

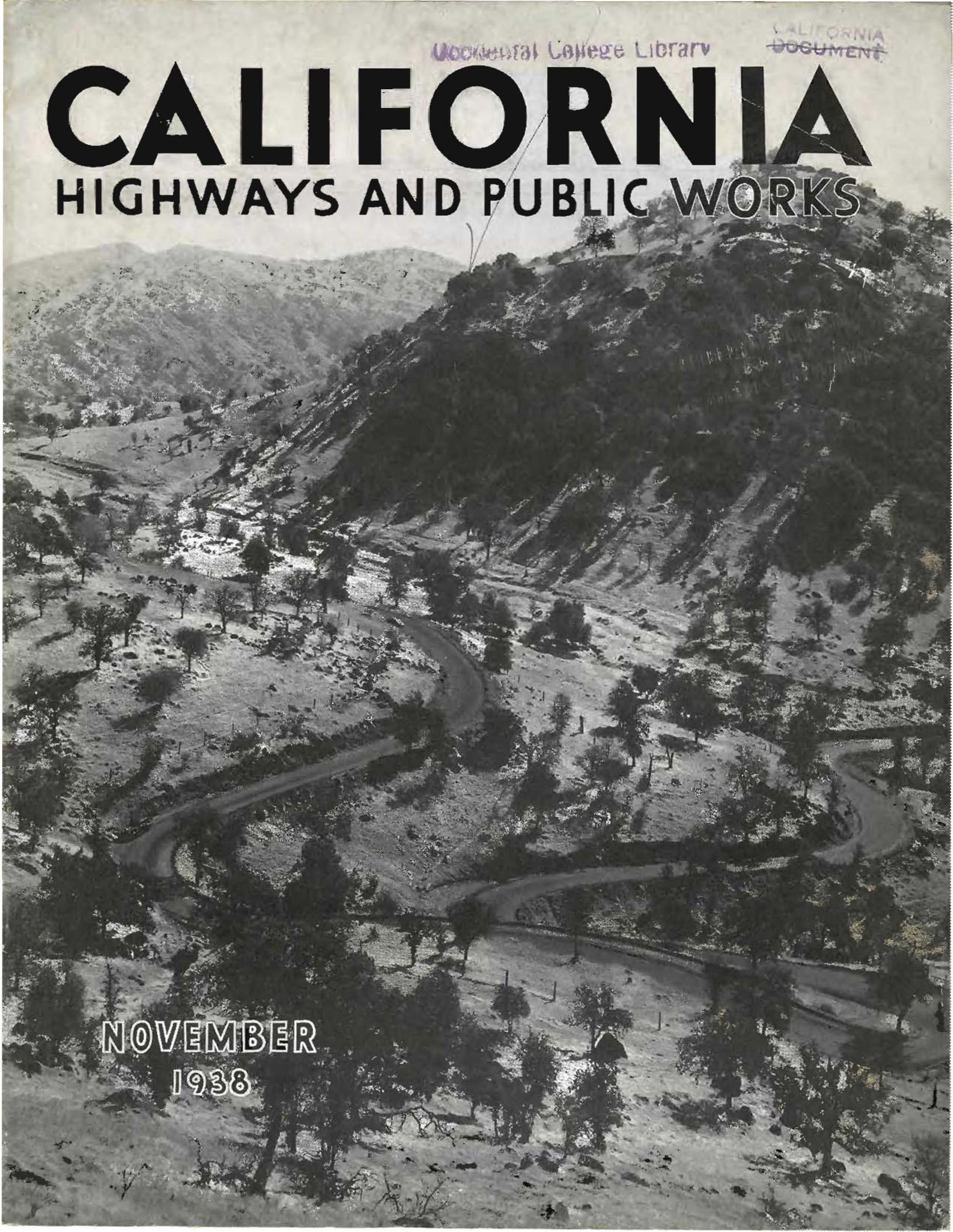
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# CALIFORNIA

## HIGHWAYS AND PUBLIC WORKS

NOVEMBER  
1938



# CALIFORNIA HIGHWAYS AND PUBLIC WORKS

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

EARL LEE KELLY, Director C. H. PURCELL, State Highway Engineer JOHN W. HOWE, Editor K. C. ADAMS, Associate Editor

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# Important Highways in District VI Will Require Large Expenditure to Provide Adequate Service

By EARL T. SCOTT, Acting District Engineer

**T**HE greater part of the productive San Joaquin Valley is included in District VI of the Division of Highways. This district covers one-eighth of the area of California and embraces five counties: Madera, Fresno, Kings, Tulare and most of Kern.

The area composing the district extends for nearly two hundred miles from the Tehachapi Mountains in the south to the Merced County line at the north, and from the Coast Range Mountains on the west to the high Sierra which flank the entire easterly boundary.

Between these mountainous confines on the east, south and west an intricate network of roads and highways serves the broad San Joaquin Valley with its varied agricultural interests and active oil industry. The main trunk of this network is State Route 4 (U. S. 99) which extends from the southerly limits to the north in almost a straight line for 189 miles. This 189 miles is an important part of the transportation route which connects the metropolitan area of Los Angeles with Sacramento and the San Francisco Bay region. Feeding this major traffic artery, and extending out into the cotton and grain fields, the vineyards, the oil fields and mountain recreational areas, the secondary highways bring the district's State highways to a total of 1580 miles.

This total mileage is improved to the following extent:

- 38 miles, or 2%, unimproved and unoled earth roads.
- 604 miles, or 38%, oiled earth roads.
- 15 miles, or 1%, graveled roads with light oiled surface.
- 281 miles, or 18%, intermediate type of surface.
- 642 miles, or 14%, of high type pavement.

While the percentage of high type pavements in this district is high, on much of this mileage the roadway widths are inadequate to properly carry the traffic imposed upon them.

U. S. Route 99 in this district, known locally as the Golden State Highway or Valley Route, carries an average of 6647 vehicles for a 16-hour period, reaching a maximum of 11,256 vehicles at the south city limits of Fresno. Of this average volume over 16% are trucks, and in addition to the trucks over three dozen through motor busses travel the route between 6:00 a.m. and 10:00 p.m.

On this highway may be seen truck and trailer loads of a very large variety of commodities. Huge loads of grapes are trucked to wineries, as about one-half the vineyard acreage of California is to be found in this district. Truck and trailer loads of cotton, oranges, grape fruit, wheat, barley and deciduous fruits of various varieties reaching this artery over the secondary highways add to the congestion.

While more than 22 miles of this route will soon be completed as an adequate four-lane pavement, there still will remain 118 miles of 20-foot pavement and 49 miles of 30-foot pavement which should be widened to four divided lanes before this important highway will safely and adequately carry the increasing volume of traffic. Such improvement is estimated to cost about \$13,166,000.

## Heavy Traffic Flow Needs Wider Roads



Top—Steep, narrow mountain grade east of Dunlap on State Highway 41, Fresno County. Center—Heavy truck and trailer loads of oil field equipment subject Route 138 to hard surface wear. Bottom—Lumber trucks on narrow grade of Route 76.



Top—Hauling 68,000-pound load on oil-field road near Rosedale in Kern County. Center—One-way bridge across the San Joaquin River, limited to eight tons, on State Highway 125, the Yosemite Highway north of Fresno, leading to the southern entrance to Yosemite National Park. Bottom—Truck and trailer loads of baled cotton on State Highway 135, an oiled earth surface road.



Although the intermediate and lower type of roads make up 59% of the district's mileage, the volume of traffic imposed upon most of these roads justifies their improvement to higher standards. The traffic count of last July shows a considerable increase over the count of July, 1937. At some stations, particularly on the west side of the district on highways leading to the oil fields, the count was double that of last year.

These roads, most of them classified as oiled earth, carry the heavy trucks and trailers transporting oil well supplies and oil well products. The importance and volume of such traffic can be realized when it is considered that 44% of the oil produced in California comes from three of the five counties making up this highway district, namely Kern, Kings and Fresno.

The present oil fields will produce for many years to come and new fields are being developed. The State highways serving these fields are inadequate and as funds become available these narrow, winding and rolling oil earth roads must be improved if the traffic is to be properly served.

In the westerly section of the district many miles of State highways, constructed by counties and later taken into the State system, were built on low grade lines and are subjected to flooding every year. Many of these roads parallel large ditches, with the pavement surface often several feet below the water level in the ditch. Seepage from the ditches keeps the subgrade saturated most of the year and maintenance crews can not keep pace with the surface failures that occur. Only raising of the height of the roadbed with imported borrow material can put these highways above the water and stop the excessive maintenance costs.

On State Route 142 the flow of traffic to Oildale and the oil fields to the north of Bakersfield is heavy, being in excess of 11,000 vehicles for



Top—State Highway No. 41, in Fresno County, near Mendota, is subject to flooding every winter causing excessive maintenance costs. Center—Tank truck and trailer on Bakersfield to Mohave highway, all-year route from California to Arizona, a narrow, winding road with many curves. Bottom—Truck waiting for passenger car to cross one-way bridge near Firebaugh in Fresno County.

the 16-hour period. The two lane pavement and the long, narrow two-way bridge across the Kern River are required to carry this large volume of traffic and the presence of many heavy trucks contributes to the severe traffic congestion which occurs daily. A wider pavement and a new bridge, either on this route or on an alternate route, should be provided.

Extending along the easterly side of the valley the high Sierra provide many recreational areas. Two of California's four National Parks, General Grant and Sequoia, lie entirely within this highway district. The southerly entrance to Yosemite National Park and a part of this popular Park are also in this district. Thousands of motorists annually visit these National Parks, and the many lake and mountain resorts.

These tourists come from all parts of California and from all sections of the United States. Safe and adequate highways should be provided for this traffic, but unfortunately, many of the highways leading to the recreational areas which were built by the counties are still narrow and crooked. The road surfacing is usually of the lower types and requires constant and expensive maintenance.

Snows block most of the roads in these mountain districts during the winter months and many remain closed for long periods as sufficient funds are not available for snow removal on all routes. Requests and petitions are received each year from various organizations for snow removal on the highways leading into winter sports areas which are not kept open, but such requests must be denied until more money is at the disposal of the Division of Highways for this work.

To keep up with the increasing volume of traffic on the State highways in the district, to provide adequate roads for the "farm to market" and "oilwell to market" trucks,

(Continued on page 24)





Narrow Newhall tunnel through Santa Susana Mountains is being transformed into open cut as indicated by dotted line.

# Eliminating a Tunnel Bottleneck

By R. C. MYERS, Assistant District Office Engineer

**T**HE Newhall Tunnel on State Highway 23 (U. S. 6) in Los Angeles County, which for years has presented one of the most annoying highway bottleneck conditions in Southern California, is rapidly being eliminated as a hazard and inconvenience to traffic.

This famous tunnel, which has served nearly three decades of traffic, was built in 1910 to replace the historical Fremont Pass Cut through the Newhall range of mountains. The tunnel, which has a bore of only 17 feet, 5 inches, was a great improvement over the old one-way road through the narrow Fremont Pass at the time of its construction and was entirely adequate for the then existing traffic and for several years thereafter.

However, traffic rapidly increased and soon the tunnel, which only pro-

vided two narrow lanes for traffic, was entirely inadequate for the tremendous volume of automobile travel using the road.

The normal traffic between the Los Angeles area and the Owens River and Antelope Valley regions was quite heavy, amounting to about four thousand cars per day, but the bottleneck condition was greatly aggravated on Sundays during the wild flower season in Antelope Valley and during the winter sports season at the Los Angeles Playground at Big Pines.

#### MLE LONG BLOCKADE

On certain of these days as many as twenty thousand cars passed through the tunnel in nine hours. For four hours during one of these days there was an average of three thousand cars per hour passing through the tunnel. Traffic was

blocked for more than one mile back of the tunnel causing an intolerable traffic condition.

Under the present improvement, the hill above the tunnel is being removed forming an open cut of sufficient width to easily handle present-day traffic on this highway. While the elimination of the tunnel is one of the most important features of the present project, it is only part of a 3.73 mile contract which extends from Tunnel Station, where this highway leaves San Fernando Road, to Placerita Canyon on the so-called Mint Canyon Short Cut.

The old highway from Tunnel Station to a point about four-fifths of a mile north of the Newhall Tunnel is being thoroughly modernized by improving alignment and widening the roadbed. From this point



Newhall tunnel cut as it appeared with mountain slopes excavated permitting traffic to proceed beside and over the old bore.

(four-fifths of a mile north of the tunnel) the road bears to the right on new alignment on what is known as the new Mint Canyon Short Cut toward Solamint on the Mint Canyon Highway.

#### SAVES 5.42 MILES

This will roughly form one side of an equilateral triangle of which Saugus and Solamint are the other two vertices. By cutting across on this side of the triangle a saving in distance of 5.42 miles will be affected and all traffic on U. S. Highways 395 and 6 from points East via Reno and Owen's Valley to Los Angeles will be saved this distance. The present contract extends as far as Placerita Canyon, leaving a distance of three miles from Placerita Canyon to Solamint to be constructed under future contract.

Work on the entire contract is proceeding satisfactorily although it is found necessary to considerably flatten the cut slope on the easterly edge of the old tunnel to secure proper stability on account of the badly broken up condition of the formation and the slope of the bedding planes on this side. The westerly side of the cut is in very stable formation with the bedding planes so sloped that there is practically no danger of slides.

#### COMPLETED IN SPRING

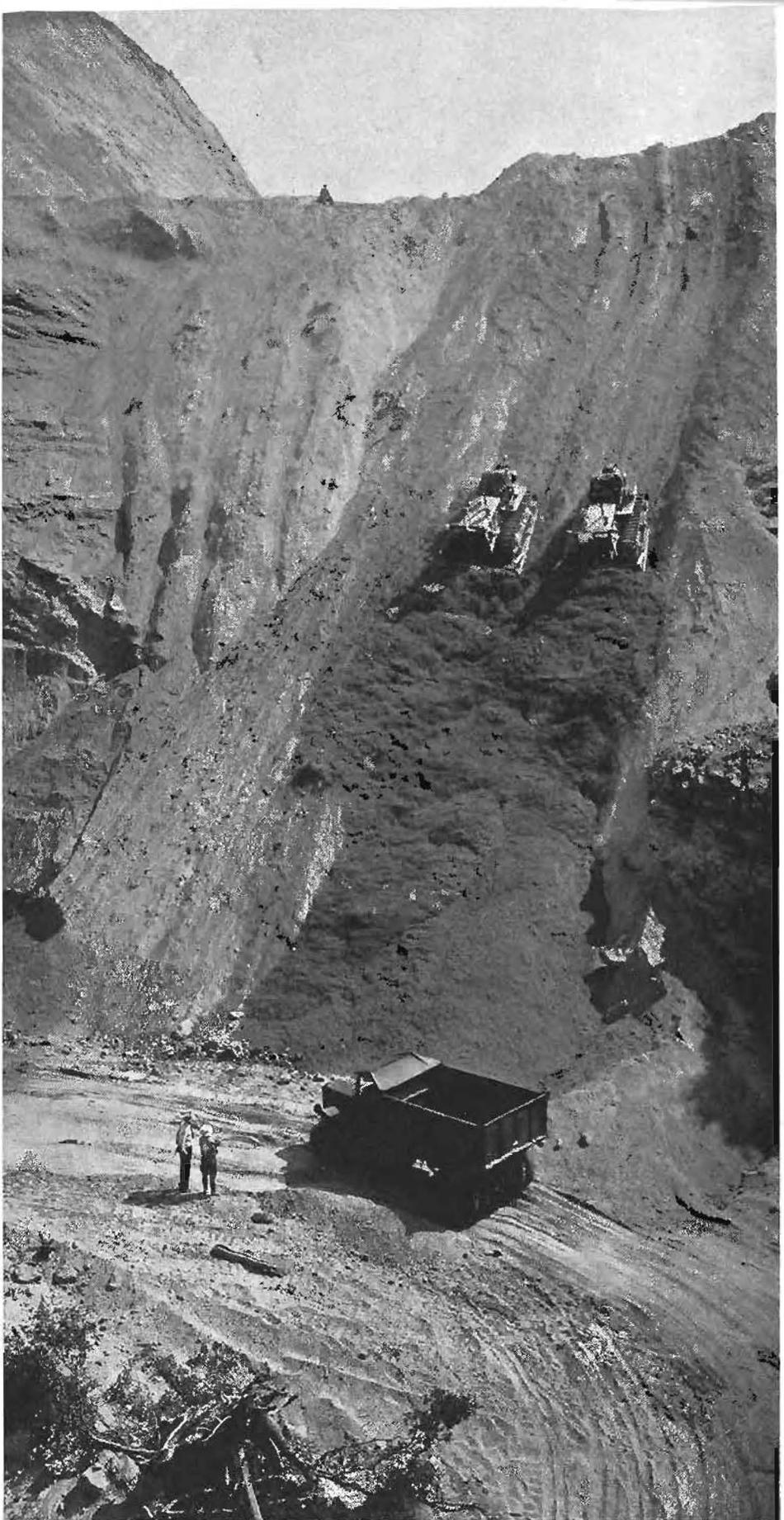
Removal of the concrete tunnel lining, although somewhat delayed by slides on the easterly side of the cut, is expected to be completed by the latter part of this year and the present contract should be completed early next Spring.

The cost of the present contract will be in the neighborhood of \$410,000 and will involve upwards of 550,000 cubic yards of excavation, more than half of which will be made at the tunnel cut. The Griffith Company of Los Angeles are the contractors.

For the portion of the road between Tunnel Station and the point where the Mint Canyon Short Cut leaves the present road to Newhall, the highway is designed for exceptionally heavy traffic and will consist of four traffic lanes with a raised curb dividing center strip 4 feet wide and wide plant-mixed shoulders.

The two center traffic lanes nearest the dividing strip will be 12 feet wide each of plant-mixed surfacing. Out-

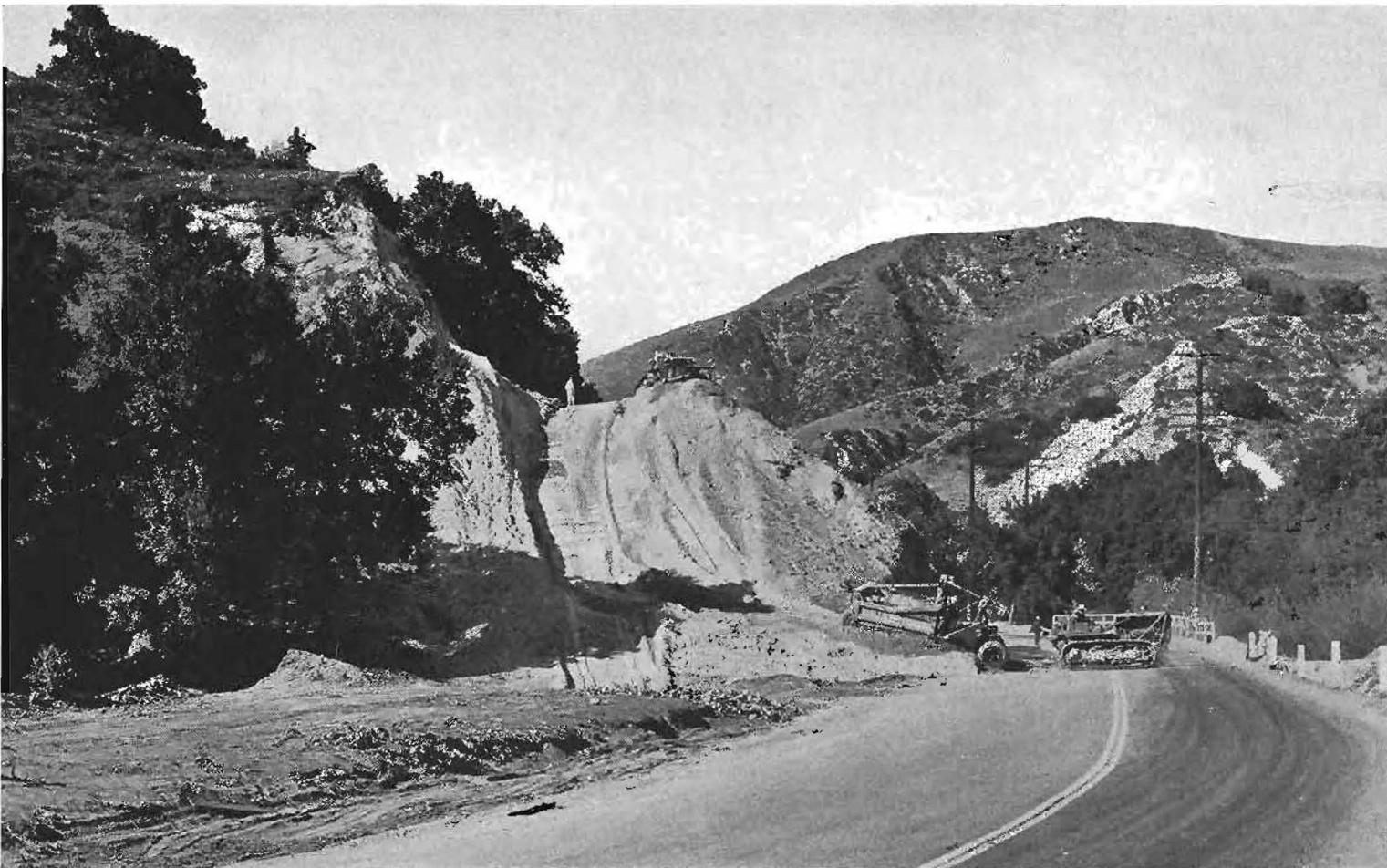
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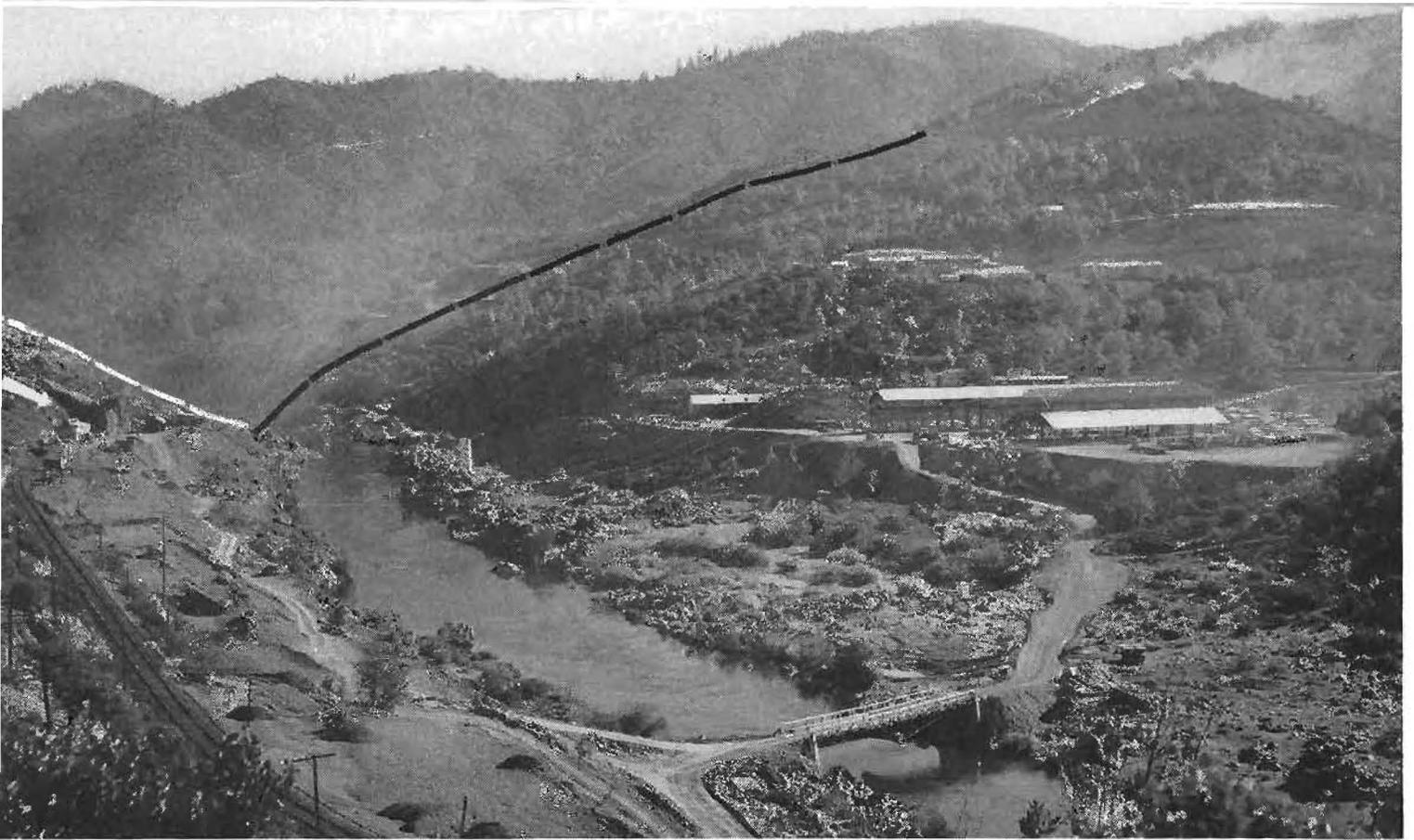


Newhall cut involved about 300,000 cubic yards of excavation. Tractors pushing dirt down for removal by shovel and truck.



Construction scene on new highway known as Mint Canyon cut-off east of the old Newhall tunnel site. Lower photo shows widening operations eliminating a sharp curve on present approach road to old tunnel site.





View of Shasta Dam site looking up stream. Solid black line and white dash line show where dam will be built across Sacramento River. Arrow indicates portal of diversion tunnel under construction.

# Dedication of the Shasta Dam

STATE OFFICIALS, some of whom have been for more than fifteen years working toward and looking forward to the day when the Sacramento River could be harnessed, joined with high Federal dignitaries in celebrating at Redding on Saturday, October 22, the start of large scale operations on Shasta Dam, key unit of the great Central Valley Project.

Representing President Roosevelt, Secretary of the Interior Ickes, accompanied by John C. Page, Commissioner of the United States Bureau of Reclamation, came from Washington to play the leading part in the ceremonies attending the formal official launching of the \$170,000,000 undertaking which will mean so much to California in water conservation, flood control and the development of hydroelectric power. Sharing honors with Secretary Ickes and Commissioner Page, was Walker R. Young, Supervising Engineer of the Bureau of Reclamation.

The ceremonies were attended by

many prominent officials and citizens from all parts of the Central Valley, who have worked unselfishly for years in the interest of the project. Among those present were Congressmen Harry L. Englebright, in whose district the Shasta Dam is located and Albert E. Carter, representative from Alameda and Contra Costa counties. Both of these Congressmen have worked unceasingly to secure congressional authorization and appropriations for the project.

State Senators Bradford S. Crittenden, John B. McColl, James Wagy and Charles Deuel and Assemblyman Clinton J. Fulcher participated in the ceremonies. The Central Valley Project Association was represented by Clarence Breuner, Chairman, Ralph Kern, Floyd Booe and James R. Fauver. The City and County of Sacramento were represented by James Dean, City Manager, and Charles Deterding, County Executive, respectively. The Southern Pacific Company was represented by J. H. Dyer, W. H. Kirkbride, E. E. Mayo and

J. E. Given. G. B. Hjelm, U. S. Attorney for the Northern District of California, A. L. Conard of Red Bluff, William Johnson, Pacific Contractors, Inc., and Warren N. Woodson of Corning, active supporters of the project, attended the dedication.

Arriving from San Francisco, Secretary Ickes and his party were greeted at the athletic field of the Redding High School Saturday afternoon by a large audience, including many federal, state, and municipal officials. Speech making was confined to an address by Secretary Ickes, short talks by Commissioner Page and Mr. Young, and a welcome extended by Judge Francis Carr of Redding who was a member of the Water Commission of the late Governor James Rolph, Jr. The program of speaking and musical renditions by the Redding Municipal and Shasta Union High School bands was necessarily limited because Secretary Ickes had to entrain for Portland Oregon, and a visit to Bonneville and Grand Coulee dams. Immediately following

the ceremonies, Secretary Ickes and his party inspected the site of Shasta Dam near Kennett, transformed within a few months time from an almost inaccessible mountain site covered with manzanitas and chaparral into an area teeming with life and bustling with construction activities.

The start of actual work on Shasta Dam, preceded by building operations on the Contra Costa canal in Contra Costa County, marked the realization of a dream that California engineers have had for more than a quarter of a century. Participating in the celebration were Earl Lee Kelly, Director of the State Department of Public Works and Chairman of the Water Project Authority of California, representing Governor Frank F. Merriam, and Edward Hyatt, State Engineer, who has devoted 17 years of untiring effort to achieve the Central Valley Project. With Mr. Hyatt, were members of his staff, including A. D. Edmonston, Deputy State Engineer, several of whom have devoted many years in working out plans for the huge project.

Generous recognition of Mr. Hyatt's efforts was given from the speakers'

platform by Mr. Young when he said, in introducing him: "I wish to introduce Mr. Edward Hyatt, State Engineer of California, who has had as much to do as any man living in making this project possible."

Mr. Young said that he regretted that Colonel R. B. Marshall, known in the engineering profession as the father of the Central Valley Project, was not able to be present at the celebration.

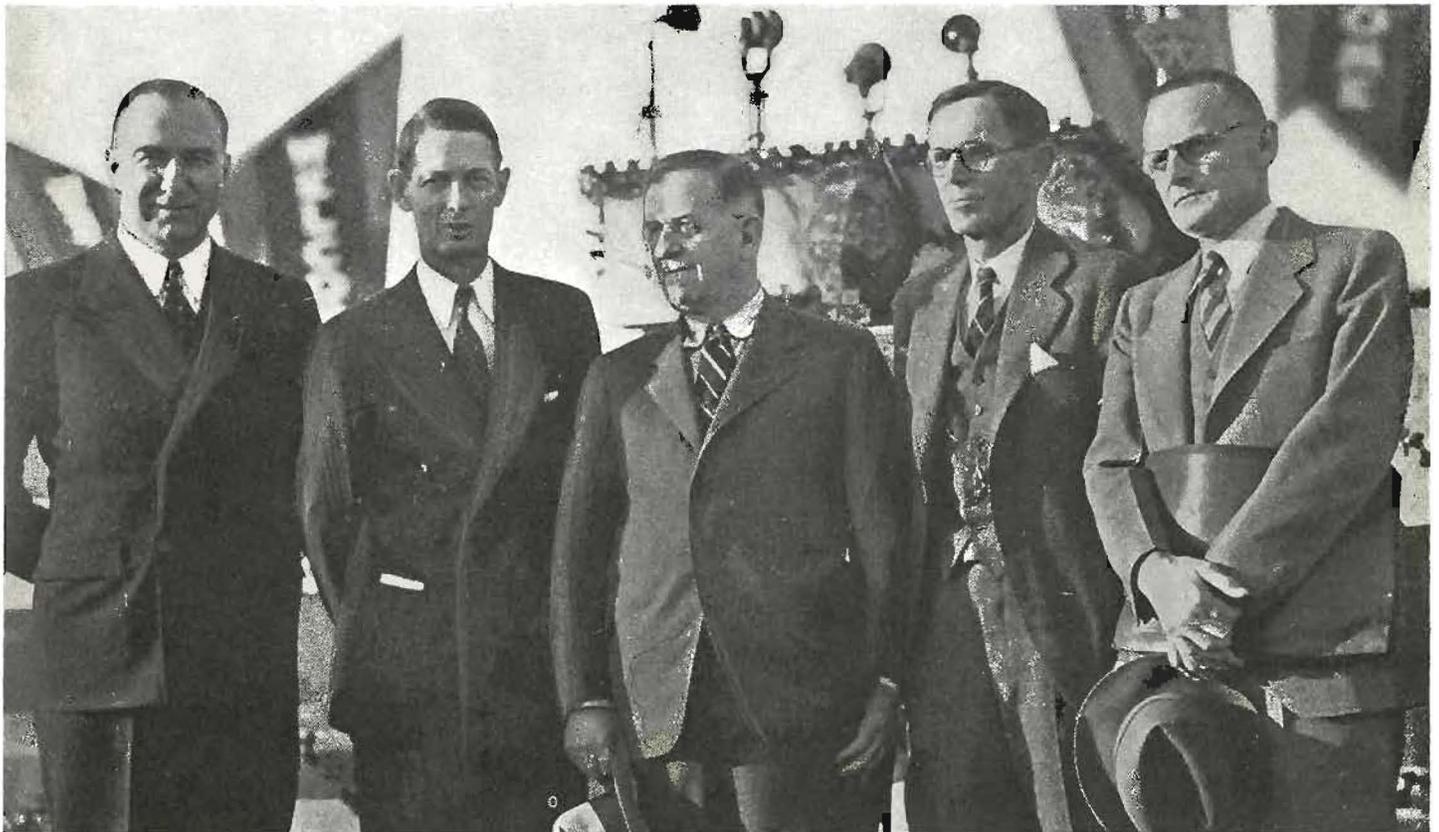
Shasta Dam and the Central Valley Project, Secretary Ickes said in his address, is the federal government's emphatic protest against the squandering of precious natural resources. Pointing out that of the three million acres now under irrigation in the Central Valley area more than one million acres face acute water shortage and abandonment, Secretary Ickes said, "Time was when we fostered a policy of exploitation in order to promote expansion westward and to speed development, but settlement of the west and elimination of the frontier borders have removed this excuse, which was lame at best."

"The day of exploitation is past. We must stop squandering our pre-

vious natural resources and must begin diligently to conserve them by careful planning and systematic effort. Unplanned and unregulated exploitation of a limited water supply has brought parts of the rich area of the Sacramento and San Joaquin Valleys face to face with retrogression. Many acres, once lush in crops, have been abandoned and permitted to revert to desert. This condition can not be permitted to endure. The nation has been slow to realize the vital change in the status of our natural resources which has followed the development of the country."

Secretary Ickes said there was no doubt that additional appropriations for the project will be forthcoming.

"The present administration in Washington is solidly committed to the Central Valley Project development," he declared. "Its construction has been fully authorized by Congress and funds made available to date total \$36,900,000. There are two particular reasons why the Central Valley Project is considered meritorious by the federal government. One is that it is a multiple purpose project. It will conserve and regu-



Secretary Harold L. Ickes, Department of Interior, posed with Federal and State officials at Shasta Dam dedication ceremonies. Left to right—Earl Lee Kelly, Director of Public Works; John C. Page, U. S. Reclamation Commissioner; Secretary Ickes; State Engineer Edward Hyatt; Walker R. Young, Supervising Engineer, Bureau of Reclamation.

late the waters of the Sacramento and San Joaquin rivers for the restoration of navigation; the control of floods; the improvement of irrigation; the control of saline encroachment and the generation of electric power. It would be difficult to conceive of a catalog of more diversified and useful purposes.

#### PRIDE IN DEDICATION

"The other outstanding feature is the fact that it is to be self-liquidating. This is a statutory requirement for every federal reclamation enterprise. I find that the project is feasible from engineering, agricultural and financial standpoints, that it is adaptable for settlement and farm homes; that the estimated construction cost is adequate, and that the anticipated revenues from the sale of water and power will be sufficient to return the cost to the United States.

"It is with great pride that I proclaim the start of heavy construction on Shasta Dam, and dedicate the Central Valley Project to the cause of conservation. The work already proceeding night and day at Shasta Dam site is the beginning of an accelerating program that will command world wide attention.

"Every shovelful of earth and every beat of a jackhammer will bring us closer to the day when the gates and valves of Shasta Dam will be operated to control the flow of the Sacramento River, and when the turbines will be set in motion to turn the electric generators. That day promises the dawn of a new and more glorious Central Valley empire whose manifest destiny of wealth and social well-being will not be denied."

Mr. Young acted as chairman of the day, introducing the speakers and distinguished guests. Describing the scope of the Central Valley Project, he said, "It is not generally known that the Sacramento is a mightier stream than the Colorado. Today the river is at a relatively low stage, but the Sacramento's mean annual runoff is 21 million acre feet compared with the Colorado's 16 million acre feet. The combined annual discharge of the Sacramento and the San Joaquin Rivers into the ocean has averaged 30 million acre feet, water enough to cover every irrigated area in the Central Valley to a depth of ten feet.

"The valley's water supply is ample in quantity; it needs only proper sea-

sonal and geographic distribution. Behind Shasta's wall of concrete will be stored 4,500,000 acre feet of water. This storage capacity will permit the operation of the reservoir for multiple purposes of conservation. It will stabilize the flow of the Sacramento River to diminish the damaging flood peaks in the spring; to eliminate extreme low flow in the fall; to permit a restoration of steamboat and barge navigation as far up the river as Red Bluff; to afford improved irrigation in much of the Sacramento Valley; and to check seasonal encroachment of salt water into the channels of the Sacramento-San Joaquin delta."

#### AN ARDENT CHAMPION

Commissioner Page, who has been and is an ardent champion of the Central Valley Project, spoke briefly preceding Secretary Ickes. It was Commissioner Page who, on January 25, 1937, following extensive independent investigations by the Bureau of Reclamation, finally selected and approved the Shasta Dam site, then known as the Kennett Dam site, as the main storage unit on the Sacramento River. His action upheld State Engineer Hyatt's recommendation to the legislature in 1931 after extensive investigations that the Kennett site be selected. Prior to recommending the present location of Shasta dam, the State Engineer and his assistants investigated all possible reservoir sites in the Sacramento River basin, including those on main tributaries as well as on the main stream. Shasta Dam site was chosen by the State as a result of the preliminary studies and investigations on the basis of a clear showing of its greater economy and superiority as compared to any other possible storage site.

The Water Project Authority of California under the directions of Public Works Director Kelly is actively assisting and cooperating with the Bureau of Reclamation as the official administrative agency of the State, created by the Central Valley Project Act of 1933 and charged with the responsibility of constructing the Central Valley Project. The technical work of the authority is handled by the engineering staff of the Division of Water Resources under the State Engineer. The work of the State has included the designation and approval of the general engineering plans for the project, and

the negotiations for the acquisition of water rights and rights of way. Other important activities are concerned with the disposal and sale of water and electric power to be made available by the project.

Shasta Dam will be one of the largest in the world, ranking with the recently completed Boulder Dam on the Colorado River and the Grand Coulee Dam now under construction on the Columbia River in the State of Washington. It will rise to a height of 500 feet above present low stream level and 560 feet above the lowest foundation. Its length along the crest will be 3,500 feet. It will be a "gravity type" massive masonry structure, slightly curved in plan, requiring more than 5,600,000 cubic yards of concrete.

#### IN PRELIMINARY STAGES

Most of the work now being done at Shasta Dam is of a preliminary nature, including construction of roads, offices, power lines, camp buildings, and similar facilities. Pacific Constructors, Inc., contractors on the job, are rushing work on the excavation for the dam foundations and erection of necessary shops and other structures, and the camp on the east slope of the Sacramento River Canyon that will handle dam workers.

Secretary Ickes and his party found the main dormitory to house 172 men nearly completed. Clearing work is under way for construction of additional dormitories, and a dining hall which will accommodate 312 men. An electric kitchen will operate 24 hours a day to feed crews when construction is fully under way. Night and day shifts are engaged on the 1820-foot diversion tunnel which will serve as a temporary right of way for the Southern Pacific Railroad and later as a river diversion conduit during dam construction.

#### DIVERSION TUNNEL UNDER WAY

When Secretary Ickes visited the site the bore had progressed about 300 feet into the south head, while other crews were engaged in excavating the portal of the north head. Excavation has begun for the dam with power shovels operating at various elevations. These shovels will soon be augmented by three 6-yard electric shovels. Each of these shovels is capable of excavating over six tons of material at a scoop. It is estimated that more than three



State Water Department officials at Shasta Dam site: Left to right—George T. Gunston; Everett N. Bryan; R. L. Jones; H. M. Stafford; A. D. Edmonston; Edward Hyatt; T. B. Waddell. Black dashes on hillside indicate foundation lines of upper and lower faces of dam.

million cubic yards of earth and rock will be removed from the slopes of the canyon to provide a suitable foundation for Shasta Dam. Some of the material excavated has been used to grade construction roads, some has been dumped into gullies to provide level spaces for the contractor's camp, and the rest has been deposited into stock piles of various grades for future use in embankment construction.

Above the dormitory site work is proceeding on the contractor's administration building, with offices, drafting rooms and other facilities. Also under construction is a hospital which will contain a twenty-bed ward, four private rooms, and surgical and first aid rooms. Residences will be located nearby. Plans call for construction

of eleven 5-room houses, fifty 3-room houses, and seventy-two 2-room structures. The contractor's work shops and railroad yard, which will include a combined warehouse and garage, machine shop, carpenter shop, compressor plant, drill forge and foundry sheds, will be located on a flat near the river. Three miles east of the dam site is located the Bureau of Reclamation camp, including five official buildings, 46 family residences, 27 duplex cottages and two dormitories. Also under construction are the government warehouse and power facilities. A substation to provide electricity for construction uses is being erected on the west bank north of Coram. Power lines are rapidly being built throughout the area.

About 700 men are employed by Pacific Constructors, Inc., awarded the general contract to furnish labor and equipment for construction of Shasta Dam under supervision of Bureau of Reclamation engineers. Ralph Lowry is the Government's construction engineer and Frank T. Crowe is the contractor's general superintendent on Shasta Dam.

About 200 men are employed by the Colonial Construction Company which has a contract to drive an 1820-foot tunnel through the west abutment of the dam site. Sam Bergstrom is the tunnel superintendent.

Approximately 1071 men are employed at the Shasta Dam site with an additional 25 or 30 men engaged in construction of a warehouse.

# New Tahoe-Ukiah Highway Link With By-Pass Bridge Completed

**T**HE dedication on Sunday, October 16, of the new bridge and highway near Sutter, which is about ten miles west of Marysville, attracted a crowd of approximately 3,000 persons. The opening of this section of road marked the completion of another step in the program of improvement planned for the Tahoe-Ukiah Highway, State Route 15, which is rapidly developing into one of the most important cross laterals in the State Highway System.

Beginning at high noon, an impressive dedication service was conducted by the Grand Officers of the Native Sons of the Golden West. With Grand President Joseph J. McShane

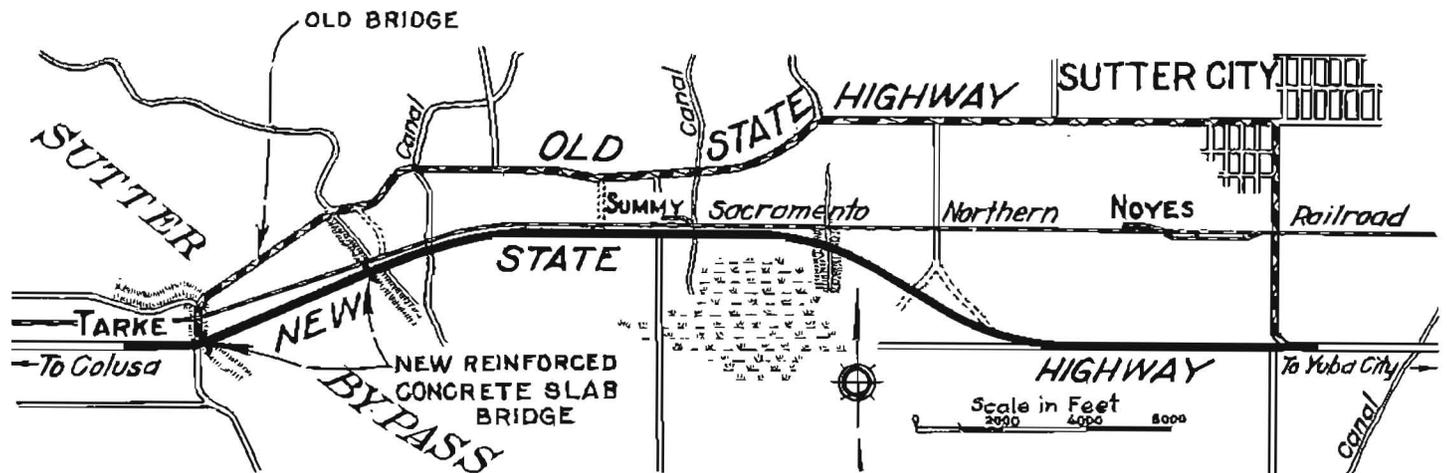
traffic and would always be used safely. Then, with the wish that traffic might always flow freely over the new project, he severed the ribbon and opened the road to public traffic.

The official caravan, followed by many private cars, then drove across the new bridge. After inspecting the project the large crowd gathered under the new bridge, where a fine barbecue had been prepared under the auspices of the West Sutter Men's Club, of which Frank Ettl is president. The main dish of the feast was barbecued buffalo, the buffalo meat having been secured specially for the occasion from Nebraska.

Before the food was served, con-

traffic of the present. There were many bad curves, among them four at right angles. The bridge across the Sutter By-Pass was very narrow and its westerly approach was particularly dangerous, involving a short, steep grade, two right angle turns and a grade crossing of the Sacramento Northern Railway.

The new project, which is 5.5 miles long, extends from Tarke to one mile south of Sutter. Constructed entirely on new alignment, it is about 1¼ miles shorter than the old road. Since it traverses flat, open country rather than skirting the Marysville Buttes, as did the old road, it was possible to eliminate all the bad curvature. The minimum radius of



of San Francisco presiding, a bronze plaque was set in the east end of the new bridge over the Sutter By-Pass. The mortar used in setting the plaque was made with sand gathered from all the counties of the State, cement from all the California cement plants, and water from all the historic missions in the State.

After this ceremony Governor Frank F. Merriam gave a short talk, emphasizing that projects such as the one being dedicated were made possible by the gasoline tax. He discussed briefly the growing importance of the Tahoe-Ukiah Highway as an east-west lateral and expressed the hope that the new link would prove to be a real convenience to public

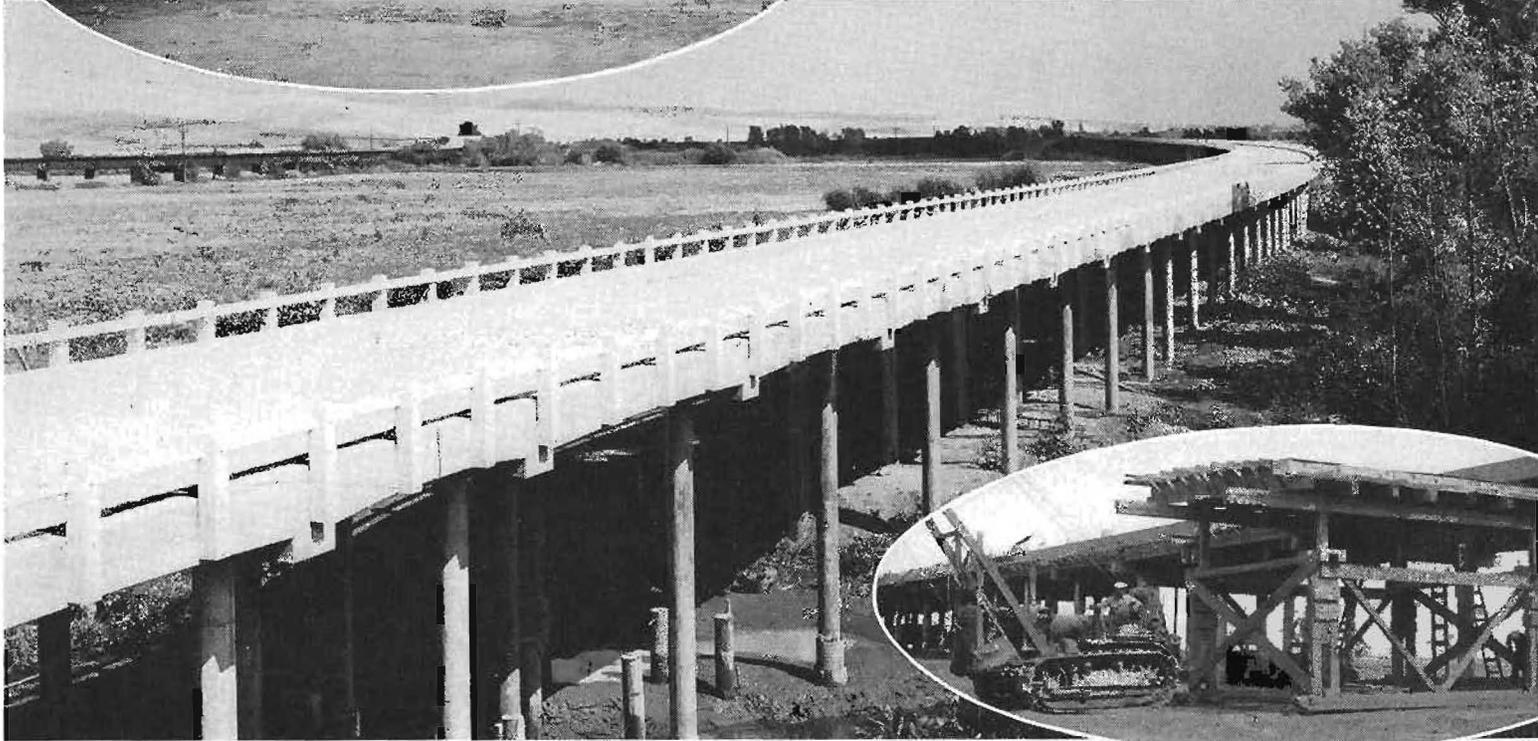
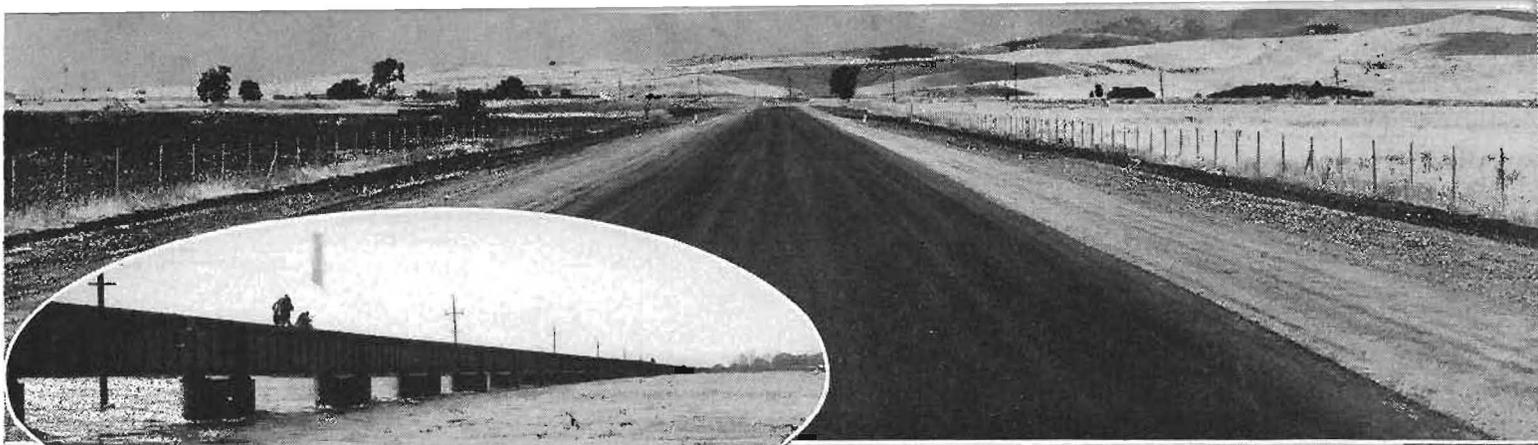
gratulatory remarks were made by several of the more prominent guests, among whom were Director of Public Works Earl Lee Kelly, State Senator George Biggar, State Senator W. P. Rich, Walter Scott Franklin, and Joseph J. McShane. Governor Merriam was again presented and talked for a few minutes on the great increase in traffic demands during the past 25 years.

The project dedicated supplants a county-built road which was taken over by the State in 1926. While the road was satisfactory for the traffic demands at the time it was built, it possessed several features which made it entirely inadequate for the higher speeds and heavier

curvature on the new construction is 5,000 feet, the maximum central angle being 34 degrees. In designing the new alignment, it was also found possible to eliminate the two grade crossings of the Sacramento Northern Railway.

The surfacing on the project consists of plant-mixed bituminous treated crushed rock 22 feet wide by 0.21 of a foot thick, on a crusher run base 23 feet wide by 0.4 of a foot thick. The total width of the graded roadbed is 36 feet.

Included within the limits of the project is a new reinforced concrete slab bridge, 4,149 feet in length and providing a clear roadway width of 24 feet between curbs. This modern



At top, section of new Tahoe-Ukiah lateral realignment. Center—New reinforced concrete bridge across Sutter By-Pass. Upper inset shows flood water conditions. Lower inset shows jumbo moving falsework unit of deck span. At bottom, left to right, State Senator W. P. Rich; Miss Stuart Franklin; Public Works Director Earl Lee Kelly; District Engineer C. H. Whitmore; N. L. Nagler; Governor Merriam; Frank Ettl; Parker Reische; Judge Coates; Maitland Pennington; Dr. W. S. Franklin.



New concrete bridge across Sutter By-Pass on Tahoe-Ukiah Lateral is 4149 feet long and 24 feet wide between curbs.

new structure replaces the old narrow one which was very inadequate for present-day traffic.

The grading and surfacing contract was completed at a cost of approximately \$140,000, the work being done by Hemstreet and Bell. Mr. W. G. Remington was resident engineer for the State.

The cost of the bridge, which was built concurrently under a separate contract, was about \$230,000. The contractors were Heafey-Moore Co., Fredrickson and Watson Construction Co., and Fredrickson Brothers. The resident engineer for the State was Mr. W. H. Johnson.

#### CONTAINS 190 SPANS

The structure contains one hundred and sixty-seven identical 22-foot spans and twenty-three identical 15-foot spans. It is of a continuous concrete slab construction supported by concrete pile bents containing three piles per bent. This large number of identical spans and the comparatively smooth condition of the stream bed made it possible for the contractor to devise a unique and interesting construction method.

The first twenty-eight 22-foot spans and the first four 15-foot spans were constructed by the usual method. The falsework for the remainder of the spans was designed as a unit so

that each unit could easily be set up and taken down. Each unit was entirely supported by the columns. This was accomplished by the use of 6-inch by 8-inch by 3-foot 3-inch timber blocks milled to fit the circular columns which were bolted on each side of the columns with three 1½-inch bolts. These blocks supported the 6- by 18-inch caps which, in turn, supported the 6- by 18-inch stringers.

Hardwood wedges were used between the blocks and the caps for the purpose of bringing the bottom of the deck form to grade and to facilitate in stripping, wedges were used between caps and stringers. Five-eighth inch plywood was used for decking.

Thirty-two units were constructed and each unit was used six times. This number of units was necessary so that the contractor could maintain a definite deck pouring schedule. Each pour included four and one-half spans and an average of three pours was made per week.

#### UNITS MOVED ON JUMBO

After the concrete had set sufficiently, each deck unit was released and moved ahead to a new location and re-erected. It was constructed so that it could be raised or lowered by means of railroad jacks under each corner and was pulled along and

set in place with a 60 h.p. tractor. This operation consists of towing the jumbo under the span to be stripped. The weights under the deck stringers were removed which lowered the falsework about 2 inches. The stringers were then raised from the falsework caps, the falsework caps removed and the deck section entirely supported by the jumbo was then ready to move to the next location.

The next step in the process was to move the jumbo with the deck unit ahead where the deck unit could be used for pouring another section. The deck section of the jumbo was then raised just enough to clear the cap and pulled into place, finally lowered on the cap and the jumbo was free to be used in placing another section. The average number of units moved and erected per week was fifteen.

"You admit you drove over this man with a loaded truck?"

"Yes, your honor."

"And what have you to say in your defense?"

"I didn't know it was loaded."

Mabel—What's worrying you, David?

Farmer's Son—I was just wondering if Dad would see to the millkin' while we're on our honeymoon, supposin' you said "Yes" if I asked you to marry me.—*Omaha Bee.*

# George B. McDougall Retires After 25 Years as State Architect

**A**PPPOINTED August 22, 1913, George B. McDougall, State Architect, who retired from public service on October 31, under civil service regulations, had charge of State building construction work having a total valuation of approximately \$65,000,000 during his term of office.

Some of the outstanding building projects more recently constructed under his supervision were the State Office Building No. 1 and the Library and Courts Building on Tenth Street in Sacramento, the State Building in San Francisco, the State Building in Los Angeles, the Motor Vehicle and Public Works Buildings on N Street in Sacramento, and the beautiful Camarillo State Hospital in Ventura County.

Governor Frank F. Merriam has said that the Camarillo Hospital from a standpoint of its architectural beauty and modern facilities is Mr. McDougall's outstanding achievement. His office also prepared the plans and specifications and is supervising the building of the new State office building at 10th and N streets, Sacramento, now under construction.

Since 1933, Mr. McDougall has had charge of approving for structural safety the plans and specifications for all new public school buildings in California. The total estimated value of these structures is approximately one hundred million dollars.

## BUSY FOUR YEARS

The last four years under Governor Merriam's building program have been the busiest of the 25 years Mr. McDougall served as State Architect. Since June of 1934, Governor Merriam has authorized or made available a total of \$37,322,819 for construction and improvement of State buildings and other construction activities, all of which have come under the supervision of the State Architect.

Of this total amount, \$19,164,165 has been expended or allocated for State benevolent institutions includ-



GEORGE B. McDOUGALL

ing hospitals for the insane, Veterans' home, homes for the feeble minded, home for aged women, and home for adult blind. The balance of \$18,158,754 has been expended or allocated for State schools and colleges, prisons, fairs, expositions, State office housing, and miscellaneous necessary improvements.

Mr. McDougall was born in San Francisco on October 11, 1868. His father, Barnett McDougall, was an architect in the Bay City. As a boy Mr. McDougall earned his first dollar reading water meters in San Francisco on Saturday afternoons for which he was paid 25 cents per meter per month. His first continuous employment was in the office of Superior Court Reporters in San Francisco and later as stenographer and secretary for the late Joseph D. Redding, San Francisco attorney. Later he was private secretary to Wm. Randolph Hearst when the latter became owner of the San Francisco Examiner.

After five years as an architectural student and draftsman in the

office of his father, Mr. McDougall became a member of the firm of McDougall Brothers in San Francisco in 1893. He became State Architect on August 22, 1913, under appointment by the late Wilbur F. McClure, who then was State Engineer under Governor Hiram Johnson. He has served under the administrations of seven different State engineers and directors of public works and under six different governors.

Mr. McDougall is a member of the American Institute of Architects and was president of the San Francisco chapter of the Institute, now called the Northern California Chapter, for two terms. He was also regional director for the Institute for the Western Region comprising California, Nevada, Arizona and Hawaii.

During the past forty years, he has been a member of the Sessions and of the Boards of Trustees of the Calvary Presbyterian Church in San Francisco and of the Westminster Presbyterian Church in Sacramento. For many years, Mr. McDougall has been a member of the Managing Board of the California State Association of Young Men's Christian Association and served as president of the Sacramento Y. M. C. A. He has always been interested in music and during his residence in Sacramento has been a member of the McNeill Club. He is a member of the Masonic bodies and the Rotary Club of Sacramento.

Mr. and Mrs. McDougall plan to return to San Rafael, Marin County, and take up residence in their former home located there.

Mr. McDougall has no immediate plans for the future, he says, except to be a frequent visitor to the Golden Gate International Exposition this spring and to journey to the northwest later in the automobile that the employees of the Division of Architecture presented him on his retirement.

"Are you the celebrated lion tamer?"

"No, I only comb the lions and clean their teeth."

# Three State Engineers Win Awards in Welding Design Competition

**T**HREE engineers of the California Department of Public Works were among those receiving awards in the recent \$200,000 contest sponsored by the James F. Lincoln Arc Welding Foundation.

The object and purpose of the contest, as announced by the sponsors, was "to encourage and stimulate scientific interest in, and scientific study, research and education in respect of, the development of the arc welding industry through advances in the knowledge of design and practical application of the arc welding process, and to provide for the payment of awards, by prizes, to those persons who by reason of the excellence of their papers upon said subject may be selected as most worthy to receive such awards."

The scope of the contest covered all fields of transportation, construction, and manufacturing. Eleven main classifications were set up and were further broken down into 44 subclassifications. That the contest was truly international is shown by the fact that 14 different nations were represented on the award list. The papers received were judged by a jury composed of 31 engineering authorities from universities and colleges.

## SUBMITTED BRIDGE DESIGN

In the subclassification on "bridges" a second prize, cash award \$508.77, was awarded to a paper jointly submitted by **B. M. Shimkin, Associate Bridge Engineer, Division of Highways,** and **G. A. Sedgwick, Structural Engineering Associate, Division of Architecture.**

An honorable mention, cash award \$101.78, was given the paper presented by **Glenn L. Enke, Associate Bridge Engineer, Division of Highways.**

The prize winning paper prepared by Messrs. Shimkin and Sedgwick presented the design of "A Two Span Continuous Girder Railroad Bridge." The bridge described is now being built, as a riveted structure, as part of a grade separation project in the San Joaquin Valley.

For the purpose of this contest Messrs. Shimkin and Sedgwick re-designed the bridge as a welded structure and then made an economic comparison of the two types.

By making full use of the inherent economies of welded construction the writers said: "a saving of 22½% in weight of metal was obtained. With the development of suitable fabricating shops this saving in metal can readily be translated into a saving in money.

## LARGE SAVINGS POSSIBLE

"Considered on a nation wide scale the adoption of welding in the manufacture of plate girder bridges would result in a very large saving every year. As most bridges are now built by public, or semipublic organizations, this saving would be a direct benefit to the traveling public in that more bridges could be built with the available funds. Anyone familiar with the number of dangerous and obsolete bridges now on our highway system will realize the importance of such a saving.

"A careful study of the subject reveals many points in which the welded girder is superior to the riveted girder. In this type of construction welding may be used with confidence. European engineers have been eminently successful in building welded girder bridges of long spans. In this country trained men and adequate fabricating equipment need to be developed to handle this class of work on a production basis.

"That only competent welders should be used on bridge work is generally recognized. Equally important is the necessity of employing engineers trained in the design and construction of welded work.

"From the standpoint of introducing welding into the field of bridge construction the welded girder is of particular importance. The girder is probably the most widely used of any bridge type and is the one most likely to show an appreciable saving in cost when welded.

"Because of its simplicity, the

welded girder is readily mastered by workmen and engineers and can be fabricated with equipment available in nearly all large structural steel shops.

"The lessons learned on girder bridges can be readily applied to rigid frames and other more complicated bridge types. The general knowledge and use of welding in bridge construction will open unlimited opportunities for the design engineer to develop new types, greater economies, and better appearing bridges."

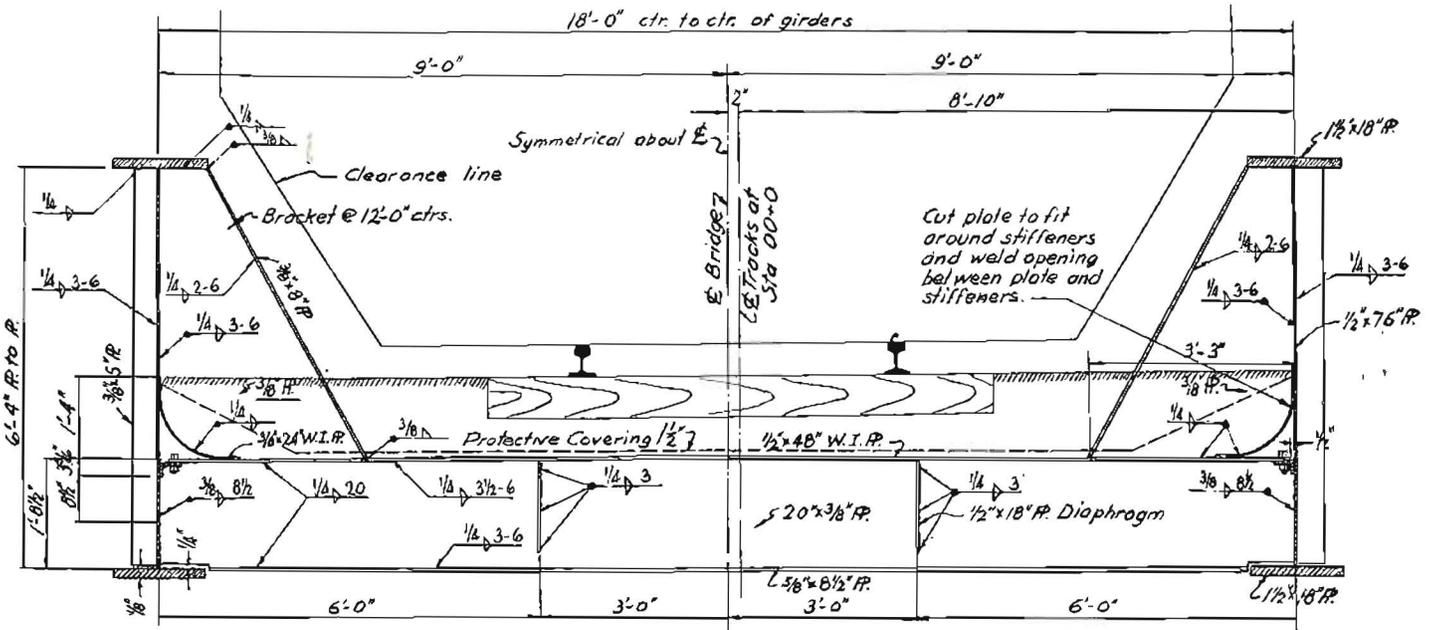
## ENKE DESIGN DESCRIBED

The paper submitted by Glenn L. Enke described the "Design of an All Welded 183 foot Through Truss Span, Two Lane Highway Bridge." For purposes of direct cost comparison, this design employed a truss type, span length, and capacity identical with a riveted truss span previously used by the California Division of Highways in two of its bridges. A two-span structure of this type was erected in 1933 across South Fork of Eel River in Humboldt County. Later, in 1935, another span was used in Plumas County for a structure across North Fork of Feather River at Rock Creek. In his paper Mr. Enke said:

"Various types of structures may be used in bridge work. These are, in order of their use from the shortest spans to the longest type of structure: concrete slabs, rolled steel beams, steel plate girders, steel trusses of various types, and steel suspension bridges with stiffening trusses.

"Plate girders reach an upper economical span limit of 100 to 200 feet, dependent upon many factors involving the number of spans, character of the ground surface immediately under the span, transportation facilities to the bridge site, and under-clearance requirements for the structure.

"The truss type is necessary in spans longer than the limits stated for a plate girder, and is employed in many variations, such as a single span or "simple" truss, continuous truss,



**TYPICAL CROSS SECTION**

Design for welded construction of two-span continuous girder railroad bridge for which B. M. Shimkin and G. A. Sedgwick were jointly awarded \$508.77.

cantilever truss, and as a stiffening truss when used with a cable system, to form the modern suspension bridge.

"The 183 foot span selected for redesign as a welded truss is of a span length and type frequently needed for single span crossings of rivers in the more rugged portions of California. The development of a better and more economical type of design will permit more of these structures to be built with the funds available, and will further the replacement program of obsolete struc-

tures that confronts the State at this time.

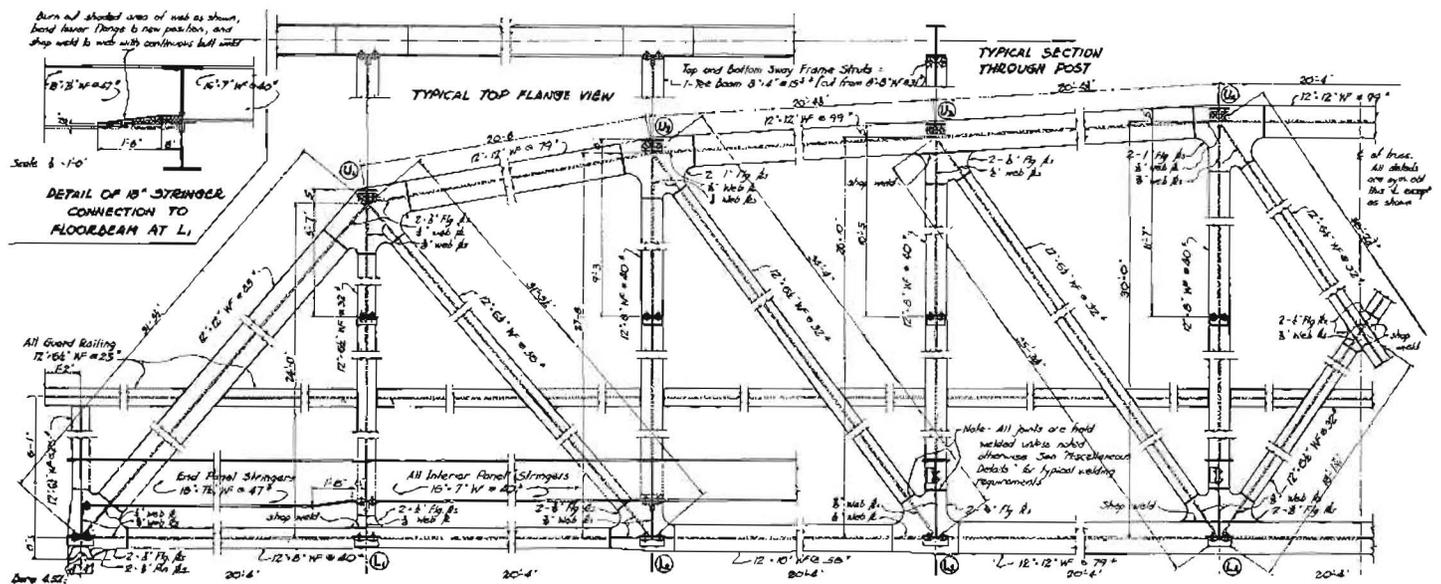
"The 183 foot welded truss span, as designed, is a 2-lane "through" type of structure in which the roadway is placed between the top and bottom truss members; as contrasted with the "deck" type in which the roadway is placed on top of the truss. The welded design showed a remarkable saving in weight and cost from that of the riveted truss as built in the two locations described above.

"The structural steel in one span of each type, including cast steel bearing

supports, weighed 144 tons. The new design in welding weighed but 93 tons. This difference in weight expressed in cost of work and materials will show a large percentage of savings in favor of the welded design. These savings may appear rather startling, but are readily demonstrated by the following general considerations:

"1. The average riveted truss has a large amount of excess detail material in the way of gusset plates, tie plates, lacing bars, all of which are necessary

(Continued on page 28)



# Relationship of the Roadway to Highway Traffic Safety

By MILTON HARRIS, Associate Highway Engineer

**T**HE ENGINEERING approach to the traffic accident problem takes the same form as the investigation and solution of any other matter that falls within the realm of the engineers. In dealing with traffic, as with other physical elements, the primary consideration is the collection of sufficient factual data to form a sound basis for logical reasoning and the eventual application of engineering principles to effect a solution of the problem presented.

The rational collection of data appertaining to traffic accidents must necessarily be obtained from reports of all accidents, which in turn are broken down to show those factors that form underlying patterns or are indicative of the causes that in themselves, or collectively, caused these accidents.

Factual data concerning traffic may be collected by survey to ascertain those patterns or habits in which motorists indulge. Survey of the

physical or other features that have a hand in shaping these patterns are also in order and come under the head of factual data necessary to be in the hands of the engineer before a logical solution can be generated.

The entire problem of providing a solution is one that challenges the utmost in engineering minds; yet before moving into the virgin field of traffic operation, there still remain problems in highway engineering that demand attention, thought, and solution. Of commanding importance is the role that the roadway plays in traffic safety.

From research conducted by the Safety Department it has been found that the general pattern of traffic accidents in California for the past several years has remained practically constant. The relationship of accident types as well as the reported causes seems to bear the same percentage to the total, year by year.

From this fact it is reasonable to hope that the application of a solution to roadway causes will materially alleviate that part of the situation and be reflected in forthcoming statistics.

Of the 12,867 contributing causes reported in 1937, 855 or 6.65% represent those concerning the roadway. A more common evaluation would be to say that the roadway was responsible for 61 deaths and 724 personal injuries during last year.

To clearly portray the relationship of roadway causes to the various elements of highway engineering, the accompanying chart has been prepared, in which the relative percentages of reported causes concerning the roadway alone are shown pyramided on a typical cross-section.

The roadway surface is immediately apparent as requiring the greatest attention to effect traffic safety. Slippery surface alone accounts for more than one half of the problem.

## Bay Bridge Reports and Revenues Over Preceding Month

**A**N increase in October traffic over the previous month on the San Francisco-Oakland Bay Bridge was announced yesterday (Monday) by Director of Public Works Earl Lee Kelly from a monthly traffic report filed by State Highway Engineer C. H. Purcell.

Comparative figures follow:

	Total October	Total September	Total since opening
Auto Trailers .....	1,149	1,473	28,921
Passenger Autos .....	688,232	657,611	16,259,399
Motorcycles .....	2,677	2,806	61,073
Tricars .....	983	1,002	19,276
Buses .....	13,594	13,153	220,779
Trucks .....	39,384	37,684	640,296
Truck Trailers .....	1,653	1,637	36,229
Toll Vehicles .....	747,672	715,367	17,265,973
Auto Passes .....	13,720	23,245	245,065
Truck Passes .....	1,591	2,010	23,906
Total Vehicles .....	762,983	740,622	17,534,944
Extra Passengers .....	235,728	233,561	4,263,197
Freight Pounds .....	108,683,917	107,886,750	1,591,338,326

The total number of vehicles to cross the Bay Bridge during October was 762,983, Mr. Kelly said, compared to 740,622 for September. The number of trucks increased from 37,684 during September to 39,384 for October. An average of 24,612 toll vehicles per day paid a total of \$399,820.40 during last month, an increase

of approximately fifteen thousand dollars over September.

Total number of vehicles to have crossed the bridge this year to date is 7,090,394, and the total since the bridge was opened—17,534,944.

With practically all work completed on the bridge electric railway terminal in San Francisco, work on the interior finish of the structure is being pushed to completion. This work includes the placing of a finish coat at the track level, wainscot painting, and enameling. Completion of the terrazzo floor on the mezzanine of the center unit was under way, with the tile setting for the walls of the east and west units continued. Benches are being placed in the waiting rooms of the street floor, with a general cleanup throughout the building under way.

Third rail has been installed for the tracks at track level.

Obstructions on or along the roadway account for over 16 per cent of the total causes attributable to roadway, with construction or repairs responsible for more than half. Shoulder conditions contributed almost 7 per cent of the hazard, while width contributed approximately 5 per cent.

Here is a challenging portrayal of figures on which highway engineers may whet their technical abilities. Its solution may be their diploma to a larger and better field of endeavor; that of *operating* our system of highways; the traffic executive, if you please.

Solution of traffic problems by the application of scientific principles is not as easy as it sounds. It calls for the use by engineers of all the scientific resources available, the science of psychology and education, the application of the principles of law and medicine and the fundamentals of politics. Above all it calls for executive ability, for no matter how logical the solution or how obvious the answer may be to a traffic problem, it still needs a directing head to put it into action and effect a change.

The highway engineer enjoys a peculiar position in relation to motor traffic. As a civil engineer he was called upon to provide a travelable way on which might run the creations of his brother mechanical engineers. He became an economist in that he might raise money equitably and expend it judiciously to appease the terrific pressure that more and more motorists brought to bear in their insatiable appetite for more cars and more roads whereon to travel. Submerged temporarily for the last quarter century under this deluge of roadbuilding, he has at last taken a breath and looked around at

his creation, to find that another element has taken form of which he has been only rather dimly conscious.

That element is traffic; and upon reflection the highway engineer has been forced to come to the conclusion that traffic has really been his driving force, the one and only thing for which he has striven to build more and better roads.

Yet traffic has grown in more ways than one and in doing so has developed a propensity for destroying life; for annoying by congestion both motorist and pedestrian; and yet producing a taxable structure that now demands its own regulation so that it may grow safer, faster, and larger, and is able to pay for this fostering in dollars and cents.

Who shall direct this growth?

The highway engineer has designed, built and maintained the physical structure since the beginning. He has been instrumental that research be adapted to the science of highway building so that the tax dollar might buy more and better roads. He has been intimately concerned with the effects of traffic on his building, yet has had no voice in directing that element which uses his highway.

He has come to accept as a fact that traffic should be directed by others than himself; yet, for example, our railroads do not have a separate operating corporation to run their trains! How much more logical that the engineers who design, build and maintain our highways should operate them, applying scientific principles for control of traffic as they have applied them in building the road so that traffic can flow freely and uniformly.

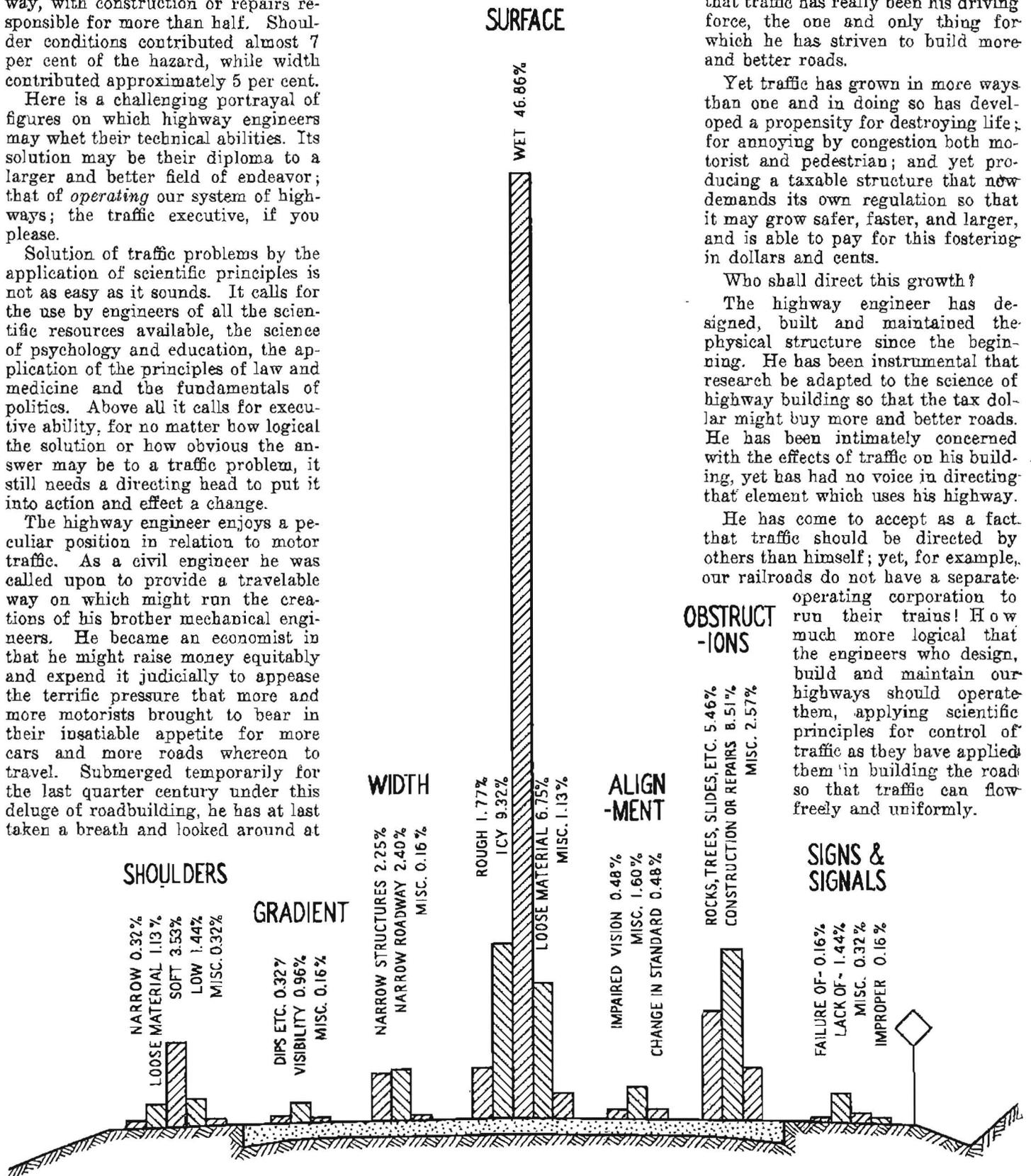


Chart showing relative percentages of accident causes attributed to roadway conditions.

# Construction Starts on New Mountain Springs Grade Relocation

By EDWARD J. NERON, Deputy Director of Public Works

**O**N A rocky mountain slope of the Coast Range barrier between Imperial and San Diego counties, Governor Frank F. Merriam on October 29 set off the first dynamite blast starting construction on the proposed new Mountain Springs Grade of U. S. 80.

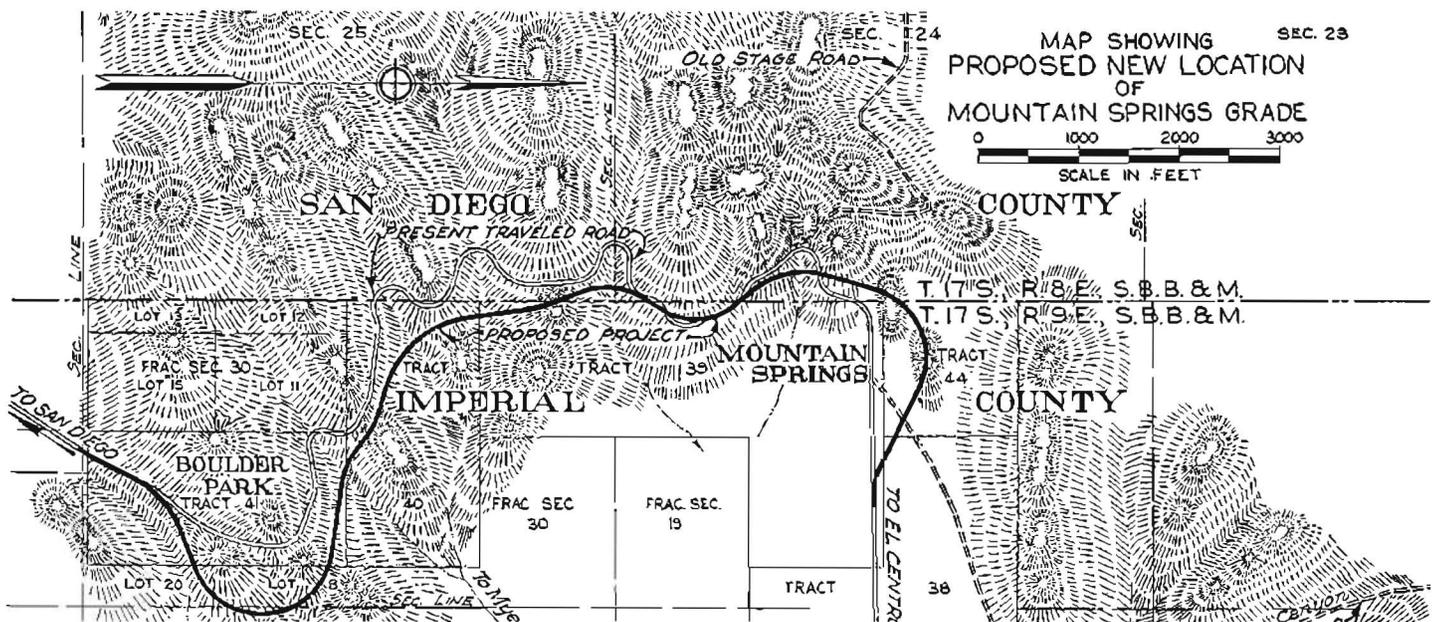
The Governor was introduced by the Chairman of the San Diego County Board of Supervisors, Mr. T. LeRoy Richards, and delivered the main dedicatory address to a happy audience of Imperial and San Diego

tending 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

the county line, known as Boulder Park.

Because of the long grade and very crooked alignment, the passing of trucks and vehicles on this grade is hazardous, and in places impossible. The new grade eliminates 952 degrees of curvature and reduces by 16 the number of curves which exist on the present highway. The minimum radius curvature on the old alignment was 126 feet. The minimum on the new alignment is 600 feet, and all but one are considerably in excess of that. The



County residents who have anticipated this much desired change for many years.

This highway has gradually developed from an old wagon stage road rising from the desert below sea level to the summit of the Coast Range. Director of Public Works, Earl Lee Kelly, recently awarded to A. S. Vinnell Company a contract for reconstructing the upper three miles of the grade.

U. S. Highway 80 is one of the main transcontinental arterials ex-

practically completed All-American Canal, which will double the irrigable agricultural area in Imperial Valley and provide irrigation for over a million acres of fertile lands.

The Mountain Springs Grade which traverses the county line rises from 44 feet below sea level at El Centro 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 and rises quite abruptly from a point known as Mountain Springs to the most westerly point on

maximum grade on the old alignment was 7.12% and on the new is 6%.

The new construction involves some very heavy rock work, averaging approximately 100,000 cubic yards of excavation per mile, most of which is on very steep side hill involving engineering problems in distribution and compaction. A considerable amount of cribbing and similar wall work is necessary in order to retain the fills on the steep slopes. It is necessary for the contractor to develop water at Jacumba and trans-

(Continued on page 24)



A novel ground-breaking ceremony was witnessed on the Mountain Springs grade relocation of U. S. 80 in Imperial County when Governor Merriam started the work by setting off a dynamite blast. In the official group, left to right, are: T. L. Richards, George Burnham, E. E. Cavanagh, Clarence Walker, H. R. Judah, Col. Ed. Fletcher, Governor Merriam, Frank G. Forward, L. G. Bradley and Edward I. Neron. The bottom picture shows a section of this narrow winding highway across the mountains between Imperial and San Diego Counties.

# New Salinas River Bridge At Soledad Officially Opened

By VERN J. ELE, Resident Engineer

**D**EDICATION of the new Salinas River Bridge marked the replacement of the old dangerously narrow and weak structure, on Sunday, October 23, 1938.

The bridge is located on U. S. Highway No. 101, a primary route of the State's system, at a point approximately one mile south of the town of Soledad in Monterey County.

This artery is one of the principal routes from San Francisco to Los Angeles, accommodating a large volume of local and tourist travel, as well as a steady through traffic of large commercial vehicles.

The Salinas River channel at the bridge site is about 1,300 feet wide and 30 feet deep. At certain times of the year its appearance is misleading as to the character of the river and the necessity of bridging the entire crossing. During the summer and fall months, there is very little water evident above the ground, and the flow is confined to a small stream which follows a meandering course over the wide river bottom.

During the winter months, after heavy rainfall the river may reach from bank to bank, and attain a depth of eight or ten feet. In periods of high water a large amount of debris consisting of brush and trees is washed down the river, and the flow is accompanied by such a scouring action of the quicksand river bottom that the river bed itself appears to be in motion. Bank erosion has been so severe during the last ten years that it now has reached a critical stage, and is causing an expensive problem to both the State and Federal governments.

Before 1914, the channel was spanned by four 120-foot timber truss spans, with a short timber trestle approach. During the Winter, that bridge, located 1000 feet upstream from the site of the present new structure, was washed out completely by the highest water recorded for the Salinas River.

To improve the alignment a new bridge was located 500 feet downstream. The structure built by Monterey County consisted of eleven 119-foot steel through Pratt truss spans supported on concrete piers. Each pier was formed by two three-foot, steel encased, concrete-filled cylinders. Each cylinder was founded on five 50-foot piles.

Designed for the horse and buggy type of traffic, a macadam surfaced roadway, 16-foot-eight-inches wide, without sidewalks was provided, along with a vertical clearance of 13-foot-seven-inches, one inch more than the present day legal load height.

As the type of traffic changed to motorized high speed vehicles with greater loadings, this structure proved inadequate. During recent years it was posted for one-way traffic for trucks and buses, 15 miles per hour speed limit, and a maximum load of 12 tons per vehicle.

In 1934, the most northerly truss was wrecked by a truck. The truss was never repaired, the roadway being supported on temporary timber bents. In 1935 a portion of the deck was destroyed by fire. The burned-over portion was replaced by new stringers and deck, and the bridge again carried traffic until February 11, 1938. On that date another high water stage, Elev. 174, washed out the south pier of the bridge, carrying the two southernmost trusses with it into the river. Then followed a month of repair work on the damaged structure, under difficult conditions, and with constant threat of further floods. Traffic was detoured from Soledad to King City on a county road along foothills east of the river. The bridge was reopened for travel on March 18, 1938, and served without further interruption to traffic until October 23, 1938, when this continuous reinforced concrete girder type bridge was dedicated to public service.

The new structure is located on a greatly improved alignment, along

downstream side of old bridge, and is connected to the existing highway by approximately one mile of concrete pavement approach.

It consists of thirteen (13) one-hundred and four (104) foot spans and two 89-foot end spans on concrete piers, hinged to spread footings founded on Douglas fir piling. The overall length of the new bridge is 1,530 feet having a roadway width between curbs of 34 feet, and two 2'-6" sidewalks.

The girders are bulb shaped design continuous over two piers and forming two 17-foot cantilevers. Bridge seats on the latter support an 80-foot suspended span, one end of which is hinged to cast steel rockers to allow for expansion.

The design is unique in being the longest span for this type bridge on the State system. The continuous, bulb-shaped girder was favored over the conventional rectangular simple span type, to effect not only a large reduction in cross-sectional area, but a noteworthy saving to the State.

The total cost of the bridge and the approaches amounted to approximately \$400,000.

H. R. Judah, California Highway Commissioner, representing Governor Merriam, was the principal speaker at the dedication ceremonies.

The cutting of a ribbon by Chairman Judah signalled the opening of the new bridge and the start of a parade which ended at a nearby municipal park where a barbecued dinner was served.

Others introduced by Al Clark, Master of Ceremonies, were: Mayor John Burke of Soledad; Mayor Leach of Salinas; Congressman McGrath; State Senator Tickle; Supervisors Redding and Talbot of Monterey County; District Engineer Lester Gibson; Bridge Contractor H. S. Lord; Resident Engineers Fred Weigle and Vern J. Ele; Secretary McCardle of the Salinas Chamber of Commerce; County Engineer Howard Cousins.



The recently completed bridge across the Salinas River on U. S. 101, near Soledad, is the longest continuous bulb-shaped girder type in the State. It is built on improved alignment near the narrow old structure as shown in the center picture. The overall length is 1530 feet with a roadway width of 34 feet between 2½ foot sidewalks.

# Blast Starts Work on Mt. Springs Grade

(Continued from page 20)

port it by pipe line  $5\frac{1}{2}$  miles to the job where over 13,000,000 gallons will be used for compacting fills.

More than 1000 San Diego and Imperial valley civic leaders, state, county and city officials, navy and marine corps officers and inland San Diego residents gathered at the base of a huge rock tower to watch Governor Merriam formally start the work.

"If you have traveled over this treacherous grade before," the Governor said, "you can appreciate the value this project will be to these two splendid counties represented here today.

"Funds for this work, like all other state highway improvements, come from the highway funds which your gasoline taxes create. It is your money which is being spent for highways which you can long enjoy."

The chief executive reviewed the progress which California has made in building adequate highways for its growing motor and truck travel.

A host of dignitaries, including many who have spent years in supporting highway development for San Diego and Imperial county, were presented by the master of ceremonies.

Frank G. Forward, chamber of commerce highway committee chairman, headed a committee on arrangements. Working with him were Fred Simpson, county highway development association president; Neil Brown, chamber shippers' committee chairman; Pat D. Smith, Fred Rhodes and James Robbins.

Representing the most Rev. Charles Francis Buddy, bishop of San Diego, was the Rt. Rev. Monsignor John M. Hegarty, vicar genera. of the Catholic diocese of San Diego, who was accompanied by Albert V. Mayrhofer.

C. L. Cotant, chamber president, headed a large delegation of chamber of commerce members, and Claude Wilson, Escondido, represented the San Diego County Development federation. Councilman Herbert E. Fish represented the city; Vice Adm. E. J.

## In Memoriam IRA A. THOMAS

On October first, at a sanitarium in San Diego, Ira A. Thomas, Maintenance Superintendent for the Division of Highways at El Centro, passed away.

Mr. Thomas had been ill only a short while prior to going to the hospital, three days before his death, and to all his many friends in District XI, knowing his abounding vitality and high spirits, his passing was a great shock.

Everyone in Imperial County, and the employees of the Division of Highways throughout the State, affectionately knew him as "Tommy." His friends were legion, as he took an active, enthusiastic and helpful part in sports, public affairs, and particularly in the activities of the California State Employees Association and he was president of the Imperial County chapter for several terms.

During his earlier manhood, Mr. Thomas took a prominent part in the building construction industry in San Francisco, and as a general contractor erected many large buildings in that city. Following the San Francisco earthquake in 1906, he conceived the idea of utilizing brick from the ruined buildings as coarse aggregate for concrete in building foundations and street work, and thereby was instrumental in expediting the early reconstruction of the city.

About twenty-three years ago Mr. Thomas went into the building industry in Imperial Valley where he erected many of the larger buildings, county bridges and other construction installations. He entered the service of the State in 1931 as superintendent in charge of all maintenance and betterment work on the State highways in Imperial County. His thorough knowledge of conditions and broad acquaintance throughout the valley, added to his wide experience in construction work, have been of exceptional value to the State. Added to these qualifications, his great enthusiasm for the work, his willingness to meet any situation that might arise at any time of the day or night, and his joy in the best accomplishment, contributed to his unusual success in meeting many emergencies and difficult situations which are encountered almost continuously in the valley and the surrounding desert.

He took a keen interest in roadside trees and plantings and installed a fine collection of cacti and desert growth at the El Centro Maintenance Station that has attracted the attention of many tourists and nature lovers. He also directed the installation of the notable beautification of the Imperial County Fair Grounds of that type.

# Highways in Dist. VI Require Large Expenditure

(Continued from page 3)

and to build safety into the highway system will require the following improvements:

38 miles	Unimproved earth roads in need of reconstruction and oiling .....	\$1,337,500
599 miles	2-Lane oiled earth or gravel roads in need of reconstruction....	20,657,700
567 miles	2-Lane intermediate and high type in need of reconstruction....	14,610,800
118 miles	2-Lane, widen to 4-lane divided, with structures .....	9,210,000
49 miles	3-lane, widen to 4-lane divided with structures .....	3,956,000
	10 Highway and Railroad grade separations and bridges not shown above.....	2,000,000
	Acquisition of Right of Way.....	5,475,000
		<hr/>
		\$57,247,000

Since funds are not now available to carry this program through to an early completion, the period required to do the desired work must be extended to fit the yearly budgetary amounts.

The highways to be constructed, re-constructed or otherwise improved must be those which, after an exhaustive study, from the standpoint of maintenance cost, traffic, safety, etc., most urgently need consideration.

King, the navy; Brig. Gen. J. J. Meade, the marine corps.

State officials and legislators included Assemblywoman Jeanette Daley, Assemblyman Charles Stream, Nat Rogan, Collector of internal revenues; R. L. Dean, acting regional forester; Harry A. Hopkins, assistant director, department of public works; Edward J. Neron, deputy director public works; E. E. Wallace, district engineer; E. E. Sorenson, assistant to Wallace; R. R. Judah, chairman, state highway commission; William T. Hart, local representative of the highway commission.

Here's to happy days: any old fool can have a good time at night.



### Has Four-year File

P. O. Box 756  
Santa Maria, Cal.  
October 5, 1938

Division of Highways  
Sacramento, Cal.

Gentlemen:

I have been receiving your publication CALIFORNIA HIGHWAYS AND PUBLIC WORKS magazine for some four years and would like to commend you for your work in publishing this magazine. I find it a very valuable as well as interesting way of keeping posted as to the progress being made on State highways and their maintenance, together with other valuable information.

I have been saving these magazines and binding them together by the year, and have found many an occasion to refer back to them. Somehow my August, 1938, issue got mislaid, so I would therefore appreciate it very much if you would forward me a copy of that issue so I can keep my yearly volumes complete, and up to date.

Very truly yours,

Paul E. Smith.

### Old Roads and New

Alpine, Calif., October 25, 1938.

California Highway & Public Works,  
Sacramento, Calif.

Dear Sirs:

I have just had the privilege and pleasure of seeing and reading the August and September numbers of your beautiful magazine and I must say that I am quite anxious to be included in the list of those to whom it is regularly sent if that may be.

As one who came to Los Angeles in the Summer of 1881 when that city had but 11,000 inhabitants and when a road was generally an open space between the place you happened to be and the place you desired to reach, and when it was usually made by driving a wagon from the one place to the other until another person could see and follow your tracks and any work done upon it was largely done by men who wished to work out their "pole tax," and having ridden or driven by horse from Santa Monica to San Jacinto, San Diego to Santa Barbara, Oakland to Santa Cruz, San Luis Obispo, over desert and mountains to Bakersfield, up the San Joaquin to Lodi and back to Oakland (Oakland to Oakland being one saddle trip of 800 miles in seven weeks), I can discern some dif-

ference in the old and the present roads. I left California in 1893 and drove back from Chicago in a small car in 1917. We were six weeks getting to San Bernardino and we had our ninth new tire on the car when we arrived. Since then I have driven over about 150,000 miles in this state, from the Mexican line to Calistoga and from San Bernardino to Sacramento, and if anybody should be able to appreciate the development of our roads, I think I should, and I certainly do. With sincere appreciation of both the roads and the magazine.

Very truly yours,

J. B. STUYVESANT,  
Cozy Cove Cottages.

### King County Planning Commission

County-City Building, Seattle  
September 30, 1938.

State Highway Department,  
Sacramento, California.

Gentlemen:

We understand that you are publishing a most interesting monthly magazine.

We will appreciate it very much if you will put us on your mailing list—if there are extra copies which can be spared.

Thanking you, we are

Yours very truly,

JOSHUA H. VOGEL,  
Planning Engineer and Executive Officer,  
King County Planning Commission.

### Enjoyed by Nicaragua's President

Consualdo General De Nicaragua

San Francisco, California,  
October 22, 1938.

Editor, California Highways  
and Public Works,  
Sacramento, California.

Sir:

Allow me the pleasure to present to you and to your able staff my very sincere congratulations for the helpful information you always give in the worthiest State's publication: "CALIFORNIA HIGHWAYS AND PUBLIC WORKS."

Really it is a pleasure to receive it every month. After I read each edition I mail it to Honorable Dr. Antonio Flores-Vega, Ministro de Fomento y Obras Publicas in the Cabinet of His Excellency, General Anastasio Somoza, President of the Republic of Nicaragua, who also enjoys it.

I remain, yours truly,  
JUAN JOSE MARTINEZ LACAYO,  
Consul General of Nicaragua.

### Praises California Highways

Monrovia, California.

California Highways  
and Public Works,  
Sacramento, Calif.

Gentlemen:

We sure can appreciate the California highways, and the way they are kept in fine condition. After we took a two-month trip through the middle western and southern states, we can readily appreciate our highways. Even though some are black topped and gravel, the California highways are better than the average in other states.

I am enjoying the "California Highways and Public Works" journal very much because it is very educational, and compliment your staff for maintaining a high standard of constructive journalism and fine printing.

Yours very truly,

DEWEESE W. STEVENS.

### Aids Yale Research

Yale University  
Bureau for Street Traffic Research

New Haven, Conn.,  
October 20, 1938

Editor California Highways  
and Public Works,  
P. O. Box 1499,  
Sacramento, California.

Dear Mr. Howe:

The photographs of the Bakersfield-Grapevine highway, which you so kindly forwarded to us recently, have been added to our visual aids library. I am very happy to have them and wish to thank you very much indeed.

I wonder if I might further impose upon your kindness by requesting copies of the photographs illustrating John H. Skeggs' article dealing with modernizing roads, which appears in the September issue of CALIFORNIA HIGHWAYS AND PUBLIC WORKS. On pages 1, 2, and 3 there is a series of eight exceptionally fine photographs showing bad road construction and practices. If it is convenient, I would very much appreciate receiving copies of these. \* \* \* We now have a collection of some 800 photos taken in New England. Should you desire some special classifications please feel free to call on us.

Thanking you again, I am

Sincerely yours,

BRYANT BURKHARD,  
Research Assistant.



SEVERAL applications for allotments from money appropriated to the Emergency Fund by Chapter 11, Statutes of 1938, Extra Session, for the restoration of public property, levees, flood control works, county roads and bridges, damaged by floods of the 1937-38 winter season throughout the State, were received during the past month.

Investigations of applications received so far have been or are being made and 188 reports and recommendations have been prepared by the Division of Water Resources and State Reclamation Board and submitted to the Director of Finance, pursuant to his instructions. Governor Frank F. Merriam has approved allocations totaling \$4,194,400 for flood damage repair work covered by these reports. The Division of Water Resources has continued the performance of some of the work for which these allocations were made, the remaining work being done by the applicants under contracts entered into with the Department of Public Works. There are now in force 114 contracts for work which will cost \$2,097,000.

#### IRRIGATION DISTRICTS

The Delano-Earlismart Irrigation District was formed at an election held October 18, 1938, following a favorable report by the State Engineer to the Board of Supervisors of Tulare County as to the feasibility of the project. The district embraces an area of 33,000 acres of highly developed agricultural land that has a deficient water supply owing to the receding ground water level. Organization was undertaken in order to contract for a water supply from the Friant-Kern Canal of the Central Valley Project which will pass through the district area.

Investigation of a project submitted by the El Dorado Irrigation District is now in progress. The proposal includes the construction of a dam on Sly Park Creek to store 12,700 acre feet of water, and the building of an eight-mile conduit through the hills to connect the reservoir with the

present distribution system. The estimated cost of the project is \$670,000.

Work has been started on the Nevada Irrigation District project, recently approved, for the building of Scott's Flat Dam. The district reports a crew of thirty men supplied by WPA will undertake clearing of the reservoir site during the winter months pending receipt of a loan and grant from PWA to carry out construction.

#### SUPERVISION OF DAMS

Palos Verdes Reservoir, one of the principal terminal reservoirs of the Metropolitan Water District of Southern California system, will soon be constructed in the Palos Verdes hills. Application for the approval of the plans and specifications for its construction were filed on October 11, 1938.

Repair work is progressing satisfactorily on a number of dams throughout the State. In addition to these a number of recent applications have been filed for the repair of structures before winter.

#### WATER RIGHTS

##### *Supervision of Appropriation of Water*

During September, 25 applications to appropriate were received. 19 were denied and 15 were approved by issuance of permits. In the same period 5 permits were revoked and the rights under 5 permits were confirmed by the issuance of licenses.

The field season in connection with the inspection of projects under permits and investigation of protested cases was concluded on September 28th. A total of 228 projects were inspected, distributed throughout practically all counties of the State. Reports of these investigations are now being prepared.

#### FLOOD CONTROL AND RECLAMATION

##### *Maintenance of Sacramento Flood Control Project*

Routine maintenance on the flood control project has been carried on during this period in preparation for high water this winter, consisting mostly of minor repairs to structures. Temporary repairs have been made to several of the by-pass bridges.

The War Department is installing additional culverts in the west intercepting canal, so that there will be no recurrence of

overflow similar to that which occurred last winter. Two additional 60-inch culverts are being installed.

The application for a PWA grant for maintenance repair work has not yet been granted, and there appears to be little prospect that it will. We are therefore preparing to do the necessary work with the funds at hand.

##### *Relief Labor Work*

An average of 125 relief laborers have been employed in clearing in the Feather River overflow channel, repairing current retards at Nicolaus and constructing wing dams at Robinson Bend. Fifty laborers are employed from the SRA transient camp in Sutter Basin.

The WPA application covering flood control work in District No. 2, containing the valley counties from the delta north to Trinity County, has been approved. This will permit the clearing of numerous flood and creek channels outside of the Sacramento project. It is expected that some of this work can be performed in cooperation with the War Department, particularly in Yolo-Colusa and Butte counties.

Clearing of levee right-of-way at the Sacramento brickyard below Sacramento has been practically completed by a crew of 15 WPA laborers.

##### *Emergency Levee Repairs*

The work of completing flood damage repair in Glenn, Butte, Shasta and Tehama counties under Executive Order E 177, has been almost completed. Work is now under way on Butte Creek and Feather River at Robinson Bend, in Butte County, and on Stony Creek, in Glenn County. The work will be completed as soon as these units are finished.

#### SACRAMENTO-SAN JOAQUIN WATER SUPERVISION

During the past month the efforts of the field men from this office have been devoted almost entirely to making a field survey of the crops and areas irrigated from the stream and return flow channels in the Sacramento and San Joaquin Valleys. The acreage data gathered will be incorporated in an annual mimeographed report containing all data relative to diversion from and water discharged to the streams in the Sacramento-San Joaquin Valley area.

Prof.—Take this sentence: "Let the cow be taken out of the lot." What mood?  
Frosh—The cow.

## Highway Bids and Awards for the Month of October, 1938

**GLENN COUNTY**—About 3½ miles north of Willows, reinforced concrete box culvert to be constructed and existing pavement to be replaced with untreated crushed gravel or stone base and plant-mix surfacing. District III, Route 7, Section B. A. A. Tieslau, Berkeley, \$5,959. Contract awarded to N. M. Ball Sons, Berkeley, \$5,795.50.

**HUMBOLDT COUNTY**—Across east branch of south fork of Eel River, 2.7 miles south of Garberville, a reinforced concrete slab supported on concrete and timber bents consisting of eight 10-foot spans replacing portions of existing bridge and approach thereto. District I, Route 1, Section A. Fred J. Maurer and Son, Eureka, \$22,474; E. E. Smith, Eureka, \$25,181; T. T. Lesure, Oakland, \$28,605; Fred J. Early, Jr., San Francisco, \$29,319. Contract awarded to Scheumann and Johnson, Eureka, \$21,141.00.

**HUMBOLDT COUNTY**—Between Big Lagoon and one mile north of Orick, about 1.4 miles to be graded and surfaced with road-mix surfacing. District I, Route 1, Sections J.K. John Burman & Sons and Scheumann & Johnson, Eureka, \$77,918; N. M. Ball Sons, Berkeley, \$84,108; Hemstreet & Bell, Marysville, \$87,339; Poulos & McEwen, Sacramento, \$93,013. Contract awarded to Claude C. Wood, Lodi, \$77,642.00.

**IMPERIAL COUNTY**—City of El Centro, East Main Street, S.P.R.R. to east city limits, and 5th and 6th Streets, State to Orange Streets, 1.3 miles plant-mix surfacing. District XI, Route 27. V. R. Dennis Construction Co., San Diego, \$22,901; R. E. Hazard & Sons, \$9,523. Contract awarded to G. W. Ellis, North Hollywood, \$9,185.00.

**INYO COUNTY**—Between Death Valley National Monument and Death Valley Junction, about 11.1 miles to be graded and road-mix surface treatment applied. District IX, Route 127, Section L. Oilfields Trucking Co., Bakersfield, \$80,608; Frederickson and Westbrook, Sacramento, \$63,451; C. G. Willis & Sons, Inc., and Chas. G. Willis, Los Angeles, \$77,062; J. A. Casson, Hayward, \$48,886; Basich Bros., Torrance, \$55,787; Griffith Co., Los Angeles, \$72,928; S. Edmondson & Sons, Los Angeles, \$67,037; Crow Bros. Construction Co., Los Angeles, \$54,326; George Herz & Co., San Bernardino, \$79,556; Isbell Construction Co., Reno, \$74,004; Dodge Construction, Inc., Fallon, \$69,116; Parish Bros., Eldridge, \$59,671; United Concrete Pipe Corp., Los Angeles, \$78,049. Contract awarded to Oswald Bros., Los Angeles, \$48,856.40.

**KERN COUNTY**—Between Weedpatch and Wheeler Ridge, about 16.8 miles to be graded and treated with liquid asphalt. District VI, Feeder road. Oilfields Trucking Co., Bakersfield, \$36,372; Griffith Co., Los Angeles, \$36,412; Basich Bros., Torrance, \$37,378; Heuser and Garnett, Glendale, \$40,208; Claude Fisher Co., Ltd., Los Angeles, \$42,010. Contract awarded to Rexroth and Rexroth, Bakersfield, \$34,812.00.

**LASSEN COUNTY**—Between Madeline and Likely, about 4.4 miles to be graded and surfaced with crusher run base and road-mix surfacing. District II, Route 73, Section F.G. Harris Bros., Vinton, \$77,372; Piazza and Huntley, San Jose, \$82,123; Frederickson & Westbrook, Sacramento, \$87,508; Isbell Construction Co., Reno, \$95,222; Mountain Construction Co., Sacramento, \$97,433; N. M. Ball Sons,

Berkeley, \$107,985. Contract awarded to Poulos & McEwen, Sacramento, \$74,969.80.

**LOS ANGELES COUNTY**—A reinforced concrete girder overhead crossing over the tracks of the Southern Pacific Co. about 6 miles east of Saugus, consisting of one 66-foot span, one 56-foot span, one 54-foot span, and one 49-foot span. District VII, Route 23, Section I. Griffith Co., Los Angeles, \$46,303; White & Wilberg, Santa Monica, \$46,442; United Concrete Pipe Corp., Los Angeles, \$47,914; Byerts & Dunn, Los Angeles, \$49,021; C. O. Sparks and Mundo Engineering Co., Los Angeles, \$50,191; Oscar Oberg, Los Angeles, \$50,896; The Contracting Engineers Co., Los Angeles, \$51,996; Gibbons and Reed Co., Burbank, \$53,115; Ralph A. Bell and Donald E. Metzger, Los Angeles, \$56,978; Nick Perscallo, Los Angeles, \$67,083. Contract awarded to W. E. Robertson, Los Angeles, \$37,902.00.

**LOS ANGELES COUNTY**—Between Rivera Underpass and Shenandoah Avenue, about 1.7 miles to be graded and surfaced with Portland cement concrete, asphalt concrete, and plant-mixed surfacing. District VII, Route 163, Section E. Griffith Co., Los Angeles, \$33,163; United Concrete Pipe Corp., Los Angeles, \$33,704; Oswald Bros., Los Angeles, \$36,222; C. O. Sparks & Mundo Engineering Co., Los Angeles, \$36,706; Sully-Miller Contracting Co., Long Beach, \$37,975. Contract awarded to W. E. Hall Co., Alhambra, \$32,880.00.

**LOS ANGELES COUNTY**—Between French Flat and Liebre Gulch, about 2.7 miles to be graded, heavy riprap to be placed and Portland cement concrete slope paving to be constructed. District VII, Route 4, Section I. Claude Fisher Co., Ltd., Los Angeles, \$145,710; Ralph A. Bell, Monrovia, \$164,485; United Concrete Pipe Corp., Los Angeles, \$174,440; Griffith Co., Los Angeles, \$195,381; Nick Perscallo, Los Angeles, \$199,937. Contract awarded to Geo. J. Bock Co., Los Angeles, \$122,205.00.

**LOS ANGELES COUNTY**—Across Castaic Creek near Castaic Junction, a bridge to be constructed; and about 0.7 mile to be graded and surfaced with plant-mixed surfacing and road-mix surface treatment applied to shoulders and detours. District VII, Route 79, Section A. J. S. Metzger & Sons, & L. A. Paving Co., Los Angeles, \$78,799; Dimmitt & Taylor, Los Angeles, \$78,274; Heuser & Garnett, Glendale, \$73,546; R. R. Bishop, Long Beach, \$75,848; Byerts & Dunn, Los Angeles, \$78,347; Nick Perscallo, Los Angeles, \$78,758; White and Wilberg, Santa Monica, \$70,893; The Contracting Engineers, Los Angeles, \$75,875; C. O. Sparks and Mundo Engineering Co., Los Angeles, \$85,660; United Concrete Pipe Corp., Los Angeles, \$76,692; W. E. Robertson, Los Angeles, \$69,750; Griffith Co., Los Angeles, \$72,749. Contract awarded to J. E. Haddock, Ltd., Pasadena, \$67,337.30.

**RIVERSIDE COUNTY**—About 8 miles southeast of Indio, two reinforced concrete bridges, one across Coachella Valley storm drain, consisting of thirteen 30-foot spans and two 9-foot cantilever spans and one across a drainage ditch, consisting of two 29-foot 4-inch spans and two 8-foot 8-inch spans. District XI, Route 187, Section F. R. E. Hazard & Sons, San Diego, \$40,639; V. R. Dennis Construction Co., San Diego, \$40,963; Valley Construction Co., San Jose, \$44,404; Donald E. Metzger & Ralph A. Bell, Los Angeles, \$46,359; The Contracting Engineers Co., Los Angeles, \$46,683; Dimmitt and Taylor, Los Angeles,

\$50,307; United Concrete Pipe Corp., Los Angeles, \$52,772. Contract awarded to W. E. Robertson, Los Angeles, \$38,614.25.

**RIVERSIDE COUNTY**—Bridge across Temecula Creek about 7 miles east of Temecula consisting of reinforced concrete girder spans supported by reinforced concrete piers on precast concrete piles. District VIII, Route 78, Section B. United Concrete Pipe Corp., Los Angeles, \$44,425; S. A. Cummings, San Diego, \$44,767; H. H. Peterson, San Diego, \$46,296; White and Wilberg, Santa Monica, \$47,070; W. E. Robertson, Los Angeles, \$49,475; J. S. Metzger and Sons and Ralph A. Bell, Los Angeles, \$49,544; Contracting Engineers Co., Los Angeles, \$50,710; Gibbons and Reed, Burbank, \$52,007. Contract awarded to C. F. Robbins, Los Angeles, \$41,876.00.

**SIERRA COUNTY**—At Downieville, existing reinforced concrete bridge to be removed and disposed of. District III, Route 25, Section A. L. C. Seidel, Oakland, \$5,869; B. A. Howkins & Co., San Francisco, \$5,811; George E. France, Colfax, \$3,900; Fred J. Early, Jr., San Francisco, \$4,251; N. M. Ball Sons, Berkeley, \$4,095. Contract awarded to E. T. Lesure, Oakland, \$3,810.00.

**SONOMA COUNTY**—Between Boiler Gulch and Miller Creek, about 0.8 mile to be graded, road mix surface treatment applied and culverts installed. District IV, Route 56, Section C.D. John Burman & Sons, Eureka, \$49,247; N. M. Ball Sons, Berkeley, \$49,522; Guerin Bros., San Francisco, \$52,082; E. T. Lesure, Oakland, \$58,513; Pacific States Construction Co., San Francisco, \$58,962. Contract awarded to Parish Bros., Eldridge, \$47,480.

**VENTURA**—A reinforced concrete slab bridge across Sespe Overflow, about one mile west of Fillmore to be constructed and approaches to be widened. District VII, Route 79, Section B. Macco Construction Co., Clearwater, \$45,636; Gibbons & Reed Co., Burbank, \$46,403; Griffith Co., Los Angeles, \$50,368; White and Wilberg, Santa Monica, \$52,444; Oscar Oberg, Los Angeles, \$53,334; The Contracting Engineers Co., Los Angeles, \$53,940; C. O. Sparks & Mundo Engineering Co., Los Angeles, \$58,176. Contract awarded to Ralph A. Bell & Donald E. Metzger, Los Angeles, \$44,863.00.

### JOINT CONFERENCE HELD ON ROADSIDE IMPROVEMENT

The National Roadside Council, the Conservation Committee of the Garden Club of America, and the American Planning and Civic Association held a Joint Conference on Roadside Improvement, on November 15th and 16th in New York City, to serve groups of people who will sponsor legislation in the 1939 sessions of the State legislatures, for roadside improvement.

All officials and organizations planning to sponsor roadside legislation were invited to attend and participate in the sessions.

# State Engineers Win in Welding Competition

(Continued from page 17)

for the safety and stability of the truss, but which do not contribute in any way to resisting the direct loads upon the truss, which are: the weight of the truss itself, the concrete roadway, and the moving vehicles using the bridge.

"2. Riveted members subject to a direct tensile pull must be sufficiently enlarged to allow for the reduction in their cross section due to rivet holes. A line of rivet holes across such a member materially reduces its ability to withstand loads, and the size of the members must be increased to make up this deficiency.

## PERMITS "RESTRAINED ENDS"

"3. All welded connections are considerably more rigid than riveted connections and permit construction of "restrained ends," the term used by structural engineers to denote the ability of a connection to resist bending as well as a direct force. This ability to withstand bending is a very useful one and permits considerable economy in rolled beams used in the floor system by transferring approximately one-half of the bending stress at the middle of the beam to the support at each end. Welding was used to join the ends of the beams together in order that they could resist stress in the support in the manner described. A greater percentage of the beam is therefore used at its maximum strength than is possible by not making use of "restrained ends."

"4. Rolled beam sections were used for all truss members, thus completely eliminating the excess detail material. With butt welded connections into a joint detail of approximately arranged plates, a smooth connection between all truss members is secured. This type of connection not only provides a smooth transition of stress and high resistance to impact stresses caused by moving loads, but is also the ideal type of surface to paint and maintain. Rivet heads and lacing bars are notoriously weak in holding a film of paint, and most maintenance costs after first general painting go to

## In Memoriam

JAMES HARVEY RUST, Highway Maintenance Superintendent in District II, Division of Highways, passed away in Susanville on September 5, 1938, after an illness of short duration.

Jim Rust, as he was known to his associates, was born at Mandan, North Dakota, on October 26, 1883. During his early years he served the Great Northern Railroad as a telegrapher, but at the age of twenty-one he came to the west coast to try his fortunes in the Pacific Northwest. The greater lure of California later claimed him, and he moved to this State where he spent the last twenty-five years of his life. Prior to entering State service he was engaged in work connected with gold dredging in Northern California. In January, 1928, he became an employee of District II, and during the ensuing years advanced to the position of Highway Maintenance Superintendent, which he occupied during the past three years.

On October 14, 1911, he was married to Reta Alma Wright, daughter of an old Shasta County family. Surviving him are his widow and three daughters—Hannah Grey and Alma Rust of Oroville and Anna Smith of Red Bluff.

Jim Rust was admired both by his superiors and his subordinates, and his passing will be mourned, not alone by his family and friends, but by his associates in the State's service.

touching up those spots. This type of construction also eliminates water pockets and recesses difficult to paint or maintain.

## CHANGE OF METHODS

"5. Erection methods are changed somewhat with the welded truss, but should actually be more economical than usual riveted truss erection as the truss members are assembled on the ground into a flat position on timber blocking at a convenient height for working. After assembly and welding of all truss members in their correct positions, the truss is raised to a vertical position and placed on the bridge pier. When both trusses are in place erection of the floor system and bracing members proceeds in the usual manner, using two erection bolts at the end of each piece. The connections are then butt welded together and the bolts removed.

"Electric welding procedure today is conducted on a scientific basis. Methods of welding, preparation of

# Eliminating Newhall Tunnel Bottleneck

(Continued from page 6)

side of these will be 11-foot strips of Portland cement concrete pavement with 7-foot plant-mixed shoulders. For the portion on the Mint Canyon Short Cut proper over which traffic will be somewhat lighter, there will be 33 feet of plant-mixed surfacing (three traffic lanes) with 8-foot oiled shoulders.

The whole Mint Canyon Short Cut is being built on up-to-date standards which will effect a very large saving to traffic using the highway. Using a conservative estimate of four thousand cars per day as average for 365 days during the year, we have 1,460,000 car trips over this highway per year.

Using three cents a mile as the cost of operation for the average car, which is extremely conservative since this includes trucks and buses as well as passenger cars, the saving in length of 5.4 miles would effect a saving of 16.2 cents per car trip. This, multiplied by 1,460,000 car trips per year, would indicate a saving to traffic of \$236,520 per year or enough to pay for the entire cost of the project from Tunnel Station on San Fernando Road to Solamint on the Mint Canyon Highway in less than four years time.

Thus the gasoline tax money invested in this project will not only be used to construct a much safer and less congested highway over which to travel but will actually repay its cost to users of the road in an amazingly short time.

surfaces, types of electrodes, and generator equipment are available for any type of work. Bridge structures have lagged behind other fields of endeavor in development of designs and construction methods to take full advantage of the welding process. This situation is largely due to the initial heavy investment in shop equipment to fabricate riveted structures. Other contributing factors are lack of job organization by the general contractors to do this type of work and lack of adequately trained welders and welding inspectors."

STATE OF CALIFORNIA  
**Department of Public Works**

Headquarters: Public Works Building, Twelfth and N Streets, Sacramento

FRANK F. MERRIAM.....Governor  
HARRY A. HOPKINS.....Assistant Director

EARL LEE KELLY.....Director  
EDWARD J. NERON.....Deputy Director

**CALIFORNIA HIGHWAY COMMISSION**

H. R. JUDAH, Chairman, Santa Cruz  
PHILIP A. STANTON, Anaheim  
PAUL G. JASPER, Fortuna  
WILLIAM T. HART, Carlsbad  
ROBERT S. REDINGTON, Los Angeles  
JULIEN D. ROUSSEL, Secretary

**DIVISION OF HIGHWAYS**

C. H. PURCELL, State Highway Engineer  
G. T. McCOY, Assistant State Highway Engineer  
J. G. STANDLEY, Principal Assistant Engineer  
R. H. WILSON, Office Engineer  
T. E. STANTON, Materials and Research Engineer  
FRED J. GRUMM, Engineer of Surveys and Plans  
R. M. GILLIS, Construction Engineer  
T. H. DENNIS, Maintenance Engineer  
F. W. PANHORST, Bridge Engineer  
L. V. CAMPBELL, Engineer of City and Cooperative Projects  
R. H. STALNAKER, Equipment Engineer  
J. W. VICKREY, Safety Engineer  
E. R. HIGGINS, Comptroller

**DISTRICT ENGINEERS**

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F. W. HASELWOOD, District II, Redding  
CHARLES H. WHITMORE, District III, Marysville  
JNO. H. SKEGGS, District IV, San Francisco  
L. H. GIBSON, District V, San Luis Obispo  
E. T. SCOTT (Acting), District VI, Fresno  
S. V. CORTELYOU, District VII, Los Angeles  
E. Q. SULLIVAN, District VIII, San Bernardino  
S. W. LOWDEN (Acting), District IX, Bishop  
R. E. PIERCE, District X, Stockton  
E. E. WALLACE, District XI, San Diego

**SAN FRANCISCO-OAKLAND BAY BRIDGE**

C. E. ANDREW, Bridge Engineer

**DIVISION OF WATER RESOURCES**

EDWARD HYATT, State Engineer, Chief of Division  
GEORGE T. GUNSTON, Administrative Assistant  
HAROLD CONKLING, Deputy in Charge Water Rights  
A. D. EDMONSTON, Deputy in Charge Water Resources Investigation  
R. L. JONES, Deputy in Charge Flood Control and Reclamation  
GEORGE W. HAWLEY, Deputy in Charge Dams  
SPENCER BURROUGHS, Attorney  
EVERETT N. BRYAN, Hydraulic Engineer Water Rights  
GORDON ZANDER, Adjudication, Water Distribution

**DIVISION OF ARCHITECTURE**

W. K. DANIELS, Assistant State Architect, in Charge of Division  
P. T. POAGE, Assistant State Architect

**HEADQUARTERS**

H. W. DeHAVEN, Supervising Architectural Draftsman  
O. H. KROMER, Principal Structural Engineer  
CARLETON PIERSON, Supervising Specification Writer  
J. W. DUTTON, Principal Engineer, General Construction  
W. H. ROCKINGHAM, Principal Mechanical and Electrical Engineer  
C. E. BERG, Supervising Estimator of Building Construction

**DIVISION OF CONTRACTS AND RIGHTS OF WAY**

C. C. CARLETON, Chief  
OLARENCE W. MORRIS, Attorney, San Francisco  
FRANK B. DURKEE, Attorney  
C. R. MONTGOMERY, Attorney  
ROBERT B. REED, Attorney

**DIVISION OF PORTS**

Port of Eureka—E. S. MACKINS, Surveyor

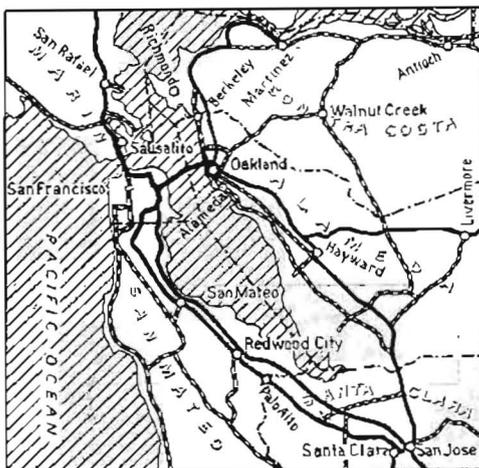
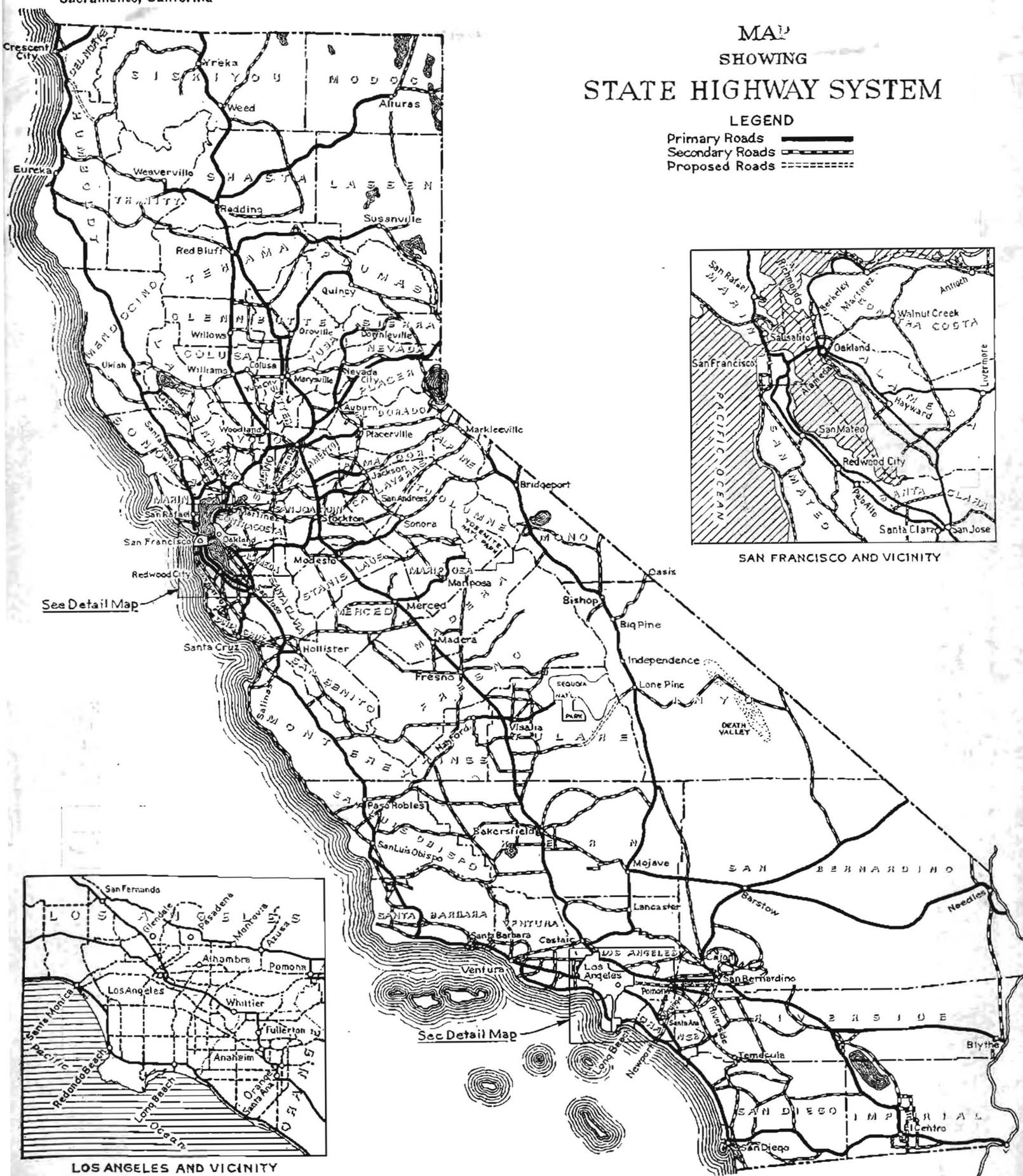
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**MAP**  
 SHOWING  
**STATE HIGHWAY SYSTEM**

**LEGEND**  
 Primary Roads —————  
 Secondary Roads - - - - -  
 Proposed Roads .....  
 (Note: The legend uses thick solid lines for primary roads, dashed lines for secondary roads, and dotted lines for proposed roads.)



**SAN FRANCISCO AND VICINITY**



**LOS ANGELES AND VICINITY**