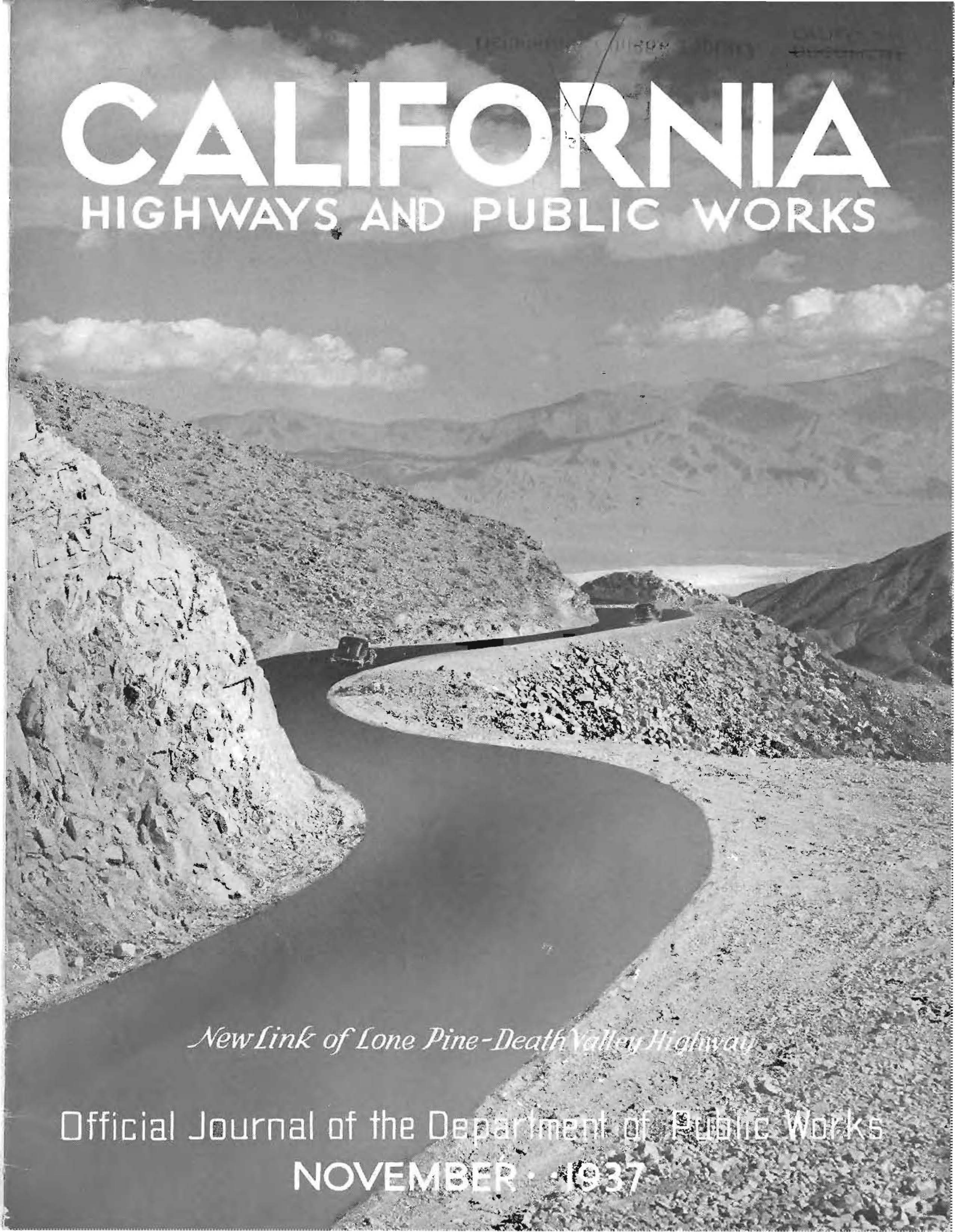
CALIFORNIA
HIGHWAYS AND PUBLIC WORKS



New Link of Lone Pine-Death Valley Highway

Official Journal of the Department of Public Works
NOVEMBER · 1937

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

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Various Types of Four-lane Separated Thoroughfares To Be Built During Biennium

New Divided Highway Plan

By FRED J. GRUMM, Engineer of Surveys and Plans

THE State Division of Highways is planning for immediate construction about 76 miles of four-lane divided highway which will supplement approximately 86 miles of this type of road now in use or under construction. This program includes a large portion of projects programmed for construction in the 1937-1938 biennium on the primary highways of the State.

The extent of this proposed type of construction is apparent when consideration is given to the possibility that the State highways, on which traffic volume will justify the divided type of highway construction, will approximate only about 5 per cent and will probably never exceed 10 per cent of the present State highway mileage.

INCREASED LANE WIDTHS ADOPTED

Incorporated in the design of the divided highways will be found the new standards of increased lane width recently adopted by the Division of Highways, which calls for a 12-foot width for the inside lane adjacent to the dividing strip, and an 11-foot width for the outside lane adjacent to the roadway shoulder. The 12-foot width for the inside lane will provide a greater operating space for vehicles while passing, thus reducing the possibility of sideswipe or the "overtaking" type of accident. The outer 11-foot width lane lies adjacent to a shoulder with width adequate for parking or for emergency movements. This shoulder will be surfaced or treated when conditions require such treatment.

The dividing strip will have a minimum width of 4 feet, the width in general being controlled by the best design which can be developed in adapting the existing pavement to the divided roadway type most economically and by the extent of the development of adjacent property directly affecting right of way costs.

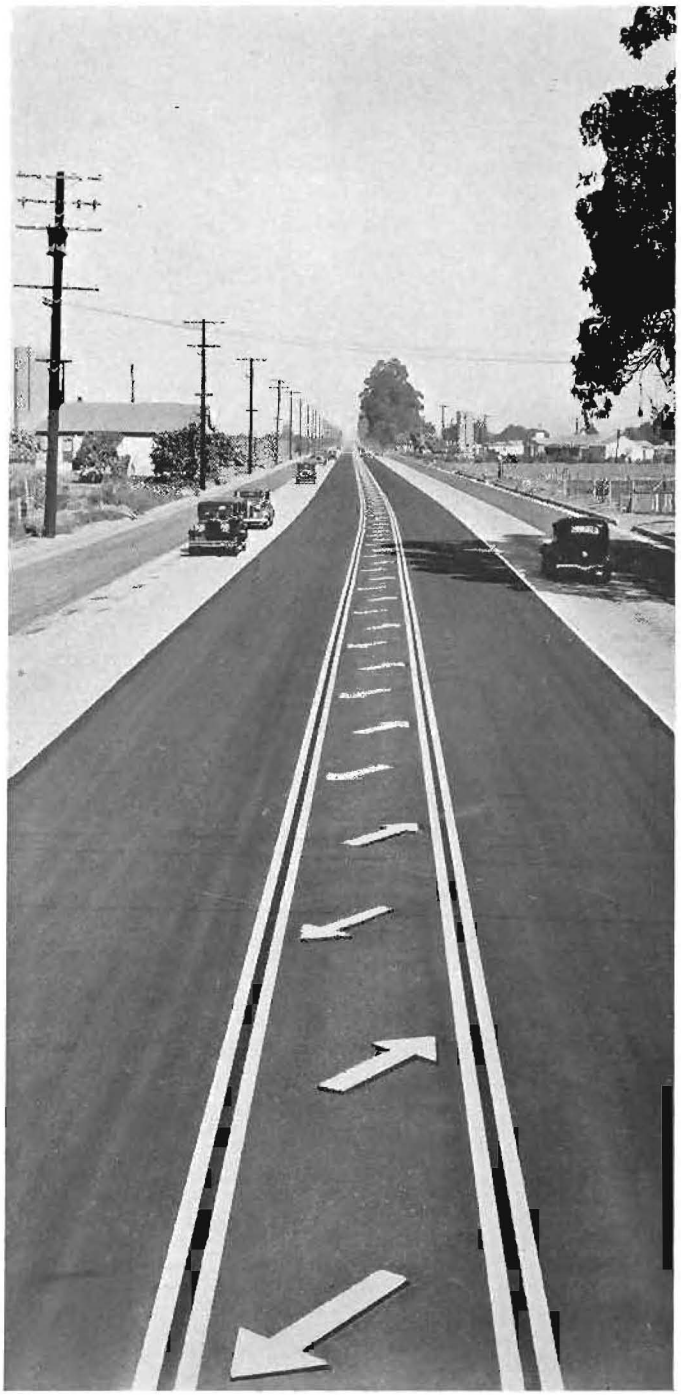
DIVISION STRIPS TO BE PLANTED

For separation widths of 20 feet or less, curb construction is proposed with planting or landscaping, where climatic conditions or water supply permits and where heavy future maintenance will not be incurred. Trees and larger shrubs would probably only be planted in dividing strips greater than 20 feet in width.

In the narrow separation strips, where planting is not practical, the area between the curbs will receive a protective seal to prevent moisture penetrating to the subgrade and causing damage to the pavement. This method also often introduces a contrasting color scheme that definitely demarks the separation strip from the pavement.

The wider dividing strip offers several advantages over the minimum As the width increases the driving hazard caused by opposing headlights is eliminated to a great extent. This hazard may be reduced further by the planting of low growing shrubs in the separating area. With a separation of 20 feet or more, protection to cross traffic is provided by an intermediate stop zone, between the two roadways.

Various types of separation strip construction have been given trial and consideration. The type apparently proving the most satisfactory in fulfilling the purpose for which



Embossed white arrows bordered by double traffic stripe make effective separation strip on four-lane highway.

Four-lane divided highway on coast route preserves existing tree rows in the separation strip.

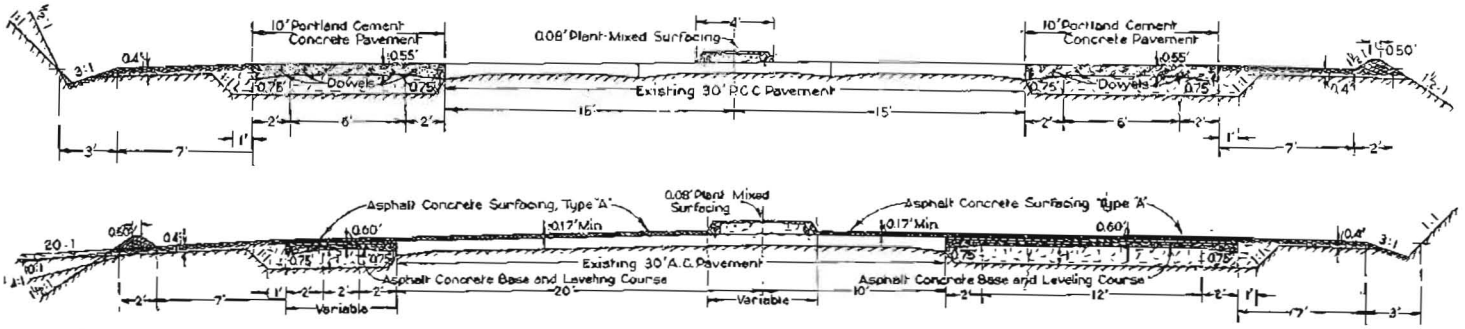
the dividing strip was designed, namely eliminating of opposing traffic hazard, consists of constructing curbs adjacent to the traffic lanes. The design of curb adopted on our work is 6 inches in height with a moderate sloping face. Studies of curb designs with light reflecting panels to increase visibility at night, are under way.

RAISED ARROWS EFFECTIVE

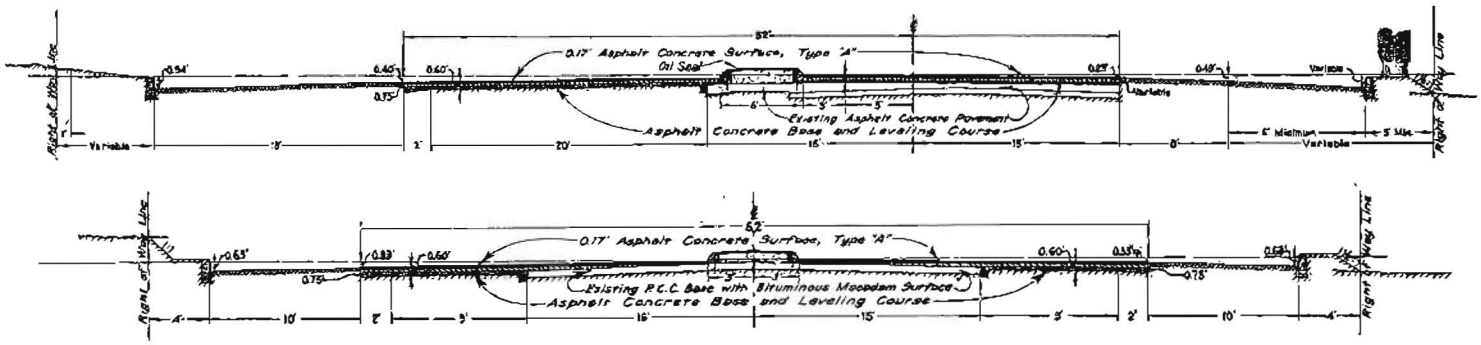
Another type of dividing strip, which is particularly effective through areas where local property developments would require so many openings in a central curbed island as to lose the effectiveness of the island construction, is the placing of embossed arrows diagonally across the separation strip with the raised arrow painted white and bordered by a double traffic stripe on each side. This design with distinctive marking sets out the dividing strip definitely from the pavement lanes. It is not, of course, as effective as the more positive curb construction but observation of traffic on installations of this type show that promiscuous crossing or invasion of the marked zone does not generally prevail and is rather carefully observed by the reasonably careful driver.

Separation of the roadway is accomplished by other means than the more conventional curbed design. Advantage is taken of the topography in some locations to use the existing 2-lane highway for one-way traffic and to construct another 2-lane, one-way traffic roadway adjacent thereto. This, in many cases, provides a separation by a differential in grades. In other instances the new roadway is planned to preserve the existing tree-rows by including them within the separation strip.

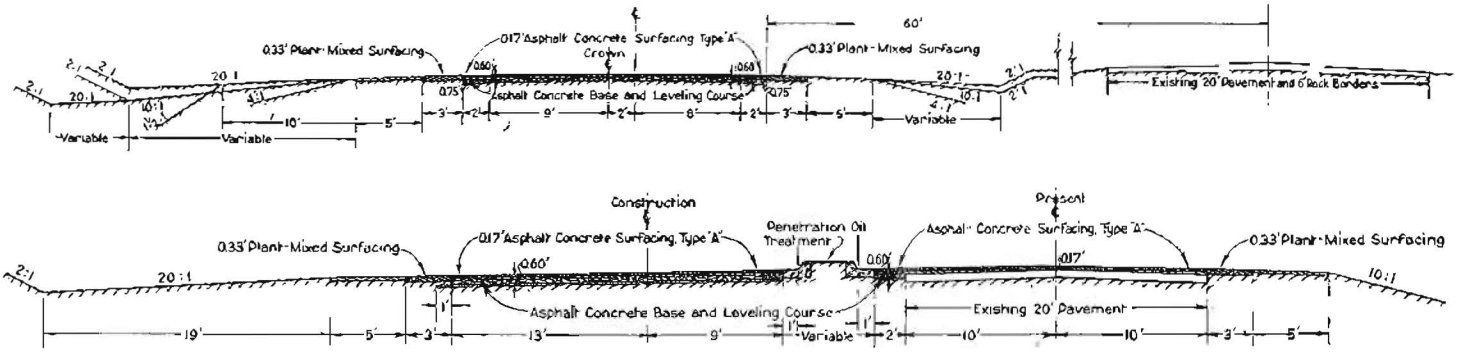
All roads requiring four lanes or more for adequate service to traffic will ultimately be developed into the divided type of roadway. There may be exceptions to this general



Design of four-lane divided highway proposed to be constructed in San Diego. Upper—Widening of Portland cement concrete pavement with curbed dividing strip. Lower—Widening of asphaltic concrete pavement with construction of curbed dividing strip.



Four-lane divided highway construction in San Bernardino County near Colton. Upper—Dividing strip off-centered in right of way with resurfacing of old pavement. Lower—Dividing strip centered upon existing pavement which is widened and resurfaced.



A 19.1 mile section of divided four-lane highway proposed for construction in Kern County, between one mile north of Grapevine and ten miles south of Bakersfield. Upper—A wide separation strip which will reduce the opposing light hazard and provide protection to cross traffic at intersections. Lower—Curbed dividing strip where right of way width is restricted and approaching transition to three-lane highway.

State highway approaching Long Beach; raised white arrows in center dividing strip.

design where large, long bridges or structures are involved or where urban development has reached such stages that the divided type of road would create a hazard or be a hindrance to the movement of traffic rather than an asset.

The adoption of the four-lane divided roadway design for highways which now are required to handle traffic exceeding two or three-lane capacity or which will ultimately de-

Type of four-lane divided highway used on route through Leucadia in San Diego County showing landscaping of center strip.

velop into that class, has also affected the design of our two and three-lane highways. On routes where future traffic increase will require a multi-lane road, the proposed two-lane or three-lane roadway is being so designed as to permit the development into a divided highway section with the least loss of existing values or investment.

Two-lane pavements, being constructed now and sufficient for present traffic, are being off-centered within the right of way, and sufficient right of way widths purchased to permit the ultimate construction without disturbing adjacent improvement when the need for the divided multi-lane roadway develops.

Three-lane pavements, whose capacity is estimated at double that of the two-lane, are being constructed as part of the program of progressive development affording both increased capacity, better service to traffic, and better economic adjustment to the funds available.

In other words, we are providing a better facility and relief from congestion by stage construction over longer mileage with limited funds which are insufficient to provide the ultimate improvement now.

In the design of these three-lane pavements are incorporated features which make it readily adaptable to the divided multi-lane type, contemplating principally additional improvement and little or no revision occasioning loss of the first improvement. The parts of the 3-lane road which are to be converted or revised are of light and relatively cheap construction and even that has salvage value.

UNIT RECENTLY COMPLETED

The 3-lane highway north of Fresno, recently constructed, is of this type. The two outside lanes are Portland cement concrete and the inner lane is of lighter intermediate material.

The outer permanent pavement lanes carry the bulk of the traffic load, the central lane is used primarily for passing purposes, and, therefore, less frequently and by the lighter, faster traffic units.

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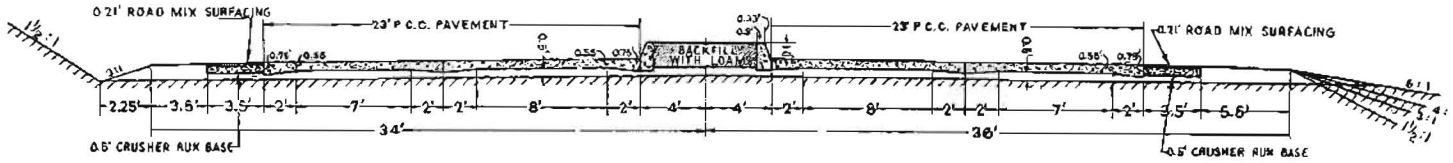
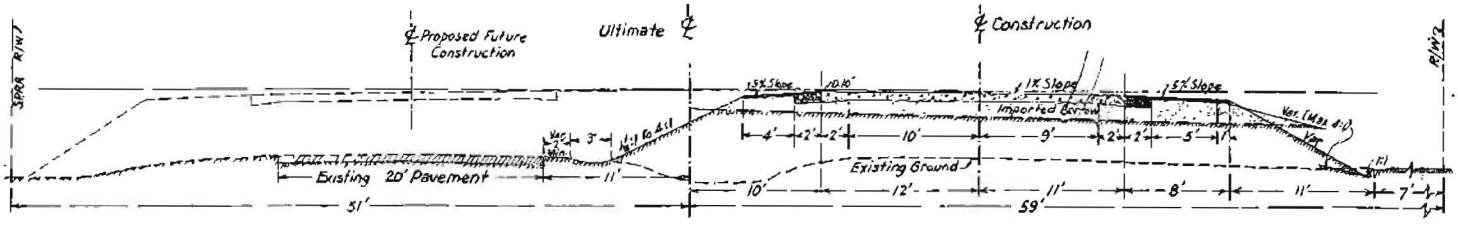


Divided four-lane approaches to the Redding Subway in Shasta County



Divided four-lane proposed in Merced County near Merced, existing highway used for one way traffic as a stage construction.

H. A. HOPKINS

H. R. JUDAH

R. S. REDINGTON

Highway Commission Personnel Changes

Assistant Director

MEMBER of the California Highway Commission since January, 1931, its chairman since 1932, Harry A. Hopkins of Taft, Kern County, advanced to a higher post in public service on October 15 when he was chosen by Director Earl Lee Kelly of the Department of Public Works to be assistant Public Works Director and received his appointment to that position from Governor Frank F. Merriam.

Elevation to his new office automatically made Mr. Hopkins a member of the California Toll Bridge Authority.

Graduating from high school in Los Angeles, Mr. Hopkins entered the oil business with which he has since been continuously connected. Taking up his residence in Taft in 1909, Mr. Hopkins helped incorporate that city in 1910, was a member of the first board of trustees there, serving for eight years, and then was elected mayor.

(Continued on page 25)

Becomes Chairman

DESCENDANT of a pioneer family of San Francisco, H. R. Judah, newspaper publisher and prominent citizen of Santa Cruz, member of the California Highway Commission since May, 1936, was on October 15 named by Governor Frank F. Merriam to be the commission's chairman, succeeding Harry A. Hopkins.

Born in Menlo Park, San Mateo County, Mr. Judah attended St. Matthews Military Academy for ten years and then entered the University of California, which he left after two years to associate himself with the home office of the Northern Commercial Company, then engaged in extensive commercial business on the Yukon River in Alaska.

In 1905, Mr. Judah went into the advertising business with his brother, F. S. Judah, and together they purchased the Peck and Garrett Company, which became the Peck-Judah Company, nationally known advertis-

(Continued on page 28)

New Member

CALLED into public service by Governor Frank F. Merriam, who appointed him a member of the California Highway Commission on October 15 to fill the vacancy created by the resignation of Harry A. Hopkins, Robert S. Redington of Los Angeles brings to his new post an enthusiasm for good roads that he has had for years.

A native of Los Angeles, Mr. Redington was educated in the public schools of that city and for the past ten years has been engaged in the mortgage and real estate business there. His work and a fondness for traveling have taken him into most of the various sections of the State affording him an opportunity to see and study the highway system of California. He has visited many states in the Union and toured Europe and the Orient always finding time to inquire into the latest highway construction methods here and abroad. Mr. Redington has been exceedingly

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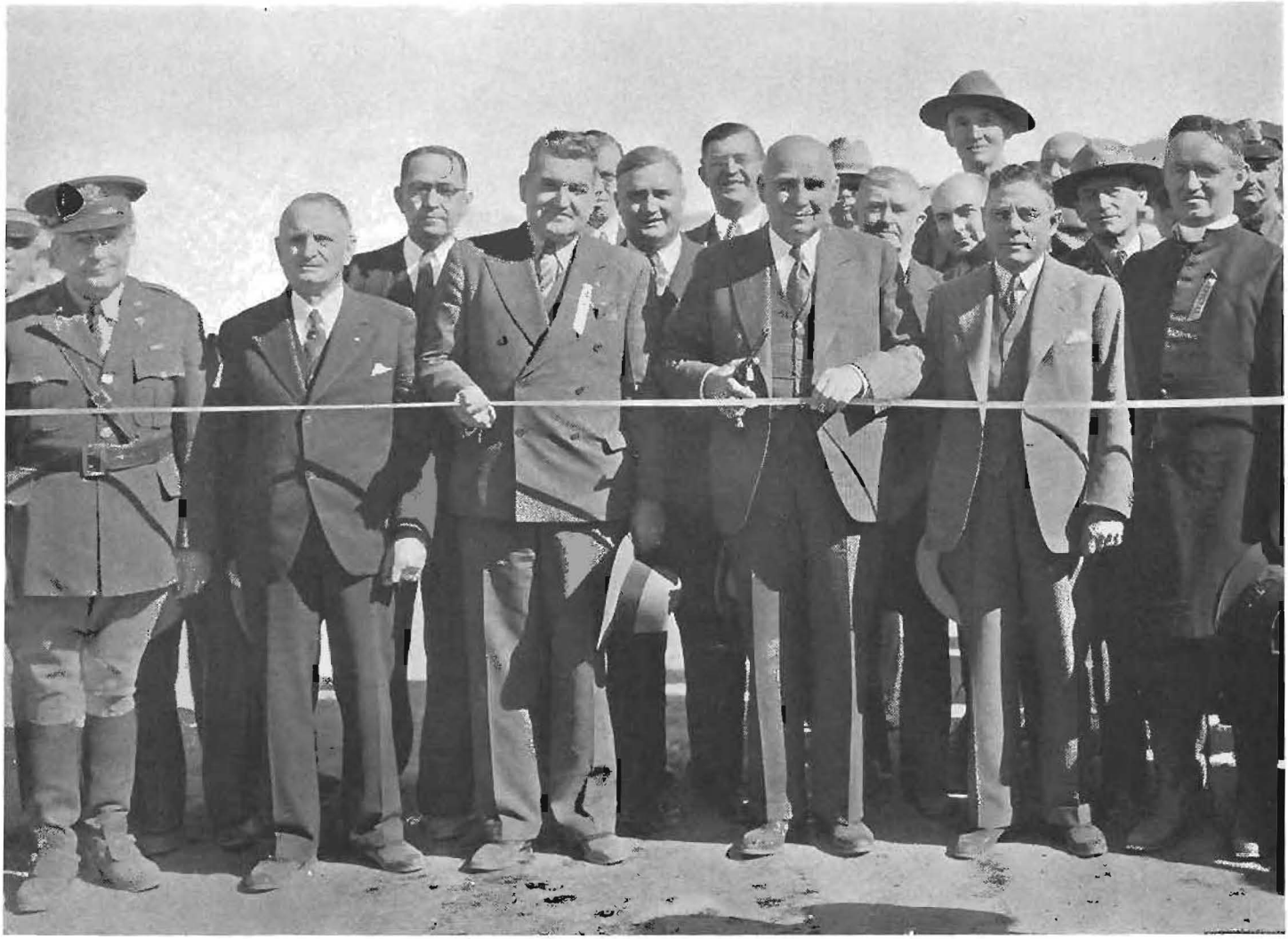

This photograph of Governor Merriam's official party was taken a few seconds before ribbon stretched across Lone Pine-Death Valley Highway was parted by bullet. Left to right, front row—Capt. C. Kane, C. C. C.; Wm. T. Hart, Highway Commissioner; Edward J. Neron, Deputy Director of Public Works; Gov. Merriam, Harry A. Hopkins, Assistant Director of Public Works; Father J. J. Crowley. Back row—Jess Hession, Deputy Attorney General; Earl S. Anderson, Registrar of Contractors; Fred E. Stewart, State Board of Equalization; Justus S. Craemer, Building and Loan Commissioner; Wm. A. Chalfont, Col. John White, U. S. National Park Service towering above Geo. Savage; Roy Boothe, U. S. Forest Supervisor.

NEW DEATH VALLEY HIGHWAY

CLIMAXING a three-day celebration featured by a pageantry of the past that never again will be staged in the West, Governor Frank F. Merriam on Sunday morning, October 31, officially dedicated the first major unit of the Lone Pine-Death Valley Highway, State Route 190, between Lone Pine and Death Valley in Inyo County.

Formal opening of the new desert road was signalized by a flash that came over telegraph wires from President Roosevelt in Hyde Park, New York, to a temporary receiving station set up beside the highway at its junction with the old Darwin Road, for years a terror to motorists owing to torrential summer cloudbursts and the tortuous Zinc Hill Grade.

Actual completion of the dedicatory ceremonies took place at Bad Water, 276 feet below sea level in Death Valley, where at sunset clear mountain water carried in a gourd from Lake Tulainyo, 12,865 feet up Mt. Whitney, was poured into the brackish slime of Bad Water while simultaneously signal fires flared up on peaks from Death Valley to Mt. Whitney.

California never has witnessed a more colorful, picturesque and unusual celebration than that which commemorated the opening of the Lone Pine-Death Valley Highway. Participating in the three-day fiesta were Paiute Indians; several descendants of survivors of the Jayhawker party of tragic memory, most of whose members died of thirst on the sun baked sands of Death Valley in December, 1849; a descendant of a survivor of the ill-fated Donner Party; pioneer desert stage drivers, cowmen, mule drivers, railroad men and prospectors, movie actors from Hollywood, state, county and city officials and a host of Inyo county citizens and their guests from near and far points.

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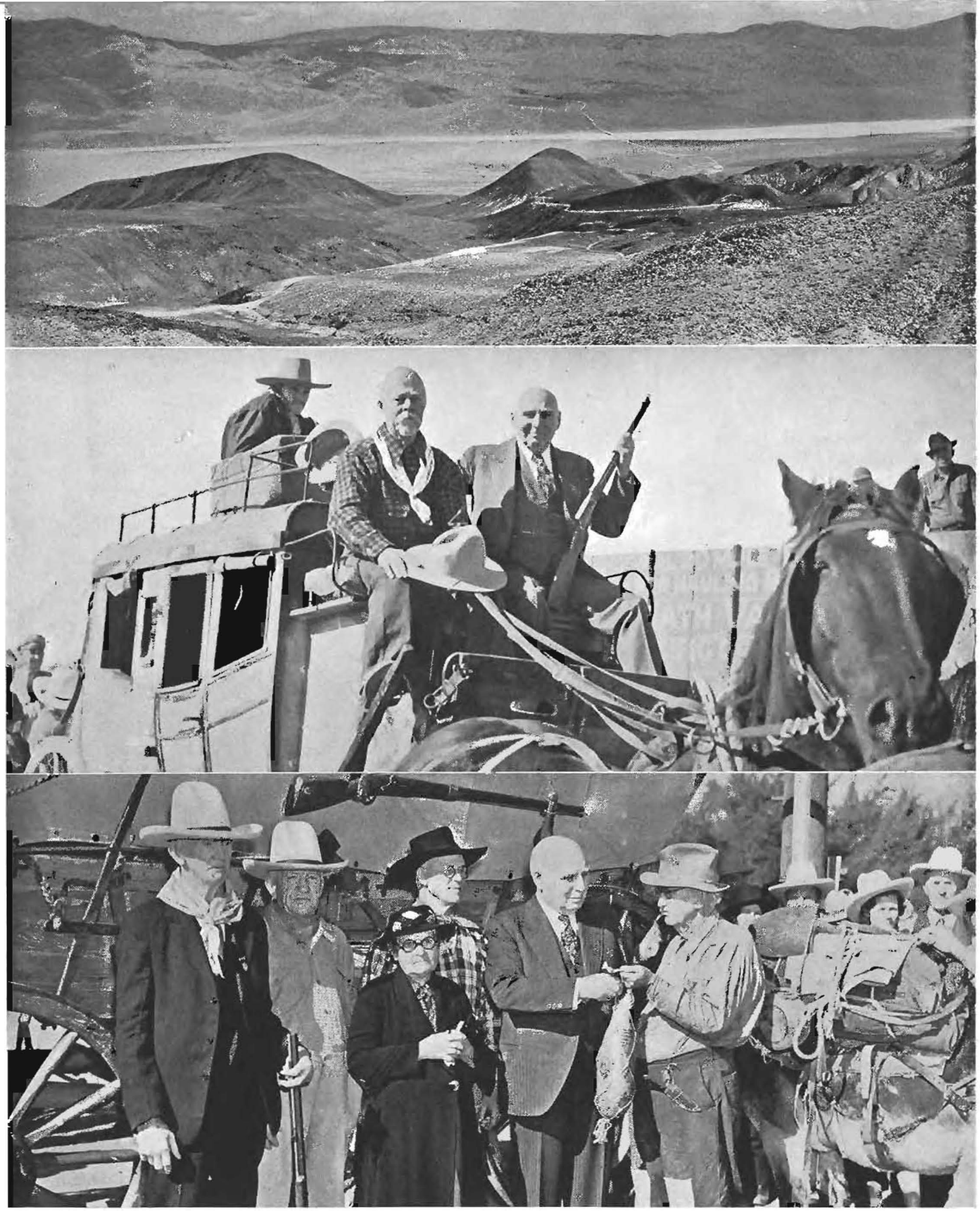


Scenes at dedication of Lone Pine-Death Valley Highway. Upper—View of new highway leading down into Panamint Sink. Center—Gov. Merriam, rifle in hand, rides as express messenger with Driver Ollie Dearborn on Mt. Whitney-Death Valley stage. Lower—Sam Ball, veteran desert prospector, hands gourd of water from Lake Tulainyo to Gov. Merriam while descendants of survivors of Jayhawker Party look on. Left to right—Henry and Frank Doty, sons of Capt. Ed Doty of Jayhawkers; Mrs. Melissa Lindner and E. W. Mecum, secretary of Jayhawker Association.

New Death Valley Highway

(Continued from page 6)

The celebration began at dawn on Friday morning when Jerry Enm, Paiute Indian runner, filled a gourd with water from Lake Tulainyo and started on an arduous trip down Mt. Whitney to Whitney Portal, fourteen miles distant. There, late in the afternoon, he turned the gourd over to a pony express rider, Bert Johnson, son of the first white man to climb to the heights of Mt. Whitney. Johnson raced with the gourd to Lone Pine, where the precious water receptacle was locked in a bank vault over night.

RELAYED BY PIONEERS' KIN

Early Saturday morning, the gourd was placed in the hands of Governor Merriam who turned it over to Sam Ball, a pioneer prospector who still is pursuing his desert search for gold. Ball strapped the gourd to the back of his burro and carried it through Lone Pine to an ox-drawn covered wagon that transported pioneers across the continent in '49. While Henry Doty of Buellton, his brother Frank Doty of Santa Barbara, sons of Capt. Ed. Doty of the Jayhawker Party, and E. W. Mecum, secretary of the Jayhawker Association, proudly looked on, young Sidney Doty, grandson of Capt. Doty, received the gourd from Sam Ball and handed it to Miss Josephine Breen of Hollister, descendant of a survivor of the Donner Party.

In the covered wagon, Miss Breen rode to a point several miles out of Lone Pine where Johnny O'Keefe, veteran mule skinner, awaited with his Twenty Mule Team, which he said never would be harnessed again. Miss Breen entrusted the gourd to O'Keefe, who took it several miles distant to where Ollie Dearborn, 76-year old driver of the ancient Mt. Whitney-Death Valley stage, was waiting with old Joel Hart, first stage driver to cross Death Valley, as a passenger.

GOVERNOR PLAYS GUARD

O'Keefe delivered the water to Dearborn, Governor Merriam climbed into the seat beside the driver, took over the rifle and the job of express messenger, and the stage was off at

Gov. Merriam draws bead on ribbon barrier, severing of which by bullet officially opened Lone Pine-Death Valley Highway.

full speed to connect with a special train, the Slim Princess, consisting of a wheezy locomotive, time-worn baggage car and three dilapidated coaches, all of which have served the desert country since 1860.

The train was brought out of retirement for a final run in celebration of the occasion. With J. M. Henry, veteran engineer at the throttle, and Governor Merriam and his party and three carloads of invited guests in the coaches, the special made the run to Keeler, famous old mining town. Henry was custodian of the gourd during the trip. Jess Hession, Deputy Attorney General, who as a youth was a brakeman on the Slim Princess, donned a brakeman's cap and filled his former job while Fred Stewart, member of the State Board of Equalization, who is proud of the fact that he once was a section hand, gave his approval to the condition of the roadbed.

TRANSFERRED TO AUTO

The gourd remained overnight at Keeler. Early Sunday morning it was transferred to a streamline automobile and taken to the point of dedication, where Governor Merriam, Deputy Director of Public Works Edward J. Neron, representing Public Works Director Earl Lee Kelly; Col. John R. White of the National Park Service; Roy Boothe, U. S. Forest Service, and others spoke briefly.

By auto the water gourd was transported to Panamint Sink where it was flown over Telescope Peak to Furnace Creek in Death Valley, later being taken by air to Bad Water. Here was held the ceremony of the Wedding of Waters.

To Father John J. Crowley of Lone Pine goes the greatest measure of credit for the successful staging of the celebration. He and his committee worked for weeks arranging the details of the unusual pageant, and the rodeos, barbecues, parades and other events of the fiesta.

With the conclusion of these dedicatory ceremonies was signalized the formal opening of the first major unit of the Lone Pine-Death Valley highway which make more accessible two famous spots in Inyo County, Mt. Whitney, the tallest peak in the United States, and Bad Water in Death Valley, the lowest spot on the American continent.

The area traversed by this highway yearly attracts thousands of pleasure seekers from all points of the world, intrigued by the rugged Sierras, the desolate wastes of Death Valley and the romantic interest of Cerro Gordo, Darwin, Panamint City, Ballarat, Skidoo, Ryan, the old Borax Works, Stovepipe Wells and the famous Furnace Creek Ranch with its ultra modern successor, the Furnace Creek Inn.

With the completion of the valuable highway work now being undertaken within the confines of the Death Val-

ley National Monument by the National Park Service, and construction work by the State of Nevada adjacent to the Monument's easterly boundary, access will be afforded to the main north and south highway in the Nevada Highway system extending from Reno to Las Vegas.

When, in 1933, the Lone Pine-Death Valley route was made a secondary highway in the State system, it was narrow and crooked with steep grades, little more than a desert trail broken-in by the variegated traffic of emigrant trains, multi-teamed freighters, prospectors' burros, and occasional stages.

IDEAL WINTER CLIMATE

A territory that had been a living horror to El Dorado bound emigrants, by the very weirdness of its fantastic formation, drew prospectors to search its vast waste for mineral wealth, leading to the discovery of valuable deposits of lead, silver, soda, potash and borax. With the ever increasing number who penetrated this desert region came the realization that here was a land which, though summer temperatures soar to 140 degrees, is an ideal winter recreational area with mild, warm days and cool nights.

Recently developed resorts, such as Stove Pipe Wells, Furnace Creek Inn, and others, have attracted winter tourists in such numbers that, together with the need of mines and mills, improvement of roads into the region became a state-wide responsibility. As soon as possible after the highway from Lone Pine across the valley became a State route, the Division of Highways began widening and improving the old road with maintenance equipment until such time as major reconstruction could be started and a modern highway should replace the old trail.

EIGHT CONTRACT IMPROVEMENTS

In addition to the continual operations of the maintenance forces, the Division of Highways has performed work under eight contracts since the spring of 1934, amounting to about $140,000 and providing for shaping, oiling, and surfacing on nearly 150 miles of road to give better facilities to traffic.

Included in these contracts was the realignment of the road from 2 miles east of Lone Pine to 1 mile east of Owens River, with a new timber bridge across the river. This work provided for 1.7 miles of new road, graded 24 feet wide. Also in this program was the line change on the 2 miles between 8 miles southeast of Keeler and Centennial Wash, eliminating a hazardous stretch of one-way road; and the surface treatment of a total of 54 miles from the westerly edge of Panamint Sink to 3 miles west of the westerly boundary of Death Valley Monument and between Death Valley Junction and the San Bernardino County line.

Building for Highway Safety

Recent pronouncements of the State Division of Highways with regard to safety factors in highway building merit the hearty acclaim of California motorists. The policy of building highways so that they may more safely handle modern high-speed traffic has not only been declared, but is actually being put into effect. Center construction dividing the opposing streams of traffic on multiple-lane highways has been adopted for the new Altamont Pass highway. There are other notable instances of the kind. Further, the standard traffic lane width will henceforth be eleven feet instead of ten.—*Motorland.*

DANGEROUS GRADE ELIMINATED

The first major reconstruction planned by the State provided for elimination of that portion of the old road known as Zinc Hill Grade, which extended down Darwin Wash to the westerly edge of Panamint Sink. In 1934 reconnaissance surveys were begun in the high plateau country north of the town of Darwin. As the only trails in the jagged array of mountains in this territory were those made by burros and wild horses, leading nowhere, most of this survey was made on foot.

Reconnoitering the easterly portion of the plateau was comparatively simple but the greatest of difficulty was experienced in the selection of a suitable route descending the 2000 feet to the floor of Panamint Sink. To overcome this difference in elevation with a line of satisfactory gradient necessitated a curving alignment hanging to lava rims, dodging basalt cliffs, and skirting cinder cones, through the vari-colored grandeur of Rainbow Canyon to join the existing road at the mouth of Darwin Wash.

ARDUOUS ENGINEERING TASK

Staking in the preliminary line was found to be even a more arduous task than the reconnaissance. While the first six miles progressed rapidly, on much of the survey it was necessary to drive to the foot of the escarpment on the westerly edge of the sink and tortuously climb the 2000 feet to the rim carrying all the paraphernalia of a survey party, including the precious canteens of water.

But with all these difficulties it was possible to lay out a highway to be constructed to present day engineering standards and capable of carrying a large volume of modern traffic.

Between the connection with the old road northwest of Darwin and the junction at the mouth of Darwin Wash it was possible to reduce the distance from 20 miles to 17.6 miles and at the same time lay a maximum grade of 7.3% and a ruling grade down Rainbow Canyon of only 6.5% as against a maximum of 19%, with much over 15%, on the old road down Zinc Hill in Darwin Wash.

173 CURVES ABOLISHED

On the old road there were 245 curves, totaling over 12,000 degrees of curvature and with a minimum radius of 30 feet, while on the new road only 72 curves were necessary with total curvature of 4,100 degrees and a minimum radius held to 200 feet. Considerable portions of the old highway were one-way road but the new routing provides a 24-foot roadway.

The contract for construction of this new highway leading from the west to Death Valley was awarded to the Peninsula Paving Company on December 22, 1936, and on January 12, 1937, the first equipment was moved on to the job.

The estimated cost of the 17.6 miles of new road will be about $182,000. A contract for oiling this new section of highway was awarded on October 20, 1937, at the cost of $10,500.

"Your doctor's out here with a flat tire." "Diagnose the case as flatulency of the perimeter, and charge him accordingly," ordered the garage man. "That's the way he does."

Governor Merriam Dedicates El Cajon Divided Highway Unit

By E. E. WALLACE, District Engineer

FEATURED by one of the greatest civic celebrations in the city's history, a gala occasion highlighted by a parade in which 1500 persons participated and two dedicatory addresses by Governor Frank F. Merriam, San Diego's $600,000 El Cajon Boulevard was officially opened to traffic on Friday night, October 15.

El Cajon Boulevard is the entrance of the U. S. Transcontinental Route 80 into San Diego, which is its western terminus.

More than 40,000 persons lined the new thoroughfare from Texas Street to Euclid Avenue to witness the parade. Arriving at Texas Street and El Cajon Boulevard at 7.30, Governor Merriam, flanked by Vice Mayor Addison Housh, Director of Public Works Earl Lee Kelly and James Robbins, president of the El Cajon Boulevard Civic Association, cut a ribbon barrier stretched across the new highway and then pulled a switch which illuminated 70 ornamental lights along the three-mile stretch of the boulevard, and was the signal for the start of a roller skating race over the smooth pavement course.

The Governor then crowned Miss Katherine Hunter as queen of the celebration and with his official party led a two-hour parade at the conclusion of which final dedicatory ceremonies were held in the Hoover High School stadium.

While Director of Public Works Earl Lee Kelly, center, and James A. Robbins, president of El Cajon Boulevard Civic Association, right, look on, Governor Merriam pulls switch illuminating new El Cajon Boulevard in San Diego.

This picture was taken during excavation of unsuitable subgrade soil and abandoned pipe lines on El Cajon Boulevard.

In his address, the Governor said that El Cajon Boulevard indicated the trend in modern highway building toward separated highways which are highly beneficial to traffic and commendable because they decrease pedestrian hazards.

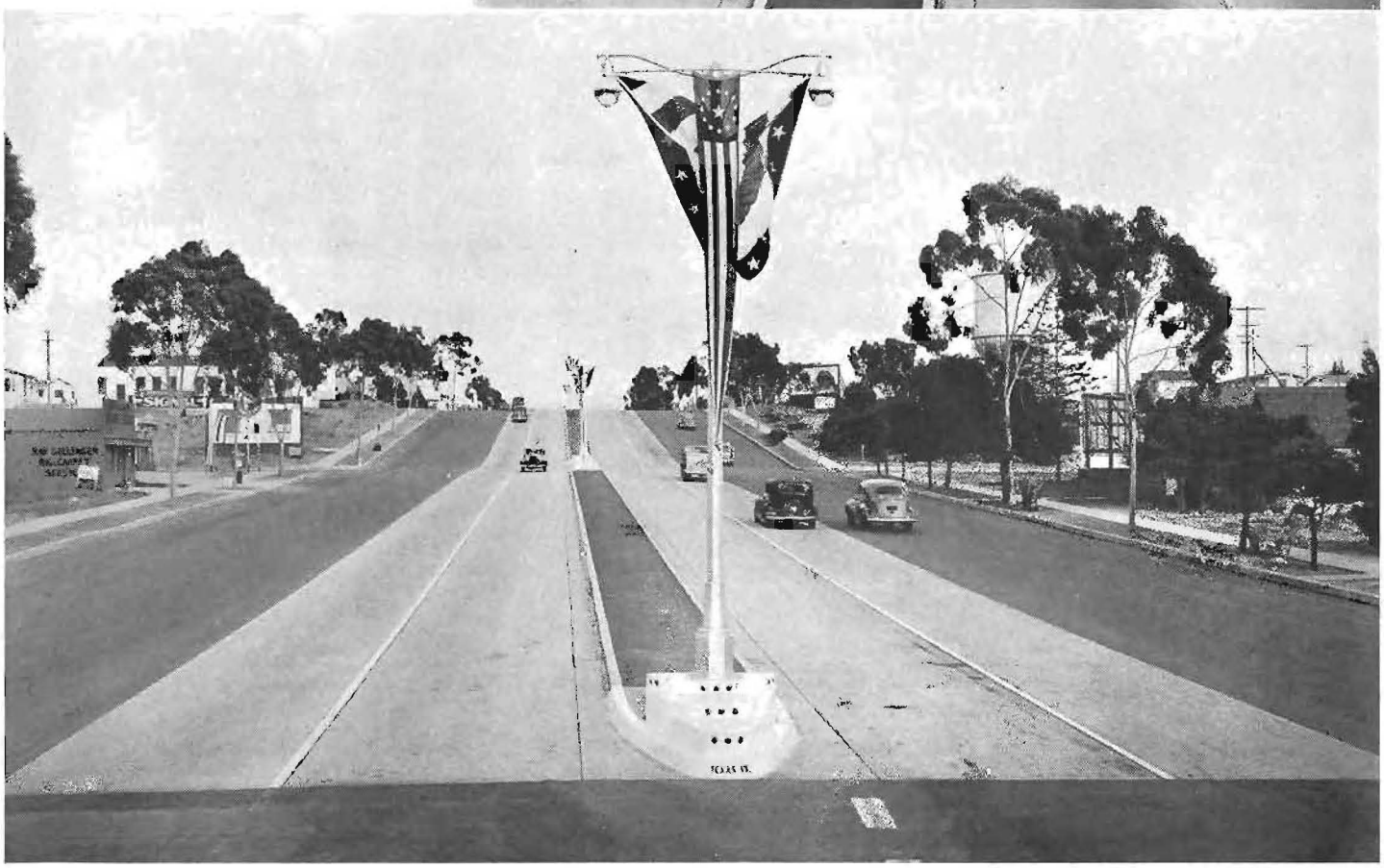
"I am happy to be here," the Governor said. "This is one of the best highways in the State of California. I am not saying that just to flatter you San Diegans—I am saying it because it is the truth. I bring to you the congratulations of the State. The city, county and federal governments must all be given their share of credit for their part in the project. I congratulate you on completion of a great civic undertaking."

Senator Ed Fletcher introduced the Governor. Other speakers were: Ad-

dison Housh, vice mayor; Walter Bellon, chairman of the board of supervisors; Milton Heller, acting president of the chamber of commerce; Charles Davis, president of the junior chamber of commerce; Capt. Paul Blackburn, commandant of the Naval Training Station; Maj. Gen. Louis Little, commanding the fleet marine corps; Maj. Gen. Harry Morehead, California National Guard Adjutant General; Harry A. Hopkins, retiring chairman of the California State Highway Commission, and newly appointed Assistant Director of the Department of Public Works, and Earl Lee Kelly, Director of Public Works of California.

El Cajon Boulevard was originally laid out with ample width, being 115 feet between curbs for a portion of its length. The progressive development of this boulevard had not previously allowed for the very poor adobe subsoil conditions encountered throughout its entire length, consequently the pavement was badly distorted.

During the preparation of plans for improvement, a thorough study of existing subgrade soils was made



These views of El Cajon Boulevard in San Diego graphically show the width of this new highway and the ornamental divided strip which also affords a safety zone for pedestrians.

at the district laboratory, resulting in the discovery that the shrinkage of the soil was more than three times the allowable limit and that the moisture content was as high as 20 per cent, caused partly by leaking water mains and by inadequate drainage.

The above conditions required correction before the repaving could be accomplished, and resulted in a rather expensive project. With the cooperation of city, federal and State authorities, approximately $340,000 was expended in providing proper drainage under and along three miles of El Cajon Boulevard, and removing the 12-inch water main from the center to the sides of the street.

After the drainage work was completed, a contract was awarded for the grading and paving project on the same three-mile section.

LARGE EXCAVATION JOB

The poor subgrade condition was corrected by removing 47,000 cubic yards of material from the central 50 feet of the road and replacing the subgrade soil with a selected disintegrated granite which had to be transported approximately three miles to the site.

Unfortunately, this work was in progress during one of the wettest winters encountered and this condition somewhat complicated our construction problems and added to the inconvenience of the adjacent property owners and business men. These people who were represented by the El Cajon Boulevard Civic Association overlooked many disagreeable and unavoidable conditions, and assisted the district forces in every way possible.

PROVIDES PEDESTRIAN ISLANDS

The final improvement provides a fine divided highway consisting of two one-way traffic lanes 22 feet wide on each side of, and separated by, a raised and curbed dividing strip 6 feet in width. Pedestrian islands are constructed on both sides of most of the street intersections, utilizing a white portland cement concrete. The islands are of sufficient height and width to provide a refuge for pedestrians and should assist in reducing the number of serious accidents which have occurred involving pedestrians attempting to cross the wide boulevard which has heretofore been inadequately lighted.

The city, county and State then cooperated in providing cable conduits, light standards and lights for each of the pedestrian islands.

Approximately $340,000 was spent in providing proper drainage under and along three miles of El Cajon Boulevard. This picture was taken during construction.

The grade of the new pavement was placed a little higher than the adjacent sides to provide for the resurfacing of the roadside adjacent to the new pavement and a bituminous premix was used to smooth out the irregularities and has, at least temporarily, provided a smooth surface adjacent to the new highway.

TRAFFIC GREATLY INCREASED

The paving project cost $312,000 and furnished 62,000 hours of employment to local labor and has resulted in a fine highway which has already greatly increased the traffic on this boulevard.

The final climax of this project was the elaborate and colorful opening which took place on the evening of October 15 when Governor Merriam dedicated the new boulevard and the Highway Commission participated in the parade and exercises which resulted from the carefully planned and whole-hearted cooperation of the El Cajon Boulevard Civic Association and the city authorities of San Diego.

Captain George T. Gunston Wins Promotion

In recognition of fifteen years of efficient service to the State, Captain George T. Gunston, Disbursing Officer of the Department of Public Works, on October 26 was promoted by Director of Public Works Earl Lee Kelly to the post of Administrative Assistant to Edward Hyatt, State Engineer and chief of the Division of Water Resources, succeeding the late John J. Haley, Jr.

Capt. Gunston entered the employ of the State on September 5, 1922, as Personnel Clerk and Assistant Secretary of the California Highway Commission. In July, 1923, he was appointed Disbursing Officer of the Department of Public Works, a position held until his elevation to his new job.

Born in Tacoma, Washington, Capt. Gunston gave up the idea of entering college when it appeared the United States would enter the World War and enlisted in the Washington National Guard in February, 1917. He was sworn into Federal service in June of that year and later attended Officers' Training School at Fortress Monroe, Virginia, where he earned a commission as second lieutenant.

Discharged from service in December, 1918, Capt. Gunston came to California and attended the University of California 1919-1920 and then transferred to the University of Washington. From 1923-1926, Mr. Gunston was second lieutenant, Finance Reserve. On June 14, 1926, he was commissioned first lieutenant, Field Artillery, California National Guard, and later was given command of Battery D, 143d Field Artillery.

Quarterly Gas Tax Distribution to Cities

THE third quarterly apportionment of the ¼-cent gasoline tax allocation under the Streets and Highways Code was distributed to the cities in October for expenditure only on streets of major importance.

A further apportionment of an equal amount will be made to the cities under Section 203 for expenditure on State highways within the cities to be expended under the supervision and control of the State Division of Highways. This money is not available to the cities until contracts have been entered into for the proposed work.

In accordance with the provisions of section 198 of the Streets and Highways Code, payment of the apportionment will be made to the cities to which expenditures have been delegated in the proportion of their pro rata share, and which have created a Special Gas Tax Street Improvement Fund to receive the payment. Payment to cities which have not submitted their annual budget will be deferred until the project statement has been received and the project agreement fully executed. The distribution for improvement of streets of major importance is as follows:

District I

City	Population	Amount
Del Norte County:		
Crescent City	1,720	$417.24
Humboldt County:		
Arcata	1,709	$414.58
Blue Lake	555	134.63
Eureka	15,752	3,821.19
Ferndale	889	215.66
Fortuna	1,239	300.56
Trinidad	107	25.96
Totals	20,251	$4,912.58
Lake County:		
Lakeport	1,318	$319.73
Mendocino County:		
Fort Bragg	3,022	$733.09
Point Arena	385	93.40
Ukiah	3,124	757.83
Willits	1,424	345.44
Totals	7,955	$1,929.76
Totals District I	31,244	$7,579.31

District II

City	Population	Amount
Lassen County:		
Susanville	1,358	$329.43
Modoc County:		
Alturas	2,338	$567.16
Shasta County:		
Redding	4,188	$1,015.94
Siskiyou County:		
Dorris	762	$184.85
Dunsmuir	2,610	633.14
Etna	379	91.94
Fort Jones	302	73.26
Montague	507	122.99
Mt. Shasta	1,008	244.77
Tulelake	300	72.78
Yreka	2,201	533.93
Totals	8,070	$1,957.66
Tehama County:		
Corning	1,377	$334.04
Red Bluff	3,517	853.17
Tehama	190	46.09
Totals	5,084	$1,233.30
Totals District II	21,038	$5,103.49

District III

City	Population	Amount
Butte County:		
Biggs	463	$112.32
Chico	7,961	1,931.21
Gridley	1,941	470.86
Oroville	3,698	897.08
Totals	14,063	$3,411.47
Colusa County:		
Colusa	2,116	$513.31
Williams	869	210.80
Totals	2,985	$724.11
El Dorado County:		
Placerville	2,367	$574.20
Glenn County:		
Orland	1,195	$289.89
Willows	2,024	490.99
Totals	3,219	$780.88
Nevada County:		
Grass Valley	3,817	$925.94
Nevada City	1,701	412.64
Totals	5,518	$1,338.58
Placer County:		
Auburn	2,661	$645.52
Colfax	912	221.24
Lincoln	2,094	507.97
Rocklin	724	175.63
Roseville	6,425	1,558.60
Totals	12,816	$3,108.96
Sacramento County:		
North Sacramento	2,097	$508.70
Sacramento	93,750	22,742.29
Totals	95,847	$23,250.99
Sierra County:		
Loyalton	837	$203.04
Sutter County:		
Yuba City	3,605	$874.52
Yolo County:		
Davis	1,243	$301.53
Winters	896	217.36
Woodland	5,569	1,350.95
Totals	7,708	$1,869.84

Quarterly Gas Tax Paid Cities to Improve

District III—Continued

City	Population	Amount
Yuba County:		
Marysville	5,763	$1,398.01
Wheatland	479	116.20
Totals	6,242	$1,514.21
Totals District III	155,207	$37,650.80

District IV

City	Population	Amount
Alameda County:		
Alameda	35,033	$8,498.45
Albany	8,569	2,078.71
Berkeley	82,109	19,918.36
Emeryville	2,336	566.68
Hayward	5,530	1,341.49
Livermore	3,119	756.62
Oakland	284,063	68,909.25
Piedmont	9,333	2,264.04
Pleasanton	1,237	300.08
San Leandro	11,455	2,778.80
Totals	442,784	$107,412.49
Contra Costa County:		
Antioch	4,508	$1,093.57
Concord	1,125	272.91
El Cerrito	3,870	938.80
Hercules	392	95.09
Martinez	6,809	1,651.76
Pinole	781	189.46
Pittsburg	9,610	2,331.23
Richmond	20,189	4,897.54
Walnut Creek	1,014	245.98
Totals	48,298	$11,716.34
Marin County:		
Belvedere	500	$121.29
Corte Madera	1,027	249.13
Fairfax	2,925	709.56
Larkspur	1,241	301.05
Mill Valley	4,164	1,010.12
Ross	1,355	328.70
San Anselmo	4,650	1,128.02
San Rafael	8,022	1,946.01
Sausalito	3,667	889.56
Totals	27,551	$6,683.44
Napa County:		
Calistoga	1,000	$242.58
Napa	6,437	1,561.52
St. Helena	1,582	383.77
Totals	9,019	$2,187.87
San Francisco County:		
San Francisco	634,394	$153,894.09
San Mateo County:		
Atherton	1,324	$321.18
Bay Shore	1,149	278.73
Belmont	999	242.34
Burlingame	13,270	3,219.09
Daly City	8,435	2,046.20
Hillsborough	1,891	458.73
Lawndale	369	89.51
Menlo Park	2,254	546.79
Redwood City	8,962	2,174.04
San Bruno	3,610	875.73
San Carlos	1,132	274.61
San Mateo	13,456	3,264.22
South San Francisco	6,193	1,502.32
Totals	63,044	$15,293.49

District IV—Continued

City	Population	Amount
Santa Clara County:		
Alviso	381	$92.42
Gilroy	3,502	849.53
Los Gatos	3,168	768.51
Morgan Hill	908	220.27
Mountain View	3,308	802.47
Palo Alto	13,835	3,356.15
San Jose	62,022	15,045.57
Santa Clara	6,302	1,528.77
Sunnyvale	3,094	750.56
Totals	96,520	$23,414.25
Santa Cruz County:		
Santa Cruz	14,395	$3,492.01
Watsonville	8,641	2,096.17
Totals	23,036	$5,588.18
Sonoma County:		
Cloverdale	759	$184.12
Healdsburg	2,296	556.97
Petaluma	8,245	2,000.11
Santa Rosa	10,636	2,580.13
Sebastopol	1,762	427.44
Sonoma	980	237.73
Totals	24,678	$5,986.50
Totals District IV	1,369,324	$332,176.65

District V

City	Population	Amount
Monterey County:		
Carmel	2,260	$548.24
King City	1,483	359.75
Monterey	9,141	2,217.46
Pacific Grove	5,658	1,348.29
Salinas	10,464	2,538.40
Soledad	594	144.10
Totals	29,500	$7,156.24
San Benito County:		
Hollister	3,757	$911.39
San Juan Bautista	772	187.28
Totals	4,529	$1,098.67
San Luis Obispo County:		
Arroyo Grande	892	$216.38
Paso Robles	2,573	624.17
San Luis Obispo	8,276	2,007.63
Totals	11,741	$2,848.18
Santa Barbara County:		
Lompoc	2,845	$690.15
Santa Barbara	33,613	8,153.99
Santa Maria	7,057	1,711.92
Totals	43,515	$10,556.06
Totals District V	89,285	$21,659.15

District VI

City	Population	Amount
Fresno County:		
Coalinga	2,851	$691.61
Clovis	1,316	319.24
Firebaugh	506	122.75
Fowler	1,171	284.07
Fresno	52,876	12,826.89
Kingsburg	1,322	320.70
Parlier	564	136.82
Reedley	2,589	628.05
Sanger	2,967	719.75

Major Streets Other Than State Highways

District VI—Continued

City	Population	Amount
San Joaquin	163	$39.54
Selma	3,047	739.15
Totals	69,372	$16,828.57
Kern County:		
Bakersfield	26,015	$6,310.83
Delano	2,632	638.48
Maricopa	1,071	259.81
Taft	3,442	834.98
Tehachapi	736	178.54
Totals	33,896	$8,222.64
Kings County:		
Corcoran	1,768	$428.89
Hanford	7,028	1,704.88
Lemoore	1,399	339.38
Totals	10,195	$2,473.15
Madera County:		
Chowchilla	847	$205.47
Madera	4,665	1,131.65
Totals	5,512	$1,337.12
Tulare County:		
Dinuba	2,968	$719.99
Exeter	2,685	651.34
Lindsay	3,878	940.74
Porterville	5,303	1,286.43
Tulare	6,207	1,505.72
Visalia	7,263	1,761.89
Totals	28,304	$6,866.11
Totals District VI	147,279	$45,727.59

District VII

Los Angeles County:		
Alhambra	29,472	$7,149.45
Arcadia	5,216	1,265.32
Avalon	1,897	460.18
Azusa	4,808	1,166.35
Bell	7,884	1,912.54
Beverly Hills	17,429	4,228.00
Burbank	16,662	4,041.94
Compton	12,516	3,036.19
Covina	2,774	672.93
Culver City	5,669	1,375.21
Claremont	2,719	659.59
El Monte	3,479	843.95
El Segundo	3,503	849.77
Gardena	7,044	1,708.76
Glendale	62,736	15,218.77
Glendora	2,761	669.78
Hawthorne	6,596	1,600.09
Hermosa Beach	4,796	1,163.43
Huntington Park	24,691	5,965.39
Inglewood	21,421	5,196.40
La Verne	2,860	693.79
Long Beach	142,551	34,580.65
Los Angeles	1,240,575	300,944.15
Lynwood	7,323	1,776.44
Manhattan Beach	1,891	458.73
Maywood	6,794	1,648.12
Monrovia	10,890	2,641.74
Montebello	5,498	1,333.73
Monterey Park	6,406	1,554.00
Pasadena	76,362	18,524.23
Pomona	20,804	5,046.73
Redondo Beach	9,347	2,267.44
San Fernando	7,567	1,835.64
San Gabriel	7,299	1,770.62

District VII—Continued

City	Population	Amount
San Marino	3,730	$904.84
Santa Monica	37,146	9,011.04
Sierra Madre	3,550	861.17
Signal Hill	2,932	711.26
South Gate	19,632	4,762.42
South Pasadena	13,730	3,330.68
Torrance	8,834	2,142.99
Vernon	1,269	307.84
West Covina	919	222.98
Whittier	14,846	3,601.41
Totals	1,896,728	$460,116.63
Orange County:		
Anaheim	11,013	$2,671.58
Brea	2,435	590.69
Fullerton	10,860	2,634.47
Huntington Beach	3,690	895.14
Laguna Beach	1,981	480.56
La Habra	2,273	551.40
Newport Beach	2,203	534.41
Orange	8,066	1,956.69
Placentia	1,606	389.59
San Clemente	667	161.80
Santa Ana	30,322	7,355.64
Seal Beach	1,156	280.43
Tustin	926	224.63
Totals	77,198	$18,727.03
Ventura County:		
Fillmore	2,893	$701.80
Ojai	1,468	356.11
Oxnard	6,285	1,524.64
Santa Paula	7,452	1,807.74
Ventura	11,603	2,814.71
Totals	29,701	$7,205.00
Totals District VII	2,003,627	$486,048.66

District VIII

Riverside County:		
Banning	2,767	$671.23
Beaumont	1,332	323.12
Corona	7,018	1,702.46
Elsinore	1,350	327.49
Hemet	2,235	542.17
Perris	763	185.09
Riverside	29,696	7,203.79
San Jacinto	1,346	326.52
Totals	46,507	$11,281.87
San Bernardino County:		
Chino	3,118	$756.38
Colton	8,014	1,944.07
Needles	3,144	762.69
Ontario	13,583	3,295.02
Redlands	14,177	3,439.12
Rialto	1,642	398.32
San Bernardino	39,068	9,477.29
Upland	4,713	1,143.30
Totals	87,459	$21,216.19
Totals District VIII	133,966	$32,498.06

District IX

Inyo County:		
Bishop	1,159	$281.15

(Continued on page 28)

This picture shows one of the many attractive mountain parkways provided for the use of motorists interested in viewing scenic attractions on California highways. Here is shown the Mormon Slide Parkway in San Bernardino Mountains. Drinking fountain in foreground.

Parking Areas on Mountain Highway

By B. A. SWITZER, Assistant Highway Engineer

THE first section of "High Gear" road into the San Bernardino Mountains was completed in 1929. An almost unbelievable development of mountain forest recreational use followed with a consequent increase in motor traffic.

The U. S. Forest Service, has conducted a traffic study in connection with the development of the San Bernardino National Forest and estimates that 1,239,000 people visit this mountain district over this road annually. Of this number it is estimated that approximately three-quarters of a million people make the trip for the sole purpose of enjoying the scenery.

This large increase of traffic created a demand for appropriate roadside improvement and beautification and many problems arose that had to be solved.

Erosion from the long slopes caused by the construction of the road across the precipitous face of the mountains had to be controlled.

Motorists interested in viewing the ever-changing scenery had to be served with places where they could safely stop to enjoy the views.

Drivers, having difficulty with cars due to inexperience in mountain driving, or defective mechanism, created a need for parking areas.

Extra width or the use of guard rails were found necessary to give protection to the motorist.

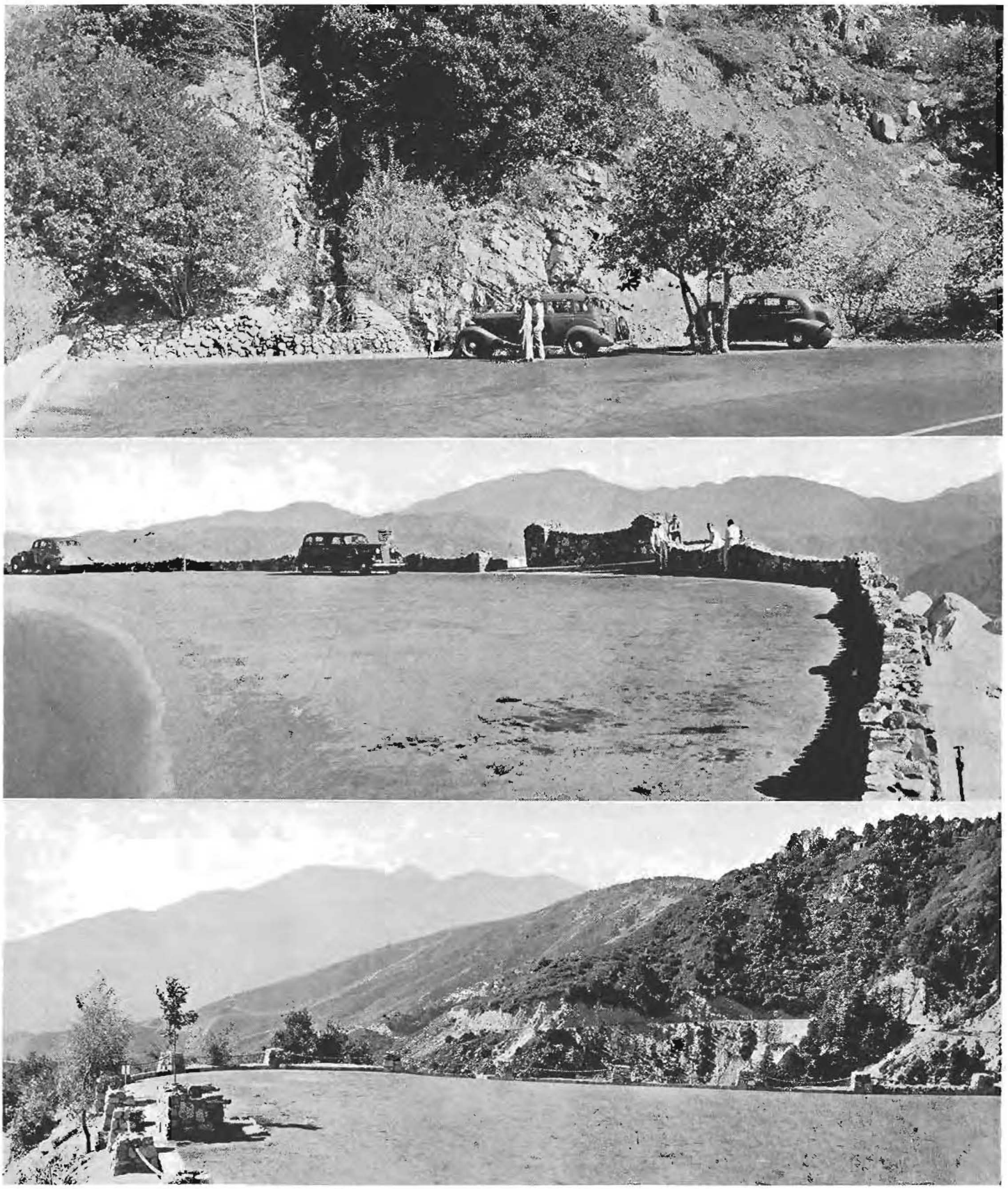
FILL SLOPES PLANTED

Erosion on the slopes is being taken care of through vegetative erosion control consisting of the placing of wattles across the raw fill slopes and the planting of hardy shrubs and trees which will serve to restore the slopes to their original condition and to obscure the rough cut slopes above the roadway.

The motorist interested in the scenery or out for an afternoon drive finds parking places constructed at lookout points, and sheltered coves where he may park his car off the traveled way and enjoy the magnificent views of the valleys below or the cooling shade of the forest foliage.

For the inexperienced driver or the unfortunate motorist having trouble with a defective car, wide parking areas are provided and drinking fountains have been constructed, mak-

(Continued on page 21)



Views of mountain parkways typical of those constructed by the Division of Highways on State Route 43, the "high gear" road into the San Bernardino Mountains. Upper—One of most popular of all parkways. There are two fountains, a waterfall and shade trees. Center—Strawberry Parkway Lookout. From this point practically the entire San Bernardino Valley may be seen. Lower—Valley View Point looking westerly toward Cajon Pass.

Six Grade Crossings Are Done Away With By Niles Project

By W. J. DEADY, Resident Engineer

THE recently completed project through Niles which involved the relocation of approximately three miles of highway included the construction of six grade separation structures and a new reinforced concrete bridge across Alameda Creek. The project is outstanding because of the many structures which were concentrated in such a limited area.

The town of Niles, located about twenty miles south of Oakland is the junction point of the Southern Pacific and Western Pacific tracks where their branch lines intersect the main line tracks from Oakland and San Francisco to points east. It is also the focal point of highway traffic where the east and west highways from Niles Canyon, Newark and Centerville intersect the primary State highway leading from Oakland and the East Bay Metropolitan area to points south.

Six grade crossings were eliminated, one obsolete underpass with impaired vertical and horizontal clearance was reconstructed and one narrow underpass was converted into a four lane divided subway. Through traffic has been transferred from the congested business district of Niles to a new improved and unobstructed alignment of ample width to handle present day traffic requirements with safety.

The designs of the underpasses are of three distinct types. The largest structure on the Niles Branch of the Southern Pacific Railroad consists of two cellular U type abutments, supporting two main line tracks and the abutments will provide support for a future wye track.

The second in size on the Western Pacific main line also has the cellular U type abutments which support two railroad tracks. Both of these underpasses have a roadway width of 44 feet with a 5 foot sidewalk on each side to accommodate pedestrian traffic.

The subway under the tracks of the Western Pacific Railroad differs from the one under the Southern Pacific tracks in that the bottom of its depressed portion is below high water of the nearby Alameda Creek and is designed with a thick pavement slab and is adequately waterproofed to withstand the hydrostatic pressure from below the pavement slab. It is equipped with a unit of two five inch automatic electric pumps. The surface water which collects in the Southern Pacific Subway is drained by a gravity septem into Alameda Creek and does not require pumps to drain the depressed portion of the roadway.

The subway under the Western Pacific San Jose Branch, a former two lane underpass which supported one railroad track was converted into a four lane subway with twin openings. The depressed portion provides a dividing island which separates the traffic coming from opposite directions. It consists of two twenty-two foot roadways and one five foot sidewalk. The old portion of the structure was architecturally treated so as to blend with the new work.

THREE UNDERPASSES

The three underpasses on the secondary highways, two of which are on the Centerville connection and one on the Niles Canyon road, which replaced the antiquated structure, are all provided with a twenty-two foot roadway and two five-foot open sidewalks.

These subways are designed in such a manner, with the sidewalks placed between the abutment walls, that the roadway width can be increased to provide an additional traffic lane at very little cost, at such time as the volume of traffic will warrant the additional width.

In addition to the six underpass structures, the project also included a new bridge over Alameda Creek. This structure is of the rigid frame, arch girder type with fluted piers. It is four hundred and thirty feet in length and has a roadway width of forty-four feet with two five-foot sidewalks. This type of bridge was chosen because of its particular suitability to the site as well as its pleasing appearance. The footings are supported by steel H beam piles forty feet in length which penetrate through the gravel in the stream bed.

In connection with the construction of the new bridge the project included the demolition of the old bridge across Alameda Creek. The old bridge was of the multiple arch type constructed many years ago by Alameda County. A major portion of the broken concrete from this structure was used in the construction of submerged protection work around the southeast approach of the new bridge.

ROADBED 56 FEET WIDE

The roadbed throughout the length of the new work on the main highway is fifty-six feet wide and is surfaced with bituminous treated stone screenings to a width of 31 feet, with the exception of the depressed portion of the three subways which are paved with Portland cement concrete pavement. The shoulders are treated with a liquid asphalt penetration treatment. The roadway is designed so that when the volume of traffic demands, it can readily be resurfaced with four lanes of pavement throughout its length.

The roadbed of the secondary connecting roads are 36 feet in width with a 22-foot width of surfacing consisting of bituminous treated stone screenings and shoulders treated with liquid asphalt.

VAST AMOUNT OF MATERIALS

Materials used in the work included 20,000 tons of concrete aggregate, 12,000 tons of gravel, 18,500 barrels of cement, 670 tons of structural steel, 5800 lineal feet of steel piles,

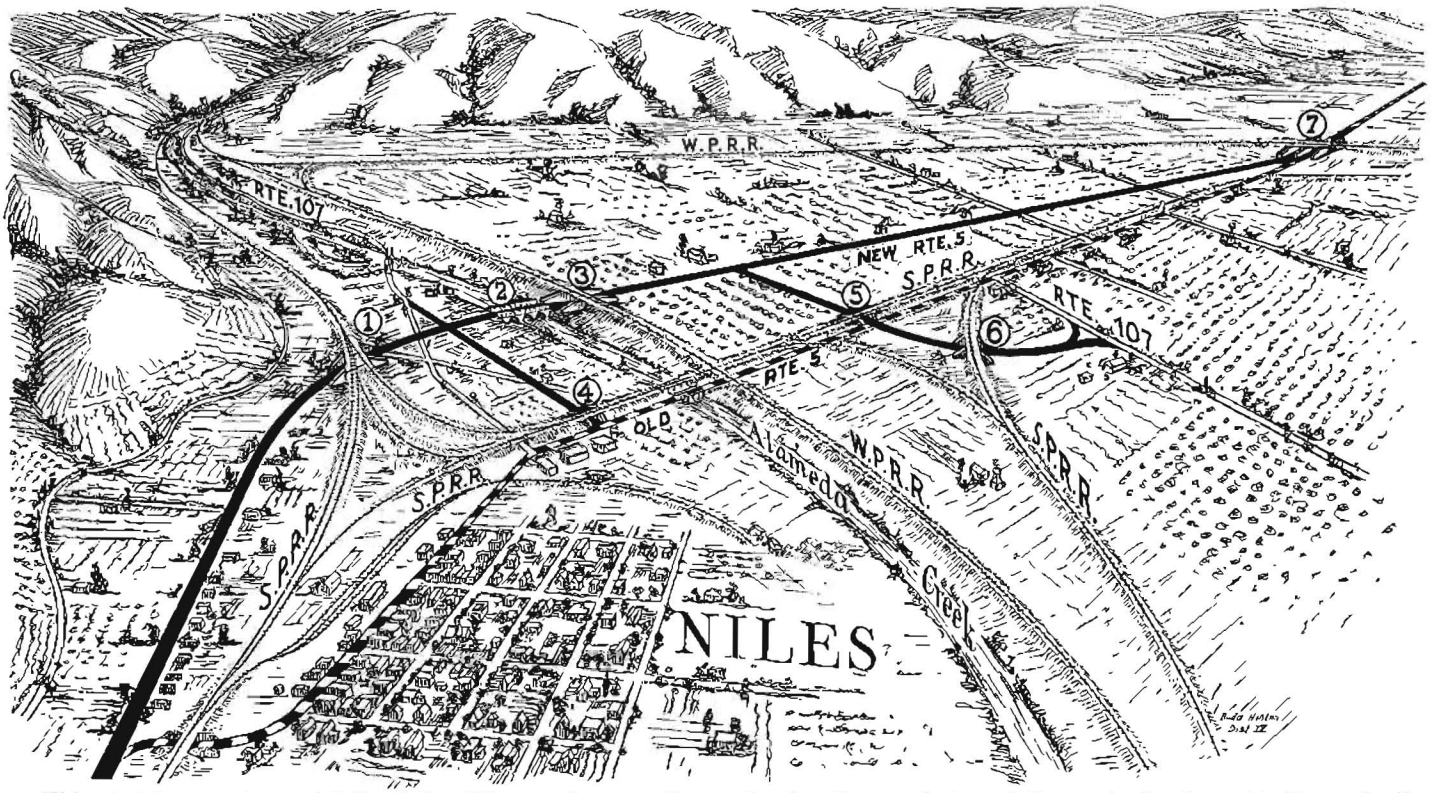
This unit of the Niles grade separation project is the Edenvale Underpass under tracks of Western Pacific Railroad.

View of four-lane bridge across Alameda Creek, one of units of the Niles improvement undertaking recently completed.

North Nile Underpass under railroad tracks of the Southern Pacific Company at Niles.

1100 feet of treated Douglas fir piles, 890 tons of liquid asphalt, and 21,000 lineal feet of various kinds of pipes over 6 inches in diameter. The contractor's records show that approximately 171,000 man-hours were worked directly on the project. This does not include the employment of railroad employees or labor engaged away from the site necessary to provide the needed materials. The contract was executed by Eaton and Smith of San Francisco.

The improvement was financed for the most part from funds made available by the Federal Government from Works Progress Administration funds under the Emergency Unemployment Relief Act of 1935. The total cost of the project was approximately $650,000 of which the State contributed an amount of approximately $122,000.



This sketch map shows details of the Niles grade separation and relocation project as follows: 1—Southern Pacific main line underpass for relocated Route 5 indicated by heavy black line. 2—Concrete bridge over Alameda Creek. 3—Western Pacific main line underpass. 4—Southern Pacific-San Jose branch underpass for Niles Canyon road. 5-6—Underpasses beneath Southern Pacific for State Highway 107 connection to Centerville. 7—Underpass of Western Pacific branch to San Jose. Dotted line shows present State Highway Route 5.

R. S. Redington, Member of Highway Commission

(Continued from page 5)

active in civic and fraternal affairs in Los Angeles. He was Exalted Ruler of the Elks in the southern city last year and a member of the 1936 Los Angeles Grand Jury.

Yatching is Mr. Redington's favorite recreation. He is a member of the Catalina Yacht Club and the Long Beach Yacht Club.

The new Highway Commissioner is a Scottish Rite Mason, member of Al Malaikah Temple of the Shrine and Ramona Parlor of Native Sons and a member of the Los Angeles Athletic Club and numerous other clubs and associations.

Various Types of Four-lane Thoroughfares

(Continued from page 4)

It presents further economic advantages. It is more flexible and adaptable to future expansion into a divided multi-lane road without loss of design continuity or of capital investment.

The center lane, of the cheaper and lighter type of surfacing, can be easily scarified, broken up and salvaged for use as shoulder material when the road is expanded to the 4-lane divided section and this center lane then becomes the separation strip while the two pavement lanes become the inside lanes of the 4-lane divided road.

The contrast in color between the two outside lighter colored lanes and the darker inner lane have produced another advantage. The contrasting color, texture and character of the pavement surfaces, although of equal smoothness and rideability, seem to act psychologically as a barrier to an indiscriminate use of the center lane for other than passing purposes, nor do vehicles in the outer lane crowd across the inner edge of their lane.

SIDE-ROAD DESIGN POSSIBLE

The divided highway is not confined to the single division strip type which separates traffic moving in opposite direction. The single division

strip type of road offers protection against the hazards of opposing traffic—the "approaching" type of accident or head-on collision. Widened pavement lanes providing greater room for movement will help to reduce the "overtaking" type of accident—side-swiping and rear end collision. On our heavy traffic roads, however, additional protection or facility is necessary to further reduce these hazards and particularly to prevent congestion—to provide for continuous, free, comfortable flow of traffic.

A segregation or separation of the different kinds of traffic—local and through—will largely accomplish this purpose. By carrying our design further, by employing several divisions of the roadway, such a separation can be achieved. Such a design includes side-roads, to serve the abutting property and local traffic, on each side of and separated from the central divided roadway which carries the through traffic. It is actually a triple highway.

Our highways entering the urban areas surrounding the larger centers of population are particularly subject to congestion produced by traffic patronizing business developed along these arteries.

QUESTIONABLE DEVELOPMENT

Expansion of these roads by the simple expedient of adding more lanes of pavement does not increase their capacity, at least not for long. More traffic, attracted by the wider road, seems only to invite more development of abutting property. Whether such development is profitable as a whole is questionable. It is certainly not profitable to the motorist who foots the bill for the road improvement.

The triple roadway section is one means of preventing the recurring problem of congestion and attendant hazards. The difficulty presented by the necessity for wide right of way and consequently large cost through well developed property, usually encountered in such urban areas, may limit its use to some extent. Study of the situation, however, indicates that other means of protecting the highway against congestion are usually equally costly in these locations.

A short section of this type of highway is now under construction through Montecito adjacent to Santa Barbara. Ultimate improvement to this type of other highways through urban areas is planned.

These higher standards of highway design and construction such as the wider pavement lanes and divided roadways naturally lead to inclusion of other features that supplement the first named, more important ones.

SAFETY FEATURES PROVIDED

Bridge and structure widths will be increased to provide a minimum roadway width 4 feet greater than the width of pavement lanes of the approaching roadway. The division strip will be carried through the structure wherever economically reasonable and possible.

Important highway intersections, where traffic conditions do not now justify the construction of grade separations, will be protected by traffic islands and segregation lanes with installation of lights and proper directional signs.

Parking Areas on Mountain Highway

(Continued from page 16)

ing water available for both man and radiator.

A WATERFALL CREATED

In one case, a mountain spring has been diverted and now drops over a precipitous cliff adjacent to the highway forming an artificial waterfall which is tremendously enjoyed by everyone passing.

One of the most important problems on mountain highways is the development of safety. On this road an answer to this problem has been found in the construction of stone piers and heavy chains which mark the edge of the highway and protect the motorist from plunging to the deep ravines below.

The piers of this "rock and chain" protection are constructed on a heavy foundation base extending three feet below the surface of the road and the whole pier is built about a four inch heavy steel pipe to which the eye bolts holding the chain are attached. The chain used between the piers is five-eighths inch galvanized iron chain with a breaking strength of over 20 tons.

Traffic on Bay Bridge 33,000 Up in October

AN INCREASE last month in practically every classification of vehicle on the San Francisco-Oakland Bay Bridge was announced by State Director of Public Works Earl Lee Kelly from the October traffic report filed by State Highway Engineer C. H. Purcell.

Total number of vehicles crossing the span during the month of October was 738,868 compared with 705,704 during the month of September, an increase of 33,000. This brings the total number of vehicles to cross the bridge, as of November 1, to 9,022,099.

Five Sundays, a 31-day month, and football, were factors Director Kelly attributed to the increase.

Average number of cars per day was 23,834 with September's average 23,523. Total collections for October were $393,465.25—up $16,000 from the previous month's business of $377,344.65.

31,000 MORE AUTOS

Passenger automobiles showed an increase of more than thirty-one thousand during October, with a total of 695,079 compared with 663,520 for September.

There was an increase of two thousand in the number of trucks crossing the bridge for the month, with 27,145 for October; and 25,993 for September.

A gain of approximately one thousand in the number of buses crossing the structure for October was also reported; with 10,453 buses for that month, as compared to 9,462 in September.

Comparative figures follow:

	Passenger autos	Auto trailers	Motor cycles
Total Sept.	663,520	1,589	2,994
Total Oct.	695,079	1,327	2,729
Total since opening	8,589,620	15,706	32,020

	Tricars	Trucks
Total Sept.	772	25,993
Total Oct.	838	27,145
Total since opening	7,212	274,951

	Truck trailers	Buses	Total vehicles
Total Sept.	1,274	9,462	705,704
Total Oct.	1 299	10,453	738,868
Total since opening	20,270	82,320	9,022,099

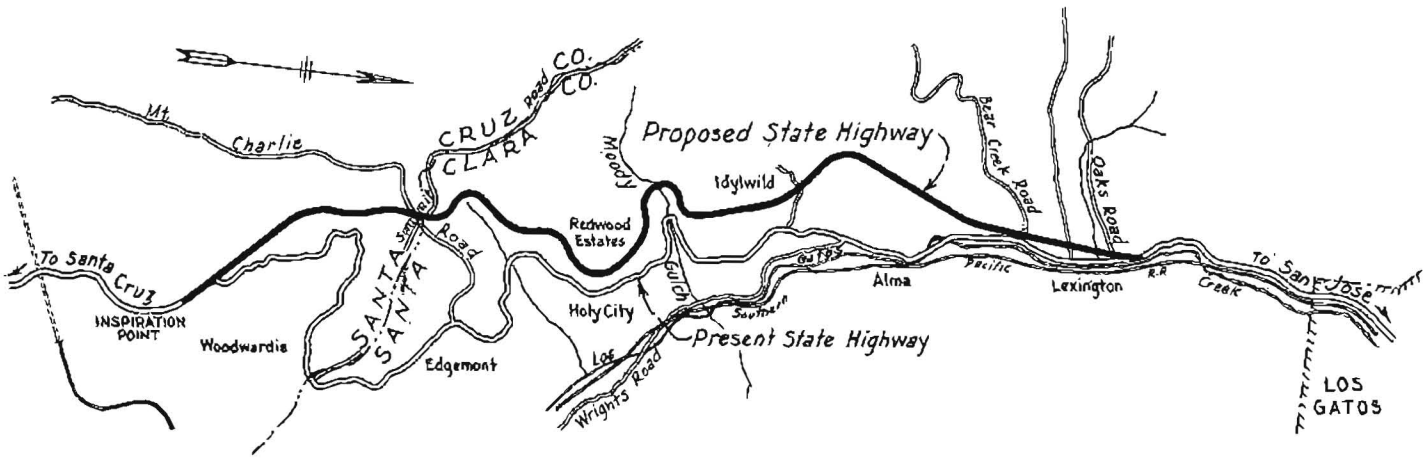
	Extra passengers	Freight pounds
Total Sept.	173,144	64 446.564
Total Oct.	184,416	69 243,169
Total since opening	1,857,420	626,072,682

Los Gatos-Santa Cruz Highway Modernization Nears Completion

By H. R. JUDAH, Chairman, California Highway Commission

MOTORISTS from every part of California will hail with delight the announcement made early this month by the State Highway Department that it will start asking for bids on approximately six and one-half miles of new highway running northerly from Inspiration Point in Santa Cruz County to what is known as the Oaks Road in Santa Clara County in the Los Gatos Canyon, the northern terminus of the job being a mile and five-eighths southerly of Los Gatos.

This improvement when completed will be one of the most important highway undertakings in the history of the Department and will modernize to the last degree the largest portion of the well known and well traveled recreational highway which leads from Los Gatos southerly into the popular Santa Cruz recreation area, the San Lorenzo Valley, and all of the important resort sections along the northern shore of Monterey Bay.



TWO CONTRACTS COMPLETED

Previously the State Highway Department in two contracts has modernized this important highway from the city of Santa Cruz to Inspiration Point. There remains from this point the completion of this newest improvement in order to wipe out once and for all the dangerous and uncomfortable travel over the 16-foot circuitous road that now exists between Inspiration Point and Los Gatos.

The forthcoming job will mean a new grade completely, at no point touching the present road. This has a decided importance for the reason that the Los Gatos-Santa Cruz lateral of the State highway system is the main northern entry into the Santa Cruz recreational area and the disadvantages that would accrue from trying to detour traffic on a rebuilding job on the present road are obvious.

The original Los Gatos-Santa Cruz lateral of the State highway system was one of the "county seat" laterals that were provided in the State bond issue of 1911, a stipulation of that issue requiring that every county seat in the State should be linked with the chosen main arteries.

HEAVY TRAFFIC INCREASE

During the interim between 1912 and the present, the popularity of the Big Basin country in Santa Cruz County and the resort areas of the Monterey Bay region has brought about a continually increasing traffic over the narrow winding highway that was originally constructed. Even within the past few years, there have been Sunday afternoons when returning traffic from the Santa Cruz area would back up as far as five miles southerly from Los Gatos unable to move, due mainly to the inadequacy of the road.

Traffic counts taken at Los Gatos for sixteen-hour periods in July have shown figures as high as 14,000 cars. Research by the Santa Cruz Chamber of Commerce had developed the fact that many persons of a timid nature have in recent years foresworn the use of the Los Gatos-Santa Cruz highway because of its hazards.

SCENERY ATTRACTS

The completion of the Los Gatos-Santa Cruz highway through the medium of this new improvement will have a state-wide significance. Many motorists from every county in California as well as thousands of visitors from most of the States of the Union and a smattering of foreign cars, have regularly patronized this road in the last twenty-five years. The wonder has been at the patience shown by the average motorist in making the slow trip over the Santa

Cruz mountains to the shores of Monterey Bay, except that some compensation has come from the appreciation of the magnificent scenery afforded on this route.

The terrain through which the new 6½ mile four-lane highway will pass is mountainous and generally wooded. A considerable portion of the surrounding land is subdivided and partly developed, with many cabins, cottages and occasional pretentious homes and estates.

CONSTRUCTION PROBLEMS

A difficult problem was presented in selecting the best routing for the new stretch of highway, not only in establishing acceptable grades and alignment in developing within a limited distance a descent from summit to the canyon floor before reaching Los Gatos, but also in designing the roadway through large cuts and over deep ravines, where the character of soil and the presence of underlying water indicated probable instability.

The proposed location is much more direct than the existing highway and, in general, follows parallel to it but at higher elevations. Before determining the adopted location for the new improvement, four alternative lines were investigated, some running at higher elevations and others closer to the present grade. The upper location finally chosen was the best that could be discovered for a stable road condition through a region that contains the San Andreas fault and is structually broken.

NEW ROAD 46 FEET WIDE

The new roadway will have a surfaced width of 46 feet and will require the excavation of about 2,300,000 cubic yards. Large cuts and high fills are necessary and in several places the minimum curvature standard of 500-feet radius was employed in order to avoid carving so deeply or filling so excessively through this fractured formation that there would be grave doubts that slopes would stand as constructed.

An original intention to run the highway over a structure at Moody Gulch was abandoned on account of its length, entailing an expenditure of one-half million dollars and the doubtful character of the foundation for the bridge footings on the south side.

Plans on the new construction include separate connections to the road used as the Skyline Boulevard, State Route 55. These plans also provide for the future ultimate treatment, when the Skyline Boulevard is permanently located. Several sites that will later be developed as landscaping projects, for public use have been selected and acquired for parking areas.

The following table illustrates the benefits that the proposed construction will effect:

	Existing	Proposed
Length	8.21 mi.	6.25 mi.
Number of Curves	132	20
Total Curvature	7700 degrees	1118 degrees
Minimum Radius of Curves	75 feet	500 feet
Maximum Grade	6%	7% (in stretches)
Average surface width	20 feet	46 feet

It is of interest to note that forty of the 132 curves on the existing road have a radius of 100 ft. or less, whereas the minimum radius of curvature on the new location applies to only several curves.

SAVING OF TWO MILES

The maximum grade on the proposed location uses in some stretches a higher rate of grade than the general gradient that is used on the old road. The maximum grade was necessary in order to meet definite controls and to obtain a more direct routing.

The new road will be approximately two miles shorter than the existing highway and contains only about one-seventh the amount of central angle of curvature. Reference to the sketch map of the project will indicate the improvement in this respect.

The reduction in distance, as reflected in the saving in operation of vehicles and based on the average travel now using the existing road, represents a capitalized value of about $850,000. This is a value equal to about two-thirds of the entire cost of the new construction and in itself shows the proposed work to be a sound business undertaking.

In Memoriam

Thomas S. O'Connell

The American engineering profession sustained a distinct loss with the passing on November 3 of Thomas Sarsfield O'Connell, State Highway Engineer of Arizona, who was a native son of California. Mr. O'Connell's death was sudden, following an emergency operation for appendicitis.

Born in San Francisco July 14, 1888, Mr. O'Connell had been a resident of Arizona for forty years. Entering the Highway Department of Arizona in 1913 as Assistant Highway Engineer, Mr. O'Connell attained national prominence in his chosen field.

Graduating from the University of Arizona, Mr. O'Connell attended West Point, being a member of the class of 1911. When the United States entered the World War in 1917, Mr. O'Connell was commissioned a captain and went overseas with the 91st Division.

Returning to Arizona in 1919, Mr. O'Connell resumed service with the Highway Department as location and construction engineer. He was appointed a District Highway Engineer in 1924 and in 1931 became State Highway Engineer.

Mr. O'Connell was a member of the board of directors of the American Road Builders Association and member of the executive committee of the American Association of State Highway Officials.

Surviving him are his widow, his mother, Mrs. H. L. Manning, Tucson, Arizona; a sister, Mrs. Fred Foster, Beverly Hills, California; and a brother, Howell Manning of Tucson.

Captain O'Connell was buried with military honors in Arlington cemetery, Washington, D. C.

Albert S. Kennedy

The death of Albert S. Kennedy on October 30, 1937, brings to an untimely end one of the faithful employees of the State of California, who for many years was engaged in the important work of supervising the construction of her bridges.

He was a capable engineer, honest and loyal to his State and loved by those who knew him. He taught his fellows by his example to be industrious, modest, kindly and considerate.

In spite of failing health he struggled on to do his bit of service to the very end and death found him still serving his fellow men.

He will be laid to rest in Oceanside while near at hand the San Luis Rey Bridge, which he helped build, will stand as a monument to his good name.

The spirit of Albert S. Kennedy lives in his good works.

Young Mother: "What makes you think our boy is going to be a politician?"

Young Father: "He says more things that sound well and mean nothing than any human being I ever saw."

Highway Bids and Awards for October, 1937

ALAMEDA COUNTY—Two grade separation crossings, one over the tracks of the Southern Pacific Co. at Redmond and the other under the tracks of the Western Pacific Railroad Co. at Stone Cut. District IV, Route 5, Section E. John Rocca, San Rafael, $103,329; C. W. Calletti & Co., San Rafael, $105,387; R. R. Bishop, Long Beach, $113,533; Barrett & Hilp, San Francisco, $117,749; Bodenhamer Construction Co., Oakland, $126,891; S. D. Bechtel, San Francisco, $145,806. Contract awarded to Heafey-Moore Co. and Fredrickson Watson Construction Co. and Fredrickson Bros., Oakland, $98,850.14.

BUTTE COUNTY—A bridge across Feather River about one mile west of Oroville to be repaired and about 0.09 mile of roadway to be graded and paved with Portland cement concrete pavement. District III, Route 21, Section A. W. K. Van Bokkelen Construction, Oakland, $28,441; C. W. Caletti & Co., San Rafael, $24,845; Lord and Bishop, Sacramento, $24,927; John Rocca, San Rafael, $25,706; Peter J. McHugh, San Francisco, $26,667. Contract awarded to M. A. Jenkins, Sacramento, $24,295.50.

CALAVERAS COUNTY—Between Stanislaus County line and Rock Creek via Milton, about 3.3 miles road-mix surface treatment to be applied to existing road. District X, Route—Feeder. A. R. Maestretti, Stockton $4,688; Piazza and Huntley, San Jose, $4,713; Claude C. Wood, Stockton, $4,890; Garcia Construction Co., Irvington, $5,013; Jones and King, Hayward, $5,502; George French, Jr., Stockton, $5,585; M. J. B. Construction Co., Stockton, $7,147. Contract awarded to J. P. Breen, Sacramento, $4,609.90.

CALAVERAS COUNTY—Between 2.5 miles east of Valley Springs and San Andreas about 6.1 miles to be graded and portions treated with liquid asphalt. District X, Route 24, Section B. Heafey Moore Co., Fredrickson Watson Construction Co., Fredrickson Bros., Oakland, $157,372; Claude C. Wood, Stockton, $142,547; Larsen Brothers and Harms Bros., Sacramento, $139,220; Piombo Bros. & Co., San Francisco, $171,701; Bodenhamer Construction Co., Oakland, $154,800; Hemstreet & Bell, Marysville, $137,381; Louis Biasotti & Son, Stockton, $139,915; J. R. Reeves, Sacramento, $174,586; Earl W. Heple, San Jose, $140,608; George Pollock Co., Sacramento, $141,487; Young and Son Co., Ltd., Berkeley, $146,380; D. W. Thurston, Los Angeles, $139,011. Contract awarded to Mountain Construction Co., Sacramento, $133,167.45.

CONTRA COSTA COUNTY—Walnut Creek Maintainance Site, maintenance buildings and appurtenances to be constructed. District IV, Route 75. Robert McCarthy, San Francisco, $9,432; A. Fredrick Anderson, Oakland, $9,732; Central California Construction Co., San Francisco, $9,645; Oliver S. Almlie, San Francisco, $9,292; Clinton G. Langum, Napa, $10,703; Edgar P. Seemans, Walnut Creek, $10,603. Contract awarded to Empire Construction Co., Ltd., San Francisco. $7,945.

EL DORADO COUNTY—A reinforced concrete girder bridge across Webber Creek about 2½ miles west of Placerville, consisting of three 71-foot spans and two 54-foot 6-inch spans on concrete bents and abutments. District III, Route 11, Section C. Hemstreet and Bell, Marysville, $42,143; John Rocca, San Rafael, $43,295; F. C. Amarosa and Sons, San Francisco, $48,270; W. K. Van Bokkelen Construction, Oakland, $49,401; S. D. Bechtel, San Francisco, $55,940. Contract awarded to Campbell Construction Co., Sacramento, $38,857.50.

INYO COUNTY—Between 1.1 miles east of Saline Valley road and Panamint Sink about 20.5 miles in length, penetration oiling to be applied to existing roadbed. District IX, Route 127, Sections E, F, G. Basich Bros., Torrance, $10,256; Oilfields Trucking Co., Bakersfield, $11,128; J. P. Breen, Sacramento, $15,512. Contract awarded to Paulsen and March, Inc., Los Angeles, $9,648.

INYO COUNTY—Between Diaz Lake and Alabama Gates, about 7.4 miles in length to be graded and surfaced with plant-mixed surfacing. District IX, Route 23, Section L. Griffith Co., Los Angeles, $89,468; Oswald Bros., Los Angeles, $83,357; A. S. Vinnell Co., Alhambra, $97,599; Geo. Herz & Co., San Bernardino, $97,604; C. O. Sparks and Mundo Engineering Co., Los Angeles, $141,467; Claude C. Wood, Stockton, $89,269; Fredericksen & Westbrook, Lower Lake, $96,637. Contract awarded to Basich Bros., Torrance, $70,637.30.

KERN COUNTY—About 20.6 miles south of Bakersfield, maintenance station buildings and appurtenances to be constructed. District VI, Route 4, Section B. Alva Hackney and Sons, Bakersfield, $12,154; Midstate Construction Co., Fresno, $14,208; Trewhitt-Shields and Fisher, Fresno, $14,172; D. A. Loomis, Glendale, $14,353. Contract awarded to William G. Gannon, Bakersfield, $10,809.

KINGS COUNTY—Between Hanford and Alcorn Bridge corner, about 6.4 miles to be paved with asphalt concrete. District VI, Feeder Road. Union Paving Co., San Francisco, $63,853; Griffith Co., Los Angeles, $68,154; Southern California Roads Co., Los Angeles, $71,910; Basich Brothers, Torrance, $73,618; Independence Construction Co., Ltd., Oakland, $78,799; N. M. Ball Sons, Berkeley, $79,641. Contract awarded to Piazza and Huntley, San Jose, $62,648.50.

LOS ANGELES COUNTY—Between Trancas Beach and Walnut Canyon about 1.6 miles to be graded and paved with Portland cement concrete and plant mixed surfacing. District VII, Route 60, Section A. George J. Bock Co., Los Angeles, $152,877; Basich Bros., Torrance, $184,592; Metropolitan Construction Co., Los Angeles, $146,929; Daley Corp., San Diego, $137,130; Claude Fisher Co., Ltd., Los Angeles, $139,826; Griffith Co., Los Angeles, $144,297; N. M. Ball Sons, Berkeley, $128,576; Dimmitt & Taylor, Los Angeles, $142,345; D. W. Thurston, Los Angeles, $130,366; George R. Curtis Paving Co., Los Angeles, $159,279; Oswald Bros. Los Angeles, $139,632; J. E. Haddock, Ltd., Pasadena, $132,682; C. O. Sparks & Mundo Engineering Co., Los Angeles, $127,378; Bodenhamer Construction Co., Oakland, $126,994. Contract awarded to Macco Construction Co., Clearwater, $123,349.

LOS ANGELES COUNTY—Between Encinal Canyon and Trancas Beach, about 3.2 miles to be graded and surfaced with plant-mixed surfacing and Portland cement concrete. District VIII, Route 60. Section A. Oswald Bros., Los Angeles, $266,532; Claude Fisher Co., Ltd., Los Angeles, $253,325; N. M. Ball Sons and D. McDonald, Berkeley, $236,101; Harold Blake, Whittier, $234,312; Daley Corporation, San Diego, $233,648; Metropolitan Construction Co., Los Angeles, $262,402; C. O. Sparks and Mundo Engineering Co., Los Angeles, $238,328; Pearson, Minnis and Moody, Los Angeles, $249,072; J. E. Haddock, Ltd., Pasadena, $242,598; D. W. Thurston, Los Angeles, $249,943; Fredericksen & Westbrook, Lower Lake, $249,154; Griffith Co., Los Angeles, $241,483; United Concrete Pipe Corporation, Los Angeles, $258,728. Contract awarded to Macco Construction Co., Clearwater, $228,807.50.

MADERA COUNTY—Maintenance buildings and appurtenances to be constructed at Coarse Gold. District VI, Route 125, Section D. Contract awarded to R. Hodgson & Sons, Porterville, $7,550.

MARIN COUNTY—Two bridges to be repaired about 4 miles north of Sausalito, one across Richardson Bay and the tracks of the Northwestern Pacific Railroad and the other across the tracks of the Northwestern Pacific Railroad near Alto. District IV, Routes 1 and 52, Sections C and A. Lee J. Immel, Berkeley, $43,811; John Rocca, San Rafael, $47,870; W. K. Van Bokkelen Construction, Oakland, $48,359; Bodenhamer Construction Co., Oakland, $48,429; C. W. Caletti & Co., San Rafael, $48,685; F. Kaus, Stockton, $48,747; Carl N. Swensen Co., San Jose, $51,391; F. C. Amoroso & Sons, San Francisco, $52,312; M. B. McGowan, Inc., San Francisco, $53,831; Peter J. McHugh, San Francisco, $56,575. Contract awarded to Macco Construction Co., Clearwater, $40,208.

MARIN COUNTY—Furnish and apply seal coat to existing pavement between Waldo and Golden Gate Bridge, about 3.4 miles. District IV, Route 1, Section D. Piazza and Huntley, San Jose, $4,185; Hayward Building Material Co., Hayward, $4,015; Lee J. Immel, Berkeley. $3,600; Pacific Truck Service, Inc., San Jose, $3,550; Macco Construction Co., Clearwater, $3,607; Tieslau Bros., Berkeley, $3,539. Contract awarded to E. A. Forde, San Anselmo, $3,252.50.

MENDOCINO COUNTY—A bridge across Garcia River 3.5 miles north of Point Arena consisting of one 120-foot steel truss span, one 66-foot two 50-foot and one 30-foot 6-inch steel beam spans on concrete piers with timber pile foundations to be constructed and approximately 0.4 mile in length to be graded, surfaced with imported material and penetration oil treatment applied. District I, Route 56, Section B. Chas. L. Harney, San Francisco, $71,625, C. W. Caletti & Co., San Rafael, $56,254; M. B. McGowan, Inc., San Francisco, $69,238; John Rocca, San Rafael, $62,229. Contract awarded to Peter J. McHugh, San Francisco, $55,891.

MODOC COUNTY—Between Cedarville and State Line, across Middle Lake, about 1.4 miles, roadbed to be widened. District II, Route 28, Section C. Garcia Construction Co., Irvington, $4,320; Harms Bros., Litchfield, $4,986; Tieslau Bros., Berkeley, $6,012; Parish Bros., Los Angeles, $6,480; Hanrahan Co., San Francisco, $12,456. Contract awarded to Poulos and McEwen, Trinidad, $3,600.

MONO COUNTY—Between Route 23 and June Lake, about 2.2 miles to be graded. District IX, Route 111, Section A. C. A. Baker, North Sacramento, $17,937; Basich Bros., Torrance, $19,422; George J. Bock Co., Los Angeles, $20,615; A. S. Vinnell Co., Alhambra, $21,792; Oswald Bros., Los Angeles, $22,528; Fredricksen and Westbrook, Lower Lake, $32,952. Contract

awarded to J. V. Galbraith and Don A. Canevari, Santa Rosa. $17,715.75.

PLUMAS COUNTY—Approaches to Spanish Creek Bridge near Quincy about 0.8 mile in length to be graded. District II, Route 21, Section C. W. K. Van Bokkelen Construction, Oakland, $18,386; Young & Son Co., Ltd., Berkeley, $19,170; Hemstreet & Bell, Marysville, $19,351; Claude C. Wood, Stockton, $19,520; Harms Bros., Litchfield, $19,615; Piazza & Huntley, San Jose, $20,191; A. R. Maestretti, Stockton, $21,629; Guerin Bros., San Francisco, $23,262; Hanrahan Co., San Francisco, $29,707; Peter J. McHugh, San Francisco, $31,236. Contract awarded to Fredericksen and Westbrook, Lower Lake, $17,415.30.

RIVERSIDE AND SAN BERNARDINO COUNTIES—At the Palm Springs and Camp Angelus Maintenance Stations, maintenance station buildings and appurtenances to be constructed. District VIII, Routes 187, 190, Sections D, E. George Herz & Co., San Bernardino, $13,954; Andrew Archibald, Altadena, $12,999; Fred Walsh, San Bernardino, $13,158. Contract awarded to V. L. & W. B. Jacobson, Los Angeles, $11,601.

SACRAMENTO COUNTY—At Paintersville, repairing a bridge across the Sacramento River. District III, Route 11, Section E. Wm. C. Tait, San Francisco, $12,954. Contract awarded to M. A. Jenkins, Sacramento, $7,928.

SAN BERNARDINO COUNTY—At the Lakeview Point maintenance site, maintenance station buildings and appurtenances to be constructed. District VIII, Route 43, Section C. Geo. Herz & Co., San Bernardino, $10,870; Fred Walsh, San Bernardino, $9,500. Contract awarded to V. L. and W. B. Jacobson, Los Angeles, $8,995.

SAN DIEGO COUNTY—Between Harasthy Street and Barnett Street in San Diego, placing plant mixed surfacing for 0.70 of a mile. District XI, Route 2, Section S.D. Contract awarded to R. E. Hazard and Sons, San Diego, $13,938; George R. Daley Corp., San Diego, $14,114. Contract awarded to V. R. Dennis Construction Co., San Diego, $13,246.

SANTA BARBARA COUNTY—Between easterly boundary and one mile north of Rincon Creek, about 1.0 mile existing roadbed to be widened and Portland cement concrete pavement to be constructed. District V, Route 2, Section H. Claude Fisher Co., Ltd., Los Angeles, $39,824; J. E. Haddock, Ltd., Pasadena, $40,155; Griffith Company, Los Angeles, $40,744; George R. Curtis Paving Co., Los Angeles, $42,917. Contract awarded to C. O. Sparks and Mundo Engineering Co., Los Angeles, $38,487.80.

TEHAMA COUNTY—At the Lost Creek maintenance site about 63 miles east of Red Bluff, maintenance station buildings and appurtenances to be constructed. District II, Route 29, Section C. Robert McCarthy, San Francisco, $7,488. Contract awarded to Liston Ehorn, Red Bluff, $6,500.

SAN BERNARDINO COUNTY—Between Los Angeles County line and Colton, about 19.3 miles to be graded and paved with asphalt concrete and Portland cement concrete. District VIII, Route 26, Section C.D,Ria.Col. Basich Bros., Torrance, $353,437; Southern California Roads Co., Los Angeles, $378,446; N. M. Ball & Sons, D. McDonald, Berkeley, $367,302; Harold Blake, Whittier, $364,339; Gibbons and Reed Co., Burbank, $418,850; David H. Ryan, San Diego, $331,813; Oswald Bros., Los Angeles, $331,676; W. E. Hall Co., Alhambra, $389,652; Daly Corp., San Diego, $348,850; Metropolitan Construction Co., Los Angeles, $368,002; C. O. Sparks and Mundo Engineering Co., Los Angeles, $379,488; J. E. Haddock, Ltd., Pasadena, $374,298; D. W. Thurston, Los Angeles, $353,606; Griffith Co., Los Angeles, $335,028; United Concrete Pipe Corporation, Los Angeles, $371,533. Contract awarded to Matich Bros., Elsinore, $318,226.

Instrumentman W. C. Names and painted level tripod in use in District IX.

SAN JOAQUIN and SACRAMENTO COUNTIES—Two reinforced concrete slab bridges across Dry Creek, about one mile east of Galt, one consisting of seven 22-foot spans, one 15-foot span, and two 7-foot 6-inch spans, and the other consisting of thirty-four 22-foot spans, five 15-foot spans, two 7-foot 6-inch spans, all supported by reinforced concrete pile bents. District X, Route 4, Sections D,A. R. R. Bishop, Long Beach, $75,956; A. Soda and Son, Oakland, $84,847; Barrett & Hilp, San Francisco, $93,395; Healey Moore Co. and Fredrickson & Watson Construction Co. Fredrickson Bros., Oakland, $75,003; F. C. Amaroso and Sons, San Francisco, $81,049; S. D. Bechtel, San Francisco, $91,489; John Rocca, San Rafael, $73,552; John Strona, Pomona, $71,123; A. Teichert and Son, Inc., Sacramento, $83,391; Campbell Construction Co., Sacramento, $73,128. Contract awarded to Lord and Bishop, Sacramento, $68,602.

SAN LUIS OBISPO COUNTY—Between Atascadero Summit and San Gabriel Avenue, about 2.8 miles to be graded and road-mix surface treatment to be applied. District V, Route 125, Section A. D. W. Thurston, Los Angeles, $151,368; Crow Bros. Construction Co., Los Angeles, $142,338; Claude Fisher Co., Ltd., $157,707; Hemstreet & Bell, Marysville, $140,848; A. Teichert & Son, Inc., Sacramento, $127,709; Macco Construction, Clearwater, $126,526; Young and Son Co., Ltd., Berkeley, $122,523; Biasotti & Son, Stockton, $132,265. Contract awarded to George K. Thompson & Co., Los Angeles, $121,413.45.

Frosh: "If I had known that the tunnel was so long I would have kissed you."

Ditto: "Good heavens! Wasn't that you?"

Gaudy Colors On Tripods Protect Road Surveyors

By MILTON HARRIS
Associate Highway Engineer

MOTORISTS traveling through District IX may wonder what artistic leanings prompted highway survey crews to paint alternate red and white bands on the tripods of their transit and level sets.

The surveyors of District IX have not taken up futuristic art. They have a very logical reason for painting their tripods in gaudy colors.

Protection of a survey crew on heavily traveled roads is always a responsibility devolving upon a Chief of Party. Due to the rapidity with which a survey crew moves, it is often impossible to keep suitable warning signs, such as "Men At Work," at correct distances from the party.

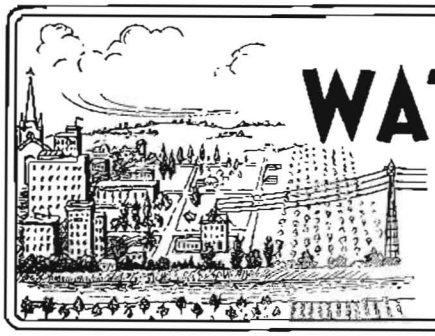
Not infrequently a motorist, having passed a warning sign some distance back, will round a curve in the highway and find himself bearing down on a surveyor and his tripod. The usual plan is for the instrumentman to stand astraddle of a tripod leg while a car is passing his instrument too close for safety. A driver will instinctively avoid hitting a human but may not be averse to driving too close to an inanimate object such as a tripod.

As a safety measure to protect not only the surveyor and his instrument but motorists as well, District IX is painting red and white bands on all its tripods.

Hopkins Appointed Assistant Director

(Continued from page 5)

In 1910, Mr. Hopkins organized a public utilities company and installed a municipal water system, later forming an ice company of which he has been manager and secretary-treasurer ever since. As a founder of the Kern County Chamber of Commerce, Mr. Hopkins served as chairman of its finance and highway committees and since that time has been prominently identified with and interested in California's highway development.



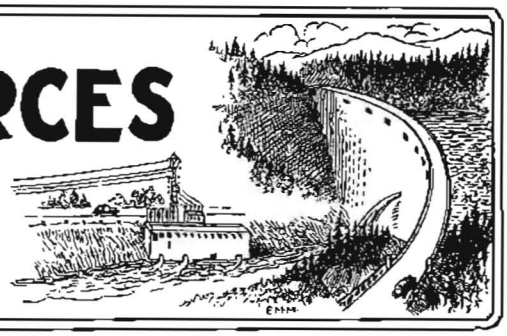
DIVISION OF WATER RESOURCES

OFFICIAL REPORT

FOR THE MONTH OF

October, 1937

EDWARD HYATT, State Engineer



IRRIGATION DISTRICTS

The irrigation season is now drawing to a close and plans are under way in many districts to resume repair work and improvements on canals and structures as soon as the water is no longer needed. During the last few years this type of winter work has furnished employment to a large number of men. and the districts have made full use of W. P. A. cooperation on their projects.

South San Joaquin Irrigation District has awarded a contract for purchase of 6000 barrels of cement to be used in concrete lining canals.

Construction work on a drainage project in the West Side District was investigated and reported upon to the Securities Commission. Contributions toward the work are being made by the State Highway Department, San Joaquin County, the Southern Pacific Railroad, and several of the larger oil companies.

On October 22. the La Mesa, Lemon Grove and Spring Valley District celebrated completion of its El Monte pumping station which will lift water from the pipe lines leading from El Capitan Reservoir into the district's distribution system. A large pipe line replacement project in this district will also be under way within the next few weeks.

FLOOD CONTROL AND RECLAMATION

Maintenance of Sacramento Flood Control Project

On Pump No. 4 at Pumping Plant No. 2 east of the Sutter By-Pass, the Worthington Pump Company installed a steel hood over the suction inlet to prevent the formation of a vortex.

Sacramento Flood Control Project

Bids will be opened on November 8, for filling the borrow pit on the Burr Mitchell property on the right bank of the Sacramento River north of Colusa. This involves placing of 66,700 cubic yards of sand and earth material. The work is being done at the request of the State Reclamation Board and in connection with right-of-way procurement for the river levee.

Flood Measurements and Gages

All of the water stage recording stations and metering stations maintained and operated by this division are now in condition for the coming flood season. Improvements at the Mawson Bridge and Gridley stations have been completed with the installation of continuous water stage recording instruments.

SUPERVISION OF DAMS

Application for approval of the plans and specifications for the construction of the Bonita Canyon Dam of the Irvine Company was filed on September 28, 1937. This is to be an earth structure 43 feet in height with a storage capacity of 295 acre-feet, situated on Bonita Creek, a tributary to Newport Bay in Orange County. The estimate cost is $26,000.

Amended application was filed on October 13, 1937, by the Whiting Company for approval of the plans and specifications for the construction of Whiting Dam in Orange County. This dam is to be an earth structure 31 feet in height with a storage capacity of 220 acre-feet. The estimated cost is $20,000. Construction or repair plans were approved for the Stinson Weir Dam on North Fork of Kings River in Fresno County; Henshaw Dam on San Luis Rey River in San Diego County; Empire Weir No. 1 Dam on the South Fork of Kings River in Kings County; Bean Hollow No. 2 Dam of the Shoreland Properties, Inc., on Arroyo de Los Frijoles in San Mateo County; Evans Creek Dam of the Tuolumne Gold Dredging Company on Evans Creek in Stanislaus County.

WATER RIGHTS

Supervision of Appropriation of Water

Thirty applications to appropriate water were received during the month of September and ten were denied and eighteen approved. In the same period five permits were revoked and the rights were confirmed in five cases by the issuance of licenses.

Among the applications received were two by the San Gabriel Valley Protective Association of Whittier proposing appropriations of 200,000 acre-feet per annum on San Gabriel River by spreading for percolation to ground water between Morris Dam and Imperial Highway, the water to be recovered later by pumping for irrigation, domestic and municipal purposes.

Field work in connection with the investigation of protested cases and projects under permit was completed during the month. A total of 190 projects, distributed throughout all counties of the State except eight, were investigated during the season.

SACRAMENTO-SAN JOAQUIN WATER SUPERVISION

During the past month the efforts of the field men from this office have been devoted almost entirely to gathering data relative to the acreage irrigated during the past season with water diverted from the streams in the Sacramento and San Joaquin valleys. The acreage data will be used to determine the use of water in the same area and will be incorporated in the report of this office. This report will also show the amount of return flow and flow from the valley streams.

The sampling of water in the delta for salinity is being carried on at a sufficient number of stations to record the rate of advance or retreat of the salinity. At intermittent intervals samples of drainage and return flow water are being obtained in the Sacramento and San Joaquin valleys.

The cool weather delayed the rice harvest somewhat but in many instances the harvesting of the crop is completed.

The flow of the Sacramento River at Sacramento on October 23 was about 7600 c.f.s. and has been at that stage since about the first of October. The flow of the San Joaquin River at Vernalis on October 23 was about 2000 c.f.s. and has been at that stage since the first week in October. For purposes of comparison, some stream flow and salinity figures follow:

CALIFORNIA COOPERATIVE SNOW SURVEYS

During the past month work has been directed toward concluding arrangements with the personnel of the various cooperating agencies throughout the State for the conduct of next winter's snow surveys.

Arrangements were concluded with Superintendent Merriam of Yosemite National Park for the park rangers to make the annual survey at nine snow courses within the park boundaries.

The seven shelter cabins on the South Fork of the Kings River have been stocked with food and supplies for the winter as have the five cabins on the North Fork, including the one just completed this summer at Loggy Meadows. The cabins at Piute Pass and Bishop Pass have also been stocked. Supplies are on hand for stocking the cabins in the American and Pit River watersheds and these as well as the balance of unstocked cabins throughout the State will be made ready for the winter's surveys within the next few weeks.

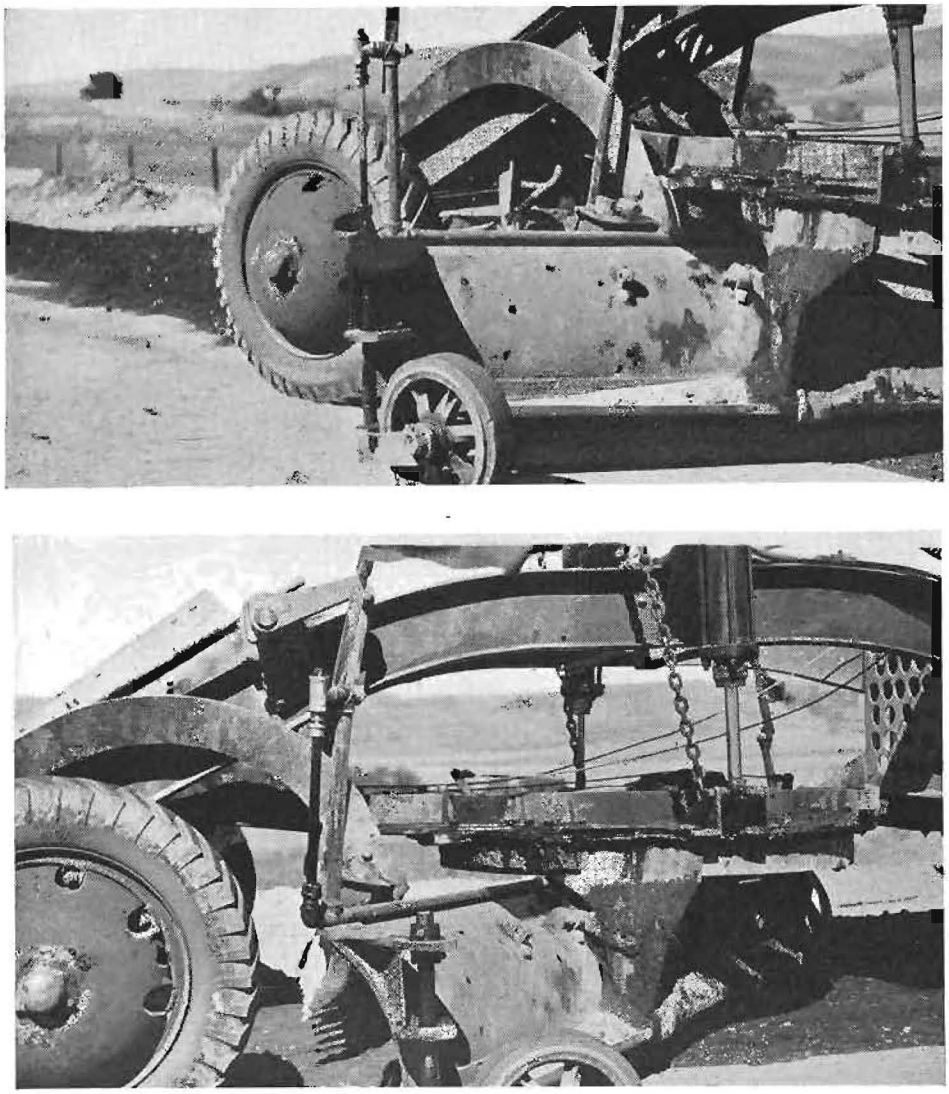
(Continued on page 28)

Grader Blade Level Devised for Oil Mix

By H. J. DOGGART
Resident Engineer

IN THE construction of road-mix oil shoulders on the recently completed Contract 85TC2-45CN3, Road V-Mon-2-H,I, between Bradley and San Ardo, two factors necessitated the development of a device to regulate the height of the cutting edge of a grader blade with reference to the grade of the finished concrete pavement.

First, it was desired to regulate accurately the depth of the shoulder trench in which oil mix shoulder material was to be placed; and second, in order to provide for settlement which invariably occurs on oil mix shoulders after being turned over to traffic where the shoulders have been finished to the grade of pavement, it was desired to cut the compacted shoulders to an even one-half inch above pavement grade.



Two views of leveling device on mold-board of grader. Upper picture shows device attached to adjustable wheel. Lower is a closeup of device and mold-board.

ATTACHMENT DEVISED

At the writer's suggestion, the contractor's mechanic constructed an attachment to the mold-board of a motor blade grader which gave positive control in regulating the height of blade in relation to pavement grade.

This device was patterned after a caster wheel and consisted of a solid rubber-tired wheel of 2-foot diameter, with swivel action, attached to one end of the mold-board by means of a bracket welded to same. This bracket was constructed of two horizontal $\frac{3}{8}$ inch sheet steel plates, spaced 12 inches apart and reinforced with a vertical web.

Each steel plate was bored to permit a one inch vertical shaft, to which the wheel was attached, to pass through. The lower end of this shaft was curved as in the case of a caster, before being attached to the wheel mounting. The position of the wheel relative to grade was firmly fixed by means of two collars, one on each side of the upper bracket and held in place on the one inch shaft by set screws.

The wheel rode on the pavement surface, and because of its swivel action, the blade could be set at any desired angle without binding action on the regulating wheel. Where it was desired to trench alongside the pavement, a section of the grader blade was cut out in order to allow a portion of the mold-board to project over the pavement. A blade with the full length of the mold-board was used where it was desired to make the final cut on the oil shoulders.

The blade leveling device shown on the accompanying photographs was used throughout the shoulder construction on this contract and was patterned after a model suggested by the Construction Department in January, 1931, except that light lubricating oil was used in place of water. The advantage of oil over water was in greater visibility and the fact that the jolting of the grader did not affect the stability of the fluid in the indicating column, as was the case where water was used. The Peninsular Paving Company, was the contractor.

It has been estimated that travel by motor car, motor bus and railroad in the United States in 1936 reached a total of 236,000,000,000 passenger-miles, or about 1,840 miles per capita.

Doctor: "Humph! I can't quite diagnose your case. I think it's drink."

Patient: "Oh, I see. Now, look here, doctor. Would you like me to come again when you're sober?"

She: Did anyone ever tell you how wonderful you are?

He: No, I don't think anyone ever did.

She: Then I'd like to know where you got the idea.

Quarterly Gas Tax Paid to Cities

(Continued from page 15)

District X

City	Population	Amount
Amador County:		
Amador City	171	$41.48
Jackson	2,005	486.38
Plymouth	343	83.21
Sutter Creek	1,013	245.74
Totals	3,532	$856.81
Calaveras County:		
Angels Camp	915	$221.96
Mariposa County:		
Hornitos	62	$15.04
Merced County:		
Atwater	917	$222.45
Dos Palos	930	225.60
Gustine	1,016	246.47
Livingston	803	194.79
Los Banos	1,875	454.85
Merced	7,066	1,714.10
Totals	12,607	$3,058.26
Sacramento County:		
Isleton	2,906	$704.95
San Joaquin County:		
Lodi	7,277	$1,765.29
Manteca	1,614	391.53
Stockton	47,963	11,635.08
Tracy	3,829	928.85
Totals	60,683	$14,720.75
Solano County:		
Benicia	2,913	$706.65
Dixon	1,000	242.59
Fairfield	1,131	274.36
Rio Vista	1,309	317.54
Suisun	905	219.54
Vacaville	1,556	377.46
Vallejo	15,277	3,705.96
Totals	24,091	$5,844.10
Stanislaus County:		
Ceres	981	$237.98

District X—Continued

City	Population	Amount
Modesto	13,860	$3,362.22
Newman	1,269	307.84
Oakdale	2,112	512.34
Patterson	905	219.54
Riverbank	803	194.79
Turlock	4,276	1,037.29
Totals	24,206	$5,872.00
Tuolumne County:		
Sonora	2,278	$552.61
Totals District X	131,280	$31,846.48

District XI

Imperial County:		
Brawley	10,439	$2,532.34
Calexico	6,299	1,528.04
Calipatria	1,554	376.98
El Centro	8,434	2,045.96
Holtville	1,758	426.46
Imperial	1,943	471.34
Westmorland	1,476	358.05
Totals	31,903	$7,739.17
Riverside County:		
Blythe	1,020	$247.44
Indio	2,601	630.96
Totals	3,621	$878.40
San Diego County:		
Chula Vista	3,869	$938.56
Coronado	5,425	1,316.02
El Cajon	1,050	254.71
Escondido	3,421	829.88
La Mesa	2,513	609.62
National City	7,301	1,771.11
Oceanside	3,514	852.44
San Diego	151,694	36,798.60
Totals	178,787	$43,370.94
Totals District XI	214,311	$51,988.51

H. R. Judah, New Highway Chairman

(Continued from page 5)

ing and travel information agency. H. R. Judah took up the duties of manager of the southern branch of the company in Los Angeles.

Following the San Francisco fire of 1906, Mr. Judah returned to Santa Cruz where he had formerly resided and was appointed manager of the chamber of commerce, a position he had previously held.

In 1907, Mr. Judah and Edward J. Devlin, then managing editor of the Sacramento Bee, decided to engage in the newspaper publishing business as partners and on November 1 of that year they established the Santa Cruz Evening News, a daily newspaper which they have operated successfully since that date.

Throughout the years of his participation in public affairs in Santa Cruz, Mr. Judah has been greatly interested in highway matters in the central coast section of the State and it was because of his zeal in the development of good roads that Governor Merriam named him on the California Highway Commission to succeed Timothy A. Reardon, resigned.

"If you were ordered to disperse a mob, what would do?"

Aspirant for police job: "Pass my hat!"

Water Resources for October, 1937

(Continued from page 26)

CENTRAL VALLEY PROJECT

The Division of Water Resources, under an agreement with the Bureau of Reclamation, has continued surveys and the collection and compilation of data in the San Joaquin Valley in connection with the acquisition of lands and water rights.

The United States Bureau of Reclamation continued the construction of the government camp for the Friant Dam and work was started on the construction of the camp for the Shasta Dam. Certain difficulties in securing rights of way for the Contra Costa Conduit were adjusted during the month and construction work was started on a portion of the canal.

STATE OF CALIFORNIA

Department of Public Works

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

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HARRY A. HOPKINS.....Assistant Director

EARL LEE KELLY.....Director

EDWARD J. NERON.....Deputy Director

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PHILIP A. STANTON, Anaheim
PAUL G. JASPER, Fortuna
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JULIEN D. ROUSSEL, Secretary

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G. T. McCOY, Assistant State Highway Engineer
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F. W. PANHORST, Bridge Engineer
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F. W. HASELWOOD, District II, Redding
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JNO. H. SKEGGS, District IV, San Francisco
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S. V. CORTELYOU, District VII, Los Angeles
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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

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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
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Port of Eureka—WILLIAM CLARK, SR., Surveyor

50171 11-37 15,700

CALIFORNIA STATE PRINTING OFFICE
GEORGE H. MOORE, STATE PRINTER
SACRAMENTO, 1937

MAP
SHOWING
STATE HIGHWAY SYSTEM