



# CALIFORNIA HIGHWAYS AND PUBLIC WORKS

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# Refinancing Bay Bridge Debt Saves State \$5,097,000 by Bond Sale at Lower Interest Rate

**R**EFINANCING of the San Francisco-Oakland Bay Bridge with an estimated saving of \$5,097,000 in interest costs was effected by the California Toll Bridge Authority on May 22d in line with the wishes of Governor Earl Warren, Chairman of the Authority.

Evidencing the Nation-wide interest of bond houses in the Bay Bridge, some 250 eastern and western firms desirous of participating in the new bond issue formed a syndicate headed by Blyth & Co., Inc., Mellon Securities Corp., Inc., Harriman Ripley & Co., Inc., and Lehman Bros. and Associates, which was awarded the \$56,000,000 Refunding Bonds on the basis of their public bid averaging 1.96613 per cent interest. The proceeds will be used to retire on March 1, 1945, all of the old bonds which it is estimated will be outstanding on that date.

The Authority anticipates a further saving of \$15,455,000 will be realized due to an excess of revenues over original financing estimates.

This excess of revenues over bond service requirements will enable the Bridge Authority to retire bonds sooner than required under the terms of the bond issue. In addition, the refinancing savings will permit the bonds to be paid off one year earlier than would otherwise have been possible.

As was pointed out by Governor Warren at the bid opening, if the present \$6,000,000 annual bridge revenues are maintained, all of the Sinking Fund Bonds of the refunding issue will be redeemed by 1952 and the remaining Serial Bonds by March 1, 1955. If this rate of redemption is maintained, the effective rate of interest on the refunding issue will be approximately 2.11 per cent.

After March 1, 1945, the total indebtedness of the San Francisco-Oakland Bay Bridge will consist of the \$56,000,000 of refunding bonds sold on May 22, 1944, plus an obligation to reimburse the State Highway Fund in the amount of \$6,600,000

advanced from that Fund for the construction of approaches under Chapter 24, Statutes of 1933.

#### AUTHORIZED ISSUE AND PURPOSE

The Authority initiated the refunding by adopting on May 5, 1944, a resolution authorizing the creation of an issue of not exceeding \$60,000,000 principal amount of San Francisco-Oakland Bay Toll Bridge Revenue Bonds of California Toll Bridge Authority.

The bonds authorized under the resolution are designated generally as "San Francisco-Oakland Bay Toll Bridge Revenue Bonds," and are limited to \$60,000,000 at any one time outstanding, consisting of \$36,000,000 Serial Revenue Bonds and \$24,000,000 Sinking Fund Revenue Bonds consisting of \$20,000,000 due September 1, 1962, and \$4,000,000 due September 1, 1963.

As of March 1, 1944, the Authority had outstanding \$57,070,000 (of an original authorization of \$77,000,000 of which \$73,000,000 par value bonds were issued) San Francisco-Oakland Bay Toll Bridge 4% Serial Revenue Bonds and 4% Series Sinking Fund Revenue Bonds secured until March 1, 1945, by an exclusive pledge of revenues of the San Francisco-Oakland Bay Bridge. These bonds were issued under a resolution of the Authority adopted April 21, 1938, as amended, and are subject to call and redemption as a whole on March 1, 1945.

The purpose of the new issue is to provide funds which, together with other funds available for that purpose, are calculated to be sufficient to redeem all of the outstanding bonds at the redemption price current on March 1, 1945, and to pay interest on the new bonds from June 1, 1944, to March 1, 1945, and expenses incidental to the issuance of the new bonds.

#### \$56,000,000 IN BONDS SOLD

On May 22, 1944, the Authority, after due notice, sold \$56,000,000 principal amount of the Bonds, in-

cluding all of the \$36,000,000 principal amount of Serial Bonds and \$20,000,000 principal amount of the Sinking Fund Bonds due September 1, 1962. The remaining \$4,000,000 principal amount of authorized Sinking Fund Bonds due September 1, 1963, will not be issued and sold unless revenues of the Bridge received prior to March 1, 1945, are below the present estimate of such revenues, and such additional \$4,000,000 authorized principal amount of Sinking Fund Bonds will be issued and sold, in whole or in part, only to the extent necessary to provide sufficient funds to redeem and retire all of the old issue outstanding on said date.

The Department of Finance of the State of California has filed with the Authority its written agreement, approved by the State Board of Control, to purchase on or before March 1, 1945, \$4,000,000 principal amount of said Sinking Fund Bonds due September 1, 1963, thereby assuring the Authority that such additional funds will be available, if required. The amount receivable from the sale of \$56,000,000 principal amount of bonds will be \$56,000,000, plus accrued interest.

Under the Resolution, the proceeds of the bonds are to be paid to the Fiscal Agent to be held in trust and paid out or allocated as follows:

- (a) To be set aside in the Current Interest Fund, an amount sufficient to pay interest on all of the bonds from their date to March 1, 1945;
- (b) \$200,000 to be set aside for the account of the Authority for the payment of expenses incidental to the calling, retiring or payment of the outstanding 4% bonds to be refunded and the issuance of the bonds, any amount so set aside and not used for such purposes to be transferred to the Reserve Fund;
- (c) The balance to be held in trust for the purchase, payment or redemption on or before March



Photo of California Toll Bridge Authority in Session at Sacramento, May 22, 1944

Members of the California Toll Bridge Authority pictured as they finished signing documents authorizing bond sale refinancing San Francisco-Oakland Bay Bridge. Left to right they are Ernest L. Adams; Lieutenant Governor Frederick F. Houser; Governor Earl Warren, chairman; Director of Public Works C. H. Purcell; Director of Finance James S. Dean

1, 1945, of all the outstanding 4% bonds to be refunded, except that the Fiscal Agent may invest any part thereof in U. S. Government obligations maturing not later than March 1, 1945, and may purchase any of the outstanding 4% bonds at a price not in excess of the redemption price (including premium and accrued interest) current on March 1, 1945. On March 1, 1945, the remaining balance, together with the proceeds of any such U. S. Government obligations and any outstanding bonds so purchased, is to be applied to the redemption of all the then outstanding 4% bonds and the payment of interest thereon to March 1, 1945.

#### DESCRIPTION OF BONDS

The \$56,000,000 principal amount of bonds of the authorized issue sold May 22, 1944, are dated June 1, 1944. The Serial Bonds bear interest payable semiannually on March 1st and September 1st of each year (except the first installment which is payable on March 1, 1945). The principal amount of bonds maturing on September 1, 1945, is \$1,030,000. This amount will increase on each

semiannual maturity date until September 1, 1959, when the final installment of Serial Bonds in the sum of \$1,460,000 will mature. Serial bonds maturing up to and including March 1, 1950, will bear interest at the rate of 3 $\frac{3}{4}$ % per annum. From that date on until the final maturity on March 1, 1959, the Serial Bonds bear interest at the rate of 2% per annum.

The \$20,000,000 principal amount of Sinking Fund Bonds bear interest at the rate of 1 $\frac{3}{4}$ % per annum, and mature on September 1, 1962.

#### REDEMPTION TERMS

All of the bonds, or all of the Sinking Fund Bonds, are redeemable as a whole by the Authority on any date on or after March 1, 1950, and prior to maturity; the Serial Bonds are redeemable prior to maturity in part by the Authority on or after March 1, 1950 (but not prior to said date) in inverse order of maturities but only after or simultaneously with the retirement of all of the Sinking Fund Bonds; the Sinking Fund Bonds are redeemable in part by the Authority on or after September 1, 1945; in each case by lot on any interest payment date, but only out of funds available therefor under the Resolution; all on published notice of not less than 30 nor more than 60 days

and, at the following prices plus accrued interest: prior to March 1, 1947, 103 $\frac{1}{2}$ %; on or after that date and prior to March 1, 1949, 103%; on or after that date and prior to March 1, 1951, 102 $\frac{1}{2}$ %; on or after that date and prior to March 1, 1954, 102%; on or after that date and prior to March 1, 1957, 101 $\frac{1}{2}$ %; on and after that date and prior to March 1, 1960, 101%; and on and after that date and prior to September 1, 1962, 100 $\frac{1}{2}$ %.

An interesting sidelight of the opening of bids for the refinancing was a report submitted to the Bridge Authority by Lester Herrick and Herrick of San Francisco, certified public accountant to the Authority, showing that gross revenues including tolls and other income, of the bridge from November 12, 1936, the date on which the world-famous span was opened to traffic, to February 29, 1944, totaled \$40,529,160.53.

#### NET REVENUES AND INTEREST

Net revenues after the deduction of expenses (other than bond interest), such as Use and Occupancy Insurance, fees and expenses of fiscal and other agents, revenue fund adjustments, principally refunds to the United States Government or its agencies for tolls paid, and uncollec-



View of San Francisco-Oakland Bay Bridge looking westerly across the structure showing the City of San Francisco in the background

tible accounts receivable, amounted to \$40,219,346.80.

Interest on bonds during this period amounted to \$19,016,981.24, leaving an excess of revenues over charges against revenues of \$21,202,365.56. Of this amount, \$4,000,000 is held in a reserve fund, leaving \$17,202,365.56, which has been used or will be available for the retirement of outstanding bonds.

The California Toll Bridge Authority is composed of the following officers of the State: Governor Earl Warren, Chairman; Lieutenant Governor Frederick F. Houser; Director of Public Works C. H. Purcell; Director of Finance James S. Dean and Ernest L. Adams, who was appointed a member by the Governor on April 4, 1944, to fill a vacancy created when by an Act of the 1943 Legislature, the Director of Public Works became ex

officio chairman of the California Highway Commission. Previously the chairman of the commission had been by law a member of the Authority.

The following is a brief review of financing operations relating to the Bay Bridge culminating with the adoption by the Toll Bridge Authority on May 5, 1944, of the resolution authorizing the refinancing plan.

Prior to April 21, 1938, the Authority had issued \$63,339,000 of 4 $\frac{3}{4}$ % San Francisco-Oakland Bay Toll Bridge Revenue Bonds all of which were held by the Reconstruction Finance Corporation. By a resolution adopted April 21, 1938, the Authority authorized the creation of an issue of not to exceed \$77,000,000 principal amount of Revenue Bonds of which \$33,000,000 were 4% Serial Revenue Bonds due serially March 1, 1939 to 1964, inclusive, and \$44,000,-

000 were 4 $\frac{1}{4}$ % Sinking Fund Revenue Bonds due September 1, 1976.

All of the \$33,000,000 Serial Revenue Bonds and \$30,339,000 of the 4 $\frac{1}{4}$ % Sinking Fund Revenue Bonds were delivered to the Reconstruction Finance Corporation in exchange for the \$63,339,000 of 4 $\frac{3}{4}$ % bonds then outstanding. Subsequently \$9,661,000 of 4 $\frac{1}{4}$ % Series Sinking Fund Revenue Bonds were issued to the Reconstruction Finance Corporation for cash which was applied to the completion of the Bridge Railway. The remaining \$4,000,000 Sinking Fund Revenue Bonds which were reserved for the acquisition of certain competing ferries, were never issued.

By an amendment of the Bond Resolution adopted June 5, 1939, and effective June 22, 1939, the interest rate for the 4 $\frac{1}{4}$ % Sinking Fund Revenue Bonds was reduced from 4 $\frac{1}{4}$ % to

4%. Provision was also made for the redemption from unexpended Construction Fund moneys of \$500,000 principal amount of Serial Revenue Bonds.

Effective June 22, 1939, the Reconstruction Finance Corporation sold \$31,700,000 of 4% Serial Revenue Bonds due March 1, 1940, to March 1, 1964, inclusive, and \$39,300,000 of 4% Sinking Fund Revenue Bonds due September 1, 1976, to a group of underwriters for par plus a premium of 4½ points and accrued interest. The Authority shared in the premium received to the extent of half of the premium over 101 or \$1,065,000, which amount was applied to the redemption of \$300,000 Serial Revenue Bonds and \$700,000 Sinking Fund Revenue Bonds held by the Reconstruction Finance Corporation.

Since \$500,000 Serial Revenue Bonds had matured on March 1, 1939, and were redeemed from revenues, the amount of bonds outstanding on June 22, 1939, was by these operations reduced to the \$31,700,000 of Serial Revenue Bonds and \$39,300,000 of Sinking Fund Revenue Bonds which were sold by the Reconstruction Finance Corporation to the underwriting syndicate.

#### \$13,930,000 OF BONDS REDEEMED

From June 22, 1939, to May 5, 1944, Serial Revenue Bonds matured by their terms and were redeemed from revenues in an amount aggregating \$2,100,000 reducing the amount of Serial Revenue Bonds outstanding on May 5, 1944, to \$29,600,000. Also during the same period Sinking Fund Revenue Bonds in an amount aggregating \$11,830,000 were either called for redemption by lot on various interest dates or were purchased from holders at not more than the call price.

These redemptions reduced the amount of Sinking Fund Revenue Bonds outstanding on May 5, 1944, to \$27,470,000 and the total of both Serial Revenue Bonds and Sinking Fund Revenue Bonds outstanding on that date to \$57,070,000.

In accordance with the terms of the resolution adopted May 5, 1944, \$410,000 was on May 18, 1944, transferred from unexpended moneys in the Construction Fund to the Fiscal Agent to be used for the redemption on September 1, 1944, of Sinking Fund Revenue Bonds. It is estimated that this amount together with surplus revenues between March 1, 1944,

## Comments on Bond Sale by Financial Press

**E**DITORIAL comment by leading eastern financial publications on the Bay Bridge refinancing has been highly complimentary to the California Toll Bridge Authority and Department of Public Works for the successful handling of the sale of the refunding bonds which are rated as high grade investment.

Moody's *Bond Survey* of New York City said:

"The California Toll Bridge Authority received bids on May 22d for the sale of \$56,000,000 of callable refunding bonds of this Authority. The issue will comprise \$36,000,000 serial bonds maturing semiannually September 1, 1945, through 1959, and \$20,000,000 in term bonds due September 1, 1962.

"Purpose of the issue is to retire on March 1, 1945, at the call price of 105 the outstanding bonded debt.

#### FIRST LIEN SECURITY

"Security will consist of a first lien on the net earnings of the toll bridge crossing San Francisco Bay \* \* \* Bond interest on the new issue is not expected to exceed \$1,500,000 initially, while total debt service charges will average less than \$4,000,000 annually.

"It is apparent that average net in the years 1940-44 would cover interest charges of \$1,500,000 about 3.60 times, and total debt service charges of \$4,000 about 1.46 times. \* \* \* The indicated margin of protection for the new issue is good. Consequently, we think that this new issue is deserving of fairly high investment regard.

"Under current conditions, bridge and other highway revenue bonds are not rated by Moody's Investors Service."

and March 1, 1945, will be sufficient to redeem at the stated call prices \$4,029,000 of Sinking Fund Revenue Bonds by March 1, 1945, reducing the amount of such bonds outstanding on that date to \$23,441,000. Serial Revenue Bonds in the principal amount of \$660,000 will mature by their terms on March 1, 1945, reducing the amount of such bonds outstanding on that date to \$28,940,000. The total amount of both Serial Revenue Bonds and Sinking Fund Revenue Bonds which will be outstanding on March 1, 1945, is therefore estimated to be \$52,381,000.

#### HIGH EARNING POWER

The *Commercial and Financial Chronicle* of New York City said:

"Purpose of the offering is to provide for the redemption of approximately the same amount of San Francisco-Oakland Bay Bridge revenue serial and term 4s presently outstanding.

"As for the bridge itself, the fact that the amount of debt originally outstanding has been reduced to the extent of some \$15,000,000 since June, 1939, indicates a formidable degree of earning power and economic security. As the refunding issue will obviously bear a considerably lower rate than the current 4 per cent figure, the spread between gross and net revenues should be greatly widened."

#### DEFINITELY HIGH GRADE

Standard and Poor's *Bond Outlook* of New York City, said "the bridge is virtually a gross revenue project since operation and maintenance expenses are paid by the State. Insurance premiums and fiscal expenses of about \$50,000 annually are the only charges taking precedence over debt service.

The San Francisco-Oakland Bay Bridge has proven its value in the traffic system of the San Francisco metropolitan area. In view of the established earning capacity of the project and the excellent coverage afforded, its obligations are considered definitely high grade."

#### MOST HIGHLY REGARDED

The *Bond Buyer* of New York City said:

"The municipal market faces a test of its strength during the next few weeks. In addition to some \$50,000,000 to \$60,000,000 bonds now on their shelves, new issues scheduled for public sale on dates preceding the opening of the Fifth War Loan Drive aggregate just about \$140,000,000. \* \* \*

"The first and by far largest item is the California Bridge issue sold Monday May 22d. This is a refunding operation and a substantial part of the \$56,000,000 bonds are expected to be taken by the holders of the outstanding bonds. Also it is one of the most highly regarded of all public revenue bonds and is being offered in a highly favorable market. The bulk, if not all of this loan, should be put away quickly."

# Freeways Relieve Traffic Congestion and Conserve Property Values

By FRED GRUMM, Assistant State Highway Engineer

This paper was delivered before the Los Angeles section of the American Society of Civil Engineers by Mr. Grumm at a meeting on April 12, 1944.

**T**HE State Planning Survey which the Division of Highways is carrying on in cooperation with the Public Roads Administration, has revealed many interesting facts concerning the highway transportation system in California. We learn that the 12,637 miles of the State Highway System, which is about 12.7 per cent of the total rural public road mileage of the State, serves 71.2 per cent of all of the traffic on the rural roads.

The remaining 28.8 per cent of the rural traffic is taken care of by the 86,923 miles of county roads.

Of the 56,000,000 vehicle miles generated daily on the public roads and streets of California, about 45 per cent are on the State Highway System.

We find that 84.4 per cent of all the rural dwellings are located along surfaced roads.

We learn that there are numerous deficiencies in our highway transportation system. By diligent study, we have detailed these deficiencies, particularly on the State Highway System, so that we have a sound basis for the preparation of improvement programs.

It is not necessary to set forth a long list of these deficiencies. I would like to refer, however, to one general statement, because I believe it has a definite bearing on the subject under discussion. That general statement is:

**Deficiencies on the State Highway System are not being corrected at the rate at which they are developing.**

This is not a new situation brought on by the war. It was in effect before the war started and has been seriously aggravated by the war conditions. In 1939, we could actually detail this disparity between obsolescence and improvement as follows:

**Replacement of the rural State Highway System due to obsolescence**

**and depreciation, is falling behind at the rate of 151 miles of road surface and 38 bridges each year."**

Deficiencies, however, do not consist only of deteriorated surface or posted bridges, but also of increasingly deficient capacity with the resulting congestion.

Inadequate capacity results not only from insufficient width of pavement, but is caused also by the character of and the manner in which traffic moves or operates on the road. This movement can become quite confusing and conflicting and thus cause congestion.

When a highway is required to carry a fairly large volume of through traffic and also to serve, at the same time, a fairly large volume of local traffic—the kind that moves into and out of the parking areas or the business developments adjacent to the highway—congestion and conflict results. In other words, then, we have congestion resulting from a cause other than merely insufficient width of pavement.

The deficiency brought about by the development of abutting property; by inducing the character of use that produces frequent movements off and onto the highway, is probably one of the most serious and most difficult to correct.

## "RIBBON DEVELOPMENT" DEFINED

We have several names for this situation. Some are hard names, but probably the one which describes it most effectively and recognizably is "ribbon development." This means the development of abutting property into commercial or business frontage. This induces the frequent on and off movements which are so detrimental to the capacity and efficiency of the highway.

It does not seem reasonable or equitable, if the motorist pays for the cost of our main thoroughfares and

probably many others besides, that owners of the abutting property should be able to profit thereby, at no expense to themselves, while, at the same time, they destroy the efficiency and integrity of the traveling facility the motorist has paid for. The net result is that the motor vehicle owner pays for limited access roads, whether he gets them or not.

## CONCEPTION OF FREEWAY

Pondering on the best methods of correcting the situation, one of the first reactions would be that it is unwise and futile to keep on expending material sums of money derived from motor vehicle taxes for highway improvement, without protecting such investment against the character of development which destroys its usefulness and makes its function obsolete. Carrying such thinking to a logical conclusion leads to a scheme whereby the abutting property is denied the right of unrestricted ingress and egress to the highway. That is the conception of the "Freeway."

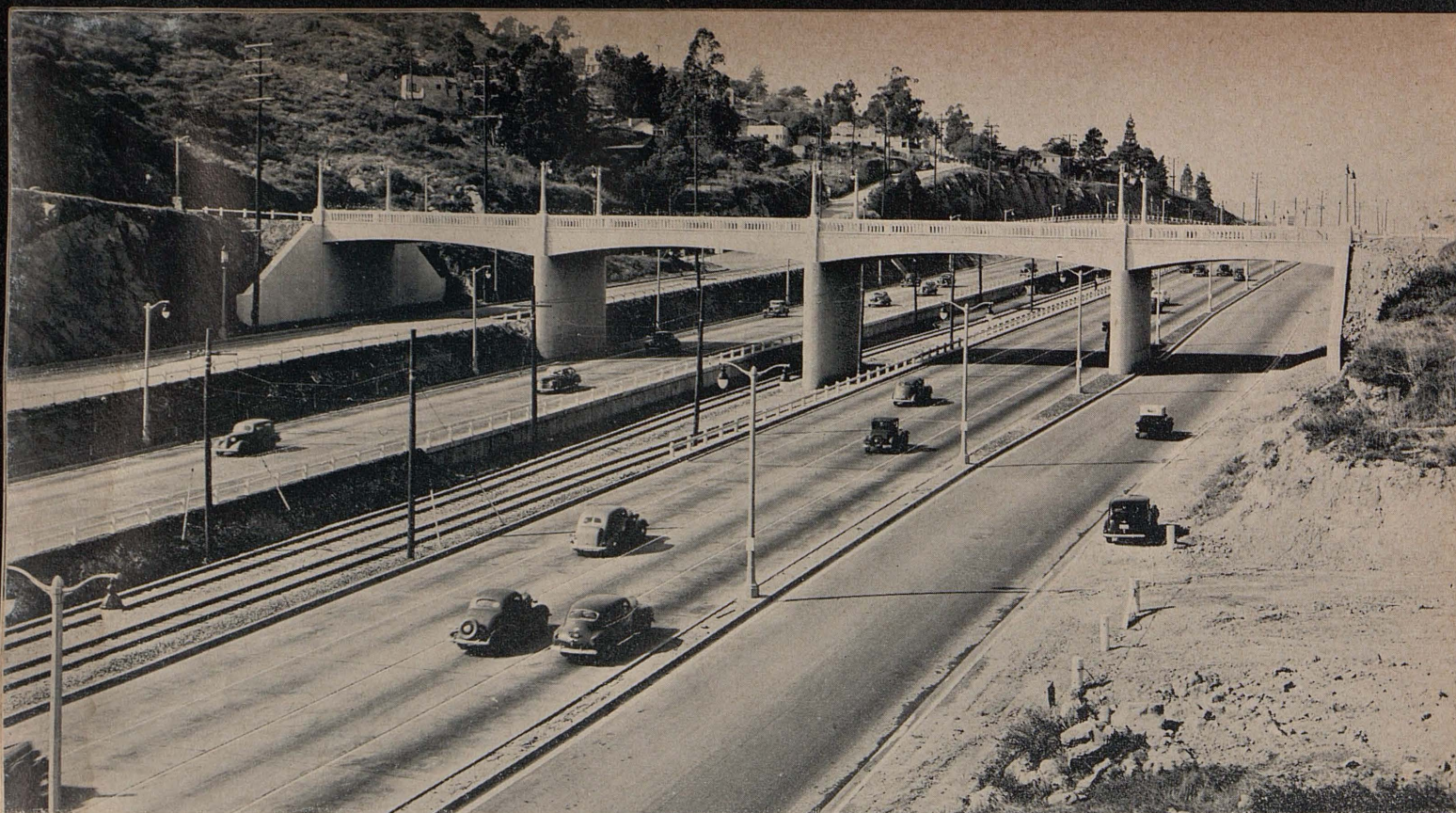
How does the freeway correct this situation? How does it function?

Someone recently said: "Our cities are worth preserving." This implies that evidently failure and deterioration of the cities is imminent. It is true that cities have had troubles, and this situation extends back to some years before the war. The tabulation of these troubles makes rather an imposing list.

In this list, we find: (a) traffic congestion, (b) inadequate transportation facilities, (c) decadence of property values, (d) high assessment, (e) high tax rate with consequent tax delinquency, (f) blight, (g) growing deficits.

## PROPERTY VALUES AFFECTED

In some of our larger municipalities, these troubles have progressed



Completed section of U. S. 101, a six-lane freeway through Cahuenga Pass with which proposed Hollywood Parkway will connect

sufficiently far so that the total of savings and trust funds invested in city property mortgages could not be liquidated from the sale of the property. In fact the plight of some of the cities has become nearly desperate. Anything that will help to cure some of these ills is, therefore, decidedly welcome.

Many of these city ills are closely allied to or are the result of some other deficiency or trouble. Traffic congestion results from inadequate transportation facilities and, in some way, has an influence on decentralization. This latter in turn produces reduction of property values, and so the vicious circle continues.

The expansion of cities followed later by decentralization is rather of a uniform pattern throughout the country. This may be illustrated by such cities as Baltimore, Washington and Chicago. Where growth and expansion have been more or less uncontrolled, or left to the tender mercies of the real estate subdivider, we find that it has taken place as ribbon development along the transportation arteries leading into or out of the nucleus or heart of the city. In Baltimore and Washington, for instance, this expansion along the transportation arterials flares out in all directions from the center.

In Chicago naturally it radiates from the city in all directions, except

easterly toward the lake. An unfortunate condition accompanying this type of expansion is the leaving of undeveloped areas between the several ribbon developments along the highways.

This method of expansion of a city by development along the busy thoroughfares leading into and out of the heart of the original town, has brought about, in many instances, a development of business frontage far in excess of that required by the population. This development has also created another evil—traffic congestion.

Because it becomes a tedious and uncomfortable undertaking for the resident of one of the outlying districts to go to the central part of town for his needs, little community centers have sprung up and the development of commercial establishments supplying the immediate needs of the residents have developed at the several intersections. Gradually, in this manner, decentralization has progressed; and following it, there is often a deterioration in value of properties within the central portion of the city.

#### SOLUTION OF DECENTRALIZATION

Perhaps, then, if we can alleviate traffic congestion; if we can correct the inadequate transportation system; if we can supply the need of

adequate facilities for uninterrupted travel in these areas of high traffic density, we may be able to remedy, or possibly to halt, the decentralization and the deterioration of property values, as well as provide safer and more comfortable means of transportation.

Freeways loom as a very appropriate, applicable solution of some of the transportation deficiencies in urban areas. Freeways can be designed expressly for urban use. They can extend to the various neighborhoods. A system of freeways can be coordinated with other travel arteries in such a manner as to correct the glaring transportation deficiencies and permit, at the same time, a remodeling of the city.

**Freeways or expressways located to cooperate and satisfy the needs of a city have a force that is more effective than some of the other methods or tools designed for relief, such as zoning and planning. The development of a system of freeways can secure more desirable conditions and make for more comfortable living.**

#### CITIES DIFFER IN FUNCTION

Such a system of freeways must be selected and designed as the result of a functional study of the city.

The problem in each city becomes individual, even though some general principles apply universally. We



have talked blithely in the past about, and have actually by-passed cities with main thoroughfares. In some instances, such procedure has developed satisfactorily and has produced benefits. In other instances, however, the beneficial results have not been as complete as was desired.

That is because cities differ in function. Some cities are sources of origin or destinations for traffic in sufficient volume to require recognition. In other instances, they are simply a place along the road, probably not even a stopping place. On the other hand, we have also the situation that in a larger city there may be different areas which in themselves become sources of origin or destination centers.

Study of our transportation problem in any city, then, requires first a

highly developed lands. Right of way, including the access rights, is expensive; ultimate construction particularly so, because it must include frequent grade separation structures and other features not usually required for the average surface road or highway.

This cost item directly influences our conclusion concerning the function of the proposed highway. Usually through traffic alone is insufficient in volume to justify the freeway construction through urban areas. It means that the project must be designed to include a certain amount of local traffic—local in the sense of originating in the general vicinity and not far removed from the locality.

The traffic we can consider as local and which can be profitably included

sideration—the discharge and distribution of this traffic from the freeway at the proper destination.

Our first step is to provide for its access to the freeway in the outlying areas. This, of course, is easily accomplished by inlets at proper locations, such as important street intersections. The second step, then, is to determine the destination of this traffic and provide ample and adequate opportunity for the exit movement.

This movement probably will occur in fairly large volume at certain hours of the day. In other words, when the commuter comes to work, the highway facility must be able to discharge vehicles at points close to the major business establishments and the larger employment centers. The off or exit ramps must be so designed that vehi-



View of section of Arroyo Seco Parkway, a six-lane freeway connecting the cities of Los Angeles and Pasadena

determination of its particular function.

In the consideration of a system of freeways, particularly through urban areas, one fact, uppermost in mind, concerns the expense involved in carrying such a facility through

in the freeway service, would be that originating in the outlying residential areas and destined for the central business area.

Including this character of traffic as essential to and served by the freeway, immediately poses another con-

ditions can readily, and at practically top speed, leave the main freeway and, gradually decelerating, direct their course into the street system.

The major volume of such vehicle movement takes place usually in the morning hours when the commuter is

(Continued on page 14)

# Four Level Grade Separation for Los Angeles Parkways Intersection

By S. V. CORTELYOU, District Engineer

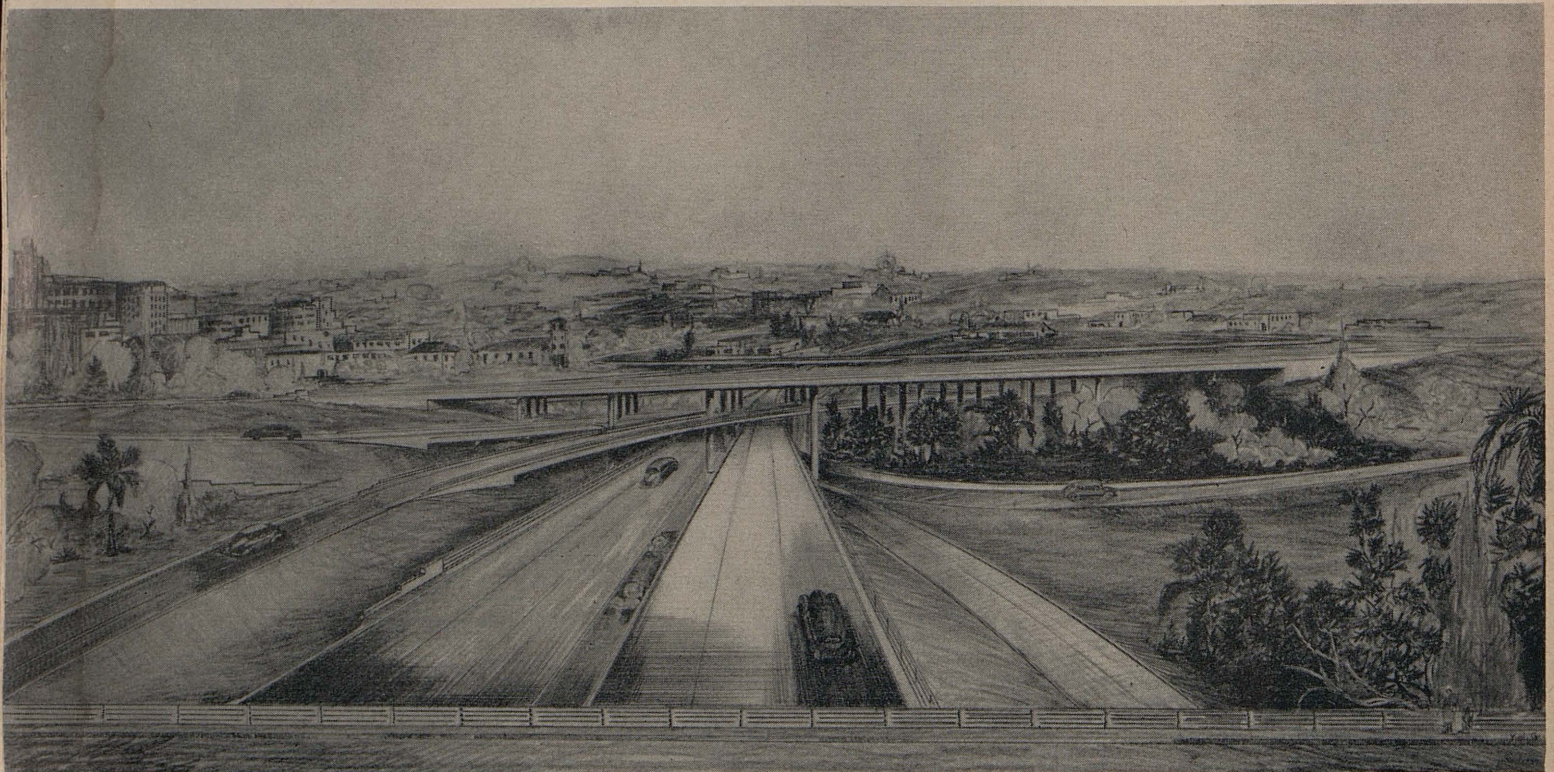
A PARKWAY system to serve the Los Angeles metropolitan area has been the subject of exhaustive study over a long period of time. The location has been definitely fixed for many of these major traffic arteries. The more important of the

State Highway Route 165 and it is the intersection of these two important traffic arteries which is the subject of this discussion and the site of the proposed four-level grade separation.

State Highway Route 2 is one of the most important major highways in

in extensively built-up areas subject to great local traffic movement as well as to heavy long distance travel.

State Highway Route 165 extends from Pasadena through Los Angeles to the Harbor at San Pedro. It is known as the Arroyo Seco Parkway from



Artist's sketch of proposed 4-level grade separation in Los Angeles of State Highway 165, Arroyo Seco-Harbor Parkway, shown as the broad six-lane divided highway in center of picture and Route 2, Hollywood Parkway, crossing the picture at top level. The other roadways are traffic interchange connections with the two major arterials

parkways are on the State highway system and are expected to handle interregional and through traffic as well as the local travel.

In the development of plans and designs for parkways which will become a final responsibility on the State Division of Highways, this governmental agency has actively engaged for many months in studies of location and design, in cooperation with the Los Angeles City Engineering Department.

Two of the major routes in this category are State Highway Route 2 and

California. It is a main thoroughfare from San Francisco to San Diego and traverses the heart of Los Angeles from Cahuenga Pass in Hollywood to the Los Angeles Civic Center at Spring Street. This portion has been designated as the Hollywood Parkway.

#### CONNECTS SANTA ANA PARKWAY

From the Civic Center southeasterly this route is known as the Santa Ana Parkway and continues past a junction with the Ramona Parkway to Santa Ana and the South Coast region. For about 20 miles this Parkway is located

Pasadena to the intersection with the Hollywood Parkway, and as the Harbor Parkway from this point southerly to San Pedro. This route traverses about 25 miles of intensively improved areas and is the lateral roadway connection between the City of Los Angeles and large cities on either side.

This intersection of the Hollywood Parkway and the Arroyo Seco-Harbor Parkway at the westerly fringe of the Los Angeles Civic Center area will be the most intensely used interchange point on the entire parkway network,

since two of the most heavily traveled routes cross each other at a point in close proximity to the center of business and governmental activity in the city.

In recognition of the great significance of this interchange point, the engineers of both the city and the State have given special study to many forms of design in order to properly provide for the heavy exchange of traffic anticipated at the intersection.

State Division of Highways engineers have developed an entirely new type of grade separation and interchange system as an outgrowth of studies of the requirements at this site. This new interchange system has been designated as a "Four-level grade separation" and embodies unusual fea-

and circuitous travel for some of the traffic movements, together with numerous bridge structures, all of which are detrimental to smooth and economical operation.

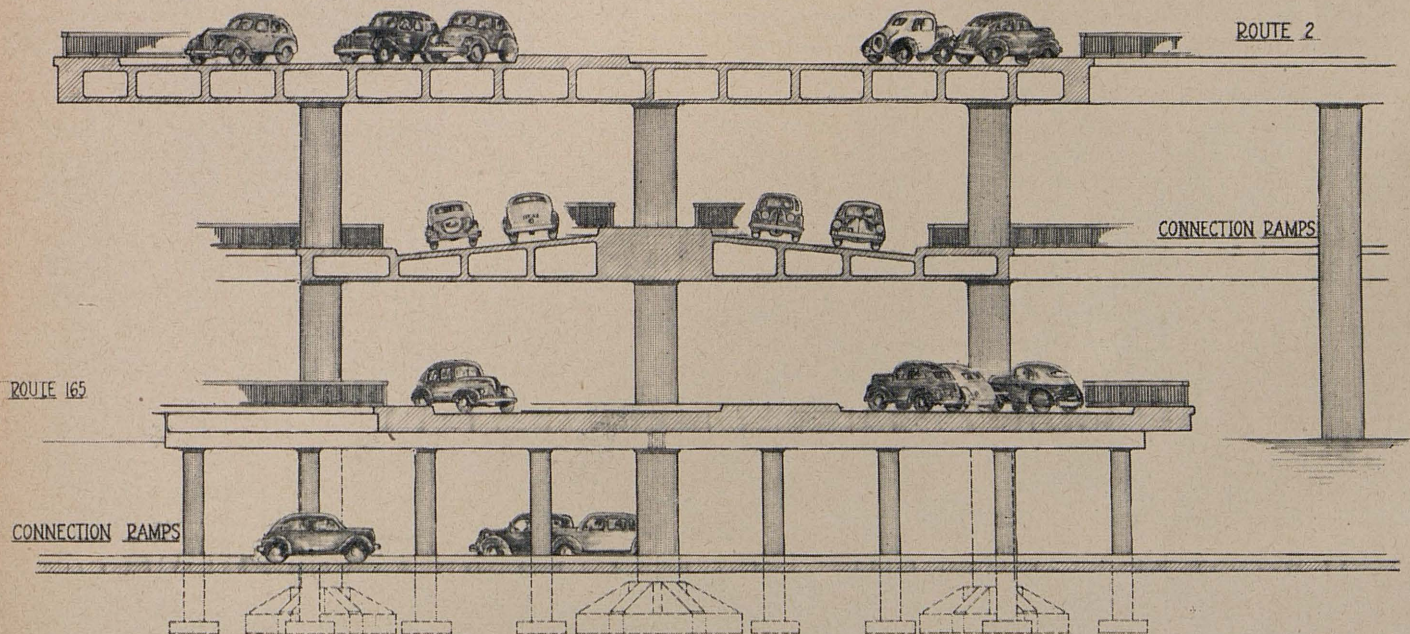
#### SIMPLIFIES TRAFFIC MOVEMENTS

The four-level grade separation eliminates these objectionable features by providing a simple turn for all traffic movements, in the direction in which each wishes to go and without excess distance over that which would be required in ordinary highway travel. It will be noted that the take-off from one parkway and junction with the other is in all cases made on the right side of the parkways, which is considered desirable on express type roadways.

lane freeway with central dividing strip. The third level is for the two 26-foot one-way roadways handling exchange from the Hollywood Parkway to the Harbor-Arroyo Seco Parkway. The fourth or highest level is the Hollywood Parkway, a six-lane freeway with a 34-foot central dividing strip.

The resulting bridge structure is 69 feet in height from the lowest roadway to the highest roadway, of which about 47 feet will extend above the natural ground surface.

Advantage has been taken of the ground contours in working out the design. The lowest level will be depressed about 22 feet below natural ground surface, which is the limit to which it can be lowered and still ob-



Cross section sketch of 4-level structure showing traffic on two major highway routes and interchange ramp connections crossing at one point

tures designed to increase safety, to reduce traffic confusion, and to decrease travel distances for interchange traffic movements between Parkways.

The plan of the intersection clearly indicates that the method of handling exchange traffic between the two parkways is greatly simplified in comparison with the conventional types of interchange systems, as, for instance, the clover-leaf type in which the left turn is accomplished by means of a three-quarter of 270° loop to the right. In the clover-leaf type there is also an overlap of acceleration and deceleration traffic with resulting conflict and confusion. Other types of exchange systems employ reversing curvature

In the four-level grade separation the basic feature is that the four separate roadway levels are so arranged as to pass one another at one point in a single bridge structure. The two major parkways intersect one another at approximately a right angle and on different levels, while two pairs of interchange roadways occupy a level each in positions bisecting the quadrants made by the main parkway crossing.

The lowest level is for the two 26-foot one-way roadways which handle the connections from the Harbor-Arroyo Seco Parkway to the Hollywood Parkway. The second level is the Harbor-Arroyo Seco Parkway which is a six-

tain drainage by gravity flow to connect with the storm drain system. The second level, the Harbor-Arroyo Seco Parkway, will be at approximate ground surface. The third level is elevated in a manner similar to an ordinary overpass. The highest level, the Hollywood Parkway, is on a supported grade with a smooth profile which meets the higher ground on each side so that the resulting effect will be natural and pleasing.

Material for the approach fills is available from surplus excavation easterly on the Hollywood Parkway project, where the parkway is depressed for a considerable distance so that important city streets in the Civic

(Continued on page 17)

# New Raw Materials Access Road Doubles Output of Lumber Mills

By M. C. FOSGATE, District Construction Engineer

IN the January-February 1944 issue of California Highways and Public Works appeared an article on a raw materials access project in Amador County which was constructed to expedite increased production and marketing of the war-needed output of that mountain region. This article covers a similar project located in Calaveras County that is nearing completion under contract with Claude C. Wood of Lodi who was the low bidder.

This project, which is 17.6 miles in length, is another splendid example of cooperation between the lumber and logging industries, Calaveras County, the Federal and State Governments as a contribution to the war effort.

The major industries participating are associated companies of the American Box Company, namely, the Stockton Box Company, Calaveras Forest Products Company, Associated Lumber and Box Company and the Blagen Lumber Company of which Walter S. Johnson is president and Charles Gray, the manager. We refer in this article

hereafter to these various companies as the industry.

The county participation is through the Board of Supervisors of Calaveras County of which A. J. Gianelli is chairman and Claude T. Smith is supervisor for the territory between Mokelumne Hill and West Point and James S. Jack, supervisor between Toyon and Mokelumne Hill.

The cooperation of the Federal Government through C. C. Morris, District Engineer of the Public Roads Administration and Regional Forester S. B. Show of the U. S. Forest Service, consisted in the provision of Federal funds to finance the work and cooperation in field supervision.

The State's participation was to make preliminary studies, plan the work and supervise the actual construction under the high pressure required on any wartime project. A. N. Lund is resident engineer in charge of the project.

Preliminary agreements were entered into between the State and the industry and between the State and the

county calling for the general participation in financing the work as follows:

The industry was to perform the clearing and actual grading work upon three important line changes:

1—From Toyon to a point approximately one-half mile northerly saving almost three-quarters of a mile in hauling logs and lumber to Toyon Mill on the railroad and over the main highway between Valley Springs and San Andreas, State Highway Route 24.

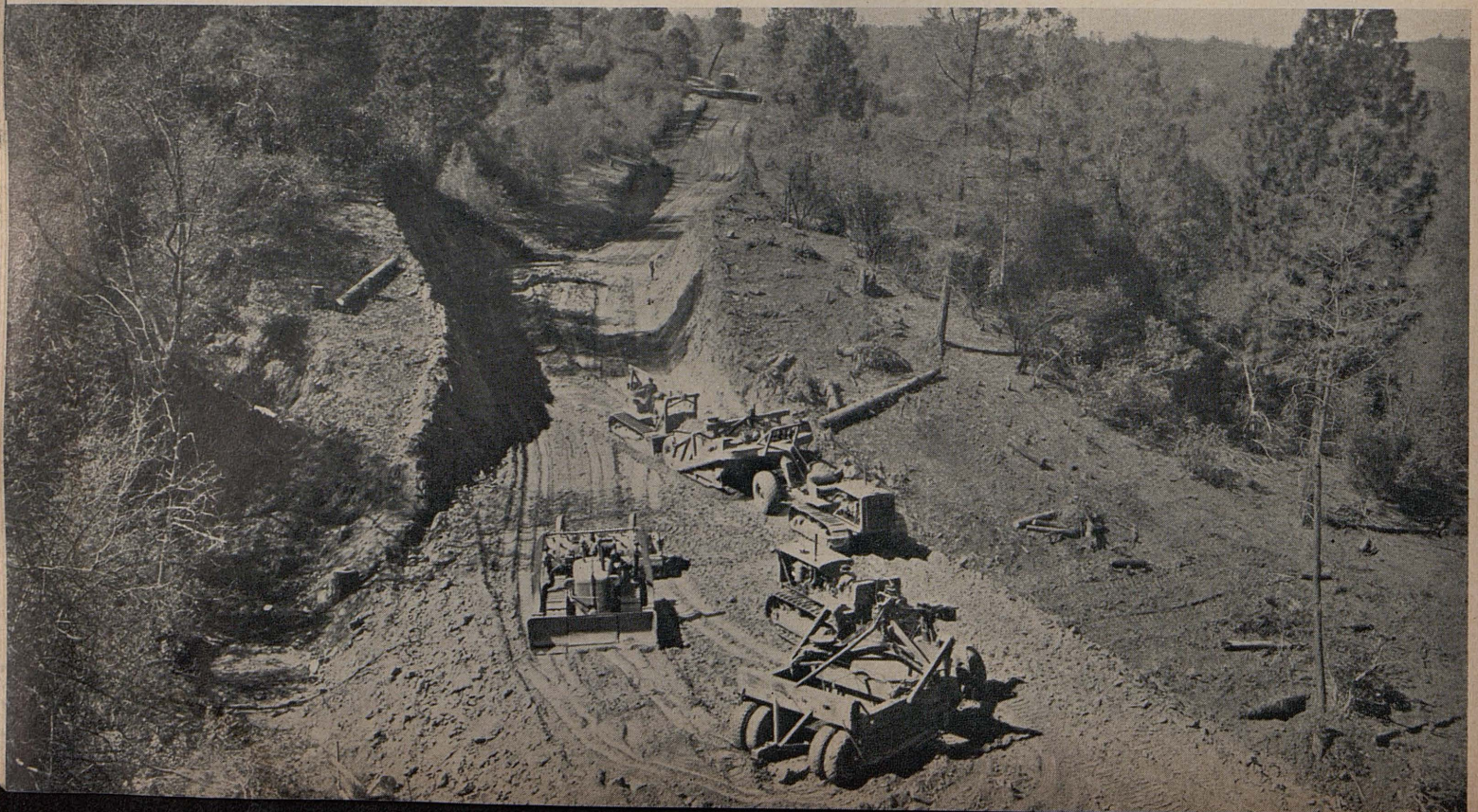
2—A major line change approximately 2.4 miles in length improving the alignment and the adverse grades of the section both sides of Mokelumne Hill.

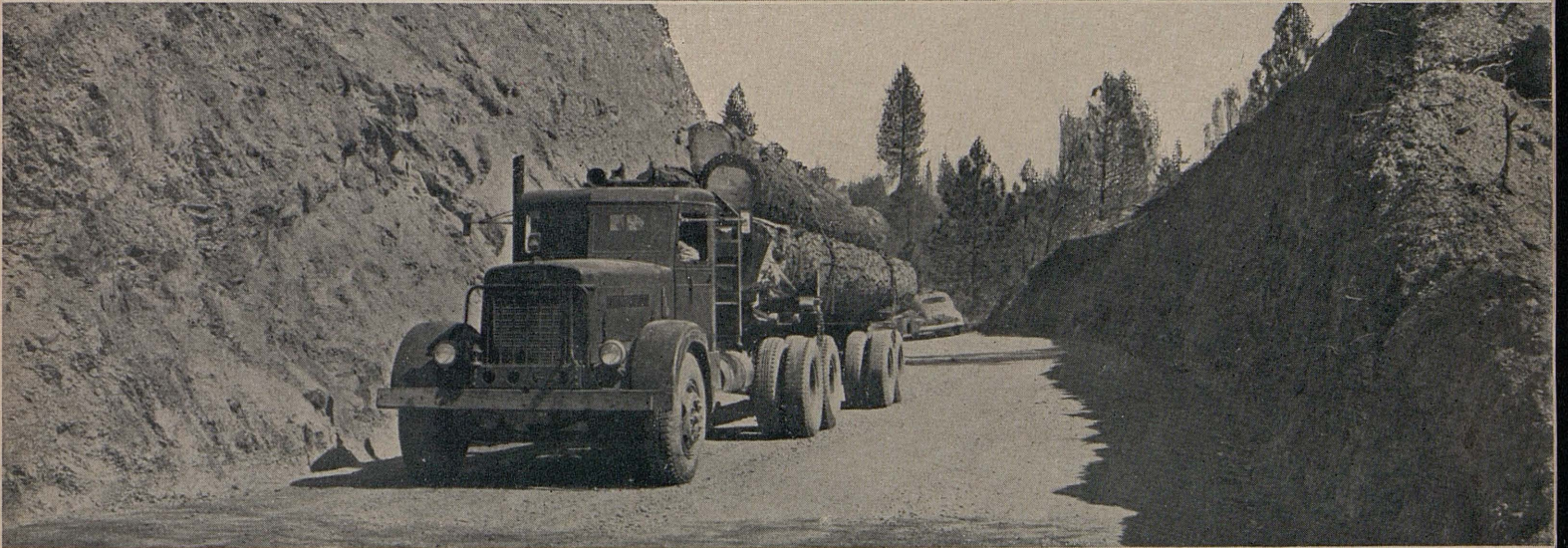
3—A line change approximately one mile in length adjacent to the middle fork of the Mokelumne River near the northwesterly terminus of the project.

The county's participation in this project consisted of acquiring all rights of way for the three major line changes cleared and graded by the industry.

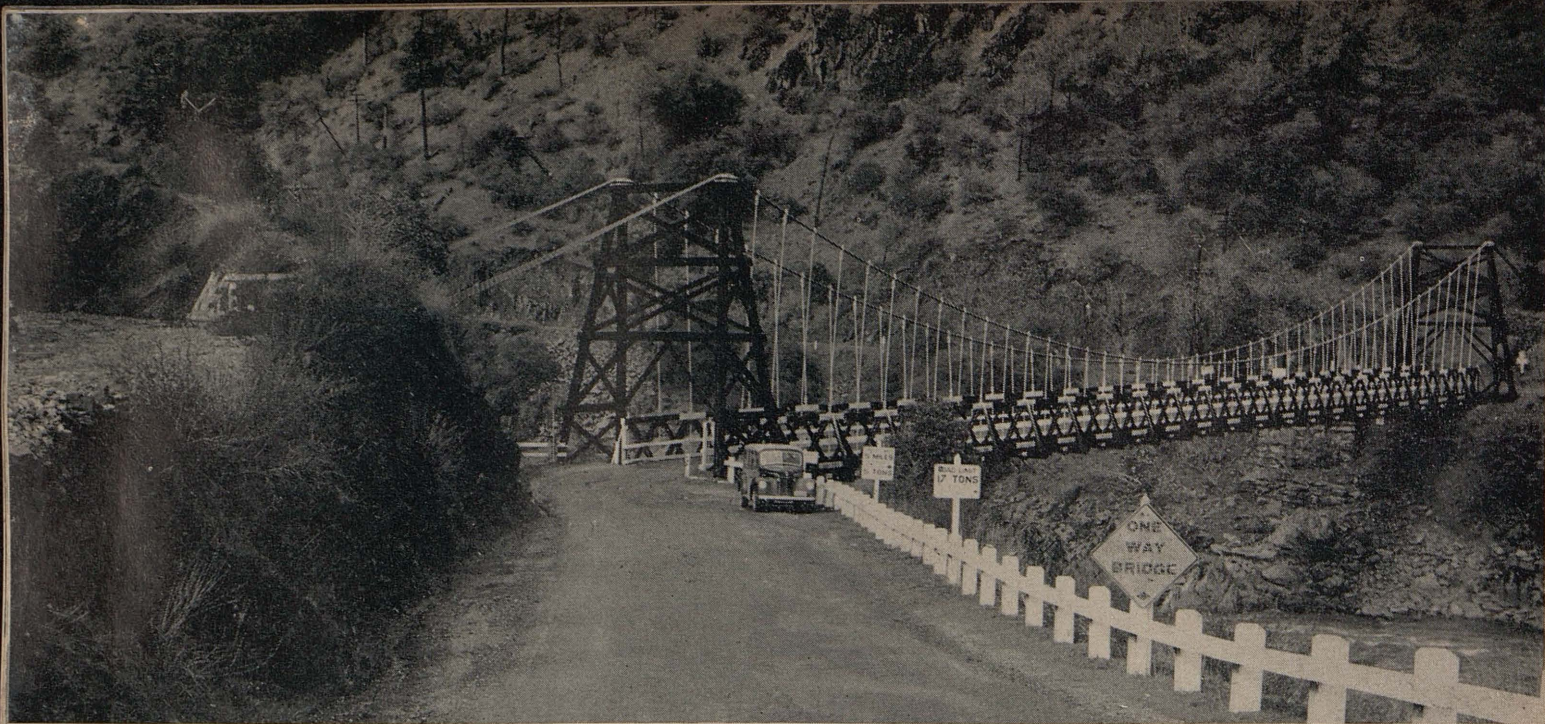
(Continued on page 16)

Construction equipment grading about 2.1 miles of line change on new route over Mokelumne Hill





At top—lumber trucks hauling heavy loads over steep grades and sharp turns on old road east of Mokelumne Hill before realignment. Center—big load of logs tops summit of McFadden Hill on new, wide highway. Bottom—view east of Flume House Hill on State Highway 5 where 10 per cent adverse grade was regraded to 7 per cent



American River Bridge near Auburn built in 1929, a 322-foot suspension span with steel cables resting in saddles supported by timber A-frame towers which became unsafe due to dry rot and decay in towers

# Old Timber Bridge Towers Replaced by Steel Ones While Traffic Proceeds

By O. T. ILLERICH, Associate Bridge Engineer

**I**N the year 1866, at the height of the gold mining days of California, a privately owned toll suspension bridge spanned the canyon of the North Fork of the American River. The site was just below the junction with the Middle Fork, three miles east of Auburn where the old Mother Lode Highway to Forest Hill branched off to Pilot Hill, Georgetown and Sonora.

This venerable structure was replaced in 1929 by a 322-ft. suspension span with two main cables made up of four 1½-inch diameter galvanized steel ropes resting in saddles on timber A-frame towers and carrying a timber deck and stiffening trusses.

The structure, a one-way bridge with a 12-foot clear roadway width, was located just east of the original bridge which was used as a detour during the construction work. Timber was utilized in the towers because this was considered a temporary site.

#### PROPOSED RESERVOIR SITE

The State Highway, a part of the Secondary Highway System, lies in a proposed reservoir site. This proj-

ect was to have been completed by 1942, which allowed the span an estimated useful life of about 12 years. However, the present National emergency postponed this plan and the timber towers were called upon for service far beyond normal expectancy. Imminent failure due to incipient dry rot and decay made replacement necessary.

#### SADDLES JACKED OVER

It was not feasible to close the road to traffic during repairs, so a plan was devised to jack the saddles supporting the two cables onto new steel towers designed to support the dead and live load of 252,000 pounds per saddle. Two 50-ton jacks mounted on top of the existing A-frame towers were used to shove the loaded saddles onto the head plates of the steel tower legs.

Each saddle represented a dead load of 134,000 pounds. Some resistance was met in overcoming friction due to the end grain of the wood in the posts and due to the horizontal components of the cable stresses. The cables were cradled from 14 feet

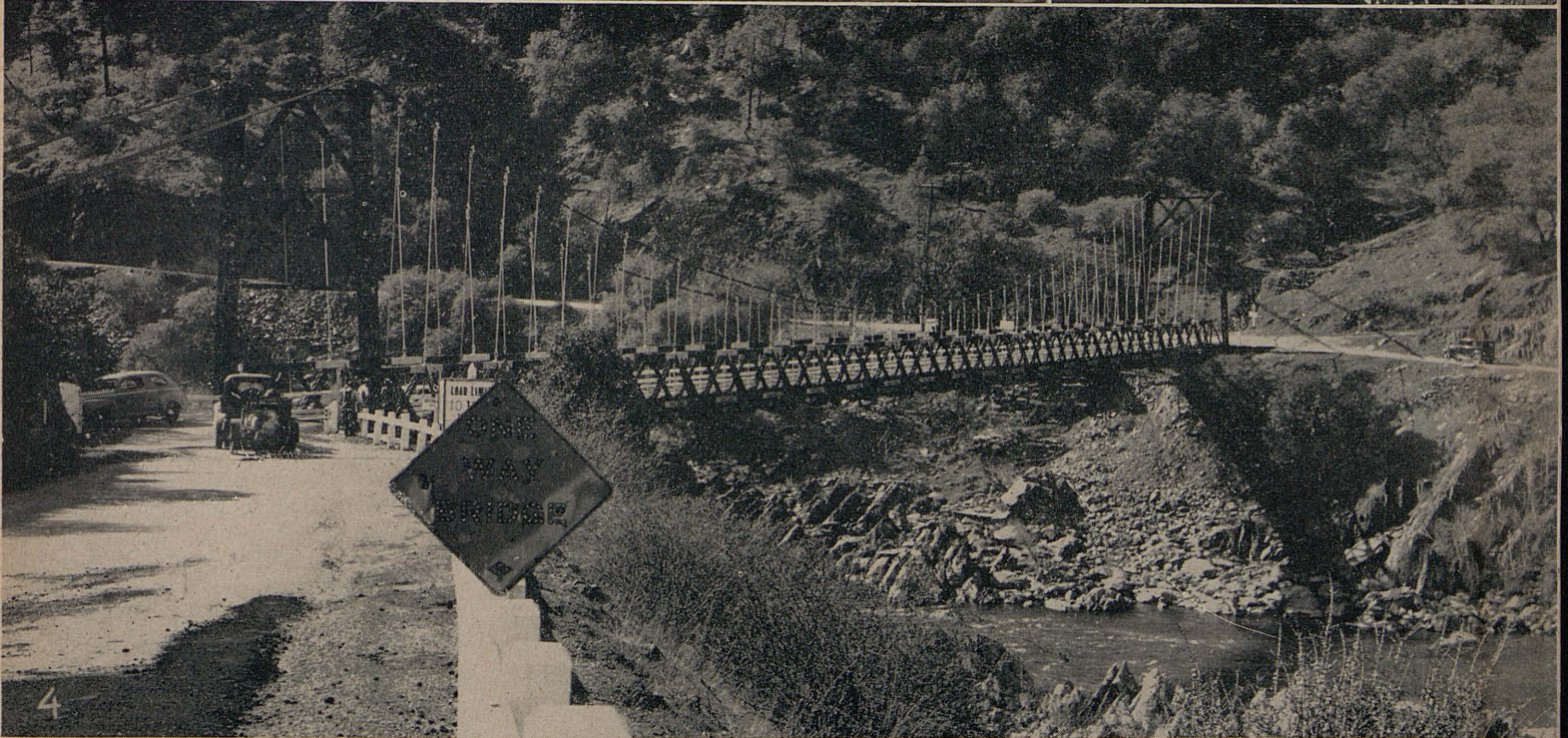
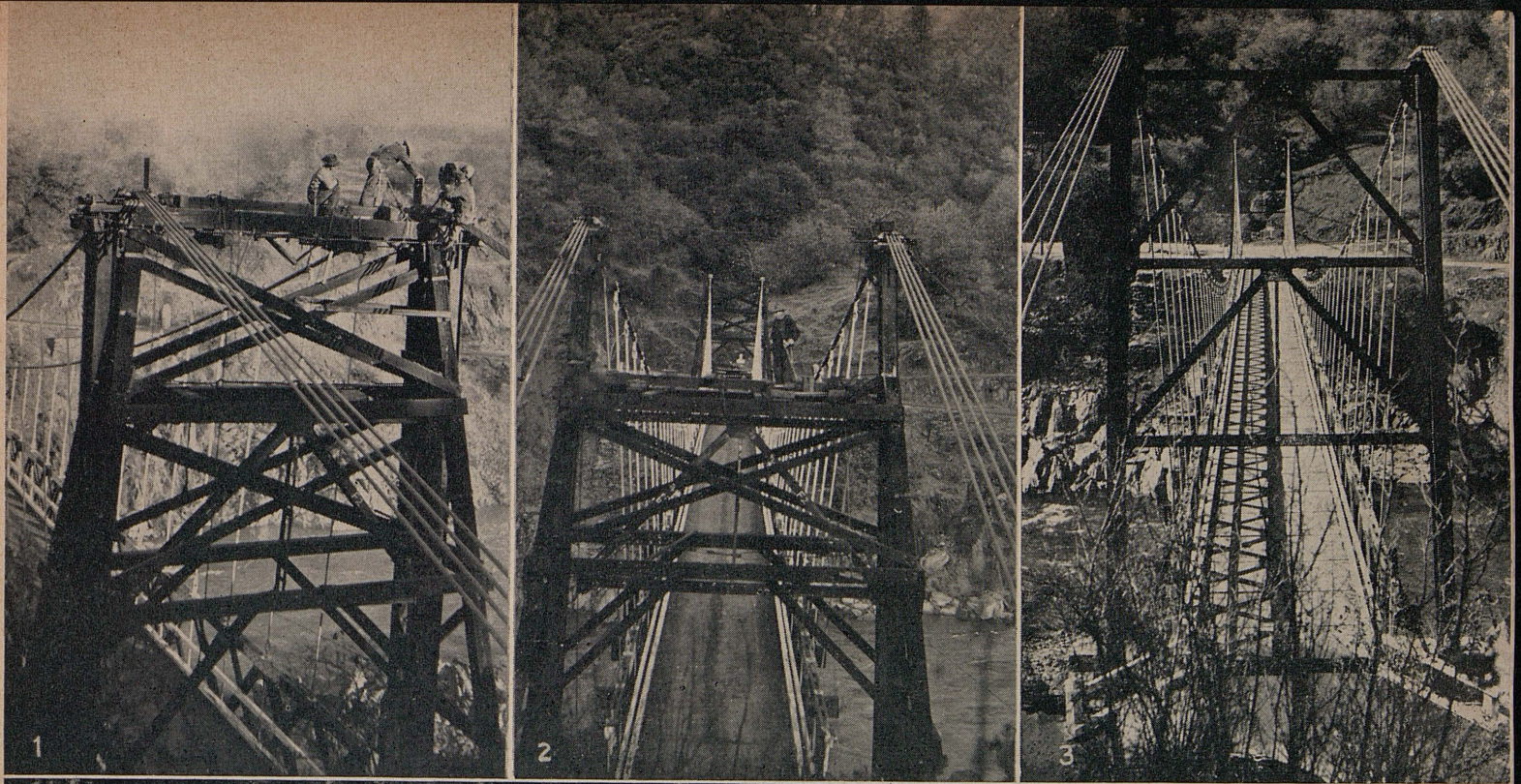
center to center at midspan to 18 feet at the saddles.

An extension at each end of the existing concrete footing block carried the two-way rocker base assemblies on which were mounted the steel H-columns made up of 12-inch WF 28-pound beams riveted to the flanges of a 21-inch WF 59-pound beam.

#### PLACING STEEL TOWERS

Each column leg had to be threaded through the sides of the timber A-frame, coming to rest with its head plate just touching the under side of the saddle casting. The columns were then guyed in place and turnbuckles were used in the stays to control the required lateral movement.

After receiving the saddles, the tops of the steel columns were moved inward by rotating the legs on the lower transverse rocker assemblies so that the saddles again centered at 18 feet. To accomplish this the upper half of the timber A-frame had to be removed. The K-frame bracing connecting the tower legs was next erected and riveted into place. The



At top. 1—Crew jacking cable saddles from wooden A-frame towers to new steel tower legs. 2—Saddles have been shifted to new steel towers. 3—Job completed with A-frame towers removed. Bottom—Bridge as it appears strengthened and supported on new steel towers

remaining portion of the old tower was removed at the completion of this work.

Each column bent was then plumbed by rocking the steel H-columns on the upper rocker assemblies. After final positioning, cable clamps were placed on each side of the saddle castings and the saddle rollers sulphured in. This confined the longitudinal movement developed at

the saddles, due to cable stresses, to the hinges at the bases of the new steelrocker towers.

Although the saddle castings rested on rollers, the original timber A-frame towers were too stiff to adequately provide for this longitudinal displacement. The lower or transverse rocker assembly was then grouted in so as to be fixed in position.

The south tower, which had 50-foot

backstays, was first completed. Work on the north tower proceeded more rapidly. This tower had 95-foot backstays which offered less horizontal resistance to the jacking operations. The contract was completed by the Kiss Crane Company of El Cerrito, California. Mr. W. B. Anderson and Mr. G. W. Thompson were Resident Engineers on the construction work.

# Freeways Relieve Traffic Congestion, Conserve Property Values

(Continued from page 7)

coming to work, and the exit facilities from the freeway, at that time, will have to function under peak volume. At the other end of the day, in the late afternoon hours, the operation is reversed—vehicles must find their way into the freeway to proceed back to their origin.

The entrance facilities to the freeway must, therefore, also be able to take care of a large volume within relatively short periods of time, even though their use during such periods may be more uniformly distributed than is the case of the outlet facilities at their peak period.

By thus combining the freeway, which we originally contemplated as the through traffic route, with service to local traffic, a sufficient volume is attracted and served to fully justify the large expenditures required in urban areas. The benefits derived by traffic from the installation of these facilities can be converted into values far beyond the cost of the improvement.

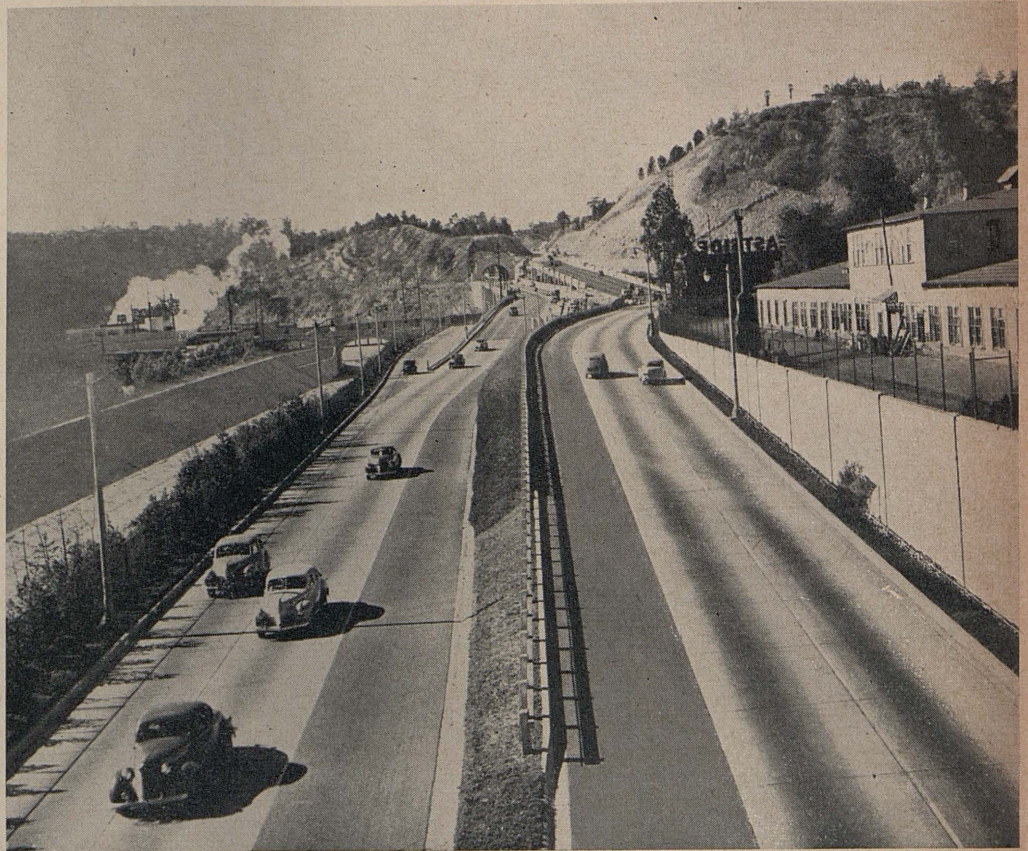
What are some of the advantages or benefits offered by freeways? We may enumerate some of these advantages:

(a) The freeway method preserves the efficiency of the road, the investment made by the motorist. Controlling the access to the highway prevents economic waste, particularly in urban areas where high values exist. Too frequently we have experienced the necessity of expanding the capacity of our major highways, only to find that, by reason of the previous improvement, property values have increased tremendously, and we are now confronted with paying much larger sums for the additional right of way required.

## FREEWAY IS ECONOMIC SOLUTION

(b) The freeway is the economic method of achieving optimum transportation service. The facilities which are a part of the modern freeway make it possible for traffic to operate without interruption with greater comfort and safety, which means that the capacity of the roadway is greater and this capacity remains unimpaired.

(c) The high standard of development, separating cross traffic, preventing conflict between vehicles and between vehicles and pedestrians,



On the above section of Arroyo Seco Parkway opposing traffic proceeds on different levels separated by a railing and planted slope

makes for increased safety and accident reduction. Lives are saved, property protected and time is conserved.

(d) The freeway presents a means of providing for the proper functioning of the city in helping toward the determination of a better land use pattern. This would apply particularly to the outlying urban areas where they border on the outlying rural lands.

## VALUE OF PROPERTY INCREASED

(e) The freeway principle takes the highway from under the influence of the adjacent land. Likewise the land is freed of the deleterious effects which traffic on a major road can produce. Transportation, therefore, can remain at an optimum, and abutting lands can be kept more comfortable, safer and cleaner. The value of the property is increased because it does not depreciate by reason of congestion, traffic noise, fumes, etc., but actually enjoys the

benefit of being brought closer in time to the central business district while still remaining distantly separated.

These advantages apply particularly and more emphatically to freeways in urban areas. These advantages are not always reduced in effect or magnitude as the freeway extends from urban to rural area. It is at this fringe of the urban area, where it turns into rural land, that the first major benefits are realized—where the limitation of access can prevent the further extension of the ribbon development.

The invasion of the country by the city—setting up commercial establishments along the highway in strictly rural areas—is neither economical or necessary. The modern motor vehicle is capable of running several hundred miles with a tank full of gas.

The service stations scattered along the rural highways can be eliminated without discomfort to the motorist. Agricultural activity can be carried on with only nominal contact with

(Continued on page 17)



# Timber Bridge Trusses Rejuvenated With Reinforced Concrete Bearing Blocks

By JASON PLOWE, Associate Bridge Engineer

ANOTHER interesting illustration of one of the many ways in which the useful life of bridges has been extended during the war-time emergency is found in the repairs made on the bridge across Indian Creek, a portion of the Feather River Highway, about 10 miles north of Quincy.

Reinforced concrete bearing blocks have been installed to carry the thrust between the timber chord and web members of the original trusses. The bridge consists of two timber deck truss spans of 114 feet on concrete piers and with timber trestle approaches carrying a 24 foot roadway. The original timber bearing blocks had been crushed by the pressure of the web members, the trusses had sagged, and complete failure was imminent unless remedial measures were taken.

## NOVEL PROCEDURE

The chord and web members were still sound, so it was decided to repair the trusses by installing new bearing blocks. This decision also conserved important amounts of critical materials and labor that would have been used if the bridge was to have been completely replaced.

The use of reinforced concrete bearing blocks, a new experience in connection with timber structures on the State highways, was decided upon after considering the difficulty of obtaining select grades of timber blocks of suitable size due to wartime restrictions; and also the necessity of installing the new blocks to fit existing truss members, including large steel hanger rods which passed through the center of the blocks, none of which were to be dismantled.

## NO DETOUR AVAILABLE

In order to keep traffic rolling over the bridge without interruption, since there are no available detours in the rugged Feather River Canyon, the deck together with the upper chord, and the lower chord were first supported on temporary timber bents



Timber bridge on Feather River Highway showing new concrete bearing blocks on truss members

at each panel point. Web members were then blocked into place and the timber bearing block split up and removed. Hydraulic jacks were then used to lift the trusses back to their proper position.

Reinforcing bar assemblies were next put into position and forms built around the truss members at each panel point. Tie rods passing through the blocks were wrapped with two layers of asphalt paper. Portland cement concrete was tamped into place in the forms to give full contact against the truss members. The average size of the blocks is 2 foot 6 inches long, by 1 foot 6 inches wide and 1 foot 3 inches high.

## INGENIOUS REPAIR SUCCESSFUL

After proper curing, forms were removed and truss tie rods tightened. Temporary bents were then removed, and again the trusses were self supporting.

Once again, wartime restrictions had given the bridge engineer the incentive to devise an ingenious



Reinforced concrete bearing block with 2 steel hanger rods through the center

means of repairing an important highway bridge with a minimum of material and labor. Early indications are that the concrete bearing blocks will be entirely satisfactory.

The repair work was done under contract by Mr. C. C. Gildersleeve.

Mr. Roy Fetter was Resident Engineer for the Bridge Department of the Division of Highways.

Girl to soldier in train window: "Where are you going, boy?"

Soldier to girl on platform: "I ain't going nowhere, gal, I'm being sent."

# New Raw Materials Access Road Doubles Lumber Mills Output

(Continued from page 10)

dustry in addition to the rights of way of numerous other major and minor line changes throughout the entire length of the work constructed as a part of the project with Federal funds. County participation also included construction of two cattle passes and of numerous fences involved in acquisition of rights of way.

## U. S FUND PARTICIPATION

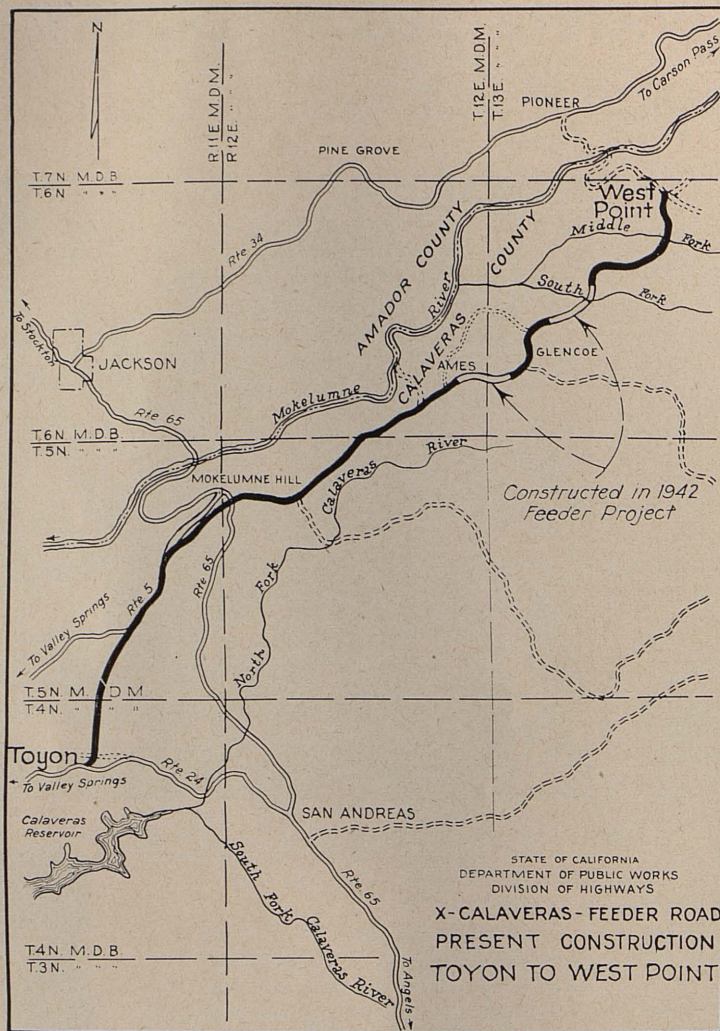
The financing provided by the Federal Government amounted to \$322,300 for construction work exclusive of that performed by the industry and the right of way costs assumed by the county.

The road contract involves approximately 100,000 cubic yards of roadway excavation, 55,000 cubic yards of imported base material, 14,000 cubic yards of local mineral aggregate for road mixed surfacing, 217,000 square yards of mixing and compacting road mixed surfacing, 2,900 feet of pipe culvert and 1,800 tons of liquid asphalt.

The State in order to expedite construction in preliminary stages was required to depend on automobile and stadia surveys in order to determine quantities for advertising purposes.

The construction engineers were required to establish details of alignment and grades, balance quantity for roadway excavation and complete the cross section necessary to determine pay quantities as the work progressed.

The entire project may be described as a road 17.6 miles in length which begins at Toyon, which is a railroad shipping point on the Southern Pacific. From this point, the road traverses new rights of way for the first half-mile, where it intersects an old county road which it follows to its intersection with State Highway Route 5 at Mile 4. After proceeding along this State highway about two miles, the construction traverses new rights of way, via Stockton Hill, by-passing the town of Mokelumne Hill, just north



of which, it crosses State Highway Route 65 and ties into the county road from Mokelumne Hill to West Point. It follows that road to within one mile of its northerly terminus where the construction is again on new rights of way.

## NARROW ROAD, STEEP GRADES

The original county roads which this project will supersede were very narrow and almost a continuous series of curves with inadequate sight distances and grades up to 16 per cent. Over long stretches the road was too narrow to permit passing a vehicle and when meeting logging trucks, in most cases, it was necessary to stop on the wider places in the road. The surface had been reinforced at required spots and the entire section had received a penetration oil treatment.

Exceptions to the above poor alignment, adverse grades, and inadequate construction on the county road between Mokelumne Hill and West Point, are two completed Federal financed projects, totaling about six miles in length, and including a concrete bridge across the south fork of the Mokelumne River.

The new construction calls for a 26-foot graded roadbed with base reinforcement varying from 4 to 6 inches in thickness, according to the bearing value of the subgrade, and a minimum 20-foot width of 2-inch road-mixed surfacing. The new construction has reduced the grades in most cases to 7 per cent against the load with a few short stretches of 8 per cent.

## GRADES AND CURVES REDUCED

When completed, this road will compare favorably with any of the State highways in this vicinity. The grades are not excessive; drainage structures have been properly super-elevated; springs have been drained; the alignment has been inestimably improved by the reduction in curva-

ture and the use of longer tangents; sharp curves and angles have been eliminated; sight distances improved; road safety has been increased; and the road may be traveled with ease and confidence.

An important section constructed under the contract was the so-called McFadden Hill line change which reduced existing adverse grades of as high as 15 per cent to a general 7 per cent with very minor short stretches of 8 per cent. This line change is one mile in length.

The industry operates two sawmills in the pine timber area, one of which lies easterly of West Point some four miles, and another located adjacent to the project at Sandy Gulch, which has gone into production this spring for the first time. A third mill is located at Toyon, the southerly terminus of

(Continued on page 20)

# Four Level Highway Intersection for L. A.

(Continued from page 9)

Center region may remain at present grade.

Alignment standards are excellent on both parkways, being on tangent at the bridge site with easy curvature adjacent. On the connections the lowest level roadways are on tangent through the four-level structure with adjoining curvature radii of 350-450 feet, and 400-400 feet which will provide safe speeds on the interchange of 35 miles per hour or better.

The third level connecting roadways are both on 300-foot radius curves with safe speeds of 35 miles per hour. These curves would have had slightly longer radius except for an important obstruction in the form of a large school building where clearance is limited. While of shorter radius than the lowest level connection roadways, these curves are elevated and therefore have ample sight distance clearance.

Grade systems are good throughout, and meet requirements of design speed of 60 miles per hour on the parkways and 35 miles per hour at the interchange roadways. Near the bridge structure the Hollywood Parkway has a maximum grade of about 3 per cent, while on the Harbor-Arroyo Seco Parkway the maximum is a short stretch of 4.5 per cent grade. On the exchange roadways the grade varies.

The grade system demanded special care and study in its development largely on account of existing major streets on all sides of the four-level structure, which themselves required grade separations with the freeways and with the connecting roadways. These limitations made necessary a very careful adjustment of all grades and positions, since grade and alignment are interrelated and each affects the others.

It is proposed to construct the four-level bridge of reinforced concrete as this material will lend itself better to architectural treatment than would structural steel. The use of reinforced concrete will also be consistent with other nearby structures planned for the parkways. Reinforced concrete design requires a slightly higher overall structure due to the greater depth of girders and floor system which is required, but the small increase in total height is not considered objectionable.

The different levels of the bridge all show the influence of superelevation

and the grade of the roadways which they carry or bridge, and in the final design these effects will be softened by proper architectural treatment of the soffit lines.

The structural design of the four-level bridge is based upon the use of nine main columns to carry the vertical loading which will be symmetrically placed and will extend from footing to the highest level, supporting the bridge decks of all levels except the lowest which is on the ground. The minimum vertical clearance for all roadways is held at 15 feet and horizontal clearance will be provided between curbs and columns.

It will be noted in the plan that the length of deck on the highest level bridge carrying the Hollywood Parkway obviates the necessity of using excessively high retaining walls. The use of retaining walls can not be entirely avoided but the design has been worked out so that there will be a minimum of wall and those required will not exceed 20 feet in height.

The area occupied by the site of the four-level bridge is an old district and buildings are out-moded and in many cases in disrepair. With the exception of the Custer School buildings, which are modern and which are preserved in the plan, there will be a benefit to the community by clearing out the old neighborhood and substituting a modern parkway facility which with proper landscape treatment will become a landmark of beauty and pride for the entire city.

The Hollywood Parkway from the Los Angeles Civic Center to a junction with the existing Cahuenga Park Freeway is regarded as an important freeway project in the Los Angeles metropolitan area. This unit will include the four-level grade separation and a portion of the Harbor Arroyo Seco Parkway. Postwar planning is proceeding at full speed.

The four-level grade separation which is believed to be a forward step in highway design is a development of an idea first suggested by District Location Engineer W. H. Irish. It is a design applicable to other sites, furnishing a compact, efficient and safe traffic exchange system, superior in many respects to most systems now in use, and at comparable cost where conditions justify this design.

# Freeways End Congestion, Save Property Values

(Continued from page 14)

the adjacent highway. Limitation of access, still permitting the necessary highway contact, should cause no hardship nor be expensive. Agricultural use of adjacent land has the least detrimental effect on highway efficiency.

Acquisition of limited access while still providing reasonable access but confining the use of land to agriculture, will effectively protect the highway investment. It provides other benefits too: it protects the commercial establishments in the nearby urban areas; it prevents the wide, uneconomical spread of many small stores and shops.

## BENEFITS CITY AND COUNTRY

It will help keep the city in the city and preserve the scenic values and the freedom of the countryside.

## RENDERS SAFE, COMFORTABLE TRAFFIC

**So, here too, in the country the freeway can advantageously fulfill its function: to render safe, comfortable, effective, unimpaired traffic service with economy.**

**It seems that we have really evolved a solution of our heavy-duty highway problem—a means of escaping from the hopeless, uneconomical dilemma into which we had fallen.**

But as with everything that is of import to mankind—that is new—it is realized slowly. We must be discreet in applying this remedy. Vested property rights are still, next to human life, the most highly considered. If we push our freeway principle too urgently, we may have to pay high to establish it.

It is quite obvious that the most fertile field to produce benefits through the application of the freeway principle is in the city—in the high traffic density area. Even at the high cost we may encounter in establishing a freeway through a highly developed urban area, we are justified by the large benefits that soon become apparent.

Directly: Congestion is relieved; efficient, adequate traffic service is provided; hazard is reduced and safety increased; relief from driving strain and added comfort is found; time is saved and economy achieved.

Indirectly: Better living conditions are promoted; residential prop-

(Continued on page 20)

## Highway Bids and Contract Awards for April and May 1944

**ALAMEDA COUNTY**—Between 0.3 miles south of San Leandro and the north city limits of San Leandro, about 1.3 miles, to be repaired with asphalt concrete. District IV, Route 5, Sections D, Oakl, SLn. Gallagher & Burk, Oakland, \$29,582; Clements & Co., Hayward, \$29,655; Heafey-Moore Co., Oakland, \$29,974; Independent Construction Co., Ltd., Oakland, \$30,780; A. J. Raisch, San Jose, \$32,160; Louis Biasotti & Son, Stockton, \$32,555. Contract awarded to Lee J. Immel, Berkeley, \$28,675.

**ALAMEDA COUNTY**—Between Dublin and Castro Hill, (portions only) about 2.6 miles, to be repaired by surfacing with plant-mixed surfacing. District IV, Route 5, Section B. Lee J. Immel, Berkeley, \$25,170; Chas. L. Harney, San Francisco, \$25,525; Clements & Co., Hayward, \$25,698; A. J. Raisch, San Jose, \$25,990; N. M. Ball Sons, Berkeley, \$27,102; A. A. Tieslau & Son, Berkeley, \$28,550; Granite Construction Co., Watsonville, \$28,660; Louis Biasotti & Son, Stockton, \$30,350; Frederickson & Watson Construction Co., Oakland, \$30,366. Contract awarded to W. C. Railing, Redwood City, \$24,152.

**EL DORADO COUNTY**—Repairing a bridge across the South Fork of the American River near Lotus. District III, Route 65, Section B. M. A. Jenkins, Sacramento, \$14,130; A. Soda & Son, Oakland, \$20,150. Contract awarded to J. & B. Rocca, Stockton, \$9,769.

**HUMBOLDT COUNTY**—Repairing a bridge on the South Fork of the Trinity River, one mile west of Salyer. District I, Route 20, Section D. Mercer, Fraser Co., Eureka, \$12,245; James H. McFarland, San Francisco, \$13,735; Fred J. Mauer & Son, San Francisco, \$14,005; Carlton C. Gildersleeve, Wilows, \$14,674. Contract awarded to Kiss Crane Co., San Pablo, \$11,637.

**LOS ANGELES COUNTY**—On Vanowen St. in the city of Burbank between Hollywood Way and Buena Vista Street, and on Clybourn Ave. in the city of Los Angeles, between Vanowen St. and Victory Blvd., about 1.2 miles to be graded and surfaced with plant-mixed surfacing. District VII, R. R. Hensler, Glendale, \$33,957; Griffith Co., Los Angeles, \$34,744; Arthur A. Johnson, Laguna Beach, \$38,151; Schroeder & Co., Inc., Roscoe, \$38,380; Clyde W. Wood, Inc., Los Angeles, \$38,509; PGK Construction Co., Los Angeles, \$41,616. Contract awarded to Warren Southwest Inc., Los Angeles, \$28,852.

**MENDOCINO COUNTY**—Between Wendling and Sonoma County line, about 4.4 miles, to be repaired with imported base material and a seal coat applied. District I, Route 48, Sections B, A, D. A. A. Tieslau & Son, Berkeley, \$29,186; John C. Spaletta, Santa Rosa, \$31,809; W. C. Railing, Redwood City, \$32,773; A. J. Clausen, Berkeley, \$33,745; Harold Smith, St. Helena, \$36,660. Contract awarded to Elmer J. Warner and Ted Watkins, Stockton, \$29,173.

**MERCED COUNTY**—Between Madera County line and Merced, portions only, about 13 miles to be repaired with imported borrow, untreated rock base and plant-mixed surfacing. District X, Route 4, 123, Sections A, A, G, W, Ellis, North Hollywood, \$129,727; Lester L. Rice, Marysville, \$137,452; Frederickson Bros., Emeryville, \$139,513; Piazza & Huntley, San Jose, \$142,210; J. A. Casson Co., Hayward, \$142,518; Elmer J. Warner, Stockton, \$144,967; J. E. Haddock, Ltd., Pasadena, \$148,303; Brown, Doko & Baum, Pismo Beach, \$151,393; M. W. Stanfield Co., Los Angeles, \$155,223; Granite Construction Co., Watsonville, \$160,259; A. A. Tieslau & Son, Berkeley, \$164,229; N. M. Ball Sons, Berkeley, \$166,737; Frederickson & Watson Construction Co., Oakland, \$180,600; Louis Biasotti & Son, Stockton, \$191,789; Stolte, Inc., Oakland, \$195,103;

A. Teichert & Co., Sacramento, \$199,782. Contract awarded to M. J. Ruddy & Son, Modesto, \$124,475.50.

**SACRAMENTO COUNTY**—For constructing pile dolphins and repairing the fender of a bridge across Steamboat Slough, 5.7 miles north of Walnut Grove. District III, Route 11, Section E. H. F. Lauritzen, Pittsburg, \$11,390. Contract awarded to M. A. Jenkins, Sacramento, \$9,435.

**SAN BERNARDINO COUNTY**—Between approximately 2 miles east of Newberry and 3.5 miles west of Hector, about 7.5 miles, to be repaired by placing plant-mixed surfacing over the existing surface and imported borrow on the shoulders. District VIII, Route 58, Section G. Basich Bros. Construction Co., Alhambra, \$110,740; Oswald Bros., Los Angeles, \$123,235; Pacific Rock & Gravel & M. W. Stanfield Co., Los Angeles, \$139,935. Contract awarded to Geo. Herz & Co., San Bernardino, \$91,795.

**SAN DIEGO COUNTY**—In the city of San Diego between Pacific Highway and Washington Street, about 1.0 mile to be graded and paved with asphalt concrete and portland cement concrete pavement. District XI, Douglas Street Extension, Griffith Co., Los Angeles, \$343,888; Basich Bros. Construction Co., Alhambra, \$350,113; Ralph A. Bell, San Marino, \$388,411; V. R. Dennis Construction Co., San Diego, \$414,424; Daley Corporation, San Diego, \$482,649. Contract awarded to Ralph O. Dixon, Los Angeles, \$326,646.

**SAN JOAQUIN COUNTY**—Across San Joaquin River at Mossdale, the fenders of the existing bridge and the deck of the bascule span to be repaired. District X, Route 5, Section B. Pomeroy Sincock, Stockton, \$49,109; The J. Philip Murphy Corp., San Francisco, \$49,454; H. F. Lauritzen, Pittsburg, \$50,787. Contract awarded to James H. McFarland, San Francisco, \$31,999.

**SAN JOAQUIN COUNTY**—Repairing deck of two bridges across Mosher Creek and Bear Creek between 9 and 11 miles northeast of Stockton, respectively. District X, Route 97, Section A. J. L. Webster, Lodi, \$12,797; Earl W. Heple, San Jose, \$9,729; Fred D. Kyle, Los Angeles, \$13,362; J. & B. Rocca, Stockton, \$8,950; Geo. M. Carr, Santa Rosa, \$9,175; A. Soda & Son, Oakland, \$11,985; Lawrence Construction Co., Sacramento, \$10,764; James H. McFarland, San Francisco, \$11,010. Contract awarded to Wallace Engineering Co., Escalon, \$8,208.

**STANISLAUS AND MERCED COUNTIES**—Between Newman and Los Banos, portions only, about 10.8 miles, to be repaired with untreated rock base and plant-mixed surfacing. District X, Route 41, Sections New, B, A, B. M. J. Ruddy & Son, Modesto, \$115,000; Brown, Doko & Baum, Pismo Beach, \$116,132; Piazza & Huntley, San Jose, \$122,012; Granite Construction Co., Watsonville, \$122,800; Louis Biasotti & Son, Stockton, \$124,544; Frederickson & Watson Construction Co., Oakland, \$125,432; McGilivray Construction Co., Sacramento, \$127,470; Frederickson Bros., Emeryville, \$130,250; A. J. Raisch, San Jose, \$130,392; M. J. B. Construction Co., Stockton, \$136,560. Contract awarded to W. C. Railing, Redwood City, \$110,304.

**STANISLAUS COUNTY**—Between San Joaquin County line and Crow's Landing and between San Joaquin County line and Modesto, portions only, a net length of about 13.1 miles to be repaired with imported borrow untreated rock base and plant-mixed surfacing. District X, Routes 41 and 110, Sections A, Pat, B, A, B. G. W. Ellis, North Hollywood, \$180,338; Lee J. Immel, Berkeley, \$219,551; A. J. Raisch, San Jose, \$198,348; M. J. Ruddy & Son, Modesto, \$175,032; Piazza & Huntley, San Jose, \$175,600; Elmer J. Warner, Stockton, \$182,376; Brown, Doko

& Baum, Pismo Beach, \$182,548; Frederickson Bros., Emeryville, \$185,938; Louis Biasotti & Son, Stockton, \$187,592; M. J. B. Construction Co., Stockton, \$192,489; N. M. Ball Sons, Berkeley, \$192,817; McGilivray Construction Co., Sacramento, \$196,870; Frederickson-Watson Construction Co., Oakland, \$197,481; J. A. Casson Co., Hayward, \$199,401; Marshall S. Hanrahan, Redwood City, \$219,500; Stolte, Inc., Oakland, \$244,273. Contract awarded to George French, Jr., Stockton, \$163,756.

**SUTTER AND YUBA COUNTIES**—Between Sutter County Hospital and 1 mile north, between Tudor Road and Oswald, in Yuba City between Bridge Street and Colusa Avenue, and in Marysville between J Street and Feather River Bridge, about 6.5 miles in length, to be repaired with plant-mixed surfacing on existing roadbed with plant-mixed surfacing on new crusher run base, borders to be constructed of crusher run base on imported borrow and seal coat to be applied thereto. District III, Routes 3, 87, Sections A, Y, C, Mvl., B. Marshall S. Hanrahan, Redwood City, \$68,362. Contract awarded to Lester L. Rice, Marysville, \$66,952.

**TEHAMA COUNTY**—Between 3 miles east of Paynes Creek and Mineral, about 16.7 miles to be repaired with plant-mixed material. District II, Route 29, Section B. Lester L. Rice, Marysville, \$104,670; E. B. Bishop, Orland, \$119,205; Clements & Co., Hayward, \$126,030. Contract awarded Mercer Fraser Co., Eureka, \$87,255.

**YOLO AND COLUSA COUNTIES**—Portions between Bretona and Geneva, about 5.9 miles to be repaired with plant-mixed surfacing. District III, Route 7, Sections C, A. A. Teichert & Co., Sacramento, \$34,746. Contract awarded to Clements & Co., Hayward, \$27,248.

### BIDS AND AWARDS FOR MAY 1944

**ALAMEDA COUNTY**—Between San Joaquin County line and one mile west of Mountain House, about 2 miles long to be repaired by surfacing with plant-mixed surfacing. District IV, Route 5, Section A. Lee J. Immel, Berkeley, \$20,628; Louis Biasotti & Son, Stockton, \$21,075; A. J. Raisch, San Jose, \$21,654; Chas. L. Harney, San Francisco, \$24,423. Contract awarded to A. A. Tieslau & Son, Berkeley, \$19,544.

**CONTRA COSTA COUNTY**—On State Highway Route 75 between the junction with Route 106 and 2.5 miles east of Antioch, portions only, about 7.5 miles to be repaired with crusher run base and plant-mixed surfacing. District IV, Route 75, Sections B, C, Ant. Piazza & Huntley, San Jose, \$142,131; Lee J. Immel, Berkeley, \$148,357; M. J. B. Construction Co., Stockton, \$168,481; Chas. L. Harney, San Francisco, \$182,597; J. R. Reeves, Sacramento, \$191,163. Contract awarded to A. J. Raisch, San Jose, \$134,470.

**FRESNO COUNTY**—Between Oil King School and Huron Road and between Hub and 4.6 miles northerly, portions about 11.7 miles in length to be repaired by constructing borders of untreated rock base material, placing plant-mixed surfacing over the existing surfacing and new borders and applying seal coat thereto. District IV, Routes 10, 125, Sections E, A. Piazza & Huntley, San Jose, \$81,768; J. E. Haddock, Ltd., Pasadena, \$87,444; M. W. Stanfield Company, Los Angeles, \$99,863. Contract awarded to Brown, Doko & Baum, Pismo Beach, \$80,070.

**HUMBOLDT COUNTY**—Between North Scotia Bridge and Fortuna, portions only, a net distance of 3.7 miles to be repaired by widening a portion with gravel base, placing plant-mixed surfacing over existing surfacing and new borders and applying seal coat thereto. District I, Route 1, Sections E, F. Clements & Co., Hayward, \$51,040.

Contract awarded to Mercer Fraser Co., Eureka, \$49,717.

**IMPERIAL COUNTY**—Between Dixie-land and 2 miles east of Seeley and between El Centro and Meloland, portions only, about 10.9 miles to be repaired with road-mixed surfacing. District XI, Routes 12, 27, Sections C, ECn, C. Basich Bros. Construction Co., Alhambra, \$50,152; Ventura Engineering Co., Los Angeles, \$51,219; Vinnell Co., Alhambra, \$51,866; R. E. Hazard & Sons Contracting Co., San Diego, \$54,120; Clyde W. Wood, Inc., Los Angeles, \$75,824. Contract awarded to Arthur A. Johnson, Laguna Beach, \$48,198.

**INYO-MONO COUNTIES**—Between Bishop and Coleville, portions about 44.3 miles to be repaired by applying a seal coat and screenings to be stockpiled. District IX, Route 23. Ventura Engineering Co., Los Angeles, \$60,190; Vinnell Company, Alhambra, \$60,295; A. A. Tieslau & Son, Berkeley, \$69,743. Contract awarded to Basich Bros. Construction Co., Alhambra, \$55,892.

**KERN COUNTY**—Between Maricopa and 3 miles east, between 6.2 miles west of Route 4 and Route 4, and between 0.5 mile and 6.5 miles east of Kern River, about 15.2 miles to be repaired by placing plant-mixed surfacing and applying an asphaltic emulsion seal thereto. District VI, Routes 57, 140, Sections BC, B. J. E. Haddock, Ltd., Pasadena, \$103,679; Pacific Rock & Gravel Co. and M. W. Stanfield Co., Los Angeles, \$128,665. Contract awarded to Griffith Co., Los Angeles, \$96,627.

**KERN COUNTY**—Between one mile east of Blackwells Corner and Semitropic School, about 16.2 miles to be repaired with road-mixed surfacing and seal. District VI, Route 33, Sections B, C. J. E. Haddock, Ltd., Pasadena, \$57,795; Arthur A. Johnson, Laguna Beach, \$58,605; Pacific Rock & Gravel Co. & M. W. Stanfield Co., Los Angeles, \$60,952; Brown, Doko & Baun, Pismo Beach, \$64,451; Phoenix Construction Co., Bakersfield, \$67,760; Griffith Co., Los Angeles, \$68,980; Bressi & Bevanda Constructors, Inc., Los Angeles, \$80,120. Contract awarded to R. R. Hensler, Glendale, \$48,464.

**KINGS COUNTY**—Lemoore Flying School to Houston Avenue, about 10.8 miles of seal coat to be applied. District VI, Route 10, Section B. Brown, Doko & Baun, Pismo Beach, \$9,100. Contract awarded to A. A. Tieslau & Son, Berkeley, \$7,700.

**LASSEN AND MODOC COUNTIES**—Between 4 miles southwest of Adin and 2.7 miles northeast of Rush Creek Bridge No. 3-03, about 12.2 miles to be repaired with plant-mixed material. District II, Route 28, Sections B, A. McGillivray Construction Co., Sacramento, \$81,584; Guerin Bros., South San Francisco, \$85,174; Isbell Construction Co., Reno, \$88,731. Contract awarded to E. B. Bishop, Orland, \$77,333.

**LOS ANGELES COUNTY**—In the city of Burbank between Buena Vista Street and north city limits, about 1 mile to be graded and surfaced with asphalt concrete. District VII, Route 4, Section Brb. Southwest Paving Co., Roscoe, \$49,764; Griffith Co., Los Angeles, \$50,862; Schroeder & Co., Inc., Roscoe, \$51,050. Contract awarded to Oswald Bros., Los Angeles, \$49,635.

**LOS ANGELES COUNTY**—Route 23 between Solamint and Acton Road, and Route 79 between Saugus and Newhall Junction, portions only, a length of about 16.2 miles to be repaired with plant-mixed material. District VII, Routes 23, 79. Sections BCD, B. Southwest Paving Co., Roscoe, \$79,687; J. E. Haddock, Ltd., Pasadena, \$98,895; Griffith Co., Los Angeles, \$100,603. Contract awarded to Schroeder & Co. Inc., Roscoe, \$75,676.

**LOS ANGELES COUNTY**—Lakewood Boulevard between Firestone Boulevard and Telegraph Road, and Rosemead Boulevard between Santa Fe Railroad and Fawcett Avenue, about 2.9 miles, to be repaired with plant-mixed material. District VII, Route

## In Memoriam

### LT. ROBERT LEE BARKWELL

First Lieutenant Robert Lee Barkwell, Assistant Highway Engineer in District II of the Division of Highways, was killed in action during the battle for the Marshall Islands, February 2, 1944, while serving with the United States Marine Corps as an assault engineer in charge of a demolition crew.

Lieutenant Barkwell was born in Stockton, California, on July 13, 1912, receiving his education in the elementary and high schools of Sacramento, graduating from the Sacramento Junior College with honors in 1932.

In August of 1932 he entered the service of the Division of Highways in District II, where he worked until he was commissioned as a Second Lieutenant in the Marine Corps. Lieutenant Barkwell reported for duty on November 30, 1942, at the Marine Base, San Diego, California. After completion of the officer's intensified training course, he was assigned to Camp Pendleton on February 2, 1943. He became a part of the 4th Marine Division upon its formation at this base. Thence followed thirteen months of intensified training, after which he was assigned to overseas duty.

As an assault engineer he successfully led his men in the battle for the Marshall Islands, which began on January 31st, and was hard at work demolishing pill box after pill box when he was killed by a random shot from a trench mortar.

Lieutenant Barkwell was a very congenial and friendly man and was held in high esteem by all of those who knew him. In his death the department loses a very faithful and capable employee.

He is survived by his wife, the former Dorothy J. Weitzenberg of Sacramento, his mother Mrs. Edith J. Barkwell of Los Angeles, his father J. L. Barkwell, Sacramento, his sister Mrs. Esther M. North, Sacramento, and a brother Earl L. Barkwell now serving with the United States Navy somewhere in the South Pacific.

—SEMPER FIDELIS—

168, Section B. Griffith Co., Los Angeles, \$28,091; M. W. Stanfield Co., Los Angeles, \$28,660; Oswald Bros., Los Angeles, \$28,883; J. E. Haddock, Ltd., Pasadena, \$30,047. Contract awarded to Vido Kovacevich, South Gate, \$27,180.

**MADERA COUNTY**—Between Madera and Merced County line, portions, about 7.3 miles in length, to be repaired with plant-mixed surfacing and a seal applied thereto. District VI, Route 4, Sections B, C. M. W. Stanfield Co., Los Angeles, \$49,751; J. E. Haddock, Ltd., Pasadena, \$51,426; Piazza & Huntley, San Jose, \$53,632. Contract awarded to M. J. Ruddy & Son, Modesto, \$41,543.

**MARIN COUNTY**—Between Belvedere Railroad Crossing and Tiburon, 0.4 mile, to be repaired with crusher run base and armor coat and penetration treatment applied thereto. District IV, Route 52, Section Bly, A.

Lee J. Immel, Berkeley, \$14,929; Peter Sorensen, Redwood City, \$14,874; Chas. L. Harney, San Francisco, \$15,738; E. A. Forde, San Anselmo, \$16,028; Louis Biasotti & Son, Stockton, \$18,114; Maceo Construction Co., Oakland, \$19,267. Contract awarded to A. G. Raisch, San Francisco, \$13,879.

**MARIN COUNTY**—Between Waldo and Golden Gate Bridge, portions only, about 3.1 miles long to be repaired with asphalt concrete. District IV, Route 1, Section D. Louis Biasotti & Son, Stockton, \$72,742; Lee J. Immel, Berkeley, \$73,830; E. A. Forde, San Anselmo, \$78,007; Chas. L. Harney, San Francisco, \$78,322; A. Teichert & Son, Inc., Sacramento, \$81,442. Contract awarded to A. G. Raisch, San Francisco, \$70,822.

**MENDOCINO AND HUMBOLDT COUNTIES**—Between Rattlesnake Summit and Garberville, portions only, a net distance of about 9.7 miles, to be repaired with plant-mixed surfacing and seal coat. District I, Route 1, Sections I, A. Mercer, Fraser Company, Eureka, \$105,012. Contract awarded to Clements & Co., Hayward, \$98,840.

**MODOC COUNTY**—Between 2.7 miles northeast of Rush Creek Bridge No. 3-03 and Chambers Ranch, about 21.8 miles, to be repaired with plant-mixed material. District II, Route 28, Sections A, B. E. B. Bishop, Orland, \$109,570; Clements & Co., Hayward, \$114,231; Harms Bros., Sacramento, \$120,770; Isbell Construction Company, Reno, \$125,985. Contract awarded to McGillivray Construction Co., Sacramento, \$98,053.

**RIVERSIDE COUNTY**—Between State Highway Route 26 and 1.2 miles south of Thermal, portions, about 9.6 miles to be repaired with road-mixed surfacing. District XI, Routes 203 and 187, Sections A, F. Arthur A. Johnson, Laguna Beach, \$34,920; Ventura Engineering Co., Los Angeles, \$34,951; R. R. Hensler, Glendale, \$38,185; Oswald Bros., Los Angeles, \$39,030; Ralph O. Dixon, Los Angeles, \$40,532; Vinnell Co., Alhambra, \$41,007; Clyde W. Wood, Inc., Los Angeles, \$43,808; Phoenix Construction Co., Bakersfield, \$45,640; Bressi & Bevanda Constructors, Inc., Los Angeles, \$46,643; Western Dredging & Construction Co., Los Angeles, \$48,397; J. E. Haddock, Ltd., Pasadena, \$51,875. Contract awarded to Basich Bros., Alhambra, \$34,855.

**SACRAMENTO COUNTY**—Repairing a bridge on the State highway across American River,  $\frac{1}{2}$  mile east of Sacramento. District III, Route 98, Section A. J. & B. Rocca, Stockton, \$8,440; Lawrence Construction Co., Sacramento, \$8,725; M. A. Jenkins, Sacramento, \$8,742; Lord & Bishop, Sacramento, \$8,932; Holdener Construction Co., Sacramento, \$10,965; Kiss Crane Co., San Pablo, \$11,550. Contract awarded to James H. McFarland, San Francisco, \$6,186.

**SANTA BARBARA AND SAN LUIS OBISPO COUNTIES**—Portions between Gaviota Creek and Arroyo Grande, about 8.5 miles to be repaired with plant-mixed material. District V, Route 2, Sections E, D, C, ML, F. Contract awarded to Brown, Doko & Baun, Pismo Beach, \$51,510.

**SAN BERNARDINO COUNTY**—At Itza Ditch, about 4.5 miles east of Essex, a timber bridge to be reconstructed. District VIII, Route 58, Section L. C. J. Paradis, Los Angeles, \$10,189; F. E. Stearman, Glendale, \$9,063; Bent Construction Co., Los Angeles, \$9,934; Ralph A. Bell, San Marino, \$9,642; Fred D. Kyle, Los Angeles, \$9,642; Norman I. Fadel, N. Hollywood, \$11,244. Contract awarded to R. R. Hensler, Glendale, \$8,476.

**SAN DIEGO COUNTY**—Portions of State highway as follows: three bridges to be repaired: one across Otay River, one across South Channel Sweet Water River and one across North Channel Sweet Water River, between 1 and 6 miles south of National City. District XI, Route 2, Section F. Bent Construction Co., Los Angeles, \$29,305; C.

B. Tuttle, Thermal, \$31,009; Walter H. Barber, San Diego, \$32,026; Contracting Engineers Co., Los Angeles, \$34,605; Fred D. Kyle, Los Angeles, \$34,951; Ralph A. Bell, San Marino, \$35,668; Oberg Bros., Inglewood, \$37,215; Ralph O. Dixon, Los Angeles, \$38,038; Byerts & Dunn, Los Angeles, \$45,378. Contract awarded to E. G. Perham, Los Angeles, \$24,768.

**SAN JOAQUIN COUNTY**—Between Tracy and Stockton, portions only, 2.3 miles to be repaired with imported borrow and plant-mixed surfacing. District X, Route 5, Sections A, B. Louis Biasotti & Son, Stockton, \$23,488; A. A. Tieslau & Son, Berkeley, \$28,112; M. J. B. Construction Co., Stockton, \$29,585. Contract awarded to George French, Jr., Stockton, \$23,408.

**SAN LUIS OBISPO COUNTY**—Portions between San Luis Obispo and 1½ miles south of Santa Margarita and between 2 miles east of Estrella River and ½ mile east of Cottonwood Pass Road, about 8.3 miles to be repaired with plant-mixed surfacing. District V, Routes 2, 33, Sections D, BC. Brown, Doko & Baun, Pismo Beach, \$53,880. Contract awarded to Granite Construction Co., Watsonville, \$49,700.

**SAN LUIS OBISPO COUNTY**—Between 0.8 mile west of Pennington Creek and Morro Bay, about 5.6 miles to be repaired by constructing borders of imported base material and placing plant-mixed surfacing over new borders and portions of existing pavement. District V, Route 56, Section D. Granite Construction Co., Watsonville, \$46,815. Contract awarded to Brown, Doko & Baun, Pismo Beach, \$44,419.

**SANTA CRUZ COUNTY**—Between Santa Cruz and Davenport, portions only, about 6.2 miles to be repaired by surfacing with plant-mixed surfacing. District IV, Route 56, Section B. Granite Construction Co., Watsonville, \$59,925; Piazza & Huntley, San Jose, \$60,975; N. M. Ball Sons, Berkeley, \$62,891; E. A. Forde, San Anselmo, \$74,660. Contract awarded to A. J. Raisch, San Jose, \$55,981.

**SOLANO COUNTY**—Between 0.8 mile west of Fairfield and east city limit of Suisun, portions only, about 1.2 miles to be repaired with untreated rock base and plant-mixed surfacing. District X, Routes 7, 53, Sections B, Frfd, Suis. Lee J. Immel, Berkeley, \$24,895; A. G. Raisch, San Francisco, \$26,262; A. A. Tieslau & Son, Berkeley, \$25,096; Piazza & Huntley, San Jose, \$28,527; E. A. Forde, San Anselmo, \$29,031. Contract awarded to Sheldon Oil Co., Suisun, \$23,985.

**SOLANO COUNTY**—Across Napa River at west city limits of Vallejo, the fenders and piers of the existing bridge to be repaired. District X, Route 208, Section A. H. F. Lauritzen, Pittsburg, \$25,475. Contract awarded to J. D. Proctor, Inc., San Francisco, \$20,587.

**STANISLAUS COUNTY**—At Hammond General Hospital, about 0.8 mile, to be graded and surfaced with plant-mixed surfacing on crusher run base. District X. M. J. Ruddy & Son, Modesto, \$30,393; M. J. B. Construction Co., Stockton, \$26,072. Contract awarded to A. A. Tieslau & Son, Berkeley, \$23,751.

**TRINITY COUNTY**—Furnishing and stockpiling crushed gravel near East Weaver Creek about ½ mile west of Douglas City. District II, Route 20, Section 4. Hein Bros. Basalt Rock Co., Redding, \$16,590. Contract awarded to Clements & Co., Hayward, \$12,950.

**TULARE COUNTY**—Between 5.1 miles north of Kern County line and 0.5 mile south of Pixley, about 6.7 miles to be repaired by placing plant-mixed surfacing and applying a seal coat thereto. District VI, Route 4, Section A. Griffith Co., Los Angeles, \$54,422; J. E. Haddock, Ltd., Pasadena, \$58,115. Contract awarded to Brown, Doko & Baun, Pismo Beach, \$52,035.

## Highway Commission Votes Additional Funds For Roadway Repairs

**T**HE California Highway Commission, returning from a three-day tour of the Redwood Empire to study at first hand postwar highway construction projects contemplated in Marin, Sonoma, Mendocino, Lake, and Napa counties, met in Sacramento June 12th and voted funds totaling \$83,802 for the following highway repair jobs.

**Monterey County**, State Route 56—\$4,000 to provide funds for repairing the bridges across Vicente Creek and Limekiln Creek.

**Ventura County**, State Route 9—\$30,000 to provide additional funds for repairing the Santa Clara River bridge at Saticoy.

**Alameda County**, State Route 5—\$30,000 from the contingency reserve, for repairing the present pavement between the Toll Plaza and the San Francisco-Oakland Bay Bridge.

**Riverside County**, State Route 26—\$13,000 for constructing a reinforced concrete culvert on the State highway east of Beaumont. The present culvert is inadequate.

**Kern County**, State Route 145—\$6,000 for surveys and plans and right of way on proposed access highway project between Johannesburg and Randsburg Junction, and between two points 75 miles and 1.5 miles north of Inyokern. The Public Roads Administration has approved this project estimated to cost \$116,000 with the understanding that the State will pay the cost of surveys and plans and right-of-way.

**Sonoma County**, State Route 1—\$431.22 for repairing the present highway between Marin County line and 0.8 of a mile north, the sum of \$9,000 was previously allocated for this project. The low bid received on May 31st was 3.3 per cent in excess of the estimate requiring additional funds.

**Marin County**, State Route 1—\$370.78, to provide additional funds for repairing the present highway between San Rafael and Sonoma County line. The sum of \$20,000 was previously allocated but the low bid received on May 31st was 3.3 per cent in excess of the estimate, requiring additional funds.

## New Raw Materials Access Road Doubles Output of Lumber Mills

(Continued from page 16)

the project, about four miles east of Valley Springs.

WILL DOUBLE PRODUCTION

The industry estimates that it will produce some 72 million board feet per year from the West Point and Sandy Gulch mills compared to last year's production of 38 million feet. This is exclusive of the production at the Toyon mill which receives logs from both the West Point area and the Blagen Lumber Company's mill at White Pines near the Calaveras Big Trees on the Ebbett's Pass road. The total production, therefore, will run close to 110 million board feet.

Both logs and sawed lumber are hauled over this raw materials access road, the lumber coming from the two mills located at West Point and Sandy Gulch and logs being hauled to the Toyon mill. The lumber produced from this area is used principally for ammunition boxes or directly for the armed forces of the United States.

On March 22, 1944, at ceremonies open to the public in the San Andreas Town Hall, the Blagen Lumber Company was awarded the Army and Navy "E" by Colonel Kenneth M. Moore of the U. S. Army Engineers and Commander Kenneth A. Goodwin of the U. S. Navy.

## Freeways Save Property Values

(Continued from page 17)

erty values are increased; decentralization is halted; decadence of business property is checked; equitable property values and taxes reestablished and stability achieved.

That sounds as if someone besides the motor vehicle user ought to help pay the bill. And so they can. If the property owner will be reasonable in his demands for right of way and access rights, willing to keep his business away from the major traffic artery—the freeway—then the motor vehicle owner will gladly foot the rest of the bill because he will not have to invest his money in vain; he will have his travel facility for good and all and save his investment too. For once there will be someone who can have his cake and eat it too!

State of California  
EARL WARREN, Governor

# Department of Public Works

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

CHARLES H. PURCELL, Director of Public Works

A. H. HENDERSON, Assistant Director

## HIGHWAY COMMISSION

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H. SEARANCKE, Acting Administration Assistant

## DIVISION OF HIGHWAYS

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FRED J. GRUMM, Assistant State Highway Engineer  
J. G. STANDLEY, Principal Assistant Engineer  
RICHARD H. WILSON, Office Engineer  
T. E. STANTON, Materials and Research Engineer  
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, Traffic and Safety Engineer  
E. R. HIGGINS, Comptroller  
FRANK C. BALFOUR, Chief Right of Way Agent

### DISTRICT ENGINEERS

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F. W. HASELWOOD, District II, Redding  
CHARLES H. WHITMORE, District III, Marysville  
JNO. H. SKEGGS, District IV, San Francisco  
L. H. GIBSON, District V, San Luis Obispo  
E. T. SCOTT, District VI, Fresno  
S. V. CORTELYOU, District VII, Los Angeles  
E. Q. SULLIVAN, District VIII, San Bernardino  
S. W. LOWDEN (Acting), District IX, Bishop  
PAUL O. HARDING, District X, Stockton  
E. E. WALLACE, District XI, San Diego  
HOWARD C. WOOD, Acting Bridge Engineer, San Francisco-Oakland Bay, Carquinez, and Antioch Bridges

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W. K. DANIELS, Assistant State Architect, Administrative  
P. T. POAGE, Assistant State Architect, Design and Planning

### HEADQUARTERS

H. W. DeHAVEN, Supervising Architectural Draftsman  
D. C. WILLETT, Supervising Structural Engineer  
CARLETON PIERSON, Supervising Specification Writer  
J. W. DUTTON, Principal Construction Inspector  
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  
FRANK B. DURKEE, Attorney  
C. R. MONTGOMERY, Attorney  
ROBERT E. REED, Attorney



# CALIFORNIA STATE HIGHWAY SYSTEM

SCALE IN MILES

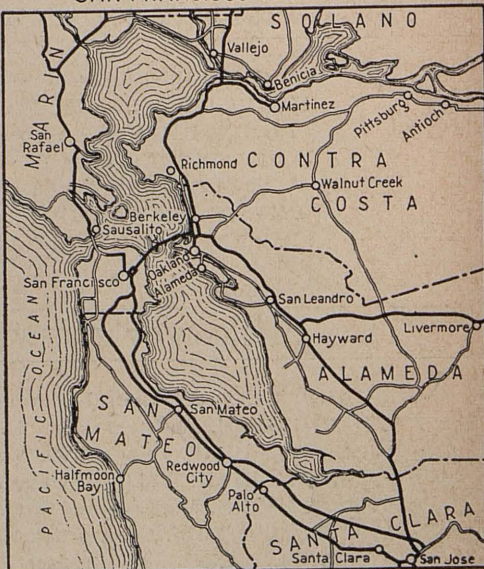


~ LEGEND ~

- Primary Routes
- Secondary Routes
- Proposed Routes



SAN FRANCISCO AND VICINITY



LOS ANGELES AND VICINITY



D50 Illuminant, 2 degree observer

L*	38.12	65.43	49.87	44.26	55.56	70.82	63.51	39.92	52.24	97.06	92.02	87.34	82.14	72.06	62.15
a*	13.24	18.11	-4.34	-13.80	9.82	-33.43	34.26	11.81	48.55	-0.40	-0.60	-0.75	-1.06	-1.19	-1.07
b*	15.07	18.72	-22.29	22.85	-26.49	-0.35	59.00	-49.00	16.50	11.31	0.23	0.21	0.43	0.23	0.19
Density							0.04	0.09	0.15	0.22	0.36	0.51			

Golden Thread

16 (M)	17	18 (B)	19	20	21	22	23	24	25	26	27	28	29	30
49.25	38.62	28.86	16.19	8.29	3.44	1.14	72.46	72.95	29.37	54.91	43.96	82.74	52.79	50.87
0.16	-0.18	0.54	0.05	0.81	0.23	20.98	-24.45	68.83	13.06	-38.91	52.00	3.45	50.88	-27.17
0.01	-0.04	0.03	0.13	0.19	0.48	-19.43	65.93	68.00	-49.49	100.77	50.00	81.29	-12.12	-24.49

Colors by Munsell Color Services Lab

Don Williams