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CHARLES H. PURCELL
Director

GEORGE T. McCOY
State Highway Engineer

KENNETH C. ADAMS
Editor

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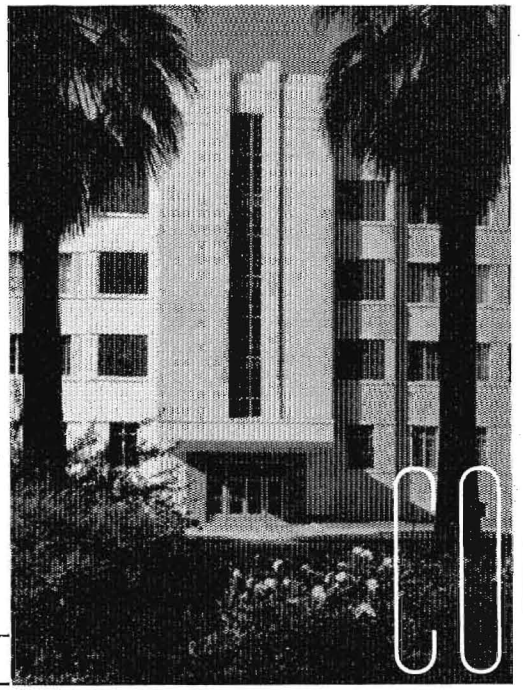


Public Works Building
Twelfth and N Streets
Sacramento

CONTENTS

Bay Crossings

Parallel Span Across San Francisco Bay Recommended

For key to photographs see map on Pages 2-3.

AS CHIEF ENGINEER of the Division of San Francisco Bay Toll Crossings, Ralph A. Tudor on Tuesday, November 16th, recommended to the California Toll Bridge Authority that a parallel bridge, together with approaches on both sides of San Francisco Bay, be built at the earliest practicable date and construction of the proposed southern crossing be deferred until it can be financed as another bay crossing.

Tudor submitted to the authority, of which Governor Earl Warren is chairman, a report based on 10 months of studies and investigations of additional toll highway crossings of San Francisco Bay in compliance with a resolution adopted by the authority on November 10, 1947.

Comparative Costs

At a public meeting held in the Assembly Chamber of the State Capitol, Tudor summarized his report. He estimated the total cost of a parallel bridge, including approaches, right of way and engineering, at $155,014,000 and of a southern crossing at $178,421,000.

"Plans can be completed and construction on a parallel bridge started by March, 1950," Tudor said, "unless unforeseen delays arise."

Tudor's report deals with a bridge parallel and northerly of the existing San Francisco-Oakland Bay Bridge, together with its approaches, and including a tube under the Oakland estuary with connections to the East Shore Freeway and the City of Alameda, and a highway crossing connecting the vicinity of the Bay Shore Freeway and Army Street in San Francisco with the vicinity of Fifth Street in Alameda and including a crossing of the Oakland estuary to connect with the East Shore Freeway.

Traffic Findings

On the subject of traffic, the report says:

"The requirements and convenience of present and future transbay vehicular traffic are probably the most important matters to consider. If this traffic is not reasonably well served, there must be some overriding and irrefutable reason for adopting a solution which is less satisfactory to the people who use and pay for the crossings. It is not difficult to determine present requirements, but the future is less certain. The latter must be carefully and exhaustively studied and not left to any short and quick speculation.

"The existing San Francisco-Oakland Bay Bridge is now congested and is approaching its ultimate capacity. If a parallel bridge is built, this condition will be effectively relieved as soon as the new bridge is completed. This relief will continue beyond 1970. If a southern crossing is built, congestion on the existing bridge will be reduced but not eliminated, and both crossings will again be congested during peak hours by 1965. Serious congestion on the San Francisco-Oakland Bay Bridge earlier than 1965 can be avoided only at the expense of diverting some peak hour traffic that would normally prefer the bridge to a longer and less convenient route via the southern crossing.

Traffic Percentages

"Approximately 82 percent of the transbay traffic will be better served and will prefer a parallel bridge to a southern crossing; 18 percent will be better served by a southern crossing. Estimates of future expansion in all areas on both sides of the bay through 1970 do not change these percentages.

"A southern crossing will induce new transbay traffic from areas which it will best serve. This is particularly true for the City of Alameda. However, the total induced traffic from all areas amounts to less than 1 percent of the total transbay traffic.

"After diversions to a southern crossing resulting from congestion on the present bridge, induced traffic, and other causes, a southern crossing in 1955 will carry an estimated 21.5 percent of all transbay traffic. The San Francisco-Oakland Bay Bridge will still carry 78.5 percent of the total. By 1970 these percentages are estimated to be 24 percent and 76 percent respectively.

No Congestion in San Francisco

"There is no choice between the crossings insofar as congestion on the

PREFACE

The impending need for added facilities on the San Francisco-Oakland Bay Bridge was recognized during the war and, on its termination, the Department of Public Works of the State of California was directed by the Toll Bridge Authority to conduct a study of the problem. Authorization was given on October 30, 1945, and a report rendered on January 31, 1947. This report recommended the construction of a new bridge parallel and immediately north of the existing crossing.

On May 10, 1946, Congress directed that a Joint Army-Navy Board be formed to study the matter. The board rendered its report on January 25, 1947, and favored a southern crossing of the bay between the vicinities of Army Street in San Francisco and Fifth Street in Alameda.

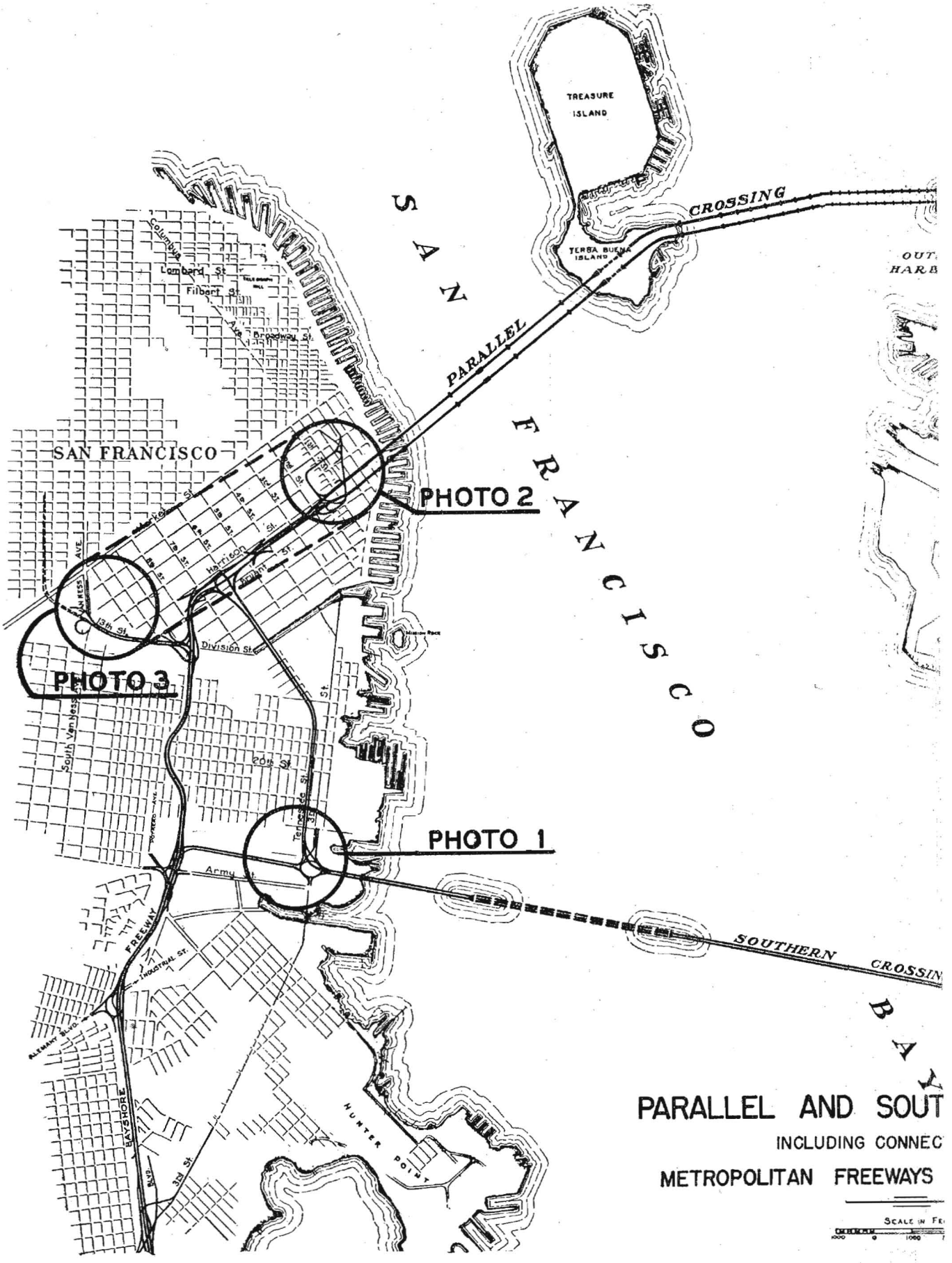
On November 10, 1947, Director of Public Works C. H. Purcell recommended to the California Toll Bridge Authority that two additional crossings be built, conforming in general to the separate recommendations described above on the same date.

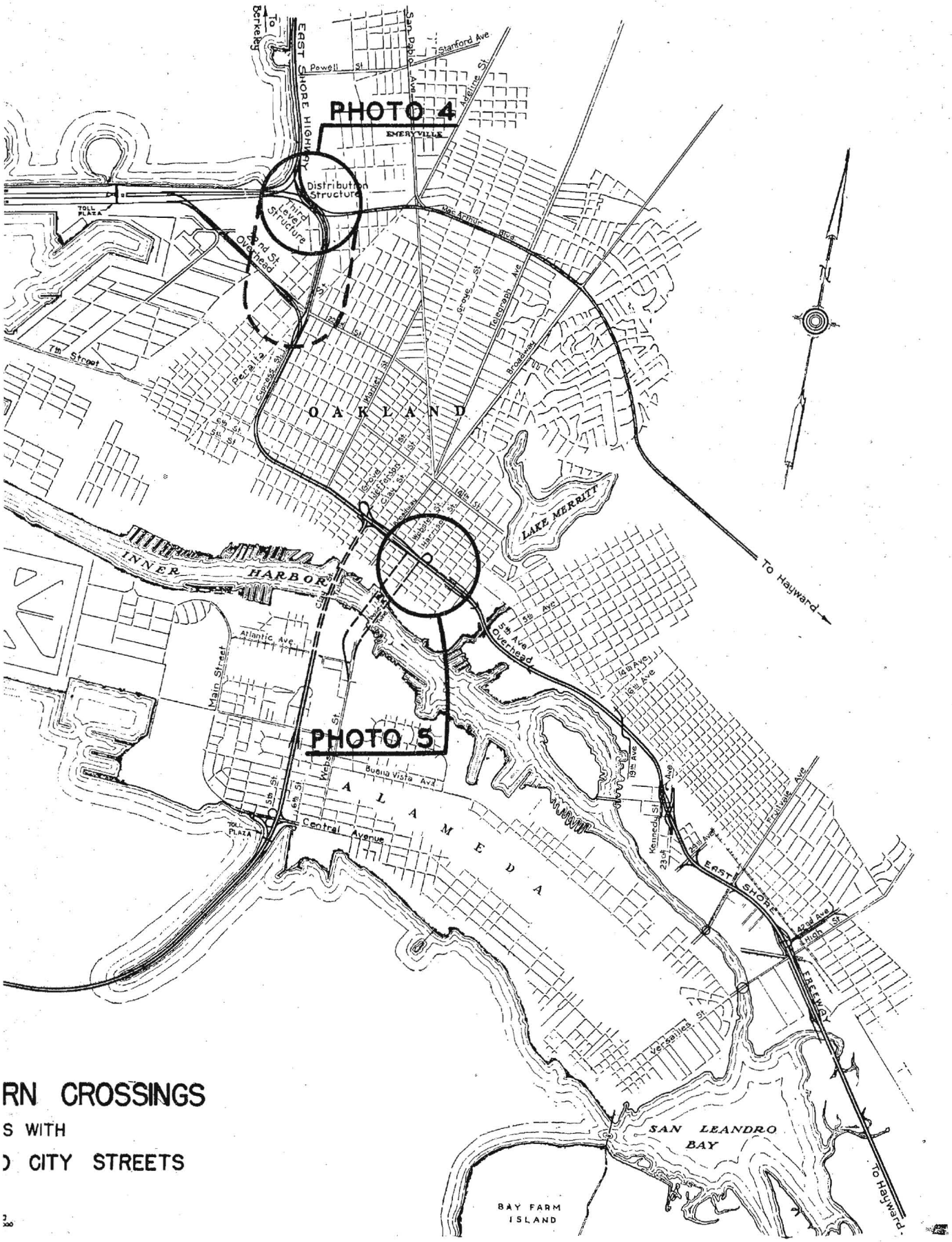
The California Toll Bridge Authority directed the Department of Public Works to report on both projects.

The Director of Public Works on December 29, 1947, created a new division within his department which was designated "The Division of San Francisco Bay Toll Crossings."

Funds to finance the engineering work needed prior to the issuance of revenue bonds for construction were appropriated by the California State Legislature. The sum of $950,000 became available on September 19, 1947, and an added $500,000 on July 1, 1948.

The Division of San Francisco Bay Toll Crossings officially began its assignment in San Francisco on January 10, 1948.


TREASURE ISLAND
YERBA BUENA ISLAND
CROSSING
SAN FRANCISCO BAY
PARALLEL
SAN FRANCISCO
PHOTO 2
PHOTO 3
PHOTO 1
SOUTHERN CROSSIN
Columbus
Lombard St.
Filbert St.
Broadway St.
Van Ness Ave.
13th St.
Division St.
South Van Ness
20th St.
Army
FREEWAY
INDUSTRIAL ST.
ALEMANY BLVD.
BAYSHORE BLVD.
HUNTER POINT
PARALLEL AND SOUT
INCLUDING CONNEC
METROPOLITAN FREEWAYS



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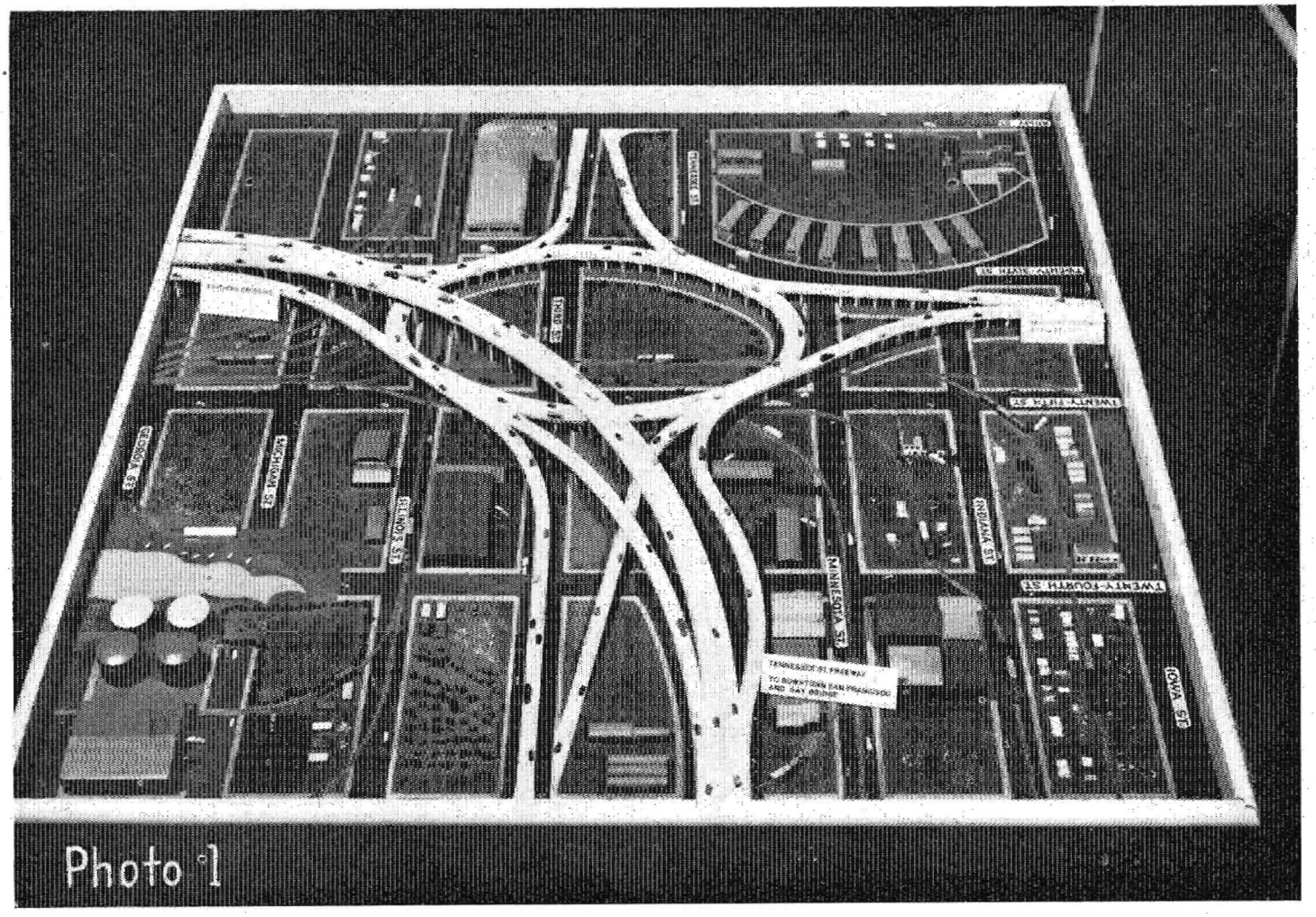


Southern Crossing model, showing Third and Army Streets rotary

streets in downtown San Francisco is concerned. The proposed system of ramps and freeway connections is planned to best suit the requirements of transbay traffic and to fit the street and local traffic pattern. At present there are two exits and two entrances for upper deck transbay traffic in San Francisco. Plans for either of the proposed crossings offer six entrances to the bridge and five exits for transbay passenger cars between the Embarcadero and South Van Ness Avenue. These are widely dispersed. In addition, the new facilities will serve Bayshore Freeway traffic destined to and from points south of San Francisco and an appreciable amount of local intracity traffic that can travel to advantage along the Bayshore Freeway and connections. The integrated connections between the existing bridge, the Bayshore Freeway and either of the new crossings will do much to relieve congestion of the streets in downtown San Francisco.

Parallel Bridge Preferred

"In the East Bay the approach layout for either new crossing, coupled with the East Shore Freeway and the streets of the several cities, is also designed to avoid congestion.

"Since a southern crossing will not effectively relieve congestion on the bay crossings, its construction will leave a large proportion of transbay traffic inconvenienced. Service for a small proportion of transbay traffic will be improved. A parallel crossing will avoid congestion for all traffic through 1970, though approximately 18 percent of the vehicles will have to travel some additional distance. There is no choice between the crossings insofar as congestion on the streets on either side of the bay is concerned.

"Insofar as service to traffic is concerned it is concluded that a parallel crossing is to be preferred."

A summary of Tudor's report, in part, follows:

Simultaneous Construction of Both Crossings

The Toll Bridge Authority by its action on November 10, 1948, adopted as a program the construction of two additional crossings and also limited consideration to the following two routes:

1. A bridge parallel and northerly of the existing San Francisco-Oakland Bay Bridge, together with its approaches and including a tube under the Oakland Estuary with connections to the East Shore Freeway and the City of Alameda.
2. A highway crossing connecting the vicinity of the Bayshore Freeway and Army Streets in San Francisco with the vicinity of Fifth Street in Alameda, and including a crossing of the Oakland Estuary to connect with the East Shore Freeway.

Other possible routes and methods for providing transbay vehicular facilities had been

considered by the joint Army-Navy Board of 1947 and the Department of Public Works, and in each instance adverse recommendations made by one or the other or both.

In the studies covered by this report, it was early realized that the present cost of building two additional crossings might exceed the credit available to the Toll Bridge Authority, since the financing of new work must be from the sale of revenue bonds. This, in turn, depends upon the earning ability of the crossings. These studies have therefore been directed to one of the following three possible solutions:

1. Simultaneous construction of both the Southern Crossing and the Parallel Bridge.
2. Construction of the Southern Crossing first with subsequent construction of the Parallel Bridge when the necessary additional credit is available.
3. Construction of the Parallel Bridge first with the Southern Crossing deferred until additional financing is possible.

After complete cost estimates had been made, the combined cost of both crossings was found to exceed the amount of money that can be borrowed. It is, therefore, not possible to build both crossings simultaneously, and it is necessary to select either the Parallel Bridge or the Southern Crossing for prior construction.

Revenues

The estimated annual revenue from a combination of the existing and the Parallel Bridges when the latter is first open for traffic is $9,675,000. For a combination of the existing bridge and the Southern Crossing it is $9,695,000. The difference of $20,000 favors a Southern Crossing. The estimated difference in 1970 is $28,000.

By increasing the tolls to 35 cents, the traffic will decrease about 4,110,000 vehicles per year but the revenue will increase an estimated $1,301,000.

Traffic Handling Facilities

In the East Bay, traffic handling facilities for both of the additional crossings as well as the existing bridge have been planned to take full advantage of the East Shore Freeway which is now under construction by the State of California. At the same time approaches have been laid out to make the best possible connection with existing streets and to fit into improvements planned for the future.

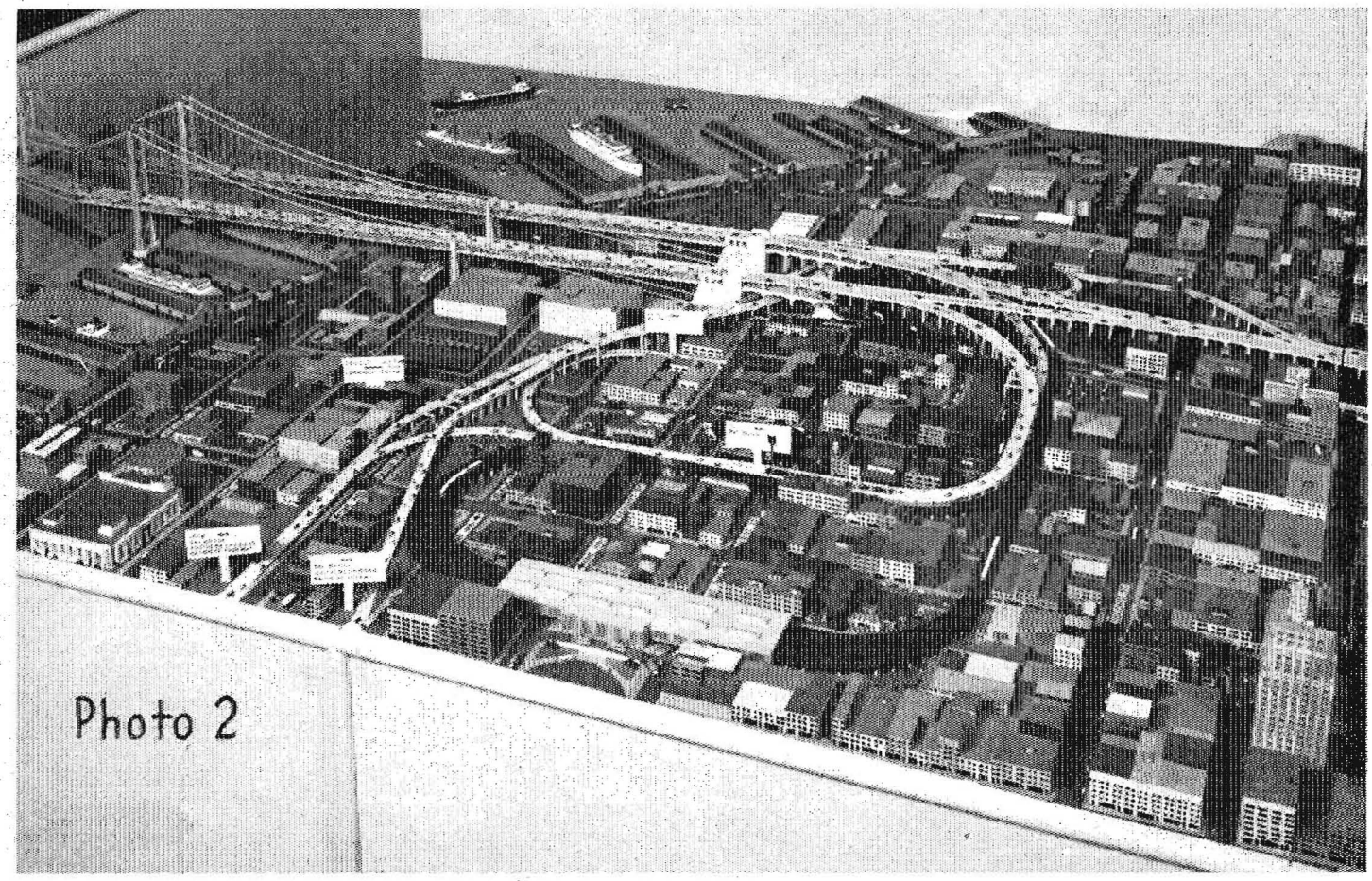
For the combination of a Parallel Crossing with the existing bridge, a new 22d Street Approach into Oakland will be built. It will connect with the East Shore Freeway as well as with local streets in the vicinity of 22d and Peralta Streets, and will also serve the Oakland Port of Embarkation. As a part of the Parallel Crossing an additional tube under the Oakland Estuary between Oakland and Alameda will be built and operated as a twin to the Posey Tube.

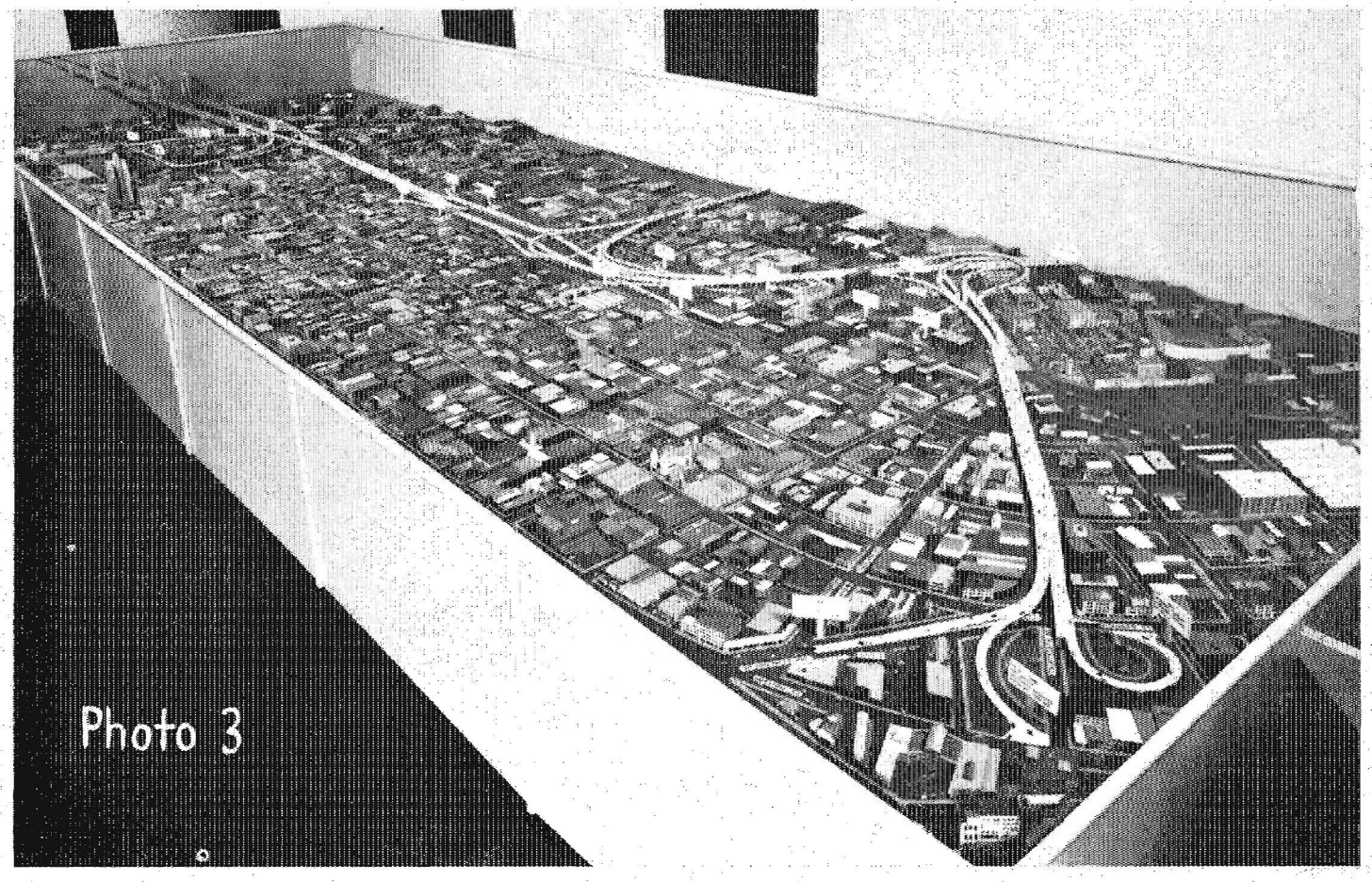
Southern Crossing

For the Southern Crossing, connections are made with the street system in Alamda, and with the East Shore Freeway and the Street system in Oakland. New twin tubes under the Oakland Estuary in the vicinity of Clay Street, which are to be a part of this crossing, will be of substantial benefit to local traffic between Oakland and Alameda, and will serve to relieve the Posey Tube.

In the West Bay the State of California is now building the Bayshore Freeway, which will join the elevated approach to the existing San Francisco-Oakland Bay Bridge at Fourth Street. Approaches for the combination of the existing and a Parallel Bridge are designed to take full advantage of Bayshore Freeway facilities. In addition to the single bridge connection now available at Fifth Street, there will be new ramps at Eighth Street, at 13th Street, at South Van Ness Avenue, and at all of the ramps of the Bayshore Freeway to the south. In downtown San Francisco east of Second Street, where there is now but one exit and one entrance for upper deck traffic,

Downtown San Francisco approaches for a second Bay crossing. For Parallel Bridge Plan model is correct as shown. For Southern Crossing Plan approaches will be modified in minor particulars





San Francisco approaches for a second Bay crossing. For Parallel Bridge Plan, 6½ Street connection to Southern Crossing (in center of picture) will be omitted. For Southern Crossing Plan, parallel bridge will be omitted

there will be three entrances and two exits at locations better suited to the local street and traffic pattern.

The Southern Crossing has also been provided with a necessary system of approaches in the West Bay. Connections are made to the street system near the bridgehead at Third and Army Streets. A freeway is provided to the west to join the Bayshore Freeway and principally serve traffic to the south of Army Street. Another freeway is provided to the north along Tennessee Street to serve the large volume of Southern Crossing traffic that will have origin or destination in downtown and the northwest parts of San Francisco. This freeway connects with the Bayshore Freeway in the block bounded by Sixth, Seventh, Bryant and Harrison Streets and thus makes available for the Southern Crossing the same ramps and street connections as were described for the Parallel Crossing.

These systems of ramps and freeways for either crossing are essential to properly serve transbay traffic and to avoid serious interference with local traffic on both sides of the Bay.

The combination of the existing and Parallel bridges makes possible one-way operation of each structure. Five wide lanes for passenger cars and two for trucks and busses will be provided in each direction. If a Southern Crossing is built, operation of the existing bridge must continue as at present. Passenger cars have three relatively narrow lanes in each direction without positive separation of opposing traffic, and trucks and busses use three lanes to carry vehicles both east and west. On the Southern Crossing, automobiles, trucks and busses will be mixed in the same lanes.

Insofar as traffic handling facilities at the ends of the two proposed crossings are concerned, both crossings have been equally well provided for. For the crossings proper, the Parallel Bridge plan offers conditions more conducive to safe and efficient operation.

The main bay crossing for a Parallel Bridge offers no problems that were not met and solved when the first bridge was built. The West Bay piers will have an average depth slightly greater than that of the original bridge, but as a whole, conditions will be quite similar.

Because of the unusual character of the Southern Crossing, much more time has been spent in developing plans. The particular difficulty has been to design large artificial islands which will serve as the termini of the subaqueous vehicular tubes under the main channel. These islands will, in themselves, produce heavy vertical loads on the bay bottom mud and, unless adequate precautions are taken, there will be extensive and long-time settlements. Studies have developed assured means for solving this problem. Other types of construction for this transition between the trestle approaches and the subaqueous tubes were extensively investigated but found less satisfactory.

Tubes for the main channel crossing and also the crossings under the Oakland Estuary are to be built by the pre-cast section method. No unusually difficult problems are anticipated except for the large quantities of material that must be handled. Dredged excavation and fill will approximate 21,400,000 cubic yards. In addition 101 concrete tube sections each 200 feet long and weighing in excess of 5,000 tons must be cast, floated into position and sunk to accurate location on the bay bottom. Other elements of construction are relatively simple.

It is concluded that the construction of either crossing is entirely feasible.

Cost Estimates

The total estimated cost of construction of the Parallel Bridge is as follows:

Main crossing	$104,255,000
San Francisco approaches including right of way	15,913,000

East Bay approaches including right of way	18,786,000
Engineering, administration, legal insurance and contingencies	16,060,000
Total cost	$155,014,000

The total estimated cost of construction of the Southern Crossing is as follows:

Main crossing	$88,351,000
San Francisco approaches including right of way	34,078,000
East Bay approaches including right of way	30,552,000
Engineering, administration, legal, insurance and contingencies	25,440,000
Total cost	$178,421,000

Thus the Southern Crossing, with approaches, is estimated to cost $23,407,000 more than the Parallel Bridge. Insofar as cost is concerned, therefore, a Parallel Crossing is to be preferred. While this is important, it should not serve to eliminate the Southern Crossing if traffic were comparably served and other considerations equal.

The estimated annual cost of maintenance and operation for the first year after any new crossings can be completed is $1,772,500 for the existing and Parallel bridges and $2,214,100 for the existing bridge and Southern Crossing.

Financing

It is assumed that financing of either of the additional crossings will be by the revenue bond method, with the earnings of the existing bridge and the new facility combined to secure the loan. No grants, interest-free loans from other sources, or other assistance has been assumed.

Based upon present financial market conditions and the sound earning record of the existing bridge, it is estimated that not to exceed $171,700,000 can be borrowed with tolls remaining at the present level. If tolls are raised to 35 cents, the upper limit of credit is estimated to be $194,800,000.

It will be necessary to include certain other items over and above actual construction costs to complete the financing of either crossing. The remaining debt on the original bridge is being paid off from current earnings but a decreasing balance will remain until early in 1952. On March 1, 1950, it will be approximately $20,505,000. Another obligation is the $6,288,550 which was loaned by the State for the approaches to the Existing Bridge. This must be repaid when a new crossing is financed.

Plans can be completed and construction on a Parallel Bridge started by March, 1950, unless unforeseen delays arise. In that event it will be necessary to borrow approximately $182,000,000. The new crossing will then be open for traffic about March, 1954. To meet this schedule it may be necessary to increase tolls to 35 cents.

If 25-cent tolls are to be retained, construction of a Parallel Bridge probably will have to be deferred until about March, 1951, and opening to traffic until March, 1955.

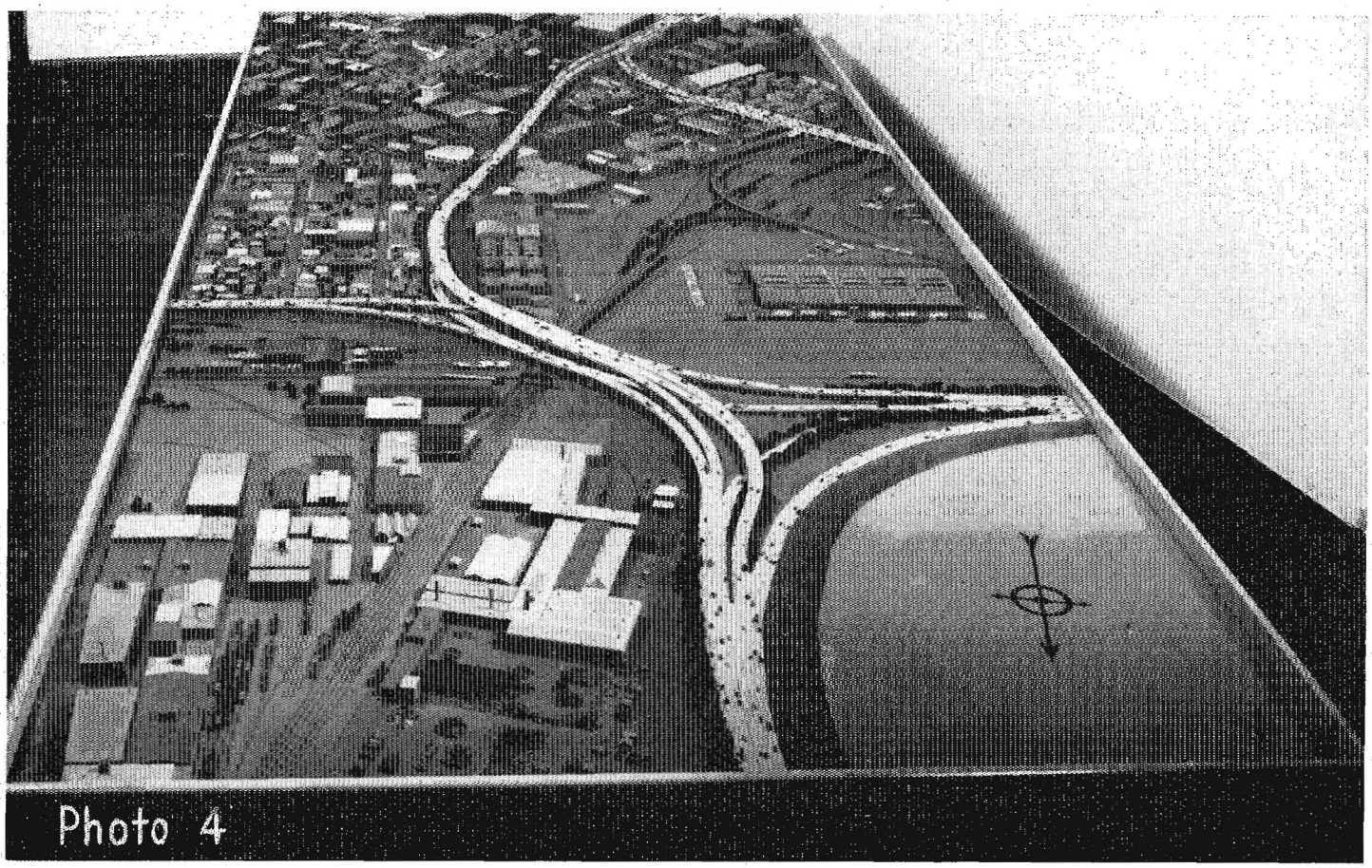
It does not appear possible to retain tolls at 25 cents if the Southern Crossing is built. The debt on the existing bridge must be further reduced before financing can be accomplished even with an increased toll. It is estimated that construction cannot start before March, 1951, which places the opening to traffic about September, 1956.

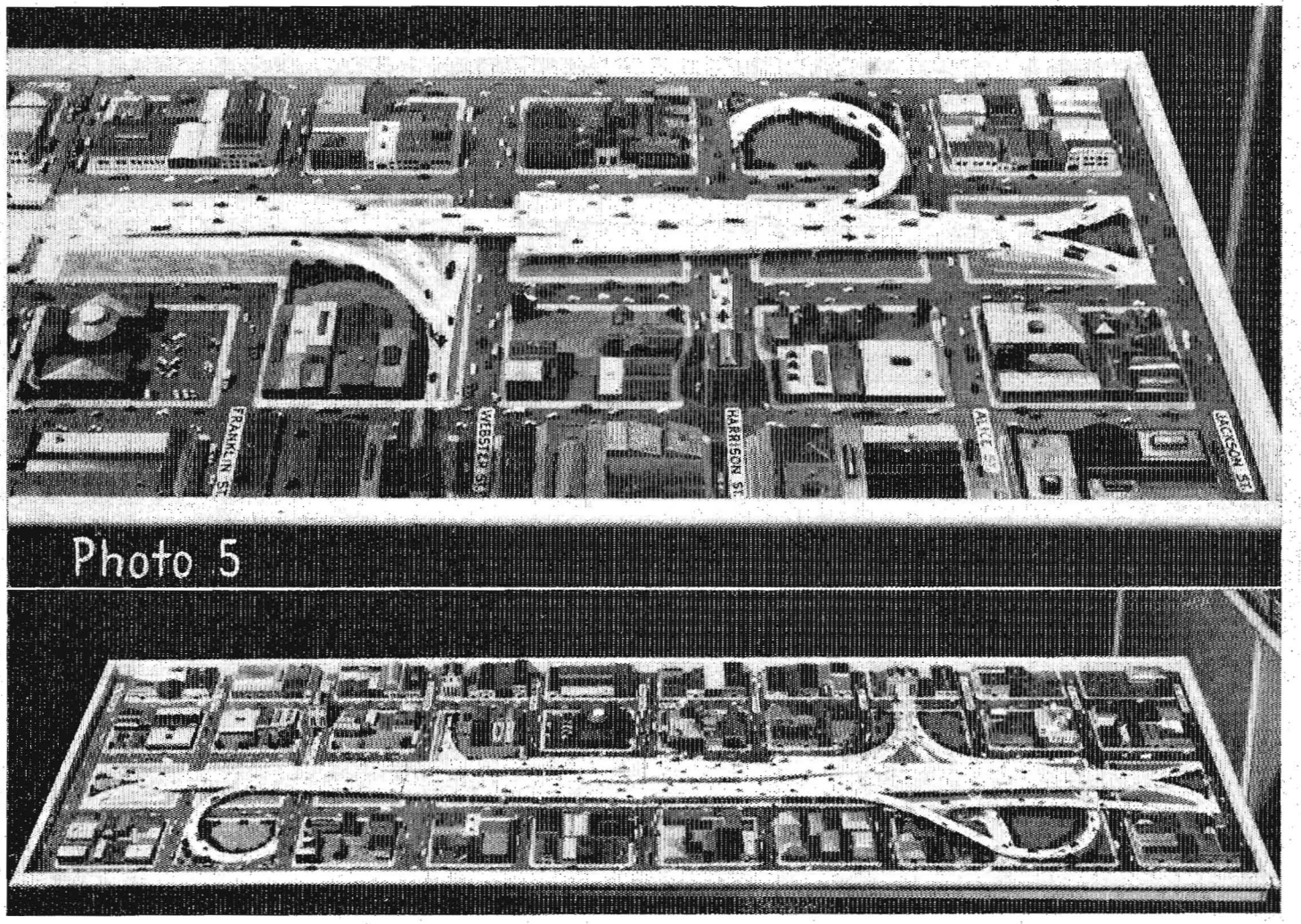
It is concluded that the Parallel Crossing can be financed with less difficulty than would be the case for the Southern Crossing.

Insurance

It does not appear that it will be possible to obtain insurance protection to the full amount that might be desired on the combination of either new crossing with the existing bridge. There is not sufficient insurance capacity in the world to provide much additional earthquake protection in this general area. Brokers estimate that, if a Parallel Bridge is built, the total coverage in addition to that now provided for the existing bridge will be about 10 percent. In the case of the Southern

Model of East Bay connections to Bay Bridge and Parallel Bridge. Photo taken looking south shows new third level of distribution structure, new Oakland Port of Embarkation connection to Cypress Street at 22d Street and new Cypress Street overpass





Upper—Model of Posey Tube on Harrison Street and new Webster Street Tube with connections to East Shore Freeway in Oakland. Part of Parallel Bridge project. Lower—Model of Posey Street Tube and twin tubes at Clay Street in Oakland, with connections to East Shore Freeway. Part of Southern Crossing project

Crossing this percentage is estimated to be between 15 percent and 20 percent.

By paying an increased premium estimated to be 100 percent, the insurance on the individual parts of the existing bridge and either additional crossing can be made equal to and perhaps a little greater than that now provided on the parts of the Bay Bridge.

It will be necessary to obtain approval of plans for navigation clearances from the Chief of Engineers and the Secretary of the Army for any crossing of the Bay proper or the Oakland Estuary.

It appears that no additional state legislation is necessary to permit the construction of either crossing.

Federal legislation is recommended to obtain rights of way for a Parallel Bridge across Yerba Buena Island and is desirable for rights of way through the Oakland Army Port of Embarkation for the Parallel Bridge, and through the Alameda Intransit Depot (Army) for either crossing.

Federal legislation to repeal the present law placing restrictions on the collection of tolls on the San Francisco-Oakland Bay Bridge after it has amortized its own cost is desirable.

National Defense

From a study of reliable data and discussion with experienced military personnel, it is concluded that:

a. Bay crossings would not be primary targets in the event of war;
b. Destructive damage to a single bridge would be difficult to achieve;
c. Destructive damage to one of the three subaqueous tubes of the Southern Crossing is somewhat more likely than to a bridge, however, simultaneous destructive damage to all three tubes from existing bombs is only a remote possibility;
d. The possibility of simultaneous destruction of parallel bridges from any existing bombs, except an improbable close hit by an atomic bomb, does not exist;
e. There is no possibility of simultaneous destruction from a single bomb of any kind now known to the existing San Francisco-Oakland Bay Bridge and a Southern Crossing tube;
f. Sabotage of any single crossing is possible but not likely if adequate and proper precautions are taken.

Insofar as service to military installations in the Bay Area is concerned, the only appreciable advantage lies to the Navy in that a Southern Crossing would afford direct connection between the Alameda Naval Air Station and the San Francisco Naval Shipyard at Hunter Point.

From the foregoing it is concluded that the Southern Crossing is preferable from a national defense standpoint but that the margin is small. The hazard of simultaneous destruction or serious damage to parallel bridges is so unlikely that a Parallel Bridge should not be eliminated in favor of a Southern Crossing if the latter does not serve transbay traffic within reasonably comparable limits.

Time Estimates

For the Parallel Bridge the estimated time of construction to serve traffic is four years. Barring unforeseen delays, plans can be available and construction started by March, 1950, so that the new facility can be available about March, 1954.

Plans for the Southern Crossing can be completed by about July, 1950, but construction cannot be commenced before March, 1951, because financing before that date does

not appear possible. The construction period prior to opening to traffic is estimated to be five and one-half years. This longer time results because the settlement of the artificial islands must be largely complete before the tube sections are placed. Opening of this crossing for traffic will be possible by about September, 1956. This is two and one-half years later than the estimated completion date for the Parallel Bridge.

From the viewpoint of earliest possible relief of congestion on the San Francisco-Oakland Bay Bridge and improvement of approaches on both sides of the bay—particularly downtown San Francisco—the Parallel Bridge is to be preferred.

Recapitulation

A recapitulation of the factors contributing to the recommendations is shown in the following Table 15.

TABLE 15
RECAPITULATION
Factors Contributing to Recommendation

	If Parallel Bridge is built first	*If Southern Crossing is built first*
1. Estimated date when congestion will be effectively relieved on San Francisco-Oakland Bay Bridge	March, 1954	Never
2. Estimated date when San Francisco-Oakland Bay Bridge and new crossing will both be inconveniently congested	Not before 1970	1965
3. Proportion of transbay traffic best served by each crossing	82%	18%
4. New traffic induced because of improved service (in percentage of total transbay traffic)	None	1%
5. Will produce additional general congestion on city streets on either side of Bay	No	No
6. Two-way traffic on existing bridge will be discontinued	Yes	No
7. Passenger autos, trucks and busses will be mixed in same traffic lanes on new crossing	No	Yes
8. Will produce most revenue and estimated amount per year	----------	$20,000
9. Total estimated construction cost including approaches, right of way, and engineering	$155,014,000	$178,421,000
10. Estimated annual cost of maintenance and operation	$1,772,500	$2,214,100
11. Estimated earliest date for financing	March, 1950	March, 1951
12. Time of construction to serve traffic	4 years	5½ years
13. Earliest date to open for traffic	March,1954	September, 1956
14. Minimum toll required to finance	25¢	35¢
15. Amount of insurance that can be obtained on existing bridge plus new crossing, over and above present insurance	10%	15% to 20%
16. State legislation required	No	No
17. Federal legislation	Desirable	Desirable
18. Department of Army permit for navigation clearances required	Yes	Yes
19. National defense	----------	Preferable
Recommended order of construction	1	2

Deep excavation work in progress on new freeway near Soquel, looking toward Santa Cruz *(see Page 10)*

In Santa Cruz

New Multiple Lane Highway Is Rapidly Nearing Completion

By E. J. CARTER, Assistant Highway Engineer

COMPLETION of work on the Rob Roy Junction to Morrissey Avenue in the City of Santa Cruz will add another section to the system of modern highways in Santa Cruz County.

The county road which is replaced by the new four-lane divided freeway was taken into the network of state highway routes in 1933.

As the county continued to grow and to develop its great farming, vacation and recreation areas, the existing road became more and more overtaxed. The roadway had been widened by means of paved border strips prior to 1933 but this provided little relief as the traffic continued to increase and, in 1936, the Division of Highways began studies to determine the best means of providing adequate facilities over this route.

As the first step in a progressive planned development a new route was established from Watsonville to Rob Roy Junction. This first project was a three-lane highway with transitions to four-lane sections, where required, to provide passing safety consistent with the higher design speed adopted for this route. This work was completed in 1942.

The present contracts will extend the highway to Morrissey Avenue in Santa Cruz, and at a future date it is planned to extend the route to a junction with State Sign Route 5, north of Santa Cruz.

The general design of the roadway now under construction is four-lane divided with a 36-foot median strip. The traveled way consists of an 11-foot outer lane and a 12-foot inner lane in each direction. Eight-foot bituminous outer shoulders are provided throughout. Two-foot inner borders of bituminous surface treatment are provided except where central curbing is required.

The pavement is three inches of plant-mixed surfacing on six inches of crusher run base placed over a varying thickness of imported borrow. The imported borrow has a minimum thickness of six inches, varying as the quality of the basement soils indicate.

This route has been designated as a limited freeway and has grade crossings or centerline crossovers at about one-quarter mile intervals. These grade crossings and centerline crossings incorporate the latest designs for maximum safety.

In addition to the grade crossings it was necessary to provide four grade separations at the more heavily traveled intersections and at two railroad crossings. Reinforced concrete bridges at Aptos and Soquel Creeks, and reinforced concrete culverts at the two Valencia Creek crossings, complete the list of major structures on this project.

The structures are various in design to best fit the traffic and structural requirements for each location.

The South Aptos Railroad Underpass is a structural steel beam bridge, supported on treated timber piles; the Aptos Creek Bridge is a reinforced concrete girder bridge, supported on spread footing; North Aptos Railroad Underpass is a structural steel through girder bridge, supported on spread footings; Capitola Avenue Overcrossing is a reinforced concrete girder bridge on spread footings; Bay Avenue Undercrossing is a three-span continuous slab bridge supported on steel pile foundations; Soquel Creek Bridge, the largest structure, is a reinforced concrete bridge, 323 feet long, with a central reinforced concrete arch span 120 feet long; Soquel Road Overcrossing is a steel beam bridge supported on spread footings; and the La Fonda Avenue Overcrossing is a reinforced concrete slab bridge on spread footings. Valencia Creek was carried under the roadway in a 180-foot radius box culvert and again in a 700-foot radius arch culvert.

The estimated cost of major structures on this project is $977,000, or about two and one-half times the cost of the original Santa Cruz to Watsonville highway constructed in 1920 and 1921.

Construction difficulties were added to by the necessity of temporarily relocating approximately two thousand feet of railroad, and by the construction of a temporary timber trestle to carry the railroad over a portion of the underpass abutment at South Aptos Creek. In addition there were many buildings and underground and overhead utilities that had to be relocated.

The deepest cut on the job is located immediately east of Aptos, where the maximum cut of 84 feet is reached. Considerable interest was created when a log uncovered in the bottom of this cut was found to be in such state of preservation that it would readily burn.

Although no traffic is carried through the project, it has required a considerable amount of work to provide traffic crossings and detours at various locations throughout the construction area.

Work Items

Some of the major items of work on this project are:

	Heple Contract	Ball Contract
Roadway excavation (cu. yds.)	395,000	805,600
Imported borrow (tons)		171,000
Crusher run base (tons)		106,700
Plant-mixed surfacing (tons)		46,600
Class "A" concrete (cu. yds.)	10,692	353
Reinforcing steel (lbs.)	1,845,000	24,500

The estimated cost of the present work is $2,764,000. This, combined with the cost of the Watsonville to Rob Roy portion completed in 1942, brings the total cost, exclusive of right-of-way and engineering, of this modern improvement to approximately $3,560,000 or about $236,230 per mile for 15.07 miles.

The project is divided into three contracts: one let to Earl W. Heple in September, 1947, for the major struc-

tures and limited grading; one for grading and surfacing, let to N. M. Ball and Sons in April, 1948; and one for illuminating the important intersecting roads, let to Granite Construction Co. in September, 1948. It is expected that the work will be completed and the road opened during the summer of 1949.

The latest 16-hour traffic counts, taken on July 11 and July 12, 1948, show a Sunday traffic of 15,384 vehicles and a Monday traffic of 13,290 vehicles. These counts expand to an estimated total vehicles per day of 17,300 for Sunday and 14,900 for Monday. It is anticipated that the traffic for a similar count in 1965 would be 22,000 vehicles per day for Sunday and 19,000 vehicles per day for Monday.

The completed route from Watsonville to Santa Cruz will be approximately two and six-tenths miles shorter than the original and the total curvature will be reduced by 1533 degrees. The reduction in curvature is equivalent to the elimination of 17 ninety-degree turns. The minimum radius has been increased from 275 feet to 2,000 feet. These improvements should result in an average saving of from 15 to 18 minutes in travel time between Watsonville and Santa Cruz.

The work is being done under the general direction of Jno. H. Skeggs, Assistant State Highway Engineer. A. Walsh is the Resident Engineer for all work being performed under the three contracts.

SANTA CRUZ COUNTY

Created February 18, 1850. This is one of the original 27 counties of the State of California. "Santa" is the Spanish feminine of "Saint" or "holy"; "Cruz" is the Spanish for "cross," and "Santa Cruz" signifies "holy cross," which emblem was to the devout explorers of California what it was to the Crusaders. Those who fell by the wayside had a rude cross erected over them to mark their last resting place; if anything notable occurred in any of the expeditions, a cross was set up, and all that marked the site of the mission which was founded by Padres Lopez and Salazar on September 25, 1791, was the memorial cross erected to mark this site. From this the county derived its name.

EARLY HISTORY OF SANTA CRUZ ROADS

Good roads did not come easily nor quickly to Santa Cruz County during its early years. In 1892 E. S. Harrison wrote in his "History of Santa Cruz County" "* * * at this time it seemed as if we were thrown back to colonial times, especially in the manner and mode of locomotion. Travel at this period was entirely 'a cabello,' on horseback."

Traveling Time—Two Days

The Mission of Santa Cruz was founded in 1791 and secularized in 1834. The horse and saddle remained the only means of travel until, in 1854, a stage coach line was established between Santa Cruz and San Jose via San Juan. Traveling time from Santa Cruz to San Francisco was two days, with a stop overnight at San Jose and a boat trip from Alviso to San Francisco on the second day.

Shortly after, another stage coach route was established via Soquel and over the mountains to Watsonville, to connect with a route over the Pajaro Turnpike mountain road from Watsonville to San Jose.

Over these routes stage coaches were pushed by the rough and ready stage coach drivers who were always an inevitable and colorful part of the development of new areas in the west.

One of the more famous drivers was not to reach full legendary status until after his death. This driver, reportedly a loud swearing, bottle nipping personage, known far and wide as "Cockeyed Charley," was a veteran of Nevada and Santa Cruz County Stage Coach lines and later retired to a small farm in the Santa Cruz mountains. After "Cockeye" passed beyond, it was discovered that he was an imposter, for "Cockeyed Charley" was a woman. This became a nationwide sensation and many stories were written to explain and to establish the identity of this now mysterious person. All such attempts were to no avail, however, for the true story was so well hidden that the final registry reads simply as follows: "Charley Darkey Parkhurst, nativity New Hampshire, occupation Farmer, age 55, date of registration 1867."

Writing of these early stage lines, Edward Martin says, "The roads were horrible mud in the winter and suffocating dust in the summer; in winter the passengers were obliged to leave the stage and assist in extracting the mud wagon from being mired down."

The Early Road System

The early road system was administered by elected road masters. In theory these roadmasters were to be under the direction of the supervisors, but being elected officials they came to feel that they were the bosses of the system and dissension and chaos rather than good roads resulted.

In 1883 the office of roadmaster was abolished and the care of the roads was entrusted to the supervisors. This event marked the first real step forward in the development of an adequate road system in Santa Cruz County.

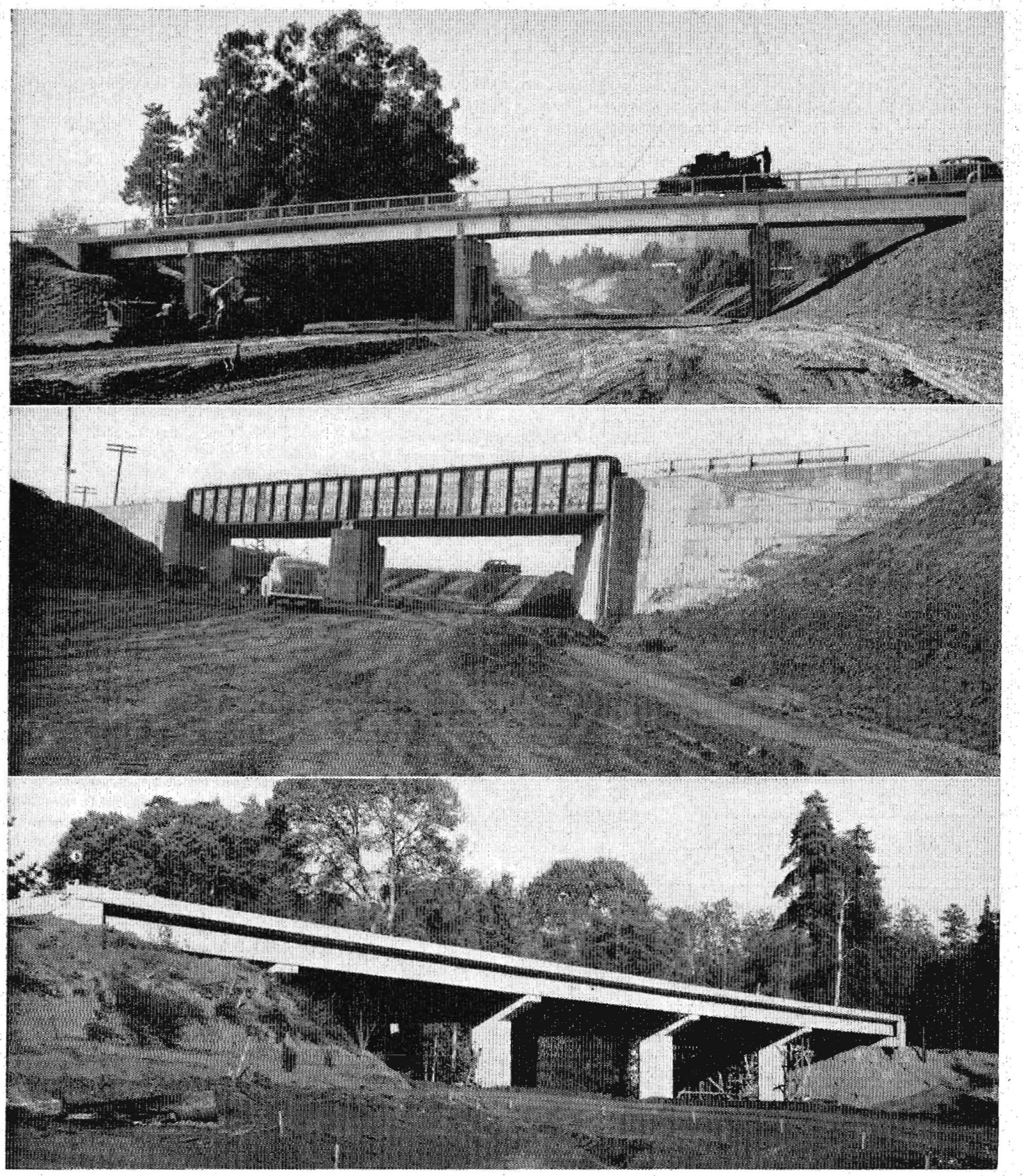
It is interesting to note, in passing, a ruling in 1851 by the Court of Sessions. This edict directed that all able bodied men between the ages of 18 and 45 should work on the roads for four days each year. Thus was labor shortage overcome in 1851.

The county road system gradually improved under the direction of the Supervisors until contracts were let in 1920 and 1921 for a 15- to 18-foot width of 5 inches Portland Cement Concrete pavement from Santa Cruz to Watsonville. This was the transition from the narrow, rutted wagon trail following the path of least resistance, fording streams or spanning them with rude log bridges to the beginning of the fast modern highway cutting as directly as possible toward its objective, bearing always in mind today and tomorrow's requirements of speed, convenience and ease of travel.

Original cost data covering expenditures on the original highway was obtained from the office of County Surveyor Arnold Baldwin, Santa Cruz County, as follows:

Santa Cruz to Soquel (approx.)	$49,000
Soquel to Pleasant Valley (approx.)	198,000
Pleasant Valley to Watsonville (approx.)	145,000

These records show a total cost of $392,000, or an average of $24,732 per mile. —E. J. C.



UPPER—Soquel Road Overcrossing, looking west. LaFonda Avenue Overcrossing in background. CENTER—North Aptos Underpass, under tracks of the Santa Cruz-Watsonville branch of the Southern Pacific Railroad. LOWER—Aptos Creek Bridge and Spreckels Drive Undercrossing

PROGRESS

Improvement on U. S. 101 Amounts to $59,572,500

By J. D. GALLAGHER, Assistant Office Engineer

Recent improvements on U. S. 101 in California, known as the Redwood Highway north of San Francisco to the Oregon line and as the Coast Route south of San Francisco to the Mexican border extend over the entire route.

In a report to Governor Earl Warren, Director of Public Works C. H. Purcell said that the value of recently completed and going contracts on 254.6 miles of construction on U. S. 101 amounts to $59,572,500. This work involves 184 projects. About 58 percent of the mileage and 54 percent of the value of the work has been completed.

"Speeding up of the development of U. S. 101," Purcell said, "has been made possible in large measure by the Collier-Burns Highway Act of 1947, which was sponsored by Governor Warren."

U. S. 101, North

DEVELOPMENT of U. S. 101 along the Redwood Highway continues to be steadily prosecuted. The most outstanding project now in use is between one mile south of Petaluma and Ignacio Wye built at a cost of $1,900,000 for 11.9 miles of divided pavement.

Four other noteworthy projects in the process of construction in Sonoma, Humboldt and Mendocino Counties are: through Santa Rosa; between Red Mountain Creek and Piercy; 1.5 miles south to 3.5 miles north of Forsythe Creek and North Scotia Bridge to 16th Street in Fortuna. Grading and surfacing these four latter projects will result in improved alignment and roadbed of 16.9 miles of highway costing in excess of $4,273,000.

The new divided highway through Santa Rosa is essentially a bypass in that its location is in the westerly part of the city remote from the business area. Since the inception of the State Highway System, U. S. 101 has been

... Continued on page 14

U. S. 99 from Bakersfield to Los Angeles has benefited greatly as a result of increased gasoline tax funds made available by the Collier-Burns Highway Act sponsored by Governor Earl Warren in the 1947 Legislature.

Director of Public Works C. H. Purcell enumerated improvement projects completed, under way, and planned on this route, particularly on the Ridge Route section of this major arterial, in a report to Governor Warren.

A previous report prepared by the Division of Highways under the direction of State Highway Engineer George T. McCoy dealt with recent and current improvements on U. S. 99 from the Oregon line to the northerly boundary of Los Angeles County. This report concerns work on the southerly portion of the route in California.

U. S. 99, South

AFTER passing through the Tehachapi Mountains the route of U. S. 99 traverses the San Fernando Valley to its southerly end. Southeast of Glendale U. S. 99 enters the Arroyo Seco Parkway, following that freeway to Figueroa Street and Sunset Boulevard. It then turns easterly along Ramona Boulevard, Holt Avenue and Valley Boulevard through the cities of Pomona, Ontario, Colton and Redlands. Here the route turns southeasterly through San Gorgonio Pass and the Coachella Valley following along the westerly side of the Salton Sea to the Imperial Valley cities of Brawley and El Centro terminating at the Mexican border in Calexico.

Beginning at the Kern County line and continuing toward Los Angeles, U. S. 99 traverses the southerly slopes of the Tehachapi Mountains, intercepting several rugged canyons along the way. Over the 30-mile section, many grades are encountered. The

... Continued on page 28

Supplementing a report to Governor Earl Warren on recent, going and planned improvement projects on U. S. 101 from San Francisco to the northern boundary line of Ventura County, Director of Public Works C. H. Purcell submitted a summary of projects completed, under way and budgeted for the section of U. S. 101 from Ventura to the Mexican border.

The value of recently completed and going contracts on 63.4 miles of U. S. 101, U. S. 101 Alternate and U. S. 101 Bypass in Southern California, Purcell reported, amounts to $25,955,000. About 30 percent of this work has been completed and the remainder is rapidly being opened to traffic.

Heavy investments of highway funds are being made in Los Angeles to construct freeways.

U. S. 101, South

EXTENSIVE improvement is now under contract between Mussel Shoals and Seacliff northwesterly of Ventura. The highway at this location is bordered on one side by the Southern Pacific Railroad and sheer bluffs while the other is restricted by the ocean. The limitations imposed by the railroad have made heavy fill construction along the beach area necessary to provide sufficient width for the divided four lanes. Protection against the severe surf is being provided by heavy riprap varying in size up to several tons. Construction costs for the 1.2 miles involved will amount to $1,149,000.

A project was recently completed between Montalvo and Ventura for developing 3.4 miles of the former two lane road into a four lane divided highway conforming to freeway standards. Traffic congestion at the east approach to Ventura, occasioned by several converging streets has been materially alleviated as a result of intersection chan-

... Continued on page 14

U. S. 101, North

Continued from page 13 . . .

directed to the central district over the original city streets which were obstructed by the court house plaza. Continual growth of the city and bordering areas has taxed the street capacities to the extent that through highway traffic has been seriously handicapped. On completion of the new route, which is located in a direct line from north to south of the city, the existing congestion will be materially relieved.

In all, 83.3 miles of improvement along the Redwood Highway have been recently completed or are under contract, the value of which is $8,263,000. Seven projects, extending over 26.4 miles of this section have been included in the budget for the 1949-50 Fiscal Year.

Bayshore Highway

South of San Francisco, U. S. 101, locally known as El Camino Real or Coast Highway, for many years was the primary connection between San Francisco and the peninsular cities of Burlingame, San Mateo, Redwood City and Palo Alto, bordering the central districts of these communities over city streets. As traffic demands increased, this highway was improved to the maximum permitted by the adjacent highly developed property. Failing to satisfy the need for more rapid communication with San Francisco a new location was selected outside of the congested areas, practically bypassing the cities along their easterly boundaries.

This location known as the Bayshore Highway and U. S. 101 Bypass was begun in the middle twenties with construction being confined to sections of immediate importance, ultimately being completed to a connection with U. S. 101 near San Jose. Its popularity with commuters and truckers to the office, retail and warehouse districts of San Francisco grew rapidly until this high volume of traffic together with the enlargement of the San Francisco airport have made construction on new alignment and to freeway standards necessary.

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U. S. 101 in California

U. S. 101 enters the State at a point between Gold Beach, Oregon, and Crescent City, California, generally parallels the coast line to the south end of Humboldt Bay where it then turns inland, following the Eel River for the most of its length. Progressing southerly to San Francisco, U. S. 101 passes through the cities of Willits, Ukiah, Santa Rosa, Petaluma, San Rafael and Sausalito.

In San Francisco the route is divided into U. S. 101 and U. S. 101 Bypass continuing as such to south of San Jose. Following its inland course through the Santa Clara Valley cities of San Jose and Gilroy, it reaches the Salinas Valley north of Salinas. The Salinas River is roughly paralleled through Kings City, Paso Robles and Atascadero.

Crossing the mountains to the westerly side, the ocean is visible for a short distance south of San Luis Obispo. After leaving Santa Maria, the route follows through the coastal mountains eventually bordering the shore line north of Santa Barbara, which is followed to Ventura. At El Rio, it is again divided as U. S. 101 and U. S. 101 Alternate, the former turning inland along the westerly side of the San Fernando Valley to Hollywood and the central portions of Los Angeles. In East Los Angeles, the route is further divided into U. S. 101 and U. S. 101 Bypass with U. S. 101 following Whittier Boulevard easterly to Fullerton Road where it turns south, passing through Anaheim and Santa Ana to Doheny Park on the ocean. From this junction, the coast line is generally paralleled to San Diego and the Mexican border.

U. S. 101 Alternate leaves El Rio Junction in a southerly direction to Oxnard and the coast which is followed through to the westerly portion of Los Angeles and the beach cities to its junction with U. S. 101 at Doheny Park. The larger of these beach cities include Santa Monica, Long Beach, Newport Beach and Laguna Beach.

U. S. 101 Bypass turns south from U. S. 101 near the easterly city limits of Los Angeles and follows along Anaheim-Telegraph Road, Rosemead Boulevard, Firestone Boulevard and Manchester Avenue to near Anaheim, joining U. S. 101.

U. S. 101, South

Continued from page 13 . . .

nelization and the installation of illumination and traffic signals.

El Rio Junction

The El Rio junction with U. S. 101 Alternate is being modernized through channelization, signals and illumination. Smooth traffic flow through this important, heavily traveled intersection will be assisted by improved pavement width and divided lane construction. Access to adjacent property will be provided by outer highways with entrance to the traffic lanes at points outside of cross traffic movements.

Nearing the City of Los Angeles, property adjacent to the present U. S. 101 highway is highly improved. To accomplish the multiple lane development required within this section, it has been necessary to depart from the location of the old road, precluding the necessity of extensive moving of buildings and other high right of way costs. In this area, two divided highway projects, locally known as the Agoura and Calabasas line changes, are in progress.

Between El Rio Junction and Universal City an expenditure of $1,506,000 is being made on 6.7 miles of improvement divided among four projects. In addition to the going work, a project for grading and paving 4.4 miles between Calabasas and Malibu Junction is included in the 1949-50 Fiscal Year budget.

The section of U. S. 101 between Universal City and Santa Ana involves a large amount of work within central Los Angeles on the Hollywood Parkway and Santa Ana Freeway. A project is now in progress on the westerly portion of Cahuenga Boulevard extending from Vineland Avenue and Barham Boulevard. The high type design of this construction conforms to freeway standards and is consistent with the adjoining section completed in 1940 which terminates at Highland Avenue.

Parkways in Los Angeles

The Hollywood Parkway together with the Santa Ana Parkway draw a vast amount of traffic from the Santa Monica, Harbor, Arroyo Seco, Olympic and Ramona Parkways. Access to

. . . Continued on page 38

Drainage

New Method of Removing Water From Highways

By F. W. HASELWOOD, District Engineer

EFFECTIVE means of removing and disposing of water that falls on or reaches the highway roadbed from other sources has developed during the years to the status of being fairly well standardized. Variations in details are largely due to climatic or other local conditions. Increasing widths of roadbed, deeper cuts, and higher fills have had their influence on the necessity and type of devices to serve the particular function of roadbed drainage.

Old-timers in the highway service in California, who began at the beginning of state highway development back in 1912, can recall many changes in highway design and construction practices. Some of these changes grew imperceptibly over a period of years, while others were more abrupt. All developed into definite policies sponsored by the ever growing traffic and varying according to climatic, soil, or other local conditions.

Design Important

Drainage practice has received much, if rather belated, attention in the past 10 years, with the result that small drainage structures or devices, commonly designated as culverts, ditches, and gutters, are now better related to the actual service they are to render, with resulting economy. This has been brought about largely in the process of design by giving more consideration to the way water in motion actually behaves under circumstances similar to those under which the culvert or ditch is to function.

Not the least, although probably long and frequently neglected, is that subdivision of roadway drainage that deals with removal and disposal of water that falls on the roadbed or reaches it from the adjacent roadside or cut slopes between the established cross drains.

Early designs solved this roadway drainage by the simple process of ignoring it. Then came the device of sloping the plane of the road surface away from the hillside and allowing the water to spill over the outer edge of the road. As long as fills were shallow and roadbeds were narrow this practice usually worked, although cases of severe loss on roads 10 feet wide have been noted.

More Satisfactory Practice

The more satisfactory practice was the construction of a defined gutter in cut sections with relief by cross drainage at appropriate intervals. This gutter varied in dimensions and design according to local conditions and sometimes was made deep enough to intercept and remove subdrainage.

As roadbeds became wider and embankments higher, the runoff from the outer half on tangents or the full width on superelevated open curves created problems on embankments which required solution.

The writer well recalls the reception of his proposal to construct a gutter along the outer edge of embankments to remove the storm water to a safe point for release. It was one of many simultaneous proposals for the solution of this problem and there eventually developed the now well-known device designated sometimes as a berm, but more commonly as a dike.

Earth Dikes Vulnerable

These dikes, as originally built on the edges of embankments for drainage purposes only, were of earth or imported borrow and were one foot high, one foot wide on top, and four feet wide on the bottom. Earth dikes were sometimes built higher to serve as protection to traffic as well as to control drainage.

Earth dikes, as built in District II in the open range country, were frequently damaged by stock and by erosion. In many cases the earth dikes one foot high interfered with snow removal and were damaged to some extent by snow removal equipment. On one job, to solve the snow removal problem, the dike was made about two inches high and a gutter about four inches deep, with flat slopes, was cut in the shoulder adjacent to the dike with a blade. This was in easily eroded material in an area subject to very heavy summer showers. This design served its purpose well and was not affected by the trampling of stock. The fills in this area were generally shallow and, in the course of time, the surface material hardened and was covered with vegetation. At present most of these shallow gutters and dikes are hardly perceptible but they are no longer necessary.

Dike Heighth Lowered

The next step in the development of the earth drainage dike was to lower its height to about eight inches and to continue the shoulder plant-mix over the face of the roadside slope and the top of the dike. This greatly increased the durability and improved the functioning and appearance of the dike.

Simultaneously with this bituminous facing, the all-bituminous mixed dike appeared. This dike was constructed in various shapes from semicircular to trapezoidal, with side slopes ranging from one to one to one and one-half to one. The all-bituminous dike had a narrower base and required a lesser width of fill or a lesser encroachment on the shoulder width.

The solution of the problem of compacting these dikes was wished onto the contractor, who tried hand-tamping and various mechanical methods with indifferent success. Poorly compacted bituminous dikes were adversely affected by the weather and even by the trampling of stock.

Mechanical Devices

Recently contractors have used mechanical devices for distributing and for finishing and compacting these

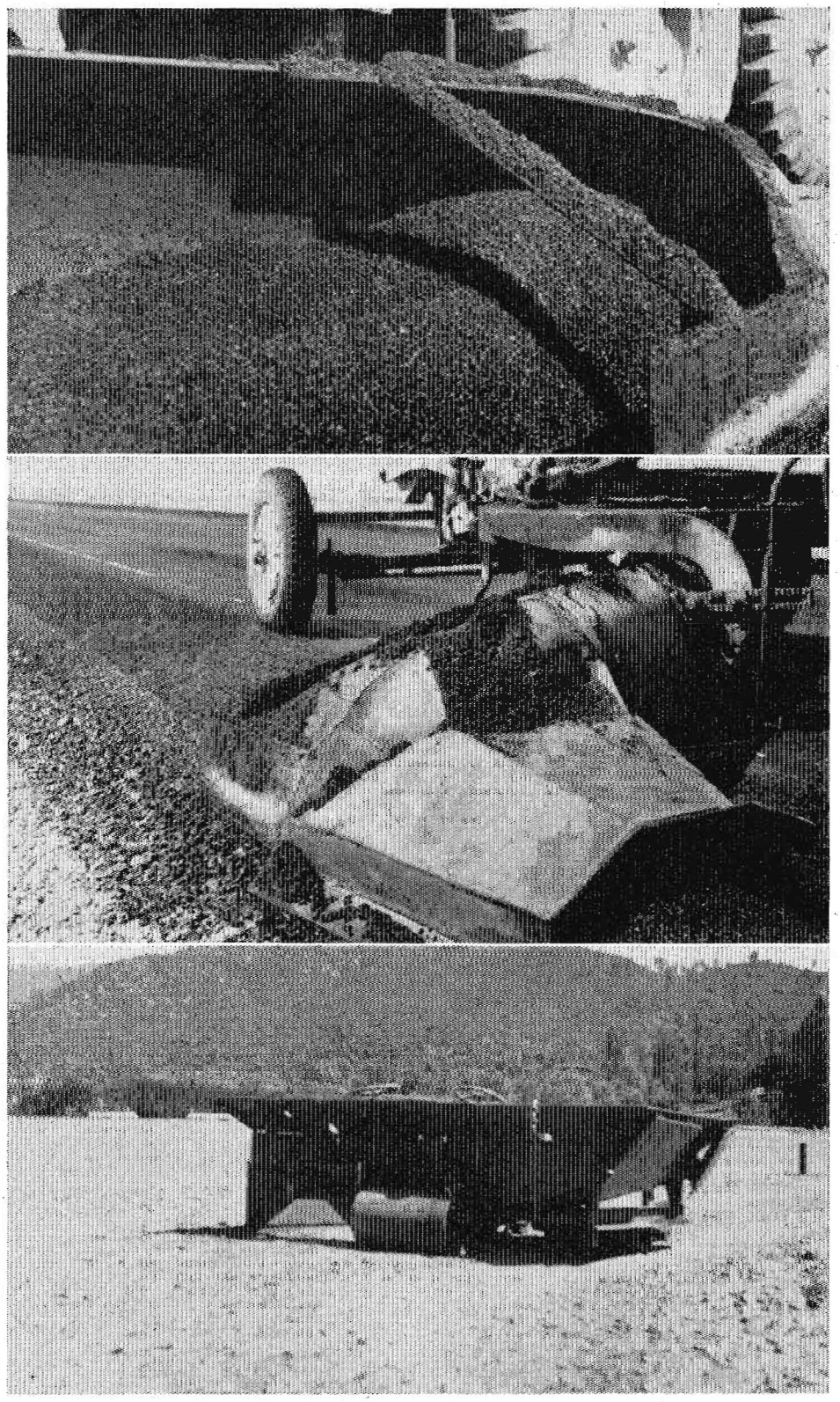
plant-mixed dikes. As used in District II by several contractors, these devices consist first of a windrow sizer and shaper, which is propelled by the truck that dumps the hot mix into it. This device leaves behind it a smooth, straight and shaped windrow which needs compacting only to provide a finished dike. The compacting device is a tapered, double-walled shell, the front end of which is as large as the sized windrow and the rear end of which is the size of the finished dike. This is fastened to a grader blade and is propelled along the dike by the grader. The weight and the taper provides a high degree of compaction. Attached to the tapered shell is a burner which heats the space between the walls of the shell. Sufficient heat is maintained to provide a hard glaze on all exposed faces of the dike. The result is a well-compacted dike with a hard outer shell that is not easily marred when heavy vehicle wheels crowd against it.

First Use of Device

The first use of the finishing and compacting device was without the windrow sizer and shaper. Plant-mixed material was dumped in the general position of the dike and fed to the compacting device by the blade of the power grader. The quality of the alignment of these dikes depends on the skill of the driver of the grader in following accurately the guide line or marks set for him.

Accompanying photographs show the windrow sizer and finishing and compacting device attached to the grader blade. The device is similar in some respects to the attachment for a finishing machine, as illustrated on page 20 of *California Highways and Public Works* for March and April, 1948.

In determining the relative economy or desirability of the bituminous faced earth dike eight inches high and the all-mixed dike four-tenths of a foot high, we find that, after allowing the fill to extend a foot beyond the plant-mixed dike for protection against weathering, the embankment quantities for the two types are identical. The bituminous faced earth dike requires 4.7 cubic yards of compacted

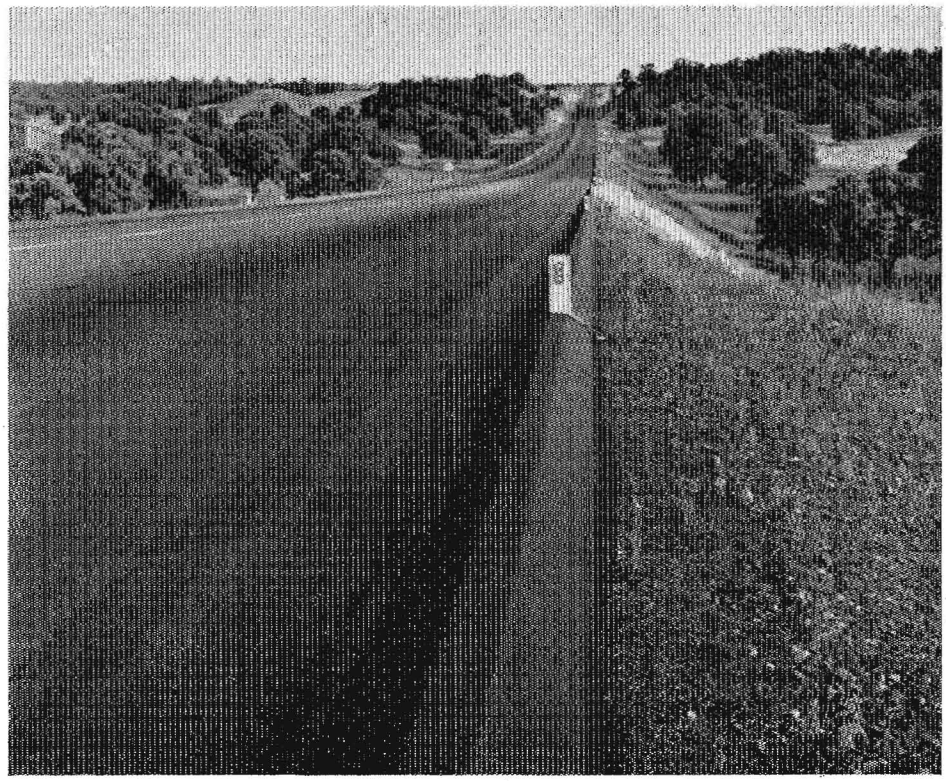


Upper—Front view of shaping and compacting device showing blade feeding mix from material end dumped on shoulder. Center—Rear view of device showing finished dike emerging. Device is tapered to provide compaction. The burner is on the right and furnishes heat to the shell chamber which aids in producing the surface glaze. Stake on front axle of grader enables driver to follow guide line for proper alignment of dike. Lower—Windrow sizer for use ahead of shaping and compacting device. This is propelled by truck which dumps its load into hopper

earth or imported borrow and 2.5 tons of plant-mix per 100 feet. The all plant-mixed dike required 5.8 tons of plant-mix per 100 feet. As constructed to date in District II, the all plant-mixed dike costs from 5 to 9 cents per lineal foot more than the earth dike faced with plant-mix.

The all plant-mixed dike is more susceptible to being shaped and compacted with mechanical devices, is more durable and sightly, and will require less maintenance cost.

In addition to its drainage function, the plant-mixed dike is a warning to traffic of the limit of the traversable area. Its value for this function can be increased, particularly for night driving, by painting the roadside face white or by the installation of reflectorized guide posts. District II practice in the installation of guide posts in the berm is shown in accompanying photographs. The use of reflectors on the guide posts is very helpful where heavy fogs occur and the driver may otherwise lose sight of the posts as well as the traffic stripe.



Four lanes tapering to two with machine-shaped and finished drainage dike and reflectorized guide posts

Along with the drainage provision on embankments, as provided by plant-mixed or other dikes, has come the practice in some locations of redesigning the gutter through cuts and lining it with plant-mix. The operation of spreading, shaping and compacting the mix to fit the gutter can and has been done mechanically. By providing heat, weight and a taper on the shaping device, similar compaction and surface glaze can be secured as on the dikes. The use of special equipment for this purpose would be encouraged if a standard shape for both dike and gutter were adopted.

Paved Gutters

The paved gutters as usually designed function well when cut slopes are stable, are not too high and are fairly flat, preferably not steeper than one and one-half to one. When slopes are steeper, cuts are deeper and material is rocky even though comparatively stable the falling of rocks loosened by frost or erosion into a paved shallow gutter usually results in many rocks coming to rest on the pavement.

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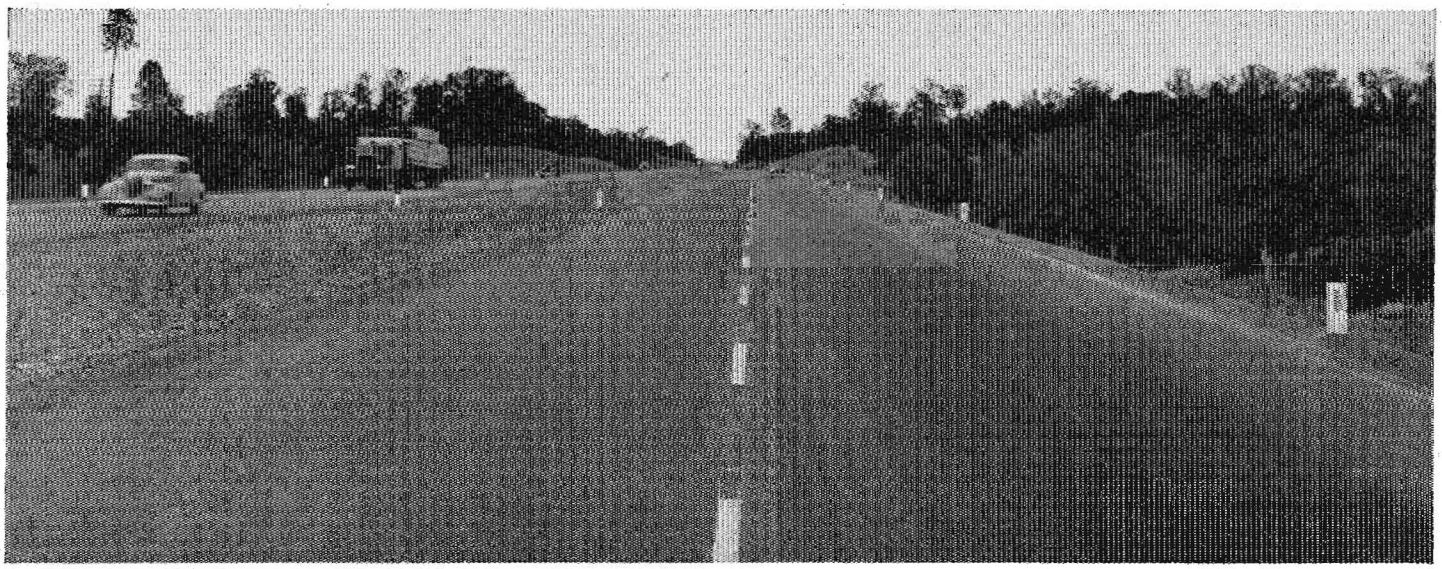
Plant-mixed, machine-shaped and finished drainage dike. Reflectorized guide posts outline road edge even in the fog



F. A. S. Project

New Tuolumne River Bridge In Stanislaus Completed

By GEO. D. MACOMBER, County Engineer and Road Commissioner

PRIOR to the war considerable progress had been made in making surveys and in planning for future major highways through Stanislaus County. From these studies it became apparent that a second route, generally paralleling U. S. 99 and adjacent to the Atchison, Topeka & Santa Fe Railroad, would be of great value to both local and through traffic. Through traffic from Merced going North to Stockton could by-pass several cities and provide an alternate route to the deep water channel at Port Stockton.

Stanislaus County through the cooperation of the State of California and the Federal Government has recently completed its first two federal aid projects. These are the first of several such projects planned by the county under the Federal Aid Program. The completed projects were started June 9, 1947, and completed August 13, 1948.

A new bridge located on Santa Fe Avenue, FAS Route 912, one mile south of Empire, across the Tuolumne River, with approximately one mile of approach road was planned as the first project for several reasons. The new structure replaces a 38-year-old bridge on dangerous alignment, 10-ton load restriction, and impaired height clearance. The highway served by the new bridge passes through some of the most highly developed fruit producing lands of the county. It carries a considerable traffic load consisting of local residents, farm to market vehicles, heavily laden fruit trucks and much through traffic.

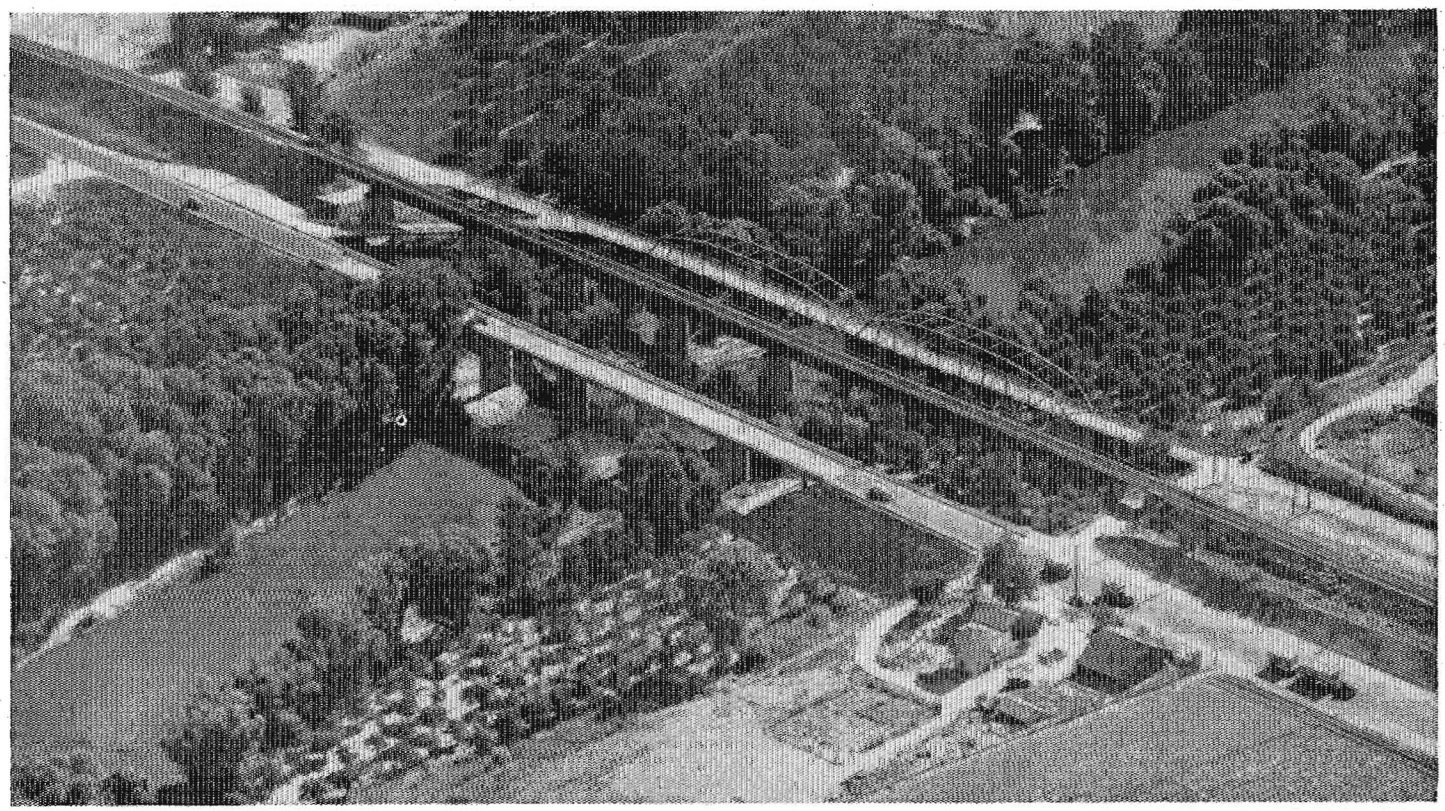
The old alignment was via a railroad underpass on a curved trestle approach to the bridge. The present alignment places the new structure on the east side of the railroad and makes a straight line from Empire to the bridge with an 1885-foot radius, super-elevated curve beginning 217 feet south of the bridge abutment.

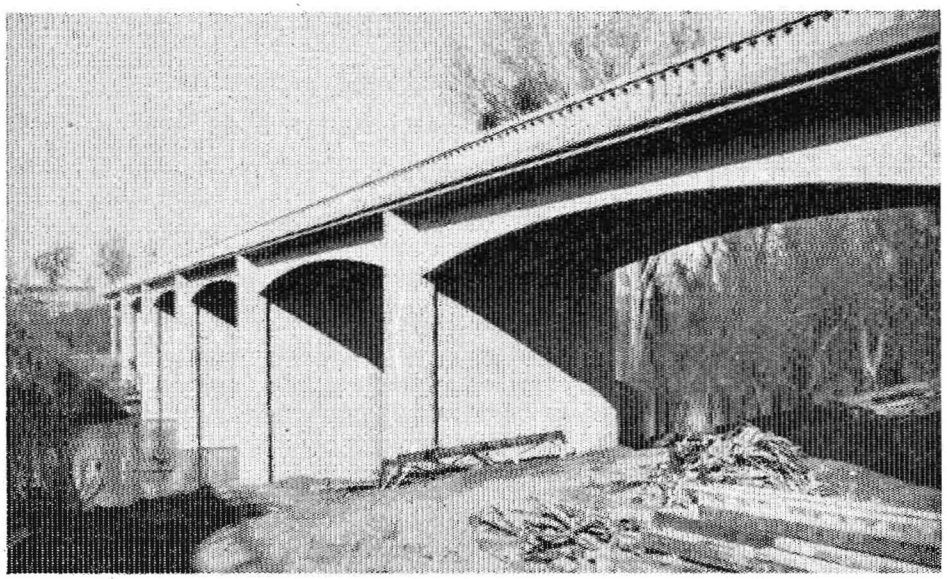
The new bridge is a reinforced concrete girder structure 495 feet long with a roadway width of 24 feet. The cost of the bridge project exclusive of engineering was $140,263.86.

Erickson, Phillips & Weisberg of Oakland were the contractors, and they were represented on the contract by Mr. Ross Phillips.

The approaches consisted of a 2-inch x 20-foot plant-mixed surface placed on 3-inch x 24-foot untreated rock base. Bituminous shoulders five feet in width were constructed. The cost was approximately $37,000 exclusive of engineering.

New bridge in foreground replaces 38-year-old structure across Tuolumne River, one mile south of Empire in Stanislaus County





Close-up of new bridge on FAS Route 912

The road approaches were constructed by Louis Biasotti and Son of Stockton and they were represented on this project by Mr. Al Regalia.

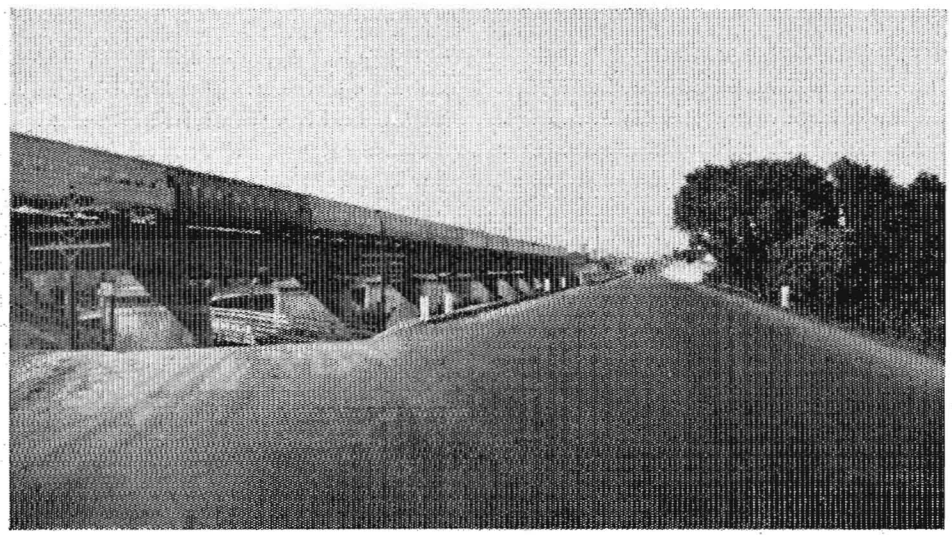
The cost of these contracts was financed in whole with Federal Aid secondary funds provided by the Federal Highway Act of 1944, and State matching funds provided by the County Highway Aid Act of 1945. Construction engineering costs incurred by county personnel were paid from county funds. Construction engineering costs incurred by the State were financed with FAS and State matching funds.

All preliminary engineering work in connection with these projects was done under the supervision of the author. The construction engineering was also under county supervision. Mr. Charles D. Hof was Resident Engineer on both jobs during the period of construction.

The cooperation of the state and federal personnel and of the contractors was of great assistance in securing the excellent work represented by the completed contracts.

Commenting on the project, State Highway Engineer G. T. McCoy said: "The Division of Highways is gratified by the thorough and excellent handling of this project by county engineering forces."

This view of new FAS highway is looking northeast



MERITED PRAISE

McCLENDON MOTOR COMPANY

Ralph W. Sorin
Crescent City, Calif.

DEAR SIR: Last winter and spring we experienced an unusually heavy rainfall in this area. Our highway system was subjected to a greatly increased number of logging and lumber hauling vehicles. The obvious result was damage to our road system. Added to the above man causes could be included slides. All of which together caused our road system to be in poor condition for the expected annual tourist traffic, and due to the poor road conditions, many tourists were advised to travel another route and by-pass this region.

Official requests were made by the people of the County of Del Norte to have the roads repaired, and the Department of Highways was made aware of the requests. How well the department responded was shown me on my travel over U. S. Highway 101 last week.

Never have I found the road in such fine condition since it was first built, and I traveled north from San Francisco to the Oregon line. In our own county the road showed large scale maintenance and good work throughout. You and your crews have done a very big job magnificently well, and are to be congratulated. The State Highway Department has had a big job in the coastal area, and the results are most gratifying to me, a lone citizen.

And I cannot refrain from expressing my appreciation to you and your crews for the large part they have played in giving us the road improvement we asked for this spring. I trust you may find some small measure of reward in the sincere thanks for a good job well done, and earnestly hope that when aid can be rendered you and your crews you will find the people here in this area most willing to give you their best as you have surely given yours.

Sincerely,

BERNARD MCCLENDON
President, Crescent City
Chamber of Commerce

Unique Project

Four-Level Grade Separation In Los Angeles First of Kind

By HENRY COMPAGNON, Chief of Survey Party

The following article describes the method of carrying out the construction staking on the four-level grade separation structure now under construction at the intersection of the Arroyo Seco-Harbor Parkway and Hollywood Parkway in Los Angeles. This unique grade separation has been a subject of great interest to engineers both within and out of the Division of Highways. This structure and interchange, costing $1,500,000, will provide for full interchange of traffic between these parkways and is the first of its kind to be built. It represents a new method of handling interchange of traffic between highway arterials. It will simplify traffic movement, reduce distance and cost of operation and provide increased capacity over the conventional "cloverleaf" type of interchange structure. Design details were described in an article by Assistant State Highway Engineer Spencer V. Cortelyou in the May-June, 1944, issue of "California Highways and Public Works." One of the more interesting facts that has become apparent during the staking and construction of this complicated structure is that a single survey crew handled the entire project, devoting only two-thirds of its time to the work. Mr. Compagnon is chief of the survey party carrying out the construction and staking of the project under direction of George M. Leatherwood, who is in charge of survey parties in District VII.

EDITOR.

THE PRELIMINARY survey as made by the State Division of Highways included the retracement of the existing city street centerlines, called the "block surveys," and in these surveys closing errors of far less than the accepted one in ten thousand were obtained.

From these data adjusted traverses were worked up and a system of coordinates established for the area. The "Record Survey Map," Figure 1, was then made showing coordinates of all street centerline intersections, angle points, distances along the centerlines, and relative bearings. Also were shown the centerlines of the two major parkways, their alignment data and coordinates where they intersected street centerlines. This map furnished the basic data for locating in the field accurately the intersection of the two parkways, or the geometric center of the four-level grade separation structure. This point was referred to as the "Q" point.

Another map of the area was made called the "Construction Control Plan," Figure 2. This map shows all of the interchange roadways and the major roadways with complete alignment data and coordinates. This map proved very useful in fixing the centerlines of the roadways at the approaches to the many bridge abutments.

In addition, a third map was required. This map was prepared by the Southern Section Office of the Bridge Department and was called the "Bridge Layout Control Plan," Figure 3. On it were the locations of the numerous spread footings, the positions of the abutments and four recommended triangulation stations, forming two axes passing through the "Q" point, north and south, and east and west. Their positions were outside of the working limits. In two corners of this map in tabular form were given the coordinates for the centers of all the footings and where bent lines and abutment lines intersected centerlines. The four triangulation stations were laid out in the field and served not only as intersection ties for recovery of the "Q" point, but also as auxiliary points for control of the interchange roadways beyond the limits of the structure.

Storm Drain Problem

The north-south axis line proved valuable also as a control for the 60-inch storm drain that went close to the center of the structure in a northerly direction. The Bridge Department had calculated coordinates along the storm drain. Its location had to be accurate as it came close to several footings with little room to spare.

In addition to the centerlines of the two parkways and the two axis lines, another line passing through the "Q" point was laid out and referenced. It was called the "centerline of structure." It paralleled equidistantly the tangents of the G and H roadways on the lowest level. On this line were the centers of seven footings. This line also passed through the radial points of the C and D deck centerlines on the third level. Their radius is 312 feet. The radial points were set and were used throughout construction.

The earthwork from the start of the job was carried out on a large scale and the saving of the survey points was difficult. One permanent point was set and was preserved until it had served its purpose. It was a little over 100 feet from the "Q" point, located on the centerline of the Hollywood Parkway with accurate distance to the "Q" point. It was located on the northwesterly side of the "Q" point where grading changed from cut to fill. A reference point consisting of a pipe two inches in diameter and five feet long was driven into the ground 24 inches below the surface, which served as a bench mark as well as for the purpose of recovering the "Q" point.

After grading had progressed and the surfaces of cuts and fills were close to ultimate, the points on the bent lines on the centerline of the Hollywood Parkway were set. They were tacked hubs buried a foot for protection. The points were chained outward from the "Q" point. Fortunately, most of the

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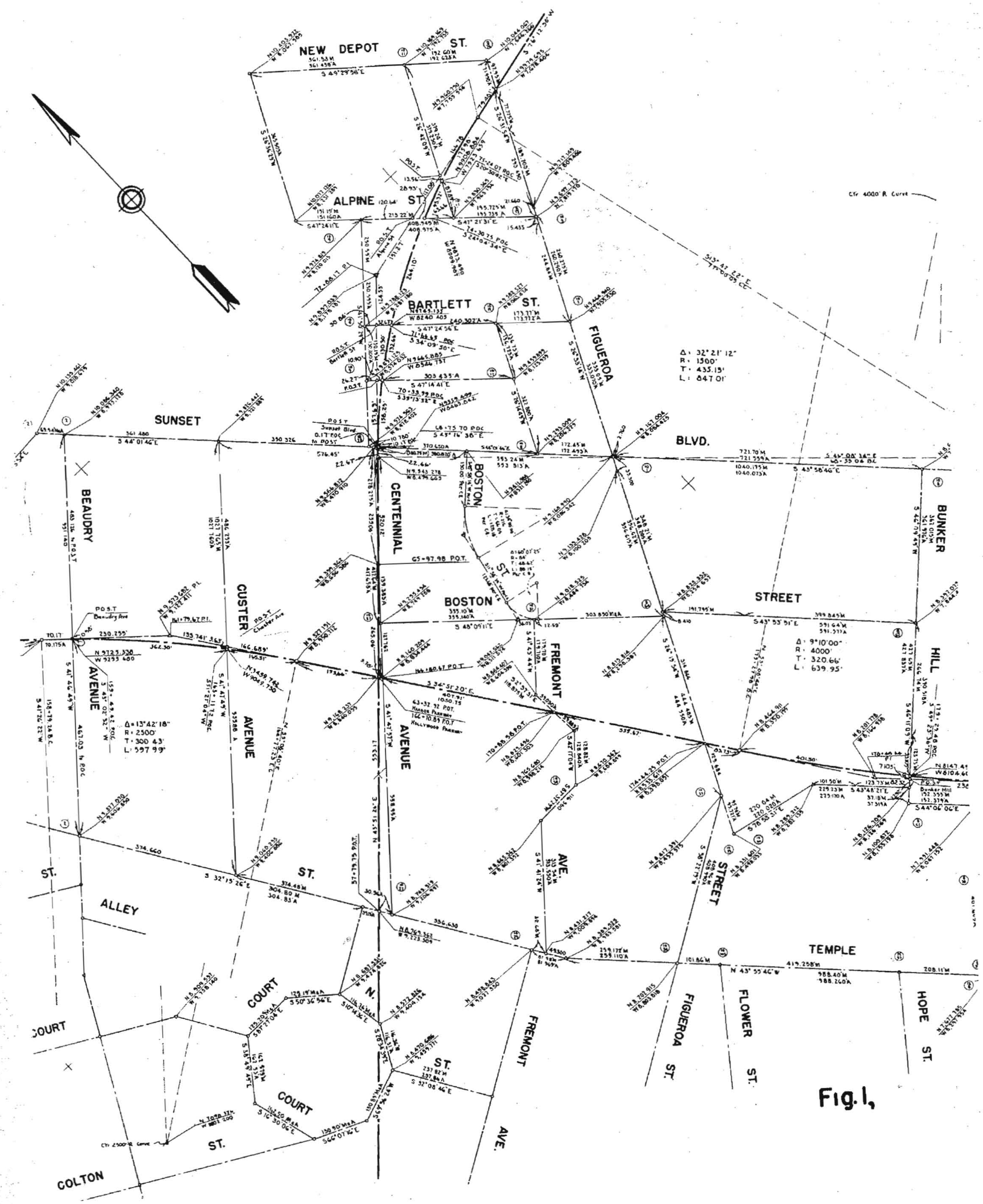
NEW DEPOT
ST.
ALPINE
ST.
BARTLETT
ST.
FIGUEROA
SUNSET
BLVD.
BEAUDRY
CUSTER
AVENUE
CENTENNIAL
BOSTON
ST.
BOSTON
STREET
FREMONT
BUNKER
HILL
AVENUE
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ALLEY
COURT
COURT
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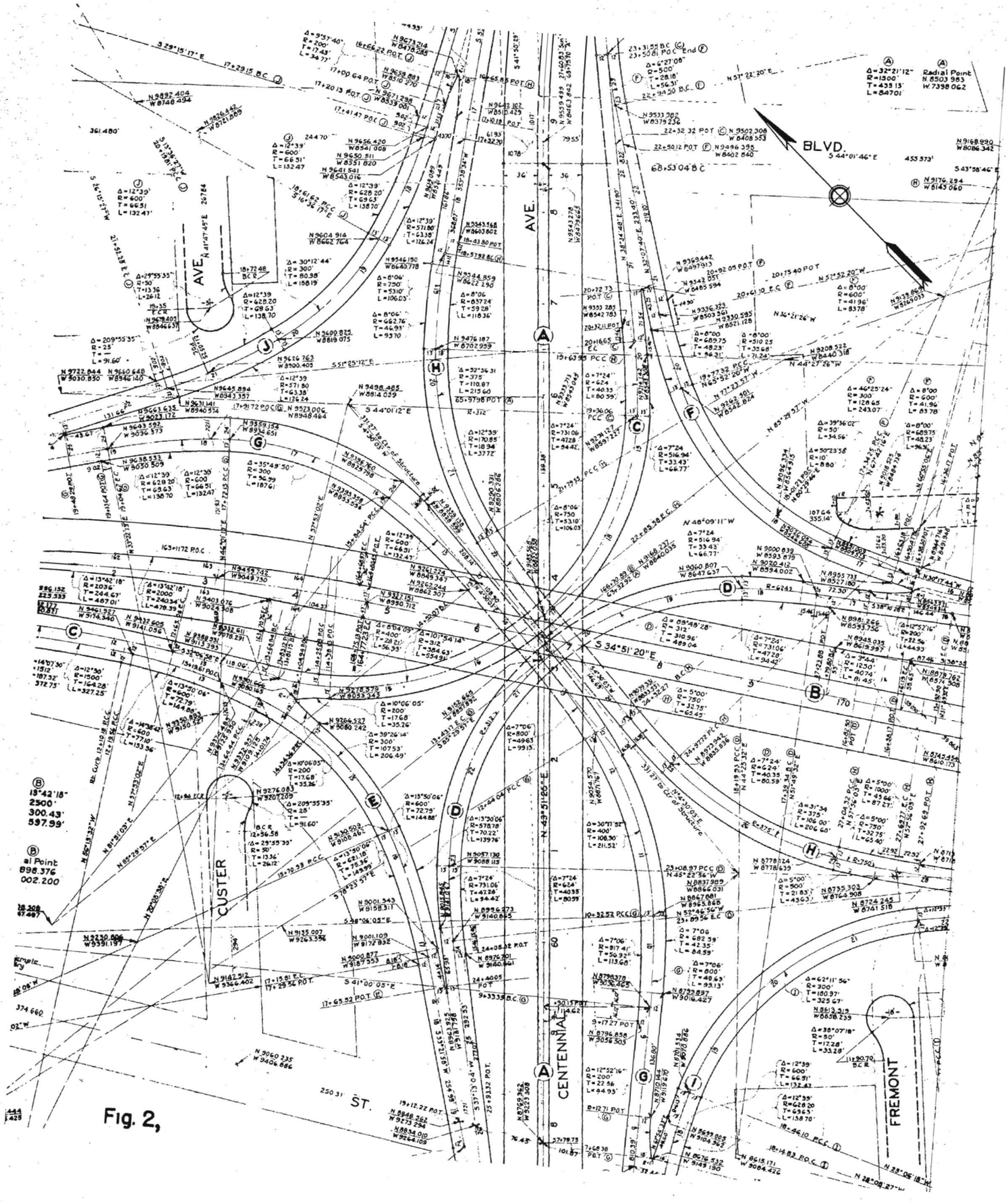
Fig. I,


BLVD.
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CENTENNIAL
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ST.
S 34°51' 20" E
N 43°51' 26" E
S 44°01' 46" E
N 51° 22' 20" E
N 34° 21' 26" W
N 44° 27' 26" W
N 65° 29' 27" W
N 71° 23' 27" W
N 46° 09' 11" W
S 44° 01' 12" E
S 51° 25' 12" E
S 41° 00' 05" E
S 38° 06' 05" E
S 78° 23' 57" E
N 89° 29' 57" E
N 81° 01' 05" E
N 85° 18' 32" W
N 32° 03' 08" E
N 32° 53' 08" E
N 33° 22' 15" E
N 38° 24' 48" E
N 32° 07' 40" E
N 41° 47' 45" E
S 29° 15' 17" E
S 43° 58' 46" E
68°53'04" B.C.
Radial Point
N 8503 983
W 7398 062
Fig. 2,

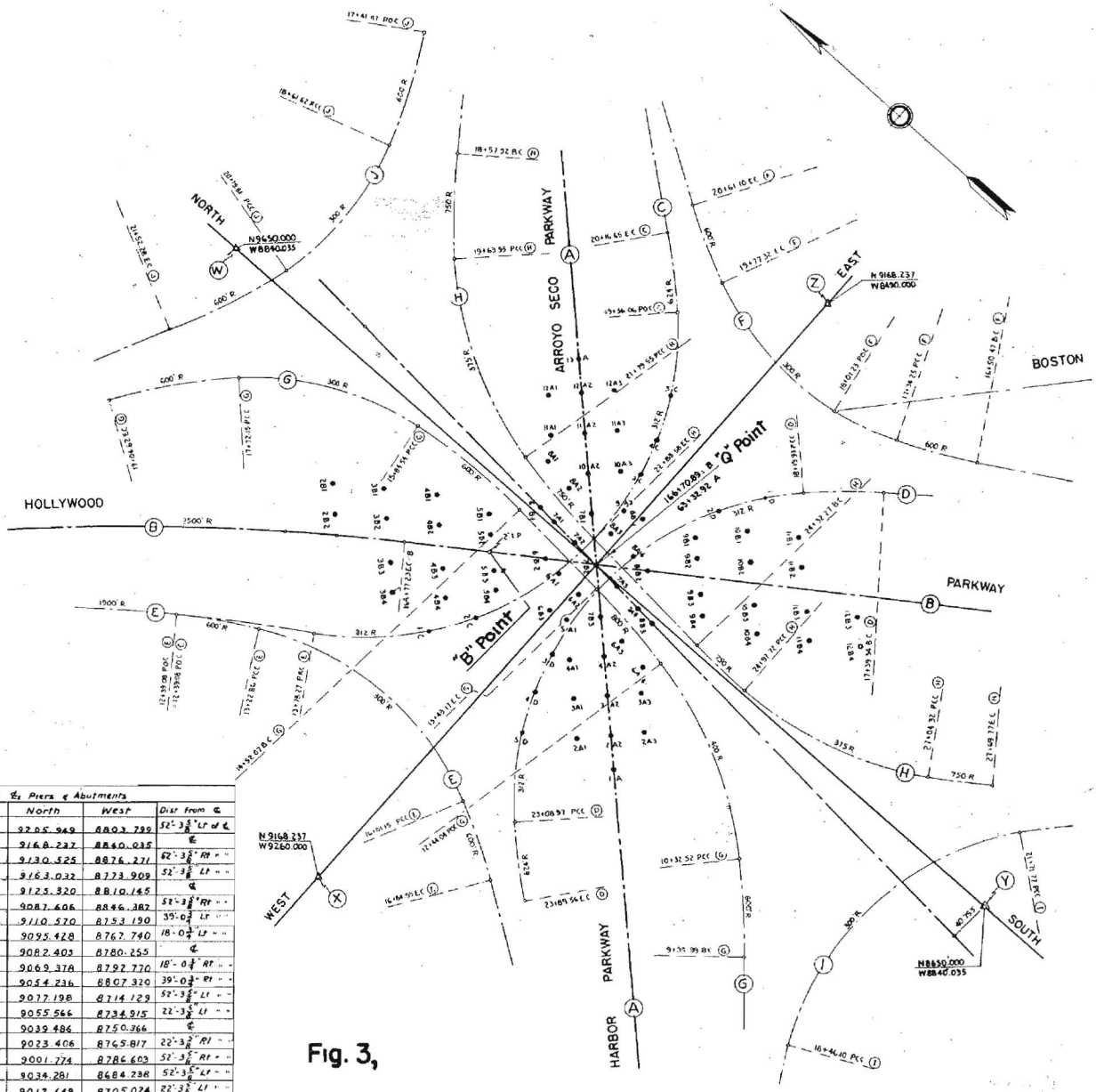


Fig. 3,

Co-ordinates of Ps Piers & Abutments				
Pier No.	℄ Station	North	West	Dist from ℄
7 B 1	B 166+70.89	9205.949	8803.799	52°-3⅝" Lt of ℄
7 B 2 (6)	"	9168.237	8860.035	℄
7 B 3	"	9130.525	8876.271	52°-3⅝" Rt " "
8 B 1	B 167+23.15	9163.032	8773.909	52°-3⅝" Lt " "
8 B 2 (6)	"	9125.320	8810.145	℄
8 B 3	"	9087.606	8846.382	52°-3⅝" Rt " "
9 B 1	B 167+75.49	9110.570	8753.190	39°-0¾" Lt " "
9 B 2	"	9095.428	8767.740	18°-0¾" Lt " "
9 B (6)	"	9082.403	8780.255	℄
9 B 3	"	9069.378	8792.770	18°-0¾" Rt " "
9 B 4	"	9054.236	8807.320	39°-0¾" Rt " "
10 B 1	B 168+27.79	9077.198	8714.129	52°-3⅝" Lt " "
10 B 2	"	9055.566	8734.915	22°-3⅝" Lt " "
10 B (6)	"	9039.486	8750.366	℄
10 B 3	"	9023.406	8765.817	22°-3⅝" Rt " "
10 B 4	"	9001.774	8786.603	52°-3⅝" Rt " "
11 B 1	B 168+80.09	9034.281	8684.238	52°-3⅝" Lt " "
11 B 2	"	9012.649	8705.024	22°-3⅝" Lt " "
11 B ℄	"	8996.569	8720.475	℄
11 B 3	"	8980.489	8735.926	22°-3⅝" Rt " "
11 B 4	"	8958.857	8756.712	52°-3⅝" Rt " "
12 B Layout line	B 169+32.39	8994.099	8651.720	56°-1½" Lt " "
12 B (6)	"	8953.651	8690.585	℄
12 B 3	"	8937.571	8706.036	22°-3⅝" Rt " "
12 B 4	"	8915.939	8726.822	52°-3⅝" Rt " "
13 B (6)	B 169+84.69	8910.734	8660.695	℄
13 B Layout line	"	8870.286	8699.560	56°-1⅛" Rt
1-C to 5-C	See plan			
1-D to 5-D	"			

Continued from page 20 . . .

bents of the "fourth" level bridge had four footings and the point on the centerline could be saved. The bent skew angle was turned and reference points were placed along the bent lines and permanent sights were established beyond the grading limits.

For the "third" level which included the C and D lines bridges, coordinate ties were calculated from the "Q" point radially to the centers of the footings and abutments. These key points were referenced after an accurate check of the alignment of the interchange roadways through them. These points fell in a definite pattern of symmetry.

The Arroyo Seco Parkway bridge or "second" level had mostly three-bent footings. Points on the centerline of bridge and bent lines could not be saved, so points were placed between the bent lines and on the bent lines between footings and on the bent lines produced where they were likely to be saved.

The reference points along the centerline of the Hollywood Parkway served as temporary bench marks and accurate levels were run along that line. Secondary level circuits were run to each abutment of the Arroyo Seco Parkway, resulting in a convenient network of points for vertical control. The temporary bench marks in the northwesterly edge of the structure had to be checked periodically until the heavy fills were stabilized. This occurred a few weeks after the earth surcharges had been placed.

Few of the important reference points were lost, but sufficient reference points were nearby to make direct coordinate ties for replacement. The established coordinate system offered an accurate and simplified method of control.

Underpass

Roseville Breaks Ground For Grade Separation

GROUNDBREAKING ceremonies launching construction work on the Roseville Underpass in Roseville, Placer County, were held on October 27th, culminating many years of effort on the part of the people of Roseville and surrounding areas. The occasion was an auspicious one for the citizens of Roseville, for the Division of Highways of the Department of Public Works, and for Governor Earl Warren, who has taken a personal interest in the project.

Officials of the State, county and city, the Southern Pacific Company, the U. S. Army Engineers, and representatives of Guy F. Atkinson Company, the contractor, participated in the celebration, which was sponsored by the Roseville Chamber of Commerce. Lieutenant Governor Goodwin J. Knight, who was the guest of honor at a luncheon tendered by the Roseville Lions Club in Odd Fellows Hall, was the prncipal speaker at the groundbreaking ceremonies.

The first spadeful of earth was turned by Charles C. Lee, Chairman of the Road and Highway Committee of the Chamber of Commerce, who was honored for 20 years of untiring efforts to make the subway a reality.

The project is estimated to require 18 months for completion at a cost of $1,327,404, the low bid of the Guy F. Atkinson Company of South San Francisco.

Delegations from Sacramento, Lincoln, Marysville, Rocklin, Loomis, Auburn, Colfax, and other communities attended the groundbreaking. Mayor Harold T. Johnson, State Senator-elect, represented the city and Supervisor J. B. Paolini, represented Placer County. Former State Senator J. L. Seawell of Roseville, now a member of the State Board of Equalization and who, while he was in the Legislature, authored a resolution calling for a survey of the project by the Division of Highways, was master of ceremonies.

Jerrold L. Seawell introduces speakers at Roseville subway ground-breaking ceremonies

An augmented student band from the Roseville Joint Union High School formally opened the ceremony.

Director of Public Works C. H. Purcell briefly described the project and the benefits which will accrue when the grade separation, designed to overcome traffic congestion on U. S. 99E (Lincoln Street) at the Southern Pacific crossing is completed.

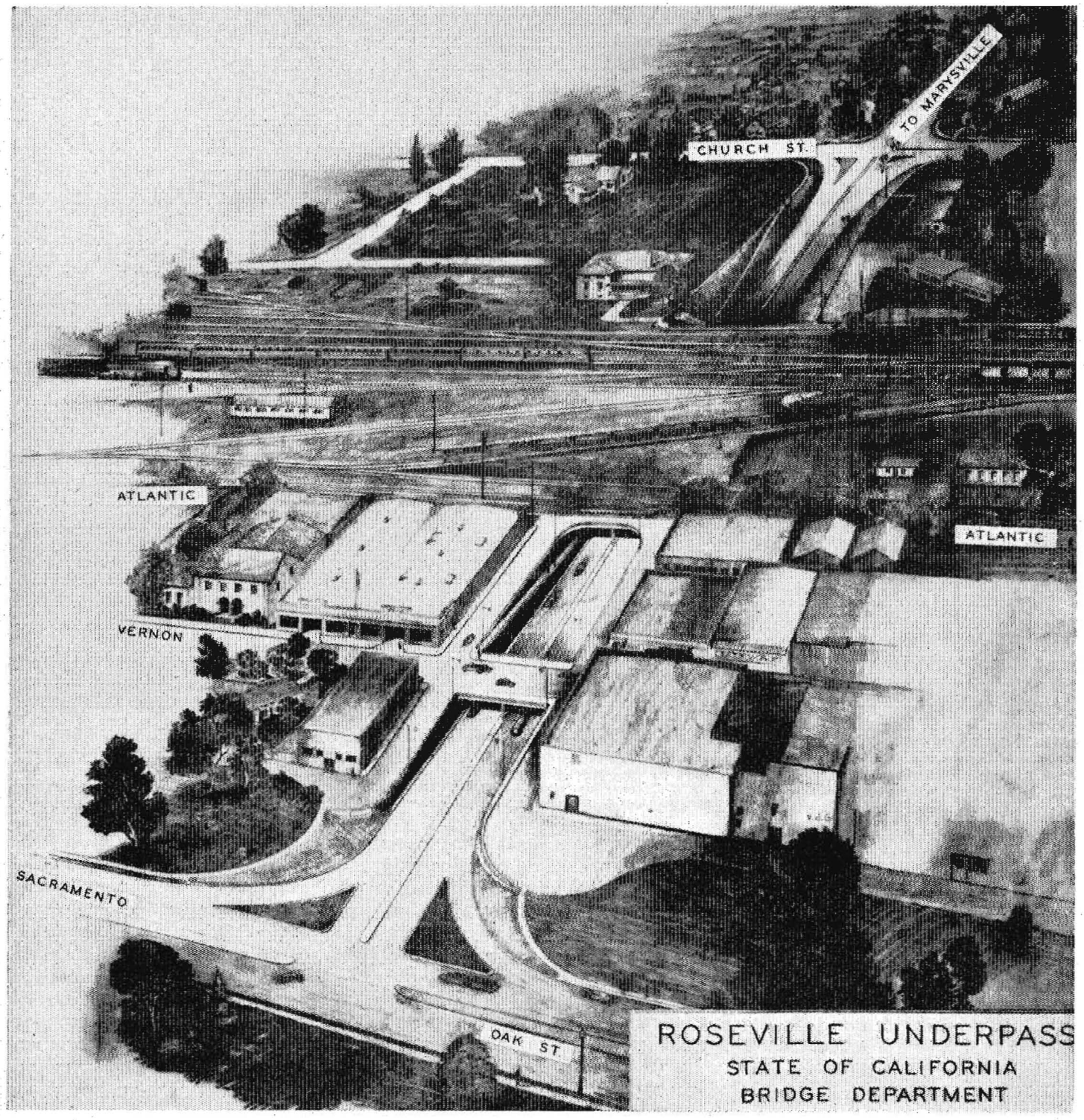
Credit for the success of the groundbreaking celebration was given to Joseph T. Barbieri, President, and Carl G. Laughridge, Secretary-Manager, of the Roseville Chamber of Commerce. Among the guests of the chamber, in addition to Lieutenant Governor Knight, Director Purcell and Jerry Seawell, were Fred J. Grumm, Deputy State Highway Engineer; Senator Allen J. Thurman, Colfax; Assemblyman-elect Francis Lindsay; J. W. Corbett, Vice President; Earl Mayo, Chief Engineer; M. L. Jennings, Division Superintendent, and R. E. Hallawell, General Manager, Southern Pacific Company; Captain Geo. W. Peterkin, representing California Highway Patrol Commissioner Clifford E. Peterson; Col. Jos. S. Gorinski, U. S. Army Engineer; Stewart Mitchell, Bridge Engineer, Division of Highways; Charles H. Whitmore, District Highway Engineer, Marysville, and Herbert S. Booth, representing Guy F. Atkinson Company.

During the war when state highway construction was at a standstill, Governor Warren had the foresight to take necessary action to provide for a postwar highway program. In 1943, he sponsored legislation appropriating $12,000,000 for the preparation of plans and for acquisition of rights of way for postwar construction, which was launched immediately following cessation of hostilities. This underpass was one of the many projects included in the postwar plans. Later the Governor initiated and backed the Collier-Burns Highway Act at the 1947 special session of the Legislature, which increased highway revenues and provided for the development of a long-range highway construction program. The action of the Governor and Legislature in providing these additional funds made this grade separation possible.

Project 3.3 Miles Long

The project, which is 3.3 miles in length, starts at Oak Street, passes under Vernon Street, Atlantic Street, the Southern Pacific tracks, and extends two miles north of the city limits. To carry this work to completion, the California Highway Commission allocated the sum of $1,800,000 in the budget for the present fiscal year.

The people of Roseville have been long subjected to delays and inconveniences at the existing crossing and there never has been any doubt as to the need for this project. However, as with all major highway projects, much preliminary work had to be done. For many years state highway engineers sought ways of eliminating the delays and hazards at the Lincoln Street crossing with the limited funds available. A comprehensive survey of the problem finally was made possible by a Senate resolution introduced by former State Senator Jerry Seawell, now a member of the State Board of Equalization, and adopted May 30, 1941.



In compliance with this resolution, the Division of Highways made an exhaustive study of the grade separation problem in Roseville. From this study, the present location of the underpass was decided upon but before the studies were completed, war was upon us and the project had to be postponed.

Traffic counts made recently by the Division of Highways at the existing crossing on Lincoln Street show that 11,000 vehicles and 3,500 pedestrians use the crossing daily. About 70 percent of this vehicular traffic and all of the pedestrian traffic is local. There is an unusually large number of train movements over this crossing since it is situated at the throat of one of the busiest classification yards in the country. Freight trains entering or leaving the yards move at reduced speeds taking several minutes to pass. Switching is constantly in progress. Checks show that the crossing is blocked 20 percent

Charles C. Lee spades first earth for Roseville Underpass. Left to right: Stewart Mitchell, Bridge Engineer, Division of Highways; Joseph T. Barbieri, President Roseville Chamber of Commerce; C. H. Whitmore, Marysville, District Highway Engineer; Councilman James Ford, Supervisor J. B. Paolini, Councilman Joe Colnar, Herbert S. Booth of Guy F. Atkinson Company; J. L. Seawell, State Board of Equalization; Mayor Harold T. Johnson, Senator-elect; Mr. Lee; Director of Public Works C. H. Purcell; M. L. Jennings, Division Superintendent, Southern Pacific; J. W. Corbett, San Francisco, Vice-President, Southern Pacific; Carl G. Laughridge, Secretary-Manager Roseville Chamber of Commerce; Deputy State Highway Engineer Fred J. Grumm, and Earl Mayo, Chief Engineer, Southern Pacific

of the time. An average of 15 trains a day stop traffic for five minutes or more. Numerous times accumulation of 50 to 100 vehicles occurs disrupting traffic in the Roseville business section.

Delays and Accidents

In addition to delays and inconveniences, the present railroad crossing has had a bad accident record. During the last 22 years, 122 accidents were reported, resulting in one fatality and 38 persons injured.

Traffic conditions in the City of Roseville will be further improved with the routing of the new highway under Vernon Street. The separation of U. S. 40 traffic from U. S. 99E will eliminate the congestion that has been a common occurrence at the intersection of the routes at their present location at Vernon and Lincoln Streets.

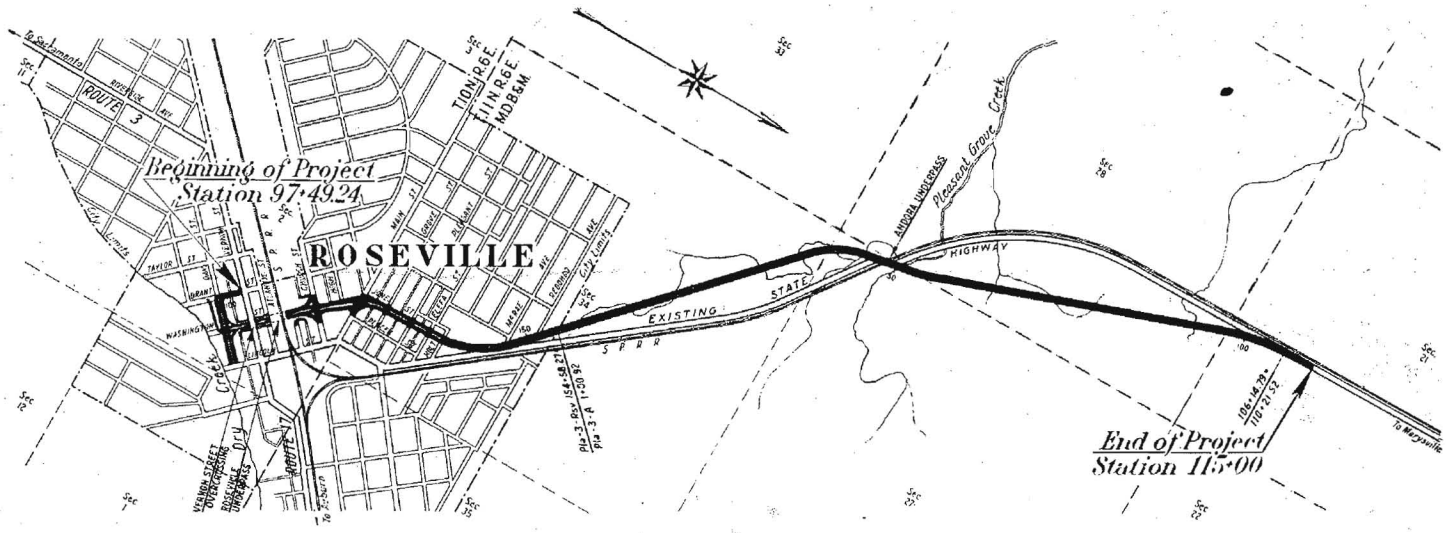
After passing under Vernon Street, Atlantic Street and the Southern Pacific tracks on Washington Street, the new route follows Jones Street and then swings on a long sweep to pass through the existing Andora Underpass on a straight line joining the present highway about a mile farther on. Elimination of the extremely dangerous curves at the Andora Underpass will also provide a long-needed improvement.

Local Cooperation

The location of the new route on Washington Street was decided upon only after very careful studies. Numerous other locations were considered. Traffic counts were made to determine which location would best serve the residents of Roseville as well as the traveling public passing through. Many consultations were held with the Board of Supervisors of Placer County and with the City Council of Roseville.

"This study," said Director Purcell, "showed the route via Washington Street would provide the greatest benefit to local traffic of any of the alternatives. It also served through traffic as well as any. It is realized that some persons are temporarily inconvenienced—this is true in the case of any improvement. That this inconvenience is only temporary is borne out by the experience of other communities when the highway has been improved.

The importance of this new route through Roseville will be more fully appreciated when it is completed. Free and uninterrupted access between the northern and southern sections of your city will be possible over a modern four-lane divided highway. Many business establishments will benefit by the removal of the through traffic from



Plan and profile of state highway (U. S. 99E) between Vernon Street at Grant in Roseville and two miles north of Roseville

their street. This improvement will do much to improve the traffic conditions on both arterials through the City of Roseville. It forms another important link in the modernization of our highways made possible by Governor Earl Warrens' highway program.

Construction Program Expands

Since the passage of the Governor's highway legislation, state-wide construction has increased considerably. Prewar budgets provided construction, construction engineering and right of way funds only from $20,000,000 to $30,000,000 dollars a year. For the fiscal year from July 1, 1947, to June 30, 1948, the value of budgeted construction, construction engineering, and right of way amounted to $64,000,000. This amount is for the construction of 230 miles of state highway, 78 miles of which will be four-lane divided highways. However, all revenue features of the Collier-Burns Act did not become available until April, 1948.

For the current fiscal year 1948-49, the first in which the full benefits of the act will be felt, the value of the budget construction, construction engineering, and right of way amounts to $82,000,000 and will provide 605 miles of state highway, 138 miles of which will be divided highway, four lanes or more in width.

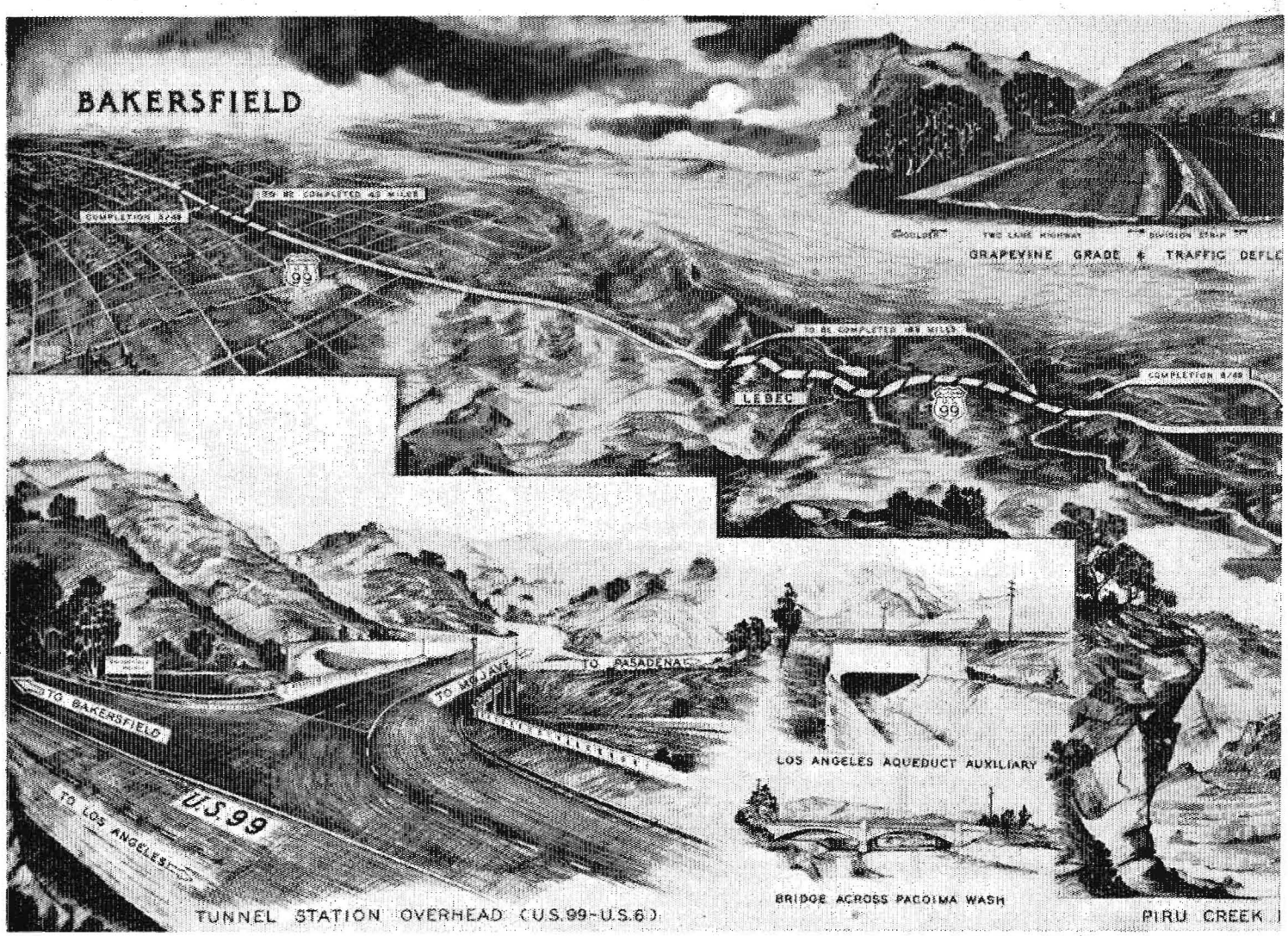
Essay Contest to Promote Interest in Highway Work

To STIMULATE interest in the profession of highway engineering among students and faculty in various universities throughout the country, the American Association of State Highway Officials has inaugurated a national essay contest. The contest which will close March 1, 1949, is divided into two divisions: the Faculty Division and the Student Division. A winner will be selected from each of these divisions. The award is an all-expense trip to the 35th annual meeting of the association in San Antonio, Texas, in October, 1949.

The sponsors hope the contest will help to alleviate the present serious shortage in highway department personnel. The association has contacted the accredited engineering universities and requested cooperation. The faculty is asked to notify Hal H. Hale, executive secretary of the association, National Press Building, Washington, D. C., of all entrants on or before November 1, next.

State Highway Engineer George T. McCoy is desirous that California help to promote the contest. He has sent letters urging active participation in the contest to Prof. C. H. Oglesby, Stanford University; Robert E. Vivian, Dean, College of Engineering, University of Southern California; George Leonard Sullivan, Dean, College of Engineering, Santa Clara University; Morrough P. O'Brien, Dean, College of Engineering, University of California, and William W. Michael, Department of Civil Engineering, California Institute of Technology.

"May I personally recommend participation in this excellent project," McCoy wrote. "The field of highway engineering is enlarging. A career in that profession can lead to high engineering accomplishment and national recognition. The combined thinking of instructors and students in critical analysis of the profession will do much toward realizing a more exacting and perhaps practical means of reaching the goals of the profession. I sincerely urge a careful study of the contest rules and a personal interest in the promotion of the project."



This sketch by Van der Goes of the Bridge Department of the Division of Highways shows improvements completed, under construction and to be constructed on U. S. Castaic, and Frenchman's Flat at Pir

Continued from page 13 . . .

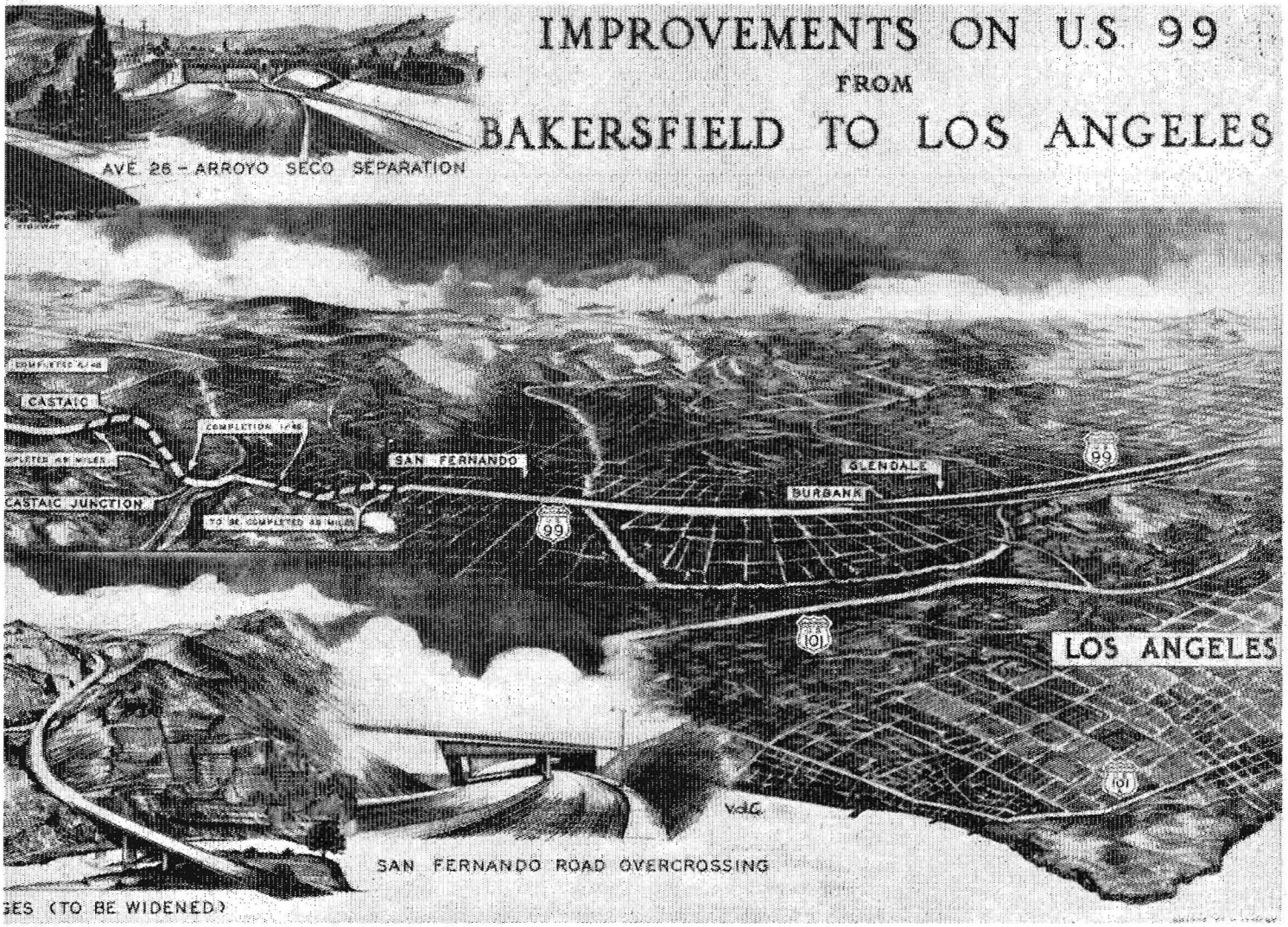
major importance of this highway developed when it became apparent that the connection between the Los Angeles area and the central valleys would become one of the most heavily traveled arterials in California. In the early thirties, when the original Ridge Route became inadequate to fulfill traffic demands the highway was laid out on the present location. During 1933, construction to three-lane standards was completed and the new route opened to through traffic. The volume of traffic has increased rapidly over the years, reaching such proportions that further widening became essential.

During the war years plans were completed for developing 27.5 miles of the most critical locations to four lanes. All four or more lanes of construction now being undertaken by the Division of Highways is of the divided type, separating the two lines of opposing travel. The first contract in this program extending over the 2.6 miles between Palomas Creek and Violin Saddle was completed in June of this year. The former road is followed generally but improved alignment has been obtained over several short stretches. Cuts were extended well into the hillsides in order that sufficient material would be available for the extensive fill widening required for four lanes. Stabilization of the original ground was a necessary precaution at many locations in order to provide firm foundations for the resulting high fills. Subsurface drainage installations were made at locations where impounded ground water was likely to develop serious maintenance problems.

Two adjoining contracts, from Violin Saddle to Whitaker Summit and between Whitaker Summit and Frenchman's Flat have been completed. Development of the road to four lanes over this section is being made along the same general plan, with construction features comparable with the portion recently completed.

A project is included in the present program for reconstruction of a 10.8-mile section between Alamos Creek and Gorman. The terrain between these limits is less severe and grades are much lighter, but the paralleling creeks which are subject to flash floods will tend to make the work expensive.

One remaining part of the Ridge Route, a section 3.8 miles in length, is



m Bakersfield to Los Angeles. One project on the Ridge Route north of Castaic was completed last June and a second between Whitaker Summit, nine miles north of k in October at a cost of $1,574,000

within the Piru Creek Gorge. Restrictions to the highway are imposed by the steep mountains on one side and Piru Creek on the other. During the original construction, extensive channel changes were made and provided with concrete lining. This work was a necessary feature to protect the highway from the torrential flow to which the stream is subject. The channel changes reduced the number of bridges to four.

Development of this Piru Gorge section to four lanes will be most expensive in that enormous quantities of earth will be excavated from the confining mountainsides. Disposal of this excavation must be at distant points since relatively small areas are available along the road for such purpose.

This project has not been included in approved budgets so far but early construction may be expected as the highway deficiency list includes an item for the work.

Two projects have recently been placed under contract for reconstructing and widening to four divided lanes from about 3.3 miles south to 2.6 miles north of the Santa Clara River. Considerable provisions have been made for drainage in the designs for this work as this area is subject to heavy storm water. Improvements are being made at the intersections with State Highway Route 126 which will materially aid in absorbing traffic entering U. S. 99 from Saugus and westerly from the direction of Ventura.

A project is included in the budget for the 1949-1950 Fiscal Year for extending the reconstruction from the northerly end of the Santa Clara River contracts to the Palomas Creek project which was recently opened to traffic. On completion, four-lane highway will be available almost continuously for 36 miles, the exception being 3.8 miles in length through the Piru Canyon.

Contracts recently completed or now under construction between Piru Canyon and 3.3 miles south of the Santa Clara represent a total expenditure of $5,275,000.

That part of U. S. 99 from immediately north of San Fernando to central area of Los Angeles is now four lanes or more, being common with U. S. 101 from the four-level structure now under construction at the intersection

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Resolutions

A. A. S. H. O. Defines Highway Policies at Salt Lake Meeting

AT ITS 34th annual meeting in Salt Lake City last September, the American Association of State Highway Officials adopted a number of resolutions defining its policies on important highway subjects. These resolutions are published in *California Highways and Public Works* for the information of all who are interested in highway development in this and other countries.

Long-range Planning Studies

WHEREAS, By special resolution at its last annual meeting in New York City this association called attention to the necessity for the development and adoption in each state of a long-range plan for the adequate improvement and continued maintenance of its several systems of highways and for the appropriate financing thereof as exemplified by the studies then under way in several states; and

WHEREAS, The importance of such studies to the enactment of appropriate State legislation has been demonstrated in California; therefore, be it

Resolved, By the American Association of State Highway Officials assembled in their Thirty-fourth Annual Meeting in Salt Lake City the twenty-fourth of September, 1948, that the association reaffirms its action of one year ago and again strongly urges each state that has not already done so to undertake the development of such a long-range plan which is so essential for effective and economical state and national highway administration.

Expediting of Construction Program

WHEREAS, President Baldock has forcefully brought to the attention of the association the unsatisfactory progress that has been made by many of the states in utilizing postwar highway funds for construction; and

WHEREAS, Recommendations have been made that the states take positive action to expedite that part of the program that may be causing such delays; therefore, be it

Resolved, By the American Association of State Highway Officials assembled in their Thirty-fourth Annual Meeting in Salt Lake City the twenty-fourth of September, 1948, that this association strongly urges the states to expedite currently authorized construction programs; and be it further

Resolved, That the association recommends that the states take positive action on the following proposals in order that the highway construction program may be advanced and expanded:

1. Ascertain the factors that are retarding progress and apply all possible corrective measures.
2. Establish an adequate salary scale for state highway employees.
3. Adopt a sound personnel policy affording opportunity for assured advancement with retirement benefits.
4. Maintain contact with colleges and universities in order to encourage students to select highway engineering as a profession.

Additional Highway Revenues

WHEREAS, Highway officials in many states still operating with revenues levied at prewar rates, find their finances cut practically in half by reason of the loss in purchasing value of the dollar; and

WHEREAS, The present highway revenues in such states are woefully insufficient to meet current maintenance and construction needs; therefore, be it

Resolved, By the American Association of State Highway Officials in their Thirty-fourth Annual Meeting in Salt Lake City the twenty-fourth of September, 1948, that the association earnestly and respectfully recommends that the legislatures of those states thus affected investigate all possibilities of providing increased revenues sufficient to meet current budget needs and thus permit their highway departments to properly discharge their responsibilities to the public.

Construction of Bridges in or Adjacent to Reservoirs

WHEREAS, There is now on the Federal Statutes a law providing funds and setting up procedure for the construction of bridges upon dams; and

WHEREAS, The present law restricts the use of such funds to bridges actually built upon dams, without provision being made for any other crossing; and

WHEREAS, In many cases the construction of bridges on dams is not economical nor feasible because of operational difficulties; therefore, be it

Resolved, By the American Association of State Highway Officials assembled in their Thirty-fourth Annual Meeting in Salt Lake City the twenty-fourth of September, 1948, that the existing federal law be amended to provide for the construction of bridges in or adjacent to such reservoirs where the federal agency, charged with the construction and operation of such dams, finds that a bridge actually on the dam is not economical nor feasible.

Maintenance Requirements for Federal Aid Projects

WHEREAS, Section 14 of the Federal Highway Act of November 9, 1921, places upon the states sole responsibility for the maintenance of all roads constructed within their respective boundaries under the provisions of said act, as amended and supplemented; and

WHEREAS, The authorization act of June 16, 1936 (49 Stat. 1519), and subsequent acts authorizing appropriations of federal-aid road funds have included provision for secondary or feeder roads and for roads in urban areas the maintenance of which under the laws of some states is not the responsibility of such states or their highway departments; therefore, be it

Resolved, By the American Association of State Highway Officials assembled in their Thirty-fourth Annual Meeting in Salt Lake City the twenty-fourth of September, 1948, that Section 14 of the Federal Highway Act should be appropriately amended to provide that the responsibility to maintain secondary or feeder roads, and roads in urban areas as defined in the Federal-aid Highway Act of 1944, constructed under the provisions of said acts, as amended or supplemented, shall be the duty of the states or their civil subdivisions according to the laws of the several states and further that any penalties imposed for failure to adequately maintain such roads shall apply to the subdivisions where the state is not responsible for such maintenance and the Congress is hereby requested to enact such legislation as it may deem necessary for this purpose.

Highways for the National Defense

WHEREAS, Section 2 of the Federal-aid Highway Act of 1948 directs the Commissioner of Public Roads to cooperate with the state highway departments in a study of the status of improvement of the National System of Interstate Highways; to invite the cooperation and suggestions of the Secretary of Defense and the National Security Resources Board as to need for improved highways for the national defense; and to supplement not later than April 1, 1949, the report dated February 1, 1941, entitled "Highways for the National Defense," to reflect current conditions and deficiencies; and

WHEREAS, This direction of the Congress affords the state highway departments an excellent opportunity to make a substantial contribution to the national defense by their cooperation in this important study. Therefore be it

Resolved, By the American Association of State Highway Officials assembled in their Thirty-fourth Annual Meeting in Salt Lake City the twenty-fourth of September, 1948, that it recognizes the urgency of this study and pledges its full support and the cooperation of its member states.

Highways on Federal Power Reservations

WHEREAS, The Legal Affairs and Right-of-Way Committees have jointly proposed the adoption of a resolution requesting the Congress to enact legislation amending the existing Federal Power Act, so as to remove or modify burdens and difficulties now impressed on the Public Roads Administration and on the several states with respect to the location and construction of public highways over lands affected by federal power site reservations; and

WHEREAS, It is proper that action in furtherance thereof be now taken. Therefore, be it

Resolved, By the American Association of State Highway Officials assembled in their Thirty-fourth Annual Meeting in Salt Lake City the twenty-fourth of September, 1948, that the association take such action as may be necessary in securing appropriate amendment to the Federal Power Act so as to provide that, notwithstanding the provisions of Section 24 of such act, if at any time more than five years after the withdrawal of any area as provided by such section, the Secretary of the Interior determines that a power project is not at the time either actually constructed or that construction has not been commenced or is not being diligently prosecuted, locations and selections for public highway purposes may be made under Section 17 of the Federal Highway Act as amended and that any lands withdrawn for such power reservations shall thereafter continue to be available for highway locations under said Section 17 until the Secretary of the Interior finds that construction of a power project, within such area withdrawn for power purposes, has been commenced and is being diligently prosecuted; and further to provide that in the event relocation becomes necessary for any public highway, laid out or constructed prior to reservation for power purposes, or any highway for which right-of-way has been secured, the cost of relocating such highway, or securing a substitute right-of-way where only a right-of-way had been secured, shall be considered as part of the cost of the power project, to be paid by a licensee or otherwise by the United States.

Bridges Over Waterways

WHEREAS, The Operating Committee on Bridges and Structures has proposed the adoption of a resolution requesting the association to make a detailed study of problems relating to federal navigation requirements, and on the basis thereof to seek any needed remedial legislation to remove or modify burdens and difficulties now impressed on the Public Roads Administration and on the several states with respect to the location and construction of bridges over waterways. Therefore, be it

Resolved, By the American Association of State Highway Officials assembled in their Thirty-fourth Annual Meeting in Salt Lake City the twenty-fourth of September, 1948, that this matter be referred to the Executive Committee with power to act.

Radio Facilities for Highway Maintenance

WHEREAS, The effectiveness of the use of radio telephony by highway maintenance departments in the saving of human life and in the conserving of public funds through increased efficiency has been conclusively demonstrated in several states; and

WHEREAS, For economic and humanitarian reasons it is desirable that such facility should be extended, and introduced into states presently lacking such equipment; therefore, be it

Resolved, By the American Association of State Highway Officials assembled in their Thirty-fourth Annual Meeting in Salt Lake City the twenty-fourth of September, 1948, that the Federal Communications Commission be asked to expedite such installations by the prompt publication of its rules in definitive form and by providing sufficient and suitable frequencies.

. . . Continued on page 55

Vets Honored

Two State Highway Spans Dedicated to War Heroes

On November 14, 1948, the Noyo River Bridge was officially dedicated as the "Charles Larson Memorial Bridge," and the Hare Creek Bridge, both near Fort Bragg, Mendocino County, was dedicated to the memory of Sergeant Emil Evensen, local boys who lost their lives in World War II.

The new Noyo River structure spans the entrance to the Noyo River harbor at the south limits of Fort Bragg. It forms a portion of nearly four miles of new highway which is being constructed south of Fort Bragg, including the new concrete arch over Hare Creek and an arch culvert at Mitchell Creek.

Naturally situated with a narrow entrance and complete protection from the sea, the Noyo River harbor furnishes one of the most secure anchorages for small boats to be found on the coast. With the tremendous increase in the fishing industry in this location the existing berthing facilities have become quite inadequate for the number of fishing boats which use the harbor.

With the intention of extending the harbor as much as one and one-half miles upstream, the War Department ruled that the Old Noyo River Bridge was a hazard to navigation so that when the new bridge was considered, it was necessary to provide a high level structure so as not to interfere with navigation.

With the removal of the old bridge in the near future, the upper portion of the river will be opened for use as extension of the harbor.

The old low level bridge was of timber construction and about 40 years old. It was narrow and posted for restricted loads and had exceeded its useful life.

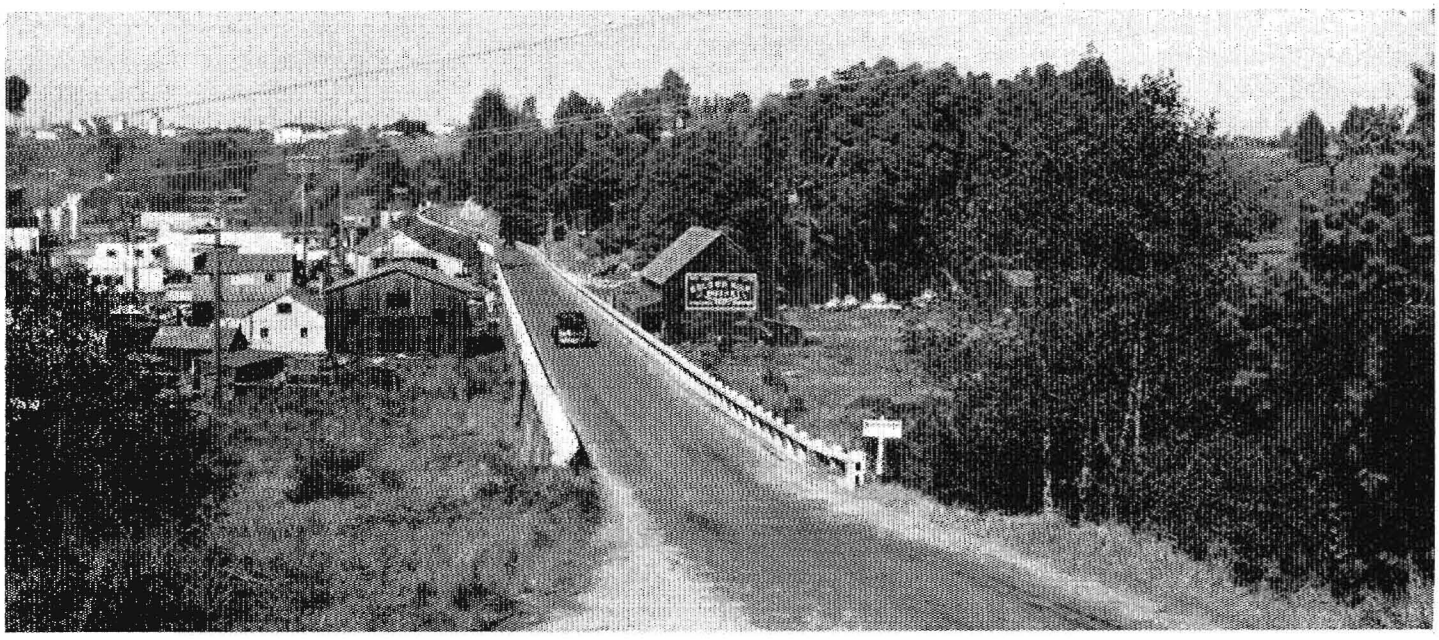
The new steel structure is of deck cantilever type, spanning the Noyo River with a minimum clearance of 80 feet. The anchor arms are 222 feet and the main span is 405 feet, of which 202 feet is the suspended span over the channel. A roadway width of 26 feet and two 3-foot sidewalks are provided. The bridge was built under two contracts, being started when the steel shortage was quite acute, with the result that the approaches and the substructure portion of the bridge were constructed in 1947 and the steel superstructure portion was erected subsequently by a different contractor.

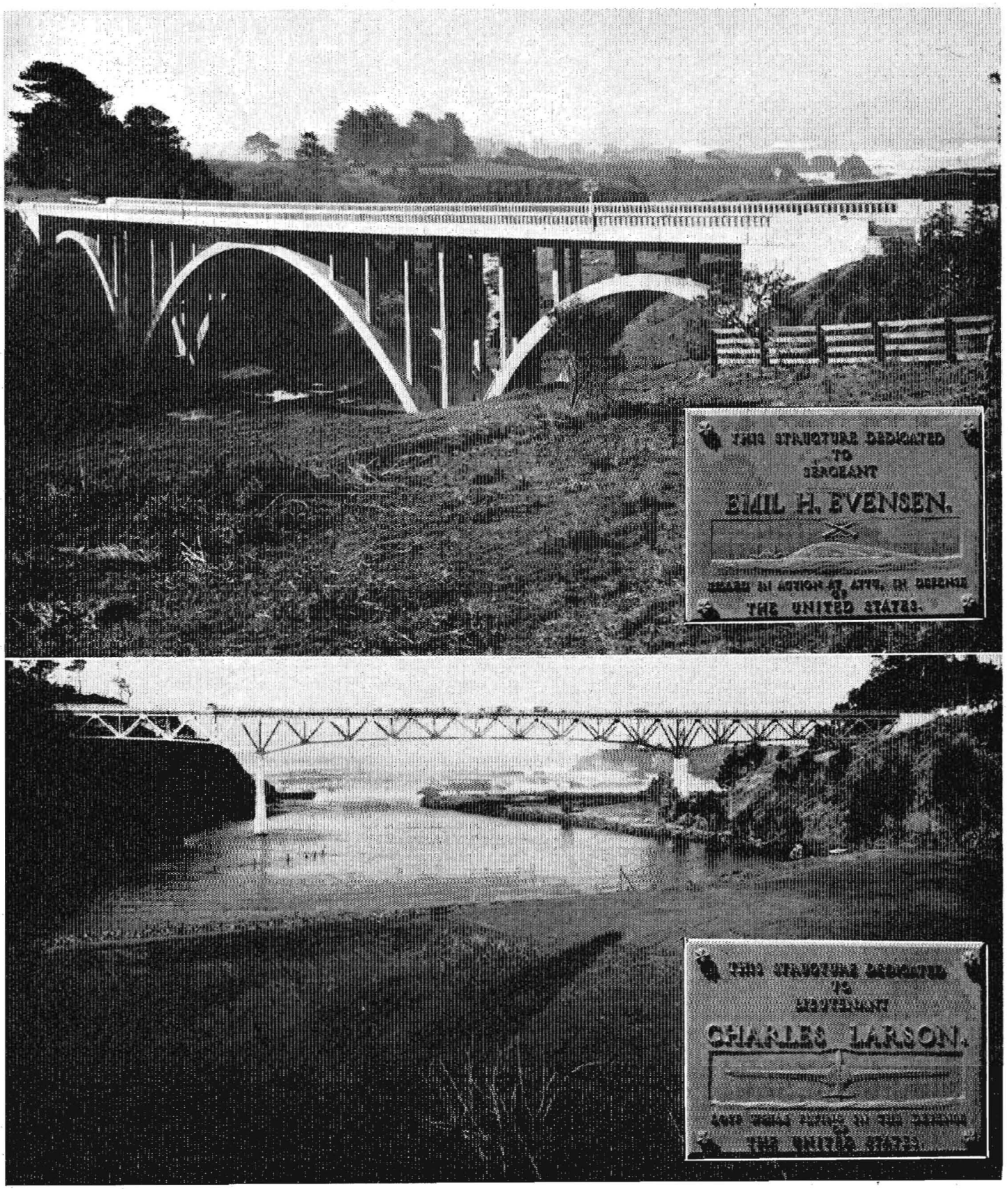
The steel was erected by means of a high line which provided considerable flexibility in the erection of the truss and also made the erection somewhat simpler because of the absence of the load of an erection derrick. The south anchor arm was erected first, followed by the south cantilever arm and then the north anchor and cantilever arms were erected. Using hydraulic jacks for adjustment, the suspended span was erected from each side to meet in the middle.

The substructure portion of the contract was done by the Guy F. Atkinson Company of San Francisco and the superstructure of the bridge was erected by J. H. Pomeroy and Company, Inc., San Francisco.

The total cost of the bridge was about $760,000. Harry Carter was Resident Engineer for the Bridge Department, Division of Highways.

Old Noyo River Bridge which is replaced by new span





Upper—New Hare Creek Bridge dedicated to Sergeant Emil H. Evenson. Lower—Noyo River Bridge dedicated to Lt. Charles Larson

Continued from page 14 . . .

Within the section between San Mateo and South San Francisco, 10 projects involving 11.4 miles of construction with a value of $8,500,000 have recently been completed or are now under construction. On completion, traffic will move between Peninsula Avenue in San Mateo and South San Francisco over divided pavement, with overhead structures for all cross traffic.

San Jose Bypass

Since the end of the war, U. S. 101 Bypass has been extended to its junction with U. S. 101 south of San Jose, practically bypassing the city toward the east thus precluding the necessity of through traffic using the heavily traveled city streets.

The two-lane road between Santa Rita and Chittenden road in Monterey County has recently been enlarged into a four-lane divided highway. Grading and surfacing the two new lanes at a cost of $1,834,000 has made an additional 15 miles of multiple lane highway available through this densely traveled area.

This is another sketch by Van der Goes showing completed, going and planned improvements on U. S. 101 from San Francisco to Santa Barbara

The portion of the coast route comprising U. S. 101 and U. S. 101 Bypass between San Francisco and Salinas has shared in the highway improvement program to the extent of $13,997,000. Projects completed since 1947 and now under construction involve 53.8 miles and comprise 39 contracts.

San Luis Obispo County

Two projects under construction and one recently completed will provide a four-lane divided highway between Pismo Beach and Cuesta Grade with exceptions to that part through San Luis Obispo.

This development is being accomplished by grading and surfacing two new lanes adjacent to the existing two-lane road. Improvement of the 14-mile section is being made at a cost of $3,634,000. Together with other construction between Salinas and Santa Maria, nine projects represent 24 miles and $4,166,700 have been completed or placed under contract in the past year.

In Santa Barbara

As traffic increased along the coast route it became necessary to move the highway route from the main streets of Santa Barbara. Steady development was made on the poorest parts of the

relocation but some inadequate connecting streets still remain. Three contracts which provide for grading and paving 2.2 miles of divided highway between Park Place and Rancheria Street including the Salsipuedes overhead crossing of the Southern Pacific Railroad will overcome most of the restrictions. Together with construction southeast of the city from Sheffield Drive to San Ysidro Road and that northwest from Hollister Wye to Fairview Avenue will permit uninterrupted movement of traffic through the city.

Multiple Lane Projects

Four other large projects within the section from Santa Maria to the Ventura County line contribute to the steadily increasing mileage of high standard highway. In all 31.1 miles of construction valued at $6,200,000 has been placed under contract in this section in the last two years.

In summarizing the 860 miles of U. S. 101 and U. S. 101 Bypass between the Oregon State Line and the Ventura County Line it should be noted that 250 miles are four lanes or more, 60 miles of which may be classed as city streets or highways within the limits of cities. Considering that 370 miles of the routes within this portion are south of San Francisco and that the greatest portion of four or more lane construction is also within these limits, then about 67 percent of the mileage carrying the highest volume of traffic has been improved to these standards.

Projects on U. S. 101 and U. S. 101 Bypass completed or placed under contract since the beginning of 1947 have developed 60 miles of this route into widths providing four lanes or more.

And More to Come

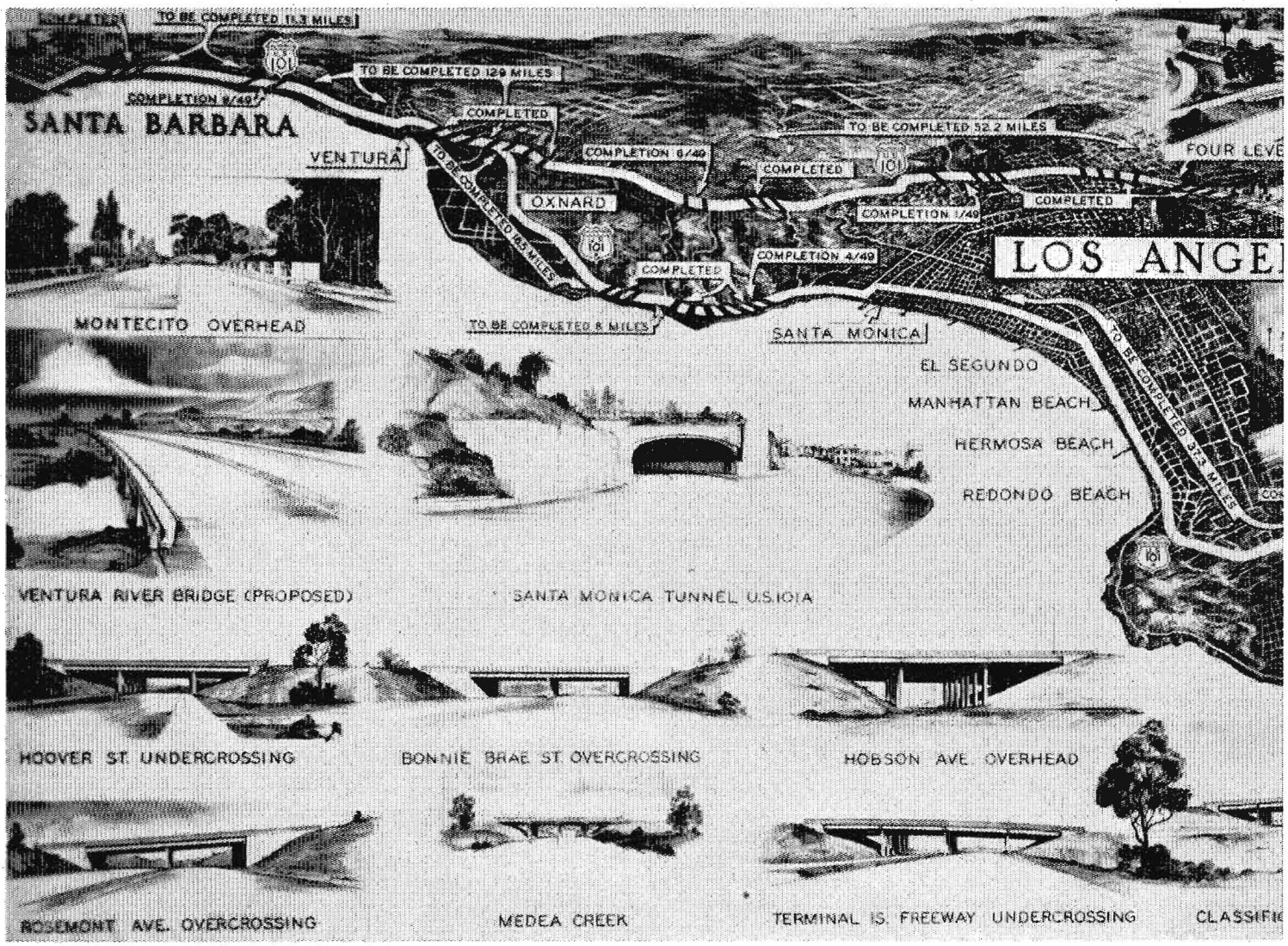
California Highways and Public Works
Division of Highways
Sacramento, Calif.

Just a line to express my appreciation for the Highway Journal I received from your office.

I find it most interesting and it is nice to learn first hand of the progress our State is making in building such wonderful highways, and such a pleasure to drive over them, too.

Yours truly,

MRS. BESSIE L. BAKER
648 37th Street, Sacramento



This sketch by Van der Goes, Bridge Department, Division of Highways, shows those sections of U. S. 101 from the northerly boundary of Ventura County to Laguna Beach in Orange County which have been converted to four-lane divided highways, which are now being improved, and which are budgeted for multiple-lane construction

IN THE State Highway Budget for the fiscal year from July 1, 1949, to June 30, 1950, adopted by the California Highway Commission, 32 projects estimated to cost $28,000,000 were approved to continue the improvement of U. S. 101 from the Mexican Border to the Oregon State Line.

In addition to providing for continued preparation of plans and acquisition of rights of way for future improvements on this route, construction of 40 miles of divided highway will be started during the next fiscal year.

In San Diego County, freeway construction will be started between San Ysidro and National City. In Orange County, eight miles of the Santa Ana Parkway will be constructed between Miraflores and the Los Angeles County line. In Los Angeles County, 4.2 miles of Firestone Boulevard between Lakewood Boulevard and Rosecrans Avenue will be improved to a four-lane divided highway.

In the City of Los Angeles, projects estimated to cost in excess of $9,000,000 were set up to continue construction on the Hollywood Parkway. When work now under way and the projects now authorized are completed this modern parkway will be opened to traffic between Grand Avenue and Western Avenue.

A length of 4.4 miles of new highway will be constructed from 1.7 miles west of Calabasas to 1.5 miles east of Malibu Junction in Los Angeles County, and at the Ventura-Santa Barbara County line 2.6 miles of new highway will be constructed in the vicinity of the Benham Overhead.

New construction is also scheduled between the Orcutt Wye and Santa Maria; north of San Luis Obispo from Cuesta Siding to 1.5 miles west of Santa Margarita; and in Salinas from the south city limits to Monterey Street.

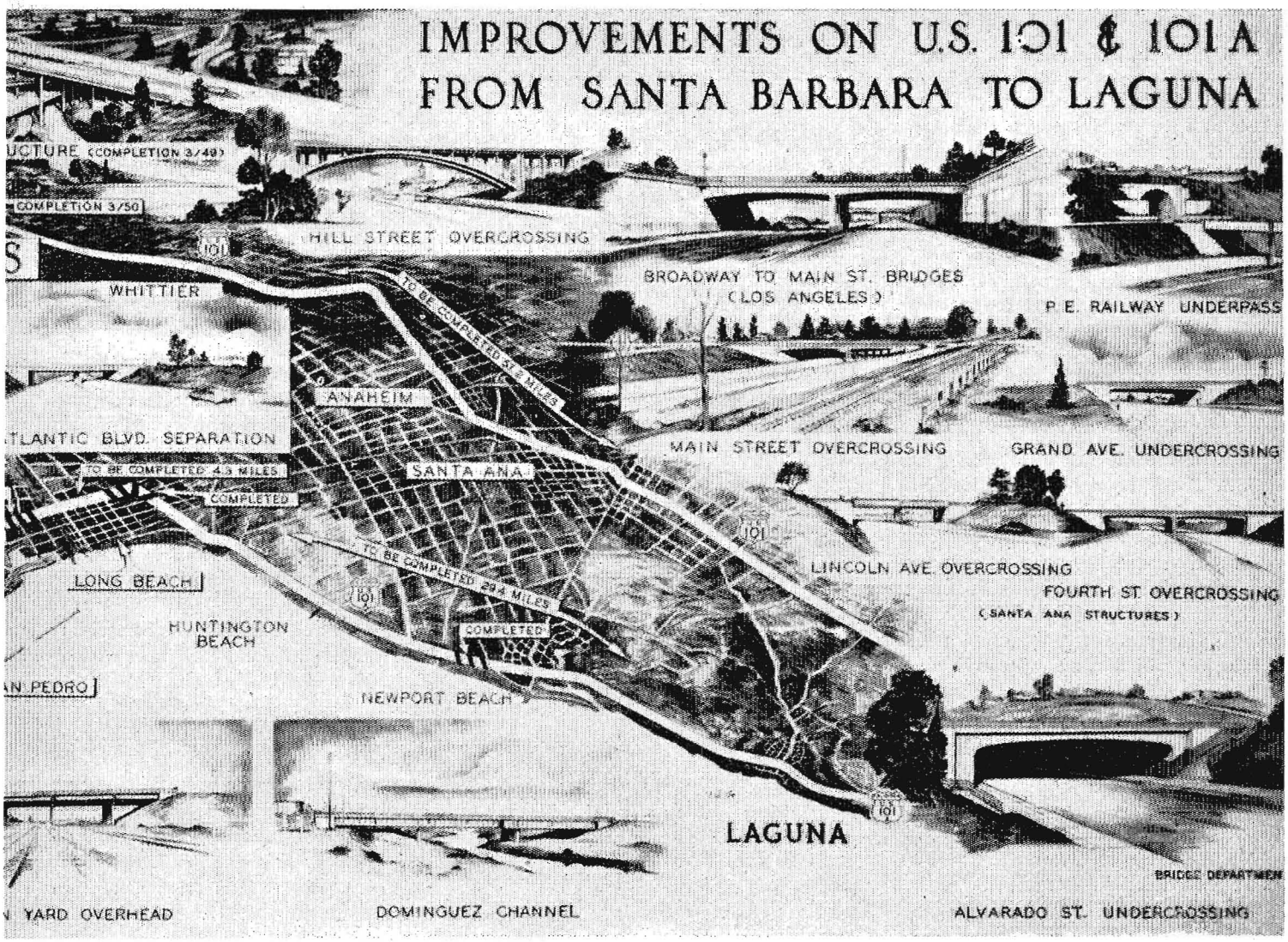
Grading and structures for a four-lane divided highway on 5.6 miles between the Sargent Overhead and Gilroy also were authorized.

On the Bayshore Freeway south of San Francisco, a grade separation is to be constructed at Sierra Point and two miles of this major freeway are to be constructed in San Francisco.

The present tortuous road around the Stone Lagoon south of Orick, in Humboldt County, is to be eliminated by construction of 3.8 miles of new road on the sand spit along the ocean.

Numerous other projects provide for resurfacing portions of present highway and miscellaneous work to increase traffic safety.

A detail of the approved projects with estimates of the cost, including necessary engineering to complete the work in its entirety, is as follows:



County	Description	Amount	Miles
San Diego	16th St. in National City to Mexican Border (portions), grade, pave, and structures	$1,687,000	2.5
San Diego	San Marcos Creek to Carlsbad (portions), surface	56,000	2.0
San Diego	Oceanside to Las Flores (portions), surface	47,000	2.0
Orange	Santa Ana Parkway—Los Angeles County line to Junction Route 2 at Miraflores (portions), grade, pave and signals	2,016,000	8.0
Los Angeles	Alameda to 3200 feet East (portions), surface	47,000	0.5
Los Angeles	Normandie Ave. to Route 60-D (portions), surface and shoulders	41,000	0.7
Los Angeles	Washington Blvd. to Venice Blvd. (portions), widen, sidewalks, and gutters	112,000	0.4
Los Angeles	Firestone Blvd., Manchester Ave. to Calden Ave. (portions), surface	22,000	0.4
Los Angeles	Firestone Blvd., Lakewood Blvd. to Rosecrans Ave., grade, pave and structures	806,000	4.2
Los Angeles	Hollywood Parkway—Alameda St. to Highland Ave. (portions), grade, pave, and structures	9,626,000	7.1
Los Angeles	1.7 miles west of Calabasas to 1.5 miles east of Malibu junction, grade, pave, and structures	1,120,000	4.4
Ventura	Montalvo to Ventura (portions), surface and shoulders	70,000	1.5
Ventura	0.2 mile east of Ventura County line to 0.2 mile east of Carpinteria, grade, surface, and structures	913,000	2.6
Santa Barbara	Orcutt Wye to Santa Maria, grade and surface	375,000	1.5
San Luis Obispo	Cuesta Siding to 1.5 miles west of Santa Margarita, grade and surface	594,000	2.0
Monterey	San Ardo to King City (portions), surface	275,000	4.2
Monterey	South city limits to Monterey St. in Salinas, grade and surface	280,000	0.9
Santa Clara	Gilroy to 0.5 mile south of Sargent Overhead; grade and structures	1,366,000	5.6
Santa Clara	Ford Road to Morgan Hill (portions), surface and shoulders	190,000	6.4
San Mateo	Vicinity of Sierra Point, grade and structure	1,008,000	
San Mateo	Grand Ave. in South San San Francisco to Broadway in Burlingame, landscaping	67,000	
San Francisco	Agusta to 25th St. in San Francisco, grade, pave and structures	3,890,000	1.4
San Francisco	10th St. to South Van Ness Ave. in San Francisco, grade, pave and structures	1,120,000	0.5
Marin	California Park Overhead to Richardson Bay Bridge (portions), surface and shoulders	112,000	1.5
Marin	San Rafael to Ignacio (portions), surface and shoulders	161,000	2.4
Sonoma	Through Santa Rosa, landscaping	56,000	
Sonoma	Healdsburg to Cloverdale (portions), widen and surface	224,000	
Mendocino	Sherwood Road to Sapp Creek (portions), surface	375,000	8.5
Humboldt	0.5 mile south of Stone Lagoon Summit to 1.0 mile south of Orick, grade	829,000	3.8
Humboldt	7.6 miles to 10.4 miles north of Orick (portions), surface	140,000	2.8
Del Norte	Richardson Creek to Klamath (portions), surface	112,000	2.0
Del Norte	10.6 miles to 6.3 miles south of Crescent City (portions), surface	207,000	4.3
		$27,926,000	

U. S. 101, South

Continued from page 14 . . .

the parkways which traverse the busiest part of the city is or will be accomplished through interchange structures, all cross traffic to be cared for by grade separations carrying vehicles either over or under the main arteries.

Interchange and separation structures placed under contract since 1946 total 30 and are included in 22 contracts. The most outstanding project is the four-level structure at the junction of the Hollywood, Arroyo Seco and Harbor Parkways which will serve for traffic separation and interchange between these routes and other city streets.

As an integral part of this unit, the six Figueroa Street bridges, two bridges over Beaudry Avenue, one at Sunset Avenue, one at Spring Street and three over Temple Street must be included. Those at the latter location are planned for future construction. Grading and paving the parkways proper has been so far confined to that portion of the Santa Ana Freeway between Ramona Boulevard Junction and Eastman Avenue. Traffic is now using the Santa Ana Parkway from Alameda Street to Soto Street.

Spring Street Structure

Construction has progressed sufficiently on the Spring Street separation structure to allow for grading a section in the vicinity of the Civic Center. This project for which bids were opened on November 26th, extends from Spring Street to Hill Street and will be the first section of grading to be performed on the Hollywood Parkway east of Highland Avenue excepting those locations incidental to bridge construction. The budget for the 1949-50 Fiscal Year contains an item for structures together with grading and paving on portions of the Hollywood Parkway between Alameda Street and Highland Avenue. Completion of the projects within this section for which funds have been allocated, will provide a major traffic artery over most of the distance from Western Avenue to the Civic Center.

Grading and paving 7.3 miles of highway together with structures between Universal City and Santa Ana represent an expenditure of $14,681,000 covering 35 contracts.

Santa Ana Parkway

Improvement along U. S. 101 Bypass will eventually be incorporated into the Santa Ana Parkway and is being developed to standards commensurate with the portion immediately adjacent to the west. A contract was awarded on September 15, 1948, for construction of 0.9 mile between La Verne Avenue and Eastland Avenue including a grade separation with the Union Pacific Railroad and continuation of the development of the freeway is made possible by inclusion in the 1949-50 Fiscal Year budget of three projects for grading and paving 15.7 miles between Lakewood Boulevard and Miraflores. With the completion of this work, the Santa Ana Freeway will be developed to parkway standards from the central district of Los Angeles to miraflores with the exception of two short sections easterly of the city limits of Los Angeles. Recent contracts for 6.8 miles of construction on this section total $1,775,000.

U. S. 101 Alternate

Between El Rio Junction and Doheny Park U. S. 101 Alternate is practically a shoreline highway. Northerly of Santa Monica the location is bordered by sheer unstable bluffs subject to severe sliding. Constant maintenance and correctional measures have been required to prevent losing large sections of the road. The demand has been so severe in recent years that relocation at critical points became necessary, one such portion being between Latigo Canyon and Malibu Creek. Construction of this project comprising 4.5 miles was recently completed at a cost of $1,843,000.

In August of this year extensive work was completed between Dominguez Channel and San Gabriel Avenue in the Long Beach area. Grading and paving 0.7 mile and constructing four bridges, an appurtenant part of the Terminal Island access highway development, was completed at a cost of $2,097,000.

Nineteen other projects scattered along U. S. 101 Alternate with an expenditure totaling $5,421,000 have provided 29.5 miles of improvement.

Less work has been done on the portion between Santa Ana and the Mexican border in the period covered by this article than any other section on U. S. 101. However, prior to and during the war military requirements were such that considerable portions of the route had been improved to high standards and maintained accordingly, particularly the extensive development of Harbor Parkway along the waterfront of the City of San Diego. A project was completed in April, 1947 for grading and paving 4.9 miles between San Luis Rey and Aliso Creek. This contract with others of less value add up to the 11.9 miles recently improved at a cost of 1,381,000. The Harbor Parkway development is scheduled for continuation in the 1949-50 Fiscal Year by the grading and paving of 2.5 miles between National City and Chula Vista.

The portion between the Santa Barbara County line and the Mexican border comprises 520 of the 1280 miles making up U. S. 101, U. S. 101 Alternate and U. S. 101 Bypass in California. During the 1947 and 1948 period, 48 miles of four or more lane construction has been completed or placed under contract in Southern California and now totals 270 miles of which 86 miles may be classed as city streets or highways within cities.

Thank You

Office of
JOHN BOARDMAN
City Engineer
Brawley, California

Mr. E. E. Wallace, District Engineer
Division of Highways
1365 Harbor Street
San Diego 1, Calif.

Dear Sir: The resurfacing of the state highways in the City of Brawley has been completed in a very satisfactory manner by the contractor. That this has been accomplished has been due to the efficient inspection and supervision of your engineer, Mr. Roy Payne, and his force.

I wish to express the thanks of the people of the City of Brawley for this improvement.

Very truly yours,
JOHN BOARDMAN
City Engineer

Tehachapi

New Mountain Highway In Kern County Opened

By J. W. COLE, Associate Highway Engineer, and
T. J. DUNN, Resident Engineer on Bridges

YEARS of wishful thinking, followed by a decade of planning by Kern County officials and civic organizations, which resulted in constructive action by the California Highway Commission, culminated on Sunday morning, October 31st, in a celebration in the City of Tehachapi.

The occasion was the official dedication of the recently completed section of highway on U. S. 466 between Keene and Tehachapi. It marked 24 years of effort to provide a safe road between these two mountain communities linking Tehachapi and points east with Bakersfield and the San Joaquin Valley.

Representatives of the State and city and county officials of Kern journeyed to Tehachapi to join the citizens of that jubilant municipality in a ribbon-cutting ceremony signalizing the opening of the new route.

A program of music by the Bakersfield Musicians' Union directed by Lawrence Foster and arranged by the Kern County Recreation and Cultural Commission, and short addresses by local and visiting officials preceded the cutting by Assistant State Highway

Ribbon cutting ceremony at Tehachapi. Left to right, front row: Misses Jeannine Callahan, Estelle Williams, Virginia Zachery and Joanne Summy. Back row: Col. S. A. Gilkey, behind Miss Callahan; Col. M. H. Rau, Muroc Army Air Base; State Senator J. R. Dorsey, Assistant State Highway Engineer R. M. Gillis, Mayor J. C. Jacobsen of Tehachapi; Sheriff John E. Loustalot, District Highway Engineer Earl T. Scott and Supervisor Charles P. Salzer, Bakersfield

This view shows new Keene-Tehachapi highway crossing Tehachapi Overhead

Engineer Ridgeway M. Gillis of a white ribbon held by four charming girls, Joanne Summy, Tehachapi; Jeannine Callahan, Mojave; Estelle Williams, Bakersfield, and Virginia Zachery, East Bakersfield.

Mayor J. C. Jacobsen of Tehachapi, General Chairman, and Robert Hackett, Vice President of the Greater Bakersfield Chamber of Commerce, introduced speakers at the dedicatory ceremonies. They included:

State Senator J. R. Dorsey, Coy Burnett, President, Monolith Portland Cement Company, which operates a plant four miles east of Tehachapi; E. T. Scott, Fresno, District Highway Engineer; J. R. Thornton, Bakersfield City Manager; A. E. Windmueller, Automobile Club of Southern California, and Sheriff John E. Loustalot, who traced the historical development of the new Keene-Tehachapi Road.

Sheriff Loustalot lauded organizations and men who many years ago sought a new link between Keene and Tehachapi to replace the old road that was hazardous, steep, narrow and winding. The Kern County Chamber of Commerce had a committee working on the program then. The late Alfred Harrell, Perry Brite, former chairman of the board of supervisors, and Stanley Abel, former supervisor, were active in promoting the new road.

Among those introduced at the ceremonies were W. E. James, State Assemblyman; C. W. Harty, Charles P. Salzer and A. W. Noon, County Supervisors; K. R. Creswell, Assistant County Fire Chief; Colonel S. A. Gilkey and Colonel M. A. Rau, Muroc Army Air Base; Stanley Abel, Executive Director, U. S. 99 Highway Association; Ardis M. Walker, Isabella, Supervisor-elect; Judge W. D. Keller, Lancaster Chamber of Commerce; Jake Vanderlei, Mayor of Bakersfield; W. F. Reynolds, Executive Director, and Emory Gay Hoffman, Manager, Kern County Chamber of Commerce; Josh Clarke, Chairman, Kern County Chamber of Commerce Highways Committee; Robert Byers, President, Mojave Chamber of Commerce; Chester A. James, County Director of Public Works; S. W. Lowden, Bishop, District Highway Engineer; W. D. Burnett, First Vice President, Monolith Portland Cement Company.

District Engineer Scott, who had charge of the project, said the new link "is an interesting road from the standpoint of engineering." One of the problems that had to be overcome, requiring considerable expense, was the Tehachapi Creek, which has caused devastating damage in the past during flood-time.

A cavalcade from the American Legion Rough Riders, Bakersfield Post No. 26, helped lend color to the celebration.

Following the ceremonies, visiting officials were honored at a special luncheon sponsored by the Kern County Chamber of Commerce and arranged by the Tehachapi Chamber of Commerce.

Committeemen arranging the celebration including Ed Spacke, O. W. Mitchell, George Teagarden, E. A. Edell, Henry F. Quade, Jacob Wiens, A. A. Farrar, Bert Oberg, Walter Johnson and O. V. Spencer, all of Tehachapi; Warren Bruce, Mojave Chamber of Commerce; Dick Leask, Bakersfield Chamber of Commerce; Art Mason, Bakersfield; Manager Hoffman, President F. H. Kalloch, and Jimmy Radoumis, of the Kern County Chamber of Commerce.

Through Tehachapi Gorge

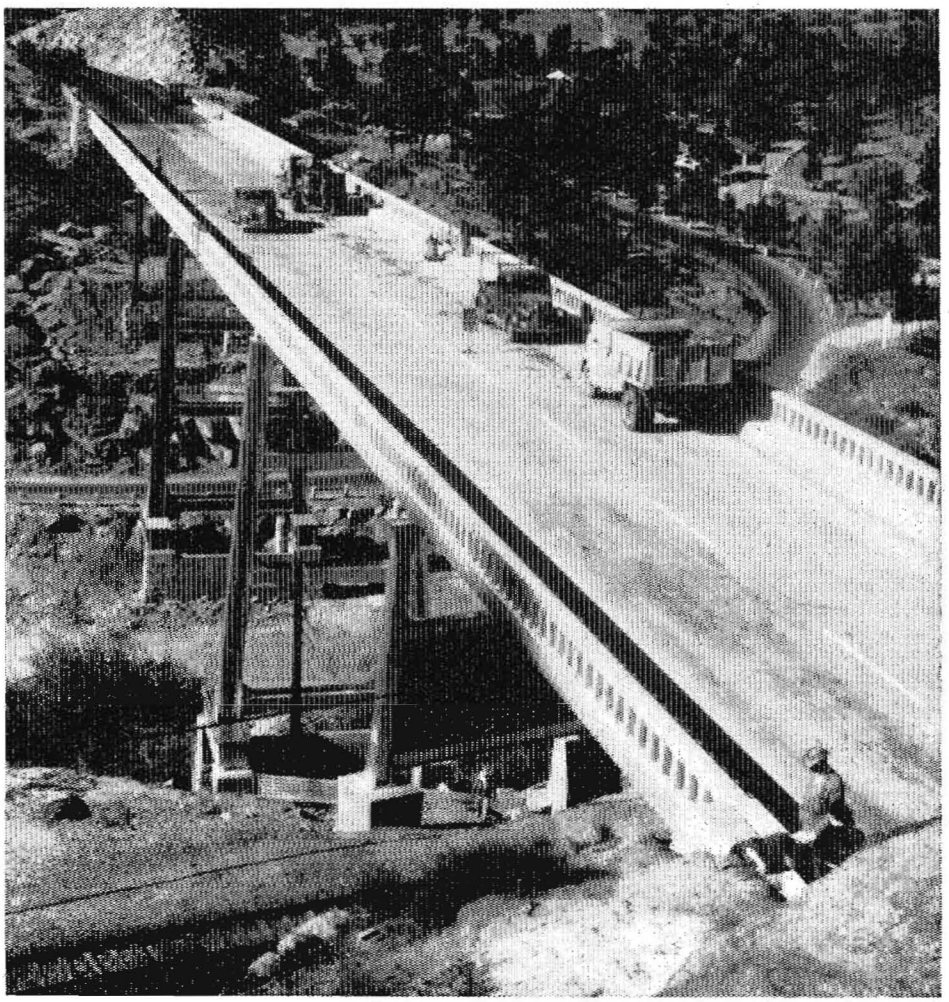
The new highway passes through the gorge of Tehachapi Creek. The Southern Pacific Railroad also passes through the gorge on the opposite side of the creek from the highway.

Tehachapi Creek is normally a small stream but occasionally storms of cloudburst proportions turn the stream into a raging torrent. At peak flood it has been estimated to carry 33,000 second feet.

Two floods of recent years have taken many lives and caused much damage to the railroad and considerable damage to the highway slope protection where channel changes had been made.

The plans for the new highway called for bituminous surface treatment three inches in depth for the entire width of the roadbed, with shoulder dykes or berms composed of the same material.

The material used consisted of imported borrow and liquid asphalt SC-4. The imported borrow was decomposed granite taken from three borrow pits located along the banks of Tehachapi Creek and one pit located about two miles west of the town of Tehachapi. There was considerable oversize in the material which the contractor elected to hand pick on the grade as it was spread and mixed.



This photo of Tehachapi Creek Bridge shows Southern Pacific Railroad tracks in lower foreground and section of old highway in background across creek

Construction

The imported borrow was loaded with a 2½-cubic-yard Northwest Shovel and hauled in dump trucks to the roadbed. It was placed in layers of the specified thickness and brought up to finished grade and later scarified, pulverized and mixed with the SC-4.

The considerations that determined this method, rather than placing the top three inches in a separate and final operation was that the construction work on rubble masonry walls was still in progress when the imported borrow was being placed. This in turn made it impossible to complete the grading between Stations 540 and 585 Sec. E, and to place the top three inches in a separate and final operation, would have caused several long moves over rough construction roads, with the Northwest Shovel.

Some Difficulty

Considerable difficulty and expense was encountered in scarifying and pulverizing the material in preparation for mixing with liquid asphalt. The imported borrow contained enough cementing properties to make it a difficult procedure to scarify, without going below the depth desired for mixing. Water was used to mellow it up, and then it was scarified with the motor grader, a harrow and disc and allowed to dry before placing in the windrow. The windrows were made with a sizer and mixed with a Woods mixer. The rolling was done with a pneumatic roller pulled by a rubber-tired tractor and a tandem roller. The dykes were rolled with a special roller designed by Mr. Woods. It consisted of two steel cones welded together at the apex of the cones and filled with concrete. It was pulled by the rubber-tired tractor. The special roller gave the berms a dressed appearance but did not get as much compaction as could be desired.

Tehachapi Superstructures

The Tehachapi superstructures contract consisted of constructing steel plate girder superstructures with concrete decks for two bridges and for two combined bridges and railroad overheads. All of the bridges have a clear roadway width of 26 feet and two safety curbs each 1 foot 9 inches wide.

Two of the bridges are across Tehachapi Creek in the vicinity of Cable. Bridge No. 50-171 is on a 1,000-foot horizontal curve and consists of four spans with a total length of 292 feet 8 inches. The piers for this bridge were originally intended to be of rubble masonry and were partially constructed several years ago by convict labor. The remainder of the piers and the abutments were built of concrete as a portion of the roadway contract which was completed in 1947. Bridge No. 50-172 is a single span structure 98 feet 4 inches long. The rubble masonry abutments for this bridge were started

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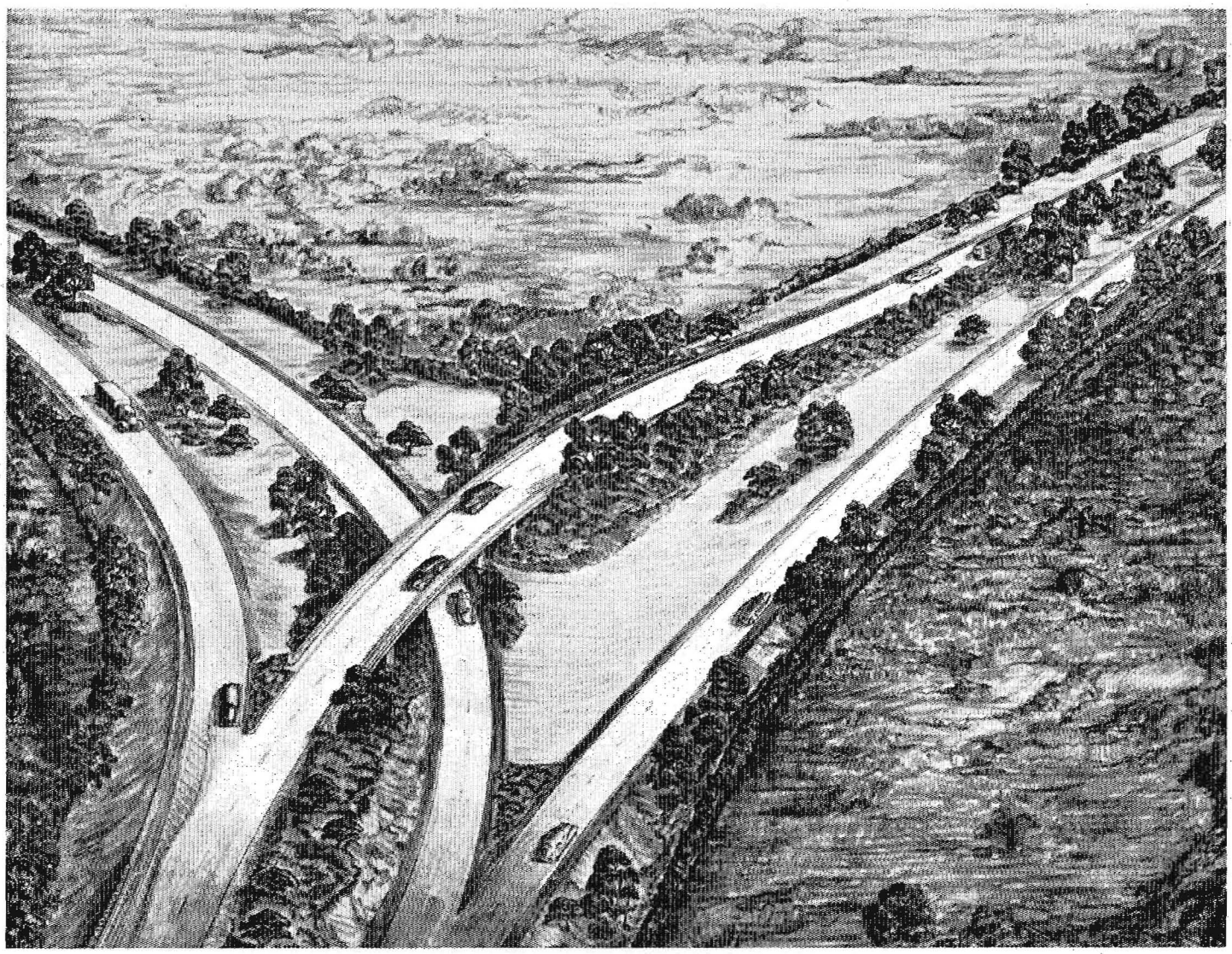


Here is an artist's conception of a portion of the North Sacramento Freeway as it will look after it is landscaped. Planting of oleanders, lilacs, Japanese cherry trees, flowers and lawns is to be started this fall. The sketch shows the junction of the freeway and Del Paso Boulevard, where landscaping is to be extensive. The work is under the direction of H. Dana Bowers, landscape engineer for the State Division of Highways

U. S. 40 Freeway Sets Record First Year

U. S. 40 Freeway, which bypasses North Sacramento and carries one of the largest road volumes in the State, has completed its first year of service without a single fatal accident, according to State Highway Engineer George T. McCoy.

"During this year, vehicles used the freeway over nine million times, yet an average of only one accident every 23 days occurred between its termini," McCoy said. "Here is striking evidence of the safety and efficiency inherent in freeway designing. The total elimination of cross-traffic and left turns, physical separation of opposing streams of traffic, and the exclusion of roadside conflicts, has practically eliminated accidents which occur most frequently on nonfreeway roads.

"During the year prior to opening the freeway, there were 22 accidents on the 1.5-mile rural section of the old route on the east of North Sacramento. From the comparable section of freeway, there have been only six accidents or a 73 percent reduction in the number of accidents.

"Freeway designing has not only provided greater relief from the usual dangers of driving, but its efficiency is reflected by the increasing number of drivers who are attracted to its use. This increase in volume, together with the decrease in the number of accidents, greatly emphasizes the safety factor."

All-time High in Auto Influx Set

Representing the greatest three-quarter year influx of cars in state history, an all-time high of 781,445 out-of-state autos, carrying 2,133,009 passengers, entered California during the first nine months of this year.

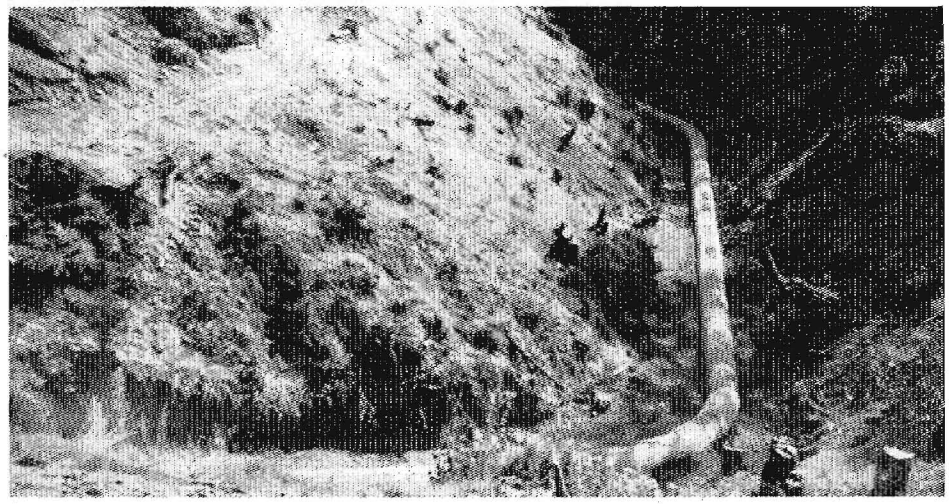
Redwood Highway

Curves on Route Are Abolished

By CHARLES A. SHERVINGTON, Senior Highway Engineer

Motorists now driving over the Redwood Highway from Red Mountain Creek to Piercy in Mendocino County for the first time are unaware of the 3.2 miles of narrow winding road that would have confronted them had they made the trip a year and a half earlier. Those who have traveled the road frequently can well appreciate the difference in driving over the present easy curves, wide roadway, and paved surface as compared to the road that preceded it.

The whole portion of the old road consisted of a series of short radius curves, some as low as 50 feet, with short or no intervening straight stretches, and with the traveled width as narrow as 16 feet, with little or no shoulder. The total curvature on the old road was 2,978 degrees, as compared to 807 degrees on the newly constructed road. The minimum radius on the improved alignment is 500 feet.



R. C. Arch culvert 462 feet long under 70,000 cubic yard embankment. Depth and winding alignment of creek prevented obtaining picture of entire installation in one photograph

War Delays Project

The improvement just completed had been planned for some time and was originally advertised for contract in November, 1942. Due to the war, however, bids received were in excess of the estimate, and, since availability of materials was doubtful, the project was postponed and included high on the priority list for postwar construction. It was then proposed to start construction during the summer of 1946. However, federal regulations regarding steel and other building material shortages delayed advertising the project until the fall of 1946, when wet weather conditions prevailing in this section of the State precluded starting any construction other than clearing.

Clearing the 42 acres covered with dense brush and trees was carried on during the winter of 1946-47. The terrain did not dry out sufficiently to permit start of heavy grading until almost April of 1947.

Slide Removal

All grading, placing of gravel base, cement treated base, and one course of plant-mixed surfacing on this 3.2-mile section was completed during 1947. The rainy season of 1947-48 prevented completing the surfacing items at that time. While the balance of the State was suffering from a drought, the rainfall in this area was near normal. The rain gauge maintained at the Garberville Maintenance Station, 13 miles northerly from the project, recorded a total rainfall for the year 1947-48 of approximately 49 inches.

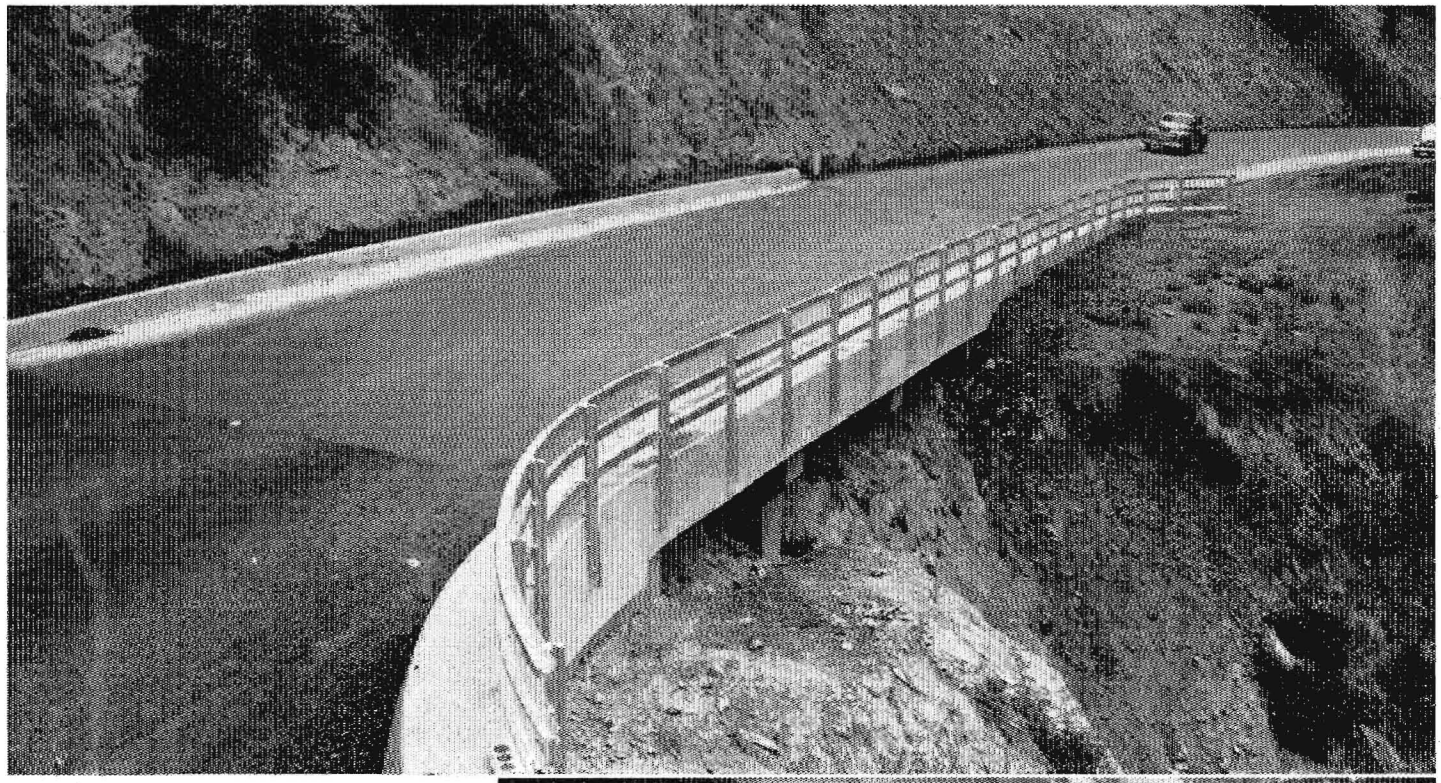
During this wet period the contractor was busy moving slides. Despite the fact that the project was designed with flat slopes and benches provided in many of the cut slopes, several large slides occurred. Some idea of the unstable terrain through which this improvement was constructed can be obtained from the fact that, out of a total of 504,000 cubic yards of roadway excavation moved, 113,900 cubic yards was material from outside of the planned roadway section.

Outstanding construction features are the large stabilization trenches required to stabilize the hillsides to support the roadway embankments, the construction of an arch culvert 462 feet long with an opening of 16.71 square feet, and the construction of a reinforced concrete sidehill viaduct supported on steel H piles.

Stabilization Trenches

A total of 12 stabilization trenches were constructed, involving approximately 75,000 cubic yards of trench excavation, 20,000 cubic yards of rock-filling material, and 2,750 lineal feet of 12-inch perforated metal pipe underdrain. The presence of much underground water in the hillsides on which embankments were to be constructed made doubtful their capacity to support the weight of the embankment without failure. The stabilization trenches were constructed so as to remove unstable material and intercept the underground water by blanketing the excavated slopes with rock-filling material and draining off the flow of water through the 12-inch perforated metal pipe.

These stabilization trenches were the first order of work before the major grading could be done. In most cases the back slopes of the trenches cut into



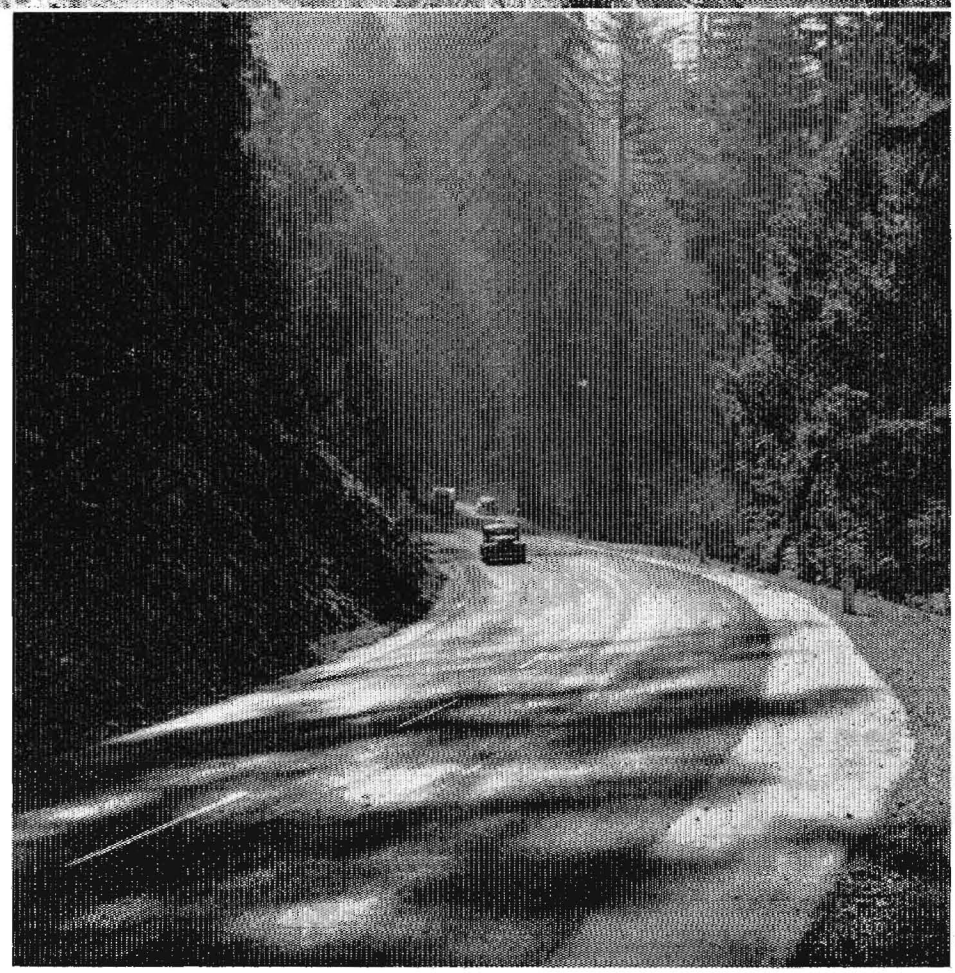
the existing traveled way and, since the slopes were in unstable material, they invariably started to slide, forcing the roadway to be excavated further into the sidehill to provide a two-way road for the traffic.

Trenches Effective

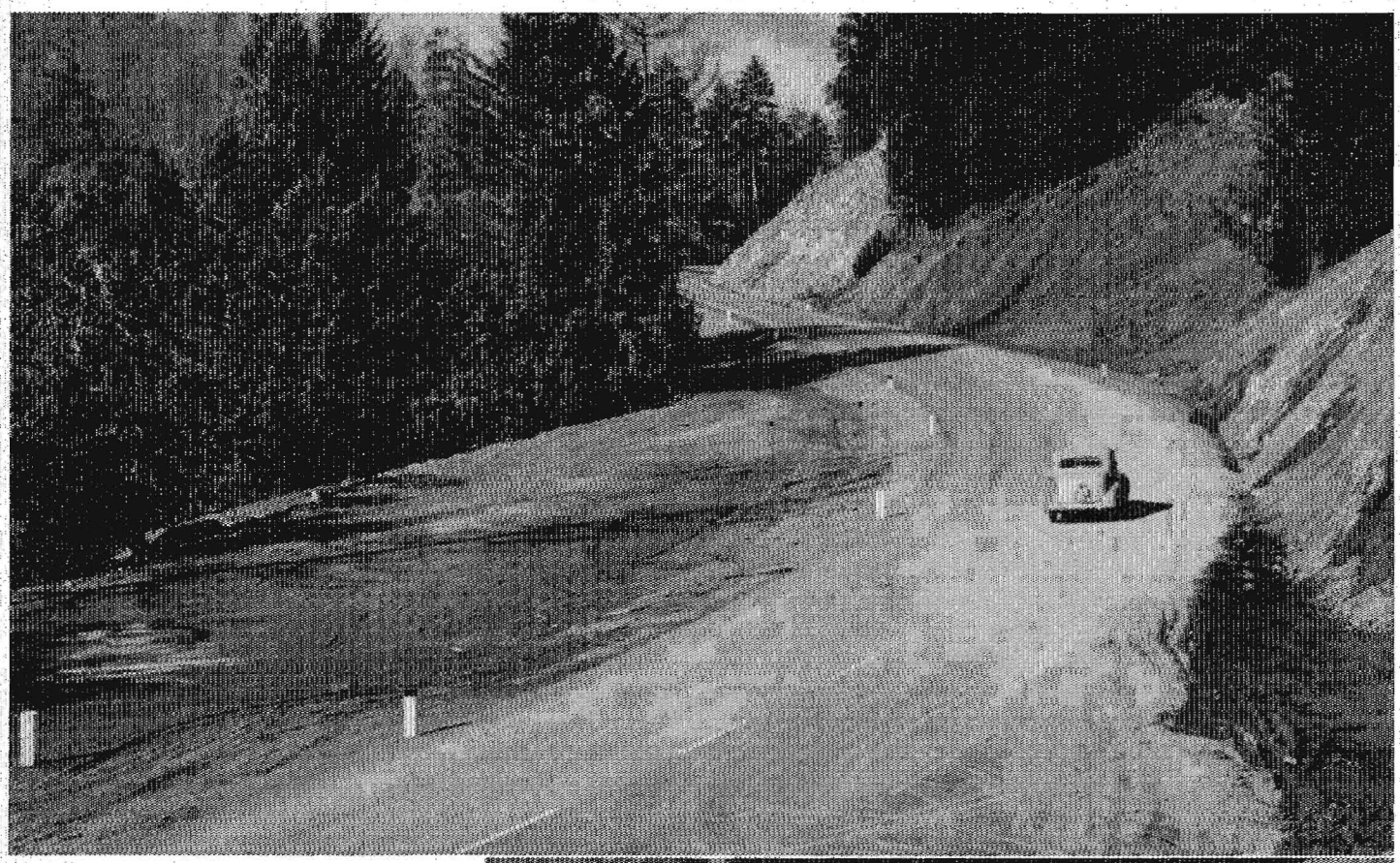
Work on the stabilization trenches, once started, had to be carried on with the greatest expediency to complete the required construction before excessive sliding occurred.

The effectiveness of the stabilization trenches was observed during the winter months when a considerable flow of underground water intercepted by the gravel blankets in the trenches flowed from the outlets. The gravel blanket beneath the 12-inch underdrain pipe, in most cases, carried the majority of flow; however, following periods of heavy rainfall, the pipes in some instances flowed as much as one-third full.

The long arch culvert was constructed on curved alignment in the creek bottom to permit the construction of an embankment of approximately 70,000 cubic yards. This embankment carried the new road over the creek on straight alignment as compared to the old crossing made by a hairpin turn having a radius of 50 feet.



Upper—Red Mountain Creek Bridge. Lower—Approaching McCoy Creek crossing



This old curve was posted with "Stated Speed" signs for 15 miles per hour, and was a point of recurring accidents.

Sidehill Viaduct

The sidehill viaduct is constructed on a sandstone bluff approximately 230 feet above the Eel River. No detour was available, so the structure had to be constructed one-half width at a time. The river side, or portion that overhangs the bluff, was constructed first while traffic was handled on a one-way road on the excavated bench section. Upon completion of the river side, traffic used this as a one-way road while the other half was constructed. In order to drive the steel H piles on the bank side, it was necessary to hold up traffic while each of the piles was driven. This necessitated walking the pile driver back and forth to allow for the passage of traffic after driving each pile.

In addition to the 3.2 miles constructed on new alignment, an additional 1.4 miles to the north, which was constructed on standard alignment in 1938, was included to receive the new

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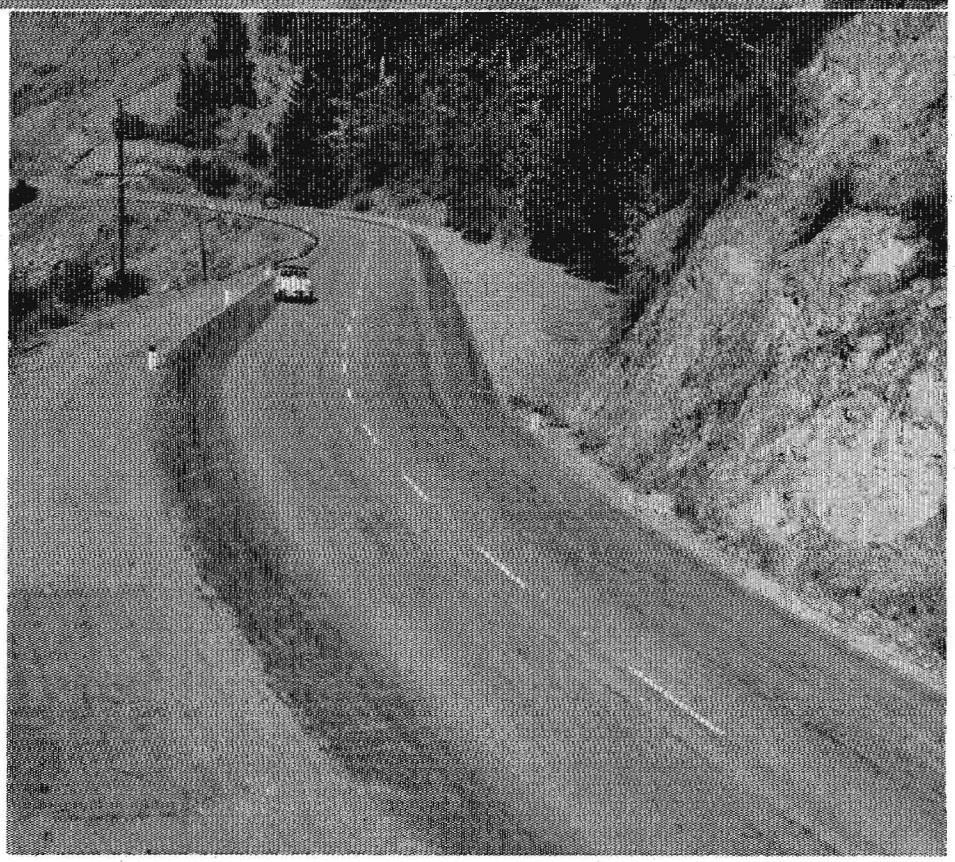
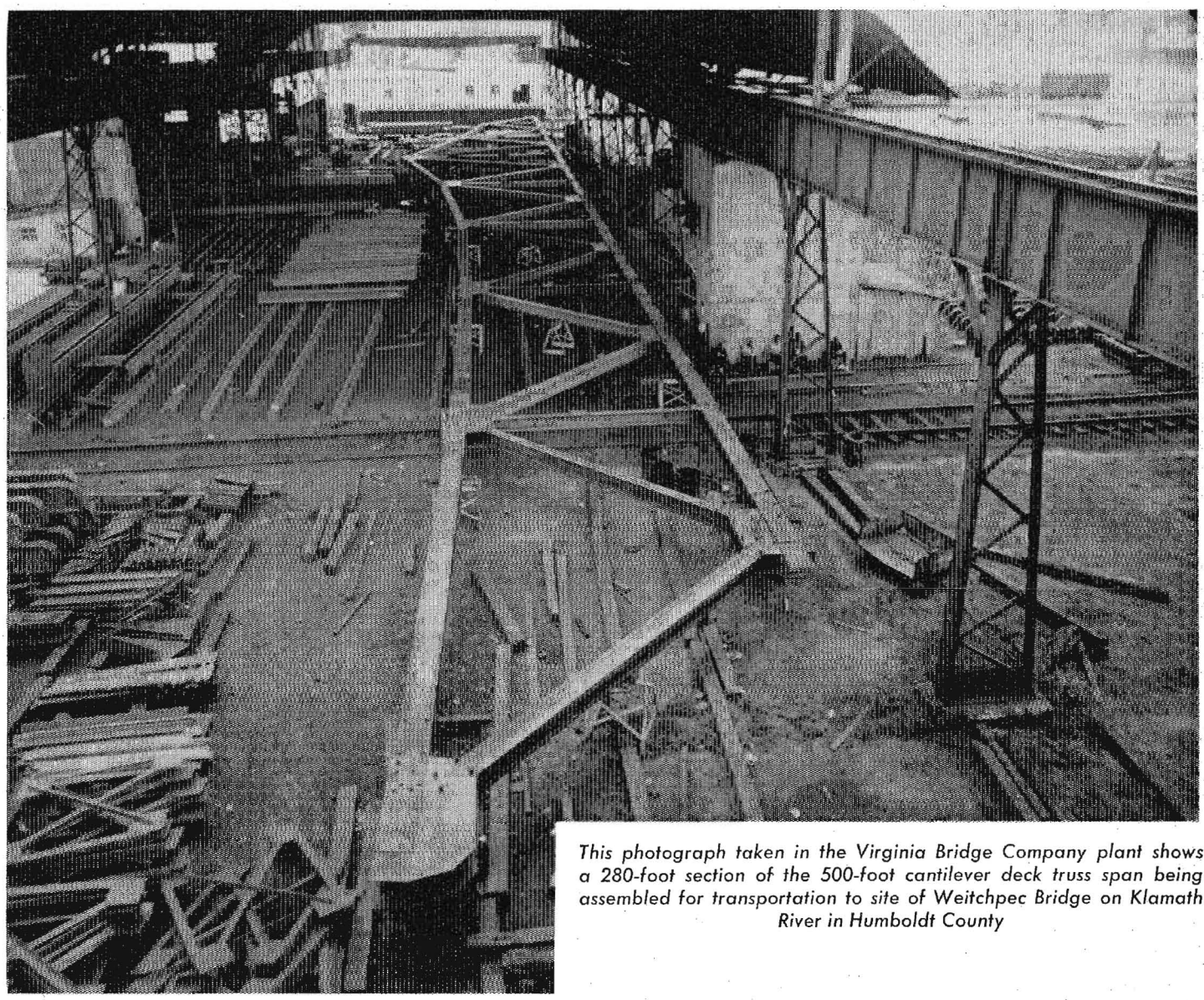


Upper—Wide roadway replaces former narrow road through unstable area. Lower—Easy curves along Eel River replace former winding road



This photograph taken in the Virginia Bridge Company plant shows a 280-foot section of the 500-foot cantilever deck truss span being assembled for transportation to site of Weitchpec Bridge on Klamath River in Humboldt County

Weitchpec Bridge Truss Assembled in Shop

By I. O. JAHLSTROM, Principal Bridge Engineer

ALMOST everyone is a "sidewalk superintendent" or "curbstone engineer." Haven't you noticed the crowd of all kinds of people which watches excavations for large buildings, erection of steel bridges and steam shovels at work?

With this in mind it was thought that the readers of this magazine would be interested in seeing how a bridge truss is assembled in the fabrication shops before erection. This is one step in the construction of a bridge that is difficult for the "curbstone engineer" to observe.

The accompanying picture was furnished by the Virginia Bridge Company, which is fabricating the steel trusses for the Weitchpec Bridge, now under construction by the Division of Highways, over the Klamath River in Humboldt County where the Trinity River runs into the Klamath. This bridge will replace an old suspension bridge which passed its "threescore and ten." Due to the high water which occurs frequently at this location—sometimes 90 feet deep in the canyon—it was necessary to construct a high level bridge with long span.

The truss in the picture is about a block long and shows the large buildings and equipment required for this work. The men eating lunch at the side of the building give a relative size of the truss.

It is necessary to assemble large trusses of this kind on their side, or flat, to see that the truss as a whole,

when the members are connected, has the desired and necessary over-all shape and that it will go together without difficulty when erected high in the air at the bridge site. It is easy to see that any necessary corrections are much more easily and economically accomplished in the shop rather than at the bridge site, which in this case is far from so-called civilization.

In the picture you will note the "plugs" called "drift pins" which are placed in the rivet holes. This pulls the members together in the same position that they will be in when riveted. Some of the holes are then bolted and the truss checked for proper over-all dimensions. These holes are then filled with rivets when the trusses are finally erected, drift-pinned and bolted, ready for the rivets which are finally driven in the field and tie the structure together as a permanent bridge on the highway system.

After the truss is assembled, as shown in the picture, and checked for shape, curvature, matching of holes, camber and dimensions, it is then taken apart and the individual members hauled to the bridge site to be reerected on its final location.

Redwood Highway

Continued from page 45 . . .

surface of six inches of cement treated base and three inches of plant-mixed surfacing, making a total length of 4.6 miles of good driving road.

Traffic Difficulties

Surfacing of the entire 4.6 miles of roadway was completed during the summer of 1948.

Some idea of the difficulties encountered by the contractor in constructing the road in this mountainous country, where no detours are available and traffic must be carried through construction, can be had from the following observation made during the summer of 1947 when grading operations were at the peak and tourist traffic was the heaviest. Traffic was held up for periods of 20 minutes while the tractors and scrapers made their rounds. It then took approximately 15 minutes to clear traffic in both directions, or a total lost time due to traffic of approximately 40 percent. This probably could have been overcome by operating a night shift, but sufficient skilled equipment operators to work two shifts could not be obtained to work in this territory.

The improvement was constructed by Oilfields Trucking Company and Phoenix Construction Company, of Bakersfield, with the sidehill viaduct and drainage structures subcontracted to O'Connor Brothers, of Red Bluff. The author was Resident Engineer, with Alton F. Kay as Resident Engineer for the sidehill viaduct.

Tehachapi

Continued from page 41 . . .

by convict labor and were completed under the roadway contract.

Keene Overhead

The combined bridges and overheads are of five spans each, and both cross Tehachapi Creek and the Southern Pacific Railroad. The Keene Overhead is 375 feet long and consists of steel plate girders with a concrete deck and supported on structural steel bents. The north abutment and the bent footings for this bridge were completed by convict labor. They present, in appearance, an unusually fine example of coursed rubble stone work. The Tehachapi Overhead is located about two miles north of the City of Tehachapi and is 465 feet in length. The piers for this bridge are of reinforced concrete and were constructed as a portion of the previous road contract.

Structural steel for the bridges was fabricated in the San Diego shops of the National Iron Works and, for the most part, was delivered to the site in trucks. Considerable work was necessary in order to develop haul roads to move the girders, some of which were 104 feet long, from the highway into a position from which they could be lifted into place. The subcontractor placed the structural steel with a 30-ton crawler crane operating from temporary roads beneath the bridges. The Southern Pacific tracks through Tehachapi represent one of the busiest railroads in the country, and it was necessary for the steel crews to work in close coordination with the railroad in order to place the spans over the tracks.

Drainage

Continued from page 17 . . .

This requires more frequent cleaning and, at some seasons, a continuous patrol not otherwise required.

The development of design and practice as they relate to removal and disposal of water from the road surface has reached a stage of thorough effectiveness. There remains the matter of selection of type and of standardizing the shape. In areas where snow is removed in the winter, the low plant-mixed dike on fills is the more desirable, although this advantage is of lesser importance where the shoulder width is five feet or more. The paved gutter through cuts is satisfactory in snow removal areas only where a paved shoulder width of not less than five feet is available for storage. In the open range country where stock may be on any unfenced highway, less damage will be done to the plant-mixed dikes, particularly those compacted by a finishing device equipped with a heater.

Durable Dikes

In much of the State, vegetation will break through a two-inch facing of plant-mix on an earth dike. This will not occur so readily, if at all, where all plant-mixed dikes are used. Quite generally, in District II, the all plant-mixed dikes have been found to be more durable, more sightly, and more serviceable than any other type and to be well worth the small additional cost.

When the shape and dimensions of these drainage devices become sufficiently standardized so that contractors may design equipment for their construction with assurance that it need not be remodeled for each job, the cost of these drainage facilities may be expected to decrease and a permanent and economical solution will have become established for what has grown from a minor to a major drainage problem on state highways.

From Bad to Worse

The driver who makes a sudden turn in traffic without signalling may find that he has taken a bad turn for the worse.

Team Spirit

A Letter Written to an Industrial Organization

The following is one of a series of letters written by Carl F. Braun, President of C. F. Braun & Co., to the employees of his company, which might well be read by all employees in both private and public organizations.—*Editor.*

EVERY American knows the meaning of team spirit. It means mutual confidence, and faith, and loyalty, throughout a working group. It means enthusiasm for the aims of the group as a whole. Without team spirit, work can never be what it should be—the greatest of our interests and pleasures. We all want team spirit, surely. But how to get it?

I—GIVE RESPECT WHERE DUE

Mutual Respect

The cornerstone of the whole thing, the beginning and the end, is the respect that every member of the group can feel for every other member. This respect can have but two sources. The man's work, and the man's general conduct. If he does well the particular job that is his to do, we give him a measure of respect regardless of other considerations. But to have our fullest respect, he must do more. He must, while doing his job, be decent and kind and thoughtful of his fellow-workers.

Respect for Job

Now then, let's first get out of our heads that the size of the job, or the nature of the job, should have anything to do with our respect for the man. We need all kinds of things to be done. One man is fitted for one thing, one man for another. One man likes certain work, one man another. If, then, he does well, and to the very best of his ability, the thing that he is fitted to do, he is worthy of our respect. Let's be sure that we give it to him.

Natural Limitations

Every man has been given some good points. But every man likewise has had placed upon him certain natural limitations. If some weight-lifting is to be done, we don't expect the little fellow to lift as much as the big fellow. All we ask of each is that he do his best. If he does, we respect him. If he doesn't, we don't respect him. Let this be our yardstick, whether the limitation be physical, mental, or anything else.

Action and Reaction

If a man seems to be self-centered, thinking chiefly of self and little of others, we may find it hard to give him our respect. But just let us remember that in all human relations, we find action and reaction. The best way to get a man to be thoughtful and considerate of his fellows, is for his fellows to be thoughtful and considerate of him. It's a rare and ingrained pessimist who can resist decent treatment. Let's be sure that we do our part before we expect it of others.

Respect Both Ways

Every leader in the company assuredly wants the respect of those whom he leads. Here again comes in the law of action and reaction. The leader need not expect his workmen to have a sympathetic respect for the leader's work and problems, unless the leader first has a sympathetic respect for the workman—for his job, his work, his interests. And the leader must do more than have respect for his men. He must show it. Again, we may put down as law that it's a hardy hater who can long resist the heart-warming experience of honest respect.

Respect His Trend

The important thing in judging a man, is not what he is. The thing to look at is, What is he becoming? He may seem pretty bad when we first have contact with him. Don't think too much of it. Wait—and see how he is when we meet him next month. If he shows genuine improvement, then let's give him our respect and help and encouragement. The real questions to ask about any man are, What is he becoming? and, How rapidly? and, How consistently? In engineering-language, What is his curve?

II—TELL HIM SO

Praise When Possible

Our respect for a man will do no good unless we find ways of showing it. True, we all agree that the good leader is the one who will take the time and pains to show us when we are wrong. But if our leader does only that, we will not be very happy. Telling a man when he's wrong is not enough. Let every leader be equally diligent to tell a man when he is right. Let's be sure that for every word of doubt or correction that goes from us in a day, we give also a word of praise—and on the same day. Above all, let the dispraise be in private, the praise in public.

Show Confidence

Now then, we may feel respect for a man, we may tell him he has our respect, we may give him his due meed of praise—but all will be in vain if we fail to use him and his abilities according to their deserts. Therefore, as a man becomes better qualified, let's be alert for an opportunity to give him a boost, to give him a try on better work. There's another thing too. Let's not sit on a man's work. If we have him do a piece of writing, investigating, designing, let's act upon it promptly. Let's not keep it on our desk for weeks until we can minutely check it. And let's not keep the man in the dark as to what we're doing about it. We'll take all the fun out of his work.

Act on Suggestions

If our company is to progress properly, it needs the help and interest of everyone on the team. Well, our people are helpful. Men in every branch of our work, are continually coming up with suggestions for better methods, better tools, better procedures. We appreciate these suggestions, too. But let's be sure to show our appreciation. If then we find a suggestion good, let's

give credit promptly and generously. If we are not able to put it into effect at once, let's tell the man why. If the idea does not seem good when examined in the light of larger circumstances, let's carefully explain why. Let's not take suggestions and disappear with them behind a dark curtain. Any man will lose interest if we do.

III—GET ACQUAINTED

Introduce One Another

If we are to respect one another, we must know one another. Therefore, every one of us must be alert to promote acquaintances between the members of our company. If we are with one member, and another member joins us, let's be sure that they know each other. If they do not call each other by name, they probably cannot recall the name. Let's help them. Let's speak up promptly and introduce them. Or if we're in doubt, we can feel our way with something like this, You know Jack Wilson, don't you Harry?

Promote Confidence

Every department—head especially, must be careful to introduce a member of his own department. So must every foreman and every leaderman. To give the name is not enough. Let's say what the man does. Let's say something nice about the way he does it. Let's say anything else that is likely to promote mutual interest and respect. And when any persons whatsoever are in our office together, let's never, never, fail to be sure that they're acquainted. This is no more than common courtesy.

Open Ourselves Up

If we cross paths with a man, let's ask him his name and work, unless we already know them. And let's tell him ours. Let's lunch, and walk, and talk, with others than those of our own narrow group. And when we do meet people, let's give them a chance to know us. Let's open up our minds and our hearts to them. How otherwise are they ever to know us; to know how we think and feel and solve our particular problems? If we do let down our hair, they will do likewise with us. If we show a sincere interest in their problems, they'll show an interest in ours. If we are shutmouth with them, they'll be shutmouth with us. Here again is action and reaction.

Dispel Fear

No one will let his hair down for us if he develops doubts as to our intentions or if he comes to look upon us as largely sources of criticism. Therefore, let's never give a man cause for apprehension or suspense. Suppose, for instance, we'd like to talk with a man —we'd like to have him drop into our office. We send him a note, or we phone him, or we have our secretary phone him. Let our note or call be friendly, and let it tell him why we want to talk—especially so if we are a leader. Otherwise, he may have some bad moments of suspense. And let's be sure that our talks don't run all to criticism. Team spirit doesn't flourish on fear.

IV—LET LOYALTY BE BROAD

Don't Localize Loyalty

Nearly all of us have loyalty in our nature. But some of us may easily fall into the error of letting it be too local. We may be intensely loyal to our own immediate group or department, but yet be intolerant, even loudly critical of other departments. The reason is plain—we've come to know those nearest us and to understand their difficulties. But this local loyalty, however intense, is not enough. We must learn to be our brother-department's helper, not his judge and critic. And this means that all of us, especially our leaders, must make a point of broadening our acquaintance with people and their problems. Their success means our success. The whole show moves up or down together.

Brother Departments

Every one of us, at times, finds himself impeded by things outside of his own department or sphere. Others do things we think they shouldn't do. Or they fail to do what we think they should do, or they do them differently from what we think right, or they don't do them at the time we think right. Well, let's ask them about it. Maybe we're right. Maybe there are circumstances we don't know about that prevent anything different. In any event, if we approach the other department in a spirit of helpfulness, one of us will learn, maybe both of us.

Respect Policies

Finally, even though we all respect and know one another, there's yet one more thing needed for team spirit. The team as a whole must understand the aims, and policies, and methods, of our company. Only thus, can every man have real interest in these things, and be able to put his heart into them. Insofar as we reasonably can then, we will through letters, meetings, talks, get the broad help of our group in setting these policies. And having set them, we will discuss them in letters and the like. Let's make it our business to see that everyone on the team understands what we are doing, and why.

Be Loyal to Team

Think of us in whatever terms we may—team, group, employees, the company, we're all in the same boat. Not one of us can go very far unless the whole team advances. None of us can be very happy in our work unless the whole team is happy. Therefore, let's all realize that the team really is *Our* team. Let's think and speak of *our* company. Let's think and speak of working with our company, or our leaders, not for them. Let leaders think of reaching out to people, not down to them. And finally, let all of us boost our team—both the whole team, the various groups, and the individual players.

V—LET LOYALTY BE ACTIVE

Give Positive Loyalty

Whether as to one employee, one department, or the whole team, let's not be satisfied with negative loyalty. If we speak no evil of a man or group, we perhaps do not hurt them. But we surely don't help them. If we take the pains to know our fellowman, or the other department, or our policies, we will find them mostly good. Let's find occasion to say so, both inside our company, and out. If we hear detractive talk of what we are, or do, let's show resentment. If here or there an act or practice seems wrong to any of us, let's ask our leader about it. As a rule, we will find the reasons sound.

... Continued on page 55

Netherlands Road

Yolo County Completes Farm to Market Highway

By SUPERVISOR ALAN MERKLEY, District No. 1

THE NETHERLANDS Road in Supervisorial District No. 1 of Yolo County is the first to be completed in a series of projects that will provide modern improved roads for the residents of the Clarksburg and Holland Land Districts in the southeastern portion of the county. It is part of Federal Aid Secondary Route 1156. The construction project begins at State Highway Route 99 (Jefferson Boulevard) near Greendale Station, and extends 4.5 miles northeasterly to the vicinity of Clarksburg.

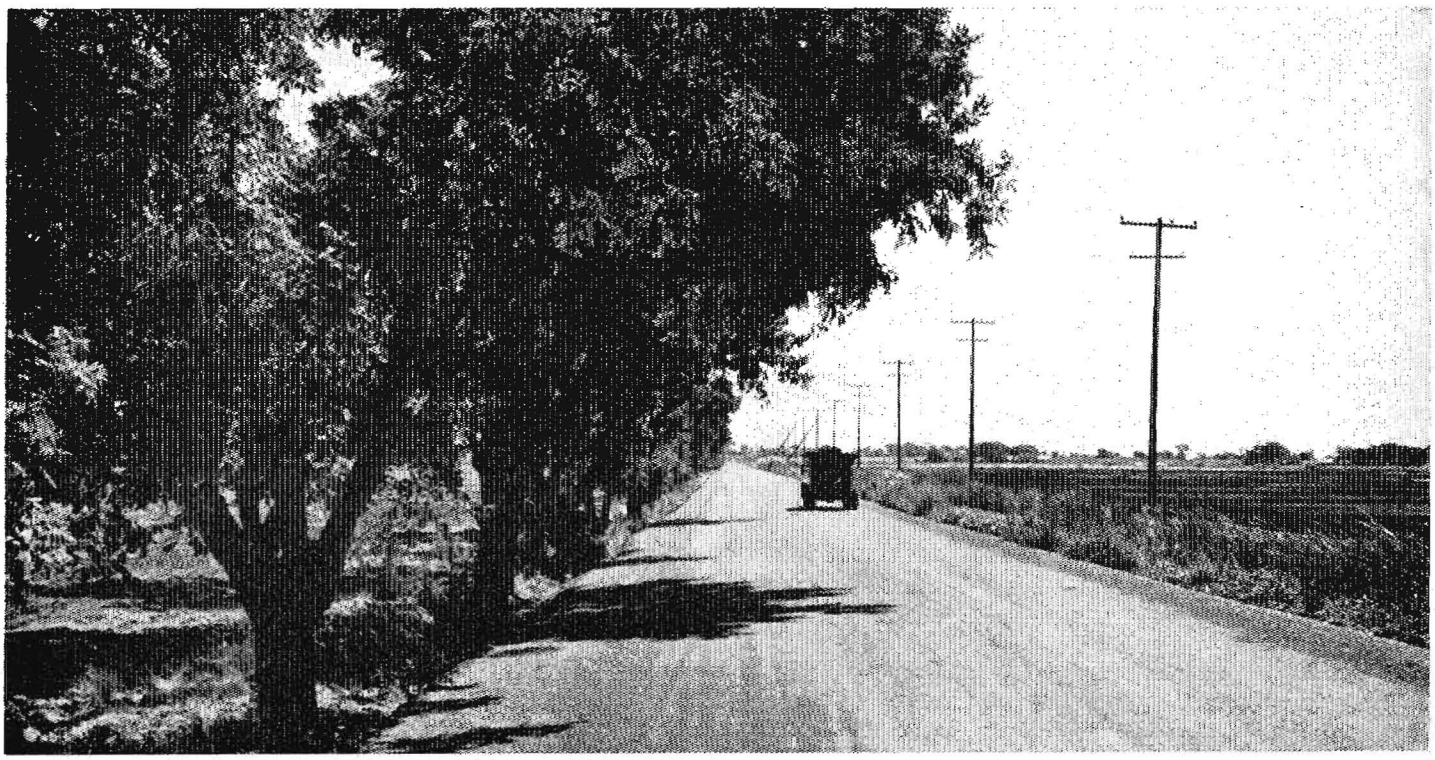
This section of the county, with an assessed valuation of $5,068,419, ranks high in the production field, truck, and seed crops. Field crops include beans, carrots, hay, milo corn, and sugar beets. Truck crops, to name a few of the more important, are asparagus, cauliflower, celery, onions, peas, spinach, and tomatoes. Seed crops produced in this area include alfalfa, table beets, carrots, lettuce, onions, sudan grass, and vetch. Most of the land is used twice each year giving very high yields. The estimated farm value of the crops from the 1947 Yolo County Agricultural Crops report is placed at $10,000,000 for this section of the county.

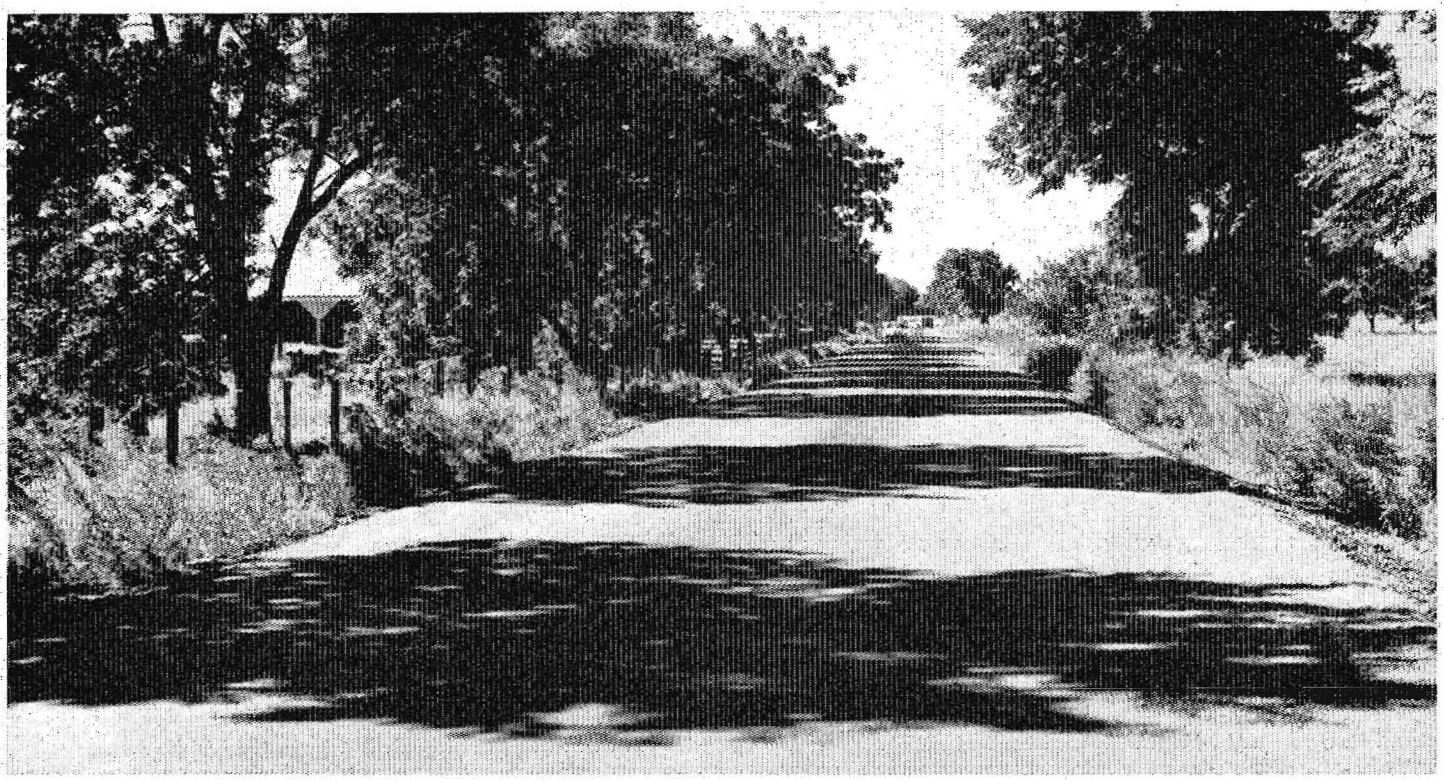
When all of these crops are harvested and hauled by trucks to markets or processing plants, the roads take a severe beating. Sugar beets alone cause an exceptionally heavy use of the roads each year at harvest time, as beets from this area as well as from the outside, are hauled to the American Crystal Sugar Company refinery at Clarksburg. All roads to the plant from the fields are county roads.

Asparagus cutting is started each year in February or March while the water table is still high from recent winter rains. For most of the year, the water table remains only a few feet below the ground surface. This makes it necessary to build good roads or see them go to pieces in a few short years. It would be difficult and take many years to build the type of roads needed with the moneys regularly raised by a nominal district road tax. Federal and state financial aid will allow these roads to be built in a much shorter time.

Other improvements now under way or proposed for future work for this section of the county include widening, new base and surfacing of the river bank road south of Clarksburg; placing of a sand blanket and resurfacing of the road due west from Clarksburg, to the only state highway in this section of the county—Route 99 along Jefferson Boulevard; widening and resurfacing of the river road north of

Section of new FAS Route 1156 in Yolo County looking north from State Route 99 about one-half mile east of Greendale





Completed section of new Yolo County highway looking west about four and one-half miles east of Greendale

Clarksburg from the Freeport Bridge to Riverview.

The Netherlands Road along with these proposed projects will provide access to and from this area, and farm to market feeder roads to serve the major portion of this area. Part of these roads are already included in the Federal Aid Secondary System. Others will be proposed for future inclusion.

The new road consists of six-inch minimum thickness of crushed gravel base with four- and five-foot width shoulders of imported material placed on the old road, forming a total thickness of not less than 12 inches of compacted pavement. In certain areas it was necessary to place additional base rock in order to properly stabilize the roadway area. A modified superelevation was obtained by building up the outside of the curves with the base material. Full width slurry and penetration treatments were applied to the base rock and shoulders, and then the center 20-foot area over the base rock was covered with a seal coat of oil and screenings.

Yolo County did considerable work shaping, filling, and realigning the existing road before the contract was let for the placing of the base rock and the paving and shoulder work. Work by the county was done with its own forces and equipment and was carried on in the summer months of 1947.

Contract work for surfacing and shoulders was started by A. Teichert and Son, Inc., of Sacramento on May 27, 1948. Advertising, award, and administration of the contract was by the State Division of Highways and Public Roads Administration.

Superintendent for the contractor at the site was Harry Rotruck. Yolo County was represented on the job by Resident Engineer W. P. Marshall, working in close cooperation with State Highway Engineer George T. McCoy, District Highway Engineer C. H. Whitmore, Marysville, and the Public Roads Administration office in Sacramento.

The total cost of the county work of $65,000 was financed by $52,500 of construction and employment funds and $12,500 of county road tax funds.

The $108,000 allotment of funds for the contract work was made with $92,537.50 of FAS and state matching funds, and $15,462.50 of Chapter 20 funds.

The total cost of the project including county and contract work will be approximately $160,000, including construction engineering. The difference from the above total of $173,000 allotted for the work represents an underrun of about $13,000 in the estimated cost of the contract work.

It was with real pleasure that this project was accepted as completed by Yolo County on August 3, 1948. Yolo County wishes to take this opportunity to thank the State Division of Highways, the District III force at Marysville, the Sacramento office of the Public Roads Administration and the contractor for their able assistance and cooperation during construction of this fine section of Federal Aid Secondary road that should serve this area of Yolo County for many years.

It is estimated that there now are approximately 3,566,309 motor vehicles and trailers registered in California.

According to government estimates, some 33,225,000 passenger cars will be licensed in the United States during 1948 – approximately 2,500,000 more than the record year 1947.

Cooperation

State of California
DIVISION OF BEACHES AND PARKS
Department of Natural Resources

Division of Highways
Burlingame Maintenance Yard
Burlingame, California

Attention:
A. Cooper, Superintendent

Gentlemen: On behalf of the Division of Beaches and Parks, the Central District Office and the Big Basin Redwoods State Park, I would like to express appreciation for the splendid help and cooperation we received from your division during the emergency caused by the forest fire that burned in areas adjacent to Big Basin Redwoods State Park.

I believe that a great service to the California State Park system, as a whole, and Big Basin Redwoods State Park, in particular, was performed by your division and by yourself and staff in particular.

I feel that all persons who cooperated in this fire, from your division, rendered us invaluable assistance at a time when it was badly needed.

Very truly yours,

DIVISION OF BEACHES AND PARKS

(Signed)
By LLOYD W. LIVELY,
Chief Ranger
Big Basin Redwoods State Park

HIGHEWAYES

WHEREAS the mainteining of highewayes, in a fitt posture for passage, according to the severall occassions that occure, is not onely necessary, for the comfort and safety of man and beast, but tends to the proffitt and advantage of any people, in the issue;

IT IS THOUGHT FITT AND ORDERED, That each towne within this jurissdiction shall, every yeare, chuse one or two of theire inhabitants, as surveyors, to take care of, and oversee the mending and repairing of the highewayes within theire severall townes respectively, who have hereby, power allowed them to call out the severall cartes or persons fitt for labour in each towne, two dayes at least, in each yeare, and so many more, as in his or theire judgements, shall bee found necessary for the attaining of the aforementioned end, to be directed in theire worke by the said surveyor or surveyors, and it is left to his or theire libberties, either to require the labour of the severall persons in any familye, or of a teame and one person, where such are, as hee finds most advantageous to the publique occassions, hee or they giving at least three dayes notice or warning beforehand, of such imployment, and if any refuse or neglect to attend the service in any manner aforesaid, hee shall forfeit for every days neglect of a mans worke, two shillings sixepence, and of a teame, sixe shillings; which said fynes shall bee imployed by the surveyors to hire others to worke in the said wayes; and the surveyors shall, within foure dayes after the severall dayes appointed for worke, deliver in to some magistrate, a true presentment of all such as have beene defective, with theire severall neglects, who are immediately to graunt a distress to the marshall or constable, for the levying of the incurred forfeiture, by them to bee delivered to the surveyors, for the use aforesaid; and if the surveyor neglect to performe the service hereby committed to him, either in not calling out all the inhabitants in theire severall proportions, as before, or shall not returne the names of those that are deficient, hee shall incurr the same penalty as those whome hee so passes by, are lyable to, by virtue of this order; which shall bee imployed to the use aforesaid, and to bee levyed allso by distress, uppon information and proofe before any one magistrate.

California Highways and Public Works is indebted to Miss Cristel Hastings of Mill Valley, California, for the following copy of a statute in The Code of 1650 of the General Court of Connecticut and adopted by the towns of Windsor, Hartford and Wethersfield, Connecticut, in 1638 and 1639.—Editor

U. S. 99, South

Continued from page 29 . . .

of the Hollywood Parkway and the Arroyo Seco-Harbor Parkway, to the Ramona Boulevard.

A project for grading and paving the route from the city limits of Los Angeles at Indiana Street to a point 1.7 miles easterly is included in the approved budget for the 1949-1950 Fiscal Year. This section is being planned partially on new alignment, while the portion conforming to the existing highway will be developed to freeway standards. The proposed work will be a continuation of the Ramona Parkway completed in 1943 between the Aliso Street interchange structure and Indiana Street.

Widening of the route in San Bernardino County to four lanes was completed in April last year between one mile east of Ontario and Etiwanda Avenue. Four lane construction on new alignment from Mulberry Street to Colton was finished at about the same time. Construction of this high standard of highway for the 16.4 miles between Ontario and Colton has required $2,598,000.

Further multiple lane development is now underway between east of Colton and Redlands. Completion of this project will provide a minimum of four lanes almost continuously from Los Angeles to White Water Junction, a large part of which is divided.

U. S. 99 is an important highway, especially east of Los Angeles, for farm to market transportation, over which a large part of the produce grown in Imperial Valley is moved by trucks. The recent highway programs have contained projects designed for development of this road to keep abreast of the heavy traffic demand. At locations where most required, improvement was designed to include multiple lane construction.

Two lanes were added to the portion between Banning and White Water in 1940 and a recent project was completed for resurfacing the original road to provide greater width.

New decks were finished on five bridges northwest of Indio during July of this year. Provision was made in this reconstruction to afford more distance

. . . *Continued on page 56*

Bids and Awards

Contracts Awarded for September and October, 1948

September, 1948

HUMBOLDT COUNTY—Between Stone Lagoon and one mile south of Orick, about 5.25 miles to be surfaced with plant-mixed surfacing on existing base and seal coat applied thereto, and shoulders to be constructed of imported base material and penetration treatment applied. District I, Route 1, Section J. Harms Bros. and C. M. Syar, Sacramento, $33,605. Contract awarded to Mercer Fraser Co., Eureka, $31,930.

IMPERIAL COUNTY—Between 10 and 25 miles west of El Centro, 15 timber trestle bridges to be redecked with reinforced concrete slabs. District XI, Route 12, Sections A,B,C. E. G. Perham, Los Angeles, $88,991; Hensler Construction Co., Glendale, $94,-703; O'Brien & Bell Construction Co., Santa Ana, $96,633; Covina Construction Co., Covina, $103,501; C. B. Tuttle Co., Long Beach, $115,548; N. M. Saliba Co., Los Angeles, $120,664; Northrup Construction Co., Long Beach, $145,693. Contract awarded to R. M. Price and O. B. Pierson, Altadena, $86,232.

IMPERIAL COUNTY—Across Condit and Bondit Ditches, about 45 miles east of Julian, two reinforced concrete slab bridges to be constructed. District XI, Route 198, Section A. E. S. and N. S. Johnson, Fullerton, $30,898; C. B. Tuttle Co., Long Beach, $36,125. Contract awarded to R. M. Price Co. and O. B. Pierson, Altadena, $26,066.

KERN COUNTY—About one-quarter mile east of Tehachapi, a reinforced concrete box culvert to be constructed and about 0.2 mile of roadway to be graded and bituminous surface treatment applied. District VI, Route 58, Section F. Parker Engineering Co., Claremont, $24,527; Guy F. Atkinson Co., South San Francisco, $35,717. Contract awarded to Oilfields Trucking Co. and Phoenix Construction Co., Bakersfield, $19,858.

KERN COUNTY—Across Grapevine Creek between Route 4 and entrance to Fort Tejon State Park, a reinforced concrete slab bridge and approaches to be constructed. District VI. Petersen Construction Co., Monrovia, $29,310; N. M. Saliba Co., Los Angeles, $29,945. Contract awarded to E. S. and N. S. Johnson, Fullerton, $19,910.

LOS ANGELES COUNTY—In the City of Los Angeles on Santa Ana Parkway between Aliso Street and Eastman Avenue, furnish and install highway lighting system. District VII, Route 2, Sections L, A, D. Ets-Hokin & Galvan, San Diego, $65,421; Tri-Cities Electrical Service, Oceanside, $67,502; R. E. Ziebarth, Torrance, $68,984. Contract awarded to Electric & Machinery Service, Inc., South Gate, $61,588.

LOS ANGELES COUNTY—On Santa Ana Parkway, between La Verne Avenue and Eastland Avenue, about 0.9 mile to be graded and paved with Portland cement concrete and grade separation structures to be constructed. District VII, Route 166, Section A. J. E. Haddock, Ltd., Pasadena, $1,380,-065; Guy F. Atkinson Co., Long Beach, $1,397,860; Winston Bros. Co. & Yount Constructors, Inc., Abusa, $1,420,847; Peter Kiewit Sons Co., Arcadia, $1,444,-704. Contract awarded to Griffith Co., Los Angeles, $1,370,538.

LOS ANGELES COUNTY—On Rosemead Boulevard at Longden Avenue and at Duarte Road, furnish and install full traffic actuated signal systems and highway lighting. District VII, Route 168, Section C. California Electric Works, San Diego, $19,118; Prescott Electric & Manufacturing Co., Los Angeles, $19,949; C. D. Draucker, Inc., Los Angeles, $21,270. Contract awarded to Econolite Corp., Los Angeles, $18,930.

LOS ANGELES COUNTY—On Hollywood Parkway, at Melrose Avenue and at Vermont Avenue, in the City of Los Angeles, a reinforced concrete box girder undercrossing and a reinforced concrete box girder overcrossing to be constructed. District VII, Route 2. J. E. Haddock, Ltd., Pasadena, $1,072,703; Guy F. Atkinson Co., Long Beach, $1,097,390; Winston Bros. Co., Azusa, $1,098,185. Contract awarded to Spencer Webb Co., Inglewood, $954,483.

MERCED COUNTY—Between Atwater and Livingston, about 5.7 miles to be graded and paved with Portland cement concrete on cement treated subgrade and plant-mixed surfacing on untreated rock base. District X, Route 4, Sections C, D, Lvtn. Fredrickson & Watson Construction Co., Oakland, $582,279; Westbrook & Pope & A. G. Raisch Co., Sacramento, $584,569; Fredrickson Bros., Emeryville, $589,757; Granite Construction Co., Watsonville, $593,383; M. J. B. Construction Co., Stockton, $604,620; A. Teichert & Son, Inc., Sacramento, $605,663; Stolte, Inc. & The Duncanson-Harrelson Co., Oakland, $650,675; N. M. Ball Sons, Berkeley, $621,228; Peter Kiewit Sons' Co., Arcadia, $629,-117; Cox Bros. Construction Co., Stanton, $632,131. Contract awarded to Guy F. Atkinson Co., South San Francisco, $573,642.

RIVERSIDE COUNTY—On Sixth Street between Magnolia Avenue and Pennsylvania Avenue, construct curbs and gutters. District VIII, Route 26. R. A. Erwin, Colton, $12,200. Contract awarded to Foster & McHarg, Riverside, $10,222.

RIVERSIDE COUNTY—Across Potrero Creek about five miles north of San Jacinto, an existing reinforced concrete bridge to be widened and approaches thereto to be graded and surfaced with plant-mixed surfacing. District VIII, Route 194, Section C. R. A. Erwin, Colton, $14,950; Parker Engineering Co., Claremont, $15,395; E. S. & N. S. Johnson, Fullerton, $15,911; Covina Construction Co., Covina, $16,362; The Hogan Co., Riverside, $16,915; Fitzgerald Construction Co., Long Beach, $17,008; H. C. Johnson, Long Beach, $17,229. Contract awarded to H. R. Breeden, Compton, $14,657.

SACRAMENTO COUNTY—At various locations in the City of Sacramento, portions about 6.9 miles in net length, existing streets to be surfaced with plant-mixed surfacing. District III, Routes 4, 6, 11, 50. J. R. Reeves, Sacramento, $108,437; McGilivray Construction Co., Sacramento, $109,645. Contract awarded to A. Teichert & Son, Inc., Sacramento, $104,815.

SAN BERNARDINO COUNTY—Between four miles and ½ mile west of Java, six timbertrestle bridges to be redecked with reinforced concrete slabs. District VIII, Route 58, Section N. Grant L. Miner, Palo Alto, $58,628; E. G. Perham, Los Angeles, $59,672; E. S. & N. S. Johnson, Fullerton, $65,610; C. B. Tuttle Co., Long Beach, $82,300. Contract awarded to Covina Construction Co., Covina, $58,616.

SAN BERNARDINO COUNTY—Between East Base Line Avenue and Orange Street, about three miles north of Redlands, about 1.6 miles, to be graded and surfaced with plant-mixed surfacing on imported borrow and two reinforced concrete bridges to be constructed. District VIII, Route 190, Section C. R. A. Erwin, Colton, $478,068. Contract awarded to Matich Bros. & E. L. Yeager, Riverside, $401,951.

SAN DIEGO COUNTY—Between Julian and Santa Ysabel, portions about 1.5 miles in length, to be graded, surfaced with imported borrow and bituminous surface treatment and seal coat applied. District XI, Route 78, Sections B, C. Covina Construction Co., Covina, $174,620; Clifford C. Bong & Co., Arcadia, $200,369; O'Brien & Bell Construction Co., Santa Ana, $205,507; R. A. Erwin, Colton, $214,135; Cox Bros. Construction Co., Stanton, $253,327; Walter H. Barber & H. R. Breeden, La Mesa, $272,547. Contract awarded to E. C. Young & Co., Bakersfield, $173,844.

SAN DIEGO COUNTY—Between 3.4 miles south of Riverside County line and Riverside County line, a distance of about 3.4 miles to be surfaced with plant-mixed surfacing. District XI, Route 77, Section G. Basich Bros. Construction Co. & Basich Bros., San Gabriel, $68,736; R. P. Shea Co., Indio, $68,-831; R. A. Erwin, Colton, $70,440; Morrison-Knudsen Co., Inc., San Francisco, $74,133; Dicco, Inc. & Dix-Syl Construction Co., Inc., Bakersfield, $84,241; John J. Swigart Co., Torrance, $84,425. Contract awarded to Peter Kiewit Sons Co., Arcadia, $64,820.

SAN MATEO COUNTY—In Burlingame and San Mateo, on El Camino Real between Peninsular Avenue and Hillsdale Boulevard, furnishing and installing fixed time traffic signal systems at 12 intersections. District IV, Route 2. L. H. Leonardi Electric Construction Co., San Rafael, $44,455; Severin Electric Co., Burlingame, $45,352; Tri-Cities Electrical Service, Oceanside, $46,633; Del Monte Electric Co., Oakland, $49,323; Abbett Electric Corp., San Francisco, $62,910. Contract awarded to George Pollock Co., Sacramento, $41,780.

SAN MATEO COUNTY—About 12 miles north of Santa Clara County line, an existing steel girder bridge and concrete piers to be removed and disposed of. District IV, Route 68, Section C. L. C. Smith, San Mateo, $2,478; Dan Caputo, San Jose, $2,665; Seaboard Construction & Diving Co., Richmond, $3,290; Joe Gerrick & Co., San Francisco, $3,930; Joseph D. Ballinger & Co., Oakland, $4,347; Kiss Crane Co., San Pablo, $4,512; Minton & Kubon, San Francisco, $4,815; A. T. Bennett Construction Co., Palo Alto, $4,995; Grant L. Miner, Palo Alto, $6,969; Guy F. Atkinson Co., South San Francisco, $7,740; James H. McFarland, San Francisco, $7,900. Contract awarded to Frank W. Smith, San Mateo, $1,795.

SANTA BARBARA COUNTY—Chain link fence near Hollister Wye, between Santa Barbara and Goleta. District V, Route 2, Section Q. Cyclone Fence Division, American Steel & Wire Co. of N. J., $2,606. Contract awarded to The California Wire Cloth Corp., Oakland, $2,597.

SANTA BARBARA COUNTY—Between Sheffield Drive and San Ysidro Road, about 1.1 miles, outer highways to be graded and surfaced with plant-mixed surfacing on untreated rock base and four reinforced concrete bridges to be constructed. District V, Route 2, Section J. N. M. Ball Sons, Berkeley, $145,543. Contract awarded to Baker & Pollock, Ventura, $132,594.

SANTA BARBARA COUNTY—Between 0.6 mile east of Arroyo Quemado and 0.7 mile west of Arroyo Hondo, about 2.6 miles to be graded and surfaced with plant-mixed surfacing on imported borrow base and reinforced concrete arch culverts to be constructed. District V, Route 2, Section F. Winston Bros. Co. & Yount Constructors, Inc., Azusa, $861,-382; N. M. Ball Sons, Berkeley, $874,419; Fredericksen & Kasler, Sacramento, $895,796; L. A. & R. S. Crow, El Monte, $995,986. Contract awarded to Clyde W. Wood, Inc., North Hollywood, $720,602.

SANTA CLARA COUNTY—At Furlong Creek, about three miles east of Gilroy, a reinforced concrete slab bridge to be constructed. District IV, Route 32, Section A. Jenson & Mangs, Palo Alto, $7,407; James H. McFarland, San Francisco, $7,791; Geo. C. Renz Construction Co., Inc., Gilroy, $8,127; Lew Jones Construction Co., Inc., San Jose, $8,189; Granite Construction Co., Watsonville, $9,039; L. V. Cantrell, Berkeley, $9,491. Contract awarded to Dan Caputo, San Jose, $7,127.

SANTA CRUZ COUNTY—Between Rob Roy Junction and Morrissey Avenue in Santa Cruz, furnishing and installing highway lighting systems at four locations. District IV, Route 56, Sections D, E, Scr. H. S. Tittle Co., San Francisco, $23,875; Frank Jackson Carroll, Santa Cruz, $24,804. Contract awarded to Granite Construction Co., Watsonville, $23,370.

SOLANO COUNTY—Near Fairfield, furnish and install traffic actuated signal system, highway lighting and railway crossing warning signals. District X, Route 7, Sections B, C. Ed. Pierce Electric Co., Vallejo, $19,785; Del Monte Electric Co., Oakland, $21,064; R. O. Ferguson Co., Visalia, $25,389. Contract awarded to L. H. Leonardi Electric Construction Co., San Rafael, $19,397.

F. A. S. County Projects

GLENN COUNTY—Across Salt Creek about 22 miles west of Orland, a reinforced concrete bridge to be constructed. District III, Route 1117. Gordon C. Weems, Willows, $17,785; Wm. E. Thomas Con-

struction Co., Sacramento, $18,403; C. C. Gildersleeve, Nevada City, $23,394; James H. McFarland, San Francisco, $23,929; L. V. Cantrell, Berkeley, $24,145; Charles T. Brown Co., San Pablo, $24,949; O'Connor Bros., Red Bluff, $24,980; Chas. MacClosky Co., San Francisco, $27,221; Baldwin Straub Corp., San Rafael, $31,036. Contract awarded to George M. Carr & Bati Rocca, Santa Rosa, $17,774.

KERN COUNTY—Between Elmo Highway and Tulare County line, about 7.2 miles to be graded and bituminous surface treatment applied thereto. District VI, Route 889. Brown & Krull, Hayward, $161,051; Westbrook & Pope, Sacramento, $174,109; Dicco Inc. & Dix-Syl Construction Co., Inc., Bakersfield, $176,212; N. M. Ball Sons, Berkeley, $176,709; Volpa Brothers, Fresno, $178,488; J. S. Smith & A. A. Edmondson, Glendale, $179,201; Arthur A. Johnson, Laguna Beach, $179,424; Oilfields Trucking Co. & Phoenix Construction Co., Bakersfield, $179,934; George E. France, Inc., Visalia, $180,500; Griffith Co., Los Angeles, $180,586; Hensler Construction Corp., Glendale, $181,292; Cox Bros. Construction Co., Stanton, $183,164; Rand Construction Co., Bakersfield, $187,386; Brown & Doko, Pismo Beach, $190,063; Clyde W. Wood, Inc., North Hollywood, $194,488. Contract awarded to Louis Biasotti & Son, Stockton, $159,453.

SAN DIEGO COUNTY—Between Fairmount Extension and State Highway Route 12 at Baltimore Drive, about 5 miles to be graded, rock base and surface course to be placed on a sub-base of selected material, bituminous surface treatment to be applied, an existing overhead crossing to be extended and a new steel beam span overhead crossing to be constructed. District XI, Routes 732, 12. Silva & Hill Construction Co., Peter L. Ferry & Son & John M. Ferry, Los Angeles, $788,605; R. E. Hazard Contracting Co. & C. G. Willis & Sons, San Diego, $825,304; V. R. Dennis Construction Co., San Diego, $831,894; Griffith Co., Los Angeles, $837,003; Winston Bros. Co. & Yount Constructors, Inc., Azusa, $842,897; Basich Bros. Construction Co. and Basich Bros., San Gabriel, $856,857; J. E. Haddock, Ltd., Pasadena, $867,880. Contract awarded to Daley Corp., San Diego, $766,309.

October, 1948

ALAMEDA COUNTY—Between 1.5 miles east and 1.7 miles west of Livermore, about 3.2 miles to be graded, an undercrossing and a bridge to be constructed of reinforced concrete and miscellaneous drainage structures to be constructed or installed. District IV, Route 5, Section F. Fredericksen & Kasler, Sacramento, $510,298; Granite Construction Co., Watsonville, $511,023; Fredrickson Bros., Emeryville, $515,051; N. M. Ball Sons, Berkeley, $557,710; Fredrickson & Watson Construction Co., Oakland, $564,444; George Pollock Co., Sacramento, $569,135; Guy F. Atkinson Co., South San Francisco, $577,762; M. J. B. Construction Co., Stockton, $601,228; Stolte, Inc., and The Duncanson-Harrelson Co., Oakland, $620,542; Piombo Construction Co. and Baldwin, Straub Corp., San Francisco, $623,855. Contract awarded to Dan Caputo and Ed Keeble, San Jose, $503,126.

BUTTE COUNTY—At Pulga Maintenance Station. District II, Route 21, Section C. L. V. Cantrell, Berkeley, $2,222. Contract awarded to Armco Drain & Metal Prod., Berkeley, $1,590.

LASSEN COUNTY — At Brockman, between Termo and Madeline, District II, Route 73, Section F. Clements & Co., Hayward, $16,000; Nevada Constructors, Inc., Reno, $21,560; Harms Bros., Sacramento, $16,000. Contract awarded to William C. Railing, Redwood City, $14,800.

LOS ANGELES COUNTY—In the Cities of Arcadia and Monrovia, on Foothill Boulevard at Garey Avenue and on Foothill Boulevard from Santa Anita Avenue to Canyon Boulevard, furnish and install full traffic actuated signal systems and highway lighting at two intersections, a semi-traffic actuated signal system at one intersection, and fixed-time traffic signal systems at five intersections. District VII, Route 9, Section J, Ada, Mrno. Prescott Electric & Manufacturing Co., Los Angeles, $36,731; Ets-Hokin & Galvan, San Diego, $37,368; Tri-Cities Electric Service, Oceanside, $38,673; Paul R. Gardner, Ontario, $39,494; Econolite Corp., Los Angeles, $39,889; C. E. Seymour, Long Beach, $44,100. Contract awarded to C. D. Draucker, Inc., Los Angeles, $35,690.

LOS ANGELES COUNTY—On Firestone Boulevard, between the Los Angeles River and Paramount Boulevard, portions, about 1.9 miles to be resurfaced with plant-mixed surfacing, untreated rock base and imported subbase material. District VII, Route 174, Sections Sgt, B. O'Brien & Bell Construction Co., Santa Ana, $100,391; Smith-Edmondson, Glendale, $100,533; Vido Kovacevich Co., South Gate, $107,448; Griffith Co., Los Angeles, $111,124; R. A. Erwin, Colton, $114,439; Oswald Bros., Los Angeles, $123,213; W. E. Hall Co., Alhambra, $124,775; M. S. Mecham & Sons, Lynwood, $129,132; Bonadiman-McCain, Inc., Los Angeles, $148,660. Contract awarded to Cox Bros. Construction Co., Stanton, $95,927.

LOS ANGELES COUNTY — Between Malibu Creek and Las Flores Creek, about 2.9 miles to be graded and surfaced with plant-mixed surfacing and two bridges to be widened. District VII, Route 60, Section A. J. E. Haddock, Ltd., Pasadena, $526,540; Basich Bros. Construction Co. & Basich Bros., San Gabriel, $579,401; A. Teichert & Son, Inc., Sacramento, $593,651; Peter Kiewit Sons Co., Arcadia, $605,834; Griffith Co., Los Angeles, $677,056. Contract awarded to Dicco Inc. & Dix-Syl Construction Co., Inc., Bakersfield, $483,549.

MARIN COUNTY—At Corte Madera intersection, about 0.2 mile in length, existing pavement to be widened to provide channelization of intersection and traffic signal system and highway lighting to be furnished and installed. District IV, Route 1. Brown-Ely Co., Contractors, Corte Madera, $26,191; I. J. Ely Company, San Anselmo, $26,691. Contract awarded to Baldwin, Straub Corp., San Rafael, $24,327.

MONTEREY COUNTY—At Soledad Prison, about 4 miles northwest of Soledad, about 0.9 mile portions to be shaped, imported borrow to be placed and bituminous surface treatment applied. District V. Threewit & Webb, Bakersfield, $10,289. Contract awarded to Brown & Doko, Pismo Beach, $7,115.

ORANGE COUNTY—At Santa Ana River, about 4 miles east of Anaheim, a reinforced concrete girder bridge to be constructed and about 0.7 mile of approaches to be graded and surfaced with plant-mixed surfacing on untreated rock base. District VII, Route 178, Section A. Lars Oberg, Los Angeles, $298,554; R. M. Price Co. & O. B. Pierson, Altadena, $307,231; John Strona, Pomona, $307,787; K. B. Nicholas, Ontario, $315,206; J. E. Haddock, Ltd., Pasadena, $329,533; Peter Kiewit Sons Co., Arcadia, $330,219; Cox Bros. Construction Co., Stanton, $334,463; Guy F. Atkinson Co., Long Beach, $354,790. Contract awarded to Charles MacClosky Co., San Francisco, $295,086.

PLACER COUNTY—Between Vernon Street at Grant Street in Roseville and two miles north of the city limits, an underpass under the tracks of the Southern Pacific Co., an overcrossing at Vernon Street, and an overcrossing at Atlantic Street to be constructed and about 3.3 miles to be graded and paved with portland cement concrete. District III, Route 3, Section Rsv., A. Granite Construction Co., Watsonville, $1,488,418; Bates & Rogers Construction Corp., San Francisco, $1,519,224; George Pollock Co., Sacramento, $1,532,342; United Concrete Pipe Corp. & John C. Gist & Ralph A. Bell, Baldwin Park, $1,539,381; Fredrickson Bros., Emeryville, $1,584,051; Fredrickson & Watson Construction Co. & M & K Corp., Oakland, $1,585,148; Lord & Bishop & A. Teichert & Son, Inc., Sacramento, $1,692,966. Contract awarded to Guy F. Atkinson Co., South San Francisco, $1,327,404.

PLUMAS COUNTY—Near Sloat Road, between Spring Garden and Cromberg, District II, Route 21, Section E. Clements & Co., Hayward, $17,200; William C. Railing, Redwood City, $16,770. Contract awarded to Nevada Constructors, Inc., Reno, $14,663.

SAN BERNARDINO COUNTY—Over Mohave River near Victorville and over Route 43 near Crestline, two existing steel bridges to be cleaned and painted. District VIII, Routes 43, 188; Sections L, A. Williams & Kelly, Los Angeles, $11,369; West Coast Waterproofing & Painting Co., Los Angeles, $13,285; R. W. Reade & Co., Berkeley, $17,220; Atlas Painting Co., Inc., San Francisco, $18,150. Contract awarded to G. C. Hewitt & Co. Ltd., Los Angeles, $10,600.

SAN DIEGO COUNTY—In the City of San Diego between Texas Street and Campo Drive; between Cudahy Channel and Balboa Avenue, and between Market Street and Home Avenue, about 5.9 miles, the existing pavement on portions of the project to be surfaced with plant-mixed surfacing and the existing pavement on portions of the project to be widened by constructing plant-mixed surfacing on imported borrow and on portland cement concrete base. District XI, Routes 12, 2, 200, Section S. D. V. R. Dennis Construction Co., San Diego, $203,928; R. E. Hazard Contracting Co., San Diego, $209,892; Daley Corp., San Diego, $217,287. Contract awarded to Griffith Co., Los Angeles, $195,491.

SAN DIEGO COUNTY—In the City of Coronado, on Orange Avenue between south city limits and Second Street, about 1.5 miles, a portion of existing pavement to be widened with plant-mixed surfacing on imported base material, portions of the existing pavement to be resurfaced with plant-mixed surfacing, existing railroad tracks and pavement to be removed at intersections and these areas reconstructed with plant-mixed surfacing on asphalt concrete base. District XI, Route 199. Daley Corp., San Diego, $59,925; Griffith Co., Los Angeles,, $61,070; V. R. Dennis Construction Co., San Diego, $62,338. Contract awarded to R. E. Hazard Contracting Co., San Diego, $57,721.

SAN MATEO COUNTY—Across Peters Creek, in Portola State Park, a reinforced concrete girder bridge, to be constructed. District IV. L. V. Cantrell, Berkeley, $29,716; Dan Caputo, San Jose, $36,852; R. G. Clifford, South San Francisco, $37,840; Grant L. Miner, Palo Alto, $38,874; Minton & Kubon, San Francisco, $39,340; Jenson & Mangs, Palo Alto, $39,452; Cattich Bros. & Stevenson, Redwood City, $39,702. Contract awarded to James H. McFarland, San Francisco, $28,352.

F.A.S. County Projects

KERN COUNTY—Between State Route 142 north of Oildale and State Route 4 north of Southern Pacific Railroad overhead crossing, about 2.8 miles to be graded and surfaced with plant-mixed surfacing on untreated rock base and bituminous surface treatment to be applied to shoulder areas. District VI, Route 887. Oilfields Trucking Co. & Phoenix Construction Co., Bakersfield, $173,093; Rand Construction Co., Bakersfield, $184,885; N. M. Ball Sons, Berkeley, $187,786; Dicco Inc. & Dix-Syl Construction Co., Inc., Bakersfield, $209,461. Contract awarded to Griffith Co., Los Angeles, $165,967.

RIVERSIDE COUNTY—Jackson Street, between 56th Avenue, 4.9 miles south of Indio and 46th Avenue, in Indio, about 5 miles to be graded, imported borrow to be placed and bituminous surface treatment to be applied. District XI, Route 1162. Arthur A. Johnson, Laguna Beach, $116,875; Westbrook & Pope, Sacramento, $126,342; O'Brien & Bell Construction Co., Santa Ana, $126,887; Basich Bros. & Basich Bros. Construction Co., San Gabriel, $127,140; R. A. Erwin, Colton, $134,322; R. P. Shea Co., Indio, $134,647; Hensler Construction Co., Mecca, $137,565; Cox Bros. Construction Co., Stanton, $138,349. Contract awarded to Foster & McHarg, Riverside, $105,307.

SOLANO COUNTY—Across Alamo Creek and at a flood channel, between 4 and 6.5 miles east of Vacaville, a reinforced concrete slab bridge and a reinforced concrete box culvert to be constructed. District X, Route 1108. Gordon C. Weems, Willows, $17,304; L. V. Cantrell, Berkeley, $17,866; Lew Jones Construction Co., San Jose, $17,998; J. Henry Harris, Berkeley, $22,423; O'Connor Bros., Red Bluff, $23,605; James H. McFarland, San Francisco, $23,788; Charles MacClosky Co., San Francisco, $31,840. Contract awarded to Wm. E. Thomas, Sacramento, $16,469.

TEHAMA COUNTY—Across Reeds Creek, Paynes Creek, and Thomes Creek, respectively, 2 miles west of Red Bluff, at Dales on Long Road, and at Paskenta, three steel beam bridges to be constructed and about one mile of approaches to be graded and surfaced with crusher run base and armor coat applied. District II, Routes 1083, 1081, and 1078. G. M. Carr & Bati Rocca, Santa Rosa, $279,876; Baldwin, Straub Corp., San Rafael, $292,108; Chittenden & Chittenden, Auburn, $298,850; Charles MacClosky Co., San Francisco, $384,668. Contract awarded to O'Connor Bros., Red Bluff, $279,763.

YUBA COUNTY—Between 3 miles north of Stanfield Hill and 2 miles south of Frenchtown Road, about 5.1 miles, imported borrow to be placed and penetration treatment and seal coat applied. District III, Route 526. H. Earl Parker, Inc., Marysville, $209,105; Harms Bros., Sacramento, $222,013. Contract awarded to A. R. McEwen, Willits, $168,598.

Why Do We Drive On the Right Hand Side of the Road?

URUGUAY, last American country to cling to the practice of driving on the left, recently started conforming to the right-hand rule of the road. Now the Pan-American motorist can laugh at international borders—unlike his European counterpart who must swing from one side of the road to the other as he drives across some of the borders of the countries of the Old World.

Uruguay's action in making the rule of the road unanimous in the Americas, raises the question why mankind did not agree on such a simple thing in the first place. Why did some nations adopt one practice and others do exactly the opposite?

The answer lies deep in the mists of time when men stopped carrying loads on their backs and on horseback and began using carts and wagons. It probably traces, says the National Geographic Society, to that universal badge of the wagoner—the horsewhip.

In old England the predominant type of transport was the simple four-wheeled box wagon with a board across the front end for the driver's seat. The driver sat on the right end of this board so as to keep his whip hand free. He could wield the whip with more ease from the right side because his arm and whip would swing clear of the vehicle. When two of these wagons met, the drivers pulled to the left. They did this so they could see if their vehicles were clearing each other.

England's American Colonies aped the mother country in the rule of the road until about 1750. Conditions peculiar to the colonies—greater distances, more long hauling, bigger freight loads—resulted in the development of the Conestoga-wagon about that time. Two or, more likely, three pairs of horses pulled these heavy wagons. The driver, or postilion, sat on the left rear horse. He did not choose to sit on the right rear horse because then his own body would be in the way when whipping the horse to his left.

From the left rear horse, however, he was in a position to strike with his whip hand at all the horses. Naturally he kept to the right when meeting other vehicles, for only on that side could he watch the space between the passing wagons to see that they cleared each other. In time the ponderous freight wagons forced all other types of vehicles to conform to their rules of the road.—*Published in Highway Research Abstracts.*

Poppies Along State's Freeways

An idea which will strike most California motorists as first rate has been submitted to the State Department of Public Works by the biology class of Kingsburg High School. The students urge the planting of poppies by the Division of Highways in the "islands" separating the lanes of Highway 99.

The division has answered the letter with the information that its landscape engineer has been planting the California poppy along freeways in Los Angeles County, and that the project will be continued and expanded as extensively as growing, maintenance and other conditions permit.

In past years some railroads in California delighted their passengers by scattering poppy seed along the rights of way, and in some localities the brilliant flower continues to thrive, a glorious sight to persons entering or touring the State.

Cultivation and grazing have removed whole fields and hills of the golden wildflower from the California landscape, and many rippling vistas of color remaining are far removed from conventional travel routes. It would be pleasant to have the state flower restored as a commonplace sight along the great new arteries of concrete and macadam which California is building.—*Stockton Record*

Resolutions

Continued from page 31 . . .

In Appreciation of the Services of President R. H. Baldock

For many years Mr. R. H. Baldock, Chief Engineer of the Oregon State Highway Department has served this association ably and faithfully on special committees, as a member of the Executive Committee, as Vice President, and during the past year as President. He has consistently demonstrated ability of a high order, a sincerity of purpose and a devotion to duty which have won and retained the admiration of his associates. The past year has been an exacting one in which significant advances have been made in association objectives. He gave unsparingly of his time and energy in supporting legislation before committees of the Congress, which culminated in the passage of the "Federal-aid Highway Act of 1948"; therefore, be it

Resolved, By the American Association of State Highway Officials assembled in their Thirty-fourth Annual Meeting in Salt Lake City the twenty-fourth of September, 1948, that the association hereby expresses its appreciation for a job well done and extends its sincere thanks to him in the occasion of his retirement from the high office of President.

Team Spirit

Continued from page 49 . . .

If they're not sound, the thing will be changed.

To sum up. Team spirit comes out of mutual respect. And mutual respect comes out of kindly sympathy. This sympathy is not an easy thing to come by quickly. But every one of us can get going. Let's concentrate on the simpler things first. Let every leader every week give a good part of his time to teaching and communicating.

We have team spirit now—a company spirit to be proud of. But think of what we can do if we all really put our hearts to it! Company progress will scarcely be the half of it. Every one of us will be a better person, a more useful person, a happier person—not only at our work, but in our home, and everywhere else.

In Memoriam

BRYAN ALLISON

The death on October 3, 1948, of "Joe" Allison deprived the Division of Highways of a loyal and trusted employee whose experience and ability were utilized in difficult work assignments.

Joe was known far and wide for his ready wit, his flair for entertaining his friends, and his unswerving courage.

He was born in Nebraska, August 4, 1896, and at an early age left home and worked his way through grammar school. Construction work of many types occupied him until April 12, 1918, when he enlisted in the U. S. Cavalry and served in the 7th Cavalry (Custer's) until discharged in September, 1919. Between 1919 and 1929 he worked in the construction industry and in February, 1929, he entered the employ of the Division of Highways as a Junior Engineering Aid. He held the grade of Junior Civil Engineer when he died.

Surviving him are his widow, Sarah Eversen Allison; his mother, Mrs. Elizabeth Allison; his sisters, Tempe and Callie Allison; his brothers, Ellwood and Wilson Allison, in whose bereavement the sympathy of the Division and his many friends is extended.

In Memoriam

E. W. ROBERTS

A valued member of the Division of Water Resources, E. Willson Roberts, Senior Hydraulic Engineer, passed away on October 6, 1948, in Sacramento, after a brief illness.

Mr. Roberts was born in Sacramento on October 29, 1891, and received his education in the Sacramento schools. He began his engineering career at the age of 17, engaging in railroad work, topographic surveys, municipal engineering, and work for private surveyors. He first entered state service in August, 1914, with the State Highway Commission, serving as chief of party, draftsman, and inspector for about two years.

From November, 1917, to June, 1919, he served with the 23d Engineers in World War I, being overseas about 14 months. In August, 1925, he joined the staff of the Division of Water Resources, beginning as a Junior Hydraulic Engineer and advancing through the intermediate grades to Senior Hydraulic Engineer in January, 1944, in which capacity he served until his passing. His work with the Division of Water Resources has been principally on investigations connected with the State Water Plan and the Central Valley Project. His familiarity with the water supply and power phases of these projects made him a valuable employee of the division.

He is survived by his widow, Mrs. Marie I. Roberts, and two daughters, Mrs. Wayne Miller and Mrs. Leo Herberger, all of Sacramento.

His many friends in the Division of Water Resources and throughout the State deeply regret his passing.

In Memoriam

LINCOLN V. JOHNSON

The State Department of Public Works mourns the death of Lincoln V. Johnson, Principal Attorney in the Division of Contracts and Rights of Way. The years will not dim the affectionate esteem in which he was held. Mr. Johnson died suddenly in his Russian River summer home near Healdsburg on Saturday morning, October 2d, last.

Mr. Johnson, who was 53, was born in San Francisco and was educated in the public schools of that city and in Cogswell College, 1910-1914; Heald's Engineering College, 1915-1915, and Golden Gate Law College, 1916-1920. He engaged in the practice of general law and patent law and in 1934 entered state service as a condemnation investigator for the Department of Public Works. He was promoted to attorney for the Division of Contracts and Rights of Way in 1942 and became a staff attorney in 1946.

In 1947, Mr. Johnson was transferred from San Francisco to headquarters in Sacramento where he endeared himself to all with whom he came in contact. In August of 1947 he was elevated to the position of Principal Attorney.

In 1912-1914 he achieved fame as the West's outstanding swimmer in the 220, 440 and 880 yard events. He was named Pacific Association AAU Swimming Commissioner in 1933 and reelected in 1938.

Mr. Johnson is survived by his widow, Miriam, and two sons, Lincoln, Jr., San Francisco, and Douglas, a student at the University of California Agricultural College at Davis.

U. S. 99, South

Continued from page 52 . . .

between curbs, thus relieving the restrictions formerly existing.

Bridges over Lone Tree Wash and San Felipe Creek were replaced in a contract completed during November, 1947. The new structures are of reinforced concrete and structural steel and, with approaches, were built at a cost of $285,800.

A project in the City of El Centro was recently completed. This rerouting of the route through a portion of the city will materially relieve the traffic congestion to which this agricultural center has been subjected.

Continuing from the end of this work, construction now in progress will extend four-lane development north through the City of Imperial to Brawley. This modern arterial improvement to U. S. 99 in the heart of the Imperial Valley is 13.1 miles in length, and it is estimated that the final cost of construction will amount to $1,700,000.

Improvement of the remaining portion of U. S. 99 is concerned with projects for resurfacing, widening of roadbed, replacement and reconstruction of inadequate bridges and realignment at critical locations. One such project being between Trifolium Canal and Sandy Beach Road, comprising 15.1 miles, was completed for $517,000.

EARL WARREN
Governor of California

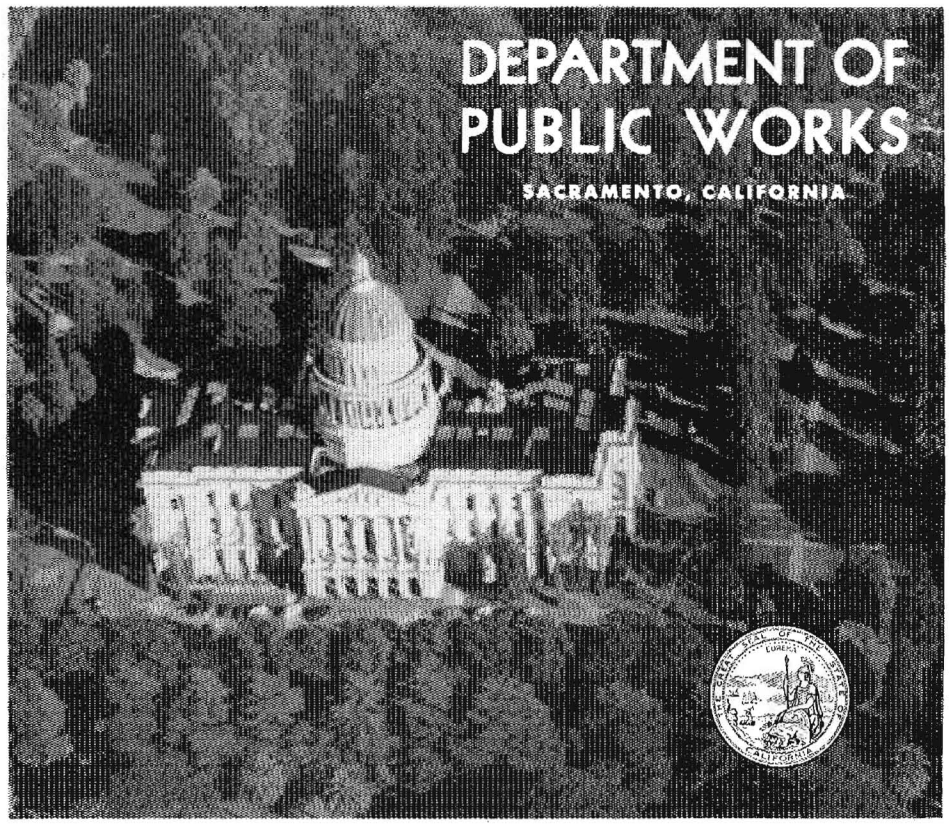
●

CHARLES H. PURCELL
Director of Public Works

●

FRANK B. DURKEE
Acting Deputy Director

●



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California Highways and Public Works
DIVISION OF HIGHWAYS
P. O. BOX 1499
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