes the snow pack to melt. To California with its rainless summers, the waters that flow down the mountain streams during the dry season are necessary for the prosperity and well being of all its citizens. Commerce, manufacturing, agriculture and mining require a dependable year round supply. Because of this importance of the water supply, advance information of runoff prospects is eagerly sought by those organizations and individuals responsible for the control and regulation of the mountain water, so that schedules for storage and diversions may be intelligently prearranged to permit efficient operation.

The State began to oversee this work in 1929. Before then only a few of the larger water users attempted to measure the snow pack and there was no coordination of their efforts. Today with State participation, standardization of equipment and methods has been effected and with more opportunity for research as to forecasting procedure more accurate results are being obtained. The value of this work is fully appreciated by the water using organizations and now most of them are cooperating. During the past year about 60 per cent of the cost of the snow surveys and work incidental thereto was absorbed by the cooperators with about 40 per cent of the cost being paid from State funds.

By FRED H. PAGET, Associate Hydraulic Engineer

## Snow Pack 50% Below Normal

Snow surveyors making their way on skis into the high country near the summit of the Sierra.





1. Coupling the snow measuring tubes.
2. Measuring distances between sampling points.
3. Pushing the hollow sampling tube down to earth.
4. Weighing snow core. Scale shows water content.



①

②

③

④

Men of the snow survey carry full equipment in large packs on their backs making tough going in soft snow.



(Continued on page 26)

and bare patches of ground often alternated so that they were continually taking off their skis to carry them in their hands across the open patches, and then putting them on again for a brief space where the snow lay too deep to allow walking without them. This "off again, on again" method of traveling was very tiring especially when carrying a heavy pack. Even where the snow was continuous, since it froze but slightly at night, after ten o'clock in the morning, the snow was mushy and the going heavy.

During the two weeks of snow measuring about 150 men took part in the snow patrols traveling an aggregate total of about 4500 miles to measure a snow pack covering an area of approximately 17,000 square miles. Some of the patrols were long, some were short, most of them were arduous and many of them hazardous. Shelter cabins along the route were stocked with food and bedding, but personal effects and the hollow tubes and weighing scales for measuring the

to cross over the south slopes, snow from the date this is written. Although the snow surveys were glad to have fine weather while in the mountains making the annual check up, even this was not without its drawbacks. For the fine weather made the going tough. Where the men had

occur until the first of May, a month a condition which does not usually north slopes is also fast disappearing; entirely bare and the snow on the many of the slopes facing south are to as high as 7000 feet. Below this and much of the snow has melted up half of March the runoff has started and much of the snow was mushy and the going heavy.

Since the middle of March, except for one very minor storm, the accumulation of snow in the Sierra has been at a standstill. Under the influence of the warm days of the last half of March the runoff has started and much of the snow was mushy and the going heavy.

The weather during the balance of the month of February was decidedly

winter were being entertained. mistic hopes for the balance of the was still below normal, more optimum period, although the snow pack storm started. At the end of the entire winter prior to the time the fell as had accumulated during the and during this time as much snow intermittently until February 11th, ever, a storm period began that lasted by that time. On January 27th, however, a storm period began that lasted one-half of the amount usually down the end of January being less than amount of snow on the ground near the early winter was very slow; the accumulation of snow during general situation.

This year because of the shortage of rain in the valleys of California there has been great interest in the snow pack accumulation and a correspondingly greater demand for information as to next summer's expectations of runoff. Progress snow surveys have been made at selected key snow courses throughout the winter to keep in touch with the





The recently appointed members of the California Highway Commission, grouped about Director of Public Works Frank W. Clark, seated in center are (left) Lawrence Barrett, chairman; (right) Bert L. Vaughn. Standing, left to right, Secretary Byron N. Scott; Iener W. Nielsen; Amerigo Bozzani; L. G. Hitchcock.

## New Highway Board Meets

**G**OVERNOR CULBERT L. OLSON'S new California Highway Commission met for the first time in Sacramento on March 17 and organized. The purpose of the meeting was to enable the commissioners to get acquainted with each other and to hear from Director of Public Works Frank W. Clark, State Highway Engineer C. H. Purcell, and engineers of the Division of Highways an outline of the work confronting them.

With Chairman Lawrence Barrett of San Francisco presiding, the new members attending were L. G. Hitchcock, Santa Rosa; Iener W. Nielsen, Fresno; Amerigo Bozzani, Los Angeles, and Bert L. Vaughn, Jacumba.

Byron N. Scott of Long Beach officially assumed his duties as secretary of the commission.

Assembling again on March 31, the commissioners learned something about the magnitude of the job ahead of them when they sat in an all-day session with delegations from many parts of the State which appeared before them on highway matters.

At this meeting the commission considered one of the problems bequeathed it by its predecessors. This was the controversy between the State and the City and County of San Francisco over the basis on which the cost of the \$1,800,000 Funston Avenue approach to the Golden Gate Bridge shall be shared. The question

of whether the new commission is legally and morally bound to fulfill a contract entered into by the former Highway Commission with San Francisco, under the terms of which the State was to bear two-thirds and San Francisco one-third of the cost of the Funston Avenue project, was referred to C. C. Carleton, chief attorney of the Department of Public Works, for an opinion.

The commission afforded hearings on applications for budget appropriations for highway projects presented by delegations from Contra Costa, San Francisco and San Mateo, Sutter and Yuba, Sierra, Kings, and Tulare counties, and from the Redwood Empire Association.

(Continued on page 23)

FOR twenty years, Lawrence (Larry) Barrett made the study of highway traffic and transportation problems a hobby. Now, as chairman of the new Highway Commission, appointed by Governor Culbert L. Olson, he is afforded the opportunity of making his hobby pay dividends to the State of California.

Attending the first meeting of the new commission on March 17, Mr. Barrett said:

"From my experiences in traveling through Europe and the United States, I am convinced that California has the greatest network of highways in the world, but is confronted by many growing problems brought about by increased motor vehicle traffic which are yet to be solved."

Chairman Barrett proposes to devote most of his time during the next four years to seeking solutions to these problems. Owner and operator of nine large garages in San Francisco, Mr. Barrett delegated to appointed managers in recent years the administration of his properties and has pursued his hobby of studying highway problems. He has traveled over nearly every road and highway in the State.

Lawrence Barrett



(Continued on page 23)

ONE of two lawyers on the new California Highway Commission, L. G. Hitchcock, is city attorney of Santa Rosa. Residing, as he does, in Sonoma County, he is thoroughly familiar with the highway problems in the great Redwood Empire.

Mr. Hitchcock, who was born on a small farm on the outskirts of Bakersfield, California, on November 26, 1901, is the youngest Highway Commissioner ever to be appointed in this State. He received his primary school training in Kern County and Los Angeles. He was still attending classes when the United States entered the World War. Even as a young fellow, he had very pronounced ideas on American patriotism and on December 30, 1917, at the age of 16 years, he joined the Navy. As a matter of fact, he was just one month past his sixteenth birthday when he entered the service of his country.

On September 30, 1919, after almost two years in the Navy, he was discharged and returned to the United States. In June, 1921, he was graduated from the Kern County Union High School and entered Stanford

L. G. Hitchcock



(Continued on page 23)

MOVING from New York to Los Angeles in 1911, Amerigo Bozzani, with his brother, Joseph, opened a modest garage for the repair of bicycles and motorcycles. From that small beginning has grown the Bozzani Motors, Ltd., of which Amerigo Bozzani is president and general manager. This concern is one of the largest of its kind in southern California.

Trained in the mechanical trades in some of the best schools of Italy, at the age of 17, Amerigo Bozzani, traveled extensively in Europe, engaging in work in his chosen vocation. In 1903 he came to this country and for two years gained experience in large machine shops in eastern States. He returned to Italy in 1905 and, following a brief visit in Rome, toured the Mediterranean coast of Africa and Asia Minor, later going to Spain, France, England and Scotland. He returned to the United States in 1906 and became an expert in the automotive industry.

Determined to enter business for himself, Mr. Bozzani went to Los Angeles in 1911 and on February 14, 1912, he and his brother opened the doors of the Bozzani Autoycle Repair Shop. In 1918 the Bozzani Motor

Amerigo Bozzani





Iener W. Nielsen



Bert L. Vaughn



Byron N. Scott

**F**RESNO County is represented on the new California highway Commission by a lawyer-farmer who has found time to interest himself in the State's far-flung road building program. He is Iener W. Nielsen, prominent Fresno attorney.

Mr. Nielsen, son of Mr. and Mrs. C. Nielsen, Fresno County ranchers, spent his boyhood days on the farm of his parents. He attended the public schools of Oleander and Easton in his home county and graduated from the Washington High School in Easton.

For one year following his graduation, Mr. Nielsen worked for the Southern Pacific Railway in Oregon and then went to Des Moines, Iowa, where he attended Highland Park College for a term. Returning to the west, he entered the University of Southern California, where he majored in law, graduating in 1912.

Since 1912 Mr. Nielsen has practiced law in Fresno and also engaged in farming.

In 1918 he married Miss Esther Dahlgren. The couple have two children, Barbara and James, both of whom are students in the Junior High School in Fresno.

Mr. Nielsen is a Mason and active

(Continued on page 22)

**B**ORN in West Virginia, Bert L. Vaughn lived his boyhood in that State and in Kentucky. At the beginning of the Spanish-American war he enlisted with the First West Virginia Volunteers and served about one year in Cuba.

His business career began in 1901, when he engaged in the hotel business in Hot Springs, Ark., moving from there to Needles, California, to take up real estate and mining pursuits. During his residence in Needles, between 1907 and 1909, he became vice president of the Parker Bank and Trust Company, of Parker, Ariz., and founded a town on the boundary line between California and Arizona, calling it Calizona.

In 1913 Mr. Vaughn established headquarters in San Diego and for the five years following he operated mining properties in California and Arizona. In 1918 he became a member of a syndicate which built the Barbara Worth Hotel in El Centro, on the completion of which he was chosen as its manager. It was while he was a resident of El Centro, in 1918, that he acquired property in Jacumba and began the building of that town, of which he has since been manager. During the last three years

(Continued on page 22)

**F**OUR years in Congress, ten years as a teacher of political science and economics, a master's degree in political science and an A.B. degree in government are the outstanding qualifications of Byron N. Scott of Long Beach, recently appointed as secretary of the State Highway Commission by Governor Culbert L. Olson.

Mr. Scott is well known in State and national democratic political circles. He is a native of Kansas and graduated from that State's university with an A.B. in government in 1924. He came to California in 1926 after two years in Tucson, Arizona, and completed the necessary requirements for a master of arts degree in political science at the University of California. For eight years he taught this subject in the Woodrow Wilson High School in Long Beach.

He was elected to Congress from the Eighteenth Congressional District on the Democratic ticket in 1934 and was reelected in 1936. During the four years he served in Washington, he was a member of the House Naval Affairs Committee.

Mr. Scott was a consistent new dealer; was a delegate from California to the Democratic National

(Continued on page 22)

On the adjoining page the close up views of "A quarter century of highway progress" diorama model show in miniature the narrow, winding, rutted dirt roads of Yesterday, about 1912, followed by the improvement to wider paved surfaces and direct three and four-lane undivided highways of Today as developed into the ultra-modern divided express highways of Tomorrow with wide division strips, grade separations and parallel service roads.

(Continued on page 25)

The tremendous increase in the cost of constructing a mile of the early day roads as compared with the cost of constructing the complicated designs now necessary should also be plainly evident to any spectator who views the model.

An attempt has been made to visually illustrate the growth of traffic since 1912 by the number of automobiles shown using each section of the model.

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transport his labors have been so largely responsible for creating. For instance, the first soil road, winding and indirect in its alignment, terminates in a pavement, fifteen feet in width, representing the first effort to supply hard-surfaced, all-weather roads. As the mileage of this type of improvement grew, the ownership of an automobile, even of the vintage of 1913 and 1914, became a pleasure instead of a trying adventure.

The adjacent section, therefore, shows the next forward step in highway construction brought by the growth of traffic—the increasing of pavement widths from fifteen feet to twenty feet, as well as the improvement of many of the earlier roads to better standards of alignment.

The three-lane pavements and undivided four-lane pavements, which are still so largely a part of our present highway development, are next depicted and the final scene represents a section of ultra-modern divided "express" highway, with its growth and expansion of the highway the highway engineer to meet the needs of scenes the results of the effort of strives to show in a natural sequence of roads in 1912, with their narrow, rutted soil surfaces—dusty in summer and muddy in winter—the model depicts the general type and condition Beginning with a section which develops in 1912, with their narrow, rutted soil surfaces—dusty in summer and muddy in winter—the model depicts the general type and condition

just a little over a quarter of a century ago.

Located in the eastern wing of the California Building is a highway diorama forty-four feet in length and five feet in width, constructed accurately to scale, which graphically portrays the tremendous growth and change which has taken place in highway facilities since the inception of the present State system of roads just a little over a quarter of a century ago.

As a PARTICIPANT in the display now in progress on Treasure Island in San Francisco the California Division of Highways has chosen for the theme of its exhibit the thought expressed by its title, namely "A Quarter Century of Highway Progress."



Highway progress model exhibited by Division of Highways on Treasure Island is 44 feet long and built to scale.





# Review of State Public Works Program by Director Clark

Director of Public Works Frank W. Clark, bearing the greetings of Governor Culbert L. Olson, delivered the following address at a joint session of delegates to the national conventions of the American Roadbuilders' Association, the Associated General Contractors and the Western Association of State Highway Officials in San Francisco on March 7th.

**M**R. CHAIRMAN, Honorable Members of the American Roadbuilders' Association, The Associated General Contractors of America, and the Western Association of State Highway Officials:

I bring you the greetings of the Governor of the State of California, Culbert L. Olson. With the reopening of our State Legislature the pressure of official duties upon the Governor has made it impossible for him personally to be present at this meeting. Accordingly, he requested that I represent him on this occasion and it is in line with his wishes that I extend, on his behalf a hearty welcome to each of you in attendance at this joint conclave of annual national meetings.

Those industries and those professions so well represented here by you men have been closely allied with and are largely responsible for the great and rapid progress which has been made in the general construction field during the first 38 years of this, the twentieth century, and I would like to take this opportunity to congratulate all of those who have played such an active part in this, the world's most outstanding period of progress.

## ENGINEERING PHASES

The present-day modern building designed for maximum convenience and comfort for its occupants as well as for minimum maintenance expense for the benefit of its owner and in turn, also, for its occupants; the modern highway for comfortable, safe, high-speed automobile travel; and the impounding of water by the construction of dams for flood control, irrigation purposes, and power development, are the three phases of engineering and construction which are of greatest interest to



**FRANK W. CLARK, Director of Public Works and Chairman of California Water Project Authority.**

those in attendance at this joint meeting. As Director of Public Works of California, I am likewise most vitally interested in these same branches of the construction industry.

I am sure that we all agree that other than certain slight changes which are necessary in the design of buildings, both for commercial and domestic use, depending upon the climatic extremes which may be found in different localities, and certain minor provisions which may be thought to be necessary from an architectural standpoint because of the possibility of earthquake damage in certain well-advertised areas (quite remote, I assure you), there is a uni-

versal similarity in this phase of the industry.

## HIGHWAY CONSTRUCTION

The same thing applies, generally speaking, in connection with road building and highway construction throughout the 48 States of the Union.

In so far as highway construction is concerned, I am sure you gentlemen, connected with the construction industry as you are, will all agree, as do practically all visiting motorists to California, that our State Highway System compares favorably with that of any other in the country. Our only concern now is that because of the tremendous highway and road mileage under State supervision and maintenance, with the relatively small amount of gas tax money available per mile for new construction and State maintenance work, we are hard-pressed to keep up with the constantly increasing current requirements.

## FEDERAL AID NEEDED

Continued and, in fact, increased Federal aid for California and, I believe, for all other States' construction, is of vital importance and I urge you gentlemen to lend your active support in aiding the States in this regard with their respective programs. In doing so, I am certain that the benefits which will accrue to our respective interests will pay handsome dividends upon the time and effort so invested by everyone.

Before leaving this subject of California highways I do want to take tribute to that fine gentleman and that nationally-known great engineer who has devoted so many years of his life to the interest of the State of California. He is largely responsible for that magnificent bridge which you

see spanning the bay, joining together San Francisco and Oakland. Not only its construction, but its very creation will long stand as an appropriate monument symbolizing his technical and engineering ability as well as his courage, his determination, and his well-earned outstanding reputation for integrity beyond question. You who know California highway development well, will know that I refer to none other than Charles H. Purell.

#### CENTRAL VALLEY PROJECT

Gentlemen, there is now under construction in the northern part of our State a great dam which represents the initial unit of a project which, because of its size and character and its importance to the State of California and the construction industry, does, I trust, warrant my briefly outlining a few of its many unique and interesting features.

All of the activities of the State of California pertaining to water development and regulation are centered within its Division of Water Resources. This branch of the Department of Public Works began in 1921 a series of investigations and studies which resulted in our present plans for what we in California know as the Central Valley Project.

This project was originally designed as a State enterprise. It was adopted and authorized by State legislation enacted in 1933. At the present time, however, the Central Valley Project is a fully authorized and approved Federal reclamation undertaking. The construction work is under the supervision of the U. S. Bureau of Reclamation, of the Department of the Interior. The key unit of the project is known as the Shasta Dam and Power Plant, located on the upper Sacramento River near Redding. There are certain developments which are supplemental to this key unit, including the relocation of the Shasta Route of the Southern Pacific Railroad. This relocation of the railroad is necessitated in order to replace that portion of the present route which will be submerged with the completion of the reservoir.

One of the important conveyance units of the Central Valley Project is the Contra Costa Conduit, which will furnish water to a portion of Contra Costa County; this is likewise under construction at the present time.

## An Epitome of Engineering Thoughts

. . . I, for one, am certainly in favor of seeing national money appropriated so that further development in this country can be carried on. . . .  
*Frank W. Clark, Director, California Department of Public Works.*

. . . Efficient America has too long paid too high a price for this nightmare of traffic congestion . . . .  
*Murray D. Van Wagener, president A.R.B.A.*

. . . At the present time labor relations is the most exacting part of the contractor's job. It calls for patience and a certain abiding faith in human nature . . . .  
*E. P. Palmer, president A.G.C.*

. . . It is foolish to attempt to build a substandard bridge . . . .  
*A. J. Meekun, senior bridge engineer, California highway department.*

. . . An act of God is most anything that a contractor runs into that makes him overrun his time limit . . . .  
*R. M. Gillis, construction engineer, California highway department.*

. . . Despite the 1938 reduction in highway accidents it is quite evident that night traffic is still abnormally hazardous . . . .  
*A.R.B.A. Committee on Highway Illumination.*

. . . An appreciable subsidy is being paid by users of the state highway system to the users of roads not on the state highway system . . . .  
*K. A. MacLachlan, California Department of Public Works.*

The cost of the project is now estimated at \$200,000,000. To date the Federal Government has appropriated an amount totaling about \$35,000,000, of which approximately \$8,000,000 already has been expended. Congress has granted an additional appropriation of \$10,000,000. The reason for this additional appropriation is based on the fact that more funds can be used to advantage. With the added appropriation, construction of the project can be speeded during the coming year.

There are other units of the project on which contracts may be let during the coming year. These will include the Friant Dam, to be constructed on the San Joaquin River, together with several conveyance units which will include the Madera-Friant-Kern canals, the San Joaquin Pumping System and the Delta Cross Channel.

The two largest streams in the State of California are the Sacramento and San Joaquin Rivers. The Central Valley Project contemplates the coordinated development of these two rivers. It is our purpose to conserve, regulate and distribute the flow of these rivers in order that urgently needed water supplies for existing agricultural, industrial and municipal development in the San Joaquin and Sacramento valleys and the upper

San Francisco Bay regions may be adequately provided.

#### SALINITY CONTROL

As I have already indicated to you, the major unit of this project is the Shasta Reservoir on the Upper Sacramento River. A massive concrete dam, which will rise 500 feet above the present stream level, will regulate the river, including its flood flows. It will provide a reservoir with a storage capacity of 4,500,000 acre feet. Upon its release from the reservoir, the water will flow down the Sacramento River, maintaining adequate depths for navigation, and at the same time it will furnish an ample supply of water for irrigation and for municipal and industrial use in the fertile delta regions along the Sacramento and San Joaquin rivers. It will at the same time prevent the intrusion of salt waters from the bay into the delta channels.

In past years this intrusion of salt waters has been the cause of substantial loss in crops and has threatened the destruction of productivity within these regions.

Adequate water supplies will likewise be made available in the delta channels for various uses in the nearby upper San Francisco Bay region, as well as in the San Joaquin Valley.

Conduits to carry the supplies to these areas will be provided.

Canals, together with a series of pumping plants, will convey the water from the delta channels to the San Joaquin Valley, a distance of one hundred and fifty miles. In accomplishing this conveyance the water will be lifted to an elevation of 160 feet above sea level. The water thus conveyed will replace the waters of the San Joaquin River, which in the past have been used for irrigation purposes in the northern San Joaquin Valley. The entire flow of the San Joaquin River will be regulated by means of the Friant Reservoir, which is the second storage unit of the Central Valley Project. This will enable the lower San Joaquin Valley to be properly irrigated by the water from the river, which previously has been used for irrigation in the northern San Joaquin Valley.

I should like to emphasize that although the Central Valley Project is being constructed by the Federal Government, the State has a most vital interest in its completion. Since the inception of work upon the project by the Bureau of Reclamation, which began in 1935, the State of California has cooperated and assisted materially in the carrying out of final studies and investigations leading to the preparation and completion of contract plans.

**PUBLIC DISTRIBUTION OF POWER**

The new State administration, since it took office at the beginning of this year, has as one of its most important objectives the initiation of an energetic program for the public distribution of the hydro-electric power and water which will immediately be made available through the medium of the Central Valley Project. In his inaugural address delivered to the Senate and Assembly in joint session on January 2, this year, Governor Olson said:

"The construction of the great Shasta Dam of the Central Valley Project was instituted as a Federal Government project. The Federal government looks to this State and to its subdivisions to be prepared to receive the benefits of this project, not only in the equitable distribution of its water, but in the utilization of its hydro-electric power, through public agencies. It shall be the purpose of this administration to promote the

means for public ownership and operation of plants and distributive facilities for the distribution of this electric power for the people at cost."

In furtherance of this announced policy, Governor Olson already has submitted to Secretary of the Interior Ickes a program which deals with the operation of the Central Valley Project. This program contains the following proposals:

**GOVERNOR OLSON'S PROGRAM**

(1) That the State, through the Water Project Authority, which is the agency created by the Central Valley Project Act of 1933 for the purpose of administering the project, take over the operation and maintenance of the entire project upon its completion. That the State enter into a contract with the Federal Government providing for the repayment of reimbursable costs of the project by means of revenues secured from the sale of water and power through supplemental contracts to be negotiated by the Water Project Authority with public and other agencies.

(2) That the State prepare plans and immediately undertake the construction of a steam electric power plant in the vicinity of Antioch, Contra Costa County, together with necessary secondary transmission and distribution facilities which will provide an adequate program for the disposal of Central Valley power to public districts before the power from the Shasta Dam becomes available in order to make an early start in the creation of a market for the power to be eventually derived out of the Shasta Project.

(3) That the State direct and assist in the organization of public districts to purchase water and power, and that the State proceed with the enactment of necessary enabling legislation to carry out the program.

**SPEED ON PROJECT URGED**

In a recent conference with Secretary Ickes, Governor Olson and I emphasized the necessity, as well as the economy, of speeding up construction work on the project. We explained that an early completion of the entire project was most essential in order to stop further abandonment of developed lands due to shortage of water.

Let me add that bills already have been introduced in our State Legislature to provide the necessary legal machinery for putting into effect the

In closing I would like to further stress one matter which, I believe, is of great importance to this entire assemblage. We have all heard a great

In addition to his budget provisions, Governor Olson has also released for immediate building construction at State institutions over the entire State, the sum of three million dollars which was unexpended and available from previous legislative appropriation.

I will now briefly touch upon another phase of the State administration program which I am sure will be of interest to all of you here assembled. Governor Olson recognizes the ever-prevailing overcrowded conditions of our State institutions and the very serious building needs which this overcrowded condition necessitates. Accordingly, the Governor has presented to the 1939 State Legislature for approval, a State building construction program for the new biennium amounting to approximately seven million dollars.

**PROBLEMS OF INSTITUTIONS**

The Federal Government and the State of California are working closely together under a well-organized program to meet this situation, but here again let me urge you gentlemen who are interested in all phases of the construction industry to lend your support in Washington for further Federal aid on all public works projects.

In 1937 and 1938 flood damages approximating \$150,000,000 were sustained in this State. The control of angry waters has become a major problem in California. We must prevent the recurrence of loss of life and property from floods with attendant disruption of transportation, communication and business facilities. It is our purpose also to conserve, as far as possible, these waters which for many years have been rolling waste-fully to the sea during the flood season, but which in the summer and fall are urgently needed for irrigation and other necessary purposes.

**FLOOD DAMAGES**

for the Central Valley Project. This policy and program will be vigorously pursued in order that the people of the State may receive the maximum benefits of the project by obtaining the available water and power at minimum costs. So much

(Continued on page 26)





Group of delegates at annual meeting of Western State Highway officials in San Francisco March 6th to 9th.

## Western State Highway Officials Meet

**T**HE annual meeting of the Western Association of State Highway Officials was held at San Francisco March 6 to 9, inclusive. The meeting was purposely scheduled at that time so that it might run concurrently with the national convention of the American Road Builders' Association and the national convention of the Associated General Contractors.

The W. A. S. H. O. convention was well attended, there being 287 registrations; and with the exception of the States of Idaho and Nevada, all of the twelve western states were represented. In spite of the fact that last minute changes had to be made in the program, the papers presented were unusually well received, and the discussions that resulted brought forth many worth-while opinions.

At the opening session on Monday, March 6, the delegates were welcomed by C. H. Purcell, State Highway Engineer, representing Director of Public Works Frank W. Clark. Also at the opening session, papers were presented by James Davis, Assistant Director of Highways of the State of Washington, and Charles Upham,

Engineer-Director of the American Road Builders Association.

On Tuesday morning the session was devoted entirely to a discussion of "Enforcing Time Limits on State Highway Contracts."

On Tuesday afternoon, there was a joint meeting of the W. A. S. H. O., American Road Builders' Association and Associated General Contractors. This large joint session was welcomed to California by the State Director of Public Works Frank W. Clark representing Governor Culbert L. Olson. Mr. Clark's address (published elsewhere in this issue) was followed by addresses given by C. H. Purcell, California State Highway Engineer; Murray D. Van Wagoner, President A. R. B. A.; C. D. Vail, President W. A. S. H. O.; E. P. Palmer, President A. G. C.; and L. I. Hewes, Deputy Chief Engineer, U. S. Bureau Public Roads.

On Wednesday the delegates spent the day at the Road Equipment Show in the civic auditorium.

On Thursday morning the meeting was devoted to a discussion of "Soil Studies" led by T. E. Stanton, Materials and Research Engineer of the

California Division of Highways. In addition, the program committee was fortunate enough to get Major Robert B. Brooks, Chairman of the committee on Highway Intersections and Grade Crossing Elimination of the A. R. B. A., to give the convention a synopsis of the report of his committee.

The business session closed Thursday noon, March 9, with the adoption of resolutions and election of officers for the ensuing year.

### RESOLUTIONS PASSED

The resolutions passed covered:

1. Resolution of thanks to the City of San Francisco, the Golden Gate International Exposition, the Fairmont Hotel, and the California Division of Highways for their respective parts in making the convention a success.

2. Authorizing the executive committee to cooperate to the fullest extent with the national organization in making the arrangements for the anniversary meeting to be held at Richmond, Virginia, in October.

3. Recommending that the cooperation committee of the American As-

(Continued on page 28)

The work of highway location and construction has been no less dif-

built it. standing monument to the men who Springs barrier, remains an out-Gorge, surmounting the Mountain tion and construction down Carriso accomplishments, the railroad loca-ern engineering and construction major barrier. In this day of mod-counties border has always been the along the San Diego-Imperial harbor facilities, the mountain range San Diego's favorable shipping and Valley, southwestern Arizona and the agricultural areas of the Imperial and highway transportation between In the development of both railway date,

is responsible for the progress to of the job by Contractor Finnell methods, and the efficient handling of modern highway equipment and of highway construction. The use good progress on this difficult piece Grade, the contractor has made very tion of the Mountain Springs - In October on the upper por-SINCE construction was started

ments to prevent future settlement. and thus consolidate the embank-down through the voids in the rock, will be used to flush the fine material water. This large amount of water posed to use 13,000,000 gallons of the embankment sections, it is pro-for the most part, of granite rock, approximately 100,000 cubic yards excavation involves the movement of The contract item of roadway ex-in the usual project.

The present construction traverses some of the most rugged portions of the Mountain Springs barrier and involves many problems of engi-neering and construction not found and the top of the grade.

1914 the State took up the improve-ment of this section where the coun-ties of Imperial and San Diego left off. Since that date and including the present improvement the State will have expended for construction a total of \$1,165,900 on the section of highway between Coyote Wells and the top of the grade.

complete elimination of 16 of the degrees less curvature, with com-

The new location will involve 952 time limit is anticipated. job considerably in advance of the seen difficulties, completion of the time elapsed, and without unfor-mately 56 per cent of his contract of the contract, with only approxi-Vinnell had completed 64 per cent

On March 15, 1939, Contractor type surfacing will be placed. funds become available, a higher road-mix surface method. Later, as treated with liquid asphalt by the imported borrow, and the surface roadway will be blanketed with

On completion of the grading, the grading is to be installed. far down these slopes, metal crib-vent the fill material from spilling steep, rocky slopes, and in order to

The roadway section must be con-structed through a section of high, westerly from the project. from Jacumba, Ave and a half miles

The contractor has installed a water line, and is pumping water

## Mtn. Springs Grade Problems

by E. E. WALLACE, District Engineer

Shovels and heavy trucks working on excavation of new Mountain Springs grade. Old grade and look-out tower seen in background.



curves on the old alignment. The minimum radius of curvature is 600 feet, as compared with 126 feet radius at present, and a 6 per cent maximum grade where a 7.12 per cent maximum existed previously. The new roadway will be 36 feet wide.

Because of a long grade and very crooked alignment, the passing of trucks and vehicles on this narrow mountain highway is hazardous and in places impossible.

The Mountain Springs Grade section of U. S. Highway 80 has gradually developed from an old wagon stage road, rising from the desert below sea level to the summit of the Coast Range. It extends from El Centro, 44 feet below sea level, to an elevation of 3240 feet at the summit near the county line.

The most westerly portion traverses some of the roughest terrain in this range of mountains. It rises quite abruptly from the point known as Mountain Springs to the most westerly point on the county line known as Boulder Park.

U. S. Highway 80 is one of the main transcontinental arterials, extending through the southern part of the United States from ocean to ocean. In addition to being a route that is open to travel throughout the entire year, the westerly portion is of extreme importance in the development of Imperial and San Diego counties, because it is the connecting link between the great agricultural section of the Imperial Valley, the county and city of San Diego, and San Diego harbor.

On October 18, 1938, the first Colorado River water was turned into the practically completed All-American Canal, which will develop the irrigable agricultural areas in Imperial Valley and provide irrigation for over a million acres of fertile lands.

#### Letter of Appreciation from Berkeley

January 24, 1939.

California Highways and  
Public Works,  
Sacramento, California.

Gentlemen:

Will you please put me on your mailing list for "California Highways and Public Works," as I hope to receive this valuable magazine every month. Mailing address: 944 San Benito Road, Berkeley, Calif.

Yours very truly,

C. H. THOMAS,  
Asst. Supt. of Streets.



Construction scene on Mountain Springs grade relocation involving excavation of approximately 100,000 cubic yards per mile, mostly granite rock. 13,000,000 gallons of water will be required in consolidating this rock into embankment sections.

# How "Speed Zoning" Safeguards Traffic; Reduces Accidents

By H. L. KILE, Assistant Safety Engineer

The following article is a paper read by Mr. Kile at the annual convention of the Western Association of State Highway Officials held in San Francisco March 6th to 9th inclusive

**S**PEED "excessive for conditions" is one of the most common causes reported as contributing to the occurrence of traffic accidents.

Qualified in this manner, there is little either of opportunity or desire for anyone to dispute such a charge. It is universally agreed that a driver should at all times properly control the speed of his vehicle. But how to best assure that this will be done is a far different matter and one upon which ready agreement is not so easily reached.

The most common methods of attempting to legally cope with the hazard inherent in speed are to either set an upper limit in miles per hour which must not be exceeded, or to simply state that speed must at all times be "reasonable and prudent."

Either of these situations leaves much to be desired. What we all want, individually as drivers, passengers, or pedestrians, or collectively as society, is to derive the utmost in usefulness, convenience and pleasure from our streets, highways, and motor vehicles; and this can not be had so long as numerous accidents occur and large opportunity for their continuance exists.

## BLANKET LIMIT PARRAOCICAL

So far as setting an upper or maximum speed is concerned, no blanket limit in miles-per-hour can be satisfactory for all portions of a highway system. It is equally unsatisfactory to all concerned to merely say to drivers or pedestrians: You must be "reasonable and prudent." Such a course is of no help to the normal individual. He already wants very much *not* to be involved in accident.

As for the small minority that may be indifferent or actually criminal in their tendencies, the difficulties in en-

forcing such a law are very great. Enforcement officers have no yard-stick except such as they may themselves devise, one which they have no assurance will be accepted as correct.

The blanket speed limits are of little help to a driver and may on occasion become just the reverse. While no one can legally claim relief from the responsibility to use due care at all times, drivers may unconsciously assume that the maximum in miles per hour is safe when such speed is not warranted. The blanket speed limit similarly works to the disadvantage of the enforcement agencies in their efforts to curb the minority who flaunt a disregard for care and then advance as a justification the fact that they were not exceeding the maximum permitted by law.

## SITUATION IS COMPLEX

The situations and conditions encountered in modern highway traffic are so complex as to require that the driver be given every possible assistance in order to avoid unsuspected hazards. That such help is needed has long been recognized and provision made to specifically call attention to railroad crossings, blind intersections, restricted clearance, substandard bridges, etc. However, in the matter of "speed"—the one thing which in some degree contributes toward practically every motor vehicle accident—we have for the most part been content to treat it in only the most general way, a state-wide maximum miles-per-hour supplemented by a certain few further restrictions for so-called "residence" or "business districts." Through necessity or otherwise we have failed to base speed regulation upon the only acceptable or enforceable formula for any legislation—that of reasonableness. The most likely explanation for this situation is that no

method for the determination of what is a reasonable speed has enlisted sufficient confidence for its support by the public.

## MANY FACTORS INVOLVED

"Speed" is entirely a relative term. Herein lies the chief difficulty toward expressing its limits in miles-per-hour. The varying influence that it may have when related to the many other contributing traffic factors can only be determined by the intelligent study and analysis of the specific problems that demand solution. It is by no means an easy or a simple task.

As we all know, highway traffic is no longer a simple matter, of concern to no one but a lone driver on his own road. It has become a matter of the widest importance and its complexity has grown proportionately, not only because of the immense increase in number of vehicle units but also by reason of the widespread social effect of this means of travel.

This has naturally led to specialized study of those things that particularly concern or relate to traffic, its behavior, and the promotion of whatever may be of benefit to it. And since "speed" is of elemental interest to traffic, this subject has received a peculiarly large share of attention.

One definite result of these studies has been the acceptance in certain States of "Speed Zoning" as one logical and promising method of increasing the traffic value of our highways. It is well to emphasize that the object sought is not to retard but, on the contrary, to facilitate the free movement of traffic. "Less haste, faster." "The more hurry the less speed." "Haste" and "hurry" are what must be eliminated in order that the real value of "speed" may be conserved. It is the recognition on the part of the traffic engineer of his responsibility

bility to place at the disposal of the average driver all the knowledge which he has or can acquire through his special training and experience, to the end that this same average driver may be assured of a completed journey within the shortest reasonable limit of time.

As defined in a recent special committee report to the National Safety Council, "Speed zoning is the application of special posted speed limits to sections of roadway, provided that the numerical values of these special limits have been determined after engineering investigation of traffic and physical conditions of these roadway sections.

"Speed zoning consists of (1) the identification of locations or sections where there are unusual conditions or where changes are required in normal driving speeds from those at adjacent locations, (2) traffic engineering study of conditions at these locations to determine maximum values of safe speed for average weather and traffic conditions, (3) posting these values, to inform drivers of the safe speeds and as a guide in the enforcement program, and (4) enforcement of these limits to the extent possible with available police personnel. All four of these steps are necessary in a speed zoning program."

#### DEMANDS REASONABLE BASIS

It is immediately seen that such a program is the very opposite of "arbitrary"; it demands that there be a logical, reasonable basis in each instance, something which both public and courts will be inclined to accept with confidence.

Quite obviously, speed zoning in the manner described must be accomplished through administrative action rather than by numerous legislative acts. Existing traffic laws in many states provide for the delegation of such authority to a State department. Once locations are established and properly posted, speeds in excess of zoned limits are evidence of violation.

In states where no provision has been made for the delegation of such authority to an administrative department, the success of speed zoning if attempted at all must depend upon the voluntary observance of motorists and whatever additional weight such zoning may have with the court in those cases brought before it under the basic speed law requiring reasonableness and prudence.

In its report previously referred to, the National Safety Council Committee on Speed and Accidents sets forth very comprehensively and in much detail the record of experience of those states where speed zoning has been used. Eighteen states are listed as having speed zones at various locations on their state highways. Several others where "speed zoning" in the accepted meaning of the term has not as yet been established do, however, make wide use of state-speed indications for curves.

Michigan, in addition to the regular types of speed zones, has also



Warning signs tell safe driving speed for curve zones on California Highways

established "traffic control zones." These zones are governed by special traffic regulations which cover not alone the speed but certain other items of movement, such as no passing, and no crossing of center line. The intent in all cases is to expedite and safeguard the use of the highway.

The natural concern both of those who have instituted this program and of many others among us who are in full accord with the logic of its approach, is to measure its effectiveness in actual operation. Happily, re-

search in this regard by the Safety Council committee disclosed general agreement among motorists, State officials, and factual records of before-and-after conditions, that speed zoning properly applied is of distinct benefit to highway traffic.

The motorists favor it because it tells them when speed reductions are required for safety and also tells them where higher speeds can be permitted with safety. Factual information, while still inadequate and lacking in uniformity, as would be expected on account of varying methods and conditions in the several states, nevertheless definitely shows that in the main vehicles travel at a more uniform speed after speed zones are established, and the percentage of those exceeding the zone limit by more than five miles per hour is reduced.

#### "CONTROL ZONE" SUCCESS

In most instances there has not yet been sufficient elapsed time for a satisfactory comparison of accident experience with respect to strictly "speed zone" establishments, but the accident record on Michigan's 28-mile "traffic control zone" on U. S. 24 and 25 south of Detroit is particularly encouraging. As noted above, zones of this character include along with "speed zoning" certain additional restrictions forbidding vehicles to cross the center line and requiring them to stay in the outside lane except when passing.

Collision accidents were reduced more than 75 per cent and fatalities about 70 per cent. A similar 6½-mile zone on U. S. 10 south of Saginaw is reported as showing a reduction in fatalities from 12 in 1937 to only one in 1938, the first year after zoning.

There is no intention to convey the idea that speed zoning attempts have been an unqualified success in all instances. This is not true; but where unsatisfactory results have obtained, it has been generally admitted that failure was not due to any inherent fallacy of principle but because insufficient care was used in selection, establishment, or enforcement.

#### REQUIRES ENGINEERING KNOWLEDGE

These are matters for engineering determination and if neglected or inadequately covered we have little right to hope for, and just as little chance to achieve, worthwhile results. We must know through accident and traffic records where the high points

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# Unusual Drainage Features on the Angeles Crest Highway

By M. L. BAUDERS, Resident Engineer

**T**HE storm of March, 1938, that ravished southern California, destroyed sections of the Angeles Crest Highway in Los Angeles County and proved the necessity of providing drainage facilities far greater than heretofore deemed necessary.

In a country where the normal rainfall is approximately fifteen inches is found a section where the precipitation is in excess of forty inches of the San Gabriel range and the country just beyond—a butte across the path of winter storms.

Brush, covering the slopes, did not prove adequate in holding back the torrential rains that fell. Rain-soaked brush, earth and rock flowed down the precipitous mountainsides in masses to overwhelm the highway clinging there, halfway down the slopes.

## FILLS WASHED OUT

Every small depression in the mountain slopes spewed down an unbelievable amount of debris, clogging drop inlets and filling to overflowing the sumps behind the through-fills. With no outlets the accumulated surface drainage soon overflowed the face drainage and overpowered the berm. Many fill-slopes were badly eroded and some of the fills completely washed out.

On an inspection trip immediately following the storm, it was very evident from the amount of debris washed from the mountain slopes onto the highway that some changes had to be made in drainage designs. With this in mind, a study was made to coordinate installation of redesigned drainage structures with the reconstruction of the damaged highway. Several possibilities were readily apparent, such as larger culverts placed through fills completely gone, revamped inlets to culverts, large spillways through daylighted points and, in some instances, large ditches or turnouts starting at the lower end

of thorough-cuts out to a point beyond the toe of the fill.

The reason for the loss of the large fills in most cases could be traced directly to the flood water flowing over the fills. Large spillways strategically placed to catch this overflow would insure against such loss in the future. Such spillways would also function as down drains to carry the excessive debris and material washed from slides. In many cases where culverts were plugged, a spillway of this kind would have saved the embankments.

On side-hill fills, of such length as to warrant down-drains to take care of surface drainage, especially constructed pipe culverts were installed down the face of the slopes. As flexibility was necessary, due to the instability of the fill material, pipes were made up along the design of the well-known "elephant trunk" concrete chute.

The entrance diameter of these pipes is 30 inches, tapering to 18 inches in a length of 40 feet. From there 12-foot sections of 18-inch pipe, belled at one end to 19 inches, continue to the bottom of the slope. Cables anchored in concrete at the top are used to hold the pipe in place. Grouted rock headwalls form the entrance. Vertical pipe grills, timber-capped and painted white for visibility, are installed across the entrance.

## PROPRIETARY REMODELED

Standard drop inlets were removed, leaving two sides in place to form "L" headwalls. Ramp-like entrance, 20 feet long and parallel to the roadway, were constructed, with rubble walls to support the shoulders. The new headwalls, as well as the old, were designed with bell-type entrances in order to minimize entrance loss. Spillways were constructed where thorough-cuts were daylighted to obtain borrow for reconstruction of

embankment fills. On the large areas suitable for parking of automobiles the spillways were built to one side. The spillway entrances were made by sloping the daylighted area down on a 15 per cent grade from the gutter-line. Entrance widths at the gutter-line are 30 to 40 feet while lengths vary from 30 to 60 feet, tapering to the width of the spillway ditch. The spillway ditches were excavated by hand and are 3 to 6 feet wide in the bottom,  $2\frac{1}{2}$  to 3 feet deep and 200 to 300 feet long, carrying the flow of water beyond the toe of the fill-embankment.

## DITCHES PAVED WITH BLOCKS

Many of the spillway ditches had to be paved to prevent erosion. Rock grouting proved to be such a slow task that precast blocks were made and cemented into place. The blocks are 4 by 18 by 36 inches. With the aid of a power-winch and an especially constructed car on tracks it was possible for a foreman and seven men to place 30 blocks a day.

Casting of the concrete blocks was done on a nearby parking area. It was possible to cast 20 blocks at a time. A foreman and seven men were able to cast approximately 80 blocks a day. The forms used were 4 x 4-inch timbers staked to the ground in the form of a grid. Charmer-strips were nailed on the center of the form timbers to provide a "V" shaped groove around the edge of the blocks to make a lock joint when the blocks were grouted into place.

One six-foot spillway, just completed, is located in the lowest part of a vertical curve and near one end of a 250-foot radius curve. The grades were so designed that the lowest part of the vertical curve centered on a small daylighted ridge at one side of the fill-embankment. A culvert of corrugated metal pipe 60 inches in diameter, placed to drain

(Continued on page 27)



Drainage features of Angeles Crest Highway in Los Angeles County. Upper left—general view of terrain with spillway entrance in foreground. Below—grouted rock channel entrance to paved spillway. Upper right—paved spillway and planted slopes. Below—spillway paved with 18 by 36 inch concrete blocks.

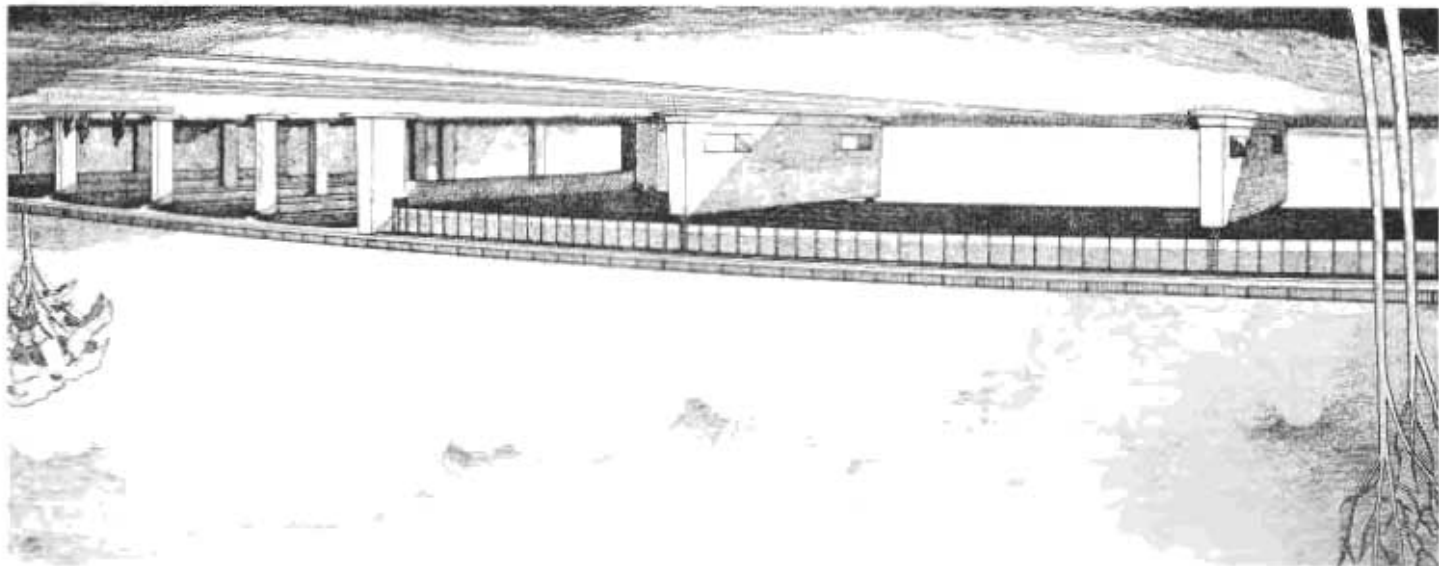
# Grade Separation Project at University Avenue in Berkeley

By E. H. McBroom, Associate Bridge Engineer

**B**IDS were opened on March 1, 1939, and a contract has been awarded to the contracting firm of Healey-Moore Company, Fredrickson - Watson Construction Company, of Oakland, for the construction of a crossing over the Southern Pacific Railroad tracks at University Avenue in Berkeley. The necessity for a separation of street and railroad grades at this crossing may readily be seen from the

which the city of Berkeley estimates at fifty-six per day. University Avenue is the main arterial connection between the East Shore Highway and the University of California Stadium, and carries a large part of the traffic to and from the football games. **SUBWAY FOUND IMPRACTICABLE** During the preliminary studies some consideration was given to the

cal clearance of 22 feet 6 inches. The main spans are supported by massive concrete piers and the concrete spans by three-column bents so placed that all intervening cross streets are free of obstructions. Five hundred fifty-four concrete piles will carry the loads down through forty feet of sand and mud to a firm foundation. The new right-of-way is 130 feet in width east of the railroad, which gives ample room for a 6 foot side-



This massive steel and concrete structure will carry daily average of 3000 motor vehicles above 6 railroad tracks used by 42 trains.

Following traffic census figures for this site. The average daily vehicular traffic along University Avenue amounts to 3000 cars and trucks, and the train movements consist of 34 passenger trains and 8 regularly scheduled freight trains per day. The Berkeley depot of the railroad is situated at University Avenue and Third Street, which is a regular stop for practically all passenger trains. The passenger trains block the crossing from one to several minutes each, and the slow moving freight trains from two to four minutes each. In addition to these regularly scheduled trains, there are switching movements

idea of constructing a subway. Because of the high level of the ground water, however, it soon became apparent that a subway was not practicable from an economical standpoint. The presence of a nine-foot diameter sewer in the center of University Avenue was also a contributing factor in the selection of the overhead type. The new bridge will consist of one 118-foot 6-inch and two 85-foot 6-inch steel girder spans and 15 reinforced-concrete slab spans varying in length from 33 feet 6 inches to 48 feet. The 118-foot steel girder span crosses over six tracks with a minimum verti-

The new bridge is designed for two 25-foot roadways, separated by a four-foot center dividing strip. A tubular section will extend along the entire length on each side. The aesthetic features tend to accentuate horizontal lines and to provide a pleasing appearance by the (Continued on page 26)



## Bert L. Vaughn

(Continued from page 9)

he has also been manager of the water works at Winterhaven, a town situated on Highway 80 near the Arizona border.

Mr. Vaughn has three sons, the eldest, Tyrone, being now assistant manager of Jacumba. Richard, his second son recently graduated from the Ohio State University and began the practice of law in San Diego. His youngest son, Don, is still attending school.

Referring to his appointment as member of the California Highway Commission Mr. Vaughn said: "I appreciate the honor thus conferred upon me, as I do also the opportunity to serve the people of this great State under the able guidance of Governor Culbert L. Olson and Hon. Frank W. Clark, Director of the Department of Public Works. At the same time I am conscious of the vital responsibility involved and shall sincerely endeavor to discharge my duties in such a manner as to deserve the approval of the people of the State and to justify the confidence of the administration."

## Lawrence Barrett

(Continued from page 8)

Born in San Francisco April 21, 1891, Larry Barrett was educated in the public schools of that city and at St. Ignatius College, now the University of San Francisco. He was one of eleven children of John and Margaret McMahon Barrett. His father was in the construction business and for six years after completing his school courses Mr. Barrett was engaged with him in the building industry.

When the United States entered the World War, Larry Barrett went to Camp Lewis with the 91st Division and went overseas with that famous fighting outfit. He saw active service in France and Belgium with the 347th Field Artillery and went into Germany with the Army of Occupation.

Returning to San Francisco after the war, Mr. Barrett entered the garage business and steadily enlarged his properties. On February 3, 1921, he married Mary Elizabeth Kerr of San Francisco. They have six children, three girls and three boys.

## L. G. Hitchcock

(Continued from page 8)

University. Mr. Hitchcock majored in law. Leaving Stanford in December, 1925, he entered the employ of a nationally known tire and rubber company.

Mr. Hitchcock was married to Miss Irma E. Walker on March 3, 1927. He had set his heart upon practicing law and in 1931 he resumed his studies of Blackstone, passed his bar examination and has engaged in the practice of law since then in San Francisco and in Santa Rosa.

During his residence in Santa Rosa, Mr. Hitchcock has been active in the civic affairs of that city. He is Commander of Theodore Roosevelt Post No. 21, American Legion, Esteemed Leading Knight of Elks Lodge 646 and a member of the Grange, Eagles and Lions Club. He is a member of the Democratic County Central Committee of Sonoma.

Mr. and Mrs. Hitchcock have two children, James, aged 9, and Janet, aged 4. The new commissioner has, by his own count, several hobbies—his youngsters, his interest in highways, working in his garden and golf.

## Iener W. Nielsen

(Continued from page 9)

in Fresno civic organizations. He has been a member of the Fresno Democratic County Central Committee for fourteen years and served as vice chairman and regional director of the Democratic State Central Committee.

Mr. Nielsen resides at 1487 Echo avenue, Fresno.

They make their home at 70 Clark Drive, San Mateo Park.

Built in proportion to his 6 feet, 3 inches of height, Mr. Barrett, before the war, was amateur heavyweight boxer of the Olympic Club of San Francisco and a member of the club's swimming team. As a young man, he played semi-pro league baseball. He is a member of several San Francisco clubs and civic organizations and of Zane-Irwin Post of the American Legion. He is vice president of the Garage Owners' Association and a director of other large mercantile and real estate interests.

## Byron N. Scott

(Continued from page 9)

Convention in Philadelphia in 1936, and was unanimously elected permanent chairman of the Democratic State Convention in Sacramento in 1938.

In Washington he put through Congress legislation for flood control on the Los Angeles and San Gabriel rivers. He was an active leader in the drive for revision of the present Neutrality Act, which is now being urged by the President.

His resolution to investigate the American Medical Association was the prelude to the Federal grand jury indictment of that organization and a part of the impetus given to the present plans of the State Medical Society to give to the people of California low cost medical attention.

Because of his interest in world affairs and his active efforts for world peace, Mr. Scott was invited to attend the International Peace Campaign Conference held in the early fall of 1938.

Mr. Scott is 36 years old and married. He is a Mason, a Sciot, a member of the Sigma Alpha Epsilon fraternity, the Exchange Club of Long Beach, and the Eagles Lodge.

After one month as secretary of the commission Mr. Scott has this to say:

"I think there is a lot that a man in this office can do, and I intend to do it to the best of my ability. The people of this State asked Culbert L. Olson to bring to Sacramento the philosophy that the State government should function for the benefit of all of the people and not for just a chosen few. That, I know, is also the conviction of the Director of Public Works, Frank W. Clark. I feel right at home in this environment and intend to do what I can to assist in the realization of this philosophy in the State Highway Department."

## HIGHWAY OFFICIALS TO CELEBRATE

The American Association of State Highway Officials announces celebration of its twenty-fifth birthday which will be commemorated during the second week of October, 1939, in connection with the regular annual meeting of the association to be held at Richmond, Virginia.

**Flood Damage Repairs**  
Investigations and the preparation of re-

**SPECIAL INVESTIGATIONS**

activities. Locations necessitated by construction Valley Project and for temporary re-facilities for the completed Central of power and communication public utility companies for the re-

Negotiations were continued with River and the San Joaquin delta. and between the mouth of the Merced and Gravelly Ford and Gravelly Ford.

In connection with studies of water rights, topographic and soil survey, maps are being prepared of lands adjacent to the mouth of the Merced River and the San Joaquin delta. Negotiations were continued with public utility companies for the relocation of power and communication facilities for the completed Central Valley Project and for temporary re-

locations necessitated by construction activities provided for in a supplemental agreement between the United States and the Water Project Authority of the State of California in connection with the preparation of data for the Central Valley Project were continued. The activities have included field surveys in connection with the preparation of topographic maps of lands along the San Joaquin River and between the mouth of the Merced River and the San Joaquin delta. Office work has included the preparation of data for reports on the acquisition of and a plan of exchange for waters of the San Joaquin River claimed by property owners east of the San Joaquin River in Merced County and south of the San Joaquin River in Fresno County.

Owing to the unusual dry season, the drainage pumping plants on the Sacramento River up so that water flowed out of the Colusa and Tisdale weirs for a few hours, but otherwise all water has been confined to the river channel. The season is now so far advanced that there is little prospect for floods in the Sacramento River system.

The rivers of the project are now at a very low stage. A short and mild storm brought the Sacramento River up so that water flowed out of the Colusa and Tisdale weirs for a few hours, but otherwise all water has been confined to the river channel. The season is now so far advanced that there is little prospect for floods in the Sacramento River system.

**FLOOD CONTROL AND RECLAMATION**

A comprehensive survey being conducted jointly by the Division of Water Resources, the U. S. War Department and U. S. Department of Interior, Geological Survey, covering the compilation and analysis of 1937-38 winter season was conducted and reports are under preparation.

Cooperative Flood Control levee of the Sutter By-pass. bridges across the borrow pit of the east levee of the Sutter By-pass.

With our own force and equipment, piles have been driven and caps set for three \$106,000 has been expended to date.

The division has carried on by force has already been completed. account the repair of the damaged units of the Sacramento River flood control project for which \$150,000 was made available out of the emergency fund. Approximately \$106,000 has been expended to date. With our own force and equipment, piles have been driven and caps set for three bridges across the borrow pit of the east levee of the Sutter By-pass. A comprehensive survey being conducted jointly by the Division of Water Resources, the U. S. War Department and U. S. Department of Interior, Geological Survey, covering the compilation and analysis of 1937-38 winter season was conducted and reports are under preparation.

There is nothing, incidentally, like a duck's hat to make a woman's head swim.

Thirteen applications to appropriate were received during February, 7 applications were denied, 12 were approved, 9 permits were revoked and the rights under 13 permits were confirmed.

**WATER RIGHTS**

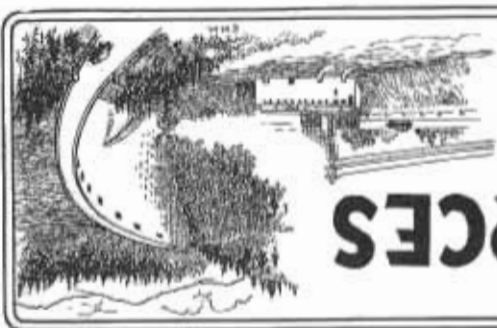
Application for construction of the Long Valley Dam of the Bureau of Water and Power of the city of Los Angeles has been approved. Construction is started on the spillways at Live Oak Dam and Pacoima Dams; on Palos Verdes Reservoir.

**SUPERVISION OF DAMS**

Two meetings of the California Districts Securities Commission California held its biannual meeting in Sacramento during the month for consideration of current legislation affecting district operations. Owing to the extremely dry early spring season many of the districts report that water was turned into their canal systems about the first of March, a month earlier than the usual practice. Rainfall is still considerably below normal in most sections of the State and the deficient snow pack indicates that there will be a shortage of runoff for late summer irrigation where storage is not available.

The Irrigation Districts Association of California held its biannual meeting in Sacramento during the month for consideration of current legislation affecting district operations. Owing to the extremely dry early spring season many of the districts report that water was turned into their canal systems about the first of March, a month earlier than the usual practice. Rainfall is still considerably below normal in most sections of the State and the deficient snow pack indicates that there will be a shortage of runoff for late summer irrigation where storage is not available.

**IRRIGATION DISTRICTS AND COMMISSION**




**DIVISION OF WATER RESOURCES**

**OFFICIAL REPORT**

FOR THE MONTH OF  
**March, 1939**

EDWARD HYATT, State Engineer

# Highway Bids and Awards for the Month of March, 1939

**ALAMEDA COUNTY**—A reinforced concrete slab and steel girder overhead crossing over the tracks of the Southern Pacific Co. at Berkeley, consisting of 15 reinforced concrete slab spans and 3 steel girder spans on reinforced concrete piers and abutments with pile foundations and about 374 feet of approach retaining walls and embankment and widening existing street. District IV, Feeder route, in Berkeley. A. Soda & Son, Oakland, \$308,136; The Utah Construction Co., San Francisco, \$321,102; Clinton Construction Co. of California, San Francisco, \$279,368; Bates & Rogers Construction Corp., Oakland, \$282,048; Earl W. Heple, San Jose, \$279,151; Union Paving Co., San Francisco, \$277,384; Lindgren & Swinerton, Inc., Oakland, \$294,603; R. G. Clifford, San Francisco, \$295,581; C. W. Caletti & Co., San Rafael, \$299,268; Chas. L. Harney, San Francisco, \$323,525; Eaton & Smith, San Francisco, \$291,789; United Concrete Pipe Corp., Los Angeles, \$286,194; MacDonald & Kahn Co., Ltd., San Francisco, \$297,321. Contract awarded to Healey-Moore Co., Fredrickson & Watson Construction Co., Oakland, \$276,900.35.

**IMPERIAL COUNTY**—Between 4 miles east of Calexico and 1 mile east of East Highline Canal, about 0.8 mile in length to be graded, surfaced with gravel and road-mix surface treatment applied thereto and bridges to be constructed. District XI, Route 202, Sections C.D. Valley Construction Co., San Jose, \$42,295; R. E. Hazard & Sons, San Diego, \$44,035; V. R. Dennis Construction Co., San Diego, \$53,455; J. E. Haddock, Ltd., Pasadena, \$60,533; G. W. Ellis, North Hollywood, \$62,941; Griffith Co., Los Angeles, \$66,167; A. S. Vinnell Co., Alhambra, \$70,395. Contract awarded to Parish Bros., Eldridge, \$41,636.70.

**ORANGE COUNTY**—In the city of Santa Ana, across Santa Ana River, a reinforced concrete girder bridge consisting of eight 53-foot spans and two 48-foot spans. District VII, Route 174, Section S.A. John Strona, Pomona, \$109,295; Vinson and Pringle, Phoenix, Arizona, \$111,840; Oscar Oberg, Los Angeles, \$114,013; C. O. Sparks & Mundo Engineering Co., Los Angeles, \$116,569; Macco Construction Co., Clearwater, \$119,393; Byers & Dunn, Los Angeles, \$119,438; J. S. Metzger & Son, Los Angeles, \$120,690; Carlo Bongiovanni, Los Angeles, \$124,805; J. E. Haddock, Ltd., Pasadena, \$127,251; Sharp & Fellows Contracting Co., Los Angeles, \$128,579; Contracting Engineers Co., Los Angeles, \$129,489; Sordal & Bishop, Long Beach, \$129,772; United Concrete Pipe Corp., Los Angeles, \$133,287; Gibbons & Reed, Burbank, \$133,369; R. E. Campbell, Los Angeles, \$134,510; Heuser & Garnett, Glendale, \$134,869. Contract awarded to Mitty Bros. Construction Co., Los Angeles, \$106,305.00.

**RIVERSIDE COUNTY**—At Station 142+10, about 4 miles west of Corona, a reinforced concrete rigid frame bridge to be constructed. District VIII, Route 43, Section A. R. M. Price, Huntington Park, \$18,479; A. S. Vinnell Co., Alhambra, \$18,674; J. S. Metzger & Son, Los Angeles, \$18,892; J. E. Haddock, Ltd., Pasadena, \$19,158; C. O. Sparks & Mundo Engineering Co., Los Angeles, \$21,374; White & Wilberg, Santa Monica, \$21,827. Contract awarded to V. R. Dennis Construction Co., San Diego, \$17,978.00.

**RIVERSIDE COUNTY**—3 miles east of Banning across San Geronimo Wash, three 30-foot spans to be added to an existing reinforced concrete girder bridge, new concrete foundations to be constructed for an existing timber bridge, about 0.4 mile of approaches to be graded and surfaced with Portland cement concrete pavement. District VIII, Route 26, Section C. Edward Green, Los Angeles, \$29,498; United Concrete Pipe Co., Los Angeles, \$30,537; The Contracting Engineers Co., Los Angeles, \$30,945; Franklin B. Gridley, Pasadena, \$31,810; J. E. Haddock, Ltd., Pasadena, \$33,869; Basich Brothers, Torrance, \$34,290; Claude Fisher Co., Ltd., Los Angeles, \$34,477; J. S. Metzger & Son, Los Angeles, \$34,494; Byerts & Dunn, Los Angeles, \$34,627; A. S. Vinnell Co., Alhambra, \$45,088. Contract awarded to Valley Construction Co., San Jose, \$27,380.75.

**RIVERSIDE COUNTY**—Between junction of Route 26 and Snow Creek, an under-grade crossing under the tracks of the Southern Pacific Co. and a bridge across Whitewater River Overflow to be constructed and about 3.2 miles to be graded and paved with plant-mix surfacing. District VIII, Route 187, Section D. The Contracting Engineers Co., Los Angeles, \$138,922; Basich Bros., Torrance, \$139,256; J. E. Haddock, Ltd., Pasadena, \$140,180; Matich Bros., Elsinore, \$142,295; United Concrete Pipe Corp., Los Angeles, \$142,297; C. O. Sparks & Mundo Engineering Co., Los Angeles, \$146,786; Claude Fisher Co., Ltd., Los Angeles, \$147,077; Geo. Herz & Co., San Bernardino, \$149,727; Earl W. Heple, San Jose, \$150,529; Winston Bros., Los Angeles, \$151,930; Oswald Bros., Los Angeles, \$154,139; Griffith Co., Los Angeles, \$155,434; V. R. Dennis Construction Co., San Diego, \$158,485; John Strona, Pomona, \$163,443; Macco Construction Co., Clearwater, \$165,646; Sharp & Fellows Contracting Co., Los Angeles, \$169,612. Contract awarded to Dimmitt & Taylor, Los Angeles, \$135,917.00.

**SAN BERNARDINO COUNTY**—At Sheep Creek near Cajon, San Bernardino County, masonry cut-off wall and slope protection to be constructed. District VIII, Route 61, Section A. The Contracting Engineers Co., Los Angeles, \$4,950; Gibbons & Reed Co., Burbank, \$5,250; Edward Green, Los Angeles, \$3,587; Triangle Rock & Gravel Co., San Bernardino, \$5,495; E. S. & N. S. Johnson, Pasadena, \$3,875; Geo. Herz & Co., San Bernardino, \$3,430; J. E. Haddock, Ltd., Pasadena, \$5,208; W. R. Shriver, Los Angeles, \$5,245; R. M. Price, Huntington Park, \$4,375; A. S. Vinnell Co., Alhambra, \$3960. Contract awarded to Matich Bros., Elsinore, \$2,921.00.

**SAN BERNARDINO COUNTY**—Two reinforced concrete bridges at points about 18.5 and 20 miles north of San Bernardino to be constructed. District VIII, Route 31, Section B. J. S. Metzger & Son, Los Angeles, \$62,571; Contracting Engineers Co., Los Angeles, \$72,736; R. M. Price, Huntington Park, \$73,560; J. E. Haddock, Ltd., Pasadena, \$74,152; W. E. Hall Co., Alhambra, \$74,301; Byerts & Dunn, Los Angeles, \$78,300; Gibbons & Reed, Burbank, \$82,194. Contract awarded to White & Wilberg, Santa Monica, \$60,484.00.

# Exhibit Shows Highway Progress

(Continued from page 19)

Moreover, an attempt has been made to illustrate the evolution of the esthetic features of highway design as well as to suggest the advantages which should, and do, accrue by virtue of intelligent and careful landscaping where climatic conditions are favorable to such treatment without excessive maintenance cost. The cooperation and interest of the California Roadside Council is gratefully acknowledged in the development of this phase of the model design.

Every part of the model is to correct scale, and the trees, shrubbery, buildings, and other appurtenances were carefully checked for historical accuracy and exactness of detail.

The basic topography of the model was first done in clay and then cast into plaster, after which the various dressings which feature the exhibit were added. The workmanship and skill throughout are of such high quality that a perfect illusion of naturalness has been created, and the model has elicited much comment and praise.

Complete plans for the highway exhibit were developed by Division of Highway's personnel, working in cooperation with the California Commission for the Golden Gate International Exposition, which supplied the funds for the construction and installation of the entire exhibition housed in the California Building.

**SAN BERNARDINO COUNTY**—At Turner Avenue about four miles east of Ontario, a reinforced concrete box culvert. District VIII, Route 26, Section D. Matich Bros., Elsinore, \$6,788; The Contracting Engineers Co., Los Angeles, \$5,972; G. E. Kerns, Long Beach, \$6,000; Carl Hallin, Los Angeles, \$6,157. Contract awarded to Gibbons & Reed Co., Burbank, \$5,680.25.

**VENTURA COUNTY**—Across Cuyama River, near Ozena, a treated timber bridge to be reconstructed. District VII, Route 138, Section E. J. S. Metzger & Son, Los Angeles, \$19,875; E. G. Perham, Los Angeles, \$21,172; Edward Green, Los Angeles, \$21,642; The Robertson Co., Los Angeles, \$21,823; R. M. Price, Huntington Park, \$23,143; C. G. Willis & Sons, Inc., & Chas. G. Willis, Los Angeles, \$23,350; S. A. Cummings, San Diego, \$23,435; Harry L. Foster, San Diego, \$23,890; The Contracting Engineers Co., Los Angeles, \$24,520; Valley Construction Co., San Jose, \$25,074; C. R. Butterfield-Kennedy Co., San Pedro, \$25,795. Contract awarded to Victor L. & Wm. B. Jacobson, Los Angeles, \$19,468.50.

# Review of State Public Works Program by Director Clark

(Continued from page 14)

deal of talk on the radio and have read much that has been written about the stopping of Federal spending and stressing the balancing of the national budget. A great deal of such talk and writings have been originated and spread by well-meaning people who just naturally disagree with the theory of spending money when there is no definite provision made for its replacement. But, there is still another element represented by large numbers who are continuously preaching this same doctrine but whose motives are less sincere and certainly not constructive. I refer to those several politically ambitious individuals whose usual approach to any situation is to criticize that which is being done instead of attempting to find a practical solution for the situation that exists.

For the government to stop spending money and to immediately balance the budget makes for good political speechmaking but until something more constructive and sound is offered than has yet come to the surface in the way of a substitute for Federal spending on public works projects, I, for one, am certainly in favor of seeing national money appropriated so that further development in this country can be carried on. I dread to even think what the consequences would be in this country if the government tomorrow suddenly called a halt to the further furnishing of any Federal funds.

## FEDERAL HELP NECESSARY

Let me remind you that right here in California the Metropolitan Aqueduct of Los Angeles County, the American Canal, the San Francisco-Oakland Bay Bridge—yes, Treasure Island and now the contemplated \$200,000,000 Central Valley project, with all their accruing benefits, would probably all have been impossible of attainment, at least for the present, had it not been for Federal financial assistance.

While most of these projects were aided financially by the United States

Government with the understanding that in time the total cost of same would be repaid to the Federal Government, most of them being self-liquidating, nevertheless, in most of the criticism that is heard in connection with the spending of Federal money there is no distinction made between financial aid temporarily extended by the government, which will in turn be repaid, as compared with outright grants.

As representatives of the engineering fraternity and the construction industries, it is imperative that we do everything within our power to encourage the United States Government in extending further financial aid to all public subdivisions and to assist in the building of all projects in this country which are sound and therefore worthy of this temporary national financial aid.

I do assure you that it has afforded me much pleasure to have had this opportunity to appear before you as a representative of California's new great Governor, Gilbert I. Olson.

## Many Motorists Have Bad Vision

A study made by the Institute of Human Relations at Yale University has revealed that from one to two per cent of the nation's automobile drivers are completely blind in one eye. A still more serious finding was that between 20 to 40 per cent of all motorists have a deficient eye which handicaps them.

Tests revealed that persons with a deficient or blind right eye have difficulty in perceiving pedestrians stepping off sidewalks or walking along the right roadway either by day or night; in viewing the road when making a right turn; in perceiving cars approaching from the right of intersection; in passing other cars; in perceiving road signs and traffic lights; in backing out from angle parking; and in keeping on the right side of the road.

# Snow Pack 50% Below Normal

(Continued from page 8)

snow pack had to be packed along. In the isolated back country of the Kings River the men were out ten days, covering 130 miles on the North Fork and 14 days, skiing 140 miles, on the South Fork. Three men in the Kern River watershed were out 13 days, traveled 135 miles on the regular snow patrol of that area. Sturdy forest rangers of the Inyo Forest crossed over the high mountain passes at elevations close to 12,000 feet above sea level to make their measurements.

The measurements brought in by the snow patrol show this year's snow pack to be a decided contrast to the bountiful one of last year. Where last year's pack on the whole was 50 per cent above normal, this year's is about 50 per cent below normal. Last year where the snow tubes measured depths of from 9 to 12 feet, this year's snow is only from 3 to 4 feet deep. Last year the melting of the snow pack brought floods and high water until late into the summer; this year, barring unlikely late heavy storms, there will be no floods.

## GRADE SEPARATION PROJECT IN BERKELEY

(Continued from page 22)

proper proportion of members rather than by excessive ornamentation.

Financing is from Federal grade separation funds allotted to California, except for the additional right-of-way which is being provided by the city of Berkeley.

The contractor has two hundred and seventy-five working days to complete the project and, if this schedule is maintained, University Avenue overhead will be opened to traffic early in 1940, permanently eliminating a danger spot for traffic on this busy State highway arterial in a city.

# How "Speed Zoning" Safeguards Traffic

(Continued from page 19)

of hazard exist, and through analysis of these records and supplemental observation that speed zoning offers a logical means of reducing the hazards.

Similarly, engineering knowledge and careful tests must be applied to determine the type and scope of zone to be established and the physical means to be employed, such as signs, markings, etc. And, finally, the direction of enforcement must be equally intelligent and based upon recorded and observable facts.

The average driver has insufficient means of knowing safe speed at all times, just as he can not know of his own knowledge that all bridges will support the maximum load. Lacking this knowledge, one becomes unnecessarily timid and another entirely too careless. The inevitable result is confusion and frequent interruption to that free and orderly movement which we one and all wish to have.

How speed zoning may assist in reaching this goal is very clearly outlined in the following conservative statement of conclusions reached by the committee on speeds and accidents:

- (1) It aids the motorist in adjusting speed to conditions.
- (2) It makes the enforcement problem easier by furnishing the police officers with a reasonable guide of what is excessive speed.
- (3) It permits adequate control of speed at locations with unusual conditions, without unduly restricting drivers where conditions permit higher speeds.
- (4) It results in motorists' driving at a more nearly uniform speed over state highways.
- (5) When accompanied by enforcement, speed zoning is very effective in reducing the frequency and severity of accidents on dangerous sections of highway.

There would appear to be every logical reason to believe that "speed zoning," honestly predicated upon the desire to safeguard and facilitate traffic, carefully and intelligently conceived and administered, will commend itself alike to motorist, pedestrian, and the general public.

# Bay Bridge Traffic Report Shows 822,914 Vehicles Crossed in March

VEHICLES totaling 822,914 crossed the San Francisco-Oakland Bay Bridge in March, it was revealed in a report submitted by Director of Public Works Frank W. Clark, secretary of the California Toll Bridge Authority, to Governor Culbert L. Olson.

The figures indicated a gain of approximately 200,000 vehicles over March of the preceding year, when the traffic total was 659,569, and a gain of 65,679 over February, 1939.

Exposition traffic accounted chiefly for the gain, Mr. Clark said, with 164,642 vehicles of last month's total going to Treasure Island. Exposition traffic from San Francisco totaled 93,646, and from the East Bay 70,996.

March's daily average of vehicles was 26,546; a slight drop from February, which had a 26,917 daily average, but a gain over the same period a year ago when the average was 21,595.

Revenues for March were \$422,904.15, a gain over the preceding 28-day month, when collections were \$390,806.86.

Total number of vehicles to cross the Bridge in the first three months of 1939 is 2,322,696, bringing the total since opening November 12, 1936, to 21,383,885.

Comparative figures follow:

	March, 1939	February, 1939	Total since opening
Passenger Autos and Auto Trailers.....	738,813	673,134	19,787,267
Motoreycles and Tricars.....	3,037	2,869	95,579
Buses.....	7,384	6,596	271,307
Trucks and Trailers.....	47,138	46,832	897,520
Toll Vehicles.....	796,372	729,431	21,051,673
Passes.....	26,542	24,256	332,212
Total Vehicles.....	822,914	753,687	21,383,885
Extra Passengers.....	259,266	215,228	5,447,355
Freight Tons.....	59,981	67,245	1,100,778

## FINED FOR DUMPING GARBAGE ON HIGHWAYS

The following clipping from the January 15th issue of the Redding Searchlight, tells of the arrests of violators of the law prohibiting the dumping of garbage on a State highway.

Arrests of this kind are rather rare but serve to warn people that it is illegal to use State highways as a public dumping ground.

"Two Dunsmuir men, Harry Stone and Pete Ressitti, were fined \$25 apiece by Justice of the Peace Marie C. Mahon of Castella Friday when they pleaded guilty to dumping garbage on the highway north of Castella.

"They were arrested by Traffic Officer James C. Lane. Officer Lane also arrested Charles B. Edwards for the same offense this week."

Pioneer girls got along with one spinning wheel, but modern ones must have four and a spare.

## Drainage Features on Angeles Crest Highway

(Continued from page 26)

the sump behind the fill, enters the spillway 60 feet down from the entrance. Rubble masonry was used to form the connection between the pipe and the spillway.

The slide removal and storm damage repair work on the first 14 miles to Red Box Divide was accomplished by the Maintenance Department. Convict labor was used to repair the storm damage and reconstruct the highway on the following section, incorporating the newly designed drainage features.

During the early winter rains this spillway functions perfectly. However, a real test will come only after an abnormally heavy rain and when the culvert through the fill-embankment has been plugged, causing the spillway to carry all of the drainage load including the debris.

## Western Highway Officials Meet

(Continued from page 15)

sociation of State Highway Officials and the Associated General Contractors be requested to give specific considerations to the problem of extensions of time for the completion of contracts and to the standardization of specifications covering this phase of the relation between contractors and the highway departments.

4. Empowering the executive committee to cooperate with the national organization with representation where necessary in connection with road legislation before congress.

The following officers were elected: President, Robert Allen, Nevada; Vice President, B. G. Dwyre, New Mexico; Secretary-Treasurer, E. C. Knowlton, Utah; Executive Committee—R. H. Baldock, Oregon; R. E. Bobitt, Texas; Dr. L. I. Hewes, U. S. B. P. R.; Dr. D. A. McKinnon, Montana; L. V. Morrow, Washington; Charles D. Vail, Colorado; Preston Peterson, Utah.

## Motor Vehicle Laws Apply to Bicyclists

Increased observance of traffic laws by cyclists is urged by the public safety department of the Automobile Club of Southern California.

Statistics compiled by the organization show 26 persons killed on bicycles in Los Angeles County in 1938, an increase of four over 1937. The Vehicle Code provides that every person riding a bicycle is subject to its provisions applicable to the driver of a vehicle, except those which by their very nature can have no application.

From a safety standpoint, one of the most important laws is that applying to lamps on bicycles. It shall be equipped with a lamp emitting a white light visible under normal atmospheric conditions from a distance of 300 feet in front of the bicycle. It also provides that it should be equipped with a red rear reflector or light reflector visible for at least 200 feet.

## In Memoriam

[Elbridge M. Ray, Jr.]

With the death of Elbridge W. (Al) Ray, Jr., as the result of an automobile accident on March 9, 1939, District X has lost a loyal and valuable employee, and his fellow workers in the District, as well as in Central Office, and his acquaintances in other districts, have lost a valued friend.

Mr. Ray's first services with the Division of Highways were in June of 1923 as a stakeman on survey party. He worked with the Department intermittently from then until his graduation from the University of California with a B.S. Degree in Civil Engineering in 1929. Since his graduation, Mr. Ray was steadily employed with the Department, the greater part of which time was in District X. His employment with the Division of Highways consisted of office work, and work on surveys and construction. His most recent employment was as Acting Resident Engineer on construction.

Mr. Ray was born September 30, 1905, in Lewiston, Idaho. He attended grade and high school in Oakland and then attended the University of California at Berkeley, graduating with B.S. Degree in Civil Engineering. At college, Mr. Ray was representative of the Engineers' Council for four terms, and was President of the University of California Chapter of the Junior American Society of Civil Engineers. He is survived by his widow, Vivian; daughter, Lynn Dee; his parents, Mr. and Mrs. E. W. Ray, Sr.; a brother and two sisters. To these is extended the deepest sympathy by his co-workers and the employees of the Division of Highways.

Soph—Did you ever hear the one about the racketeer sardine?  
Tosh—What is a racketeer sardine?  
Soph—One that always winds up in the can.

6. A highway improvement program divided into two general classes of projects: (1) Those of the emergency type, and (2) Those for the long-time plan.
7. A plan of State and Federal safety organization adequate to secure on a wide scale the adoption and enforcement of the action program here proposed.
8. A national education program.

## Amirigo Bozzani

(Continued from page 8)

Car Company was established and this later became Bozzani Motors, Ltd.

In 1918 the Bozzanis took over the selling of popular makes of automobiles. The first year their sales totaled only fifty cars, but by 1929 they were selling an average of 2500 automobiles a year and employing 125 persons. Bozzani Motors, Ltd., is considered one of the outstanding automobile organizations in Los Angeles.

Mr. Bozzani for years has taken an active part in the civic life of Los Angeles. He is a member of Elks Lodge No. 99, Pentaptha Lodge No. 202, F. & A. M., Jimstian Grotto No. 76 of the Masons, Al Malakiah Temple of the Shriners, the Los Angeles Consistory Scottish Rite and the Chamber of Commerce. He is a member of the Jonathan Club and is on the advisory board of the Bank of America. He is president of the Garibaldi Society, the oldest and largest Italian lodge in California.

In 1932 Mr. Bozzani was chairman of the Southern California Division of the Italian-American Democratic Committee and from 1934 to 1938 was chairman of the State of California for the Italian-American Democratic Division. In 1936 he was a delegate to the Democratic National Convention in Philadelphia and is a member of the Democratic State Central committee.

## Eight-point Plan for Road Safety

Thos. H. MacDonald, Chief of the U. S. Bureau of Public Roads, has outlined an eight-point plan for increasing highway safety.

1. Uniform State motor vehicle traffic laws.
2. Skilled investigation of traffic accidents.
3. The establishment of a uniform system of accident reporting.
4. The establishment of an adequate highway patrol including the official inspection of vehicles.
5. The establishment of complete

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**Department of Public Works**

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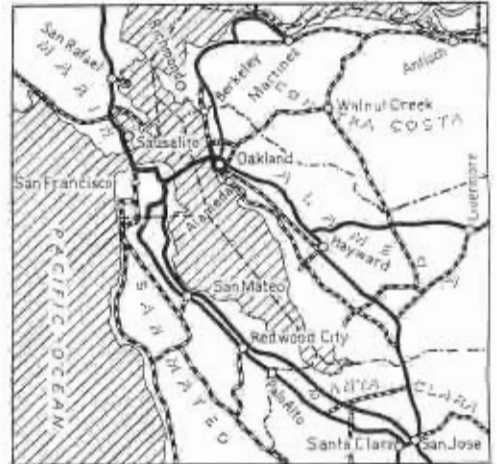
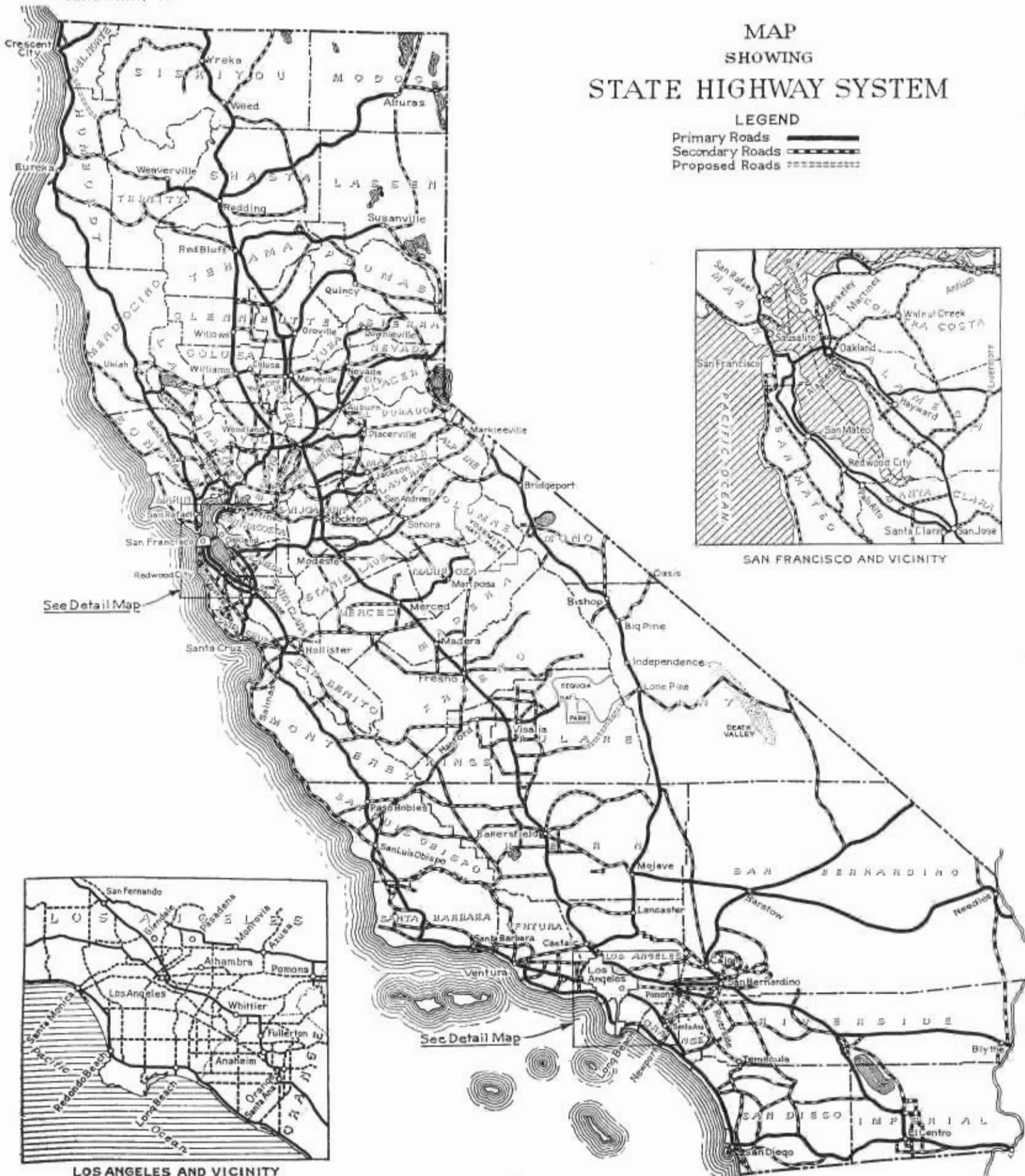
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MAP  
 SHOWING  
**STATE HIGHWAY SYSTEM**

**LEGEND**

- Primary Roads
- Secondary Roads
- Proposed Roads



**SAN FRANCISCO AND VICINITY**



**LOS ANGELES AND VICINITY**

See Detail Map

See Detail Map