

# CALIFORNIA

## HIGHWAYS AND PUBLIC WORKS

CARQUINEZ TOLL BRIDGE ACROSS STRAITS OF CARQUINEZ  
ON U.S. 40. PURCHASED BY STATE  
(SEE ARTICLE IN THIS ISSUE)

SEPTEMBER  
1940

# CALIFORNIA HIGHWAYS AND PUBLIC WORKS

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

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Governor Culbert L. Olson burning the golden chain barrier officially opening Carquinez Bridge under State ownership. Left to right—Governor Olson; Larry Barrett, Chairman California Highway Commission; Edward Murphy, Attorney for California Toll Bridge Authority; Director of Public Works Frank W. Clark; President W. W. Morrish of American Toll-Bridge Co.; L. J. Breuner, Vice President Oakland Chamber of Commerce; Mrs. Audrey Hecht former vice president American Toll-Bridge Co. and Walter Kanen.

## State Takes Over Carquinez Bridge; Tolls Reduced Fifty Per Cent

**S**TATE ownership and operation of the Carquinez and Antioch bridges became a reality on September 16th.

Promptly at 11.30 o'clock a.m., Governor Culbert L. Olson, as chairman of the California Toll Bridge Authority, severed with a blow torch the golden chain stretched across the Carquinez bridgehead on the Vallejo side of the Carquinez Straits, and personally purchased the first toll ticket at the new rate of thirty cents per automobile and passengers, thus formally dedicating the structure as a State-owned span.

This momentous ceremony had been preceded by a half hour of speech making, during which Will F. Morrish, retiring president of the American

Toll Bridge Company had presented to Frank W. Clark, Director of Public Works, a deed to the Carquinez and Antioch bridges, which document was in turn handed to the Governor by Mr. Clark.

The celebration at the bridgehead was arranged for by the Oakland Chamber of Commerce with the assistance of chambers of commerce, officials and civic groups of Alameda, Contra Costa, Solano, Sonoma, Napa, Yolo and Sacramento counties. Mrs. Audrey Hecht, widow of Avon J. Hanford, one of the builders of Carquinez Bridge, was introduced and recalled that she had participated in the dedication of the span in 1927. Mrs. Hecht was vice president of the American Toll Bridge Company. Following the dedication ceremonies, a luncheon was tendered to Governor

Olson, State and county officials and distinguished guests at the Casa de Vallejo Hotel in Vallejo.

A large crowd, gathered at the bridgehead, cheered the Governor when he officially took over the bridge for the State of California. Mr. Louis J. Breuner, vice president of the Oakland Chamber of Commerce, acting as chairman of the transfer ceremony committee, after expressing the pleasure of his organization and the East Bay counties over State acquisition of the spans, introduced Mr. Edward Murphy, attorney for the California Toll Bridge Authority, who as master of ceremonies, presented Larry Barrett, chairman of the California Highway Commission. Mr. Barrett said:

"Governor Olson, Director Clark, Mr. Breuner, Mr. Morrish, distinguished guests and friends:

"My pleasure in being here today is twofold. As a member of the California Toll Bridge Authority, I am happy to have been in a position to assist in the acquisition by the State of the Carquinez and Antioch bridges, which we have gathered here today to celebrate. During the period of negotiations for the purchase of these American Toll Bridge Company properties, it has been highly gratifying to Governor Olson and the members of the Authority to know that our plans to place the Carquinez and Antioch spans under public ownership and operation received such widespread support from the public and the press. We all feel that in buying these bridges we have complied with a real public demand.

"As chairman of the California Highway Commission I, together with the other members of the Commission, am very much pleased with the outcome of the negotiations instituted by Governor Olson and Director of Public Works Frank W. Clark which today mark the first steps toward wiping out two toll barriers on the State highway system. We look forward to the time when there will be no toll bridges on our State highways.

"It will require some seven and one-half years to make the Carquinez and Antioch bridges toll-free but, in the meantime, with the reduction of toll charges the motorists of California will benefit by toll savings of more than \$3,000,000. This alone justifies the State's action in purchasing and operating these two bridges.

#### MORRISH PRESENTS DEEDS

In presenting to Director Clark the deeds to the properties of the American Toll Bridge Company, Mr. Morrish paid a high compliment to the members of the California Toll Bridge Authority and to the Department of Public Works for the business-like manner in which they had conducted negotiations for the purchase of the bridges.

"In retiring as president of the American Toll Bridge Company," Mr. Morrish said, "I want to express to you, Governor Olson, and to you, Director Clark, my wish that in the very near future the tolls on the Carquinez and Antioch bridges can be again reduced and that as speedily as possible the State of California will make these spans toll free."

Accepting the deeds from Mr. Morrish, Director Clark said:

"Needless to say after the part I have played in bringing about State ownership of these bridges, I am highly gratified by the public enthusiasm being expressed here today. Now that the deal has been consummated, I have only a few words to say. There is present here today the man who is entirely responsible for setting in motion the State machinery necessary to

### Bidders Express Their Satisfaction

**A**T THE conclusion of the opening of bids at the meeting of the California Toll Bridge Authority on Wednesday, September 11, 1940, Governor Culbert L. Olson asked the assembled bidders if they were satisfied with the result and the stenographer's record of the incident reads as follows:

**GOVERNOR OLSON:** And may I ask you if all you bidders feel that the bidding has been conducted fairly, openly and on a true basis of competition, and that the lowest bidder is Kaiser & Company?

**A VOICE:** No question about it.

**A VOICE:** No question.

**A VOICE:** Yes, sir, very much so.

**\*MR. VIC. E. BREEDON:** Mr. Governor, I would like to state on behalf of one of the associates on the bids, it is very seldom that we have the privilege of having such complete information at the disposal of the bidders prior to the call for bids. I think Mr. Clark and his associates ought to be congratulated on the fine way in which they have presented this issue to the bond buying houses.

\* Representative of R. H. Moulton Co. of San Francisco.

make the Carquinez and Antioch bridges publicly owned and publicly operated with tolls cut in half. The man responsible for this achievement is Governor Culbert L. Olson and I take genuine pleasure in presenting him to you."

As Director of Public Works and secretary of the California Toll Bridge

Authority, Mr. Clark delivered to Governor Olson the deed to the bridge. In accepting the deed, Governor Olson said in part:

"My Fellow Citizens:

"It is a most satisfying experience to me as Governor of the State of California to receive this deed transferring the title to the Carquinez and Antioch Bridges to the people. The people have long talked, and hoped for complete public ownership of their public utilities. And, as a matter of fact, for many years it has been the express policy of the State Government to build or acquire, and to own and operate all toll bridges, with the end in view of ultimately eliminating all toll charges.

"Nevertheless, it has been only in the past year and a half that actual official steps have been taken to make the people the owners of these two bridges, which serve an area where more than two million people live and work; people for whom these bridges are a primary public necessity.

"It is true, that by the terms of the franchises held by the private company which, until today, owned these bridges, they would have become public property in 1948. Thereafter they would have become toll-free in only a short while.

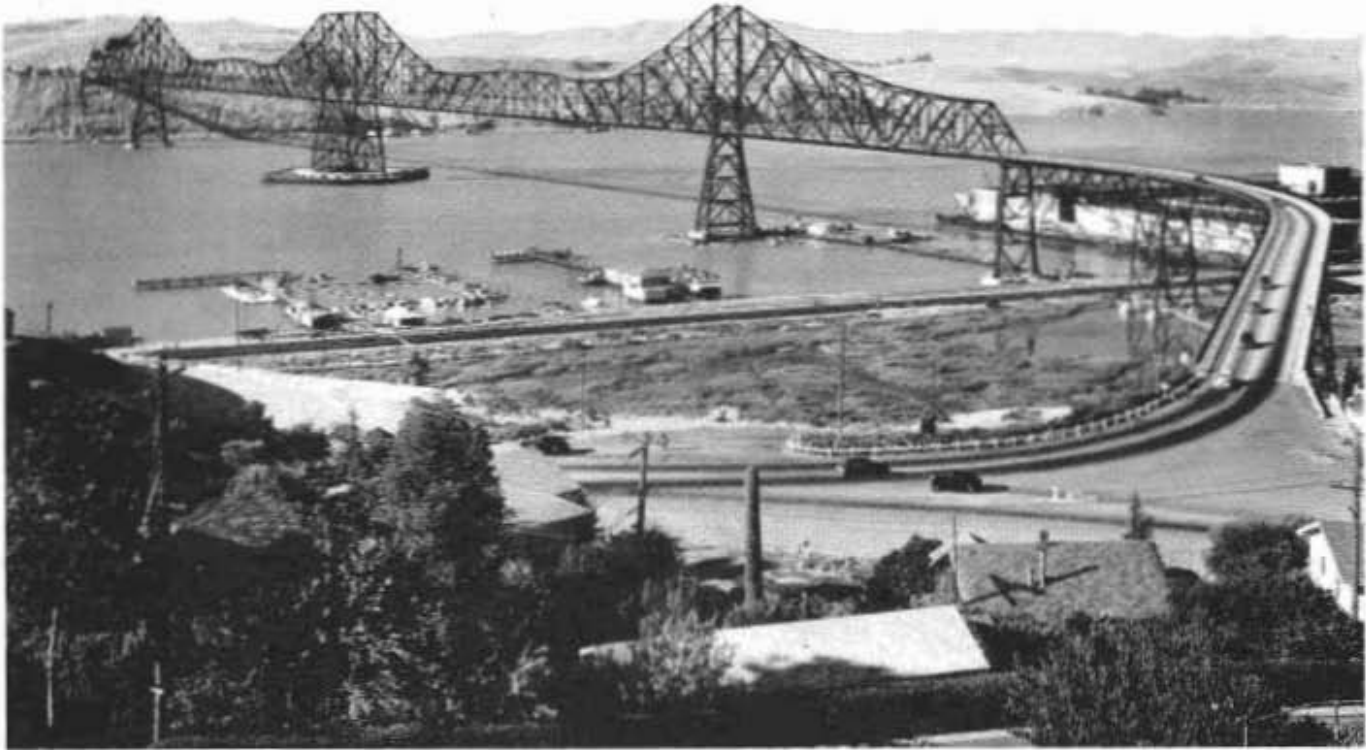
#### SAVING PEOPLE MILLIONS

"But the virtue of taking them at this time rests in the fact that we are now able, with practically no cost to the State, to immediately take them over as publicly owned and operated bridges and at the same time reduce the toll so substantially that in the coming eight years the people using these bridges will save millions of dollars; in fact, almost as much as is being paid for the bridges out of their revenues during that period.

"There are two reasons for these great savings.

"First, the State does not have to exact a profit over and above the cost of operating the bridges and retiring the revenue bonds issued for their purchase.

"And second, the California Toll Bridge Authority, acting for the people, has obtained this purchase money at an interest rate of only about one and three-quarters per cent. This extraordinary low interest rate indicates not only that the bond purchasers have ample security



Carquinez Toll Bridge across the Straits of Carquinez on U. S. 40 (State Highway Route 7) purchased by the State.



Antioch Toll Bridge across the San Joaquin River on State Highway Route 11 near Antioch, purchased by the State.



Director Frank W. Clark presenting Governor Olson the deed to the bridges.

and are anxious to support their government by financing sound public enterprises, but it also indicates that they recognize revenue bonds as sound investments.

#### TOLLS PAY FOR BONDS

"These bonds are not an obligation against the people, nor against the State Government, nor even against the bridges themselves. They are payable only out of the bridge revenues; out of the tolls paid by the people who use them at almost one-half the previous toll charges to cross these mighty rivers.

"I take this opportunity to voice public recognition and praise of the many people whose hopes and prayers, whose agitations and ardent labors, consummated the happy ending that we here celebrate. To them are due the fervent thanks of the millions of people who use these bridges.

"First it seems to me that special recognition is due to Mr. Frank W. Clark, the State Director of Public Works, and his attorneys and staff for so ably conducting the investigations and delicate negotiations which led to this auspicious occasion. It was their work that enabled the purchase at a most reasonable price, and the

sale of the revenue bonds on such favorable terms.

#### TRIBUTE DUE SPONSORS

"Grateful tribute and recognition are due to the boards of supervisors and the many city councils in the areas tributary to these bridges; and to the Chambers of Commerce, the California State Grange, and the Labor Unions, and the civic, fraternal, and patriotic organizations and to the hundreds of individual citizens whose persistent agitations created the public sentiment so necessary to the successful consummation of this large public ownership enterprise.

"Recognition and thanks are due to the many investment underwriters whose careful appraisal of this enterprise led them to compete so vigorously for the privilege of financing it on terms so favorable to the people.

"There are, it is true, a very few citizens who will condemn this transaction as a piece of socialism; as government encroaching upon private enterprise; "government in business."

"But the rest of us will recognize it for exactly what it is; a very practical piece of business; a highly successful example of the virtue and benefits of public ownership. It mat-

ters little what we call it. It serves the principle pronounced many years ago by Abraham Lincoln that government should do for the people the things they can not do for themselves, or the things which they can not do so well for themselves.

"From today on every citizen who pays toll here can do so with that satisfying sense of the pride and freedom that attend ownership; thoughtful of the day, only a few years from now, when he may use this bridge free of charge. Thus this bridge stands as a lasting symbol of things American. Soon we shall strike this bridge free from the tolls and charges that narrow and restrict its use.

"By the same token we may now look forward to the day when in America shall strike ourselves free from the bigotries and prejudices which narrow and restrict our realization of the full benefits implicit in the promise of American Life.

"I am immeasurably grateful for the small part it has been my proud privilege to play in bringing about this happy and successful conclusion.

"I thank you."

#### LUNCHEON FOLLOWED CEREMONIES

Some two hundred civic leaders and officials attended the luncheon given by the Vallejo Chamber of Commerce and the Vallejo Junior Chamber of Commerce following the bridgehead ceremonies. Luther Gibson, Vallejo publisher, presided at the luncheon and introduced for brief addresses Mr. Murphy, Mr. Breuner, Mr. Barrett, Mr. Morrish and Director Clark.

Governor Olson closed the day's celebration with an address in which he pointed out that such community spirit and cooperation as was evidenced at the bridgehead and at the luncheon was highly encouraging for all those who believe that public ownership is greatly desirable when private property is not confiscated and the greatest public good possible is achieved.

In a statement reviewing the negotiations leading up to State acquisition of the bridges, Director of Public Works Clark said:

"On September 11th, bids for revenue bonds necessary to finance the acquisition of these structures were opened by the California Toll Bridge Authority with the astonishing result that the State received from Kaiser & Co. and Sargent, Taylor & Co. of San Francisco a bid providing for a premium amounting to \$500,999.99, which assures an almost unbelievably

low rate of interest approximating one and three-quarters per cent and makes practically certain that the bridges will become toll-free six months earlier than had been anticipated.

"Acquisition of these toll spans is an outstanding example of Governor Culbert L. Olson's public ownership policies. In purchasing the bridges, the State has made possible great public benefits without injury to private interests or confiscation of private property.

"The soundness of the deal, which was negotiated by the present administration under the personal direction of Governor Olson, is evidenced by the wide interest in the Carquinez Toll Bridge Revenue Bonds manifested by investment dealers in all parts of the United States.

"If our present revenue estimates for the spans work out, tolls can be discontinued late in 1947 and all bonds paid off not later than January 1, 1948.

"As a result of the competition engendered, the State received a bid from Kaiser & Co., and Sargent, Taylor & Co., pursuant to which the California Toll Bridge Authority was only required to issue \$5,943,000 principal amount of bonds, and received, in cash, \$6,443,999.99 plus accrued interest. In addition, as a part of the purchase price of the bridges, the State received \$350,000 cash now held by the American Toll Bridge Company, resulting in a net cost of the two bridges of only \$5,593,000.

"The method of sale adopted by the Bridge Authority, while comparatively new in California, is a well-established practice in the East of selling the least number of bonds which will produce a given sum of money. As a result of adopting this method of financing, the State was able to immediately cut tolls on the Carquinez and Antioch bridges in half, and will also be able to pay off and retire all of the \$5,943,000 bonds to be actually issued by 1947, or more than six months before the date of the expiration of the present franchise. Upon retirement of the bonds the bridges become toll free. In addition to making both bridges toll free prior to the time they would revert to the State under the present law, the motoring public will save an amount estimated to be in excess of three million dollars as a result of the reduced tolls.

"Acquisition of the bridges by the State does not, in fact, involve the State in any obligation, as the bonds to be issued will be paid entirely from revenues from the Carquinez and Antioch bridges, and no taxes of any kind or character can legally be levied for their payment.

"Negotiations for the purchase by the State of the Carquinez and Antioch bridges came to a head on August 23rd when the California Toll Bridge Authority, of which Governor Olson is chairman, meeting in San Francisco, approved the terms of a revised offer for the properties which had been made by the Department of Public Works to the American Toll Bridge Company and accepted by that corporation.

"At the same time, the Authority authorized the issuance and sale of one to fifteen-year serial bonds in the amount of \$6,443,000.

"The Authority also appointed the Pacific National Bank of San Francisco, fiscal agent, and designated the Manufacturers Trust Company of New York City, N. Y., collection agent under the bond issue.

"The State Railroad Commission approved of the purchases of the bridges on September 3.

"Under an agreement between the contracting parties, the Toll Bridge Company credited to the State cumulative toll collections at the rate of \$2,200 a day from March 1, 1940, to the closing date of negotiations, September 16, or \$437,800 for a total of 199 days.

**"Had this stipulation not been insisted upon, the State would have been deprived of \$437,800 and the bond issue would have had to be increased accordingly.**

"The purchase price approved by the Toll Bridge Authority on August 23rd and which supplements the original one accepted by the owners of the bridges on May 21st last, offers a definite solution of the problem of the Martinez-Benicia Ferry, owned and operated by the American Toll Bridge Company.

"The new agreement provides that the Toll Bridge Company at the request of the Department of Public Works, will: (Continued on next page)



Governor Olson buys first bridge ticket at new price of thirty cents.



President Morrish of American Toll-Bridge Company gives bridge deed to Director Clark.

"(a) Without the payment of any additional compensation cause the operative properties and franchises now owned by the Martinez-Benicia Ferry to be transferred and conveyed to the counties of Contra Costa and Solano, or either of them, the cities of Martinez and Benicia, or either of them, or to any other person, firm or corporation, group or association designated by the Department of Public Works, subject to approval by the State Railroad Commission, or

"(b) Apply to the Railroad Commission for permission to abandon the Martinez-Benicia Ferry and, to the best of its ability, divest the ferry company of all right to own, operate or maintain its ferries or franchise rights appertaining to the operation thereof, upon the condition that the Department of Public Works will make such request within not more than thirty days from the closing date of negotiations with the American Toll Bridge Company; otherwise the Company shall be free to take such action as it deems advisable with respect to the ferry."

#### List of Bidders for Carquinez Toll Bridge Revenue Bonds

	Purchase price offered	Per value of bonds to be taken for purchase price
Kaiser & Co., Sargent, Taylor & Co.....	\$6,443,999.99	\$5,943,000.00
Harris Hall & Co. and Associates .....	6,443,999.99	6,027,000.00
Blyth & Co. and Associates..	6,443,999.99	6,050,000.00
First Boston Corporation and Associates.....	6,443,376.00	6,115,000.00
Lehman Bros. and Associates .....	6,443,680.14	6,194,000.00

"On behalf of Governor Olson and the California Toll Bridge Authority, I desire to assure the residents of Contra Costa and Solano counties, particularly the citizens of Benicia and Martinez who now use the Martinez-Benicia ferry, that the State will make every effort to keep the ferry in operation. The ferry either will be turned over to one or more of the political subdivisions interested or some arrangement will be made whereby the present employees of the ferry, if they are able to organize a cooperative association to operate this service, will be permitted to continue operation.

"I have discussed this matter with the Railroad Commission and the Department of Public Works has given extensive consideration to plans for future operation of the ferry.

"The offer made by the State for the bridges was predicated upon the assumption that the company had no actual physical properties for sale inasmuch as title to the two spans would revert to Contra Costa and Solano counties, in which they are located, in approximately eight years. The company held a franchise giving it the right to operate the bridges and collect tolls until the expiration of the franchise in 1948. The State's offer was based on the earnings which could have been realized during the remaining eight years of operation.

"In recommending to the Toll Bridge Authority the purchase of the bridges, the Department

(Continued on page 26)



Sign announcing State-owned bridge and reduced toll price.



# Traffic on State Highways Shows Increase of 2.2 Per Cent Over 1939

By C. H. PURCELL, State Highway Engineer

**I**N ACCORDANCE with long-established practice the annual state-wide traffic count on State highways was taken Sunday and Monday, July 14 and 15. A comparison with the same period for 1939 shows an increase of slightly more than 2 per cent.

While seemingly a very moderate increase, it is in reality a very sizable one when we recall that the July 1939 figures, which it exceeds, were very much above the average for the first half year of 1939 taken as a whole, as was pointed out at that time.

No such sudden spurt has been recorded during July of the present year, but a very pronounced increase in traffic on the State Highway System for the full seven months' period is indicated by the monthly counts recorded at regularly established key stations. This increase is approximately 7 per cent, which compares rather closely with the increase in excess of 5 per cent noted in gasoline sales for the State as a whole.

There were few routes showing either spectacular gains or losses. Neither was there any great variance between the increase shown for traffic on Sunday as compared with that for Monday. Comparison of the main groups shows "Recreational" routes as enjoying the largest increase, with the "Main North and South" group continuing to carry approximately the same heavy volume of traffic as that recorded in July, 1939.

There was no change from the regular procedure of previous years in the manner of taking the count. Actual recording covers the 16-hour period from 6 a. m. to 10 p. m. for both Sunday and Monday. Traffic was segregated by hourly periods into the following vehicle classifications: California passenger cars, out-of-state passenger cars, buses, light trucks, heavy trucks, trailers drawn by trucks, trailer coaches, and other passenger-car trailers.

Each year some minor changes in the census become necessary, such as the relocation, addition, or discontinuance of individual stations.

These comparisons for the various route groups are as follows:

	Sunday	Monday
All Routes	+ 2.49	+ 2.13
Main North and South Routes	- .40	+ .25
Interstate Connections	+ 4.09	+ 3.93
Laterals Between Inland and Coast	+ 3.82	+ 3.84
Recreational Routes	+ 8.06	+ 4.91

The gain or loss of traffic volume for State Highway Routes 1 to 80, inclusive, which constitute the basis for the foregoing summary, is shown in the following tabulation:

Route	Terminal	1940			
		Per cent gain or loss Sunday		Monday	
		Gain	Loss	Gain	Loss
1. Sausalito-Oregon Line		0.34		2.08	
2. Mexico Line-San Francisco		3.98		3.54	
3. Sacramento-Oregon Line		2.02		1.66	
4. Los Angeles-Sacramento		4.77		7.76	
5. Santa Cruz-Jc. Rt. 65 near Mokelumne Hill		0.93		1.39	
6. Napa-Sacramento via Win-lens		51.27	12.72		
7. Crockett-Red Bluff		6.26		1.92	
8. Ignacio-Cordelia via Napa		9.35	3.43		
9. Rt. 2 near Mantaho-San Bernardino		4.22	5.50		
10. Rt. 2 at San Lucas-Sequoia National Park		7.54	9.25		
11. Rt. 75 near Antioch-Nevada Line via Placerville		4.61	6.38		
12. San Diego-El Centro		11.72	11.38		
13. Rt. 4 at Salina-Rt. 23 at Sonora Jc.		8.28	3.95		
14. Altamny-Martinez		6.59	5.11		
15. Rt. 1 near Calpella-Rt. 37 near Cisco		5.22	7.73		
16. Heald-Lakeport		16.94		1.53	
17. Rt. 3 at Newcastle-Rt. 15, Nevada City			2.60	1.30	
18. Rt. 4 at Mercedes-Rt. 40 near Yosemite		6.72	0.75		
19. Rt. 2 at Fullerton-Rt. 26 at Beaumont		4.40	7.29		
20. Rt. 1 near Arcata-Rt. 83 at Park Boundary		7.18	11.83		
21. Rt. 3 near Richvale-Rt. 29 near Chilcoot via Quincy		11.69	18.65		
22. Rt. 56, Castroville-Rt. 29 via Hollister		24.49	19.16		
23. Rt. 4 at Tunnel Sta.-Rt. 11, Alpine Jc.		6.85	8.36		
24. Rt. 4 near Lodi-Nevada State Line		20.06	5.63		
25. Rt. 37 at Colfax-Rt. 83 near Settlly		12.68	6.97		
26. Los Angeles-Mexico via San Bernardino		0.62	2.90		
27. El Centro-Yuma		1.71	0.40		
28. Redding-Nevada Line via Alturas		17.22	6.45		
29. Peanut-Nevada Line near Purdy's		9.26	15.38		
31. Colfax-Nevada State Line		6.82	2.12		
32. Rt. 56, Watsonville-Rt. 4 near Califa		1.75	9.25		
33. Rt. 56 near Cambria-Rt. 4 near Famosa		9.04	2.67		
34. Rt. 4 at Galt-Rt. 23 at Pickell's Jc.		2.91	18.89		

Route	Terminal	1940			
		Per cent gain or loss Sunday		Monday	
		Gain	Loss	Gain	Loss
35. Rt. 1 at Altamny-Rt. 20 at Douglas City			6.26		5.96
37. Auburn-Truckee		6.81			0.66
38. Rt. 11 at Marys-Nevada Line via Truckee River			1.83		3.92
39. Rt. 38 at Tahoe City-Nevada State Line		12.30		7.39	
40. Rt. 13 near Wentziana-Rt. 76 at Benton		13.55		14.46	
41. Rt. 5 near Tracy-Kings River Canyon via Fresno		12.61		13.52	
42. Redwood Park-Las Galas		0.18			0.57
43. Rt. 60 at Newport Beach-Rt. 31 near Victorville		7.37		1.53	
44. Boulder Creek-Redwood Park		1.41			4.70
45. Rt. 7, Willows-Rt. 3 near Biggs			17.65		11.57
46. Rt. 1 near Klamath-Rt. 3 near Cray			9.70		6.43
47. Rt. 7, Orland-Rt. 29 near Morgan			1.76		2.02
48. Rt. 1 N. of Cloverdale-Rt. 56 near Albion			6.49		22.98
49. Napa-Rt. 15 near Sweet Hollow Summit		10.35		8.75	
50. Sacramento-Rt. 15 near Wilbur Springs		2.44		1.34	
51. Rt. 8 at Schellville-Sebastopol		2.42	9.83		11.99
52. Alto-Tiburon		2.89			
53. Rt. 7 at Fairfield-Rt. 4 at Lodi via Rio Vista		5.57		7.21	
54. Rt. 11 at Perkins-Rt. 65 at Central House		3.49		13.36	
55. Rt. 5 near Glenwood-San Francisco		15.98		14.25	
56. Rt. 2 at Las Cruces-Rt. 1 near Fernbridge		6.43		1.49	
57. Rt. 2 near Santa Maria-Rt. 23 near Freeman via Bakersfield		3.47		7.07	
58. Rt. 2 near Santa Margarita-Arizona Line near Topock via Moham and Barstow		7.27		1.72	
59. Rt. 4 at German-Rt. 43 at Lake Arrowhead		7.59		1.34	
60. Rt. 2 at Serris-Rt. 2 at El Rio		16.97		7.64	
61. Rt. 4 S. of Glendale-Rt. 59 near Phelan		25.59		12.19	
62. Rt. 171 at Northam-Rt. 61 near Crystal Lake		6.30		6.56	
63. Big Pine-Nevada State Line		68.25		85.57	
64. Rt. 2 at San Juan Capistrano-Slythe		7.64		8.80	
65. Rt. 18 near Mariposa-Auburn		9.73		1.07	
66. Rt. 5 near Mendota-Rt. 13 near Oakdale		11.36		1.39	
67. Pajaro River-Rt. 2 near San Benito River Bridge		1.75		9.80	
68. San Jose-San Francisco		4.34		8.25	
69. Rt. 5 at Warm Springs-Rt. 1, San Rafael		0.90			3.28
70. Ukiah-Talmage		39.33		23.52	
71. Crescent City-Oregon Line		8.74		4.72	
72. Weed-Oregon Line		7.40		9.50	
73. Rt. 29 near Johnstonville-Oregon Line		11.53		12.50	
74. Napa Wye-Cordelia via Vallejo and Benicia		21.77		20.41	
75. Oakland-Jc. Rt. 65 at Altaville		2.58		12.25	
76. Rt. 125 at Show Ave.-Nevada State Line near Benton		40.18		14.24	
77. San Diego-Los Angeles via Pomona		3.36		4.96	
78. Rt. 12 near Decampo-Rt. 19 near March Field		4.96		0.41	
79. Rt. 2, Ventura-Rt. 4 at Castaic		12.73		3.97	
80. Rt. 51, Rincon Creek-Rt. 2 near Zaca		7.00		5.79	

# Los Gatos-Santa Cruz Highway Unit Dedicated and Opened

**W**ITH a colorful program of pageantry, ceremony and music the last 1.8 miles of the Los Gatos-Santa Cruz highway relocation and reconstruction project was dedicated and officially opened on August 30th at Los Gatos in the presence of State, county and city officials and civic dignitaries.

The opening of this final unit of a modern highway between the Santa Clara Valley city and Santa Cruz on Monterey Bay marks the completion of a Division of Highways project that has progressed by stage construction under six separate contracts over a period of 9 years and 6 months and has cost the State approximately \$3,000,000. It is 20.6 miles in length of which 14.6 miles is four-lane road and the rest 3-lane.

The dedicatory ceremonies featured a parade of old and modern modes of transportation after the cutting of a ribbon raised a barrier and was followed by addresses of officials introduced by President Stanley Mills of the Los Gatos Chamber of Commerce.

#### REPRESENTS GOVERNOR OLSON

The two principal speakers were Colonel John H. Skeggs, District Engineer of the State Division of Highways in charge of the project, representing State Highway Engineer C. H. Purcell and Deputy District Director of Public Works Morgan Keaton, who represented Governor Olson and Director of Public Works Frank W. Clark. Mr. Keaton said:

"It is a real pleasure for me to be here today as your guest and I bring you the very sincere greetings of your Governor, Culbert L. Olson, and convey to you his regrets that he can not be here in person. I bring you also the best wishes and heartiest greetings of your Director of Public Works, Mr. Frank W. Clark, who sincerely regrets he is also unable to be with you on this memorable occasion.

"The opening of this 1.8-mile section of State highway marks the completion to modern engineering standards of the twenty miles between Los Gatos and Santa Cruz.



MORGAN KEATON, Deputy Director of Public Works

"The State of California has for the past several years been confronted with the difficult task of providing steady improvement to 14,000 miles of road in the State Highway System with no increase in the rates of State gasoline tax and motor vehicle fees since the State Highway System was less than one-half the present mileage.

#### HIGHER STANDARDS DEMANDED

"In addition to this doubling of mileage without increase in basic rates for State revenue, the State is confronted with an increasing volume of traffic which necessitates and demands even higher standards of safety and convenience in construction of highway facilities.

"To meet these demands for improvement to greater mileage and higher standards has required the most careful planning on the part of Division of Highway Engineers and critical selection by the California

Highway Commission of projects proposed for inclusion in biennial highway budgets.

"The increasing popularity with motorists of the redwood covered Santa Cruz mountains and of the beautiful beaches along the northern shore of Monterey Bay resulted in traffic volumes on the Los Gatos-Santa Cruz route beyond the service ability of the old highway.

#### FIRST CONTRACT IN 1931

"In planning orderly development of the highway system throughout the State, modernization of this scenic route has held a prominent place. Almost ten years ago reconnaissance surveys were complete for the relocation of this highway between the Santa Clara Valley and the coastal country at Santa Cruz.

"As rapidly as available funds could be allocated by the commission a series of major contracts have been under way for construction of adequate highway facilities through this section of the coast range.

"On May 18, 1931, the Department of Public Works awarded the first of the contracts providing for grading and surfacing of the State highway from the city limits of Santa Cruz to a point one mile northerly. Three contracts were then awarded between 1933 and 1934 for construction on improved line and grade between Inspiration Point and Scotts Valley and, in 1936, the gap between Scotts Valley and one mile north of Santa Cruz.

#### LARGEST GRADING CONTRACT

"In December of 1937 the largest of the contracts was awarded for construction of the route between The Oaks and Inspiration Point. On June 30 of last year many of you were present at the dedication when Mr. Frank W. Clark, Director of Public Works, officially opened that section.

"In passing, it might be well to comment that the construction of that six and one-half miles was one of the largest highway grading contracts ever undertaken by the Division of Highways. Over 2,500,000 cubic



Two views of sidehill viaduct on Los Gatos-Santa Cruz 4-lane highway. Top picture shows how two lanes are carried on viaduct built on curve. Bottom picture shows steel piling and character of construction supporting the highway.

yards of earth were moved in the construction of the roadway and structures. The foundation treatments in construction of the massive fills and deep cuts were developments of detailed engineering studies and the project received much comment and study in highway engineering circles throughout the entire country. The Los Gatos-Santa Cruz highway is one of the nationally known highways.

"On the thirteenth of December last year the Director of Public Works, Frank W. Clark, awarded the last of the road construction contracts—the one we open to public travel today. One month later, January 11 of this year, the last structure contract was awarded for construction of the side hill viaduct one-half mile south of Los Gatos.

#### SIDE-HILL VIADUCT SOLUTION

"Construction of this last section, the 1.8 miles between Oaks Road and Los Gatos, has not been a simple task.

Exhaustive engineering investigations were necessary to locate the four-lane highway in the narrow Los Gatos Creek Canyon, where the railroad and water company both had existing facilities. These studies emphasized the necessity of avoiding as far as possible heavy cuts in the hillside. The results of these engineering and geophysical investigations concluded with inclusion in the road design the side-hill viaduct.

"The entire reconstruction program for the State highway between Los Gatos and Santa Cruz has involved eleven contracts and the total cost to the State will exceed two and one-half million dollars.

"The new highway makes the distance between the Santa Clara Valley and Santa Cruz only 20.6 miles, a saving of approximately five miles over the distance traversed by the old road. In reconstruction, the new highway has eliminated innumerable sharp curves and steep pitches in grade line.

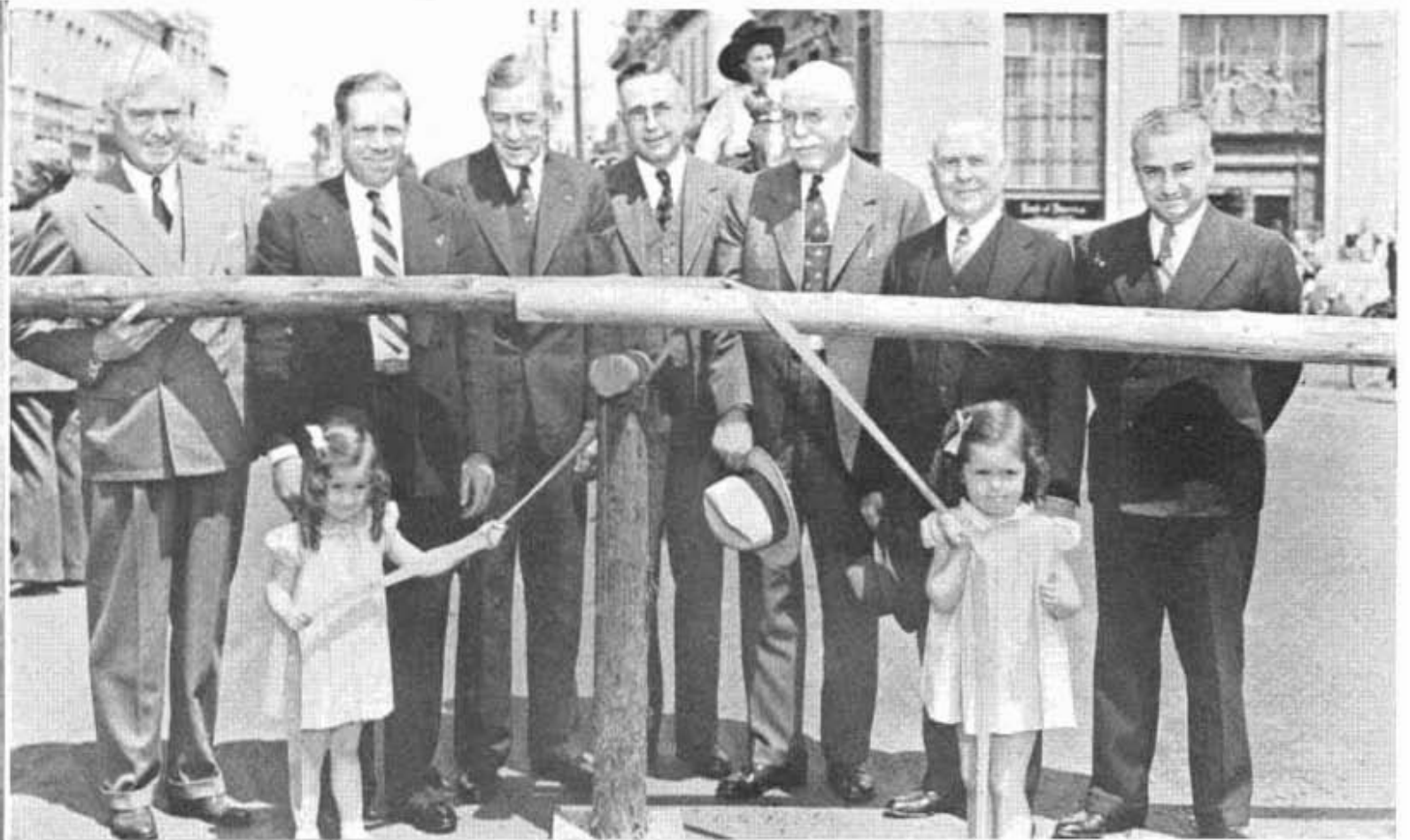
"The present highway presents to the motorist an urban boulevard through the mountains. Over 14½ miles of four-lane road and about 6 miles of three-lane.

"The days of congested traffic crawling in long lines behind some slow-moving vehicle have left the Santa Cruz road and the Department of Public Works today presents to the people of California a completed thoroughfare through one of this State's most scenic sections."

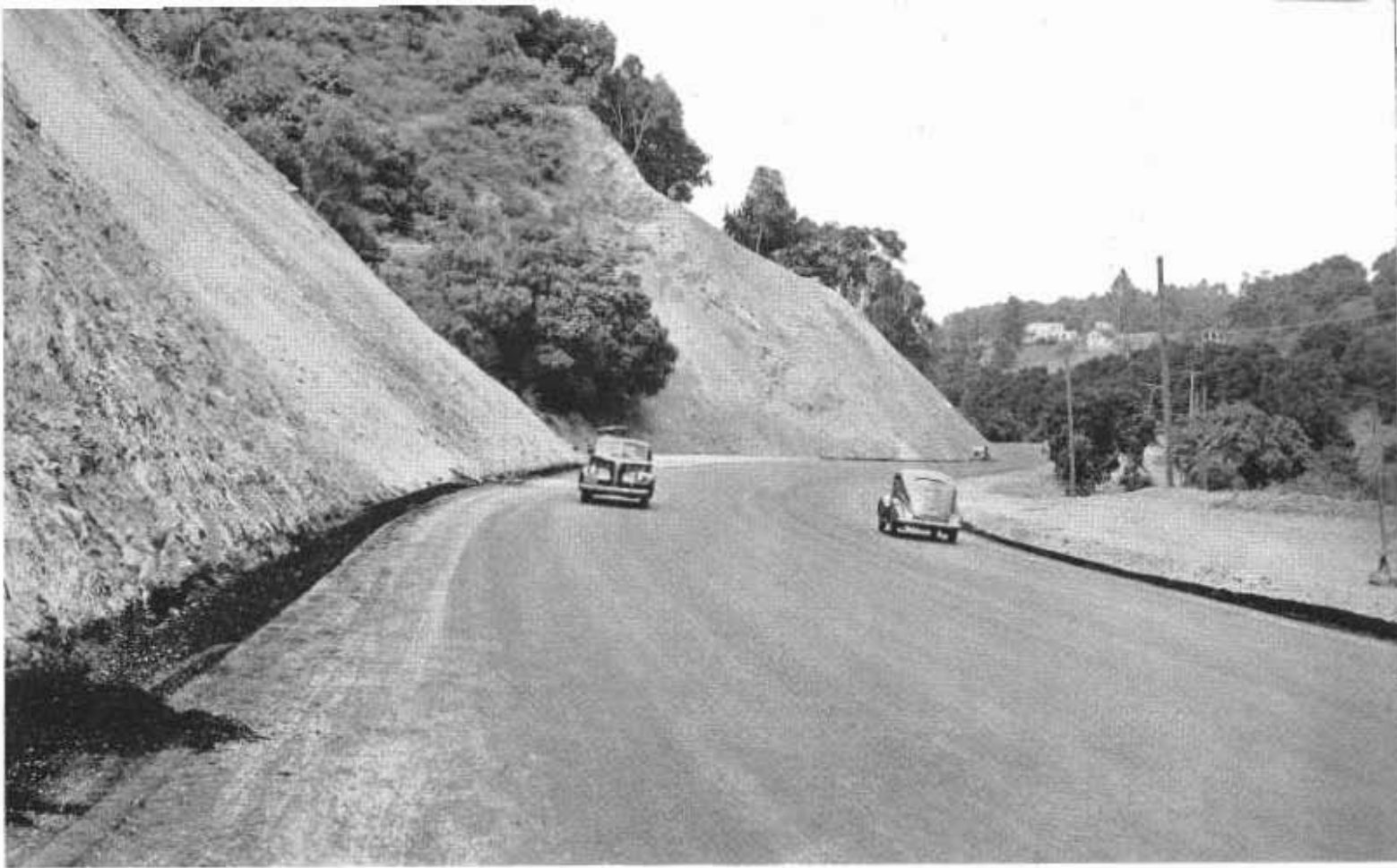
Colonel Skeggs, in his brief talk, thanked the people of Los Gatos and Santa Cruz and intervening points for enduring without criticism the inconveniences to which they were subjected during the period of construction.

"I don't think we have ever had a more difficult job to execute," he said, "and we of the highway department want to thank the people of Los Gatos for their cooperation during the construction of this last section."

The last link, Col. Skeggs said,



Official group at highway dedication. Left to right—President Stanley Mills, Los Gatos Chamber of Commerce; Morgan Keaton, Deputy Director of Public Works; Jno. H. Skeggs, District Engineer; G. A. Morgan, Chairman, Santa Cruz County Supervisors; Supervisor C. P. Cooley, of Santa Clara; C. D. Hinkle, Mayor of Santa Cruz, and Marc Vertin, Member of City Council and Acting Mayor of Los Gatos. The little girls are Nadyne Rhineland and Cecelia Miller of Los Gatos.



View of wide, sweeping curves on newly completed unit of 4-lane Los Gatos-Santa Cruz Highway before traffic lines were painted.

cost \$300,000 per mile and the engineering problem consisted of squeezing a highway in between the slopes of a steep hill and a railroad right-of-way at the base of it making it necessary to carry two of the lanes on a side-hill viaduct. The contractors were Heafey-Moore Co. and Frederick-Watson Construction Company.

The Los Gatos and Santa Cruz Chambers of Commerce cooperated in the celebration arrangements and entertainment of officials and guests at a luncheon after the ceremony. Among those who participated in the dedication were: Vice Chairman Bert B. Snyder, president of the Santa Cruz Chamber of Commerce; Supervisor C. P. Cooley of Santa Clara County, Supervisor George Morgan of Santa Cruz County, Mayor C. D. Hinkle of Santa Cruz, Acting Mayor Marc Vertin of Los Gatos; Santa Clara County Surveyor Robert Chandler; M. C. Hall, Santa Cruz Chamber of Commerce manager; Andy Balieh and Lloyd Bauman, members of the Santa Cruz Chamber of Commerce highway committee, and others.

A treasured possession of the Los Gatos Chamber exhibited by Manager



W. W. Clark is a stock certificate dated San Jose May 20th, 1863, for 66 shares in the Santa Cruz Gap Turnpike Joint Stock Company incorporated in 1857 with a capital stock of \$21,000 to build a turnpike road over the mountains.

Mem: "Where is Jimmy this afternoon?"  
Pop: "If he knows as much about canoes as he thinks he does, he is out canoeing. But if he doesn't know any more about it than I think he does, he's swimming."

#### T. H. DENNIS, RESEARCH CHAIRMAN

T. H. Dennis, Maintenance Engineer of the California Division of Highways, has been appointed by the Highway Research Board of the National Research Council as chairman of a committee to prepare a paper on maintenance equipment.

Other members of the committee are: H. K. Bishop, of the Public Roads Administration; J. E. Lawrence, Massachusetts Department of Public Roads; Rex M. Whitton, Missouri State Highway Department; A. A. Anderson, Portland Cement Association; B. E. Gray, The Asphalt Institute.



General view of oval track for testing highway construction material and surface mixtures to destruction under heavy truck traffic.

## Road Construction Test Track Built

By T. E. STANTON, Materials and Research Engineer

**I**N AN effort to develop exact data from which to more intelligently and economically design low cost road construction with consequent material saving in cost either of original construction or subsequent maintenance, a test track has recently been built in the vicinity of Sacramento and is now being tested to destruction under heavy truck traffic.

This test track is of sufficient width to permit the operation of loaded trucks. It is oval in shape with the test installations on the tangents between the curved ends. In other words, the test track consists of two parallel straight test sections about 200 feet apart connected at the ends by semicircular arcs. Each straightaway is 200 feet long and is divided laterally and longitudinally into four test panels, each  $7\frac{1}{2}$  feet wide and 100 feet long; a total of eight test sections of different types of construction.

Construction consisted of excavating a trench section to a level grade

and cross-section which was then filled to a depth of 6 inches with clean porous sand and screenings. Over this sand cushion a 12-inch blanket of imported soil of low bearing value was placed. A soil was selected which developed a minimum saturated bearing value of 5 per cent or less. This adverse soil subgrade was carefully placed and compacted as uniformly as possible at a suitable moisture content.

In order to secure absolute uniformity both in gradation of aggregates and in the amount of binding material the various types of materials included in the test were accurately proportioned and mixed in a pug mill at a contractor's mixing plant.

It was considered important that the granulometric composition of comparable treated and untreated types be as nearly alike as possible. It was also desirable that no variations other than design variations occur throughout the depth or length of any particular panel.

After being prepared in a central mixing plant the mixtures were hauled to the track and placed on the compacted subgrade to a level cross-section, but to a variable thickness longitudinally. The purpose of this type of construction was to provide a thickness of base at one end of each test section which must inevitably fail and at the other end of sufficient thickness to stand up under heavy truck traffic when the subgrade soil is saturated.

The thickness of the base was increased uniformly longitudinally from a thickness of approximately three inches at one end to a depth of 18 inches at the farther end, which latter depth is believed to be more than sufficient to prevent failure of all types tested. Failure of each type of base should then progress from the thinner end back to a point representing the minimum thickness under which the type will withstand a given amount of traffic.



Above—Test track straightaway with 8 test sections of treated material. Below—Superelevated curve surfaced with bituminous mixtures.

Theoretically, the point of maximum thickness at which failures occur will serve as a direct comparison of

the relative merits of the various types. It should thus be possible to determine by direct observation

whether or not any benefit is derived from any particular stabilization treatment, and if such benefit is com-



Roughometer designed and built at the Division of Highways laboratory for measuring roughness of pavement surfaces.

mensurate with the cost involved.

As stated, the construction layout permits the testing of eight separate panels under comparable test conditions; the types proposed being as follows:

- (1) Crusher run base (untreated) with a minimum bearing value of 100%
- (2) Cemented gravel mixture (untreated) with a 50% bearing value
- (3) Same as (2) stabilized with emulsified asphalt
- (4) Same as (2) stabilized with Portland cement
- (5) Sand clay mixture (untreated) with a 15% bearing value
- (6) Same as (5) stabilized with emulsified asphalt
- (7) Same as (5) stabilized with Portland cement
- (8) Same as (5) stabilized with cutback asphalt (special)

A plant mixed surfacing two inches thick was placed over the base section, thus making a total thickness of base and surface ranging from five inches to twenty inches.

The subgrade, base, and bituminous wearing surface of each section were compacted to the extent usually obtained under favorable construction conditions. After all materials were in place and compacted, a number of

trips were made with a loaded truck to determine if the base and surfacing were inherently stable when dry and supported by a solid foundation.

At the appropriate time the sand bed was flooded with water to saturate the low bearing soil subgrade. After the moisture content of the subgrade reached a predetermined value, actual testing of the road was begun, using one or more loaded trucks to test the various sections to destruction.

Each failure is being repaired as it develops after noting the position and character of the failed area. The surface is constantly maintained in good condition during the test in order that no sound area may be prejudiced by failure of an adjacent weaker section.

The traffic part of the test was started during the first week in September, therefore, no information of value is as yet available. It will probably require a number of weeks of concentrated truck traffic to produce reliable results on which future designs can be based.

The construction and tests described above afford the opportunity for a number of collateral tests not directly related to the subject of foundation treatment but which it is hoped will furnish the answer to several other perplexing problems.

For instance, the traffic department

is interested in securing exact data on the relative efficiency of several simple types of automatic traffic recording devices. A controlled and definite volume and weight of traffic such as that on the test track affords the opportunity to secure this information.

In a similar way, tests are to be made of the load carrying capacity and resistance to abrasion of low cost bituminous surface mixtures using four grades of liquid asphaltic binders. The surfacings have been placed with and without bituminous seal or binder coats on the subgrade to determine the advantage, if any, of binder coats.

Pressure, deflection and temperature measuring devices have been installed and tests are being made of the distribution of pressure at different depths; deflections of the surface on dry and saturated foundations and the temperature at various depths below the surface.

Different formulation traffic lacquers will be tried out on the traffic guide lines to ascertain if any improvement or economy can be effected in our standard California type traffic lacquer.

Roughness measurements will be made with a new light weight portable type roughometer designed and built at the Laboratory. These measure-

(Continued on page 23)



# State Institutional Building Picture Facing Division of Architecture

By ANSON BOYD, State Architect

THE State's mental hospitals had 19,437 inmates, on June 30, 1935. Five years later this number has risen to 23,000. The State Fire Marshal has surveyed the State institutions and has raised serious doubts about the safety of a large number of overcrowded and antiquated State hospital structures. These two bald facts form the background for any consideration of a State institutional building program.

Recently and in line with a cooperative study of the State institutional requirements, Director Frank W. Clark, of the Department of Public Works, has suggested that its Division of Architecture discuss this institutional building program.

Before drawing any conclusions from a rising curve of State and institutional population or the adequacy and safety of the present buildings and equipment, it is appropriate to state our understanding of the basic aims of the Department of Institutions and the legal restrictions upon the type of buildings erected.

As to the first, the State has for many decades assumed, for reasons generally of public welfare, the segregation and permanent care of mentally afflicted people and has viewed the steadily increasing load as a necessary function to be accepted and provided for. Under the more recent scientific approach to this problem, early treatment and preventive measures have been instituted and under the present administration applied intensively.

## BUILDING PLANS AFFECTED

This latter policy vitally affects the contents of an institutional building both as to plan and equipment. Secondly, the existing laws define minimum safety requirements which apply to any structure in which persons are held under restraint against their will. This requirement sets a cost floor which eliminates very a cheap, nonfire resistant types of construction and in general terms defines the ma-

terials of which institutional buildings must be built. Thus we are compelled to begin with two contrasting and contradictory factors to be compromised in working out with the Department of Institutions a solution to their long term plan and immediate detail needs.

On the one hand is a constructive and scientific handling of otherwise potential long-term patients by means of treatment, readjustment, and care in order that they may be returned in as large numbers as possible to their normal places in their communities, thus counteracting to some extent the steady increase; and on the other hand, is the condition of overcrowding and hazardous housing of permanent patients which teeters perilously on the edge of disaster, which makes bare space for more beds imperative.

## BUILDINGS DETERIORATED

While the highly successful record made by the Department of Institutions during 1940 indicates that preventive measures and a carefully supervised parole system have been able to retard the total increase to an almost level population, it is unlikely that without drastic overhauling and replacement of what the State Fire Marshal justly defines as "hopelessly deteriorated" buildings it will succeed in withstanding the normal trend of growth.

The Division of Architecture is taking the following steps toward the present and immediate needs of the institutions as limited by the funds available or likely to be available for the purpose. In view of the main objectives which may be stated in very elementary terms as the *housing*, according to an accepted humanitarian standard, of those patients who are permanent or semipermanent wards of the State; and the *housing, treatment, and eventual discharge or parole* of as many patients as can be reasonably readjusted and returned to their communities, the Division of Architecture is conducting a series of

studies of the proportional "use" values of each item which goes into the finished building on the basis of classifying them into those features which are:

1. Desirable
2. Indispensable

In order that the money allotted may:

1. Produce an economical proportion of the above items.
2. Produce the highest percentage of features which lead directly to the main objectives.
3. Produce the most square feet of buildings with the least number of dollars possible and of the kind of building that will do the most good.

These latter three statements, it may be noted, are variations on the same theme and are uncomplicated and as mentioned before, elementary. They represent that which should be entirely obvious and a matter of routine. Their neglect, however, during close attention to what seem to be important detailed requirements, leads to the laying on of layer after layer of minor additional costs which in their sum total, may vitally restrict the accomplishment of these basic objectives.

## INCREASED ENROLLMENT INDICATED

They are repeated now as a prelude to a briefly summarized look at the prospect in view for State institutions and in the light of this prospect, a drastic re-evaluation of that which is "desirable" and that which is "indispensable" becomes much less of a platitude and far more of a necessity in spreading the money to do the job.

From the report of Dr. Rosanoff, Director of the Department of Institutions, we find an indicated increase in enrollment of approximately 3,000 during the ensuing 4-year period. This is equal to one average State

(Continued on page 25)

# Field Studies of Traffic Behavior

By K. A. MACLACHLAN, Highway Economist

**I**N ORDER to obtain more specific knowledge of the behavior of all types of motor vehicles under varying traffic conditions the Public Roads Administration has developed special equipment with which data may be gathered in the field. Information gathered by this equipment includes speeds, placement on the roadway, pertinent data regarding vehicles making passings under various conditions, and performance of trucks on grades.

Tests have been made utilizing this special equipment in several eastern States and for a six-weeks period in April and May, the Division of Highways cooperated with the Public Roads Administration in making similar studies on various sections of the California Highway System. The studies made in California were divided into three sections as follows: (1) Speed-placement studies; (2) Passing practice studies; and (3) Truck performance studies.

## SPEED-PLACEMENT STUDIES

Speed placement studies furnished data on the speed of vehicles, the spacing between vehicles, and their transverse placement on the roadway. A total of twenty-six different sites were occupied for a period of from one to three days each. These sites included locations on 2, 3, 4 lane and 4 lane divided highways of various types of alignment and gradient and traffic conditions ranging from approximately 1,600 to 18,000 vehicles per day. An estimated 135,000 vehicles were observed and data recorded for each.

The speed of vehicles is obtained for this study by the action of the wheels on rubber detector tubes spaced normally 24 feet apart. Passage of the vehicle over the first tube operates a switch which in turn starts the operation of an electro-mechanical rotary stepping switch of the type employed in automatic telephony. Passage of the vehicle over the second tube similarly stops operation of the rotary switch at one of 50 contact points.

The point at which the switch stops is recorded on a strip chart which moves through a graphic recorder. These data are readily converted to miles per hour during analysis work. The strip chart is ruled into seconds and proceeds through the recorder at a constant speed such that the time interval between each vehicle may be obtained and, knowing the speeds, subsequently the longitudinal spacing between vehicles may be computed in feet.

Transverse placement of vehicles is obtained by use of a special placement cable located between the detector tubes. This placement strip is so constructed that the transverse location of vehicles is recorded to the nearest foot on a graphic recorder of the same type used in recording of the speed data.

## PASSING PRACTICE STUDIES

The passing practice studies furnished data relative to the behavior of vehicles during passings under a wide range of traffic conditions. The equipment was designed to show all movements of vehicles within a one-half mile section indicating their transverse location by lanes, the direction of travel in that lane and the speed at any point in the test section. A total of ten sites all on 2 lane highways were selected, most of them located on roads of good alignment with a special interest in locations where passings would occur at relatively high speeds.

A total of approximately 50,000 vehicles were studied from which about 5,600 passings occurred. The analysis of these passings will show the speeds before, during and after passing of all vehicles involved, the length of road necessary to complete both single and multiple passings and other pertinent data.

## EACH AXLE RECORDED

The equipment necessary to record these data consisted of detector tubes laid on the highway, spaced 50 feet apart and constructed with a pneumatic switch at each end of the tube

and a plug in the center of the tube to separate the lanes. These tubes are electrically connected with recorders such that the passage of each axle over every tube is shown on a strip chart moving through a graphic recorder at a constant speed.

A total of six recorders at three separate stations are used and are synchronized so that the movement of any vehicle may be followed through the entire test section and the time of passing from one point to another may be later scaled to 0.01 seconds and then converted into speeds in miles per hour. As each vehicle passed a given point in the section its type, if other than passenger car, was recorded on the chart.

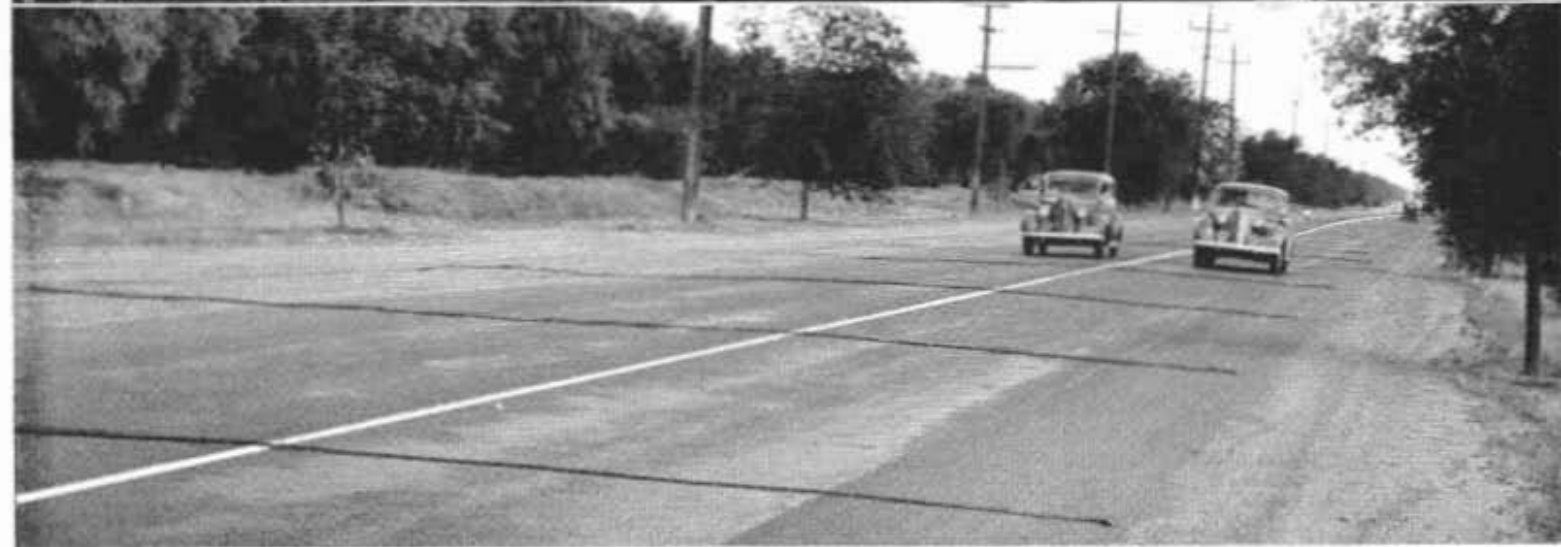
## TRUCK PERFORMANCE STUDIES

Tests were made on the performance of various sizes of trucks with various loads on different grades. One purpose of this study was to compare data obtained with information gathered by the Public Roads Administration when it tested new trucks under various conditions.

Both the speed-placement and the passing study equipment were utilized for this study. All trucks passing the test section were weighed either at a pit-scale or by a loadometer party. At the time of weighing, data were recorded relative to the type, make, weight, engine size, transmission, etc. On passing the test section license numbers were recorded so that speeds were obtained for each truck to correlate with data obtained at the weighing station.

The several sites used in the truck performance study involved various gradients and were located at various altitudes in order to furnish information under different operating conditions.

The analysis of the field data obtained from these traffic behavior studies is now being carried out by the Division of Highways. The specific knowledge of the behavior of vehicles on our highways is bound to be a valuable aid in strengthening the design of future highways.



At top—Speed placement cables in operation on highway. Cable is secured with clamp in foreground. Center—Interior of equipment truck showing two graphic recorders on right. Typical installation for passing practice study. Recorders are concealed in olive grove at left background.



View of Coast Highway tunnel, ramps and overhead grade separation structure at Colorado Avenue intersection in Santa Monica.

# Santa Monica Grade Separation

By R. C. MYERS, Assistant District Office Engineer

COMPLETION of the Colorado Avenue grade separation in the City of Santa Monica on July 13th has removed the hazard at what has been one of the most congested and dangerous spots for traffic along the Southern California Coast.

Northbound traffic on State Highway Route 60 passes under Ocean Avenue and Colorado Avenue in a tunnel on curved alignment. Traffic on Ocean Avenue and Colorado Avenue to reach the Palisades Beach Road (Route 60) formerly had to travel down the steep grade on Colorado Avenue from Ocean Avenue toward the beach and then make a right angle turn northerly approaching Route 60 that made a blind connection with northbound traffic on that route and approached the southbound traffic on a long curve where

the point of crossing on a very acute angle was always uncertain. Numerous collisions and near accidents were reported.

#### COMPLEX TRAFFIC PROBLEM

The problem was difficult of solution because Ocean Avenue and the Palisades Beach Road are parallel and only 200 feet apart, while the difference in elevation between them is about 35 feet. The abutting property is very valuable and highly improved with beach clubs, apartment houses, concessions, etc.

State Route 60 is one of the heaviest traveled highways in the State and the curved tunnel carrying said traffic under the City Park Lands and the two streets mentioned above, creates a situation which is quite complex.

To further increase the congestion,

large crowds wishing to use the Santa Monica Municipal pier were obliged to follow Colorado Street through the midst of this already overcrowded area. Sunday crowds using the recreational concessions on the pier, vary from 25,000 to 30,000 persons during the summer months.

On the other, or southerly side of Colorado Avenue, Appian Way extends into the beach area immediately southerly of the pier. Thus the three streets, Colorado Boulevard, Palisades Beach Road and Appian Way, joined at a common intersection with the intersection of Palisades Beach Road and Roosevelt Highway a few feet distant.

#### THREE-WAY INTERSECTION

To further aggravate this extremely annoying and dangerous traffic condition, Colorado Boulevard and



At top—Overhead structure across 4-lane Coast Highway at Santa Monica. Below—Tunnel and ramps at intersection with Appian Way.

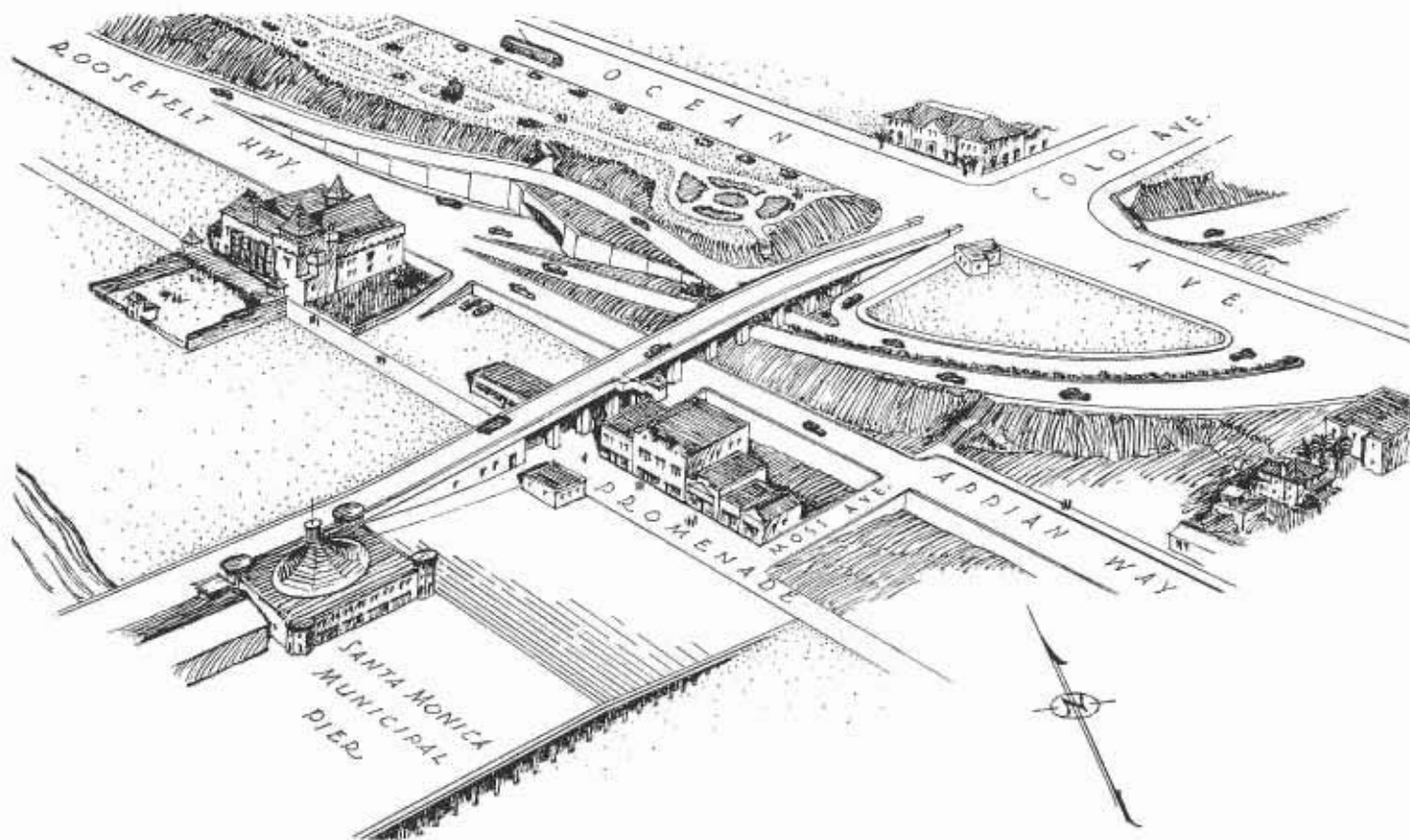
Ocean Avenue, with their heavy volumes of traffic, intersect at less than 200 feet from this three-way intersection.

For a number of years, this nar-

rowly confined area was subjected to an ever increasing traffic burden which finally became so acute and dangerous that the City of Santa Monica requested the State Division

of Highways, in cooperation with the City, the County of Los Angeles, and the P.W.A., to undertake its solution.

From this seemingly hopeless traf-



Sketch of grade separation at Santa Monica involving a tunnel, overhead structure crossing three highways and a wide promenade.

fic snarl emerged the idea of the so-called Colorado Avenue Grade Separation project which has been carried to a successful completion during the last year and one-half. Its opening has been in time to give relief to this crowded traffic condition for the greater part of the present summer season.

Traffic can now flow freely in practically any direction desired without interference from opposing or conflicting traffic. Turning movements are confined almost entirely to one-way right-hand turns with the consequent freedom from the annoyance and danger of traffic friction.

To accomplish these results a reinforced concrete viaduct having an overall length of 650 feet has been built along Colorado Avenue from Ocean Avenue to the pier. This structure carries two traffic lanes and two 4-foot sidewalks. The grade is elevated sufficiently at the crossings of Route 163 and the Appian Way connection to permit these two roads to pass underneath.

A one-way two-lane ramp carries southbound traffic on Roosevelt Highway wishing to continue southerly on Ocean Avenue, from a point

near the present tunnel entrance, under the Colorado Avenue structure up to a connection with Ocean Avenue whence it follows southerly along Ocean Avenue and other connecting streets to the Ocean Park area.

From this same location near the tunnel entrance, a two-lane road continues southerly along the ocean front, passing under the Colorado Street structure and connects with Appian Way and the beach area immediately southerly of the pier.

Northbound traffic on Ocean Avenue (Route 163), wishing to continue northerly along the Roosevelt Highway (Route 60) uses a two-lane ramp passing under the Colorado Avenue bridge and over an extension of the previously existing tunnel to connect with the Roosevelt Highway about 850 feet northerly of Colorado Avenue. Other short road connections have been made between this ramp and Ocean Avenue along each side of the bridge structure.

The project as a whole has included the widening and improving of Ocean Avenue (State Highway Route 163) from Colorado Boule-

vard to Pico Street and the further extension of this Route southerly to Bicknell Avenue. The City of Santa Monica engineering force worked with the Division of Highways in the preparation of plans for Route 163 from Colorado Boulevard to Bicknell Avenue.

The State prepared the plans for the Colorado Avenue separation structure and appurtenant roads and connections. The entire work has been accomplished under seven P.W.A. contracts, all of which were awarded by the City of Santa Monica. Inspection has been handled by State forces. The State and County aided the City in the acquisition of rights of way.

The cost of the project including surveys and plans, acquisition of right of way and construction, has been about \$554,000, contributed approximately as follows:

Federal Public Works Administration Funds.....	\$169,000
State Highway Funds, 1½¢ gas tax funds .....	98,000
¼¢ State Highway gas tax, City of Santa Monica.....	139,000
County of Los Angeles funds.....	148,000
<b>Total .....</b>	<b>\$554,000</b>

# California Traffic Operating Its Own Stop and Go Signals

By F. M. CARTER, Assistant Safety Engineer

THE State Division of Highways, in cooperation with several California cities, recently has installed stop and go signals which actually are timed by the traffic itself. This type of signalization is commonly known in the United States as Traffic Actuated Traffic Control; in Canada it has been called the "robot" system.

The system is based on the principle of operating traffic signals by the passing vehicles and consists of three major parts—the traffic signals, the traffic detectors and the control mechanism. Types used in California are semi-traffic and full-traffic actuated.

In semi-traffic actuation the detectors are placed in the minor highway approaches—in full-traffic actuation the detectors are placed in all approaches to record approaching traffic. The control mechanism receives the information from the detectors and assigns the right of way, by means of standard traffic signals, to the different streets in accordance with the traffic flow as indicated by the detectors.

## THE TRAFFIC DETECTOR

The signals are mounted on standard posts—and are of the national standard three-color type with red, amber, and green lenses. The amber light is shown as a clearance interval only to the street losing the right of way and not to the street receiving the right of way. This method has the advantage of preventing the dangerous practice of starting on the amber light before the green. At all intersections the signals are located on the far right-hand corner of each approach in conformity with accepted national practice.

The traffic detector is a contact-making device connected to a relay in the control mechanism and actuated by the pressure of a wheel passing over it at any point. One or more detectors are installed in each ap-

proach to the intersection in the normal traffic lane. Detectors are placed in the pavement with their surfaces flush with the surface. They are located in the approach a distance of from seventy-five to one hundred and fifty feet from the intersection depending upon the required braking and stopping distance for the normal speed of approaching traffic.

In addition to the vehicle detectors, trolley detectors are used where electric trains use the intersection. Push buttons also may be installed for pedestrians.

## THE CONTROL MECHANISM

The control mechanism is the most important part of the robot system. Its function is to receive the impulses from the detectors and then assign the right of way, by means of the signals, in accordance with the traffic demand from instant to instant, as indicated by the detectors.

This controller or dispatcher accurately registers, remembers and responds to actual traffic demands. The robot system divides the traffic cycle into an initial "go" interval, a vehicle "go" interval, an amber or cautionary interval and a red or "stop" period.

The maximum time which traffic after passing over a detector will be required to wait for the green signal is predetermined and set on the dispatcher. All intervals are separately adjustable for each thoroughfare and are easily changed by the means of knobs on the face of the dispatcher.

## OPERATION OF SIGNAL

A car approaching the "red" light places an impulse in the dispatcher by crossing the detector. This impulse immediately takes the green light away from the opposing highway traffic and lights the "amber" light. The "amber" light is predetermined for three seconds. With the detector placed approximately one hundred and twenty feet from

the entrance to the intersection, a car traveling twenty-five miles per hour would require approximately three seconds to reach the intersection when the green light should show so as to permit the approaching car to continue without changing gears.

If the intersection is being used by traffic on the opposing highway, the waiting cars are given the right of way at the first break in the opposing traffic. If no break appears naturally in the opposing traffic, this traffic is automatically stopped at the end of the predetermined maximum period and the waiting cars given the right of way.

When continuous traffic on either highway is stopped by the operation of the maximum period to allow waiting traffic on the other highway to use the intersection, the right of way reverts at the first opportunity (or at the end of the maximum period) to the highway on which the continuous traffic was interrupted.

## DISPATCHER REMEMBERS

Each car approaching the intersection against the "red" signal at a time when the other highway is using the right of way is automatically recorded and remembered by the dispatcher so that the right of way will later be transferred to it without the necessity of recrossing the detector.

The time of the "green" signal period on each highway is governed by the flow of traffic on that highway, each vehicle approaching the intersection and crossing the detector extends the "green" interval sufficient time for that vehicle giving the impulse to reach the center of the intersection. This "green" interval is extended as long as vehicles cross the detector up to the maximum period for that highway. The control, therefore, allows only such time as is actually needed on each highway in accordance with the immediate traffic demands. The timing of the traffic periods is thus automatically ad-



justed by the traffic itself and from instant to instant. The wide variation of the green period as determined by the actual traffic from cycle to cycle is of considerably greater importance than the variation in the total cycle, due to the wide fluctuation in the distribution of the "green" signal between the two movements.

#### OPERATED 24 HOURS

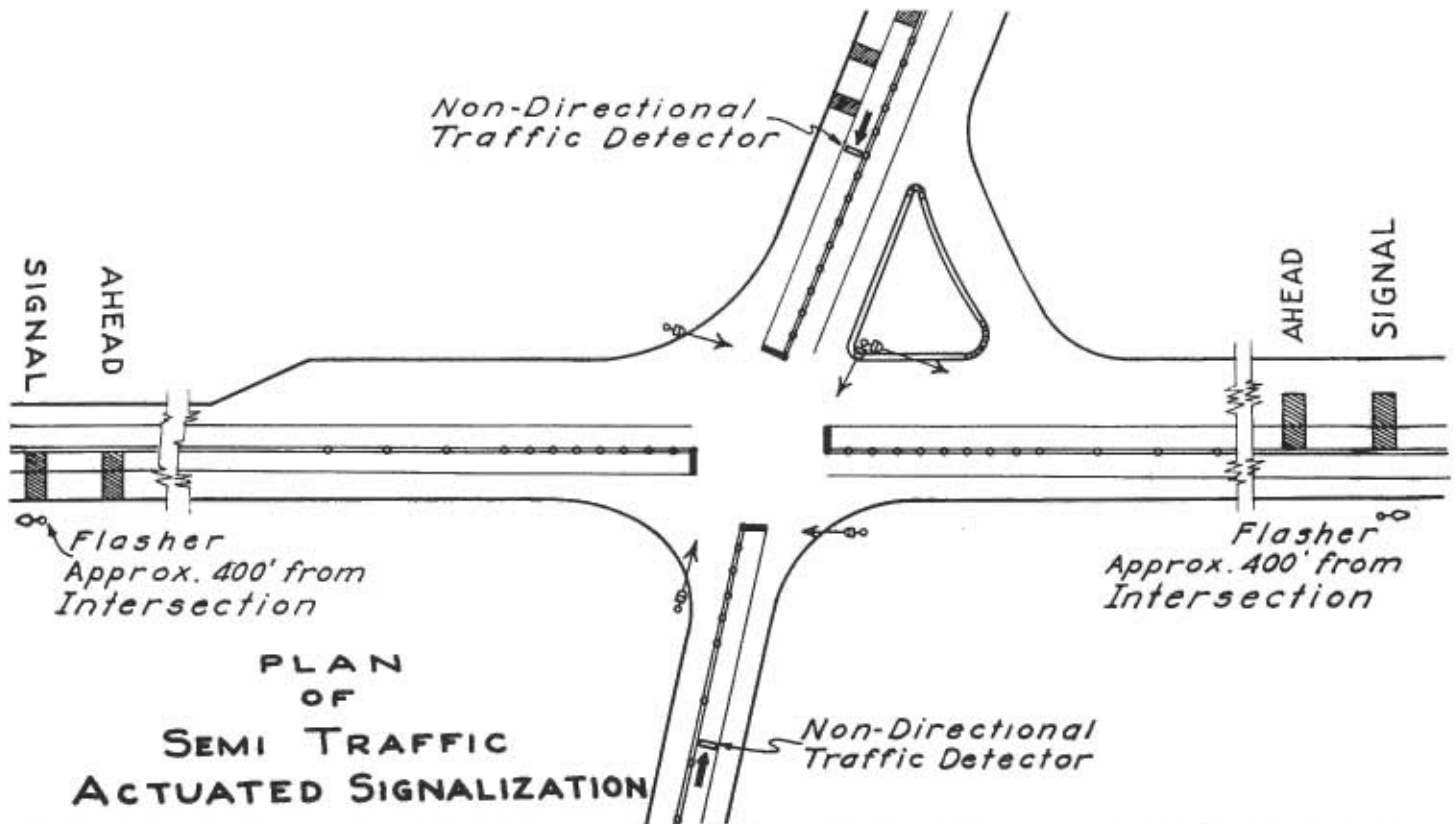
This vehicle-actuated system is operated continuously since the objection to all night operation is removed by the elimination of unnecessary stops and delays. The safety element of continuous operation is thus retained.

While it is only recently that this traffic-actuated type of control has been installed in California, there are at this time eleven installations in the State and five being installed or out for bids. Two are full actuated systems, the remainder are semi-traffic actuated.



At top—Traffic actuated signal on East Shore Highway (U. S. 40) at Berkeley. Car in foreground has crossed pavement detector and is entering intersection. At bottom, arrow points to signal control treadle or traffic detector which is operated by wheel of car passing over it.





Sketch showing installation plan of semitraffic actuated signalization and location of flashers and non-directional traffic detectors.

The first installation of this type of control in California was installed by the city of Berkeley at the intersection of the Eastshore Highway (U. S. 40) and University Avenue. At this intersection there is a heavy left-turn traffic from University Avenue in the morning. These signals operate on a 30-second cycle—with an initial period of six seconds, a vehicle interval of four seconds, three seconds of amber for clearance intervals and a minimum of fourteen seconds of green for the Eastshore (major) highway. These signals have been operating continuously since they were placed in use and none but favorable comments have been heard.

Just recently the city of Palo Alto installed a full traffic actuated system at the intersection of El Camino Real (U. S. 101) and Embarcadero—adjacent to the campus of Stanford University. The initial interval of six seconds and the vehicle interval of four seconds is the same on both highways. The difference in the approach speeds is taken care of by the distance of the detectors from the intersection.

The detectors on the El Camino Real are one hundred and thirty feet from the intersection and those on Embarcadero are ninety feet. Ad-

vance yellow flashers with "Signal Ahead" signs are positioned about four hundred feet in advance of the intersection. These flashers operate only during the yellow and red intervals.

A semitraffic-actuated system has recently been installed at the intersection of Garvey Avenue (U. S. 60-70-99) and Rosemead Avenue (State 19), and a full-actuated system is being installed at the intersection of Garvey Avenue and San Gabriel Avenue, both in Los Angeles County.

Motorists and traffic officers are high in praise for these traffic control devices. They soon find that if the approach to an intersection under traffic-actuated control is made at a reasonable speed, and in the absence of opposing traffic, a motorist will be able to proceed on through without reducing gears.

From the point of view of the vehicle driver the traffic-actuated system of traffic control has a definite appeal—he feels as if he were a part of the system. It is his movement that times the signals. He does not have to wait unless other traffic is moving. The majority of our motorists are courteous—they do not become irritated by delay when there is an apparent reason for it.

## Road Construction Test Track Built

(Continued from page 14)

ments will be made periodically to determine relative increase in roughness under traffic of the different types of construction.

### ACKNOWLEDGMENT

The investigations and tests described in this article are being conducted as a research project of the California Division of Highways on the approval of Director of Public Works Frank W. Clark at the initiation of State Highway Engineer Chas. H. Purcell. The Surveys and Plans, Construction, Maintenance and Materials and Research Departments collaborated in the development of the specifications for the construction and conduct of the test.

His car took him from his home to the office.

The lift took him from the vestibule to his own particular room.

His secretary took it down when he wished to write a letter.

And he could always reach the telephone without rising from his chair.

So naturally the great morning paper welcomed his views on the exhausting rush of modern business life.

# Two Grade Separations to Solve Palo Alto Traffic Problem

By E. L. WALSH, Associate Bridge Engineer

**T**WO GRADE separations are now under construction in Palo Alto. Both structures, only 550 feet apart, are on University Avenue, which serves as a main connection between Stanford University and the business section of the town. One separates University Avenue from the main line of the Southern Pacific Railroad; the other, on El Camino Real, separates the State highway from the heavy cross-traffic on University Avenue.

These two structures with their appurtenant connections and service roads are combined to make a complete project and will provide free and uninterrupted travel at this point by channelizing the through State Highway (U. S. 101) and local traffic. The layout, with its dividing curbs, islands, service roads, and warning lights, will preserve continuity of traffic and thus avoid the delays

and traffic friction coincident with the existing situation.

Work was started on the Southern Pacific separation November 21, 1939, by Contractor P. J. Tyler. The contract is now 60 per cent complete.

On June 11, 1940, a second contract for grading and paving with asphalt and Portland cement concrete on El Camino Real was awarded to the Union Paving Company of San Francisco.

A third contract was awarded to Earl W. Hepple on July 15, 1940, for constructing a reinforced concrete rigid frame structure which will carry University Avenue traffic over El Camino Real.

## RAILROAD SEPARATION STRUCTURE

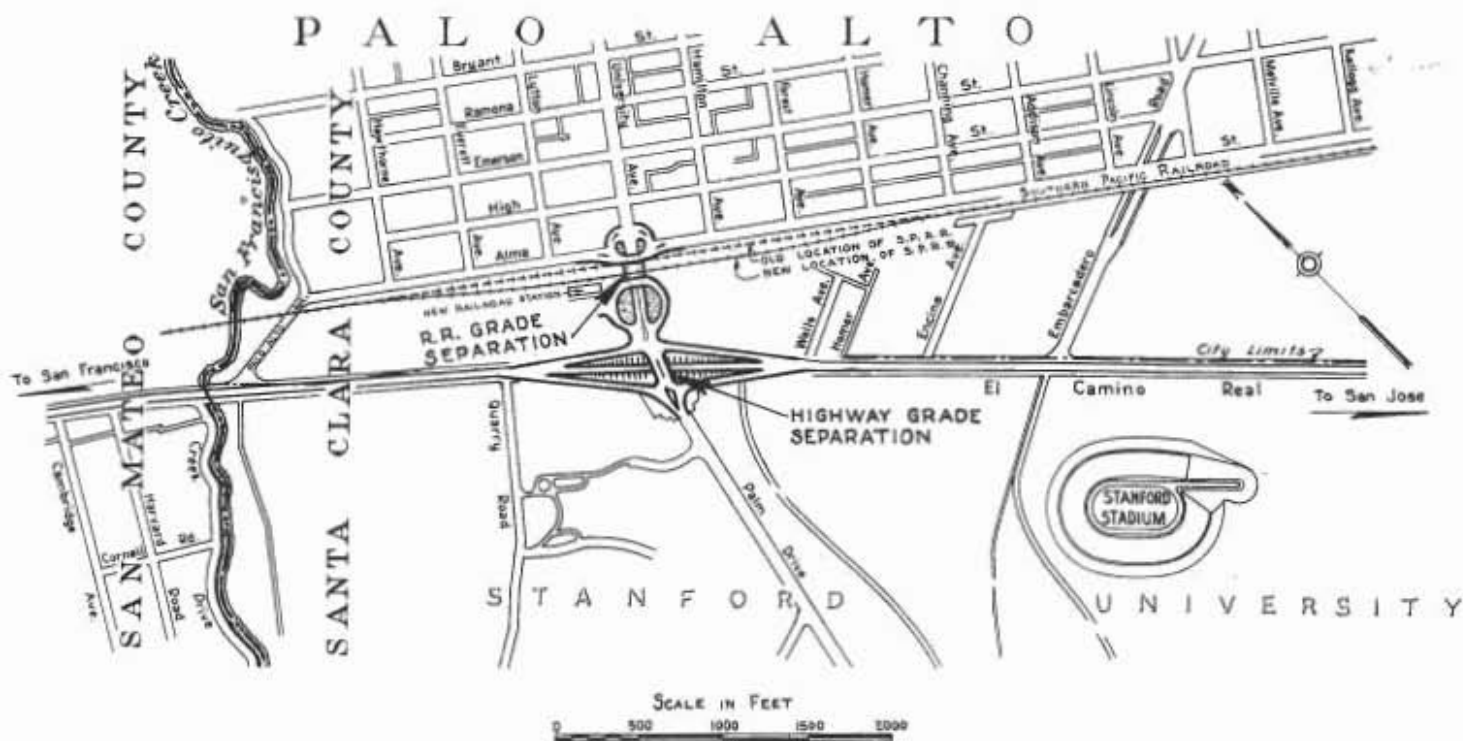
The main difficulty in constructing a subway under the tracks of the railroad was due to the proximity of the tracks to the large buildings of the

business section of town. There was insufficient distance to depress the roadway under the tracks and return to natural ground level on a suitable grade before reaching the business frontage.

Therefore, it was necessary to elevate the railroad tracks five feet, in conjunction with moving them laterally approximately 80 feet. Such an extensive change required the rearrangement and channelization of the existing connecting streets, relocation of the railroad company's freight and passenger facilities, and the relocation of numerous underground and overhead public utilities.

To maintain uninterrupted train service it has been necessary to construct the structure in two steps. The first operation confined all activities to the south side of the tracks. The

(Continued on page 27)



# State Institutional Building Picture

(Continued from page 15)

hospital institution complete. Existing conditions of overcrowding in the State institutions as quoted from the State Fire Marshal's survey, the findings of which are, in general, not overstressed, amount to an additional 6,000 patients.

In the absence of a very large appropriation or bond issue to take care of this overwhelming load, the work of the Division of Architecture will consist of the undramatic duty of studying each individual item which goes into a building and each operation which goes into its fabrication with the idea of accomplishing all of that which is "indispensable" and as much of that which is "desirable" as is possible.

## FUNCTIONAL DESIGN

This promptly brings us into the field of what is termed "functional design." "Functional design" reduced to simple language means the use of the things that do the work to also provide the external and internal visible appearance.

"Functional design" may or may not look odd to the layman according to the skill of the designer. It is the intention of the Division of Architecture to design buildings which represent a sound long term investment for all of the people of the State while making use of all the possible advantages of recent improvements in materials and equipment as well as to maintain respect for the traditions and tastes of the communities in which these buildings are erected.

## In Memoriam

Robert Leroy Jones, 53, Deputy State Engineer in Charge of Flood Control and Reclamation, Department of Public Works, State of California, passed away at his home early on September 12th as a result of heart failure.

Mr. Jones was born in Laramie, Wyoming, June 15, 1887, and attended the Denver, Colorado, high schools, University of Denver, and University of California at Berkeley.

He started work under his father, R. M. Jones, a well-known Consulting Engineer of Denver, Colorado, doing general electrical and hydraulic engineering work in Wyoming, Colorado, and Mexico until 1910. At that time he came to this locality as the Principal Assistant Engineer of Reclamation District No. 1500 in Sutter County. In 1917 he was called from this position to become Chief Engineer of the Sutter Basin Company at Robbins, California. In 1921 he left this position to join the engineering staff of the State of California.

His early work with the State was in the positions of Associate Hydraulic Engineer, Division of Engineering and Irrigation, Department of Public Works; Chief Assistant Engineer, State Reclamation Board. In 1929 he was promoted to the position of Deputy State Engineer in Charge of Flood Control and Reclamation for the Department of Public Works. This is the position he occupied at the time of his death. In this position he was in charge of all flood control maintenance for the State Engineer's office. This included not only the Sacramento Flood Control project, but work for and with other departments and divisions of the State in many rivers of the State and at times in the Pacific Ocean.

Following the floods of the winter of 1937-38 he was in charge of the extensive work of flood repair and rehabilitation in the northern half of the State involving the expenditure of several million dollars.

Mr. Jones was recognized as an authority on flood control and reclamation work in the Sacramento Valley. His engineering work here was outstanding and he was prominent in the development of the modern engineering trend of flood control practice. His passing is a distinct loss to all residents of the Central Valleys and his counsel and advice will be particularly missed by the reclamation districts in this area.

Probably no one man was as well acquainted with the complex flood problem of the Sacramento River Flood Control Project and as well equipped to handle them as Mr. Jones.

He has been active in the affairs of the American Society of Civil Engineers since 1917. For the ten years prior to 1932 he was a director of the Sacramento Municipal Utility District. He was affiliated with the Tehama Lodge No. 3, Free and Accepted Masons, and was intensely interested and active in Boy Scout work in the Golden Empire Council area.

He is survived by his wife, Mrs. Nellie N. Jones, and six children, Robert J., Barton L., Patricia, Dorothy Ann, Emily Rose and William Stephen, and four brothers, Barton Jones, a well-known and prominent Consulting Engineer with the Tennessee Valley Authority; Kirby V. Jones, Engineering Executive of the Firestone Rubber Company in Akron, Ohio; Allen Jones of Quincy, Mass.; and Paul Jones of Schenectady, N. Y.

Funeral services were held at the James R. Garlick chapel at 10.30 a.m., Saturday, September 14.



ROBERT LEROY JONES

## World Record for Toll Spans Set by Bay Bridge August Traffic

FOR THE month of August another all-time record for traffic was established on the San Francisco-Oakland Bay Bridge. A total of 1,668,627 automobiles, trucks, buses, etc., crossed the span during this busiest of all months. It is believed that this figure is an all-time record for toll structures throughout the world.

The total collections for the month were \$456,779, which was \$25,440 less than the same month a year ago.

On Sunday, August 25, traffic totaled 68,752, which has only been ex-

ceeded on one occasion and that was the Sunday following the opening of the bridge in 1936. The lowest day was Tuesday, August 6, when 47,674 vehicles crossed.

The total amount of traffic, exclu-

sive of that to the Exposition, was remarkable and amounted to 1,404,286 vehicles.

August traffic on the San Francisco-Oakland Bay Bridge and comparative figures are:

	August 1940	August 1939	July 1939	Total Since Opening
Passenger autos and auto trailers.....	1,543,477	1,038,555	1,413,564	36,275,360
Motoreycles and triars.....	4,811	4,316	4,588	160,554
Buses.....	27,423	17,466	26,547	610,125
Trucks and truck trailers.....	71,550	50,529	68,421	1,756,693
Others.....	21,366	16,662	20,809	612,107
<b>Total vehicles.....</b>	<b>1,668,627</b>	<b>1,127,528</b>	<b>1,533,929</b>	<b>39,414,839</b>

# Building Six Bridges and Subway on Dixon-Davis Realignment

By R. E. PIERCE, District Engineer

**I**N THE March, 1940, issue of CALIFORNIA HIGHWAYS AND PUBLIC WORKS appeared an article regarding the starting of construction on the alignment of U. S. 40 between Dixon and Davis. Since that article appeared, the grading and minor drainage structures included in the original contract have been practically completed. Work is well under way on the contract for the new subway under the Southern Pacific about 0.7 mile south of Davis as well as another contract, including six bridges, which is just getting under way.

The first 5 miles of this project is graded for two lanes located off the center of the right of way so as to conform to an ultimate four-lane divided highway. The balance of 2.3 miles is graded for a four-lane divided highway.

## SUBWAY 62½ FEET WIDE

About 1.5 miles from the Dixon end of this project a short section of divided highway has been graded in order to provide better facilities to care for traffic at the intersection here with the present road leading to Woodland and up the west side of the Sacramento Valley.

The subway now under contract consists of a steel and concrete structure which will provide two twenty-seven foot roadways with a six-inch dividing strip and two four-foot sidewalks.

The bridge contract, just getting started, includes six reinforced concrete bridges. This is three more than was originally planned, due to conditions observed during the unusually high water in Putah Creek during February of this year. They are to be constructed in the area to the south of South Fork, which was flooded in the overflow from Putah Creek. These three bridges are each 52½ feet long.

The bridge over South Fork is 478 feet in length and the two bridges over Putah Creek, built to accommo-

## Washington Orders It

### EXECUTIVE OFFICE OF THE PRESIDENT

Bureau of the Budget  
Washington, D. C.

California Highways and  
Public Works

P. O. Box 1499  
Sacramento, California

Gentlemen:

It will be greatly appreciated if you can make available without cost, for the official use of the Bureau of the Budget, the publication listed below. If there is a charge for this publication, please endorse the amount in the space below and return this letter so that an official order may be placed. An addressed frank is enclosed for your use.

Please address communications to:

Library, Bureau of the Budget, Room 452, State Department Bldg., Washington, D. C.

Your courtesy will be sincerely appreciated.

Very truly yours,

(Mrs.) Marcella S. Heartshorn  
For the Library

Mattis, George. Channelizing traffic in Oakland. Calif. Highways and Pub. Works, P. O. Box 1499, Sacramento, Feb. 1940, P. 12-13, 18, 27.

date the divided highway, are each 210 feet long.

Each bridge will provide a clear roadway width of 27 feet and two one-foot nine-inch sidewalks.

This project makes an important improvement on this route which is

the principal cross-state highway in Northern California, joining as it does the metropolitan area surrounding San Francisco Bay and passing through Sacramento and on across the State line to the east.

The distance will be shortened 3.25 miles and the curvature will be reduced from 612 degrees to 144 degrees. Five of the curves on the old road are right angle turns of short radii. The new location also in bypassing Davis eliminates passing through traffic on narrow city streets at reduced speed. The new road is provided with adequate rights of way for the ultimate divided two-way roadways.

## State Buys Carquinez and Antioch Spans

(Continued from page 6)

of Public Works emphasized the fact that State acquisition of the structures will not cost the taxpayers of California a cent.

"Under the reduced tolls on the bridges made effective by the State, the motoring public will be saved approximately \$4,000,000 during the next seven and one-half years, within which time it is expected the revenue bonds will have been retired and the bridges made toll free."

The Carquinez Bridge consists of a center tower span of 150 feet and two side towers with cantilevers and suspended spans of 1100 feet each. The north anchor span of 500 feet reaches a pier located on the bluff; the south anchor span of 500 feet connects with an approach viaduct giving an overall length of 4482 feet.

The Antioch Bridge consists of one 320-foot steel lift span and one 320-foot fixed span, 2078 lineal feet of deck truss spans on towers, and 1921 lineal feet of reinforced concrete trestle, making an overall length of 4639 feet.

# Grade Separations to Solve Palo Alto Traffic Problem

(Continued from page 24)

concrete abutments and center pier at the new track location were completed and structural steel to support the tracks was placed in final position. Railroad traffic was transferred over the new structure in its ultimate location on August 28.

## TEMPORARY RAILROAD STATION

Work is now in progress tearing up the old tracks and excavating for the north portion of the structure. The abutments and center pier will be extended and the superstructure placed to provide a through connection for Alma Street traffic.

During the time the contractor has been engaged with construction of the subway proper, he has also constructed a temporary passenger station to serve railroad patrons since the new location of the tracks necessitated the demolition of the old station. At the same time, the Southern Pacific Company has removed the old passenger station and started work on a new one.

While work is in progress north of the tracks vehicular traffic will be inconvenienced in traveling between Alma Street and University Avenue. It will be necessary to limit traffic to one-way only because of the extent of work at this intersection.

## EL CAMINO REAL SEPARATION

Traffic which prior to construction used University Avenue between El Camino Real and the town of Palo Alto now is detoured from the north, via Palo Alto Avenue and Alma Street. Traffic from the south reaches town via Embarcadero Road. A subway under the tracks at Embarcadero Road was constructed from Federal funds under State supervision in 1936.

At the intersection of El Camino Real and University Avenue the State Highway (El Camino Real) will be depressed to go under the reinforced concrete rigid frame structure which will carry University Avenue traffic.

The depressed portion of the underpass is 2,600 feet long and comprises 49,000 cubic yards of roadway excavation. In the depressed portion along El Camino Real there will be two roadways of 35-foot width, separated by a six-foot dividing strip.

## Outstanding Safety Need says Barrett

Larry Barrett, Chairman of the California Highway Commission, has issued the following statement:

"The proposed conversion of the Bayshore Highway from San Francisco to Palo Alto into a freeway is one of the most important, if not the greatest, highway project undertaken to date by the State.

"Governor Olson, Director of Public Works Frank W. Clark, and the Highway Commission feel that it is absolutely necessary, in view of the high accident rate on the Bayshore Highway and the ever increasing traffic congestion, that this project be started at the earliest possible moment.

"While the cost of the project in its entirety will be tremendous, the saving of life and property and the relief of dangerous traffic conditions will fully justify any expenditure required to make the Bayshore Highway a modern safe route. As a resident of San Mateo County, and with my business interests in San Francisco, I have had occasion over a period of years to travel the Bayshore Highway at least twice a day and I know the hazards to motorists that exist there today.

"I think the launching of this project will be hailed as one of the outstanding achievements of the present State administration."

A four-foot walkway on each side is provided. At natural ground level flanking El Camino Real, connecting roads are to be constructed which will provide interconnecting links between University Avenue and El Camino Real.

The structure over El Camino Real will provide two 35-foot roadways separated by a four-foot dividing

curb. Eight-foot sidewalks are provided on each side for pedestrians. The total length of the structure will be one hundred forty-six feet, consisting of two central spans of forty-six feet, six inches, and two end spans each twenty-six feet, six inches long.

The project is to be extensively landscaped with trees and shrubbery. In designing the landscaping for such a project with its channelized driveways, considerable study is given not only to harmonious and attractive appearance but also to the type and location of the plants in relation to driving safety, so that no "blind spots" will result. Several existing trees which are matured are to be replanted at new locations.

The railroad separation is being financed from 1939 Works Program Grade Separation Funds. The city of Palo Alto acquired the necessary additional right of way.

## A COOPERATIVE PROJECT

The El Camino Real Separation is being financed from State highway funds and 1941 Fiscal Year Federal Aid. The city of Palo Alto is financing its share from quarter-cent funds allocated for use on city streets of major importance.

It is anticipated that the project will be completed and thrown open to traffic by January 1, 1941. The total cost of the completed project, exclusive of the betterments to the Southern Pacific Railroad facilities, the cost of which is being borne by the railroad company, will be approximately \$520,000.

George W. Thompson is the Resident Engineer for the State.

## EXCLUSIVE READING MATTER

California Highways  
and Public Works,  
Messrs.,

I have seen the magazine you put out and it is a very interesting one.

I would like you to send it to me because it covers things you don't get in other magazines.

Mark H. Lamb  
Visalia, Calif.

A high-school girl, seated next to a famous astronomer at a dinner party, asked him, "What do you do in life?"

He replied, "I study astronomy."  
"Dear me," said the girl. "I finished astronomy last year."

## Highway Bids and Awards for the Month of August, 1940

**CALAVERAS COUNTY**—A reinforced concrete slab bridge at Six Mile Creek, District X, Route 65, Section C. M. J. B. Construction Co., Stockton, \$4,600; O. J. Scherer Co., Angels Camp, \$4,755; A. A. Tieslau, Berkeley, \$5,276. Contract awarded to T. C. Tunsen, Modesto, \$3,402.

**FRESNO COUNTY**—Across Big Creek 0.6 mile south town Big Creek, remove existing timber bridge and construct new concrete slab timber bridge. District VI, Route 76, Section D. Thomas Construction Co., Burbank, \$12,174; McClain Company, Los Angeles, \$12,734; L. D. Tonn, Lodi, \$14,648. Contract awarded to J. E. Anderson, Visalia, \$9,751.

**FRESNO COUNTY**—Across Kings River sloughs 6.5 and 7.3 miles northwest of Reedley, two timber bridges with reinforced concrete decks to be constructed. District VI, Feeder Road. Trewitt, Shields & Fisher, Fresno, \$18,573; F. Kaus, Stockton, \$19,483; J. J. Munneemann, Santa Barbara, \$20,000; A. S. Vinnell Co., Alhambra, \$20,813. Contract awarded to F. Fredenburg, South San Francisco, \$18,428.

**HUMBOLDT COUNTY**—At Shively and Greenlaw Bluffs, about 0.3 mile, to be graded and surfaced with plant-mixed surfacing, and slope protection work to be constructed. District I, Route 1, Section D. E. R. E. Campbell, Los Angeles, \$73,168; Fred J. Maurer & Son, Eureka, \$92,884; Harold Smith, St. Helena, \$90,729; E. E. Smith & N. M. Ball Sons, Berkeley, \$102,690; Engineers, Ltd., Sacramento, \$118,979. Contract awarded to Joseph Shaw, Crescent City, \$69,411.

**MADERA COUNTY**—Across Chowchilla River, 2.5 miles north of Chowchilla, a reinforced concrete slab bridge. District VI, Route 4, Section C. F. Fredenburg, South San Francisco, \$13,857; Thomas Construction Co., Burbank, \$14,990; M. J. B. Construction Co., Stockton, \$15,982; Trewitt-Shields, Fisher, Fresno, \$16,065; Frank J. Reilly, San Francisco, \$18,017; Marshall Hanrahan, Redwood City, \$20,790. Contract awarded to McClain Co., Los Angeles, \$13,127.

**MARIN COUNTY**—Furnish and install truck scale about 2.5 miles north of San Rafael. District IV, Route 1, Section A. Toledo Scale Co., New Jersey, \$4,934; William D. Rapp, Santa Rosa, \$5,603; Leibert & Trobeck, San Rafael, \$6,600. Contract awarded to Mario Bottini, San Rafael, \$4,607.

**MONO COUNTY**—Between Grant Lake and junction with Route 23, near Rush Creek, 1.3 miles to be graded and penetration oil treatment applied. District IX, Route 111, Section A. R. E. Campbell, Los Angeles, \$14,890. Contract awarded to Basich Bros., Torrance, \$7,954.

**MONO COUNTY**—At Soda Creek, 28 miles northwest of Bridgeport, remove existing bridge and construct reinforced concrete bridge. District IX, Route 13, Section A. Campbell Construction Co., Sacramento, \$12,733; Thomas Construction Co., Burbank, \$12,978; A. S. Vinnell Co., Alhambra, \$14,250. Contract awarded to A. A. Tieslau, Berkeley, \$9,712.00.

**MONTEREY COUNTY**—Between Gonzales and Salinas, about 16 miles, imported borrow to be placed on shoulders and road-mix surface treatment applied thereto. District V, Route 2, Sections C. B. Brown & Doko, Pismo Beach, \$20,160; Granite Construction Co., Watsonville, \$21,910; L. A. Brises, Arroyo Grande, \$22,586; J. E.

Haddock, Ltd., Pasadena, \$22,664; L. C. Karstedt, Watsonville, \$24,446; Lee J. Immel, Berkeley, \$26,068. Contract awarded to J. A. Casson Co., Hayward, \$17,928.

**ORANGE COUNTY**—Across Santiago Creek at the city of Orange, a reinforced concrete bridge to be constructed and about 0.34 mile of roadway to be graded and surfaced with plant-mixed surfacing. District VII, Route 43, Section A, Orange. Oberg Bros., Los Angeles, \$47,881; J. S. Metzger & Son, Los Angeles, \$48,522; J. E. Haddock, Ltd., Pasadena, \$48,899; Dimmitt & Taylor, Los Angeles, \$49,019; Byerts & Dunn, Los Angeles, \$51,648; Vido Kovacevich, South Gate, \$52,724; Carlo Bongiovanni, Hollywood, \$53,443; Chas. H. Johnston, Los Angeles, \$55,946; Griffith Co., Los Angeles, \$56,828. Contract awarded to Werner & Webb, Los Angeles, \$46,388.

**PLACER COUNTY**—Between Homewood and Tahoe City, about 1.5 miles of plant-mixed surfacing to be placed over the existing traveled way. District III, Route 38, Section A. A. Teichert & Son, Inc., Sacramento, \$8,900. Contract awarded to Independent Construction Co., Oakland, \$7,385.

**RIVERSIDE COUNTY**—Construct timber approach spans across Colorado River at Ehrenberg and extend bridges across Teed and Acari ditches District XI, Route 64, Sections C. D. F. A. S. Vinnell Co., Alhambra, \$18,620; W. H. Barber, San Diego, \$15,388; R. E. Hazard & Sons, San Diego, \$19,948; R. J. Daum, Inglewood, \$23,898. Contract awarded to Thorstan & Dahl, Los Angeles, \$12,824.

**RIVERSIDE COUNTY**—Between three miles west of Riverside and Riverside, about 3 miles to be graded and surfaced with plant-mixed surfacing on cement stabilized base. District VIII, Route 19, Section A. Oswald Bros., Los Angeles, \$109,946; J. E. Haddock, Ltd., Pasadena, \$115,843; Griffith Co., Los Angeles, \$124,876; Claude Fisher Co., Ltd., Los Angeles, \$137,348; Basich Bros., Torrance, \$143,463. Contract awarded to Matich Bros., Elsinore, \$106,485.

**SAN BERNARDINO COUNTY**—Concrete slab bridge at Cable Creek, 3 miles northwest of San Bernardino. District VIII, Route 31, Section A. Matich Bros., Elsinore, \$12,866; A. S. Vinnell Co., Alhambra, \$12,985; C. R. Butterfield-Kennedy Co., San Pedro, \$14,749; Carl Hallin, Los Angeles, \$15,674. Contract awarded to Oberg Bros., Los Angeles, \$12,423.

**SAN DIEGO COUNTY**—At Barnett Ave. and Rosecrans St., between Miramar Road and Torrey Pines Reservoir, about 2.6 miles to be graded and surfaced with asphalt concrete, portland cement concrete and plant-mixed surfacing. District XI, Route 2, Section S.D. B. G. Carroll & H. L. Foster, San Diego, \$52,656; Griffith Co., Los Angeles, \$54,289; V. R. Dennis Construction Co., San Diego, \$56,163. Contract awarded to R. E. Hazard & Sons, San Diego, \$49,466.

**SAN DIEGO COUNTY**—Between Oak Grove and 0.8 mile north, about 0.8 mile to be graded, roadmix surface treatment to be applied and a reinforced concrete bridge across Chihuahua Creek to be constructed. District XI, Route 78, Section E. C. G. Willis & Sons Inc. and Chas. G. Willis, Los Angeles, \$33,106; V. R. Dennis Construction Co., San Diego, \$38,252; J. E. Haddock, Ltd., Pasadena, \$38,721; Chas. H. Johnston, Los Angeles, \$39,387; R. E. Hazard & Sons, San Diego, \$39,783; A. S. Vinnell Co., Alhambra, \$40,162; Daley Corp., San Diego, \$41,406; Byerts & Dunn, Los Angeles, \$50,653.

Contract awarded to Roland T. Reynolds, Anaheim, \$29,918.

**SAN JOAQUIN COUNTY**—At Stockton State Hospital, 0.1 mile to be graded and surfaced with plant-mixed surfacing on crusher run base. District X, Stockton State Hospital. Lee J. Immel, Berkeley, \$7,320; Johnston Rock Co., Inc., Stockton, \$6,231; M. J. B. Construction Co., Stockton, \$6,303; S. M. McGaw, Stockton, \$6,197. Contract awarded to Louis Biasotti & Son, Stockton, \$5,688.

**SANTA BARBARA COUNTY**—Between Tecolote Creek and Las Varas Creek, about 3.4 miles to be graded and surfaced with plant-mixed surfacing. District V, Route 2, Section G. Maceo Construction Co., Clearwater, \$219,495; Gibbons & Reed Co., Burbank, \$221,384; Oswald Bros., Los Angeles, \$229,674; J. E. Haddock Ltd., Pasadena, \$235,612; R. E. Hazard & Sons, San Diego, \$238,853; Fredericksen and Westbrook, Sacramento, \$240,626; A. Teichert & Son, Inc., Sacramento, \$248,090. Contract awarded to Basich Brothers, Torrance, \$216,772.

**SISKIYOU COUNTY**—Between Weed and 1.4 miles north, about 1.4 miles in length, to be graded and surfaced with road-mix surfacing on crusher run base. District II, Route 72, Section A. Fredrickson Bros., Emeryville, \$65,506; Fredericksen and Westbrook, Sacramento, \$67,790; A. Teichert & Son, Inc., Sacramento, \$72,288; Poulos & McEwen, Sacramento, \$73,744. Contract awarded to Parish Bros., Hollywood, \$65,442.

**SONOMA COUNTY**—Between 2.3 miles north and 1.2 miles south of Petaluma about 3.6 miles to be graded and surfaced with asphalt concrete and a reinforced concrete bridge to be constructed. District IV, Route 1, Section C. Pet. Heafy-Moore Co. and Fredrickson & Watson Construction Co., Oakland, \$207,835; A. Teichert & Sons, Inc., Sacramento, \$209,468; Fredericksen and Westbrook, Sacramento, \$211,447; Chas. L. Harney, San Francisco, \$215,587. Contract awarded to Louis Biasotti & Son & L. D. Tonn, Stockton, \$205,836.

**TRINITY COUNTY**—Between Douglas City and Vitatum's, about 0.8 mile to be graded and surfaced with screened gravel base and surfacing material and embankment protection to be constructed. District II, Route 20, Section A. Claude C. Wood, Lodi, \$109,917; Harms Bros. & N. M. Ball Sons, Berkeley, \$127,853; C. W. Caletti & Co., San Rafael, \$139,554; Johnston Rock Co. Inc., Stockton, \$156,316. Contract awarded to Hemstreet & Bell, Marysville, \$106,307.

**YOLO COUNTY**—Between one mile east of Davis Subway and Swingle, about 3.5 miles to be graded, portland cement concrete pavement to be constructed and the existing pavement to be surfaced with plant-mixed surfacing. District III, Route 6, Section A. N. M. Ball Sons, Berkeley, \$177,971; A. Teichert & Son, Inc., Sacramento, \$181,877; M. J. B. Construction Co. and F. Kaus, Stockton, \$188,646; Heafy-Moore Co. & Fredericksen & Watson Construction Co., Oakland, \$206,606. Contract awarded to Fredericksen & Westbrook, Sacramento, \$172,955.

Clerk: "Sir, my wife is cleaning house and wants me to help her. Would you let me off this afternoon?"

Manager: "I certainly will not."

Clerk: "Thank you, sir. I knew I could count on you."—The Live Oak.

# State of California

CULBERT L. OLSON, Governor

## Department of Public Works

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

**FRANK W. CLARK, Director of Public Works**

**FRANZ R. SACHSE, Assistant Director**

**MORGAN KEATON, Deputy Director**

### CALIFORNIA HIGHWAY COMMISSION

LAWRENCE BARRETT, Chairman, San Francisco  
LENER W. NIELSEN, Fresno  
AMERIGO BOZZANI, Los Angeles  
BERT L. VAUGHN, Jacumba  
L. G. HITCHCOCK, Santa Rosa  
WALTER CHAMBERS, Secretary

### DIVISION OF HIGHWAYS

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

#### DISTRICT ENGINEERS

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

#### SAN FRANCISCO-OAKLAND BAY BRIDGE

RALPH A. TUDOR, Principal Bridge Engineer, Maintenance and Operation

### DIVISION OF WATER RESOURCES

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

### DIVISION OF ARCHITECTURE

ANSON BOYD, State Architect  
W. K. DANIELS, Assistant State Architect  
P. T. POAGE, Assistant State Architect

#### HEADQUARTERS

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

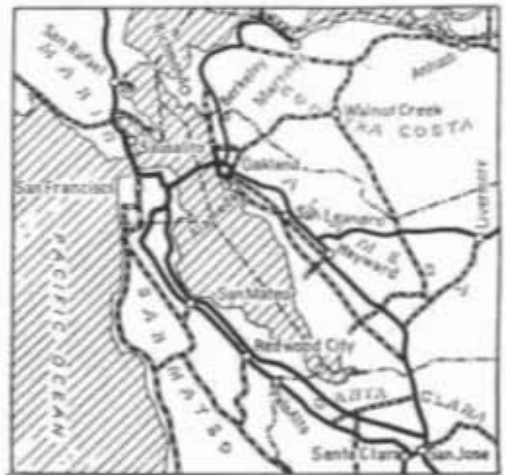
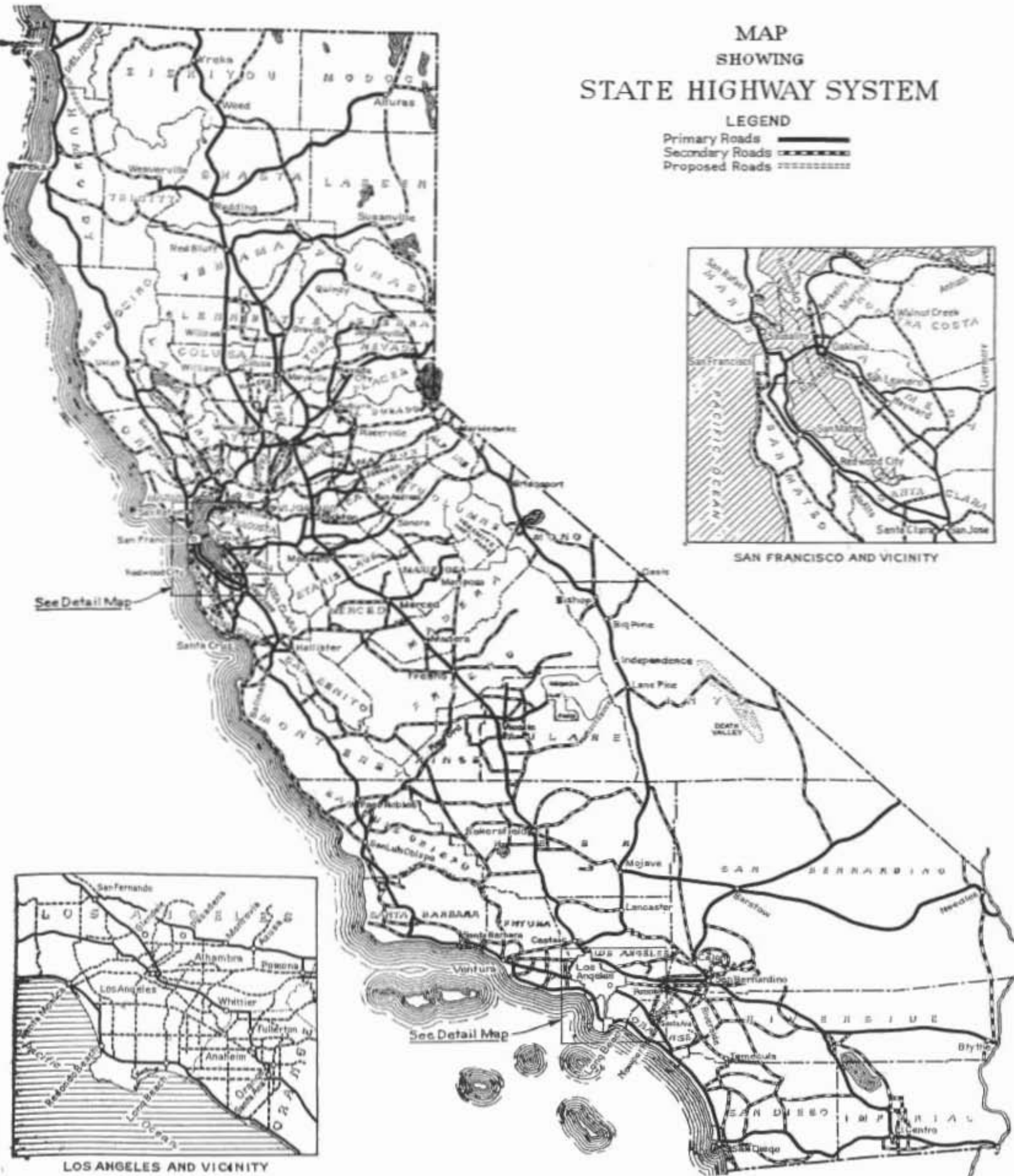
### DIVISION OF CONTRACTS AND RIGHTS OF WAY

C. C. CARLETON, Chief  
PHIL F. GARVEY, Assistant Chief  
FRANK B. DURKEE, Attorney  
C. R. MONTGOMERY, Attorney  
ROBERT E. REED, Attorney



# MAP SHOWING STATE HIGHWAY SYSTEM

**LEGEND**  
 Primary Roads —————  
 Secondary Roads - - - - -  
 Proposed Roads .....  
 (Note: The legend symbols are represented by different line styles: a solid line for primary roads, a dashed line for secondary roads, and a dotted line for proposed roads.)



SAN FRANCISCO AND VICINITY



LOS ANGELES AND VICINITY

See Detail Map

See Detail Map