

# CALIFORNIA

## HIGHWAYS AND PUBLIC WORKS

CALIFORNIA  
DOCUMENT



JANUARY - FEBRUARY  
1949

# California Highways and Public Works

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

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Published in the interest of highway development in California. Editors of newspapers and others are privileged to use matter contained herein. Cuts will be gladly loaned upon request.

Address Communications to

CALIFORNIA HIGHWAYS AND PUBLIC WORKS  
P. O. Box 1499  
Sacramento, California

Vol. 28

January-February

Nos. 1, 2



Public Works Building  
Twelfth and N Streets  
Sacramento

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# High Costs

## Seriously Retarding State Highway Building Program

RICHARD H. WILSON, Assistant State Highway Engineer; HENRY C. McCARTY, Office Engineer, and RICHARD R. NORTON, Assistant Office Engineer

WE ARE ALL familiar with the effect of present day inflation on our everyday life. The cost of building a house is from two to three times the prewar cost; food prices have more than doubled; in fact every item of cost has increased to such an extent that our income is equivalent in purchasing power to less than half of what it was before the war.

A natural question is "What effect is inflation having on California's Highway Construction Program?" Highway construction has not escaped the inflationary pressure, and the following facts show that contract prices have more than doubled since 1940.

The basic elements of cost of highway construction are: (1) materials, (2) wages and (3) equipment rental or ownership cost. Other factors such as overhead, supervision, taxes, insurance and profit are usually proportional to the three basic elements.

### Cost of Materials

An investigation was made of the cost of materials used in highway construction covering price trends for cement, asphaltic products, aggregates, steel, lumber, corrugated metal pipe, concrete pipe, and freight rates.

The following tabulation shows a comparison of 1940 and 1948 average cost to the contractor of these materials on a state-wide basis from the best available information.

Item	Unit	1940 Price	1948 Price	Per cent increase
Cement	Bbl.	\$2.29	\$3.34	46
Paving asphalt	Ton	6.54	16.29	149
Aggregates	Ton	1.13	1.79	58
Reinforcing steel	100 Lb.	2.37	5.02	112
Structural steel	100 Lb.	3.65	5.16	41
Lumber	MFBM	32.36	96.17	197
CMP	Lin. Ft.	1.84	2.64	43
Concrete pipe	Lin. Ft.	3.30	4.67	41

These price increases are shown on the accompanying charts for the period 1940 to 1948, plotted on an index scale with the year 1940 equal to 100. (See page 2.)

### Range of Increases

From the above examples it can be seen that there is little uniformity in the price increases from 1940 to 1948. They have only one thing in common—they are all increases. The extreme range from a 41 percent increase in the price of structural steel and concrete pipe to the 197 percent increase in the price of lumber shows that prices are extremely unstable.

An analysis has been made of the more commonly used highway construction materials to determine the average increase as applicable to highway construction costs. To determine the average cost increase, the amount of materials required to perform the eight major contract items listed on page 4 was compiled. The cost of materials required to perform that quantity of work in 1940 and in 1948 was established and from this it was determined that materials in general had increased in August, 1948, to 183 percent of the 1940 cost.

The average freight rate increases are those granted by state and federal regulatory bodies since 1940 and are 144 percent of the 1940 rates.

### Labor Costs

Labor costs were investigated from available contractor's labor statistics. These data show that in 1940 the average wage paid for an hour's labor (skilled and unskilled) on California highway construction projects was \$1.01. For the first half of 1948 this figure had risen to \$2 or 198 percent of the 1940 cost. Overtime paid is taken into account in the labor costs shown but other costs such as subsistence, travel time, taxes, and labor efficiency (or productivity) are not in the curve of hourly labor rates.

The sharp increase from 1941 to 1942 is probably accounted for by the large amount of overtime worked at the be-

ginning of the war and not to a large increase in wage rates. The steady rise in wage costs show that the wage stabilization orders of the Federal Government during the war years were not entirely effective in keeping actual labor costs from rising.

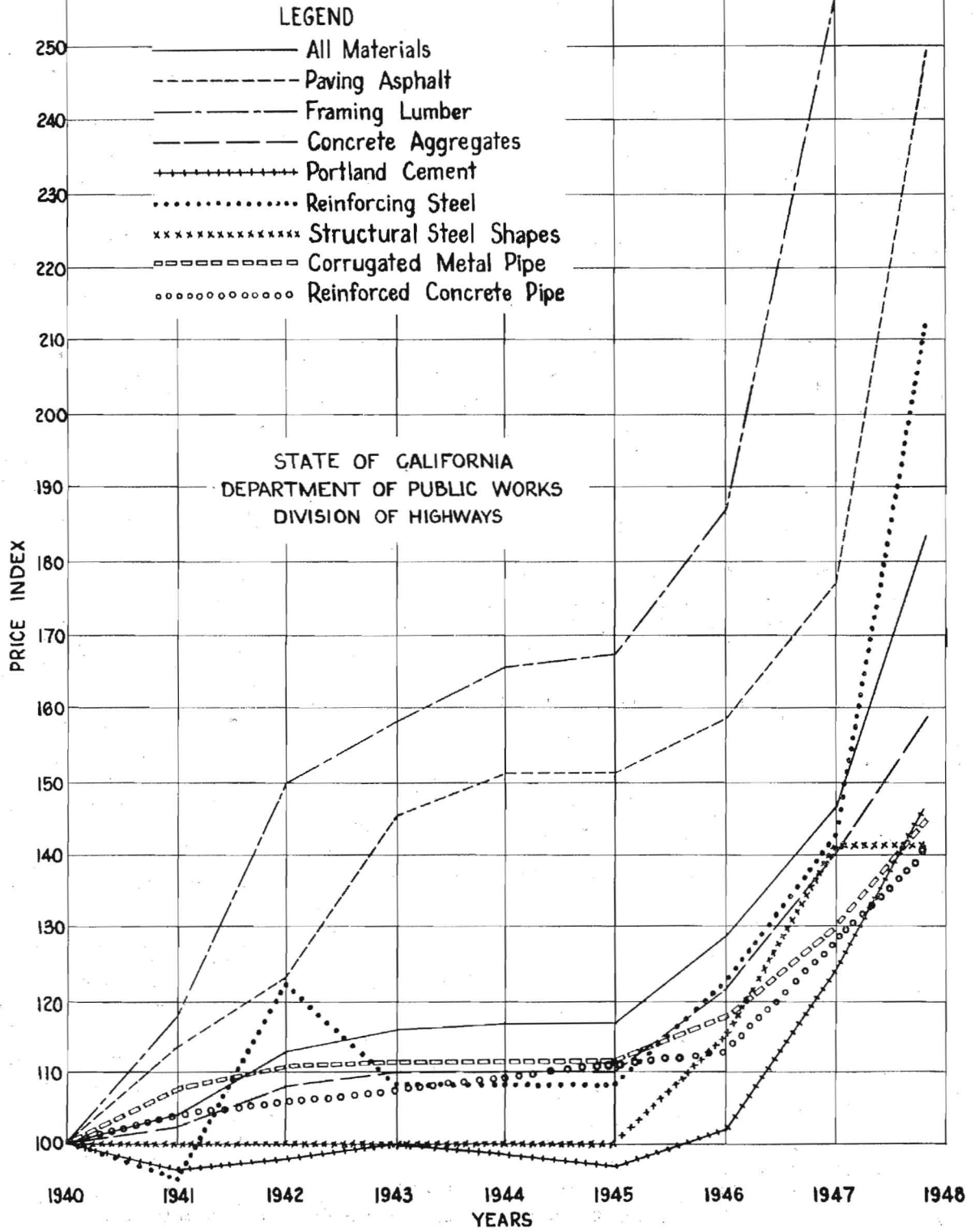
There is nothing to indicate that labor costs will not continue to rise. The 1946 labor cost was \$1.75 per hour. In 1947 it rose to \$1.82, a \$0.07 increase. For the first half of 1948 it was \$2 or an increase of \$0.18 in a six months' period. As the cost of living continues to increase (the cost of living increases at the rate of about 10 percent per year, according to the Bureau of Labor Statistics) it can be expected that demands for still higher wages will be encountered. The data showing the increase in hourly labor costs do not reflect the true increase in labor costs to the contractors due to the fact that labor productivity is not as great now as it was in 1940.

Mr. W. D. Shaw, Manager of the Southern California Chapter of the Associated General Contractors of America, in his letter of September 14, 1948, states that labor productivity is now only 65 percent as compared to 1940. Other sources such as the *Engineering News Record* estimate this factor at from 60 percent to 70 percent compared to 1940.

### Increased Mechanization

The continued mechanization of highway construction operations since 1940 has, according to the opinions of various California highway contractors, somewhat offset the decrease in the productivity of individual workmen. In other words the percentage of unskilled labor to total labor has decreased as a larger proportion of highly skilled labor is utilized as a result of increased mechanization.

# PRICE INDEX CONSTRUCTION MATERIALS



To arrive at the true increase in labor costs at the present time a conservative productivity factor of 75 percent (compared to 1940) has been used. This factor was used rather than the low factor of 65 percent as estimated by Mr. Shaw, as the increased mechanization in highway construction mentioned above will warrant increasing this factor to 75 percent. The decrease in productivity since 1940 has been applied to hourly labor costs on a uniformly decreasing basis since 1940 to arrive at the curve of actual labor cost increases.

These data show that labor costs for the first half of 1948 were 264 percent of the 1940 cost. (1940 cost = 100 percent)

#### Equipment Situation

The cost of new highway construction equipment has increased to 188 percent of the 1940 cost for the United States as a whole, according to Marshall and Stevens of Chicago, as shown in the May 27, 1948, issue of *Engineering News Record*. Since equipment costs are fairly uniform throughout the country, the national average was used for comparison.

According to the Public Roads Administration the cost of equipment ownership and operation is now 160 percent of the 1940 cost with costs rising sharply as old equipment is being replaced with new equipment at higher prices.

From the foregoing known factors an analysis was made showing the overall increase in contractor's costs of performing highway construction in California since 1940. The factors of 45 percent for labor, 27 percent for materials, 23 percent for equipment and 5 percent for overhead costs to total costs have been determined from records of recently completed California highway construction projects. In order to determine the cost of labor, the direct payments to labor on a number of recently completed projects was compiled from notarized labor statistics submitted by the contractors in accordance with federal requirements.

#### Profit or Loss

From these figures, which do not include other costs such as unemployment insurance, social security, and

compensation insurance, it was determined that the direct payments to labor averaged 37 percent of the payments to contractors by the State. This figure varied from a low of 24 percent to a high of 44 percent on various contracts. A low percentage of labor cost probably indicates a higher margin of profit, while a high labor cost may indicate a considerable financial loss on the project. The State is not in a position to determine these factors of profit or loss, and in order to arrive at average costs to the State it is necessary to use average labor costs as shown by the contractors' reports.

In order to determine actual labor costs, the pay roll payments referred to above were increased by 10 percent to cover unemployment insurance, social security, compensation insurance, and other labor costs in addition to direct pay roll payments. Then the actual payments to contractors on the same tabulated contracts used to accumulate pay roll payments was determined. Although, as stated above, the actual profit to the contractor is not known, the cost to the State was reduced by 10 percent to arrive at the approximate contractor's cost on the assumption that the average contractor's profit is somewhere near 10 percent. The ratio of total labor cost (direct labor payments plus 10 percent) to the contractor's cost (amount paid by the State reduced by 10 percent contractor's profit) produced the ratio of 45 percent labor cost to contractor's total cost.

#### Construction Cost Factors

Accurate statistics were available in determination of the 45 percent labor cost and the 27 percent material cost. The 23 percent equipment cost was determined by assuming 5 percent overhead cost and the equipment cost arrived at by difference between these factors and 100 percent.

The relative index numbers of these various construction cost factors are shown in the following tabulation. The first column is the percent of total cost of construction represented by that item; the second column is the present cost of that item using 1940 as an index number base; the third column is the present index number cost of the item.

Item	Percent of item in total construction cost	Present cost of item compared to 1940=100	Present number cost of item compared to index total construction cost (1940=100)
Labor	45	264	118.80
Materials	27	183	49.41
Equipment	23	188	43.24
Overhead	5	200	10.00
1948 Contractor's Cost Index			221.45

#### Contractor's Costs

In the above analysis of contractor's costs the intangible item of materials availability has not been taken into account. Although the term "intangible" is applied to this item, it is known to be a real factor in increasing contractor's costs. Any delays to the contractor in the delivery of materials to an orderly schedule increases his cost considerably and this must be taken into account in the preparation of bids. However, because of the impossibility of determining this factor it has not been considered in this analysis.

The above index shows that contractor's costs have increased 121 percent over 1940. The next natural question is: how does this compare with the increase in bid prices for highway work?

From available contract records an index has been computed of highway construction costs determined from amounts paid to contractors for highway work since 1940. This cost index is shown on the accompanying chart. (See pages 6-7.)

#### 1940 Base Year

The year 1940 has been selected as the base year with an index number of 100. The year 1940 represents conditions before the beginning of the National Defense Program which started the rise in construction costs.

Eight major contract items have been selected for study as representative of the majority of work on State Highway contracts. In order to give the proper weight to each item the total quantity of each item for the fiscal year beginning July 1, 1947, and ending June 30, 1948, has been compiled. Following is a list of the eight items and the total quantity for the year ending June 30, 1948.

Item No.	Item	Quantity
1	Roadway excavation	15,697,410 cubic yards
2	Crusher run base	681,611 tons
3	Plant-mix surfacing	1,501,178 tons
4	Asphalt concrete	34,060 tons
5	Portland cement concrete pavement	209,157 cubic yards
6	Class "A" Portland cement concrete (structures)	163,760 cubic yards
7	Bar reinforcing steel	27,305,435 pounds
8	Structural steel	36,413,500 pounds

The average bid prices for these items were weighted by determining the total quantity and total cost of each item in each year from 1940 to 1948, and the average weighted bid price determined.

#### Average Bid Price

The weighted average bid price for each of these eight items was then multiplied by the total quantity of that item for each full year from 1940 to 1945 and for each half year thereafter. This gave a comparative cost of doing the same work in each period since 1940. With 1940 taken as the base year, with an index number of 100, comparative costs for the following periods are as follows:

	California highway construction cost index
1940	100.0
1941	125.0
1942	157.5
1943	156.4
1944	177.8
1945	179.5
1946 (1st half)	166.1
1946 (2d half)	193.2
1947 (1st half)	202.5
1947 (2d half)	204.1
1948 (1st half)	216.8

In other words, an item of work that cost \$100 in 1940 cost \$216.80 in the first six months of 1948 or an increase of 116.8 per cent.

It will be noted from the preceding figures that the contractor's cost index of 221.45 is 4.65 index points higher

than the index of 216.8 representing actual cost to the State. A rational explanation would be that on an average contractors are making less profit. However, with the numerous assumptions which must be made, especially labor productivity, it is not believed that the small difference has any significance.

#### Composite Mile Index

The Public Roads Administration "Composite Mile Index" and the *Engineering News Record* "Construction Cost Index" are also shown plotted on the chart. These indices have been re-computed on the basis of 1940 to show the comparison with the California index. The Public Roads Administration index is based on actual contract prices paid in the United States as a whole and is in very close agreement with the California index at the present time. The Public Roads Administration Index is 210.2, or an increase of 110.2 percent, for the first quarter of 1948 and 217.7, or an increase of 117.7 percent, for the second quarter of 1948 as compared to the California Index of 216.8, or an increase of 116.8 percent, for the first half of 1948.

The *Engineering News Record* index is based on a fixed amount of materials and hours of labor and according to the editors of the magazine is not adjusted for labor productivity, materials availability or other "intangibles" and as would be expected is lower than either the California or Public Roads Administration index, which are based on actual over-all costs.

The trend shown by all three of these indices is that costs are increasing at a faster rate than ever before and that the "leveling off" influence that was widely predicted a year or two ago has definitely not materialized.

Mr. G. Donald Kennedy in his report, dated October 15, 1946, to the California Legislative Joint Fact-Finding Committee predicted that construction costs would be twice the 1940 figure for the fiscal year ending June 30, 1947. The actual index was 202.5 for the first half of 1947, which is in very close agreement. However, Mr. Kennedy predicted that June, 1947, would be the peak of construction cost, as shown in the chart on page 113 of his

report, and that costs would level off from that point to 128 percent of his 1937-1941 base.

While it is probable that a peak in prices will be reached, followed by a decline, there is no reliable evidence at this time to indicate what the peak will be or when it will occur.

#### Effective Competition

From the above, a natural question arises as to the cause of this increase in construction costs. Is the large amount of highway construction now being placed under contract creating an inflationary pressure on the construction market?

On July 1, 1948, there were 507 contractors prequalified by the Division of Highways with a combined bidding capacity of \$1,049,000,000.

On November 1, 1948, there were 283 contracts in force with a combined construction cost of contract work only, not including construction engineering, in the amount of \$88,604,000.

The amount of work under contract was only 8.4 percent of the total bidding capacity. Therefore, it can be seen that the use of this low proportion of the available contracting capacity certainly is not a factor in increasing prices.

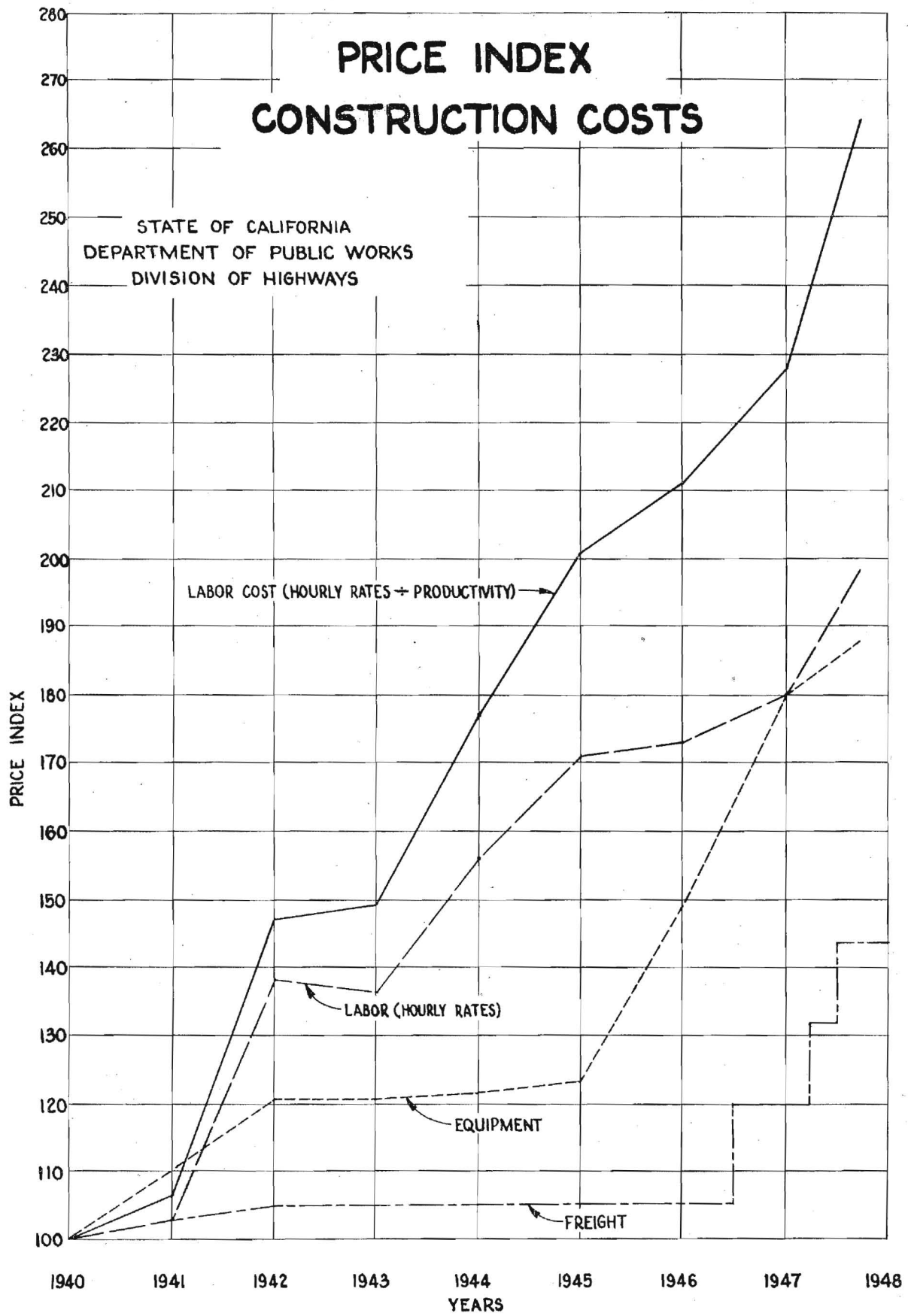
To illustrate the bidding capacity available, the following tabulation shows the number of contractors available for various size projects:

Size of project	Number of contractors pre-qualified
\$1,000,000 and over	137
\$ 250,000 to \$1,000,000	187
\$ 125,000 to \$250,000	347
\$ 50,000 to \$125,000	382
Up to \$50,000	507

At this point it is interesting to note the number of bids received on various sized projects advertised in the period from July 1, 1947, to June 30, 1948:

Size of project	Average number of bidders
Up to \$50,000	4.5
\$50,000 to \$100,000	5.2
\$100,000 to \$250,000	6.6
\$250,000 to \$500,000	7.4
\$500,000 to \$1,000,000	7.0
Over \$1,000,000	7.4
All projects	5.6

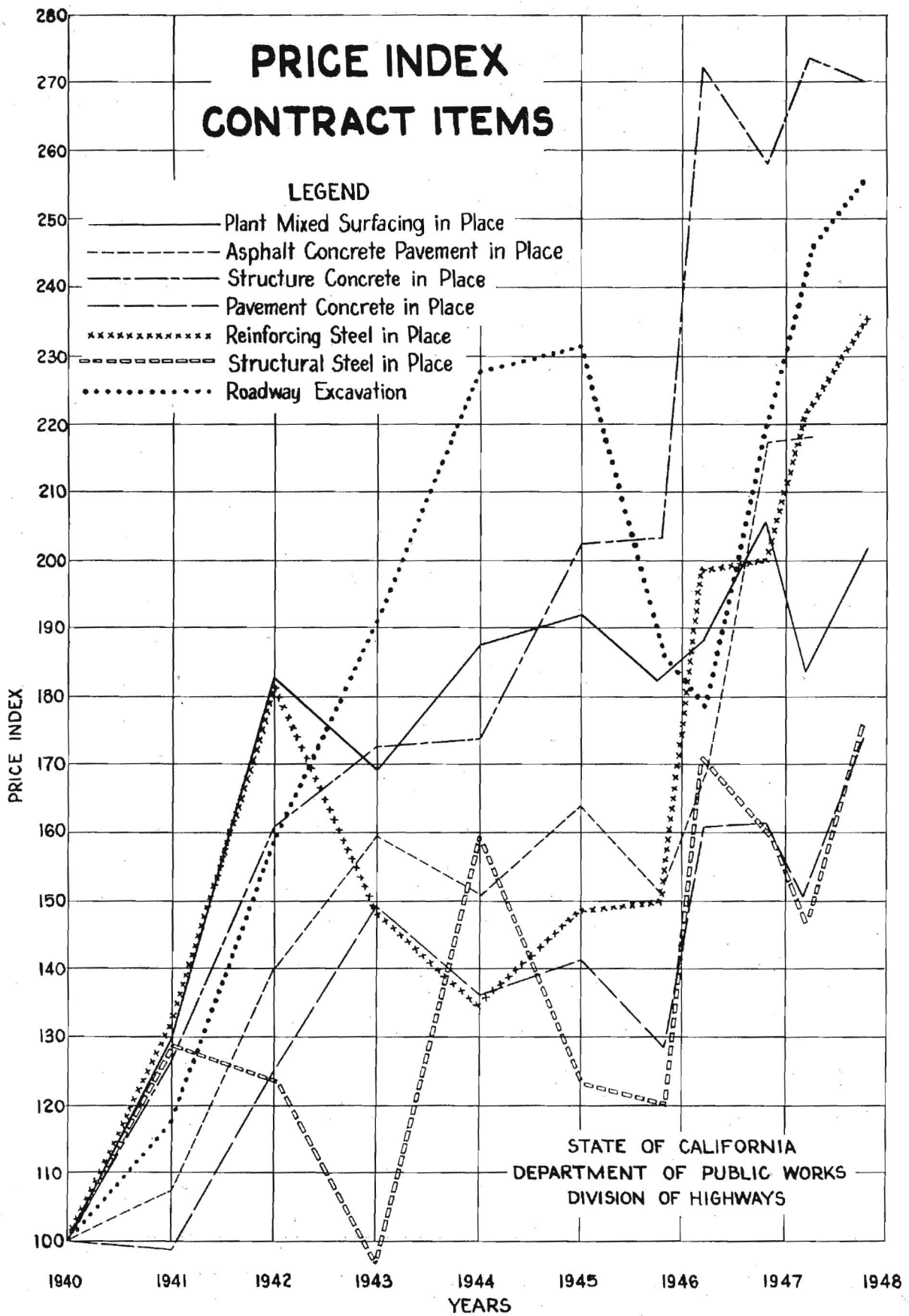
# PRICE INDEX CONSTRUCTION COSTS



# PRICE INDEX CONTRACT ITEMS

## LEGEND

- Plant Mixed Surfacing in Place
- - - Asphalt Concrete Pavement in Place
- - - Structure Concrete in Place
- - - Pavement Concrete in Place
- \*\*\*\*\* Reinforcing Steel in Place
- - - Structural Steel in Place
- ..... Roadway Excavation

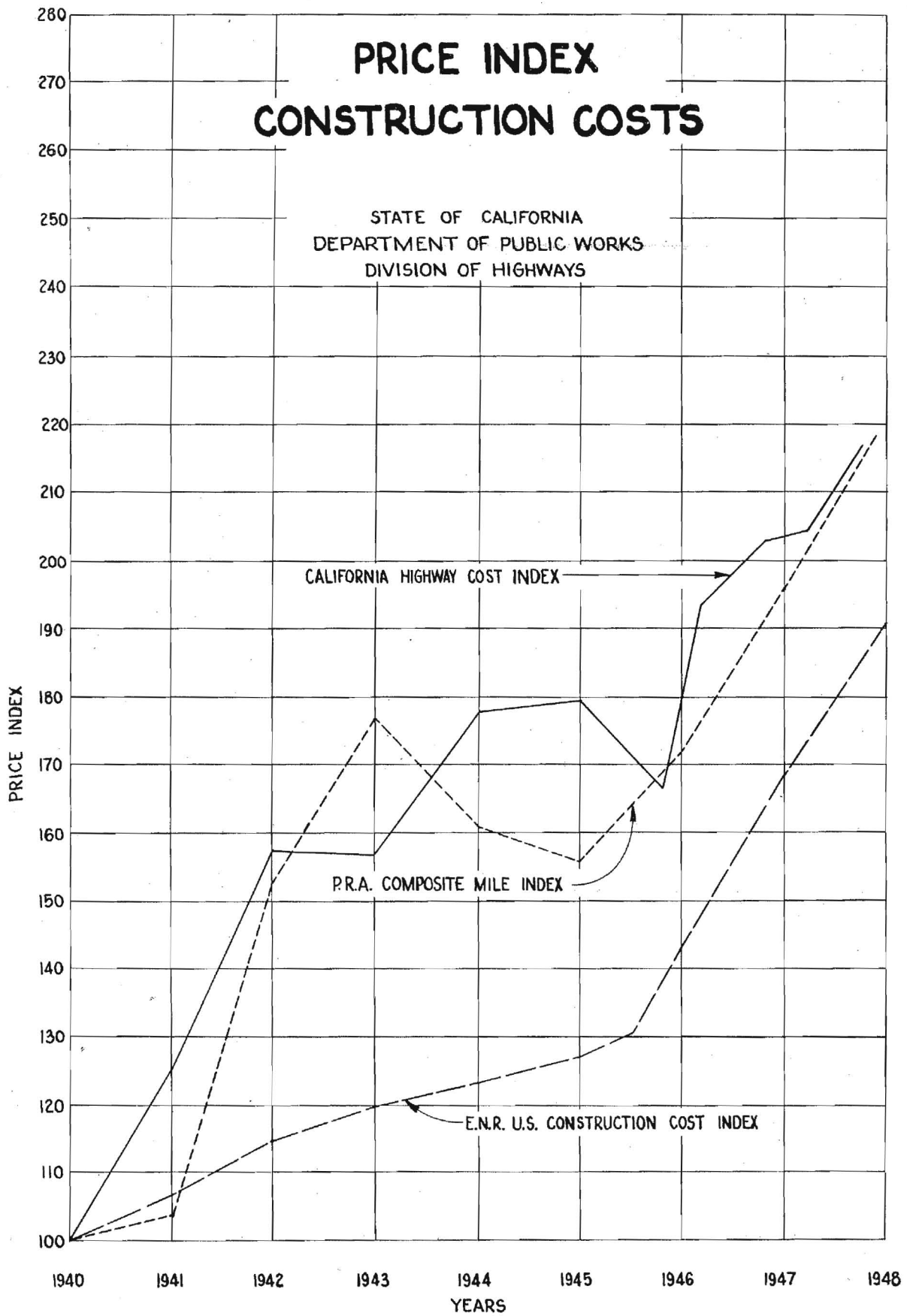


STATE OF CALIFORNIA  
DEPARTMENT OF PUBLIC WORKS  
DIVISION OF HIGHWAYS



# PRICE INDEX CONSTRUCTION COSTS

STATE OF CALIFORNIA  
DEPARTMENT OF PUBLIC WORKS  
DIVISION OF HIGHWAYS



From this tabulation it can be seen that the general trend is greater competition on the larger projects than on the smaller projects. This is at variance with the idea proposed in some quarters that contract prices could be reduced by splitting up large projects into smaller units to give smaller contractors more opportunities to bid.

With 137 contractors prequalified to bid on projects of over \$1,000,000 and with an average of 7.4 bids received on these large projects, it is evident that the size of projects advertised is not an inflationary factor, but has been in fact an influence to keep prices from increasing even more.

#### Highway Deficiencies

Since the correction of the critical deficiencies in the State Highway System was predicated on a relatively short period of high prices, with a subsequent leveling off, it can be readily seen that the continuance of the upward trend in construction costs has and will continue to offset gains in revenue under the Collier-Burns Act of 1947 and will make it impossible to modernize the California State Highway System in step with population and traffic increases. In the July, 1940, issue of *California Highways and Public Works*, Mr. Fred Grumm, Deputy State Highway Engineer, estimated that the State Highway System would require the expenditure of \$512,000,000, not including right of way costs, to bring it up to modern standards at that time. This figure was based on 1940 design standards and 1940 construction costs.

In 1946 the State Highway Deficiency Report, which appeared in the *Senate Daily Journal* of June 19, 1947, lists the cost of correcting the critical deficiencies that existed at that time as \$1,173,000,000, exclusive of right of way expense, based on 1946 design standards and 1946 construction costs.

To bring both of the above up to date in line with 1948 construction costs, the 1940 and 1946 estimates will have to be expanded by the appropriate cost increase factor to make them comparable.

1940 Estimated Deficiencies =  
\$512,000,000

1948 Price Index (1940 = 100) =  
216.8

$\$512,000,000 \times 2.168 = \$1,110,000,000$  = 1948 cost of correcting 1940 deficiencies to 1940 design standards.

1946 Estimated Deficiencies =  
\$1,173,000,000

1948 Price Index (1946 = 100) =  $\frac{216.8}{179.7}$   
= 120.6

$\$1,173,000,000 \times 1.206 = \$1,415,000,000$  = 1948 cost of correcting 1946 deficiencies to 1946 design standards.

#### Increase in Standards

The difference between the 1948 cost of bringing the State Highway System up to 1940 design standards of \$1,110,000,000 and up to 1946 standards of \$1,415,000,000 is due to the increase in standards since 1940.

The increased design standards are made necessary by the change in character, volume and weight of traffic since 1940. These changes require more lanes, heavier bases, pavements and structures than were contemplated in 1940.

To illustrate the unprecedented growth that has occurred in California since 1940 there follows a tabulation of some of the more important factors:

Item	1940	1948	Percent increase
Population	6,907,387	10,250,000 (est. 1-1-49)	48.4
Total vehicle registration	2,990,262	4,010,000 (estimated)	34.0
Taxable motor fuel consumed (million gallons)	1,733	2,959 (estimated)	70.7
Vehicle miles per day on rural state highway system	21,302,000	29,373,000 (estimated)	37.7

#### Fuel Consumption

With proper corrections, taxable motor fuel consumed can be considered as a measure of total traffic on all roads and streets in the State. In 1940 the average motor vehicle in California consumed 581 gallons of fuel. In 1948 the fuel consumption per vehicle was estimated as 656 gallons or an increase of 75 gallons. While there has been a slight increase in the total miles traveled per vehicle per year, it has been estimated that two-thirds, or 50 gallons of the increased fuel consumption is due to decreased mileage per gallon.

This decreased mileage per gallon is due to a combination of the following factors:

- (a) Increased average age and consequent decrease in efficiency of motor vehicles.
- (b) Increased congestion in traffic, both rural and urban, particularly delays caused by the large increase in traffic signals installed since the end of the war.

By applying this factor to the 70.7 percent increase in motor fuel consumed, the increase in total traffic on all roads and streets in the State was determined to be 57.2 percent.

#### Traffic Increases

As the vehicle miles on the Rural State Highway System have increased 37.7 percent in the same period and it is reasonable to assume that the increase for the total State Highway System (urban and rural) is proportional to the total traffic increase in the State, then it must be concluded that traffic on the Urban State Highway System has nearly doubled.

This conclusion was reached in the following manner: The relationship between urban and rural state highways was taken as 15 percent and 30 percent respectively of the total traffic in the State in 1940. This relationship was determined in 1934 and 1937 by the Highway Planning Survey and may be expressed as  $T = \text{Urban State Highway Traffic}$  and  $2T = \text{Rural State Highway Traffic}$ , both in the year 1940. Then  $3T = \text{Total State Highway Traffic}$ . Since we have assumed that total state highway traffic has increased at the same rate as total traffic in the State, then in 1948 the total state highway traffic would be:

$$3T \times 1.572 = 4.716T$$

The 1948 rural state highway traffic would then be:

$$2T \times 1.377 = 2.754T$$

From the above the 1948 urban state highway traffic would then be:

$$\frac{4.716T - 2.754T}{T} = 1.962$$

or an increase of 96.2 percent since 1940.

#### Freeways Needed

This large increase in metropolitan State highway traffic, which can be verified by any motorist in any city in California by the traffic congestion he encounters daily, shows the need for increased freeway construction in urban areas.

# Times Change

And So Do Designs  
of Highway Building

By GEO. T. McCOY, State Highway Engineer

CONSIDERATION of the constant large expenditures for repair and reconstruction of existing highways is quite apparent evidence that the old method of building highways at ground level through flat terrain is no longer proper construction. The cumulative effect of these conditions has resulted in base and pavement failures and explains the necessity for drastic change in our design and construction techniques, so as to provide better service life and reduce maintenance expenditure.

We found it necessary to revise our designs of state highway construction as the conditions changed: the larger increase in the total number of motor vehicles; the increase in their speed; the even greater increase in the number and weight of heavy trucks; the greater mileage and area of operation.

## Bearing Power

Present design procedure investigates and recognizes the value of bearing power of the existing soil upon which the new highway is to be placed and the adverse effect of high water traffic volumes and the degree of com-

paction necessary for the top three feet of the highway prism have been determined and standardized. This has resulted in adopting a minimum grade raise of 2.5 feet above questionable ground such as usually exists through flat valley terrain, in order to avoid having to excavate to place base and surface material and to clear high water tables.

Where a greater depth than 2.5 feet prevails for some distance, it can usually be accounted for by need to get the grade above a high water condition. Occasional deeper fills are usually due to ground undulations.

## Current Practice

On projects where two new lanes are being constructed adjacent to an existing highway for four-lane use, it is current practice to place the new grades approximately two feet above existing highway grades to permit placing additional surfacing on the old highway when reconstruction is necessary. This is done to eventually get all lanes at approximately the same elevation, a particularly desirable condition at crossovers.

Additional controls that affect height of grade line above existing ground are a necessity to clear culvert installations with maximum cover at shoulder edge and tie in to bridge grades that are purposely placed high to clear high water elevations.

## Grade Changes

With so many controls on position of grade with respect to original ground, there is generally very little leeway in which to undulate the grades for quantity reduction. Apart from the economical aspect of the design, it is necessary to eliminate such grade changes, where reasonable to do so, because of their average effect on night driving due to shifting light beams. They can affect sight distance depending upon the amount of change. These refinements are all factors that are seriously concerned with traffic safety. They are considered well worth the additional cost. Under the light traffic volumes of the past, the need for such high standards of design was not as great as it is today with our highways crowded to capacity.

## HIGH COSTS

Continued from page 8 . . .

There is nothing to indicate that the public demand for freeway construction will not continue to increase as the freeways now under construction are completed and the motoring public becomes more familiar with their obvious advantages.

If we accept the 1946 estimated deficiencies, which at 1948 prices amount to \$1,415,000,000, exclusive of right of way costs, then it can be seen how long it will take to correct these deficiencies without taking care of future deficiencies

which are certain to occur due to the large increase of urban traffic.

If we assume that present prices will continue without change, the deficiencies remain unchanged and current revenues available for construction remain at the present level then the correction of present deficiencies would require the following period of time:

$$\frac{\$1,415,000,000 \text{ (Present Construction Deficiencies)}}{\$70,000,000 \text{ (1949-50 Construction Budget)}} = 20 \text{ years}$$

If the assumption is made that the price structure will continue to rise indefinitely or that it will level off at a point as high or higher than it is now,

then we are faced with the fact that the time of correcting deficiencies in the State Highway System will be materially lengthened.

If prices decline substantially and present revenues remain approximately the same, the highway construction program can be accelerated.

If prices remain at present levels or continue to rise, the modernization of the highway system with its increasing traffic must proceed at a greatly reduced and inadequate rate.

The above analysis of rising construction costs and increasing traffic congestion does not present a very bright outlook for early modernization of the California state highway system under present economic conditions.

# Efficiency

*Stores Department Embodies Best Commercial Practices for Economy*

By MILTON HARRIS, Stores Engineer

**B**UILDING HIGHWAYS in California has become "big business."

The California State Highway System was established in 1912 and expenditures by the California Highway Commission for the year 1913 amounted to \$2,098,000.

During the intervening years highway development has been such that in October, 1948, the Highway Commission adopted a state highway budget for the Fiscal Year 1949-50 totaling \$128,000,000.

An annual budget of this amount clearly indicates the magnitude of operations attained in this phase of State Government.

Through 35 years of its existence the California state highway organization grew slowly with increased functions added here and there to accommodate its expansion.

## **Highway Division Streamlined**

In 1947, however, after the State Legislature passed the Collier-Burns Highway Act, the entire state highway organization was revamped to a streamlined design.

Having become "big business" it was deemed advisable to adopt policies and administrative practices followed by highly efficient and successful industrial organizations. To attain this end, the Division of Highways administrative structure was reorganized upon a broader basis, decentralizing executive control from the State Highway Engineer to Assistant State Highway Engineers, each in charge of a particular phase of work, such as "Operations," "Planning," "Administration," "Bridges," etc.

## **Stores Department**

Under the direction of the Assistant State Highway Engineer in charge of Administration, were placed the functions of the Office Engineer; city and city-cooperative projects; county and county-cooperative projects; and the

establishing of a new agency—a Stores Department.

Though the reorganization was accomplished quickly, it was the result of several years of study and careful planning. Included in the plan was the gathering together under one subdivision procurement and distribution of all supplies, materials, and light equipment—a Stores Department.

The California Division of Highways employs approximately seven thousand persons to conduct its business of planning, designing, constructing and maintaining state highways. This personnel includes engineers, attorneys, truck drivers and equipment operators, mechanics, and laborers, accountants and clerks, typists and stenographers and many other classifications. For the effective performance of this organization there must be furnished tools with which to work, supplies with which to function, and materials from which highways may be fabricated.

In a governmental agency of such size, operating under an annual budget of more than 100 million dollars, the quantities of required tools, supplies, and materials run into large totals. Purchases for the Division of Highways processed through the Stores Department amount to about 7.5 million dollars per year.

## **War Surpluses Bought**

In the establishment of the Stores Department under the reorganization of the division, this new procurement and distributing section was built around the organization which had been established in 1945 to take advantage of war surplus material offered for sale by the War Assets Administration.

The California State Legislature authorized purchase and stockpiling of such material by Act of June 23, 1945. The Division of Highways acting under authority of the Director of Finance immediately commenced in-

spection and purchase of items considered desirable.

The problem of storage which presented itself from the beginning was solved by renting a warehouse at Puente in Los Angeles County for purchases made in Southern California and erecting temporary warehouses in Sacramento on state property purchased for other purposes. Incidentally, the temporary Sacramento warehouses were constructed of surplus army barrack buildings placed on raised foundations so as to provide sufficient headroom for adequate storage.

## **Big Savings Effected**

War surplus further gave rise to the problem of adapting materials to civilian or highway use, other than that for which the material was originally designed and manufactured. To meet this phase, which was purely an engineering problem, highway engineers were assigned to investigate the feasibility of utilizing items offered for sale and their efforts were reflected in the saving of thousands of dollars to the motoring taxpayers of California.

A sum of 880,000 was spent in buying war surplus supplies and a saving of \$580,000 has been realized to date as based on current average commercial prices.

To effect these savings, the engineers converted tent pegs into survey stakes, barbed wire entanglement posts into sign and fence posts by welding them into useable lengths, pilot house chairs into draftsmen's stools, barrack buildings into dwellings, ammunition dumps into storage buildings, camouflage and torpedo netting into bank protection devices and so on.

The next logical problem to be overcome was distribution of these surplus purchases to the users as they required them and to accurately bill their costs. The whole problem of supply and distribution for highway use was critically analyzed in order that

it might be put on an efficient basis, accountants were called in to devise proper bookkeeping systems and the Stores Department became an operating organization.

#### **Functions of Department**

The functions of a Stores Department as conceived by the Division of Highways encompasses much more than merely storing and distributing items used by their forces. Though, with the exception of heavy road equipment and automotive units, all supplies, equipment, and materials are purchased through this procurement organization, the name Stores Department is really a poor substitute used in lieu of something more descriptive as a designation for a service largely of an engineering nature.

A name should be devised to denote analyzation of needs and use, preparation of specifications, research to obtain the best materials for the job at hand and economic research to keep abreast of price trends, supply and demand. However, the immediate need of an operating agency to accomplish these functions transcended the need of a name, therefore, the use of the title Stores Department should bring to mind a group of engineers attacking an economic highway problem, rather than a few storehouses filled with pencils, rope and red tape.

#### **Problems of Buying**

Analyzation of needs takes the supply problem from the realm of guessing and puts it on a firm logical basis of actual field usage. No great amount of skill is necessary to predict required quantities of nails and the specific uses for which various nails will be needed, but to collect this data and project it ahead six months so that an adequate quantity of nails are in stock at that time, yet not too many, requires time, effort and coordination.

If no one does this job, nails will be bought on someone's guess and the State may be the loser. Nails may not appeal to you as an item of moment, yet when Highways buy nails in car-load lots, it looms big and when combined with 8,000 other items requiring the same type of research we reach king-size proportions.

Analysis of needs brings to light many other possibilities for saving money, such

### **Boss of Stores Department**

Richard Hagan Wilson, Assistant State Highway Engineer in charge of Administration, has the following major phases of state highway work under his direction:



RICHARD H. WILSON

The Office Engineer and his functions; County and County Cooperative Projects; City and City Cooperative Projects; Stores Department.

Mr. Wilson has gained wide experience in the field of highway engineering by progressively holding various positions of importance since graduation from the University of Michigan in 1912. His early highway endeavors were with the California Highway Commission from 1912 to 1915 after which he migrated to the Washington State Highway Department. Following two years duty with the Army, 14 months of which was in France, he returned to Washington for eight years, during which period he became District Engineer in that State. California again beckoned him and in 1927 he became District Maintenance Engineer at Eureka. From there he was transferred to District III as Office Engineer and in 1933 he became Headquarters Office Engineer. In October, 1947, Mr. Wilson was again promoted, this time to the position of Assistant State Highway Engineer.

"Dick" Wilson, as he is affectionately known to his many friends throughout the State, has gained a national reputation for his work on the Administrative Committee of the American Association of State Highway Officials.

as standardization, elimination of overstocking or underbuying, and substitution. As an example of possibilities in standardization, research on the use of survey stakes brought to light the facts that the Division of Highways had formerly purchased stakes in small quantities from various local mills at prices ranging from \$20 to \$60 per thousand and 26 different types of stakes were being purchased. These types were reduced to six in number and bids were called for in quantities suitable for a year's supply with the result that a net annual saving of \$20,000 accrued to the State.

#### **Overstocking Eliminated**

To properly maintain the State's highways, approximately 300 tons of grader blades are used annually as replacements on machines that smooth road surfaces and shoulders, clean ditches, and mix oil and rock for resurfacing. Previously it was the custom to request each maintenance superintendent to estimate his requirements for the year. If he felt that the number received the previous year filled his needs, he reordered in like amount and before many years had passed, it was found that certain territories were overstocked to the point that some of the blades were obsolete.

This overstocking has now been obviated and each superintendent receives a sufficient allowance to complete his work; the remainder are stocked in central warehouses to be used in understocked areas or for emergency issue as the need arises. Proper working level is maintained by analysis of actual use in the preceding year balanced against mileage of improvement that eliminates grader work and against estimated maintenance funds.

#### **Time and Money Saved**

Understocking may be as severe a money eater as overstocking due to the necessity of purchasing small quantities at various times, often at retail prices, and because of the inability to follow price trends, particularly under the present rising market and scarcity of certain supplies. As an example, before the installation of the Stores Department, the Division of Highways issued on an average of 12 purchase orders per year for each item purchased. This was small lot buying with

a vengeance. Today, this type of buying is being eliminated as far as is consistent with available warehouse space, so the attendant waste in higher prices and time lost in waiting for delivery is disappearing.

Time lost in waiting is an intangible factor, but it is a fact that the time of previous delivery was a minimum of thirty days from time of preparation of the requisition to delivery of the item. With present storage facilities this has been reduced to a matter of a few days and with both warehouses functioning it will be the policy of the Stores Department to complete delivery of items in stock within forty-eight hours.

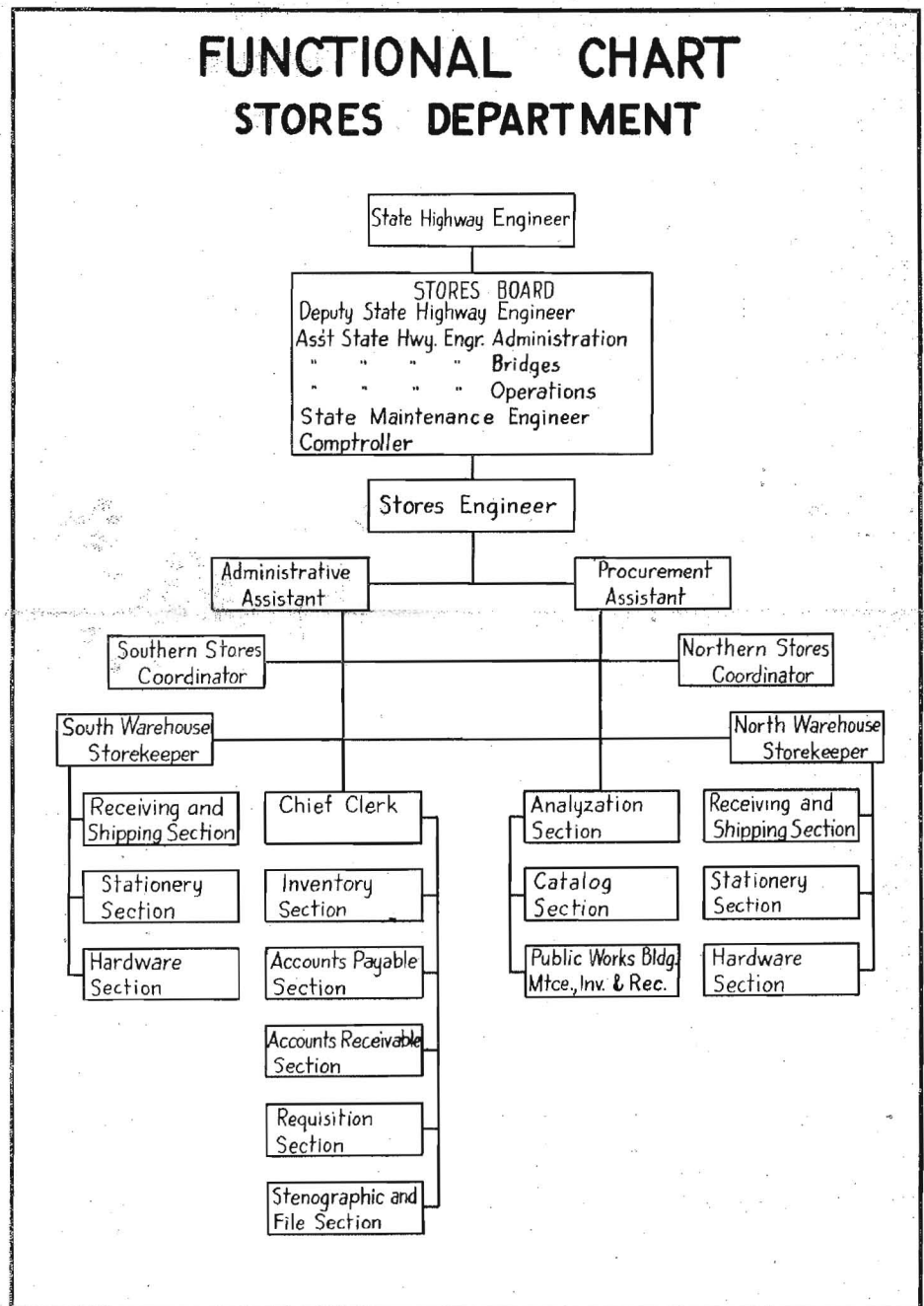
#### Random Ordering

Another function of the Stores Department is to supply specifications for the purchase of tools and supplies. Too often in the past a person desiring a new hammer would look in a hardware catalog and pick out a pretty picture and say, "That's what I want." As a result, various brand names have become stamped into our vocabulary and no substitution would be acceptable. Another person would be equally vociferous in demanding a hammer of a different make and in the end, the buyers were obtaining a variety of tools at assorted prices, whereas a single purchase should have sufficed. To top this chaos, invariably the person ordering the item was not the user.

#### Careful Selection of Tools

The Stores Department is approaching this problem as a corollary to standardization by taking a poll of likes and dislikes in various hand tools from the workmen who actually use the tools. For instance 220 men were interviewed as to their preferences in picks; the weight, type, length of handle, etc. This cross section represented about 10 percent of those men who use picks and seems a fair sample.

A further example of this type of research involved shovels, both round point and square point. In this case, a variety of preferences were expressed, so a half dozen of each brand of shovel coming close to the general over-all specifications were purchased, the brand names effaced and the tools distributed to workmen. Each man is allowed to use a shovel for a day or so



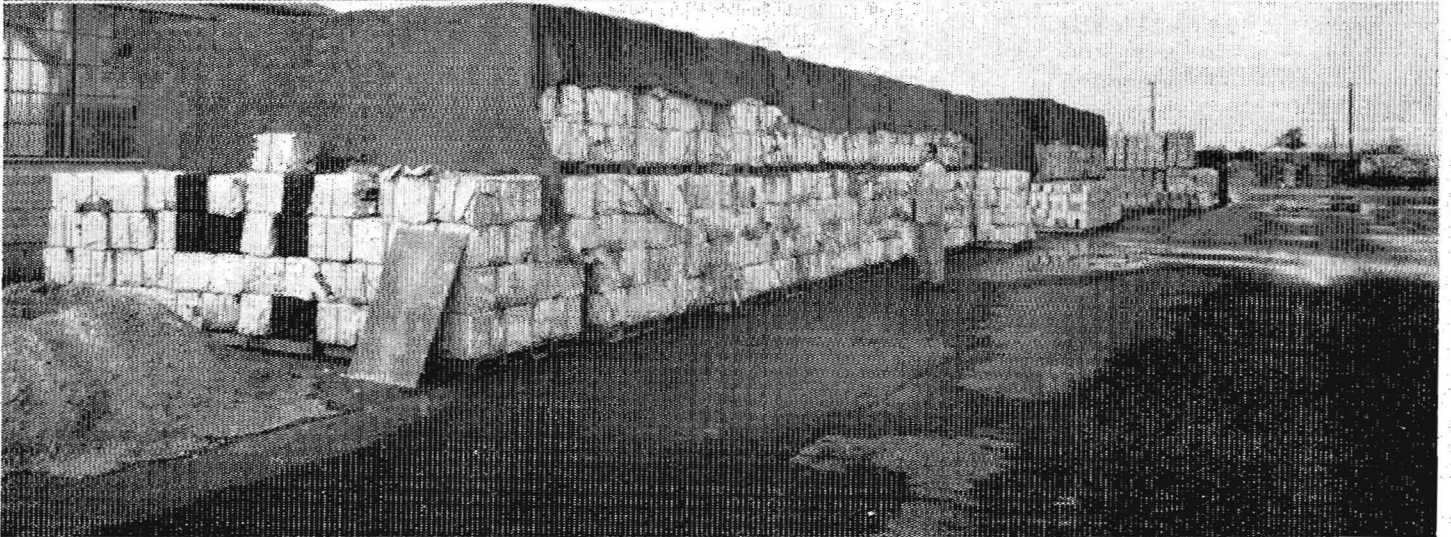
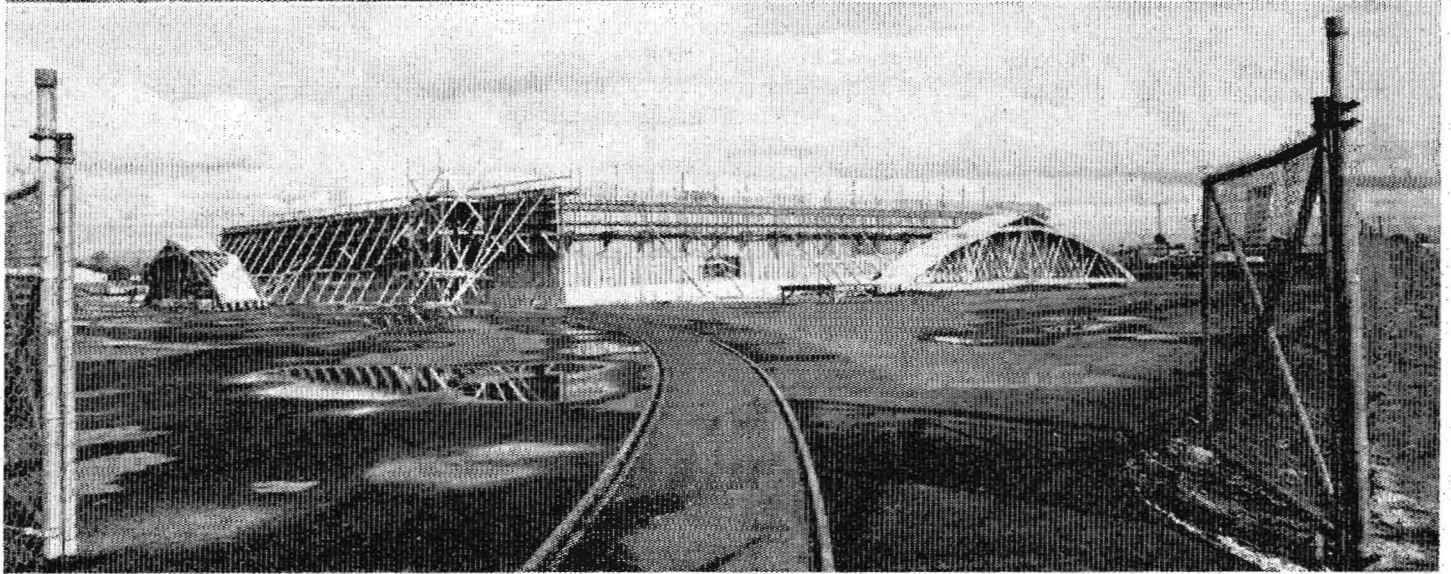
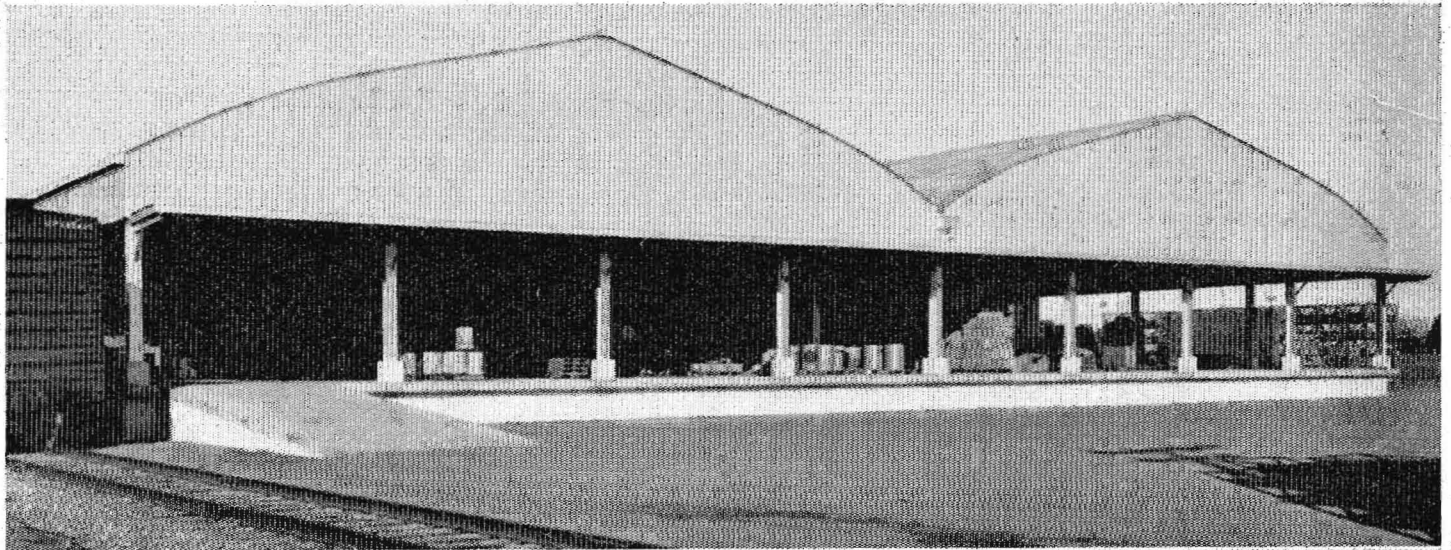
and his reaction to each of several points recorded and the shovel passed to another man for trial, preferably in another crew.

At the end of this test, all data will be assembled and analyzed and shovels then will be bought on open specifications without reference to brand names and the users of the tool will be the people who determined the specifications.

#### Help from Laboratory

The Materials and Research Laboratory of the Division of Highways has

become interested in the Stores Department program to the extent of setting up accelerated tests to determine certain properties that should be covered by specifications for various items. A preliminary test was made of metallic tapes and a machine has been designed to test pencils. Blue print paper is tested with a reflectometer and other devices to determine its properties. Results will be correlated to field use and in the end, open specifications will be used to buy these items instead of using brand names. The laboratory has



*Upper—View of Sacramento warehouse showing loading dock and rail unloading facilities. Center—Los Angeles warehouse under construction showing rail facilities and portion of hard-standings. Lower—Portion of warehouse stock of survey stakes at Los Angeles. These stores protected from rains, top and bottom*

long tested paints, cement, steel and other materials, hence its entry into this field of testing tools and appliances is but an extension of its function.

#### **Cooperation**

Actual procurement for the State of California rests with the Division of Purchases, Department of Finance, acting as buyers for all state agencies. The Stores Department maintains the closest liason with the State Purchasing Agent and acts as a clearing house or contact between the personnel of the Division of Highways and the State Purchasing Agent. There is a distinct line of demarkation between the functions of the two agencies, yet close cooperation is obtained. The Purchasing Agent refers bargains and vendors to the Stores Department, with Stores in turn furnishing sources of supply to the buyers in the Purchasing Division. In general, the Stores Department works up each request for purchase to the point where a buyer can take over and actually buy the items with a minimum of trouble.

In this day of rising prices and certain scarcities, a considerable number of man hours are expended in finding out where scarce merchandise may be obtained, whether or not the time of delivery is acceptable and if the price is within reason. All this is another function of the Stores Department, as well as keeping a close watch over price trends so that inventory may be obtained at the best possible cost.

#### **Stockpiling**

In July of 1946, price trend and retarded time of delivery indicated it would be advisable to stockpile steel "H" piling for use in the foundations of highway bridges. Some four thousand five hundred tons were placed on order and delivery taken six to nine months later. To date, steel has taken two rises in price and freight rates have advanced 20 percent, hence steel for which the State paid \$3.72 per hundred pounds would now cost \$5.30 per hundred.

Holding to the policy that the State should not infringe upon free enterprise, this stock of "H" piling is not sold to contractors or others, but is

available solely for state highway work on a loan basis. Let us assume that Contractor X has been the successful bidder on a bridge project involving "H" piling in its foundation. Instead of waiting several months for delivery of the piling necessary to start operations, he is now enabled to draw upon the state stockpile and commence work immediately. His contract provides for the replacement of the borrowed piles under suitable protection for the State and the stockpile becomes a revolving fund dedicated to speedier completion of highway bridge projects.

#### **Search for Materials**

Recently it became necessary to procure several dozen hoe handles. Inquiry among the usual coast vendors produced no results so it became apparent that the search must extend to eastern manufacturers. The result was that eastern stock was discovered in San Francisco in the hands of a representative who had never contacted our buyers.

The Division of Highways uses considerable yardage of a cheap cotton cloth that became so scarce during and immediately after the war that it could only be purchased in small lots at retail prices. Textile mills were contacted in the east and south with a result that the Stores Department has placed an order at a price that compares favorably with prewar purchases.

#### **State Institutions Help**

The Stores Department also acts as a manufacturing agent, centralizing and filling demands for special equipment that cannot be purchased from other sources. By close contact with penal institutes, state schools and other agencies, full advantage is taken of their capabilities and manufacturing facilities to provide articles at a distinct savings to Highways. As an example, the Blind School is manufacturing flagman's coats and flags, Chino Institute for Men is making fence posts, Lancaster's School for Boys is manufacturing survey stakes and Tehachapi Prison for Women is making fiber washers. Several commercial firms likewise have contracts to produce articles peculiar to highway needs.

The foregoing technical and commercial aspects of the Stores Department have been dwelt upon in order to differentiate between these functions and the mechanical functions of storage and distribution. Purchasing an item with its attendant problems is followed by the function of getting it to its final user expeditiously. For purposes of this article, it may be stated that those items which are distributed directly from vendor to user, called "direct issue," are separated from those articles which are first warehoused and then delivered to the user upon his requisition.

Direct issue merchandise, in general, consists of items that are not economical to store due to bulk, possibility of deterioration, or are only purchased occasionally to fit specific conditions, for example; rock aggregate, blue print paper, and carpet, respectively, would not be practicable to warehouse. On the other hand, rope, bolts and survey stakes can be beneficially and economically stored and distributed without waste of time.

#### **State Buys Warehouse Sites**

To accommodate the storage of supplies, the Division of Highways purchased two sites, one at 59th and Folsom Boulevard in Sacramento to serve the northern half of the State, and one at 111th Place near Avalon in Los Angeles to serve the southern half of the State. Each site will accommodate at least four warehouses with suitable complimentary outdoor storage and with railroad facilities. An initial warehouse unit of 33,000 square feet is being built at each site complete with all facilities at a cost of \$212,000 for Sacramento and \$303,000 for Los Angeles. This includes cost of land consisting of 17.8 acres in Sacramento and 10 acres in Los Angeles. The difference in cost between the two locations is due to the variation of land values between Los Angeles and Sacramento.

Each site was carefully selected from the standpoint of economic distribution. Railroad spur connections were necessary for incoming shipments bought in carload lots, and outgoing shipments via motor freight lines necessitated a location near the hub of these





*This interior photograph of Sacramento warehouse shows small portion of stores*

lines. Express and parcel post shipments also were taken into account. These factors were given full consideration and applied to each proposed site before final determination to purchase.

#### **Distributive Functions**

The distributive functions of the Stores Department is reflected in the saving of time in getting supplies into the hands of users without delay. Prior to the formation of this department, the time of delivery was a minimum of thirty days from writing the requisition to receipt of goods. The Stores Department is fast approaching a 48-hour delivery to any point in the State. With more or less duplicate stocks in the north and south, the waiting time will be cut to a minimum and in the event of an emergency, this saving of time will be invaluable.

Quite recently a bridge was burned east of Fresno and all materials and hardware necessary for reconstruction

of this structure were on their way within one and one-half hours after receiving the requisition, notwithstanding the fact that delivery had to be made over a weekend and from both warehouses.

Each warehouse includes adequate office facilities and a small crate shop equipped with power tools for use in packaging.

#### **Warehouse Facilities**

The latest engineering ideas in materials handling have been embodied in the plants as are consistent with the wide variety of merchandise. All material possible is stored on flat pallets or in box pallets to facilitate handling with fork lifts. Inside work is handled at present with a small fork lift and outdoor storage is cared for by a 7½-ton lift truck.

Each warehouse has a three-ton van body truck for close delivery and pickup service. Hard-standing areas are

provided so that yarded merchandise may be handled in any type of weather. Each initial warehouse unit has been designed with a large covered shipping platform on which all receiving, shipping and checking is accomplished. Each platform is equipped with a 10-ton pit scale over which incoming and outgoing shipments may be checked for weights.

The shipping platform is supervised by a specialist who not only receives and checks incoming shipments, but is also responsible for checking out and routing outgoing articles. He must be familiar with rates, methods of shipping, freight classification and packaging because it rests on his judgment as to whether or not a package shall go forward by truck, or rail, express or parcel post.

#### **Traffic Management**

The traffic management phase of distribution is one that has long been

neglected and one in which a considerable saving to the State may be effected. Distribution cost is a major commodity and transportation is purchased in the same manner as any other item. To this end, close cooperation is maintained with the State's consulting traffic manager and several warehouse employees are enrolled in schools giving night courses on this subject.

The warehousing plant of the Stores Department is supplemented by a Headquarters Office which is the directing head. At headquarters a master inventory file is maintained which contains all the items carried in each warehouse, but differs from the warehouse inventory cards in that the cost and sales price of each article is entered. Two additional sections devoted to "accounts receivable" and "accounts payable" complete the bookkeeping cycle which functions as follows:

#### Requisitions

A requisition for an item originates in the field, taking the necessary data from the Stores Department catalog or describing the article needed if for "direct issue"; the requisition is then forwarded to the nearest warehouse for processing. There is only one form of requisition used and only one channel for it to flow through, thereby eliminating chances for error.

Upon receipt of the requisition at the warehouse, it is compared with their stock record cards and if in stock, is immediately filled and forwarded to the consignee. A copy of the requisition is forwarded to headquarters where it enters the inventory section for entry on their cards and pricing. After proper extensions are made it passes to the accounts receivable clerk who sends one copy as an invoice to the consignee and another copy to the district office with a transfer record. This serves as a bill against the ordering office, which in turn makes the proper entries in their books and, in effect, pays the Stores Department for the merchandise delivered.

#### Through Channels

In the event that a warehouse is unable to fill a requisition from its stock, the requisition is forwarded to headquarters where it is processed for purchasing through the Purchasing

Division, at which time determination is made whether or not the item should be bought in quantity for stock or merely purchased for the account of the consignee. In event the material is purchased for stock, the "accounts payable" section follows through and prepares the bills for payment. In the case of a direct issue from vendor to district, the district office receiving the material pays the bill.

Another function performed by the Headquarters Office is to keep track of the use of materials and to analyze trends. Various charts and reports are prepared in headquarters and kept up to date in a manner followed by industrial or commercial organizations.

A catalog section is charged with preparing, issuing and keeping up to date a loose leaf book enumerating all items kept in stock. The continual changes are sent out to each individual who possesses a catalog, thus keeping it current. Stock numbers are assigned to new items and proper nomenclature and descriptions are correlated.

#### Personnel

To man the Stores Department, all personnel in headquarters having to do with procurement, requisitions or materials, were transferred and incorporated in the new department when it was formed. Prior to the organization of Stores, there were in the Division of Highways Headquarters, five separate groups whose functions consisted of procurement of materials in some form or another. These separate groups were incorporated into the new department. Accountants were transferred to complete the set-up and additional clerks, stockkeepers and laborers added in order to operate the warehouse. A stationery storeroom, formerly operated in the Public Works Building, was used as the nucleus for the Sacramento warehouse, its personnel and functions merely expanded to accommodate the additional duties imposed.

The accompanying functional chart depicts the Stores Department organization. It will be noted that its authority stems from a board composed of the Deputy State Highway Engineer who acts as chairman, the Assistant State Highway Engineers in charge of administration, operation and bridges, the Comptroller of the Divi-

sion of Highways and State Maintenance Engineer. The board is the policy-making group whose functions are administered by the Assistant State Highway Engineer in charge of administration. The Stores Board represents those heads of the Division of Highways who have the most contact with the use of tools, supplies and materials and thus constitute a panel corresponding to a board of directors in a commercial organization.

#### Stores Organization

Reporting directly to the Administrator is the Stores Engineer who is responsible for the complete functioning of the Stores Department and the promulgation of policies to be placed before the Stores Board for decision. Aside from the usual organization inherent to procurement, storage and accounting functions, the Stores Department maintains two traveling coordinators whose functions are to act as contact men between warehouse and using agencies, straightening out misconceptions, correcting errors and explaining policies as well as conducting surveys to ascertain if improvements in procurement may be effected or if users are over or understocked. This continuous personal contact makes for better coordination of effort and allows the Stores Department to better perform its fundamental function of service to the employees of the Division of Highways.

To further this idea of service, a series of posters and bulletins are being prepared depicting proper and safe methods of caring for and using tools, information on manufacture of various commodities and other types of data for the use and information of highway personnel. A clever little figure named "Gus, the Gopher," created by one of the storekeepers, is the thread on which is strung the above data and through whose "digging into things" a continuity is effected.

#### Results

The Stores Department commenced operation in April, 1947, and opened its temporary warehouses in Sacramento and Puente in September of the same

... Continued on page 64

# Coast Highway

Another Unit of San Luis  
Obispo Freeway Completed

COMPLETION of construction of the 6.6 miles between Miles Station and the southerly end of Marsh Street in San Luis Obispo marks another step in the development of the Coast Highway, U. S. 101, into a freeway. This project was the second of four projects planned to convert that portion of the Coast Highway between Pismo Beach and Cuesta Grade into a four-lane divided freeway.

In conformance with the present plan of ultimately developing the Coast Highway into a full freeway on sections where heavy traffic congestion is found, and to a limited freeway over the balance of the route, the right of way on this project was acquired on a limited access basis. This restricts access to the freeway from adjoining prop-

erty to definite locations or limits. This means of preserving the investment in right of way and construction by preventing ribbon development and the traffic congestion which it creates, is proving very prudent.

On the portion of the project from Miles Station to the Santa Fe crossing of San Luis Obispo Creek, the improvement was effected by construction of an additional two-lane roadbed on the opposite side of an abandoned narrow gauge railroad roadbed, from the existing two-lane highway. Ribbon development along the existing highway on the balance of the project would have made the cost of improving it so large that it became economical to construct a complete four-lane divided highway along a relocation.

Low bearing ratios of basement soils required that a subbase of imported borrow be placed throughout the project. This subbase had a minimum thickness of one-half foot except across San Luis Valley where the soils had bearing ratios of as low as 1 percent at 0.1-inch penetration, a minimum thickness of one foot was required. Imported borrow for this purpose had a bearing ratio of 50 percent or more at 0.1-inch penetration, an expansion of 1 percent or less and a plasticity index of six or less.

Surfacing on the traffic lanes consists of a 4-inch thickness of plant-mixed surfacing over a 6-inch thickness of crusher run base. Shoulders and gutters are surfaced with a 3-inch thickness of

. . . Continued on page 41

*New four-lane divided freeway at southerly entrance to San Luis Obispo*



# Bakersfield

## New Four-lane Divided Highway in Kern County

By F. M. ROUSH, Associate Highway Engineer

ANOTHER SECTION of U. S. 99 was completed during the month of November, extending a previously constructed four-lane divided highway southerly 3.3 miles to H Street near the Garces Circle in the City of Bakersfield. This provides a divided highway extending northerly from Bakersfield approximately 19 miles to Famoso.

### General

The work done consists, in general, of the construction of a graded road-bed; paving with Portland cement concrete on cement treated subgrade; also paving with asphalt concrete on Portland cement concrete base, on existing surfacing and on crusher run base, and, with plant-mixed surfacing on Portland cement concrete base, on crusher run base and on earth subgrade.

Two reinforced concrete bridges for highway separations at Pierce Road, a steel girder track span on concrete abutments for a railroad underpass at Minkler Spur, a steel girder bridge for a railroad overhead at Oil Junction, and, reinforced concrete slab bridges across Canal Lateral No. 29 and Beardsley Canal, were constructed.

The entire section was landscaped.

### Alignment

The alignment is the same as the former three-lane highway except at the Pierce Road separation structure and the Minkler Spur Underpass, which are relocated southwesterly of the former location. Except through the relocated portion, the existing three-lane pavement of asphalt concrete is used as the northbound lane of the divided highway.

### Pavement Subgrade

The new southbound lane is of Portland cement concrete 24 feet in width, 0.67 of a foot in thickness and laid on a 0.33 of a foot cement treated subgrade.

Approximately 3 percent by weight of Portland cement was used in this subgrade treatment which attained an average strength of 475 psi at 7 days and 630 psi at 28 days. The subgrade treatment was accomplished by applying bulk Portland cement to a formed windrow which was then processed through a Barber Greene Travel Plant. A pneumatic tired roller and a tandem roller provided the compaction.

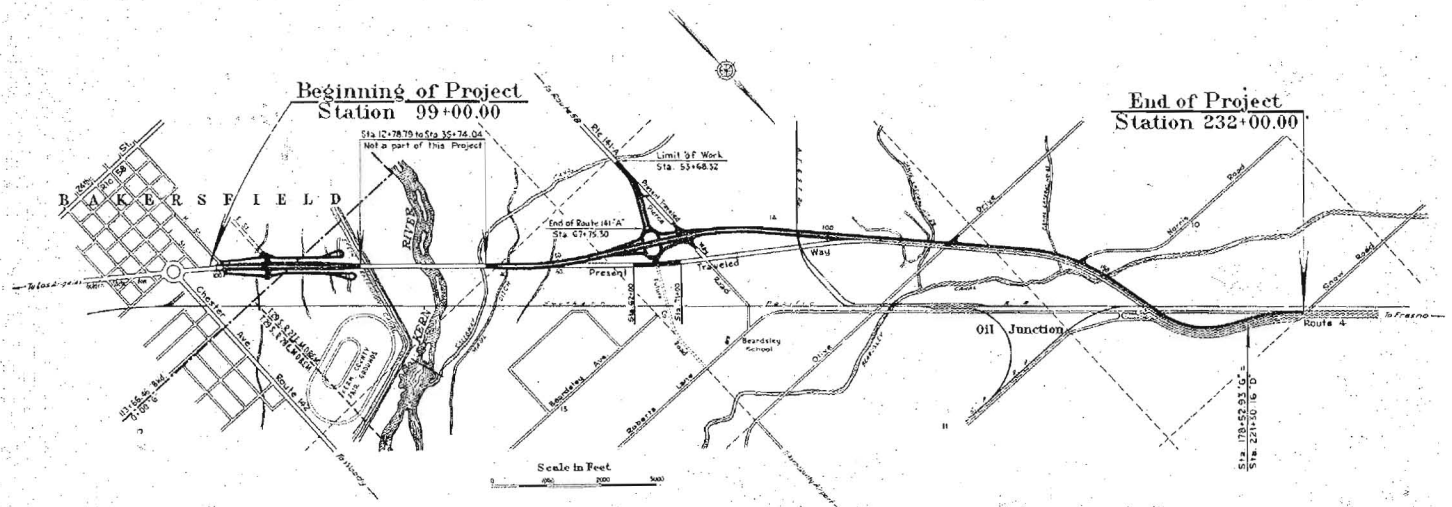
### Outer Highways

The project was designed as a limited freeway with outer highways to pro-

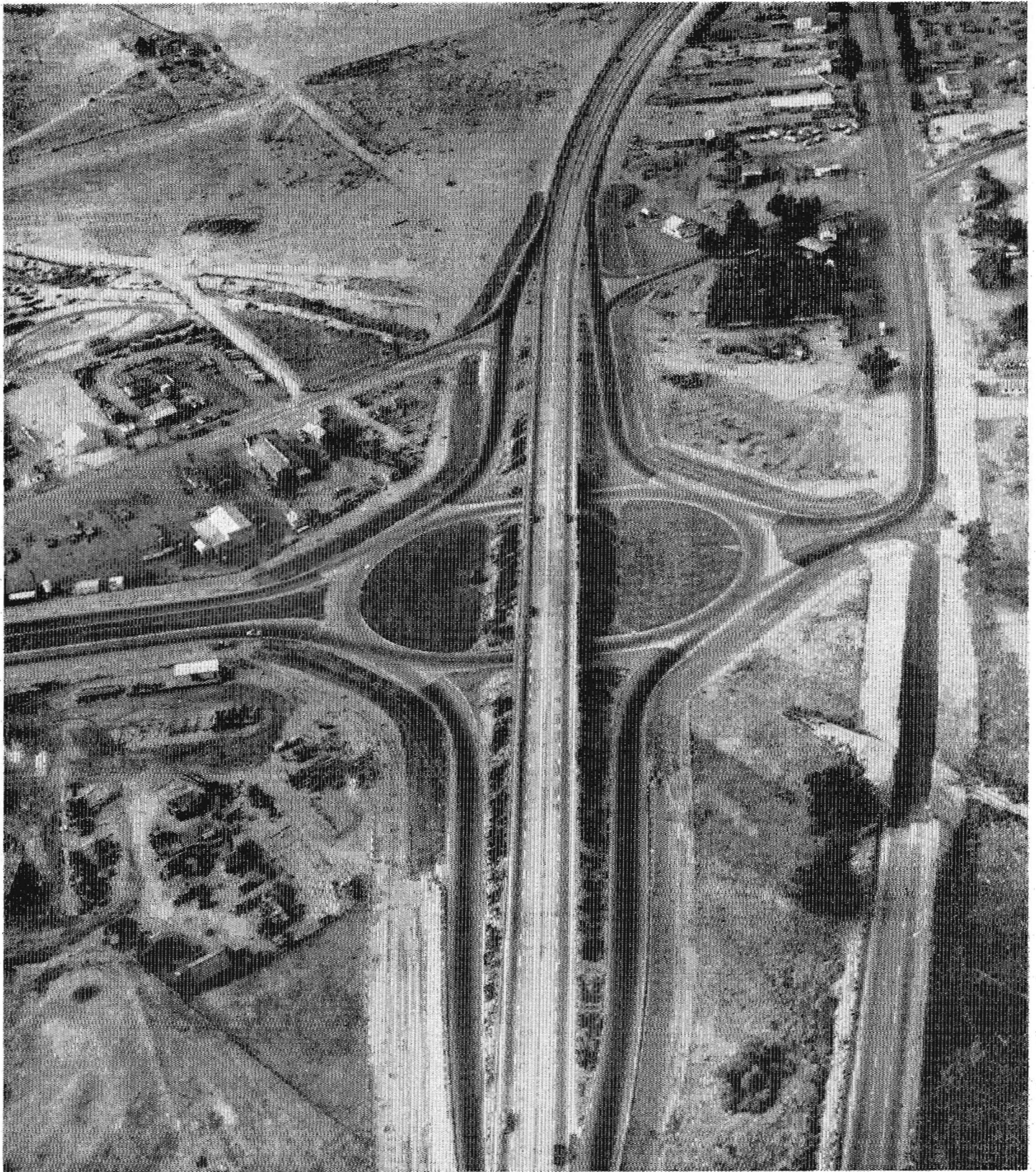
vide ingress and egress for the commercially developed areas. Between Olive Drive and Norris Road, outer highways on each side of U. S. 99 were planned for future construction. Due to the rapid increase in roadside development in this section between the time of planning and construction, it was deemed necessary to construct these roads at once in order to preserve the effect of the safety features being included elsewhere in the project.

### Pierce Road Rotary

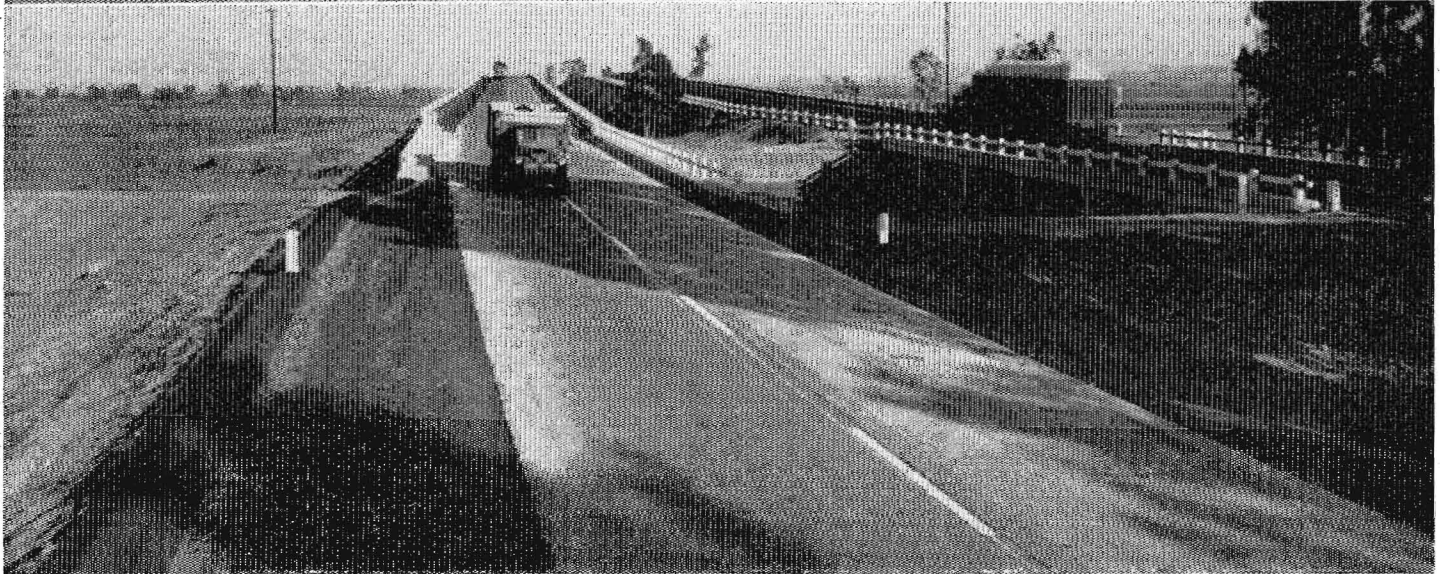
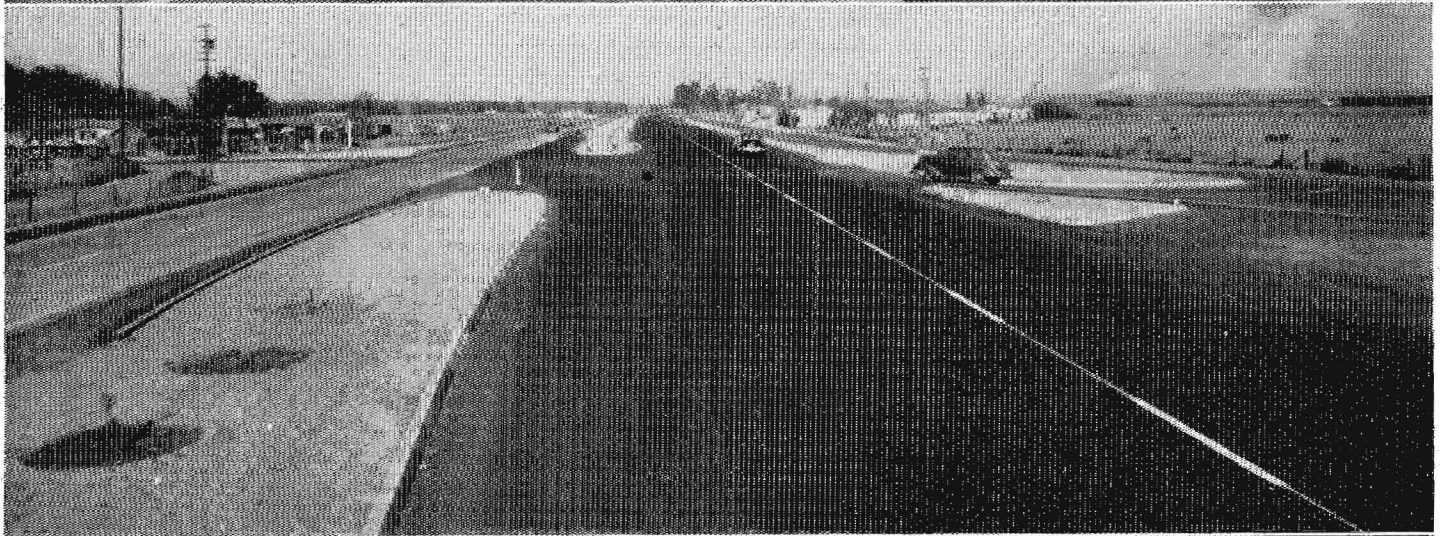
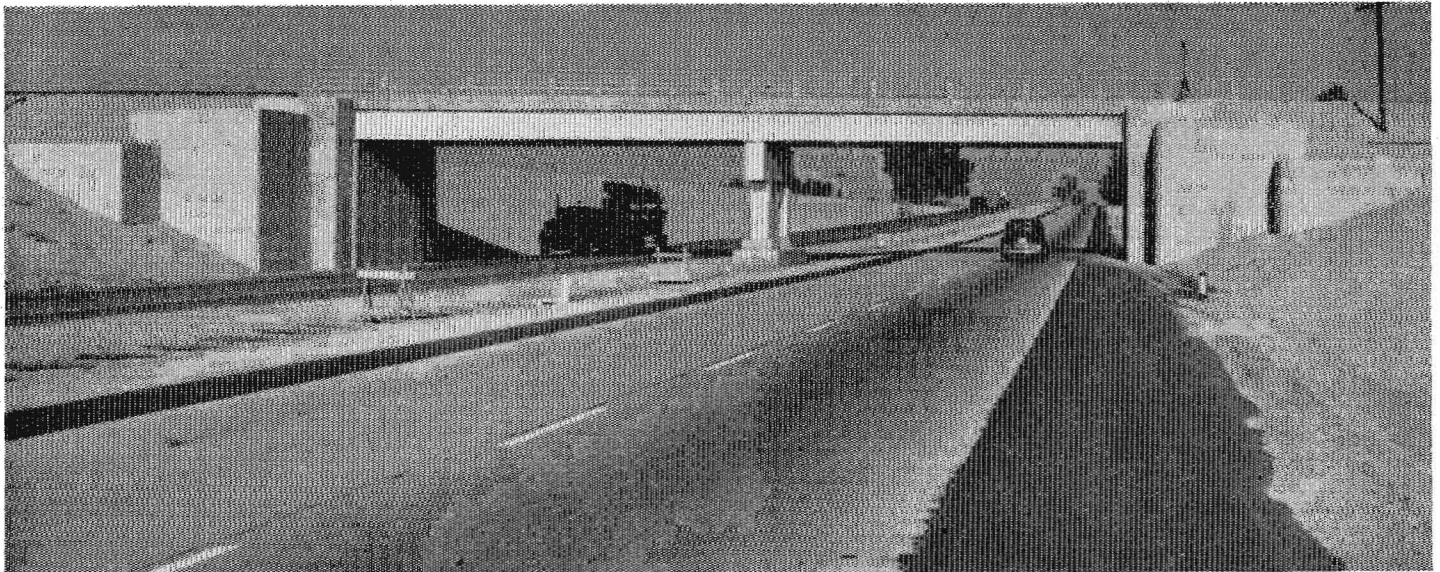
The need for a highway grade separation structure arose from the rapid growth of business developments at the Pierce Road intersection and extending southerly on Pierce Road for about two miles. In addition to the usual service station and auto court development, this section has seen a phenomenal growth in the oil well supply and trucking terminal business. Due to the nature of the local business, much of the turning movement was by long, semitrailer units, which created a hazardous situation at the intersection that could only be alleviated by the use of a grade separation. This bridged rotary provides for Pierce Road traffic with the main line traffic being carried over



This sketch shows the design and alignment of the recently completed four-lane divided highway between Bakersfield and Snow Road in Kern County



*Pierce Road Rotary. U. S. 99 is shown bridging the relocated Pierce Road with southbound traffic moving toward right of photo. Former Pierce Road is at the left and former U. S. 99 may be seen at top center. The rotary pavement is of Portland cement concrete and the ramps are of plant-mix over a Portland cement concrete base*



UPPER—Minkler Spur Underpass viewed from point north of structure. CENTER—Looking northerly at Olive Drive Intersection. LOWER—On southbound lane looking northerly with Beardsley Canal in foreground and Southern Pacific Overpass in background. Existing highway used as northbound lane on the right

the rotary by two three-span concrete bridges of slab design. Pierce Road was relocated from Calloway Canal to line up with the future location of the county portion of the road which will extend northerly across the Southern Pacific Railroad in an underpass to a connection with Roberts Lane. Relocation of Pierce Road also placed the location of the extensive area needed for the structure in a section relatively free from commercial development.

#### Relocation

The relocated portion of Pierce Road was constructed as a four-lane divided highway with the pavement in the rotary portion being Portland cement concrete Class "B" 26 feet in width and 0.67 feet in thickness over

the rotary has grass and eucalyptus. When these plantings have matured, this grade separation structure will have a very attractive appearance.

#### Rodent Barrier

There were no unusual methods of construction involved in the project but as might be expected when there are over one hundred contract items, at least one might be classed as unusual. It is believed the item of rodent barrier falls in this group.

The rodent barrier was included in the contract as the result of right of way negotiations with an owner involved in both the old Minkler Spur underpass site and the new location. It seems that while flooding his alfalfa at the old site, the water found its way through gopher holes to the adjoining

top of the barrier was five and one-half inches above the surrounding ground and extended five feet four inches below the surface.

For a short period after erecting the rodent barrier burrowing activities were noted but since there was no food available within the right of way the gophers either died or moved overland to greener pastures because there has been no evidence of their work for a considerable time. (*Rumor has it that one gopher committed suicide even before being forced to leave the area. This gopher received particular attention from the workmen because he would frequently come to the surface just ahead of the power shovel, move on a few feet and then dig furiously out of sight. One day he failed to appear for the contest. 'Tis said he died of shame*



Looking northerly from south end of existing overpass at main line tracks of the Southern Pacific. New structure is on the left

0.33 feet of cement treated subgrade. The remainder of Pierce Road pavement is of 0.25 feet plant-mixed surfacing over 0.58 feet of Portland cement concrete. Four Portland cement concrete ramps descending from the main line route and connecting with the rotary will provide for all turning movement situations.

Landscaping of the rotary includes the planting of sycamore trees and grass on the level portion within the rotary and a ground cover of periwinkle honeysuckle and lantana on the main line fill slopes which cross the rotary. The area on the outside edge of

earth slopes of the depressed portion of the underpass and flooded the underpass so deeply that highway traffic had to be rerouted. The owner was threatened with legal action if there was a recurrence of the incident. The rodent barrier along the right of way line at the new location was the result of this situation.

The barrier consists of 16-gauge corrugated iron conforming to the Standard Specifications for the unformed sheets for 21-inch corrugated metal pipe. Sheets were placed vertically against one side of a trencher dug ditch with a full corrugation overlap. The

*because the shovel could move dirt so much faster than he. On the other hand, death might have occurred because of overwork.)*

#### Cost of Work

Because of the number of major structures, this short section of divided highway was built at the relatively heavy cost of about \$1,295,000 for the contract items. The cost of the right of way was about \$330,000.

Griffith Company was the contractor on the job, W. M. Nett was the Resident Engineer and T. J. Dunn was the Bridge Department representative.

# Honorable Discharge

ON MARCH 1, 1949, C. C. Carleton, familiarly known as "C. C." Chief Counsel for the State Department of Public Works, will retire from state service, the span of which covers the period of systematic state-wide highway improvement in California.

On November 10, 1911, the consent of Hiram W. Johnson, then Governor, and U. S. Webb, then Attorney General, first having been obtained, he reported for duty at the offices of the California Highway Commission, then



C. C. CARLETON—1911

temporarily established in committee rooms on the fourth floor of the Capitol Building at Sacramento, as attorney for the new commission. Several months before, the California Highway Commission had been organized, with Burton A. Towne, of Lodi, as Chairman, and Charles D. Blaney, of Saratoga, and N. D. Darlington, of Los Angeles, as members. W. R. Ellis, of Berkeley, was secretary of the commission. Austin B. Fletcher, of San Diego, was appointed the first State Highway Engineer.

After Mr. Carleton was appointed as attorney, he sat in the meetings wherein

the qualifications of the first staff of engineers were reviewed, and George R. Winslow, now retired, was appointed office engineer to report for duty January 1, 1912, and seven division engineers, namely, Francis G. Somner, Thomas A. Bedford, James B. Woodson, Arthur E. Loder, William S. Caruthers, Walter C. Howe and William L. Clark, were selected to report for duty January 2, 1912.

#### With Fletcher in San Diego

From this early nucleus has grown the great organization constituting the present Division of Highways.

Mr. Carleton, before coming to Sacramento, had been associated with Mr. Fletcher in the development of a county highway system in San Diego County.

In August, 1909, the people of San Diego County had authorized a bond issue of \$1,250,000 under authority of the so-called Savage Act (for the construction of county boulevard systems) passed by the Legislature in 1907 and amended in 1909.

This sum of money was considered to be so vast for road construction in those early days that a San Diego County Highway Commission was created, composed of three multi-millionaires, John D. Spreckels, A. G. Spalding and E. W. Scripps, to serve as trustees of such a "huge" expenditure.

Mr. Carleton served as special attorney for this commission for two years. At the time that the "boulevard" system of San Diego County was being constructed, there were less than forty thousand motor vehicles registered in the entire State of California. At the time that he became attorney for the California Highway Commission the registration had risen to about seventy-five thousand motor vehicles. Recently in 1948 it was announced that the registration of motor vehicles in California has passed 4,000,000.

#### Early San Diego Highways

In San Diego County, Mr. Carleton not only served as legal adviser for the

commission but handled a number of condemnation proceedings whereby rights of way were acquired for the San Diego County system of highways, many of which later became incorporated into the State Highway System. As part of his duties he negotiated a number of right of way acquisitions through the large ranchos of San Diego County, including the original 20-mile grant over the great Santa Margarita Ranch for the Coast Road. This work enabled the state highway authorities



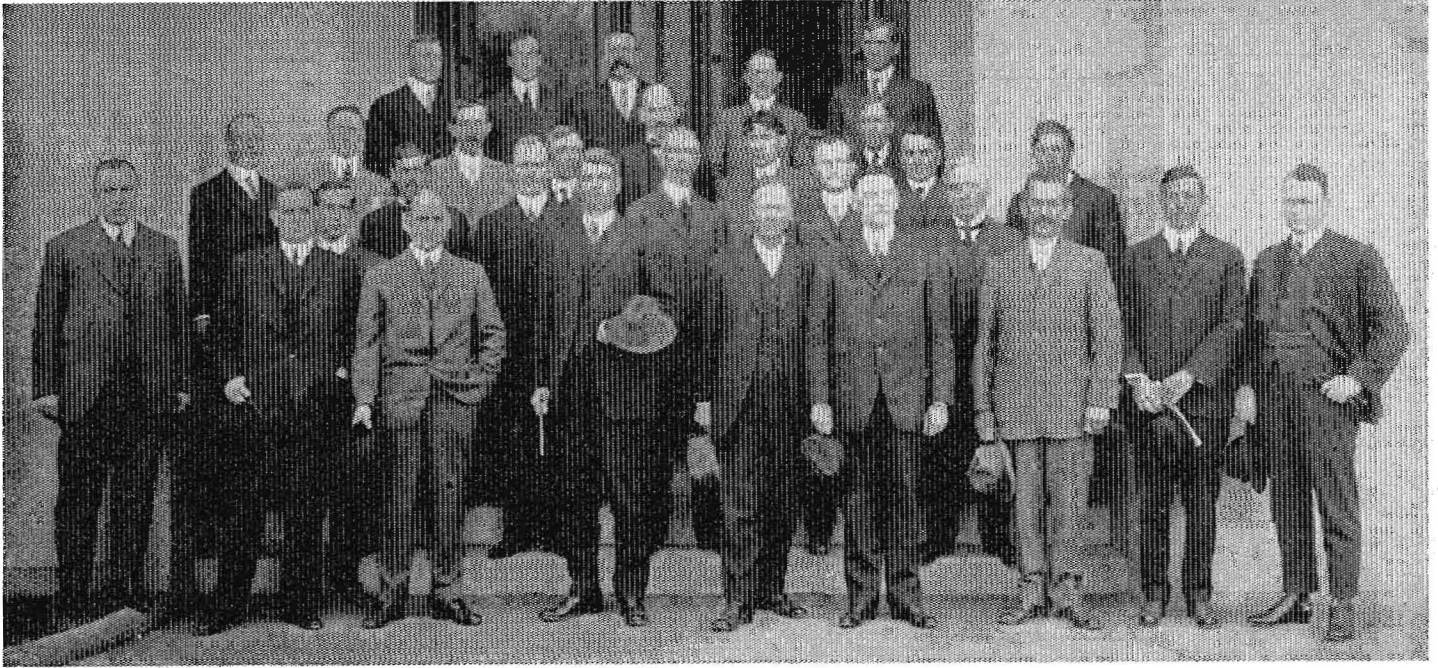
C. C. CARLETON—1949

to proceed much more speedily in that county than they otherwise could have done had these early rights of way not been obtained.

#### Came Here in 1908

Mr. Carleton came to California from the State of Michigan in 1908 and was junior partner of a law firm at Sault Sainte Marie, of which Horace M. Oren, then Attorney General of Michigan, was senior partner. Through his close association with Attorney General Oren in state affairs, he had had ex-





**PIONEER ROAD BUILDERS—Front Row, Left to Right**—G. B. Harrison, Editor, "California Highway Bulletin"; N. D. Darlington, Highway Commissioner; A. B. Fletcher, State Highway Engineer; C. F. Stern, Highway Commissioner; W. F. McClure, State Engineer; C. D. Blaney, Chairman, Highway Commission; W. L. Clark, Division Engineer; T. E. Stanton, Principal Assistant Engineer, Division VI; R. K. West, Principal Assistant Engineer, Division IV  
**Second Row, Left to Right**—S. S. Stahl, Principal Assistant Engineer, Division III; L. H. Gibson, Second Assistant Highway Engineer; A. E. Loder, Division Engineer; W. S. Caruthers, Division Engineer; S. V. Cortelyou, Principal Assistant Engineer, Division VII; W. R. Ellis, Secretary, Highway Commission  
**Third Row, Left to Right**—H. L. Warren, Purchasing Agent; W. C. Howe, Division Engineer; T. A. Bedford, Division Engineer; R. H. Stalnaker, Principal Assistant Engineer, Division II; G. R. Winslow, First Assistant Highway Engineer; C. C. Carleton, Attorney for Highway Commission; C. B. Osborne, Geologist; G. Mattis, Principal Assistant Engineer, Division IV; R. E. Dodge, Office Engineer  
**Back Row, Left to Right**—J. B. Woodson, Division Engineer; J. H. Small, Chief Accountant; F. G. Somner, Division Engineer; A. B. Cleaveland, Assistant Engineer; F. W. Haselwood, Principal Assistant Engineer, Division I

perience in the law of eminent domain before coming to this State. He was born in Carthage, Illinois, graduated from Carthage College, Illinois, and received his legal education at the University of Michigan and Yale University. After leaving law school he spent some time abroad preparing for the diplomatic service, which he later abandoned in favor of practicing law in the United States.

The California Highway Commission, under the first \$18,000,000 highway bond issue, which seemed to be a lot of money at the time, was confronted with the construction of several thousand miles of state highways contemplated by the bond issue. The commission showed great resourcefulness in obtaining aid toward this end. The boards of supervisors of California voted to furnish necessary rights of way and construct all bridges over a span of twenty feet at county expense. Material companies gave special prices for their products entering into construction of State highways. The railroads granted special freight rates, and

other contributions were made to supplement the \$18,000,000.

#### Poor Prophecy

When Mr. Carleton came to Sacramento in the fall of 1911, as he had been permitted to continue a private law practice while in San Diego along with his public duties, he asked Mr. Fletcher how long he should arrange to stay in Sacramento on the special highway work to which he was to devote his entire time.

Mr. Fletcher replied that he definitely should keep his "sign on the door" of his law office in San Diego as he figured that it would require about three years for the engineers to spend the \$18,000,000, but that his work as attorney should be completed in about two years.

Incidentally, Mr. Carleton is still Chief Counsel for the Highway Department—37 years later—and the highway work ahead is ever expanding.

During his early years with the State he accompanied the Commission and engineers on many of the "road scouting" journeys.

#### Rough Pioneering Trip

These were far from pleasure jaunts. Commissioner Blaney reported "We started out to find if it was possible to abolish many of the natural barriers and run two big trunk roads from Oregon to the Mexican line, with no greater grade than 6 percent.

"We covered 6,850 miles on our tours. We were kicked off mountain roads by mules, we were stuck in river fords, we slid around dangerous mountain grades, we broke windshields and punched holes in the bottom of our gasoline tank on rocks in the desert."

However, Mr. Carleton recalls how he almost burst with pride when he was invited to accompany the commission in its "very swagger" 1911 Locomobile automobile, 48 H. P., open six-cylinder type, seven-passenger seating capacity, which had been purchased for \$5,000 delivered in Sacramento. He felt that the ultimate of motoring luxury had been attained.

#### First State Highway Project

The first shovel of earth for the new State Highway System on Contract

No. 1 was moved on August 7, 1912, in San Mateo County, on the highway leading from San Francisco to San Jose.

It was not very long before Mr. Carleton realized that he might as well remove his sign from the law office door in San Diego.

In 1916, California voted the second state highway bond issue in the amount of \$15,000,000. In 1916 the Federal-Aid Road Act was passed by Congress, which also heartened the good road enthusiasts of California.

On January 23, 1919, the highway funds nearing exhaustion, a meeting was held in the highways committee room of the Senate, State Senator M. B. Johnson, of Montara, representing San Mateo, San Benito and Santa Cruz Counties, presiding. Mr. Carleton was one of those present. The motion was carried that "this gathering resolve itself into a committee of citizens to take up the matter of another state highway bond issue, and that Mr. Johnson be requested forthwith to confer with Governor Stephens."

Governor William D. Stephens said he believed in good roads, was very proud of the work done to date by the California Highway Commission, and approved the general idea.

#### Third Bond Issue

The Legislature of 1919 passed a Senate Constitutional Amendment resolution, providing for a \$40,000,000 state highway bond issue, which was adopted at a special election held July 1, 1919, the vote being 196,084 for and 27,992 against.

This measure completed the series of state highway bond issues, totaling \$73,000,000, before state highway construction was placed on a "pay-as-you-go" basis.

In 1923 Mr. Carleton, desiring to enter the private practice of law, resigned as counsel for the commission and for four years specialized in engineering and construction law, with offices in San Diego and Los Angeles. He also represented units of the construction industry of California in the 1925 and 1927 sessions of the Legislature.

In 1923 the first 2-cent gas tax measure was passed by the California Legislature, and in 1927 this act was amended to provide for an additional 1-cent tax for state highway construction.

### San Diego Birthplace Of Road System, Says Forward

OCEANSIDE, Jan. 5 (Special)—San Diego County was the birthplace of California's Highway System, Frank Forward, San Diego business and civic leader, today told a combined meeting of Oceanside Chamber of Commerce and service clubs. Ray Wilcox, Chamber President, presided. Rotary, Kiwanis and Toastmaster Clubs members attended.

Forward, Chairman of the San Diego Chamber Highway Committee, traced the history of the far-flung State Highway System, with particular reference to construction of certain units and their effect on tourist and freight traffic.

"California copies its modern highway system from the San Diego County Highway Commission of about 1909 when our road program was being mapped out and administered by the late E. W. Scripps, John D. Spreckels and A. G. Spalding," Forward said. "Our plan was so successful that the State took Austin B. Fletcher and C. C. Carleton to initiate the State Highway Program."—From *San Diego Union of January 6, 1938.*

#### Returns to State Service

During the administration of Governor C. C. Young, in the fall of 1927 Mr. Bert B. Meek, then Director of Public Works, requested Mr. Carleton to come to Sacramento to aid in the reorganization of the legal and right of way activities of the Department of Public Works. On March 1, 1928, a new division of the Department of Public Works was created, with the consent of Governor Young, known as the Division of Contracts and Rights of Way. Mr. Carleton very reluctantly at the time accepted the appointment as chief of this new division, as it required his full time service for the State. It became his duty as chief of the division to supervise and coordinate all of the legal, right of way, legislative and claim work of the department.

On the same date Mr. Charles H. Purcell, prior thereto District Engineer of the U. S. Bureau of Public Roads, and now Director of Public Works of California, was appointed to serve as

State Highway Engineer, and the two officials have worked in close harmony for the past twenty years.

#### Legal Division Expands

With the expanding activities of the legal division, a number of attorneys have been added to Mr. Carleton's staff specializing in law germane to the operations of the department.

Several years ago the position of Chief Right of Way Agent for the Division of Highways was created, the incumbent to be in charge of all right of way agents and the solicitation for rights of way in the field, thus enabling the legal division to concentrate its efforts on the conduct of condemnation proceedings and other departmental litigation in the courts, as well as attending to the general legal matters of the department.

The Division of Contracts and Rights of Way, therefore, has now become a strictly law agency, expanded from a one-man job in 1911 to a division of its own with a staff of 20 attorneys.

Mr. Carleton refers to the state highway bond issue period as "ancient history," and to the present gas tax or "pay-as-you-go" plan as "history now in making," with which "most folks are now very familiar."

#### Toll Bridge Activities

Some of Mr. Carleton's most pleasant legal assignments in the more recent years have been in connection with the financing, construction and purchase of toll bridges by the California Toll Bridge Authority.

He assisted in drafting the legislation passed by the 1929 Legislature creating the Authority and authorizing the issuance of revenue bonds to build or purchase toll bridges in the State of California.

He was sent East to make a special study of revenue bond laws and decisions of several states, notably New York and Kentucky, where the plan had been used successfully in financing the construction of large toll bridges.

In 1932 he was present at the meeting of the Reconstruction Finance Corporation in Washington, D. C., when it granted a loan of \$62,000,000 to the California Toll Bridge Authority for

. . . Continued on page 54

## FROM MEN AND MULES TO MECHANIZED EQUIPMENT



R. H. STALNAKER—1912

WHEN Austin B. Fletcher came from San Diego to Sacramento in 1911 to become California's first State Highway Engineer and in that capacity to lay the foundations of what today is the Division of Highways he summoned several men with whom he had worked when he headed the San Diego County Highway Commission.

Among these was R. H. Stalnaker, who retired on January 1st, relinquishing the post of Equipment Engineer of the Division of Highways after 37 years in state service.

During the span of those years, Mr. Stalnaker witnessed a complete change

in highway construction and maintenance beginning in the days when virtually all operations were handled by men and animals and progressing to modern mechanized methods.

Born in Kansas City, Missouri, on December 29, 1878, Mr. Stalnaker completed his education in that state and then engaged in various activities, including land surveying. From 1900 to late in 1906 he was Deputy County Surveyor of Jackson County, Missouri.

Like many other engineers of the Division of Highways, he answered the call of the West in October, 1906, worked as a land surveyor in Los Angeles County for several months and then accepted employment with the Spreckels Company in San Diego for two years.

From February, 1909 until August, 1911, he was employed by the San Diego County Highway Commission under Mr. Fletcher, transferring to the Los Angeles County Highway Commission. On April 1, 1912, Mr. Stalnaker responded to the call of his former superior and entered state service with the old California Highway Commission as a chief of party on location.

On March 15, 1913, he was appointed Assistant Division Engineer in what was then Division 2 and now is Highway District 2. He served in that capacity until February, 1918, when he was assigned to Central Office in Sacramento as General Office Assistant Engineer. In March, 1920, he took over general field inspection in the northern part of the State.



R. H. STALNAKER—1949

When the Equipment Department of the Division of Highways was organized in August, 1921, Mr. Stalnaker was placed in charge and served continuously in that capacity until his retirement. He set up the equipment rental system of the Division of Highways on January 1, 1924, and has steadily developed it. His department and rental system have been used as models by a number of other states.

Mr. Stalnaker, affectionately known to all his associates as "Russ," was succeeded by Earl E. Sorenson, Principal Equipment Engineer.

## CARL E. BERG RETIRES FROM STATE SERVICE

THE DIVISION OF ARCHITECTURE of the Department of Public Works lost one of the most valuable members of its headquarters staff when Carl E. Berg, District Construction Supervisor, retired on December 31st, last.

After attending the Danish University and Polytechnic Institute in Denmark, Mr. Berg came to the United States and followed heavy construc-

tion work in the East and South and finally located in California in 1920. On September 15, 1922 he entered state service as an estimator for the Division of Architecture and was assigned to construction work at the Stockton State Hospital. In 1924 he was promoted to the post of "Engineer of Estimates and Cost" at headquarters of the Division in Sacramento. In May, 1947, he was made district supervisor of the

Sacramento district, in which capacity he handled the remodeling of the DeWitt Hospital at Auburn and the Modesto Hospital at Modesto, which within a year gave the Department of Mental Hygiene facilities for approximately 6,000 mental patients.

Mr. Berg plans a trip through the United States this year and possibly a visit to Denmark to see relatives and old friends.

# Relief

## New Santa Barbara Freeway Will Eliminate Traffic Congestion

By JOHN M. CHAFFEE, District Office Engineer

OPENING on November 18, 1948, of a recently constructed portion of Santa Barbara Freeway on the Coast Highway, U. S. 101, between Park Place and Rancheria Street in the City of Santa Barbara, eliminated congestion and delays experienced by traffic along narrow city streets of former routing.

With traffic approaching a volume which could no longer be carried satisfactorily over city streets, studies for a rerouting of the Coast Highway through the City of Santa Barbara were undertaken early in the 1930's. On the basis of these studies a new location was adopted. The portions of this relocation between the easterly city limits and Park Place and along Rancheria Street from Bath Street to Hollister Avenue, about one and three-quarter miles west of the westerly city limits, were constructed in 1934 prior to conception of our modern freeway design.

Funds did not permit programming construction of the intervening section immediately and the portions along which traffic congestion was the most acute at that time were selected for construction.

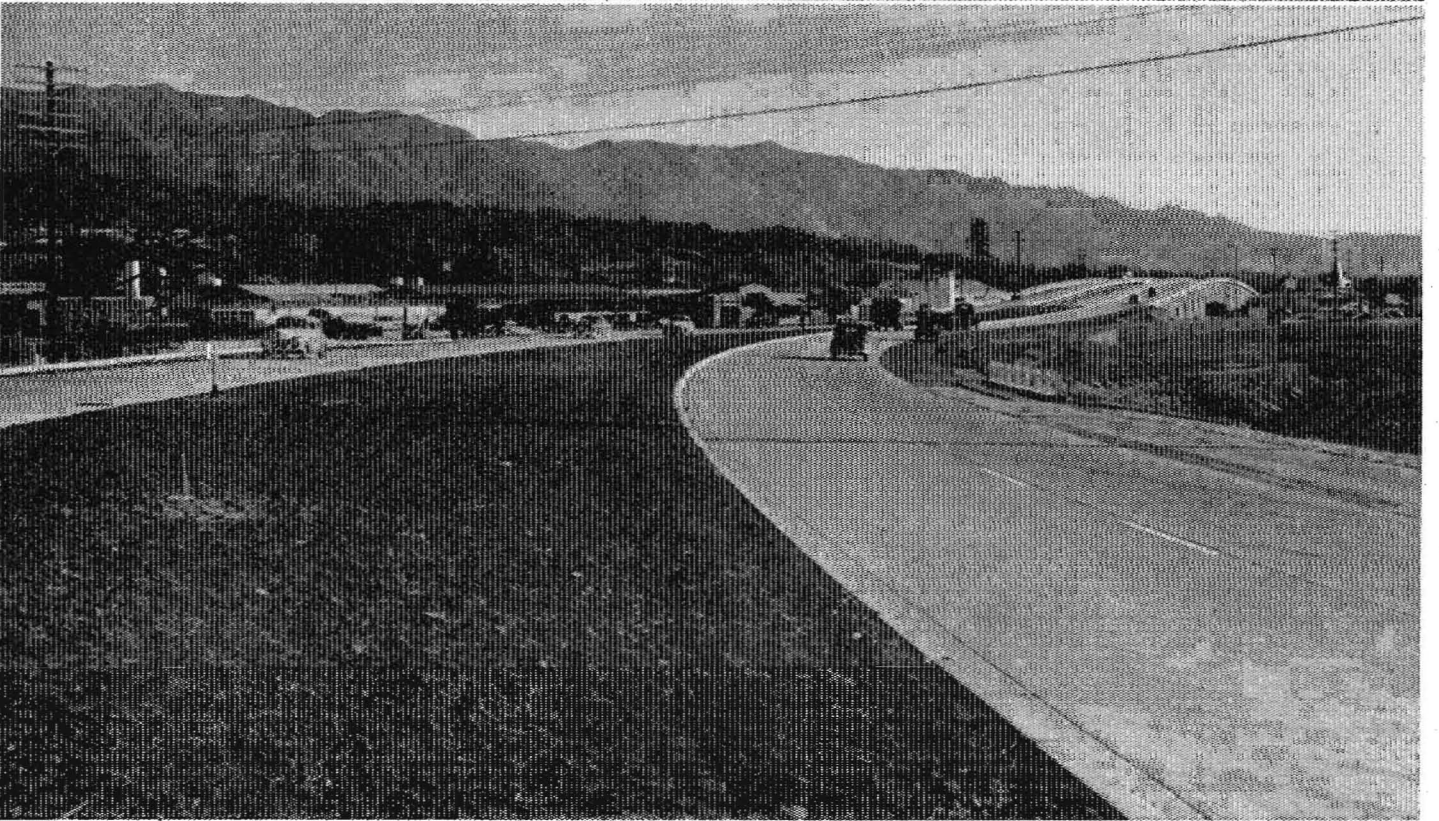
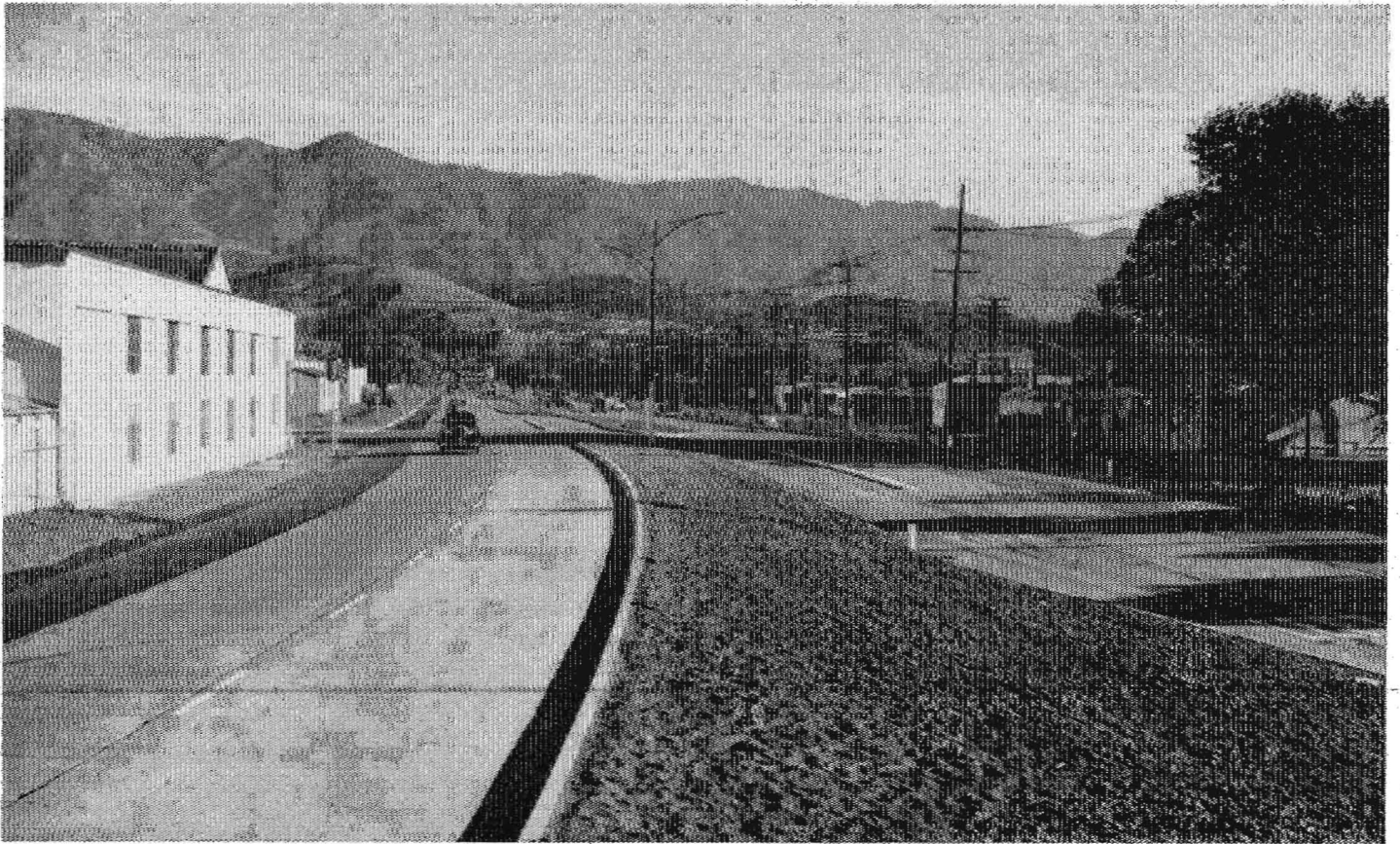
### Freeway Declaration

The route was adopted by the California Highway Commission on July 25, 1941, at which time the commission also passed a resolution establishing the route as a freeway. Construction of this intervening unit of the freeway was scheduled for 1942. Preliminary planning and negotiations for the project were undertaken in 1934 and were well advanced at the beginning of the war, which postponed construction indefinitely. During the war years negotiations with the City of Santa Barbara were consummated, plans completed, and right of way acquired and cleared.

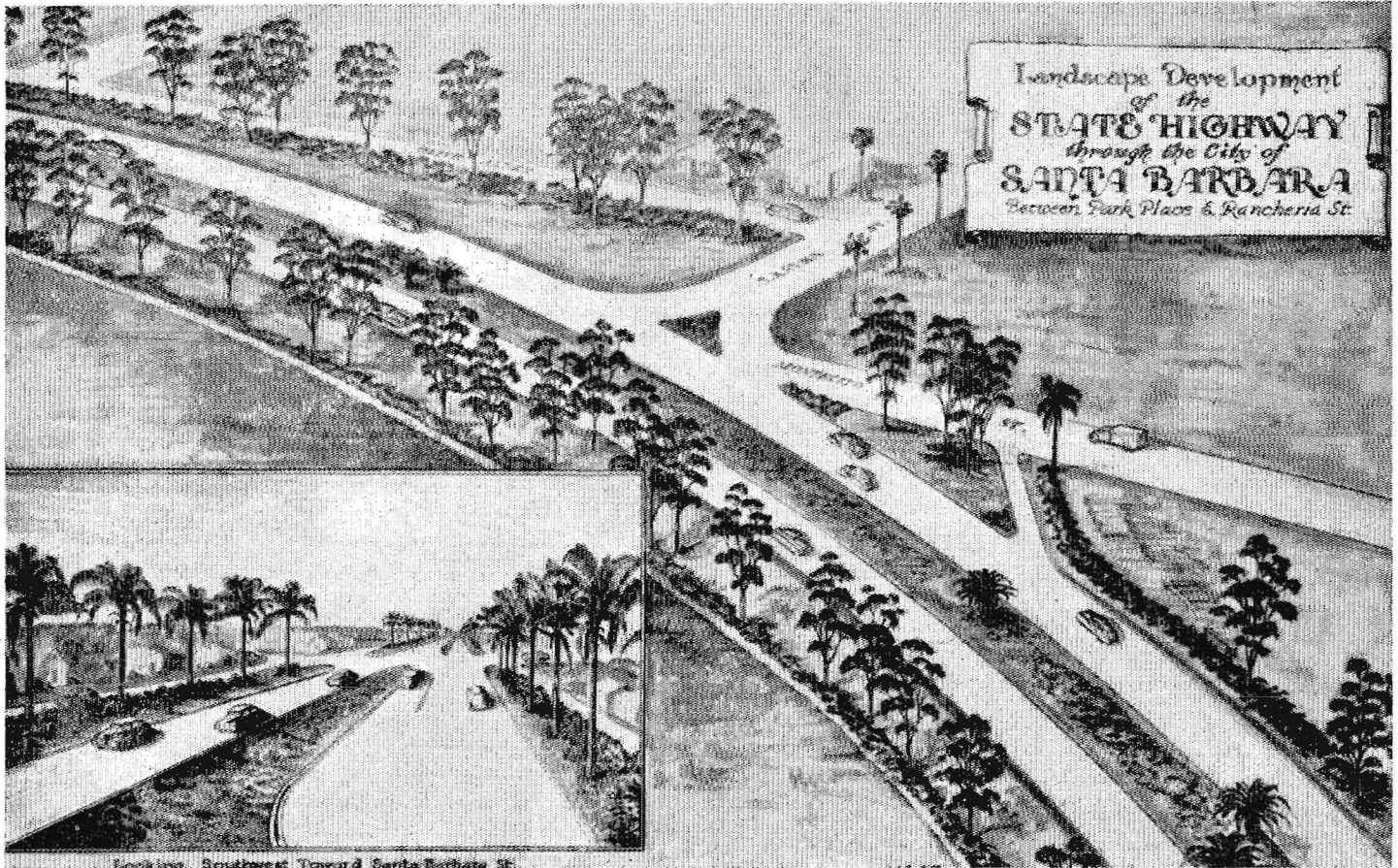
The acute housing shortage and restrictions on new construction at the time the right of way was being acquired and cleared, combined to complicate the problem of moving or demolishing occupied homes and buildings. In some instances, after consummation of right-of-way negotiations, it was necessary to permit continued owner or tenant occupancy on a rental basis until other housing could be found. In those cases where the owners were not interested in moving tenant-occupied houses, and the tenants could not find other housing, the houses were sold with the stipulation that the tenants were to have continued occupancy of the houses when relocated. Such sales were made, after publication of a notice for two weeks, to the bidder submitting the highest sealed bid with the buyer to handle and pay the cost of moving. Where owners or tenants

Milpas Street Intersection on easterly approach to Salsipuedes overhead structures





*UPPER—View of freeway showing Montecito Street as outer highway on southerly side. LOWER—Santa Barbara Freeway looking easterly, showing Salsipuedes overhead structures. Santa Ynez Mountains in the distance*



found other housing, vacated houses were sold by the same procedure. Clearance of the right of way was accomplished without any evictions or contributing to the acute housing shortage. Only buildings of such construction that they could not be moved were demolished. These buildings were occupied by business establishments.

#### Only Six Intersections

Numerous intersecting streets along the former routing carrying fairly large volumes of cross traffic interrupted and materially impeded the flow of highway traffic. On the new 2.3 miles of freeway there are now only six intersections where city street traffic may cross at grade. At five of these intersections—Milpas Street, Santa Barbara Street, Anacapa Street, State Street and Chapala Street—traffic actuated, two-phase signals regulate and expedite the flow of traffic. Crossings of Quarantina Street, Salsipuedes Street and an industrial spur which carry heavy volumes of traffic to the surrounding industrial

area are made on twin separation structures. These structures, one for each set of lanes to carry traffic in each direction, consist of reinforced concrete deck slabs on four 36-inch wide flange steel girders supported by two-column reinforced concrete bents of rigid frame design founded on timber piling. Each structure is 1,300 feet in length and has a 26-foot roadway.

The freeway roadbed, in general, consists of two 12-foot width lanes on each side of a 36-foot curbed median strip. An eight-foot surfaced shoulder borders the exterior lanes to permit emergency parking. Short sections of outer highway interconnect streets severed by the freeway. Montecito Street serves as an outer highway from Laguna Street to De La Vina Street.

#### Heavy Pavement

Estimated 5,000-pound equivalent wheel loads over this section for a 10-year period are in excess of 10,000,000, requiring a heavy industrial type pavement. This consists of eight inches of

Portland cement concrete pavement over a minimum six-inch thickness of imported borrow having a bearing ratio of not less than 50 percent and an expansion of not more than 1 percent. As protection against pumping action of the pavement, the imported borrow subgrade was treated with 4 percent of Portland cement to a depth of four inches the full width of the pavement.

Basement soils throughout the project had low relative compaction, making it necessary to remove and recompact them to a depth of three feet below profile grade in accordance with our standard practice. As these soils were suitable for use as top soil, they were excavated to a depth of 2½ feet below profile grade and used to construct the upper six inches of the central dividing strip and areas between the shoulders and right-of-way line. After compacting the exposed surface of the basement soils until the required relative compaction had been obtained in the upper six inches of

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# Snow Areas

Better Parking Facilities;  
Strict Law Enforcement

IN RELEASES to the press, State Highway Engineer George T. McCoy announced that snow sports enthusiasts who visit mountain playground areas this winter and spring will find parking facilities greatly improved, but he warned that motorists traveling into these areas must carry skid chains and be prepared for snow at any time.

The State Division of Highways has spent a considerable sum in providing additional signs and parking areas in the snow playgrounds, McCoy said, however, that motorists who park upon the highway or who use the highways without required chains will be turned back and cited for the violation.

Signs indicating the need of chains have been erected approximately one

mile in advance of a second sign which will read, "STOP—vehicles without chains on rear wheels prohibited." So that motorists will not use chains beyond points needed, a sign indicating the end of the chain control zone has been erected.

The greatest problem in past years has been that of parking. Mandatory

... Continued on page 55



# F.A.S. Roads

San Bernardino County  
Is Making Progress

By A. COONROD, District Office Engineer

UNDER the provisions of the County Highway Aid Act of 1945, San Bernardino County was allocated \$1,708,114 in federal aid secondary and state matching funds for use in improving roads on its Federal Aid Secondary System. By reason of this apportionment, the county has or is improving a rural network of farm to market roads and connections between state highways in the southwesterly portion of the county which will be of permanent value.

The county submitted seven road projects in its program which involved the construction of 28.5 miles of highways at an estimated cost of \$1,871,000. As part of these improvements, three high-type bridges were to be constructed.

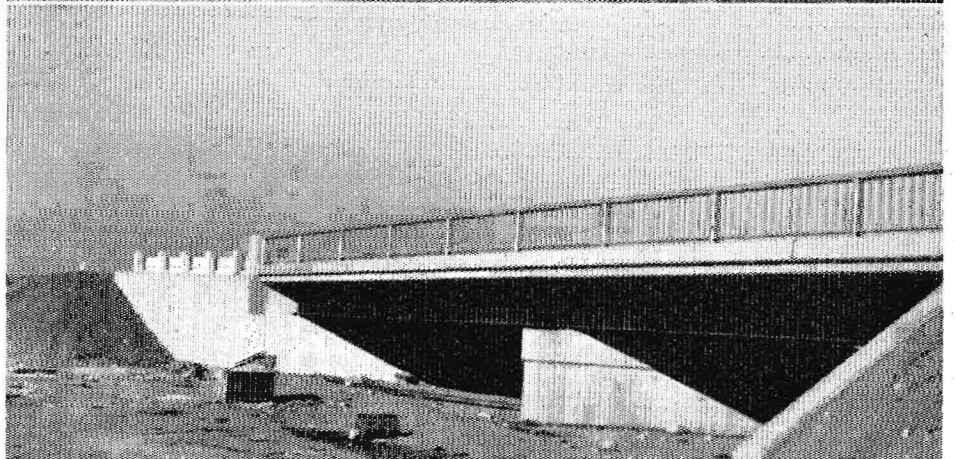
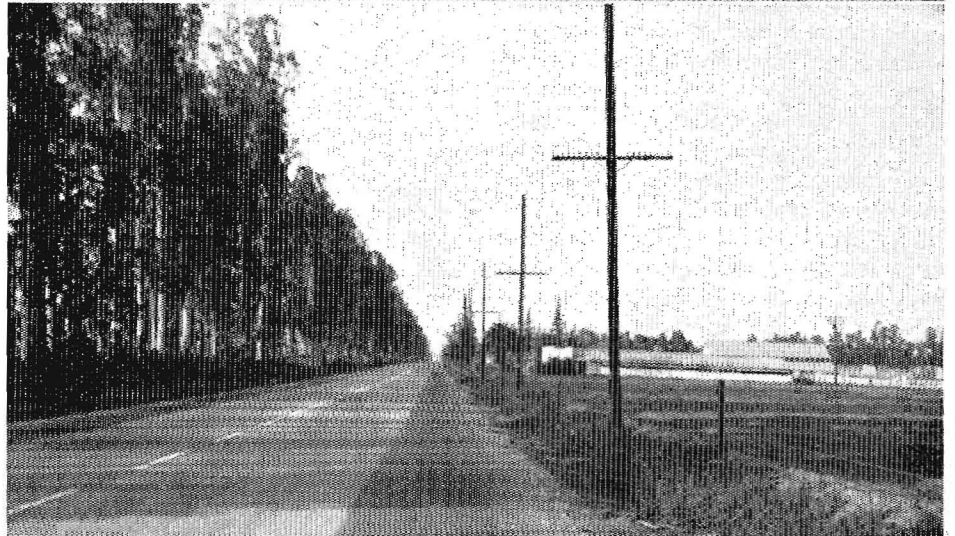
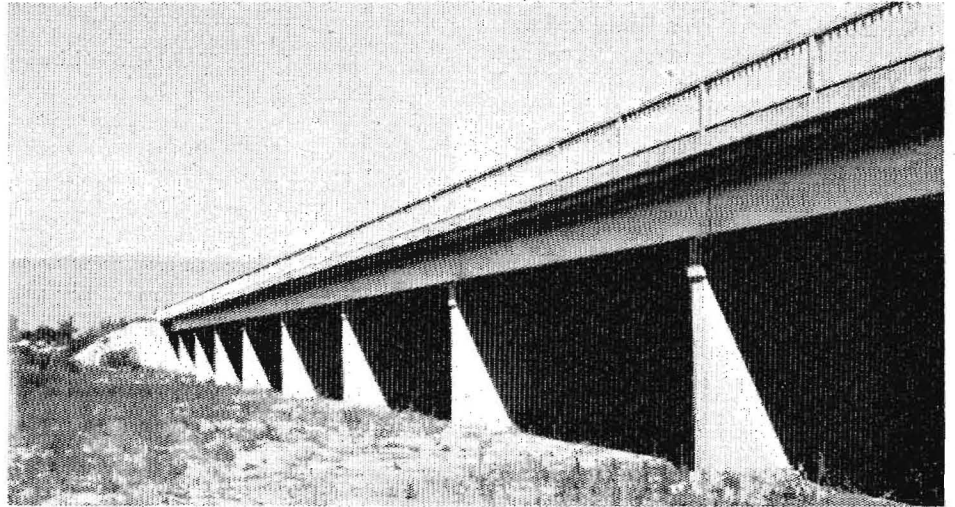
At this time the county has completed construction on three projects at an estimated cost of \$673,000, has two contracts under way estimated to cost \$427,000, and has advertised for bids for one improvement with an estimated cost of \$520,000. Therefore, the county has obligated by contracts or advertising \$1,620,000 in FAS and state matching funds.

## Work by County

All work in connection with preliminary engineering was performed by the county under the direction of Howard L. Way, County Surveyor and his deputy, J. E. Riebe.

The county has a completely equipped laboratory wherein most tests in connection with road and bridge improvements may be made. The county utilized these facilities in making necessary tests, both during the preliminary stage and after construction was under way. Ray Taunton is in charge of the laboratory.

Although some relocation has been undertaken, the work has consisted generally of modernizing existing roads.



UPPER—New bridge across Santa Ana River at Waterman Avenue. CENTER—Rural scene on completed Archibald Avenue Improvement. LOWER—Newly completed City Creek Bridge, East Fifth Street, San Bernardino

and Public Works



The first project undertaken by the county involved the improvement of Waterman Avenue at the easterly city limits of San Bernardino between the south city limits and the Pigeon Pass Road. The length of the improvement was 2.7 miles and included the construction of two steel girder bridges, one across the Santa Ana River and the other across the San Timoteo Creek.

**All-Year Route**

Previous to the construction of the bridge across the Santa Ana River, it was necessary to close the road during flood conditions and by reason of the improvement an all-year route has been provided. The contract for the improvement was awarded to the Griffith Company, Los Angeles, April 8, 1947, and all work was completed January 9, 1948. The cost of the improvement was \$401,400.

The second project involved the construction of a two-lane road parallel to the existing highway which provided a four-lane divided highway on the Bloomington Diagonal between the Ontario-Colton Freeway and Rialto. The county was enabled to construct the widened roadway because of the abandonment of a railroad which formerly paralleled the existing road. The contract for the improvement was awarded to T. M. Page, Monrovia, August 7, 1947, and was completed December 19, 1947. The improvement was 2.1 miles in length and cost \$60,000.

**Third Project**

The third improvement was on Archibald Avenue between Valley Boulevard and Cloverdale Avenue in Riverside County. The work consisted of grading and placing a two-lane plant-mixed surface and the construction of a multiple span culvert across a flood-control channel. The length of the improvement was approximately six miles and cost \$212,000.

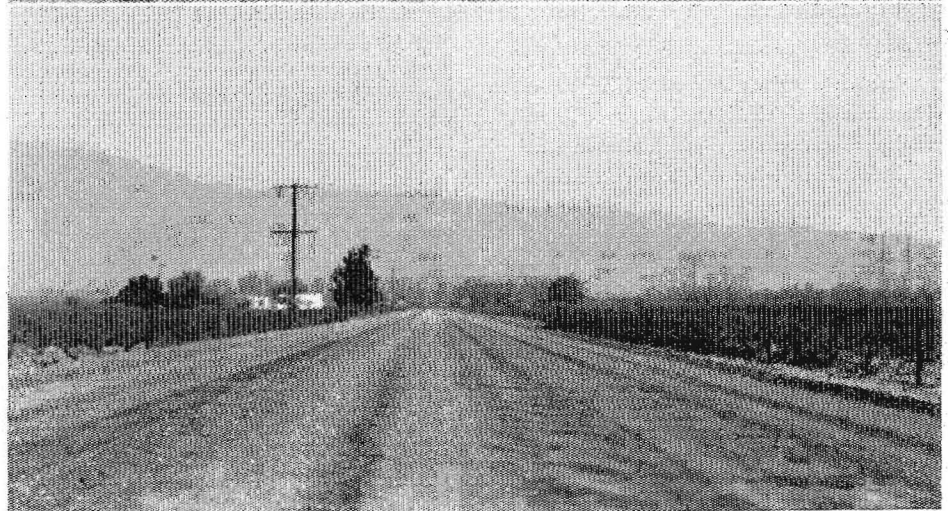
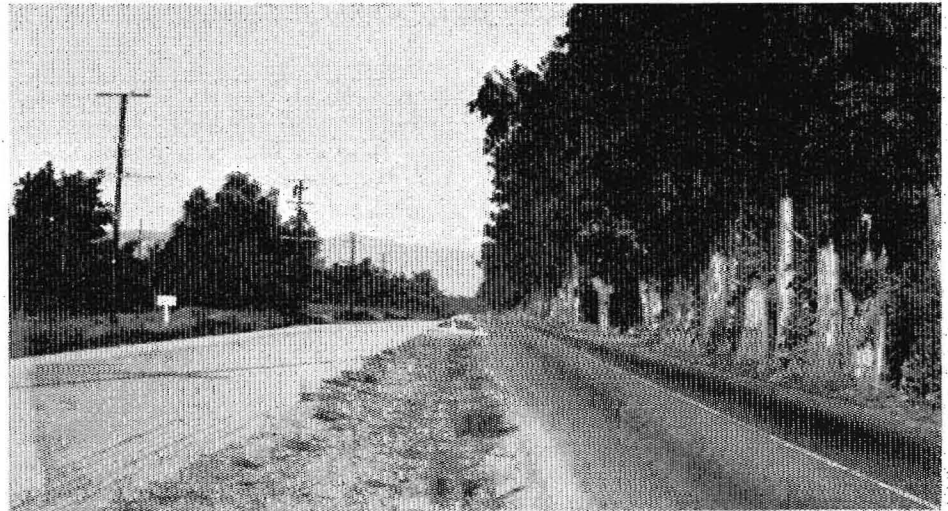
The next project undertaken by San Bernardino County involved the improvement of approximately four and one-half miles of East Fifth Street between Waterman Avenue and City Creek. As a result of this improvement, the Third Street entrance to the city, which serves the Army Air Depot, will be relieved of considerable congestion. The contract for the improvement was

awarded March 26, 1948, to E. L. Yeager, Riverside, and is rapidly nearing completion.

A contract for the improvement of Etiwanda Avenue between Valley

Boulevard and Foothill Boulevard was awarded to Match Bros., Colton, August 9, 1948, and involved the construction of a two-lane graded roadway and

... Continued on page 60



UPPER—Once a two-lane road between a railroad track and row of eucalyptus trees, now a four-lane divided highway. CENTER—Etiwanda Avenue now under construction. Foundation material in place. LOWER—Mail boxes attest to rural character of East Fifth Street

# Practical Joke

Interesting Story  
Of Old Temecula

By J. M. HOLLISTER, Resident Engineer

CONSTRUCTION operations for relocating U. S. Highway 395 near Temecula, passing through apparent virgin mountain terrain, uncovered evidence of an early granite quarry enterprise of long duration. Here it was that a practical joke, directed at one of the quarry workers, was found in crude engraving in lasting granite in the form of a gravestone memorial. Residents of the area have furnished the story connected with the "memorial," and at the same time recalled details of the quarry enterprise, the abandonment of a main line railroad once existing adjacent, and other items of local historical interest.

The highway relocation passes along the southeasterly end of the Elsinore Mountains and through a gap at the summit. The surface is covered with very large granite boulders, chaparral, and scattered oak trees. Here, while drilling a hole in one of the large boulders preparatory to blasting, it was observed that dust, produced by the drilling bit, covering the boulder surface, made visible the following otherwise unnoticed lettering:

Here Lies the Body of  
D. B. LOWER  
WIFE AND  
DAUGHTER  
Who Died of Starvation  
1910

#### Inquiry Launched

Here was a find; perhaps gruesome, perhaps of local historical interest and, in any event, certainly unexpected. If this was the burial place of three people, a formal disinterment would be necessary. Accordingly, the resident engineer started an investigation by contacting the local postmistress, who said that her parents had been in the area in 1910 and might be able to furnish some information on the matter. Her father, Mr. Roripaugh, was contacted

but he could only direct the investigation to a Charles Vickers, purported to be a foreman at the quarry in 1910. Mr. Vickers, an elderly man, upon being approached and questioned, with much amusement, related:

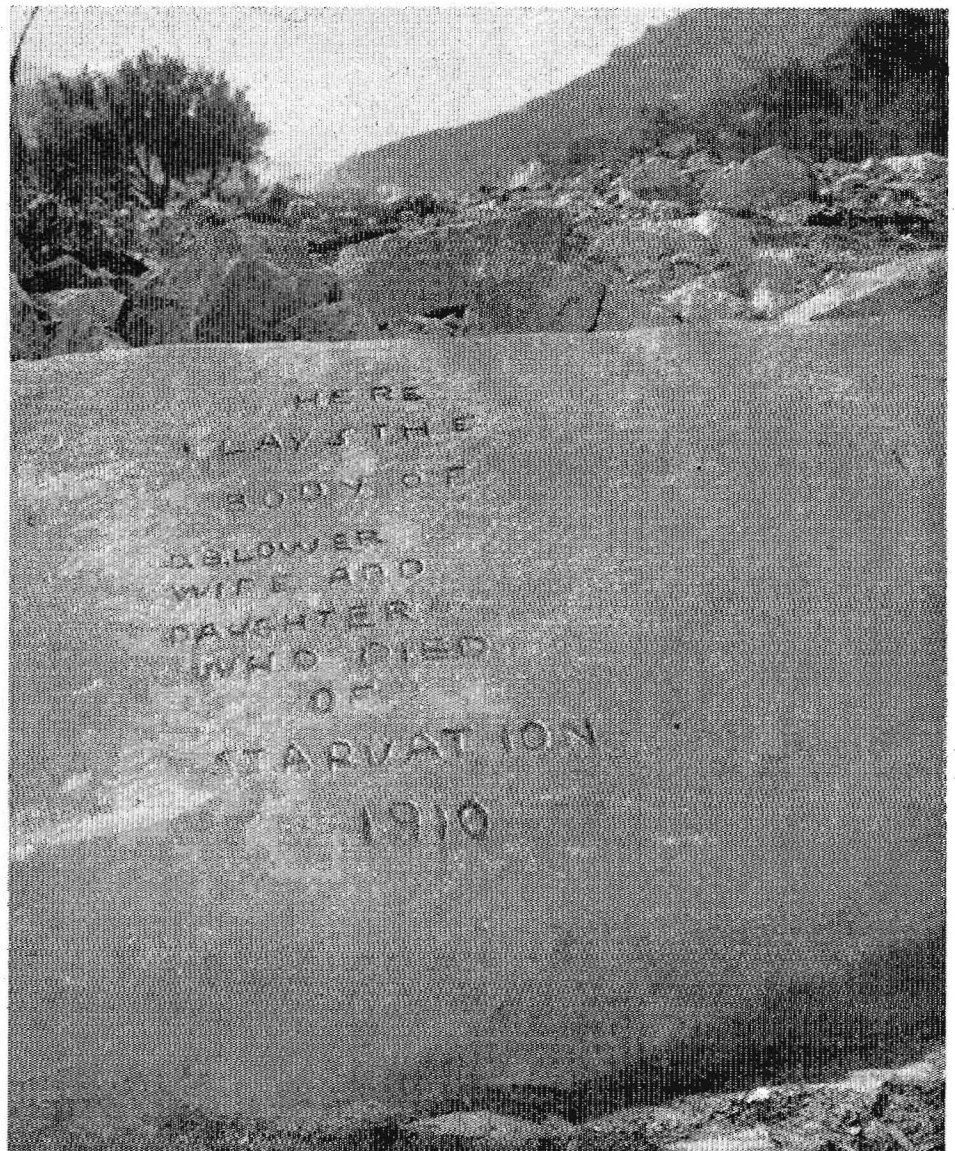
#### The Story

"During the early 1880's, Pat Quinn of San Francisco opened a granite quarry in the area where you found the 'memorial,' to obtain granite rock in commercial quantities and

sizes for buildings, curb stones, and paving blocks. This granite was particularly suitable, as it was very straight-grained and easily split along predetermined lines into rectangular shapes. The rock was quarried, sized, and hauled north across the Temecula River to the nearby Santa Fe Railroad. From there it was shipped on order for use throughout the State. This railroad was once the main line connecting Colton and San Diego.

"During the year of 1910, one of the men employed at the quarry was Dave Lower, who owned a ranch above Sacramento. He was forever complaining about his uncertain

"Gravestone memorial" with inscription carved as a practical joke



financial status. Always when the pay roll, being sent from San Francisco was a little late, his cry was 'my wife and daughter on the ranch will die of starvation.' This continued grouching caused his co-workers to retaliate. So, at times, when the quarry crew was idle, several of the men, with the tools of their trade, climbed up to the site and carved the eerie inscription for all to see.

"Anyone who recalls early days on construction will remember the lengths to which construction stiffs would go to perpetrate a practical joke. No matter what cost in sweat and hard work was needed to put something over, they would have their jokes. Everyone in camp would participate in the laugh, and woe unto the victim if he could not take it: The drinks certainly were on Dave. From that time on, he refrained from voicing the imminent starvation of his wife and daughter."

The "memorial" boulder is being preserved as a roadside curiosity on this new important interstate highway, which, now being constructed on freeway standards, will carry a large volume of traffic when other adjacent sections are also reconstructed.

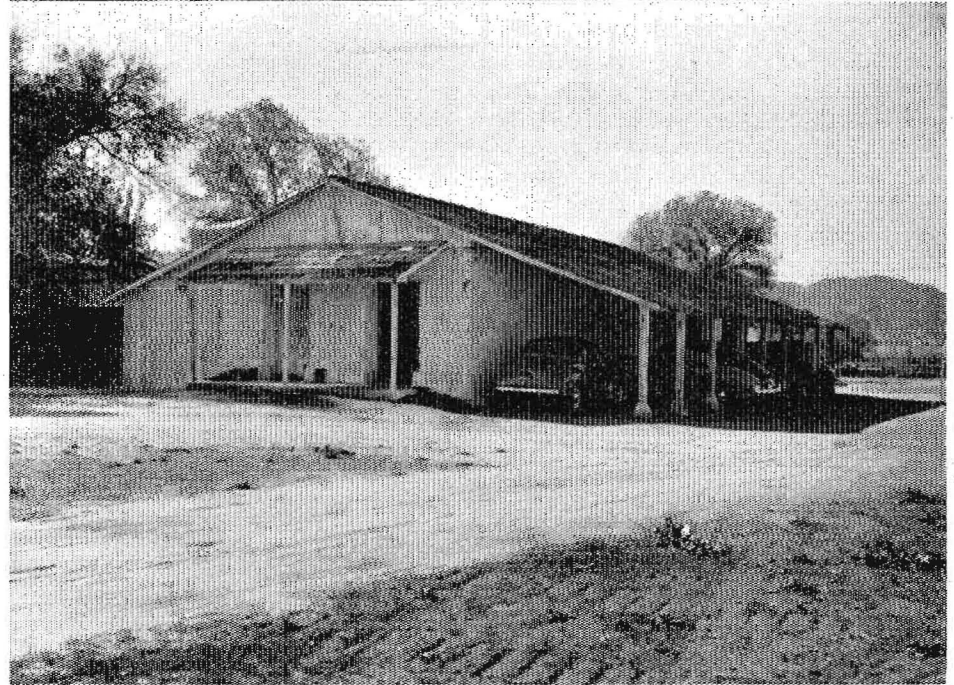
**Early Day Floods**

The heavy general floods experienced in 1891 washed out the railroad tracks through the adjacent Temecula Canyon through which the railroad crossed to the coastal plain. (It was previously washed out and rebuilt in 1884-85.) The main line was not again rebuilt here, though the portion between Corona and Temecula did operate as a branch feeder. In recent years the tracks between Elsinore and Temecula have been removed. A new railroad replacement line to San Diego had been constructed via Santa Ana Canyon, 40 miles to the north, and thence down the coast.

Passers-by in this area for years have been puzzled when observing that split blue-gray granite is used for ranch fence posts. It seemed incredible that ranchers would undertake the tedious work of quarrying fence posts for delineating and controlling their boundaries. This practice is now understood coincident with the fictitious grave-stone.

**Unique Fence Posts**

The fence posts are established to be remnants of curb stones and which remained on the site as waste after the quarry shut down. Ranchers conceived the idea of salvaging these old rejected curb stones and using them for fence posts as they would never rot or burn



UPPER—Grading operations for relocation of U. S. 395 in the Elsinore Mountains. LOWER—Old adobe depot of Butterfield Overland Stages at Temecula, converted to grain storage warehouse.

as do wooden posts. These granite posts were generally placed thirty or forty feet apart to assure stability of the fence line, and interspersed with wooden posts. While some have been replaced with wooden line posts, at the present time many of the old ranch property fences consist of these granite posts on which barbed wire is strung.

**Temecula History**

Temecula is perhaps best remembered for the part it played in early Spanish-Mexican California history and the period immediately following the conquest. Temecula Rancho was established by Mission San Luis Rey and was one of the few Mexican land grants made to Indians. Here, Indian stories

# Award Denied

State Wins Freeway  
Access Litigation  
(See Article on Page 38)

By JOHN C. WEBB, District Right of Way Agent

**A**WARD DENIED IN FREEWAY ACCESS SUIT was a headline of a news item recently appearing in a San Diego newspaper.

Ordinarily we are not surprised when a jury fails to find damage in a condemnation suit involving the acquisition of land; but in this case, in which the taking of access rights was the sole issue, not only was no award made, but the jury found that the property had been specially benefited due to the construction of the Cabrillo Freeway.

In an action entitled "*People v. Horsford, et al.*," the State sought to condemn the access rights along the north line of a 65 x 100-foot lot, located at the southeast corner of 10th Avenue and Ash Street in the City of San Diego. The dedicated portion of Ash Street ended at the easterly line of the lot, being coincident with the westerly boundary of Balboa Park, but connected with some park roads traveled generally by the public. This property, although improved with two very old, single family residences, was and is zoned for residential income. All witnesses agreed that development to the highest and best use of the property would require the construction of a two- or three-story apartment building.

## Ash Street Intersection

Ash Street was reconstructed easterly of 10th Avenue to serve as one of the approach roads at the southerly terminus of Cabrillo Freeway. It extends westerly to the San Diego Harbor and has been established as an arterial highway for its entire length; consequently, a large volume of traffic now flows past this intersection. The reconstruction of this street necessitated a slight raise in grade, so that the northeasterly corner of the property now lies approximately four feet below the grade of the new sidewalk.

In the original answer, the owner claimed \$5,000 for "access rights" plus

\$10,000 damage caused to the remainder of the property by reason of the taking of access rights and the construction of the highway. This answer was modified during the trial by the court striking the portion of the answer demanding \$5,000 for access rights in line with the ruling established in the case of *People v. Al G. Smith Company, et al.*

The defendant's witnesses testified that the taking of access rights had the effect of changing the character of the lot from that of a corner lot to an inside one. The resultant difference between the two represented a diminution in value ranging from \$3,800 to \$6,000.

## State's Contentions

Witnesses for the State testified that the taking of access rights on the north side of this property would have little or no effect on the development of the lot for apartment house use, because entrance ways could be suitably developed on the 10th Avenue frontage. They further contended that the lots still retained the main attributes of a

corner lot, viz.: light, air and view. Consequently, their testimony was to the effect that there was either no damage or that it was merely nominal.

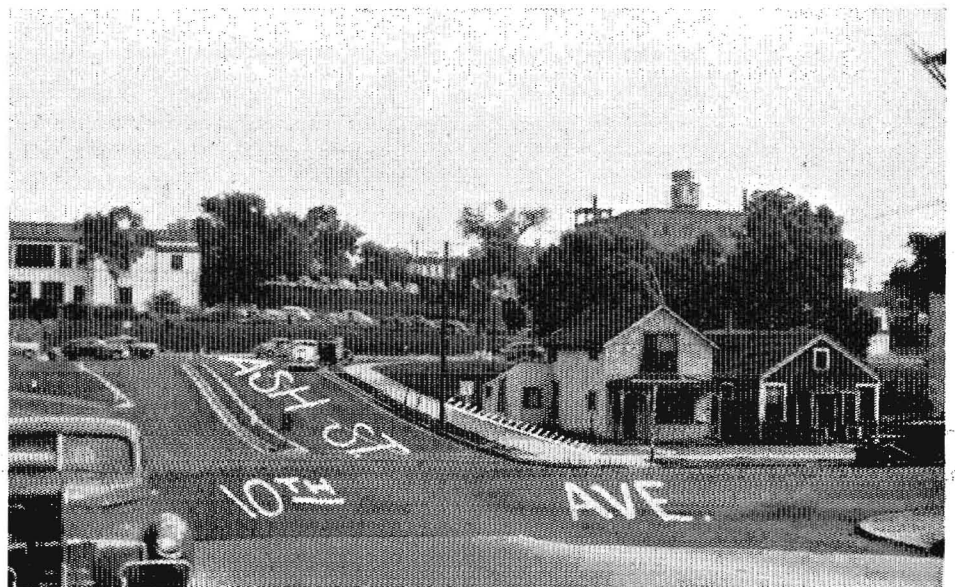
Further, the witnesses for the State believed that the property had been substantially benefited by the construction of Ash Street as an integral part of the freeway due to prominence and increased advertising value. Testimony for special benefits ranged from \$2,500 to \$2,600.

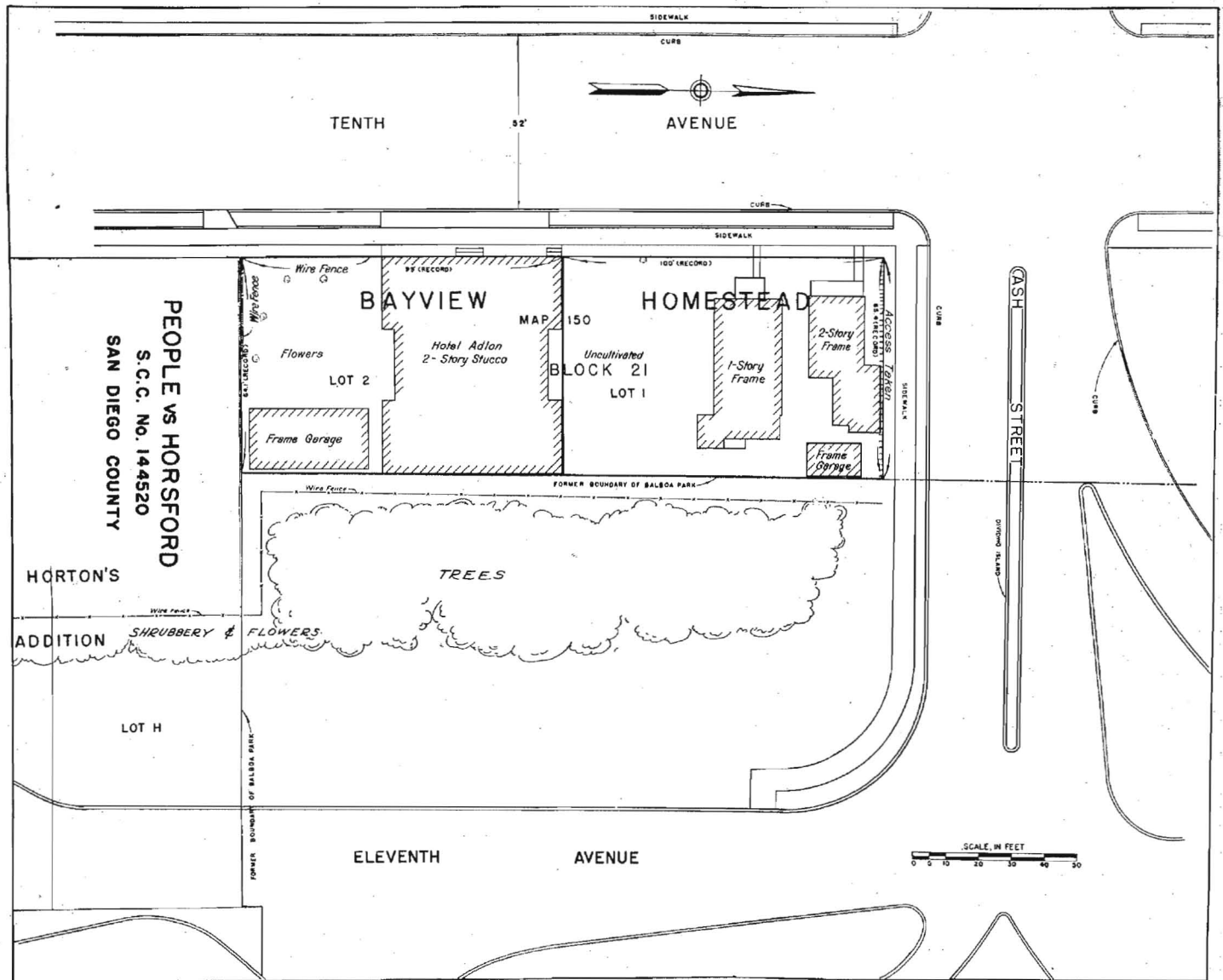
## Victory for State

The opinions of the State's witnesses were supported by evidence of sales of the property itself. The property sold for \$9,000 in June of 1945. In September, 1947, it resold for \$15,000. The State filed its condemnation suit in January, 1948. The defendant bought the property in April, 1948, for \$17,500.

Both defendant's and plaintiff's witnesses testified that, generally speaking, the peak in sales prices was reached in the latter part of 1946 and that prices have remained constant since that time. This would imply that the increases in

Intersection of Ash Street and Tenth Avenue in the City of San Diego. Hatch lines indicate the portion along which access rights were acquired in "*People vs. Horsford*"





**PEOPLE vs HORSFORD**  
 S.C.C. No. 144520  
 SAN DIEGO COUNTY

the lot sales could be attributed directly to the construction of the freeway.

**Verdict of the jury:**

Damages .....	None
Special benefits .....	\$2,500

Another interesting case in which no award was made, entitled "*People v. Al G. Smith Company, et al.*," was tried in Imperial County in 1946. This case involved a large acreage having one-half mile of frontage on Highway 99, just north of the city limits of El Centro. Properties on the opposite side of the road had been subdivided into one-acre lots for many years, but were sparsely settled.

**Imperial County Case**

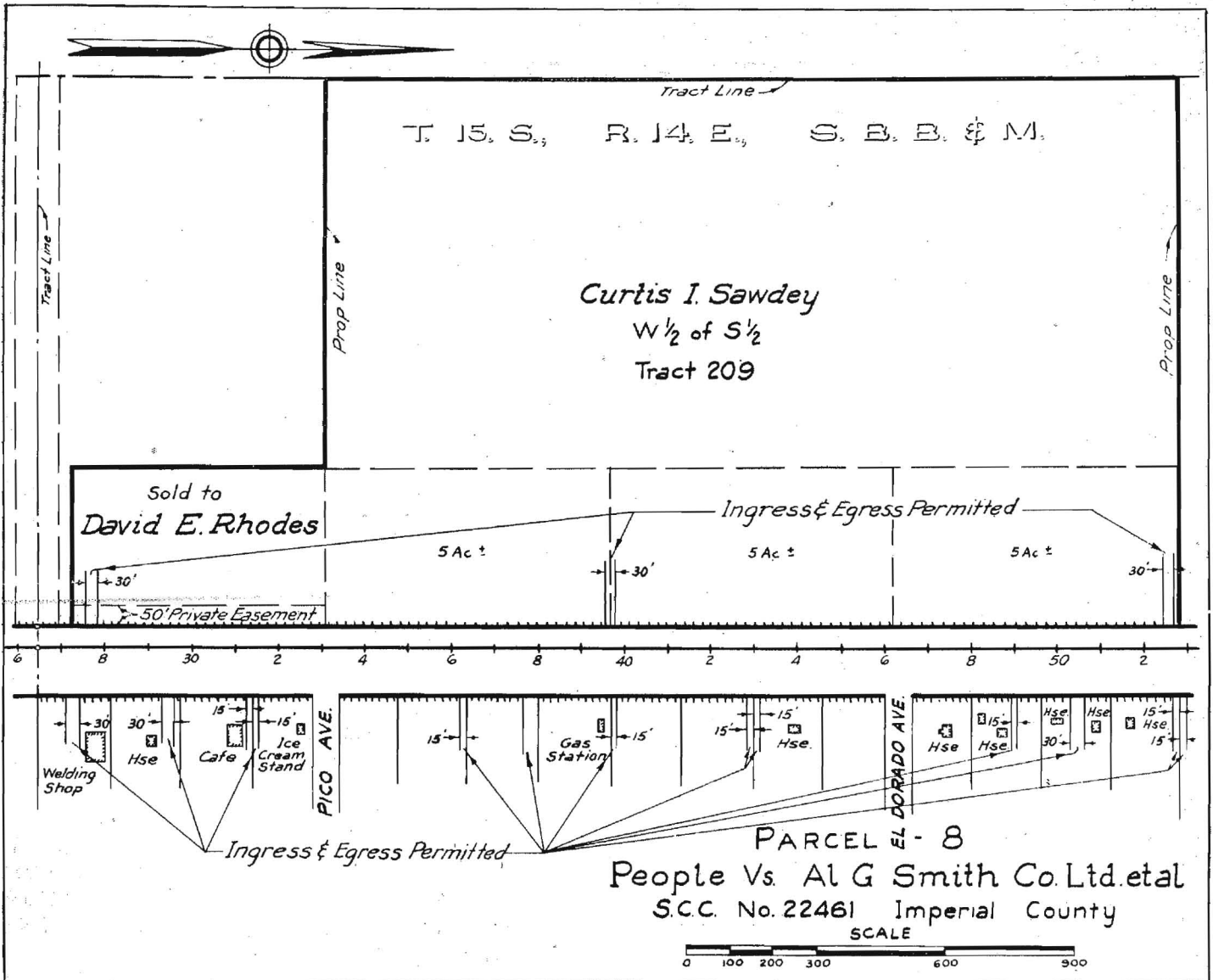
Since the termination of World War II, activity had increased in the sales of these lots, particularly along the highway, for industrial and commercial use. Most of these sales included properties on which controlled access rights had been acquired and each holding had been limited to one opening into the freeway. The sales indicated that the properties sold for substantially higher prices than previously, and higher than the current selling prices of lots having frontages on adjacent side streets.

This property, prior to the filing of the suit, was devoted to farming. After the suit was filed, the owner sold five acres with 600 feet of highway frontage for \$7,500 to a farm equipment

sales agency. One access opening was provided for this parcel and the seller reserved a right of way 50 feet wide to connect his remaining property to this opening. The new purchaser did not claim any compensation for the taking of access rights over the portion he had purchased.

**Sale Pattern**

During the trial the owner testified that his property, as farm land, was worth \$500 per acre, but that the highway frontage for business purposes was worth \$1,500 per acre. He failed to show, however, why the remainder of highway frontage could not be sold for business purposes, whereas the State showed that the remainder could be sold at the same price, using the same



pattern as developed by the first sale. This pattern would provide one access opening for each five-acre parcel. (See map.)

The defendant in this case also attempted to introduce evidence as to the cost of constructing an outer highway adjacent to the right of way line. Upon timely objection by the State's attorney, the court held such evidence to be inadmissible and improper as it was an attempt to prove a collateral matter for a special use.

The Appellate Court of the State of California not only upheld the court's ruling on this subject, but denied the defendant's contention that his constitutional rights had been violated by reason of no payment for the taking of access rights as a property right. The

... Continued on page 50

This highway frontage was sold to a farm equipment agency for \$7,500



# Outer Highway

Increased Business for  
Roadside Restaurant

By E. P. JONES, Right of Way Agent

ON NOVEMBER 1, 1948, the famous "Milk Farm" restaurant began operations on an outer highway constructed by the State of California. Previous to the above date this restaurant had direct access to the through lanes of traffic of the adjacent state highway.

The Milk Farm has a unique history, having originally been established in the early 'twenties by Karl A. Hess on a location on the old state highway northerly of its present location. At that time it was called "Hess' Corner" and a feature was the offering of all the milk or buttermilk that a person could drink for the sum of 10 cents. Milk drinking records by individuals were kept and these records are now displayed in the present building.

In 1940 the business was purchased by H. R. "Doc" Henderson, the name changed to "Henderson's Corner" and later, in 1940, influenced by an article in the *Saturday Evening Post*, the name was changed to "Milk Farm." Upon the relocation of U. S. 40 to the present alignment a new establishment was constructed in its present location,

and until November 1, 1948, enjoyed full and unrestricted access to this highway.

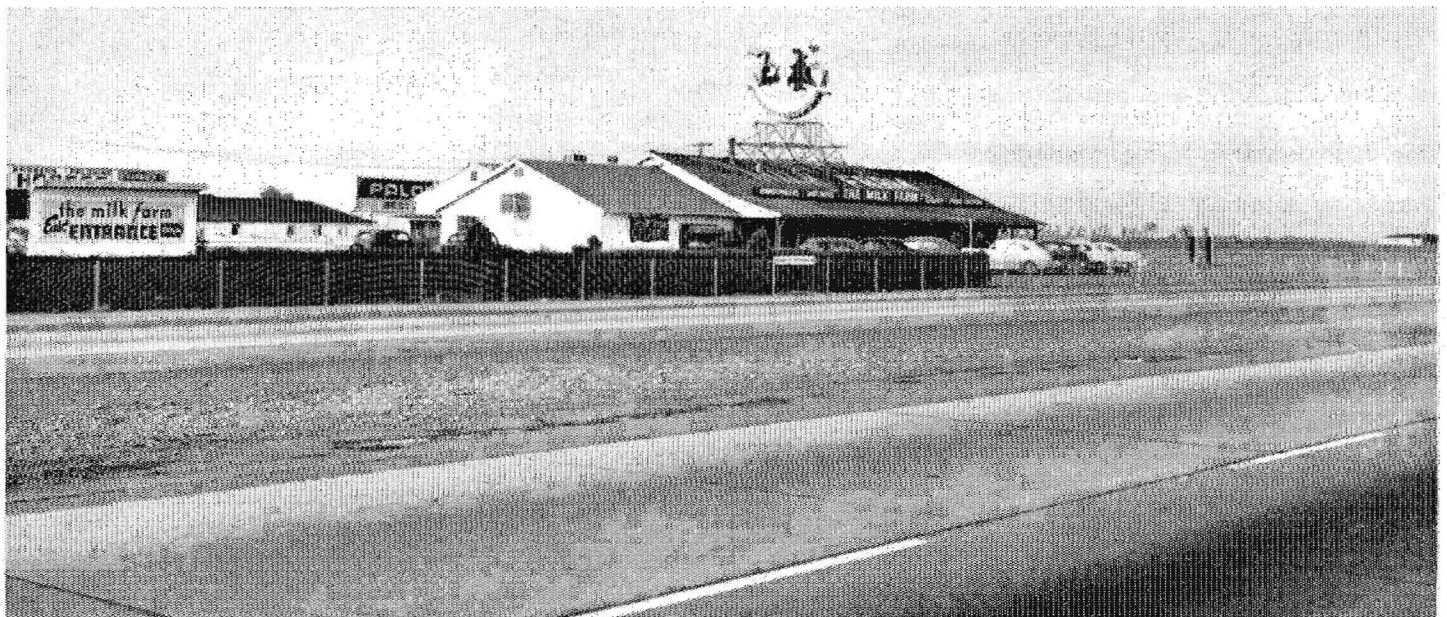
Due to the large volume of business that this restaurant enjoys the traffic moving in and out and parking alongside of the highway was recognized as a serious hazard to through traffic. It was decided to negotiate with Mr. Henderson and two adjoining property owners with the view in mind of placing these properties on an outer highway. After extended negotiations because of the natural reluctance of the owners to experiment, they were convinced by the state agents that the outer highway would not be a detriment and would actually benefit their properties. This fact is definitely borne out by the letter from Mr. Henderson which is here reproduced in its entirety.

Construction of the outer highway commenced on February 23, 1948, under a contract with Harms Brothers. E. L. Craun acted as Resident Engineer. The contract provided for ap-

proximately 1,700 feet of plant-mixed surfacing and untreated rock base and the erection of a chain link fence three feet in height and two feet within the state highway right of way line between the outer highway and the through lanes of traffic. Work progressed rapidly and, as before stated, the outer highway contract was completed on November 1st. In addition to the State constructing the outer highway Mr. Henderson also had considerable area around his buildings paved with oiled mixed surfacing.

On the accompanying sketch the freeway itself is designated together with the outer highway and the present location of the various buildings. It was not necessary to move the restaurant building under this project as the same had been built a sufficient distance from the property line to allow the construction of the outer highway without affecting the building. The only buildings necessary to be moved were the service station and a "Giant Orange Stand" located easterly of the

View of Milk Farm from northbound lanes of freeway



# THE MILK FARM

Two Miles North of Dixon, California

Mr. G. T. McCoy  
State Highway Engineer  
Sacramento, California

H. R. HENDERSON, Owner

December 2, 1948

Dear Sir:

As owner and operator of the Milk Farm Restaurant I wish to take this occasion to inform you as to my reactions resulting from the placing of this business on an outer highway.

This restaurant is located two miles north of Dixon on U.S. Highway 40 and has been built up over a period of years and the same has been enjoying an excellent business and represents a large investment.

Property upon which this business is operated previously enjoyed full unrestricted access to U.S. Highway 40 along its entire frontage. Upon first being approached by the representatives of the State Highway Right of Way Department with their suggestions that this business be placed upon an outer highway, I was naturally somewhat doubtful as to the feasibility of this move, particularly considering the fact that the outer highway of some 1700 feet in length would serve not only my own property but also two other property ownerships.

State representatives, by reason of their thorough prior analysis of the resultant situation thoroughly convinced me that the placing of the business upon an outer highway would not in any way damage my business and would definitely add to the safety and comfort of the travelling public and also to my customers. I wish to compliment the State Highway Department in having in their employment such men as Mr. Fred C. Moore and Mr. L. J. Malatesta who negotiated with me for this change.

Since the construction of the outer highway was completed on November 1st. I have been exceptionally well pleased with the fact that my business has not in any way been impaired and has probably been enhanced by reason of being placed upon the outer highway. The reaction of my customers, both old time repeat customers of which there are many, and also new customers has been excellent and they have remarked many times to my employees of the feeling of safety and security that they now enjoy by "off-highway" parking.

I am naturally pleased to note that during the first month since this work was completed that my business has increased several hundred dollars over the corresponding month of last year.

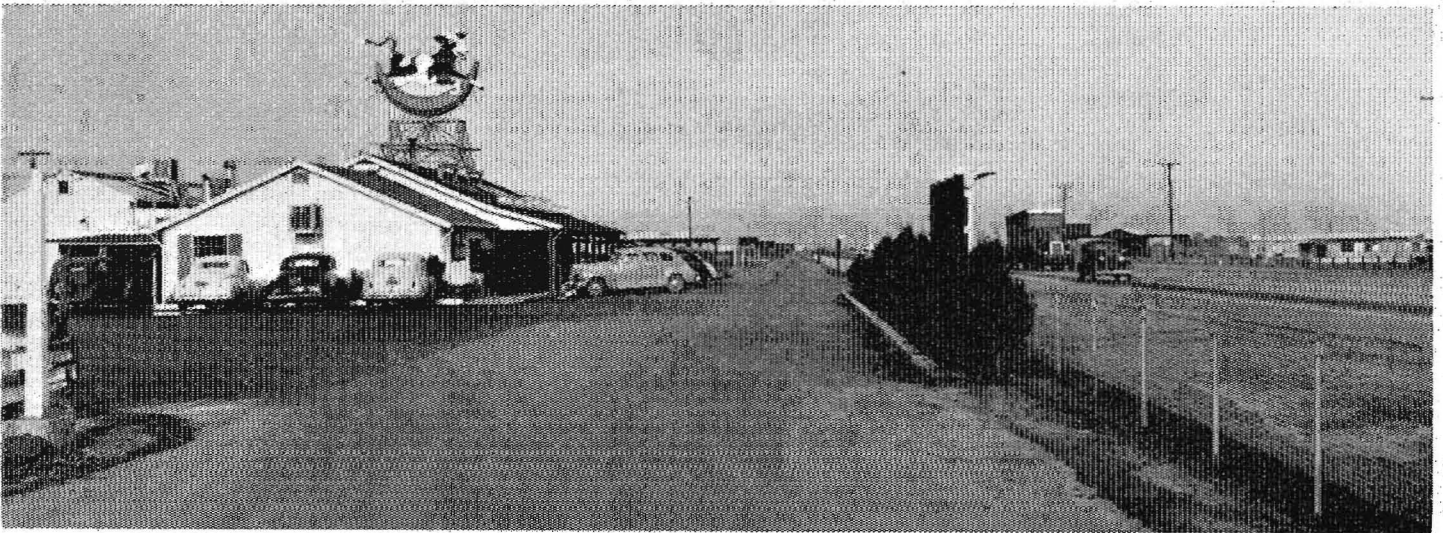
I am writing this letter as I thought you and your engineers and Right of Way men would be interested in the effect of this work upon such a large established business such as mine.

Very truly yours,

H. R. Henderson

*America's Most Unique Highway Restaurant ....*





Henderson's Milk Farm restaurant building as it appears to customers approaching along outer highway

restaurant building and at the easterly entrance to the outer highway.

One unique feature of the improvement is that the outer highway serves three separate land ownerships and although the State as a condition of the right of way agreement constructed the outer highway, it was constructed on the property of the three adjacent property owners who entered into a joint easement agreement with each other for the use of it.

The state highway right of way staff is happy to learn that Mr. Henderson is so well pleased with this ultra-modern type of highway development, and that not only his regular customers are continuing to patronize

his roadside business establishment, but also an increased volume of transient trade has resulted.

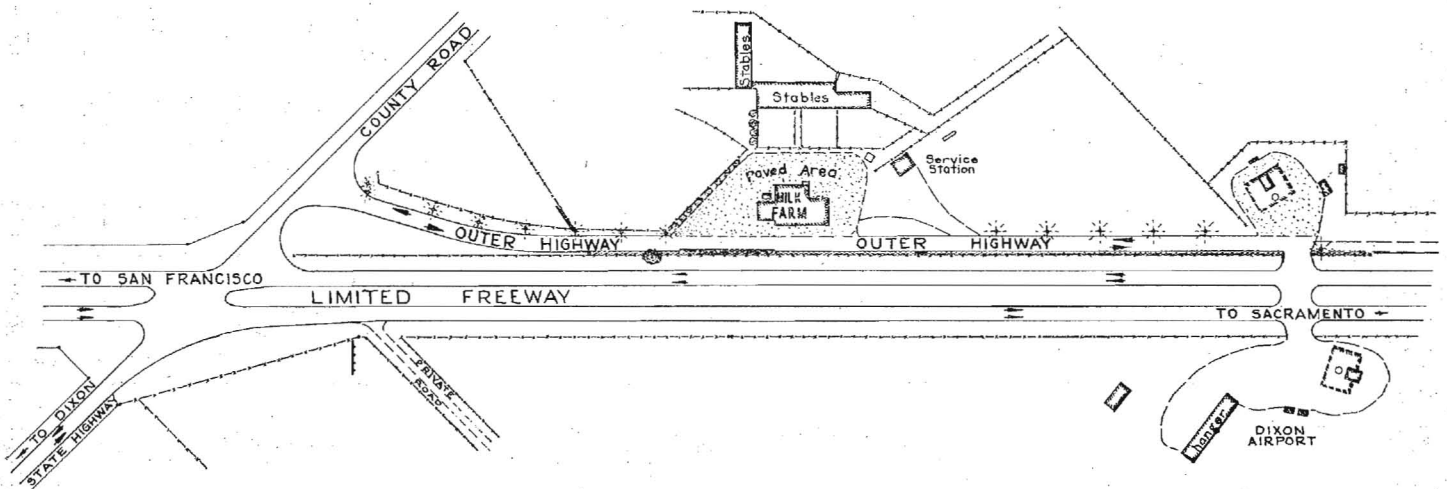
This case is a further verification of the conclusions we have reached as a result of extensive studies of modern freeway development not only in California but in other states, that a roadside merchant with a real service to render and quality merchandise to offer, need have no fear for his future welfare and continued successful business operation when located on an outer highway.

It is of course obvious that with off-highway parking facilities located adjacent to the business establishment on the outer highway, with points of ingress and egress to the through lanes

of traffic properly located, as they have been in the case of this improvement, patrons of the establishment have a definitely increased feeling of security when they leave the freeway and drive their vehicles along the outer highway where they are entirely separated from the fast moving traffic on the through lanes.

This type of design has long since proven to be a tremendous step forward in adding to the safety of the occupants of rapidly moving vehicles on the freeway itself, where the operator of a vehicle is naturally alerted and expecting conflicting movements of traffic at intersecting crossroads

... Continued on page 45



This sketch shows how outer highway serves Milk Farm. Stars on outer highway indicate lighting standards erected by owner of Milk Farm

## COAST HIGHWAY

Continued from page 17 . . .

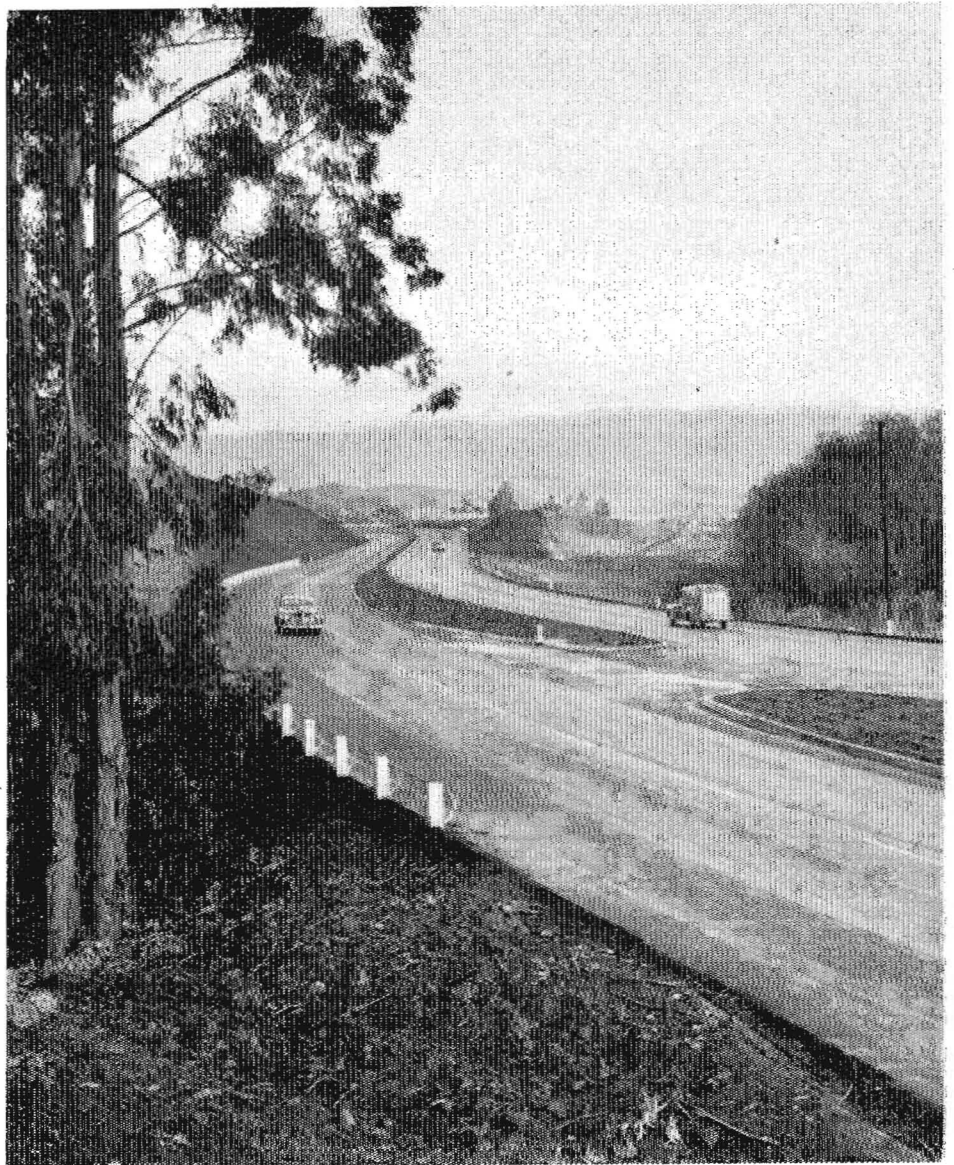
plant-mixed surfacing over an imported borrow base.

The narrow confines of the San Luis Obispo Creek canyon made it necessary for construction to encroach on the creek channel for several hundred feet at two locations. Training channels were excavated as substitutes for the natural channels at these locations. Normal flow of San Luis Obispo Creek is very moderate but it is subject to high stages with considerable overflow in its lower reaches during years of heavy precipitation. These high stages peak rapidly due to a large portion of the drainage area being mountainous with precipitous slopes and a shallow soil mantle. The training channels were constructed with greater capacities at all stages than the combined capacity of the main channel and the overflow channels blocked by roadway embankment so that overflows should be less frequent and less damaging than in the past.

Roadway embankment and training channel slopes vulnerable to scouring, particularly at points of impingement, were protected with selected rock riprap. Rock for this purpose was selected from roadway excavation, produced from a local ledge rock quarry or obtained from a waste pile of rock too large to be processed by the crushing and screening plant during production of mineral aggregate for crusher run base. This protection required the placing of 18,000 cubic yards of rock riprap.

The San Luis Obispo Creek bridge near the northerly end of the project consists of two 39-foot and one 52-foot steel stringer spans with concrete decks supported on reinforced concrete piers and abutments with steel pile foundations. The structure provides a clear roadway width of 68 inches. Abutments of the structure are protected from scour by sacked concrete riprap founded well below the creek bed.

A full traffic actuated signal system and highway lighting system were installed on the new entrance to San Luis Obispo at the intersection with Higuera, Marsh and Archer Streets. These traffic signals have served to eliminate



Freeway relocation of U. S. 101 south of San Luis Obispo looking north toward Santa Lucia Range

the previously prevalent congestion at this intersection by regulation of traffic with only minor delays to a small portion of the traffic.

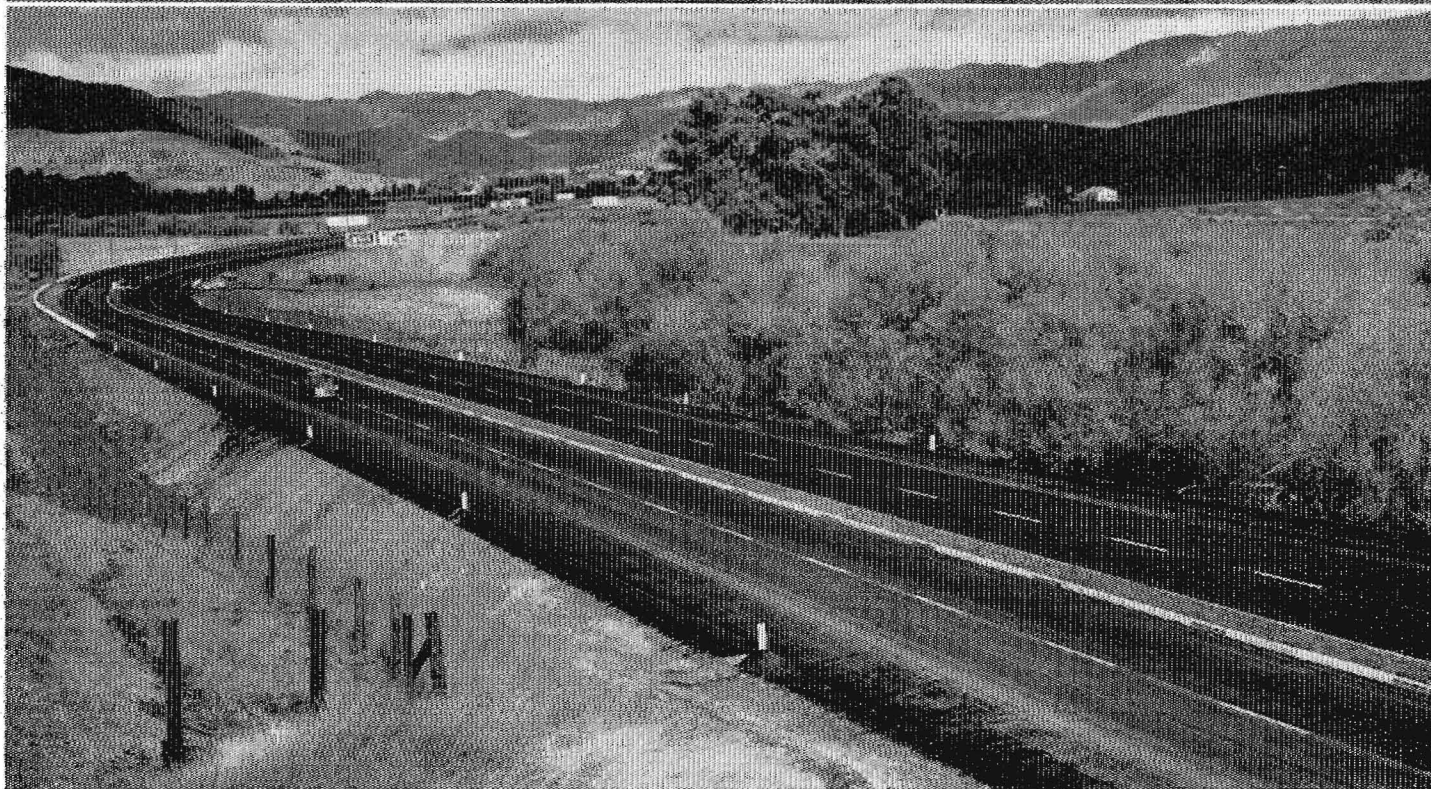
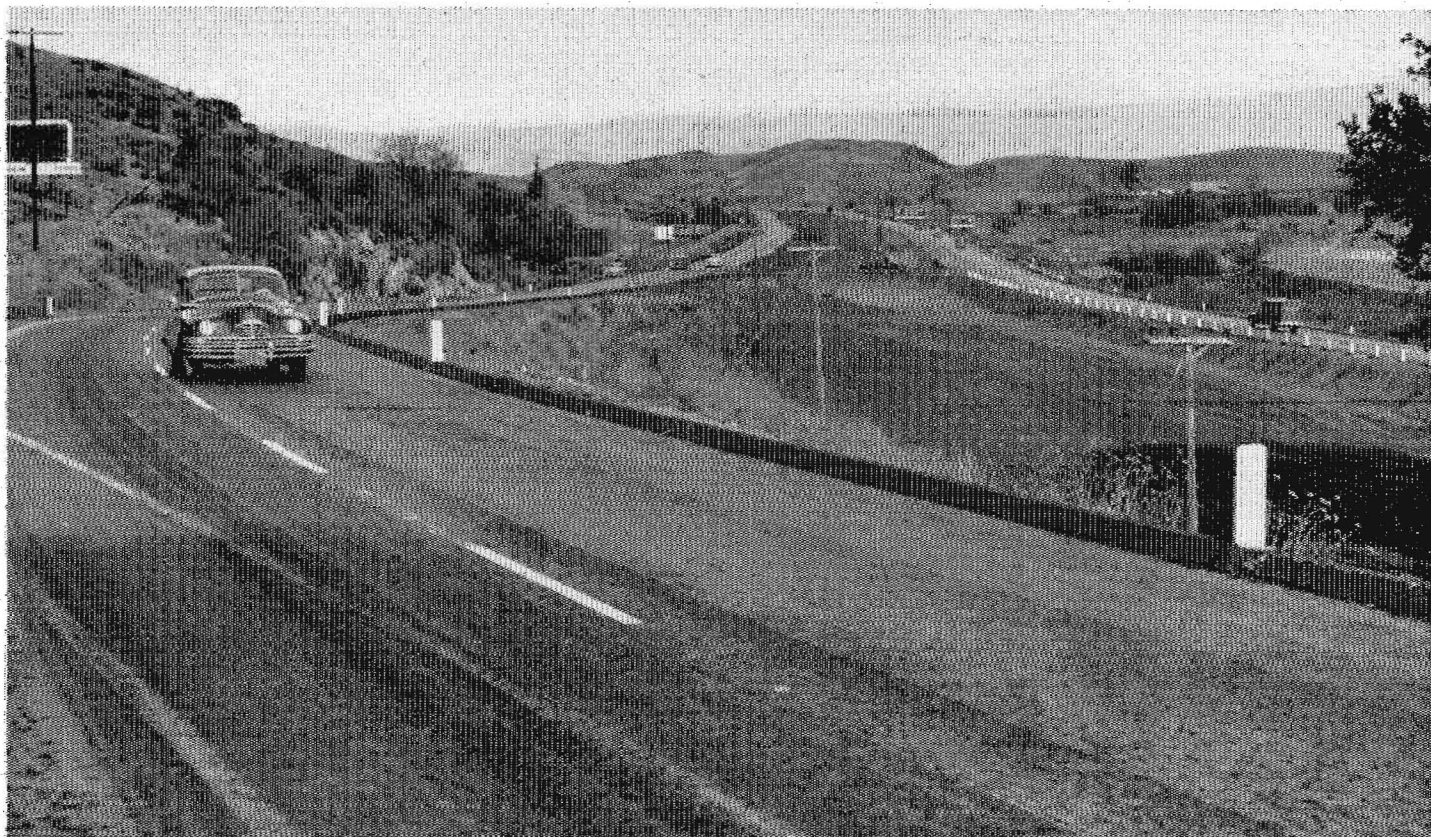
Excavation slopes composed of earth were covered with topsoil removed from the roadway prism. Topsoil selected from embankment areas was placed over the central dividing strip and channelization islands. Upon completion of the placing of topsoil, excavation and embankment slopes and the central dividing strip were planted with mesembryanthemum edule (ice plant) cuttings. The rows and the plants in each row were spaced at two-foot centers measured horizontally.

The freeway adjacent to the city was further landscaped by the planting of eucalyptus trees, mesembryanthemum croceum, acacia longifolia and begonia tweediana.

Construction between Pismo Beach and Miles Station, the third unit of this freeway, is well advanced. Inclement weather will probably delay its completion until next spring.

Acquisition of right of way for the remaining unit of the freeway through San Luis Obispo has been started. Construction on this unit will be undertaken as soon as funds are available to finance it.

. . . Continued on page 59



UPPER—View of new four-lane divided highway developed from old two-lane highway. LOWER—Looking north across San Luis Valley toward San Luis Obispo

# New Institute

Transportation and Traffic  
Engineering Courses at U. C.

As *California Highways and Public Works* goes to press, the First California Institute on Street and Highway Problems is in session at the University of California under the auspices of the Institute of Transportation and Traffic Engineering.

Scheduled to speak at the general sessions on Monday and Wednesday, January 31st and February 2d, presided over by Director of Public Works C. H. Purcell and Prof. H. E. Davis, Acting Director of the Institute, were Governor Earl Warren; Senators Randolph Collier and Michael J. Burns, authors of the Collier-Burns Highway Act of 1947; Senator George J. Hatfield; Commissioner T. H. MacDonald of the U. S. Public Roads Administration; President Robert G. Sproul of the University of California; Dean O'Brien of the Engineering Department; G. Donald Kennedy, Vice President of the Automotive Safety Foundation, Washington, D. C.; F. L. Alexander, General Manager of the County Supervisors Association; State Controller T. H. Kuchel; Deputy State Highway Engineer Fred J. Grumm; F. R. Coop, Personnel Director, City of Pasadena; and Director T. J. Kent of the Department of Civic Planning of the University of California.

Participating in the sessions for the State Division of Highways were R. M. Gillis and J. W. Vickrey, Assistant State Highway Engineers; Harold B. La Forge, Engineer of Federal Secondary Roads; A. M. Nash, Engineer of Design; F. M. Carter, Assistant Traffic Engineer; K. A. MacLachlan, Planning Engineer; F. N. Hveem, Materials and Research Engineer; N. R. Bangert, Assistant Maintenance Engineer; and J. C. Young, Traffic Engineer.

From February 7th to 11th, the First Western Institute for Traffic Training will be held under the direction of Commissioner Clifford E. Peterson of the California Highway Patrol. Class hours will be from 9 to 12 and 1 to 5 daily and the following courses will be given: Peace Officer Traffic Training, Accident Records and Their Uses, Chemical Tests to Determine Intoxication, Fleet Supervisor Training for Motor Vehicle Accident Prevention, Pedestrian Protection, Traffic Engineering and Seminar on Public Support Program Planning.

In connection with the institute's program, Mr. Hveem of the Materials and Research Laboratory of the Division of Highways is giving a series of six lectures on asphalt under the auspices of the San Diego and Fresno State Colleges as part of the University of California Extension. His first lecture in San Diego on January 14th-15th attracted 230 engineers of the State, counties and cities, and petroleum and other industries.

**T**HE INSTITUTE OF TRANSPORTATION and Traffic Engineering, recently organized at the University of California, was established as the result of an act of the Legislature in 1947, for the express purpose of aiding in the development of the State Highway Program. In accordance with the intent of the enabling bill, the immediate objectives of the institute relate to the development and improvement of highways, although the bill is broad enough so that ultimately other modes of transportation may receive attention.

As an agency functioning under and in conjunction with the university, the primary function of the Institute of Transportation and Traffic Engineering is education and the advancement of knowledge of the field. With respect to the educational function, three general types or programs of training are envisioned: (1) Training of a graduate and professional type; (2) various phases of in-service training, and (3) the dissemination of factual information to public agencies and

groups other than those composed of technical engineers.

#### Trained Engineers Needed

With respect to the collegiate training, the intent is to make available over a period of years, trained engineers in sufficient number to man the proposed construction program, and to develop students in the field with a broad outlook on the problems of modern transportation. On the undergraduate level, the institute, through its teaching and research staff, will strengthen and augment the present undergraduate transportation option in civil engineering. On the graduate level, courses of study are being established leading to advanced professional degrees.

With respect to the in-service phase of training, various types of conferences, short courses and special schools are being given or are proposed such as to meet the need and desires of county, city and state engineering organizations for the training of their engineering personnel on various subjects. With respect to the public infor-

mation phase, there is under way the development of an extensive library of information in the transportation field, the preparation of statistics, charts, exhibits, etc., and plans are being made whereby trained personnel from the institute may collect and present, when called upon, facts and data which may be of aid to city, county or state organizations.

#### Research Activities

In supporting the college program of instruction, especially on the graduate level, provision is being made for research activities in such fields as may be reasonably expected to support the highway development program over the next decade. Important areas of research will be in traffic, in highway economics, in materials and structures, and in vehicle operation and safety. These research activities have a triple purpose; first, to serve as a means for the instruction of advanced students; secondly, to aid in the collection of needed information; thirdly, to provide a cooperative link between the

institute and the State Division of Highways, or like public agencies, for the purpose of obtaining proper emphasis and direction to the general training programs.

The graduate and undergraduate college instruction leading to degrees in transportation engineering will be offered on the Berkeley campus, where there are also available the facilities for physical research and research for vehicle equipment. On the Los Angeles campus the problems of driver characteristics and safety will be emphasized, and there is already under way some research work under Dean L. M. K. Boelter of that campus, to determine the relation of the vehicle driver to road operation. On the Los Angeles research staff there will be psychologists and physiologists, in addition to engineers.

#### Subjects Offered

Plans have been made to offer instruction in the following subjects: Traffic engineering, highway planning, highway design, airport planning and design, pavement and subgrade design, airphoto techniques and interpretation, transportation economics, and urban transportation.

Facilities for research are being provided in the following fields: Traffic characteristics; driver characteristics and accident phenomena; vehicle and lighting characteristics; basic mechanics of granular materials and mixtures, such as bituminous concretes, stabilized soils, etc.; and airphoto interpretation. Arrangements are contemplated whereby, in cooperation with the State Division of Highways, field studies may be made on performance and characteristics of pavements and other highway structures.

#### Professional Staff

At the present time, the professional staff at Berkeley is comprised of the following individuals:

Harmer E. Davis, Professor Civil Engineering, serves as Acting Director. Davis received the assignment about the middle of May and has been active on the organizational work since that time. Davis' previous work has been in the field of highway materials and research.

Dr. Donald S. Berry, Assistant Director and Professor of Transportation En-

gineering. Berry was for a number of years Director of the Traffic and Transportation Division of the National Safety Council.

Ralph A. Moyer, Professor of Civil Engineering and Research Engineer for the institute. For many years, Professor Moyer has been at Iowa State College teaching numerous phases of the field of highway engineering and conducting many notable researches, many of which have been aimed at the problems of highway operation and vehicle economics.

Mr. Cecil J. Van Til, who will serve as Lecturer in Transportation Engineering and will be in charge of airphoto interpretation instruction and research. Mr. Van Til comes from Purdue University where he has worked under Professor Kenneth B. Woods on the Joint Highway Research Project.

Mr. Fred N. Finn, Lecturer and Administrative Assistant for the institute. Mr. Finn was a graduate student in soil mechanics at the University of California during the past year and has helped with the organization and administration of the institute.

#### Advisory Committee

An advisory committee, made up of highway and transportation specialists and other leaders in the State of California, meets periodically to advise on the institute's programs of research and training. Subcommittees of this advisory committee have been established to assist with such in-service training activities as a highway transportation engineering conference, and a Western Region Institute for Traffic Training.

Members of the Advisory Committee are:

Frederick L. Alexander, General Manager, County Supervisors Association of California; Wallace B. Boggs, County Surveyor and Road Commissioner; Warren K. Brown, Director of Transportation, Public Utilities Commission; Earl F. Campbell, Director, National Safety Council, Western Region; Warren E. Carey, Director, California Aeronautical Commission; Felix Chappellet, Chairman, Freeways Subcommittee of the Metropolitan Traffic and Transit Committee, Los Angeles Chamber of Commerce; Roy W. Crum, Director, The Highway Re-

## An Memoriam

### ROBERT GLOE

Robert Gloe, Junior Civil Engineer, employed by the Division of Highways in Surveys, died in an airplane accident, during the week end of January 8, 1949, while on a flight from Taft, California, to Los Angeles.

Robert Gloe was a self-reliant young man, 32 years of age. He had been gifted with an alert mind and a strong robust physique. He had completed two years in the University of Utah in Civil Engineering. He spent the years from December, 1943, to May, 1946, with the U. S. Army. From June, 1947, to February, 1948, he was employed in the Wyoming State Highway Department.

He started work with the California Division of Highways, District VII, February 16, 1948. He was assigned to surveys with a T.A.U. Senior Engineering Aid rating. Shortly thereafter he was successful in passing the Senior Engineering Aid test, and although qualified for the higher rating of Junior Civil Engineer which test he had passed in the fall of 1948, he insisted on completing his probationary period as Senior Engineering Aid, that ended December 31, 1948. On January 1, 1949, he received his appointment as Junior Civil Engineer, a rating that he held for the short period of seven days.

search Board, National Research Council; R. M. Gillis, Assistant State Highway Engineer, State of California; Richard Graves, Executive Director, League of California Cities; J. E. Havenner, Southern California Automobile Association, Public Safety Department; Dr. Lawrence I. Hewes, Chief, Western Headquarters, U. S. Public Roads Administration; Charles Lyon, Legislative Representative, The Trucking Industry, Inc.; J. O. Mattson, Automotive Safety Foundation; Edwin Moore, California State Automobile Association; Clifford E. Peterson, Commissioner, California Highway Patrol; J. L. Springer, Western Highway Institute; Ralph C. Wadsworth, City Engineer, San Francisco.

# Radio vs. Snow

Highway Crews Battle Storms Over Air Waves

**D**URING the December and January storm period, the Maintenance Department of the Division of Highways was enabled to cope with the emergency situation which developed on mountain highways by the use of radio installations, Director of Public Works C. H. Purcell reported to Governor Warren. He referred particularly to the advantageous use of radio in District I, which embraces Del Norte, Humboldt, Mendocino, and Lake Counties and a portion of Trinity County, where unprecedented snowfalls prevailed in some sections of the district.

"Radio installations in other districts were used to good advantage also," Purcell said. "It is evident that this service should be extended to provide better communications, especially in the Los Angeles and San Francisco areas where traffic problems are acute."

Maintenance Engineer T. H. Dennis said that District I now has seven radio land stations, three repeater stations and 20 mobile units in operation.

"Land line communications in our Eureka District," Dennis said, "which includes Mendocino, Lake, Humboldt, and Del Norte Counties, as well as a portion of Trinity County, are frequently disrupted during the winter months due to heavy slides, windstorms, washouts, and fallen trees. At such times, lacking the conventional system of communication, superintendents may be unable to get in touch with either their crews or the district office in order to plan the best disposition of their crews or advise the public of existing conditions.

"Since it is a distinct advantage to the motoring public that it be advised of road conditions so that it may properly plan trips, particularly for commercial vehicles, it was decided to install a radio system in that district. This radio system had just been completed prior to the Christmas holiday storm which isolated portions of Lake



UPPER—Radio technical truck

LOWER—Radio antennae tower at Garberville



"Radio, therefore, in this district has certainly proved its worth, both to the public and the State, in the matter of traffic safety, convenience, and economy."

County and for a time tied up short sections of the main route U. S. 101.

"By aid of the radio system, the Eureka District Office kept in constant touch with its field superintendents, who advised them of road conditions and the steps they were taking to correct them. Where normally it would have required several hours or more to divert equipment, with the radio this was accomplished in a matter of minutes. The disposition of the men and equipment aided materially in not only shortening the time of clearing the roads, but also in providing the public with an accurate picture of road conditions.

## OUTER HIGHWAY

Continued from page 40 . . .

and at crossovers through the division strip, that are clearly visible.

The cost of right of way acquisition including readjustment of building improvements for outer highway development represents an increased cost to the people of the State of California as compared to the conventional type of highway improvement. However, the added cost is exceptionally low compared to the tremendous increase in the safety and comfort of the traveling public.

At more and more locations along the heavily traveled California State Highway System this modern type of traffic safety development is coming into existence, with the result that more and more vehicle operators are becoming adjusted to the new method of approach to roadside business establishments. When the roadside merchant is as quick to adjust himself to the new type of merchandising conditions as Mr. Henderson has been, the ultimate in traffic safety is achieved without economic loss to the property owner and with tremendous benefit to the traveling public.

## NEW BUTTE CITY BRIDGE ACROSS SACRAMENTO RIVER DEDICATED

ON MONDAY, January 17, the new state highway bridge across the Sacramento River near Butte City was opened for traffic.

Dedicatory ceremonies were sponsored by the Willows Chamber of Commerce.

Introduced by President E. O. Balyeat of Willows Chamber of Commerce, Harvey Stinger acted as master of ceremonies. Music was furnished by the Willows High School Band. Short talks were made by Senator Louis Sutton of Maxwell, Assemblyman Lloyd W. Lowrey of Rumsey and

Chamber of Commerce; Don Quinn, Chico Chamber of Commerce; Fred Farrar, Butte City; J. J. Ohrt, Colusa County Supervisor; R. E. Hockins, Butte County Supervisor; Marshall Lane, Richard Nichols, John Fiack, W. L. Linville and Jack Adams, Glenn County Supervisors; Mel Haigh, Glenn



Traffic begins using newly dedicated Butte City Bridge

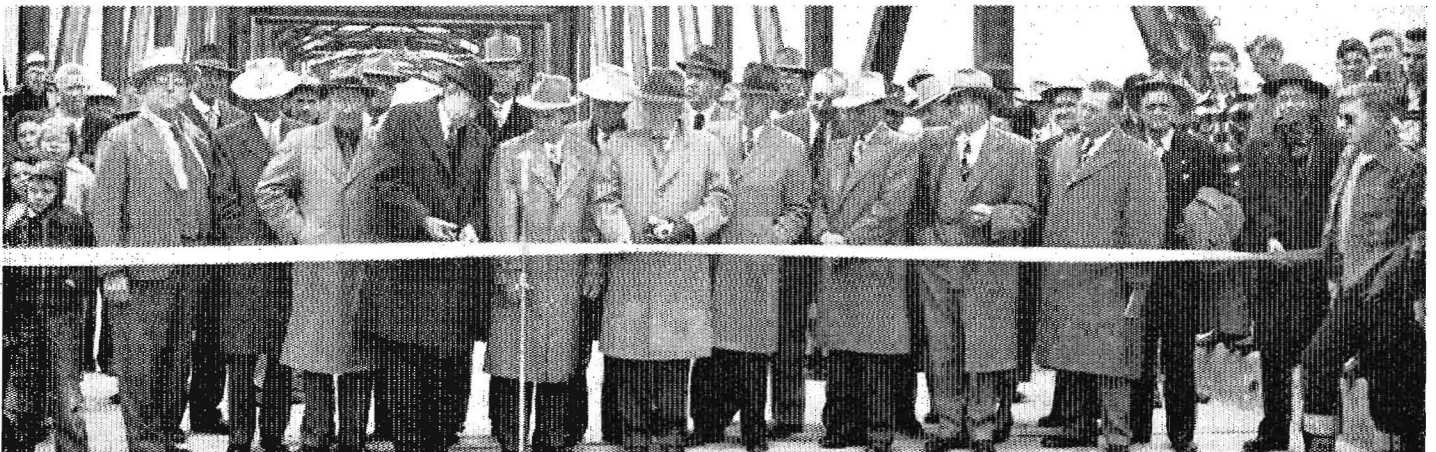
Some fifteen hundred persons witnessed the dedicatory ceremonies, which were climaxed when Mayor Robert E. Boyd of Willows cut a silk ribbon stretched across the highway approach to the bridge.

Jay Clare of Butte City. Among those introduced were: Con Davis, Principal, Glenn County High School; A. J. Pesky, Colusa Chamber of Commerce; Tully A. Moore, Gridley Chamber of Commerce; Patsy O'Neil, Oroville

County Road Commissioner; Mayor Arch Davison, Colusa; Mayor Meyer, Oroville; Mayor Earl Bevins, Chico; Mr. Childs, representing Engineer C. H. Whitmore, Division of Highways,

... Continued on page 55

**Butte City Bridge dedicated.** Left to right—State Senator Louis Sutton, Fred Farrar, Butte City; Assemblyman Lloyd Lowrey, Supervisor C. J. Wescott, Colusa County, Mayor Robert E. Boyd of Willows, cutting ribbon; Judge Ben R. Ragain, Colusa Superior Court; Mayor Gerald L. Meyers, Oroville; Tullie C. Moore, President Gridley Chamber of Commerce; Mayor Arch Davidson, Colusa; Don Quinn, Secretary of Chico Chamber of Commerce; Major Earl Bevins, Chico; Jay Clare, Butte City; A. L. Weibel, Editor, Chico Enterprise Record; Con Davis, Principal, Willows High School; R. E. Hocking, representing Butte County supervisors; Earl Balyeat, President Willows Chamber of Commerce; Supervisor Richard Nichols, Glenn County; J. H. Stinger, Vice President, Willows Chamber of Commerce; M. G. Haigh, Glenn County Road Commissioner; George Rummel, Director, Willows Chamber of Commerce and chairman of the day. Patsy O'Neil, Secretary of the Oroville Chamber of Commerce is almost hidden behind Mr. Balyeat



# Freeway Policy

Highway Commission  
Seeks Understanding

By GEORGE W. SAVAGE, Secretary, California Highway Commission

TWO YEARS ago next January the State Legislature met in Sacramento, and out of that meeting passed what is now known as the Collier-Burns Act. Since that time the work of eliminating the deficiencies in California's Highway System has begun to roll. Coincident with it, there has developed in certain parts of the State what has been referred to as "opposition to freeways." This objection, or opposition to the freeway type of construction, seems to spring in the most part from organized minority groups led by leaders whose property might be adversely affected by the construction of a freeway, or whose property might be advantageously affected if a freeway could be promoted at a different location.

It is well to remember that this is not a new situation. The Division of Highways has had this problem to face throughout all of the years that it has been building highways. Actually, you cannot build a highway without taking somebody's property for right of way. Too, construction of highways has, in some instances enhanced the value of immediately adjacent property. Considering these facts, together with the population increase in this State and the wider spread of industrial development, it is obvious that right of way acquisition becomes more and more perplexing and costly as time goes on.

#### Freeways Prove Value

The Division of Highways finds that there is little objection or opposition of note to freeways when they are actually constructed and opened to operation. The difficulty seems to arise through fear of what may be the effect of a freeway, than from knowledge of ill effect that has occurred under operating conditions. In some instances people seem to see more of the disturbance that must go with freeway construction, rather than the benefit that derives from that construction. It is the department's contention that



GEORGE W. SAVAGE

much of the objection and opposition to freeways as such will diminish as more and more miles are put into operation.

Let us look at our freeway program in California.

Between September 29, 1939, when the California Highway Commission adopted the first group of freeways, and November 1, 1948, a total of 208 freeway resolutions were adopted, bringing the total freeway mileage in California to 1213.4 miles.

On the effective date of the Collier-Burns Act, September 23, 1947, the freeway mileage in California was 861.7 miles. On January 1, 1948, it had increased to 992.2 miles, and on November 1, 1948, it had reached 1213.4 miles.

#### Freeway Defined

A "freeway" is defined by Section 23.5 of the Streets and Highways Code as follows:

"Freeway" means a highway in respect to which the owners of abutting lands have no

right or easement of access to or from their abutting lands or in respect to which such owners have only limited or restricted right or easement of access."

The only distinction between a freeway and an ordinary highway is in the matter of access to the freeway. On the ordinary highway the property owner has a legal right of access from the highway to his property and from his property to the highway. On the freeway this right of access may not exist at all as in the case of a full freeway. The mileage of full freeways will necessarily be small. They will be constructed in urban areas to carry extremely heavy volumes of traffic. There will be fewer intersections of other streets at grade with these full freeways in urban areas.

The commonest type of freeway, and the greater mileage, will be the more important routes constructed on a limited freeway standard. About the only difference between a limited freeway and an ordinary highway is that abutting property is limited to certain specified openings for purposes of access to and from the highway or freeway.

Insofar as any circuitry of travel is concerned—that is, having to go farther in order to get to a crossover and get back to a point on the opposite side of the highway—there is no difference whatever between an ordinary divided highway without restriction of access and a limited freeway. Both have center dividing strips. Therefore, a limited freeway is no more of a Chinese Wall or barrier than an ordinary divided highway.

#### Purpose of Freeways

The fundamental purpose of restricting rights of access on the limited freeways to certain designated openings is to prevent the growth of roadside businesses which so clutter up the highway that vehicles are entering or leaving the highway from every conceivable angle.



A graphic illustration is the unincorporated territory immediately south of Modesto commencing right after crossing the Stanislaus River Bridge. Several years ago this road was constructed on new alignment through open, unimproved farm land. Today both sides of the road are built up solidly with various businesses for almost a mile. Due to vehicles leaving and entering these premises a traffic hazard has been created requiring a 25-mile speed limit on this section.

If this section had been constructed on a limited freeway standard, the abutting property would have been developed from service roads with the traffic from the abutting property entering the highway at only designated points, greatly reducing the hazard.

#### **Roadside Businesses**

The development of business establishments just outside the limit of our cities has recently been considerably accelerated by the adoption of city sales taxes. One of the causes of businesses being located on the highways immediately outside of the cities was to escape property taxation on inventory. Now that transactions are subject to a half-cent or cent city sales tax, the advantages of locating furniture stores, heavy equipment houses and similar businesses on the main highways outside of the cities are enhanced.

An ordinary state highway constructed on divided highway standards would take just as much land as would a limited freeway. Many of the people who object to the freeway as such would be objecting if the ordinary state highway were built. For instance, if all of the property owner's lot is taken for right of way, it certainly makes no difference to him whether it is taken for a freeway or for an ordinary state highway. Likewise, many of the people who are objecting to the establishment of freeways are objecting because traffic will be diverted away from their place of business because a new and shorter line is being established. This same diversion of traffic would take place if the road were laid out on the new line as an ordinary state highway. In fact, the objectors would be hurt worse as competing businesses would be established on the new line if laid out as an ordinary state highway.

#### **Controversies**

At the present time there are eleven contemplated California freeway developments which involve either actual or potential controversy.

It is by no means my intention to infer that these eleven projects are the only ones which have been involved in controversies. It is doubtful indeed if any freeway project has not at one time or another drawn the fire of some group or organization opposed to it. What should be pointed out is that up to the present time practically all of these controversies have been worked out and necessary agreements reached without delaying the over-all construction program. In fact, the greater proportion of objections there encountered have been ironed out without their reaching the controversial stage.

Such controversies have been worked out, not by unanimous consent but by the concurrence of those responsible, reached through study, argument, and compromise among representatives of the California Highway Commission, the Division of Highways and local authorities, such as planning commissions, city councils, boards of supervisors, etc.

#### **Future Projects**

We wish to reiterate that projects now involved in controversy are not currently budgeted projects but are all planned for future development. These so-called controversies are an inevitable part of the procedure of planning major public works of this type, and if kept within reasonable bounds can be distinctly beneficial in bringing out for consideration points which otherwise, might be overlooked, and which in some cases might have an important bearing on the over-all service value of the improvement.

Principal protests which have arisen before the Commission in recent months include those on Route 5 in San Jose; Petaluma in the vicinity of Cotati; at Carpenteria; Route 4 through Madera; the Hollywood, Harbor and Ramona Freeways in Southern California; and Route 2 in the vicinity of Ocean-side south to San Diego.

Now what action has been taken to settle such cases?

Action in these controversies follows the established policies of the Department of Public Works and the California Highway Commission, in giving consideration to every reasonable solution offered that can be supported on the basis of service to traffic with due consideration for its effect upon the economic and social life of the community.

#### **State Restricted**

In some cases, this policy has been carried forward to a satisfactory conclusion by means of consultation with individuals, organizations and officials concerned. In other cases, further surveys, economic and otherwise, are being made so that before any final action is taken every fact and factor involved in the location problem will have been presented and studied. It should be recognized, however, that there is a definite limit beyond which these State agencies cannot go, while remaining faithful to the trust reposed in them by the Legislature and general public, to provide a proper State Highway System with money contributed by every person operating a motor vehicle or paying for transportation of persons or goods over the highway.

What action has been taken to avoid similar arguments over freeway locations in the future?

Approximately a year ago the Director of the Department of Public Works and Chairman of the California Highway Commission embarked on the first step of a new policy. This called for, at the time of commencing studies or surveys for the location or major relocation of any state highway to be constructed as a freeway, that a meeting shall be called of local officials, at which the local press shall be invited, for the purpose of advising those interested that such studies or surveys are being commenced.

#### **Freeway Policy Adopted**

Shortly thereafter, Mr. Neil Petree and the state-wide Highway Committee of the California State Chamber of Commerce, held a meeting in San Francisco at which representatives of his committee, as well as the Division of Highways and the State Highway Commission were present. At that time a general statement of policy concerning freeway locations was proposed. On

July 15, 1948, the California Highway Commission adopted a resolution setting forth a procedure for formal hearings where the location or relocation of a state highway to be constructed as a freeway may be properly presented to interested local parties. All departments and districts in the Division of Highways have been notified of this policy which, in addition to the first step which I have mentioned, calls for the following action:

"That the Division of Highways of the Department of Public Works determine on that location for the freeway which in its judgment will best serve the public interest and report the same to the commission.

#### **Public Hearings**

"That the Division of Highways, on authorization of the commission, give adequate public notice of the commission's intention to consider the adoption of the location so determined and also give written notice to the city council or board of supervisors, if unincorporated territory is involved, or both, of such intention. Such notice to the local legislative body or bodies shall specify that if any such legislative body considers a public hearing on the matter necessary or desirable, this commission will hold or cause to be held such hearing if requested by any such local legislative body within thirty days after the first regular meeting of such legislative body following receipt of written notice; or the commission may, on its own initiative, call a public meeting or grant such hearings as it may deem necessary or desirable.

"If any such legislative body requests such hearing, this commission shall hold or cause to be held a hearing, after due public notice of the time and place thereof, at which time and place all persons interested in the matter will be heard and all questions and objections pertaining to the matter will be answered or explained by the State Highway Engineer or members of his staff.

"After such hearing, or after the expiration of such period of thirty (30) days, if no hearing is requested, the commission will take action in respect to the location or relocation of such freeway."

The authorization to give public notice of the commission's intention shall be by specific resolution of the commission relating to each such location or major relocation. In all other respects, this resolution authorizes the State Highway Engineer to do such things without further resolution or order of the commission as are necessary to comply with the specified procedure.

#### **First Hearing in Petaluma**

The first such hearing held under this new policy was at Petaluma in the high school auditorium on November 4, 1948. At this hearing two members of the Highway Commission were present, with Chester H. Warlow, commission member from Fresno, serving as chairman. In addition, Division of Highways engineers were on hand to provide any information desired.

At this hearing the chairman briefly stated the policy of public hearings as adopted by the commission. He advised the some two hundred fifty people present that the Sonoma County Board of Supervisors and the City Council of Petaluma were notified of the commission's intention to consider the adoption as a freeway of a portion of highway Route U. S. 101 between Petaluma and Cotati. Both the board of supervisors and the city council requested that the hearing be held. Both the chairman of the board of supervisors and the Mayor of Petaluma joined with the Highway Commissioners in the hearing.

#### **Warlow Presides**

Chairman Warlow presented a brief statement in which he pointed out the commission's sympathy with those disturbed over the possibility of their property being taken or damaged by the construction of a new highway. He advised all that the law provides for full compensation for property taken or damaged. He further stated that the commission, by this hearing, sought to ascertain whether, in the opinion of local officials and the people of the community, this proposed new state highway is so located as to fit in properly with the needs of the city and county so that it will serve both through traffic and local traffic effi-

ciently. He went on to say that the commission wants to be sure that the proposed location assists rather than impedes the proper development of the community.

A detailed map of the proposed freeway route was provided, and engineers were called upon to explain the route, reasons for its location, and other matters of interest in connection with the proposed improvement.

Following the presentation made by the engineers, the protestants were heard. At the outset of the hearing, cards were passed to every individual present. Each was asked to write his name, address, the agency or interest he represented, upon the card. In addition, he was to note whether he wished to address the meeting. Representatives of various groups of protestants were given full hearing.

The Highway Commission as a quasi-judicial body served in this instance as a board of review. A full court report of the proceedings was taken.

At the Petaluma hearing eight persons representing protest groups spoke. In addition, several persons were heard who urged the commission to adopt the proposed route.

#### **Action Postponed**

Little difficulty was experienced with individuals who sought to get out of line or to take over the hearing for their own purposes. Of the two hundred fifty persons present, approximately forty were in favor of the route as proposed by the engineers, and about one hundred seventy-five were opposed. In addition, there were a number of onlookers who voiced no interest either for or against the proposed route.

As a result of this hearing the commission did not act upon the route adoption at its meeting held in Sacramento on November 17th and 18th. At that time the commission requested the engineers to check on the effect of highway noise on the egg production of affected poultry plants, and to make a further survey of possible routes, with the hope that a solution may be found which might in part satisfy some of the protestants.

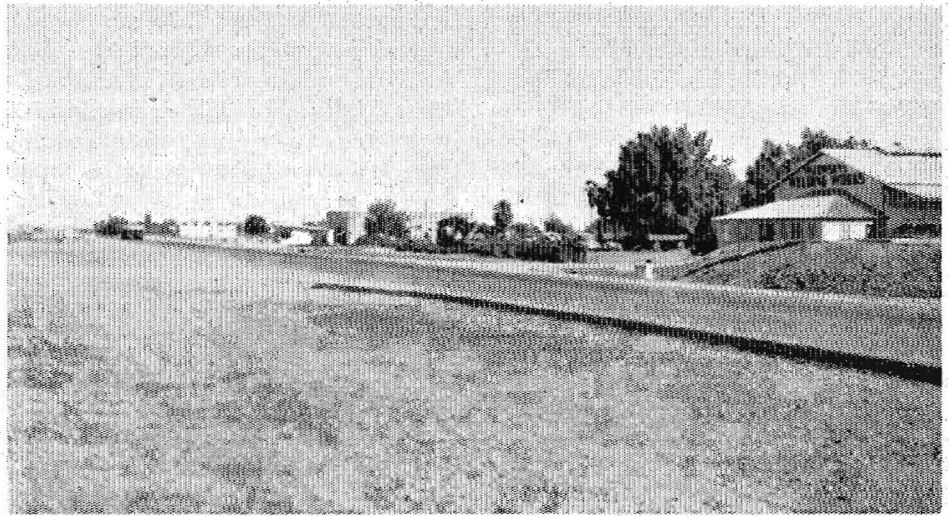
Free and open discussion in a democratic manner featured the Petaluma hearing. I believe that those, both for and against the proposed route, left the high school auditorium after some 3½ hours of discussion with the feeling that all sides had been given a full and fair hearing, that it was the commission's sincere desire to achieve a better understanding with the public; and, at the same time, to provide the California highway system with the best possible freeway route in that area.

#### Commission's Position

It is doubtful if any policy or procedure will entirely eliminate controversy in connection with the freeway system. It is not entirely without advantage, in fact, to have these differences, provided they are held to the merits of the case. Complete elimination of any expression of opposition or difference of opinion is neither desirable or possible. The problems and goals to be faced in each decision are not the private or personal concern of the California Highway Commission or of the employees of the Division of Highways, but of the general public, individually and collectively.

The general public has placed upon the Highway Commission and the Division of Highways the burden of solving these problems and of achieving these goals. To accomplish this mission, these state agencies must have the courage and integrity to make decisions in the light of available information for the best interests of all the public. At the same time, these agencies must stand firmly against any and all opposition which they consider unfounded or ill advised.

The commission, by its expressed policy, seeks to better inform local groups and local levels of government as to plans and projects in each area of the State. Unfortunately, it has not always been true that local levels of government have been firm in their position when faced with local opposition. There have been times in the past when local levels of government have had signed agreements with the State of California covering freeway routings. Later, when opposition developed, often because of lack of hearings being called by either city or county officials, these agreements have either been can-



Recent ribbon development on east side of U. S. 99

## AWARD DENIED

Continued from page 37 . . .

higher tribunal also held that the owner was entitled only to the difference in the market value before and after the taking and, therefore, the verdict of the jury for "no damages" was sustained.

#### Damages Nominal

This type of verdict supports the belief of many right of way agents and appraisers that, as a general rule, damages, if any, resulting from the taking of access rights are only nominal and

that benefits, instead, usually accrue from highway improvements. Studies made in various highway districts of the State to determine the selling prices of properties after controlled access rights have been acquired also bear out this theory.

For years, governmental agencies have bestowed benefits on private property by expenditures for public improvements. If newer types of improvements, such as limited access highways, are designed that enhance property values to a lesser degree than formerly, it is unreasonable to assume that such is a damage.

celed or placed in jeopardy. In the past it has been easy for the local level of government to pass the buck neatly to the State Highway Commission and the Division of Highways.

#### Harmony Sought

In such instances, the commission feels that its newly expressed policy will help to keep it from being placed behind the eight-ball. At the same time it will tend to indicate to the public that in all freeway matters the local levels of government and the State are working hand in hand in the development of an adequate, fluid, efficient State Highway System for the people of California.

The commission is as desirous as anyone that the Division of Highways shall work to the end that there will be harmony and understanding from the initial stages to the completion of each highway project. We have appreciated the cooperation that has been given us

by local planning organizations and by most local levels of government. After all, the State must have signed agreements with either cities or counties whenever a freeway is projected which will limit the access rights of individuals or close city or county streets.

The freeway problem, therefore, is a mutual problem.

I look forward to the time when we may see our increasing efforts directed toward planning and building highways, with the confidence and assurance that the over-all situation is improving rapidly, and continues to improve as the months pass. The people of our cities and of the State should insist that California, as the foremost State in the motor vehicle registration and use, should likewise be the foremost State in the quality of its highway system, and in the effectiveness of its service to the general public.

# Highway Bids and Awards for November, December, 1948; January, 1949

## November, 1948

**ALAMEDA COUNTY**—On East 14th Street, between 148th Avenue and Hampton Road, furnishing and installing traffic signal and highway lighting systems, District IV, Route 105, Section B. Abbett Electric Corp., Emeryville, \$42,101; Severin Electric Co., San Francisco, \$44,791; Spott Electrical Co., Oakland, \$47,350; Tri-Cities Electrical Service, Oceanside, \$48,228; Del Monte Electric Co., Oakland, \$48,431. Contract awarded to L. H. Leonardi Electric Construction Co., San Rafael, \$40,164.

**AMADOR COUNTY**—Between Cook's Station and 0.4 mile east of Ham's Station, about 3.6 miles to be graded, surfaced with surfacing material on a base and a bituminous surface treatment applied. District X, Route 34, Section F. Clements & Co., Hayward, \$172,985; J. Henry Harris, Berkeley, \$179,275; A. Teichert & Son, Inc., Sacramento, \$185,937; Fredrickson Bros., Emeryville, \$194,582; Nevada Constructors, Inc., Reno, \$198,664. Contract awarded to Westbrook & Pope, Sacramento, \$136,054.

**KERN COUNTY**—On Grapevine Grade, at Oak Glen, shoulders to be widened for school bus stops at three locations and reset guard railing. District VI, Route 4, Section A. Griffith Co., Los Angeles, \$3,170; Threewit & Webb, Bakersfield, \$3,527; Phoenix Construction Co., Bakersfield, \$4,940; Volpa Bros., Fresno, \$8,540. Contract awarded to Bob Hawk, Bakersfield, \$2,516.

**LOS ANGELES COUNTY**—In the City of Los Angeles, on South Main Street, between First Street and Second Street, automobile parking area to be graded and surfaced with plant-mixed surfacing on imported borrow and accompanying facilities to be installed. Griffith Company, Los Angeles, \$26,118. Contract awarded to Charles Buschlen, Burbank, \$19,214.

**LOS ANGELES COUNTY**—On Hollywood Parkway, at Santa Monica Boulevard and at Normandie Avenue, in the City of Los Angeles, a reinforced concrete overcrossing and a reinforced concrete undercrossing, including approaches thereto, to be constructed. District VII, Route 2. W. J. Disteli & R. J. Daum Construction Co., Los Angeles, \$595,703; Spencer Webb Co. & George W. Peterson, Los Angeles, \$611,820; Charles MacClosky Co., San Francisco, \$627,882; Guy F. Atkinson Co., Long Beach, \$674,290. Contract awarded to J. E. Haddock, Ltd., Pasadena, \$556,906.

**LOS ANGELES COUNTY**—Between Vineland Avenue and Barham Boulevard in the City of Los Angeles, about 1.8 miles to be landscaped. District VII, Route 2. Jannoch Nurseries, Altadena, \$24,707; Huettig & Schromm, Palo Alto, \$26,284. Contract awarded to Henry C. Soto Corp., Los Angeles, \$23,620.

**LOS ANGELES COUNTY**—On Lakewood Boulevard-Rosemead Boulevard, between Bellflower Boulevard and Beverly Boulevard, about 5.9 miles, existing roadbed to be widened by grading and placing untreated rock base material, plant-mixed surfacing to be placed over existing pavement and untreated rock base, and a curved central dividing strip to be constructed. District VII, Route 168, Sections A, B. M. S. Mechem & Sons & Boddum & Peterson, Lynwood, \$591,088; Basich Bros. Construction Co. & Basich Bros., San Gabriel, \$611,171; J. E. Haddock, Ltd., Pasadena, \$624,913; Griffith Co., Los Angeles, \$628,082; United Concrete Pipe Corp. & Jesse S. Smith & A. A. Edmondson, Baldwin Park, \$664,829; Peter Kiewit Sons Co., Arcadia, \$683,883; Silva & Hill Construction Co., Los Angeles, \$721,312; W. E. Hall Co., Alhambra, \$822,858. Contract awarded to Vido Kovacevich & Vido Kovacevich Co., South Gate, \$587,844.

**NAPA COUNTY**—Between Kelly Curve and Glass House Curve and between Route 74 and old Napa Wye, about 2.4 miles in length to be graded and paved with Portland cement concrete on cement treated subgrade and plant-mixed surfacing on crusher run base. District IV, Routes 74, 8, Sections A, B. Parish Bros., Benicia, \$316,159; A. G.

Raisch Co., San Francisco, \$342,929; Chas. L. Harney, Inc., San Francisco, \$350,746; Stolte Inc. and The Duncanson-Harrelson Co., Oakland, \$369,070; Fredrickson & Watson Construction Co., Oakland, \$375,979. Contract awarded to Fredrickson Bros., Emeryville, \$295,711.65.

**RIVERSIDE COUNTY**—Over the Southern Pacific Co. tracks, about one mile west of Beaumont, and over San Jacinto River, about six miles north of Hemet, metal blast plates to be installed on an existing bridge and existing bridges to be cleaned and painted. District VIII, Routes 19, 194, Sections D, C. Oran B. Phillips, Jr., Long Beach, \$22,290; Carl Broome, Redlands, \$23,989. Contract awarded to Acme Maintenance Engineering Co., Bell, \$16,508.90.

**SAN BERNARDINO COUNTY**—Construct foreman's cottage at Needles maintenance station. District VIII, Route 58. Sharp & Sons, Bloomington, \$12,169. Contract awarded to L. G. Wilkes, Needles, \$9,584.

**SAN DIEGO COUNTY**—Between north city limits of San Diego and Miramar, about 6.5 miles to be graded and a cement treated subbase constructed. District XI, Route 77, Section A. Silva & Hill Construction Co., Los Angeles, \$682,946; Fredericksen & Kasler, Sacramento, \$686,774; Griffin Co., Los Angeles, \$687,441; L. A. & R. S. Crow, El Monte, \$704,847; Basich Bros. Construction Co. & Basich Bros., San Gabriel, \$716,029; J. E. Haddock, Ltd. & Cox Bros. Construction Co., Pasadena, \$793,435. Contract awarded to R. E. Hazard Contracting Co. & C. G. Willis & Sons, San Diego, \$659,141.80.

**SAN LUIS OBISPO COUNTY**—At Paso Robles School for Boys, located 3 miles northeast of Paso Robles about 0.6 mile in length to be shaped, imported borrow to be placed and bituminous surface treatment applied thereto. District V. Threewit & Webb, Bakersfield, \$7,111; C. E. Pumphrey, Paso Robles, \$7,360; Henry C. Dalessi, San Luis Obispo, \$8,792; Browne & Krull, Hayward, \$8,980. Contract awarded to Brown & Doko, Pismo Beach, \$6,599.

**SAN FRANCISCO CITY AND COUNTY**—Alterations to freight elevator, District IV Office Building. Otis Elevator Co., San Francisco, \$1,848; Independent Elevator Co., Inc., San Francisco, \$2,050. Contract awarded to Atlas Elevator Co., San Francisco, \$1,741.

**VENTURA COUNTY**—Under the track of the Southern Pacific Co., about one-half mile west of El Rio, an existing underpass to be widened by the addition of a new plate girder track span. District VII, Route 60, Section B. E. G. Perham, Los Angeles, \$105,582; W. E. Byerts, Los Angeles, \$115,210; Macco Corp., Paramount, \$120,878; Hensler Construction Corp., Glendale, \$126,913; N. M. Saliba Co., Los Angeles, \$130,554; C. J. B. Construction Co., Oxnard, \$164,006; C. B. Tuttle Co., Long Beach, \$167,588. Contract awarded to Grant L. Miner, Palo Alto, \$100,703.50.

## F. A. S. County Projects

**BUTTE COUNTY**—Between two miles east of Chico and Paradise about 9.2 miles to be graded and surfaced with crushed gravel base and a reinforced concrete girder bridge to be constructed. District III, Route 757. Piombo Construction Co., San Francisco, \$441,058; A. Teichert & Son, Inc., Sacramento, \$468,162; Fredrickson Bros., Emeryville, \$494,295; Chittenden & Chittenden, Auburn, \$514,784; George Pollock Co., Sacramento, \$543,865; H. Earl Parker Inc. & Clements & Co., Marysville, \$548,427. Contract awarded to Granite Construction Co., Watsonville, \$363,877.

**FRESNO COUNTY**—On Clovis Avenue between Ventura Avenue and Shaw Avenue, about 5 miles in length, widening the existing pavement with crusher run base and surfacing existing pavement and pavement widening with plant-mixed surfacing on portions of the project, and constructing plant-mixed surfacing on crusher run base on other portions of the project. District VI, Route 814. P. J.

Moore and Son & Harms Bros., Sacramento, \$143,579; Gene Richards, Fresno, \$146,710; A. Teichert & Son, Inc., Sacramento, \$154,312; Volpa Bros., Fresno, \$154,520; R. M. Price Co. & Rex B. Sawyer, Altadena, \$158,403; Guy F. Atkinson Co., South San Francisco, \$173,514. Contract awarded to Ted F. Baun, Fresno, \$141,544.

**NAPA COUNTY**—Between intersection of State Route 8-B with Imola Avenue and intersection of State Route 8-A with Foster Road, and on South Jefferson Street to south city limits of Napa, about 1.7 miles to be graded and surfaced with plant-mixed surfacing and seal coat on crusher run base. District IV, Route 776. McGillivray Construction Co., Sacramento, \$114,187; A. G. Raisch Co., San Francisco, \$117,950; Fredrickson Bros., Emeryville, \$123,349; N. M. Ball Sons, Berkeley, \$123,395; Harms Bros. & C. M. Syar, Sacramento, \$123,954; J. R. Armstrong, El Cerrito, \$128,058; Arthur B. Siri, Inc., Santa Rosa, \$136,242; Parish Bros., Benicia, \$137,836; Slinsen Construction Co., Napa, \$159,617; J. Henry Harris, Berkeley, \$168,152. Contract awarded to A. Teichert & Son, Inc., Sacramento, \$108,269.

**SUTTER COUNTY**—Over Cross Canal, about six miles south of Nicolaus, a reinforced concrete slab bridge to be constructed. District III, Route 926. H. W. Ruby, Sacramento, \$124,025; Lew Jones Construction Co., San Jose, \$128,078; Chittenden & Chittenden, Auburn, \$134,714; A. Soda & Son, Oakland, \$140,232; Granite Construction Co., Watsonville, \$143,371; John C. Gist, Sacramento, \$144,570; Dan Caputo, San Jose, \$146,450; E. H. Peterson & Son, Richmond, \$146,552; Erickson, Phillips & Weisberg, Oakland, \$148,715; Minton & Kubon, San Francisco, \$155,677; Northup Construction Co., Long Beach, \$159,300; Fredrickson & Watson Construction Co., Oakland, \$161,130; G. M. Carr & Bati Rocca, Santa Rosa, \$160,334; Baldwin Straub Corp., San Rafael, \$171,198; Bates & Rogers Construction Corp., San Francisco, \$171,434. Contract awarded to Lord & Bishop, Sacramento, \$122,140.

## December, 1948

**LOS ANGELES COUNTY**—On Hollywood Parkway at Western Avenue in the City of Los Angeles, a structural steel girder overcrossing to be constructed. District VII, Route 2. W. J. Disteli & R. J. Daum Construction Co., Los Angeles, \$674,201; J. E. Haddock, Ltd., Pasadena, \$678,250; Bates & Rogers Construction Corp., San Francisco, \$718,265; Peter Kiewit Sons Co., Arcadia, \$773,885; Spencer Webb Co. & Geo. W. Peterson, Los Angeles, \$794,372; Charles MacClosky Co., San Francisco, \$798,442; Guy F. Atkinson Co., Long Beach, \$832,642. Contract awarded to Oberg Bros. Construction Co., Inglewood, \$664,204.

**LOS ANGELES COUNTY**—About 1.2 miles east of the Ventura County line, a reinforced concrete cattle pass to be constructed. District VII, Route 2. Troy Construction, Inc., Los Angeles, \$8,970; E. S. & N. S. Johnson, Fullerton, \$9,992; F. Fredenburg, Temple City, \$11,195; Parker Engineering Company, Claremont, \$12,793; Peter Kiewit Sons Co., Arcadia, \$13,314; N. M. Saliba Co., Los Angeles, \$13,315; R. A. Erwin, Colton, \$13,410. Contract awarded to Thomas Construction Co., Newhall, \$8,755.

**MARIN COUNTY**—Between Ignacio Wye and Sonoma County line, about 3.1 miles to be graded and a portion surfaced with plant-mixed surfacing on cement treated selected material. District IV, Route 8, Section A. Piombo Construction Co., San Francisco, \$366,564; N. M. Ball Sons, Berkeley, \$369,490; Fredrickson Bros., Emeryville, \$370,771; Fredrickson & Watson Construction Co., Oakland, \$372,375; Harms Bros., Sacramento, \$393,525; A. Teichert & Son, Inc., Sacramento, \$398,438; George Pollock Co., Sacramento, \$411,413; Chas. L. Harney, Inc., San Francisco, \$423,601; Fredericksen & Kasler, Sacramento, \$429,725; Eaton & Smith, San Francisco, \$437,368; McGillivray Construction Co., Sacramento, \$448,182; Guy F. Atkinson Co., South

San Francisco, \$473,773; Granite Construction Co., Watsonville, \$479,037; M. J. B. Construction Co., Stockton, \$525,421. Contract awarded to Parish Bros., Benicia, \$354,579.35.

**MERCED COUNTY**—Furnishing and installing traffic signals and highway lighting in city of Livingston at intersection of Route 4 and Cressley Way. District X, Route 4. Ets-Hokin & Galvan, Stockton, \$14,950; Tri-Cities Electrical Service, Inc., Ocean-side, \$13,876; L. H. Leonardi Electric Construction Co., San Rafael, \$12,990. Contract awarded to R. Gould & Son, Stockton, \$12,949.75.

**SACRAMENTO COUNTY**—Between the North Sacramento Viaduct and one-half mile east of Ben Ali, about 3.7 miles, concrete barrier posts and curbed traffic islands to be constructed on portions. District III, Route 3, Section B. Fredericksen & Kasler, Sacramento, \$9,392; Matthew & Jorgenson, Hughson, \$10,500; William E. Thomas Construction Co., Sacramento, \$10,556; H. B. Folsom, Sacramento, \$11,127; McGillivray Construction Co., Sacramento, \$12,161. Contract awarded to Fred Kaus, Stockton, \$8,341.62.

**SACRAMENTO COUNTY**—At the North Sacramento Off-ramp, about 0.17 mile in length, to be graded and surfaced with plant-mixed surfacing on crusher run base. District III, Route 3, Section B. J. R. Reeves, Sacramento, \$16,283; A. Teichert & Son, Inc., Sacramento, \$17,307; Brighton Sand and Gravel Co., Sacramento, \$20,097. Contract awarded to McGillivray Construction Co., Sacramento, \$11,254.00.

**SANTA BARBARA COUNTY**—Redecking a bridge across Gaviota Creek at Las Cruces. District V, Route 56, Section A. C. B. Tuttle Co., Long Beach, \$3,856; Troy Construction, Inc., Los Angeles, \$4,818; Repsher Brothers, Bakersfield, \$6,730. Contract awarded to Brown & Doko, Pismo Beach, \$3,655.

**SAN JOAQUIN COUNTY**—Over Old River and Middle River, between 13 and 18 miles west of Stockton, two existing swing span steel bridges to be repaired. District X, Route 75, Section A. Evans Construction Co., Berkeley, \$48,431; Pomeroy Sinnock, Stockton, \$54,107; Chittenden & Chittenden, Auburn, \$54,752; Erickson, Phillips and Weisberg, Oakland, \$58,296; H. W. Ruby, Sacramento, \$62,406; R. G. Clifford, South San Francisco, \$70,978; J. R. Armstrong, El Cerrito, \$76,657; Dan Caputo, San Jose, \$77,752; J. Henry Harris, Berkeley, \$81,168; J. H. Pomeroy & Co. Inc., San Francisco, \$82,498; Baldwin Straub Corp., San Rafael, \$94,842. Contract awarded to Lew Jones Construction Co., San Jose, \$46,578.

**F. A. S. County Projects**

**INYO COUNTY**—Between 16 miles north of Trona and the southwest end of Wildrose Canyon, about 15 miles in length, to be graded, imported borrow placed and penetration treatment applied. District IX, Route 1065. Hensler Construction Corp., Glendale, \$112,103; Basich Bros. Construction Co. & Basich Bros., San Gabriel, \$115,302; Nevada Constructors, Inc., Reno, \$116,098; J. A. Payton, Riverside, \$121,609; Bonadiman-McCain, Inc., Los Angeles, \$129,366; Westbrook & Pope, Sacramento, \$132,443; Roland T. Reynolds, Anaheim, \$132,472; Cox Bros. Construction Co., Stanton, \$136,382; Brown & Doko, Pismo Beach, \$136,890; R. A. Erwin, Colton, \$138,559; Dicco Inc. & Dix-Syl Construction Co., Inc., Bakersfield, \$138,570; Rand Construction Co., Inc., Bakersfield, \$141,197; Browne & Krull, Hayward, \$154,323; Anderson Co., Visalia, \$165,475; Oilfields Trucking Co. & Phoenix Construction Co., Bakersfield, \$224,085. Contract awarded to Arthur A. Johnson, Laguna Beach, \$91,237.

**ALAMEDA AND SAN MATEO COUNTIES**—At intersection of Hesperian Blvd. and Eden Landing Road in Mt. Eden and at intersections of Bayshore Highway with Main Street and Chestnut Street in Redwood City, furnishing and installing traffic signal and highway lighting systems. District IV, Routes 69, 105, 68, 107, Sections B, A. RdwC. Del Monte Electric Co., Oakland, \$27,733; L. H. Leonardi Electric Construction Co., San Rafael, \$30,329; Tri-Cities Electrical Service Inc., Ocean-side, \$30,561. Contract awarded to R. O. Ferguson Co., Visalia, \$27,575.99.

**CONTRA COSTA COUNTY**—At Crockett, a timber fender for the existing bridge across Carquinez Strait, to be constructed. District IV, Route 7, Section A. Healy Tibbitts Construction Co., San Francisco, \$63,080; The Duncanson-Harrelson Co., San Francisco, \$68,610. Contract awarded to Ben C. Gerwick, Inc., San Francisco, \$58,117.

**LOS ANGELES COUNTY**—Between Soto Street and Eastman Avenue, about two miles in length to be landscaped. District VII, Route 2, Sections L.A., D. Jannoch Nurseries; Altadena, \$43,149; Henry C. Soto Corp., Los Angeles, \$44,354; Justice-Dunn Co., Oakland, \$45,996. Contract awarded to Huetttig & Schromm, Palo Alto, \$42,372.

**LOS ANGELES COUNTY**—In the City of Los Angeles, on Hollywood Parkway, between Hill Street and Spring Street, an area to be graded and a portion of North Broadway, between Temple Street and Sunset Boulevard to be paved with Portland cement concrete and asphalt concrete and two reinforced concrete bridges for overcrossings to be constructed. District VII, Route 2. C. G. Willis & Sons, Los Angeles, \$998,539; Peter Kiewit Sons Co., Arcadia, \$1,073,965; J. E. Haddock, Ltd., Pasadena, \$1,146,320; Winston Bros. Co. & Yount Constructors, Inc., Azusa, \$1,157,520; Griffith Co., Los Angeles, \$1,283,115. Contract awarded to Guy F. Atkinson Co., Long Beach, \$914,158.

**LOS ANGELES COUNTY**—On Hollywood Parkway in the City of Los Angeles, a reinforced concrete girder bridge to be constructed for an undercrossing at Glendale Boulevard, a reinforced concrete box section to be constructed for a pedestrian undercrossing at Echo Park, and about 0.26 mile of roadway to be graded, and existing streets to be paved with Portland cement concrete and plant-mixed surfacing on Portland cement concrete base. District VII, Route 2. Chas. MacClosky Co., San Francisco, \$477,824; Spencer Webb Co. & Geo. W. Peterson, Los Angeles, \$491,481; Chas. J. Rounds & Lars Oberg, Contractors, Los Angeles, \$495,424; C. B. Tuttle Co., Long Beach, \$512,736; Winston Bros. Co. & Yount Constructors, Inc., Azusa, \$513,304; W. J. Disteli & R. J. Daum Construction Co., Los Angeles, \$521,226; Wonderly Construction Co., Long Beach, \$568,257. Contract awarded to J. E. Haddock, Ltd., Pasadena, \$469,457.70.

**LOS ANGELES COUNTY**—On Firestone Boulevard, approaches to Los Angeles River Bridge, about 0.6 mile in length, to be graded and paved with Portland cement concrete pavement. District VII, Route 174, Section SGT. Cox Bros. Construction Co., Stanton, \$164,815; Nathan A. Moore, El Monte, \$165,143; Griffith Co., Los Angeles, \$168,177; Vido S. Price & Glenn Graham, Los Angeles, \$174,822; Clyde W. Wood, Inc., North Hollywood, \$190,671; N. M. Saliba Co., Los Angeles, \$223,275. Contract awarded to O'Brien & Bell Construction Co., Santa Ana, \$147,166.60.

**LOS ANGELES COUNTY**—Between Solstice Creek and Malibu Creek, about 3.3 miles in length to be landscaped. District VII, Route 60, Section A. Jannoch Nurseries, Altadena, \$11,922; Henry C. Soto Corp., Los Angeles, \$14,948; Huetttig & Schromm, Palo Alto, \$16,619. Contract awarded to Stephen L. Vistica, San Mateo, \$9,874.15.

**LOS ANGELES COUNTY**—Between San Bernardino Road and Route 26, a distance of about 1.1 miles in length, shoulders to be graded and surfaced with plant-mixed surfacing on imported sub-base material and untreated rock base and existing pavement to be resurfaced with plant-mixed surfacing. District VII, Route 77, Sections Emte, A. J. E. Haddock, Ltd., Pasadena, \$197,788; R. A. Erwin, Colton, \$207,454; Griffith Co., Los Angeles, \$212,713; Basich Bros. Construction Co. & Basich Bros., San Gabriel, \$217,093; Silva & Hill Construction Co., Los Angeles, \$227,177; Clifford C. Bong & Co., Arcadia, \$241,291. Contract awarded to M. S. Mecham & Sons & Boddum & Peterson, Lynwood, \$190,740.

**LOS ANGELES COUNTY**—On La Brea Avenue from Arbor Vitae Street to Centinela Avenue, furnishing and installing traffic signal systems at five intersections and reconstructing traffic signal systems at four intersections. District VII, Route 164, Section Ing. Clinton Electric Corp., Los Angeles, \$22,988; C. D. Draucker, Inc., Los Angeles, \$23,765; Econolite Corp., Los Angeles, \$25,614; Tri-Cities Electrical Service, Inc., Los Angeles, \$26,203. Con-

tract awarded to Electric and Machinery Service, Inc., South Gate, \$18,227.

**LOS ANGELES COUNTY**—Arroyo Seco Parkway, between Bartlett Street and Figueroa Terrace, in the City of Los Angeles, about 0.2 mile in length, outer highway to be graded and paved with asphalt concrete on imported base material. District VII, Route 165, J. E. Haddock, Ltd., Pasadena, \$107,717; Chas. T. Brown Co. & Paul Valkich Construction Co., Los Angeles, \$129,320; Bonadiman McCain, Inc., Los Angeles, \$132,762. Contract awarded to Jesse S. Smith, Glendale, \$99,719.50.

**LOS ANGELES COUNTY**—On Norwalk Boulevard at Carson Street and at Imperial Highway, furnish and install full traffic actuated signal systems and highway lighting at two intersections. District VII, Route 170, Section A. Clinton Electric Corp., Los Angeles, \$18,366; Ed Seymour, Long Beach, \$18,700; C. D. Draucker, Inc., Los Angeles, \$19,610; Econolite Corp., Los Angeles, \$21,454. Contract awarded to Tri-Cities Electric Service, Inc., Los Angeles, \$18,173.

**LOS ANGELES COUNTY**—On Firestone Boulevard, approaches to Los Angeles River Bridge, about 0.6 mile in length to be graded and paved with Portland cement concrete pavement. District VII, Route 174, Section SGT. Cox Bros. Construction Co., Stanton, \$164,815; Nathan A. Moore, El Monte, \$165,143; Griffith Co., Los Angeles, \$168,177; Vido S. Price & Glenn Graham, Los Angeles, \$174,822; Clyde W. Wood, Inc., North Hollywood, \$190,671; N. M. Saliba Co., Los Angeles, \$223,275. Contract awarded to O'Brien & Bell Construction Co., Santa Ana, \$147,166.60.

**LOS ANGELES COUNTY**—On Arroyo Seco Parkway, between Avenue 26 and Fair Oaks Avenue, in the cities of Los Angeles and South Pasadena, a net distance of about 3.2 miles, chain link fence to be furnished and installed. District VII, Route 205, Section LA, SPas. Cyclone Fence Division, American Steel & Wire Co., Glendale, \$24,021. Contract awarded to Alcorn Fence Co., Los Angeles, \$23,413.60.

**SANTA CLARA COUNTY**—At the intersection of Bellomy Street with Park Avenue and The Alameda, in the City of Santa Clara, furnish and install traffic signal system and highway lighting. District IV, Route 2. Kurze Electrical Works, San Jose, \$11,979; Tri-Cities Electrical Service, Inc., Los Angeles, \$12,059. Contract awarded to L. H. Leonardi Electric Construction Co., San Rafael, \$11,760.50.

**F. A. S. County Projects**

**SAN JOAQUIN-SACRAMENTO COUNTIES**—Across Mokelumne River, about 2 miles north of Thornton, a steel truss swing bridge with reinforced concrete and timber trestle approach spans, to be constructed. District X, Route FAS 540. Baldwin Straub Corp., San Rafael, \$261,547; Chittenden and Chittenden, Auburn, \$263,052; H. W. Ruby, Sacramento, \$270,135; Bates and Rogers Construction Corp., San Francisco, \$274,659; Dan Caputo, San Jose, \$275,583; Erickson, Phillips and Weisberg, Oakland, \$276,522; A. Soda and Son, Oakland, \$281,702; A. L. Miller, Sacramento, \$289,791; E. H. Peterson and Son, Richmond, \$306,588; Pomeroy Sinnock, Stockton, \$311,021; Northup Construction Co., Long Beach, \$322,007; Fredrickson & Watson Construction Co., Oakland, \$323,286; George Pollock Co., Sacramento, \$324,762; Johnson, Drake & Piper, Inc., Oakland, \$329,206. Contract awarded to Lord & Bishop, Sacramento, \$244,852.

**SAN BERNARDINO COUNTY**—On Pigeon Pass Road, between Brookside Avenue at west city limit of Redlands and La Cadena Avenue about 1.5 miles south of Colton, about 8.4 miles to be graded and surfaced with plant-mixed surfacing on existing pavement and imported base material. District VIII, Route FAS 714. Griffith Co., Los Angeles, \$397,827; Winston Bros. Co. & Yount Constructors, Inc., Azusa, \$406,881; J. E. Haddock, Ltd., Pasadena, \$414,630; Match Bros. & E. L. Yeager, Riverside, \$419,300; Oilfields Trucking Co. & Phoenix Construction Co., Bakersfield, \$424,473; J. A. Payton, Riverside, \$446,106; R. A. Erwin, Colton, \$452,862; Hensler Construction Corp., Glendale, \$474,826; T. M. Page, Monrovia, \$481,304; A. Teichert & Sons, Inc., Sacramento, \$483,126; Peter Kiewit Sons Co., Arcadia, \$497,086; George Herz & Co., San Bernardino, \$511,591. Contract awarded to Basich Bros. & Basich Bros. Construction Co., San Gabriel, \$390,593.20.

## In Memoriam

**J. K. KINSMAN**

*J. K. Kinsman, Senior Equipment Engineer, attached to Headquarters Shop, died after a short illness on January 3, 1949.*

*Mr. Kinsman was born on November 15, 1880, in Boston, Massachusetts. He completed his education at the Royal College of Engineers at Plymouth, England, and had a rather wide and varied experience before entering state service, including more than ten years as mechanical superintendent for Miller & Lux in the southern San Joaquin Valley. He was also one of the organizers of Magnesium Products, Inc., which developed magnesium deposits near Patterson during, and immediately succeeding, the first world war. During his residence in the San Joaquin Valley, he was active in civic affairs and for several years was president of the Stanislaus County Board of Trade.*

*Mr. Kinsman entered state service in October, 1924, and was a trusted employee of the Equipment Department for more than twenty-four years. His wide and varied experience rendered him a valuable employee of the Equipment Department and his passing is sincerely regretted by all with whom he was associated.*

*He is survived by his widow, Mrs. Marie B. Kinsman; a son, Frank Kinsman of Sacramento, and a daughter, Mrs. Alice Trefts of Santa Maria, California.*

## SERIOUS TRAFFIC PROBLEM

With more than forty million motor vehicles using our streets and roads by the end of 1948, America's traffic problem is reaching staggering proportions, according to J. T. Callaway, President of the American Road Builder's Association.

"In the United States, we now have one car for every four persons," said Mr. Callaway. "Compare this with one for every 17 in Great Britain, 25 in France, 70 in Russia, and 222 in the rest of the world. And our factories are turning out trucks and cars faster than we can build the roads to provide adequate safety and traffic relief."

and Public Works

## In Memoriam

**ALFRED R. EBBERTS**

Members of the engineering profession in many parts of the world mourn the death on January 2, 1949, of Alfred R. Ebberts, Associate Physical Testing Engineer of the California Division of Highways. Mr. Ebberts died after a brief illness.

Widely known for his research and writings, Mr. Ebberts came to Sacramento in 1938 and joined the Materials and Research staff of the Division of Highways.

Born in Pittsburgh, Pa., he was educated at Cornell University where he received a bachelor of chemistry degree in 1920. He received his license in civil engineering by examination in California after independent study.

During World War I he was a lieutenant in the field artillery of the 7th Division.

He was a chemist with various firms until 1925, when he became an engineer for Alleghany County, Pa. Subsequently, he went to New York City to become technical director for Colprovia Roads, Inc., and held the post until 1934.

Mr. Ebberts was a member of the American Association for the Advancement of Science, as well as a counselor for the Sacramento Section of the American Chemical Society. He also was a member of the American Society of Testing Materials, an associate member of the American Society of Civil Engineers and secretary of the Mount Ralston Club in Sacramento.

He was coauthor of the book on asphalt paving processes which is a reference work throughout the world. He also was the author of numerous technical papers.

Mr. Ebberts resided at 1341 Forty-second Street, Sacramento. His survivors include his widow, Mrs. Emeline Ebberts, and his daughter, Elizabeth Ebberts.

**LOOK BEFORE YOU TURN**  
When making a U-turn on an open highway, be careful. Slow down, and look in both directions before turning. Remember, also, that the California

## In Memoriam

**SPENCER R. BURROUGHS**

Stricken with a heart attack while attending a Thanksgiving dinner reunion with his wife's family in Susanville, Spencer R. Burroughs, Principal Attorney of the Division of Water Resources, Department of Public Works, died unexpectedly on November 26, 1948. He was the son of the late Judge H. D. Burroughs and Judge Gladys Burroughs of Susanville.

Burroughs and his wife, Olga, his sons Trent and Jeffrey and daughter Olga had gone from Sacramento to Susanville to spend Thanksgiving Day with his wife's parents, former Assemblyman Jay and Mrs. Wemple.

Born in Chico June 27, 1894, Burroughs was educated in the public schools of Susanville. His father served for many years on the superior bench of Lassen County and upon his death his widow succeeded him, later being appointed a deputy in the office of the Attorney General. She is now making her home in Susanville.

Burroughs attended the University of California for two years and graduated from Stanford Law College after two years of study there. He was an ensign in the U. S. Navy 1917-19 and upon his return from service was admitted to the bar in 1919. He entered the private practice of law in 1920 and in 1922 accepted a position as attorney for the Division of Water Rights now the Division of Water Resources and advanced to the post of Principal Attorney.

In World War II, Burroughs' son, Spencer, Jr., was an ensign in the Navy and was killed at Okinawa.

Burroughs was considered one of the outstanding authorities on water law in California. He is survived by his widow, daughter Olga, and sons Trent and Jeffrey.

Vehicle Code prohibits such a turn on a curve or on a grade, unless the driver making the turn can be seen by an oncoming driver for a distance of at least two hundred feet.

## PRACTICAL JOKE

Continued from page 34 . . .

are still being retold about the arrival of the first parties of the dreaded Yankee. Subsequent unhappy relations provided material for the famous romance, "Ramona," written by Helen Hunt Jackson in 1884 as a result of her work on a government investigation of the Mission Indians in California. This romance is beautifully recounted annually by the Ramona Pageant at Hemet.

At the time when suitable commercial communications were finally extended westerly as far as St. Louis, Missouri, the U. S. Federal Government let a contract in 1857 to the Butterfield Overland Stages to carry the mails from the railhead at Tipton, Missouri, westerly, a distance of 2,500 miles to San Francisco by stagecoach.

### Stagecoach Route

The choice of route through the Southwest was influenced by availability of watering places and was bitterly contested by the rival towns of San Diego, San Bernardino, and Los Angeles. Of secondary importance was terrain. To put it mildly, the trip to San Francisco on the route traversed by stagecoach via Fort Yuma, across Imperial Valley, Carrizo Canyon, Warner's Ranch, Temecula, Chino, and Los Angeles was a rugged one for a traveler. The Federal Government annulled the contract during the Civil War because communications on other parts of the line through enemy territory could not be kept open.

Modernization of some sections of the old so-called inland route between Riverside and San Diego on U. S. Highway 395 was undertaken during the war because of military necessity. The major portion of the route in San Diego County is now complete, and includes the spectacular Cabrillo Freeway entering the City of San Diego. Progress in Riverside County to date has been on a more modest scale, but does include the improved section of a modern four-lane divided highway serving the large military bases at Camp Haan and March Field. Improvement in Riverside County between the southerly boundary and Temecula, a distance of



Resident Engineer J. M. Hollister shows height of granite curb stone remnant serving as a ranch fence post

six miles, on freeway standards is presently under contract to Morrison-Knudsen Company, Inc. In both coun-

ties, realignment to high standards and rerouting are accomplishing very substantial savings in distance.

## DISCHARGE

Continued from page 25 . . .

the construction of the San Francisco-Oakland Bay Bridge.

Mr. Carleton has also taken an interest in legal developments relating to public works of the other states and is a charter member of the Committee on Legal Affairs of the American Association of State Highway Officials.

### Rendered Many Opinions

He has rendered a large number of opinions through the years which have had an important bearing on the development of the State Highway System. These opinions have rarely been carried to the courts by interested parties. He was early called on to pass upon the legality of the original locations of highways in the framework of the State Highway System as con-

templated by the eighteen million dollar bond issue and succeeding bond issues, such as the North Fork of the Feather River Highway, the Weaver-ville Lateral, the Ridge Route (U. S. 99), and, later, on the relocation of important sections of the State highway in various parts of the State to meet modern traffic requirements.

He has written innumerable opinions on the validity of bids submitted by State highway contractors in the progress of the work.

He has interpreted many laws involving the financing of the State Highway System and has appeared as counsel in numerous cases in the Supreme and Appellate Courts involving the condemnation of rights of way for state highways, such as the well-known

. . . Continued on page 57

## SANTA BARBARA

*Continued from page 29 . . .*

underlying soil, the excavation was backfilled with imported borrow. This served the dual purpose of increasing the support afforded the pavement by replacing low-bearing ratio basement soil with quality imported borrow and provided top soil required for landscaping purposes without additional cost. A deficiency of excavation required that most of the embankment on the project be constructed of imported borrow and the provision for excavating top soil from excavation and embankment areas made this possible.

### Landscaping Delayed

Plans provide for landscaping the freeway. Because of the specialized nature of the work, it was not included as a portion of the roadway contract which did include installation of underground portions of the sprinkler system for maintenance of landscaping and placing of top soil over the areas to be planted. It was contemplated that the landscaping be let to contract so that it would be undertaken immediately upon completion of the roadway contract. This was precluded, however, by the water shortage. This remaining work to complete the freeway will be let to contract as soon as a continued supply of water can be assured to perpetuate the planting.

Construction of the Salsipuedes overhead structures was accomplished under two separate contracts. The first of these, covering construction of the substructures, was awarded to Macco Corporation in March, 1947. It was completed in December, 1947, at a cost of \$226,700. The second contract, amounting to \$553,900 for construction of the superstructures, was awarded to Carl N. Swenson Company in August, 1947. Painting of the structural steel, which will complete the structures, should be finished by the end of December, 1948. These contracts were performed under the supervision of the Bridge Department with Mr. R. E. Fetter as Resident Engineer.

The roadway was constructed by N. M. Ball Sons under a contract amounting to \$877,200. This contract, which was completed in August, 1948, was performed under the general direction of District Engineer L. H. Gibson. The Resident Engineer was H. J. Doggart.

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## SNOW AREAS

*Continued from page 30 . . .*

no parking signs have been erected along the highway and where parking facilities are available, "Park Off Pavement" signs will be found. Where small parking areas which will permit but eight or ten cars are located, a single sign will be found. Where a larger parking area is available, large portable signs reading "Beginning parking area" have been erected.

Under the Streets and Highway Code of California, the Division of Highways is given authority to close highways or set up restrictions for their use and the California Highway Patrol is authorized to cooperate with the department in the enforcement of these restrictions.

"Parking signs will be strictly enforced as will the requirement for chains," McCoy said. "On weekends thousands of cars move into the snow areas and it will be only by the will and cooperation of all concerned that the greatest enjoyment can be gained. Motorists must remember three things: carry skid chains, control speed, and park properly.

"Motorists who do not drive mountain roads frequently little realize the hazards of snow and ice on the road. By traveling without chains they endanger not only their own lives but the lives of others. The importance of carrying chains cannot be stressed too strongly.

"By authority of the Vehicle Code speed limit signs are placed on state highways in snow areas, not only for

the safety of vehicles and their occupants, but to protect pedestrians and skiers in resort areas. Cars easily get out of control on icy highways."

At those times during the snow season when the highways are dry and free from snow mandatory chain signs are hooded. In advance of every snow the Division of Highways provides illuminated bulletin-type signs to inform the traveling public of the conditions to be encountered at higher elevations. These signs inform motorists when chains are required. Parking areas are provided so that vehicles can be driven off the roadway while installing chains. Parking on the roadway is a traffic violation.

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## BUTTE CITY

*Continued from page 46 . . .*

Marysville; J. A. Johlstrom, State Division of Highways and Pat Cadero, Resident Engineer, Butte City Bridge.

The bridge and approaches, including a small structure at Rasor Slough, were constructed under two contracts. The substructure and approaches were constructed by Johnson Western Co. and the Judson, Pacific-Murphy Corporation was the contractor for the superstructure.

The bridge consists of reinforced concrete girder spans plus the main 292-foot structural steel truss swing span. The completed bridge provides a clear roadway width of 26 feet and two safety curbs, each one foot six inches in width.

Work was started on the substructure and approaches in March 1947. The total cost of the structure and approaches is approximately one-half million dollars.

The opening of the new bridge will end the trans-river ferry service which has been in operation since May, 1941. Although this ends the use of state operated ferries on the Sacramento River, the ferry will be sent down the river to Stockton to serve as a standby unit in the San Joaquin Delta region.



# U.S. 101

## Unusual Highway Project Is Under Way on Ventura Coast

By F. B. CRESSY, Assistant District Engineer

**A**N INTERESTING and unusual state highway project is currently being constructed along the ocean in Ventura County between the cities of Ventura and Santa Barbara.

The new project, a four-lane divided highway, will not only improve existing alignment but will also alleviate an unsatisfactory drainage condition.

The old highway and concrete seawall, reconstructed in 1926, parallels the Southern Pacific railroad tracks at a grade approximately twenty feet below and seaward of the railroad. Storm waters, in passing down the steep 400-foot-high cliffs on the land side of the railroad, pick up an unusually heavy load of erodable material. Because of the low level of the roadway in comparison with the grade

of the railroad, silt laden water would plug the flatter highway culverts and block the roadway by depositing silt and debris over the pavement.

The Design Department of the Division of Highways not only prepared plans to bring this 1.2 mile section of the Coast Route up to modern standards but also prepared plans to protect it from the ravages of the ocean. The contract was awarded to Clyde W. Wood, Inc., June 29th and construction was under way on July 12, 1948.

All culverts are of the reinforced concrete box type with the outboard 20 feet designed to cantilever through the seawall.

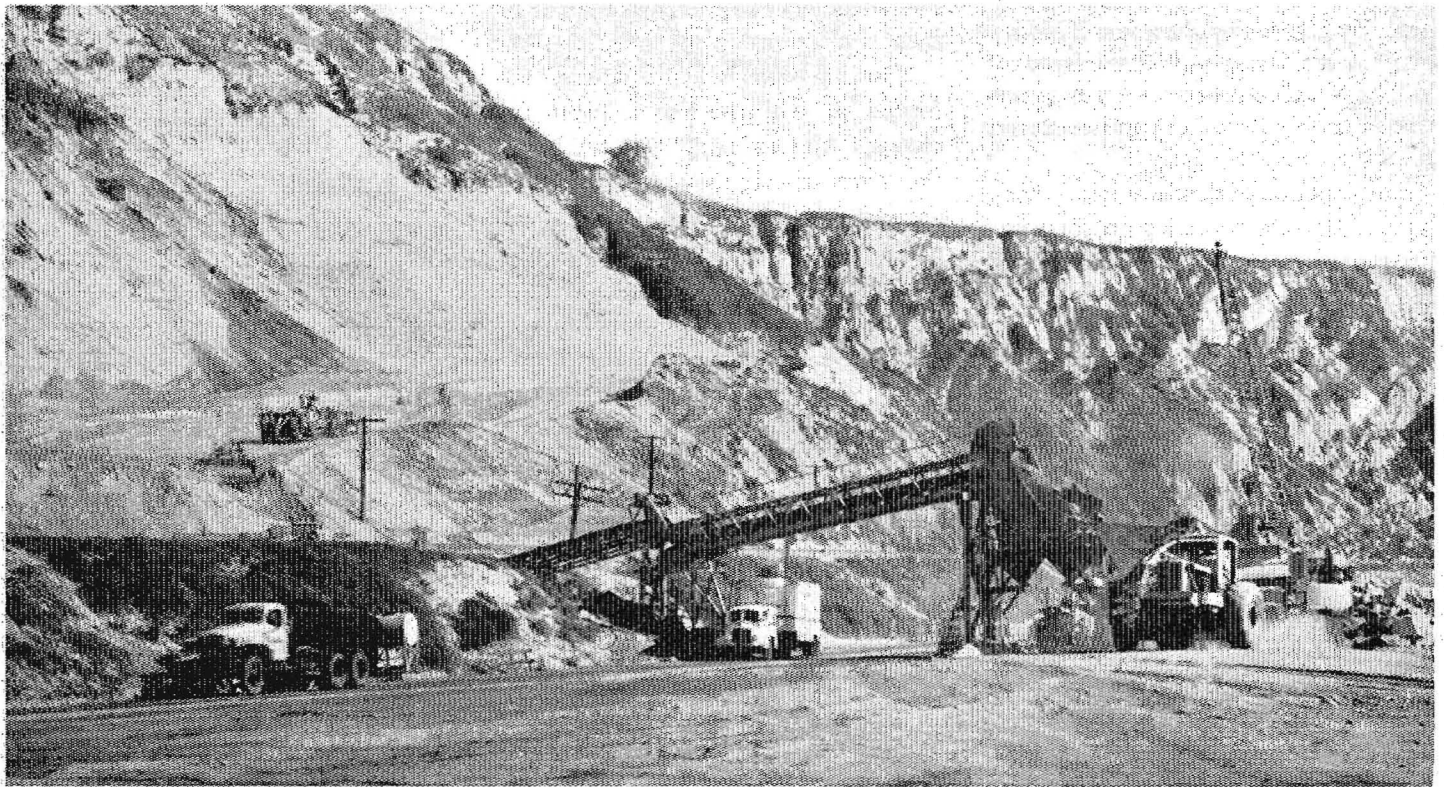
A rip-rap seawall has been constructed practically the entire length of the project. Rip-rap for this seawall

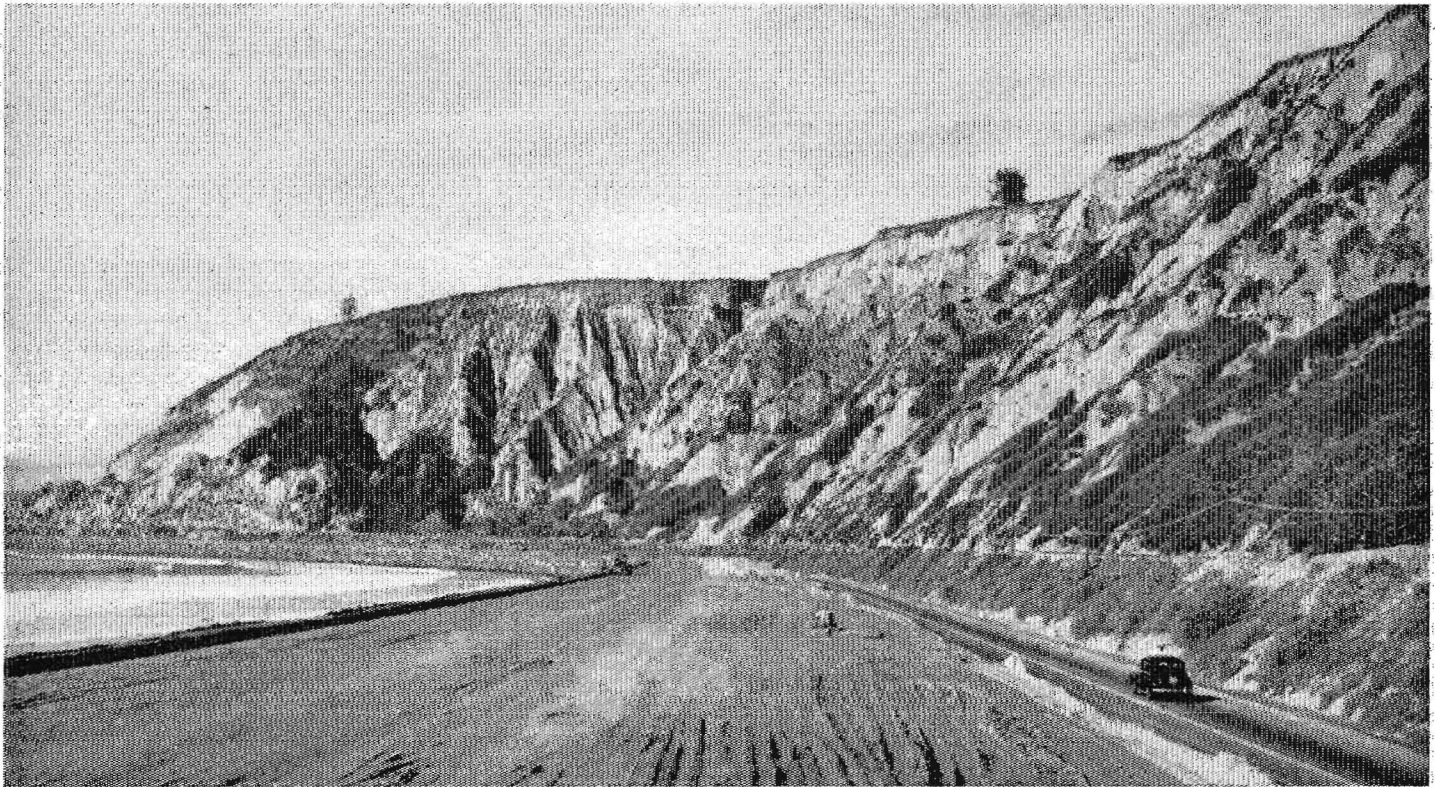
was hauled from Riverside on flat cars and placed by crane. Rock was specified in four sizes, ranging from one-fourth to ten tons depending upon location in the wall, to break up battering wave action. To prevent scouring of roadway fill material, three feet of shore protection gravel was placed between the fill and seawall.

Approximately 63,000 tons of heavy stone and 19,000 cubic yards of shore protection gravel were utilized for seawall construction. The wall averages approximately eleven feet in thickness ranging in height from—3 feet below mean tide to 20 feet above.

The contractor has developed a novel method of transporting excavation from the borrow pit, easterly of the railroad tracks, to the roadway fill

*Borrow pit and belt conveyor at westerly end of project. Note that conveyor passes beneath railroad tracks through existing drainage culvert*





Northwesterly view showing left half of roadway to approximate final grade. Note riprap shore protection in left background

westerly of the tracks to comply with specifications for non-interruption of either rail or highway traffic.

The belt conveyor system, shown in the accompanying photograph, receives the excavated borrow for the embankment in a belt feeder on the far side of the tracks. A conveyor running beneath the tracks and over the highway to provide a 14-foot clearance, discharges the material over a shaker screen where one-inch and larger rock

is separated. Fill material is loaded from the first hopper into turnapulls. Rock discharged into the second bin is used for shore protection gravel and also, after being crushed, is utilized for untreated rock base.

The traveled way is located at an elevation of +20 feet (above mean tide). The three inches of asphaltic surfacing is supported by eight inches of untreated rock base and 10 inches of imported subbase material.

This section of state highway is estimated to cost \$1,038,000. The construction of the riprap seawall, unnecessary on most projects, accounts for about \$480,000 or almost half of the total cost.

Stanley Wood is project manager for the contractor and A. W. Carr is Resident Engineer for the State Division of Highways, District VII. The project is scheduled to be completed the early part of May, 1949.

## DISCHARGE

Continued from page 54 . . .

Ocean Shore Railroad case. (32 A. C. 425.)

He was counsel in the two Supreme Court cases establishing the legality of the use of revenue bonds in California for the financing of the San Francisco-Oakland Bay Bridge, namely, *California Toll Bridge Authority v. Wentworth*, 212 Cal 298, and *California Toll Bridge Authority v. Kelly*, 218 Cal. 7.

## INTELLIGENCE

The motorist who drives at average speed in heavy traffic deserves an "above average" rating for intelligence and highway courtesy.

## VAST DIFFERENCE

Traffic accident records reveal that there's a world of difference between careful driving and reckless driving—and in too many instances, it's the difference between this world and the next.

## STAY IN GEAR

Drivers who coast down grade with gears in neutral are indulging in an extremely dangerous practice which is specifically prohibited by the Vehicle Code. A good rule to follow is to use the same gear for descending a grade as that used for climbing.

## ALL TOO TRUE

The common expression, "my feet are killing me," has special meaning when applied to the careless pedestrian who habitually jaywalks.

# Final Link

*Extension of Olympic  
Boulevard Completed*

By E. A. PARKER, Construction Engineer—Field (Metropolitan)

**O**FFICIAL OPENING to public traffic of the final link in Olympic Boulevard between Los Angeles and the Pacific Coast Highway at Santa Monica was celebrated recently with the customary ribbon-cutting ceremony and parade. The ribbon was cut by Mayor Gates of Santa Monica, assisted by Los Angeles County Sheriff Eugene Biscailuz and by Representative Donald L. Jackson of the Sixteenth Congressional District.

Officials of the State, county, and Cities of Santa Monica and Los Angeles and a large group of citizens enjoyed the ceremony marking the completion of this heavily traveled arterial, which now provides a direct routing of traffic from the eastern city limits of Los Angeles to the Pacific Coast Highway at Santa Monica.

#### **Adopted as Freeway**

The route was adopted by the California Highway Commission on April 3, 1936. The portion of the project in

the City of Santa Monica between 20th Street and the easterly boundary of Centinela Avenue was adopted as a freeway by the State Highway Commission on July 31, 1942.

This final unit extends from Lincoln Boulevard in Santa Monica to Bundy Drive in West Los Angeles, a total distance of 2.3 miles. From Lincoln Boulevard to 20th Street in Santa Monica the alignment is along the existing Olympic Boulevard and is tangent throughout. From 20th Street to Bundy Drive the improvement is completely new road.

Additional right of way was acquired to provide a total width of 120 feet from Lincoln Boulevard to 20th Street, and a total width of 110 feet from 20th Street to Bundy Drive. This involved the removal of several dwelling houses and business buildings. The facilities of public utility companies were affected, making necessary the relocation of numerous water, gas, sanitary sewer, and power lines. At the Pacific Electric Railway crossing it was necessary to remove three spur

tracks, construct a new spur track, and raise the grade of the main line track.

#### **Multiple Lane Highway**

From Lincoln Boulevard to Centinela Avenue features of the completed project include the construction of a four- and six-lane divided highway with eight-foot parking strips along the outer edges of the roadway adjacent to the curbs.

The new work consisted of an eight-inch Portland cement concrete pavement placed on 13 inches of selected material, the top four inches of which was cement-treated. The six-lane highway between Lincoln Boulevard and Ninth Street is separated by a curbed division strip 12 feet wide. The four-lane highway between Ninth Street and Centinela Avenue has a uniform curbed dividing strip 36 feet wide. Top soil one foot in thickness was placed in the central dividing strip which was planted with *mesembryanthemum edule* cuttings.

*Olympic Boulevard extension looking easterly from near Lincoln Boulevard, showing newly completed divided highway construction*



From Centinela Avenue to Bundy Drive the full width of 86 feet between curbs is paved, and to provide color contrast alternate lanes of Portland cement concrete and asphaltic concrete on a Portland cement concrete base were used.

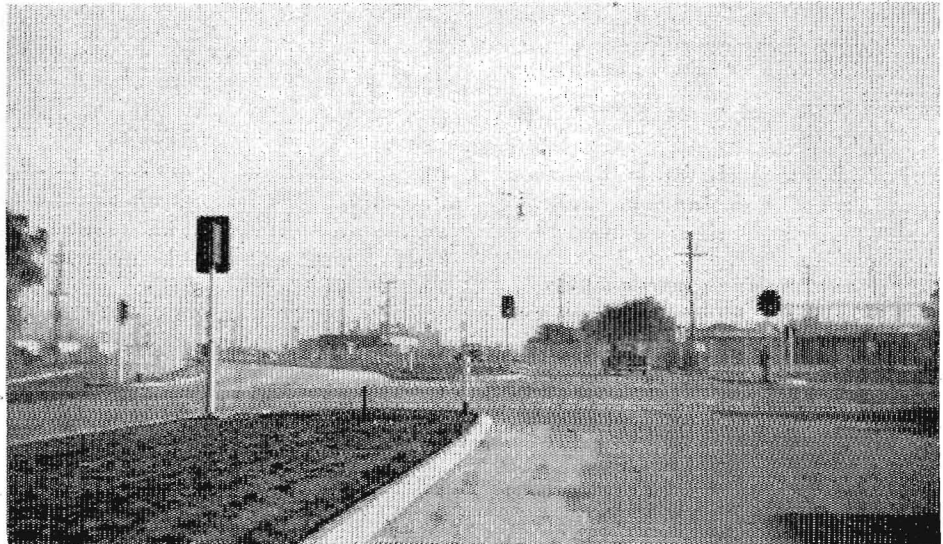
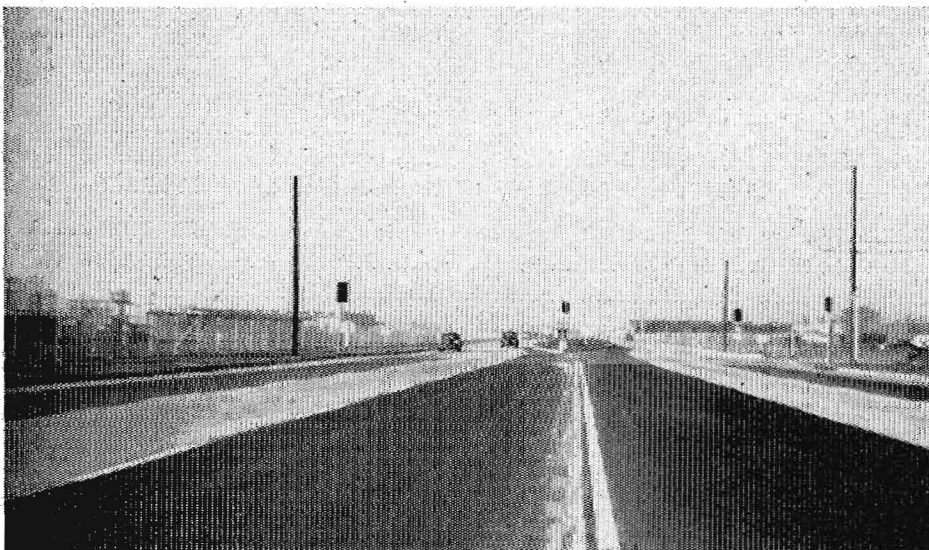
#### Storm Drain System

On account of the accumulation of storm water which caused flooding at various locations, it was necessary to construct an extensive storm drain system consisting of approximately eighteen thousand lineal feet of reinforced concrete pipe varying in diameter from fifteen inches to fifty-four inches which, together with the construction of appurtenant catch basins and manholes, amounted to approximately 45 percent of the total cost of the work.

As this project is a limited access freeway, cross-overs for motor vehicles were permitted only at strategic intersections, where additional left-hand turning lanes were provided. At these six street intersections an interconnected, fixed-time traffic signal system was installed under a separate contract operating concurrently with the roadway contract.

This improvement, together with a recently completed state highway contract between the Colorado Street tunnel and Lincoln Boulevard, will greatly facilitate motor vehicle traffic to and through Santa Monica.

Looking westerly across Centinela Avenue, showing contrasting colored lanes



Looking westerly across 14th Street, showing left-turning lanes

#### Seventy-four Foot Roadway

The improvement of Olympic Boulevard to the west of this project consisted of the reconstruction of the existing roadway. The existing pavement, which had become badly cracked and broken, was removed and underlying subgrade material excavated to a depth of approximately twenty inches below finished grade. The new roadbed section consists of constructing a subgrade of imported borrow material eight inches in thickness. Over this subgrade was placed an eight-inch layer of untreated rock base topped with four inches of plant-mix surfacing. The roadway is 74 feet between curbs.

J. E. Haddock, Ltd., the contractor on both highway projects, made very satisfactory progress. Work started on February 9, 1948, and was completed on November 24, 1948, more than three months before the specified date for completion. The total construction cost was approximately \$1,017,000. C. D. Draucher was the contractor on the signal installation system; the approximate cost was \$50,000.

The highway contract from Lincoln Boulevard to Bundy Drive was under the supervision of Resident Engineer R. A. Collins, and the highway contract from the Colorado Street tunnel to Lincoln Boulevard was under the supervision of Resident Engineer F. E. Sturgeon. R. W. Van Stan was resident engineer in charge of the signal contract.

## COAST HIGHWAY

Continued from page 41 . . .

Fredericksen and Kasler, Sacramento, constructed the roadway on this second unit under contract amounting to \$1,400,000. Installation of traffic signals and highway lighting was made by the L. H. Leonardi Electric Construction Company, San Rafael. The contract for this work amounted to \$15,600. The work was under the general supervision of District Engineer L. H. Gibson. The Resident Engineer was Mr. V. E. Pearson.

## In Memoriam

### C. WARREN BECKLEY

C. Warren Beckley, Associate Right of Way Agent with the Division of Highways in Redding, passed away suddenly on December 18, 1948.

Warren received training in electrical engineering at the University of California, but after graduating took up work along the civil engineering line, acting first as a surveyor with the McCloud River Lumber Company and then as a right of way engineer, with the Division of Highways, State of California. After 12 years as a right of way engineer, Warren became Assistant Right of Way Agent in 1944, at the Redding Office, where he was active in carrying out his work up to the time of his passing.

Warren was liked and respected by all with whom he came in contact and his loss will be felt very keenly by the entire district staff at Redding, as well as by the American Right of Way Association, in which he took an active part.

## F.A.S. ROADS

Continued from page 32 . . .

with a plant-mixed surface. The length of the improvement is 2.6 miles and the estimated total cost is \$175,000.

### Important Connection

This project when completed will form an important cross valley connection between state highways, and its proximity to the Kaiser Steel Mill and service to a large area capable of extensive development makes it potentially important as a future heavily travelled highway.

Bids were opened December 30th for the improvement of the Pigeon Pass Road between State Highway Route 43 south of Colton and Brookside Avenue in Redlands. This project traverses citrus areas for a greater portion of its length. There will be two important line changes, one relieving the congested streets in the town of Loma Linda and the other forming a needed grade and alignment improvement through Pigeon Pass. The improvement has a length of 8.4 miles and is estimated to cost \$520,000.

# Plans Rushed

PLANS are now being rushed to completion in the District VII office of the State Division of Highways at Los Angeles to provide for the double-barreling of a 4.3-mile length of Rosemead Boulevard, State Highway Route 168, between Beverly Boulevard and Garvey Avenue.

At the present time this is perhaps one of the most congested sections of state highway that exists on the entire system because of the heavy trucks, transporting sand and gravel from the San Gabriel River production plants, having to use the narrow two-lane pavement along with a large volume of automobiles. The need for this improvement has been recognized for many years. The report of 1944 to the Senate Fact-Finding Committee, on page 4, carried a photograph which clearly shows the heavy traffic that overtaxes the capacity of this state highway.

### Freeway Agreement

It was originally planned that the portion only of Route 168 through the Whittier Narrows Flood Control Dam Project of the Federal Government should be developed as a freeway, and toward this end a freeway agreement was entered into between the County of Los Angeles and the State so that some of the existing county roads might be closed and the rights of ingress and egress taken from abutting property along the state highway. As the state's plans for providing this section of freeway progressed, various citizen organizations protested, under the misapprehension that this was the initial step in converting all of Rose-

mead-Lakewood Boulevard into a freeway. Since the Whittier Narrows Project, when constructed, will provide freeway characteristics for traffic control, it was decided on the occasion of the November 17, 1948, meeting of the State Highway Commission to rescind former action, and plans are now being changed in the Los Angeles office, looking toward the development of a divided highway instead of a freeway as had originally been planned.

### Four-lane Divided Highway

The plans will provide that the existing two-lane pavement shall be used for one direction southbound traffic and that a new 24-foot width of Portland cement concrete pavement on cement treated subgrade of imported base material be placed on the easterly side of the existing traveled way for the use of one-way northbound traffic. A curbed central division strip 18 feet wide is being provided to separate traffic moving in opposite directions. New rights of way are being obtained on the easterly side so that there will be ample width for pavement, shoulders and slopes.

The budget for the current fiscal year (July 1, 1948, to June 30, 1949) contains an allocation of \$1,165,000 to provide for right of way acquisition, construction engineering, and the construction of this project. It is expected that the contract for this work will be advertised with bids to be received early in March. A short time limit of 175 working days will be provided so that public traffic will have the use of this completed improvement at the earliest possible date.

Most construction engineering required in connection with these projects has been furnished by San Bernardino County, and on future projects it is anticipated that it will handle all construction engineering required in connection with FAS contracts.

All details in connection with the design and construction of county roads

are under the supervision of Howard L. Way, County Surveyor and Road Commissioner. Federal-aid secondary contracts were under the general supervision of E. Q. Sullivan, District Engineer, Division of Highways, San Bernardino. The Public Roads Administration's representatives were under the supervision of E. C. Brown, District Engineer, Sacramento.

# Four Level

Construction Advancing on  
Unique Highway Project

By H. R. LENDECKE and C. G. BEER, Associate Bridge Engineers

CONSTRUCTION work is now nearing completion on the four-level structure. This unique grade separation project is located about one-half mile northwest of the Los Angeles Civic Center at the intersection of the Hollywood-Santa Ana Parkway and the Arroyo Seco-Harbor Parkway. It will provide for the separation and interchange of traffic between these two main thoroughfares, which, when they have been completed, will carry a heavy volume of traffic of all descriptions.

The Arroyo Seco Parkway, which now connects Los Angeles and Pasadena, will be extended southerly to intersect the Hollywood Parkway at the structure. Continuing on beyond the structure, the parkway, then to be known as Harbor Parkway, will extend to the harbor area. The Hollywood Parkway now under construction will extend westerly from Civic Center

through Hollywood and Cahuenga Pass to the San Fernando Valley.

#### Construction Under Way

These two main routes will cross the four-level structure on the second and fourth levels, while the first and third levels are devoted to interchange ramps. Typical sections representing the type of construction and showing the roadway widths are shown in the accompanying photo. The lowest level "G" and "H" will be built under a future paving contract. Only the rough grading is being done as part of the structure contract. The second level "A" deck consists of continuous slab construction on three-column bents. The third level "C" and "D" decks are of continuous box girder construction. These two decks are supported on single column bents or on skewed beams.

The top level "B" deck is made up of two continuous box girder bridges. This level is supported on four column bents and the two parallel decks are tied together by heavy reinforced concrete beams at the three central bents.

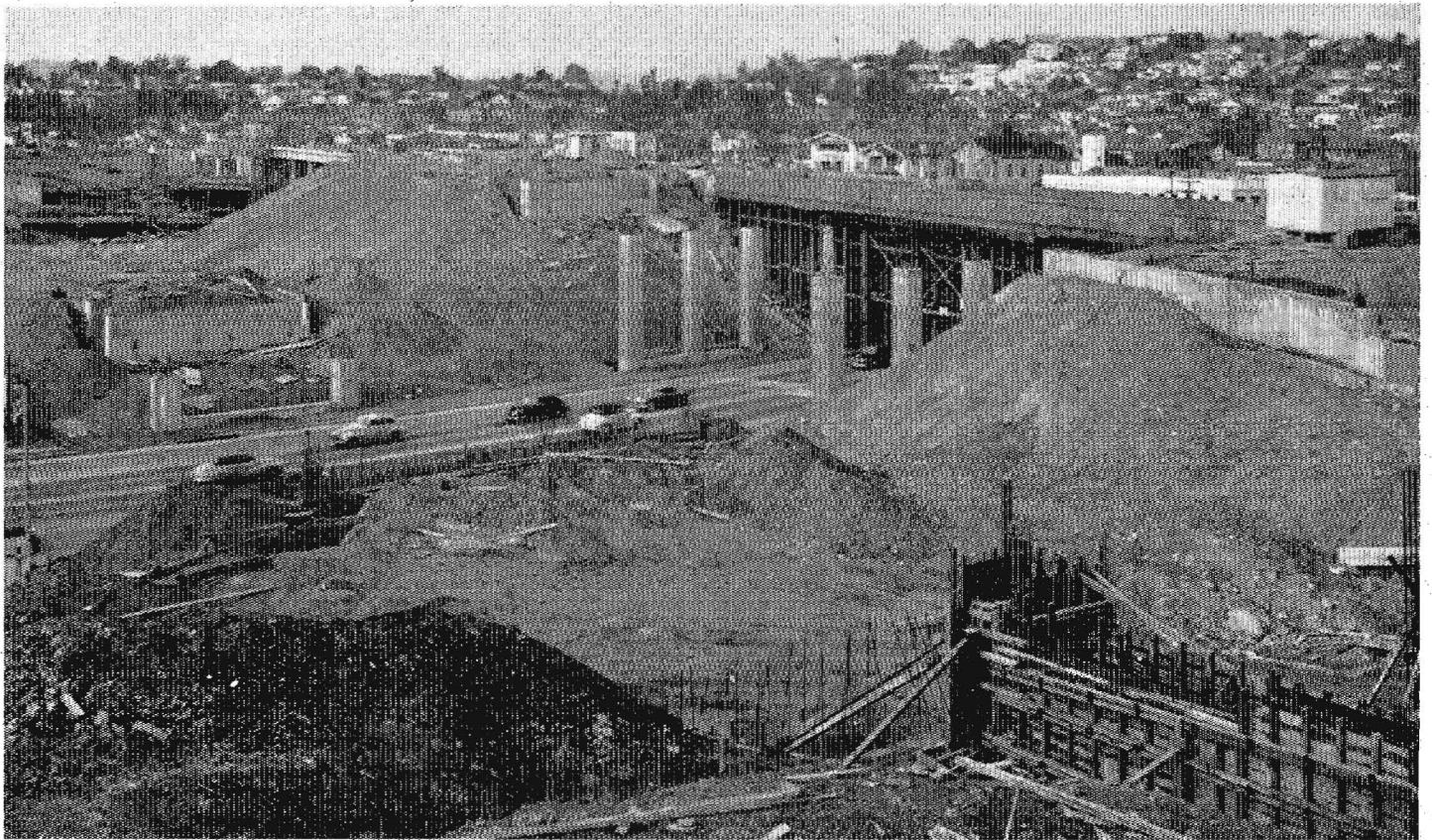
A total of 10 U-shaped abutments and 73 columns on individual hexagonal footings support the structure. In 25 of the column footings and three of the abutments, 477 steel bearing piles are used to provide additional support.

#### Test Borings

Test borings at the site showed a surface soil coverage for an average of about fifteen feet overlaying a water-bearing sand. Beneath the sand layer the material changed rapidly into the characteristic sandstone which is found in much of this area. Lying as it does at one edge of the original Los Angeles

Four-Level structure looking south from the completed Sunset Boulevard Bridge over the Arroyo Seco Parkway





Upper—Figuroa Street undercrossing as viewed looking northwesterly with the Four-Level structure at left in the distance

Lower—Four-Level structure looking westerly along the upper or Hollywood Parkway level

oil field, some oil seepage was encountered in many of the footing excavations.

Although the location lent itself quite well to the structure which is being built, nevertheless it was necessary to excavate 18 feet below the original ground near the center of the structure and to place fills as high as forty feet above the original ground to care for the extremes in traffic lanes. Owing to the generally poor quality of the excavated material, fills were built up in alternate four-inch layers of the local material interlaid with layers of imported sandstone.

After the excavations were made, it became evident that it would not be necessary to have piles under all of the footings. In some locations the column footings were placed directly on the underlying sandstone which provided an adequate foundation. Each footing was considered individually in the light of material exposed by the excavation. The discovery of suitable material at or within a few feet of the planned foundation grade made it possible to eliminate a large number of the bearing piles. Steel bearing piles were used chiefly on the westerly portion of the structure. The maximum length of pile driven was only 42 feet.

#### Design of Forms

The contractor gave considerable thought and planning to the design of his forms. The construction of a multiple hinged form for the hexagonal footings greatly facilitated the construction of these units. The columns were circular of 3 feet, 4 feet and 4½ feet diameters varying from 5 feet to 64 feet in height. For these also the contractor designed the forms for repeated useage, building the taller columns first and cutting his forms to fit the shorter ones as pouring progressed. The column forms were constructed of 2x4 tongue and groove material and because of the careful workmanship an exceptionally nice appearance was obtained on the finished concrete.

The falsework was in general supported upon timber piles. Through the central portion of the structure, falsework posts supporting the upper levels rested on the previously poured lower decks. In these areas because of the necessity that the falsework be left in

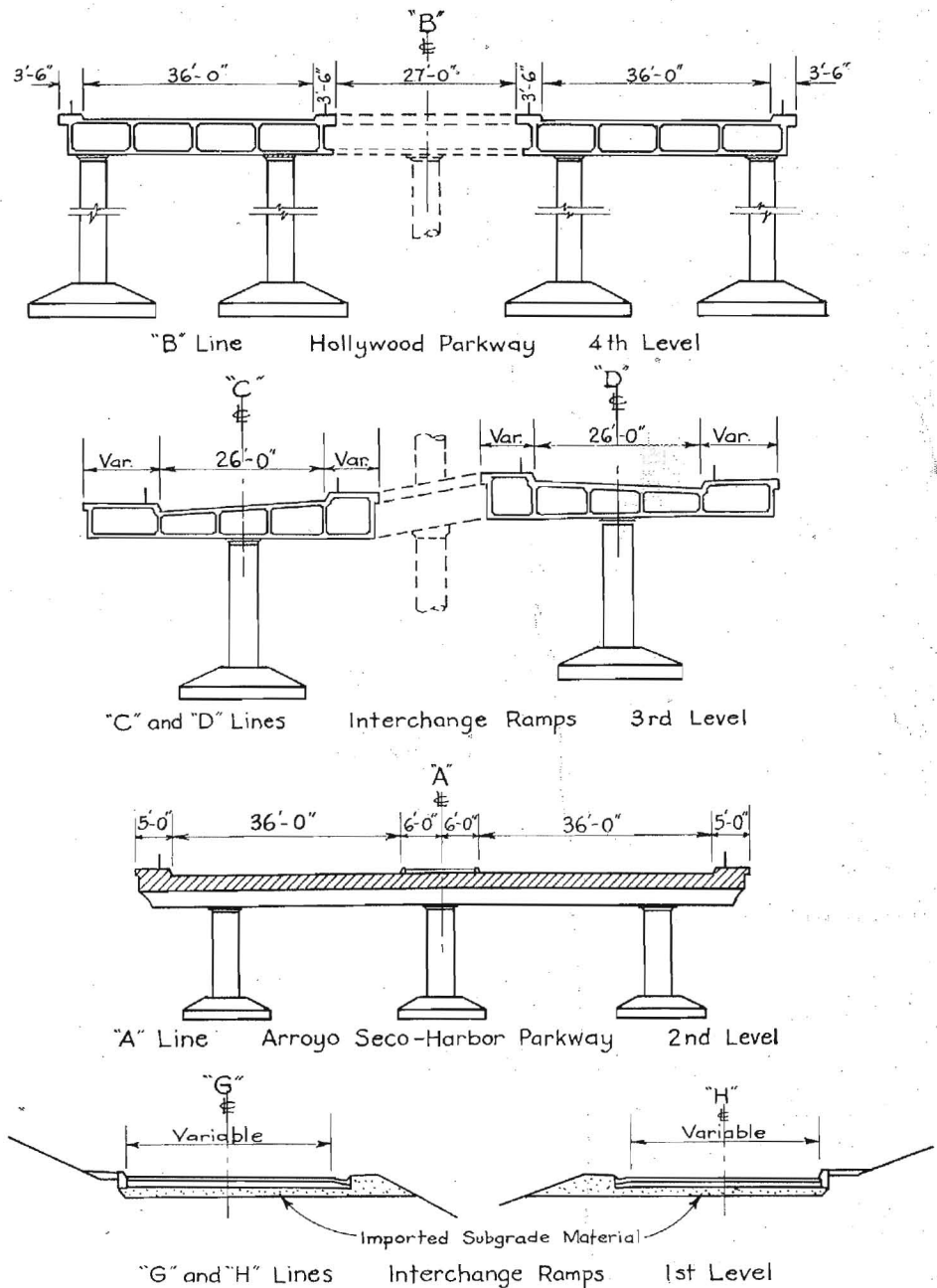


FIG. 1 - TYPICAL SECTIONS OF FOUR-LEVEL STRUCTURE

place until the upper deck had been poured and cured, a large amount of falsework and form lumber was tied up so that it could not be reused until the late stages of the job.

#### Expansion and Contraction

In considering the provision for expansion and contraction, the structure can be likened to a starfish. The heavily reinforced column at the geometric center is rigidly connected to its special ribbed footing and also into both the intermediate levels through which it

passes. This results in a point of relative fixity at the center of the structure. Radiating out from this point are the decks which may be visualized as 10 arms of the starfish having progressively more allowance for movement nearer their ends where they rest on steel rockers and bearing plates at the abutments.

As was described in a previous issue of *California Highways and Public Works*, the laying out of the structure presented no small problem which was



most successfully solved by use of coordinate ties to a grid system. With the many curves, both horizontal and vertical, proper control of the location of lines and grades required the utmost in skill and precision.

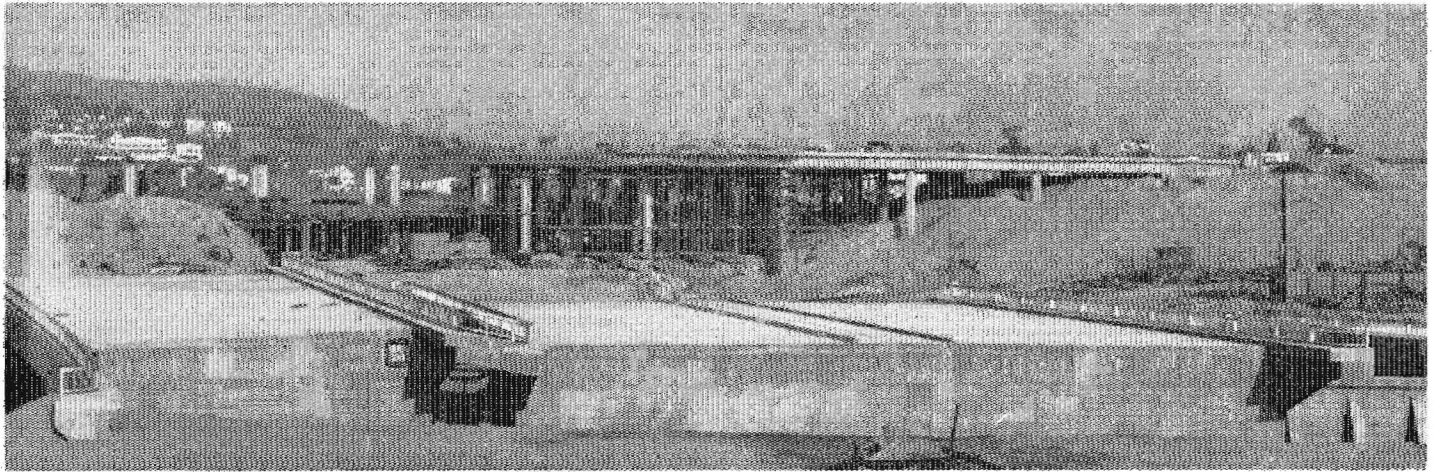
The major quantities in the structure included 15,000 cubic yards of structure concrete, 30,000 cubic yards of structure excavation, and 3,500,000

pounds of reinforcing steel. The detailing, bending and placing of all reinforcing steel was done at the job site by the general contractor. This resulted in very accurate fitting of reinforcing bars.

The James I. Barnes Construction Company is the general contractor on the four-level structure, for which R. K. Harris is Project Manager. The de-

sign of the structure was handled by the Bridge Department under the direction of F. W. Panhorst, Assistant State Highway Engineer. The City of Los Angeles and District VII of the Division of Highways collaborated with the Bridge Department in the traffic and location studies. H. R. Lendecke is Resident Engineer on the project for the Bridge Department.

Looking northeasterly from Court Street towards Temple Street structures in the foreground and Four-Level structures in the distance. Center structure in foreground is on the Harbor-Arroyo Seco Freeway, the others are off and on ramps



## EFFICIENCY

*Continued from page 16 . . .*

year. The permanent warehouse in Sacramento was occupied in September, 1948, and it is expected to complete the Los Angeles building by March, 1949.

The current cost of operating the warehouses exclusive of Headquarters is approximately 8 percent of the business handled. Headquarters of the Stores Department is so closely knit with other highway headquarters activities as to make it impractical to separate its costs, hence it is charged to general administration.

Savings so far effected have not been entirely segregated as to arrive at a satisfactory figure. The elements of time saved and other intangibles are of so great moment as to make any dollar and cents figure abortive.

### Satisfactory Progress

Suffice to say that all concerned with this new project are well pleased with progress to date and all feel that a distinct step in efficiency has been accomplished. Of prime importance is the fact that a central agency has been es-

tablished to receive and disburse information concerning procurement and one channel has now been established between the Division of Highways and the Division of Purchases. This tends to localize all pertinent information and leads to the closest of cooperation between the ordering agency and the buyers.

Another factor which should be listed under results is speed in paying highway bills. Many vendors have had reason to complain about doing business with the State due to slowness in receiving payment, but with the establishment of the Stores Department a system has been effected to process all invoices without loss of time and to take advantage of commercial discounts. Discounting bills has proved to be an effective money saver for the Division of Highways.

It is felt by the State Highway staff that the centralization of highway procurement and other allied services into a Stores Department has been a step forward in administration of an efficient Division of Highways that will reflect a considerable savings to the motoring public of California.

## Reappointments

For the second time since the California Highway Commission was reorganized on September 14, 1943, under an act of the Legislature, Governor Earl Warren has reappointed Commissioners James A. Guthrie, San Bernardino publisher, and Chester H. Warlow, Fresno banker.

When the present commission was named in 1943, with Director of Public Works C. H. Purcell as chairman, the appointees drew straws to determine their staggered tenures of office. Mr. Guthrie and Mr. Warlow drew two-year terms and were reappointed to four-year terms by the Governor in January, 1945. Their terms expired on January 15th of this year and on January 18th the Governor submitted their names for reappointment for four-year terms to the State Senate for confirmation.

**EARL WARREN**  
Governor of California

**CHARLES H. PURCELL**  
Director of Public Works

**FRANK B. DURKEE**  
Acting Deputy Director

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STEWART MITCHELL . . . . . Principal Bridge Engineer  
E. R. HIGGINS . . . . . Comptroller

**Right of Way Department**

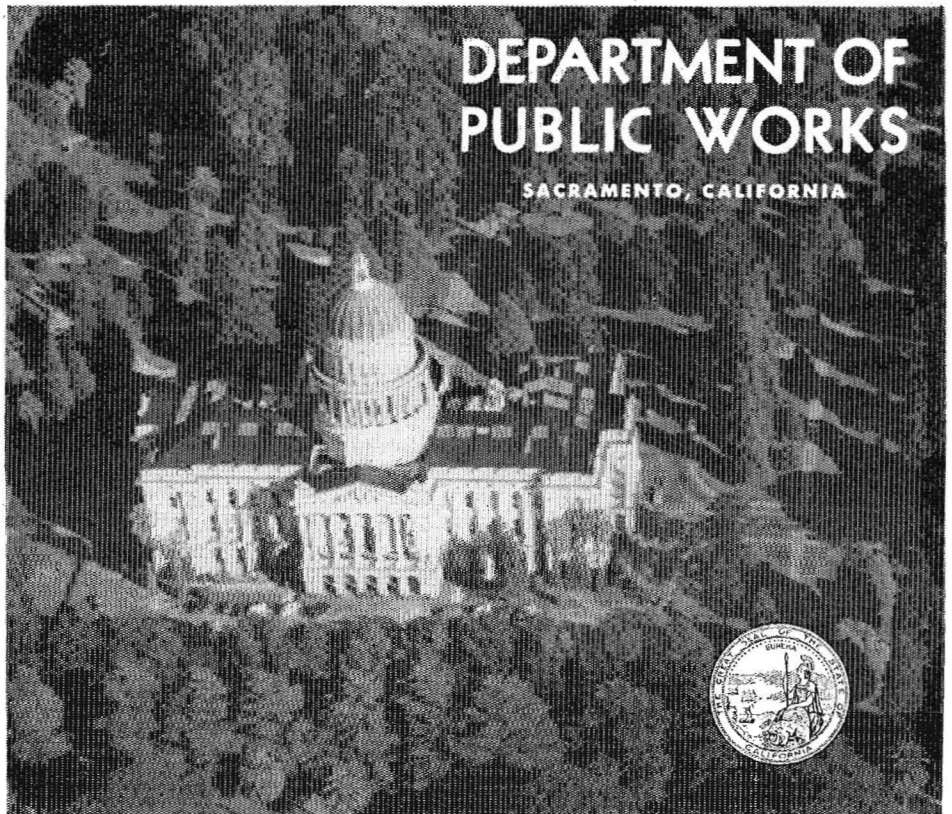
FRANK C. BALFOUR . . . . . Chief Right of Way Agent  
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**District VII**

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 RETURN POSTAGE GUARANTEED

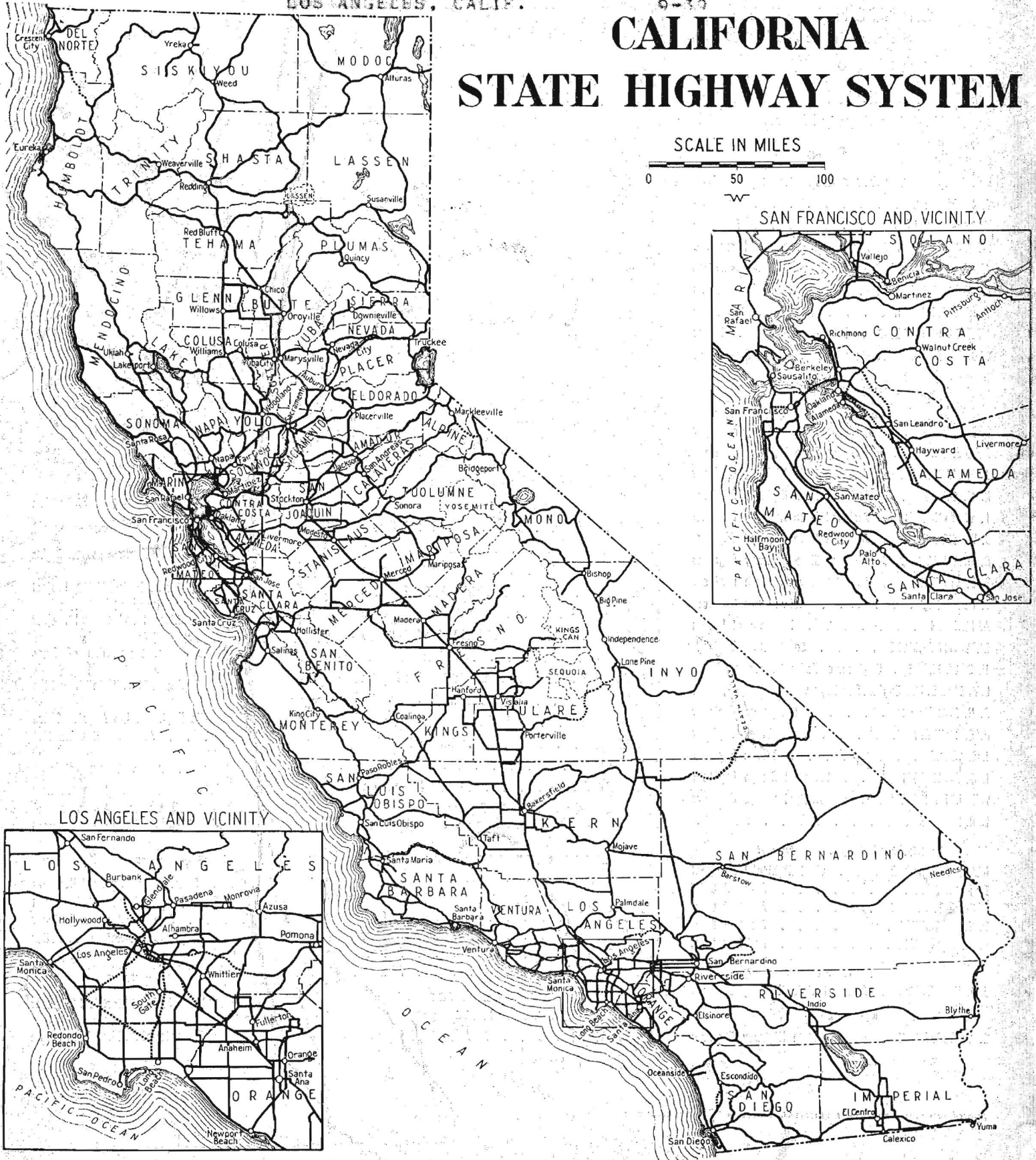
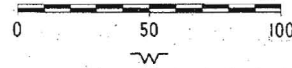
SEC. 562 P. L. & R.  
 U. S. POSTAGE  
**PAID**  
 Sacramento, Cal.  
 Permit No. 152

DR. REMSEN D. BIRD, PRES.  
 OCCIDENTAL COLLEGE  
 EAGLE ROCK,  
 LOS ANGELES, CALIF.

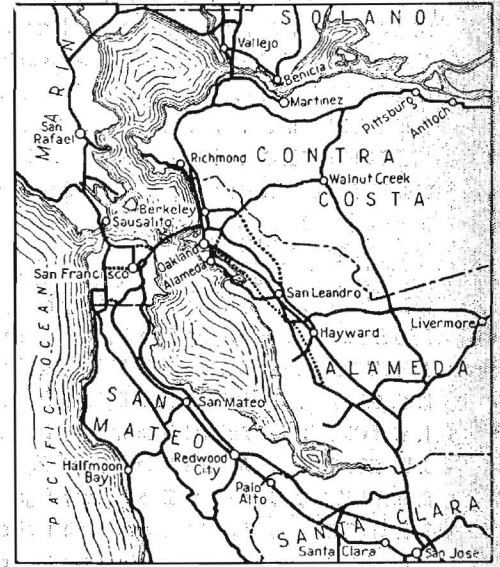
9-32

# CALIFORNIA STATE HIGHWAY SYSTEM

SCALE IN MILES



SAN FRANCISCO AND VICINITY



LOS ANGELES AND VICINITY

