

CALIFORNIA

HIGHWAYS AND PUBLIC WORKS

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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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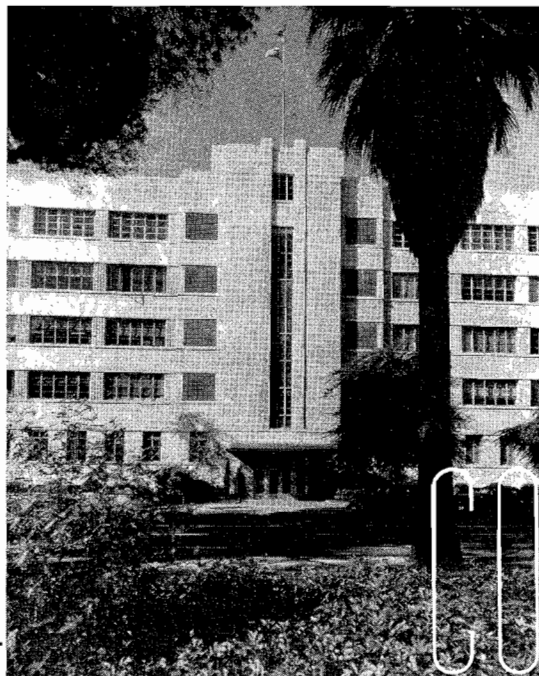
Address Communications to

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

Vol. 30

July-August

Nos. 7, 8



Public Works Building
Twelfth and N Streets
Sacramento

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Great Loss

Charles H. Purcell Retires as Director
Of State Department of Public Works

THE STATE OF CALIFORNIA has lost the services of one of the most distinguished engineers of our time.

Charles Henry Purcell, Director of Public Works and Chairman of the California Highway Commission, internationally famous builder of highways and bridges, retired on July 31st.

As State Highway Engineer, to which post he was appointed by Governor C. C. Young in February, 1928, he conceived and supervised the building of the San Francisco-Oakland Bay Bridge, an enduring monument to his genius.

In January, 1943, he was named head of the Department of Public Works by Governor Earl Warren.

His unflagging devotion to duty during a period of 23 years in State Government has been an inspiration to all who had the privilege of knowing him and observing his work and achievements.

In announcing to the press on July 26th that he had regretfully accepted Mr. Purcell's resignation, Governor Warren said:

"It is with the deepest regret that I have accepted the resignation of Charlie Purcell as Director of the Department of Public Works. Charlie has been a great public servant and has given himself to his job until he has approached the point of exhaustion. I had hoped that a long rest would restore him to health and enable him to carry on, but his doctor has advised him that he must retire.

"I know of no one who could have done a better job during these hectic years when we have been carrying out the tremendous construction program that the State has undertaken. It is a real blow to lose Charlie and he will be missed in the state service very, very greatly."

In addition to his duties as Director of Public Works, Mr. Purcell held ex officio positions on the Governor's Council, the California Toll Bridge

Authority, the State Public Works Board, the California State Conservation Commission, the Board of Public Buildings Reconstruction, the Surplus War Property Procurement Advisory

Project Authority. He also was a member of the California Commission on Interstate Cooperation.—*Editor.*

Born in Nebraska

Mr. Purcell was born at North Bend, Nebraska, January 27, 1883, a son of John and Mary (Gillis) Purcell. His paternal grandfather came to the United States from Ireland during the Civil War period, and settled at Freehold, near Albany, New York.

John Purcell, father of Charles Henry, was born in New York but settled later in Nebraska with his three brothers, Thomas, William H. and Charles A. Purcell.

William H. Purcell moved to Chicago, where he engaged in the grain business and became one of the pioneer grain merchants and maltsters. He was one of the first members of the Chicago Board of Trade.

The fourth brother, Charles A. Purcell, went into partnership with William H. and was later the first president of the American Malt-ling Company.

There was one sister, Mary Dowling, who died in Los Angeles, in 1933.

The architect, William Gray Purcell, retired, is a son of the fourth brother, Charles A. Purcell.

Mary (Gillis) Purcell, mother of Charles Henry Purcell, was a daughter of John Gillis of Cape Breton, Nova Scotia, superintendent of a coal mine there.

Mr. Purcell in 1914 married Minnie Pullen, daughter of Andrew Pullen of Portland, Oregon.

Drew Bridges as a Boy

Mr. Purcell attended Stanford University for one year in 1902. The death of his father caused him to go to Chicago, where he took the first job that offered, which happened to be messenger in the Grain Pit.



CHARLES H. PURCELL

Board, the State Allocation Board, the San Francisco and Los Angeles World Trade Center Authorities, the State Highway Finance Board and was Chairman of the California Highway Commission and the California Water

DURKEE NEW DIRECTOR

On August 3d, Governor Warren appointed Deputy Director Frank B. Durkee to serve as interim director. Mr. Durkee has been deputy director since May, 1948. Prior to that time he had been a member of the legal staff of the department since 1927, having entered state service as editor of *California Highways and Public Works* in November, 1923.

PURCELL LEAVES IMPRINT FAR BEYOND HIS OWN STATE

RETIREMENT of Mr. C. H. Purcell as Director of Public Works in California means the loss from active service of an outstanding figure in highway improvement in the United States. He has made a record in public service that few can equal. Conspicuous ability as an engineer and administrator has made him a leader since the beginning of the modern highway movement. While his work has been entirely in the western states and notably in California his influence has extended throughout the Nation and to many foreign countries. He has always led in the development of the best practices in the many phases of highway improvement and has had the ability to inspire confidence in the acceptance of these practices. He leaves an imprint on highway engineering and administration that extends far beyond the borders of California.—*Thomas H. MacDonald, Commissioner of Public Roads, Bureau of Public Roads, Washington, D. C.*

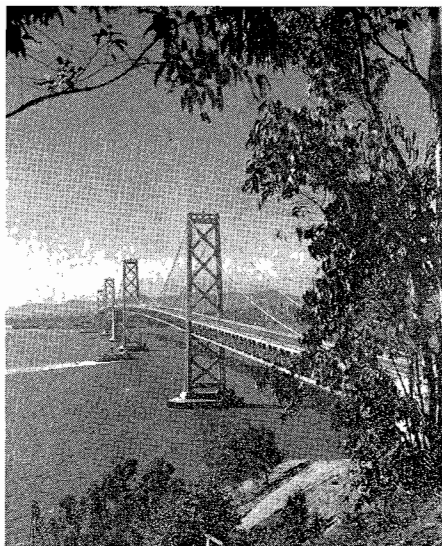
As a boy, Mr. Purcell had a fondness for drawing, particularly for making pictures of bridges. He had early set his heart on becoming an engineer, so, after 12 months in Chicago, he gave up his position and enrolled in the University of Nebraska. He was graduated as a civil engineer in 1906.

He gained his first engineering experience during his sophomore and junior years by working Saturdays and during vacations as a draftsman for the Burlington Railroad.

After receiving his diploma, Mr. Purcell became an instrument man and later resident engineer for the Union Pacific in Wyoming. Here he built his first bridge. It was a 200-foot, steel girder, concrete-foundation structure across Bitter Creek. From that time on bridges were his hobby.

Went to Peru

From Wyoming, Mr. Purcell went to Ely, Nevada, where the Guggenheims were building a \$17,000,000 smelter. The chief engineer was Tom Cox. He gave young Purcell a job, never dreaming that one day Purcell,



An enduring monument to the genius of C. H. Purcell

as chief engineer of the most famous bridge in all the world, would send for him and place him on his staff of engineers.

About the time that the Guggenheim smelter was completed, American capital was looking with interest toward the mines of South America and Mr. Purcell, with a small company of men who had worked with him at Ely, went to Peru in 1907, where for two and one-half years he acted as principal

ENVIABLE REPUTATION

IHAVE KNOWN Charlie Purcell for the past 35 years, first as Bridge Engineer of the Oregon State Highway Department, second as Division Engineer of the U. S. Bureau of Public Roads with headquarters at Portland, then as State Highway Engineer of California, and later as Director of Public Works of the State of California. It is with deep regret that I learn that his health forces him to retire as Director of the California Department of Public Works.

Mr. Purcell has made an enviable reputation as an outstanding engineer. He combines the admirable characteristics of intelligence, professional skill, integrity and courage. His wise counsel will be sorely missed in the American Association of State Highway Officials which he once served as president and for many years as director.—*R. H. Baldock, State Highway Engineer of Oregon.*

TRIBUTE FROM WASHINGTON

Announcement of the retirement of Charlie Purcell from active participation in highway affairs in California will meet with universal regret among hundreds of engineers in the western states who by reason of his long experience and progressive accomplishments have accepted his opinions and advice without question as the wisdom thereof has invariably justified.

None has had the rounded experience and the over-all picture as Purcell, first as Division Engineer for the Bureau of Public Roads at Portland with supervisory functions in Montana, Oregon, Washington and Alaska, and then for many years with the great State of California which developed a marvelous system of highways and world-famed bridges under his direction. We in Washington join a multitude of others in wishing him much happiness in a retirement well earned.

W. A. BUGGE,
Director of Highways,
Olympia, Washington

assistant chief engineer for the Cerro de Pasco mines.

His job in Peru finished, Mr. Purcell returned to New York and then in 1910 came to California and went to Marysville to design steel work for gold dredgers then being built in the Oroville district.

Adventured in Oregon

When Mr. Purcell had been a draftsman for the Burlington Railroad, the president of that corporation, Ralph Budd, had been his friend and hearing that Budd was engaged in construction operations on the Oregon trunk line, Mr. Purcell struck out for Oregon.

His spirits were dampened but his ambition was not lessened when he was offered and took a job as chief engineer of a Columbia River logging railroad. Oregon at this time was building a number of road bridges of iron and steel construction. Mr. Purcell proposed that concrete bridges be built across the smaller streams.

A great hullabaloo was raised by the interests which had a monopoly on selling bridges to Oregon boards of



Tom Cox and his assistant, young Charlie Purcell, have breakfast in Peru during their mining days there in 1907—Cox on right, Purcell seated next to him

supervisors, but Mr. Purcell persisted and finally began building concrete bridges. Those bridges are still in use.

Built Columbia River Highway

As a result of this work, Mr. Purcell was appointed the first Bridge Engineer for the then newly organized Oregon State Highway Department, later becoming assistant to the State Highway Engineer in designing and constructing Oregon's first paved highway in Jackson County.

Leading citizens of Portland were dreaming of a great highway along the Columbia River and they turned to Mr. Purcell to help them build it. Mr. Purcell resigned from his state position and became the Bridge Engineer of the Columbia River Highway project.

When this task was completed he returned to his post as State Highway Bridge Engineer. He remained for a year and then for two years was bridge engineer for the United States Bureau of Public Roads, with headquarters in Portland.

In 1920 he was appointed District Engineer of the Bureau of Public Roads in charge of District No. 1, embrac-

INSPIRING LEADER

IT IS WITH the keenest regret that I learn that Mr. Purcell feels it necessary to resign as a member of the Executive Committee of the American Association of State Highway Officials. So far as I know, there is no one who has contributed more to the organization, progress and strength of AASHO than he. We look to him as an elder statesman. He has always given without stint of his time and great talents to the work of the association.

It is with great reluctance that I accepted Charlie Purcell's resignation as of August 1, 1951.

Mr. Purcell has embodied the spirit, personality, ability and charm of the great engineer. An inspiring leader and executive, and a learned and talented engineer he was for a generation at the top of his profession.

It is a privilege for me to testify to the worth of a great American. Permit me to express the hope that he will have many years of happiness, health and prosperity.—J. A. Anderson, President, American Association of State Highway Officials.

ing Oregon, Washington, Montana, Northern Idaho and Alaska and for seven years supervised the spending of \$55,000,000 of federal money on national forest and national park highway and bridge work.

Became California Engineer

In February, 1928, Mr. Purcell was appointed State Highway Engineer of California and in five years supervised the construction of \$153,000,000 of highways in this State. When Mr. Purcell was offered his California post by Governor C. C. Young and Bert B. Meek, then Director of the Department of Public Works, he was told that he would be expected to make a comprehensive report on state-owned toll bridges, including the proposal to bridge San Francisco Bay.

This was greatly to Mr. Purcell's liking. It was right down his alley. It was in line with his dreams. It was to make him the greatest bridge builder of all time.

Hoover-Young Commission

In October, 1929, the Hoover-Young San Francisco-Oakland Bay Bridge Commission was created and Mr. Purcell be-

LOSS TO AASHO

WHEN NEWS of the retirement of Charlie Purcell from the position of Director of the California Department of Public Works, and membership on the Executive Committee of the American Association of State Highway Officials, reached this office, it left us all with a feeling of depression and personal loss. It has been my privilege to serve as executive secretary of this association for almost eight years and during that time, Mr. Purcell's presence on the Executive Committee has been one of stimulation and encouragement to me and to the staff.

Our feeling of loss is small compared to that which will be felt by the member departments of this association, in whose interest and welfare Mr. Purcell has devoted so much of his time, ability and energy over the years past.

Our records indicate that Mr. Purcell became a member of the Executive Committee of the American Association of State Highway Officials on June 1, 1928, and he has served continuously since that time. He was president of the association in 1937-38. An able engineer and administrator, his valuable counsel will be missed by all of us and his service to highways over the years past has not been limited to the great State of California, but every member department has been a beneficiary. It is such men as Charlie Purcell, both present and past, who have made the association the great and respected organization that it is today.

Believe me, we will miss him in the difficult times that lie ahead of us and we all express the sincere hope that in his retirement from public office he will now find the time and opportunity to relax and enjoy himself, which privilege is so often denied to those men who have devoted their lives to public service.—*Hal H. Hale, Executive Secretary, American Association of State Highway Officials.*

came a member of it and its secretary. He was authorized to make an investigation, traffic survey and prepare a preliminary plan and design, including financing, for a bridge across San Francisco Bay.

STATE ENGINEER PURCELL MERITS PUBLIC RECOGNITION

Honorary degrees conferred by American universities sometimes inspire more of sneers than of cheers.

But nothing but cheers will greet the action of the University of California in conferring the degree of doctor of laws on Charles H. Purcell, State Highway Engineer and Chief Engineer of the San Francisco Bay Bridge.

Not that such recognition will add to the name or the fame of the man receiving it. Both stand imperishable in the great structure with which his name forever will be associated.

But the state university has made a fine gesture that gives public recognition to a big job admirably performed by an able, conscientious, yet unassuming public servant.

It was in 1931 that Purcell was chosen Chief Engineer of the Bay Bridge. And from that day until the structure finally was completed, in the parlance of the street, it was "his baby."

Its construction presented many unusual problems.

It called for engineering feats never before attempted. Had it been built under private contract, the engineer in charge could have retired when the last paint was applied with a handsome personal fortune.

Purcell did the job as an employee of the people of California. And so well did he work that the bridge was completed months before schedule; and for less money than the original estimate.

Nor did one breath of scandal or of criticism attach to the building of the bridge.

What a beautiful thing it is today!

None but the most insensitive can drive across it without feeling that here Titans were at work, here the modern mind created something that expresses at its highest and best the marvelous scientific age in which we live.

California is proud of the bridge.

And she is also proud of her master bridge builder, Charles H. Purcell.—*From Sacramento Bee, March 24, 1937. Similar editorials appeared in many California newspapers.—EDITOR.*

LOSS TO THE STATE

THE RETIREMENT of Charles H. Purcell from public service because of ill health will be a great loss to the State of California.

For Charlie Purcell was one of those individuals too seldom found in public life who blend together rare ability, conscientiousness, high integrity and unlimited devotion to his job.

Purcell's resignation officially is from the post of Director of Public Works. But his duties included membership on numerous important boards and commissions, among them the water project authority, the California Toll Bridge Authority, the California State Conservation Commission, the Governor's council and the State Allocations Board, to mention but a few.

Purcell was the Chief Engineer of the San Francisco-Oakland Bay Bridge during its planning and construction stages and the operation of the structure since its completion has been under his department.

Thus, if it can be said that the bridge is a monument to any single individual that honor rightly should go to him. Not only was he head man in planning and building it but he also was one of the key men in negotiating the financing.

Purcell was no 8 to 5 man but carried his job with him during all his waking hours. As State Highway Engineer, prior to his service on the Bay Bridge, Purcell brought the California road system up to high standards.

He will be missed deeply. But the State wishes him well in his retirement and he can have the satisfaction of knowing that few men leave greater imprints of their service than he does in highways, bridges and public buildings.—*Sacramento Bee, July 28, 1951.*

Mr. Purcell's completed report was adopted by the commission and in January, 1931, he was named Chief Engineer for the Bay Bridge, continuing to administer the duties of his office as State Highway Engineer.

All Californians are familiar with the financial delays and difficulties encountered by Mr. Purcell, the State Admin-

... Continued on page 25

South of Border

Governor Warren Loans Highway Engineer to Sonora, Mexico

By F. N. HVEEM*

EARL WARREN

Governor of the State of California, Sacramento, California

Mexico City, Mex., 28 June

I am considering immediate construction of road from Hermosillo to Bahia Kino of 70 miles sandy ground where adequate surfacing materials are scarce. Planning to use recent highway practices for subgrade stabilization with asphalt or cement for which we have no experience in Mexico. Will consider it personal favor if you would authorize the visit of a specialist from your highway department to look over project and make necessary studies together with Mexican engineers. Will be glad to pay expenses and salary. For answer will be at Hotel Del Prado, Mexico City, until Wednesday, July 4th, returning to Hermosillo. Kindest personal regards and thanks in advance.

IGNACIO SOTO

Governador del Estado de Sonora

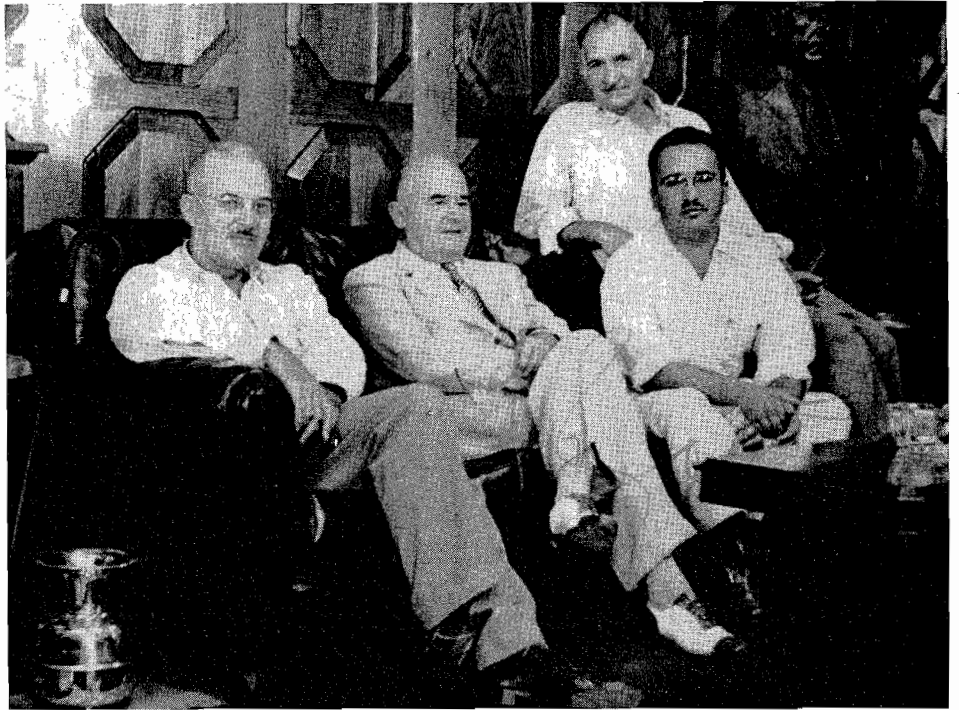
Governor Warren's reply to the above telegram indicated that a California engineer could be made available for a brief period, and after further confirming telegrams, it was agreed that the writer should go to Hermosillo, capital of the State of Sonora, to confer with the Mexican engineers. The State of Sonora adjoins the southerly boundary of Arizona and lies eastward of the Gulf of California on the mainland in northwestern Mexico.

Final authorization was received on Wednesday, July 11th, at 5 p.m. and after rather hurried preparation and somewhat hectic last minute arrangements, the plane was boarded at 7 p.m. Thursday and arrived in Hermosillo at 3.28 a.m. on the morning of Friday, the 13th.

Governor Soto Has Many Friends

Following a call from Governor Soto's office, Senor Alberto O. Montijo, Chief of the Department of Highways, arrived at the hotel in the governor's car and we then proceeded to the Palacio de Gobierno which is the Sonoran equivalent of our State Capitol building. After preliminary discussions with Governor Soto, which conversations presented no difficulty as both the governor and Senor Montijo speak excellent English, it was agreed that inspection of the highway should await the arrival of the federal engineer from Mexico City.

* Materials and Research Engineer, California Division of Highways.



Governor Ignacio Soto of Sonora receives F. N. Hveem, California Highway Engineer. LEFT TO RIGHT—Hveem, Governor Soto, Senor Manuel Lopez-Vela, Construction Engineer, Comite de Caminos Vecinales, Mexico City, and Senor Alberto O. Montijo, Chief, Department of Highways, State of Sonora.

I subsequently learned that Governor Soto began his career as an employee of a bank in Douglas, Arizona, later going into business for himself. Governor Soto has many friends in Arizona and other states of the U. S. A. Senor Montijo resided in California for a number of years and received his degree in civil engineering from the University of California. His first job after leaving college was at Pitthree in Shasta County.

The road from Hermosillo to Kino Bay was being planned as a joint project to be financed one-third from federal funds, one-third by the State of Sonora and one-third by taxes or assessments levied upon the properties or individuals served by the improvement. Federal participation in this type of road is under the jurisdiction of the Comite Nacional de Caminos Vecinales, and we were soon notified that

... Continued on page 30

Temecula Study

What Happens to the Small Highway Town When By-passed

By FRED O. GIBBONS, Right of Way Agent, District VIII

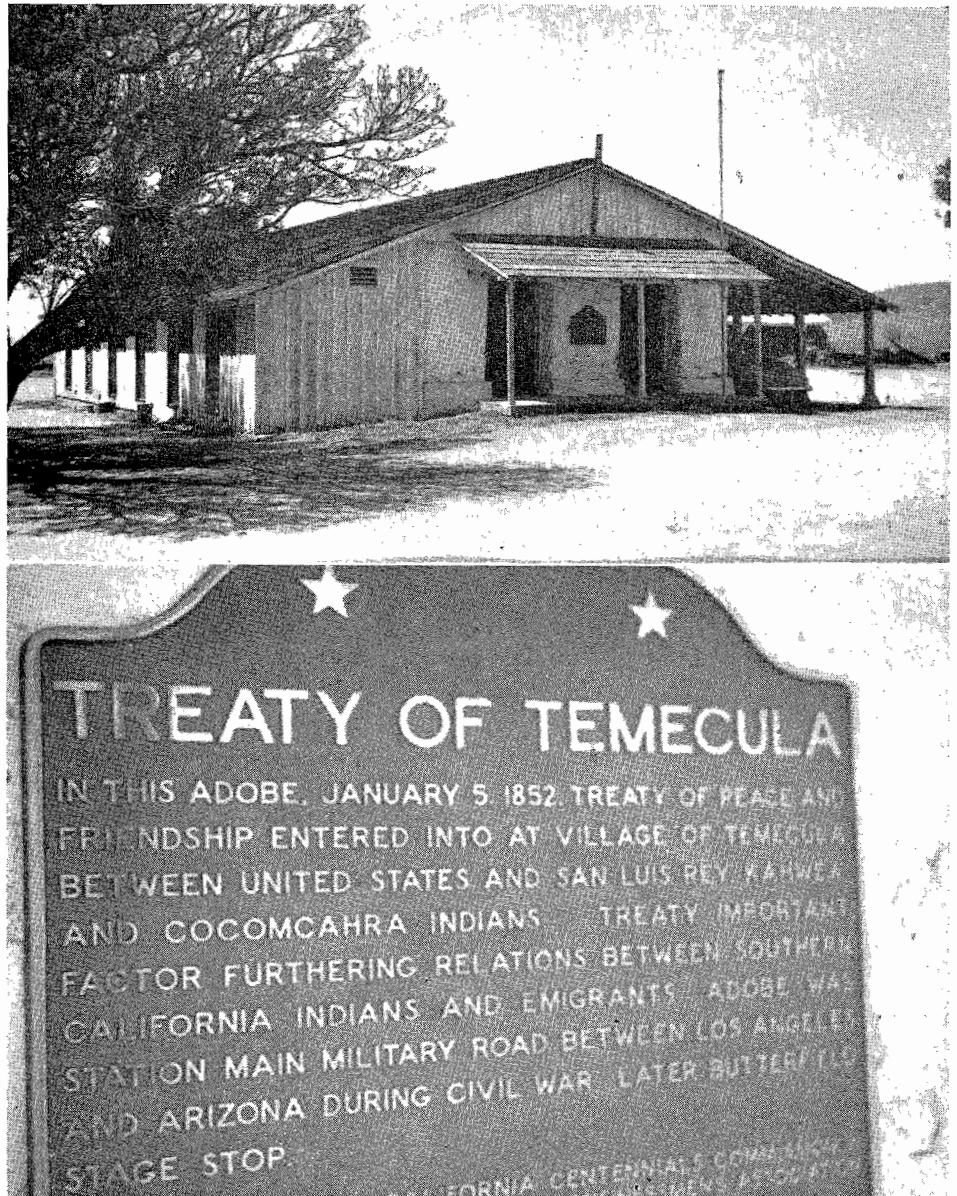
THE FOURTH OF JULY of 1949 was just four days old when the heavy traffic through the town of Temecula in Riverside County was rerouted around the town onto a new section of the freeway on U. S. Highway 395.

The businessmen of Temecula thought the result would be disastrous. They awaited the expected dire consequence of the by-pass with long and solemn faces, visioning the loss of their incomes, their businesses, and their savings. These men had no false delusions about their small community. They knew that, even before the traffic was diverted, many a motorist had sped down the town's main thoroughfare without even knowing the town's name. Indeed, some travelers had been only vaguely aware of Temecula's very existence as they passed through it. What then, the businessmen asked themselves, would happen when almost all the traffic was removed from town? To find the answer to this question, the Division of Highways recently conducted a study of the Temecula Bypass and this article is a report of what was found.

Interesting History

Temecula, with a population of approximately 500, lies in the San Jacinto Valley between the cities of Escondido and Elsinore, one town out of the many that will be affected by the conversion of U. S. Highway 395 to freeway status from San Diego northerly.

To appreciate Temecula, one must know something of its history. Once the home of Indian tribes, the Temecula Rancho was established by Mission San Luis Rey and was one of the few Mexican land grants made to the Indians. The area surrounding the town is the scene in which the tragic romance between Ramona and Allesandro blossomed forth. A re-enactment of this glorious romance may be seen annually in the play "Ramona" in nearby Hemet.



UPPER—Historic old adobe building where treaty was signed with Indians 100 years ago. LOWER—Plaque placed on building by California Centennials Commission.

Indians Sign Peace at Temecula

Almost 100 years ago the old town of Temecula was chosen as the site for the signing of a treaty of peace between the United States Government and three hostile Indian tribes. The adobe building in which the treaty was signed

still stands and is still in use by the cattle ranch on which it is located. In the 1850's, this same adobe building served as a stagecoach stop for the Butterfield Overland Stage Company, a close affiliate of the Wells Fargo Express Company. The tracks left by the



Temecula has no traffic congestion in business district since it was by-passed

old stages are still visible on the surrounding hillsides. They write a story of Indian raids, holdups, accidents, and hardships not known in this modern age.

Temecula itself attained importance as a railroad stop on the main line between San Diego and San Bernardino in the 1880's and 1890's. Great droves of cattle were once brought to the railroad town to be shipped to the Nation's food centers. However, the railroad tracks were washed out in the general floods of 1892 and never replaced. Temecula survived the floods to become one of the many highway towns serving the traveling public between San Diego and Riverside. The cattle industry is still an important factor in the town's economy as Temecula lies at the westerly end of the Vail Ranch—a vast cattle empire of some 80,000 acres.

Answers to Questions

Temecula is an important addition to our studies for it is representative of the many smaller highway towns which have already been by-passed and those which may be by-passed in the future.

To the inhabitants of such a town, the imminence of a by-pass or any diversion of traffic presents a far greater problem than it would to people living

in a larger city. The people of a small highway town believe, and rightly so, that the highway means the life or death of the town. In a city, it may mean only a certain percentage of decrease or increase in business. What, then, are the effects of by-passing the small highway town, which, unlike a city, has almost no local traffic upon which to draw? And, what can a small town do to alleviate any adverse effects that may result from being by-passed?

By interviewing every affected businessman in Temecula and by analyzing the sales volume of each business two years before and approximately two years after the date of the opening of the by-pass it was found that the motorist-catering establishments in Temecula showed no ill effects as a result of being by-passed. The five cafes in Temecula on an average suffered an 18.8 percent decrease in sales volume. However, statistics show that Riverside County's cafes showed an 18.1 percent decrease in the same period, 1948 to 1950. Thus, despite the poor business outlook, apparently there was no damage to cafe business in Temecula as a result of being by-passed.

The average service station in the town of Temecula fared even better than the average station in Riverside County. County stations showed a 27 percent decrease in sales from 1948 to 1950;

whereas, Temecula's average station showed only an 8.1 percent decrease in business.

Motel Not Hurt

In the opinion of the manager of Temecula's only motel which was in operation prior to the opening of the by-pass, no ill effects were suffered by the diversion of traffic. As a matter of fact, he feels that the by-pass was a definite benefit to the business.

This opinion is substantiated emphatically by the fact that a new motel was built subsequent to the opening of the by-pass and has enjoyed a lucrative business from the start. The owner of the new motel says that her customers are "tickled to death" for a chance to sleep off the highway.

The remaining businesses in this small highway town number less than half of the total. They include the markets, liquor store, blacksmith shop, et cetera, which do not depend primarily upon highway trade. Unfortunately, there are no appropriate statistics available with which to compare these businesses with similar ones in Riverside County. However, interviews with the respective owners of each of these remaining businesses in Temecula have revealed that the removal of through traffic has had little or no effect upon their trade.

No Ill Effects

From the above comparative statistics and from the reports of the merchants concerned, it has been determined that the town of Temecula suffered no ill effects as a result of being by-passed. The tremendous increase in traffic on the freeway, being approximately 60 percent, has more than offset any damage which might have occurred to business in this small highway town. This fact is made even more startling with the realization that Temecula has lost almost all of its former fishing trade which used to patronize nearby Lake Henshaw. This lake, like so many others in Southern California, is down drastically due to the severe drought of the last few years.

Business Pattern

Of considerable interest is the effect of the by-pass on the business pattern of the small community. Just prior to the opening of the by-pass, business was better than average due to the additional trade from the construction crews; but for the first few days after the diversion of traffic, sales slumped badly. The construction workers were gone and the new road was still strange to the old customers. Business increased rapidly, however, as travelers became



One of three effective community map type signs placed along new freeway to direct motorists to Temecula

acquainted with the recently built approaches to the town. Today, the increasing traffic on the better road is increasing sales steadily.

Many businessmen, especially service station operators, reported that their number of sales has decreased somewhat, but that the average amount sold on each individual sale has increased.

Signs

Advertising signs have helped greatly in eliminating any adverse effects of the by-pass. One gas station and cafe operator has increased his sales tremendously by the advantageous use of highway signs.

... Continued on page 57

Another view of Temecula business district showing absence of through traffic



Alpine Road

San Mateo County Completes the Third Section of Federal Aid Secondary Route

By HERBERT FRAHM, Resident Engineer

A SECTION of the Alpine Road in San Mateo County which is in the Federal Aid Secondary System was completed on June 7, 1951. This is the third federal aid project that has been completed in San Mateo County. The project realigned 2.57 miles of the Alpine Road which is a section of F. A. S. Route 1048. The limits of the project are between 1.7 miles north of Portola Road and Mayfield Avenue at the San Mateo-Santa Clara county line.*

The first project completed in 1947 realigned 2.883 miles of F. A. S. Route 1052, the limits of which were between the Alameda de las Pulgas, at the westerly city limits of Redwood City, and the Canada Road, County Road No. 20, F. A. S. Route 1048.

The second project, completed in 1949, realigned 4.693 miles of Canada

Road, F. A. S. Route 1048, the limits of which were between 2.5 miles north of Woodside and Ralston Avenue.

The first two projects were completed with the aid of state and federal funds, and the one just completed with the aid of federal funds.

Benefits to Public

The Alpine Road from Mayfield Road to its intersection with the Portola Road provides an important link between commute centers and a rapidly growing rural and residential area. As it existed, the Alpine Road consisted of 16 feet of pavement with substandard alignment, blind curves and a narrow bridge with sharp turns to both approaches. On the realignment of this section a new bridge was constructed across San Francisquito Creek. The sec-

tion of road that was realigned conformed to the standards of federal aid secondary roads for rolling topography with an average daily traffic count from four hundred to a thousand. The width of the new roadbed is 34 feet with 22 feet of plant-mixed surfacing, and six-foot shoulders. All curves were super-elevated in accordance with standards of the Division of Highways.

* This project is a unit of a well-conceived and executed program of improvement upon San Mateo County Federal Aid Secondary Routes 1048 and 1052. This routing traverses Alpine Road, Portola Road, Whiskey Hill Road, Canada Road, and Edgewood Road. The construction work upon this scenic drive is being accomplished with a maximum of utility consistent with preservation and improvement of scenic effect. The painstaking work of the San Mateo County Road Department is appreciated.—H. B. LaForge, *Engineer of Federal Secondary Roads.*

Alpine Road looking east toward Ladera subdivision entrance





Alpine Road looking west across new bridge

The new construction makes it possible for public and commercial vehicles and school busses to travel to commute centers, shopping centers, and schools with a considerable saving of time and a degree of safety not obtainable on the old road.

Engineering and Construction Problems

The design or relocation within the limits of the project resulted in an unbalanced line of 40,000 cubic yards of excess excavated material due to the proximity of the improvements northerly of the San Francisquito Bridge crossing. It was in this section that heavy cuts were encountered. The cost of moving the improvements or homes would not justify a balanced line. The original plan was to dispose of the excess material in an area adjacent to the roadway, but in the progress of construction the Menlo Park Sanitary District made arrangements to haul, at its own expense, all the excess material from the project to its sewage treatment plant site.

The excavation of the sliver cut northerly of San Francisquito Creek Bridge crossing would not have been too difficult except for many rocks located high on the cut. The rocks were up to three feet across, one foot thick, and

round as a wagon wheel. Occasionally, in spite of every precaution, one of these rocks would tip on edge and roll. Fortunately, only minor damage to two homes resulted from these "bounders."

Excavation on the sliver cut also filled the old narrow road with rocks and earth, making it necessary to control traffic. Delay was kept to a minimum by the use of a D-8 Caterpillar and Caterpillar blade clearing the road for traffic.

New San Francisquito Bridge

The new bridge across the San Francisquito Creek is a reinforced concrete bridge of symmetrical design, 117 feet long, with three spans supported on concrete piers and abutments. It has a 26-foot clear roadway with a raised safety curb and concrete rail on each side. The bridge was designed by Don S. Wilson, San Mateo County Engineering Road Department, and approved by the Bridge Department of the Division of Highways. Mr. Wilson was able to supervise construction of the bridge and the preliminary part of the road construction as resident engineer before being recalled to active duty with the United States Navy Construction Battalion.

Surfacing for the new road consisted of two inches of dense graded plant-mixed surfacing placed on six inches of crusher run base and seven inches of selected material. Previous projects in San Mateo County have been surfaced with an armor coat, and on this project an armor coat was previously planned. Unfavorable weather conditions for operations of placing an armor coat caused us to change the surfacing to plant mixed. During the paving operations traffic was quite heavy and with the use of a pilot car to control traffic we were able to place the surface with a minimum of lost time, which would have occurred had we placed an armor coat.

Winter Delays Project

Clearing and fence construction were accomplished by San Mateo County forces during the winter before letting the contract. This procedure worked out very well, for in addition to facilitating clearing by permitting winter burning it was possible for the survey crew to set construction stakes with some assurance that they would remain throughout the period of construction.

The project was originally scheduled for completion November 9, 1950, but

... Continued on page 58

Escondido Study

City Benefits Materially After Being By-passed by Freeway

By W. STANLEY YOUNG, Headquarters Right of Way Agent

THE ESCONDIDO study has presented an interesting variation from our previous by-pass studies for three principal reasons:

1. The fact that approximately one-half of the retail businesses in the city are located along the superseded section while the other half are not has made possible a comparison of affected businesses to relatively unaffected businesses in the same community.

2. The traffic count along the main business street, a section of which was formerly the highway, had disclosed a slight increase a year after the by-pass opened, despite through traffic removal.

3. A locally conducted poll of businesses along one section of the superseded highway had indicated opinions that substantial detrimental effects had resulted from through traffic removal. The findings of this poll were opposed by the facts developed by an analysis of all factors involved.

The City of Escondido is located approximately 30 miles northerly from San Diego on one of the State's main north-south routes, and has a population of about 6,600 people, making it the largest by-passed city we have studied.

Highway Use Increased

It is nationally known for its avocado and citrus orchards, and also attracts a considerable number of vacationists because of its delightful climate, picturesque scenery and proximity to many recreational facilities, such as lake and ocean fishing, dude ranches and public parks. There are also several large stock ranches nearby.

Opening of this expressway section of U. S. Highway 395 reduced the travel time between Escondido and San Diego to about 30 minutes. Improvement of this highway between the two cities and also portions northerly from Escondido to Riverside, resulted in a substantial increase in the use of the highway.

This gain in general usage was revealed by the regular Division of Highways traffic count figures at various locations along the highway. The indicated increased usage has amounted to about 35 percent on Sundays and 20 percent on week days in the vicinity of Escondido. Meanwhile, the main north-south routes throughout the State averaged an increase of about 10 percent.

Several miles north of Escondido, traffic along the highway had increased as much as 55 percent on Sundays and 60 percent on week days. These traffic volume gains indicate that both local and tourist use of this route have increased. It is apparent from these figures that U. S. Highway 395 has become increasingly competitive with U. S. Highway 101, the main coastal north-south route.

Traffic Statistics

For a coherent discussion of the effects of the expressway by-pass on Escondido business and property values, it is necessary to refer to the accompanying engineering diagram showing the by-pass in a heavy black line, and the superseded section of highway with a dotted line. Upon opening of the by-

pass the traffic count indicated that the principal entrance to the city shifted to Grande Avenue, along which is situated the main business district illustrated in the diagram.

As a result of the shifting of downtown-bound traffic, and the elimination of nonbuying through traffic, the vehicular traffic along Escondido Boulevard, the southerly entrance to the city, had dropped off about 35 percent by a year after the expressway opening.

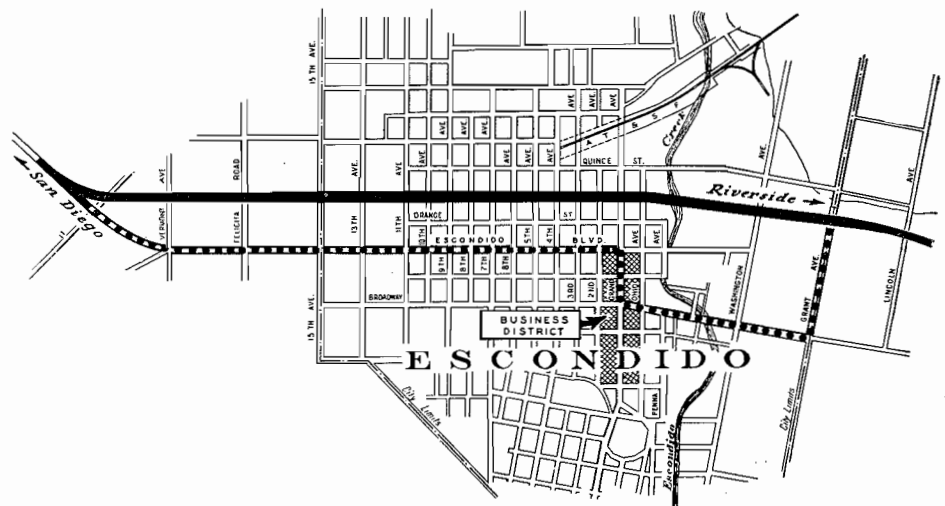
Although traffic along Grande Avenue immediately fell off somewhat after the by-pass was opened, by the middle of 1950, there was actually about a 15 percent greater traffic count on week days and 5 percent more on Sundays than existed prior to the by-pass.

During the year following the expressway opening, vehicular usage of the portion of the superseded highway northerly of Grande Avenue had diminished approximately 50 percent on Sundays and 25 percent on week days.

RETAIL BUSINESS

As was stated near the beginning of this article, merchants along Escondido Boulevard had attempted to make a factual study of the effects the by-pass

Engineering diagram showing expressway by-pass section colored in solid black and superseded route through Escondido in dotted line. Main business district fronting on Grand Avenue is shown by cross notching.



had on the businesses along the boulevard.

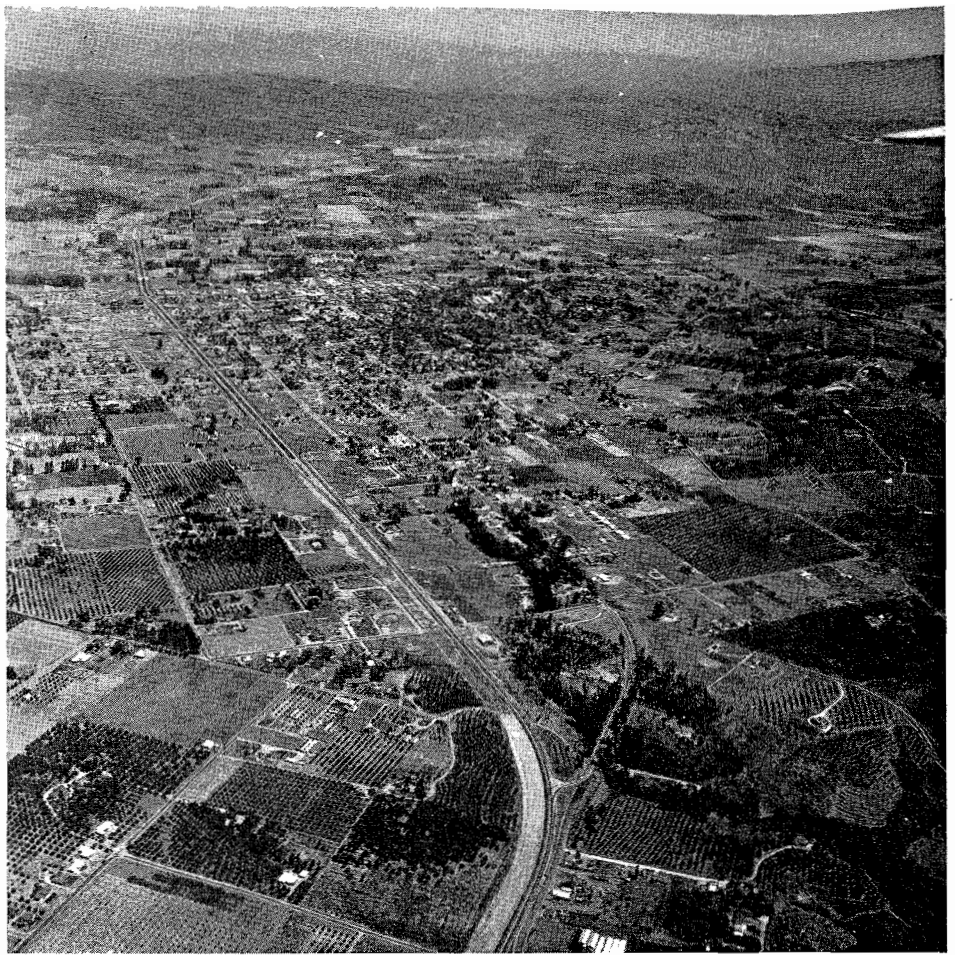
The incomplete information obtained in their study indicated that the by-pass was very detrimental to the cafe and service station businesses, which comprise most of the retail outlets along this section. However, our analysis and comparison according to location and type of business of the gross retail sales returns of all businesses in Escondido to San Diego County business averages indicated that the by-pass did not cause a significant reduction in total volume of these businesses along South Escondido Boulevard, although similar businesses along the Grande Avenue portion of the superseded section did enjoy substantial gains not realized in other locations during the period. In this, as in other studies, the businesses catering largely to motorists were considered separately because any effects of the traffic fluctuations could be expected to become immediately apparent in these retail businesses affected.

Business Increases

The comparison of the gross business volume of each of these groups of Escondido businesses, both by-passed and unaffected, to the volume of the same types of business throughout the county is pictured graphically in the accompanying chart. In this comparison we found that the 67 businesses along the by-passed section enjoyed a total volume increase much greater than was the increase of the other 64 Escondido businesses not located along this superseded highway, and was also greater than the San Diego County average gain. These by-passed businesses gained 17.8 percent, while unaffected businesses gained 1.09 percent and San Diego County businesses averaged a 3.2 percent gain.

The cafe and bar business throughout the area dropped off during the year beginning July 1, 1949. However, the nine by-passed cafes had a reduction of only 2.15 percent in total business volume, while unaffected cafes and bars in Escondido had a reduction of 6.2 percent and San Diego County businesses of this type fell off 14.1 percent.

The 18 service stations along the superseded route had an over-all gain of 1.9 percent in retail volume, at the



Aerial photo looking northerly over City of Escondido towards Riverside County line showing expressway by-pass of city. Some of many orchards around Escondido visible in foreground and to right.

same time the San Diego County service station average was a 23.7 percent decline. We were able to secure the sales volume figures of but one of the four service stations in Escondido not located on the former highway, and therefore could not use these for a comparison.

Gasoline Sales

The number of gallons of gasoline dispensed by only seven of the service stations in Escondido over the two-year period was secured. These figures indicated an average reduction of 29.38 percent in gallonage dispensed. Five of the service stations were located along the superseded section. One of these service stations which was closed a considerable part of the year after the expressway opened and which had changed tenants several times both before and afterwards, disclosed a 71.9 percent reduction in gallonage. One of the stations enjoyed a 2.19 percent increase in gallonage.

Since these gallonage figures cover only a fraction of the total service stations in Escondido and since there had been an over-all increase in service station retail business, as well as an increase in number of vehicles entering the city, it is not logical to surmise that the expressway by-pass was the principal reason for the gallonage drop-off of the limited number of stations on which figures were available. Rather, the opening of some new stations in the city during the period after the expressway opened and the shifting of customers to other establishments probably accounts for much of the gallonage reduction of these service stations.

It is interesting to note that the average number of gallons sold per month by these seven service stations was only about 7,700 despite the fact that several of the best stations in the city were included. However, the ratio of dollars received in retail purchases on the part of these service stations to the number

of gasoline gallons dispensed was exceptionally high. This may account for the continued operation of some of the unusually large number of service stations serving Escondido.

Other Classifications

In the comparison of the classification "other businesses," the substantial benefits of the highway improvement were very apparent. These businesses along the superseded section, most of which are on the Grande Avenue portion, registered a gain of 20 percent in total volume. Meanwhile, similar businesses located along the portion of Grande Avenue which was not a part of U. S. Highway 395, but in the principal business district, gained only 1.27 percent, and similar San Diego County businesses averaged an increase of 7.3 percent. Please refer to the previously mentioned graphic comparison.

Because of the opinion of adverse effects resulting from the by-pass on the part of Escondido Boulevard merchants, the businesses that were situated on Escondido Boulevard and on a portion of the superseded highway northerly of the main business district, both locations where a severe drop in traffic was registered, have been grouped and the over-all service station and cafe

business gain or loss in these locations during the year after the expressway opening has been computed.

Service stations, numbering 16, along these sections had an over-all reduction of 6.3 percent in retail business volume, while the aforementioned county average was a 23.7 percent decline. As stated previously, the total volume of service station business along the by-passed route in Escondido, dominated by the Grande Avenue stations, registered a 1.9 percent gain. Eleven of the service stations continuously in operation during the period of the study suffered declines in business volume, but only one had a more severe drop than the county average.

Summary of Study

The six cafes along these sections (Grande Avenue businesses omitted) fell off 3.8 percent in total volume. As indicated in the graph, the county average in these types of businesses was substantially poorer, being a 14.1 percent reduction in the cafe and bar business. The six cafes also averaged slightly better than the 4.69 percent decline in business registered by the cafe and bar business generally in Escondido, in which are included the businesses never on U. S. 395. However, four of the cafes had business declines and three

had greater declines than the county average.

To summarize this phase of our study—the analysis of the business volume of retail establishments through Escondido has disclosed that:

1. Business of each type generally did better along the superseded sections than did the same types of businesses never situated directly on U. S. Highway 395 and also better than the San Diego County average.

2. Service stations and cafes along the superseded sections where the traffic reduction was greatest had a better average than the county but these service stations fared poorer than Escondido service stations generally.

3. The highway improvement was especially beneficial to the business volume of establishments along the two-block portion of the superseded section of Grande Avenue.

4. There was an 11.7 percent increase in total retail business volume in Escondido the year after the expressway opened exclusive of all chain firms and businesses having two or more outlets in the county. The dollar amount of this increase was approximately one and one-quarter millions.

Some of the items which suggest themselves as reasons for the difference in the findings of the local business study and our analysis of the by-pass effects along

Looking south along the superseded portion of Escondido Boulevard showing some of businesses which are interspersed along one mile of street within city



certain portions of the superseded highway section are as follows:

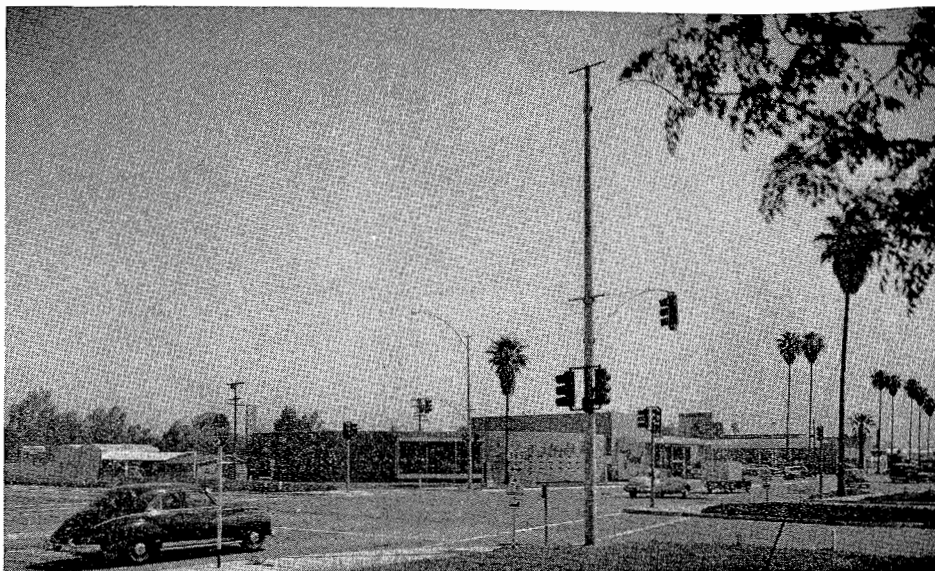
1. Individual merchants were unable to separate the effects of through traffic elimination from the effects of the construction of new businesses and the shifting of customers from one business to another along the same street. This segregation was not necessary in our analysis because general by-pass effects on business potential are reflected only in the total volume of all similar businesses along the same section.

2. The general downward trend in the cafe and service station business throughout the county was not taken into account.

3. An element of the rationalizing encountered in some of our previous studies wherein the comparison used was "the amount of business which would have developed if the highway had not been realigned and use of the facility had increased as it did after the improvement" may have entered into some of the individual opinions rendered.

REAL ESTATE

In studying all of the 80 real estate transactions in Escondido along the superseded section and on Grande Avenue in the vicinity of the highway since 1945, we found that the property values have been continuously on the increase. This was true along all sections of the superseded route, although the most



Intersection of Grand Avenue, principal business street, with expressway. The substantial gain in values was along the section of Grand Avenue partly visible in right center of picture.

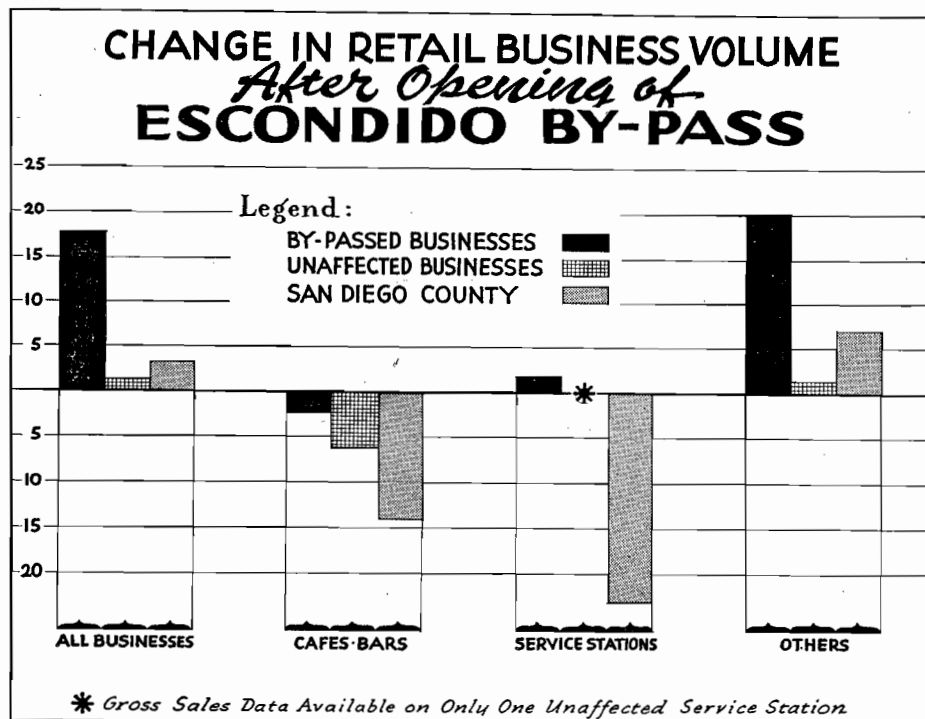
substantial gains in value as well as the greatest realty activity were registered along Grande Avenue between the expressway and South Escondido Boulevard.

The extremes in vacant property selling prices during the five years following World War II along Grande Avenue are indicative of the rapid rise in values there. In 1945 vacant property

along this section had sold for as low as \$20 per front foot. In the latter part of 1949 one vacant property was sold for \$315 per front foot.

Along Grande Avenue, between the expressway and the main business district, 11 properties were sold two or more times between 1945 and 1950. In each case the succeeding sale was considerably above the preceding one. A few of these properties recently sold for four times as much as the price of the same property shortly after World War II. Several properties sold for about twice as much after construction of the expressway as the previous sale.

Graphic comparison of the retail volume of various types of businesses along the superseded portion of U. S. Highway 395 through Escondido to other Escondido businesses not situated along this route and to similar San Diego County businesses during the same period



Increase in Building

There has also been a substantial increase in business building along Grande Avenue just east of the expressway in the past two years. At the present rate of growth Grande Avenue will soon be built up continuously with commercial establishments. Patronage for these new businesses comes from areas brought nearer in driving time by the highway improvement and from the rapidly expanding Escondido community population.

Real estate activity along the superseded sections north and south of Grande Avenue in Escondido has been considerably slower than on the main business street. However, the limited number of sales which have occurred did not indicate any decline in values

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Busy Day

*Highway Commissioners Break Ground
For Two Major Freeway Projects in South*

By R. C. KENNEDY, Secretary, California Highway Commission

ON WEDNESDAY, June 27, 1951, three members of the California Highway Commission put in a real busy day.

Harrison R. Baker, James A. Guthrie and Chester A. Warlow had consented to go on a tour of Southern California sponsored by the California State Chamber of Commerce. Meetings had been scheduled from Monday through Thursday at various places from Santa Maria to Riverside.

On Wednesday morning the commissioners, state highway engineers and the group from the State Chamber of Commerce met on Grand Avenue, Los Angeles, back of the Biltmore Hotel. Here the caravan was formed and started on its way, led by Paul O. Harding, Assistant State Highway Engineer in Charge of Metropolitan District VII. Finally, the caravan reached the lower

level of the four-level distribution structure in the heart of Los Angeles.

Ground Broken

Here a stop was made while ground was officially broken for the start of a portion of the Harbor Freeway between Temple Street and Fourth Street. This short section will connect the Arroyo Parkway directly with the Harbor Freeway, now being constructed as far as Olympic Boulevard.

Autos passing under four-level grade separation structure using the lowest level for first time





Official group at ground-breaking ceremonies. LEFT TO RIGHT—Assistant State Highway Engineer J. W. Vickrey, Commissioner Chester W. Warlow, Assistant State Highway Engineer Paul O. Harding, Commissioners James A. Guthrie and Harrison R. Baker, and Ken Kendrick, California State Chamber of Commerce.

A part of the ground-breaking ceremonies consisted of the pushing in of enough dirt to provide a ramp connection between the Harbor Freeway and the Temple Street bridge so that the cars in the caravan could drive over this structure and pass under the four-level grade separation structure, utilizing the lowest level that will provide the traffic interchange for westbound traffic between the Harbor Freeway and the Hollywood Freeway.

River Freeway Started

This occasion was momentous because it was the first time that passenger automobiles had utilized the lower level of the four-level grade separation interchange in just this manner, actually driving in the direction intended over the roadway that has been provided to connect the Harbor Freeway with the Hollywood Freeway.

When the ceremonies were completed, the caravan was led out the Santa Ana Freeway to Lakewood Avenue; south on Lakewood to the Pacific Coast Highway in Long Beach; west on the Pacific Coast Highway to just west of the bridge spanning the Los Angeles River.

Here the official ground-breaking ceremonies for the start of construction on the Los Angeles River Freeway from Pacific Coast Highway to 223d Street were held.

This contract was awarded to the Griffith Co. and amounts to \$1,507,323.30. It is for 2.5 miles and includes grading, paving and structure.

Cooperation

At the ground-breaking ceremonies the principal speaker for the Highway

... Continued on page 62

Groundbreaking for Los Angeles River Freeway. LEFT TO RIGHT—Walter Haverkort, President of Long Beach Chamber of Commerce; Commissioner Baker, Assemblyman William Grant and Mayor Burton W. Chace, Long Beach.



OUR MILLIONTH VICTIM

By COL. ROBERT C. F. GOETZ, Editor-in-Chief, Traffic Quarterly

THIS is the year when someone will become the millionth victim of fatal motor accidents in the United States. This is our record for a generation—nearly three times as many killed by motor cars in the last 50 years as were killed in action in all our wars in the 175 years of our history. It is a shocking record, shocking enough to awaken a vigilant and sympathetic people.

It has not done so. It has not awakened us, though citizens have daily commented and speculated upon it, and writers have strained their vocabularies to arouse us to effective action.

These significant records, scrupulously compiled, are subject to many forms of statistical comparison. But even a cursory examination reveals many reasons for annual repetition of motor vehicle casualties and their growing seriousness.

Our repeated failures to face the problem realistically have reached a degree of indifference. And the indifference has been a national disgrace for a quarter of a century. No other problem of the same importance to our life and security has gone so long with so little correction.

These statements are made with full knowledge of minor variations over the long period of years and of those arguments based mainly on laws of chance and inevitability. So long as we leave undone those things that so obviously ought to have been done, we practice defeatism and decry the consequences.

Any approach to a solution must curtail those unnecessary accidents due to causes subject to correction. To achieve this end, definite and positive control measures should be rigidly enforced.

Every community has contributed to the problem. Every community has a moral obligation to correct it.

It is unthinkable that so many incompetent and dangerous drivers have been qualified and privileged to drive by official state agencies. The tendency to neglect minor offenses leads to carelessness, serious accidents and a flouting of law.

Driving a car is a serious business, but many drivers do not so regard it. On their feet they are one thing, in their cars quite another.

Any form of industry or national activity operated on similar loose and neglectful principles would quickly founder. The initiation of corrective measures must come from higher-ups. It is their serious responsibility and moral duty.

Reasonable regulations, enforcement with sufficient emphasis on minor violations and stern judicial support will quickly bring the driving public to a sane realization of their obligations.

The editorial by Colonel Goetz indicates that every community contributes to the traffic accident problem and has an obligation to correct it. This can be applied to states as well as communities. California is making a determined effort to reduce accidents. Governor Warren's Traffic Safety Conference, held in Sacramento last December, was attended by more than 500 persons.

The annual Inventory of Traffic and Safety Activities conducted by the National Safety Council ranks California first in a group of the eight largest states for achievements in the year 1950 in traffic and highway engineering, traffic legislation, and traffic law enforcement, a tie with Ohio for first place in public information, and second in driver licensing.

Although California ranks high in the national safety contest in the important points mentioned by Colonel Goetz, the number of traffic accidents is appalling. Even greater effort is necessary in traffic safety activities. Every driver must be made to realize that "driving a car is a serious business."—Editor.

Escondido Study

Continued from page 14 . . .

after the elimination of most through traffic.

Since there are more than two miles of frontage along South Escondido Boulevard and Broadway north of Grande Avenue, the abundance of available land had maintained values for either commercial or residential uses at about the same level. This level has risen steadily with property values generally in the city. Commercial growth in the forms of new businesses and expansion of existing facilities has apparently not been retarded along these by-passed sections. However, the tendency has been for these businesses to solicit greater local patronage.

CONCLUSIONS

Our analyses of the retail sales figures of Escondido businesses and the real estate transactions along the by-passed sections conclusively pointed out that the highway improvement has been a substantial benefit to Escondido. Obviously it is impossible as well as unimportant to segregate the actual by-pass effects from the effects of the general highway improvement.

The increased use of the highway in the vicinity and the greater number of vehicles now entering the city as well as the 11.7 percent gain in over-all retail business volume in Escondido indicates the growth taking place in the area since the construction of the expressway. Undoubtedly the highway improvement was one of the major contributing factors.

Concerning the sections of the super-seded route where there was a substantial decline in traffic after the by-pass opening, it is evident that there was not a reduction

in amount of business potential following the by-pass installation but rather a change in the nature of the potential. The result was a betterment to some businesses to the detriment of other merchandising establishments, especially those which were catering almost entirely to highway patronage.

Following in line with the accelerated activity in Escondido after the highway improvement, the ensuing rise of property values throughout the community was to be expected.

As has been our experience in previous studies, the retail sales analysis of Escondido businesses reiterated that it is impossible to estimate accurately the effects of any single incident on an individual business without having available the volume figures of all local competitors as well as a suitable yardstick to eliminate the necessity for consideration of general economic fluctuations.

Arnold Freeway

Another Link of Industrial Highway in Contra Costa Open

By R. C. KENNEDY, Secretary, California Highway Commission

A LONG AWAITED development of the freeway system of Contra Costa County was consummated on Tuesday, July 17th. Very simple ceremonies were held at the Port Chicago end of the construction by having Ralph R. Arnold, for whom the highway is named, cut a ribbon signifying the opening of the 4½-mile section to traffic. Immediately following the cutting of the ribbon, a caravan was formed which traversed the entire length of the new construction and ended at the Villa Cafe in Pittsburg. A luncheon sponsored by the Pittsburg Industrial Association was held to formerly celebrate the completion of this section of highway.

This 4½-mile section of freeway between Port Chicago Road and Pittsburg was constructed by Parish Brothers of Benecia at a construction cost of \$850,000.

The right of way for this unit is generally 166 feet in width and cost

\$312,000, including clearing of improvements and utilities, making a total cost of \$1,162,000, or approximately \$258,000 per mile. This freeway consists of a four-lane divided roadway with a separation structure over the old highway near the west end of the project.

Pedestrian Underpass

A pedestrian underpass is provided across the freeway at the Ambrose Park recreational area. Frontage roads were provided where required by local traffic in the vicinity of Bailey Road, Bella Vista Avenue and Railroad Avenue.

The geometric design of the roadway is two 12-foot lanes in each direction, separated by a division strip of variable width, with a minimum of six-foot curbed section to a maximum of 32 feet in the uncurbed portion.

The structural design is a four-inch plant-mixed surface over 20 inches of

imported base material, the top eight inches of which is cement treated.

Illumination is provided at important road intersections and in the pedestrian underpass.

This section of roadway took about 16 months to complete and was financed from State Gas Tax and Federal Aid Funds.

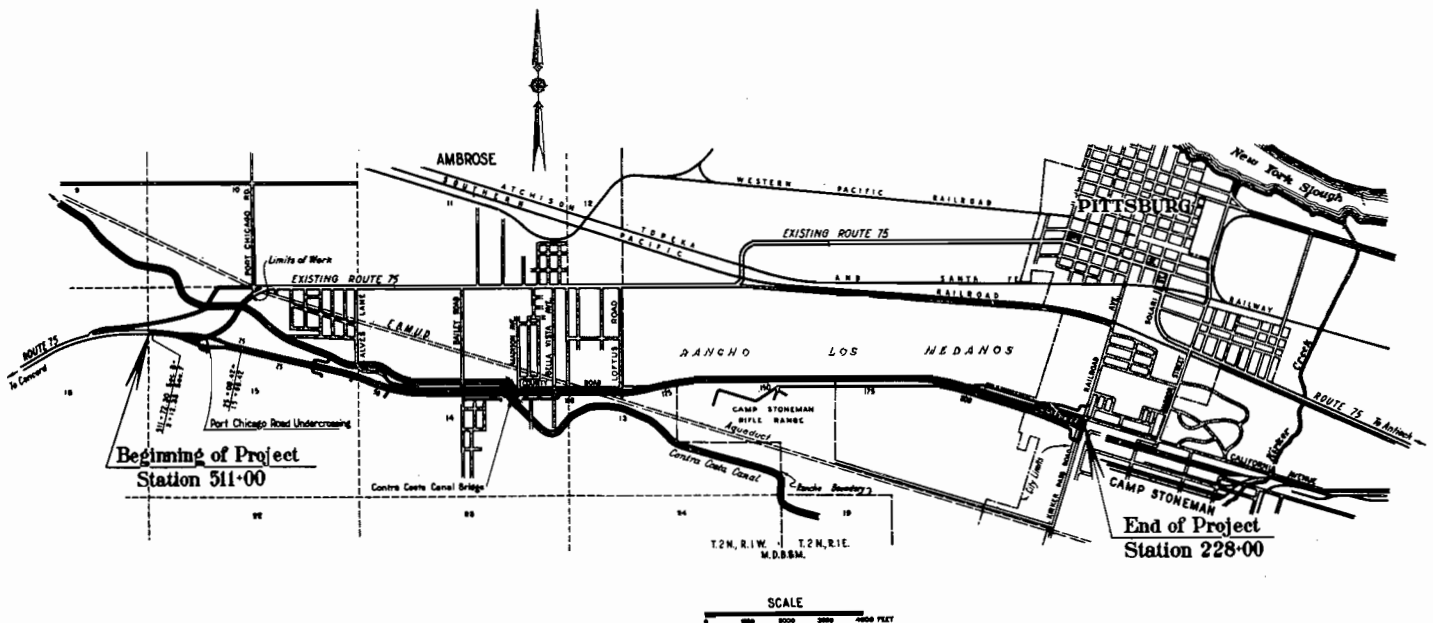
The accompanying map shows the relation of the new freeway to the old road and adjacent communities.

All Industries Represented

All the industries of eastern Contra Costa County were well represented by members of the industrial association.

Joseph L. Judson, President of the Contra Costa County Development Association, was master of ceremonies. His first introduction was of Jack Cummings, Chairman of the Board of Supervisors of Contra Costa County. Cummings welcomed the engineers and representatives of the Highway Com-

In Contra Costa County, between Port Chicago Road and Pittsburg



Length of Project 23,659.97 feet 4.481 miles



UPPER—Scene at dedication at Port Chicago end of freeway showing separation structure. Eastbound traffic uses lanes on left, westbound traffic elevated lanes on right. CENTER—Caravan goes over new highway. BOTTOM—New highway looking west.



Joe Arnold cuts ribbon opening new section of Arnold Freeway. LEFT TO RIGHT—H. L. Cummings, Col. R. D. Boerem, Col. Jno. H. Skeggs, Arnold, Highway Commissioner Chester H. Warlow, J. L. Judson, Deputy State Highway Engineer R. M. Gillis.

mission and hoped that it wouldn't be too long before he could welcome them again under similar circumstances.

Supervisor Buchanan was next introduced, as this new construction is in his district. He told of the plans of the county for the coming year, as far as its road program was concerned, and lauded the Division of Highways on the amicable relations they had always had with their representatives.

Joe McCulloch of the Columbia Steel Corporation, represented the Pittsburg Industrial Association and he, too, welcomed everybody to Pittsburg.

As Deputy Commander of Camp Stoneman, Col. R. D. Boerem said he was sure that the new highway would relieve much congestion to and from his station and hoped that the Highway Commission could see fit to continue the road so as to make it even better. Col. C. C. Williams, Commander of the air forces at Camp Stoneman, echoed the sentiments of Col. Boerem.

Robert L. Condon, Assemblyman of the Tenth District, hoped that this new road was only the beginning. He stated that Contra Costa County is now the second industrial county in the State of

California and its needs for more roads were becoming more apparent each day.

Senator George Miller of the Seventeenth District, thanked the Highway Commission for everything it has done. He stated that if the present growth of Contra Costa County continued, the needs for more highways would grow with them. He wants more industries in Contra Costa County, and to get more industries, more and better highways will be needed. He sees in his mind's eye, a highway from the new Richmond-San Rafael Bridge, traversing the county in an east and west direction, and another highway from the future Martinez-Benicia Bridge, traversing the county north and south.

Col. John H. Skeggs, Assistant State Highway Engineer, was called upon and merely thanked everybody for being at the celebration and hoped that he would attend many more.

A. L. Weymouth, District Engineer, stated that he would like to see the commission get more money so it could build more highways and so that so many people wouldn't complain.

Chester A. Warlow, Highway Commissioner, stated that the commission

was well aware of everything that pertains to the troubles of Contra Costa County. He stated that any highway problem can be solved if you have money enough to build it.

According to Warlow, who read from statistics, the commission has spent \$8,000,000 in Contra Costa County in the past six years, but it has not made a dent in the critical deficiencies as the last report showed that there was an \$82,000,000 deficiency in Contra Costa County. This critical deficiency, he said, has been caused by the rapid population and automobile growth in Contra Costa County, as well as in the entire State. According to the present rate that highways are being built, with the present money available, it will take some 30 years to remove the critical deficiencies in Contra Costa alone.

Joseph L. Judson then paid special tribute to Ralph R. Arnold, who was at one time County Surveyor for Contra Costa County. According to Judson, the idea of the Arnold Industrial Highway was thought of 25 years ago, and the idea was promulgated by Arnold at that time. This day marked the realization of part of Arnold's dream.

Rynard Bergman Retires After 32 Years of Service

THE DIVISION OF HIGHWAYS is a relatively large organization with about 8,000 employees, nearly 3,000 of whom are engineers. During the nearly 40 years of the department's growth there have been many engineers who have given years of efficient and faithful service to the development of California State highways. Included in this group was Rynard A. Bergman, who has retired from state service just 32 years after he first went to work for the old California Highway Commission on December 18, 1918. On one or two occasions Bergman left state employment for other engineering work but each time the fascination of highway work called him back so that within the 32 years, he worked for the state highway organization a total of over 31 years.

Saw Army Service

Born in Minneapolis in 1891, "Bergie" received his engineering education at the University of Washington and began his work as an engineer in California on field parties and at the drafting table with the Orange County Road Department. He also worked on road surveys and construction for Riverside and Sacramento Counties. In 1918 Bergman enlisted in the Army and served three months in officers training school. Upon his discharge, he entered the employ of the California Highway Commission as instrument man and assistant resident engineer.

Prior to 1922 Bergman left California State highway employment to work for the Oregon Highway Commission, the reclamation district at Colusa, and to engage in the logging industry with his father near Seattle. Back in California, he was a draftsman and resident engineer for District I of the California Highway Commission. Following that he worked continuously until his retirement in Districts III, VIII, IX and XI and with the office engineer's organization in headquarters.

... Continued on page 53

ASSISTANT STATE ENGINEER P. H. VAN ETTEN IS RETIRED

ASSISTANT State Engineer P. H. Van Etten retired from his position with the State Division of Water Resources on June 15th after 22 years of service with the State. Van Etten became an employee of the Division of Water Resources in 1929 as senior hydraulic engineer. He subsequently held the posts of principal and supervising hydraulic engineers.

Van Etten has been in charge of the division's surveys of potential water projects throughout the State, including studies of California's water needs which led to the proposed Feather River Project. He worked on the early studies which were the basis for the Central Valley Project, and bringing a water supply from the Colorado River to San Diego.

Prior to his state service Van Etten worked for the Bay City Water Company and in 1914 designed and built the South San Joaquin Irrigation Dis-



P. H. VAN ETTEN—1951

trict's canal system. He was subsequently resident engineer of the South San Joaquin Farm Lands Company in charge of design and construction of the irrigation and reclamation system for 2,000 acres belonging to that company.

Van Etten was a first lieutenant during World War I in the 23d Engineers. He spent fifteen months overseas with the A. E. F. Returning from service he spent four years as superintendent for various construction companies building docks and industrial buildings in the Tacoma, Washington, area. From 1923 until 1929 he was superintendent of construction on a number of sewer construction jobs in Southern California.

After attending schools in Dover, New Jersey, where he was born, Van Etten came to California in 1905 to attend Stanford University. He graduated with a mechanical engineering degree in 1909. Van Etten married Miss Mae Kelliher, a teacher in Escalon, in 1915. They will make their home in Stockton.

P. H. VAN ETTEN—1909



Warthan Canyon

Traffic Hazards Removed From
Coalinga-San Lucas Highway

By HARVEY W. PORTER, Associate Highway Engineer

ON JULY 14, 1951, the Coalinga Chamber of Commerce officially celebrated the opening of the latest improvement of State Sign Route 198 in Warthan Canyon, between Coalinga and San Lucas. Contract 51-6TC5, with John F. Blakemore as contractor, was started November 14, 1950, and completed June 26, 1951, some 2½ months ahead of schedule

Ceremonies Held

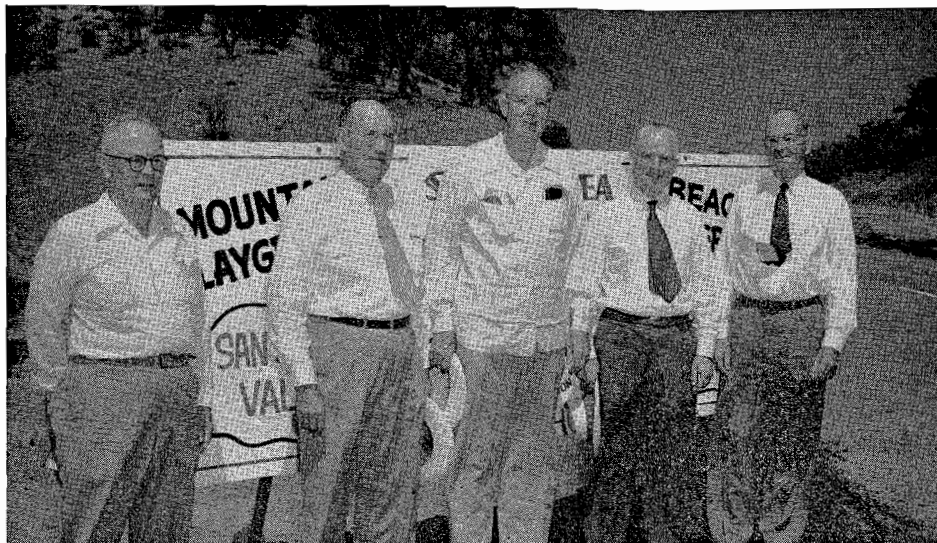
Ceremonies were held 13 miles west of Coalinga, at the junction of the road leading to Coalinga Memorial Springs.

R. B. Branum, Chairman of the Highway Committee of the Coalinga Chamber of Commerce, introduced five of the real oldtimers who have been working for years on this particular road project. Branum welcomed the representatives of the Division of Highways and the Highway Commission, and expressed the hope that sometime in the not too far distant future more money could be allotted for the continuation of the improvements on this highway.

The only speaker besides Branum was Chester A. Warlow, a member of the California Highway Commission, residing in Fresno. Warlow told of the rising costs of highway construction and the static condition of the income that the Highway Commission had to deal with. He told of the myriad miles of our highway system which were in need of improvement and stressed the fact that the commission is doing the very best job it could with the money it had available.

Immediately following the ceremonies, a caravan was formed to Lone Pine Resort, where a barbecue lunch was served to an invited list of guests.

The Warthan Canyon project was set up to eliminate several crossings of Warthan Creek and several dangerous curves in the winding, existing road. Creek crossings in this mountainous area have been very troublesome in the past due to the small capacity drainage facilities on the old road and



At Warthan Canyon dedication. LEFT TO RIGHT—Ed. Waite, Construction Engineer, and District Engineer E. T. Scott, Fresno; Highway Commissioner Chester H. Warlow, Deputy Director of Public Works Frank B. Durkee, and R. C. Kennedy, Secretary of Highway Commission.

the flash floods that are prevalent in this locality.

The work was done in two locations, the major section starting 13 miles west of Coalinga at the crossing of Hot Springs Canyon Creek and extending westerly over new alignment for 3.2 miles. The second section of the work began 5.5 miles farther west at Lone Pine Inn and extended for 0.2 miles to the junction of Warthan Creek with Coal Creek, 1.8 miles east of the Monterey-Fresno County line.

Creek Crossings Eliminated

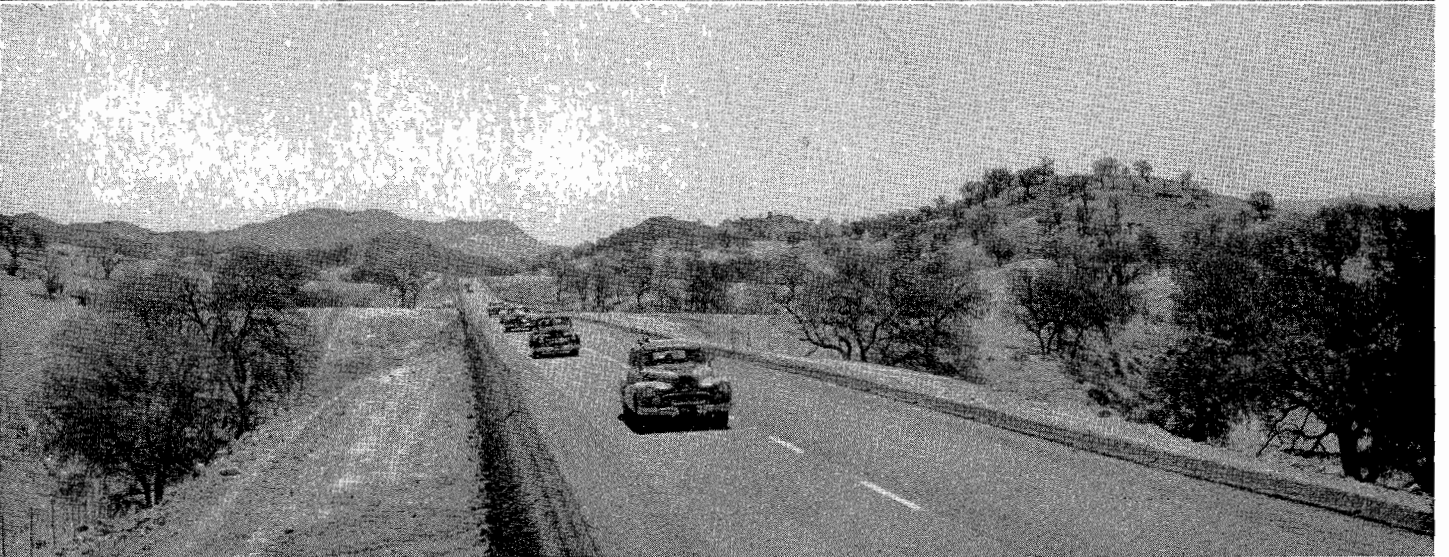
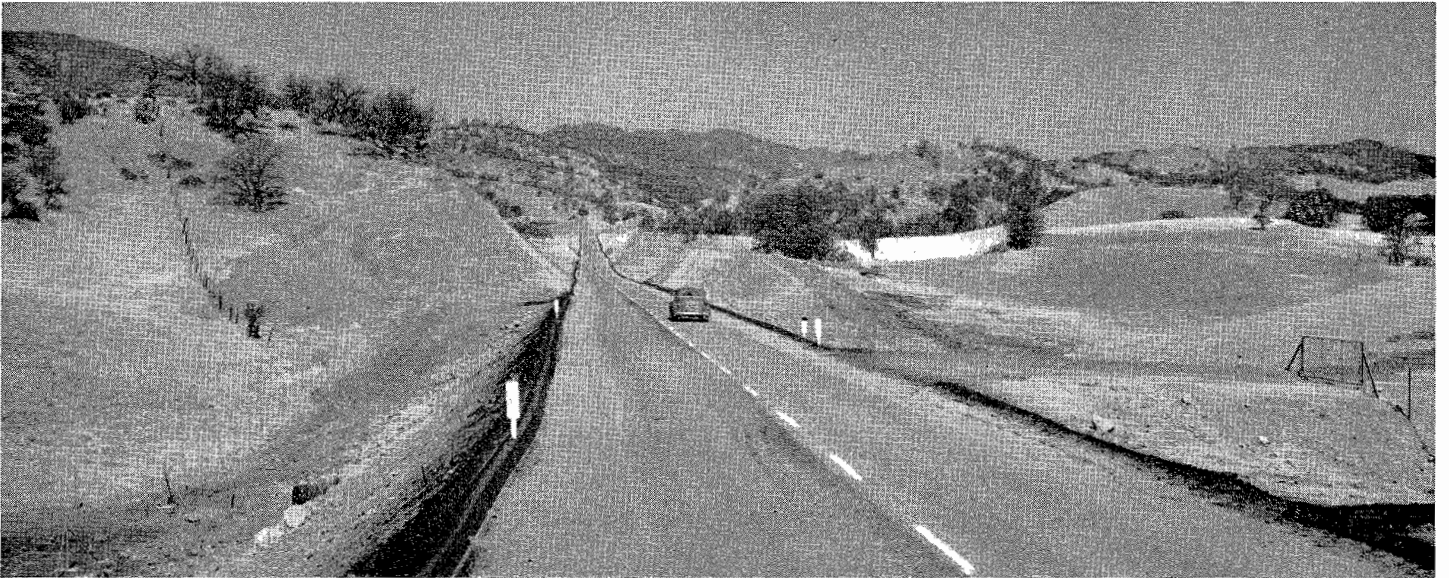
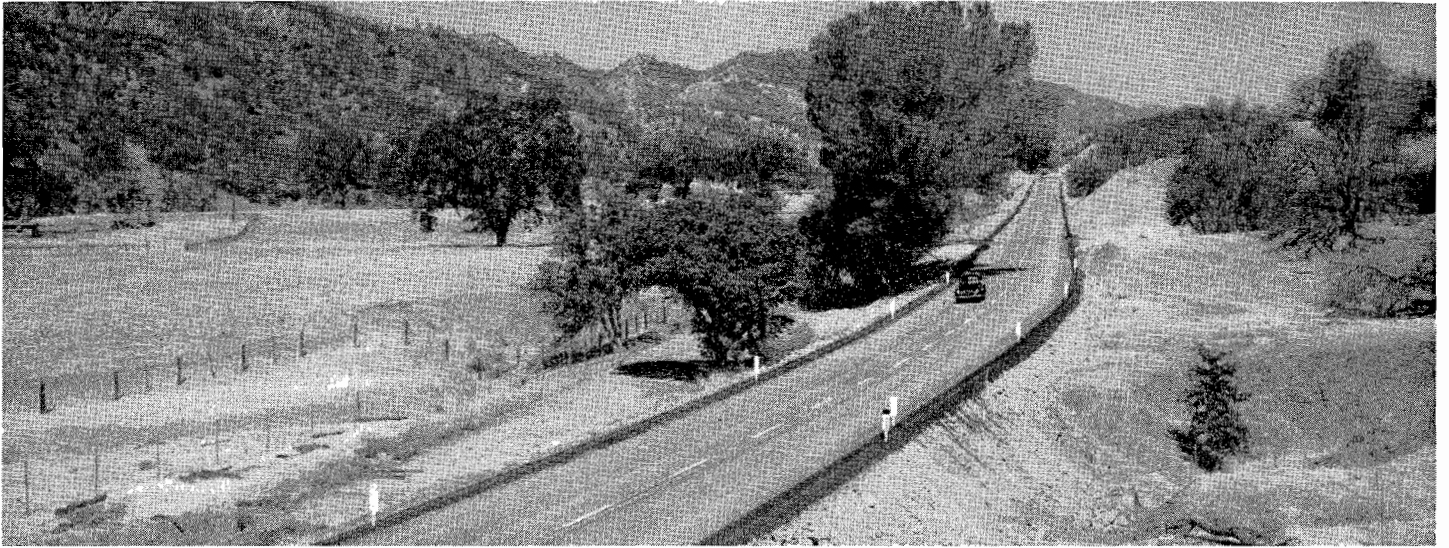
A reinforced concrete slab bridge 88 feet long consisting of three spans supported on reinforced concrete bents was built across Hot Springs Canyon Creek to replace an often washed out 20-foot timber bridge. As part of the improvement, the modern design standards used in the location was able to establish one tangent 7,600 feet long which replaced two crossings of Warthan Creek and two miles of winding road. Four additional crossings of Warthan Creek were eliminated by the construction of two major channel

changes of 10,000 cubic yards each, one on each of the two sections of the project.

The project was planned with a balance section between the cuts and fills. There was 275,000 cubic yards of material to be excavated from the cuts and channel changes with 1,700,000 station yards of overhaul necessary to complete the embankments. One mile from the easterly end of the project at engineer's Station 76+00, a thorough cut 700 feet long and 75 feet deep contained a total of 106,000 cubic yards. At this location, the alignment intersected a ridge which showed outcroppings of sandstone. Another sandstone outcropping was found along a 90-foot sidehill cut 2.1 miles from the easterly end of the project at Station 15+00.

Compaction Factor

From the materials available, the structural design of the roadbed was set up to place the embankments to within two feet of grade with a minimum relative compaction of 85 percent without the addition of water. Standard methods of compaction were



Three views of new Warthan Canyon highway. Lower picture shows official dedication party moving over newly completed section.

used above the plane two feet below grade. Twenty inches of select material obtained from the two sandstone cuts was to be placed as a cover over the structurally weaker materials predominating over the remainder of the job. The top four inches of this sandstone was to receive a bituminous surface treatment providing two 11-foot lanes with two-foot shoulders on each side. Berms or gutters were to be constructed throughout.

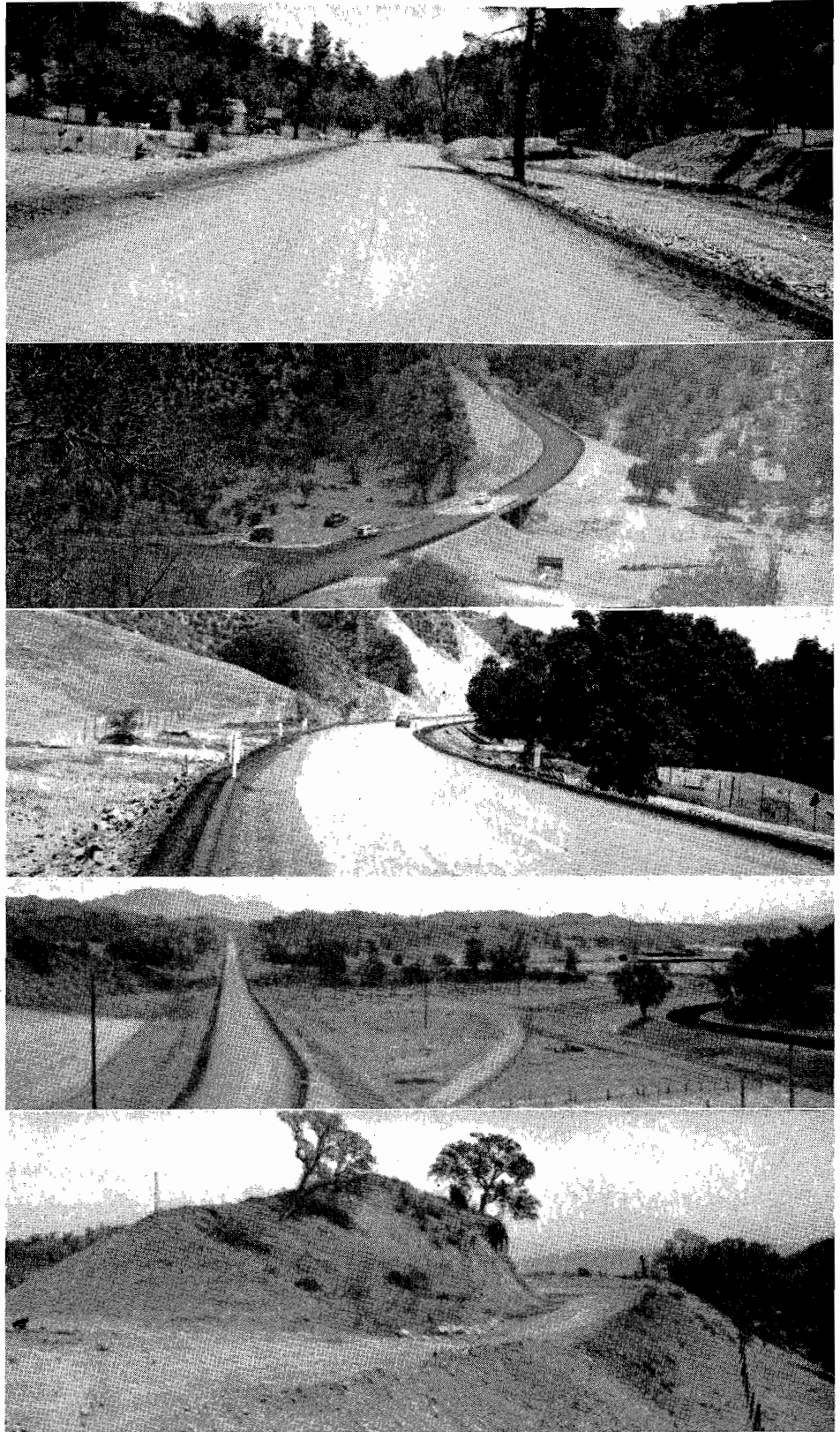
The contractor chose to use 12 cubic yards Tournapulls to do all of the excavation. Pioneering of the roadway section was accomplished with D-8 Caterpillar dozers and Caterpillar No. 12 power blades. Using up to six Tournapulls, the contractor moved a maximum of 8,000 cubic yards of material during a nine-hour shift. The 85 percent minimum compaction was easily obtained by routing the "pulls" over the entire fill width and supplementing at times with sheepfoot rolling.

Drill Rig Used

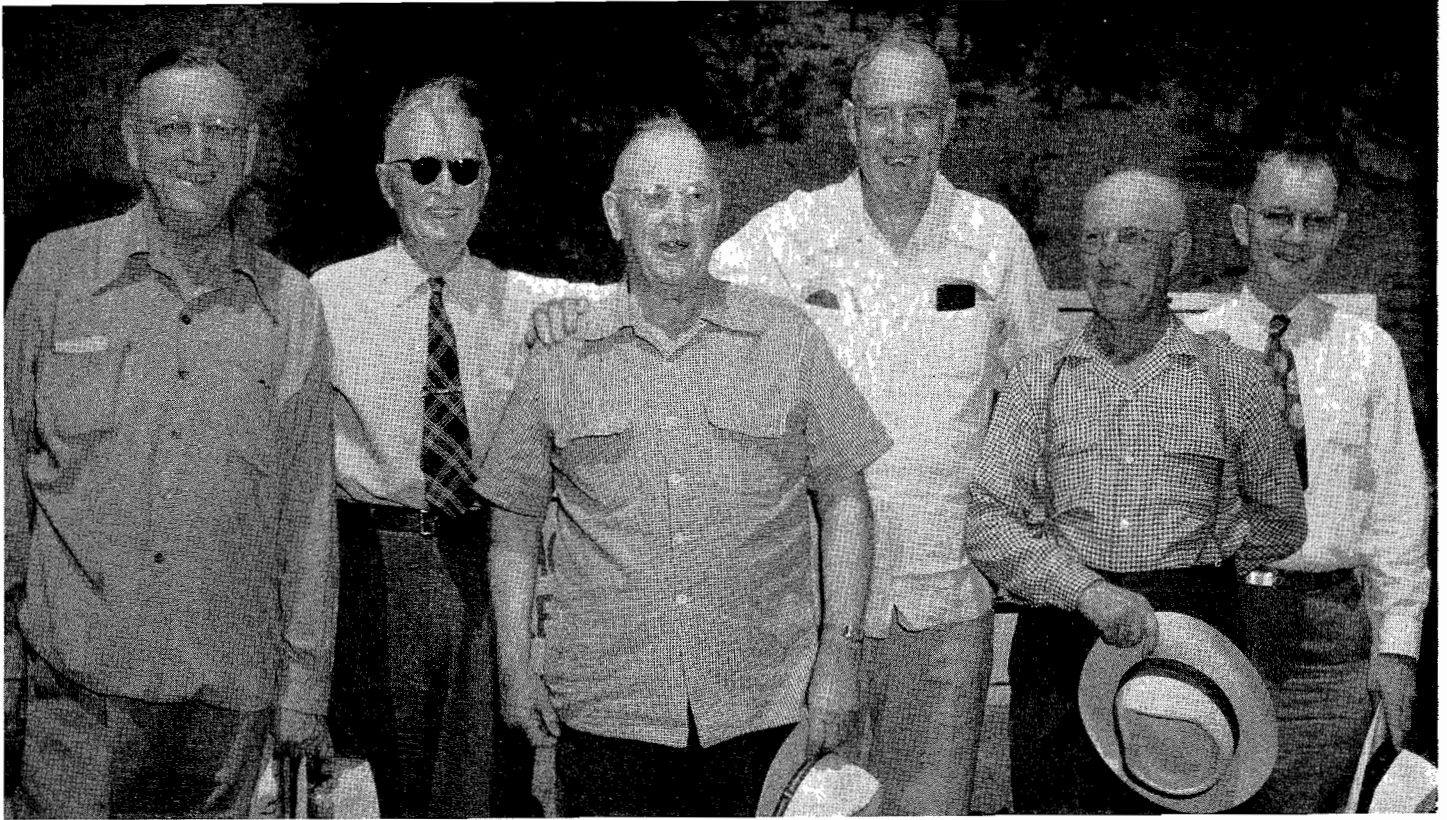
As the "big cut" at Station 76+00 was opened up, the district drill rig was brought on the job and samples were taken down into the center of the cut. Sampling ahead of the work in this manner proved to be a wise move as it was discovered that the "R" value necessary for the top layer of the select material could not be obtained from this cut. The drill rig brought material up from two of the test holes which gave the appearance of being a rich oil mix, but which proved to be two veins of low grade coal when the cut was finally excavated. Streambed gravel from Warthan Creek, approximately 1,000 feet south of Station 60, was tested and found to be satisfactory and was used in place of 12,500 cubic yards of the lower grade material of sandstone and coal from the "big cut."

Project Cost \$203,000

The bituminous surface treatment was done using SC-3 and SC-4 liquid asphalts with a Gardner mixer supplemented with blade mixing. The portion of the road using the sandstone select material from the sidehill cut at Station 15+00 was found to be extremely difficult to mix. The sandstone material was very absorbent—having a "K" factor by the centrifuge, Kerosene



UPPER—Channel change and new road at Lone Pine Inn. Bridge across Hot Springs Canyon Creek at easterly end of project. Ninety-foot hill cut approached by 2,500-foot radius curve. New 7,600-foot tangent replaces winding road on right. Sharp curve on old road three miles from easterly end of project eliminated by new alignment.



These are the "old timers" who for years have been working for Warthan Canyon project. LEFT TO RIGHT—F. J. McCollum, editor *Coalinga Record*; Frank Wells, J. G. Cheney, Highway Commissioner Warlow, Jacob Zwang, Robert Abel, *Coalinga Hot Springs*.

Equivalent Method of 1.5—and tests showed that the optimum oil content would be 9-12 percent. SC-3 liquid asphalt was added in four applications, mixing with the Gardner and power blades after each application. Approximately 8 percent of SC-3 was finally mixed into this material. The stream-

bed gravel on the remaining section was readily mixed and laid with addition of 5.5 percent of SC-4 liquid asphalt.

After one week of traffic, a Class "C" medium seal was applied, using approximately 22 pounds of rock and 0.25 gallon of penetration type emulsion per

square yard.

The total construction cost of this project was \$203,000. The contractor was John F. Blakemore of El Monte, California. The author was resident engineer, and the bridge department representative on the Hot Springs Canyon Bridge was A. E. Hoerchner.

Great Loss

Continued from page 4 . . .

istration and the Department of Public Works in obtaining through Congress and the Reconstruction Finance Corporation the funds necessary for the building of the bridge. However, these funds were obtained, largely through Mr. Purcell's efforts in Washington, and the Stanford freshman who had worked as a messenger boy in the Chicago Grain Pit began the stupendous task of bridging San Francisco Bay.

The bridge was opened to traffic November 12, 1936.

Charles H. Purcell is an honorary member of the American Society of

Civil Engineers, and a recognized national authority on public highways.

He is also a member of the National Executive Committee of Ten of the American Association of State Highway Officials and is a representative of the United States on the Permanent International Commission of the Permanent International Association of Road Congresses.

Mr. Purcell was appointed a member of a committee of 12 nationally known highway engineering experts by Secretary of Agriculture Henry Wallace in June, 1937, to promote maximum safety and highway utility; official title—Special Committee for the Consideration of Administrative and Design policies for Highways.

He served as President of the American Association of State Highway Officials in 1938.

In November, 1937, Mr. Purcell was appointed Executive Officer, California Commission for the 1939 Golden Gate International Exposition.

In 1944, the coveted George S. Bartlett Award was conferred upon Mr. Purcell by the American Association of State Highway Officials, the American Road Builders Association and the Highway Research Board of the National Research Council for "outstanding contribution to highway progress."

He holds honorary degrees of Doctor of Laws from the University of California; and Doctor of Engineering, University of Nebraska.

HIGHWAY COSTS

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

THE PAST 15 months have shown the most rapid increase in highway construction costs in California that has occurred since 1940.

This was revealed by the latest California Highway Construction Cost Index compiled by Richard H. Wilson, Assistant State Highway Engineer; Henry C. McCarty, Office Engineer, and Richard R. Norton, Assistant Office Engineer, of the Division of Highways.

The cost of state highway construction in California has increased 22.3 percent in the first half of this year and 48.9 percent during the past 15 months.

From the California index there is no indication that this upward trend will not continue in the future.

However, there are two other indexes that show a leveling off in the last several months. The Bureau of Labor Statistics Wholesale Price Index showed no increase from February to May, 1951, after rising 20.1 percent in the preceding 10 months. The Engineering News Record Construction Cost Index showed only a 1 percent increase from February to June, 1951, after a 10.7 percent rise in the preceding year.

From the trend indicated by these other indexes and a general knowledge that an oversupply of many consumer goods now exists, it may be reasonable to expect that a peak in the California Highway Construction Cost Index has been reached and there will at least be a leveling off in the near future.

Highway costs, as measured by the California Highway Construction Cost Index with the year 1940 taken as a base of 100, climbed during World War II and the postwar period to a peak of 216.8 in the first half of 1948. After 1948 there was a decline to 160 in the first quarter of 1950. From this point on there has been a very rapid rise. The second quarter of 1950 was 12.5 percent above the first quarter of 1950; the third quarter was 5.1 percent above the second quarter; the fourth quarter was 3 percent above the third quarter; the first quarter of 1951 was 10.6 percent above the fourth quarter of 1950, and the index reached 238.3 in the second quarter of 1951, which was 10.6 percent above the first quarter.

Following is a tabulation of the California Highway Construction Cost Index since the first postwar peak was reached in the first half of 1948:

Period	Index 1940=100	Change from previous period	Change from first half 1948	Change from first quarter 1950
1948 (first half)	216.8	-----	-----	-----
1948 (second half)	216.4	-0.2%	-0.2%	-----
1949 (first quarter)	200.4	-7.3	-7.6	-----
1949 (second quarter)	195.7	-2.3	-9.7	-----
1949 (third quarter)	187.9	-4.0	-13.3	-----
1949 (fourth quarter)	178.8	-4.8	-17.5	-----
1950 (first quarter)	160.0	-10.5	-26.2	-----
1950 (second quarter)	180.0	+12.5	-17.0	+12.5%
1950 (third quarter)	189.2	+5.1	-12.7	+18.3
1950 (fourth quarter)	194.8	+3.0	-10.1	+21.8
1951 (first quarter)	215.4	+10.6	-0.6	+34.6
1951 (second quarter)	238.3	+10.6	+9.9	+48.9

In Memoriam

WILLIAM T. HART

Appointed to the State Highway Commission by Governor Frank F. Merriam on July 7, 1936, William T. Hart of Carlsbad, the first Highway Commissioner from San Diego, died in an Oceanside Hospital on June 17th, at the age of 81 years. Mr. Hart had a distinguished record in public service.

A resident of Carlsbad for 30 years, Mr. Hart was resident agent for the South Coast Land Co., which owns property along the coast between Oceanside and Del Mar. He managed this company when it built the Del Mar Hotel.

He was appointed to the State Park Commission during the administration of Governor James Rolph, Jr., and aided in acquiring parks in San Diego County which now are a part of the State Park System.

Mr. Hart was a director of the Union Title Insurance & Trust Co. of San Diego, prior to his appointment to the Highway Commission by Governor Merriam. He was a district vice president of the California Real Estate Association and was an original director of the Oceanside Commercial & Savings Bank, which later was absorbed by the Bank of America. He was the first president of the San Diego County Development Federation.

A lifelong Republican, Mr. Hart had been active in affairs of the party. He was a Mason and was affiliated with the Scottish Rite Bodies, Shrine, Sciots and Grotto. He also was a member of the I. O. O. F.

Surviving are his widow, Mrs. Sarah M. Hart, and two sisters in Canada.

TRACY PUMPING PLANT

At the Tracy Pumping Plant near Tracy, California, six huge pumps, each driven by a 22,500-horsepower motor, lift water from the Delta 200 feet into the Delta-Mendota Canal, on the rim of the Central Valley Basin's western foothills.

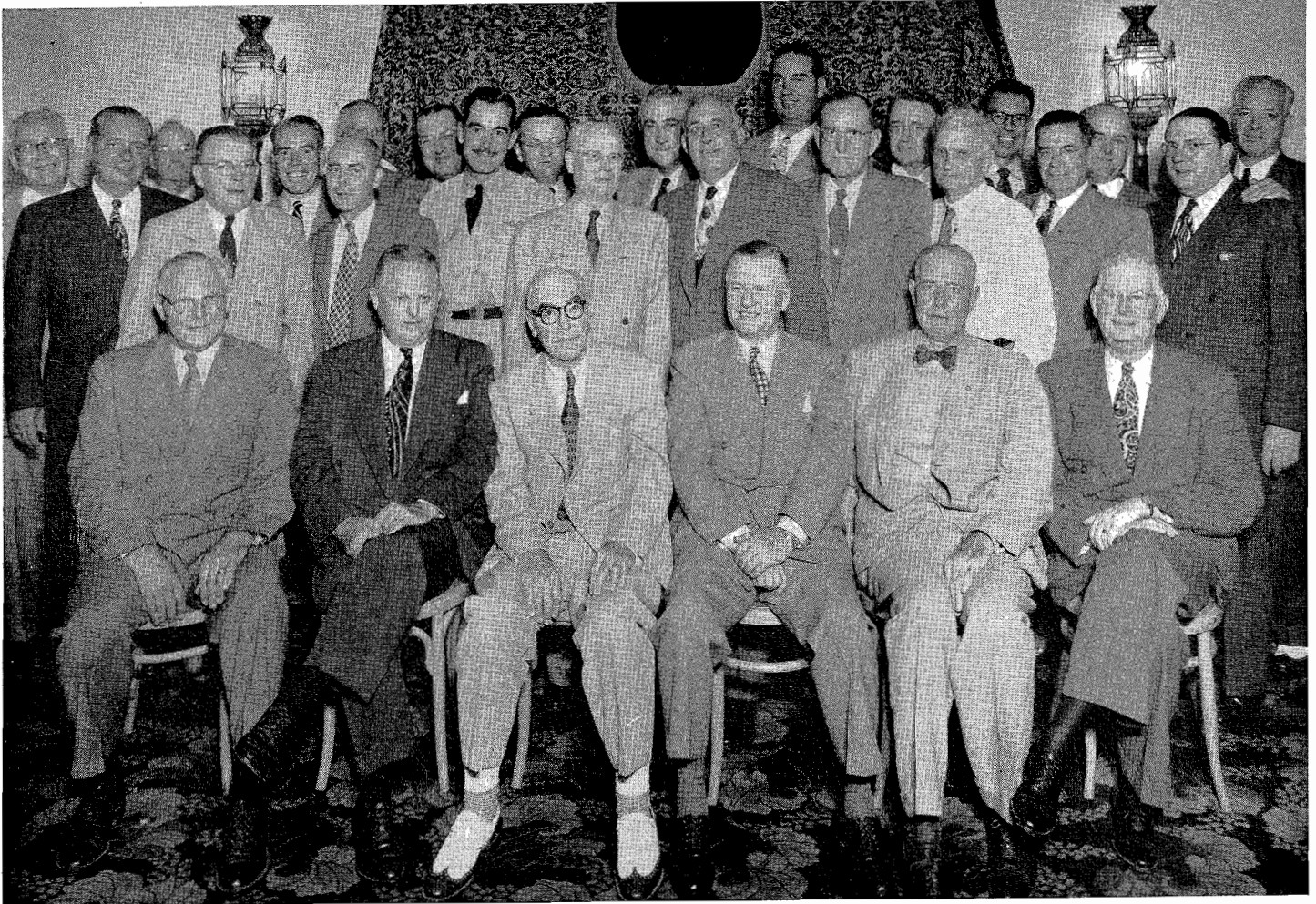
SHASTA LAKE

Shasta Lake, behind the Shasta Dam on the Sacramento River, when full will hold 1,460,000,000 gallons of Central Valley Project water, or enough to cover 450,000,000 acres of land to a depth of one foot.

C.V.P. OBJECTIVE

The prime objective of the Central Valley Reclamation Project is an equalization of the Central Valley Basin's water resources between the surplus water area in the north of California and the water deficient southern two-thirds of the valley.

Highway Commissioners and State Chamber Meet



ON JULY 19, 1951, the Executive Committee, State-wide Highway Committee, California State Chamber of Commerce, met with the California Highway Commission in Sacramento. The following were among those who attended the Annual Get-together Luncheon at the Sutter Club in Sacramento:

SEATED (left to right): Highway Commissioners F. Walter Sandelin, Ukiah; Harrison R. Baker, Pasadena; and Chairman Charles H. Purcell, Sacramento; State-wide Highway Committee Chairman Neil Petree, Los Angeles; Highway Commissioners Chester H. Warlow, Fresno; and James A. Guthrie, San Bernardino. STANDING (left to right): Assistant State Highway Engineer Paul O. Harding, Los Angeles; Rights-of-way Study Committee Chairman Dudley W. Frost, Oakland; California Highway Commission Secretary R. C. Kennedy, Sacramento; Senator Jesse Mayo, Angels Camp; Central Valley Highway Committee Chairman Irving Symons, Sonora; Chief Attorney of the Division of Contracts and Rights-of-way Robert E. Reed, Sacramento; Highway Deficiency Study Committee Chairman Frank H. Mogle, San Bernardino; North Coast Highway Committee Chairman Frank W. Luttrell, Santa Rosa; General Lacey Murrow, Commanding General, 434 Transport Carrier Wing, Camp Atterbury, Indiana; Central Coast Highway Committee Chairman Dr. E. J. Leach, Salinas; State Department of Public Works Deputy Director Frank B. Durkee, Sacramento; State Highway Engineer George T. McCoy, Sacramento; Central Coast Highway Committee Vice Chairman Claude T. Faw, Berkeley; San Joaquin Valley Highway Committee Vice Chairman Charles S. Ehrhorn, Visalia; Assistant State Highway Engineer J. W. Vickrey, Sacramento; Deputy State Highway Engineer R. M. Gillis, Sacramento; San Joaquin Valley Highway Committee Chairman W. S. Hillis, Madera; Sacramento Valley Highway Committee Vice Chairman John O. Bronson, Sacramento; Assistant State Highway Engineer R. H. Wilson, Sacramento; Chief Right-of-way Agent Frank C. Balfour, Sacramento; California State Chamber of Commerce General Manager James Mussatti, San Francisco; Southern California Highway Committee Vice Chairman Kenneth Kendrick, Los Angeles.

State Fair

Thousands Will Travel Over Splendid Highways to See It

CALIFORNIA'S splendid highways, which have contributed in great measure to the tremendous growth of California, will pave the way to the magnificent terminal where the treasures of the Golden State will be unveiled at California's Ninety-second State Fair in Sacramento, August 30th through September 9th.

Development of state highway routes to meet the needs of traffic is continuing at the accelerated rate which was made possible under provisions of the Collier-Burns Act of 1947. During the four years since the act became effective, 1,424 highway construction contracts with a value of \$327,301,200 have been placed under way.

During this period improvement has been made to a total of 4,017 miles of highway, of which 3,192 miles are located on the State Highway System, the remainder being on county roads in the Federal Aid Secondary System, in state parks and state institution grounds.

Divided Highways and Freeways

Traffic congestion in recent years has necessitated accent on development of four-lane divided highways and freeways on the more heavily traveled state routes, particularly in urban areas. Such four or more lane construction on the State Highway System completed since July, 1947, now under construction, or budgeted for the current year, totals 691.4 miles of which 599.1 miles are freeways.

Included in the yearly programs for state highway development are many projects on routes leading directly toward Sacramento from the several sections of the State.

U. S. 40 Improvement

Construction now under way on U. S. 40 between San Francisco and Sacramento is rapidly bringing to culmination the four-laning of the 90 miles from the state capital to the bay. Construction projects under way on this

portion of route will provide continual four-lane divided highway standards from the Carquinez Bridge to Sacramento with the exception of the Yolo Causeway, which is undivided. The work nearing completion in Solano County is being performed under two contracts and provides for construction to freeway standards of the six miles from the Cordelia Underpass to Ledge Creek near the county hospital and 1.7 miles through the southerly portion of Vacaville. The cost of these two improvements will be about \$2,000,000.

West Sacramento Freeway

In Yolo County, between the easterly end of the causeway and the Tower Bridge across the Sacramento River at the westerly entrance to the capital city, five contracts with a total value of more than \$900,000 are under way for the construction of eight grade separation structures necessary to freeway development on this portion of the route. Grading of the freeway will follow upon completion of the structures, a sum of \$520,000 having been included by the Highway Commission in the state highway budget for the current fiscal year. Pavement will be placed as soon as the graded roadbed is complete.

New Elvas Bridge

Work is progressing rapidly in placing the substructure of the new bridge at the Elvas Crossing of the American River on the proposed new approach of State Route 98 into Sacramento at 30th Street. The cost of the piers and abutments of this structure will total about \$730,000. Included in the current budget is an amount of \$750,000 for necessary grade separations on the approaches of the new bridge. Construction of the superstructure of the bridge and grading and paving of the proposed highway from C Street in Sacramento to a connection with U. S. 40-99E near Swanston Road will follow as funds are budgeted by the Highway Commission.

The sketch on the opposite page was drawn by Vander Goes, Bridge Department, Division of Highways



Widening H Street Bridge

To provide more adequate facilities for traffic entering Sacramento from the north on old Route 98, the State is widening the H Street bridge over the American River to four lanes at a cost of \$146,000 and the county and city are widening the underpass through the levee under the Southern Pacific Railroad and constructing four-lane divided pavement from the subway to Fulton Avenue.

Improvement of the so-called "River Road" between Woodland and Sacramento is being performed under a contract for widening and surfacing portions totaling 5.1 miles between E Street in Woodland and the Yolo By-pass. The cost of this work will be nearly \$200,000. Another project on this route is included in the budget for the current year in an amount of \$150,000 for grading and surfacing from one-half mile north of Kiesel to two miles south of Kiesel.

On U. S. 40 easterly of Sacramento, the six miles of four-lane divided highway between Auburn and Applegate has been opened to traffic during the past year. Plans are proceeding for carrying development of this route to freeway standards from the easterly end of the North Sacramento freeway to east of Roseville. Under a contract started this spring portions of this route on the grade between Donner Lake and the summit are being widened to relieve traffic congestion over the pass.

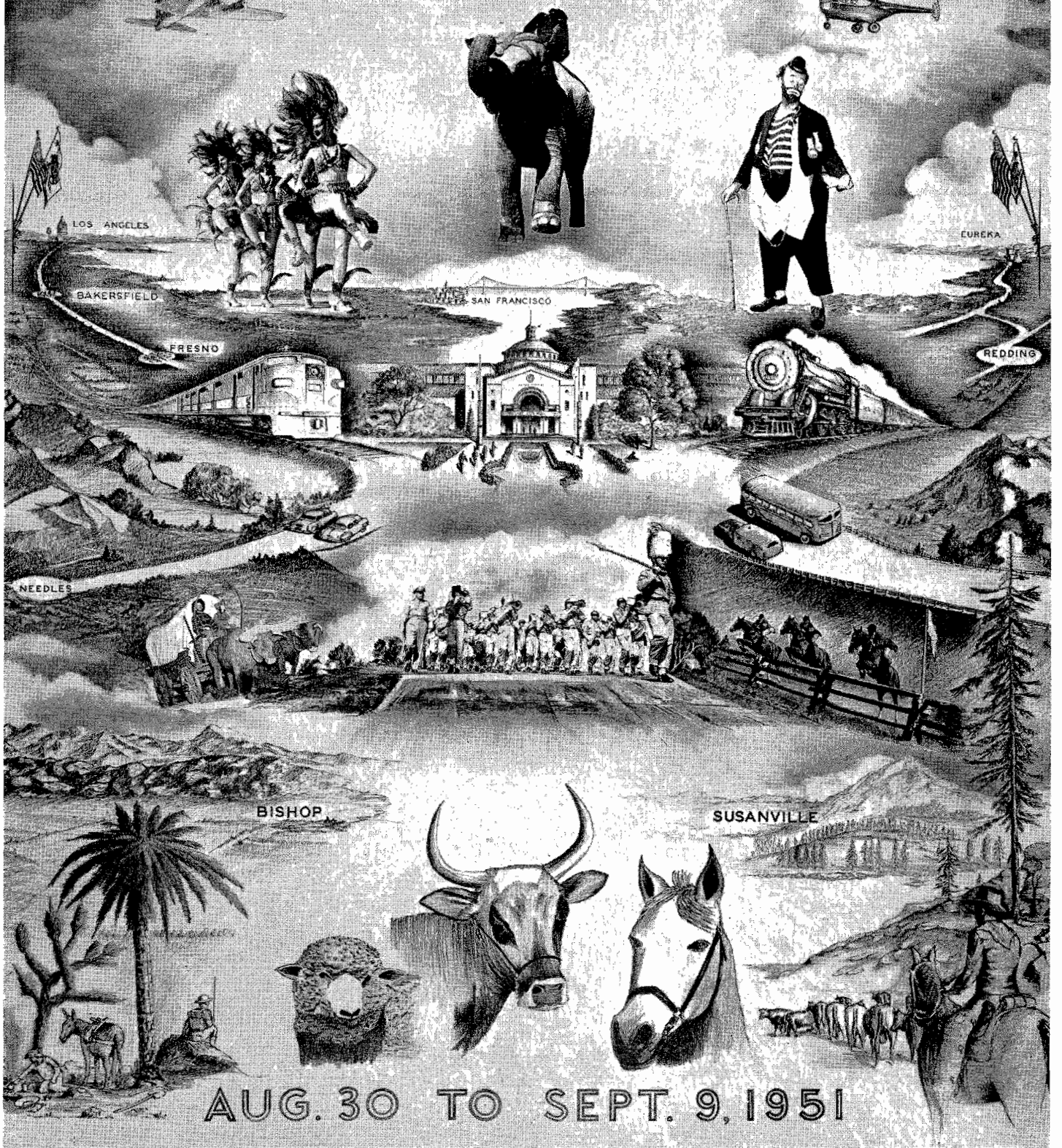
On U. S. 50 a contract is under way for straightening and widening two miles between the railroad crossing east of Placerville and Five-mile Terrace. This improvement will cost about \$326,500.

Alameda County Projects

Improvement of highways more distant, but nevertheless leading to Sac-

... Continued on page 54

WELCOME TO THE CALIFORNIA STATE FAIR SACRAMENTO



South of Border

Continued from page 5 . . .

Ingeniero Manuel Lopez-Vela, Chief of Construction, would arrive in Hermosillo on Sunday afternoon, July 15th.

Field Inspection Made

Monday morning, following further discussion with Governor Soto, a field inspection was made over the road to Kino Bay. The roadbed had been graded and shaped up but it was without surfacing or drainage structures. The country is generally arid and strongly resembles the desert regions of Southern California and Arizona. The land is relatively level, broken occasionally by small elevations or outcroppings of barren rock. The proposed highway traverses an area of gravelly soil which would produce an excellent road building material but this deposit terminates a few miles westerly from Hermosillo, after which the soil becomes heavier with considerable clay, finally changing to large areas of fine alluvial silt which makes up the excellent farm land of the lower Sonora River Basin.

This westerly area posed the chief problem leading the Mexican engineers to ask advice as the absence of readily available gravel or sources of crushed stone led them to consider the possibility of stabilizing the existing soil by some means.

Hveem's Recommendations

After an inspection of the materials and the existing roadbed, recommendations were made to utilize the local gravel within the limits of economical haul for the easterly portion of the project, a distance of some six or seven miles. Gravel was not available for the second section and the soils appeared to contain too much clay for economical or practical stabilization methods. However, small outcroppings of rock immediately adjacent to the highway appeared to be suitable sources for the development of crushed stone. This material could be utilized for the intermediate section reaching to the areas of fine silty soils. It was recommended that consideration be given to the use of Portland cement to form a stabilized base to be covered by a bituminous sur-

face hauled from the quarry sites mentioned above. Final recommendations, of course, were contingent upon the results of tests to be performed in the California laboratory upon the roadbed soils.

Sonora Enjoying Boom

After final discussions and tentative conclusions were reached, the engineers proposed a trip over the highway south of Hermosillo through the coastal city of Guaymas and farther south to Obregon and Navojoa. The highway from Nogales, Arizona, through Hermosillo to Guaymas is built on generally high standards of alignment and roadbed width and surfaced with dense graded roadmix bituminous mixture. The road from Hermosillo to Guaymas is in excellent condition. The surfacing is not yet completed on the portions further south to Navojoa. The new highway is now under construction, the gravel base now being placed will be surfaced by roadmix method. The highway south of Guaymas in the vicinity of Obregon and Navojoa traverses broad areas of farmlands, some under cultivation with many square miles now being cleared and prepared for farming.

Sonora is enjoying an agricultural boom; in addition to large areas of fertile land several factors have combined to encourage this development, chief of which has been the energetic activities of the able men who have held the position of governor in recent years.

Progressive Building Program

The former Governor Rodriguez of Sonora spent much time and money in the construction of dams to conserve the available water and also built many new and modern school buildings. At present, Governor Soto has continued the work on hospitals and schools and is placing special emphasis upon highways. The efforts of the state have been further aided by the interest and support of President Aleman. The Sonorans now feel particularly optimistic over their future and from a previously rather underdeveloped condition, Sonora is now rapidly forging to the front among the states of Mexico. The highways are being constructed to high

standards of alignment and grade with elevated grade lines for the most part well above danger of flooding.

The Federal Government maintains a materials laboratory in Navojoa and tests are conducted regularly on aggregates, soils and other materials of construction. Summer temperatures are high and field survey crews go to work as early as 5 a.m. as transit work becomes very difficult in the heat of the day.

Rich Area Needs Water

The return trip from Navojoa to Hermosillo was made by plane. The aerial view discloses a vast area of rich land which needs only water to produce heavily. The return to the air-conditioned hotel in Hermosillo was by no means unpleasant on the nineteenth of July, and departure for Sacramento was made at 4.40 a.m. the next morning.

The brief trip to Sonora was interesting and instructive. The Mexican engineers are coping with the problem of constructing highways and encounter many of the difficulties familiar to engineers in California, chief and most chronic of which is the lack of funds to build the roads that are needed. In spite of the fact that life proceeds at a somewhat more leisurely pace and at a more sedate tempo than is the case in California, the amount of work accomplished is impressive. Engineers and public officials in Mexico realize that there is much to be done. One American mining engineer who had lived in Mexico for over 40 years summed it up: "There is much to do but we do not try to do it all in one day."

Anyone having first-hand acquaintance with the pressures involved in the administration of a modern highway program could not help but enjoy the absence of nervous tension and the generally serene attitude with which problems are faced in Mexico.

As the plane circled above the airport before heading northwesterly to California, one looking down on this old Mexican city in the moonlight, could understand something of the feeling that led the founders to name the town Hermosillo, which may be literally translated as the place that is "a little beautiful."

WASHO

Highway Engineers From Western States,
Texas, Alaska and Hawaii Hold Meeting

WITH MORE than 300 delegates and guests in attendance, the Western Association of State Highway Officials held its thirtieth annual convention in San Francisco June 25th-28th.

The meeting was considered one of the most successful ever held by the association.

Governor Earl Warren went to San Francisco to extend a welcome on behalf of the State of California. Highway officials of the 11 western states—Washington, Oregon, California, Arizona, New Mexico, Nevada, Utah, Wyoming, Montana, Idaho and Colorado—and of Texas and the Territories of Alaska and Hawaii attended.

MacDonald and Hale Attend

Thomas H. MacDonald, U. S. Commissioner of Public Roads, Washington, D. C., headed a delegation of officials of the Bureau of Public Roads from the various states. He was accompanied by Hal H. Hale, Secretary of the American Association of State Highway Officials.

Highlighting most of the principal addresses was the theme of highways for national defense with emphasis also being placed on the need for increased efforts to diminish the tragic toll of deaths and injuries caused by traffic accidents.

General sessions in the Fairmont Hotel were called to order by President W. L. Anderson, Utah Highway Department, at 10 a.m. on Monday, June 25th. Following an invocation by Rev. James Lyons, S.J., University of San Francisco, a redwood burl gavel was presented to President Anderson by Supervisor T. Fred Bagshaw, Marin County head of the Supervisors Unit of the Redwood Empire Association.

State Highway Engineer George T. McCoy, pointing out the importance of the convention in these critical times, extended a welcome on behalf of the California Division of Highways.

San Francisco's official welcome was extended by City Engineer Ralph



STATE HIGHWAY ENGINEER GEO. T. McCOY

Wadsworth, representing Mayor Elmer E. Robinson.

Following a roll call of states by Secretary-Treasurer J. A. Elliott of Texas, President Anderson delivered the opening address.

President Anderson Speaks

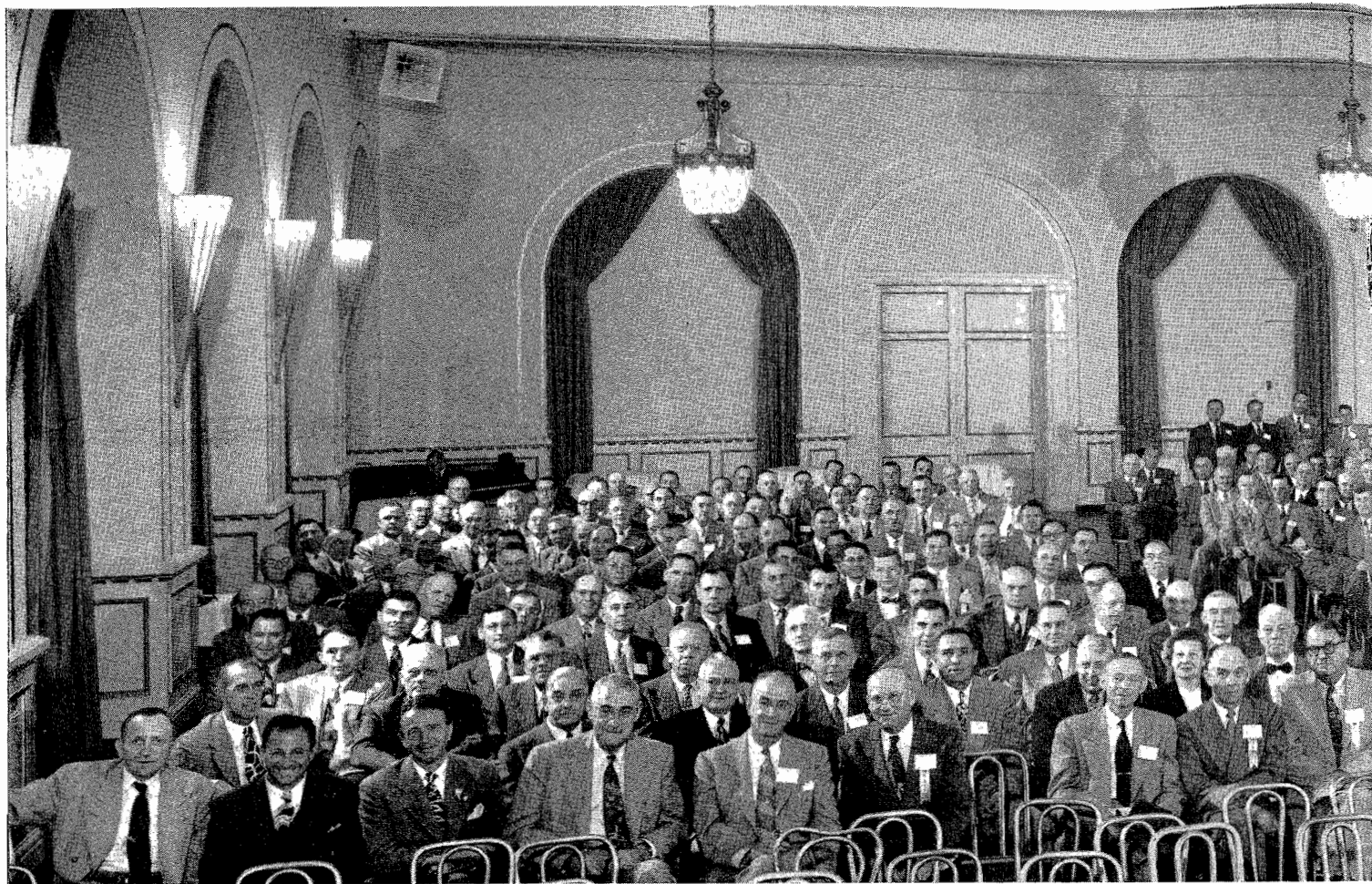
President Anderson stressed the urgent need for acceleration of construction of our highways to a modern standard, so that they will be able to carry the enormously increased loads and volumes of traffic which will be demanded of them should all-out war occur. He said, in part:

"It is eight years ago since WASHO last met in San Francisco. Fatefully, we were then, as now, entering a critical period with restrictions on highway construction beginning a like period of priorities and allocations of critical materials. At that time, we were entering the war where an all-out effort in conserving materials and manpower was necessary to build up this Nation into the greatest arsenal in the history of the world. To do this, the theory was ad-

vanced that roads were expendable, yet they played a part in that war that prevented a complete collapse of the transportation system. Other forms of transportation would have bogged down completely had it not been for the roads which carried the enormous quantities of materials and personnel. A Senate committee, in examining the Nation's war effort, found that "war production is dependent upon an economy geared to rubber." William M. Jeffers, Rubber Director of the War Production Board, declared "The greatest lesson of war is that domestic economy in this Country depends upon transportation—not only the transportation that is afforded by the railroads, airplanes, busses, and trucks, but also the individual transportation which every family has in its automobile."

All-out Preparedness

"As of today, we are not yet in an all-out war, and our effort is one mainly of preparedness. Considering that the highways have not yet recovered in necessary reconstruction of surfaces, bridges, etc., that took a terrific beating and neglect during the last war, I certainly believe that a most vital part of our preparedness program should be to accelerate the construction of our highways to a modern standard, so that they will be able to carry the enormously increased loads and volumes of traffic which will be demanded of them should an all-out war occur. Nothing could be more disastrous that a bog-down in highway transportation. I thought that this idea had been sold, yet of recent date those in authority in our national government have put out restrictions to hamper the highway program and have also requested that the legal load limits be waived or increased, as though by an act of law or regulation a road surface or bridge can be made to carry heavier loads. Increasing loads would only break down our present highway structure to what could easily be an impassable road. Before the railroads increase speed or



Delegates to Western Association of State Highway Officials assembled for first day's sessions

loads, their tracks are modernized with better alignment, grades, ballast, and heavier rails. The highways have always had a reversal of this procedure, rebuilding the highways after the increased load and volumes have been imposed, which has resulted in terrific costs in maintenance dollars, vehicle operation costs, and accidents.

Must Be No Slow-down

"There is only one solution, and that is to rebuild our inadequate roads and bridges at an accelerated rate rather than a slow-down. I believe emphasis should be given to our main highways, especially the interstate system, though not restricted to this system. In the West, unlike the East, our large areas have been developed in the motor age and are, therefore, not served by railroads. These areas contribute large amounts of food, minerals, and other raw materials to our national economy, and their entire existence depends on

motor transport. The roads to such areas cannot, therefore, be neglected, though they are secondary in character. For example, eight counties of the 29 counties in Utah are not served by any railroad, and in many of the other counties only a small percentage of the communities have railroad transportation.

"We realize there may be, for a period, not enough steel and other critical materials for our civilian and military consumption. However, highways should be given one of the highest priorities. If allocation is still necessary, it should be given to an agency which knows the highway problem and can make intelligent evaluation as to the necessity of the improvement. The Bureau of Public Roads should adequately qualify for this position. The allocation system should be set up so that prompt action can be obtained, as delays to our program in filling out forms and passing these through numerous

hands will seriously retard our national preparedness program. Our highways are needed now.

Problem of Bottlenecks

"With more highly developed long-range aircraft and more devastating explosives, consideration, as part of the civilian defense and preparedness program, should be given to the elimination of serious bottlenecks which might be blocked by bombing, sabotage, etc. Long stretches of alternate road cannot be built, but often short by-passes can be improved where structures and other physical obstacles will cause a most serious delay in repair of the highways or detouring the traffic. I believe an examination of this problem in each state should be given serious consideration.

"With the rapid increase in population which is occurring in most western states, sacrifice of any of our design standards can lead to early obsolescence with practically a total loss of our capital improvement. I believe if we are



of their thirtieth annual convention in the Terrace Room of the Fairmont Hotel in San Francisco

ever going to get a modern highway system, every cent that can be spared from maintenance and temporary emergency repairs should be spent on reconstruction with present-day modern standards, and to design for the projected increase in traffic within a reasonable period. It has been observed that widening and providing better surfaces generally increases the speed of traffic. Leaving inadequate alignment with curves which may appear to have a reasonable radius, and a grade line which does not meet the standards for sight distance for the traveled speed, or the sacrifice of most other good design features, will therefore contribute to an increase in accidents, and result in early obsolescence of the improvement. Continuous rebuilding of our roads with loss of capital investment justly destroys the confidence of the public.

"It is our job to convince the public, Congress, and the legislatures that half-way construction is false economy and

more money must be made available so that we can proceed with a program of high type modernization of our highways with a reasonable rate of progress. The truck owners and passenger car owners, I am sure, are willing to pay for good roads. This has been demonstrated on toll roads where the vehicle drivers are willing to pay approximately an additional cent per mile for passenger cars with increased sum for trucks in order to ride over a modern highway, rather than a parallel, inferior road of inadequate design. Economic analysis of vehicle operation over a proposed improvement, as compared with an existing facility will often show savings which will amortize the improvement in a few years. Such factors are shorter distances, grade reductions, savings due to elimination of traffic jams and stops, reductions in vehicle maintenance, and especially in the reduction of accidents. Indirect savings also result to the public, due to reduced mainte-

nance costs of such facility and in the over-all economy through reduction of transportation costs and better highway transportation service.

"It is the duty of the highway department to furnish all necessary data as to cost and needs; however, it should not be left entirely for the highway department to sell the program while the beneficiaries argue as to the distribution of the costs.

"The reason that secondary roads are given increasing consideration by the legislatures and Congress is because the farm lobbies and other local organizations and the individuals who live on such roads, which is a large proportion of the population in these areas, are constantly bringing this problem before the county commissioners, the legislatures, and the Congress; while few, except the highway administrators, lobby for funds for the main highways. In fact, the construction of primary road improvements is often criticized

RESOLUTION NO. 1

WHEREAS, The duly constituted authorities of the Government of the United States have found it desirable and necessary to place restrictions on the utilization of critical materials in order to properly carry out the necessary functions of the national defense; and

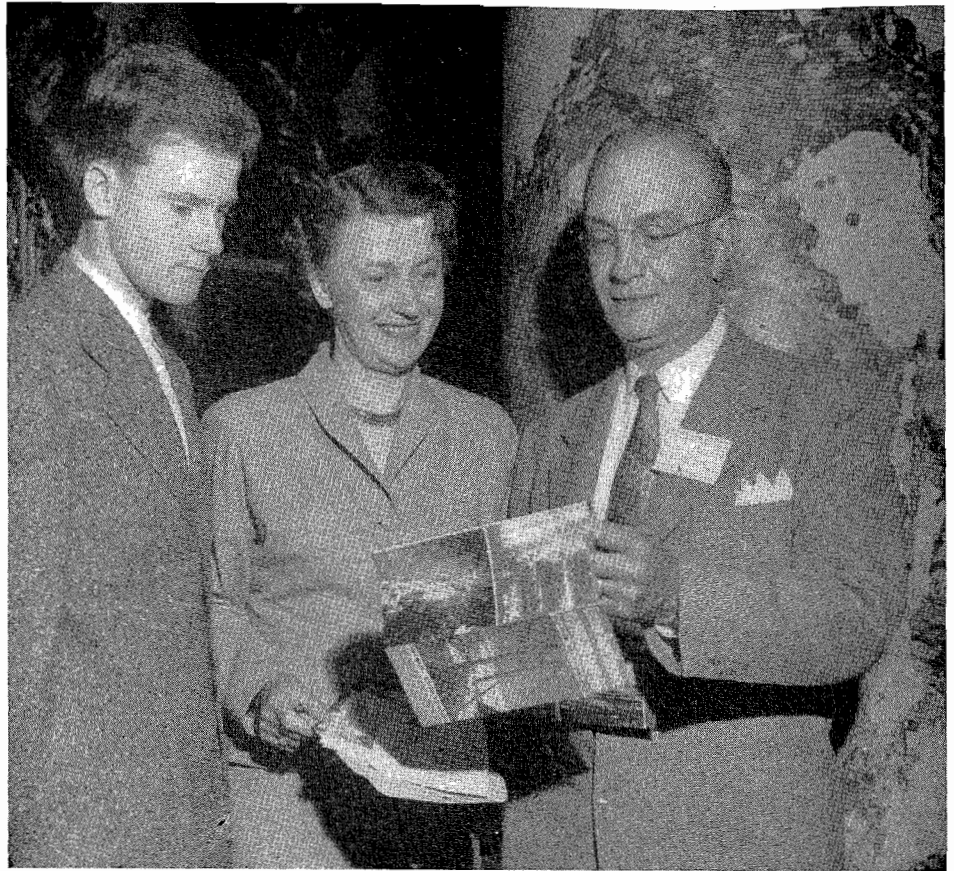
WHEREAS, The National Production Authority of the Department of Commerce has issued its Order M-4 relative to all types of construction including highways and roads; and

WHEREAS, The National Production Authority has most properly delegated the key functions under Order M-4 relative to roads and streets, through the Secretary of Commerce, to the Bureau of Public Roads; and

WHEREAS, Said delegation of authority on roads and streets has provided to the state highway departments a most logical procedure under said Order M-4; now, therefore, be it

Resolved, That the Western Association of State Highway Officials, assembled at San Francisco, California, on June 28, 1951, express its commendation and thanks to the National Production Authority for its wisdom in selecting this most efficient method of handling this difficult problem.

The president of the Western Association of State Highway Officials is directed to transmit copies of this resolution to: Mr. Manly Fleischmann, Administrator, National Production Authority; Mr. Charles Sawyer, Secretary of Commerce; and Mr. Del Rentzel, Under-secretary of Commerce.



WASHO President Anderson was accompanied to the convention by Mrs. Anderson and son, Don

by the local people, due to new rights of way and small town by-passes being required for modernization, so that the small portion of people who think that they will be inconvenienced by such changes often cause considerable delay or modifications which sacrifice good design. The highway department seldom receives the support it should by the highway user organizations who would be the beneficiaries, even though such organizations are in favor of the improvement.

Against Federal Fuel Tax

"Increase in federal fuel tax is again being considered by Congress. I vigorously protested this action to the members of the congressional committees on taxation and highways. The main argument brought up in the Utah State Senate for the reduction of the proposed motor fuel tax increase from 2 cents to 1 cent was that the proposed increase would result in a total 3½-cent increase, including the proposed increase in the federal tax.

"It is my opinion that we should continue to vigorously oppose federal fuel tax increases and leave this source of funds for state revenue which is so badly needed in our highway preparedness program. I also recommend that the association request Congress to return to the states a larger percentage of the motor vehicle and motor fuel federal taxes now collected by increasing federal aid highway appropriations. The Federal Government is not consistent wherein they penalize a state for diversion of road user taxes, yet they divert a large percentage of such federal taxes for other purposes.

"Though the association has in the past emphasized to Congress the need for adequate forest highway appropriations, these appropriations are still behind the authorizations as made in the highway acts. This revenue is very much needed at this time in the development of forest highways to obtain the necessary timber and other raw material to meet the increasing demands of these materials for defense purposes. The forest appropriation affects mainly the western states, and it is, therefore, our duty to call the attention of Con-

gress to the urgency of adequate appropriations for this purpose.

"Before closing, I would like to mention one other thing which should cause some serious thinking. This year will probably see the one-millionth man who has died in the defense of his country in all wars since the first gun was fired for independence in 1776. Also this year, we will have the

RESOLUTION NO. 2

WHEREAS, It will be necessary that the National Congress re-enact the Federal Aid Highway Act in 1952 if continuity is to be provided for the programs of development of the highway systems of this Country; now, therefore, be it

Resolved, by the Western Association of State Highway Officials, assembled at San Francisco, California, on June 28, 1951, That the Executive Committee of the American Association of State Highway Officials be requested to take all necessary steps, in the Fall of 1951, to prepare data and a program to support a proposed Federal Aid Highway Act of 1952, in order that no time may be lost in the enactment of such necessary legislation by the National Congress as early as possible in the 1952 session.

one-millionth man killed by motor vehicle, in a comparatively much shorter period. Our expenditures to save lives in battle is tremendous, but are we not calloused to the highway deaths and are we as a Nation, state, community, and individuals doing what we can to reduce this slaughter?

"I have emphasized in my paper the necessity for taking into consideration every reasonable factor which will reduce accidents, and I recommend that as an association and as highway administrators we consider highway accident reduction as our number one problem, so that we can travel over our highways with a reasonable degree of safety."

Baldock of Oregon Speaks

State Highway Engineer R. H. Baldock, of Oregon, held the attention of the convention with a constructive address on "Essentiality of Highway Construction to the National Defense Effort" which is printed elsewhere in this issue.

During luncheon in the Tonga Room of the Fairmont Hotel on Monday, the delegates heard Howard G. Vesper, President, California Research Corporation, who discussed the oil potentialities of the West and the production of oil from shale.

The principal speaker at the afternoon session was U. S. Commissioner of Roads MacDonald, whose subject was "Maintaining a Sound Highway Plan." Other speakers were Secretary Hale, of the American Association of State Highway Officials, George Keating, Production Engineer, Office of Defense Mobilization; Assistant State Highway Engineer R. H. Wilson, of the California Division of Highways, and A. N. Carter, Co-Secretary, the Associated General Contractors of America, whose subject was, "Contracting in a Period of National Emergencies."

Vice President Nash Presides

Vice President A. M. Nash, District Highway Engineer of the Division of Highways, Eureka, presided at Tuesday morning's general sessions, during which the convention heard addresses by Fred Burggraf, Associate Director Highway Research Board; Wade Sherard, General Manager, Motor Truck Association of California, who promised the support of his organization in

all matters pertaining to the protection of highways; and State Highway Engineer W. A. Bugge, of Washington State, who discussed relations between state highway engineers and contractors, in an interesting address on "Penalties for Overrun in Contract Time."

Warren Urges Increased Safety

Governor Warren was given an ovation when he arrived to address the convention at 11 a.m. In his talk "The Importance of Highways to the West," he took advantage of the occasion to make an urgent plea for cooperation between all federal and state and local agencies in reducing traffic accidents on highways.

Tuesday afternoon Deputy State Highway Engineer R. M. Gillis, California Division of Highways, presided at an operations session which heard Earl Withycombe, Assistant State Highway Engineer, Sacramento, on the subject of "Cement Treated Base Construction in California"; Ralph Moyer, Research Engineer, Institute of Transportation and Traffic Engineer-

ing, University of California, on "Skid Resistance Measurements"; Walt Winters, Chief Engineer, The Asphalt Institute, on "Simplification of Grades of Asphalt," and Bailey Tremper, Materials Engineer, State of Washington, on "Paints and Protective Coatings."

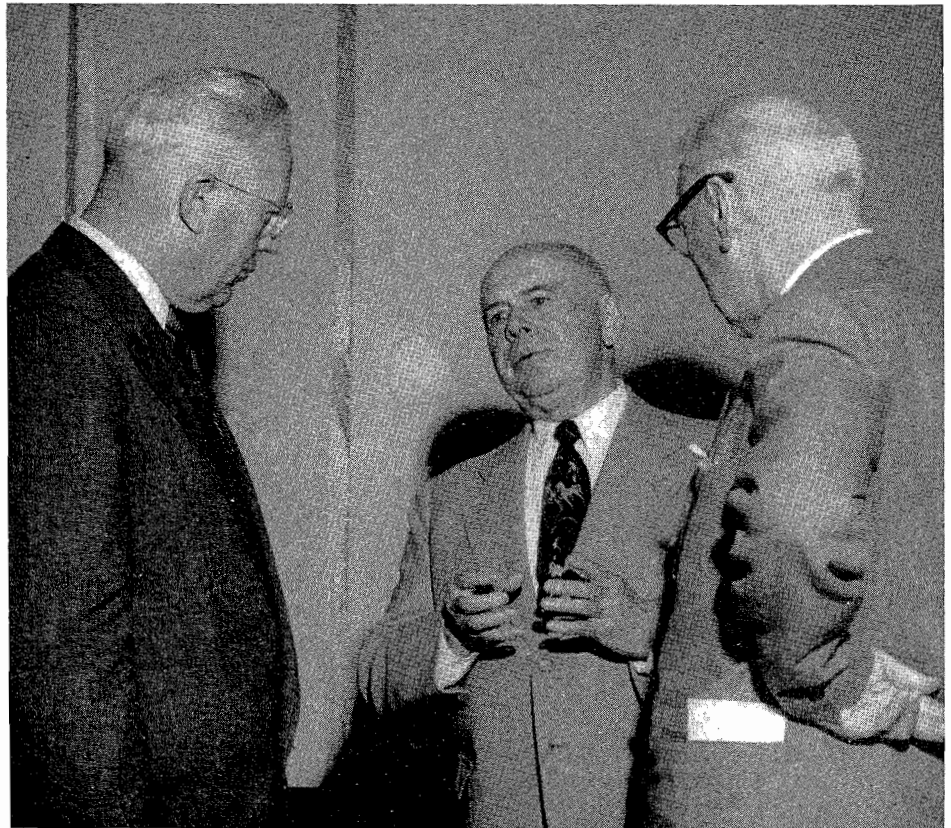
State Highway Engineer Mark U. Watrous, of Colorado, presided at the Design Session Tuesday afternoon. Speakers were Eugene Maier, Chairman, Highway Research Board, "Channelization and Intersections"; William E. Willey, Engineer of Economics and Statistics, Arizona, "Truck Speeds on Grades"; V. A. Endersby, Chairman, Trixial Institute Research Cooperators; and Harmer Davis, Director, Institute of Transportation and Traffic Engineering, University of California, "Analysis of Data on Accident Statistics."

Annual Dinner

The annual WASHO dinner was held in the Gold Room of the Fairmont Tuesday night.

... Continued on page 54

Governor Warren, left, U. S. Commissioner of Roads MacDonald and Director of Public Works C. H. Purcell absorbed in discussion of highway problems



Plea For Safety

Governor Warren Urges United Action to Reduce Highway Accidents

IN WELCOMING the delegates to the Western Association of Highway Officials to California, Governor Warren made an urgent plea for united action designed to reduce accidents on highways.

A Plea for Safety

"I want to have all the agencies in our State which have anything to do with the traffic problem to work with those in every other state in the West, and I do hope that we can do something substantial about it," the Governor said.

"I think that we can do something about it in the planning of our highways. We know that we have 73 percent less fatal accidents on our divided highways, limited access highways, than we have on our regular highways, though they are good highways. So, I believe that the more freeways we can have, the more limited access highways that we can add to them to reduce hazards, and the other complications in traffic, the better off we will be.

"So, gentlemen, I believe that because you are interested in these same things in which I am interested, and in which our Highway Department is interested, we are more than fortunate to have you here with us in our midst.

"We know that we can learn from what you are doing in your states. We believe that something good is bound to come from counseling with one another.

"I believe that we can say with just pride that we are as progressive out here in the West as any other part of the Country. I believe we can say we are not afraid to try, if we believe something will accomplish good, and I believe we are about as neighborly a people as is to be found on earth, and with those qualities, and with natural western ingenuity and initiative and courage I believe that we can have programs that will develop the finest highway system in the world, and what is even more important, make them the safest for our people to ride on."



Governor Warren addresses convention

The Governor's address, in part, follows:

"I want to bring to you at this time a very cordial, even though it's a belated welcome. I regret that I could not have been with you yesterday and have had the opportunity of sitting through all of your discussions, because I know there is no one in my State who needs the benefits of your views or the inspiration of your presence more than I do.

"We in California are highway conscious until it hurts, because we recognize the seriousness of our deficiencies, and, as we look forward into the future, we realize that our problems are very, very great indeed. We are working on our problems every day, but we do have a greater sense of security that we have in our midst those from our neighboring states who are also highway-minded, and who are trying to do something about it. We realize that what we do here in California for highways, and what we don't do, affects your problems in the other west-

ern states, just as much as what you do and don't do, affects us.

United West

"We see in this great west and southwest country of ours, a region in which each state has much in common with its neighbors, and in the aggregate, constitutes an empire, an empire that stands in great strength to our Nation, and happiness and prosperity to those who live here, if we just plan properly for the future.

"And I have always believed that anything that helped any one part of this great western country, helps the entire West, and by the same reasoning, anything that hurts any part of the West, hurts the entire West.

"And so, we want to know what you are doing, and how you are doing it; we want to exchange ideas with you. We want to grow up with you, because every one of these western states and Texas as here represented, are still growing up. We are still 'teenagers.'

Common Understanding

"We still have the better part of our lives before us, and the best way to do all of this is to have common understanding, and to do as much planning together as it is possible to do, particularly in the field of highways.

"I want to say to you, without any attempt at flattery, that no group of people in this great West is doing more to open, to use our natural resources, doing more to attract populations, or to expand markets, or to undergird our economy than your highway planners and builders.

"Our highways in California have had a very logical and a very natural development. They date back about 175 years. As a matter of fact, San Francisco is at present celebrating the 175th anniversary of her founding, and the foundation for our highways was laid a few years before that.

Padres Blaze First Highway

"First came the intrepid De Anza, and Portola to blaze the first trail in

California for His Majesty, the King of Spain.

"Then came the kindly padres, intent on establishing Christianity in western civilization in this great western world, and as a part of their travels through Southern and Central California, up through Sonoma, about 25 miles north of here, they established the El Camino Real.

"This was all done by the beginning of the nineteenth century.

"Then came the trappers and the traders, mountain men, such as Kit Carson, restless and adventurous, and they too developed trails across our mountains and our valleys.

Early Trails

"Then came the Argonauts across the Rockies, and across the plains, and across our own mountains, in their prairie schooners, in search of gold. They developed trails.

"Then came the pioneers, from the Louis and Clark Expedition, down through Oregon and through Northern California.

"Then, of course, after that, came the Iron Horse.

"And all of these moves established immigrant trails, which with few deviations, now constitute the major state highways in California.

"Then our motor vehicles came along, and they became the beneficiaries of all this travail until today we have one of the finer highway systems of the world.

"One of the greatest things about our highway system is that they bring us into closer contact and intimate friendship with you, our neighbors.

Spectacular Development

"People are still following the admonition of Horace Greeley to 'Go west, young man, go west.'

"There is no more spectacular change in the population pattern of this Country at any time, than has occurred in these western states and Texas during these past 10 years.

"In 1940, there were 20,000,000 people in these states. Today there are 27,000,000 people, and we have the same proportions so far as motor vehicle registration is concerned.

"In those states in 1940, we had 7,000,000 registered automobiles. In

1950, we had 12,000,000. The growth is fabulous, but as you all know, perhaps even better than I do, it creates problems, and one of those problems falls upon you as highway planners and builders and administrators.

Value of Highways

"Judging by present day trends, the future does not offer any haven of rest for any of our highway officials because, for instance, in California, our population has increased so rapidly that we are bewildered from day to day by the kaleidoscope of the changing pattern of life.

"Life has been very good to us out here in the West, and I think principally because, or at least for one reason, because we have had people who have been devoting their lives to the development of good highway systems.

"No longer does rural life mean narrow isolation and drudgery for people, no longer does it mean congestion in our metropolitan centers. We have complete movement here, perhaps freer than in any other part of the world, and because of that, we all have a better life, and are building a better place in which to live for our children and for their children.

Postwar Construction

"But we must keep it up, day in, day out. In California, we have tried to do our part; we have initiated a program that has resulted in great development in our highway system.

"We started during the war, World War II, to accomplish this result, because during the depression years, and the very early war defense period, we had no opportunity to construct new highways, but we did do our planning during all the war years. We had our plans on the shelf.

"When VJ Day came along, it took us only a matter of weeks to get our construction started, but we were not financed adequately and it became necessary for us to adopt a more comprehensive plan based upon the recognition of the necessity for a system of highways with emphasis on limited access to them.

Highway Legislation

"So, in 1947, through the cooperation of all of the people in California

who were interested in highways, we had a special session of the Legislature. The Legislature remained in session from January until June, until it knocked down all of the opposition to a good highway system and program, and emerged with what we know in California as the Collier-Burns Bill, which does increase the revenue of the State for highway purposes, and makes it possible for us to attack in a very substantial way the deficiencies which have accumulated through the depression years and the war years, and which were greatly accentuated by the tremendous growth during that same period.

Huge Program

"It might interest you to know, that since July 1, 1947, we have actually constructed \$380,000,000 in highways under this single program. At the present time, we are advertising for \$15,000,000 in bids and we have budgeted another \$130,000,000 for the fiscal year beginning July 1, 1951, or, a total of \$526,000,000 for actual construction purposes since July 1, 1947.

"With this money, we have built 3,722 miles of highways, including 584 miles of modern divided highways, and at the present time bids have been submitted for 136 miles more of divided highways.

"Now, this is progress, but it is not enough.

"We are falling behind, day by day, and we must find a way in California to accelerate our construction program because the registration of automobiles not only keeps pace, but it goes beyond anything we can do in the construction of highways.

"You know, our population has grown along with these other things. In 1940, we had 6,900,000 people in California.

"In the 1950 census, we had 10,560,000, and it is estimated that in 1960 we will possibly have 14,000,000 people.

"In automobiles we had approximately 3,000,000 in 1940, we had 5,000,000 in 1950, and it is estimated that we will have 6,500,000 in 1960. So, we just have to be highway-minded, we have to keep our minds on it, day in and out, and we have to do this not only for our own pleasures, but we must do it if we are going to play the part this great western country should play in the defense of our Country.

National Defense Factor

"I firmly believe that our system of highways will have a very marked influence upon the national defense program, whatever it may be.

"During these days, we have a good many responsibilities.

"I think that first, we have a responsibility to carry on our programs of highway development and maintenance, and to make them just as effective as possible in the national defense program.

"I believe we must continue to modernize and maintain our state highway systems, not only for the defense program, but for the happiness and the security of our own people, and for the purpose of attracting our neighbors from the Middle West and Eastern states to this great western empire of ours.

"I believe we must protect our highways against abuse of every kind. I believe that we must protect them against the abuse of overloading. I believe that Mr. Sherrard is correct when he says that the motor vehicle industry of this part of the Country is trying to work with us. I am sure, between them and you who are officials of the highway systems and our Legislature with its understanding, that we can protect our highways against overloading and other abuses that are designed to destroy them and make them not usable for all the purposes that they should be used.

Increased Safety Needed

"And then, I want to say something to you about safety. I believe that is one of our greatest responsibilities. It seems to me that there should be some way we can figure out a way to increase the safety factor. I don't know what the answer is. I have been a law enforcement officer for a good many years of my career. I've talked with most of the important law enforcement officials in this State. It seems to me that the matter is truly very complex.

"But, I do believe that those who are interested in good highways and the safety of our people have the ability to work out some kind of program that will keep us from destroying life as we have been doing at the present time.



HAL H. HALE, Secretary of AASHO

Appalling Toll

"You know, last year in the United States there were 35,000 people killed and 1,200,000 people injured in highway accidents. Why, that makes the Korean figures just look small and inconsequential. But still, nobody seems to get terribly excited about it. We do, if it happens to reach into our own homes or into the circle of our friends, but somehow or other there has never been a public awareness of the great danger on our highways, and until there is, I am satisfied that we are going to have an uptrend in accidents, and, in all probability, fatal accidents, because we are living in a world of speed. The farther we go along in that world of speed, the faster people want to travel on the highways, and many times, speed is accompanied by recklessness which raises the probability of accidents geometrically.

"So, I wish that we could bring about some kind of an understanding between law enforcement officials, judges, highway officials, highway users, and other interested groups that could result in a real, concerted and concentrated effort to knock down this terrible accident record that we have throughout our Country."

RESOLUTION NO. 3

WHEREAS, The Western Association of State Highway Officials recognizes the necessity and immediate need of construction of a test road in order to determine the effect of various axle loadings on nonrigid type of pavement; and

WHEREAS, The majority of the state membership of the Western Association of State Highway Officials have expressed their desire to participate in the construction and operation of a test road in cooperation with the National Academy of Sciences; and

WHEREAS, The National Academy of Sciences, through the Highway Research Board, has signified its willingness to supervise and administer the construction and operation of said road; and

WHEREAS, The Highway Research Board will obtain the cooperation of the Bureau of Public Roads and other interested agencies in financial participation; and

WHEREAS, Such financial participation will be approximately \$95,000; and

WHEREAS, The estimated cost of said test road is \$180,000, exclusive of the above mentioned participation; and

WHEREAS, The participation of the respective member states will be on an equal basis, except that the State of Nevada, by legislative restrictions, is limited to \$15,000; and

WHEREAS, The location of said test road should be in an area where the climatic and soil conditions are representative of the greater portion of the western region, and to be as centrally located with respect to the participating states as possible; and

WHEREAS, Such location will be in an area consisting of Southeast Idaho, Southwest Wyoming or Northwest Utah; and

WHEREAS, The Standards Committee of the Western Association of State Highway Officials is so constituted to determine the specific location and prepare the specifications; and

WHEREAS, The Council of State Government recognizes the need for a test road in the western region as a basis of determination of the equitability of the highway users' costs; now, therefore, be it

Resolved, 1. That such a test road be undertaken and agreements entered into with the National Academy of Sciences to administer the test road.

2. That each participating state shall share equally in the cost of said road with the exception of the State of Nevada.

3. That the Standards Committee of the Western Association of State Highway Officials determine the specific location and specifications within 30 days.

4. That an advisory committee be established, consisting of one member from each participating state, to be appointed by the chief administrative officer, and one member representing the Council of State Governments.

5. That the present Subcommittee on Test Road Planning, as appointed by President Anderson, be continued and augmented by one member from the state wherein the test is located, until such time as the advisory board has been established and is operative.

6. That, if a specific location is not determined in 30 days, the states be again polled for an alternate location that can be expedited to completion.

California Again Wins Award of National Safety Council



State Highway Engineer McCoy holds National Safety Council annual award which was presented to Governor Warren, left, by F. M. Carter, extreme right. In center U. S. Commissioner of Public Roads MacDonald and Public Works Director Purcell.

FOR THE third time during his tenure of office, Governor Earl Warren has been presented with the Annual Award of the National Safety Council in recognition of California's outstanding engineering performance in traffic safety activities.

The award was handed to Governor Warren by F. M. Carter, Western Director of the Institute of Traffic Engineering, at a brief ceremony at the Fairmont Hotel in San Francisco which was a part of the second day's program of the Western Association of State Highway Officials.

In presenting the award, Carter said: "Governor Warren, California again, under your leadership, has distinguished itself in its efforts toward the problem of national highway safety. During your administration and through your efforts, the Collier-Burns

Act has provided the means for accelerating the State's efforts to make driving on our highways safe.

"For years the National Safety Council has evaluated the programs of highway safety as between states and has recognized those outstanding states with appropriate awards. Recently, the council regrouped the states, through its committee of judges, of which Mr. Thomas H. MacDonald, Commissioner of U. S. Bureau of Public Roads, is chairman. California was placed in that group which includes the most thickly populated and heavily trafficked states: New York, Pennsylvania, Ohio, Illinois, Michigan, Indiana, Texas, and California. In each year's evaluation, the judging of the question of improvement in traffic engineering has been conducted by the National Safety Council through the Institute of Traffic

Engineers, a nation-wide professional society composed of state and city traffic engineers.

"In the years 1947 and 1948, California won first place in traffic engineering as against the Eleven Western States. Plaques of recognition were presented to the State by the Institute of Traffic Engineers. In the year 1950, California again has won recognition as that state of the eight most thickly populated states which has shown outstanding engineering performance in traffic safety activities.

"As a director of the Institute of Traffic Engineers, it is my very great pleasure, on behalf of that organization, to present to you this award in recognition of California's outstanding accomplishments in traffic engineering."

CEMENT TREATED BASE CONSTRUCTION IN CALIFORNIA

By EARL WITHYCOMBE, Assistant State Highway Engineer

(Presented at WASHO Conference June 25, 26, 27, 1951, by Mr. Withycombe.)

CALIFORNIA lays no claim to having contributed in originating the successful use of cement in the treatment of soils and bases. Much to the contrary, California was one of the first to demonstrate that cement as a treatment to subgrades was an unsuccessful procedure.

The use of concrete as a pavement type in the interior valleys of this State began in 1914. In this earlier construction the subgrade consisted of whatever material was encountered in excavation, which in a great many instances was the highly expansive valley clays commonly known as adobe. These clays possess a lineal shrinkage in excess of 10 percent. Early in the life of these pavements it became evident that the destructive effect of the subgrade was far greater than that of traffic. Much thought was given to subgrade corrective measures, and in 1921 a day labor project was set up in connection with a going contract for the paving between Denverton and Rio Vista to provide admixtures with the native adobe of portland cement, hydrated lime, limestone and bitumen.

30 Years of Service

A condition survey was made in 1924 which disclosed no visible evidence of any benefit from any of the subgrade treatments and interest in the study ceased. In April of this year it was decided to investigate the condition of the soil treated with cement after 30 years of service. Cores were obtained of the subgrade which indicated that the original construction had been so poorly conducted that none of the subgrade could be considered as having been treated in the manner contemplated. To those of you who have attempted to mix cement with tenacious clays, the reasons are understandable. The mixing process had



EARL WITHYCOMBE

been so crude that pure cement was found in thin lenses and there was little apparent intimate mixture with the subgrade soil. The very interesting disclosure in the investigation was that no evidence of deterioration of the cement treated mixture was apparent where the cement had been properly incorporated.

1938 Experiment

In 1937 California became interested in the Texas work with low cement content pavements with the object in mind of creating a better base for bituminous surfacing than was afforded by the rock bases in use at that time. In 1938 a contract was let for the construction of a section 0.95 miles in length in which the specifications provided the concrete be designed on a strength basis rather than a fixed cement content in which a minimum of 450 pounds per square inch flexural strength at seven days with not less than four sacks of cement to the cubic

yard were the controls. It was found that the minimum strength could be obtained with three-sack concrete and two 500-foot sections were constructed with the reduced amount of cement.

It is interesting to note that the three-sack concrete, representing a cement content of 7½ percent by weight of the dry aggregate, is after 13 years carrying moderate traffic without the need of a surface cover. Ten-day cylinders for the three-sack concrete averaged 850 pounds per square inch compressive strength and the 11-year cores averaged 4,347 pounds.

California Develops Process

Not too much enthusiasm was exhibited at the time over this one and only experiment with low strength concrete. The use of cement in treating sands was receiving much national publicity. During the same year a short section of sandy silt subgrade for bituminous surfacing in the vicinity of Macdoel was treated with cement by the then generally used farm equipment mixing method. The following year three other projects in scattered locations were similarly treated.

At this point in the history of cement treatment California lays some modest claim to being instrumental in the development of the process. Adoption of the idea was spontaneous and it was hurriedly fitted with long pants and brought along to the point wherein 283,000 barrels of cement were used for such purposes in the calendar year 1950, in this State alone.

It was during the 1940 construction season that the antiquated farm machinery was abandoned and plant mixing or mixing with modern traveling pug mills was adopted. Standard procedures for the control of cement treated base construction were worked out under the able direction of former Materials and Research Engineer Thos. E. Stanton and his successor Francis N. Hveem. Briefly, the procedure consists of fabricating the specimens four inches in diameter and approximately four inches in height. The mold con-

tains a tin liner in which the mixture is placed in two layers, each layer being rodded by hand, after which the mold is placed in a frame and load applied by means of a hydraulic jack to 25,000 pounds and held for one minute before releasing. This procedure is used to determine optimum moisture, maximum test density, and to fabricate test specimens.

Loss of Moisture

During the process of fabrication, notation is made of loss of moisture squeezed out of the specimen. The amount of this loss is determined by weighing immediately before and after application of the static load. I wish to call particular attention to this feature of the control. A small amount of excess moisture must be present in nearly all mixtures to insure maximum compaction which goes hand in hand with the maximum strengths obtainable with the amount of cement being used. When strengths fall off on a job under construction, our first thought is to examine the test report for the moisture indication. The upper limit of excess moisture is readily determinable in the field. Isolated areas of quaking or jelying during consolidation is a clear indication that detrimental excess moisture is present.

The measure of consolidation in place is determined by excavating a sample from the finished construction and measuring the space by means of a sand volume apparatus. Dry weights per cubic foot are compared with the fabricated specimen and the relation expressed in percentage of compaction.

Uses

Cement treatment in California is used for three distinct purposes, namely:

(1) To provide an economical pavement foundation of limited slab strength greater than that of the natural material but less than that of concrete pavement.

(2) To solidify subgrades for concrete pavement and make them resistant to displacement or to erosion in the presence of moisture under the rocking action of slabs as a result of curling.

(3) The addition of low cement contents to foundation materials to overcome high expansion qualities or to increase shearing resistance.

Cement Treated Bases

Cement treated bases are set up on



R. M. GILLIS

a strength requirement. Present practice is to design on 650 pounds per square inch at seven days. This is usually obtained with cement contents varying from 4 to 7 percent. Determination of the cement content in base mixtures as well as all other types of cement treatment is based on laboratory investigation of the materials in advance of writing specifications for the project.

In the early stages of cement treated base construction the tendency was to design on a rather high cement content and accept whatever strengths that these produced. As a result it was not uncommon to have 28-day strengths run as high as 2,000 to 3,000 pounds per square inch. This led to unsightly contraction cracking in a considerable number of instances, both longitudinal and transverse, that were transferred through the bituminous surfacing and frequently resulted in objectionable surface spalling.

After making a survey of the mileage placed at the time, a strength of 650 pounds per square inch at seven days was decided upon as that at which contraction cracking ceased to be objectionable. Our specification was drawn up accordingly in which it is required that the mineral aggregate in combination with the specified amount

of cement shall produce the above strengths. This would indicate a minimum strength only, but in the practical administration of the specification it serves more or less as a maximum also. When job strengths indicate that the minimum is being materially exceeded the cement content in the mixture is reduced accordingly. This can readily be done as cement in all mixtures is set up as a separate contract item.

Remarkable Success

One of our earliest uses of cement for base construction was to correct a bituminous macadam pavement that was failing by reason of the plastic qualities of the filler in the rock base course. In this instance, the surface course was mixed in with the base following which cement was added and the combined mixture relaid as a base for a new bituminous surface. Many similar projects have been so treated since that time with remarkable success. Pavements that were being pounded to pieces by concentrated log and lumber hauling have been so treated and are serving satisfactorily under continued similar traffic.

Rather than sacrifice the value of the bituminous surface by mixing it in as a part of the new cement treated base, experimental work on a job-size scale was recently conducted of breaking up bituminous surfacing, crushing it to the original sizing of the aggregate, adding a highly aromatic solvent, remixing and relaying as a surface course. The success of this work indicates that bituminous pavements that are failing from plasticity of the base course can be torn up, remixed and relaid without the addition of any aggregate other than the cement. This should result in material savings in the reconditioning of some of our older pavements.

Various Mixing Methods

When aggregate is to be imported from an outside source, cement treated bases are usually required to be built by the plant-mix method. The road-mix method is specified when the aggregate comes from multiple sources or when treating the material in place. Continuous mixing plants have been used quite extensively in recent years on this type of work and productions of 250 tons per hour are not uncommon. Road-mixing is permitted only by the use of approved road-mixing ma-

chines corresponding to the types generally used for bituminous work. In order to insure the maximum strengths obtainable with the amount of cement being used, a time limit is provided for the interval between mixing and completion of finish rolling of not to exceed two hours.

Spreading of plant-mixed material is performed by the use of various ingenious devices but most commonly with spreaders generally employed for bituminous work.

Compaction of Bases

Compaction of cement treated bases is obtained with 12-ton three-wheel rollers for which we have yet found no substitute. We do not permit the use of a sheepsfoot roller due to the distortion of the surface and to the time consuming factors involved. Field compaction is required to be not less than 95 percent of that obtained in the samples fabricated under static load of 25,000 pounds.

After the desired compaction is obtained the surface is shaved with a blade grader to profile tolerances of not to exceed three-eighths inch deviation in 10 feet. Final rolling follows immediately behind the cutting by means of a pneumatic-tired roller along with water applied through atomizing nozzles. This imparts a dense, close knit surface of even texture.

Immediately upon completion of the final rolling a curing seal of approximately 0.2 gallon per square yard of asphaltic emulsion is applied. The base is then ready for surfacing as soon as the seal is sufficiently dry.

Cement Treated Subgrades

The added increment of truck loadings on our highways during the war years in the interest of the defense effort resulted in an epidemic of pumping and stepped-off concrete pavements the correction of which presented a serious drain on current finances. Measures that had to be taken to prevent the action of rocking slabs from being transmitted through the bituminous resurfacing often resulted in an expenditure greater than the first cost of the concrete pavement.

... Continued on page 43

Praise for Convention Management



Governor Warren congratulates George S. Pingry, convention manager, while Robert E. Reed, on Governor's left, Chief Counsel, and Frank B. Durkee, Deputy Director, now Director, California Department of Public Works, smile their endorsement

DELEGATES to the WASHO convention were unanimous in their praise of George S. Pingry and his staff for the efficient manner in which they managed the meeting and the entertainment provided for those in attendance.

Before adjournment, the convention adopted the following resolution:

"WHEREAS, The Thirtieth Annual Conference of the Western Association of State Highway Officials has assembled in San Francisco, California, and enjoyed a most profitable business meeting of the association; and

"WHEREAS, The usual hospitality of the great State of California has been exceeded in this particular instance; now, therefore, be it

Resolved, That the President of the Western Association of State Highway Officials express to the State of California, Department of Public Works, Division of Highways, the sincere thanks and appre-

ciation of the delegates to this conference for the splendid handling of the tremendous detail of the conference as well as the most generous hospitality that was extended."

Pingry, Assistant Chief Right of Way Agent, District IV, worked for weeks making arrangements for the convention. His assistants before and during the sessions were Mrs. John H. Skeggs, Ladies Section; R. P. Duffy, District Construction Engineer, Transportation, and B. W. Booker, District Engineer, Men's Freeway Bus Tour.

Aileen Moriarity was in charge of the convention registration desk and her staff was composed of Stella Biedenbach, Marilyn Kennedy, Jo Stevenson, Mary Pingry, Janet Puccinelli, Jean Kornahrens, Margaret Tucker, Mary Hyde, Shirley Della Maggiora, Helen Zupan, Information.

A conditional survey of this damage disclosed that it was more or less prevalent on all of the trunk highways within the State. Specific sections were singled out for further study and from these studies came the recommendation to adopt some means of subgrade solidification in new construction, particularly in those materials that have a record of being susceptible to pumping or displacement. Cement offered the greatest promise and has been largely used for this purpose.

Economical Methods

For reasons of economy in utilizing the treated material mixing is specified to be performed after the side forms are in place and the subgrade cut to section. The road-mix method is permitted for this reason. A four-inch thickness was decided upon as a standard to insure appreciable depth at all points. The amount of cement usually ranges from 3 to 5 percent. Strength requirements are not specified for this type of work but the recommendation for design purposes is approximately 300 pounds per square inch at seven days.

This type of subgrade treatment requires the placing of side forms sufficient for two days run in advance of the mixer. Normally, subgrade prepared one day is covered with pavement the following day; however, no prohibition is placed on covering cement treated subgrade with pavement immediately upon the drying of the curing seal.

Thickness Not Reduced

Although this treatment no doubt adds materially to the structural strength of the design, we have not attempted to reduce the thickness of the superimposed concrete pavement. The first of this type of subgrade was constructed in 1945. None of the pavements laid over such subgrades has shown any tendency to pump or step-off. This might appear to be a rather extravagant measure to prevent subgrade displacement and subsequent pavement distortion; however, our experience with corrective measures in stabilizing rocking slabs is that the cost may range from \$20,000 to \$50,000 per mile. The cost of the cement treatment

of subgrades averages \$4,500 per mile for two-lane pavement.

In the construction of cement treated subgrade the contractors generally equip the job with a continuous train of machinery with which to scarify, pulverize, spread cement, mix and layout the finished product in one operation. Compaction, trimming, and application of the curing seal follow closely behind these operations. The entire procedure being identical with that required for road-mix cement treated base. With good organization this work has been carried out without any delay to paving operations on projects employing 34-E dual-drum pavers with a capacity of 1,300 cubic yards of concrete per eight-hour day or the equivalent of 4,400 lineal feet of single-lane pavement.

Treatment With Low Cement Content

A considerable mileage of pavement foundation has been constructed with low cement contents ranging from 1 to 2½ percent. These treatments are to strengthen local materials and make the importation of costly high quality base unnecessary. By this means materials without excessive plastic qualities can often be made the equivalent for pavement foundation of the standard types of rock bases and at a considerable saving in over-all costs.

The practice of importing materials of a better or more uniform quality than the native soils for the upper layers of the roadbed has been practiced by California for a great many years. Usually the source of such imported borrow is determined in advance and the specifications insure the bidder that acceptable materials are available at these locations. Frequently, preliminary sampling fails to disclose the presence of adverse material and some of it is placed on the roadway before it is disclosed by check tests. This usually can be corrected by the addition of small percentages of cement which can be provided under extra work financed from the project contingency fund.

Option of Contractors

In setting up specific locations from which to obtain material for the foundation layers the contractor has the option of selecting any substitute

source of his choosing providing it is of equal quality. Contractors have added cement to local material sources at their own expense in order to make acceptable a material that was more economically located than the source designated by the State.

The question was raised as to the uniformity in distribution of cement by the road-mix methods when low percentages were used. Extra cement as a factor of safety was advocated. To insure uniformity in this respect the feature of cement distribution is made the subject of check from time to time on all projects. Cross-sections of the mixed windrow are obtained by sampling from both sides and the center and fabricating into individual samples for testing. Comparative strengths of these samples are accepted as the measure of uniformity of mixing and the uniformity between cross-sections is accepted as the measure of efficiency in spreading cement. When this procedure was placed in practice we began to find out things about mixing equipment.

We have satisfied ourselves by these methods that we can successfully mix cement with fine-graded materials such as silty sands with as little as one-half of 1 percent of cement.

Strength is not a requirement with low cement content mixtures and they are treated in the same manner as any other embankment material except that the rate of compaction is reduced from 150 cubic yards to 100 cubic yards per roller hour. Compaction is specified to be not less than 95 percent of that determined by the impact or field method compaction test developed by the department to measure the consolidation of embankments. The amount of cement to be added and the control testing of the mixture are both determined by the stabilometer.

It might appear from the foregoing that California has gone all out for cement as a general cure-all. Such is certainly not the case. Cement treatment is far from being a cheap form of construction and in considering its use the benefits to be gained must be carefully weighed against the cost. The proper use of cement is filling a long-time need and very definitely has a place in highway construction and maintenance.

IMPORTANCE OF HIGHWAY CONSTRUCTION TO THE NATIONAL DEFENSE EFFORT

By R. H. BALDOCK, State Highway Engineer of Oregon *

WHEN the strategic network of military highways was selected prior to the second world war, it was found that the roads that are the most vital to the peacetime economy are likewise the roads deemed most necessary in time of war. Unfortunately, during World War II, highways were regarded by many of the national authorities as expendable, and the Nation has not yet been able to restore the highway deficiencies resulting from this mistaken concept.

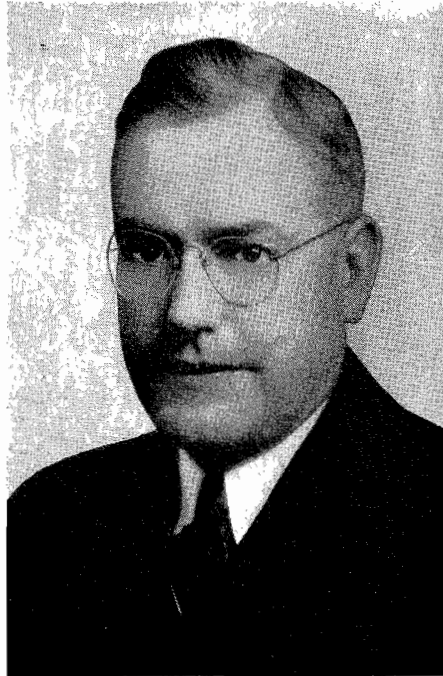
The report of the Joint Economic Committee of the Eighty-first Congress, prepared with the cooperation of the Bureau of Public Roads and the state highway departments, entitled "Highways and the Nation's Economy," found that more than 9,000,000 persons are employed directly or indirectly in highway transportation industries, that many businesses depend solely upon the patronage of the motorist, and that almost all commodities are transported, in part at least, by motor trucks.

Roads Affect All People

In fact, roads affect intimately the lives of all people. They are necessary in peace and vital in war. Highways facilitate and make possible the delivery of military equipment, materiel and supplies by enabling the expeditious movement of materials from the farm, the mine, and the woods to the factories and the processing plants; and, second, by moving the goods from the factories to the shipping points.

In the first world war, vital transport of this Country nearly broke down because it was almost entirely supplied by rail. During the second world war, much of the traffic moved over the highways, but they suffered greatly from the wartime impact and the wounds have not yet healed. Highways

* Mr. Baldock delivered this address at the WASHO Convention in San Francisco.



R. G. BALDOCK

are, in effect, the Nation's first line of defense, and the rebuilding of deficient highways and the maintenance of the present highway system is a most vital need of our present defense economy.

Indeed, the pace of the global "cold war" has materially stepped up during the past 10 months, while the "police action" in Korea has become a major conflict. War is basically a struggle to keep transportation lanes open and functioning efficiently on land, on sea, and in the air.

Motor Vehicle Transportation Vital

Headlines point to the spectacular achievements of combat forces, but the vitally important work of military transport vehicles back of the front and the civilian and industrial transport of all sorts in the noncombatant areas in this Country is generally forgotten. It is no exaggeration to say that the production front in this Country is so de-

pendent upon motor transportation that, if it fails or is seriously impaired, the industrial paralysis may be fatal.

For over 40 years our American economy has become increasingly dependent upon motor vehicle road transportation. At the present time there are approximately 50,000,000 motor vehicles in the United States, of which nearly 8½ million are trucks, busses and pickups; 71 percent of the families own passenger cars.

Dependence of Rural Areas

Nearly 50 percent of all our population living in rural areas is almost entirely dependent upon private automobiles for transportation. Over 50,000 communities are without railroad service, and some 2,500 towns do not have any means of mass transportation whatsoever. Large numbers of the population have moved from the dense urban areas to homes in the rural areas, meanwhile continuing to gain their livelihood in the city. These people have built their social and economic life entirely around the automobile because the sparseness of the commuter population does not justify mass transportation to the degree that is necessary to give the service required.

Large numbers of small plants that are being used in the present defense effort are entirely dependent upon motor truck shipments for their continued operation.

There is an inherent advantage in motor transportation over any other form of transportation yet devised. It has an outstanding physical flexibility due to the characteristics of the motor vehicle which can travel almost anywhere. There is a wide range of vehicles to fit a wide range of needs and a minimum number of transfers of freight, passengers, mail or express at intermediate points, while topographical obstacles are overcome much more easily by motor vehicle than by rail

transport. Service is provided to numerous points to which transportation cannot be provided economically by any other means.

Importance of Motor Transport

Motor transport is tied intimately into the business and social lives of all people. Nearly 80 percent of the farm trips are for necessary uses. It is vital to the livestock industry. No one thinks of driving cattle overland any more.

It is necessary to the milk industry, to all types of agriculture, and to the mining industry. Without motor trucks, there would be virtually no lumbering today. The truck logger is starting in where the railroad operator quit. He tackles country of such rough topography that rail lines could never be built.

The National Highway Users Conference recently wrote to Charles E. Wilson, Director of the Office of Defense Mobilization, and told him that the critical condition of the Nation's highways must be speedily corrected if our national defense effort is not be seriously handicapped. They asked him to recognize the essentiality of highway transportation, including an accelerated highway improvement program and the appointment in the Defense Production Administration of a person experienced and competent in highway transportation as a high level adviser to analyze highway problems and to develop policies and programs that will insure adequate and efficient transportation services in the present emergency.

Lack of Highway Capacity

In 1949 the Hon. T. H. MacDonald, Commissioner of Public Roads, said:

"The most serious deficiency of our highways today, not only the interstate system, but others of greater or less importance, is their lack of capacity to provide for the ever-increasing number of motor vehicles in service. This year the production of motor vehicles at present rates will range well above 5,000,000 units. With a substantial allowance for vehicles taken out of service, the increase of vehicles in use, if it could be formed into a moving column, would stretch over 27,000 miles, or once around the world at the equator and 3,000 miles further on a second lap. The use of motor vehicles is

RESOLUTION NO. 4

WHEREAS, The Congress of the United States is now considering a proposal of the House Ways and Means Committee to increase the federal automotive excise tax on gasoline, diesel fuel and other components of highway transportation, such levy estimating to yield in excess of one-half billion dollars annually; and

WHEREAS, Highway users are already contributing one and one-half billion dollars annually in World War II excises that are still in effect; and

WHEREAS, Under said proposed increase the highway users of the eleven Western States and Texas will contribute \$200,000,000 annually in gasoline and diesel fuel excises alone; and

WHEREAS, The field of automotive taxation is one that historically and rightfully belongs to the states, and is their principal sources of revenue for construction, maintenance and patrolling of highways, including matching of federal aid for highways; and

WHEREAS, Further encroachment by the Federal Government into this field of taxation would interfere with the taxing potential of the states for highway construction and maintenance essential to our national security; and

WHEREAS, The development of the western region has been geared to the growth of highway transportation where many communities are entirely dependent on highways and automobile, truck and bus transportation; and

WHEREAS, These proposed increased excises are discriminatory because they are to be imposed on only one form of transportation—highway transportation—and will place all of its components in a "luxury" classification along with many admitted nonessentials; now, therefore, be it

Resolved, That the Western Association of State Highway Officials, meeting in San Francisco, California, on July 28, 1951, hereby voice their opposition to any increase in said excise taxes; and, be it further

Resolved, That copies of this resolution be forwarded to the chairmen of the House Ways and Means Committee and the Senate Finance Committee and other appropriate officials urging strenuous opposition to these unjust and discriminatory increases.

the direct support of three of our major industries, without reference to the ancillary spread into numerous other elements of our economy. It seems unnecessary to argue that the annual addition of increments to highways, if overloaded and unsafe, cannot be continued at current rates without major enlargements and increases in the highway systems.

Deficiencies Acute

"Because of the concentration of traffic on the interstate highway system the deficiencies are acute, particularly within the urban areas, but these inade-

quacies extend to the remaining mileage of the Federal Aid System, rural and urban, to many miles of the secondary Federal Aid System, and to other roads not included. If we are to have roads that are safe, and if we are to obtain the utility of the motor vehicle with economy, it is necessary to have a program of reconstruction, rehabilitation, and extension of highways consistent with the number and types of motor vehicles now in service, to which extraordinary additions are being constantly made."

Recent speakers at the annual meeting of the American Road Builders' Association, held in Milwaukee, Wisconsin, March 12th-14th, expressed the idea in different ways, but it comes around to the same thing.

"I do not consider it intelligent preparation for defense," declared U. S. Senator Dennis Chavez, Chairman of the Senate Committee on Public Works, "to permit highway transportation to deteriorate in any degree. The main highways are the assembly lines of a large portion of our defense plants. Raw materials move over the highways to plants. Parts for weapons and machines move from one plant to another for processing. We must feed, clothe and house our war workers and all the rest of our population. Usage of highways must continue for these purposes."

Need Highways in War and Peace

"Our military strength," said E. R. Needles, outgoing President of the A. R. B. A., "is largely measured by our industrial strength. We cannot have fewer cars, poorer cars, fewer trucks or even lighter trucks if our people and our industries are to be served as they should be, and if our military strength is to be built up and fostered. We need more and better highways, in war as well as in peace, if we are to remain strong and efficient as a Nation."

"A highway system cannot be considered expendable," asserted James A. Anderson, State Highway Commissioner of Virginia and President of the American Association of State Highway Officials, "for it would not be possible to replace or repair it quickly, even if the costs in money, manpower, materials and equipment could be spared from other defense needs. Pol-

icies adopted should assure reasonable protection of our highly essential highway system."

Forthright Warnings

A. C. Clark, Deputy Commissioner of Public Roads, called attention to the fact that the states are not building new roads but are replacing present highways that are worn to the extent that they are no longer able to handle the fantastically increased number and weights of traffic. He pointed out that our job is not the building of new roads but the keeping of the vast highway plant in operation. He stated that before this emergency came along the highway maintenance already had reached a point of diminishing returns because of too little being available for road modernization.

These forthright warnings were reinforced by the experience of the past war period in which partial crippling of the highway plant had resulted from a failure of understanding. Yet at Milwaukee, somehow, as reported by *Better Roads*, one felt an undercurrent of the uncertainties that clouded the meetings of 1940 and 1941. What materials *would* be readily available, and for how long? Would the habit of neglect slip into its old place? The spirit was resolute, but the doubts hung on. Failure of the National Production Authority to grant reasonable priorities for steel needed for highways is difficult to understand. This error must be rectified at once.

Action Expected

It is hoped that the National Production Authority will soon issue an order designating the Bureau of Public Roads as their representative in the administration of the control of the allocation of critical materials. It is expected that some such action will be taken after the first of October, as otherwise the highway work will largely come to a standstill.

The arguments for the necessity for highways for both our peacetime and our wartime economy are unassailable. No one entirely discounts them, but everybody expects the highway engineer to "pull a rabbit out of the hat"—be able to get along some way. It must be admitted that the highway engineers have done a good job, particularly those in charge of maintenance, because of their past ability to keep a highway sys-



WASHO Vice President A. M. Nash

tem operating in the face of increasing traffic, increasing loads, increasing costs, and relatively decreasing revenues, but, unless many sections can be rebuilt shortly, bottlenecks may develop.

Problem of Maintenance

The people in charge of priorities for essential materials may admit the essentiality of highways, but they do very little about giving the highways the requisite materials to build the roads so necessary for the defense effort. It can't be done by maintenance alone. The maintenance engineer is run ragged now trying to keep up with the tremendous depreciation caused by the last war. He is trying to maintain critical deficiencies that have reached the point where reconstruction is absolutely necessary, and without this reconstruction the maintenance money will be poured down a rathole.

The trucking industry, which vitally needs highways for the movement of its vehicles, is continually fighting with highway administrators to lower taxes and to increase weights. I have seen no effort on their part yet to help to secure the priorities for essential materials so necessary to make the highway improvements to provide the necessary roadbed for their vehicles. We would welcome that help. On the contrary, some of their spokesmen allege that the highway engineers are not competent—that a body of men who have spent

a lifetime in the building of roads do not know their business. It is high time that they realize the basic necessities of the highway program and help the highway departments to get the money and the materials to carry out these needs. We must have better cooperation. Everyone should get over his "pet peeve" and make an intelligent appraisal of the facts bearing on the situation. Everyone must also realize that no wartime necessity will justify the destruction of the highways, which would certainly break down the entire defense effort. It may even jeopardize the security of this country.

Knudson's Request

On March 8, 1951, Mr. James K. Knudson, Director of the Defense Transport Administration, wrote a letter to all the governors in which he pointed out the vital need of transporting by truck essential goods needed in the war effort, the shortage of equipment to do the work, and the need to load the equipment to the maximum possible extent. He asked that they set aside the barriers at state boundaries and permit the movement of vehicles of greater size and weight and called attention to the uniform standards on sizes and weights promulgated by the American Association of State Highway Officials. However, he asked that this AASHO code serve as a minimum rather than a maximum standard during the emergency.

We all know that very careful review of the situation by the association evidenced that this should be the approximate maximum standard. Mr. Knudson asked the states whose present limitations are below the code requirements to raise their standards to the code minimum but requested that there be no reduction of the existing size and weight standards of any state that now exceed the AASHO standards. He requested cooperation and assistance in holding to an absolute minimum the spring thaw restrictions to permit the operation of fully loaded trucks where it would be dangerous and unwise to operate them only partially loaded.

States' Rights

No one has yet been able to control the weather, and the imposition of heavy loads when the frost is leaving the subsoil may rupture the pavements and cause such damage as to seriously

MAINTAINING A SOUND HIGHWAY PLANT*

By THOS. H. MacDONALD, Commissioner of Public Roads

THERE IS general acceptance of the fact that confronted by conflicts of economic and political philosophies, world-wide in scope, our central objective must be to build and to hold the strength of this Nation far above any level previously reached. To achieve this purpose every concept that has a major influence in determining public policies must be reviewed for its integrity and discarded if it is found false. Present conditions within the Nation provide fertile fields for the growth of false and dangerous concepts with reference to the highway program. Some of these are old but some are more recent.

Highways, including streets, are an essential element of our whole transportation system. Without highways the system cannot function as a complete service, that is, origin to destination. Regardless of how efficient or how adequate other forms of transport may be, the service of transportation of either people or goods begins and ends on the highways and streets. Because highway construction and main-

* Address by Mr. MacDonald at Thirtieth Annual Conference of the Western Association of State Highway Officials, San Francisco.

impair the state's economy as well as to prevent the movements Mr. Knudson desires. Mr. Knudson stated that this problem could either be dealt with through the adoption by the states of a uniform regulatory code or by federal action in this field. It would be both absurd and unfair for the Federal Government to act in the field of weights and dimensions of motor vehicles without at the same time assuming the responsibility of maintaining the highways which the states now have. This is an invasion of states' rights which should not be tolerated.

It is apparent all through Mr. Knudson's letter that he fails to understand the basic concept that motivates the state highway engineer, and that is the building of high-

RESOLUTION NO. 5

WHEREAS, The vast areas of mountainous and wild land of the western states are the source of water for our communities, our industries and our agriculture; and

WHEREAS, Well vegetated and healthy watersheds tend to regulate runoff; and

WHEREAS, Denuded watersheds accelerate runoff and erosion and increase probability of damage to highways and bridges and may cause untold damage to other property; now, therefore, be it

Resolved, That this association go on record as urging increased efforts by all agencies and persons concerned to protect our watersheds from fire, overcutting, overgrazing and other forms of abuse and to work toward restoring damaged areas; and be it further

Resolved, That copies of this resolution be forwarded to the United States Department of Agriculture, United States Forest Service, United States Department of the Interior, United States Bureau of Land Management, and the Governors of, and the Members of Congress from, the western states.

tenance are a public responsibility and carried on by public officials, the attention of the public is generally focused on the highway program as such, rather than on the end product which the highways make possible, that is, transportation. By such shortened vision the trees are seen and the forest fades to a blur.

ways to serve the greatest number of people and to permit the moving of the maximum size and load that the facilities will permit. There is a maximum load to which the facility can be designed, because there is a limitation on finances and because of the further fact that increases in design would result in extra costs far beyond the payment of the small segment of the trucking industry which would benefit therefrom. Most states are now designing for reasonably heavy loads, as represented by the AASHO code, but we must face the condition that the majority of the loads have to be carried over the roads that we now have. These roads will rupture when certain overloads are applied. There is no possible way to repeal or temporarily set aside the law of gravity.

Vast Mileage

There is also the carry-over from the days when the highways were brought into the unemployment relief category. There are those who would defer highway construction now to await another like period of unemployment with never a thought to the functioning of transportation as an essential factor in making possible employment at high levels.

We have a vast mileage of public highways—3,322,000 miles in all. Of this total, 2,574,000 miles have been graded and drained or have received a higher degree of improvement. This mileage would circle the earth at the equator 100 times. Every mile is of importance to some segment of the population and for some purpose. The task of the highway officials of the country then is to keep this mileage available for use, and the operations which make this possible are constant maintenance and periodic rehabilitation.

The service life of roads is dependent upon the type of the improvement and the amount and kinds of traffic using them. It would be possible to assign a well authenticated length of life to the different types of road surfaces and thus arrive at the rate of replacement

It is indeed high time that all of us—highway departments, trucking industry, Defense Transport Administration, and the general public—approach this problem intelligently and endeavor to restore the alarming critical highway deficiencies which are, in the main, due to the beating that the roads took from the heavy traffic of World War II. These critical deficiencies of the primary federal aid system of this country now equal 22 billions of dollars.

It is necessary that we do more than maintain the highway system. We must restore the critical deficiencies as part of the defense effort in order that the road system may carry the tremendous load that this present defense effort will impose. We have no time to lose. The emergency is now upon us.

or rehabilitation necessary per year to keep the highway plant in reasonable operating condition. To focus more closely on the problem suppose we look at only a percentage of the total—357,000 legally designated miles under jurisdiction of the state highway departments which constitute the primary rural state highway systems.

Rate of Surfacing

The rate of surfacing of these systems has been carried forward as follows:

	<i>Average of miles per year</i>
1922-1931, 207,255 miles	20,725
1932-1941, 230,804 miles	23,080
1942-1949, 128,617 miles	16,077

For the past three years the rate of surfacing on the state primary system (rural) has averaged 23,675 miles per year, approximating the same rate as the 10-year period 1932-1941 inclusive. The total rural surfaced mileage as of January 1, 1950, was 344,458. The most reliable figures we have indicate that in 1921 there were 84,000 miles of surfaced highways, so we have gained through the period approximately 260,000 miles of surfaced roadway on our primary state systems.

Over a 28-year period the annual average is 9,300 miles. But we have built in 28 years, 567,000 miles of surfaced roadways, or 20,000 miles per year, which means the reconstruction of 307,000 miles total, or 11,000 per year. Thus, we have been working for three decades on a 31-year cycle of replacement for our main road surfacings which is far in excess of the life expectancy, and added to this gloomy picture is that, as engineers, we know the replacements have largely not been adequate in the modernized details of design to meet the demands of the rapidly multiplying traffic. This fact presents the red flag of warning of how dangerously close we are to losing the struggle to keep the main system of roads in operation at the present rate of rehabilitation. This same general situation exists on secondary and local rural roads with a more exaggerated lag in the rate of replacement and a consequent higher maintenance expenditure.

RESOLUTION NO. 6

WHEREAS, The national forests of the United States have vast resources of water, timber, minerals, grass, wild life, fish, scenery, and provide livelihood and recreation for millions of people; and

WHEREAS, The utilization of these resources and their protection from fire and pests requires a network of many thousands of miles of forest development roads and highways; and

WHEREAS, Many of the resources of the national forests return a large revenue to the Federal Government; and

WHEREAS, Most states and counties are financially unable to construct or maintain the roads necessary for the forest system; and

WHEREAS, Current appropriations by Congress for forest highways and forest development roads have been far below the amounts authorized by Congress; and

WHEREAS, With the rising costs, it has become impossible to provide needed road facilities in the national forests; now, therefore, be it

Resolved, That this association go on record as urging the Congress of the United States to appropriate such sums for forest highways and forest development roads as are now authorized under existing legislation.

Program Out of Balance

We have indeed failed to balance our highway transportation program between adequate roadways and new motor vehicles. The figures which are quoted as the annual rate of placements of new surfacings and rehabilitations of the existing roadways have remained almost static as an annual average for nearly 30 years.

In the meantime the growth of motor vehicle use is fantastic. Particularly is this true of the growth of truck traffic. In 1904 there were only 700 trucks registered in the entire United States, just 1.3 percent of total registration.

In 1910 the percentage of trucks in the registration was still only 2.2. Percentage figures at 10-year intervals are as follows:

Year	Percent
1910	2.2
1920	12.0
1930	13.3
1940	14.3
1950	17.0

Thus there was a rapid expansion in the proportion of trucks from 1910 to 1920, and a steady increase since that time.

Truck Traffic Increase

In 1929 only about 12 percent of the traffic on rural roads was truck traffic, on the basis of the somewhat fragmentary information available at that time. Beginning in 1936, comprehensive traffic volume and weight data have been obtained throughout the Country so that more accurate figures are available. In 1936, truck traffic constituted 18 percent of the total, and by 1949 it had risen to 22 percent. Thus, in the 20 years from 1929 to 1949, the increase in truck traffic was almost twice as great as that of traffic as a whole.

But the most striking, and perhaps the most important development with regard to trucking, has been the rapidly increasing usage of heavy vehicles. Combinations, or vehicle trains, were little used prior to 1930, and no accurate data concerning them are available for these earlier years. In 1936 they constituted 13.9 percent of the cargo vehicles found on rural roads, and in 1949 they constituted 22.7 percent. Because of their greater capacity, these vehicles carry a much larger proportion of the tonnage than their frequency in the traffic stream would indicate. In 1936 they accounted for less than half (43.0 percent) of the total ton-mileage on rural roads, while in 1949 they accounted for about two-thirds (66.1 percent) of it.

Increased Use of Heavy Vehicles

Reflecting the increased use of the heavier vehicles, as well as heavier loading of vehicles of all types throughout the United States, the average carried load increased from 2.5 tons in 1936 to 4.4 tons in 1949. In California an early survey made in 1920 showed the average carried load for trucks to be 1.8 tons. In 1936 the average carried load in California was 3.4 tons, and in 1949 it was 5.5 tons.

From 1936 to 1949, travel on rural roads by vehicles of all types increased from 123 billion vehicle-miles to 216 billion vehicle-miles, a 76 percent increase. During this period truck traffic increased 115 percent (from 22 billion to 47 billion vehicle-miles) and the truck haulage increased 207 percent (from 35 billion to 107 billion ton-miles). Final 1950 figures have not yet

been compiled because data are still lacking from several of the states. However, it is apparent that defense activities have resulted in an abnormal increase in truck usage and carried loads, and it appears that the increase in ton-mileage for the one year from 1949 to 1950 will exceed 30 percent.

Primary Highway Mileages

Again referring to the figures of the development of primary highway mileages, it is evident that a very large percentage of these main roads on which we are dependent today were built in the period 1922-1941. The high type pavements were very largely built after the design adopted as the result of the Bates Road Test in Illinois in 1922 and 1923. The design was based on the legal axle load limit of 16,000 pounds on solid rubber tires which has been equated to the 18,000-pound axle limit on pneumatic tires in the code of the American Association of State Highway Officials. Our roads for the most part will not carry heavier axle loads without excessive deterioration as has been demonstrated by the Maryland test. There is a callous disregard of road preservation by a small fraction of the operators of trucks. This, probably due to a lack of knowledge or a yielding to pressures, extends also to some legislative and other official circles. Excessive loads, particularly excessive axle loads, must be kept off our roads if the whole highway plant is to be kept in operating condition.

Highways for Defense

One of the finest examples of the recognition that our highway plant must be used properly if it is to be kept in operating condition is the transportation policy adopted by the Defense Department. This policy recognizes strict adherence to the state laws for the movement of military vehicles and military cargoes and provides a controlled plan for the requesting of permits for overloads only when military necessity requires. The highway officials of the Country are indeed indebted to the Transportation Corps of the Army and to its Chief, General Heileman, for the initiation and strong support of this policy. In this connection the State and Local Officials Committee of the President's Highway

RESOLUTION NO. 7

WHEREAS, In 1947 and again in 1949 each state was requested to prepare an estimate of needed improvements on the federal aid systems to assist in presenting the highway needs to the Congress; and

WHEREAS, Current and up-to-date estimates of needs will continue to serve increasingly important purposes in portraying the essentiality of the highway system both in times of peace and times of national emergency; be it therefore

Resolved, That the member states of the W. A. S. H. O. expedite the installation of a continuing inventory of needs of the federal aid primary, federal aid secondary and federal aid urban highway systems in accordance with the recommendations of the Finance Committee of the American Association of State Highway Officials.

Safety Conference has performed an invaluable service in acting in a liaison capacity between the military authorities and the officials of the states. General James A. Anderson, President of the American Association of State Highway Officials, is the chairman of this committee and General C. Reynolds Weaver is the director.

While the annual rate of rehabilitation of the obsolete sections of our highway plant must be maintained near present levels if our highways are to be kept in sound operating condition, we can cooperate fully with the defense effort by a careful application of criteria in the selection of projects that will best meet and serve defense needs.

Critical Materials

The need for conserving critical materials in an effort to further defense preparations has been increasingly emphasized during the past few months. Obviously, the authorities charged with responsibility for implementing defense mobilization plans have been making sincere efforts to effect an equitable distribution of materials between the military and essential civilian activities. Increasing demands of the military and defense agencies, however, have necessitated more drastic controls and curtailment of civilian activities. As a consequence, the National Production Authority on May 3, 1951, issued an amended M-4 order.

The original M-4 order issued on October 27, 1950, prohibited construction of any projects that would be used for recreational, amusement or

entertainment purposes. Other minor amendments followed, but the revised order of May 3d cut straight across the entire construction industry by prohibiting commencement of construction on any project requiring the use of more than 25 tons of steel unless authorization was obtained from the National Production Authority. The only major exemptions related to activities of the Department of Defense, Atomic Energy Commission and the National Advisory Committee for Aeronautics.

It was obvious immediately that the procedure outlined was impracticable for carrying on a program of essential highway construction in an efficient manner.

Bureau of Public Roads Delegated

Conferences were immediately arranged with responsible officials of the National Production Authority for the purpose of securing a delegation of authority for the Bureau of Public Roads to approve projects for construction. Some delay ensued because of the indicated desirability for similar delegations to other agencies in carrying on their respective programs. Finally, Delegation 14 was issued on June 7, 1951, in which authority to approve projects was granted to eight federal agencies. Included therein was a delegation to the Secretary of Commerce in regard to Bureau of Public Roads programs.

On June 7th also, an ad interim re-delegation of authority from the secretary to the Commissioner of Public Roads was issued for the approval of construction projects as well as designating the commissioner as the claimant agency for highways. On the same date instructions were wired by our office to the field relative to approval of construction permits by the division and district engineers. Supplemental instructions followed, including criteria of essentiality to be used as a guide in the approval of projects for construction.

Workable Plan

It should be remembered that there has been no waiver of the provisions of NPA Order M-4 but merely a delegation of authority to approve commencement of construction. We now have a workable

plan under this order to insure a continuance of essential highway construction, and the application of criteria to the selection of individual projects should not be done in a perfunctory manner. Steel is scarce and we will cooperate in the conservation effort by utilizing it only for the advancement of the defense effort and for the maintenance of a supporting civilian economy.

Up to the present it is our opinion a fair share of the available steel has gone to the highways, since there remained a quota in the supply for un-rated orders. During the second quarter, many of the larger states did not request priority assistance to any extent because of their ability to obtain so-called "free" steel.

Steel Allotments

We first received an allotment of steel amounting to 151,000 tons for rolling in each of the months of May and June. However, notice of the allotment for the May rolling was received two weeks after the beginning of the lead time and therefore could not be utilized. DO rating authorizations were prepared in this office and issued by NPA for practically the full amount of the June rolling allotment. Approximately 31,000 tons of this amount, however, have already been revali-dated for third quarter rolling because of the claim by some of the mills that the original authorizations were received too late or that they had already accepted their required quota of DO rated orders.

The Bureau of Public Roads, as claimant agency for highway construction and maintenance regardless of financing, has received from the Defense Production Administration an allotment of steel for the third quarter of 1951. Another allotment for the fourth quarter of 1951 is expected before long. While the DPA is cooperating fully with the Bureau of Public Roads in regard to the need for steel in highway construction and maintenance, the quantity allotted is below the requirement estimates which had been developed in cooperation with the state highway departments. The Defense Production Administration, however, is required to balance highway steel requirements against other defense needs.

RESOLUTION NO. 8

WHEREAS, The delegates to the Thirtieth Annual Conference of the Western Association of State Highway Officials enjoyed the privilege of listening to a most able discussion of the importance of highways to the West by the Honorable Earl Warren, Governor of California; and

WHEREAS, It is fully realized by the delegates that the time of a Governor of a great state such as California is constantly in demand and, consequently, that we were most fortunate that Governor Warren took the time to visit with us at this meeting; now, therefore, be it

Resolved, That the President of the Western Association of State Highway Officials transmit to Governor Earl Warren our sincere appreciation of the privilege given us to meet with him and to listen to his splendid discussion on highways.

Controlled Materials Plan

At the present time we are securing DO rating authorizations for the September rolling in accordance with the states' recommendations. Some difficulties have been noted in procuring steel in certain areas even with these authorizations, because some mills are again claiming that they have already accepted their required quotas of DO ratings for the third quarter. We are hopeful that these difficulties will be overcome upon initiation of the controlled materials plan and that an authorization under this plan will truly be equivalent to a cashier's check on a known supply of material.

The controlled materials plan for steel, copper, and aluminum is about to go into effect. The steel allotment made for the highway program is the first step. Regulations 1 to 4 have already been issued. CMP Regulation 5, to be issued shortly, will cover maintenance, repairs, and operating supplies, and CMP Regulation 6 will cover construction. A favorable feature of the CMP is the provision that a claimant agency will secure a letter symbol and have the authority to issue its own suballotments. This should have a tendency to decrease paper work and expedite procurement of available materials.

Replacements Problem

Over 500,000 major units of equipment support the highly mechanized construction and maintenance programs on the essential highway transportation systems. The replacement of

worn-out units and the acquisition of sufficient repair parts and supplies to keep the existing fleet operating is becoming increasingly difficult.

Early this year, the bureau presented to the Defense Production Administration estimates of quarterly requirements for highway construction and maintenance machinery and replacement parts. The bureau, as claimant agency for highway construction and maintenance has also been initiating spot priority assistance for the purchase of essential construction and maintenance equipment as well as the various kinds of scarce materials other than steel. In this we have had the full cooperation of the National Production Authority.

The Bureau of Public Roads has also made definite recommendations to DPA and NPA regarding the serious depletion of the supply of cutting edges for graders, snowplows, dozers, etc. We have asked that a directive be issued to provide the particular steel necessary for the fabrication of these cutting edges. This short supply of cutting edges alone is threatening an immediate work stoppage on some of the 50,000 motor graders and in the fall on many of the 36,000 snowplows. It is hoped that satisfactory solution can be secured for this and other equipment repair parts problems.

Shortages are also developing in the supply of copper cable for traffic control devices and in the supply of titanium and other ingredients for traffic line paints. The bureau is seeking solutions for these problems.

Obviously, we are now operating under a program of austerity. The construction of many desirable projects must necessarily be deferred. More stage construction work should be undertaken and the use of substitutes for critical materials encouraged. Once again we should be alerted to the need for justifying bid prices, especially those for steel which are rising rapidly. Nonessential activities must be curtailed in order to aid the defense effort. We should be fully appreciative of the recognition being given to the importance of highways in the defense program and, in our efforts to maintain this favorable position, we should not fail to recognize the importance of other defense-supporting agencies by demanding a full peacetime quota of materials, equipment and supplies for our highway activities.

PENALTIES FOR OVERRUN OF CONTRACT TIME*

By W. A. BUGGE, Director, Department of Highways, State of Washington

THIS, according to the program, is the Thirtieth Annual Conference of the Western Association of State Highway Officials, an organization which has performed an outstanding job of promoting technical advances and uniformity in highway matters for our 12 member states. These conferences are of just as much value to us who head our several departments as they are to the assistant engineers we bring along and from whom we gain much of highway wisdom in specialized subjects. I know that we of Washington look forward to the meetings with pleasurable anticipation for the good we will get from them.

"A great transformation in highway building and techniques has occurred since the western association was organized by a small group of western officials 30 years ago.

"Along with the phenomenal transformation of highway transportation and design have come multitudinous changes in specifications to define methods of construction and to direct and regulate the operations of the contractor. But over the span of these years there has been little change in the manner of defining and enforcing liquidated damages or penalties for unjustified overrun of time in completing contracted work.

"I am not too greatly convinced that that this is a field for uniformity of procedure by the several states, as is very desirable for many others of our closely related problems, because the conditions which impel overruns of time are not common, particularly insofar as climatic conditions are concerned. This, in the Northwest, has much to do with overruns and the necessity of authorizing most of the time extensions.

Dubious About Set Formula

"I am likewise dubious that any set formula can be devised to act as a tonic

* Address, in part, by Mr. Bugge at WASHO convention in San Francisco.



W. A. BUGGE

for better time performance without injury to many of our more capable and conscientious contractors who ought not be penalized for the shortcomings of the lesser capable and negligent ones.

"Whatever we do separately or collectively should keep uppermost in mind the fact that the contracting industry is just as indispensable to heavy construction as the engineering profession, and it must, therefore, be treated with a fairness that sometimes is hardly distinguishable from clemency.

"If we are arbitrary in the exacting of liquidated damages or penalties, regardless of the well-phrased rhetoric of our signed contract, the courts have repeatedly shown they are always prepared under the realities of life to grant relief when it is justified. Our determinations, therefore, should be in the light of the same justice the courts would impose, and ought not be influenced by the timidity or reluctance of the contractor to assert his legal rights.

Overruns Lessen

"With a world of modern equipment to work with and a comparatively lesser amount of labor now required, the number of overruns appears now to be comparatively less than it was some years ago. However, some of these overruns are very irritating, costly to the public, and unnecessary even under average conditions of weather and ordinary supplies of labor, equipment and materials. It is these overruns with which we are concerned in this discussion, and to what extent they are occasioned by the owner represented by us engineers, and to what extent by the contractor himself.

"There is a diversity of ways under which states and other municipalities set up time for completion of contracts. Some of them, of which our State is one, specifies a definite number of calendar days, some set a definite calendar date, and others base the completion date upon a definite number of work, or workable days. Prior to 1937 the State of Washington specified a definite calendar date for completion, but since then the time has been based upon a definite number of calendar days. I am inclined to believe, in view of the complexity of conditions, accentuated by the existing national emergency which promises to be of long duration, that we should consider another shift to 'workable' days.

Completion Dates

"Fixing a definite completion date by either calendar date or by interval of definite calendar days and the collection of substantial liquidated damages is justifiable if the improvement falls in the same category as a commercial building for rental purposes or imperative owner occupancy, and every delayed day of its construction deprives the public of its urgent use and necessitates detour or adds to the inconvenience of the highway user. Otherwise, undue haste which ordinarily adds cost, and heavy liquidated

damages or penalty for overrun, is not so necessary.

"Very often the time for completion is the decision of a single engineer without due analysis of all conditions. Given a half dozen engineers to carefully fix the time on the same project independently of each other and you will have a half dozen different answers, not all of which will have contemplated all the climatic and physical obstacles that will encumber the contractor. The same minute accuracy that dignifies the plans is not, and probably cannot be evolved in setting time limits, but with better analysis of conditions it might well be improved.

Time Limits

"In setting the time limits do we give proper consideration to the fact that it requires same time for any contractor, however efficient he may be, to assemble his equipment, transport and get it in place on the project, and to gather his organization before he can proceed effectively with production? One prominent governmental agency for many years—and perhaps yet as far as I know—specified that the contractor must be working on the project within 10 days of award, and apparently fixed his time limit with that among other considerations regardless of the fact that the official notice to proceed was forwarded by ordinary mail and that the project might be at a comparatively inaccessible location.

"Do we give adequate consideration to the isolation of the project from the labor market and differentiate in estimating time as between the isolated project and the one close to the metropolitan areas? Equipment, once on the project, will work for anyone but labor to run it is nowadays very discriminating. Construction workers of some crafts are not to be found in all areas and must be brought in from other localities. Labor will not employ so readily in these lush days of prosperity to work in the remote regions without special inducements which the contractor cannot give without jeopardy to his relations with the unions from which he must get his labor supply. The most dependable of the crafts want to work no farther from home than will permit driving to and from

WASHO Ladies Provided With Entertainment

WHILE the delegates to the WASHO Convention were busy with their sessions, the ladies in attendance were provided entertainment under the gracious direction of Mrs. John H. Skeggs, wife of Assistant State Highway Engineer Skeggs, of District IV, San Francisco.

On Monday afternoon, they were taken on a personally conducted tour of Gump's, San Francisco's world famous art and antique shop.

Monday evening they and the delegates were guests of the California Division of Highways at the Ice Follies of 1951.

Tuesday morning the ladies were taken on a cruise of San Francisco Bay, landing in Oakland at 12 noon, proceeding by busses through Oakland and Berkeley to the Claremont Hotel where a luncheon was served. Before returning to San Francisco over the San Francisco-Oakland Bay Bridge, they were shown through the University of California campus. They were honored guests at the annual dinner in the Fairmont Hotel Tuesday night.

Wednesday morning the ladies were taken on another bus trip to Palo Alto via the Marina and Cliff House and through Hillsborough. After luncheon at Rickey's, they returned to San Francisco, by way of the Skyline Boulevard, through Stanford University, the Lake Merced area, Sunset Boulevard, and Golden Gate Park.

the work every day and this tends to encumber the isolated project with less efficient help, and more unavoidable delays.

Not Normal Times

"These things, including the normal numbers of 'quits' or 'discharges' and lack of parts, the contractor can generally anticipate by contingencies in his costs before bidding. But these are not normal times; labor and parts become increasingly critical month by month. It follows, therefore, that even though the contractor may have a full complement of equipment and top or-

ganization, in face of the unsettled conditions he cannot be expected to very accurately estimate the calendar time he will need for completion and be thereby enabled to include possible penalties within his field costs and proposal.

"As owners, we should not escape our own responsibilities if we expect the contractor to meet his. Therefore, one other thought occurs with respect to what we may further do to reduce the tendency for overruns. Are we advertising our projects in the best seasonal order for some particular classes of construction, or do we let the contracts more nearly in the sequence by which the field surveys and plans become matured and as befits our own convenience?

Make Awards Quickly

"Above all, we ought to make awards as quickly as possible after opening of bids and we should delay the contractor the least possible because of revision of plans when the work is in progress. The reasons are too obvious for further comment.

"We have covered some things which we, as representatives of the owner, can do to lessen the tendency toward overruns. The contractor can do as much or more.

"It would simplify our difficulties considerably if all contractors were of equal management and equipment ability—all on par with the few we consider most efficient—but such is not the condition. We have to take them as they come, subject to their prequalification statements, and even those may be somewhat fictitious. We have learned from experience there is as much difference in contractor management and celerity as there is difference in the ability and alacrity of our own engineers—and that you will agree is quite a bit. Obviously, we cannot expect all contractors to meet the same high performance as the contractor we consider par exemple.

Standard Specifications

"Our own standard specifications provide a deduction as liquidated damages for all engineering costs and other liquidated damages as may be suffered, in a sum not to exceed \$50 for each day

which may elapse between the specified date and the actual date of completion. This is not a severe deduction considering the fact that it is the same regardless of the size of project, and it is not sufficiently heavy to reimburse all engineering costs in some cases. It does, however, have a salutary effect.

"The more I delved into this subject of overruns in preparation of this discussion, the more impressed I became with the method of fixing time limits by a stated number of 'workable' days. It would seem to eliminate much of the speculation on the part of the contractor and may be more definite for both parties to the contract. Where used, it should be required that the contractor and the engineer shall each endorse a signed statement at the end of each week to indicate the number of days or fractional parts that were sufficiently workable to permit substantial progress of the work.

"Having been a part of a contracting organization that meticulously tried to meet its obligations, I can say from experience that there is scarcely nothing more discouraging in legitimate bidding than to be underbid by a contractor who has no intention of keeping his commitments and who proposes to rely upon good luck, sympathy and fictitious excuses to dissipate the penalties he knows he will deserve. If for no other reason than to encourage those who conscientiously endeavor to finish on time, we ought to enforce the penalties and liquidated damages with these derelicts. By their greed they deprive others of work and they cause the public much loss not reflected in the lower bid.

Courts Considerate

"In general, the courts are inclined to be very considerate of the rights of the contractor, and they consider along with the tightly worded contract intended to surrender his rights to the wisdom or whim of the engineer, all elements that contribute to non-performance—and this is particularly evident in the court decisions where the owner himself has in the least degree contributed to the delays by negligence or other retardant action. The courts will sustain a reasonable amount of penalty or liquidated damages if the circumstances are due en-

tirely to negligence or conditions which, with reasonable precaution, the contractor could have prevented.

Violations Not as Numerous

"While the matter of overruns will continue to be serious in instances—it will never be perfect—the violations are not as numerous as they were in the old days when contractor management possessed abundant zeal but operated under handicaps of primitive equipment that required more workmen, and when the management lacked much of engineering know-how. Today the conditions are much different because of great advances in the technique and capacities of construction equipment, better labor relations, and not the least of all because the educational background of contractor and engineer is now more nearly common.

"If we shall further reduce the violations of time limitations we will need to change our policy from one of considerable tolerance to one of more strict enforcement, shorn of the sympathetic and conjectural elements that are invariably interjected as reasons for time extensions. We must start the process at the level of the resident engineer for it is from him that we ought to rely for facts upon which to grant or deny extensions. It is axiomatic that the young engineer is more inclined to strict observance of the written contract than the older engineer whose experience, acquaintance and age tend to mellow his determinations.

Duty of District Engineer

"Since we have both types of engineer, one may be too severe and the other perhaps too far on the lenient side, it is incumbent upon the district engineer to know his projects so well himself that he can from actual contact in the field, and not so much from perusal of formal reports reaching his office, impartially weigh the facts and make recommendations in accordance. The district engineer, if he will, can exert more influence with the contractor in stepping up his progress than can the resident engineer, and do it probably with less unpleasantness. When we boil it down, the responsibility for bettering conditions must rest with the district engineer because it is within

Bergman Retires

Continued from page 21 . . .

17 Years in San Bernardino

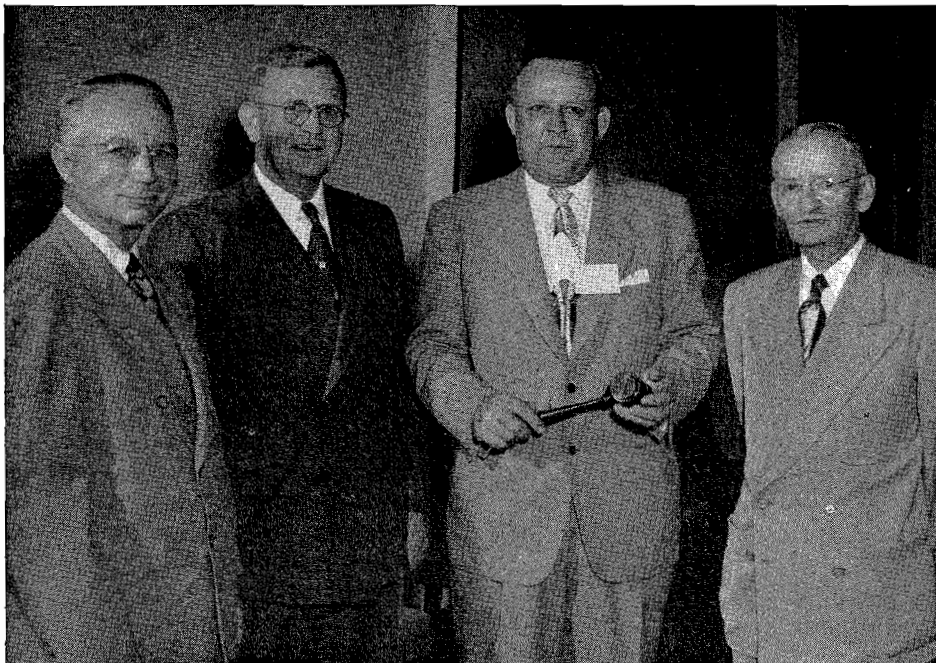
For 17 years Bergman worked in District VIII (San Bernardino) as chief draftsman and office engineer. From 1942 to 1946 he was assistant to the district maintenance engineer in District XI in San Diego. From 1946 to 1949 he was chief draftsman and locating engineer in District IX in Bishop until his health enforced a slowdown in his activities. In May, 1949, Bergman was transferred to the Headquarters Office in Sacramento where he worked until his retirement.

"Bergie's" many friends in the Division of Highways sincerely regret that it has been necessary for him to retire, as engineers of his ability, resourcefulness, and loyalty are most difficult to replace. They are thankful, however, that present day retirement makes it possible for Bergman, who has given the best years of his productive life for the benefit of the State, to retire with a sense of security and comfort.

Bergman is married and he and his wife have two sons and a daughter, all of whom are married with families of their own, the Bergmans having two grandchildren. The sons are both employed in the Right of Way Department of the Division of Highways, Reynard in District VI and Robert in District IV. The Bergmans are residing in San Diego.

his province to control the field engineers, and his is the responsibility also to foresee changes and revisions so well in advance of the construction that the contractor will not be delayed or injured thereby. Let us not forget our own responsibilities in this and any other matters that contribute to overruns.

"There appears no sure panacea for the problem of time overruns, no infallible rule for inflicting penalties or liquidated damages, but we can, through recognition of our own related responsibilities and the cooperation of the construction industry, operate to reduce the extent and frequency of these unpleasant but necessary administrations of contract authority."



Newly elected WASHO officers. LEFT TO RIGHT—Executive Committeeman Ralph Jones, Highway Commissioner, New Mexico; Secretary-Treasurer, Glenn S. Paxson, Bridge Engineer, Oregon; President, W. A. Bugge, State Highway Engineer, Washington; Vice President, Mark O. Watrous, State Highway Engineer, Colorado. State Highway Engineers Geo. T. McCoy, California, and J. R. Bromley, Wyoming, are the other two members of the Executive Committee.

WASHO

Continued from page 35 . . .

Wednesday morning the delegates were taken on a bus trip to view the Bayshore Freeway in San Francisco and San Mateo Counties, and the Eastshore Freeway in Alameda County. They were guests of the Oakland

Chamber of Commerce at a luncheon in Tilden Park in Oakland and returned to San Francisco in the afternoon.

Thursday morning's session was devoted to reports of committees, the report of Secretary-Treasurer J. A. Elliott, Bureau of Public Roads, Fort Worth, Texas, and the election of officers. The convention adjourned at noon.

State Fair

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ramento, is, of course, a continuing process. At the present time major construction is in progress on U. S. 50 in Alameda County under two contracts for four-lane divided highway between Dublin and 1½ miles west of Livermore, a total of 10.3 miles in the Livermore Valley, which will cost over \$2,500,000. This improvement will connect with similar divided highway development completed more than a year ago.

Visitors to the fair from Southern California who have not traveled either the Valley Route or the Coast Route for a year or two will be impressed

with the progress made in four-lane divided construction on both of these arterials connecting the northern and southern portions of the State. Under present state highway construction programs each year sees several new sections built to four-lane divided or freeway standards added to the routes. This modern development is advancing with such constancy that motorists may now look forward to the time when the State's main north-south arteries are complete four-or-more-lane thoroughfares between Los Angeles and Sacramento and Los Angeles and San Francisco.

Besides being the medium over which scores of thousands of motorists travel to the Fair, these highways are

used by the huge fleet of trucks required to transport the countless tonnage which goes into the production of the multimillion dollar exposition.

Part of the tonnage this year, which ranges from livestock to orchids, will be a huge statue carved from a giant redwood felled near Three Rivers, California. The statue, fashioned by Carroll Barnes, noted sculptor, is symbolic of youth, the theme of the 1951 Fair. It will be trucked to the Fairgrounds and unveiled as a highlight of the opening day ceremony.

Heavy Truck Traffic

Simultaneously, other trucks will be on the highways converging on Sacramento with cargoes of fruit, wine, processed foods, minerals, lumber, livestock feed, farm and industrial machinery and hundreds of thousands of other items which are fractional parts of the whole which is assembled, finally, into a great fair.

Rolling toward Sacramento, too, will be scores of trailers carrying horses for the horse show and the races, while still others will be transporting speedboats for the aquatic events on September 2d and 9th.

A goodly percentage of the hundreds of thousands who enjoy the Fair also motor to Sacramento over a network of smooth highways, a startling contrast to the rough and rutted roads over which fairgoers bumped their way to California's first state fair at San Francisco in 1854.

Like the highways, the Fair, from its sketchy beginning, has developed tremendously. And the 1951 exposition promises to be the greatest of all.

Many Features

Bustling night activities will be ushered in by a magnificent display of fireworks. One of these is the sparkling Pageant of California Fashions where svelte models will display the latest creations of the State's apparel industry.

Another comprehensive art show will be presented by the Fair. The work of California artists, for which \$15,000 in prizes are being offered, will be on display in the picturesque outdoor gallery opposite Governor's Hall.

In Governor's Hall, visitors will find

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Annual Meeting

District Right of Way Agents
Report on Big Job Well Done

By GLENN L. WHITT, Headquarters Right of Way Agent

CULMINATING the most successful year in the history of the Right of Way Department, California's district right of way agents, and their assistants, assembled in the State Highway Commission board room in Sacramento on July 12th and 13th for their annual conference. This assembly is a yearly occasion, held under the supervision of the Chief Right of Way Agent, for the purpose of clarifying procedural details and establishing a uniform policy for the coming year.

Most Successful Year

The fiscal year just ended marked the successful completion of the largest right of way program ever attempted by any state in any one year. Approximately \$40,000,000 worth of real property transactions were handled, including nearly \$37,000,000 in the right of way program of the Division of Highways and approximately \$3,000,000 in acquisition for other state agencies under the program instituted by the State Public Works Board through the Department of Finance.

The conference was honored this year, for the first time, by the presence at the opening session of California's Director of Public Works, C. H. Purcell, Deputy Director Frank B. Durkee, State Highway Engineer G. T. McCoy, Deputy State Highway Engineer R. M. Gillis; J. W. Vickrey, Assistant State Highway Engineer—Planning; R. H. Wilson, Assistant State Highway Engineer—Administration; Earl Withycombe, Assistant State Highway Engineer—Operations; G. F. Hellesoe, State Maintenance Engineer; Don Evans, State Construction Engineer; H. C. McCarty, Office Engineer; J. P. Murphy, Personnel and Public Relations; E. R. Higgins, Comptroller; and R. C. Kennedy, Secretary of the State Highway Commission.

Oregon Sends Representatives

Also attending, for the first time, was a delegation from the Right of Way Department of a sister state—Oregon—in the persons of R. L. Porter, Assistant

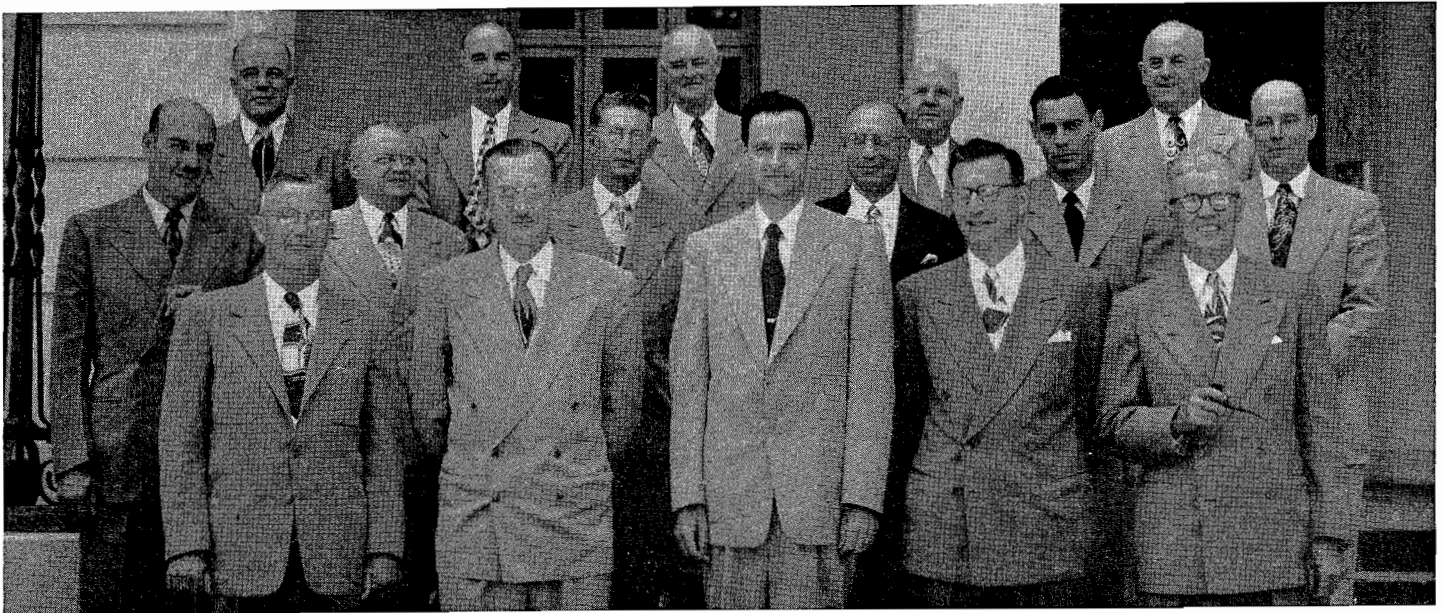
State Right of Way Engineer, and Harry G. Benson, Right of Way Supervisor, Division II.

Following introductions of those in attendance and election of officers for the coming session, Chairman Frank C. Balfour, Chief Right of Way Agent, expressed to the group his personal appreciation for the wholehearted cooperation and the fine work that was accomplished during the past fiscal year.

Educational Program

Turning to the business at hand, the first item on the agenda, and the most important, was a report by E. F. Wagner, Deputy Chief Right of Way Agent and Chairman of the Education Committee, on courses to be given during the coming year under the perpetual in-training educational program. These courses are as follows: October 1st to December 17th—course on the Right of Way Manual, procedure and technique of right of way work; January 7th to February 13th—Basic Engi-

Heads of Right of Way Department and District Right of Way agents. LEFT TO RIGHT—BOTTOM ROW: Fred Moore, San Luis Obispo; John Daniels, San Francisco; G. Mulcahy, Marysville; C. G. Piper, Redding; R. H. Ramsey, Eureka. CENTER ROW: Earl Bunker, Fresno; H. Leonard, Los Angeles; Ray O'Bier, San Bernardino; Serge Ray, Bishop; Wayne Hubbard, Stockton; John C. Webb, San Diego. TOP ROW: E. F. Wagner, Los Angeles, Deputy Chief; R. S. J. Pianezzi, Sacramento, E. M. MacDonald, Sacramento, and George Pingry, San Francisco, Assistant Chiefs; Frank C. Balfour, Sacramento, Chief Right of Way Agent.



neering Course; February 18th to March 18th—general course on appraisals, negotiation, and economic studies.

These courses are designed to initiate more audience participation, more practical work, and less self-study, with the emphasis on practical work.

The second item on the agenda was a discussion on economic studies, led by Rudolph Hess, Headquarters Right of Way Agent. Such studies, for the purpose of determining the actual effect on the market value of properties on which rights of ingress and egress have previously been restricted, are presently underway in each district. The information obtained, based on actual "before" and "after" sales, is to be distributed to all districts for use by the appraisal sections. Continuous studies are to become a permanent part of the appraisal procedure.

Economic Studies

The effect of information developed from economic studies on the planning for highway realignment or re-routing was also pointed out; particularly the data which has previously been developed on by-passed communities.

Throughout the conference assistance and advice on legal problems were received from attorneys of the Division of Contracts and Rights of Way, whose annual conference coincides with that of the Right of Way Department. Attorney Russell Monroe of the Headquarters staff, presented a summary of new legislation passed by the current session of the State Legislature affecting the Department of Public Works and the Division of Highways; Attorney Herbert Williams of the Los Angeles staff, led a discussion on recent court cases; Attorney Paul Porterfield of the San Francisco staff, led a discussion on the so-called "Integrated plant" theory; and Attorney Norris Burke presented a comprehensive analysis of the present problems involved in rearranging utilities in the way of highway construction.

On Thursday evening the entire group gathered in the Venetian Room of the Sacramento Hotel for the annual dinner. Problems and discussions begun during the day were continued with vigor during the evening.

HELPFUL TO SCHOOL

PESCADERO UNION HIGH SCHOOL
Pescadero, California

California Highways and Public Works
Sacramento, California

For a number of years you have been sending us copies of each issue of your official magazine, which we have used in connection with a number of our courses of study with what we believe have been highly satisfactory results. It is an extraordinarily informative publication of a very practical nature. It gives a comprehensive and quite inspiring account of the State's road and bridge systems; and we should like to thank you for supplying us with copies during these past years.

I should also like to add by profound gratitude for the great courtesy displayed by your department to us.

Very sincerely yours,

EDWIN F. WILLIMAN
Principal

Discussion of Appraisals

The conference reconvened promptly at 8 a.m., Friday, July 13th, with the first order of business a discussion on appraisals led by E. M. MacDonald, Assistant Chief Right of Way Agent. Mr. MacDonald's discussion clarified several of the technical details involved in the preparation of appraisals and ended with the request that the Income Capitalization method of estimating market value be used only when other, and surer, methods cannot be used.

There followed, in succession, a discussion on estimating salvage value and costs of moving improvements conducted by J. T. Zeeman, Headquarters Right of Way Agent; a discussion on certification of right of way for construction and awards of contracts, by W. M. Douglass, Headquarters Right of Way Agent; and a general discussion on real property versus personal property led by Robert E. Reed, Chief, Division of Contracts and Rights of Way.

Budget Problems

The afternoon session was thrown open to round table discussion wherein specific problems encountered by the various districts were presented for so-

lution. More time was allotted to this portion of the conference than previously due to the fact that discussions of this nature have proven to be of great value in the past.

During the discussion, E. R. Higgins, Comptroller of the Division of Highways, became the target of a rapid-fire series of questions regarding budget problems during the past year and plans for the coming year. Mr. Higgins' assistance was invaluable and was greatly appreciated. Questions were also proposed by the Oregon delegation as to problems encountered in dealing with the Federal Bureau of Land Management and as to the sources of information for Economic Studies.

Good Will Ambassadors

The final session of the conference was, as usual, difficult to terminate. However, the curtain was drawn at 4.30 p.m. by Chairman Balfour with a reminder that Right of Way Agents are the field ambassadors of the Division of Highways and must continue to merit the confidence of the public by honest and fair dealing, under the code of ethics. He expressed pride due to the good public relations work being done and again expressed appreciation for the fine job accomplished during the past year.

Throughout the conference the value, to any organization, of a periodic meeting such as this was well demonstrated. Many administrative and procedural defects naturally appear which are difficult to correct by correspondence alone, particularly in the Right of Way Department with its district offices located in widely separated areas throughout the State. Many of such imperfections are easily and quickly corrected by the annual conference.

The Right of Way Department looks forward with confidence toward another large program for the coming year. Approximately \$35,000,000 is budgeted this year for purchase of rights of way in the campaign to create for California the finest highway system in the Nation.

Temecula Study

Continued from page 8 . . .

Probably the most help to the town are the three community map-type signs placed at strategic locations along the new freeway. As can be seen from the accompanying photos, these map-signs warn the motorist as far ahead as one mile before he reaches an approach to the town. They show him briefly and simply in the form of a picture how to reach and to leave the town. By illustrating the fact that the traveler does not have to backtrack to leave town, the signs achieve a special effectiveness.

The three map-signs are a community project bought from funds contributed by every businessman in Temecula. Everyone in town considers the signs well worth their cost. In fact, the only objection seems to be that they should be larger. One enthusiastic townsman has even advocated three large billboard-size neon signs to run 24 hours a day, flashing the same map off and on.

Safety

Undoubtedly, of the greatest immediate benefit to Temecula, or any by-passed town for that matter, is the safety achieved by removing the speeding traffic from the main thoroughfare. Every resident is grateful for the diminished danger, regardless of what the economic effect upon the town may be.

Real Estate

The freeway has apparently had no adverse effects upon property values. There have been only two real estate transactions on the superseded section since the by-pass; neither indicates any loss in property values. Also, the town's only active real estate broker is of the opinion that the by-pass has had no ill effects on land values in Temecula.

CONCLUSIONS

The conclusions reached in this study are essentially the same as those reached by the merchants of Temecula. A by-pass, even of a small highway community, does not mean the death of that community. On the contrary, certain types of businesses, such as motels, may be greatly benefited by having speeding and noisy traffic removed from their front doorsteps.



Formerly a saloon, the above building was once the mecca for thirsty cowhands who brought great droves of cattle to Temecula in the 1880's and 1890's

State Fair

Continued from page 54 . . .

the amazing exhibit of the Pacific Telephone and Telegraph Company, titled "Looking Ahead With the Bell System."

As in former years, the Fair will hold its gorgeous flower show in the magnificent Hall of Flowers, a place of concentrated floral beauty and fragrance.

In other great exhibit palaces will be an array of displays that are almost endless. One of the most timely will be that of the California Office of Civil Defense. It will stress protective measures in the event of an atomic attack.

Other exhibits will feature machinery, foods, hobbies, home appliances, furniture, tools and, in fact, almost everything pertinent to the American way of life.

Among the many displays in the Educational Exhibits area will be those of the State Department of Natural Resources, the State Division of Industrial Relations, the Social Security Administration and the armed services.

One of the new attractions—the Junior California Museum—will be housed in the nearby Regional Building. Here, visitors will find a wealth of exhibits, devoted mostly to the natural history of California.

There will be free entertainment attractions galore—music by dozens of bands, precision stepping by drill teams, antics of strolling clowns, dancing, vaudeville shows and scores of special events. Two outstanding soloists will appear twice daily with the California State Fair Band. They are Raphael Mendez, one of the world's foremost trumpet players, and Patricia Lynn, featured singer in many big musical productions.

There will be the major livestock shows, with thousands of purebreds competing for \$76,152 in the open division and \$31,000 in the junior division, the latter split between Future Farmers of America and 4-H Clubs. In kindred fields, exhibitors will vie for \$2,750 for dairy products and \$5,500 for poultry, pigeons and rabbits.

Other facets of rural life will be shown in the imposing Agriculture Building, teeming with fruit, grain, vegetables and other products of the farm, all displayed against colorful backgrounds of the various county exhibits. More than 35 counties will present ingenious displays this year. In addition, the Agriculture Building will house the exhibits of many foreign nations and the Wine Institute's garden which this year will feature wine tastings of the State's vintages. This year, too, the vintners of the State will com-

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Another view of new Alpine Road in San Mateo County looking west

Alpine Road

Continued from page 10 . . .

the heavy, early winter made a shutdown necessary. After the winter the contractor had to scarify and relay his crusher run base, as well as take care of other winter damage.

Preliminary and construction engineering was performed under the direction of M. A. Grant, County Engi-

neer and Road Commissioner, subject to the approval of the Division of Highways. The wholehearted cooperation received by the county engineer and his staff from the State Division of Highways' personnel has been greatly appreciated. This cooperation facilitated the planning and construction of this project, and we look forward to future F. A. S. projects. The design work is now under way for certain

of the F. A. S. routes in San Mateo County.

Rights of way were acquired by the County of San Mateo. Court action was not necessary, except a friendly condemnation suit was required against the Leland Stanford Junior University. Construction was performed under contract by Eugene G. Alves, general contractor of Pittsburg, California, at a cost of approximately \$142,500.

State Fair

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pete for gold medals and blue ribbons at the Fair's wine show.

Stellar Horse Show

Among the many outstanding attractions will be the fashionable horse show, with nearly 450 horses going through their paces for premiums amounting to more than \$35,000. This stellar event will be held each evening, with jumping and other outdoor events in the afternoons, except on September 2d and 9th.

On these two days speedboat racing will be featured. Fast outboards will rocket over the Fair's racing moat on September 2d and the following Sun-

day the inboards, even faster, will roar over the aquatic course.

The Fair will stage a splendid horse race meet on week days during the Fair. Ten events are scheduled for each day, climaxed by the Governor's Handicap, \$10,000 added, on September 6th. Purses for the meet total more than \$125,000.

Outstanding Stars

The night theatrical spectacles will be more spectacular and entertaining than ever. Presented on the miracle stage in front of the grandstand, the night shows will feature such outstanding stars as Dennis Day, Jerry Colonna, the Sons of Pioneers, Harry "Woo-Woo" Stevens, the Will Mastin Trio, Jack Cathcart's Continentals and many other acts, including a three-ring circus.

All Fair attractions, with few exceptions, are free to those who have paid the low admission price of 50 cents to the grounds. Children under 12 are admitted free.

General admission to the horse races is \$1; reserved seats \$1.50 and boxes \$2.40. The charge for children under 12 is 50 cents and they must be accompanied by an adult.

General admission to the night show is 60 cents; reserved seats \$1.20 and boxes \$1.80. Children under 12 are admitted free to the unreserved section but must be accompanied by an adult.

General admission to the horse show is 60 cents; reserved seats \$1.20 and boxes \$1.80. Children under 12, when accompanied by an adult, are admitted free.

HIGHWAY BIDS AND AWARDS

June, 1951

BUTTE COUNTY—Between Biggs Road and Oroville Wye, about 5.4 miles, constructing plant-mixed surfacing on untreated rock base over existing pavement and borders on a portion of the project and constructing plant-mixed surfacing on existing pavement and borders on the remainder of the project, applying a seal coat to plant-mixed surfacing and applying penetration treatment to the shoulders. District III, Route 3, Section B. P. J. Moore & Son and Floyd O. Bailey, Tracy, \$164,447. Contract awarded to Rice Bros. Inc., Marysville, \$160,881.50.

EL DORADO COUNTY—Across Trout Creek and Upper Truckee River, about three miles west of Bijou, existing bridges to be repaired and detours to be graded, surfaced with lime treated imported sub-base material and liquid asphalt penetration treatment and detours to be removed. District III, Route 11, Section K. J. Henry Harris, Berkeley, \$69,018; Joe Chevreux & Ted Schwartz, Grass Valley, \$49,870. Contract awarded to H. W. Ruby, Sacramento, \$43,544.80.

EL DORADO AND AMADOR COUNTIES—At Cosumnes River, about 4.8 miles north of Plymouth, a reinforced concrete box girder bridge to be constructed and approaches about 0.4 mile in length to be graded and surfaced with imported surfacing material on imported base material and bituminous surface treatment and seal coats applied. District X, Route 65, Sections A.C. LeFever & Bing, Sacramento, \$199,834; G. M. Carr & Bati Rocca, Santa Rosa, \$221,409; Pike & Hill, Carey Bros. Construction Co. & Bailey Construction Co., San Rafael, \$216,645; Charles MacClosky Co., San Francisco, \$263,593. Contract awarded to Thomas Construction Co., Fresno, \$191,927.40.

EL DORADO COUNTY—At various locations between 2.4 miles west of Riverton and Strawberry, mineral aggregates and screenings to be furnished and stockpiled. District III, Route 11, Sections F,G,H,I. Contract awarded to Liston Ehorn, Red Bluff, \$36,365.

EL DORADO COUNTY—At Echo Creek, about 0.3 mile south of junction of Route 11, a reinforced concrete bridge to be constructed and about 0.3 mile of approaches to be graded and bituminous surface treatment applied. District X, Route 23, Section A. Joe Chevreux & Ted Schwartz, Grass Valley, \$46,249. J. Henry Harris, Berkeley, \$61,423; B. S. McElderry, Berkeley, \$70,289. Contract awarded to H. W. Ruby, Sacramento, \$43,475.50.

EL DORADO COUNTY—In the City of Placer-ville at the intersection of Coloma, Spring and Mill Streets, for widening with plant-mixed surfacing on untreated rock base and constructing a retaining wall, curbs, gutters and sidewalks. District III, Route 65. Brighton Sand & Gravel Co., Sacramento, \$6,407. Contract awarded to Joe Chevreux, Auburn, \$4,120.

GLENN COUNTY—Between 1.1 miles south of Walker Creek and Walker Creek, about 1.1 miles to be graded and surfaced with plant-mixed surfacing on cement treated crusher run base. District III, Route 7, Section B. Clements & Co., Hayward, \$152,918. Contract awarded to C. V. Kenworthy, Stockton, \$139,687.

HUMBOLDT COUNTY—Install truck scales and construct approaches about seven miles north of Arcata and at junction of Route 20 and Korb Road. District I, Routes 1, 20, Sections I,A,B. Humboldt Constructors, Inc., Eureka, \$53,185. Contract awarded to Mercer, Fraser Co., & Mercer, Fraser Gas Co. Inc., Eureka, \$42,753.19.

HUMBOLDT COUNTY—Over Burns Freeway, at 11th & 14th Streets in Arcata, two reinforced concrete girder bridges to be constructed and approaches to be graded and surfaced with plant-mixed surfacing on imported base material. District I, Route 1. Erickson, Phillips and Weisberg, Oakland, \$291,840; G. M. Carr & Bati Rocca, Santa Rosa, \$297,988. Contract awarded to Mercer, Fraser Co. & Mercer Fraser Gas Co. Inc., Eureka, \$279,958.90.

HUMBOLDT COUNTY—At North Fork Mad River, about 7.5 miles east of Blue Lake, a structural steel and reinforced concrete bridge to be constructed and about one-half mile of approaches to be graded and surfaced with plant-mixed surfacing on cement treated base. District I, Route 20, Section B. Mercer, Fraser Co. & Mercer Fraser Gas Co. Inc., Eureka, \$382,587. Contract awarded to G. M. Carr, Bati Rocca and John Burman & Sons, Eureka, \$367,195.60.

HUMBOLDT COUNTY—Across Grizzly Creek, about 7.2 miles west of Bridgeville, an existing reinforced concrete birder bridge to be repaired. District I, Route 35, Section B. Frederickson Bros., Emeryville, \$23,570. Humboldt Constructors, Inc., Eureka, \$27,162; Mercer Fraser Co. & Mercer Fraser Gas Co. Inc., Eureka, \$28,979. Contract awarded to G. M. Carr & Bati Rocca, Santa Rosa, \$22,033.50.

KERN COUNTY—Between south boundary of Sequoia National Forest and 2.5 miles southwest of Democrat Springs, about 5.3 miles damaged portions of roadbed to be graded and bituminous surface treatment applied. District VI, Route 57, Sections F,G. Dicco, Inc., Bakersfield, \$176,926; Oilfields Trucking Co. & Phoenix Construction Co. Inc., Bakersfield, \$182,648. Contract awarded to Norman I. Fadel, North Hollywood, \$119,222.

LAKE COUNTY—Across Seigler Creek and Cache Creek, respectively, just west of the west city limit and 1.2 miles north of the north city limit of Lower Lake, two reinforced concrete bridges to be constructed and approaches to one bridge to be graded. District I, Route 49, Section C. Lew Jones Construction Co., San Jose, \$159,544; Chittenden & Chittenden & B. S. McElderry, Auburn, \$163,832; Erickson, Phillips & Weisberg, Oakland, \$180,399. Contract awarded to Tumblin Co., Bakersfield, \$144,332.

LOS ANGELES COUNTY—In the City of Los Angeles on Harbor Freeway between Temple Street and Third Street, in the Four-Level area, and on Hollywood-Santa Ana Freeway between Grand Avenue and Los Angeles Street, highway lighting and illuminated sign systems to be furnished and installed. District VII, Routes 2,165. Fischbach & Moore, Inc., Los Angeles, \$106,336. Contract awarded to Ets-Hokin & Galvan, Inc., Wilmington, \$105,633.

LOS ANGELES COUNTY—On Ramona Freeway from Helen Drive to Eighth Street, highway lighting and illuminated sign systems to be furnished and installed. District VII, Route 26, Sections D,L,A. Fischbach & Moore, Inc., Los Angeles, \$88,763; Ets-Hokin & Galvan, Inc., Wilmington, \$88,920; Westates Electrical Construction Co., Los Angeles, \$91,368. Contract awarded to Electric & Machinery Service, Inc., South Gate, \$87,123.

LOS ANGELES COUNTY—On Ramona Freeway in Alhambra between Hellman Avenue and Eighth Street, about 0.9 mile to be graded and paved with Portland cement concrete on cement treated subgrade and with plant-mixed surfacing on imported base material; and three bridges to be constructed; to provide a six-lane divided highway with frontage roads. District VII, Route 26. Bongiovanni Construction Co., Los Angeles, \$1,312,704; J. E. Haddock, Ltd., Pasadena, \$1,340,733. Contract awarded to Griffith Co., Los Angeles, \$1,303,598.85.

LOS ANGELES COUNTY—In the City of Long Beach on Los Angeles River Freeway, from State Street to 223d Street, highway lighting and illuminated sign systems to be furnished and installed. District VII, Route 167. Electric & Machinery Service, Inc., South Gate, \$68,640; Westates Electrical Construction Co., Los Angeles, \$69,488; Ets-Hokin & Galvan, Inc., Wilmington, \$70,123. Contract awarded to Fischbach & Moore, Inc., Los Angeles, \$68,212.

MARIPOSA COUNTY—Between Briceburg and Yosemite National Park Boundary, about 17.7 miles grouted rock toe walls and riprap to be constructed, portions to be graded and plant-mixed surfacing to

be placed over existing surface and untreated rock base. District X, Route 18, Sections E,F,G,H. Eaton & Smith, San Francisco, \$1,229,085; United Concrete Pipe Corp., Baldwin Park, \$1,288,288. Contract awarded to Piombo Construction Co., San Francisco, \$1,212,424.50.

MERCED COUNTY—Furnishing and installing traffic signal system and highway lighting in the City of Merced at the intersection of 16th Street with G Street. District X, Route 4. R. Goold & Son, Stockton, \$7,269. Contract awarded to L. H. Leonard Electric Construction Co., San Rafael, \$6,941.

SAN DIEGO COUNTY—Between 0.7 mile south of San Marcos Creek and 2.2 miles south of Carlsbad, about 3.2 miles, construction of a graded roadbed adjacent to the existing highway and Portland cement concrete pavement on cement treated subgrade, surfacing the existing pavement with plant-mixed surfacing and applying seal coats thereto; and construction of three reinforced concrete bridges and one double reinforced concrete box culvert. District XI, Route 2, Section B. Griffith Co., Los Angeles, \$641,997. Contract awarded to Cox Bros. Construction Co., Stanton, \$637,345.

SAN DIEGO COUNTY—On Pacific Highway between E Street and Date Street, in the City of San Diego, two traffic signal systems and lighting systems to be reconstructed; Portland cement concrete curbs to be removed and reconstructed and plant-mixed surfacing and seal coats to be constructed. District XI, Route 2. Westates Electrical Construction Co., Los Angeles, \$38,102; California Electric Works, San Diego, \$38,405. Contract awarded to Ets-Hokin & Galvan, San Diego, \$36,824.30.

SOLANO COUNTY—Furnishing and installing traffic signal system and highway lighting at intersection of Sonoma Street with Nebraska Street. District X, Route 74, Section A. Ed Pierce Electric Co., Inc., Vallejo, \$6,234. Contract awarded to L. H. Leonard Electric Construction Co., San Rafael, \$5,849.

SONOMA COUNTY—Furnish and install highway lighting and modify existing traffic signal systems on Santa Rosa Freeway, between Steele Lane and Barham Avenue. District IV, Route 1, Sections E,Sro. L. H. Leonard Electric Construction Co., San Rafael, \$15,979; R. Flatland, San Francisco, \$16,286; Hall Sloat Electric Co. Inc., Oakland, \$16,592. Contract awarded to Karl F. Stolting, Santa Rosa, \$14,425.

TULARE COUNTY—Across Deep Creek about 5.4 miles east of Visalia, a reinforced concrete slab bridge to be constructed and a detour to be graded and surfaced. District VI, Route 10, Section C. Thomas Construction Co., Fresno, \$47,785. Contract awarded to Rex B. Sawyer, Visalia, \$43,676.

LOS ANGELES COUNTY—Over Los Angeles River and Southern Pacific Co. tracks at Figueroa Street and over Southern Pacific Co. tracks at Alhambra Avenue, existing steel bridges to be cleaned and painted. District VII, Routes 165,4. Acme Maintenance & Engineering Co., Montebello, \$30,082; Timmons Painting and Engineering Co., Long Beach, \$44,748. Contract awarded to G. C. Hewitt & Co. Ltd., Los Angeles, \$25,945.

LOS ANGELES COUNTY—On Harbor Freeway between Fourth Street and Temple Street, about 0.6 mile to be graded and paved with Portland cement concrete and asphalt concrete. District VII, Route 165. Griffith Co., Los Angeles, \$714,039. Contract awarded to Webb & White, Los Angeles, \$669,922.

LOS ANGELES COUNTY—On Lincoln Boulevard, between the south city limits of Los Angeles and Washington Boulevard, about 0.3 mile roadway to be excavated, untreated rock base to be constructed and surfaced with plant-mixed surfacing. District VII, Route 60. Vernon Paving Co., Los Angeles, \$15,030; Jesse S. Smith, Glendale, \$15,796; George Savala, Studio City, \$16,547; Griffith Co., Los Angeles, \$17,976; McClain Construction Co. Inc., Hawthorne, \$19,301. Contract awarded to Oswald Bros. Co., Los Angeles, \$14,500.

LOS ANGELES COUNTY—On Murphy Street between Eastern Avenue and connection with the Ramona Freeway, about one-half mile to be graded and surfaced with plant-mixed surfacing on imported base material and a steel beam span bridge for the Pacific Electric Railway to be constructed. District VII, Route 26, Section D.L.A. Charles MacClosky Co., San Francisco, \$187,660; Griffith Co., Los Angeles, \$196,634; Flickinger & Welker, Los Angeles, \$220,273; Norman I. Fadel, North Hollywood, \$223,407. Contract awarded to J. E. Haddock, Ltd., Pasadena, \$154,174.70.

LOS ANGELES COUNTY—On Hollywood Freeway, in the City of Los Angeles, between Cahuenga Boulevard and Gower Street, five bridges to be constructed and about 0.6 mile to be graded and surfaced with Portland cement concrete pavement on imported base material. District VII, Route 2. Webb & White & George W. Peterson & Jack W. Baker, Los Angeles, \$1,659,680; Charles MacClosky Co., San Francisco, \$1,693,865; Bongiovanni Construction Co., Hollywood, \$1,794,655; Griffith Co., Los Angeles, \$1,892,442; Guy F. Atkinson Co., Long Beach, \$1,907,586; Peter Kiewit Sons' Co., Arcadia, \$1,992,576; J. E. Haddock Ltd., Pasadena, \$2,024,017. Contract awarded to Winston Bros. Co., Monrovia, \$1,634,442.95.

LOS ANGELES COUNTY—Between Route 60 and 223d Street in the City of Long Beach, about 2.5 miles to be graded and paved with Portland cement concrete, interchange roads and acceleration and deceleration lanes to be surfaced with plant-mixed surfacing on untreated rock base and a grade separation structure to be constructed to provide a freeway with a six-lane divided roadway. District VII, Route 167. Guy F. Atkinson Co., Long Beach, \$1,434,996; Basich Bros. Construction Co., N. L. Basich and R. L. Basich, Garvey, \$1,551,103; J. E. Haddock, Ltd., Pasadena, \$1,590,958. Contract awarded to Griffith Co., Los Angeles, \$1,429,146.

LOS ANGELES COUNTY—On Hollywood Freeway, at Bronson Avenue and Gower Street, in the City of Los Angeles, two reinforced concrete bridges and storm drain and sanitary sewer systems to be constructed. District VII, Route 2. Lars Oberg & Chas. J. Rounds, Los Angeles, \$927,909; Charles MacClosky Co. & Radich & Ferguson, Inc., San Francisco, \$947,880; Webb & White, Los Angeles, \$950,372; Winston Bros. Co., Monrovia, \$981,295; Bongiovanni Construction Co., Hollywood, \$982,286; MacDonald & Kruse & Pacific Allied, Sun Valley, \$1,149,759. Contract awarded to George W. Peterson & Jack W. Baker, Los Angeles, \$913,870.

LOS ANGELES COUNTY—In Culver City at the intersections of Sepulveda Boulevard with Sawtelle Boulevard and Jefferson Boulevard-Playa Street and the intersection of Firestone Boulevard with Graham Street, semitraffic actuated signal system and highway lighting at two intersections and fixed-time traffic signal system at one intersection to be furnished and installed. District VII, Routes 158,174. Sections B,C,I,C,B. Westates Electrical Construction Co., Los Angeles, \$20,980; Electric & Machinery Service, Inc., South Gate, \$21,338; Fischbach & Moore, Inc., Los Angeles, \$21,761. Contract awarded to C. D. Draucker Inc., Los Angeles, \$20,510.

MARIN-SONOMA COUNTIES—Across Richardson Bay and the tracks of the Northwestern Pacific Railroad Company, about 1.5 miles north of Sausalito, over the tracks of the Northwestern Pacific Railroad Company at Forbes Station and across Russian River at Healdsburg, three existing steel bridges to be cleaned and painted. District IV, Route 1, Sections C,A,B. R. W. Reade & Company, Berkeley, \$25,946. Contract awarded to Bill Reid Painting Service, Sacramento, \$24,775.

MONO COUNTY—Between five miles north of Sonora Junction and Antelope Valley, portions, about 2.7 miles in length, to be graded and road-mixed surfacing to be placed on imported base material. District IX, Route 23, Section K. Contract awarded to R. P. Shea, Co., Indio, \$204,774.40.

MARIPOSA COUNTY—Between Cathay Junction and five miles east, about five miles to be surfaced with plant-mixed surfacing on untreated rock base. District X, Route 18, Section I. M. J. Ruddy & Son, Modesto, \$182,341. Contract awarded to Munn and Perkins, Modesto, \$163,259.

ORANGE COUNTY—At the intersection of Manchester Avenue with La Palma Avenue and Fullerton Road with Imperial Highway, furnish and install traffic actuated signal system and modifying highway

lighting system at one intersection and furnishing and installing full traffic actuated signal system with highway lighting at one intersection. District VII, Routes 174, 2, 176, Sections A,F,A. Electric and Machinery Service, Inc., South Gate, \$23,057; Fischbach and Moore, Inc., Los Angeles, \$23,689; Westates Electrical Construction Co., Los Angeles, \$23,760. Contract awarded to C. D. Draucker, Inc., Los Angeles, \$22,641.

ORANGE COUNTY—On Santa Ana Freeway, between Broadway in Santa Ana and First Street, a railroad underpass, five highway separation structures and a pedestrian undercrossing to be constructed and about 2.8 miles to be graded and portions to be surfaced with Portland cement concrete pavement on cement treated sub-base; interchange roadways, acceleration and deceleration lanes and outer highways to be surfaced with plant-mixed surfacing on untreated rock base, to provide a freeway with four-lane divided roadbed. District VII, Routes 174, 2, Sections S,A,C. Griffith Co., Los Angeles, \$2,460,271; Guy F. Atkinson Co., Long Beach, \$2,486,505; Peter Kiewit Sons' Co., Arcadia, \$2,547,789; United Concrete Pipe Corp., Baldwin Park, \$2,563,215; Allison Honer Co. & Cox Bros. Construction Co., Santa Ana, \$2,584,340. Contract awarded to Winston Bros. Co., Monrovia, \$2,439,710.

RIVERSIDE COUNTY—Between 0.6 mile west of west junction with Route 187 and 1.2 miles east of Whitewater, about 3.9 miles to be graded and surfaced with plant-mixed surfacing on cement treated base and two reinforced concrete bridges to be constructed. District VIII, Route 26, Sections C,D. Griffith Co., Los Angeles, \$1,053,815; Peter Kiewit Sons' Co., Arcadia, \$1,167,905; Fredericksen & Kasler, Sacramento, \$1,196,017; R. R. Hensler, Sun Valley, \$1,349,984. Contract awarded to Basich Bros. Construction Co., N. L. Basich & R. L. Basich, Garvey, \$1,049,143.10.

RIVERSIDE COUNTY—In the City of Riverside, on Magnolia Avenue at Central Avenue—Brockton Avenue and at Jurupa Avenue, traffic signal systems to be furnished and installed and traffic island curbs and driveway to be constructed. District VIII, Route 43, Westates Electrical Construction Co., Los Angeles, \$28,300; Paul R. Gardner, Ontario, \$29,460. Contract awarded to Fischbach & Moore, Inc., Los Angeles, \$27,612.

SACRAMENTO COUNTY—Across Cosumnes River near Bridgehouse, a bridge to be constructed and about 0.8 mile of approaches to be graded and surfaced with plant-mixed surfacing. District III, Route 54, Section C. George Pollock Co., Sacramento, \$191,963; Geo. M. Carr & Bati Rocca, Santa Rosa, \$192,870; Lefever & Bing, Sacramento, \$193,102; Thomas Construction Co., Fresno, \$202,118; H. W. Ruby, Sacramento, \$207,815. Contract awarded to Al Erickson & Co., Napa, \$190,537.50.

SAN BERNARDINO COUNTY—In the City of Colton, between Route 26 and Grant Avenue, about 1.3 miles, existing roadbed to be widened and surfaced with plant-mixed surfacing. District VIII, Route 31, Match Bros. Paving Co., Colton, \$85,782; Geo. Herz & Co., San Bernardino, \$98,471; R. A. Erwin, Colton, \$99,895; E. L. Yeager & Co., Riverside, \$105,110. Contract awarded to Hubbs Equipment Co., Colton, \$84,447.50.

SAN BERNARDINO COUNTY—Across Mojave River at Victorville, and over the tracks of the Atchison, Topeka & Santa Fe Railway Co. at Barstow, and at Mt. Vernon Avenue in San Bernardino, three existing steel bridges to be cleaned and painted. District VIII, Route 31, Sections D,G,Sbd. Timmons Painting and Engineering Co., Long Beach, \$33,333; Acme Maintenance Engineering Co., Montebello, \$44,562; G. C. Hewitt & Co. Ltd., Los Angeles, \$47,595. Contract awarded to Baker & Pollock, Ventura, \$28,654.

SAN BERNARDINO, RIVERSIDE AND ORANGE COUNTIES—At various locations, about 45.2 miles in net length, a seal coat to be applied. District VIII. Covina Construction Co., Covina, \$88,379; G. J. Payne Co., Los Angeles, \$103,412; G. & H. Paving Co., Los Angeles, \$107,505. Contract awarded to Geo. Herz & Co., San Bernardino, \$77,260.60.

SAN DIEGO COUNTY—Between Balboa Avenue in the City of San Diego and Las Flores, portions, about 5.2 miles in length, to be surfaced with plant-mixed surfacing. District XI, Route 2, Section SD, A,B,Ocn,C. Cox Bros. Construction Co., Stanton, \$145,787. Contract awarded to Griffith Co., Los Angeles, \$103,178.

SAN DIEGO COUNTY—Between 0.13 mile south of San Luis Rey River and entrance to Camp Pendleton, the existing steel truss bridge across San Luis Rey River to be widened and the existing approaches to be widened by constructing plant-mixed surfacing on Portland cement concrete base. District XI, Route 2, Ocn,C. Allison Honer Co. & Cox Bros. Construction Co., Santa Ana, \$994,560; Guy F. Atkinson Co., Long Beach, \$1,017,426. Contract awarded to Charles MacClosky Co., San Francisco, \$989,677.60.

SAN DIEGO COUNTY—At the intersections of Montgomery Freeway with 18th Street and with 24th Street in National City and at the intersection of Montgomery Freeway with E Street in Chula Vista, highway lighting to be furnished and installed. District XI, Route 2, NatC,ChV. Ets-Hokin & Galvan, San Diego, \$3,831; Westates Electrical Construction Co., Los Angeles, \$4,165. Contract awarded to California Electric Works, San Diego, \$3,700.

SAN DIEGO COUNTY—At Hancha Creek, about 10 miles east of Bonsall, a reinforced concrete bridge to be constructed and about one-third mile to be graded and surfaced with road-mixed surfacing on selected material base. District XI, Route 195, Section B. H. R. Breeden, Compton, \$43,348; E. G. Perham, Los Angeles, \$44,347; Cox Bros. Construction Co., Stanton, \$45,201; Norman I. Fadel, North Hollywood, \$47,201. Contract awarded to Einer Bros. Inc., Escondido, \$41,410.62.

SAN FRANCISCO COUNTY—Over the presidio of San Francisco in the City of San Francisco, an existing steel bridge to be cleaned and painted. District IV, Route 2. Russell Hinton Co., San Francisco, \$76,678; R. W. Reade Co., Berkeley, \$78,244. Contract awarded to M & K Corp., San Francisco, \$30,259.

SAN FRANCISCO CITY AND COUNTY—On Bayshore Freeway between 18th Street and Bryant Street, a portion of a bridge and miscellaneous road work to be constructed. District IV, Routes 68, 2. Charles MacClosky Co. & Eaton & Smith, San Francisco, \$3,235,995; Guy F. Atkinson Co., South San Francisco, \$3,257,405; Fredericksen & Watson Construction Co. & M & K Corp., Oakland, \$3,271,073. Contract awarded to Chas. L. Harney, Inc., San Francisco, \$3,044,734.50.

SAN FRANCISCO COUNTY—Across Presidio of San Francisco at the easterly end of the San Francisco approach to the Golden Gate bridge in the City of San Francisco, the existing reinforced concrete bridge to be repaired. District IV, Route 2. Healy-Tibbitts Construction Company, San Francisco, \$51,285. Contract awarded to Eaton & Smith, San Francisco, \$43,000.

SAN JOAQUIN COUNTY—Painting buildings at District X Office, Shop, and prefabricated buildings in Stockton. Roger W. Case, Stockton, \$5,030; J. F. Ecker, Stockton, \$5,656; Alman Painting and Decorating Co., Stockton, \$5,986. Contract awarded to Henry Wolters & Son, Stockton, \$3,803.

SAN MATEO COUNTY—Trees to be removed in the City of San Bruno between Angus Avenue West and Sylvan Avenue. District IV, Route 2. Precision Stump Extractors, San Francisco, \$4,900; Modern Tree Experts, Santa Rosa, \$6,950. Contract awarded to Leslie S. Mayne, San Mateo, \$4,320.

SANTA BARBARA COUNTY—At Gaviota Gorge, about 1.5 miles south of Las Cruces, a concrete lined tunnel to be constructed and about 0.1 mile of roadway to be graded and paved with Portland cement concrete. District V, Route 2, Section E. Macco Corp., Paramount, \$798,429. Contract awarded to Rhoades-Shofner Construction Co., Inc., Los Angeles, \$464,929.60.

SIERRA COUNTY—At Salmon Creek, about 3.8 miles north of Sierra City, the existing reinforced concrete girder bridge to be repaired by the construction of one additional span. District III, Route 25, Section B. Ted Schwartz, Grass Valley, \$27,677; Chittenden & Chittenden & B. S. McElderry, Auburn, \$31,055; O'Connor Bros., Red Bluff, \$33,785. Contract awarded to Lefever & Bing, Sacramento, \$24,950.

SISKIYOU COUNTY—Across Thompson Creek about 12 miles northeast of Happy Camp, a bridge to be constructed and about 0.15 mile of approaches to be graded. District II, Route 46, Section B. J. P. Brennan, Redding, \$41,172; B. S. McElderry, Berkeley, \$55,672. Contract awarded to E. H. Peterson & Son, Richmond, \$36,768.60.

SONOMA COUNTY—In the City of Healdsburg, at the intersections of West Street with North Street, and with Matheson Street, traffic signal systems to be furnished and installed. District IV, Route 1. Karl F. Stolling, Santa Rosa, \$9,697; R. Flatland, San Francisco, \$9,760; Howard Electric Co., Gilroy, \$12,311; Abnett Electric Corp., San Francisco, \$12,874. Contract awarded to L. H. Leonard Electric Construction Co., San Rafael, \$9,253.

SONOMA COUNTY—At Sheephouse Creek about 2.6 miles west of Duncan Mills, a reinforced concrete box culvert to be constructed and about 250 feet of roadway to be graded and bituminous surface treatment applied. District IV, Route 104, Section A. Helwig Construction Co., Sebastopol, \$24,708; Charles S. Moore & Robert R. Murdoch, Oakland, \$24,803; G. M. Carr & Bati Rocca, Santa Rosa, \$24,978. Contract awarded to Wheeler Construction Co., Oakland, \$23,529.75.

TUOLUMNE COUNTY—Between Jamestown and Sonora, about 3.3 miles to be graded and surfaced with plant-mixed surfacing on untreated base, a reinforced concrete arch culvert to be constructed and an existing bridge to be widened. District X, Route 13, Section B, Sra. Eaton & Smith, San Francisco, \$680,257; Guy F. Atkinson Co., South San Francisco, \$746,890; Piombo Construction Co., San Francisco, \$758,563. Contract awarded to Harms Bros., Sacramento, \$596,743.87.

YUBA COUNTY—Between Morrison's Crossing and Wheatland, bituminous surface treatment of existing shoulders, 2.4 miles. District III, Route 3, Section A. Browne & Krull, Hayward, \$8,050; Brighton San & Gravel Co., Sacramento, \$29,330. Contract awarded to Claude C. Wood Co., Lodi, \$7,183.75.

F. A. S. County Routes

BUTTE COUNTY—Under the tracks of the Western Pacific Railroad Company and Southern Pacific Company and at the High Sierra Pine Mills, near the City of Oroville, two underpasses and a bridge to be constructed. District III, Route 1169. Chittenden & Chittenden and B. S. McElderry, Auburn, \$243,275. Contract awarded to C. K. Moseman, Belmont, \$207,312.75.

LOS ANGELES COUNTY—Across San Gabriel River, on Orangethorpe Avenue, a reinforced concrete girder bridge to be constructed. District VII, Route 737. Charles MacClosky Co., San Francisco, \$209,881; E. C. Perham, Los Angeles, \$216,808; C. B. Tuttle Co., Long Beach, \$218,162; John Strona, Pomona, \$228,872; Byerts & Sons, Los Angeles, \$244,851. Contract awarded to Oberg & Cook, Gardena, \$199,301.50.

SAN BENITO COUNTY—On Fairview Road between Mansfield Road and Lone Tree Road about 1.6 miles to be graded and imported base material placed and a penetration treatment applied. District V, Route 670. Volpa Bros., Fresno, \$25,663; Paul E. Woof, Fresno, \$27,391; H. Sykes, Patterson, \$31,173; Huntington Bros., San Anselmo, \$36,427. Contract awarded to Granite Construction Co., Watsonville, \$23,969.

SANTA CLARA COUNTY—On McKee Road between Bayshore Highway and Gordon Avenue, about 3.1 miles in length, the existing road to be widened; plant-mixed surfacing with seal coat to be placed on existing pavement and on imported base material, shoulders to be constructed of imported base material and a Class B-dbl. seal coat applied thereto; to provide a four-lane divided highway. District IV, Route 1016. A. J. Raisch Paving Co., San Jose, \$248,986; Leo F. Piazza Paving Co., San Jose, \$260,014. Contract awarded to Edward Keeble, San Jose, \$242,779.50.

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ALAMEDA COUNTY—Between Hopyard Road and 2.5 miles west of Dublin, about 4.6 miles in length, a new roadway parallel to the existing roadway on portions of the project and a four-lane divided highway on other portions to be graded and surfaced with P. C. C. pavement on C. T. S.; road connections and transitions to be graded and surfaced with P. M. S. on existing pavement and on various types of bases; bridges and miscellaneous drainage structures to be constructed and highway lighting facilities to be furnished and installed; to provide a four-lane divided highway for the full

length of the project. Guy F. Atkinson Co., South San Francisco, \$1,583,375.70; Ball & Simpson and San Ramon Valley Land Co., Berkeley, \$1,576,350.26. Contract awarded to Fredrickson & Watson Construction Co., Oakland, \$1,374,058.80.

CALAVERAS COUNTY—Across North Fork Calaveras River about 2½ miles north of San Andreas, a bridge to be constructed and about 0.1 mile of approaches to be graded, I. B. M. to be placed and surfaced with plant-mixed surfacing. Haas & Rothschild, San Francisco, \$109,574; James H. McFarland, San Francisco, \$97,437; Lafever & Bing, West Sacramento, \$84,878; Elmer J. Warner, Stockton, \$83,545; Chittenden & Chittenden and B. S. McElderry, Auburn, \$82,941.50; Pike & Hill, Bailey Construction Co., and Carey Bros. Construction Co., San Rafael, \$79,852; George Pollock Co., Sacramento, \$79,424; Thomas Construction Co., Fresno, \$73,810.50. Contract awarded to Charles S. Moore & Robert R. Murdoch, Oakland, \$64,915.

COLUSA COUNTY—Between Arbuckle and 3 miles north, about 3 miles in length to be graded and surfaced with P. M. S. on C. R. B. and four reinforced concrete slab bridges to be constructed. District III, Route 7, Section A. Harms Bros., Sacramento, \$456,108.30. Contract awarded to Clements & Co., Hayward, \$378,862.10.

FRESNO AND MADERA COUNTIES—Between north of Selma and Merced County line, portions, about 13.0 miles in length, roadside areas to be prepared and planted. District VI, Route 4, Sections AC; A, C. Dana R. Tyson Co., Sacramento, \$18,846.35; Stephen L. Vistica, San Mateo, \$15,336.95; Olivers Flower Shop and Nursery, Fresno, \$13,616.75. Contract awarded to Huettig, Schromm & Bennett, Palo Alto, \$12,674.25.

INYO COUNTY—Between 11 miles north of Trona and Death Valley National Monument, about 25.7 miles in length, seal coat to be applied to portions, R.M.S. to be placed on portions, and cement treatment to be applied to other portions of the project. District IX, Route 1065. Pacific Rock & Gravel Co., Monrovia, \$103,705; George Herz & Co., San Bernardino, \$91,455; Dicco, Inc., Bakersfield, \$87,941.25; Flickinger-Welker, Los Angeles, \$83,238; Rexroth & Rexroth, Bakersfield, \$73,872.50; Jesse S. Smith & Robert R. Hare, Glendale, \$71,797.50. Contract awarded to Verne MacArthur, La Crescenta, \$68,611.25.

KERN COUNTY—Between 1.7 miles and 7.2 miles north of Randsburg Junction, about 4.9 miles in net length to be graded. Imported borrow to be placed and surfaced with R. M. S. District IX, Route 145, Section A. R. P. Shea Co., Indio, \$115,000; Geo. Hertz & Co., San Bernardino, \$99,920.30; Dicco, Inc., Bakersfield, \$94,554.75; C. W. Peterson, North Hollywood, \$89,915; Flickinger-Welker, Los Angeles, \$85,520; Rexroth & Rexroth, Bakersfield, \$79,528; Lowe & Watson, San Bernardino, \$76,472.75; Jesse S. Smith & Robert R. Hare, Glendale, \$73,971.50. Contract awarded to E. C. Young, San Fernando, \$73,295.50.

KERN COUNTY—Between 4.5 miles northwest of Isabella and Isabella Dam Site, about 4.6 miles in length to be graded and surfaced with I. B. M. with the upper portion B. S. T. and a reinforced concrete and structural steel bridge to be constructed. District VI, Route 142, Section F. Ball & Simpson, Berkeley, \$894,253.10; United Concrete Pipe Corp., Baldwin Park, \$889,134. Contract awarded to Hess Construction Co., Inc., Long Beach, \$761,903.77.

LOS ANGELES COUNTY—On Hollywood Freeway, between Cahuenga Boulevard and Gower Street, highway lighting and illuminated sign system to be furnished and installed. District VII, Route 2. Westates Electrical Const. Co., Los Angeles, \$38,757; Newberry Electric Corp., Los Angeles, \$38,413; Fischbach & Moore, Inc., Los Angeles, \$37,802; Electric & Machinery Service, Inc., South Gate, \$37,363; A. S. Schulman Electric Co., Los Angeles, \$36,668. Contract awarded to C. D. Draucker, Inc., Los Angeles, \$36,465.

LOS ANGELES COUNTY—On Pomona Boulevard between Ferris Avenue and Potrero Grande Drive about 2.3 miles in length to be graded and paved with asphalt concrete. District VII, Route 172-A. Griffith Co., Los Angeles, \$364,979.40; Jesse S. Smith, Robert R. Hare & Service Const. Co. of Southern California, Burbank, \$314,115.50; H & H Construction Co., Long Beach, \$338,357.25; Vido Kovacevich Co., South Gate, \$324,681.50. Contract awarded to Boddum & Peterson, Long Beach, \$321,897.

MERCED COUNTY—Between Snelling and Stanislaus County line about 6.4 miles in length, a graded road to be constructed and bituminous surface treatment applied thereto. District X, Route 919. Elmer J. Warner, Stockton, \$147,358; C. V. Kenworthy, Stockton, \$135,788; Chittenden & Chittenden, Auburn, \$128,328; River Rock, Inc., Merced, \$126,584. Contract awarded to United Concrete Pipe Corporation, Baldwin Park, \$124,727.80.

MERCED AND STANISLAUS COUNTIES—Between Madera County line and Keyes about 23.4 miles in length, roadside areas to be prepared and planted. District X, Route 4, Section A, Merced, C. A. James E. Boothe, Compton, \$53,860.79; Leonard Coats Nurseries, Inc., San Jose, \$45,738.20; Dana R. Tyson Co., Sacramento, \$43,855.61; Huettig, Schromm & Bennett, Palo Alto, \$30,759.52; Janoch Nurseries, Altadena, \$30,079.25; Stephen L. Vistica, San Mateo, \$25,063.65. Contract awarded to Richard J. Repsher & Sons, Paso Robles, \$24,310.20.

SAN DIEGO COUNTY—At the intersection of National Avenue with Main Street and in the City of San Diego at the intersection of Federal Blvd. with 47th Street; full traffic-actuated signal systems and highway lighting to be furnished and installed and channelization to be constructed. District XI, Routes 2, 199; 200-F, A; S.D. Ets-Hokin and Galvan, San Diego, \$40,657.35. Contract awarded to California Electric Works, San Diego, \$39,931.70.

SAN DIEGO COUNTY—In the City of San Diego, at the intersection of Pacific Highway with Washington St., a two-phase full traffic-actuated signal system to be changed to a three-phase full traffic-actuated signal system, and channelization to be constructed. District XI, Route 2-S.D. California Electric Works, San Diego, \$22,472; Westates Electrical Construction Co., Los Angeles, \$21,601.50. Contract awarded to Ets-Hokin & Galvan, Inc., San Diego, \$21,363.26.

SAN DIEGO COUNTY—Between Dulzura & Campo, about 0.8 of a mile in length to be graded and a B. S. T. to be applied. District XI, Route 200, Section D. Ralph A. Bell, Monrovia, \$132,136; Morris S. Van Meter, Bonita, \$108,257.76; Eimer Bros., Inc., Escondido, \$98,445.40. Contract awarded to Cox Bros. Construction Co., Stanton, \$93,522.

SAN JOAQUIN COUNTY—Protective screening on state highway between Mariposa Road and Calaveras River and between D Street and Route 4, a length of 6.8 miles, District X, Routes 4, 5, E, Stockton, C. Stockton. Leonard Coates Nurseries, Inc., San Jose, \$10,188.20; Stephen L. Vistica, San Mateo, \$9,568.20; Dana R. Tyson Co., Sacramento, \$8,042.35. Contract awarded to Huettig, Schromm & Bennett, Palo Alto, \$5,634.45.

SAN LUIS OBISPO COUNTY—About 13 miles west of Atascadero, between 2.6 miles and 5.0 miles east of Route 56 about 2.3 miles in length, roadway to be graded, imported subbase material and I. B. M. to be placed and surfaced with B. S. T. District V, Route 125, Section A. Madonna Construction Co., San Luis Obispo, \$185,580; Covina Construction Co., Covina, \$170,516.25; Volpa Bros., Fresno, \$164,513.78; Granite Construction Co., Watsonville, \$160,385; M. J. B. Construction Co., Stockton, \$144,999.70. Contract awarded to Valley Paving & Construction Co., Inc., Pismo Beach, \$142,745.50.

SIERRA COUNTY—Between 6.3 miles east of North Yuba River Bridge and 4.5 miles west of Sierra City, portions, about 1.9 miles in net length to be graded and penetration treatment applied. District III, Route 25, Sections A & B. Richter Bros., Oroville, \$246,890.70. Contract awarded to J. Henry Harris, Berkeley, \$199,184.

SOLANO COUNTY—Protective screening on state highway between Ledgewood Creek and Alamo Creek, a length of 8.1 miles, District X, Route 7-B & C. Leonard Coates Nurseries, Inc., San Jose, \$12,457.70; Stephen L. Vistica, San Mateo, \$10,729.60; Dana R. Tyson Co., Sacramento, \$10,356.30. Contract awarded to Huettig, Schromm & Bennett, Palo Alto, \$9,726.24.

SONOMA COUNTY—Between Stewarts Point and Gualala, portions, about 2.7 miles in length to be graded, I. B. M. to be placed, and B. S. T. to be applied. District IV, Route 56, Section E. J. Henry Harris, Berkeley, \$127,971.60; Arthur B. Siri, Inc., Santa Rosa, \$102,993.55; Britt-Pugh, Ukiah, \$98,265.24. Contract awarded to Huntington Bros., San Anselmo, \$94,494.

SONOMA COUNTY—At various locations between Cloverdale and Santa Rosa, a net distance of about 8.9 miles to be graded and surfaced with P. M. S., District IV, Route 1-A & B. Frederickson & Watson Construction Co., Oakland, \$414,982; Granite Construction Co., Watsonville, \$362,444.10; A. G. Raisch Co., San Rafael, \$292,845.30; M. J. Ruddy & Son, Modesto, \$285,356.80. Contract awarded to J. R. Armstrong, El Cerrito, \$278,948.46.

TULARE COUNTY—On Frazier Valley Highway, between Strathmore and 3.5 miles east, about 2.9 miles in length of roadway to be graded, imported subbase and base material to be placed, and surfaced with road-mixed surfacing. Jesse S. Smith and Robert R. Hare, Glendale, \$108,651; Wells & Fields Constructors, Visalia, \$99,289.75. Contract awarded to Griffith Company, Los Angeles, \$102,865.

F. A. S. County Routes

COLUSA COUNTY—Between 5.8 miles north of Colusa and Glenn County line, about 8.3 miles in length; portions to be graded and surfaced with plant-mixed surfacing on imported base material and plant-mixed surfacing to be placed over existing pavement on other portions of the project. District III, Route 761. A. Teichert & Son, Inc., Sacramento, \$180,271; Clements & Co., Hayward, \$158,447. Contract awarded to Harms Bros., Sacramento, \$156,714.

GLENN COUNTY—Across Elk Creek, about 24 miles west of Willows, a reinforced concrete slab bridge to be constructed. District III, Route 1117. Chittenden & Chittenden and B. S. McElderry, Auburn, \$28,914; O'Connor Bros., Red Bluff, \$27,254; Eaton & Smith, San Francisco, \$26,973.20; Barton Construction Co., Oakland, \$23,655. Contract awarded to James H. McFarland, San Francisco, \$21,571.

KERN COUNTY—On Main Drain Road, between Lerdo Highway and Bakersfield—McKittrick Highway, about 9.4 miles in length to be graded and a penetration treatment applied. District VI, Route 895. Oilfields Trucking Co. & Phoenix Construction Co., Inc., Bakersfield, \$405,040.90; Volpa Brothers, Fresno, \$378,369; Griffith Company, Los Angeles, \$349,101. Contract awarded to Covina Construction Co., Covina, \$328,294.98.

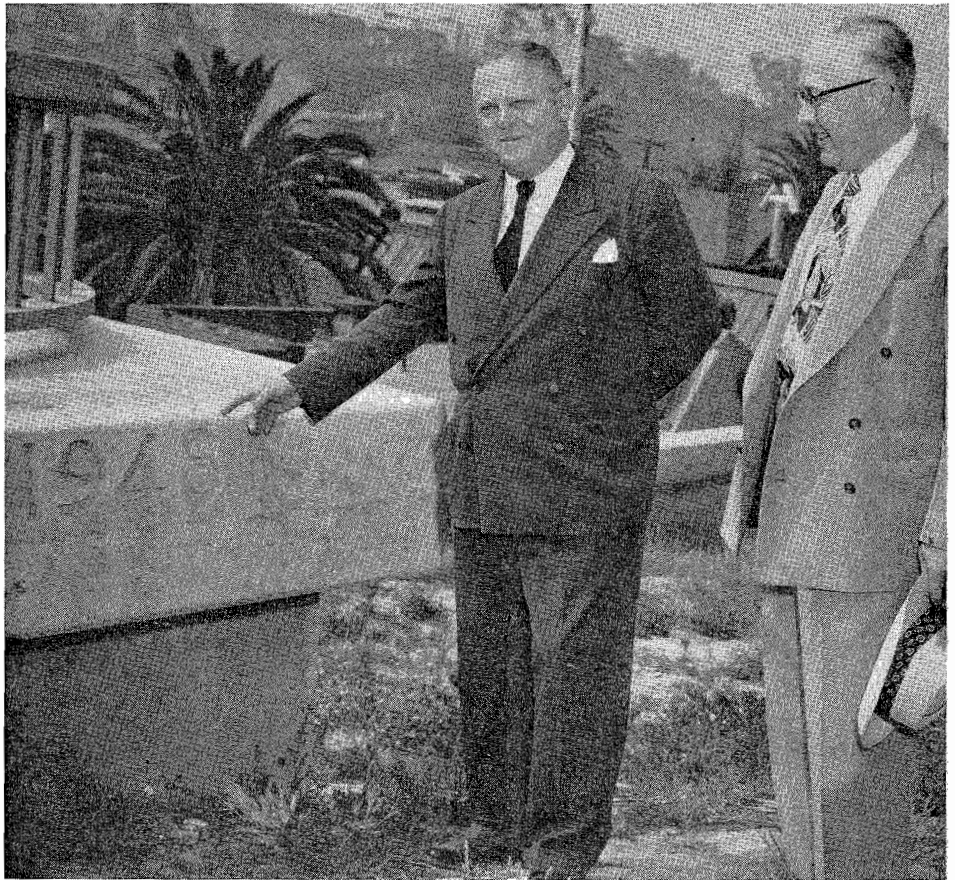
LAKE COUNTY—Between 7.0 miles and 3.5 miles west of Lower Lake, about 3.5 miles in length to be graded and drainage facilities installed. District I, Route 1039. O'Connor Bros., Red Bluff, \$66,789; Chittenden & Chittenden, Auburn, \$38,836; Carey Bros. Construction Co., San Anselmo, \$37,883; Vega Engineering & Grading Co., Berkeley, \$36,025; Arthur B. Siri, Inc., Santa Rosa, \$34,075.95; Britt-Pugh, Ukiah, \$31,847.50. Contract awarded to Harold P. Hastings, Lakeport, \$18,951.50.

MADERA COUNTY—On Firebaugh-Madera Road, between Firebaugh Bridge and 3 miles east, about 3 miles in length, to be graded and surfaced with road-mixed surfacing on untreated rock base. District VI, Route 811. Volpa Brothers, Fresno, \$96,086; P. J. Moore & Son and Floyd O. Bailey, Tracy, \$93,000.50; Baun Construction Co., Fresno, \$91,505; Gerald E. Brewster, Avenal, \$89,440. Contract awarded to M. J. Ruddy & Son, Modesto, \$83,325.

RIVERSIDE COUNTY—On Hole & Holden Avenue, between West Riverside city limits and Arlington Avenue, about 3.6 miles in length to be graded, cement treated base to be constructed and surfaced with plant-mixed surfacing. District VIII, Route 701. George Herz and Co., San Bernardino, \$190,555.30; Matich Bros., Colton, \$171,682.50; E. L. Yeager Co., Riverside, \$166,308.50. Contract awarded to R. A. Erwin, Colton, \$164,082.50.

LOTS OF WATER

The combined capacities of Shasta Lake behind Shasta Dam and Millerton Lake behind Friant Dam will provide 25 gallons of water for every man, woman and child in the United States every day for one full year.



Commissioner Harrison Baker points to cornerstone of Francisco Street bridge which was start of Harbor Freeway in 1948

Busy Day

Continued from page 16 . . .

Commissioner was Mr. Baker. He stressed the fact that this highway's early construction was due to the cooperation of the people of Long Beach and the Division of Highways. Mr. Baker also stated the cooperation, such as this, really made the work of the commission and the Division of Highways much easier.

Assemblyman Wm. Grant lauded the commission and the Division of Highways and said that it had been his privilege to work with both bodies of men and he was sure, in his mind, that a wonderful job was being done for Long Beach and the entire State.

George T. McCoy, State Highway Engineer; Mayor Burton W. Chace of Long Beach, and D. W. Campbell, Manager of the Long Beach Chamber of Commerce, also spoke.

As soon as the ceremonies were over, the caravan left for Garden Grove and lunch with representatives of Orange County. After lunch, the entire assemblage left for Riverside to meet with representatives of Riverside County and from there they left to meet with representatives of San Bernardino County.

WATER FESTIVAL

Water spilled from Shasta Dam into the Sacramento River on August 1st will open the great 10-day Central Valley Water Festival, August 1st-10th, inclusive.

Men and machines are speeding work on the Tracy Pumping Plant, where six of the world's largest pumps will lift a river-sized stream of water 200 feet from the valley floor into the Delta-Mendota Canal. The Tracy Pumping Plant will be the scene of one of the major celebrations of the Central Valley Water Festival, August 1st through 10th.

U.S. 40

Two Remaining Sections of Two-lane Highway Soon Will Be Eliminated

By M. C. FOSGATE, Assistant District Engineer

CALIFORNIA HIGHWAYS AND PUBLIC WORKS magazine published in its March-April, 1950, issue an article by District X reporting on the opening of 13 miles of limited freeway completed on U. S. 40 during 1949. This article stated, in part: "All two-lane road is

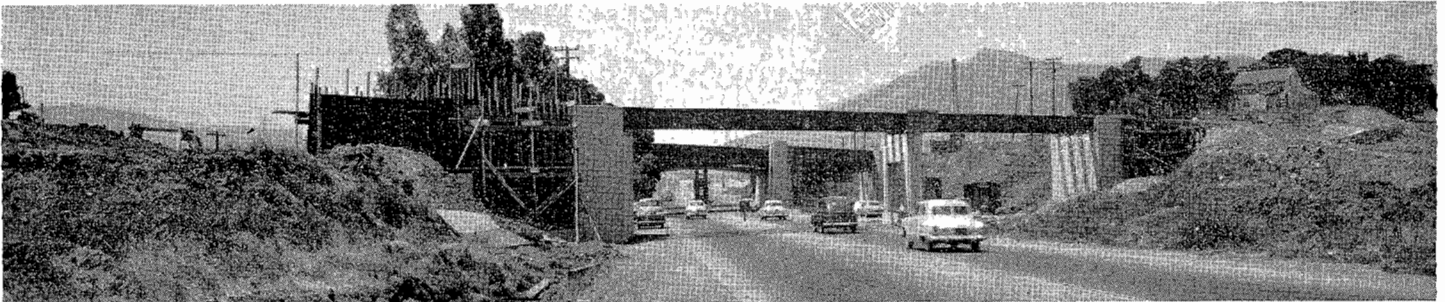
eliminated between Sacramento and the Bay region with the exception of that portion between Ledgewood Creek and Cordelia, a distance of 5.24 miles, and a short section between Ulatis and Alamo Creek, 1.4 miles. It is hoped both of these remaining sec-

tions will be under contract before July 1st of this year (1950)."

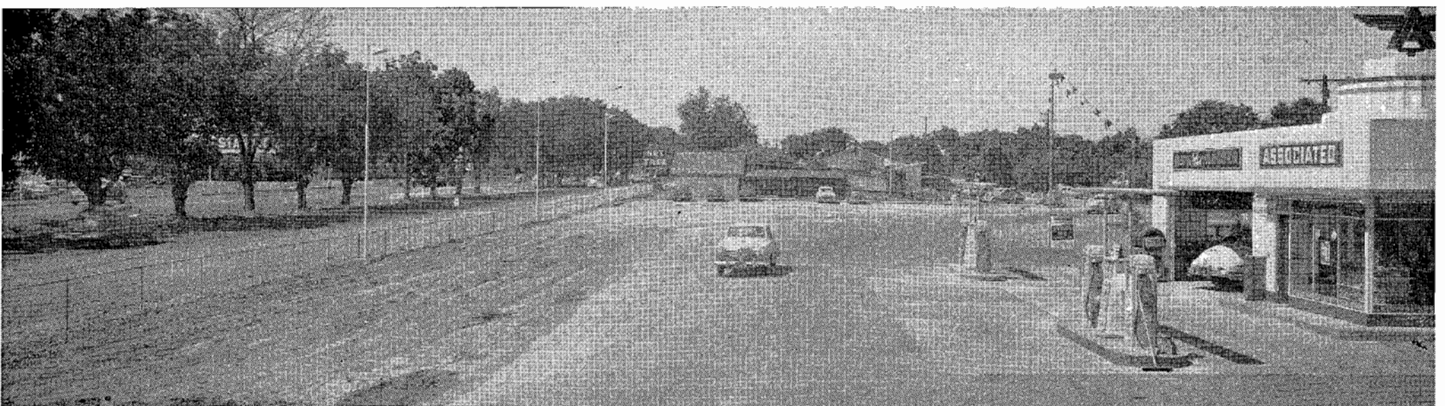
Another article in the November-December, 1950, *California Highways and Public Works* magazine described the Cordelia project. The following explains progress on that unit as well



Grading two additional lanes for four-lane divided highway. Looking easterly from Vacaville.



Railroad bridge under construction near Cordelia Wye which is in background



This is the north entrance to the outer highway at the Nut Tree



Grading for outer highway near Vacaville-Dixon substation of Pacific Gas & Electric Company

as the other unit at Vacaville which was contracted for in February, 1951. Also other work in completing this important freeway is reported on.

Will Be Completed This Fall

On the section between Ledgewood Creek and Cordelia, the major portion of the paving is completed after some delays due to cement shortages. The underpass under the Southern Pacific Railroad near Cordelia is 90 percent complete, and the overpass carrying Route 12 traffic over Route 40 is nearing completion. Progress on all items of work on this project has also been hampered by the limited supply of labor available. However, it is expected this road will be open to traffic this fall.

The section at Vacaville between Ulatis Creek and Alamo Creek has the grading 100 percent complete. The overpass across the railroad and Mason Street is started. Piles for this structure have now been received. A detour was added during construction over about one-half of the distance of this section which allows the construction of the entire roadway without interference or inconvenience to traffic.

Detour Aids Project

It was necessary to construct a temporary structure across Alamo Creek to accommodate this detour. Due to a shortage of steel it is anticipated that the overhead and bridge on this contract will not be completed prior to January 1st. However, because of the revised detour the contractor will be able to lay his concrete paving completely to the paving notches in the structures which will mean as soon as the structures are completed traffic

may use the new highway. As it is anticipated the section between Ledgewood Creek and Cordelia will have been completed prior to this time, this will then eliminate all two-lane highways on Route 40 between the Bay area and the causeway near Sacramento.

Leading toward the development of a full freeway, further progress has been made toward better access control in this area. A frontage road has been completed at the Nut Tree east of Vacaville with necessary chain link fencing. Traffic stopping at this famous eating place is now properly directed in and out from entrances on the west-bound lane. These entrances are approximately 500 feet on either side of the Nut Tree, which also includes a service station. Cross-overs were also constructed from the northbound lanes opposite these entrances.

Frontage Road

To further protect traffic on this route, a frontage road is being constructed from a county road adjacent to the Vacaville P. G. & E. Substation to 4,000 feet west. This is an area where many small businesses and service stations exist. The entrances from this frontage road both enter the west-bound lane on county roads where traffic islands, curbs, and fencing will protect the traffic on Route 40 from illegal entrance.

This contract is well along, the grading being complete, and the base and surfacing will be under way shortly. It is expected this contract will be completed early this fall. This contract also

includes fencing at several locations between Vallejo and Davis to protect the traffic on this route from illegal movement of vehicles entering and leaving private businesses.

Miscellaneous other traffic features now under way or to be made a part of contracts now advertised include landscaping and erosion control between Ledgewood Creek and Alamo Creek; illumination in the vicinity of Vacaville, and installation of truck scales near Cordelia.

The completion of these above items and further planned access restrictions will soon see U. S. 40 handling its increasingly heavy traffic safely and expeditiously.

FROM SPAIN

MANUEL MATEOS
Canteras Graníticas y Micrograníticas
(Spain) Avila

FECHA, June 23, 1951

MR. KENNETH C. ADAMS, *Editor*
California Highways and Public Works
Sacramento, California

DEAR MR. ADAMS: I wish to express my sincere thanks for your kindness in mailing me the January-February and March-April issues of your useful magazine *California Highways and Public Works*. I have always found it extremely helpful for my interest in its questions. I know how your Country is in the vanguard about highways, and I would be pleased to continue receiving copies.

Yours truly,

MANUEL MATEOS

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Governor of California

FRANK B. DURKEE
Director of Public Works

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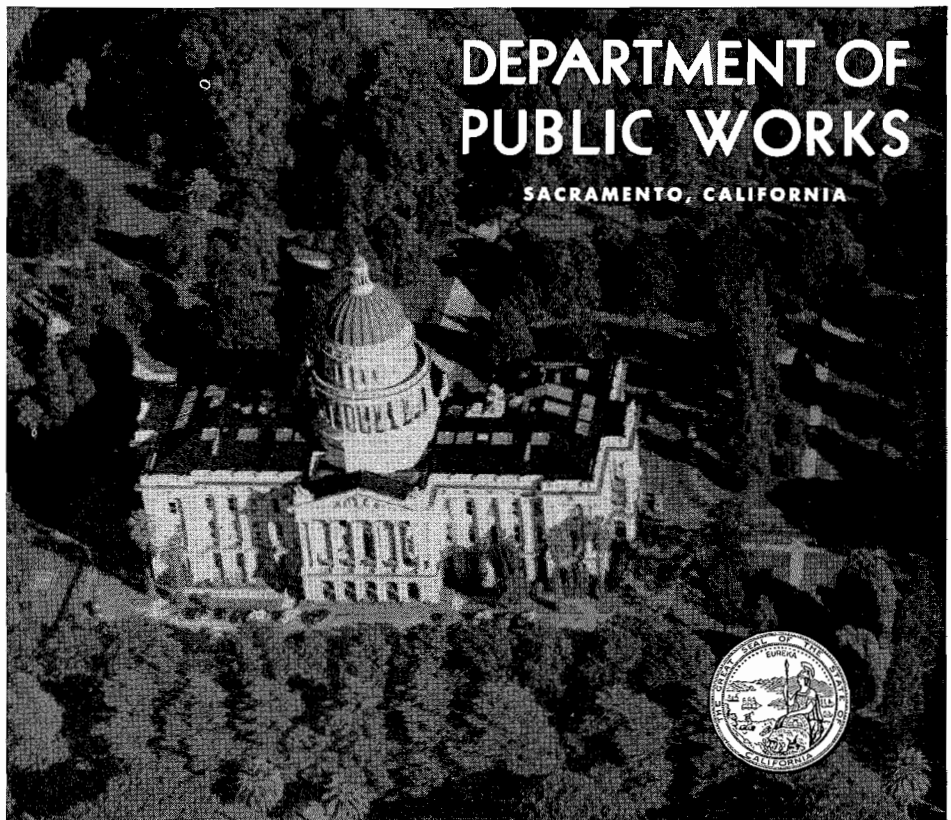
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If all the man-made forest fires in California in 1950 had been in a space one mile wide along the route of U. S. 101, you would have to drive for two days to see all the blackened waste. It would stretch for 745 miles, or from Los Angeles to near the Oregon line.

The mile-wide strip of ruin would represent the 477,000 acres of forest, range and watershed lands that were swept by the 2,867 fires resulting from human carelessness. They were 70 percent of all forest fires in California last year, according to a study made by the California Division of Forestry and the U. S. Forest Service. The other fires were due to lightning.

The man-made fires are preventable fires, the foresters point out. They ask all the people who travel through or work in California forest and range areas this year to prevent such fires by memorizing and observing these simple rules:

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.



Remember . . .

Only you can PREVENT FOREST FIRES!