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California Highways and Public Works

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

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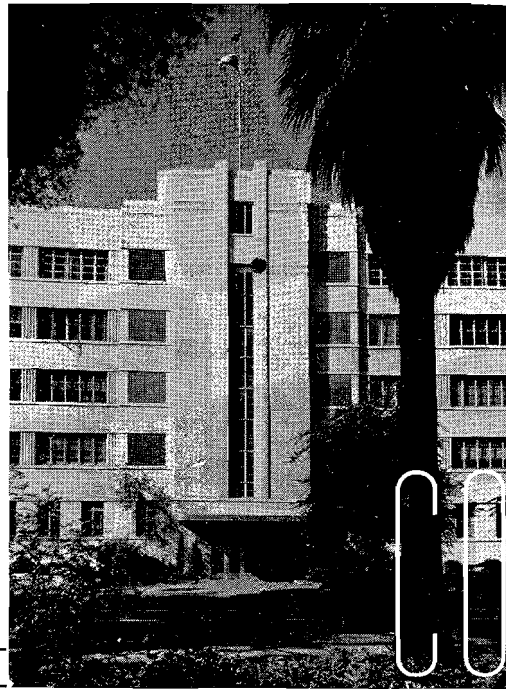
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KENNETH C. ADAMS, Editor
P. O. Box 1499
Sacramento, California

Feather River Project

Oroville Dam Will
Be Huge Facility

21 Miles of Present
Route Are Affected

Highway Relocation

GOVERNOR EARL WARREN, in a recent telecast, reported on accomplishments of the 1953 Legislative Session on water matters, particularly the progress being made in connection with the Feather River Project. This project, the Governor stated, is the greatest undertaking of its kind ever attempted. He reported that the Legislature had authorized an additional \$750,000 for continuation of studies necessary before construction of the project can be undertaken.

Construction of the Feather River Project by the State of California, acting through its Water Project Authority, was authorized by the Legislature in 1951. The legislative act authorized construction of the units set forth in the publication of the State Water Resources Board entitled "Report on Feasibility of Feather River Project and Sacramento-San Joaquin Delta Diversion Projects proposed as features of the California Water Plan," dated May 15, 1951.

The same act directed the Department of Public Works, through the State Engineer, to conduct the necessary investigations, surveys and studies and to prepare plans and specifications for the project, but made no money available for carrying out the work. However, the Legislature of 1952 appropriated \$800,000 for performing the work directed by the act. The additional amount of \$750,000 appropriated by the 1953 Legislature for the Fiscal Year 1953-54 is to complete the studies under way with the objective of preparing a report for submission to the Water Project Authority in which recommendations would be made with reference to the financing and construction of the project.

Oroville Dam

The Feather River Project as presently contemplated includes the Sacramento Valley Unit, the San Joaquin

Valley Unit, the San Francisco Bay Unit and the Southern California Unit.

The Sacramento Valley Unit comprises the Oroville Dam and Reservoir, Oroville Power Plant, Oroville Afterbay Dam and Power Plant and an electric transmission system to a Bethany Substation in Contra Costa County. The Oroville Dam, creating the Oroville Reservoir with a storage capacity of 3,500,000 acre-feet, would be located about five miles above Oroville. The dam would be 710 feet high above streambed level and would have a total crest length of about 6,850 feet. The main concrete dam across the channel of the Feather River would be 5,040 feet long. The spillway dam in a saddle on the right abutment would be 810 feet in length and would be joined to the main dam by 1,000 feet of earthfill dike.

Oroville Reservoir

Construction of the reservoir would require the relocation of sections of the Western Pacific Railroad and state highway, and would destroy the existing 70,000-kilowatt Las Plumas Power Plant of the Pacific Gas and Electric Company. The Oroville Power Plant, which would have a capacity of 440,000 kilowatts, would be located directly across the streambed at the base of the dam. An afterbay dam would be located $4\frac{1}{2}$ miles downstream from the main dam for re-regulation of power releases. Another power plant of 25,000 kilowatts capacity would be located below this dam. It is contemplated that there would be three 230-kilovolt transmission circuits, to transmit the electric energy generated, from the power plants to the substation near Bethany, west of the Sacramento-San Joaquin Delta.

Studies made indicate that there are available in the channels of the Sacramento-San Joaquin Delta for a period of five to eight months of every year 600,000

acre-feet of surplus water monthly. With the Oroville Reservoir operated for flood control and to supply water for all requirements in the Feather River Service Area, sufficient releases could be made to supplement these surplus waters to permit a constant diversion from the delta of about 3,930 second-feet, which is equal to 2,845,000 acre-feet annually. At the same time an average of $1\frac{1}{4}$ billion kilowatt hours of electric energy would be generated annually.

The 14,000,000 cubic yards of concrete required for the Oroville Dam would be about one-fourth more than the amount in the Grand Coulee Dam and more than twice the amount used in Shasta Dam.

The proposed relocated line of the Western Pacific Railroad would be about 23.4 miles long and would replace 27.1 miles of existing line.

Feather River Highway

About 21 miles of present State Highway Route 21 (Sign Route No. 24), the Feather River Highway, would be replaced by a relocated line. The position of the high Oroville Dam immediately above the existing highway bridge across the Feather River, and the arm of the reservoir extending up the deep canyon of the West Branch of the Feather River, are controls that preclude developing a relocation in the Feather River Canyon along the reservoir border. Of several alternative routes studied the most favorable from all standpoints is that from Oroville to Jarbo Pass via Table Mountain, Cherokee, and Yankee Hill. On this tentative relocation new bridges would be required across the Feather River at Oroville and the West Branch of the river beyond Cherokee. The bridge over the West Branch would be unusually high and long and would have separate decks for the relocated highway and the Western Pacific Railroad, similar to the joint structure built over the Pit River for the Shasta Reservoir project.

Seventeen Miles of New Construction

The proposed replacement of the existing highway would require about 17.5 miles of new construction. The estimated cost, exclusive of the highway-railroad bridge over West Branch, is approximately \$5,000,000. The new facility will be designed on standards equal to the present highway section that would be superseded. The Division of Water Resources is obtaining photogrammetric maps as a basis for projecting plans for the highway relocation. Highway plans will be prepared by the Division of Highways using funds made available by the Legislature for studies of the Feather River Project.

San Joaquin Valley Unit

The San Joaquin Valley Unit of the Feather River Project would divert project water from the Sacramento River through a cross channel to the westerly area of the Sacramento-San Joaquin Delta from which it would be lifted to provide water for the west side of the San Joaquin Valley and for the Southern California and San Francisco Bay units. The diversion from the delta would be from Italian Slough, a tributary channel of the Old River channel of the San Joaquin River. The intake canal is being designed for a capacity of 6,000 second-feet. The San Joaquin Valley unit includes the intake channel, five pumping plants and canals between the pumping plants running to the southerly end of the valley and terminating at Pastoria Creek three miles east of Grapevine. The pumping plants would raise the water from the delta at tidewater elevations varying from -0.4 foot to 5.9 feet maximum, to a maximum elevation of 1,500 feet. Water would be lifted from the terminus of the intake channel to the canal at elevation 225 feet.

Line of Canal

The canal would parallel the Delta-Mendota Canal of the Central Valley Project to a point at San Luis Creek at which point a pumping plant would lift the water to elevation 400 feet. The canal would then follow on grade contour along the west side of the San Joaquin Valley to the Buena Vista Hills where another pumping plant would

lift the water to elevation 500 feet. The canal would then follow the foothills at the southern end of the San Joaquin Valley to Wheeler Ridge where two pumping plants would raise the water to the 1,500-foot elevation. A canal would then run along the south side of Wheeler Ridge and continue, on grade contour, to Pastoria Creek. The total length of canal to this point would be about 295 miles.

The San Francisco Bay Unit would divert water from the main canal of the San Joaquin Valley Unit at a point about 1.5 miles from the first pumping plant, at which point a single lift would raise the water to an elevation of about 720 feet. The water would be conveyed through the Coast Range in a tunnel about 7,000 feet long into the Livermore Valley. Studies are being made of conduits which would carry the water to terminal storage reservoirs to serve areas in Alameda, Santa Clara, San Benito, and San Mateo Counties.

Southern California Unit

The Southern California Unit of the Feather River Project would start with a pump lift at Pastoria Creek which would raise the water to an elevation of 3,357 feet at the portal of the first of two tunnels through the Tehachapi Mountains aggregating 10.5 miles in length. From the outlet portal of these tunnels, located at the divide between the Santa Clara River Basin and the desert, near Quail Lake, a conduit of canals and tunnels on grade contour would extend to Barrett Reservoir in San Diego County. The conduit after leaving the tunnels would extend along the Antelope Valley on the desert side of the mountains, passing about 270 feet above the Fairmont Reservoir on the Los Angeles Aqueduct. It would cross Amargosa Creek and follow the south side of that creek about 470 feet in elevation above the Palmdale Reservoir, cross Soledad Pass at Vincent and Little Rock Creek below the Little Rock-Palmdale Dam. The course of the conduit would then be easterly across the Mojave Desert to a portal of a three-mile tunnel on the Mojave River, terminating in Devils Canyon, a tributary of the Santa Ana River and a source of water for the City of San Bernardino. The conduit would then

be a series of tunnels following the south slope of the mountains north of San Bernardino and Redlands southerly to a siphon across the San Geronio Pass between Beaumont and Banning. The course of the conduit would then bear southerly along the mountains east of the San Jacinto Valley, passing above Lake Henshaw on the San Luis Rey River and crossing the headwaters of the San Diego and Sweetwaters Rivers, to a terminus at a tributary of the Tia Juana River that runs into the reservoir created by Barrett Dam. The total length of the conduit would be about 580 miles from the point of diversion in Italian Slough in the San Joaquin Delta.

The objective of the Southern California Unit would be to furnish water to supplement existing supplies including California's rights to the Colorado River, presently available to the areas south of the Tehachapi Mountains. It must be considered an additional, not a substitutional, supply for that area.

Studies Well Under Way

Field surveys and office studies are under way of an alternative route which could deliver water on the west side of the San Gabriel Mountains, rather than on the desert side, by means of a tunnel at elevation 1,500 feet which would extend from a portal at Pastoria Creek a distance of 27 miles to a portal on Castaic Creek.

Work has been in progress on the Feather River Project studies for the past year. Nine contracts have been executed for photogrammetric mapping of portions of the project. The contracts include the mapping of the relocations of the Western Pacific Railroad, Highway Route 21, the Feather River Railway and the Oroville-Feather Falls County Road, made necessary by the construction of Oroville Reservoir. The Oroville dam site has also been mapped at a scale of 50 feet to the inch. Five of the aforementioned contracts are in progress for the mapping of 445 miles of the conduit route from Italian Slough to the north line of Fresno County and from Tupman in Kern County to Barrett Reservoir in San Diego County. The portion between the north line of Fresno County

... Continued on page 32

CALIFORNIA AGAIN WINS NATIONAL AWARDS FOR EXCELLENCE IN TRAFFIC SAFETY ACTIVITIES

GOVERNOR WARREN, on behalf of the State of California, has accepted three national awards for excellence in traffic safety activities for 1952.

The awards were for first places in traffic engineering and traffic enforcement and for outstanding achievement in driver licensing. This marks the third consecutive year that the State has won highest honors in enforcement and engineering.

The winning scores were based on the annual inventory of traffic safety activities which the National Safety Council and a number of technical and educational organizations conduct each year.

California, for comparison purposes, is grouped with seven other states with major traffic problems: New York, Pennsylvania, Ohio, Michigan, Indiana, Illinois and Texas.

Third Consecutive Year

For the second consecutive year California has been awarded first place on a national basis for outstanding achievement in traffic engineering. The Institute of Traffic Engineers, the judging agency, recently announced a first place tie between California and Michigan in the 1952 Annual Inventory of Traffic Safety Activities. The 1952 award marks the third consecutive year in which California has won or tied for first place in its class, which comprises the highly populated and heavily trafficked states.

Ratings are based on a comprehensive report which includes the highway organization, degree of control and aid given to cities and counties, the number of persons engaged in traffic engineering functions, and man-hours involved in the various types of traffic engineering studies. Accomplishments during the year in added traffic control devices such as signs, highway and railroad signals and separations, highway lighting, hazardous locations improved, miles of highways with center line maintained, curves and no-passing zones regularly marked, etc., are an important factor of the report. Major construction accomplishments such as miles of highways by lanes, and

number of bridges constructed, are given less weight.

California Consistent Winner

Prior to 1949 California had been grouped with the 11 western states. Under this classification, California had been ranked first in the group for both the years 1947 and 1948. It is interesting to note the improvement in

this State's ratings as issued by the National Safety Council. California's traffic engineering program was appraised at 83 percent in 1947, while the 1952 award was based on a 95 percent performance.

Due to the variations between states in size and amounts of highway travel,

... Continued on page 40

Governor Warren presents traffic safety awards to department heads. Left to right: A. H. Henderson, Director of Motor Vehicles; Milo L. Hewitt, Supervising Inspector, Highway Patrol; Governor Warren; State Highway Engineer George T. McCoy.



Real Progress

U. S. 99 Now Four-lane
Divided Highway for 115 Miles

By HARRISON R. BAKER, State Highway Commissioner

EVENTS happen to our highways that are scarcely noticed by the motoring public. Construction goes on, slight delays are encountered, the motoring public keeps on traveling our roads, and first thing you know we have miles and miles of four-lane divided highways and nobody thinks much about it.

Way back in 1940, December 14th, to be exact, the first of 37 contracts was let by the State Division of Highways for a revamping of the Ridge Route. And then World War II came along and construction stopped. In 1947 the State started in again to do the job of reconstruction on the Ridge Route.

The State, for administrative purposes, is divided into 11 districts by the Division of Highways, and it so happens that work on the longest stretch of four-lane divided highway came under the jurisdiction of two districts.

District VII has responsibility for the 45 miles in Los Angeles County, and District VI has responsibility for the 70 miles in Kern County.

First Contract Let

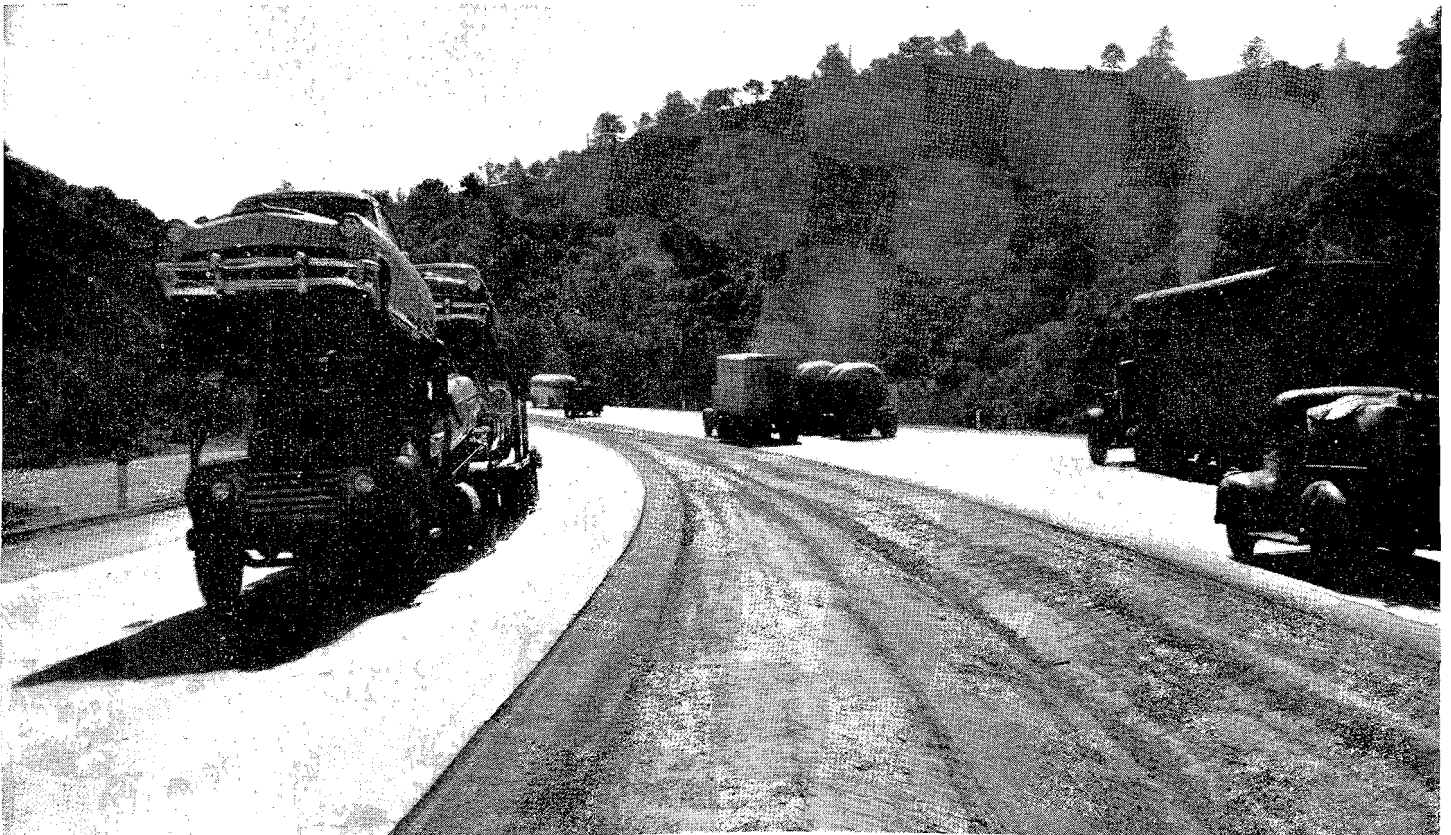
The first of the many contracts for reconstruction was in District VI and covered from Fort Tejon to 1.4 miles north of Grapevine Station. Since that time both districts have been working steadily on the "face lifting" job of the Ridge Route.

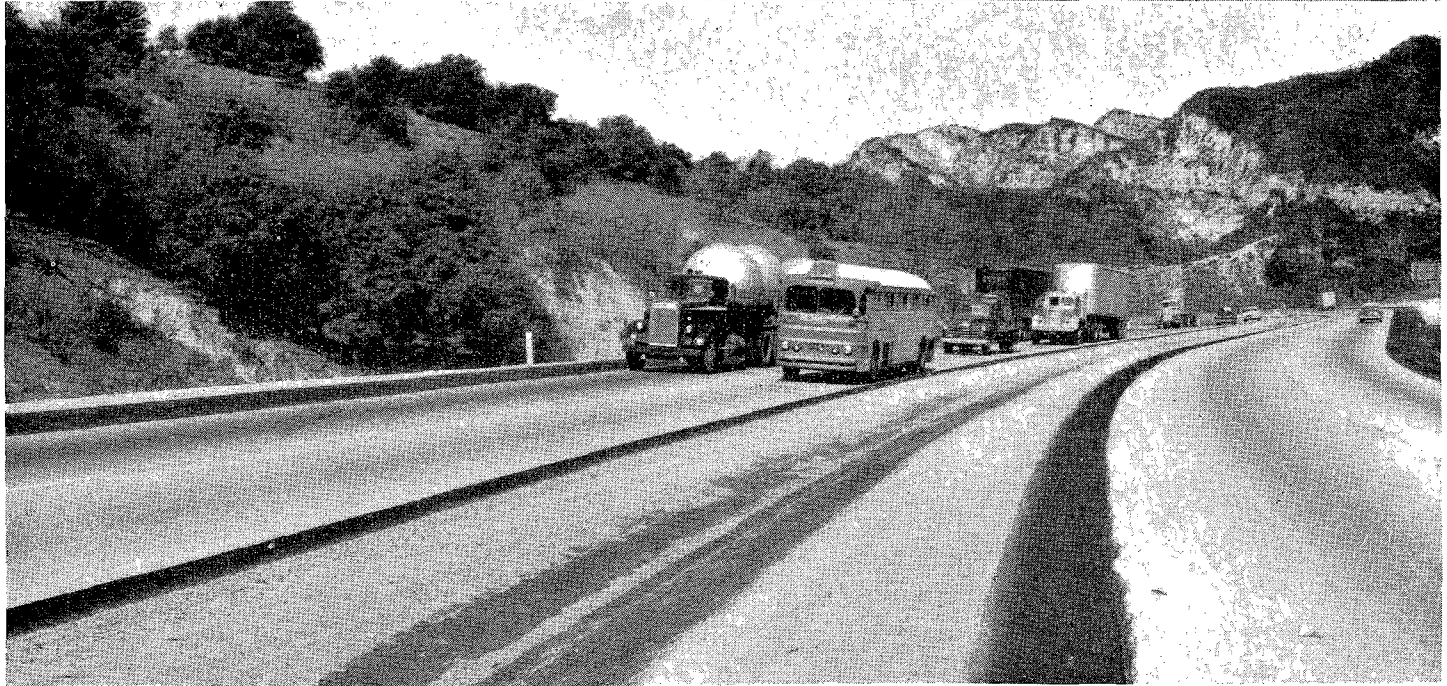
During the past six years District VII has let 15 U. S. 99 reconstruction contracts for a total of \$13,493,760 and District VI has let 22 reconstruction contracts for a total of \$12,125,010. Included in the above amounts is \$1,796,100 for right of way in District VII and \$2,102,000 for right of way in District VI. Six bridges have been built in District VII and four bridges in District VI.

The last of the reconstruction contracts has been completed and the motoring public of California now has the use of 115 miles of continuous four-lane divided highway from Tunnel Station at the north city limits of Los Angeles to the Delano Underpass in Kern County near the Tulare county line. This is the longest stretch of continuous four-lane divided highway in our State at the present time. The average motorist does not realize that there is this 115-mile-long continuous stretch of four-lane divided highway now at his disposal. It has happened gradually.

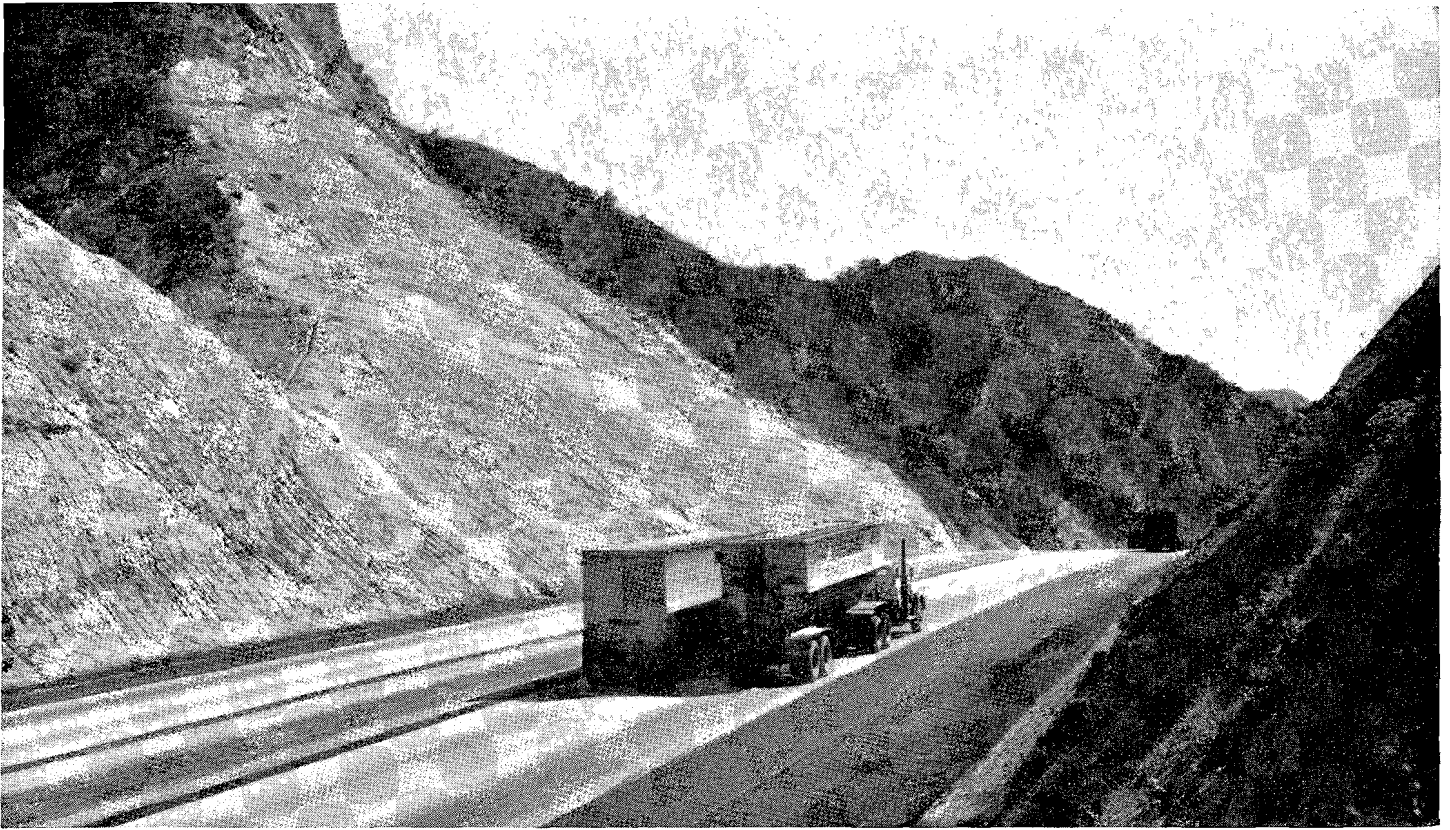
U. S. 99 is a north and south traffic arterial of very great value connecting the productive San Joaquin Valley and Sacramento Valley with the Los Angeles metropolitan residential and industrial areas. The importance of this

Weldon Canyon section of Ridge Route looking southerly from Weldon Summit, showing typical use of this highway by trucks





UPPER—Looking northerly along Weldon Canyon section of Ridge Route toward Weldon Summit. LOWER—Looking southerly along Weldon Canyon toward Wiley Canyon. Photograph shows traffic congestion that can occur even on a modern, four-lane, divided highway when heavy vehicles traveling at approximately the same speed attempt to pass each other on upgrades.



UPPER—View looking southerly through Weldon Summit, showing flattening of excavation slope on left in order to eliminate possibility of slides occurring that might obstruct highway. LOWER—Looking southerly along Ridge Route, showing junction with State Route 79 leading easterly to Saugus.

state highway is indicated by the fact that during the past five years the increase in traffic volume has been about 10 percent per year. Because of the importance of the Ridge Route as a heavily traveled truck road very necessary to the industrial and economic life of the Los Angeles metropolitan area, it is interesting to speculate on its value to the motorists and to the people of the State. As detailed above, the cost of the reconstruction job just completed on the 115 miles of four-lane divided highway was \$25,600,000. Adding to this figure the cost of original construction, we find that this 115 miles has cost a total of \$40,000,000. With this sum a capital asset of considerable value has been created. What is its worth on the books, based on earning power?

Traffic Counts

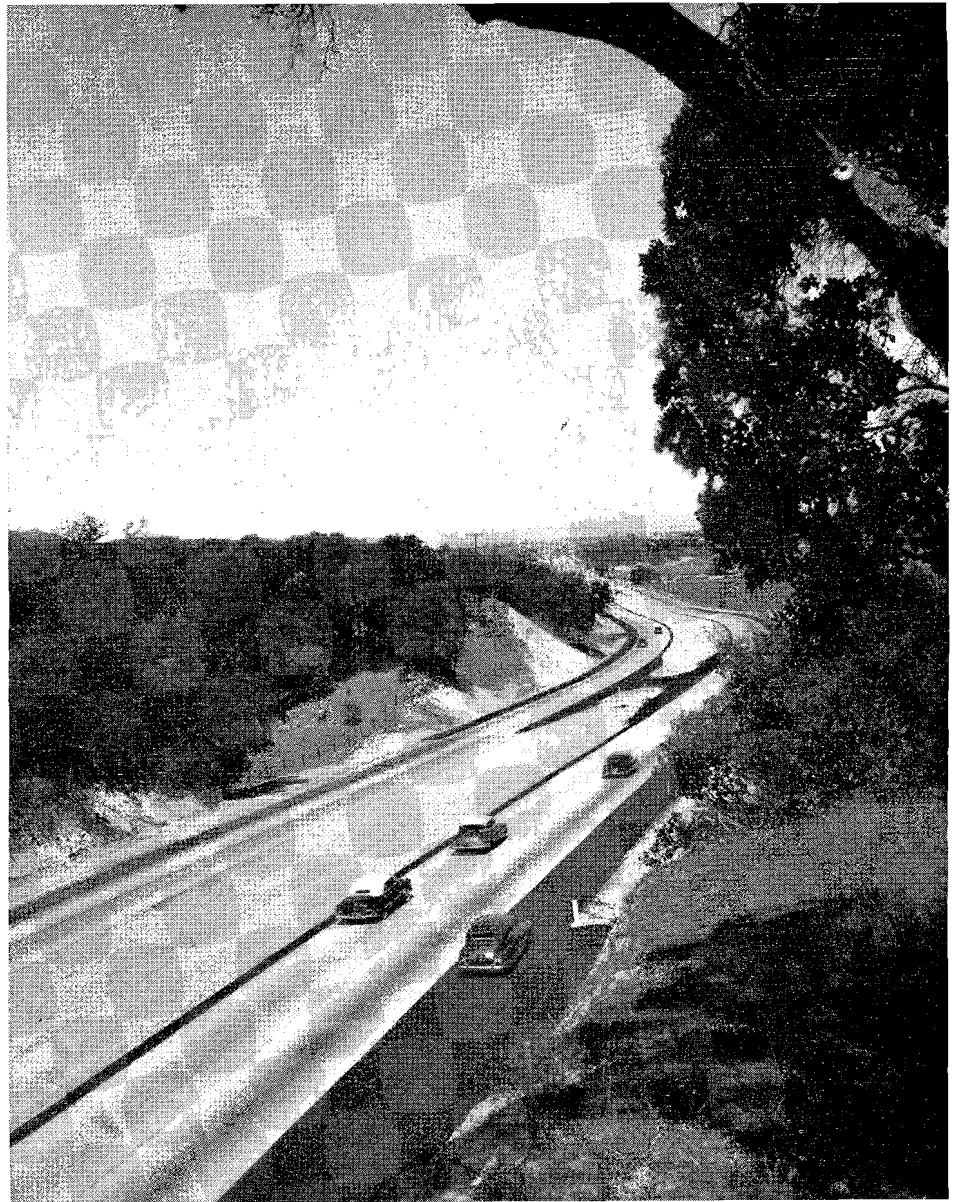
We find upon going to the traffic record that on this 115 miles there are 12 traffic count stations. The traffic count station showing the lowest 1952



count is centrally located at Lebec near the Los Angeles-Kern county line where a Monday 16-hour count was 8,706 vehicles. At the north city limits of Los Angeles the Sunday 16-hour count was 13,622 vehicles. The maximum count was at the station at Bakersfield where the Monday 16-hour count was 23,418 vehicles. A study of the results at all traffic count stations would indicate that a conservative average daily traffic figure for the Ridge Route would be 14,000 vehicles.

Traffic count figures indicate that about 15 percent of the traffic is trucks. To one driving the Ridge Route, this figure would seem extremely low. No doubt this is because the percentage is by numerical count only, and does not take into account either the size or the tonnage of the trucks. If we were attempting to get the proportion of trucks to passenger automobiles using the Ridge Route on the basis of total tonnage of each type of vehicle or perhaps the total area of highway occupied, then we would doubtless find that the trucks in bulk about equaled or even exceeded the passenger vehicle traffic. In any event we know this, that generally speaking, even on a numerical percentage basis there are half again as many trucks on the Ridge Route as are operating on other state highway routes, and that this is several times the percentage of trucks that usually operate on city streets. The fact that trucks utilize the Ridge Route to such a considerable extent is very clearly indicated by some of the photographs accompanying this story.

Now getting back to the problem of evaluating this 115 miles of divided highway. Perhaps the most logical approach would be to consider it as a toll road. I don't want to be misunderstood by out-of-state readers. The possibility of making the Ridge Route a toll road has never been considered. It has been completely paid for by public funds. It was paid for largely from gasoline tax funds and there is no intention of making it a toll road even though this is one state highway passing through a type of terrain that would be very adaptable to installation of toll collecting stations. We are at this time merely thinking about it as a toll road for the purpose of arriving at an estimate of its present worth to the people



Weldon Canyon section of Ridge Route, looking northerly toward Pico Canyon Road

of California. Certainly it is the type of facility which would warrant a charge of one cent per vehicle mile for automobile traffic and four cents per vehicle mile for trucks.

Figuring on this basis, 12,000 automobiles per day at 1 cent per mile would bring in \$13,800 per day, which equals \$5,037,000 per year. Two thousand trucks per day at 4 cents per mile would bring in \$9,200 per day, which equals \$3,358,000 per year. The total earnings per year would be \$8,395,000. On this basis the total cost of the Ridge Route would be paid off in less than five years' time. If we take this yearly income and capitalize it at 4 percent, we find that this 115 miles of divided highway, built at a cost of \$40,-

000,000, is actually worth \$210,000,000. These figures are presented to indicate that the people of the State of California have gotten more than their money's worth for the state highway funds that have been invested in the Ridge Route. They can feel gratified that the job has been fully paid for and that through the years to come there will be no assessment of tolls.

Plans of the State Division of Highways are to have both U. S. Highway 101, the Coast Route, and U. S. Highway 99, the Valley Route, continuous four-lane divided highways from the Oregon line in the north to the Mexican border in the south. Work is continuously in progress modernizing both of these routes.

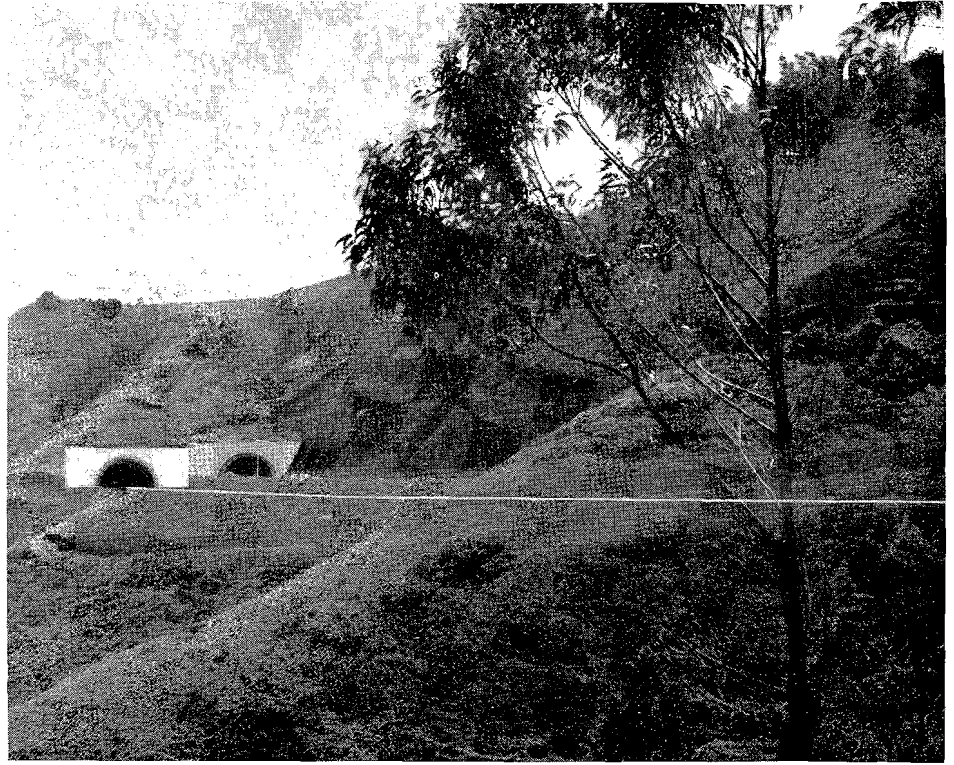
Waldo Project

Golden Gate Bridge Approach
Widening Is Urgently Needed

By DRURY ELDER, Design Engineer

CONSTRUCTION will soon be in progress for widening the Waldo Grade, the north approach to the Golden Gate Bridge. The present four-lane section of highway between Manzanita and the Golden Gate Bridge, a distance of about four miles, is a vital line of U. S. 101 that carries an average daily traffic of about 25,000 vehicles. This highway carries a large load of peak-hour commuter traffic from Mill Valley and points north that presently reaches a maximum of about 2,800 vehicles per hour. Complex intersections serving the City of Sausalito enter the highway near both ends of the project.

The need for expanded traffic capacity over this section of highway was first foreseen about seven years ago. Several alternate studies were made on various possible alignments. Alternates ranged from lines skirting Sausalito along the bay front; along the slope above the business section of Sausalito to studies relating to widening of the present facility. Widening of the existing alignment was finally adopted as being the most feasible consistent with proper traffic service and the least interference to existing improvements. The four-mile improvement will entail the removal of only four dwellings and two service stations.

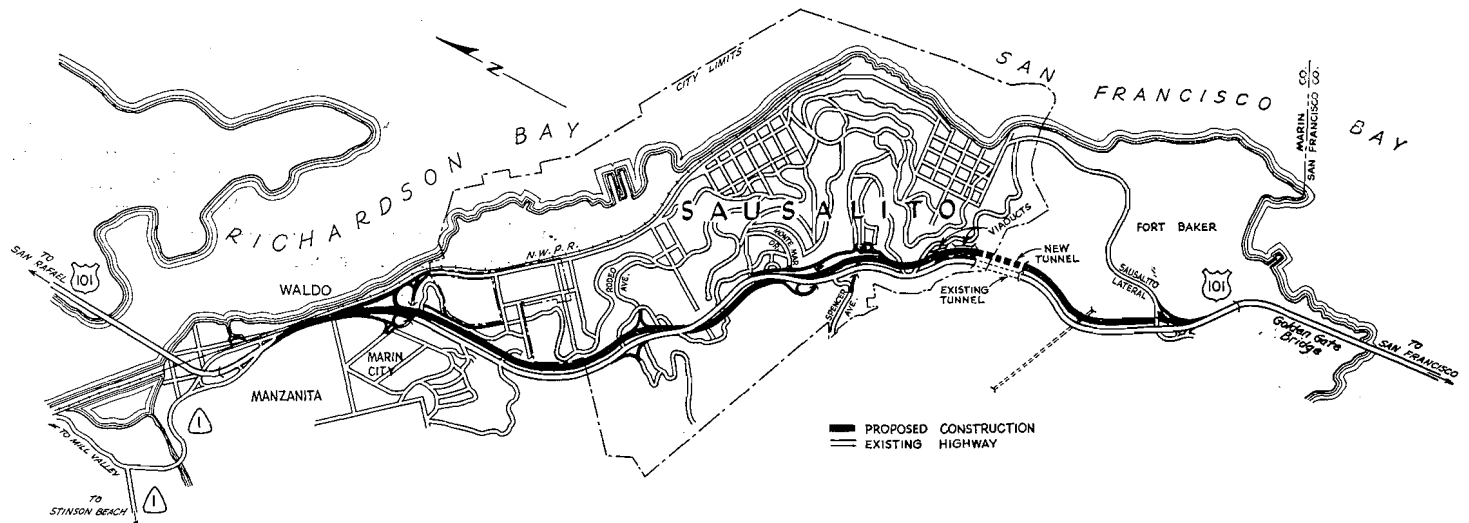


Looking south toward the Waldo Tunnel with a centerline of the three northbound lanes and the portal of the northbound bore shown in white

Declared a Freeway

This section of highway was declared a freeway by the California Highway Commission on May 15, 1947. Freeway

agreements were executed with Marin County and the City of Sausalito in April of this year. Right of way is being acquired on a full freeway basis



with the purchase of access rights throughout. This will result in only four vehicular entrances to the freeway by means of traffic interchanges within the limits of the project.

Proposed improvement is planned to consist of converting the major portion of the existing highway to a three-lane highway for southbound traffic and constructing three new lanes for northbound traffic with curbed median throughout.

Planned in Two Stages

Execution of the work is planned in two stages. The first contract, which is planned to be let the latter part of this summer, is to consist of grading, structures and portions of base and surfacing required for the convenience of traffic. This project is expected to be completed about the end of 1954. The sec-

ond contract, to follow immediately on completion of the first contract, will consist of base, surfacing, median curb throughout and final incidentals.

Most of the new construction will be along the easterly side of the present road, except for about 3,000 feet in the central portion of the project, where the new construction will be along the west side of the existing road.

New Highway Tunnel

Major structures will consist of a new highway tunnel, two sidehill viaducts, a new undercrossing, a new overcrossing, extension of two existing undercrossings and extension of a military tunnel that passes under the freeway.

The new highway tunnel will be a reinforced concrete-lined tunnel 1,000 feet long providing a clear roadway

width of 40 feet with one 4-foot and one 2-foot 6-inch sidewalk. It will be located parallel to and easterly of the existing Waldo Tunnel and will accommodate northbound traffic.

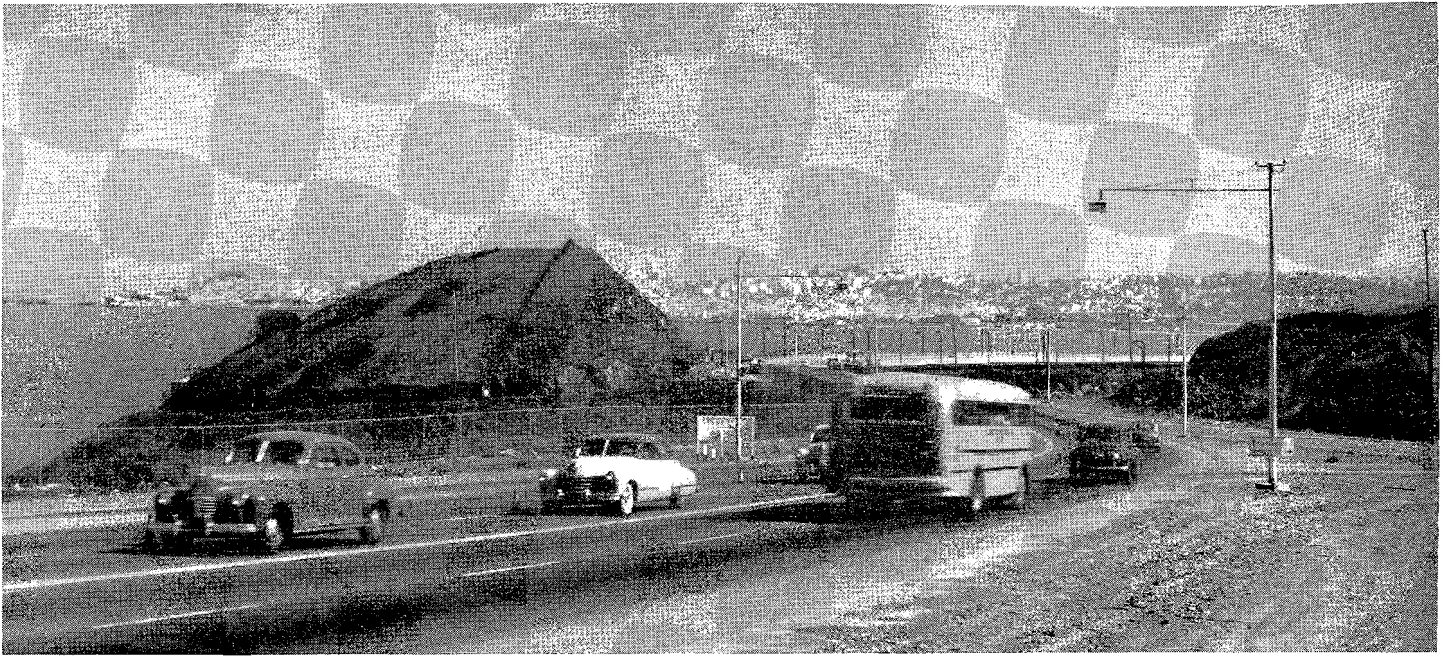
The two sidehill viaducts will be situated immediately north of the new tunnel and will be reinforced concrete girder structures about 270 feet and 318 feet long respectively, each providing a clear roadway width of 40 feet.

Traffic Interchange

A traffic interchange is required near the summit of Waldo Grade to serve Sausalito traffic in that area. Because the terrain is on a steep hillside slope, this interchange varies somewhat from the usual conventional interchange types. It involves an overcrossing at Spencer Avenue consisting of a reinforced concrete girder bridge about 314 feet long

Looking north from a point above the Fort Cronkhite Tunnel portal to the site of the twin Waldo Tunnel bore. The centerline of the proposed three northbound lanes and the new northbound tunnel are shown in white.





This photo shows the southerly terminus of the proposed widening project and the Marin end of the Golden Gate Bridge with San Francisco in the background and the Bay Bridge on the extreme left

providing a clear roadway width of 26 feet and one 5-foot sidewalk. Also included in the interchange is an undercrossing about midway between Spencer Avenue and Monte Mar Drive which will consist of a reinforced concrete rigid frame bridge 147 feet long by 35 feet clear span with a 5-foot sidewalk.

Improvement of the existing interchanges at the Sausalito lateral near the south end of the project and at Waldo near the north end of the project will require extension of undercrossings existing at those locations.

Military Tunnel Extension

The southerly portion of the project passes through the Fort Baker military reservation. A long military tunnel passing under the highway and serving the upper portion of the reservation will require extension on the easterly end. This extension will be a reinforced concrete arch structure about 108 feet long providing a clear span of 20 feet.

During public hearings relating to freeway agreements for this project, the residents of Marin County were assured that traffic interference would be held to a minimum during construction of this project. This presented quite a problem with respect to the transporting of earthwork material from exca-

vation on one side of the highway to embankment on the opposite side without hauling across the existing traveled way.

Steep Terrain

Because of the steep terrain, the toe of embankment slopes will extend a maximum of about 710 feet from highway centerline at an elevation approximately 300 feet below highway grade. The top of cut slopes will extend a maximum of 630 feet from centerline at a maximum elevation of about 290 feet above highway grade. Most cut and fill slopes will be benched with 20-foot to 40-foot benches.

About midway of the project, approximately 650,000 cubic yards of excavated material must be obtained from the west side of the highway for use in embankments along the east side. The problem of getting this material across the highway without interfering with traffic was solved by planning the construction of Monte Mar Undercrossing in two stages in such a manner that, after the first portion of the structure is completed on the west side, about 510,000 cubic yards can be transported through the undercrossing for disposal east of the highway. In order to distribute the remainder of this cut in embankments to the north along the

east side of the highway, a 60-inch tunnel liner is planned through a deep fill which will accommodate a conveyor belt. After serving its purpose as a conveyor belt tunnel, the tunnel liner will become a part of the final drainage system required on the project.

Photogrammetric Surveys

Design of this project was accomplished largely through the medium of contours determined by aerial photogrammetric surveys. This resulted in a great economy in the cost of preliminary surveys, which would have otherwise run much higher than average cost because of the steep rugged terrain in this area. Ground surveys were reduced to a minimum consisting of only such survey work as was required where tight line and grade controls were necessary.

Waldo Grade, serving as the north approach to the Golden Gate Bridge, is to be financed largely from Golden Gate Bridge toll revenue. A legislative act has provided \$5,000,000 to finance a large share of the cost of the widening project. This sum is to be repaid from bridge tolls to the Bond Sinking Fund of 1943 in the State Treasury. The remainder of the cost is to be provided from the State Highway Fund.

Artesia Street

State Highway Route 175 in
Los Angeles Is Standardized

By WILLIAM D. MCGINNIS, Assistant Highway Engineer

WITH THE tremendous increase in population in the southeastern portion of the greater Los Angeles area in recent years, an ever increasing need for a good east-west highway has become evident. There is at present no consistently good east-west road between Pacific Coast Highway (Long Beach) and Firestone Boulevard, a distance of 11 miles. Artesia Street, being about half way between Pacific Coast Highway and Firestone Boulevard, presented an ideal location for such a highway development.

The improvement of Artesia Street to modern state highway standards was divided into three road construction contracts, one bridge construction contract with approaches, and one signal contract. With the utilization of the existing bridge over the Los Angeles River and bridge approaches, there is being provided a continuous length of approximately 6.25 miles of modern four-lane highway. This bridge, costing \$640,000 was completed in 1949 under a City of Long Beach contract financed from the former city ¼-cent gas tax fund for state highways.

First Contract 2.47 Miles

The first contract, let to Warren Southwest, Inc., was from the San Gabriel River to Downey Avenue, a length of 2.47 miles. The existing roadway in this section consisted of both two- and three-lane concrete pavement with penetration treatment shoulders in poor condition, and no curbs or gutters. The construction completed on this section provided for widening and surfacing with plant-mix to give a four-lane divided highway with parking lanes and curbs throughout, and with left-turn lanes at all major intersections. The construction of curbs was necessary to handle drainage properly, and since the completion of the job a great many of the prop-



Cutting ribbon at Artesia Street ceremonies. Left to right: Ano Saveressing, Shirley Saveressing, and Assistant State Highway Engineer Paul O. Harding.

erty owners at their own expense have had sidewalks constructed.

The alignment was changed between Bixby Avenue and Woodruff Avenue so as to eliminate two right-angle turns. The old alignment had a right-angle turn at Woodruff Avenue coming from the west, and then went south for approximately 700 feet, and then another right-angle turn to the east. These right-angle turns were eliminated by the constructing of two easy riding curves between Bixby Avenue and Woodruff Avenue.

Excavation Problems

This particular contract was unique in that all the roadway excavation and overhaul were redesigned during construction. The original plan was to excavate to two feet below profile grade, replacing the bottom one foot with select material from within the job limits, on top of which was to be placed eight inches of untreated rock base and four inches of plant-mixed surfacing. The excess material was to

be hauled and placed in a designated embankment for the Long Beach River Freeway, a distance of approximately three miles from the west end of the contract.

This plan became impractical when it was discovered that due to a high-water table and a saturated clay soil, the contractor's equipment bogged down continually while attempting to place and compact the selected material. A new plan was then formulated. If, after excavating one foot, the underlying material was stable, the ground was then compacted to 90 percent and the untreated rock base and plant-mixed surfacing were placed thereon. If, after excavating one foot, the material appeared to be unstable, the excavation was then made to two feet below finish grade, and one foot of imported subbase material was placed before placing the untreated rock base and plant-mixed surfacing.

Opening Ceremony

On March 20, an official opening ceremony was held for this \$460,000 contract at the corner of Bellflower Boulevard and Artesia Street. Several brief talks were given outlining the history and development of Artesia Street, a ribbon was cut with appropriate formalities, and the ceremony was climaxed by a parade of vehicles through the completed job representing the various modes of transportation that have been used on Artesia Street down through the years. These included a horse-drawn carriage, various old-time cars, and finally, the very latest 1953 model automobiles. Representing the Division of Highways at the ceremony were P. O. Harding, Assistant State Highway Engineer, and W. L. Fahey and E. T. Telford, District Engineers.

Before the completion of this first contract, another contract had already been let to M. S. Mecham & Sons for the improvement of Artesia Street



Artesia Street looking easterly showing typical construction operations now in progress between Alameda Street and Long Beach Boulevard

from Downey Avenue west to Long Beach Boulevard. There was a break in this contract between Atlantic Avenue and Butler Avenue, where the previously mentioned existing facilities over the Los Angeles River and the bridge contract over the future location of the Long Beach River Freeway were located, thus giving a net length of 2.38 miles.

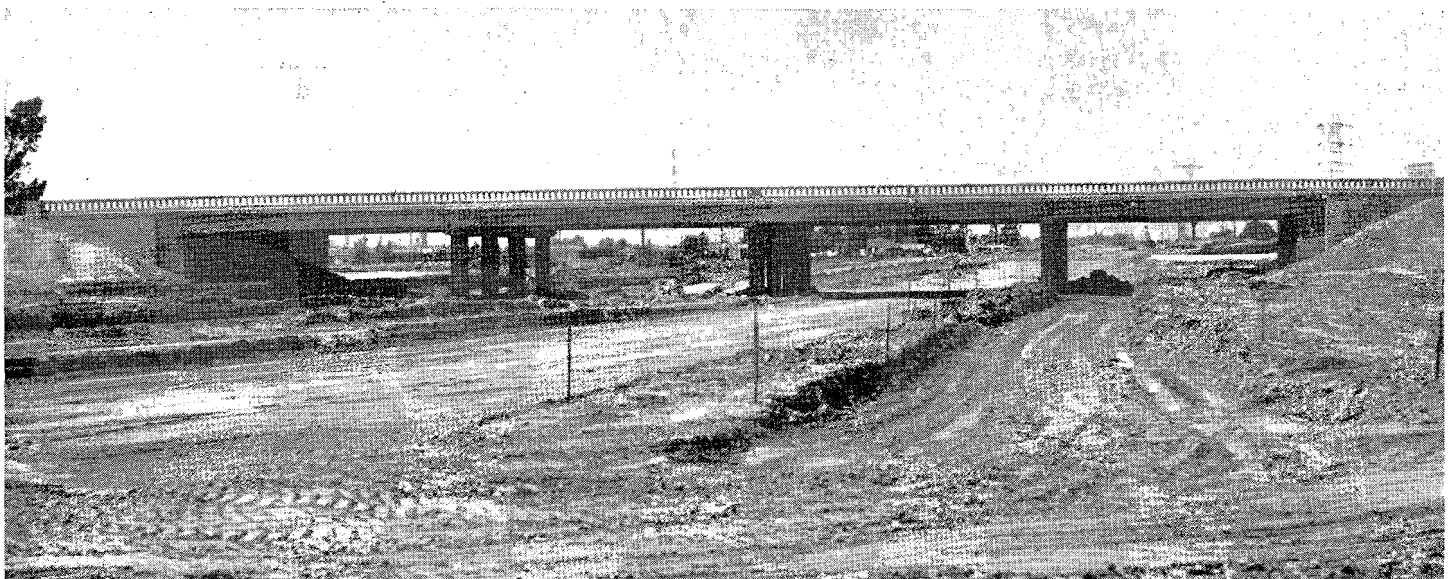
The existing roadway in this section, which was entirely within the City of

Long Beach, consisted of a two-lane concrete roadway resurfaced with plant-mix, from Downey Avenue to the Union Pacific Railroad crossing. From the Union Pacific Railroad crossing to Atlantic Boulevard there was a four-lane roadway partly of resurfaced concrete, some new plant-mixed surfacing on an untreated rock base, and on penetration treated base. The remaining section from Butler Avenue to Long Beach Boulevard was a two-

lane roadway of road-mix pavement in poor condition. There was curb and gutter on both sides from Atlantic Avenue to Cherry Avenue, and on the north side from Paramount Boulevard to Hammond Avenue.

The construction on this contract provided for a four-lane divided highway with parking lanes and left-turn lanes in the division strip at intersections. The portions of the roadway that were over a good existing base

View looking northerly showing bridge carrying Artesia Street, State Highway Route 175, over the Long Beach Freeway. This view indicates grading construction activity on the Long Beach Freeway.





Completed Artesia Street improvement looking easterly from the Los Angeles River Bridge. The intersecting street in center of photograph is Atlantic Boulevard, State Highway Route 167.

were resurfaced and the remaining areas were excavated to two feet below finished grade, except where a relative compaction of 90 percent was encountered sooner, with one foot of either select material or imported sub-base material being placed under eight inches of untreated rock base and four inches of asphalt concrete. The existing curb and gutter on the north side from Atlantic Avenue to Cherry Avenue was left in place, but the curb on the south side was removed and new curb constructed 10 feet to the south,

so as to provide for the additional width of roadway.

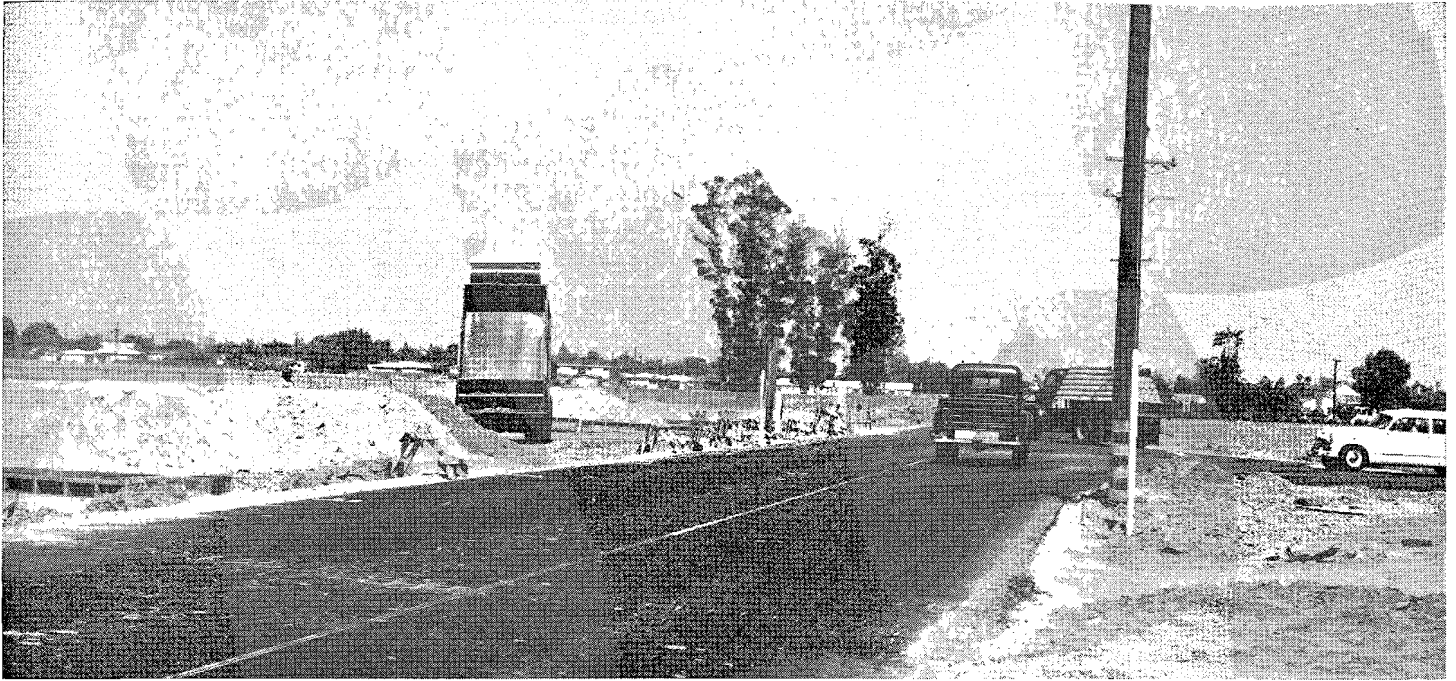
Excess Excavation

The excess excavation from this job was placed in an embankment for the Long Beach River Freeway immediately to the south of the one for the previous contract. The total embankment placed from these two contracts on the Long Beach River Freeway was approximately 30,000 cubic yards. This contract was completed on April 21, at a total construction cost of \$348,000.

Presently under construction are two additional contracts which will carry improved Artesia Street from Long Beach Boulevard to its present western terminus at Alameda Street. The first of these contracts, let to M. S. Mecham & Sons, provides for widening and paving so as to provide a four-lane divided roadway from Long Beach Boulevard west to the Southern Pacific Railroad Crossing, a distance of 0.79 miles. The second contract from the Southern Pacific Railroad to Alameda Street was largely a traffic

Looking easterly along completed Artesia Street improvement. The intersection in the foreground is with Lakewood Boulevard, State Highway Route 168.





Looking easterly showing construction operations in progress near Alameda Street. This photograph indicates type of traffic that has to be handled through construction.

signal installation contract, being only 85 feet long. This contract was awarded to Westates Electric Construction Company. The subcontractor for the grading and paving operations on this contract was M. S. Mecham & Sons. The resident engineer on this signal installation contract was Ray E. DeGroff. On all three of the Artesia Street road contracts, L. W. Sixt was the resident engineer.

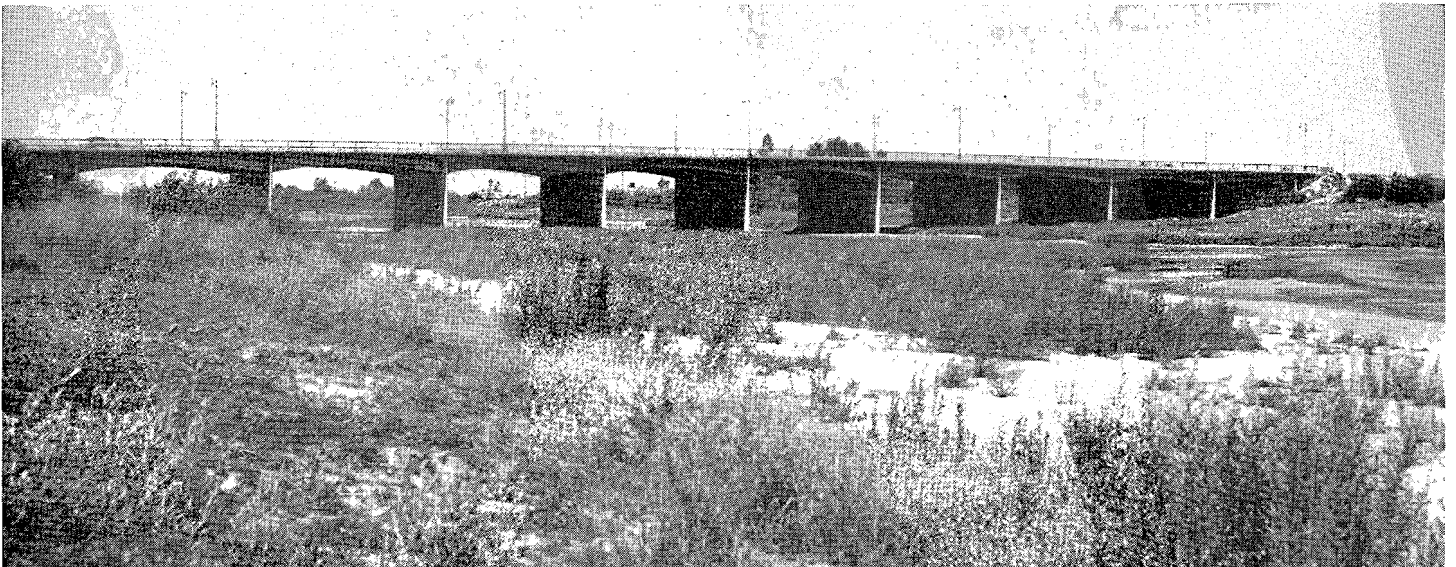
Completely New Construction

The improvement from Long Beach Boulevard to Alameda Street provides for completely new construction, with the exception of the utilization of 500 feet of existing curb on the north side of Artesia Street. The structural section provided one foot of imported subbase material under eight inches of untreated rock base, topped with four inches of asphalt concrete. The im-

provement replaces a two-lane road-mix pavement in very poor condition. The last 1,000 feet of this contract are being constructed on an interim or temporary basis as the ultimate plan calls for a grade separation to be built over the Southern Pacific Railroad tracks, Alameda Street, and Compton Creek immediately to the west of Alameda Street.

. . . Continued on page 55

View looking upstream showing the bridge carrying Artesia Street, State Highway Route 175, over the Los Angeles River

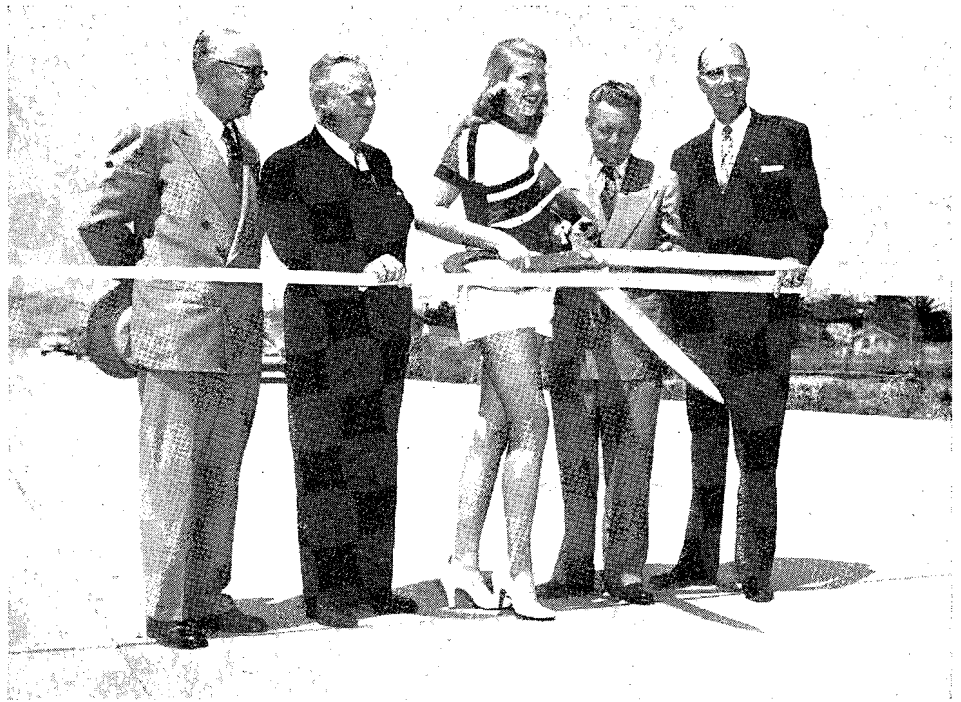


Ramona Freeway

Construction Completed From Los Angeles City to Alhambra Front Door

WHEN THE one-mile length of construction between Fremont Avenue and Atlantic Boulevard in Los Angeles was completed by Griffith Company, contractor, on May 26, about 6.2 miles of completed Ramona Freeway were brought from Aliso Street in Los Angeles to the front door of the City of Alhambra. The city officials and the Alhambra Chamber of Commerce considered this to be a milestone worthy of celebration.

Celebrating this important event a brief ribbon cutting ceremony was conducted by the Alhambra Chamber of Commerce at 11 a.m. on May 26th. Representing the City of Alhambra were the following: Thomas D'Arcy Quinn, Mayor, Alhambra; Edwin A. Ingham, City Manager, Alhambra; W. M. Jarrett, City Engineer; Joseph Chambers, President, Alhambra Chamber of Commerce; L. VanTongren, manager, Alhambra Chamber of Commerce; Diane Hurley, Queen of Hi-Neighbor Days Celebration.



Ribbon cutting ceremony on Ramona Freeway at Fremont Avenue showing from left to right: Assistant State Highway Engineer P. O. Harding, State Highway Commissioner Harrison R. Baker, Miss Diana Hurley, Queen of Hi-Neighbor Day's Celebration, City of Alhambra, Thomas D'Arcy Quinn, Mayor of City of Alhambra, and Joseph Chambers, President of Alhambra Chamber of Commerce

View looking westerly toward Fremont Avenue showing caravan of official cars using the outbound roadway immediately upon completion of ribbon cutting ceremony





View looking westerly from Marengo Avenue showing newly completed Ramona Freeway outbound lanes immediately after ribbon cutting ceremony

Representing the State Division of Highways were: Harrison R. Baker, State Highway Commissioner; P. O. Harding, Assistant State Highway Engineer; W. L. Fahey, District Engineer; Edward T. Telford, District Engineer; F. B. Cressy, District Construction Engineer; B. N. Frykland, Resident Engineer; Warren James, Bridge Department Representative.

Representing Griffith Company, contractor, were: J. F. Porcher, Gen-

eral Superintendent, and H. G. McGregor, Bridge Superintendent.

The cost of this contract was \$1,426,000 and the work was started on August 8, 1951. It is interesting to note that the contractor prosecuted the work with energy and initiative and completed it about seven weeks ahead of the allotted time.

This ribbon cutting ceremony was a notable event, particularly for this reason. It was the first ribbon cutting

ceremony to be held in connection with Ramona Freeway construction, notwithstanding the fact that as of this date a total of 26 construction contracts have previously been completed. It is of interest to note that over the 52-mile length of Ramona Freeway, from Aliso Street in the City of Los Angeles to the west city limits of Colton in San Bernardino County, \$28,000,000 have been spent and obligated by the State Divi-

... Continued on page 53

View looking northerly along Atlantic Boulevard, State Highway Route 167, showing completed bridge to carry Ramona Freeway over Atlantic Boulevard



Long Beach

By EDWARD T. TELFORD
District Engineer

Freeway

Phenomenal Traffic Increase Gives Impetus to Project

A STUDY has just been completed of the postwar growth in traffic for the area easterly of the location for the Long Beach Freeway, that was formerly called "Los Angeles River Freeway." The area studied is bounded by state highway routes as follows: Route 167 (Atlantic Boulevard), Route 168 (Rosemead Boulevard), Route 174 (Firestone Boulevard) and Route 2 (Whittier Boulevard). This area, lying easterly of the City of Los Angeles, has experienced an unprecedented growth as rapid as has occurred in any area of Los Angeles County.

The expansion has been equal to that in the San Fernando Valley and in the Lakewood area in Long Beach. But the growth is unique in that much of the increase is due to heavy industrial installations.

New Industries

An actual count has been made of the new industries constructed in this area since the end of World War II and it has been found that an additional 62 major industrial plants have been erected and put into operation. Typical of these are the new industrial

plants of General Pipe and Supply Company, Thor Power Tool Company, North American Aviation, Inc., Libby McNeil and Libby, Crucible Steel Company of America and Lever Brothers' \$25,000,000 soap manufacturing plant. With this industrial growth has come a corresponding traffic increase so that generally speaking we can say that the traffic on state highways and other thoroughfares in this area has doubled. The 16-hour July Monday traffic counts at our established traffic count stations are as follows:

Year	1		2		3			4		5	
	Jc. Rts. 166 and 167 Telegraph and Atlantic		Jc. Rts. 2 and 168 Whittier and Rosemead		Jc. Rts. 166 and 168 Telegraph and Rosemead			Jc. Rts. 167 and 174 Atlantic and Firestone		Jc. Rts. 168 and 174 Lakewood and Firestone	
	Rt. 166 E. of Rt. 167	Rt. 167 S. of Rt. 166	Rt. 2 W. of Rt. 168	Rt. 168 S. of Rt. 2	Rt. 166 W. of Rt. 168	Rt. 168 N. of Rt. 166	Rt. 168 S. of Rt. 166	Rt. 174 E. of Rt. 167	Rt. 167 N. of Rt. 174	Rt. 174 W. of Rt. 168	Rt. 168 N. of Rt. 174
1947	17,895	29,337	12,618	18,661	15,646	17,119	21,307	18,776	24,199	13,803	17,839
1948	14,613	32,309	11,834	23,884	17,725	17,720	21,925	23,176	21,775	16,246	19,870
1949	19,930	31,045	13,487	17,522	21,662	16,816	19,791	22,048	24,304	21,757	19,505
1950	22,720	34,459	16,889	28,693	25,666	26,284	31,718	30,015	31,327	25,416	25,601
1951	29,352	35,472	17,249	27,686	31,362	26,347	33,512	34,060	27,934	30,348	34,258
1952	32,517	40,999	18,237	29,035	35,163	26,687	38,637	31,038	31,362	44,535	31,189

Industrial Growth

Highway construction in this area by State and county has not kept pace with the industrial growth and development. Los Angeles County on December 18, 1951, paved a two-lane dip across the Rio Hondo Channel at the location of the old Foster Bridge, a short distance south of Telegraph Road, and immediately this carried a 24-hour volume of 2,545 with a 480-peak hour in one direction. The latest count, January 22, 1953, showed the 24-hour volume to be 9,257 with a peak hour of 1,460 in one lane. Some of this traffic will be directed to the Santa Ana Freeway and to Florence Avenue when present construction across the Rio Hondo is completed.

Another illustration of phenomenal growth of traffic is Washington Boulevard. The connecting section of Washington Boulevard between Telegraph Road and Vail Avenue was open to traffic in 1942. A 16-hour volume of 5,518 was counted here in December, 1945, and signals were installed in February, 1947, at the intersection with Telegraph Road. This section of Washington Boulevard is now carrying about 22,000 vehicles in 16 hours.

The area included on the *accompanying map* is estimated to be about 30 percent developed as a source of industrial and commuter traffic. Much of this traffic will be served by the Santa Ana Freeway. However, a ma-

major part of the traffic desires trips to the large residential sections to the north, to Montebello, to Monterey Park, to Alhambra, etc. The Long Beach Freeway with northerly extension is of high priority for this purpose.

Other Projects

Construction of Garfield Avenue in the section across the Union Pacific Railroad tracks is now under way by Los Angeles County and is scheduled for completion in January, 1954. The construction of Garfield Avenue from south of Clara Street to Gage Avenue is planned for 1954-1955 by the county, with right of way acquisition in the 1953-1954 budget. The beneficial effect of these two Garfield Avenue projects on present Atlantic



Airplane view looking southeasterly along Santa Ana Freeway showing traffic congestion on Eastern Avenue and Atlantic Boulevard where these traffic arteries come together and cross the freeway on a grade separation bridge. Union Pacific Railroad tracks are shown to the left. This traffic interchange system has become known as "The Mixmaster." Traffic congestion such as pictured here that occurs during peak hours will be relieved by construction of the Long Beach Freeway and road projects now under construction by the Los Angeles County Road Department.

Boulevard congested traffic conditions may be fully as important as that of the Long Beach Freeway when completed.

North of the Santa Ana Freeway additional capacity is still available on Rosemead Boulevard. Extension of Slauson Avenue across the Rio Hondo to join Rosemead Boulevard is scheduled for contract as a county FAS project in the 1953-1954 Fiscal Year,

and plans have been submitted for review by the State. This project is a vital link with the industrial district and will utilize Route 168 as its main supply line. Completion of all of the above projects will greatly improve traffic service in the area.

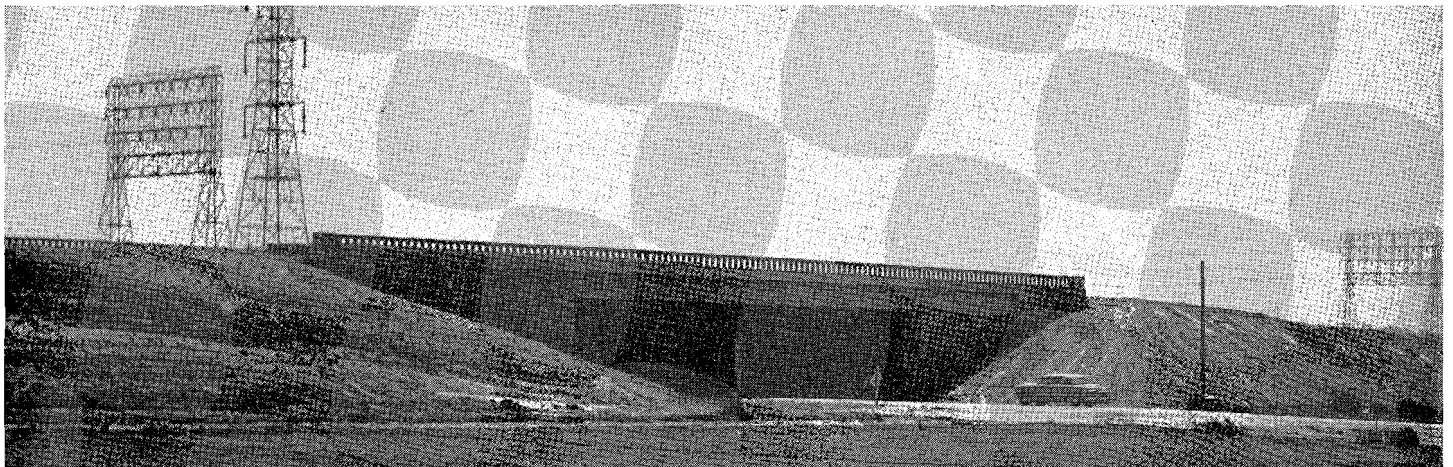
Future Construction

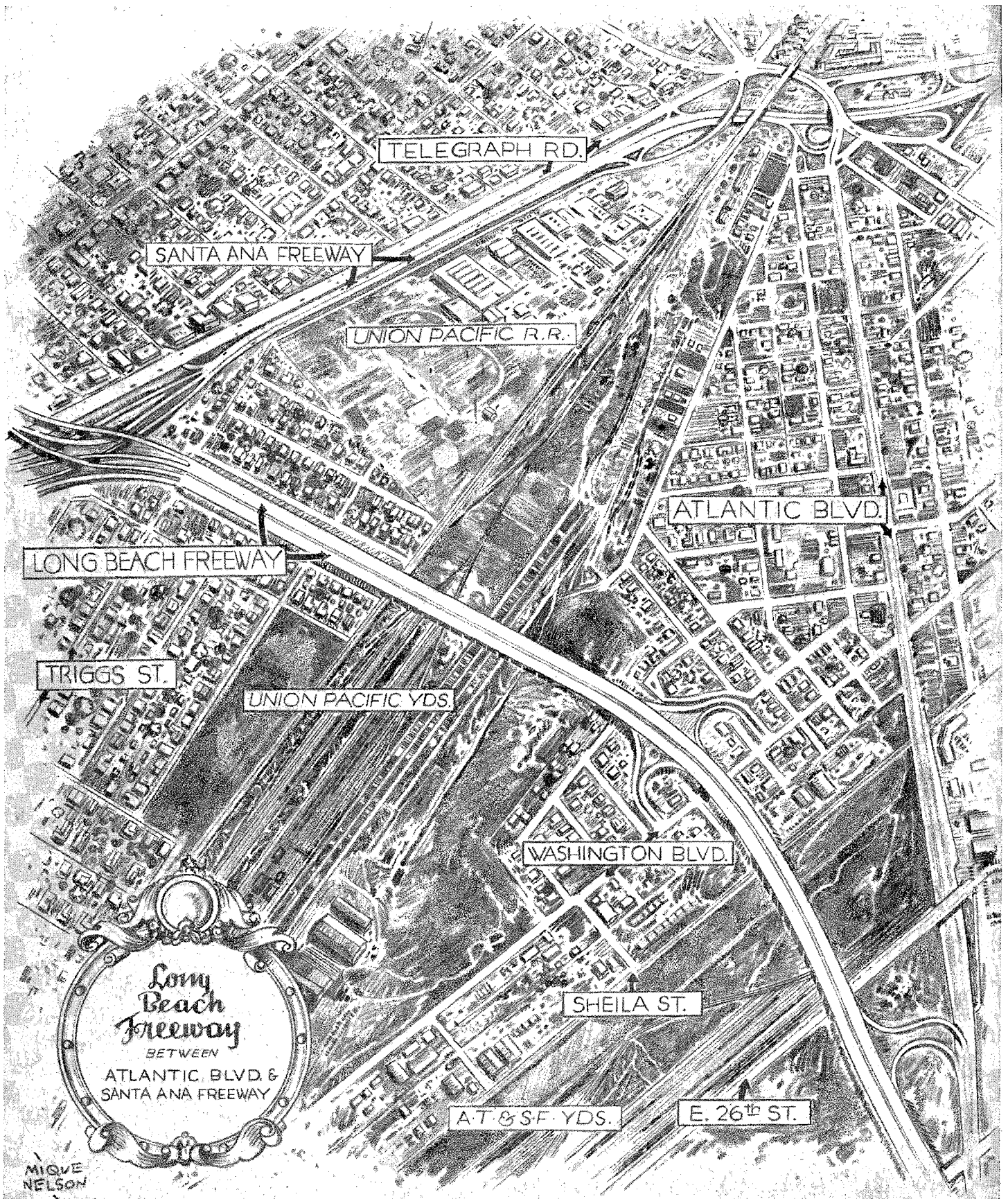
Preliminary action toward the construction of the northern extension of

the Long Beach Freeway, previously known as the "Concord Freeway," from the Santa Ana Freeway to Huntington Drive in Los Angeles, was taken June 18th by the Highway Commission.

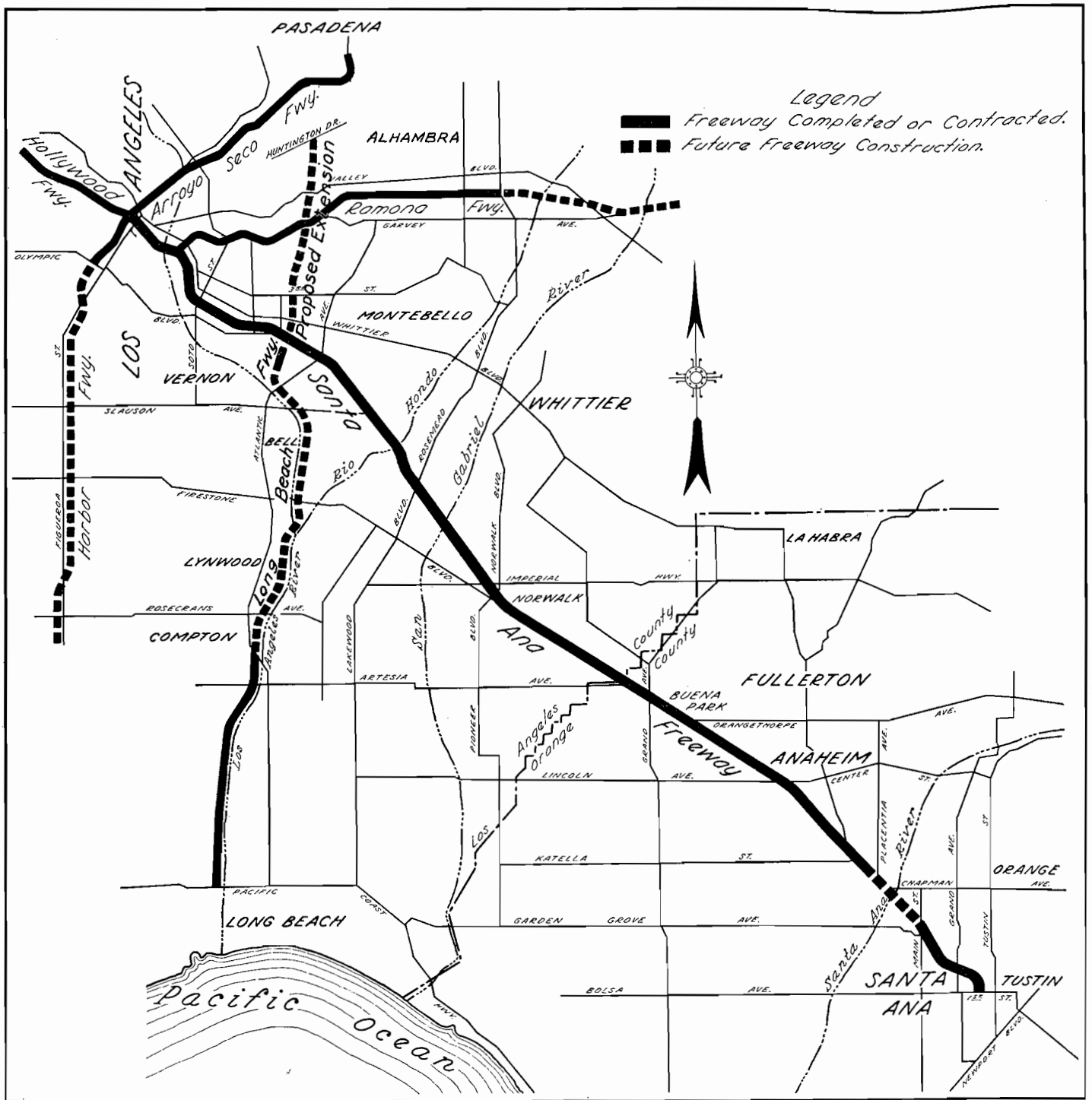
The commission declared its intention to consider the adoption of the new routing and declare it a freeway. The proposed extension is approximately 5.2 miles long and construction

Looking easterly showing completed bridge structure to carry the Long Beach Freeway over Del Amo Boulevard





Sketch map looking northerly showing portion of Long Beach Freeway as it will look crossing the freight classification yards of the Atchison, Topeka & Santa Fe Railway and the Union Pacific Railroad in the East Los Angeles area. In the background is shown the traffic interchange system between the Santa Ana Freeway, Atlantic Boulevard, Eastern Avenue and Telegraph Road that is now being called "The Mixmaster."



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Revised 5-5-33

and right of way costs are estimated at nearly \$20,000,000. Future construction, however, would be dependent on relative deficiencies of other portions of the State Highway System.

State Highway Engineer G. T. McCoy was requested by the commission to determine whether local authorities wish the commission to hold a public

hearing before final action is taken to adopt the routing.

Major Relocation

The proposed routing involves a major relocation of the present route on Atlantic Boulevard. It provides for the extension of the Long Beach Freeway north from the Santa Ana Freeway, generally paralleling Eastern and

Humphreys Avenues. It passes through the City Terrace area of Monterey Park in the Puente Hills and continues northward, roughly parallel to the Alhambra city limits, to connect with Huntington Drive near Lowell Avenue in Los Angeles.

Not including the 5.2 miles of the proposed northerly extension, the

Long Beach Freeway is 16.4 miles in length extending from Pacific Coast Highway (State Highway Route 60) in the City of Long Beach to the Santa Ana Freeway near the easterly city limits of Los Angeles. The contract for the southerly 2½ miles between Pacific Coast Highway and 223d Street was completed at a cost of \$1,600,000 and opened to traffic during the early part of this year. Major freeway structures at Compton Creek and Del Amo Boulevard were completed and accepted by the State Director of Public Works on May 8, 1953. The piers for the Los Angeles River Bridge in Southgate were constructed by the U. S. Corps of Engineers in connection with the improvement of the river channel. Piers were financed by the Division of Highways at a cost of \$167,000.

Four Going Contracts

At the present time work is in progress on four construction contracts. These contracts cover lighting and signs, grade separation bridges at Artesia Street, at Cota crossing of the Pacific Electric Railway between Dominguez Street and Del Amo Boulevard, and freeway construction between 223d Street and Atlantic Avenue in Compton. In addition, the State Division of Highways is financing the cost of constructing the Pacific Electric Railway grade separation structure in the City of Lynwood across the freeway, which project is being handled by the U. S. Corps of Engineers. The City of Long Beach and the State are jointly financing the cost of constructing a pumping plant at the junc-



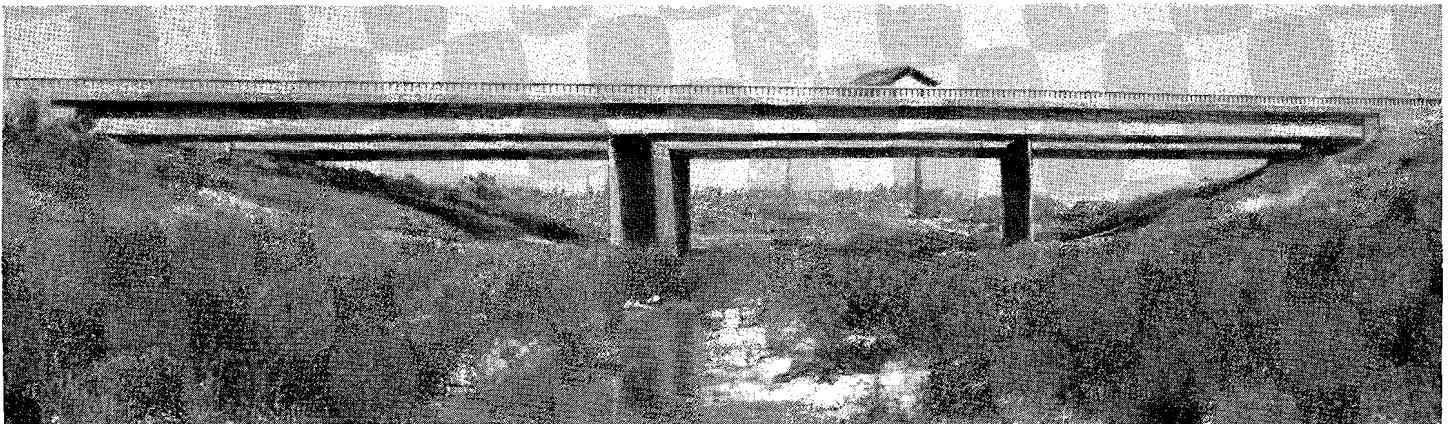
Airplane view looking northerly along completed Long Beach Freeway from Pacific Coast Highway in foreground to 223d Street in background. Beyond is shown construction now in progress along the Los Angeles River.

tion of Long Beach Boulevard and the Long Beach Freeway. This project is being handled as a city contract. The total expenditure by State to date for rights of way and construction on the Long Beach Freeway is approximately \$14,000,000.

Particular mention should be made of the construction work being carried out by the City of Long Beach, southerly of Pacific Coast Highway on the section of this freeway which is off the State Highway System. Early this year the city opened to eastbound and westbound traffic the Anaheim Street Bridge over the freeway that was in-

cluded in the city's contract with Guy F. Atkinson. The City of Long Beach early in June of this year completed and opened a section of the city's portion of this freeway from Pacific Coast Highway extending under Anaheim Street to a temporary connection with Seventh Street and Pico Avenue. Southerly of Anaheim Street, the city is completing designs and will advertise and award city contracts in the near future for other grade separations with full traffic interchange facilities, and for bridges across the Los Angeles River. It is expected that this freeway, for which the City of Long Beach has

Looking easterly toward recently completed bridge to carry the Long Beach Freeway over Compton Creek

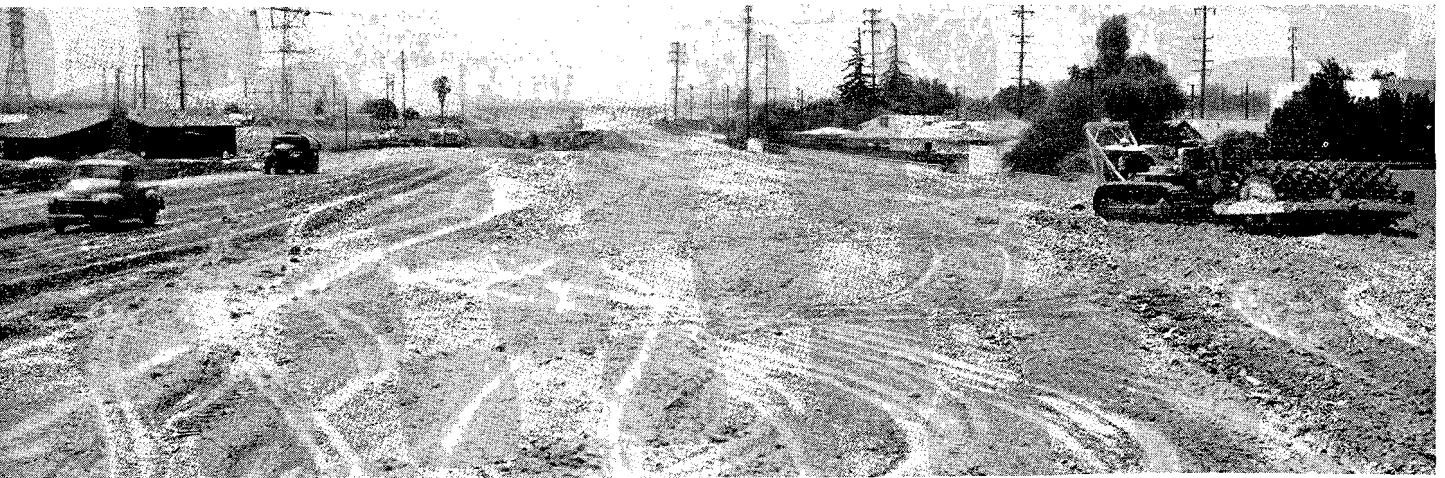




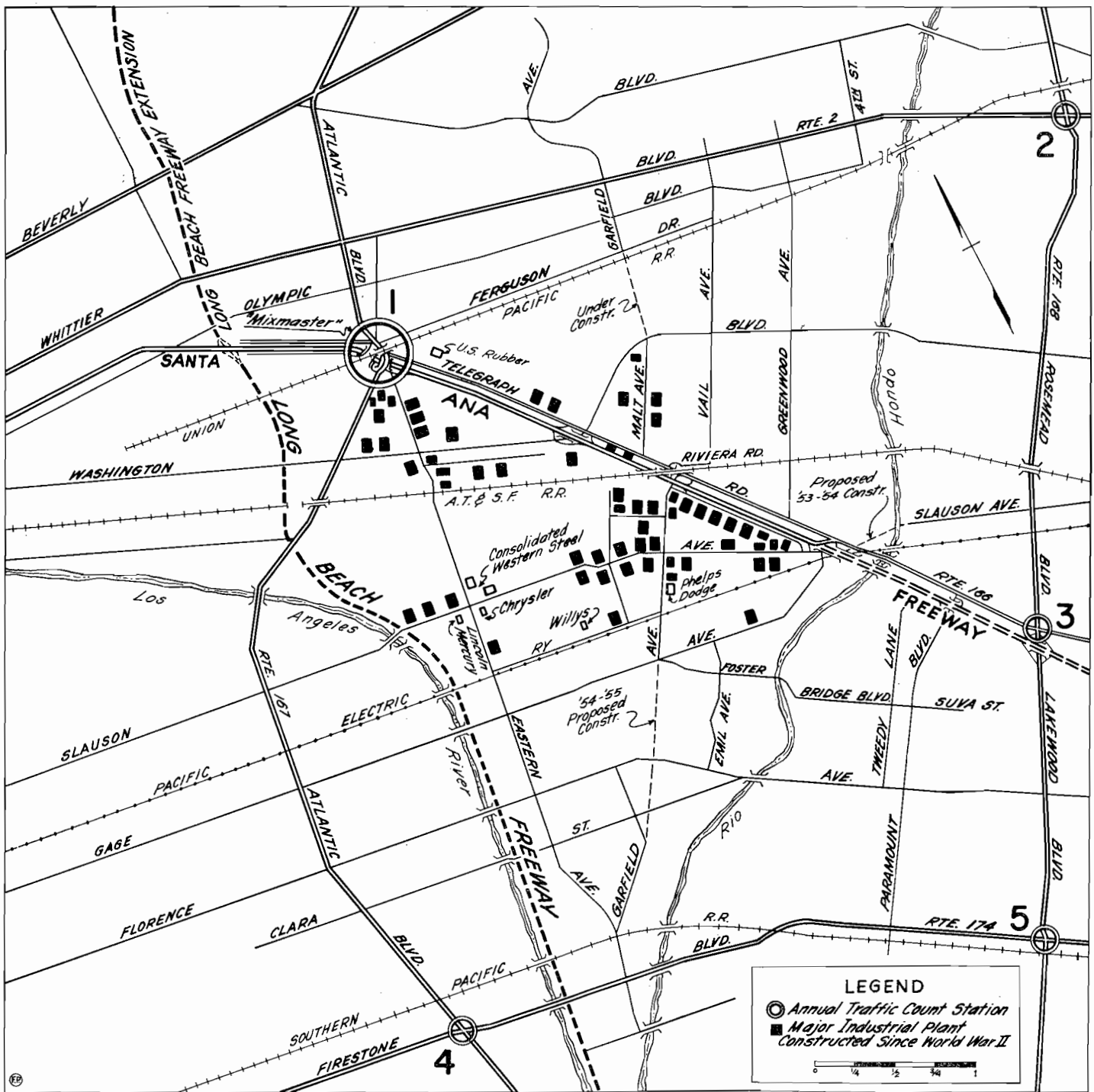
Looking southerly along Long Beach Freeway, showing Long Beach Boulevard Bridge in background



Looking northerly along Long Beach Freeway showing construction operations in vicinity of Long Beach Boulevard Bridge which was designed and built under supervision of the City of Long Beach



Looking southerly from Atlantic Avenue, along Long Beach Freeway showing construction operations in progress. Recently completed Artesia Street Bridge across freeway shown in background.



Vicinity map showing area easterly of Long Beach Freeway where traffic study was recently completed. This map shows location of annual traffic count stations and the major industrial plants that have been constructed in this area since World War II.

accepted responsibility for design, construction and financing, will be completed and opened to traffic within about three years' time. The total estimated costs of the city's portion of this freeway is in the neighborhood of \$12,000,000, all of which is financed from other than state highway funds.

Freeway Between Compton and Long Beach

The completion of construction now under way on the four and one-half miles from 223d Street in Long Beach northerly to Atlantic Avenue in Compton, is anticipated early in 1955. When this is completed public traffic will have seven and one-half

miles of continuous full freeway between Compton and Long Beach.

The Division of Highways is actively engaged in completing designs and right of way acquisition for the remaining nine miles between Atlantic Avenue in Compton and the north-

... Continued on page 38

State Fair

*Again State Highways Will
Bring Thousands to Capital City*

ALL CALIFORNIA highways again will lead to Sacramento when the 1953 edition of the California State Fair opens September 3d for an 11-day showing. With the famed exposition going into the climax of its ninety-ninth year, record crowds are expected.

Motorists, many of them bringing the entire family, are expected to converge on Sacramento from every county in the State, if past performances are any criterion.

From the smallest county—Alpine, nestling on the spine of the Sierra, and from San Bernardino, the largest—hopeful exhibitors and expectant visitors will fill the car with gasoline and oil and head for the 207-acre site of the fair in Sacramento.

In addition to the tremendous outpouring of agricultural and industrial wealth which will be represented at the fair, many counties are featuring their vacationland and sight-seeing attractions. Great variety in scenery, climate and terrain, plus the State's fine network of highways have made recreation and travel big business in California.

California's Magic

The theme of the 1953 State Fair is "California's Magic," which will be portrayed in scores of different ways. County exhibits, livestock shows, Hall of Flowers and commercial exhibits will carry the major load, but a full representation of the things which make California great will be on hand.

Two million dollars worth of purebred livestock, plus agricultural and industrial products representing the core of California's multi-billion dollar economy, beautiful flowers, works of art and crafts, racing, horse shows, music, showmanship and glamor all go into the pattern which emerges as the West's outstanding exposition.

Continuing in the path of constant improvement which the fair has followed throughout the years, this year's edition will offer \$233,000 in premium money, more entries in various ex-



Typical scene on State Fair grounds

hibits, more color, and the best entertainment available anywhere.

Many Counties to Exhibit

The California State Fair is a gigantic window display reflecting more than 100 years of progress and achievement by the Golden State. It is a miniature tour of the State with its fertile fields, productive orchards and vineyards, its bustling industrial areas, its ranges dotted with cattle and sheep, its bountiful natural resources, its fast growing cities, and its world famous recreational areas and scenic grandeur.

In the counties building alone representative samples of this vast wealth are collected in spectacular county exhibits. To date 36 counties have scheduled exhibits and nine more are making plans for exhibits.

Premiums which are offered by the fair to promote development of better agriculture, industry and homemaking, total \$60,000 in the counties exhibit. Of this amount \$18,600 is offered for the best feature exhibits and the remainder for specific products as part of the exhibits.

Livestock premiums this year will total \$115,090, with \$43,798 reserved

for the junior division comprising Future Farmers of America and 4-H Club members. In addition to these awards by the fair, some 40 livestock associations, special organizations and institutions offer additional cash premiums, trophies, ribbons and prizes.

Horse Racing

Horse racing, another prime attraction at the fair, features racing daily except Sundays. Horsemen are offered \$150,000 in purses. Enthusiastic support by the wagering public pushed nearly \$4,000,000 through the mutuel windows last year for a new record and even that figure may be topped this year.

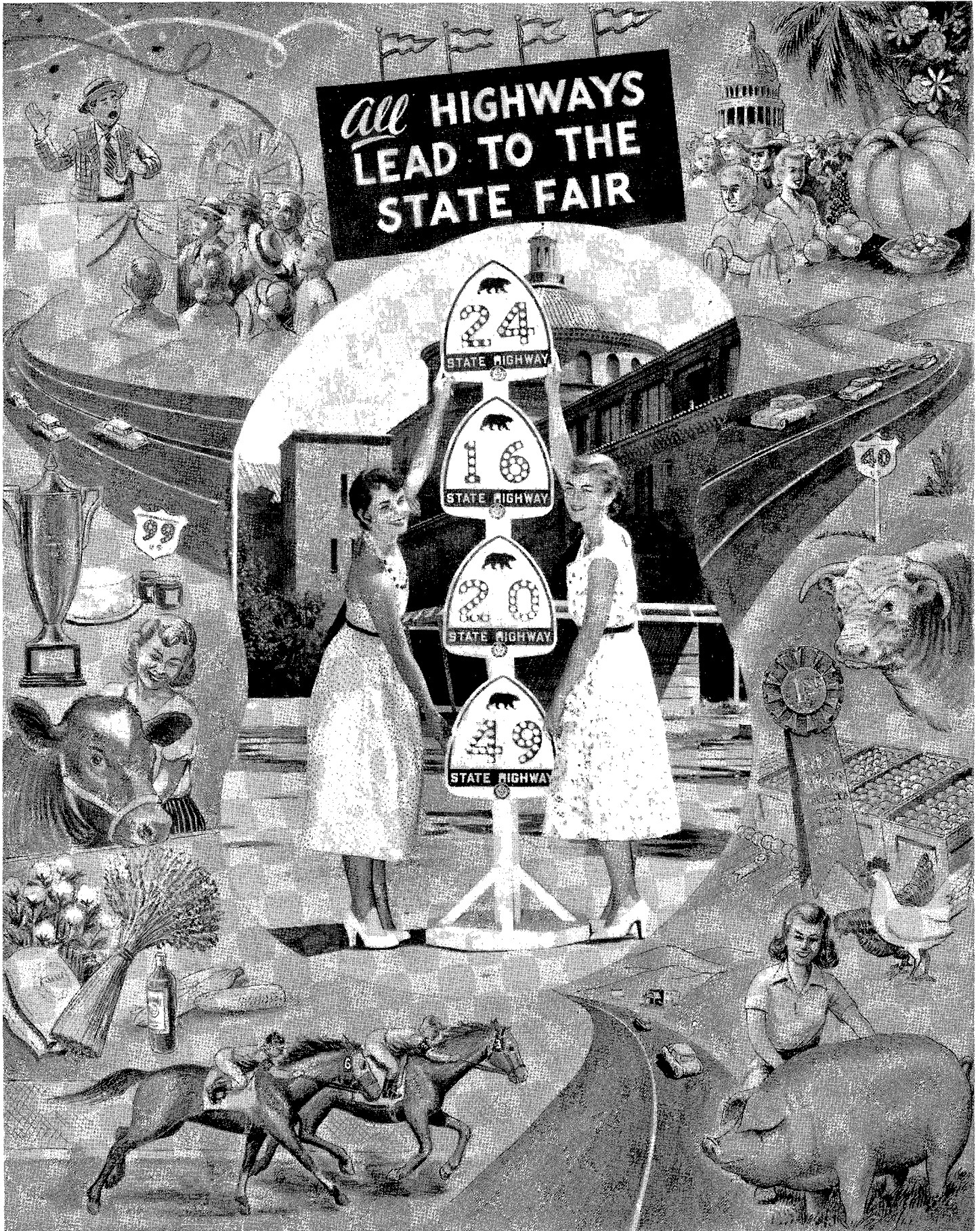
More than 200 industrial and commercial firms will exhibit their products in the commercial exhibits section this year, for which two new buildings are being erected.

For the gardening enthusiasts—California is full of them—the State Fair again will show one of the greatest floral and garden displays ever assembled in one place. The Hall of Flowers will become a setting of floral splendor with displays ranging from exotic tropical blooms to the spiny cacti of California's deserts.

For entertainment alone the fair offers just about everything. Top stars like Spike Jones and Phil Harris of stage, screen, radio and TV fame will star in the night shows. Jones and his troupe will play the first five days, while Harris will show the final six.

Sigurd Rascher, famed saxophonist, will give two free performances daily at the fair bandstand. Twenty bands, dozens of vaudeville acts and variety shows, dance revues and the Gayway add up to 11 days and nights of solid packed entertainment.

Admission to the grounds still is only 50 cents. Grandstand reserved seats for both horse racing and night shows are \$1.50 and box seats \$2.40. Reserved seats for the horse show are \$1.20; whereas box seats are \$1.80.



Rural Road Inventory

By E. R. FOLEY
Supervising Highway Engineer

Joint County-State Comprehensive Studies

CALIFORNIA'S counties are cooperating in an inventory of all of the rural roads in the State. The Rural Road Inventory is a nation-wide program sponsored by the Bureau of Public Roads. The work is being done by the State-wide Highway Planning Survey of the Division of Highways.

The objective of the inventory is to traverse every rural road which is open to public travel and record or "log" mileage, physical aspects of the road, such as surface type, condition and width, plus the man-made improvements served by the roads. These im-

provements are referred to collectively, as "culture."

Upon completion of the inventory in any county, a report is prepared which includes tabulations of the field data, an analysis of the county's rural road system, and a series of maps.

Nation-wide Inventory

This nation-wide inventory of rural roads is a part of the planning program under federal aid to the states for highways.

The first such inventory was conducted and the resulting maps were

prepared during 1936 and 1937. The maps are commonly referred to as Highway Planning Survey maps and are dated 1937. This initial inventory of rural roads provided factual data, much of which had not been compiled in any suitable form until that time.

As the postwar highway program developed, it was evident that the maps prepared in 1937 were inadequate, due to the tremendous growth during and after World War II. Many of the counties expressed a desire to avail themselves of the opportunity to use the facilities of the Highway Planning Survey in making a reinventory of their local roads. Therefore, on May 5, 1949, a procedure was set up for

FD-404 CHRS RA-102		ROAD INVENTORY													SHEET																										
PARTY NUMBER 6		CHIEF OF PARTY <i>John Doe</i>				POSTED NAME OR NUMBER OF ROAD <i>Thompson Road</i>								COUNTY BUT		MAP SHEET NUMBER 02 B 3 9 4 2 1 5 6 8		POINT OF BEGINNING LATITUDE LONGITUDE			ROAD NUMBER 50547A																				
COUNTY REPRESENTATIVE <i>Jerry Ball</i>		RECORDER <i>James Smith</i>				DATE								1 2 3 6 7 8 9 10 11 12 13 14 15 16 17		18 19 20 21 22 23																									
CULTURE ITEMS (MAJOR STREET)													MILEAGE		CONGESTED AREA		NOTES	CONTROL		RESERVATION		WIDTH		SURFACE		SIDE WALKS		FEDERAL AID ROUTE NUMBER													
REGULATION	INDUSTRIAL	SCHOOL	TRANSPORTATION	MISCELLANEOUS	BUSINESS ESTABLISHMENT	INDUSTRIAL PLANT	INDUSTRIAL	INDUSTRIAL	INDUSTRIAL	INDUSTRIAL	INDUSTRIAL	INDUSTRIAL	INTERVENING DISTANCE	ODOMETER READING	ROAD SYSTEM	RESERVATION		ROADED	TRAVELWAY	TYPE	CONDITION	DIVIDER	LEFT	RIGHT	ADJUSTMENT	GRADIENT	FEDERAL AID ROUTE NUMBER														
24	25	26	27	28	29	30	31	32	33	34	35	36	43	44	45	46		47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70
																	END																								
THOMPSON ROAD													0 0 0 0 2 7 5				Chico C. L. Sign Smith St.	1 A 0 0 2 0 3 6 2 0 0 M G 0 1 1 1																							
													0 2 7 0 2 4 8				Wolfe Cr. ← } Br.	1 A 0 0 2 0 3 6 2 0 0 M G 0 1 1 1																							
													2 3 6				16' Tim. ← } Culv.																								
													2 2 5				SPRR.																								
													2 1 0				137																								
																	Jog Right																								
													2 1 0				137	FA																							
													1 2 0		DW		DW CM																								
													1 1 4				BE CH																								
													1 1 0				33																								
													1 0 7				BE																								
													9 7				SC																								
													8 9				DW BE																								
1 1 1 0 3 0 3 0 1 1 6 7 0 0 8 1													0 8 1				Sierra Natl. Forest Bdry.	1 4 0 0 0 0 2 6 1 8 0 6 F		0 0 1 2																					
													7 5		DW		433																								
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STATE OF CALIFORNIA
STATE-WIDE HIGHWAY PLANNING SURVEY
IN COOPERATION WITH
BUREAU OF PUBLIC ROADS
U.S. DEPARTMENT OF COMMERCE

COUNTY			MAP SHEET NUMBER		POINT OF BEGINNING												ROAD NUMBER						
1	2	3	6	7	8	LATITUDE						LONGITUDE						18	19	20	21	22	23
B	U	T	0	2	B	3	9	4	2	2	1	5	6	8	B	0	5	4	7	A			

STRUCTURES

ROAD SYSTEM	ODOMETER												FUNCTION STRUCTURE	SUPER-STRUCTURE				SPANS				OVERALL LENGTH (FEET)				WIDTH		VERTICAL CLEARANCE	POSTING	CONDITION	DATE BUILT	FEDERAL AID ROUTE NUMBER	NOTES											
	24	25	26	27	28	29	30	31	32	33	34	35		36	NUMBER	LENGTH IN FEET	40	41	42	43	44	45	46	CURB TO CURB	RAIL TO RAIL	SIGNALS	52							53	54	55	56	57	58	59	60	61	62	63
	TYPE AND MATERIAL	MOVABLE	37	38	39	40	41	42	43	44	45	46		47	48	49	50	51	52	53	54	55	56	57	58	59	60							61	62	63								
4002024811	T	S	0	0	3	0	1	5	0	0	0	4	7	2	0	2	5	2	0	0	0	0	F	4	2	Wolfe Creek																		

RAILROAD GRADE CROSSINGS

ROAD SYSTEM	ODOMETER												CALIFORNIA PUBLIC UTILITY COMMISSION NUMBER												NUMBER OF TRACKS		FEDERAL AID ROUTE NUMBER	NOTES					
	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49			50	51	52	MAIN	OTHER
	R.R. CODE NO.	LINE LETTER	MILEAGE	TYPE OF TRACK																													
4000022501	C	-	-	0	1	5	3	1	6	-	-	-	2	0	Southern Pacific R.R.																		

agreement between the counties and the State to accomplish this purpose.

The counties contribute financially at the rate of \$2.50 per mile of maintained county road, and also furnish one man to aid the field party in the logging of field data. Formal agreements between the boards of supervisors of 25 of the counties and the State Division of Highways have now been executed. Seven final reports have been presented to the counties, and the inventory program in the remaining 18 counties under agreement is in various stages of completion.

The Field Inventory

The inventory procedure was set up primarily by the Bureau of Public Roads. The field party consists of a party chief, a recorder, and a county representative who is usually assigned from the county road commissioner's office. The presence of a representa-

tive of the county on the field party insures that the road commissioner's office is cognizant of the procedure used, and the experience gained is of direct value to the county and the man. It is his duty to act in liaison between the county and the State. He obtains all necessary information on the status of roads regarding jurisdiction. He is also helpful in obtaining subdivision maps in newly populated areas and in directing the party over the county's road system. All decisions as to whether or not a road is under county jurisdiction are made by county personnel alone.

An ordinary light sedan is used by the field party. It is equipped with an odometer capable of measuring to one-thousandth of a mile—approximately five feet. Mileages are recorded to the nearest one one-hundredth of a mile. A special flashing red light, red flags, large rear-view mirrors, and an

extra spare tire complete the special equipment used. The extra spare tire proved to be a necessity due to the conditions encountered on some of the so-called "traversable" roads. Needless to say, the field parties have had some fairly exciting trips into the wilds of various parts of California.

Road Logs

The road logs, as they are called, are recorded on forms especially adapted for tabulation of the data on the International Business Machines (IBM) equipment. Figure 1 shows the front of this form, which is used for the road log. Figure 2 shows the reverse side of the form, on which data on structures and railroad grade crossings are logged.

Among the items logged on the roads are:

1. Length
2. Width of roadbed and traveled way

3. Surface type and condition
4. Sidewalks
5. Alignment
6. Gradient

Roadside culture is also logged in rural areas, including:

1. Farms
2. Dwellings
3. Industrial plants
4. Business establishments
5. Transportation facilities
6. Schools
7. Churches
8. Recreational facilities

Details logged on structures of 20 feet in length and over include:

1. Function of structure
2. Type and material
3. Number of spans
4. Length of longest span
5. Over-all length
6. Width: Curb to curb and rail to rail
7. Sidewalks
8. Vertical clearance
9. Posting
10. Condition

Items logged on grade crossings include:

1. Railroad code number
2. Mileage
3. Type of track
4. Number of tracks

Additional data on train traffic and protective devices at the crossings are obtained from the Public Utilities Commission.

It is estimated that there are 100,000 miles of rural roads in the State. In San Bernardino County alone, 7,800 miles of roads were logged. The average rate is 25 miles per party per day.

Traffic Data

The Traffic Section of the Highway Planning Survey obtains traffic counts on the major county roads. These counts, correlated with regular state highway counts, are adjusted for weekly and seasonal factors and average daily traffic volumes are calculated for the county road system.

The traffic data along with the data obtained from the road inventory are punched on IBM cards for analysis. The information is then used in preparing tabulations and in mapping of the county.

Three Series of Maps

Three series of maps of each county are produced:

The general highway map shows culture served by the roads and has the surface type of the roads delineated by symbol in the road band. *Figure 3* shows Sheet No. 2 of San Diego County, as an example of this map.

The traffic map also shows the culture and has average daily traffic groupings delineated by symbol in the road band.

These two maps are required in the rural road inventory program of the Bureau of Public Roads.

The county road system map shows all county road names and numbers. State highways, county primary and county secondary roads are delineated on the map by symbol in the road band. Other local roads are shown by an open road band. *Figure 4* shows Sheet No. 2-J of San Diego County as an example of this map. By reference to *Figure 3*, the part of Sheet No. 2 can be located which is covered by Sheet 2-J at a larger scale.

The county road system map is developed for use in certification of maintained miles of county roads. Such certification is required by law to be made by the Director of Public Works to the Controller. The Collier-Burns Act distributes a portion of the gas tax to the counties on the basis of such mileages.

Base Map

The county maps are drawn at a base scale of 1 inch = 1 mile on 36 inch x 36 inch sheets. In areas where the congestion is too great to allow use of this scale, enlargements are shown in the margin or on extra sheets at a scale of 4 inches = 1 mile. Again, using San Bernardino County as an example, there are 30 sheets at 1 inch = 1 mile to cover the county. Twenty-five additional sheets are required to show the congested areas, for a total of 55 sheets in this county.

The map is plotted on the Lambert conformal conical projection from the logs, United States Geological Survey and Forest Service maps, county subdivision maps, aerial photographs, and other data. The road net, main hydrographic features, railroads, prominent ranges and mountain peaks, bridges, city limits, reservations, et cetera, are shown.

The Division of Highways has entered into cooperative agreements with

the Production and Marketing Administration of the Department of Agriculture to obtain aerial photography of a large portion of the State. This photography is used in preparing the county maps, and it is also available for design studies in the planning of the expanding highway program.

The gyroscopic equipment of the highway planning survey has been used extensively where required to establish a basic net of roads where control is lacking. This was especially valuable in the desert area of San Bernardino County where many hundreds of miles of road were "gyro traversed" for road inventory purposes. The gyro equipment is thoroughly discussed in an article in the July-August, 1952, issue of *California Highways and Public Works*.

After a check of the pencil drawing, the base map is traced in ink on linen tracing cloth. This tracing is then used as the base from which to develop the three series of maps.

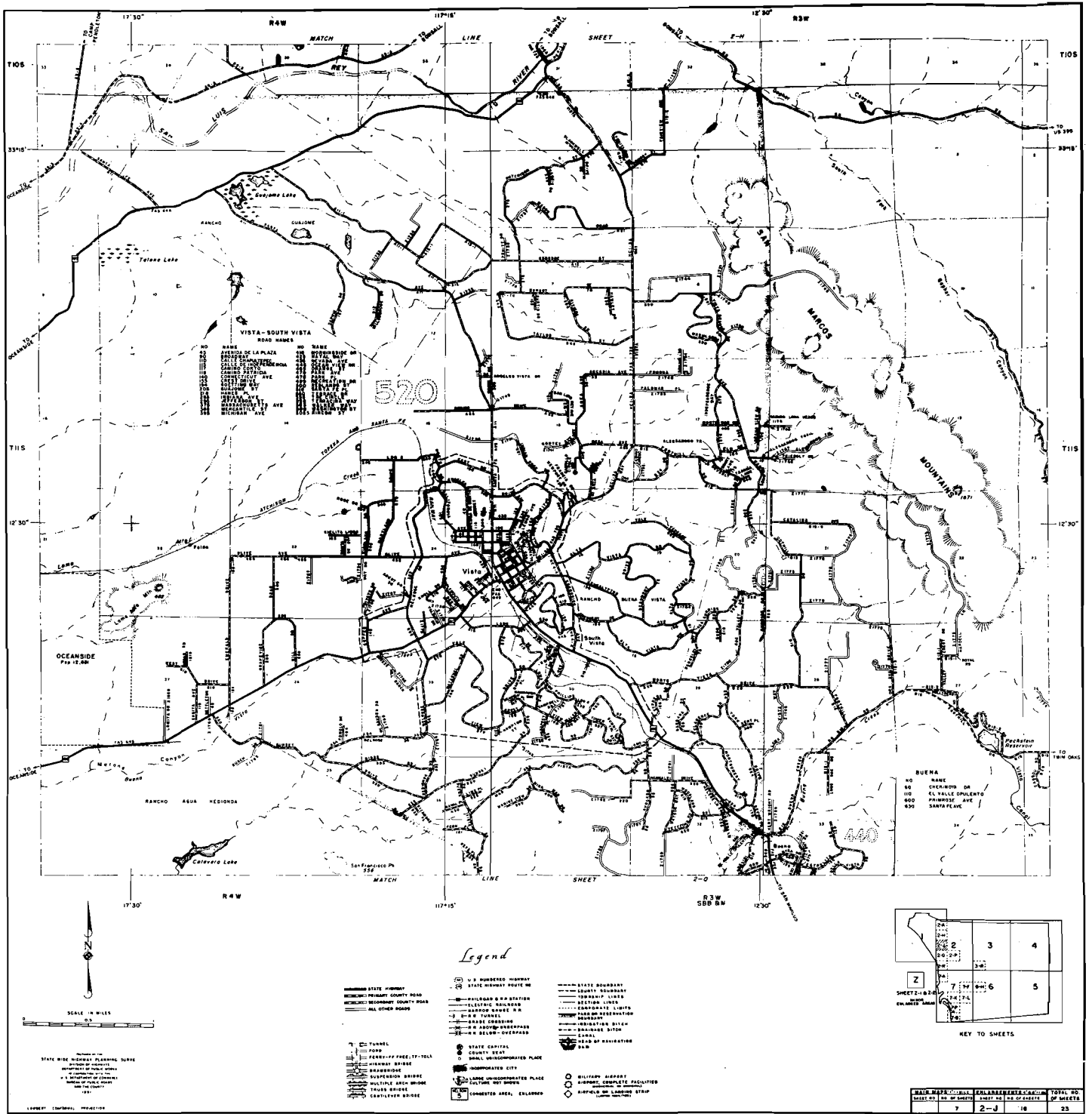
Developing the Three Series of Maps

Kodak Autopositive film is used to obtain reproducibles on which to delineate different features to complete the final maps.

First, a film is made of the base tracing. The county road names and numbers are added, and the symbols for county primary and county secondary roads, as well as state highways are delineated in the road band. This film then is the master for the county road system map.

Next, the culture symbols are added to the base tracing. "Stick-up" material is used in placing the culture on the base. The State Printing Plant prints the required symbols on special adhesive-backed sheets from a plate prepared by the drafting section. With the addition of the proper legend and title by "stick-up" methods, the base is ready for another autopositive film to be used in final preparation of the general highway map. To this film are added the symbols in the road bands denoting the various surface types of the roads, and it is then the master general highway map.

Finally, the General Highway title and legend are removed from the base tracing and necessary legend and title added for the traffic map. Another film



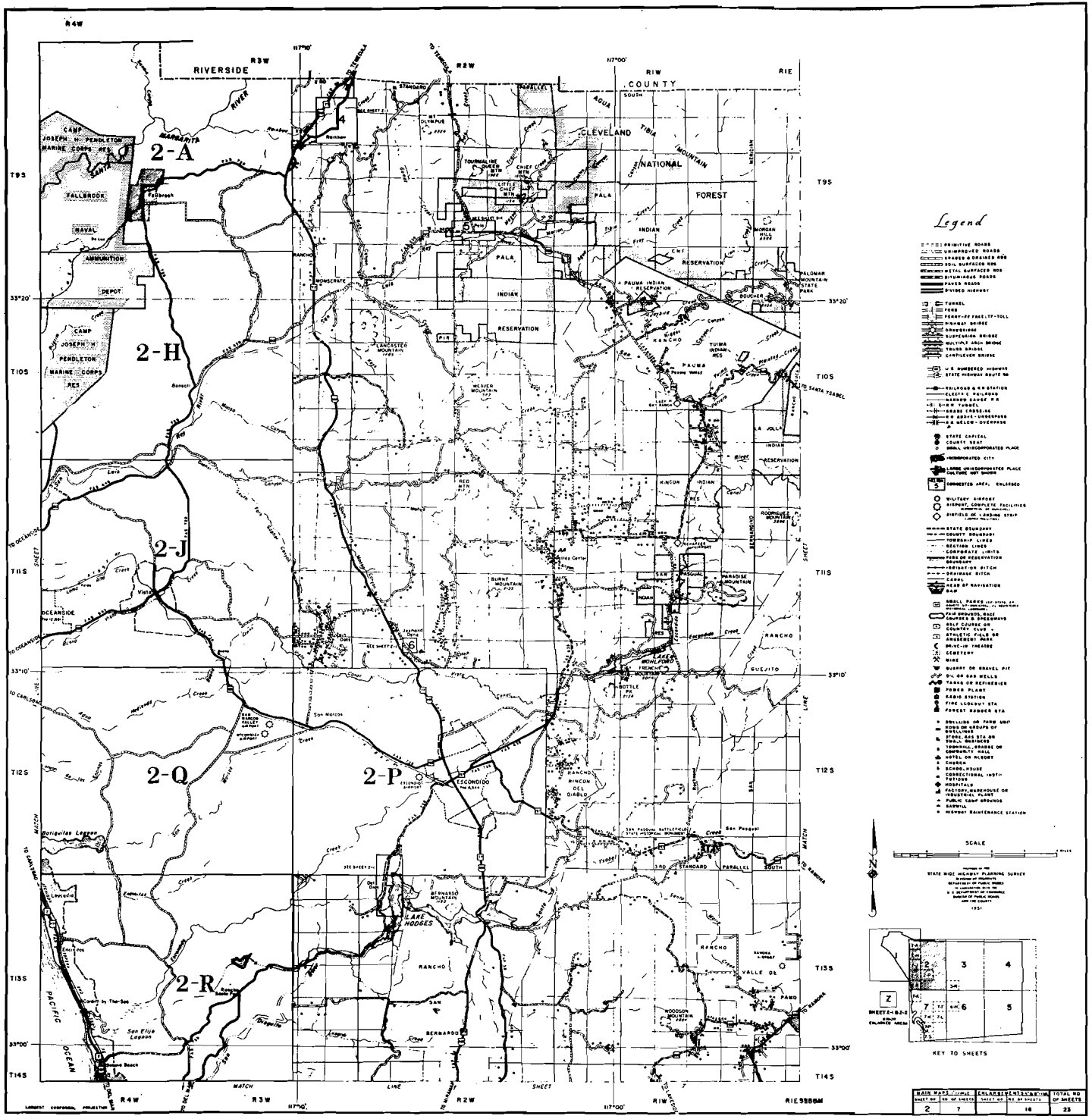
COUNTY ROAD SYSTEM SAN DIEGO COUNTY CALIFORNIA

is obtained from this base. Actual traffic counts and count stations are delineated thereon, as well as symbols in the road bands denoting various average daily traffic groupings. This results in the master for the traffic map.

Upon completion, each map is thoroughly checked by the checking section and necessary corrections are

made. Prints are obtained for submission to the Bureau of Public Roads for final approval. Some corrections are required following this Bureau of Public Roads check, but the maps are now well standardized and such final corrections are few in number. A date of release is added and the mapping is complete.

Since the 36 inch x 36 inch sheets are rather unwieldy, except for office use, each series is photographically reduced to one-half scale by the State Printing Plant. These one-half scale maps, 18 inches x 18 inches in size, are proving very popular for use by various governmental agencies, private companies, and the general public.



Legend

- PRIMITIVE ROAD
 - UNPAVED ROAD
 - GRADED & DRAINED ROAD
 - PAVED ROAD
 - DIVIDED HIGHWAY
 - TUNNEL
 - FERRY OR CABLE FERRY
 - GRADE CROSSING
 - U.S. NUMBERED HIGHWAY
 - STATE HIGHWAY ROUTE NO.
 - RAILROAD & STATION
 - ELECTRIC & TELEPHONE LINE
 - GAS LINE
 - WATER LINE
 - SEWER LINE
 - IRRIGATION DITCH
 - CANAL
 - DAM
 - WATER TOWER
 - CITY HALL
 - COUNTY SEAT
 - UNINCORPORATED PLACE
 - INCORPORATED CITY
 - UNINCORPORATED PLACE
 - CONNECTED AREA, ENLARGED
 - MILITARY AIRPORT
 - AIRPORT, CIVILIAN FACILITIES
 - AIRPORT, NO LANDING STRIP
 - STATE BOUNDARY
 - COUNTY BOUNDARY
 - TOWNSHIP LINES
 - SECTION LINES
 - RANGE LINES
 - BOUNDARY OF RESERVATION
 - RESERVATION DITCH
 - RESERVATION DITCH
 - RANCHO
 - WELL
 - QUARRY OR GRAVEL PIT
 - OIL OR GAS WELLS
 - TANK OR RESERVOIR
 - POWER PLANT
 - RADIO STATION
 - FIRE LOOKOUT STA.
 - FOREST RANGER'S DIA.
 - DWELLING ON FARM UNIT
 - DOCK OR WHARF
 - SCHOOL HOUSE
 - SCHOOL BUILDING
 - HOSPITAL
 - HOSPITAL
 - FACTORY, WAREHOUSE OR INDUSTRIAL PLANT
 - PUBLIC CAMP GROUNDS
 - AIRPORT
 - HIGHWAY MAINTENANCE STATION
- SCALE
STATE HIGHWAY PLANNING SERVICE
DIVISION OF HIGHWAYS
CALIFORNIA DEPARTMENT OF TRANSPORTATION
1951
- KEY TO SHEETS
- | | | |
|---|---|---|
| 2 | 3 | 4 |
| 5 | 6 | 7 |

They are on sale by the Division of Highways at a price which covers cost of printing and handling.

Final Report

The final report on the rural road inventory in any county consists of a general discussion of the methods used

in the field inventory, traffic counting, and mapping. In addition, an analysis is made of the various road systems by use of the IBM equipment. Two series of tables are offered to indicate the present status of the county's road system and of other roads which were logged. The first series of 13 tables

deals with the roads. The second series of nine tables covers the structures of 20 feet and over in length. Among the road tables presented are the following:

"Miles of Road Classified by Surface Type and Average Daily Traffic."

"Miles of Road Classified by Traveled Way Width and Average Daily Traffic."

"Miles of Road Classified as to Condition and Average Daily Traffic."

Among the structure tables are the following:

"Number of Structures Classified by Type and Material and Condition."

"Number of Structures Classified by Width and Average Daily Traffic."

"Number of Structures Classified by Condition and Average Daily Traffic."

"Number of Structures Classified by Posting and Condition."

A summary of the county's receipts and expenditures for road purposes over the past 15 years is also presented.

Field Notes

Accompanying the final report are copies of the field notes which are produced by use of the IBM equipment.

The master tabulation is designed to furnish all data obtained from the field inventory in a form convenient for ready reference with that for primary county roads, secondary county roads, other local roads, and state highways given in order. Average daily traffic and vehicle miles of traffic are included.

The structure tabulation contains all of the information logged in the field on structures. Average daily traffic is also shown where data are available.

The railroad grade crossing tabulation includes the field data logged as well as road and train traffic and protection at the crossings.

The County Road System Tabulation is designed to show the complete system of maintained county roads in a form applicable for use in certifying maintained miles under requirements of the Collier-Burns Act of 1947.

The original tabulation, reflecting the results of the rural road inventory, conforms with the county road system map produced at the same time. The law requires that any changes to a county's system of maintained roads be made by the Board of Supervisors in May of each year. When such changes are approved by the Division

of Highways, a new tabulation can be turned out, the master maps changed, and the correct mileage of maintained county roads is then a matter of record annually.

Special Studies

With all data available on IBM cards, the Division of Highways is able to make very quickly any special study that the individual counties may request. For example, all roads could be listed in order of width or average daily traffic; structures in order of width or by condition. If a county road department wished to study its primary and secondary systems, those primary roads carrying very light traffic and those secondary roads carrying very heavy traffic can be listed as well as other critical features as desired. This service is available to the counties on request.

Uses

The county maps, tabulations and report have many uses. The need for adequate records of mileages of county roads maintained has been mentioned. Many of the smaller county road departments have never had an adequate amount of personnel to undertake a systematic inventory of their roads. The Collier-Burns Act of 1947 requires that each county employ a road commissioner. Since its enactment many new men have taken over this position in the various counties. In many cases it was necessary that they set up a complete new system of records. With limited funds and lack of trained personnel, this job is far from complete. Therefore, there is practically unanimous approval of the road inventory program by the road commissioners.

Maps Are Valuable

In some of the counties in which the inventory has been completed, members of the boards of supervisors have stated that they find the maps and tabulations extremely valuable at board meetings. Quick reference can be made to specific points on road matters brought before them by the taxpayers as individuals and in groups.

Humboldt County requested the inventory with the express intention of using the data in preparation of a suf-

ficiency rating system upon which future allocations of road improvement funds are to be based. They are now engaged in preparing such a rating system with advice from the Institute of Transportation and Traffic Engineering of the University of California.

It should be noted that the Humboldt County Supervisors were so interested in expediting the inventory program that the county undertook the making of their own traffic counts. The supervisors themselves helped in this work.

Used in Planning

The planning commissions in several counties have expressed great interest in the data as compiled and are using the resulting maps and tabulations in their planning programs.

Kern County has prepared special maps of each road foreman's district from the inventory data for use of their maintenance forces.

In the summer of 1952, the County Supervisors Association requested all counties to submit a road deficiency report, with specific data required on deficiencies and cost of improvement. Those counties with the inventory data already available were able to prepare their reports to the association with a minimum of effort and a consequent saving in cost. The reports of these counties were also among the best presented.

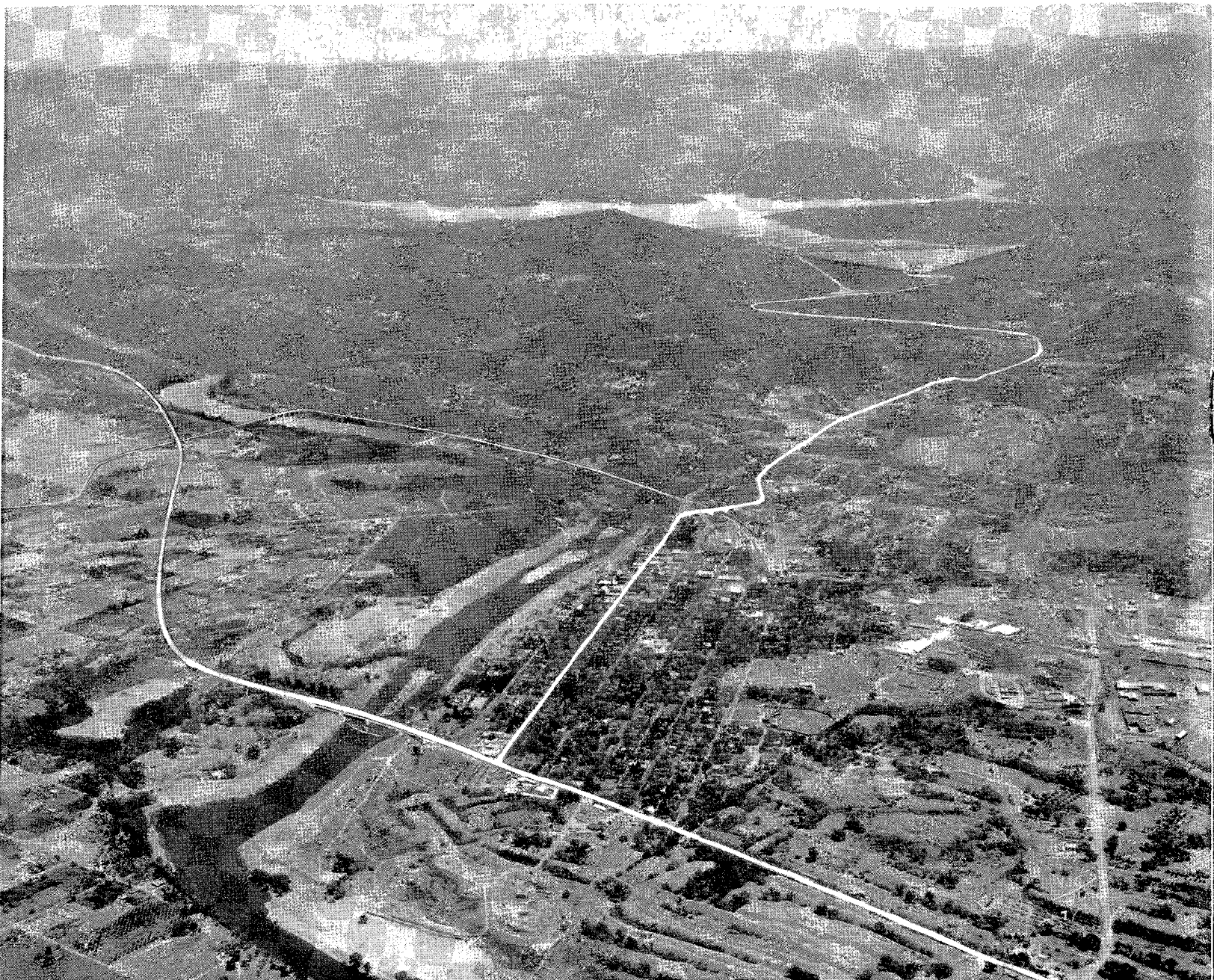
Maps in Wide Use

At the state level, the maps are in wide use, not only in the various sections of the Division of Highways, but in other departments, including the Public Utilities Commission, Beaches and Parks, and Highway Patrol.

The Bureau of Public Roads makes use of the inventory data on a nationwide scale in preparing material for presentation to committees of Congress regarding new appropriations for federal aid and the like. The federal aid secondary system is delineated on the maps and studies of the over-all system and individual projects to be undertaken in the federal aid secondary program are aided by use of the maps.

Other federal mapping agencies are furnished with prints of the county maps for their special uses.

... Continued on page 60



Artist Van der Goes, Bridge Department, uses aerial photograph taken by Merritt R. Nickerson to indicate proposed relocation of Feather River Highway. White line on right indicates present Feather River Highway, which will have to be relocated. White line on left shows approximate relocation of highway. White line in center foreground indicates proposed realignment of Western Pacific Railroad line.

Continued from page 2 . . .

and the proposed Buena Vista Hills Pumping Plant near Taft is being mapped, and the canal located on the ground, by a survey party.

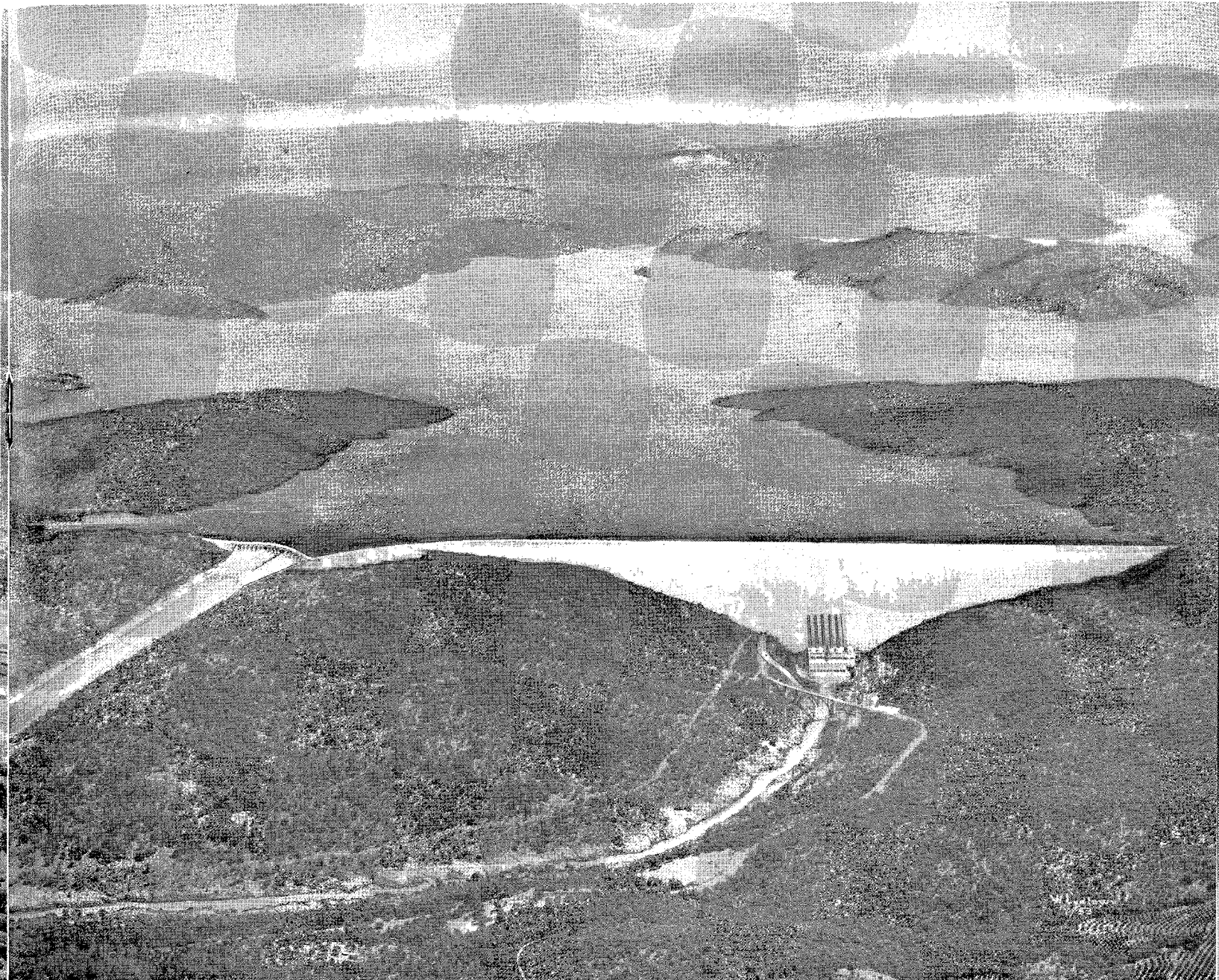
Revised Estimates of Cost

Revised cost estimates of the Oroville Dam, Oroville Power Plant, Afterbay Dam, Afterbay Power Plant, Switchyards, Transmission Lines and

Bethany Substation, based on redesigns of these features are nearing completion. The preparation of new drawings, based on the redesigns, to be used for the amended exhibits to be submitted to the Federal Power Commission in connection with an application for license now on file with that agency, is in progress.

A contract for drilling core holes by diamond drill at the Oroville dam site

has been completed with seven holes drilled on each abutment for a total length of 1,627 feet. Two exploratory tunnels, one on each abutment, have been excavated to a total length of 1,800 feet. The drilling of five diamond drill core holes at the site of the proposed combination railroad and highway bridge crossing of the West Branch of Feather River has been completed with a total length of hole of



Van der Goes and Nickerson cooperate again. The artist uses aerial photograph upon which to place his conception of what the Oroville Dam and spillway and reservoir will look like when completed.

345 feet. A transparent plastic model of the Oroville dam site based on data obtained by core drilling and tunneling, and the detailed topographic survey of the site, is being constructed for further study of foundation conditions.

Design of Canals

Design of the canals and structures of the San Joaquin Valley and Southern California units is in progress and

a detailed layout of the canal is completed from intake at Italian Slough to Los Banos. A tentative layout of the canal south of Quail Lake has been made for about 63 miles of line and typical structures designed. Appraisal of properties for the San Joaquin Valley unit is in progress.

Consulting engineers working with the Byron-Jackson Pump Company have completed alternative plans and

and layouts for the pumping plants at Wheeler Ridge and Pastoria Creek and layouts for the other plants. The work is now sufficiently advanced to permit detailing of the equipment and the writing of specifications.

Work is being continued in San Bernardino on possible holdover storage sites and main lateral routes in the area south of the Tehachapi Mountains.

Cost Index

California Highway Construction Costs Almost Stationary in Second Quarter

By RICHARD H. WILSON, Assistant State Highway Engineer
H. C. McCARTY, Office Engineer
JOHN D. GALLAGHER, Assistant Office Engineer

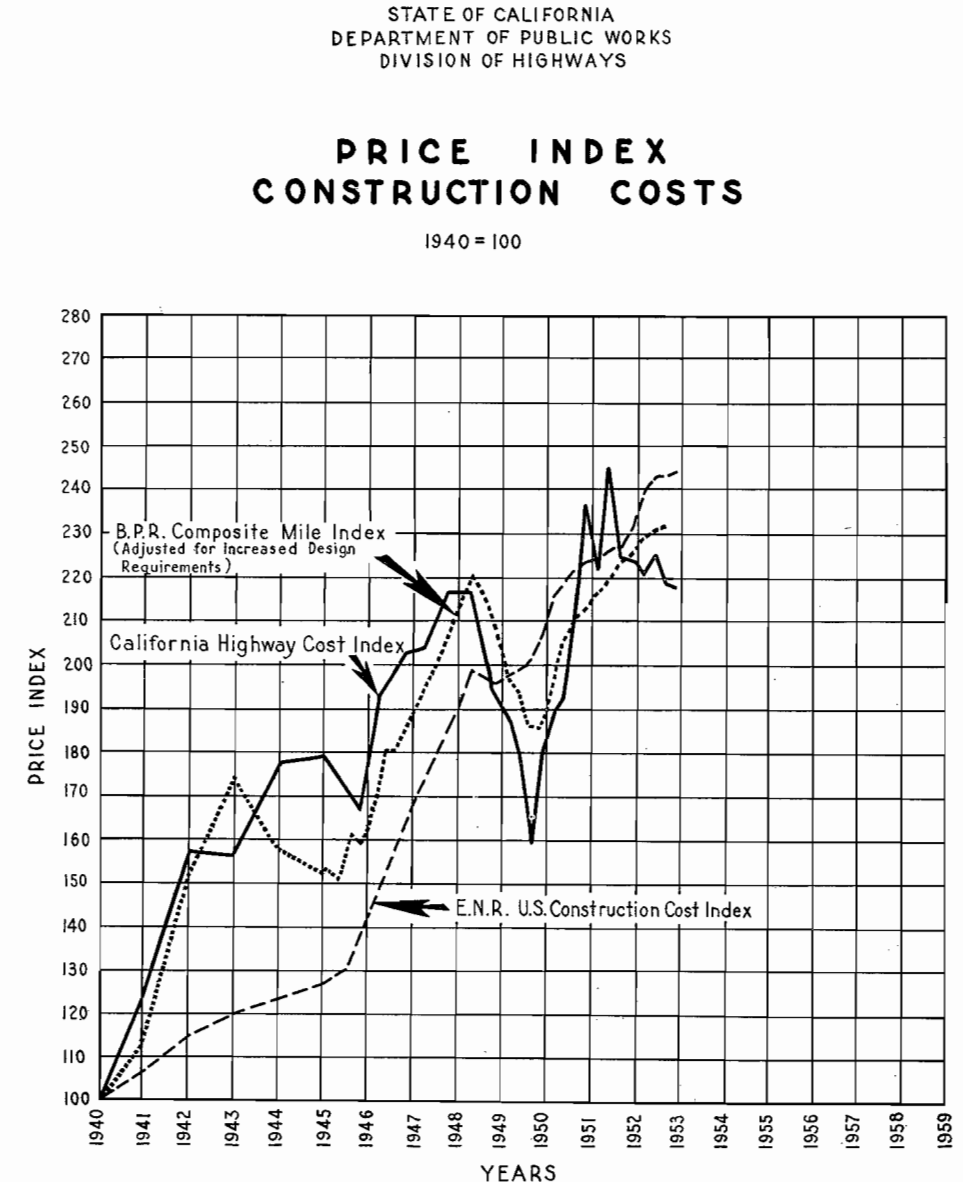
CONSTRUCTION costs on state highway contracts awarded during the second quarter of 1953 were only 0.4 percent lower than those of the first quarter of 1953 as reflected by the California Highway Construction Cost Index.

The index for the second quarter of the year was 217.5 (1940=100), only eight-tenths of an index point below the 218.3 for the first quarter. This second quarter index figure of 217.5 is 27.9 index points, or 11.4 percent under the 245.4 for the fourth quarter of 1951, which was the quarter of highest costs as indicated by the index. It also is 57.5 points, or 35.9 percent over the 160.0 of the first quarter of 1950, which was the low dip in prices prior to the beginning of the Korean War.

The following is a tabulation of the California Highway Construction Cost Index by years and quarters since 1940.

Year	Cost Index
1940	100.0
1941	125.0
1942	157.5
1943	156.4
1944	177.8
1945	179.5
1946	179.7
1947	203.3
1948	216.6
1949	190.7
1950 (1st quarter)	160.0
1950 (2d quarter)	180.0
1950 (3d quarter)	189.2
1950 (4th quarter)	194.8
1951 (1st quarter)	215.4
1951 (2d quarter)	238.3
1951 (3d quarter)	221.9
1951 (4th quarter)	245.4
1952 (1st quarter)	224.8
1952 (2d quarter)	224.4
1952 (3d quarter)	221.2
1952 (4th quarter)	226.2
1953 (1st quarter)	218.3
1953 (2d quarter)	217.5

While the index dropped four-tenths of 1 percent during the second quarter of 1953 this is not neces-



sarily to be considered an indication of a leveling off of construction costs as average contract prices on four of the eight construction items used in computing the index showed increases during the period.

Roadway excavation, which had shown such a marked decline during the first quarter of 1953, was up 11

percent, rising from \$0.45 to \$0.50 per cubic yard. Average prices of plant-mixed surfacing, asphalt concrete pavement and Portland cement concrete pavement all increased; the P. M. S. from \$5.27 to \$5.38 per ton, the A. C. pavement from \$4.46 to \$4.59 per ton, and the P. C. C. pavement from \$12.47 to \$13.06 per cubic yard.

Number of Bidders Prequalified to Bid On State Highways

The following data show number of contractors qualified to bid state highway projects as of July 1, 1953. Based on their maximum ratings, these 691 contractors are grouped as follows:

\$10,000,000 and over	— 32
5,000,000 to 10,000,000	— 66
2,500,000 to 5,000,000	— 117
1,500,000 to 2,500,000	— 184
1,000,000 to 1,500,000	— 233
500,000 to 1,000,000	— 337
250,000 to 500,000	— 481
100,000 to 250,000	— 575
50,000 to 100,000	— 607
up to 50,000	— 691

The combined bidding capacity on June 30, 1953, of these 691 contractors was \$1,345,632,100, or in round figures \$1,350,000,000.

In arriving at this combined bidding capacity figure all ratings in excess of \$20,000,000 are entered at the \$20,000,000 figure.

Last year at this time there were 611 prequalified contractors with a combined bidding capacity of \$1,118,337,500, using the \$20,000,000 cut-off point.

The four items for which average contract prices declined were: untreated rock base which dropped from \$2.48 to \$2.07 per ton, structure concrete from \$53.19 to \$52.68 per cubic yard, bar reinforcing steel from \$0.098 to \$0.091 per pound and structural steel from \$0.150 to \$0.132 per pound. In this group the 17 percent drop is the average contract price of untreated rock base, the 12 percent drop in structural steel, and the 7 percent drop in bar reinforcing steel were the major influences causing the slight decline of 0.4 percent in the over-all index.

That the declining influence of steel will not continue is a certainty as a rise in basic prices for the next quarter has been announced, and the current negotiations between labor and management for another round of wage increases in practically all branches of the construction industry can indicate

AVERAGE CONTRACT PRICES

	Roadway excavation, per cu. yd.	Crusher run base, per ton	Plant-mix surfacing, per ton	Asphalt concrete pavement, per ton	PCC pavement, per cu. yd.	PCC structures, per cu. yd.	Bar reinforcing steel, per lb.	Structural steel, per lb.
1940	\$0.22	\$1.54	\$2.19	\$2.97	\$7.68	\$18.33	\$0.040	\$0.083
1941	0.26	2.31	2.84	3.18	7.54	23.31	0.053	0.107
1942	0.35	2.81	4.02	4.16	9.62	29.48	0.073	0.103
1943	0.42	2.26	3.71	4.76	11.48	31.76	0.059	0.080
1944	0.50	2.45	4.10	4.50	10.46	31.99	0.054	0.132
1945	0.51	2.42	4.20	4.88	10.90	37.20	0.059	0.102
1946	0.41	2.45	4.00	4.68	9.48	37.38	0.060	0.099
1947	0.46	2.42	4.32	5.38	12.38	48.44	0.080	0.138
1948	0.55	2.43	4.30	5.38	13.04	49.86	0.092	0.126
1949	0.49	2.67	4.67	4.64	12.28	48.67	0.096	0.117
1st quarter 1950	0.34	2.22	3.65	3.74	—	40.15	0.077	0.081
2d quarter 1950	0.40	2.13	4.48	3.74	10.86	43.03	0.080	0.105
3d quarter 1950	0.41	2.32	4.25	5.50	10.91	44.34	0.093	0.131
4th quarter 1950	0.42	2.81	4.64	4.61	12.55	43.18	0.098	0.120
1st quarter 1951	0.45	3.07	4.06	5.22	11.71	46.38	0.103	0.206
2d quarter 1951	0.63	3.88	4.56	4.63	12.93	51.50	0.105	0.166
3d quarter 1951	0.56	2.88	4.59	3.90	12.41	46.14	0.107	0.165
4th quarter 1951	0.66	2.91	5.66	4.89	12.71	49.38	0.105	0.169
1st quarter 1952	0.56	3.25	4.88	4.77	14.25	47.46	0.094	0.152
2d quarter 1952	0.53	3.19	5.29	4.13	14.20	49.12	0.091	0.143
3d quarter 1952	0.55	2.61	5.49	4.60	12.80	48.21	0.094	0.132
4th quarter 1952	0.66	2.68	4.97	—	12.53	48.45	0.094	0.128
1st quarter 1953	0.45	2.48*	5.27	4.46	12.47	53.19	0.098	0.150
2d quarter 1953	0.50	2.07	5.38	4.59	13.06	52.68	0.091	0.132

* Untreated rock base substituted for crusher run base at this point.

NUMBER AND SIZE OF PROJECTS, TOTAL BID VALUE AND AVERAGE NUMBER OF BIDDERS

(January 1, 1953, to June 30, 1953)

Project volume	Up to \$50,000	\$50,000 to 100,000	\$100,000 to 250,000	\$250,000 to 500,000	\$500,000 to 1,000,000	Over \$1,000,000	All projects
Road projects:							
No. of projects	74	16	39	16	7	7	159
Total value (bid items)	\$1,608,046	\$1,216,955	\$6,105,860	\$5,384,564	\$4,754,912	\$9,288,699	\$28,359,036
Avg. no. bidders	5.1	5.8	5.8	6.4	10.0	7.7	5.8
Structure projects:							
No. of projects	24	9	6	2	3	1	45
Total value (bid items)	\$517,582	\$661,397	\$987,498	\$630,150	\$1,999,819	\$1,140,222	\$5,936,668
Avg. no. bidders	6.8	8.3	10.5	17.0	9.3	16.0	8.4
Combination:							
No. of projects	—	—	—	—	—	4	4
Total value (bid items)	—	—	—	—	—	\$10,959,600	\$10,959,600
Avg. no. bidders	—	—	—	—	—	7.8	7.8
Summary:							
No. of projects	98	25	45	18	10	12	208
Total value (bid items)	\$2,125,628	\$1,878,352	\$7,093,358	\$6,014,714	\$6,754,731	\$21,388,520	\$45,255,304
Avg. no. bidders	5.5	6.7	6.4	7.6	9.8	8.4	6.4

Total Average Bidders by Months

	Jan.	Feb.	March	April	May	June
1953	5.5	6.1	7.5	6.4	5.9	6.0
1952	7.6	6.4	6.9	6.0	4.5	4.8

**NUMBER AND SIZE OF PROJECTS, TOTAL BID VALUES AND
AVERAGE NUMBER OF BIDDERS**

(July 1, 1952, to June 30, 1953)

Project volume	Up to \$50,000	\$50,000 to 100,000	\$100,000 to 250,000	\$250,000 to 500,000	\$500,000 to 1,000,000	Over \$1,000,000	All projects
Road projects:							
No. of projects..	149	42	67	30	14	8	310
Total value (bid items)	\$3,266,574	\$3,017,829	\$10,575,448	\$9,953,453	\$9,566,240	\$11,208,491	\$47,588,035
Avg. no. bidders	4.5	5.0	5.9	5.8	8.2	7.4	5.2
Structure projects:							
No. of projects..	40	20	10	6	5	3	84
Total value (bid items)	\$896,140	\$1,443,987	\$1,714,427	\$2,097,372	\$3,233,306	\$5,242,057	\$14,627,289
Avg. no. bidders	4.8	6.9	9.2	9.0	9.4	9.3	7.2
Combination:							
No. of projects..					2	8	10
Total value (bid items)					\$1,917,715	\$19,972,108	\$21,889,823
Avg. no. bidders					3.0	8.0	7.0
Summary:							
No. of projects..	189	62	77	36	21	19	404
Total value (bid items)	\$4,162,714	\$4,461,816	\$12,289,875	\$12,050,825	\$14,717,261	\$36,422,656	\$84,105,147
Avg. no. bidders	4.7	5.6	6.3	6.8	9.0	7.9	5.7

Total Average Bidders by Months

	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	Year
1952-53	4.3	4.3	5.9	5.1	5.9	4.8	5.5	6.1	7.5	6.4	5.9	6.0	5.7
1951-52	4.3	4.0	4.6	4.4	8.0	7.3	7.6	6.4	6.9	6.0	4.5	4.8	5.3

only additional rises in construction costs.

While in the previous quarter both the Engineering News-Record Construction Cost Index and the U. S. Bureau of Public Roads Composite Mile Index showed signs of hesitancy and leveling off from their steady and continuous rise, they again indicate an upward trend. The Engineering News-Record Index for the second quarter of 1953 is 244.1 (1940=100) which is 1.4 index points or 0.6 percent above the 242.7 for the first quarter and the U. S. Bureau of Public Roads Composite Mile Index (adjusted for increased design requirements) for the first quarter of 1953 was 231.7 (1940=100) which is 1.5 index points or 0.7 percent above the 230.2 of the fourth quarter of 1952.

Price indexes on the over-all economy of the Country as well as reports of many economic analysts claim at least a leveling off if not a decline of prices in general. Nevertheless, consideration of bid prices received on state highway projects in California and the continued demand for wage increases present no firm indication of any decline in highway construction costs.

Analysis of the highway construction cost situation in California indicates that several current factors tend to counteract rises in contract bid prices.

Competition between bidders on state highway work is extremely strong.

One factor which is affecting bidding on heavy construction in California is the governmental freeze placed on the extensive construction of projects for the Air Force, the Army and the Navy for which nearly six billion dollars was voted two years ago, of which \$467,000,000 was to have been spent in California. Some California contractors who were low bidders on large contracts for such federal work find themselves waiting while the whole program is reviewed and revamped. These contractors must have going work and they bid to get it.

There are a large number of construction contractors operating in California (691 are prequalified to bid on state highway work), many of whom must regularly meet large equipment obligations, and in addition must have continuing work to hold

... Continued on page 47

Freeway Project Through San Luis Obispo Progresses

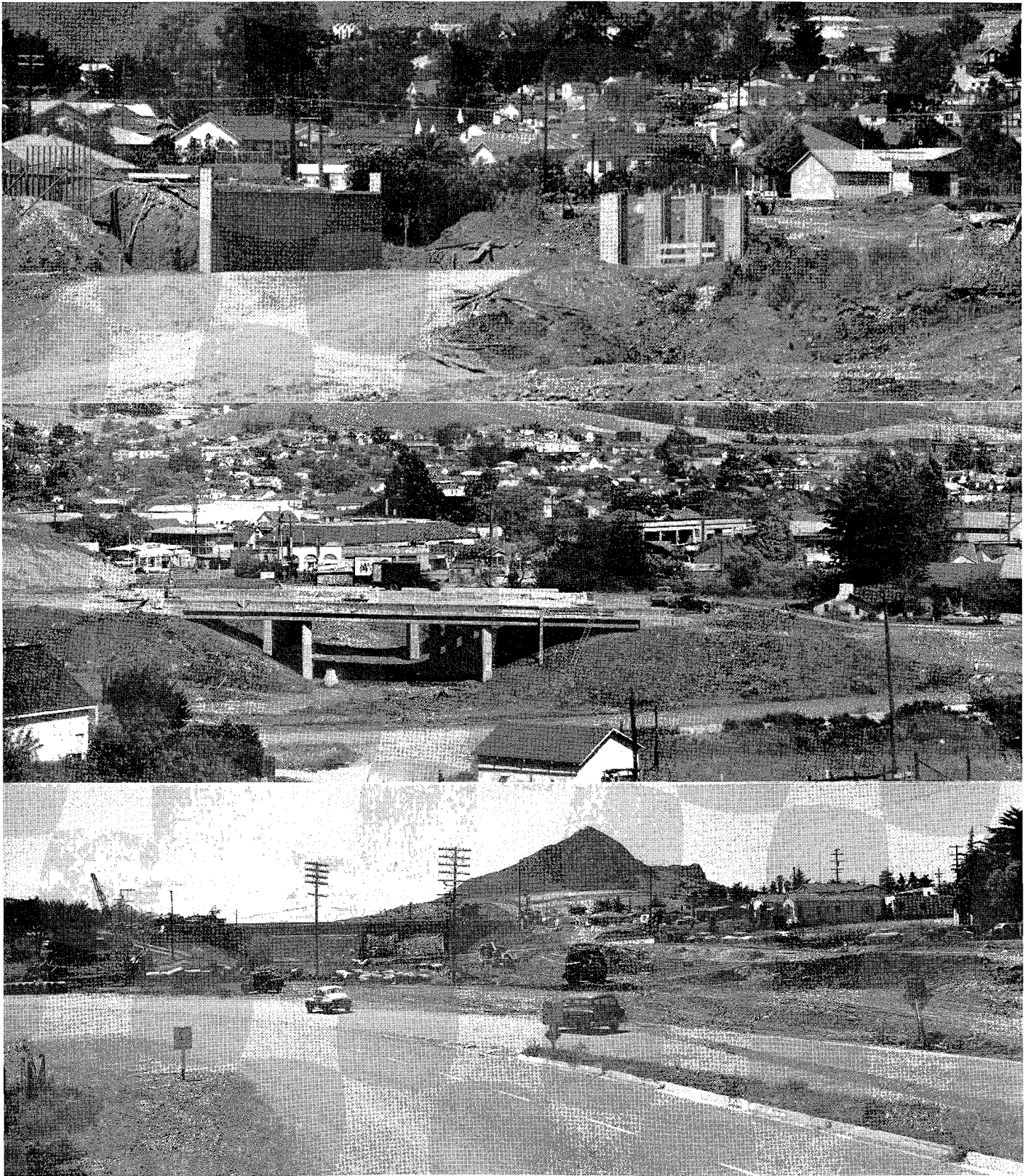
Photo opposite →

THE CITY of San Luis Obispo, halfway between San Francisco and Los Angeles, has rapidly undergone a major physical change in that the development of U. S. 101 through the city is now well past the halfway mark with regard to completion.

The freeway routing through the city, for the most part, follows a depressed area. At the present time a major drainage structure which carries Stenner Creek under the freeway in a reinforced concrete box culvert has been completed as have the grade separation structures at Marsh, Chorro, Grand and Buena Vista Streets. Work on the Santa Rosa (Highway 1) Street crossing is well under way as is the Southern Pacific Railroad undercrossing. It is anticipated the Santa Rosa Street structure will be completed on August 25, 1953, and the railroad undercrossing on approximately the same date. Immediately upon completion of the railroad undercrossing the shoofly located immediately north of the railroad will be removed and work will be started on the Ida Street crossing.

Grading work is now practically completed and the placing of imported base material has been started. It is estimated all structures, grading and base work will be completed early this fall and that the final project for paving will be let to contract soon thereafter. All work being completed as scheduled it is anticipated the freeway will be opened to traffic early in 1955.

The C. B. Tuttle Company of Long Beach built the Marsh Street, Chorro Street and Stenner Creek structures; the Thomas Construction Company of Fresno built the Buena Vista and Grand Avenue structures; the Granite Construction Company of Watsonville is building the Santa Rosa and Ida Street separations and the railroad undercrossing; and the Madonna Construction Company of San Luis Obispo has the grading contract. R. M. Herbert and W. A. Curtis represented the Bridge Department on the structures and W. W. Evans is the resident engineer on the grading project for the district.



UPPER—Partially constructed Santa Rosa Street (Route 56) Crossing of San Luis Obispo Bypass. CENTER—Completed structures for March Street Grade Separation and connections at southerly end of San Luis Obispo. LOWER—Completed Buena Vista Crossing of freeway at northerly end of San Luis Obispo.

Long Beach Freeway

Continued from page 23 . . .

erly terminus of this freeway at the junction of the Santa Ana Freeway and Olympic Boulevard. On this section, construction contracts will be advertised and awarded as fast as funds are made available.

On May 28, 1953, bids were opened in the Los Angeles office of the Division of Highways for the construction of a structural steel and reinforced concrete overhead for the Long Beach Freeway over the tracks of the Union Pacific Railroad between Leonis Street and Dunham Street. J. A. Thompson and Son, Contractors, of Inglewood, California, submitted the low bid of \$1,147,221.50.

Structural Steel Overhead

On June 25, 1953, bids were opened in the Los Angeles office of the division for the construction of a reinforced concrete and structural steel overhead to carry the Long Beach Freeway over the freight classification yard of the Atchison, Topeka & Santa Fe Railway. The low bid was submitted by B. J. Ukropina, T. P. Polich, Steve Kral and John R. Ukropina of San Gabriel in the amount of \$1,174,577.10. The general location of these two railroad grade separation bridges over freight classification yards is shown on the accompanying "bird's-eye" drawing by Mique Nelson of the District VII staff.

The Long Beach Freeway between 223d Street and Olympic Boulevard will be constructed initially as a six-lane divided freeway with provision being made at some future date to widen this freeway to an ultimate width of eight lanes northerly of its junction with the Sepulveda and Terminal Island Freeways. Southerly from the junction, the ultimate width of the Long Beach Freeway is six lanes and is so being constructed.

In the construction of this freeway the Division of Highways is fortunate in having had the fullest possible cooperation from the various cities, the Los Angeles County Regional Planning Commission, Flood Control District and Road Department and the U. S. Corps of Engineers. It is in no small measure due to these other governmental agencies that the Long Beach Freeway is now so well along toward completion.

In Memoriam

RALPH E. C. DELANEY

Funeral services for Ralph E. C. Delaney, Assistant Highway Engineer for the State Division of Highways, District VII, were conducted on July 3, 1953, at Forest Lawn in Glendale in the Little Church of the Flowers.

Ralph was born on September 28, 1904, in Denver, Colorado. He graduated from the East Denver High School in 1922 and was employed from that date until 1926 by a construction firm in Denver. In 1927 he came to California and worked for the Los Angeles County Surveyor and the Los Angeles County Flood Control District until 1936. He then accepted appointment with the State Division of Highways in District V at San Luis Obispo and later transferred to District VII at Los Angeles where he was employed until the time of his death.

In District VI Ralph worked for nine years with the Survey Department as Instrumentman and Chief of Party. During that time he carried out many of the first freeway surveys in the Los Angeles area. For the last four years he was employed by the District Construction Department as Assistant Resident Engineer and Resident Engineer on many different types of highway contracts. His last assignment was on the Harbor Freeway construction between the Four-level Traffic Interchange Structure and Olympic Boulevard. In downtown Los Angeles, Ralph's background of wide experience on construction made him a very valuable man on complicated freeway projects. He was particularly adept at working out detailed arrangements which came up when freeway construction interfered with existing facilities. His services with the Division of Highways will be greatly missed.

Ralph was a member of the San Marino Masonic Blue Lodge and was very active with the De Molay group, having received the Legion of Honor award from that organization. He is survived by his wife, Mrs. Theresa Delaney, and two sons, Robert, age 23, who is a cadet in the Air Force at Moultrie, Georgia; and Richard, age 20, who is with the 35th Infantry Regiment in Korea.

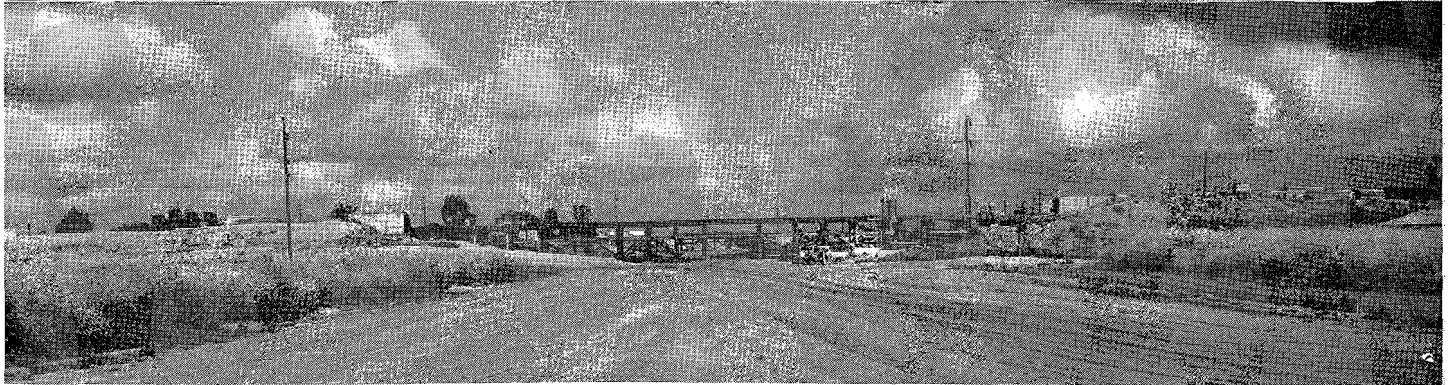
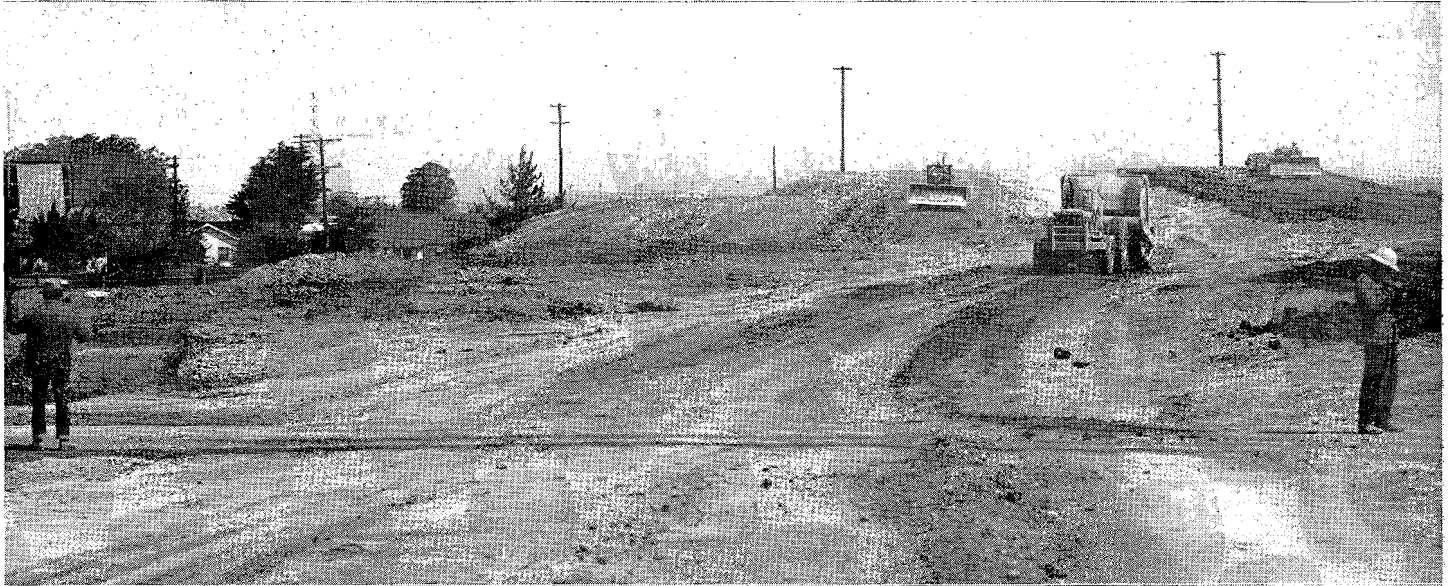
Salinas Freeway Rapidly Nearing Completion Date

Photo opposite →

RAPIDLY nearing completion on Highway 101 through the City of Salinas are the first two units of the Salinas Freeway, which will eventually provide for freeway development over a length of approximately 10 miles, passing through the fringe area and the city itself. The development will connect on the south with the recently completed expressway just south of Spence Underpass and will be on the east side of the railroad for its entire length. In general, it passes to the east of the industrial development along the railroad and Abbott Street, through the easterly portion of Salinas and the western portion of Alisal, terminating for the present with a traffic interchange at the intersection with North Market Street near the Santa Lucia Inn. Future plans provide for the freeway to be developed on the westerly side of the existing routing of U. S. 101 between the North Main Street crossing and Santa Rita.

The two projects now under construction involve approximately 2.2 miles of grading, four reinforced concrete overcrossings (North Main Street, Sherwood Drive, Alisal Street and Market Street); two double 12-foot box culverts, and 8 x 10 x 268-foot box culvert, together with numerous drainage structures. Ramps and approaches being constructed in connection with the major overcrossings are to be paved with plant-mixed surfacing on cement-treated base, also short sections of city streets connected with the various crossings. Due to an unfavorable drainage condition and to facilitate settlement and consolidation of basement soils, it was necessary to construct numerous vertical sand drains and to supercharge major fills, particularly in the vicinity of the Market Street Overcrossing. Excellent results have been obtained therefrom.

Keeble and Caputo of San Jose are the contractors on both projects. J. M. Sturgeon is the Resident Engineer for the district, and the Bridge Department Representatives are Guy Mancarti and A. E. Hoerchner.



UPPER—North Main Street Overpass construction looking south. CENTER—Market Street Crossing, showing construction work, looking north. LOWER—Sherwood Drive Overcrossing, looking west.

National Safety Awards

Continued from page 3 . . .

all ratings are based both on the maintained miles of highway and on annual vehicle miles of travel in each state. Under this rating, the advantage rests with the smaller, highly urbanized states where the many lengths of rural highways between cities are necessarily highly developed from the traffic control standpoint. Since mountain and desert roads comprise a high percentage of California's highway system, the first place award to this State is indeed a remarkable achievement, with full credit going to the California Division of Highways and its traffic department.

Highway Patrol Recognized

The award for first place in traffic law enforcement was given for the work of the highway patrol. Presentation was by John D. Holstrom, Berkeley Chief of Police, Fifth Vice President of the International Association of Chiefs of Police, the organization which judged the enforcement phases of the inventory.

Joseph E. Havenner, Los Angeles, presented the first place award for traffic engineering on behalf of the Institute of Traffic Engineering. The institute judged this portion of the inventory which covered activities of the Division of Highways, Department of Public Works.

The drivers license award for outstanding achievement was presented by Paul F. Hill of Chicago, senior field director for the National Safety Council. The award was in recognition of work done by the Division of Drivers Licenses, Department of Motor Vehicles.

Present at the presentation ceremonies in the Governor's office were: George T. McCoy, State Highway Engineer; George M. Webb, State Traffic Engineer; Rodney C. Richardson, Assistant to the Director of Public Works; Milo L. Hewitt, Supervising Inspector, California Highway Patrol; A. H. Henderson, Director of Motor Vehicles, and Tom Bright, Deputy Director of Motor Vehicles.

Governor Warren, after accepting the awards, passed each one along to the state department involved.

An Memoriam

EMIL A. PENROSE

Emil A. Penrose, Highway Superintendent of the Santa Monica area of District VII, passed away of a heart attack at his home in Santa Monica on the evening of June 30, 1953.

Gus, as he was affectionately known by his many friends, was born in La Grange, Texas, on August 1, 1899. He became Highway Superintendent of the Santa Monica area in September of 1941 and served in that capacity until his untimely passing at the age of 53. His sincerity, devotion and ability were long considered an example of all that a husband, father, friend and public servant should be.

Gus joined the U. S. Marine Corps in 1918 and served until 1920. From 1920 to 1929 he gained much valuable experience as a carpenter, miner and contractor. He entered state employment in February, 1929, in District IX, beginning his career with the Division of Highways Maintenance Department as a skilled laborer. He transferred to District VII in 1933 as a maintenance foreman. His reputation as one of the best highway superintendents in the State was well earned, fully deserved and widely recognized. He will be greatly missed by all who knew and worked with him.

He is survived by his widow, Mrs. Alice I. Penrose; a daughter, Mrs. Harold L. R. Smith; a son, Kenneth L. Penrose, and three grandsons.

Highway Engineers Win Essay Awards

Division of Highways' employees John W. McDonald and Scott H. Lathrop submitted winning essays in the recent nation-wide Better Highways Awards Contest conducted by General Motors.

McDonald, a resident engineer in District V, received the top California award of \$1,500 for his paper on "How to Plan and Pay for the Safe and Adequate Highways We Need." Lathrop, an engineer in the Sacramento Head-

Rock Slide Closes Scenic Tahoe Road

Photo opposite →

A ROCK SLIDE of unusual proportions for high altitude Sierra roads closed scenic State Sign Route 89 near Eagle Creek on the west side of Lake Tahoe on Sunday, May 24, 1953. The site of the slide was at a point high above Emerald Bay on a portion of the road which is buried deep in snow during the winter months.

The closure resulting from the fall of thousands of yards of massive boulders and trees followed closely the removal of the last remnants of drifts and snowslides and the opening of the section to summer travel. One-way traffic was restored through the slide area the following day; however, additional movement of the rock mass forced the closing of the road again on Tuesday, May 26, 1953.

As a preliminary investigation disclosed that a large crack had opened in the mountain side above the slide face, clearing of the road could not be started until a geological investigation of the entire area had been made and the effect of removing the slide material determined.

Large boulders, some rolling from points 100 feet or more above the road, made the slide clearance work extremely hazardous and required the scaling of the entire slope of all loose fragments. Heavy bulldozer equipment was used to remove the massive rocks from the road surface.

The road was reopened to one-way traffic under flag control during daylight hours on June 19th. Traffic was carried past the slide under control during the night of June 25th, and unrestricted movement was restored on June 26th.

quarters Office, received \$500 for one of the two honorable mention awards given in California.

The awards were presented on June 29th by General Motors officials at a dinner meeting of the General Motors Club in San Francisco.



UPPER—Aerial view of slide area near Emerald Bay. LOWER—Bulldozer clearing rock slide from Sign Route 89.

Eastshore Freeway

Traffic Bottleneck in San Lorenzo and Hayward Broken

By WILLIAM TRAVIS, Senior Highway Engineer

ONE OF THE more serious traffic bottlenecks in the metropolitan San Francisco Bay area was obviated on Friday, June 5, 1953, with the official opening to traffic of a newly constructed portion of the Eastshore Freeway. The new unit extends from Lewelling Boulevard in San Lorenzo to Jackson Street in Hayward, a distance of 3.9 miles, and brings the length of Eastshore Freeway completed at present to a total of 14.7 continuous miles.

Dedicatory ceremonies and an inspection tour were sponsored by numerous local civic organizations under the leadership of the Alameda County Highway Advisory Committee. Ribbon cutting rites were held at the Jackson Street terminus of the freeway and again at the entrance of the newly completed A Street Interchange, which will serve San Lorenzo.

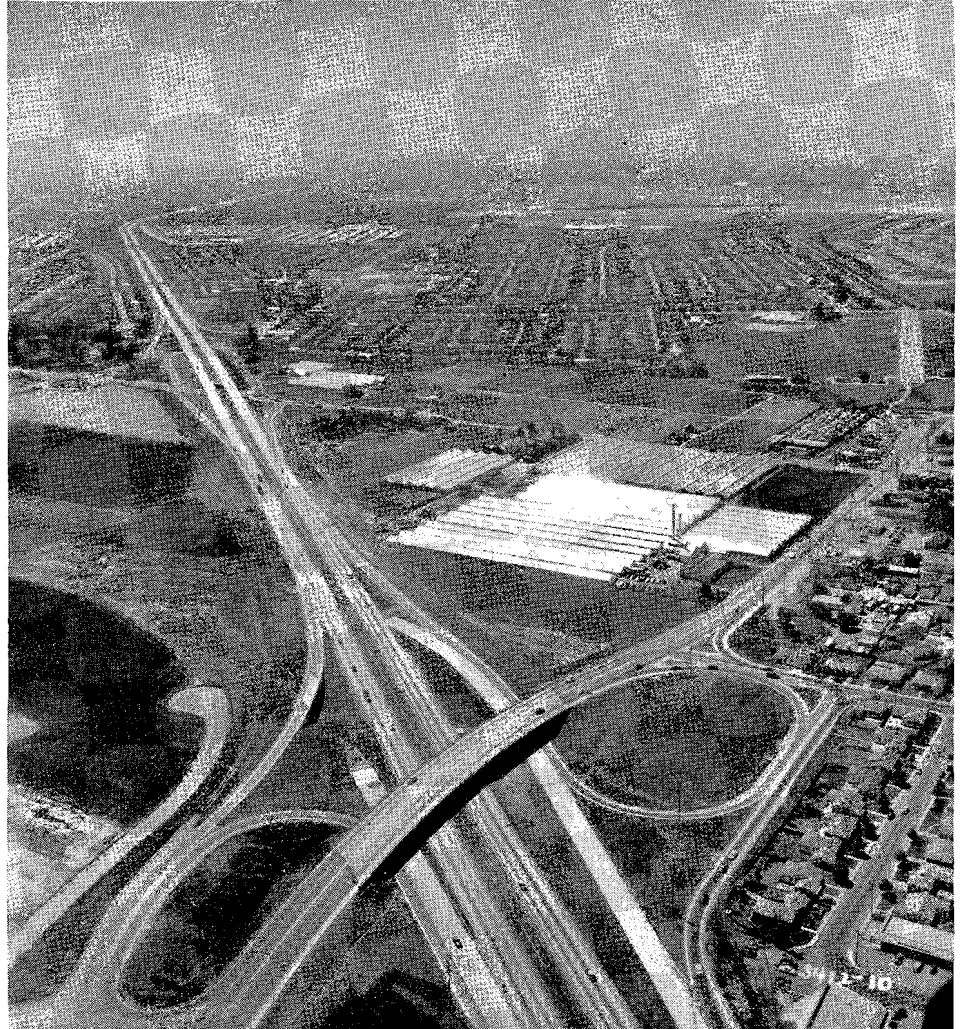
Ceremonies Held

Following these ceremonies, at an informal reception in San Lorenzo, state highway representatives and the contractors met with county officials and representatives of many local civic organizations which have been instrumental in furthering the freeway program in the East Bay. Harry Bartell, chairman of the Alameda County Highway Advisory Committee, presided. Speakers on the program included State Highway Engineer G. T. McCoy, B. W. Booker, Assistant State Highway Engineer in charge of District IV, and Highway Commissioner H. Stephen Chase of Sacramento.

This newly opened portion of the Eastshore Freeway provides the highest type of traffic service for the communities which it traverses, and will be of greatest value in relieving heavy through traffic on local roads.

Four-lane Divided Highway

The new unit is a four-lane divided facility with provision for ultimate expansion to six lanes. Interchanges at Winton Street, A Street and Hesperian Boulevard will assure the orderly flow



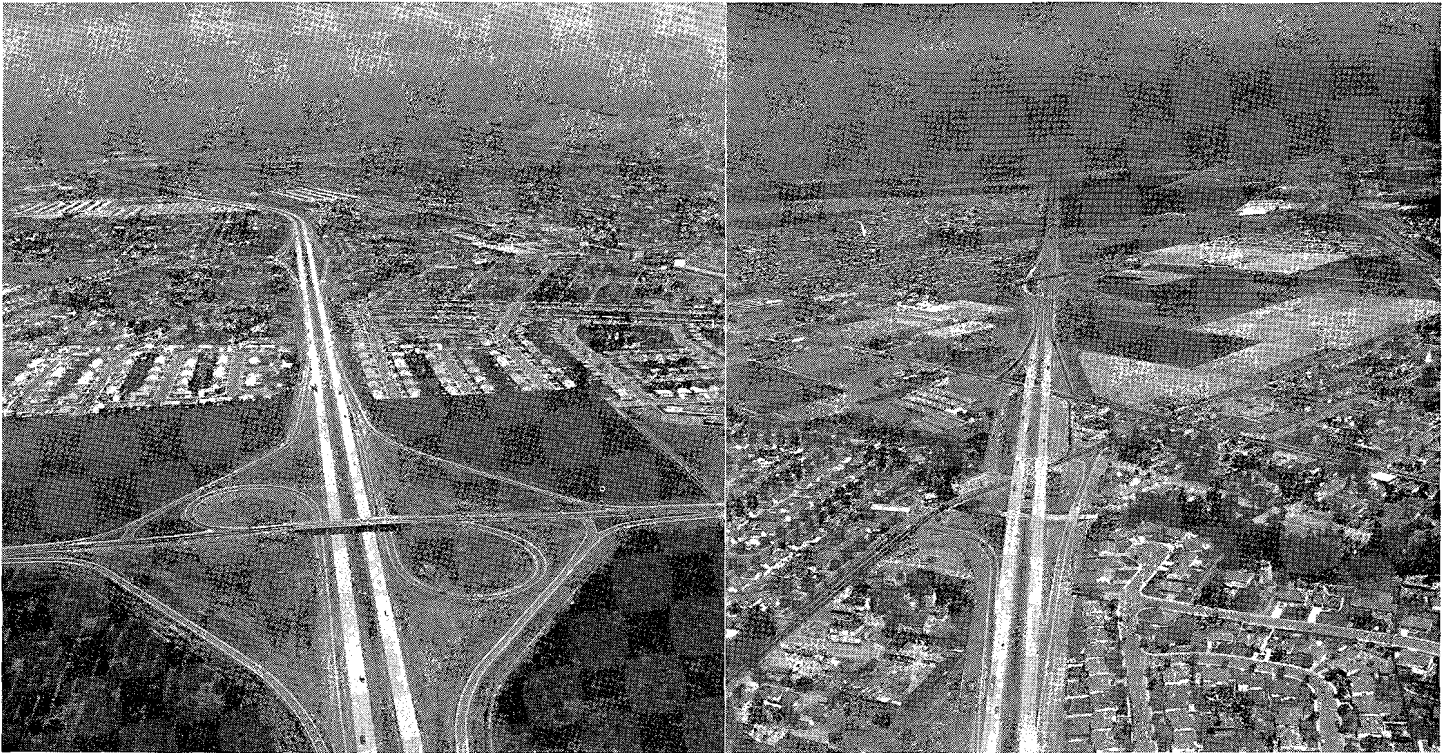
Eastshore Freeway looking south toward San Lorenzo. Washington Avenue interchange in foreground.

of traffic to and from the freeway. Freeway overcrossings for local traffic have been placed at Hathaway Avenue and Paseo Grande, and an undercrossing for pedestrian use has been constructed at Sunset Boulevard.

The dedicated section, costing \$3,938,000 including rights of way, was completed by Frederickson & Watson Construction Company and M & K Corporation, joint venture contractors, with commendable speed, less than 20 months having elapsed between the start of work and opening ceremonies.

Another Freeway Project

Another Eastshore Freeway project now under construction between Fallon and Market Streets in Oakland, scheduled for completion at the end of the year, will eliminate the present conflict between Eastshore Freeway traffic and Posey Tube traffic. Plans are rapidly being furthered for additional units of the freeway within the City of Oakland, which units, when completed, will provide a full freeway facility from the San Francisco-Oakland Bay Bridge to Hayward.



LEFT—Looking north along Eastshore Freeway toward San Lorenzo; Winton Avenue cloverleaf in foreground, A Street diamond type interchange in the middle. RIGHT—Eastshore Freeway looking north toward San Leandro; structures visible include bridges over San Lorenzo Creek in foreground, followed by Hesperian Boulevard Undercrossing, Lewelling Boulevard Undercrossing, and Washington Avenue Overcrossing.

BEN ALI-ROSEVILLE FREEWAY ON U. S. 40 UNDER WAY

AUTHORIZATION to advertise for bids on the second unit of the Ben Ali-Roseville Freeway on U. S. 40-99E has been given to the Division of Highways by State Director of Public Works Frank B. Durkee.

Bids were opened on July 29th in Sacramento for construction of seven reinforced concrete bridges along a 7.4-mile portion of the future freeway between Ben Ali in Sacramento County and the Placer County line.

Work began a few weeks ago on construction of six structures and grading of the freeway roadbed for the Roseville bypass from the Placer County line to one-half mile east of Roseville, a distance of 3.5 miles.

Allocation of \$2,200,000

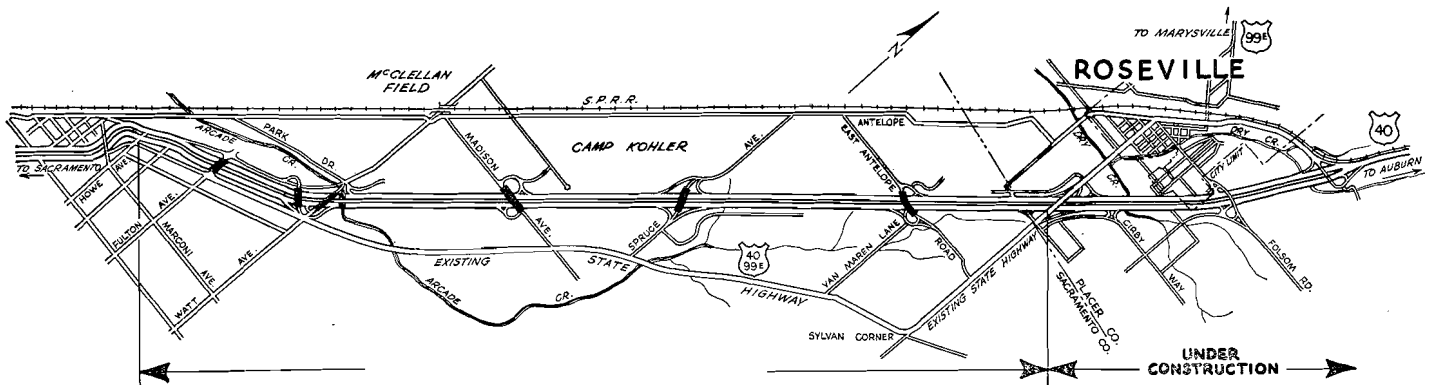
The State Highway Budget for 1953-54 contains an allocation of \$2,200,000 for both jobs. The estimated cost of the Placer County portion of the work, now in progress, is \$1,345,-

000, leaving approximately \$855,000 allocated for the seven structures to be built in Sacramento County.

Both contracts are scheduled for completion in the summer or early fall of 1954.

Grading of the Sacramento County portion of the freeway and paving of the entire project will be placed under contract as soon as progress on the structures will permit.

... Continued on page 58



Early Days

First Highway Commission Gives Way to Present-day Agency

By R. C. (CASS) KENNEDY, Secretary, California Highway Commission

(Continued from last issue)

AT THE MEETING of the Highway Commission on March 19, 1919, the minutes show that the commission had received a letter from the Automobile Club of Southern California requesting permission to erect an ornamental arch of "WELCOME" over the state highway alongside a certain camping site at Cajon Pass in San Bernardino County. But it was voted that the granting of such permission would establish an annoying precedent and that the same be denied. In other words, the commission was even then keeping signs off the state highways.

On May 29th, the seminar, or conference, with all division engineers, was held. Various aspects of highway construction, such as drainage, thickness of concrete, width of pavement, and everything else pertaining to it, were discussed, and all the engineers have the benefit of their experience to the commission.

Mr. Emmett Phillips, commissioner from Sacramento, passed away on June 18, 1919. At the meeting of June 26, 1919, George C. Mansfield of Oroville presented his credentials as the appointee of the Governor and was seated. At this same meeting, the secretary read a letter from Dr. C. R. Blake, County Health Officer of Contra Costa County, complaining that certain cloth signs that he had placed on the state highway in Contra Costa County had been removed by Division of Highways employees. These signs were warning against dumping garbage and refuse on the state highway. Naturally, the doctor was complaining about such action of the employees of the State Highway Commission. The commission decided that such signs, authorized by boards of health, do not violate the intent of the law and the commission's regulations concerning signs on the state highway. The commission voted that the Highway Engineer be requested to notify the various division engineers to

permit such signs to remain when placed on the state highway.

Publicity Needed

At the August 5th meeting the commissioners decided that they should have more publicity regarding what they were doing. They instructed the secretary to prepare a publicity letter for the press following each meeting of the commission. But before this letter was released, it should be submitted back to the commission for its approval.

Also, at the August meeting, a group from the State Forestry Board and people interested in preserving the redwoods, along with the State Superintendent of Banks, and two or three other people, met with the commission to discuss the best procedure to pursue to preserve the redwoods along the state highway in Mendocino, Humboldt, and Del Norte Counties. After a rather long discussion, the minutes show that the members of the State Forestry Board, the State Highway Commission, and other interested parties would make a journey to Eureka, to arrive at Eureka on Saturday, August 30, 1919. They would then hold a conference with the persons who were then engaged in cutting timber along the state highway, and then would formulate a definite policy as to the course to pursue.

Measuring Tires

At the meeting of November 6, 1919, a letter from T. J. Tehaney, Superintendent, State Motor Vehicle Department, was read. This letter concerned the matter of weight limitation per inch of tire width as referred to in Section 15 of the Motor Vehicle Act. On recommendation of the Highway Engineer it was voted to adopt the idea. Then the minutes go on to detail how to measure the width of tires and how to weigh the trucks with front wheels on the scale, and then the rear wheels on the scale, and then all upon the scale.

One of the first commission actions in 1920 was denial of a permit to the Touring Bureau of the California State Automobile Association which had requested a permit to send a Fageol truck loaded with batteries to Los Angeles from San Francisco. The truck was to be driven at a speed in excess of 15 miles per hour. It was voted that the Automobile Association be informed that the California Highway Commission did not have the authority to increase the rates of speed defined by the State Motor Vehicle Act. In that day and age (1920) the trucks all had solid rubber tires on them and the speed limit had been set for them on the highways at 15 miles. Also, it was noted that Division Engineer Caruthers was granted a leave of absence for one year so that he might assume the duties of engineer of Sacramento County. The county had sold some bonds, the proceeds of which were to be used on the construction of roads, streets, etc.

Leave for Caruthers

Caruthers was given a leave of absence. G. R. Winslow, who was first assistant highway engineer under Mr. Fletcher, was appointed to fill the job as division engineer.

The commission went into the pest control business on January 22, 1920. There is a paragraph in the minutes stating that it was the opinion of the commission that the State should cooperate in the eradication of ground squirrels on state highway rights of way wherever the adjoining property owners were doing their part by killing these rodents. The highway engineer was authorized to adopt such measures as might be necessary to render such assistance on behalf of the State.

On January 28, 1920, the commission had received an application from Alexander Burness, who was agent for Balfour, Guthrie & Company of Brentwood. He wanted to use four trailer

wagons attached to a 45-horsepower Holt Caterpillar tractor for hauling sand and gravel on the highway and across the iron bridge near Brentwood. This, the commission denied, being of the opinion that the use of more than two trailers was not for the best interests of the public.

Secretary Ellis Resigns

On February 26th there is an application from the Automatic Clock Company of Lodi, California. It wanted to erect glass signs, 6 feet by 2½ feet, which would be automatically lighted. These signs would contain a road guide and advertising matter. The company wanted to erect these signs at all curves, railroad crossings and crossroads along the State Highway System in California. The commission denied this, holding that it was contrary to policy.

At the March 23d meeting in 1920, W. R. Ellis resigned as secretary. The resignation was to become effective on March 31st, with a leave of absence in the meantime at his option. Ellis had been secretary of the commission since the beginning on August 9, 1911, until March 31, 1920.

At this meeting, C. C. Carleton was appointed acting secretary and he was to be that in addition to his duties as attorney.

At the April 13th meeting, the commission authorized W. G. Hunter, an assistant highway engineer, to go to Washington, D. C., and possibly to certain War Department bases in the east. He was to go there for the purpose of selecting equipment and supplies offered to the commission by the U. S. Bureau of Public Roads.

Nothing is said in the minutes as to how many trucks were going to be allotted to the commission by the U. S. Bureau of Public Roads. These trucks were surplus military equipment. But at the April 23d meeting, the commission instructed the Highway Engineer to set aside one hundred motor trucks from the allotment for rental to state agencies for use on public highways, and that from the one hundred trucks so set aside, one truck be reserved for each county in the State.

Overloads on Highways

At the June meeting, because of the apparent need to reduce state highway

construction, owing to the difficulty of selling highway bonds, the Highway Engineer was directed to discontinue all location surveys as soon as practicable, and to dismiss all survey parties that were not needed for the work of the construction already in program in progress. To further retrench, the commission voted that a number of day labor authorizations should be discontinued immediately.

People who were overloading on highways were in for a bad time, for at the October 5th meeting of the commission, the Highway Engineer was instructed to purchase six loadometers. He was directed further to have a suitable truck, equipped with four of these loadometers, and to assign two employees to operate the truck in cooperation with one or more officers from the State Motor Vehicle Department. The commission wanted to start out as soon as possible on a systematic weighing of trucks, which appeared to be operating illegally, and it wanted this to be done in all parts of the State.

Also, at this same meeting the specifications for concrete bases were changed. Bases had been four inches up to this time, and were increased to five inches. The vote was that on all going contracts, and on all future contracts, the base should be increased to five inches.

Directional Signs

At the meeting on February 9, 1921, the commission voted that the Highway Engineer should make a study and a report on a plan for the establishment of a system of warning and directional signs on state highways. He was also to give an estimate of the cost of such a system. He was supposed to include in this report such information as he could gather on what had been done in other states and in foreign countries, and also any of the codes adopted by the International Association of Road Congresses, and the American Association of State Highway Officials.

At numerous places in the minutes of 1921 are notations of adverse votes regarding requests to hang signs across the road. Chambers of Commerce of different towns all wanted either to hang a canvas sign or make a permanent sign at each end of their town that was traversed by a state highway, so that when a motorist got to this sign he

would know where he was. But the commission ruled against every one of them as they came up. It even refused permission for the Six-Minute Ferry, which used to run across Carquinez Straits, to put up signs indicating the way to the ferry.

In the minutes of March 3, 1921, I ran across the name of Henry J. Kaiser of Seattle, Washington, who was bidding on a road job in Santa Barbara County. As I continued through the minutes of 1921 I discovered that later on Mr. Kaiser had changed his address to Oakland, California. I think probably that everyone who is reading this knows who Henry J. Kaiser is.

On May 18, 1921, John F. Galvin of Richmond, California, was appointed secretary and disbursing officer of the commission. He succeeded Ellis.

On May 18th the commission voted that the Highway Engineer be directed to issue a general order to all his divisions to the effect that only such warning devices as were the property of the State be installed at grade crossings and dangerous places on state highways.

Public Works Department Formed

The Legislature in January, 1921, made some changes in the setup of the Highway Commission and other departments in the State. It passed a law forming the Department of Public Works, very similar to what it is today. The Highway Engineer was made the Executive Officer of the commission to work directly under the commission.

On September 21st the commission split the State into three inspection districts—one, District A, with headquarters in Alameda; two, District B, with headquarters in Sacramento; and three, District C, with headquarters in Los Angeles. Three general inspectors—one for each district—were appointed. Evidently these men were general inspectors of all the work done under contract or day labor.

The minutes of the October 11th meeting make notice of letters received from boards of supervisors of the following counties: San Diego, Placer, Amador, Ventura, San Bernardino, Orange, Marin, and from the Highway Commission of the City of San Diego, and from the Tahoe-Ukiah Highway

. . . Continued on page 55

New Span

San Leandro Bay Bridge Is Opened to Traffic

ON JULY 1, traffic began using the new San Leandro Bay Bridge connecting Alameda with Bay Farm Island. Work started on the new bridge on April 18, 1951.

The old bridge was first built in 1881 and spanned the Estuary at Webster Street. In 1898 it was moved to its present location. Much deterioration has taken place on the old span over the years. For several years it has been posted for reduced speed and weight limits.

Future developments of San Leandro Bay by the City of Oakland have been taken into consideration in the design of the new bridge. All the piers adjacent to the channel have been made deep enough to allow for the dredging of a deepwater channel to an elevation of minus 35 feet. At such time as the water traffic becomes sufficiently heavy provision has been made so that a second bascule span may be erected to double the available channel width and increase the present 92-foot width to a channel width of 200 feet between fenders.

Large Cofferdam

The main pier of the new bridge, which houses the machinery and the counterweight, is the largest cofferdam constructed on a state highway since the building of the San Francisco-Oak-

land Bay Bridge. The pier is 55 feet wide, 90 feet long and is 73 feet high. It rests on 369 timber piles. At such time as the channel may be deepened provision has been made for attaching a heavy duty fender around the pier for protection from collision with large vessels.

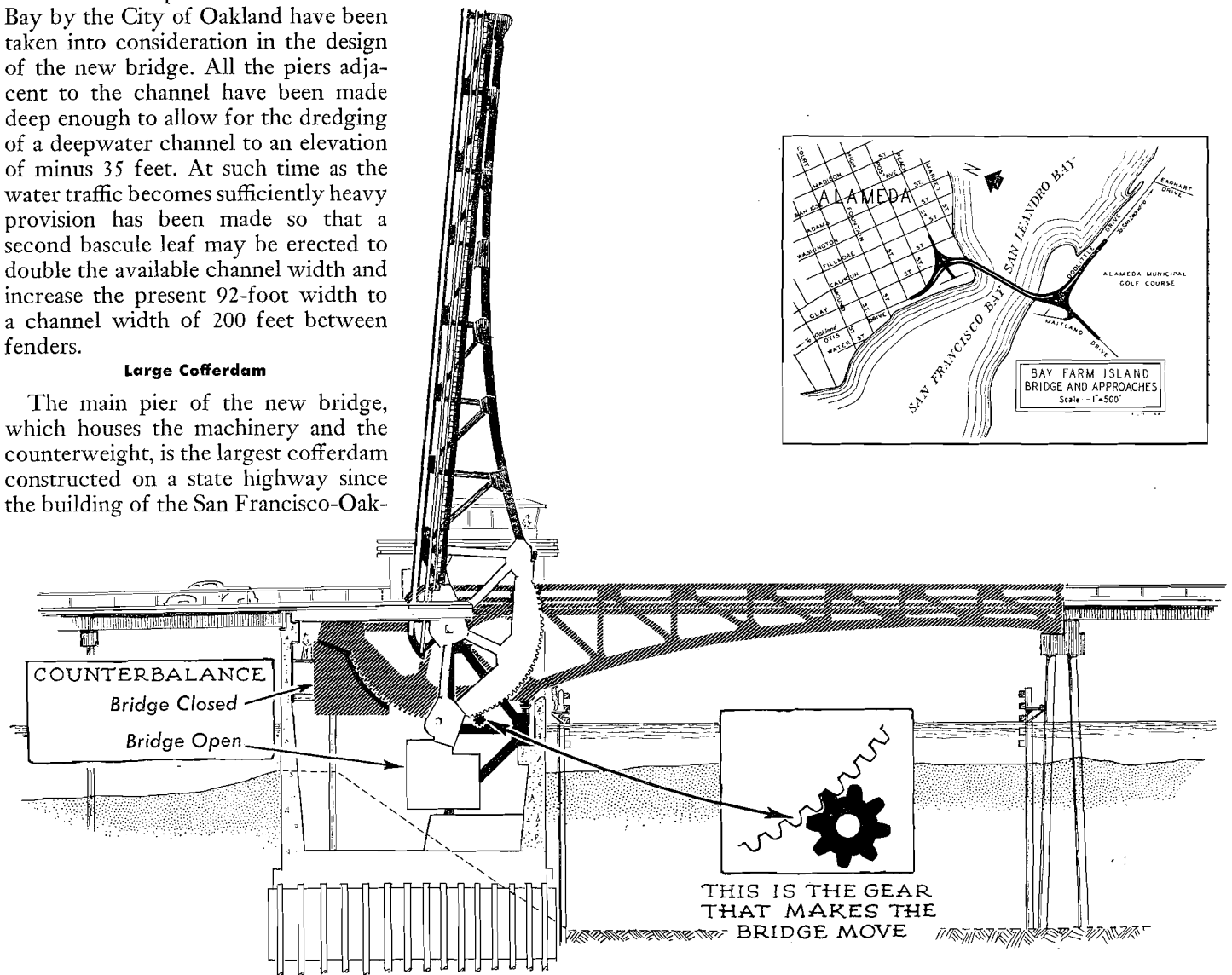
The bascule span is 125 feet long and is counterbalanced by a counterweight weighing 1,100 tons. The design is such that the counterweight is suspended below the roadway and sinks into a

well in the pier when the bridge is raised.

Two 50-horsepower motors will open the bridge to its full angle of opening in two and one quarter minutes. All of the operating machinery for the lift span is enclosed within the main pier.

Maximum Protection for Traffic

A complete interlocking electrical system is provided to insure maximum protection to vehicular and pedestrian



Artist's sketch showing location of San Leandro Bay Bridge and mechanical method of its operation

traffic. In raising the bridge the operations must be followed in the prescribed sequence by the operator. It is so designed that it is impossible to open the span until all the protective devices, including traffic gates on the north end and the positive barriers which raise out of the deck on the south end, are in place.

Duncanson-Harrelson Co. and Stolte, Inc., were the contractors for the bridge proper. Fredrickson & Watson Construction Co. was the contractor for the approaches. The design and construction of the bridge was carried out by the California Division of Highways Bridge Department under the direction of F. W. Panhorst, Assistant State Highway Engineer—Bridges. The resident engineer for the Bridge Department was John E. Burke.

Right of way, moving utilities and clearance came to \$156,000. Approaches cost \$338,000. The bridge, including engineering and design, cost \$1,850,000. The total cost of the project was \$2,344,000.

Cost Index

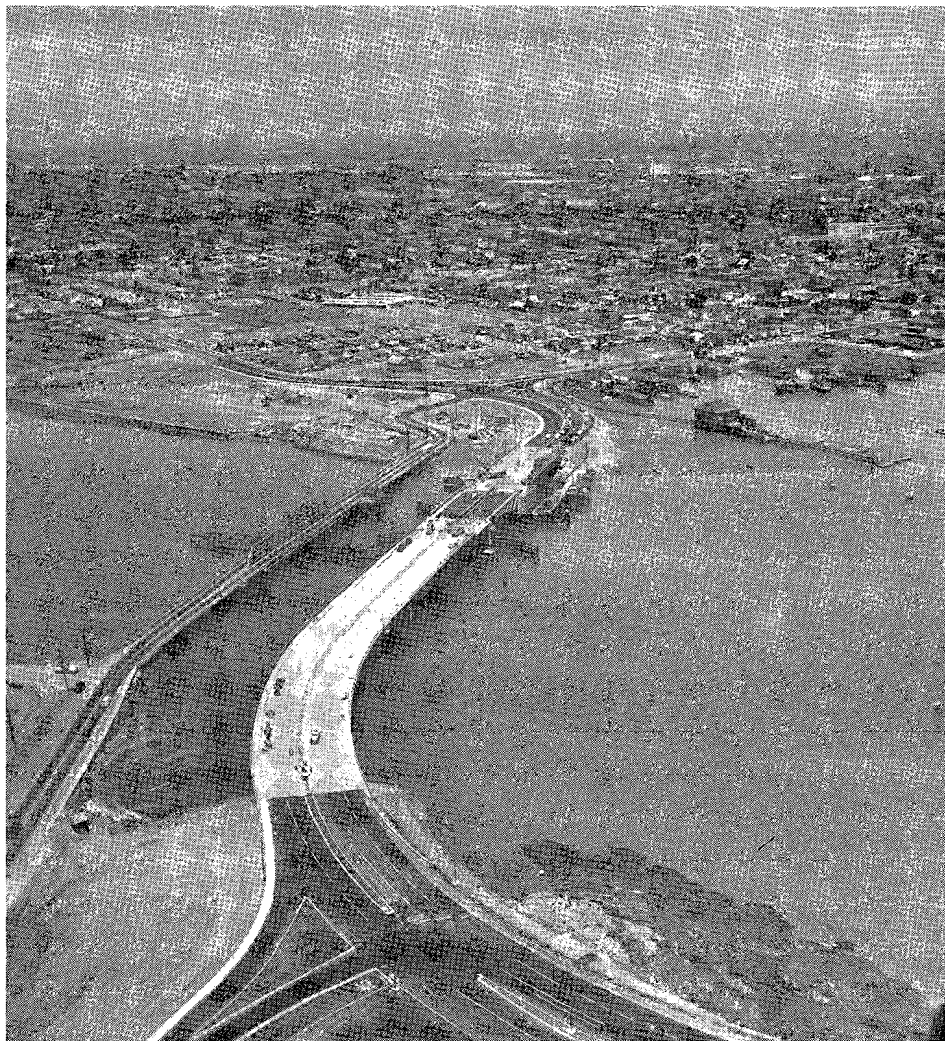
Continued from page 36 . . .

their construction organizations intact, with a result that they bid low to get the jobs.

It is the belief of this department that such costs will continue upward, possibly at a decelerated rate, but still upward.

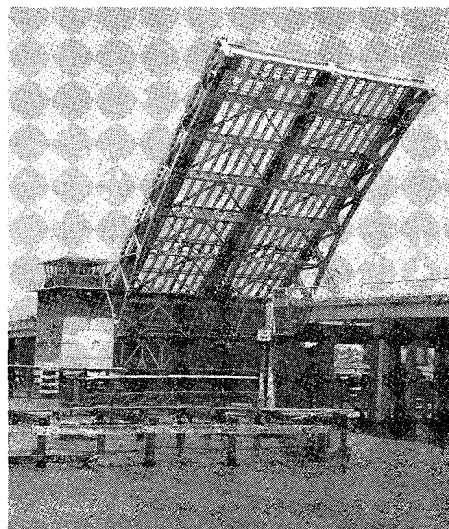
On the accompanying chart are plotted for comparative purposes the Engineering News-Record Construction Cost Index, the U. S. Bureau of Public Roads Composite Mile Index (adjusted for increased design standards) and the California Highway Construction Cost Index, all to the base of 1940=100.

Accompanying tabulations show: (1) the average unit prices by years and quarters for the eight basic highway construction items on which the California index is based; (2) the average number of bidders on various sized contracts for the first six months of 1953 and for the fiscal year from July 1, 1952, to June 30, 1953; and (3) the number of bidders prequalified to bid on state highway construction on June 30, 1953, grouped to the several brackets of bidding capacity.



Aerial photograph of San Leandro Bay Bridge opened on July 1

This photograph shows span being opened during dedication ceremony



FROM TURKEY

California Highways and Public Works Sacramento, California, U. S. A.

GENTLEMEN: Traffic Safety Section of the Turkish Ministry of Public Work will greatly appreciate if you will be kind enough to mail us a copy of "January-February" and "March-April" 1953 issues of the *California Highways and Public Works* magazine and from then on enter our section as a regular subscriber of the magazine.

We are sure that the magazine will be very useful in our daily studies and we thank you in advance.

Yours sincerely,

SEDAT MENGILIBORU
Chief, Traffic Safety Section
Construction and Maintenance
Division
Ankara, Turkey

Retirements *from* Service

Frank E. Burnside

FRANK E. BURNSIDE, retired General Superintendent of Shops for the Equipment Department of the Division of Highways, was honored recently at a gathering of his former associates at Sacramento, who presented him with a beautiful television set and a leather-bound "Memory Book" containing the signatures of his many friends in the Division of Highways.



FRANK E. BURNSIDE

Burnside retired on April 1st of this year after more than 33 years of service. His record of state employment began on October 15, 1919, shortly after his discharge from the United States Navy, when he "hired-out" as repair shop foreman for Division (now District) III. Three years later he was appointed general foreman, and the following year, superintendent of the newly organized Divi-

sion of Highways Equipment Department.

Schooling in Sacramento

He received his early schooling in the public schools of Sacramento, where he completed high school. In later years, by diligent home study, correspondence, and university extension courses, he so advanced his education that he was able to qualify for certification as a registered mechanical engineer.

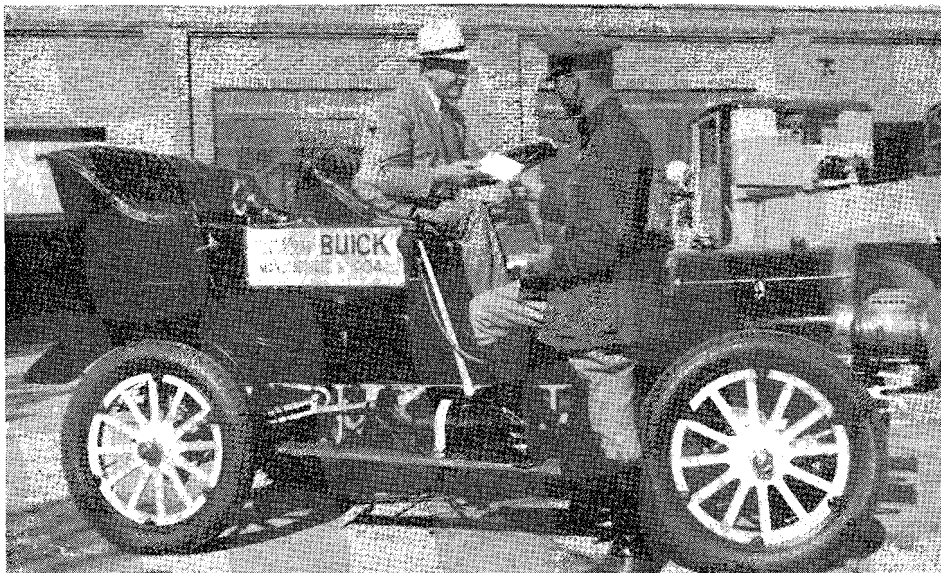
His first position after leaving school was with the Southern Pacific Company in 1905 as clerk. The salary of 15 cents per hour seems infinitesimal by today's standards, yet it was, apparently, the prevailing wage at that time. In 1906, Burnside began his four-year apprenticeship to the machinist trade. Following the completion of that apprenticeship, his interest turned from railroads to the new field of automobiles, which were then only beginning to crowd the horse out of the livery stable. With but few interruptions, Burnside's career was from then on connected with matters automotive.

In Fire Department

It is interesting to note that he was the first driver of the first piece of

... Continued on page 58

Frank Burnside in 1904 Buick being handed traffic citation. (The editor suspects this picture was posed in fun.)



Fred R. Belknap

FRED R. BELKNAP, 70, Division of Highways Engineer in the District VIII Office at San Bernardino, retired from state service on May 5th. Belknap, who has led many survey parties on highway projects throughout the southern part of the State, came to work with the division in 1921 as an instrument man with District VII in Los Angeles. He transferred in 1928 to the San Bernardino district, where he remained until his retirement.



FRED R. BELKNAP

Belknap was born in 1883 on the Tulare Indian Reservation. He received his engineering training from the Throop Institute of Technology at Pasadena, graduating in 1904. Throop Institute was the forerunner of the present-day California Institute of Technology.

Belknap had a varied career before becoming permanently associated with the Division of Highways 32 years ago.

In 1906 he was employed on the Owens River Aqueduct. In 1910 he worked for a short time as a transitman on the Alaska Northern Railroad at Seward, Alaska, leaving his job to spend the next two years prospecting for gold.

From 1913 to 1917 he was employed by the Imperial Water Company at Holtville, California, and later by the San Diego and Arizona Railroad.

During World War I Belknap served with the U. S. Army Engineers in France, returning in 1919 to take a job with the Los Angeles County Flood Control.

Belknap and his wife reside at 2244 Serrano Road in San Bernardino.

Luke D. Packard

LUKE D. PACKARD, Senior Highway Engineer in charge of the Drafting Section of the Highway Planning Survey, retired on June 30th after 28 years' service with the Division of Highways.



LUKE D. PACKARD

Packard came to work for the division in 1920 as an assistant resident engineer on a construction project along U. S. 99E in Tehama County.

From 1921 to 1924 he was stationed in District VII at Los Angeles where he served as resident engineer on several bridge jobs throughout the southern part of the State. In 1924 he transferred to Headquarters Bridge Department in Sacramento where he first was Assistant Bridge Engineer and later Construction Engineer.

From 1928 to 1932 Packard left state service to engage in private contracting work, planning and supervising the construction of many highway, bridge, water system, and building projects.

Veteran of Two Wars

He returned to the Division of Highways in 1932, first serving as resident engineer on the Kings River Canyon Highway, and later joining the Planning Survey at headquarters.

Packard is a veteran of both World Wars. From 1917 to 1919, he served as air cadet and later second lieutenant with what was then known as the Aviation Section of the Signal Corps, and which eventually developed into the U. S. Air Force. From 1940 to 1947 he served as major, and later as lieutenant colonel with the U. S. Air Force and was stationed for some time in Alaska and the Aleutian Islands.

Packard was born at Granville Summit, Pennsylvania, in 1889 and attended school at Tacoma, Washington.

His engineering career began in 1906 when he took a job as a chainman on a locating party for the Green River Water Supply System which serves the City of Tacoma.

... Continued on page 51

Harry H. Wildy

A RETIREMENT PARTY was tendered by friends and associates on Monday, June 1, to Harry Wildy, one of the few remaining colorful early day surveyors.



HARRY H. WILDY

His practices established surveying procedures that are used extensively in District VII highway work today. The loss of his services will be keenly felt by all of his co-workers.

Born in Yazoo City, Mississippi. Following his early migration westward in 1913 from work with Stone and Webster in Boston, Massachusetts, he began his long career as a surveyor with Koebig and Koebig in Los Angeles. In March, 1914, he began a year and a half's work with the Santa Fe Railroad. He started his 39-year career with the State on September 15, 1914.

During the colorful days when practically all of the district business correspondence was written in longhand, Harry had many varied experiences, stories of which never fail to excite the listener's imagination. Of course Harry's good friends accuse him of exercising his own imagination when relating them but for the most part, he has old-time friends to verify even the most doubtful.

During Harry Wildy's heyday there were many occasions when teams and wagons stuck in the mud, rough winters with snow in the mountains and dry windy summers on hot sandy deserts and the often recurring plague of late paychecks or long delayed expense checks. Even in those days, salary increases were obviously a problem, as witness a letter by District Engineer Patch to Headquarters office on June 21, 1918:

"As mentioned herein, private corporations in this locality are giving a general increase to their employees at a higher percentage increase than recommended above, and some of our best men have been offered and accepted

better salaries for doing work similar to what they have been doing in this division."

Harry Wildy's record is one to be envied by the old-timers and to be emulated by young engineers. Reports on his performance are generously sprinkled with such remarks as:

"One of the best party chiefs we have had"; "Thoroughly dependable in every respect"; "A quiet, willing, energetic worker whose services have been very satisfactory"; "The uniformly high quality of your work has enabled those using the information furnished by you to accept it with complete confidence in its reliability"; "Tactful in dealing with subordinates"; "Quiet and efficient."

"Quiet and efficient!" That portion of his record was emphatically demonstrated during the survey at the summit of Mint Canyon in Southern California. One day, unbeknownst to Chief Wildy and his party members, an apiary just over the hill was being robbed. Those bees were fighting mad! As the story goes, the instrument man glanced through the instrument and to his astonishment saw a level rod standing alone and unattended and watched as it gracefully fell to the ground. By the time he was able to interpret the wild flailing arm antics of the rod man, the mad bees were on him too. Where was Harry? In his quiet and efficient manner, bellowing like a bull, he was wasting no time in making tracks for the pickup. There was no time to open the door so he just stuck his head in through the window and frantically wound it up. The exact details of that episode have faded with the years but have lost little by repeated telling by Harry's friends.

THANK YOU

MR. KENNETH C. ADAMS, *Editor*

DEAR MR. ADAMS: Your publication is one of the finest that reaches my desk—informative, concise and complete—it is a treasure. I do not keep a file of these; they are sent to Scotland, to my brother, who was a resident here years ago. I want to let him know how California is progressing. Thank you very much for your share in the magazine.

Sincerely,

H. D. BROWN

New Light Success

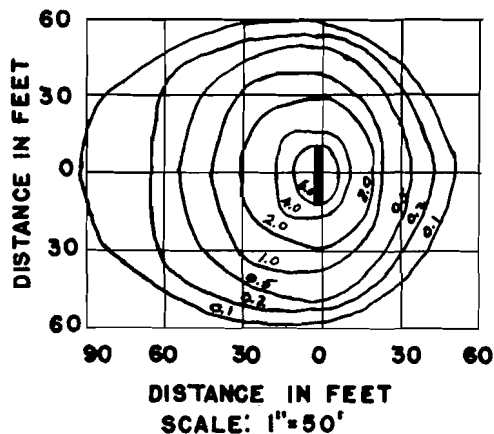
Fluorescent Luminaire Is Giving Satisfactory Results

By ROY MATTHEWS, Senior Electrical Engineer, Traffic Department

THE FLUORESCENT highway luminaire developed by the Traffic Department of the Division of Highways has been in use for over a year with satisfactory results.

This luminaire is designed for use at intersections only. It is mounted at the far right corner of the intersection and is so constructed that most of its light rays are directed back into the intersection.

Figure 1 shows the isolux curve of horizontal foot-candles for this unit when mounted at a height of 30 feet. The pavement directly underneath the luminaire is illuminated to a level of approximately 7 foot-candles. This is about twice as much light as obtainable with the common 20,000-lumen mercury vapor street lighting luminaire.



ISOLUX LINES OF HORIZONTAL FT.-CANDLES
Model 100 Fluorescent Intersection Luminaire
28' Mounting Height, Four 5800 Lumen, 600 ma.,
4500° White, 96 inch, T-12 Slimline Fluorescent Lamps

FIGURE 1

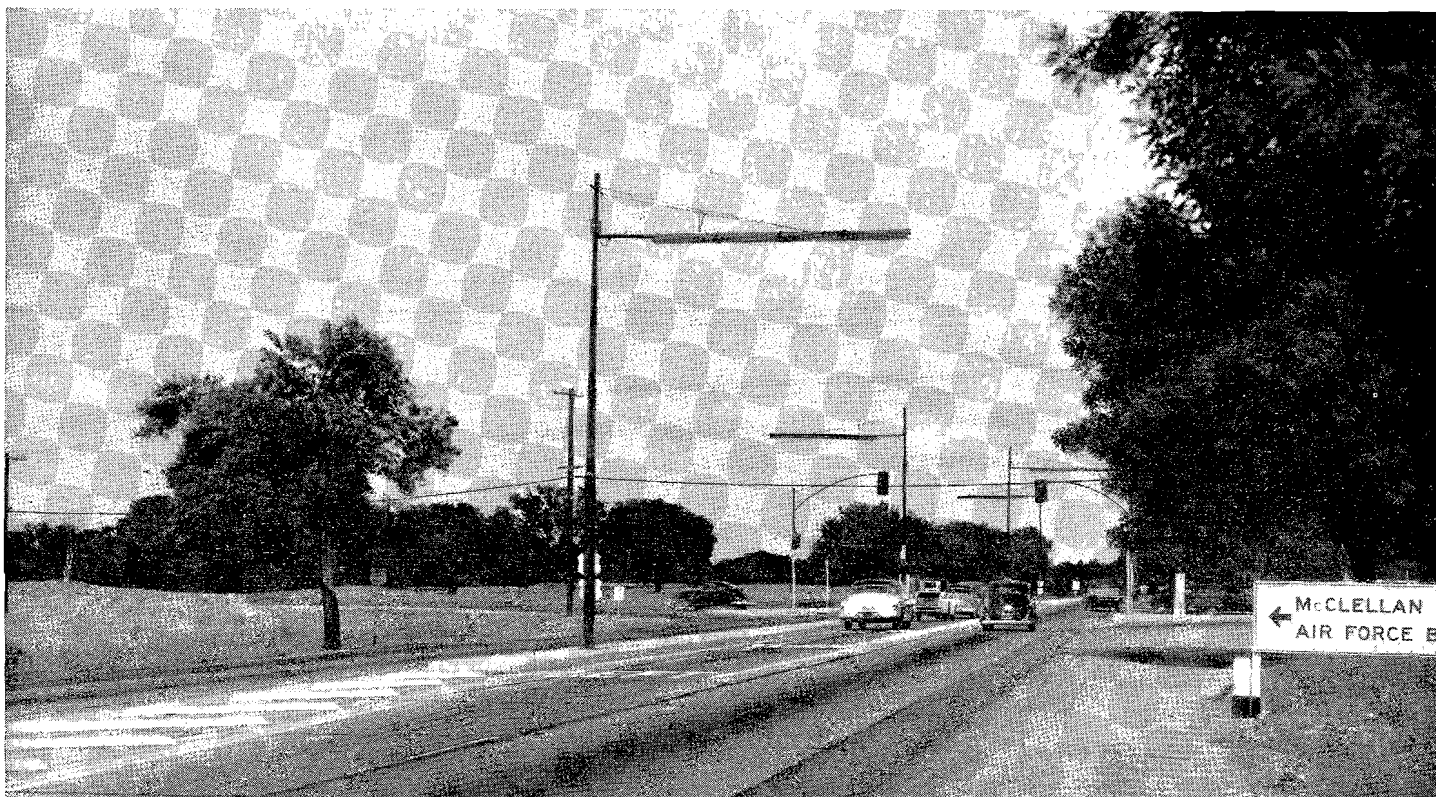


FIGURE 2



FIGURE 3

Construction of Luminaire

The fluorescent luminaire is constructed of 16-gauge sheet steel. The underside of the unit is white porcelain enameled finish and the top of the unit is dark green porcelain enameled. The reflector is of the open type, that is there is no glass cover.

Fluorescent lamps are usually designed to give the greatest light output at about 70 degrees Fahrenheit. It was first believed that the use of an open reflector such as used in this unit would not be practicable because the light output of the lamps would decrease with cool winter night temperatures. However, no visible decrease in light output has been evident.

Figure 1 shows that although most of the light is directed back into the intersection there is also quite a bit off the ends of the unit. Some of this light could probably be redirected back into the intersection, if desired, by the addition of a reflecting surface at the ends of the unit.

Figure 2 shows a daytime view of the intersection of Auburn Boulevard (U. S. 40) and Watt Avenue, a few miles northeast of Sacramento. Four of the

fluorescent lights are used at this location. Two units are used at the intersection proper in the prescribed manner, and two others are used to illuminate the entrance to the left turn lanes on both approaches to the intersection.

The units provide good illumination of the intersection, but by far the greatest asset is the lack of glare. According to the Illuminating Engineer Society, there is no single factor so detrimental to visibility in roadway lighting as glare. Glare not only results in a reduction in visibility but also produces eye discomfort and fatigue.

Figure 3 shows a night view of the same intersection. The photographer was located fairly close to the first unit, which illuminates the entrance to the left turn lane. The brightness shown by this unit in the photograph would be cut off from the view of a driver by the vehicle's top. The remaining units shown illustrate the view of the approaching driver. Note that only a small horizontal line of light is visible to the motorist and this is of such small area that the motorist's visibility is not hindered.

Luke D. Packard

Continued from page 49 . . .

Varied Career

From 1906 until 1920, when he joined the Division of Highways, he had a varied career which included work with the Northern Pacific Railroad, the Washington Highway Commission, the Interstate Commerce Commission, and as Assistant County Engineer for Oklahoma County, Oklahoma.

Packard is married and has three children: William D., a captain in the U. S. Air Force stationed at Victoria, Texas; Mrs. Barbara J. Livesey of Walnut Creek; and Bruce, now with the Division of Highways at Markleeville.

He is a member of Sacramento Post No. 61 of the American Legion and has been active in Junior Legion Baseball for many years, holding the position of manager of the Post 61 team. He has also been active in the California State Employees Association, the Air Force Association, and the American Society of Photogrammetry.

Following his retirement Packard plans to continue in engineering work, specializing in aerial surveys.

ANOTHER LINK OF ARNOLD INDUSTRIAL HIGHWAY

WITHOUT fanfare or the usual ribbon cutting, the new five-mile link of the Arnold Industrial Highway between Pittsburg and Antioch was opened to traffic July 1st.

This new section of state highway, started on February 25, 1952, by Peter Kewit & Sons Co., is a four-lane divided freeway with provision for an ultimate expansion to six lanes.

Traffic interchanges have been built at Railroad Avenue, Stewartville Road and at H Street-Minta Road. Future interchanges are planned for Somersville Road and at A Street. The latter will be part of the next contract for the continuation of the freeway.

Overcrossings have been provided at Harbor Street, Incinerator Road-Aberdeen Avenue and at Standard Oil Road.

Right of way, moving utilities and clearance cost \$785,000. Construction of the freeway cost \$2,621,000—making a total for the new section of \$3,406,000.

In lieu of the usual ribbon cutting the Contra Costa Development Association hosted a dinner in Antioch for the highway commission and engineers

Arnold Freeway Facts

Railroad Avenue in Pittsburg to "A" Street in Antioch.

Length of project: 5.0 miles.

Type of construction: Four-lane divided freeway with provision for future expansion to six lanes.

Interchanges: Provided at Railroad Avenue, Stewartville Road, "H" Street-Minta Avenue.

Freeway overcrossings: Provided at Harbor Street, Incinerator Road-Aberdeen Avenue, Standard Oil Road.

Future interchanges (initial channelization): Somersville Road, "A" Street.

Contractor: Peter Kewit & Sons Co.

Work began: February 25, 1952.

Work completed: July 1, 1953.

Cost of right of way, utilities and right of way clearance \$785,000

Cost of construction..... 2,621,000

Total cost \$3,406,000

from the Division of Highways on Wednesday evening, June 17th.

Six Projects Cost \$22,000,000

Including the 3.9 miles of the Eastshore Freeway completed on June 5th, and the Arnold Freeway, major state highway projects in the Bay area and completion dates are:

July 1—San Leandro Bay Bridge and approaches, Alameda.

August—Bayshore Freeway through City of San Mateo, 2.6 miles.

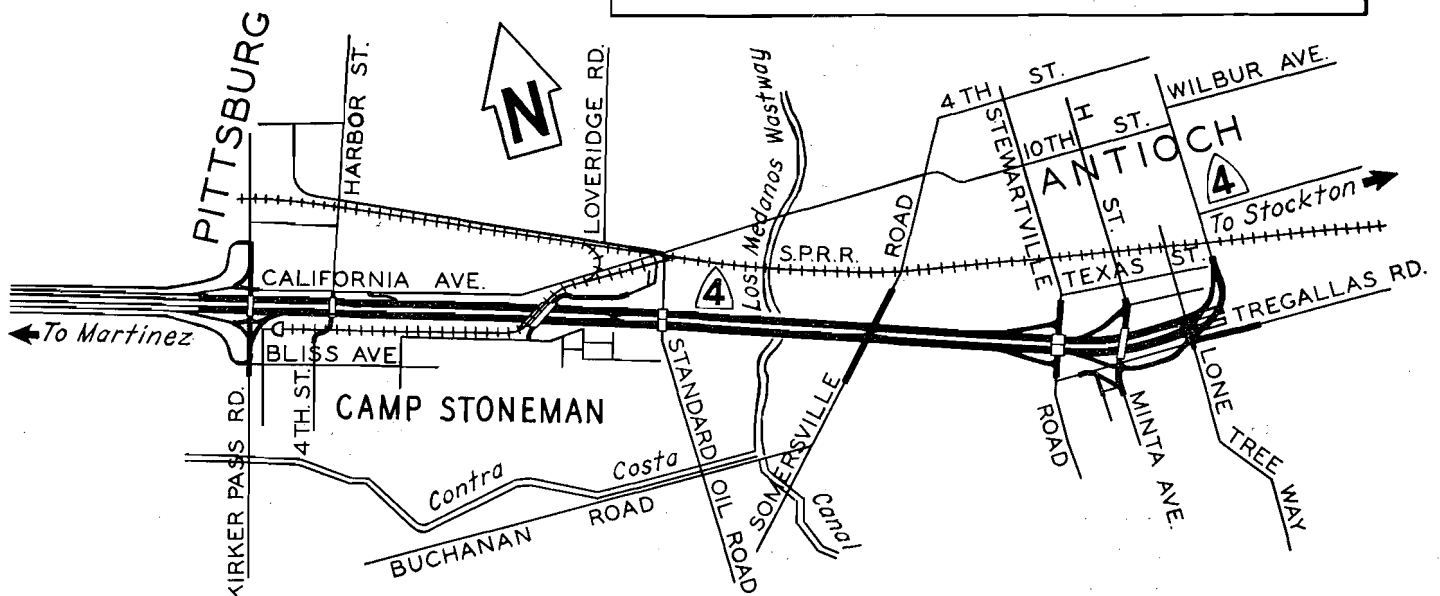
August—U. S. 101 from California Park to Myrtle Street in San Rafael, two miles.

September—Bayshore Freeway in San Francisco from Army Street to Bryant Street.

The total cost of these six projects, including rights of way, is more than \$22,000,000.

State Director of Public Works Frank B. Durkee pointed out that these projects are units in a long-range continuous program of state highway improvement which is being carried on as rapidly as available funds permit. They have been under construction for

ARNOLD INDUSTRIAL FREEWAY PITTSBURG TO ANTIOCH



varying lengths of time. Many other projects designed to provide further relief from congestion and hazard are under way in the Bay region, while still others have been included in the 1953-54 state highway budget but not yet placed under contract.

San Leandro Bay Bridge

The new San Leandro Bay Bridge replaces an old two-lane structure which is now being removed. This four-lane divided facility, with its approaches, totaling 0.9 of a mile in length, was constructed at an approximate cost of \$2,194,000.

Bayshore Freeway

Extension of the Bayshore Freeway in San Mateo County as far as 16th Avenue, near the south city limits of San Mateo, will provide an additional 2.6 miles of six-lane divided highway for the heavy volumes of traffic which use this route. The cost, including rights of way, was about \$2,750,000.

Meanwhile, construction is beginning on the next five miles of Bayshore Freeway to the south, through Belmont and San Carlos.

The most complex and costly of the summer-opening projects is the new section of the Bayshore Freeway extending north from Army Street in San Francisco, terminus of the existing eight-lane freeway unit which begins at Alemany Boulevard.

The job will provide eight lanes from Army Street to 17th Street, beginning in September. It will connect with a viaduct, already completed, which will be placed in service at the same time, to provide a connection to Bryant Street. When this section is opened to traffic, it will provide a by-pass for the entire length of Potrero Avenue.

The cost of the 1.3-mile unit from Army Street to 17th Street, including rights of way, is estimated at \$4,819,000. The viaduct section cost an estimated \$3,500,000 to construct.

Meanwhile, construction has begun on the Bayshore Freeway unit south from Alemany Boulevard to Third Street; and work is being carried forward on the fill for the proposed open-water section of the Bayshore Freeway across Candlestick Cove.

... Continued on page 60

Ramona Freeway

Continued from page 16 . . .

sion of Highways for right of way acquisition and construction.

First Construction in 1935

The first construction on the Ramona Freeway was in 1935, carried out by the State Division of Highways on the two-mile section in the City of Los Angeles from Aliso Street, east of the Los Angeles River, to the east city limits at Indiana Street. This construction was a conventional type, four-lane highway, with the exception that access rights of abutting property were acquired. Immediately after the war was over, this section was converted into a freeway with grade separations and central division strip. This was in 1946, and since that time much has been accomplished in the development of the Ramona Freeway.

All of the development in Los Angeles County has been and is being carried out on a full freeway basis, with all access rights of abutting property acquired and grade separations provided for all streets and highways and railroads that cross this freeway.

In San Bernardino County

In San Bernardino County the development is also on a full freeway basis from the Los Angeles county line through Ontario to Archibald Avenue, a distance of seven miles. From Archibald Avenue, just east of Ontario, to the west city limits of Colton, a distance of 15 miles, the development is on the basis of providing a limited access freeway, or "expressway," with full or partial control of access but without grade separations at streets and highways that cross the freeway.

Over the entire length of the Ramona Freeway substantially all of the required right of way has now been secured in San Bernardino County and in Los Angeles County from the westerly terminus of the Ramona Freeway at Aliso Street to Rosemead Boulevard. From Rosemead Boulevard easterly to the Los Angeles-San Bernardino county line, much of the right of way has been acquired and right of way agents of the State Division of Highways are now active in the El Monte to Pomona area. In the Cities of Claremont and Pomona all rights of way

needed have been obtained. The Division of Highways now has in progress eight major construction contracts on the Ramona Freeway which are in various stages of completion.

Fifteen Miles Completed

Completed as of this date are the 15 miles of limited access freeway in San Bernardino County between Archibald Avenue and the west city limits of Colton that was first opened to public traffic in the spring of 1947, and in Los Angeles County the 6.2 miles of full freeway between Aliso Street in Los Angeles and Atlantic Boulevard in Alhambra. The date for completion of contracts now in progress in Los Angeles County from Atlantic Boulevard to Rosemead Boulevard is December, 1953. When this construction work is finished there will then be 10 miles of completed full-freeway construction between Aliso Street and Rosemead Boulevard.

Due to the fact that the State Highway Commission adopts budgets each year designating where available funds shall be spent on highway projects, it is not possible to establish a construction schedule for unfinanced portions of the Ramona Freeway, or to establish any date for final completion throughout. The Highway Commission in adopting its budget for the 1953-1954 Fiscal Year has allocated \$7,300,000 additional funds for continuing construction on the Ramona Freeway.

Financed from this allocation, bids were opened in Los Angeles on March 12th to complete the four-lane freeway from the Los Angeles-San Bernardino county line easterly through Ontario to Archibald Avenue, a distance of 7.2 miles. The low bidder was: J. A. Payton, George Herz and Company, and Clyde W. Wood & Sons of Riverside. The total of the low bid was \$2,308,178.22. On April 30, 1953, bids were opened for an adjoining 6.34 miles of four-lane freeway from the Los Angeles-San Bernardino county line westerly through Claremont and Pomona to San Dimas Avenue. Guy F. Atkinson Company was the low bidder and the total of the low bid was \$3,389,766. Construction is well under way on both of these contracts.

STATE CHAMBER SUBMITS HIGHWAY RECOMMENDATIONS



Members of California Highway Commission and engineers of the Division of Highways at luncheon with officials of California State Chamber of Commerce

ON JULY 23d the California State Chamber of Commerce submitted to the Highway Commission in Sacramento recommendations for 108 state highway improvement projects for the Sacramento Valley region and in line with its long established custom entertained the members of the commission and engineers of the Division of Highways at a luncheon at the Senator Hotel.

The recommendations were part of some 458 highway improvements contained in the state chamber's entire report on road and highway conditions

in all parts of California. They will be considered by the Highway Commission in its study of the 1954-55 highway budget.

The projects were submitted by William J. Tunison, Westwood, Chairman of the Sacramento Valley Highway Committee of the California State Chamber of Commerce, who was introduced to the commissioners by F. W. Tarr, Chico, Vice Chairman of the State Chamber's State-wide Highway Committee.

The projects listed reflected the combined thinking of some 1,500 business,

farm and civic leaders from all of the State's 58 counties. The project recommendations were formulated during a series of 41 regional meetings arranged in cooperation with local civic organizations, officials of cities and counties and interested farm and business leaders. These "grass roots" conferences were held over a two-months' period in various parts of the State.

The recommendations were made with the consultation and approval of business and civic leaders throughout the Sacramento Valley area.

Early Days

Continued from page 45 . . .

Association. These letters all complained about the damage to highways by overloaded auto trucks.

The October 20th minutes note letters from the following counties: Solano, Lassen, Sonoma, Santa Cruz, Los Angeles, and from the San Diego Draymen's Association, Upper Lake Chamber of Commerce, A. L. Wisker of Grass Valley, from Tom McCormick, and from the Automobile Club of Southern California, all complaining about the breaking up of the highways by overloaded trucks.

New Personnel

Personally, I do not think it necessary to go through the minutes of the years following 1921. What struck me, when I first began this series, were the difficulties the Highway Commission encountered and overcame in getting an organization together accomplishing what it did on our highways. Even in those days the Highway Commission worked under a terrific handicap due to lack of funds. Although from time to time the Legislature authorized bond issues and finally passed the gas tax, it still didn't help matters when it came to building the number of roads and the kind of roads that were necessary to carry the ever-increasing automobile traffic.

To start with, the Motor Vehicle Department was part of the Highway Commission, and was such for quite a number of years. It was in 1931 that the Legislature took this division from the Department of Public Works and set it up as a separate department in the State. This, of course, lessened the work of the Highway Commission a great deal. It was in 1928, when Bert B. Meek of Oroville was appointed Director of Public Works, that the late C. H. Purcell was named State Highway Engineer and Chief of the Division of Highways.

The Highway Commission, as such, changed during the regimes of different Governors. It was finally in January of 1943 that the Legislature set up the commission as it is today.

Earl Warren assumed the office of Governor in January, 1943, and im-

Artesia

Continued from page 14 . . .

The portion of the Artesia Street improvement now under construction is scheduled to be completed in August of this year. Future construction between Alameda Street and Central Avenue, a distance of 1.8 miles, will include the construction of three bridges; one over the Pacific Electric Railway, a second over Compton Creek Channel and a third over the tracks of the Southern Pacific Railroad and Alameda Street.

Complete Interchange

A complete interchange will be provided between Alameda Street and Route 175 to be constructed in two quadrants. Construction schedule has not yet been set for this improvement for which plans are now nearing completion.

From Central Avenue west to Main Street, a length of 1.5 miles, is the first completed section of this east-west highway. It was completed in 1939 as a divided highway on a limited access basis. To the west of Main Street this state highway is 174th Street and Redondo Beach Boulevard. As of this time two contracts are in progress, one 1.2 miles long from Pier Avenue in Redondo Beach to Inglewood Avenue, and the other contract 3.6 miles long from Inglewood Avenue to Normandie Avenue. The remaining section, 1.5 miles between Normandie Avenue and Main Street, is now in the final design stage, with right of way acquisition under way.

Thus good progress is being made in the improvement of State Highway Route 175 to meet the east-west traffic demand in the southerly portion of the Los Angeles metropolitan area.

mediately appointed State Highway Engineer Purcell to the post of Director of Public Works. George T. McCoy moved into Purcell's position as State Highway Engineer. The commissioners who were then in office all resigned and for a period of several months there was an interim commission, until September, 1943. At that time Governor Warren appointed the present commission, with two excep-

WHAT ABOUT ANOTHER VISIT

COUNTY ROADS BOARD
Exhibition Building
Rathdown Street, Carlton, N. 3
Victoria, Australia

1st June, 1953

*The Editor, California Highways and Public Works,
Sacramento, California, U. S. A.*

DEAR SIR: It is just a shade over 26 years since I called at the Office of the State Highway Commission, as it then was, and saw the then Chief Engineer, Mr. Robert M. Morton, and others. Mr. Morton was good enough to put me on the mailing list for *California Highways and Public Works* and I have received copies regularly ever since.

The publication is one of the best of its kind in the world, and is always eagerly sought after by our construction and other engineers who make full use of the technical articles. The descriptions of limited access highways and the very practical articles dealing with methods of assessing compensation to be paid adjacent landowners are most valuable and when public opinion in this country has been educated to the need for limited access highways, this wealth of information will be of great assistance, firstly in drafting the necessary legislation and subsequently in administering it. Unfortunately, that time has not yet arrived but we still live in hope.

With kind regards and wishing you and your Highway Commission continued success,

Yours sincerely,

J. MATHIESON
Deputy Chief Engineer

CORNING

Corning, located in Tehama County, is known principally for its ripe olives.

tions. C. Arnhold Smith of San Diego resigned in January, 1949. He was succeeded by Charles T. Leigh of San Diego. A few months ago, Homer P. Brown of Placerville resigned, and Governor Warren appointed H. Stephen Chase, of Sacramento, to take his place. The rest of the commission, as presently organized, are the original appointees of 1943, who have been reappointed as their terms expired.

Recreational Road

Another Link in Inyo's
FAS Program Completed

By L. E. ELDER, District Construction Engineer

ON JUNE 12, 1953, another federal-aid secondary project was completed and opened to unrestricted use to vacationists and sportsmen seeking recreation in the high Sierra region west of Big Pine, Inyo County.

The completed project is a portion of Inyo County's Federal-aid Secondary Road No. 1069 which originates at Glacier Lodge resort and extends easterly for a total length of 10.4 miles to the town of Big Pine. The route is known locally as the Glacier Lodge Road.

Early Dirt Road

Access to the Glacier Lodge area was originally over a narrow, dirt road, constructed sometime early in the 1900's, along the south side of Big Pine Creek and was used primarily to haul lumber from an early day sawmill located a short distance east of the present Glacier Lodge resort. Later, the sawmill was abandoned and the farmers in the vicinity of Big Pine assumed the maintenance of the old road as a means of access to small dams and irrigation control structures located along the upper reaches of Big Pine Creek.

In 1925 the City of Los Angeles started to develop the area as a potential source for electrical power. During this latter stage of development, the city relocated the road to its present location along the north side of Big Pine Creek Canyon. The road was then later turned over to the County of Inyo and made a part of the county road system.

Recreational Highway

The Glacier Lodge road is now primarily a tourist road and affords one of the many accesses to the popular hunting and fishing areas for which Inyo County is noted.

In addition to the recreational facilities in the immediate vicinity of the lodge, considerable interest is created

for the hardier type of recreation seeker by the presence of high level lakes and an existing glacier, which are accessible only by pack trail. The glacier is known as the Palisades Glacier and is reported to be the most southerly located glacier in the United States. The glacier is located in extremely rough country between 8 and 10 miles west of the Glacier Lodge resort, at an elevation of about 13,000 feet above sea level.

Steep, Tortuous Road

The portion of the Glacier Lodge road just completed was the portion between 3.4 miles west of Big Pine to the Glacier Lodge resort for a total length of 6.4 miles. The existing road through this portion consisted of a roadbed varying in width from 16 to 20 feet, with the central 14 feet surfaced with a bituminous surface treatment which had been applied by Inyo County subsequent to its inclusion in its county road system. The greater portion of the improved section is constructed along the northerly slope of the deep gorge through which Big Pine Creek flows to its junction with the Owens River. The original road followed the general contour of the adjacent mountainside and, as a consequence, was a tortuous, steep, crooked road rising from an elevation of 5,100 feet to 7,780 feet in a little over six miles.

The new construction provides a 24-foot roadbed with the central 20 feet surfaced with road-mixed surfacing for a depth of three inches. The alignment in general follows the existing alignment and grade, except at various locations where the sharp radius curves presented a traffic hazard.

Alignment Readjustments

Minor adjustments were made in the alignment at these locations which provided for improvement of the hori-


zontal sight distance to conform to the minimum standards required by the Bureau of Public Roads. Excavation slopes were constructed to a 1:1 slope and due to extremely rocky nature of the material, were finished in accordance with the requirements specified for Class "B" slopes.

Mineral aggregate for road-mixed surfacing was obtained from the roadway prism near the center of the project. In order to obtain sufficient material from this source, it was necessary to obtain permission from the United States Forest Service to daylight the cut slope on the side adjacent to Big Pine Creek. The excavation slopes on the lower side of the roadway prisms were purposely made flat and uniform at the request of the United States Forest Service to provide a rest area for vacationists.

County Project

The construction work was performed by Ball and Simpson, Berkeley, California, at a cost of \$210,000, exclusive of engineering. The project was financed from federal-aid funds supplemented by funds made available to the counties under provisions of Chapter 20 of the County Highway Aid Act and the Collier-Burns Bill of 1947.

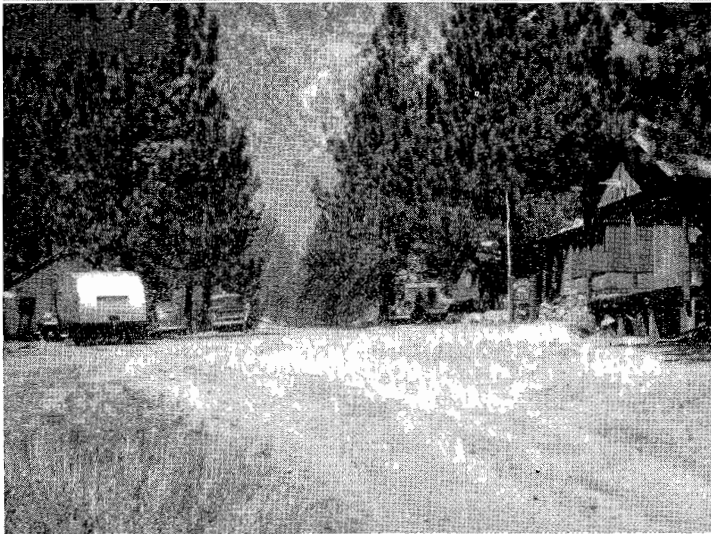
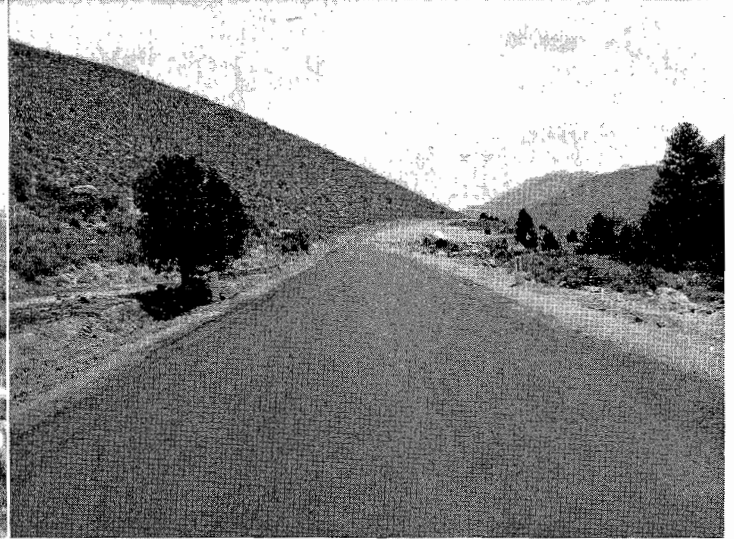
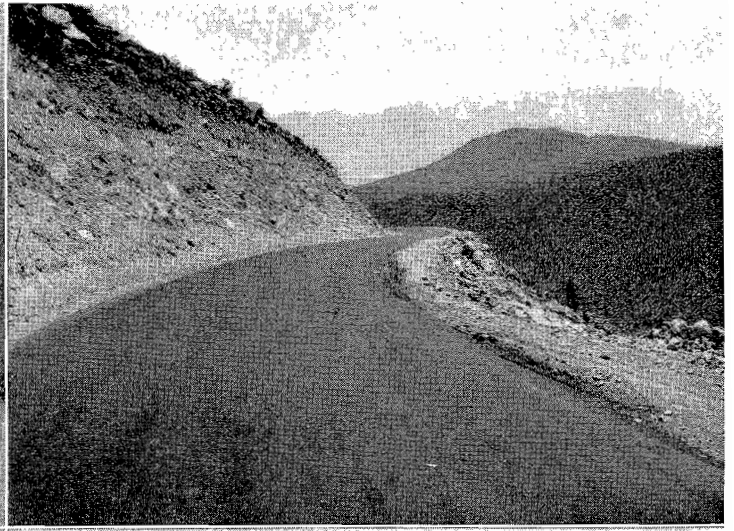
Construction engineering forces used on the project were all county employees, under the direct supervision of County Road Commissioner J. K. Smith. R. W. Fisher was the resident engineer on the project. Administrative assistance was furnished the county on behalf of the California Division of Highways by Milton Harris, District Engineer, District IX, and the author.



The photographs on the opposite page are before and after pictures showing improvements on Glacier Lodge Road in Inyo County

BEFORE

AFTER



Ben Ali Freeway

Continued from page 43 . . .

Seven Structures

The location and description of the bridges are as follows:

Fulton Avenue Overcrossing

Reinforced concrete slab bridge, consisting of two spans about 117 feet in total length, supported on a reinforced concrete bent and abutments, and providing a clear roadway width of 28 feet and two 5-foot sidewalks.

Auburn Boulevard Ramp Overcrossing

Reinforced concrete box girder bridge consisting of two spans about 144 feet in total length, supported on a reinforced concrete pier and abutments and providing a clear roadway width of 22 feet.

Watt Avenue Overcrossing

Reinforced concrete box girder bridge consisting of two spans about 181 feet in total length, supported on a reinforced concrete bent and abutments, and providing a clear roadway width of 52 feet and one 5-foot sidewalk.

Arcade Creek

Reinforced concrete slab bridge composed of two parallel structures; each structure consisting of three spans about 103 feet in total length, supported on concrete pile bents and providing clear roadway widths of 28 feet.

Madison Avenue Overcrossing

Reinforced concrete box girder bridge consisting of two spans about 175 feet in total length, supported on a reinforced concrete bent and abutments, and providing a clear roadway width of 28 feet and one 5-foot sidewalk.

Spruce Avenue Overcrossing

Reinforced concrete box girder bridge consisting of two spans about 132 feet in total length, supported on a reinforced concrete bent and abutments and providing a clear roadway width of 28 feet and one 5-foot sidewalk.

East Antelope Road Overcrossing

Reinforced concrete box girder bridge consisting of two spans about 175 feet in total length, supported on a reinforced concrete bent and abutments.

Frank E. Burnside

Continued from page 48 . . .

automotive fire equipment in the City of Sacramento, having been hired by the city to instruct the firemen in the handling of the complicated chemical truck. Many of the men he instructed are now retired from the Sacramento Fire Department—men like former Chief Anderson, who became so excited on his first trip down K Street with Burnside in an old Rambler that he tore the handle from the bell serving in lieu of a siren. Some of the old-timers may recall that Terence Mulligan, the present chief, was then a call-man who reported to fires on his bicycle.

Burnside's enthusiasm for automobiles led him to take part in the early day "road races" to Lake Tahoe, when California's highways were but a series of bridgeless creek crossings and but little better than graded trails. The route was from the Sacramento Hotel to Folsom, then over the old Green Valley Road to Placerville, over Echo Summit to Meyers and Tallac on Lake Tahoe and return to Sacramento. In 1913, the cup went to Burnside for driving the first car of the year to make the Sacramento-Lake Tahoe round-trip under its own power. The car was a Chalmers "Model 30" touring car—minus top or windshield which alone speaks volumes for Burnside's hardihood.

Good Driver

Prior to World War I, and also immediately after his employment by the State following the war, Burnside's reputation as a driver and mechanic caused him to be selected as chauffeur on the longer, more arduous, tours of Governor Stevens, Highway Commissioners Stern, Darlington, Whitmore and Mansfield; State Highway Engineer A. B. Fletcher, and a Congressional Committee of Investigation on Orientals in California. The unimproved roads and the unreliable automobiles of that day made it imperative that a skillful driver and excellent mechanic accompany each group, if any adherence to schedule was to be maintained. It is to Burnside's credit that each tour was successfully completed, even when it was necessary to drive all day, and then

spend the greatest part of the night underneath the vehicles preparing them for the next day's run.

Served in Navy

In 1917, the Nation's entry into World War I led him to enlist in the Navy. He was assigned to the destroyer *USS Taylor*, later transferred to aviation and eventually commissioned chief petty officer and appointed instructor in blimp and airplane construction and maintenance at Great Lakes Naval Training Station, where he received his discharge in April, 1919.

In his service with the State, Burnside personally designed and supervised the construction of many of the devices, some of which are now internationally known, that have helped to bring our highway system to its present state of efficiency. Among these are the traffic-stripping equipment and the special oil-distributor trucks and other types of asphalt-handling equipment used throughout the State.

When the equipment department was first formed, he was selected to tour the war plants to procure the necessary shop machinery and tools for the various shops in the State, as well as to procure much of the automotive and construction equipment for the Division of Highways. So keen was his judgment that much of the machinery he selected is still in service today.

During World War II he was borrowed by the U. S. Bureau of Public Roads for duty as equipment administrator on the Alcan Highway in northern British Columbia and the Yukon Territory. After successfully completing his assignment he was returned to state service.

In his interesting and varied experience, Burnside made many friends among those in private industry as well as those in the service of this and other states. His never-failing good humor and his winning personality won for him the sincere affection and respect of his associates.

At the moment, he is too busy enjoying the company of Mrs. Burnside and their two charming children, Bobby and Jane, to make any definite plans for future activity. For the first time he is able to devote as much of his time to them as he wishes.

Traffic Trends

Volumes of Travel on Rural State Highway System Steadily Increasing

By R. J. ISRAEL, Assistant Traffic Engineer

INCREASING traffic volumes on California's highways are as relentless as the tides. The accompanying graph shows the yearly recorded vehicle miles of travel on the Rural State Highway System. Except for the decline caused by gas rationing and other wartime travel restrictions from 1942 to 1944, the trend has been and is constantly upward.

Vehicle miles of travel on the Rural State Highway System for 1952 is esti-

mated as 14,983,000,000. This value is 2.7 times the estimate for 1934 when the existing annual traffic count was first established.

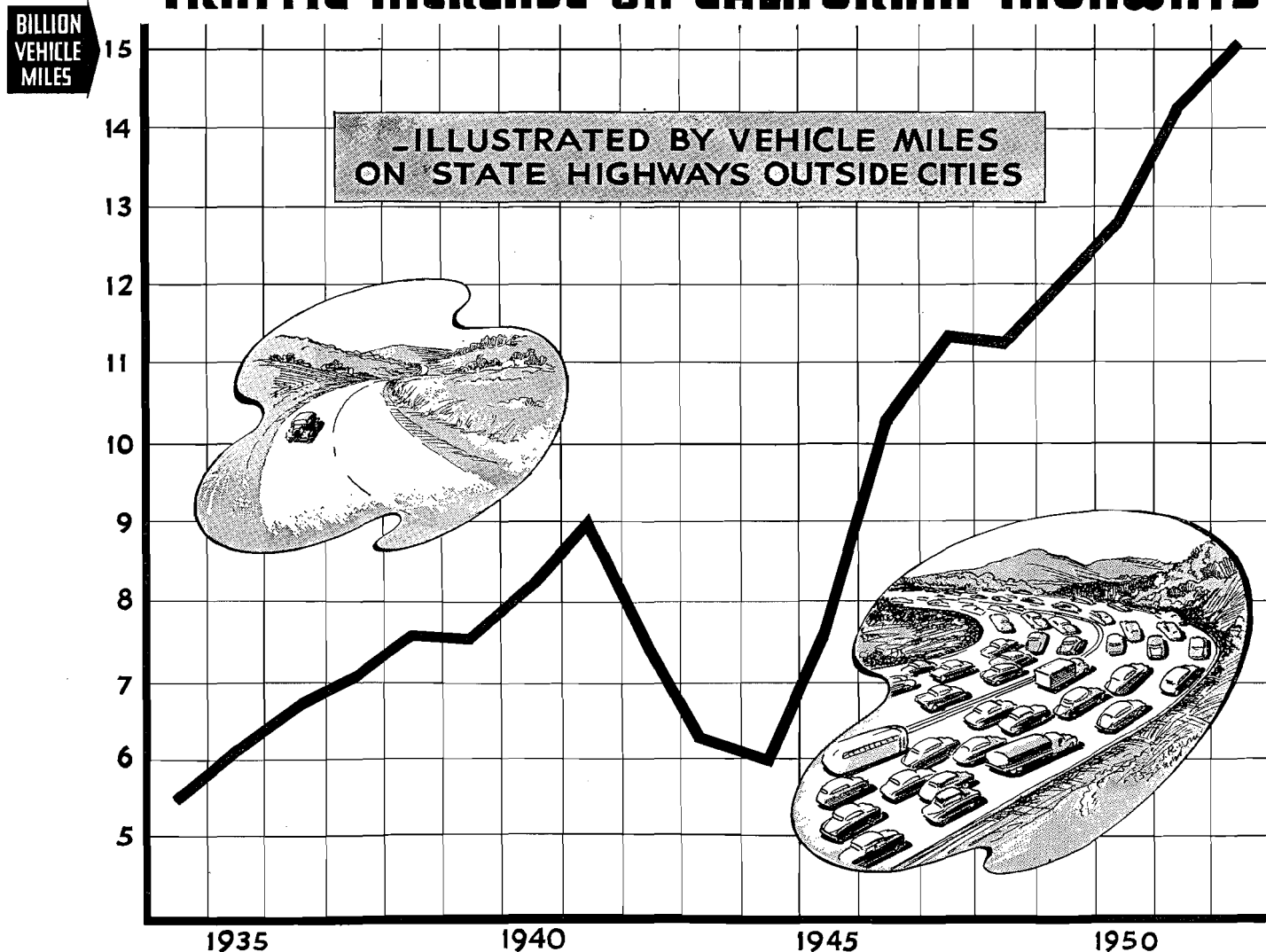
Traffic volumes for each section of the Rural State Highway System are obtained from approximately 1,000 annual count locations, with volumes adjusted through 85 monthly count stations and 15 seven-day stations. All such counting is done manually in

order to include classification by type of vehicle.

Rural Traffic Is Heavy

Rural state highways, representing only about 11 percent of the total road mileage in the State, now carry almost 30 percent of the state-wide traffic. The urban portions of the State Highway System carry much higher traffic volumes than do the rural. However, due to the great number of count locations

TRAFFIC INCREASE ON CALIFORNIA HIGHWAYS



required to effectively determine city traffic totals, urban travel is not obtained on an annual basis.

One phase of urban travel which is determined annually is that on the urban full freeways. These freeways are developing the highest traffic volumes ever recorded in California, and seldom exceeded elsewhere. The two and one-half mile portion of the Hollywood Freeway between Grand and Silverlake Avenues had an average daily traffic of 110,000 vehicles in 1952 while the Highland to Barham portion of the same freeway averaged 115,000 vehicles per day. Traffic on the eight-lane portion of the Arroyo Seco Freeway frequently exceeds a daily volume of 100,000 vehicles and the San Francisco-Oakland Bay Bridge also exceeded 100,000 on its maximum day of record.

Freight and Passenger Traffic

The percentage of freight vehicles on the highway system has remained fairly constant through the years, that is, in numbers trucks are increasing at generally the same rate as passenger vehicles. However, loads have increased greatly. This is due both to heavier loads by type of freight unit and increasing percentages of multivehicle units, particularly semitrailer combinations. Average weight of loaded freight vehicles, as recorded by the 1952 loadometer survey, was 2.3 times the average recorded by the 1936 survey.

The rate of increased travel on the Rural State Highway System is held down to some extent by reductions in road miles. Although total state highway mileage has remained virtually constant since 1934, the rural portion is periodically losing high traffic sections due to expansion of incorporated cities. Another factor which tends to retard the growth of traffic on the State Highway System is traffic saturation. Many miles of highways, and particularly those that feed our metropolitan areas, are carrying volumes far above their rated capacity. Under such conditions congestion during peak hours may cause traffic to be diverted from the highway when an alternative route is available. An example of the latter is the one-way couplet just north of the City of Sacramento. Although the 12th

Arnold Highway

Continued from page 53 . . .

Marin County Project

The six-lane freeway construction on U. S. 101 (Francisco Boulevard) leading from California Park north into San Rafael for a distance of two miles will benefit Marin County and Redwood empire traffic, beginning in August. This improvement, involving an estimated over-all cost of \$1,552,000, will eliminate a traffic bottleneck at the San Quentin Wye.

Another important state highway project under contract in the Bay region is the widening of the Eastshore Highway north of the Distribution Structure in Oakland, and its conversion to a full freeway, with interchanges at Powell and Ashby Avenues, at a construction cost of about \$3,000,000.

On U. S. 50, just east of Hayward, a \$1,412,000 contract is under way on 2.2 miles of freeway through Castro Valley. This improvement will, when completed, mark another step forward in the progressive modernization of the major highway connection between the Bay region and the San Joaquin Valley. Still another project on this route, consisting of seven and one-half miles of expressway, is under way between the Altamont Pass and Tracy.

REDUCE LIGHT POWER

The high power of today's headlights makes it all the harder to drive safely in fog unless the car owner remembers to use the lower or city-driving beam when the air is saturated with moisture.

Street extension is carrying the heavy southbound traffic of U. S. 99, this traffic cannot be included since 16th Street is the State Highway.

With an expected 6,000,000 registered vehicles in California for 1953 and a continually expanding population, traffic must continue to rise at a substantial rate. Freeways, as have been demonstrated, can carry huge volumes of traffic safely and rapidly. The extension of freeways on the major routes and improved standards throughout the system are essential to accommodate present and anticipated traffic volumes on California state highways.

Rural Road Inventory

Continued from page 31 . . .

Private individuals and many types of businesses purchase the maps from the State.

Staff

The state-wide highway planning survey is a part of the planning department, which is headed by Assistant State Highway Engineer J. W. Vickrey. In direct charge of the planning survey is F. M. Reynolds, Principal Highway Engineer under Vickrey. The writer is responsible for the road inventory section.

The close cooperation between the counties, the Bureau of Public Roads, and the Division of Highways in the rural road inventory program is a great aid in the over-all planning and development of the transportation system in California.

ON TRAFFIC PAINT

State of New York
DEPARTMENT OF PUBLIC WORKS
Buffalo, N. Y.

May 18, 1953

MR. KENNETH C. ADAMS, *Editor*

DEAR MR. ADAMS: After reading the article, "Traffic Paint," by E. D. Botts, which appeared in the March-April issue of *California Highways and Public Works*, I sent it on to one of our other district engineers, who is presently chairman of a state committee studying traffic paints and pavement marking procedures.

If extra copies of this issue are available, I would appreciate your sending me a couple more, as I desire to review the article again and have it in the files for future reference.

I always look forward to receiving my copy of your magazine as the articles are well prepared and always interesting to me and my staff. The photos of construction projects, pavement markings and signs are especially sharp and well taken. It would be very worthwhile if more of the states could arrange to publish a similar magazine.

Sincerely yours,

CHAS. R. WATERS
District Engineer

COUNTIES TO GET NEW STATE AID FOR ROADS

By H. L. JOYNES, Assistant Engineer of Federal Secondary Roads

WHILE congressional committees are discussing the advisability of continuing federal aid for county road construction, California's legislators and Governor have endorsed the program in no uncertain terms by approving Senate Bill No. 1961, now Chapter 1871 of the Statutes of 1953. The new legislation which amends the Secondary Highways Act of 1951, provides state matching funds limited to a maximum of \$50,000 per year per county for the 87½ percent of California's federal-aid secondary funds that are reapportioned to the counties. The 57* rural counties will receive amounts sufficient in the smaller counties to match all of their FAS funds.

As this issue of California Highways and Public Works goes to press, *no official interpretation of every phase of the new statute is available*. Therefore, this article must be confined to generalities.

One provision, regarding which there seems to be no doubt, repeals the section of the Secondary Highways Act of 1951 that required all relinquished FAS funds to remain in the relinquishing county for expenditure on state highways in the Federal-Aid Secondary Highway System. An amendment added provides that all federal funds apportioned to a county and not claimed or used by that county shall be expended on state highways in the FAS System in any county in that county group including the county from which released. This provision has the effect of transferring any federal-aid secondary funds released by any county, to the State Highway Fund, from whence they will be budgeted to projects upon the state highway portion of the Federal-Aid Secondary System in the same manner as any other federal-aid funds. Logically, even the few counties which have not heretofore participated in the program will now do so.

* San Francisco, being entirely urban, does not participate in the FAS program.

Progress Reviewed

While we are awaiting the effective date of the new legislation (September 9, 1953), it seems proper to pause and reflect on the progress made under the postwar Federal-Aid Secondary Program. By progress, we do not mean necessarily the number of miles of road and the number of bridges built, but for those of you who are statistically minded, we have prepared tables showing such information which you will find printed on these pages. We are referring to the less obvious aspects of the Federal-Aid Secondary Program, which when brought into the limelight, are much more spectacular and important than the figures in the tabulations.

When, on June 1, 1945, State Highway Engineer George T. McCoy created a separate department within the Division of Highways for administering the county portion of the Federal-Aid Secondary Highway Program,* he also set a pattern which was soon followed by many other states. Because California is too large for efficient centralized functioning of such a program and because it was important that benefits gained from this new field of county-state cooperation be spread as widely throughout the State as possible, it was determined that the new department would operate through each State Highway District Engineer who assigns an engineer to actuate the program in close contact with the county authorities. Congress amended the Federal Highway Aid Act in 1950 so as to require that every state establish such a department.

New Administrative Unit

Due to the absence of centralized control of road matters within each county, this new administrative unit within the California Division of Highways experienced difficulty in some

* H. B. LaForge heads this unit, which during the reorganization of 1947 became one of the functions of administration under Assistant State Highway Engineer Richard H. Wilson.

cases. At that time, most California counties had their road systems divided into five districts identical with the districts represented by the five elected county supervisors, with each supervisor administering the road affairs of his own district. In such counties, each district not only kept road taxes collected within its boundaries, but often because no agreement could be reached between the five supervisors for a more equitable distribution of state-collected motor fuel tax apportionments, such funds were divided equally between the five road districts. It was these early difficulties of satisfactory county-state cooperation in road matters which prompted the California Legislature to write into the Collier-Burns Highway Act of 1947, a provision requiring each county board of supervisors acting as a unit to appoint one road commissioner who would be in charge of all road matters in the county, and be responsible only to the board of supervisors acting as such. It should be noted that the basic concept of local government has not been altered, but opportunities for better operation have been improved both internally and in coordination with other governmental units.

County Road Commissioners

Because many of the counties already had competent nonregistered engineers within their organizations, the Collier-Burns Highway Act of 1947 permitted the board to appoint any other person it believed qualified and competent to administer the county's road affairs. Thirty-two of the 58 counties have road commissioners who are registered civil engineers and two others are licensed land surveyors. Although the law required centralized road control in every county this change was not accomplished overnight, even though all counties were required to appoint a road commissioner to avoid loss of state-collected tax apportionments. However, after six years it appears that practically all of the counties are operating their road

SUMMARY OF COUNTY AND STATE HIGHWAY PROJECTS UTILIZING POSTWAR FAS FUNDS THROUGH JUNE 30, 1953

	No. of contracts	No. of bridges	Miles of road	Total cost	Federal-aid secondary and county highway aid act funds	Other funds
County Projects						
Under contract		7	116.160	\$4,688,809.20	\$2,450,147.62	\$2,238,652.58
				784,645.84	329,398.00	455,247.84
	30			<u>\$5,473,446.04</u>	<u>\$2,779,545.62</u>	<u>\$2,693,900.42</u>
Completed		160	1,121.046	\$35,085,561.94	\$25,060,433.68	\$10,025,128.26
				12,533,465.67	9,881,949.72	2,651,515.95
	312			<u>\$47,619,027.61</u>	<u>\$34,942,383.40</u>	<u>\$12,676,644.21</u>
Totals	342	167	1,237.206	\$53,092,473.65	\$37,721,929.02	\$15,370,544.63
State Projects						
Under contract		10	62.958	\$4,242,808.83	\$1,560,992.58	\$2,681,816.25
				1,027,646.70	469,924.87	557,721.83
	16			<u>\$5,270,455.53</u>	<u>\$2,030,917.45</u>	<u>\$3,239,538.08</u>
Completed		17	72.812	\$6,131,868.73	\$2,905,664.31	\$3,226,204.42
				2,614,166.56	1,325,088.00	1,289,078.56
	26			<u>\$8,746,035.29</u>	<u>\$4,230,752.31</u>	<u>\$4,515,282.98</u>
Totals	42	27	135.770	\$14,016,490.82	\$6,261,669.76	\$7,754,821.06
Grade Crossing Protection						
70 crossings	64			\$279,036.80	\$265,000.00	\$14,036.80
Grand Totals	448	194	1,372.976	\$67,388,001.27	\$44,248,598.78	\$23,139,402.49

The above totals do not include the 1½ percent of the federal-aid secondary funds that are required to be expended for highway planning. These funds and the grade crossing protection funds are taken from the 12½ percent not apportioned to the counties. The average cost of the 167 county bridge projects is \$79,749, and the average cost per mile of the 1,237.206 miles of county roads constructed under the program is \$32,149.

departments as a single unit. The Federal-Aid Secondary Road Program has, to some extent, aided in accomplishing the change-over, for during the years when no state matching funds were available, it was not difficult for the counties to see the fallacy of dividing an already small federal apportionment five ways and thus requiring five small uneconomical contracts. These are the less obvious things we refer to as "progress."

Federal Aid Phase

Progress in another phase of the program stands out noticeably in reviewing R. F. Reynolds' article on the history of federal aid for highways in California which appeared in the January-February, 1950, issue of this magazine. The phase referred to is the development of an integrated road system for the purpose of determining projects eligible for federal aid. The original Federal-Aid Road Act of 1916 did not designate a system, but permitted the expenditure of federal aid for the improvement of any rural road over

STATUS OF THE 87½ PERCENT OF CALIFORNIA'S FEDERAL-AID SECONDARY HIGHWAY FUNDS MADE AVAILABLE TO THE COUNTIES

	Federal act and fiscal year	Total apportionment to counties	Relinquished for state FAS roads	Retained for county FAS roads
1944 Act				
	45-46 Fiscal Year.....	\$4,496,427.00	\$132,697.00	\$4,363,730.00
	46-47 Fiscal Year.....	4,496,426.00	129,241.00	4,367,185.00
	47-48 Fiscal Year.....	4,496,426.00	73,400.00	4,423,026.00
1948 Act				
	49-50 Fiscal Year.....	4,020,746.00	592,458.00	3,428,288.00
	50-51 Fiscal Year.....	4,027,439.00	381,683.87	3,645,755.13
1950 Act				
	51-52 Fiscal Year.....	4,622,503.00	703,895.00	3,918,608.00
	52-53 Fiscal Year.....	4,573,916.00	374,562.00	4,199,354.00
1952 Act				
	53-54 Fiscal Year.....	5,082,669.00	378,027.45	4,704,641.55
	Totals	<u>\$35,816,552.00</u>	<u>\$2,765,964.32</u>	<u>\$33,050,587.68</u>

which the United States mails were then or might thereafter be transported, a provision so broad as to include almost any rural road. After five years of such haphazard expenditure of federal-aid highway funds, the Federal Highway Act of 1921 required the designation of a system of federal-aid

highways, limited to not more than 7 percent of the total rural road mileage in the State. The experience gained in developing such an integrated road system proved useful when the Federal-Aid Highway Act of 1944 was enacted, and the substantial allotment for secondary roads provided by this act was

required to be expended on a system consisting of the principal secondary and feeder roads, including farm-to-market roads, rural free delivery and public school bus routes, either outside of municipalities or inside of municipalities of less than 5,000 population. The system was to be selected by the state highway departments in cooperation with the county supervisors, county commissioners or other appropriate local road officials and the United States Commissioner of Public Roads.

Problems Encountered

The Federal-Aid Highway Act of 1948 continued these stipulations as to the system, but the Federal-Aid Highway Act of 1950 omitted the word "principal" from "principal secondary and feeder roads" and added the terms "local rural roads, county roads, township roads, and roads of the county road class." Apparently these changes which favor a more rural type project were sponsored by Congressmen from the predominantly rural states whose counties were having difficulties in securing adequate state cooperation. The situation which brought about this change in the act never existed in this State. By legislation, California has guaranteed the counties 87½ percent of the FAS funds allotted and the Division of Highways has always encouraged the counties to select their own projects in conformance with their greatest needs.

California is the fastest growing state in the Union, has the highest motor vehicle registration and its county roads carry three and one-half times more traffic than the national average for such roads. Because of this high traffic density, California counties have surfaced over 86 percent of their rural road mileage, compared with a national average of less than 50 percent, leaving unsurfaced only little used mountain and desert roads which would be uneconomical to maintain in a surfaced condition. Oiled or paved county roads exceed 50 percent in California, whereas the national average is about 10 percent. Having successfully accomplished their purpose of bringing the "last man out of the mud," many California counties must turn their attention to a bigger problem of providing adequate traffic arteries in the fringe areas close to

**FEDERAL-AID SECONDARY HIGHWAY FUNDS
1953-54 Fiscal Year Apportionment to the Counties**

The Secondary Highways Act of 1951 fixes the counties' share of the California apportionment at 87½ percent, which is the same percentage used for each year's funds since the beginning of the present program in 1945.

County	Apportionment	County	Apportionment
Alameda	\$61,905	Orange	\$103,212
Alpine	25,413	Placer	64,573
Amador	25,675	Plumas	54,461
Butte	93,435	Riverside	195,832
Calaveras	31,052	Sacramento	121,240
Colusa	30,518	San Benito	36,163
Contra Costa	104,929	San Bernardino	360,860
Del Norte	25,413	San Diego	192,509
El Dorado	46,327	San Francisco	-----
Fresno	273,481	San Joaquin	121,405
Glenn	40,118	San Luis Obispo	84,118
Humboldt	112,692	San Mateo	31,650
Imperial	109,083	Santa Barbara	76,125
Inyo	127,489	Santa Clara	122,345
Kern	231,198	Santa Cruz	49,108
Kings	61,900	Shasta	86,835
Lake	36,176	Sierra	25,413
Lassen	73,712	Siskiyou	121,854
Los Angeles	216,419	Solano	48,934
Madera	65,791	Sonoma	138,751
Marin	36,972	Stanislaus	126,664
Mariposa	31,456	Sutter	37,812
Mendocino	92,761	Tehama	60,703
Merced	95,473	Trinity	52,074
Modoc	62,300	Tulare	205,172
Mono	46,577	Tuolumne	43,427
Monterey	113,130	Ventura	92,761
Napa	50,895	Yolo	44,887
Nevada	32,052	Yuba	29,439
		Total	\$5,082,669

urban centers where traffic is unable to move freely between farm and market due to inadequate highway capacity.

Because the 1950 and 1952 Federal Highway Acts stress projects having rural characteristics, the more densely populated counties within California are having difficulty in applying the implied pattern. Although multilane projects are presently avoided if possible, we feel that the federal authorities will eventually succeed in securing a more liberal interpretation of the law in order that the *most needed projects* on the secondary and feeder roads in every county can be included in the Federal-Aid Secondary Program, whether it be a county in the most rural section of the country, or a county in one of the most populated sections. After all, California counties should not be penalized for twoscore years of local taxation and determined effort.

Objectives Restated

The most important objective of the Federal-Aid Secondary Program is to require cooperation between the state and county road officials to the end that every county will have an efficiently operated and adequate road department. The best way of accomplishing this objective is through the cooperative construction of adequate modern highways by contract to give that department experience in designing and supervising the construction of such highways. We feel that much progress has been made toward reaching this objective, especially in that the counties are taking advantage of the opportunity to help themselves.

It will be noted from an examination of the table headed "Status of the 87½ Percent of California's Federal-Aid Secondary Highway Funds Made Available to the Counties," that the total funds relinquished each year by the counties was less under the 1944

federal act than under subsequent acts. This is explained by the fact that state matching funds totaling \$12,000,000 were provided by the County Highway Aid Act of 1945 to match the federal funds apportioned to the counties from the Federal Highway Act of 1944 in order to give impetus to the beginning of the program. No federal funds were apportioned to the states for the 1948-49 Fiscal Year because, due to a late start by reason of war-end conditions, there was a considerable carryover of funds to bridge the gap. Since no state matching funds were provided for the 1948 and 1950 federal acts, each county was left to its own resources.

Matching Funds

Many counties had adequate road budgets to absorb the unmatched federal funds without difficulty, and others were farsighted enough to augment their road funds by special taxes or transfers from their general funds. Some of the counties chose to relinquish their federal funds to the State for expenditure on the state portion of the Federal-Aid Secondary System in their county. Since the most important objective of the federal-aid program could not be fully accomplished without 100 percent county participation, the legislature removed the obstacle of insufficient matching funds by providing same to the counties in such amounts as to insure the participation of every county. The engineers engaged in administering the Federal-Aid Secondary Program for the State are looking forward, with pleasant anticipation, to renewed contacts with the road commissioners of the counties that have not been in the program during the past few years.

Engineers assisting the district engineers in maintaining contacts with county road commissioners and in supervising district FAS matters are: District I (Eureka), Chas. H. Bowman; II (Redding), Louis Aramayo; III (Marysville), Ted Jain; IV (San Francisco), Fred W. Montell; V (San Luis Obispo), Wm. S. Dolliver; VI (Fresno), Jack G. Sprague; VII (Los Angeles), Mel L. Bauders; VIII (San Bernardino), C. Worth Gaylord; IX (Bishop), F. N. Roberts; X (Stockton), A. L. Tschantz-Hahn and XI (San Diego), Ray L. Beuthel.

Over Quarter Billion Dollars Bidding Capacity Represented at Bid Opening

ON JULY 16, 1953, the Division of Highways opened bids in Los Angeles for proposed construction to freeway standards of three miles of U. S. 99 in the San Fernando Valley, between 0.6 of a mile south of the junction of Sepulveda Boulevard and 0.4 of a mile north of the north city limits of Los Angeles. At its northerly end, this work will connect with the recently completed divided highway development through Weldon Canyon.

Fourteen of California's largest contractors submitted bids for this project. The firm of Griffith Company of Los Angeles was the low bidder, submitting a proposal in the amount of \$3,060,-396.35.

The other 13 bidders were as follows:

Guy F. Atkinson Co., Long Beach, \$3,222,646.25
 Webb & White & W. J. Disteli, Los Angeles, \$3,243,075.80
 Fredericksen & Kasler, Sacramento, \$3,261,910.85
 Fredrickson & Watson Construction Co. and M. & K Corporation, Oakland, \$3,349,790

J. E. Haddock, Ltd., Pasadena, \$3,-420,768.40
 A. Teichert & Son, Inc., Baldwin Park, \$3,446,907
 Charles MacClosky Co., L. A. & R. S. Crow and Matich Bros., Los Angeles, \$3,449,820
 Gordon H. Ball, San Ramon Valley Land Co. & Harms Bros., Berkeley, \$3,460,317.42
 Peter Kiewit Sons Co., Arcadia, \$3,-533,685
 Winston Bros. Co., Monrovia, \$3,605,-888.25
 J. A. Thompson & Son, Inglewood, \$3,623,369.55
 B. J. Ukropina, T. P. Polich, Steve Kral & John R. Ukropina, San Gabriel, \$3,694,521
 Stolte, Inc., Oakland, \$3,713,341.

This group of bidders indicates the interest shown by the contracting industry in large state highway contracts. It also indicates the competition which develops when projects for larger units of highway construction are advertised for bids and implies the savings in construction costs made possible through such active competition.

Insistent Public Will Get Adequate Roads

Better public understanding of our highway requirements and the people's insistence that the job be done will speed the building of the adequate roads our Country needs, according to Albert Bradley, executive vice president of General Motors and chairman of the National Highway Users Conference.

Mr. Bradley delivered the opening address of a one-day conference of more than 150 representatives of industrial, highway user, farm, business and civic organizations participating in the nation-wide adequate roads movement in Washington, D. C.

Mr. Bradley employed the newspaper world's "who, what, where, why, and how" in analyzing the thinking which led to the launching of the PAR movement 15 months ago.

Banks Given Promotion In Water Resources

State Engineer A. D. Edmonston has announced the appointment of Harvey O. Banks, Sacramento, Supervising Hydraulic Engineer, to be Assistant State Engineer in Charge of Water Rights Administration and Water Quality Investigations to succeed Gordon Zander, retired. He named Leslie C. Jopson to take over the duties of Harrison Smitherum, retired, and to perform additional functions as Principal Hydraulic Engineer in Charge of Water Rights Applications, Watermaster Service, and Water Rights Adjudications. He will be an assistant to the State Engineer on special projects from time to time. Philip J. Coffey will assist Banks in water quality investigations.

Banks was appointed principal hydraulic engineer on February 2, 1952.

EARL WARREN
Governor of California

FRANK B. DURKEE
Director of Public Works

RUSSELL S. MUNRO
Deputy Director

HIGHWAY COMMISSION

HARRISON R. BAKER Pasadena
H. STEPHEN CHASE Sacramento
JAMES A. GUTHRIE San Bernardino
F. WALTER SANDELIN Ukiah
CHESTER H. WARLOW Fresno
CHARLES T. LEIGH San Diego
R. C. KENNEDY, Secretary Sacramento

DIVISION OF HIGHWAYS

GEO. T. MCCOY State Highway Engineer
R. M. GILLIS Deputy State Highway Engineer
CHAS. E. WAITE Assistant State Highway Engineer
EARL WITTHYCOMBE Assistant State Highway Engineer
F. W. PANHORST Assistant State Highway Engineer
J. W. VICKREY Assistant State Highway Engineer
R. H. WILSON Assistant State Highway Engineer
F. N. HVEEM Materials and Research Engineer
GEORGE F. HELLESOE Maintenance Engineer
J. C. YOUNG Engineer of Design
G. M. WEBB Traffic Engineer
DON G. EVANS Construction Engineer
H. B. LA FORGE Engineer of Federal Secondary Roads
C. E. BOVEY Engineer of City and Cooperative Projects
EARL E. SORENSON Equipment Engineer
H. C. McCARTY Office Engineer
J. C. WOMACK Planning Engineer
J. P. MURPHY Principal Highway Engineer
F. M. REYNOLDS Principal Highway Engineer
E. J. SALDINE Principal Highway Engineer
A. L. ELLIOTT Bridge Engineer—Planning
I. O. JAHLSTROM Bridge Engineer—Operations
J. E. McMAHON Bridge Engineer—Southern Area
STEWART MITCHELL Bridge Engineer—Special Studies
E. R. HIGGINS Comptroller

Right of Way Department

FRANK C. BALFOUR Chief Right of Way Agent
E. F. WAGNER Deputy Chief Right of Way Agent
GEORGE S. PINERY Assistant Chief
R. S. J. PIANEZZI Assistant Chief
E. M. MacDONALD Assistant Chief

District IV

B. W. BOOKER Assistant State Highway Engineer

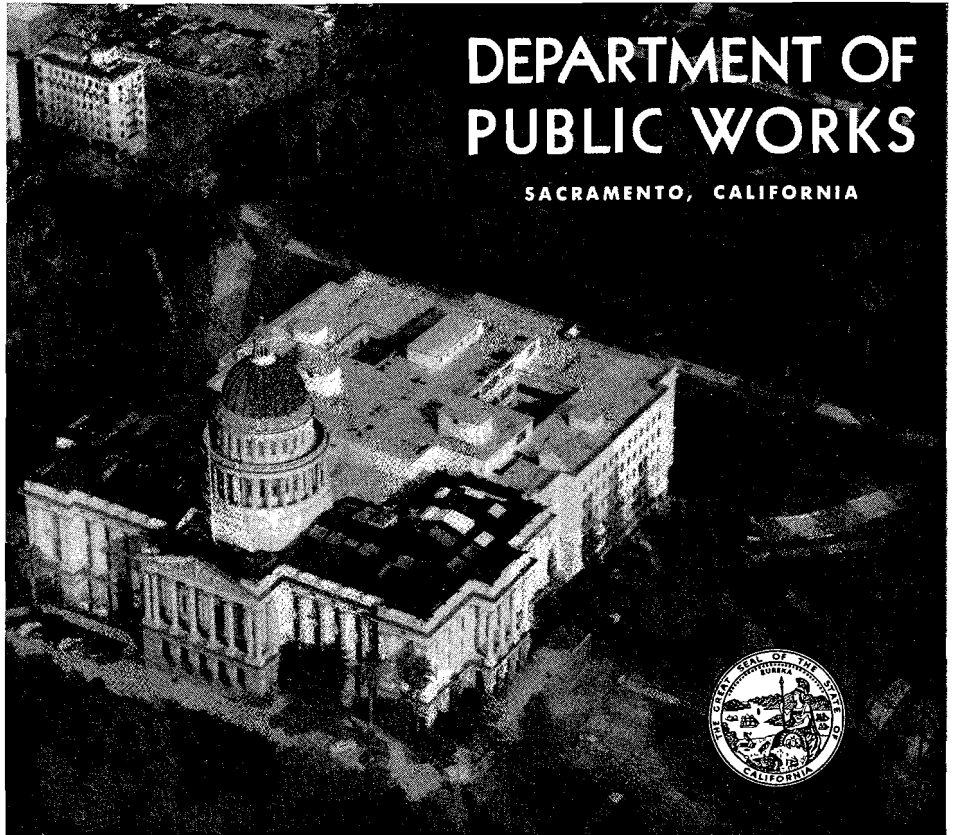
District VII

P. O. HARDING Assistant State Highway Engineer

DIVISION OF HIGHWAYS

District Engineers

ALAN S. HART District I, Eureka
J. W. TRASK District II, Redding
A. M. NASH District III, Marysville
J. P. SINCLAIR District IV, San Francisco
L. A. WEYMOUTH District IV, San Francisco
E. J. L. PETERSON District V, San Luis Obispo
E. T. SCOTT District VI, Fresno
W. L. FAHEY District VII, Los Angeles
E. T. TELFORD District VII, Los Angeles
C. V. KANE District VIII, San Bernardino
MILTON HARRIS District IX, Bishop
JOHN G. MEYER District X, Stockton
E. E. WALLACE District XI, San Diego
HOWARD C. WOOD Bridge Engineer
State-owned Toll Bridges



**DEPARTMENT OF
PUBLIC WORKS**

SACRAMENTO, CALIFORNIA



**DIVISION OF CONTRACTS AND
RIGHTS OF WAY**

Legal

ROBERT E. REED Chief
GEORGE C. HADLEY Attorney
HOLLOWAY JONES Attorney

**DIVISION OF SAN FRANCISCO
BAY TOLL CROSSINGS**

NORMAN C. RAAB Projects Engineer

DIVISION OF WATER RESOURCES

A. D. EDMONSTON State Engineer, Chief of Division
G. H. JONES Assistant State Engineer, Sacramento
River Flood Control Project, Supervision of Safety
of Dams, Sacramento-San Joaquin Water Supervision
T. B. WADDELL
Assistant State Engineer, Water Resources Investi-
gations, Central Valley Project, Irrigation Districts
HARVEY O. BANKS Assistant State Engi-
neer, Water Rights and Water Quality Investigations
MAX BOOKMAN
Principal Hydraulic Engineer, Los Angeles Office
HENRY HOLSINGER Principal Attorney
T. R. MERRYWEATHER Administrative Officer

DIVISION OF ARCHITECTURE

ANSON BOYD State Architect
H. S. HUNTER Deputy Chief
ROBERT W. FORMHALS
Administrative Assistant to State Architect

Administrative Service

W. K. DANIELS . Assistant State Architect, Administrative
WADE O. HALSTEAD
Principal Estimator of Building Construction
EARL W. HAMPTON . Construction Budgets Administrator
CARLETON PIERSON . . Supervising Contracts Writer

Planning and Design Service

P. T. POAGE
Assistant State Architect, Design and Planning
A. F. DUDMAN Principal Architectural Designer
CARL A. HENDERLONG
Principal Mechanical and Electrical Engineer
C. L. IVERSON Chief Architectural Draftsman
JOHN S. MOORE Supervisor of Special Projects
WALTER E. LORD Supervising Specifications Writer
JAMES A. GILLEM Supervisor Area III (Los Angeles)

Construction Service

D. C. WILLETT Chief Construction Engineer
F. A. JOHNSON Principal Structural Engineer
NATE W. DOWNES
Supervising Engineer of Maintenance and Operations

Area Construction Supervisors

THOMAS M. CURRAN Area I, Oakland
J. WILLIAM COOK Area II, Sacramento
FRANK R. AUSTGEN Area III, Los Angeles

**Area Structural Engineers,
Schoolhouse Section**

C. M. HERD Area I, San Francisco
M. A. EWING Area II, Sacramento
H. W. BOLIN Area III, Los Angeles

Action, adventure, and romance fill the pages of California's last 100 years of history. Human initiative repeats itself again and again through the colorful years of rapid development, but without the great natural wealth of water, soil, forests, mines, and petroleum, the interesting history could never have been written.

Plenty abounded everywhere a century ago, timber for homes and farms, gold in staggering quantities to focus world-wide attention on a then remote frontier, rich soils for productive farms and pasture land, and subsequently, oil to supply energy for mechanized development. And finally, during the most recent 30 years harnessed water and water power to supply cheap electrical energy and to transform vast areas of semi-desert to veritable garden lands of plenty.

To this wealth there was added a temperate climate, recreational opportunities, and scenic beauties of such diverse nature as to have few equals. A haven for home lovers, a mecca for tourists, and a refuge for sportsmen—A Green and Golden California.

There is no state in the Union more dependent on her natural resources. Every drop of water, stick of timber, and blade of grass is needed if we are to meet the challenge of our expanding population.

We cannot meet this challenge if we continue to allow the large number of forest fires to start on our wild lands. Most of those fires start through careless acts by people. It is time to correct those careless habits and to:

Hold your match and feel it before discarding.

Crush out tobacco butts in mineral soil. In autos, use the ash tray.

Drown your campfire; stir it; drown it again.

To burn trash or brush, get a permit from the nearest fire protection officer; then notify him before you start the burning.

KEEP CALIFORNIA GREEN AND GOLDEN

Please...
help people be more careful!



Remember . . .

Only you can PREVENT FOREST FIRES!