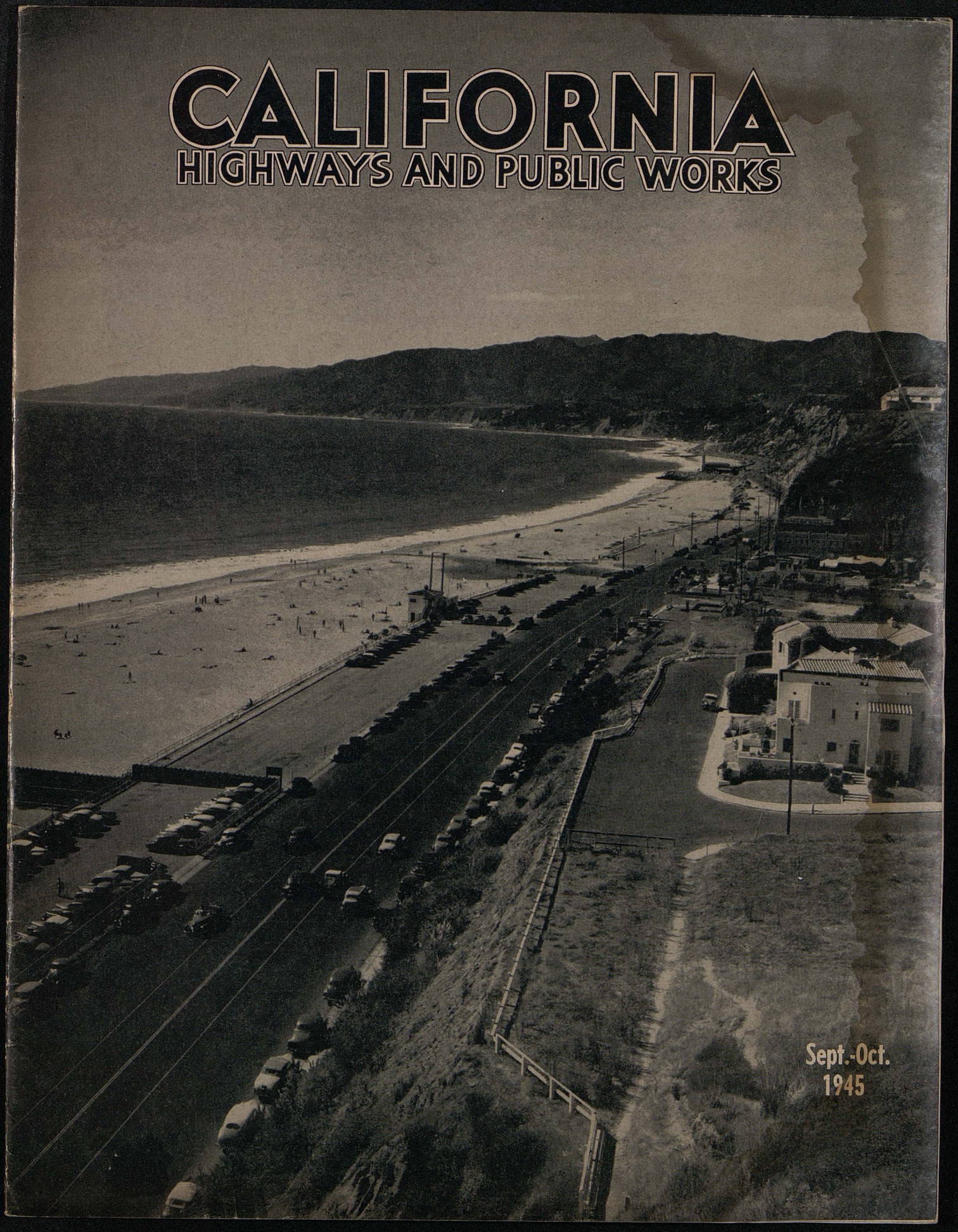
CALIFORNIA
HIGHWAYS AND PUBLIC WORKS



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CALIFORNIA HIGHWAYS AND PUBLIC WORKS

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Table of Contents

Governor Earl Warren on tour of northern section of Redwood Empire with the California Highway Commission. Left to right: Homer P. Brown, Placerville; C. Arnholt Smith, San Diego; James A. Guthrie, San Bernardino; C. H. Purcell, Director of Public Works and chairman of Commission; Governor Warren; Chester H. Warlow, Fresno; Harrison R. Baker, Pasadena, and Walter Sandelin, Ukiah

Governor Wants Redwoods Saved

ON A TOUR of the northern section of the Redwood Empire Governor Earl Warren on September 25th and 26th viewed at first hand the highway needs and the State parks and beaches in Mendocino, Humboldt and Del Norte counties.

The Governor was accompanied on his trip by all the members of the California Highway Commission, State Highway Engineer George T. McCoy, members and officers of the State Park Commission and officials of the Redwood Empire Association and of the three counties visited.

In addresses at Ukiah, Eureka and Crescent City, Governor Warren placed emphasis on the duty of the State to coordinate future highway development in the Redwood Empire with the necessity for preserving the magnificent redwood trees for posterity and the improvement of State parks and beach facilities in the area. He shared this ambition with Chairman Joseph R. Knowland of the State Park Commission and Director of Public Works C. H. Purcell, who is also chairman of the California Highway Commission.

More than 400 persons attended a banquet which was given in the municipal auditorium in Eureka on Wednesday night, September 26th in honor of the Governor. In talks at luncheons at Ukiah and Crescent City, the Governor spoke briefly and emphatically on the theme of protecting the redwoods and developing parks and beaches but made his principal address in Eureka. Introduced at the banquet by Past President Paul Mudget of the Redwood Empire Association, the Governor discussed the postwar problems which confront California.

"We can not make prosperity through Government jobs," he said, "the big job in our State is to provide employment for more than 2,000,000 persons who have come here during the war and who will for the most part remain here. Private enterprise must take care of these. We must solve our problems through cooperation and tolerance. We must develop our resources to provide such employment.

"Our State Government has been making preparations for the reconversion. More than $300,000,000 of State funds have been saved up for postwar work and this money will be expended to build permanent improvements on our highways, at our State institutions, in our State parks and on our splendid beaches. These must be jobs of all kinds provided. It looks like a big task but I am not in any way pessimistic. California has met other large problems and we will meet this one."

In addresses to audiences at Ukiah, Crescent City and Eureka, Chairman Purcell said that the State is ready to

Joseph R. Knowland, Oakland, chairman of the California State Park Commission, points to one of majestic redwood trees which line U. S. 101 in the heart of the redwood belt. On his right are State Highway Engineer George T. McCoy, C. H. Purcell, chairman of the Highway Commission, and Governor Warren

take up where it left off almost four years ago the development of the State Highway System. He announced that the Highway Commission has launched its $115,000,000 postwar highway building program by allocating approximately $49,000,000 to designated projects which will be advertised for bids prior to June 30, 1946. He said some projects in the postwar program will be advertised for construction this fall and that once started the advertising for bids and the letting of contracts will proceed in an orderly manner and be carried on continuously consistent with the ability of the road construction industry to keep abreast of the program.

Mr. Purcell said that highway and bridge projects within the Redwood Empire and which are included in the initial program of the Division of Highways will total $14,193,300.

While highways, parks and beaches were given major consideration by Governor Warren, Mr. Purcell and Mr. Knowland, the Governor took occasion at the Ukiah luncheon to mention the Mendocino State Hospital and to praise Senator George M. Biggar, of Covelo, and Assemblyman Michael J. Burns, of Eureka, for their interest in State highways, State parks and governmental problems generally.

"I have never thought that Mendocino had the proper maximum security institution for mental cases," the Governor declared. "I believe we should handle menace cases in a special hospital and this is a problem to which we will give serious consideration."

The Highway Commission and the State Park Commission met the Governor at Ukiah where a luncheon was tendered by the Ukiah Chamber of Commerce at the Palace Hotel, with Superior Judge Lilburn Gibson presiding, after which the Mendocino board of supervisors conducted the official caravan to Hartsook where the Humboldt board of supervisors took over as guide. Pausing at various redwood groves, the Governor and his party drove to Scotia for an overnight stop.

On Wednesday the caravan proceeded from Scotia to Crescent City in Del Norte County.

The Del Norte board of supervisors greeted the party at the Humboldt-Del Norte County line and after a brief stop at Wilson Creek beach the caravan was escorted to Hotel Lauff in Crescent City where the chamber of commerce was host at luncheon. President Errol Winn of the Chamber

(Continued on page 31)

Scenes like the one on the opposite page, a section of the Redwood Highway in Humboldt County, are what Governor Warren desires the State of California to preserve for all time

HIGHWAYS OF CALIFORNIA

By J. D. GALLAGHER, Associate Highway Engineer

This is the second in a series of articles on Highways of California by Mr. Gallagher.—Ed.

MOTHER LODE HIGHWAY

From an historical point of view, one of the most interesting State routes is the Mother Lode Highway which traverses the heart of California's early gold mining country. The northerly terminous of this route is the City of Auburn, in Placer County; from this point the highway extends southerly through the Sierra foothills to Mariposa, a distance of 169 miles. The route is well surfaced throughout its entire length. The country touched by this route was the setting for much of California's gold rush, when many an early-day miner searched these hills for the fabulous Mother Lode, mythical source of the yellow wealth. A list of towns and place-names in the region through which this highway passes would furnish a good index for Bret Harte stories or the early writings of Mark Twain.

Between Auburn and Placerville the route passes through the old settlement of Coloma on the South Fork of the American River, where in 1848 the millwright, James W. Marshall, touched off the California gold rush by discovery of gold in the tail-race of a sawmill he was operating for Captain John Sutter. From here the highway then moves down into old Placerville, referred to by forty-niners as "Hangtown," because of its speedy and final system of frontier justice to malefactors against the pioneer code.

HISTORIC SPOTS

From Placerville, the Mother Lode traverses oak-covered rolling foothills dotted with towns bearing those picturesque names so reminiscent of the free and easy days of the gold rush: El Dorado, Fiddletown, Fair Play, Grizzly Flat, and Dry Town. From Dry Town, the oldest community in Amador County the name of which was a misnomer in the early-days as far as liquid refreshment was concerned, the highway, crossing through a saddle in the ridge south of Rancheria Creek, follows up Amador Creek to the sleepy village of Amador City where crumbling buildings are the chief evidence of the one-time activity around the old Keystone mine. The road crosses the next ridge at the same point as the old "Amador Trail" of the '50's, evidence of which may be seen in the old stone walls and grass covered roadway. In the valley below this summit lies the attractive town of Sutter Creek, with neat lawns and houses settled beneath large shade trees. While many of the buildings here date back to the roaring gold days, most have had facial treatments, concealing their age behind modern fronts which to some degree detract from the old time atmosphere of the vicinity.

Leaving Plymouth, the motorist may see the old so-called Hetty Green mine, formerly the Eureka, which is now owned by the Central Eureka Company. In 1859, Alving A. Hayward bought this property and between 1852 and 1881 it had produced $13,000,000. Hetty Green, who amassed a fabulous fortune, owned the mine for a period and it still is popularly referred to as the Hetty Green mine.

INTO AMADOR

Out of this valley the highway continues southerly to a junction at Martel with the Jackson lateral and continues on down to Jackson, the county seat of Amador County. Adjacent to the highway on the outskirts of Jackson are the properties and workings of the famous Argonaut and Kennedy mines, two of the largest in California. Because of these two mines, there is a large population of hard-rock miners in Jackson and the town retains a typical mining atmosphere in spite of the modernization of many of the buildings. The old court house is a point of considerable historic interest, where even as late as 12 or 15 years ago, the old town well with its bucket and rope was in general use by the neighborhood. The National Hotel in Jackson witnessed much excitement during the fifties, including the hanging from a tree (which formerly stood in front) of an entire gang of Mexican desperadoes who had murdered all of the adult residents in a rooming house on Rancheria Creek. The only survivor of this tragedy was a small baby who was thrown out a second-story window with her throat cut. She recovered, however, and lived to raise a family.

In the center of Jackson, the Carson Pass lateral takes off from the Mother Lode to wind its way up to the top of the Sierra, crossing the summit at elevation 8,650 beyond beautiful Silver Lake and the Carson Spur. This route is along the trail followed by the intrepid Kit Carson, who guided many caravans to California.

BRET HARTE COUNTRY

South from Jackson, the Mother Lode Highway crosses into Calaveras County and up through the famous old mining town of Mokelumne Hill and down again to historic San Andreas and further on to Angels Camp. Through the writings of Mark Twain and Bret Harte the history of this section of the Mother Lode country is more familiar to the average citizen than that of other locations. San Andreas was the site of the famous old Metropolitan Hotel, featured in some of the writings of these two chroniclers of California's golden days. The hotel, however, was destroyed by fire 20 years ago. It was from San Andreas that the gentlemanly, but much feared, lone bandit Black Bart was sent to the penitentiary after a meteoric career as a stage robber.

Angels Camp was another center of turbulent activity during the early decades of the State's existence, from which Messrs. Harte and Clemens derived the material for many of their fascinating tales. It was here that the famous "jumping frog" episode, made immortal by Mark Twain took place. At Carson Hill, a little farther to the south, is located the celebrated Morgan mine, where a $43,000 fortune was found in a single gold nugget.

WHERE MARK TWAIN LIVED

Beyond Melones and into Tuolumne County the highway moves on to Sonora, surrounded by such historical mining communities as Columbia, Rawhide, Jamestown and Chinese Camp. Between the Calaveras County line and Sonora lies the quaint little village

Upper—Jackson, Amador County, still retains much of the color of pioneer days. Lower—On left is famous Hetty Green Mine in Mother Lode.

of Tuttletown; here, a short distance off the Mother Lode on Jackass Hill is Mark Twain's cabin. Mark Twain was known as "The Sage of Jackass Hill" and the old store where he made his daily purchases is still in use.

At Sonora the Mother Lode makes a junction with the Sonora Pass (elevation 9,624) highway which crosses the high Sierra to the east to connect with U. S. 395 between Bridgeport and Coleville in Mono County.

Southwesterly from Sonora the Mother Lode highway follows the Sonora Pass lateral to a point some six miles beyond Jamestown; there it takes off in a southeasterly direction through Chinese Camp, Moccasin, Coulterville and up into the mountains by way of Bagby and Bear Valley to Mariposa. Between Chinese Camp and Moccasin the Big Oak Flat road leads off toward the east and, traversing the northern half of Yosemite National Park, this lateral becomes the Tiogo Pass Route over the Sierra. It crosses the divide at elevation 9,941, the highest crossing of the mountains on the State highways,

from which point it twists down to a connection with U. S. 395 near Leevining on Mono Lake. Bret Harte's old cabin is situated near Groveland on the Big Oak Flat Road.

Those familiar with the writings of Bret Harte will readily recall Poker Flat, Poverty Hill, Table Mountain, Whiskey Hill and Jimtown. These historic spots are all accessible from Jamestown.

KINGS RIVER CANYON

In highway development, scenic grandeur is usually accompanied by the heaviest of construction. Probably nowhere has this been better illustrated than in the building of the State highway into Kings River Canyon in Fresno County.

The Kings River National Park in eastern Fresno and Northeastern Tulare Counties embraces an unrivaled wilderness of rugged granite and forest, and the Kings River Canyon leading to the park presents scenery which closely approaches that of Yosemite Valley in massive majesty.

The most direct State highway connecting this wild mountain fastness of California's high Sierra with the outside world is the road between Fresno and the General Grant Grove by way of Squaw Valley. The route leaves General Grant Grove on its northerly boundary and travels along the valley side of the lower Sierra to Cherry Gap. Passing through the Gap the first view is obtained of the rugged beauty of the lower Middle Fork of the Kings. A little further, at Lookout Point, a splendid panorama is had of the massive rock formations of the country along the South Fork and the relative positions of Ten-Mile Creek, the two forks and the main Kings River Gorge.

Windy Cliff, picturesque spot on Kings River Canyon Highway

INSPIRING YUCCA POINT

Winding farther down the grade the highway rounds Yucca Point, an inspiring point of vantage, from which the view of the glacier-carved gorge justifies the name given to the river by the Spaniards in 1805: "El Rio de los Santos Reys" (The River of the Holy Kings). On down over gentle grades and easy curves the highway is carved in the granite of the canyon wall finally reaching the river at Windy Cliff, some 18 miles from the General Grant Grove. Here the rock formation suddenly changes as a great limestone dike rises almost vertically to a height of 1,500 feet above the river. This limestone presents striking examples of natural sculpture. About 200 yards above the highway in the face of Windy Cliff is Patt Boyden's Cave, large galleries and grottoes filled with stalactites and stalagmites through which, from unknown sources, flow strong air currents.

DIFFICULT PROBLEM

Building the highway around Horseshoe Bend presented the most difficult single problem in the road's construction. At this point the highway grade is some 300 feet above the river and its path was blocked by a rugged point of solid granite jutting over the river. While in all the construction of the Kings River Canyon explosives had played a most important part, the high point in operations was the removal in one blast of over 50,000 cubic yards from the face of this rock mass. A coyote hole four to six feet high was drilled along the gutter line of the roadway for a distance of 570 feet. Nine stub pockets were drilled off this tunnel toward the face to provide more advantageous placement of the powder, in all, a total of 745 feet of tunnel was drilled. The charge consisted of 37 tons (74,450 pounds to be exact) of explosive. After the charge had been placed the entire tunnel was carefully packed and backfilled with rock and earth to insure most effectiveness from the blast. In the one shot, 50,500 cubic yards of

rock was moved from the face of the cliff, leaving a solid rock foundation on which to lay the road surface. The westerly 200 feet broke along a vertical seam leaving as clean a bit of construction as could have been desired.

At Windy Cliff, where the highway reaches the river elevation, the road crosses to the northerly side and follows on past Boulder and Grizzly Creeks to Deer Creek Cove where State construction ends. An additional four miles, however, was built by the U. S. Forest Service on to Cedar Grove, where a large area has been cleared among the trees and prepared with camping conveniences.

The State's portion of the Kings River Canyon project covered a distance of 24.5 miles and was built at a cost of $2,300,000, an expenditure which has provided Californians with easy access to some of the Nation's most beautiful mountain country.

SANTA MONICA COAST

When the California coast line was pushed above the tide level much of the shore line consisted of high mesa land leading back to the coastal mountains. Through the centuries, run-off from the mountainous areas cut deep canyons to the sea and the incessant beating of ocean waves broke down the mesa into rugged bluffs and headlands. One of the most characteristic of these locations is along the coast northerly from Santa Monica into Ventura County. Here precipitous bluffs have long stood high above the Pacific with Point Mugu near the Los Angeles-Ventura County line thrusting its rocky chin into the pounding breakers.

The 1919 Highway Bond Issue added to the State highway system a road along the coast between San Juan Capistrano in Orange County and Oxnard in Ventura County. Development of a shore line highway on the 112 miles between these two points necessitated construction along those bluffs north of Santa Monica.

LONG LITIGATION

The southerly portion of the Santa Monica-Oxnard section lay through the famous Rancho Malibu Sequit y Topango. A sizeable volume could be written on the litigation for rights of way through this ranch, which was carried on for years, first by Los Angeles County and then the State. The controversies relative to highway right of way were before the courts of Los Angeles and Ventura Counties for long periods and even were carried to the United States Supreme Court.

First construction on the Malibu section, in 1921, consisted of seven and one-half miles of 20-foot Portland cement concrete pavement. During 1923 and 1924 some grading was done by State forces pending acquisition of rights of way. The next contract, for grading 16 miles through the ranch Arroyo Sequit to Las Flores Canyon, was completed in October, 1926. This contract involved nearly half a million yards of roadway excavation, 125 pipe culverts, 10 concrete box culverts, one 135-foot arch culvert and a reinforced concrete bridge. Under agreement with Los Angeles County three other bridges were constructed across the larger canyons: Malibu Creek, Solstice and Corral. Upon completion of the grading another contract was begun at once for the placing of pavement.

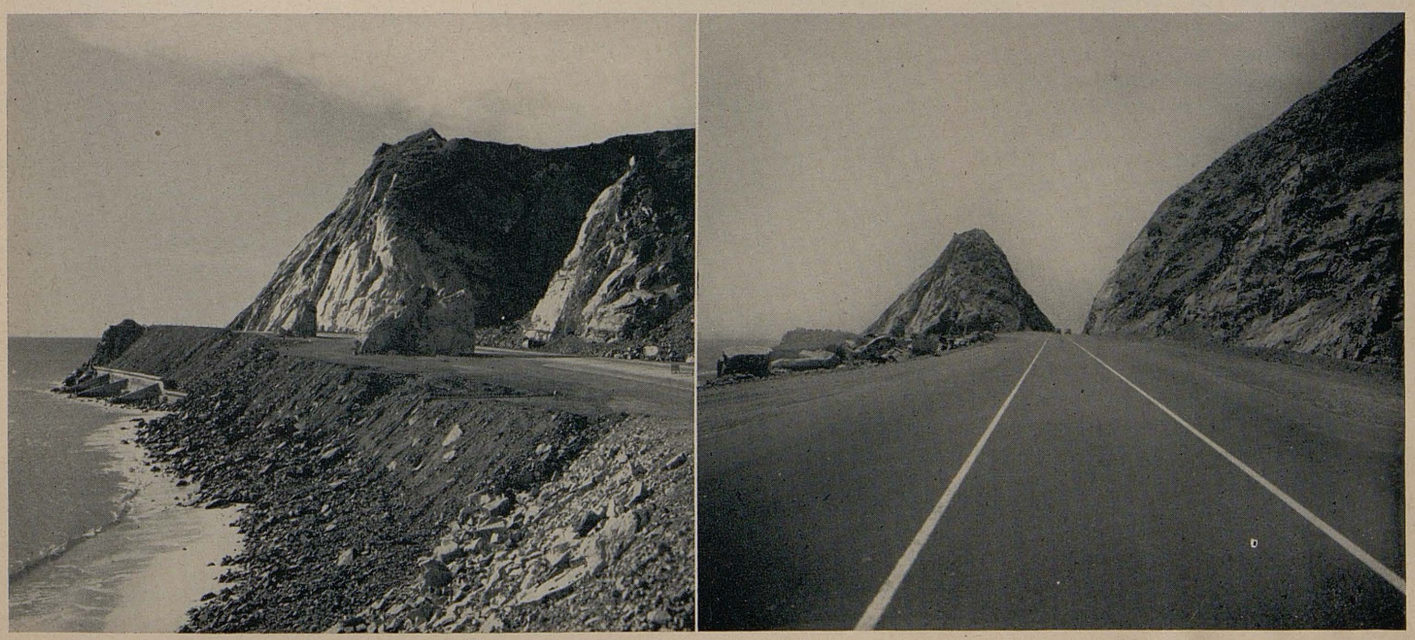
SPECTACULAR WORK

This section of the highway involved no grades of any consequence. Where it was found necessary to leave the beach, the highway leads across a high mesa, overlooking the ocean on one side and the rugged brush-covered Santa Monica mountains on the other.

The most spectacular work between Santa Monica and Oxnard occurred on about 10 miles in the vicinity of Sycamore Canyon and Point Mugu, near the Los Angeles-Ventura County line. Back in 1924 and 1925 initial construction on this 10 miles entailed more than one million cubic yards of excavation, 75 per cent of which was solid rock. At Point Mugu where the entire nose of rocky headland was cut away, over 250,000 cubic yards of material were moved.

At the time of this construction, access to the Oxnard end of the Point Mugu section was easily accomplished over previously completed State work. On the Santa Monica end, however,

On left is Point Mugu where highway swung around cliffs causing traffic hazard. On right is Point Mugu Highway cut which did away with dangerous old road



the situation was quite the opposite; from the end of the seven miles of new pavement out of Santa Monica there were 22 miles of rough mountain road to the construction site. For this reason contractors' camp equipment and steam shovels were brought in by water on ocean scows and delivered on the beach. At the time, these amphibious operations were a dangerous and expensive undertaking and tugboat captains were loath to come in shore unless amply protected and well paid. Landings were, however, accomplished in rather heavy seas without mishap.

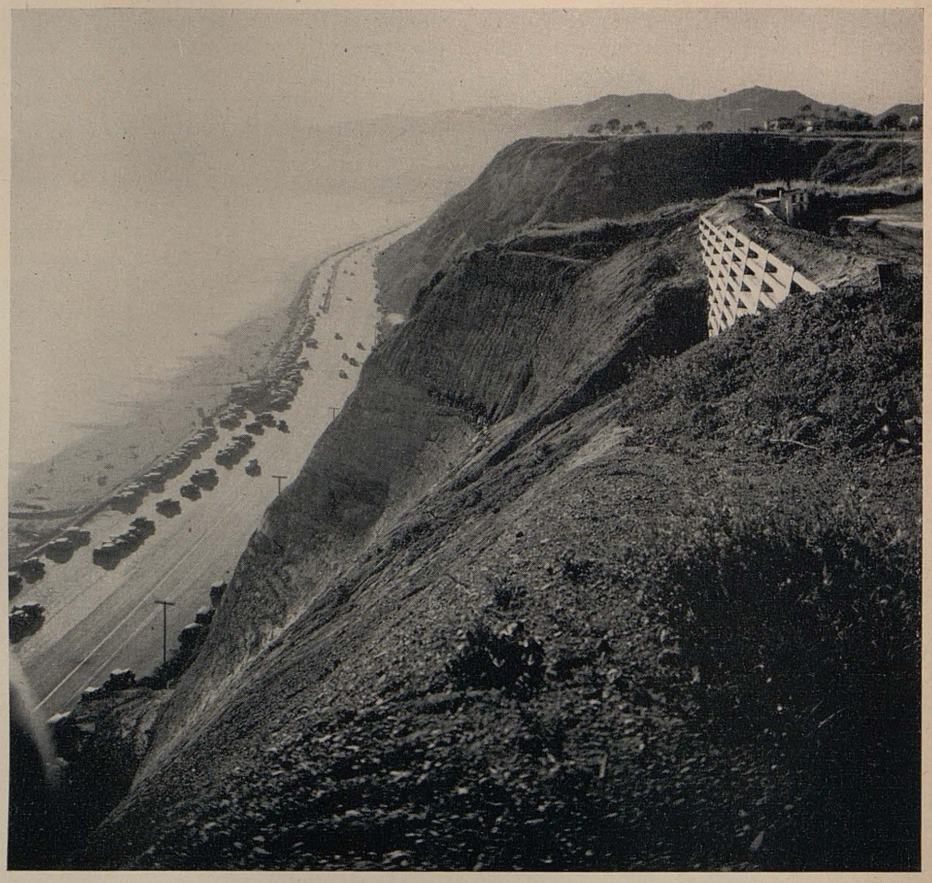
DIFFICULT CONSTRUCTION

From a construction standpoint, drilling and blasting operations presented the main difficulties in the Mugu section. It was necessary to build trails over the hills to the edge of the cliffs and to provide ropes, ladders and platforms to make the face of the bluffs accessable for tunneling. Coyote holes were driven from the face to the inside gutter line of the proposed roadbed and smaller cross-tunnels ending in large explosion pockets were drilled from the coyote holes about every 30 feet. Explosive charges amounted to as much as 6,250 pounds of black powder in a single pocket and often a single blast comprised 80,000 pounds. After the charges were in place the problem of backfilling presented difficulties and in some instances it was necessary to lower material in buckets down the face of the cliffs to tunnel portals.

The roadbed section along the base of these bluffs cut through the hard igneous rock which formed the face and at irregular intervals intercepted soft interior rock of sedimentary origin. This made blasting a delicate and uncertain matter. At one time the powder foreman, a man of years of experience and unquestioned ability, misjudged how far back one of his large blasts would break. The top of the cliff, 150 feet above the explosive charge, broke some 60 feet back of the slope stakes and carried away the ground on which the foreman and two helpers, who fired the shot, were standing. It is unbelievable that they could have gone down 200 feet to the very surf with that mass of moving rock and live, but fortunately all three escaped death.

DANGEROUS WORK

The engineers on survey parties working ahead of the drillers felt that the contractor had no corner on hard and dangerous work. Scaling perpendicular cliffs and dangling from ropes high above the pounding breakers were all part of a day's work for them as well.



Scene on Santa Monica Highway showing precipitous bluffs which engineers had to overcome

Since the days of those pioneer contracts in the early and middle twenties, development of this highway has gone a long way. Further construction, reconstruction, widening and straightening during the past twenty years have evolved this route into a modern thoroughfare, four lanes, divided, over southerly end. Prior to the war and its curtailment of recreational driving this coastal highway carried some of the heaviest traffic on the State highway system, summer Sunday counts in several years reaching to 37,000 cars in sixteen hours. Sixteen years ago, when the route was a two-lane highway, 53,303 cars were recorded in sixteen hours at the Santa Monica Canyon intersection on July 14, 1929—the State's highest record for rural traffic density.

FIGHT AGAINST OCEAN

Another interesting construction feature used by the State in developing this route involved protection of the roadbed from the force of the surf. For six or eight years after the highway was constructed, the constant wave action north of Santa Monica Canyon gouged into the shelf upon which the highway was built. If nothing had been done about it the ocean would have undoubtedly swallowed the highway and begun again its age-old task of tearing down the bluffs.

That highway was an important link in the State road system; it represented an investment of millions in public funds; the people wanted it, they needed it, and for $30,000 it was saved to them, together with a new stretch of sandy beach nearly a mile long and 200 feet wide.

The method used to protect the highway and build up the beach was not new in engineering practice; it consisted of constructing five sheet piling walls (technically known as groins) at right angles to the shore line. These groins were placed about 500 feet apart and extended into the surf some 200 feet. As far as man's effort was concerned that was all there was to it.

The ocean did the rest and within twenty months built up a fine sand beach for a distance of more than 3,300 feet along the shore. Without going into details, the theory of this method is to break up the cross currents along the shore, known as the littoral drift, with the result that sand carried by the water is dropped and washed ashore by incoming waves. The method, while not applicable to all locations, was most successful in this instance and added a recreational spot of inestimable value to southern California.

TORREY PINES GRADE

Just fifty years after Columbus sailed his galleons across the Atlantic Cabrillo dropped anchor in San Diego Bay and was the first white man to set foot in California. It was not until 200 years later that the first mission was erected and the pueblo of San Diego established around it—the first city of California.

From this beginning, Father Junipero Serra started the development of California. His chain of missions, each a day's journey apart, extended northward along the El Camino Real. Over this rough, dusty, but nonetheless royal, highway plodded the sandaled feet of Franciscan padres, marched steel-helmeted conquistadores and rode swaggering vaqueros.

That part of this forerunner of the State highway system immediately north of the pueblo of San Diego lay upon the flat mesa which extends back from the bluffs along the ocean shore. At Sorrento Creek, where the stream had cut a canyon through the mesa, the trail twisted and turned down the face of the bluff to sea level through a cluster of tall, windswept trees, the only grove of Torrey Pines. For over a hundred years, access between the level of the ocean at the mouth of Sorrento Creek and the top of the mesa was down this steep and twisting road and highway which evolved from the old trail of the Franciscans.

This section of U. S. 101 did away with old Torrey Pines Grade in San Diego County

WORK COMPLETED IN 1932

It was not until some twenty years after the First State Highway Bond Issue that statutes governing development of the State highway system were liberalized to permit participation by the State in the improvement of State routes through cities and, though the notorious Torrey Pines grade lay upon the trunk route between San Diego and Los Angeles, it was within the city limits of San Diego and outside the jurisdiction of the Division of Highways.

During the late twenties the city of San Diego began a planned development of important city streets and highways which included the relocation of the old State route to the north. This change provided a shift to Rose Canyon on the easterly side of the mesa and a complete relocation of the Torrey Pines grade. With the change in State highway laws, the Rose Canyon project was built by the city with the financial cooperation of the State. With further legal changes permitting the Division of Highways to improve its routes within cities, the State and the city jointly took on the project of relocating the Torrey Pines grade. In 1932 the work was completed.

At this time when jurisdiction of urban State routes was invested in the Division of Highways, the Torrey Pines grade was notorious as one of the most tortuous and dangerous grades on any major State highway and its elimination from the State system was of inestimable benefit to traffic. The new alignment provided for a long and relatively straight grade out of the Sorrento Creek canyon to the top of the mesa, on a line east of the old grade.

TREES SAVED

Incidentally, the contract which provided for paving the new highway also provided one of the first four-lane

(Continued on page 32)

Bridge Maintenance Practice On California Highway System

By KENNETH ELDER, Assistant Engineer

THERE are 4,636 bridges on the California State Highway System omitting culverts. Of this number 3,142 are built of steel and concrete, 1,394 of timber or steel with timber approaches and 100 are steel bridges with timber deck systems. The estimated value of these bridges exclusive of State-owned toll bridges is $125,000,000.

The protection of this investment and the maintenance of the bridges in such condition that they will best serve the traveling public is a duty of the Bridge Department of the Division of Highways. Within the Bridge Department, maintenance work is handled directly by the Maintenance and Research Section. Methods of repair and maintenance as developed and field tested by this section over a number of years have included several practices that are worthy of note and should be of interest to the engineers and construction men engaged in this work throughout the Country.

There will be no attempt made to enumerate all maintenance problems encountered, but the more important features of the work, with illustrations, will be covered in a series of articles, of which this is the sixth. It deals with Improving Clearances on Highway Structures.

ONE major portion of work done in connection with the widening of numerous State Highway bridges has been done by contract; however, in many instances bridge clearances can be greatly improved by relatively minor alterations. These minor alterations are usually accomplished by the maintenance forces and this article will deal with such minor work.

Structures on the present State System classified as bridges, exclusive of underpasses, tunnels, and overcrossings, fall under any one of the four following classifications:

1. Concrete and steel structures of 10-foot span or over, excepting those of less than 20-foot span which have a depth of fill over them greater than the span length.

2. Timber structures of three feet or greater total span and two feet or greater in height; excepting those of less than 20-foot span where the fill over them is greater than 1.5 times their span length.

3. All structures which, measured parallel to roadway center line, have a length of more than 20 feet between the inside faces of end abutments. (This class conforms to the records of the Public Roads Administration and the State Planning Survey.) About 3,500 of 4,377 strictly bridge structures have spans of greater than 20 feet.

4. Any structure which, in the opinion of the engineer, creates a traffic hazard, or has some special feature requiring regular investigation. About 2,400 structures have roadway widths which are less than the present

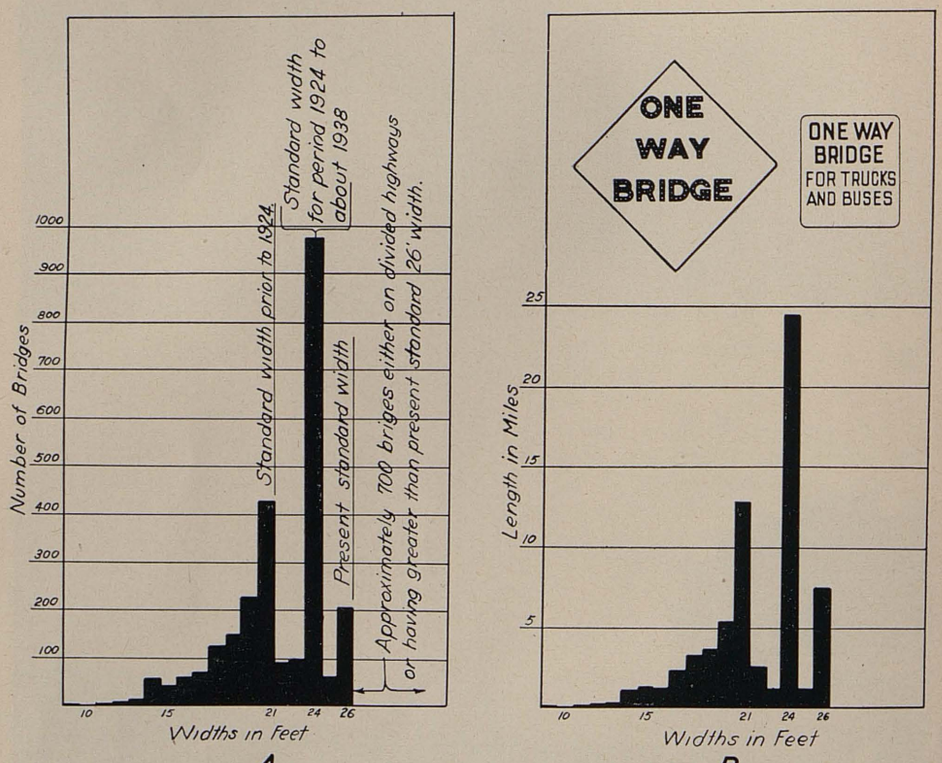


FIGURE NO. 1

standard width of 26 feet. They can be grouped according to their roadway widths as shown in the graphs in **Figures 1A and 1B. Figure 1A** shows the number of bridges in each group and **Figure 1B** the roadway mileage in each group.

NARROW BRIDGES

The standard width for bridges carrying two-lane traffic in California prior to 1924 was 21 feet. This was changed in 1924 to 24 feet. The present standard roadway width is 26 feet and is based on two 11-foot lanes with an additional two-foot strip on either side. The need for this width is shown by the fact that the California Motor Vehicle Code allows a maximum overall width of 100 inches on all vehicles and 120 inches on certain types of special equipment.

There are many narrow structures on the State System, the widening of

which is impracticable or unwarranted because of the cost. Advance notice of such condition, in the form of warning signs, is considered expedient. Two types of warning signs have been adopted for this purpose. All bridges having a clear roadway width between 20 feet and 16 feet have advance signs reading "One Way Bridge for Trucks and Buses." Those structures whose roadway width is less than 16 feet have advance signs reading "One Way Bridge." **Figure A** shows signs of these types.

Such signs have, no doubt, been instrumental in reducing accidents at these structures and are considered well worth their cost.

WIDENING COST HIGH

Structures having widths less than 20 feet are usually situated on roads carrying a relatively small amount of traffic and seldom can be widened without complete reconstruction because of their generally light design and poor condition. However, some are situated on roads carrying a relatively large volume of both heavy and light traffic and these present a considerable hazard.

The cost of widening all the narrow bridges to the present standard width of 26 feet would be at least $5,000,000.

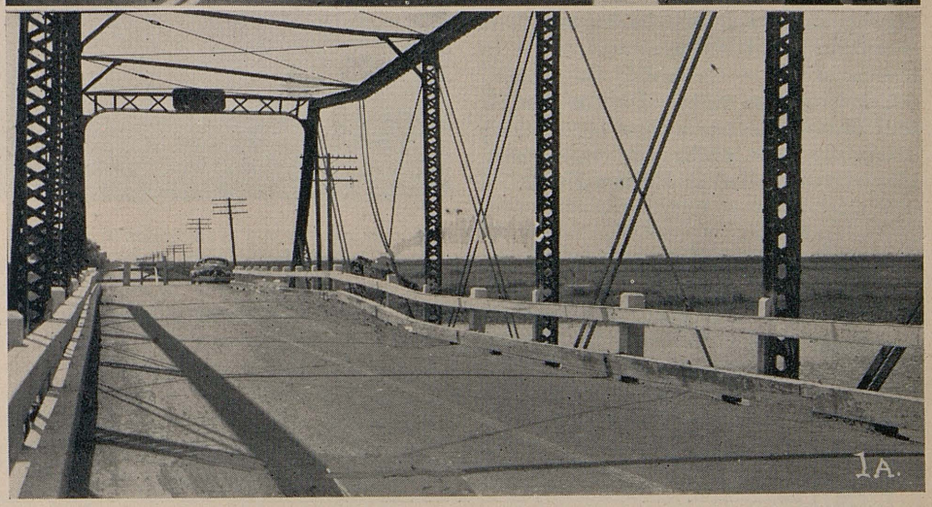
It would be desirable to do this, but because of the large expenditures necessary to take care of structurally weak bridges and other more urgent work, much of it will have to be deferred indefinitely. In the meantime, we are faced with high maintenance and repairs to the many bridge rails on such structures that are continually damaged by vehicles.

There are many through steel trusses on the State System with narrow roadways which, for the most part, have been inherited from the various counties. Proper widening of this type of bridge is generally impractical and the cost of replacement is relatively great.

SERIOUS BOTTLE-NECKS

These structures constitute a serious "bottle-neck" in many places and they have caused accidents which have been expensive to the State, to the owners of the vehicles and therefore to the traveling public at large. It has been observed that in such cases heavy, wide vehicles, in order to avoid risk of striking the rail or curbs, encroach on the opposing traffic lane. **Photo No. 1** indicates this condition, it being one of considerable hazard on heavy traveled roads. **Photo No. 1a** shows the result of a very serious accident which occurred on a narrow steel truss when two vehicles, in attempting to pass, caused extensive damage to several critical members of the structure. Deducting the width of the two vehicles from the roadway width, only 7½ inches was left for passing clearance.

1.

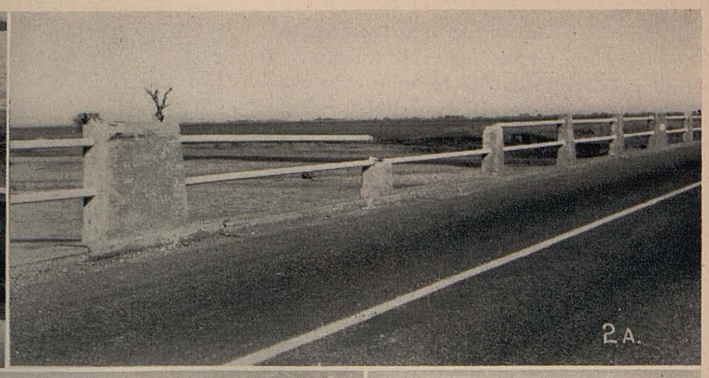

1A.

Other similar accidents have resulted in the breaking up of one or more members with a resulting partial failure of the structure. It is one of the unsolved mysteries of the age why some simply supported trusses, which have been badly damaged in this manner, continue to function under heavy loads.

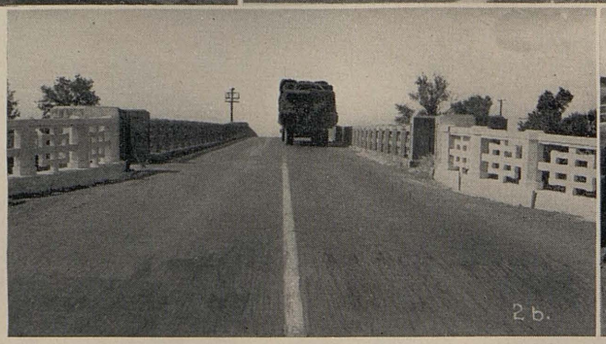
RAILS DAMAGED

Rails are severely damaged when curbs are so narrow that they offer insufficient room for overhang. **Photo Nos. 2 and 2a** show cases of this kind where large portions of the railing have been torn out. In the case of the bridge shown in **Photo No. 2a** 70 posts out of a total of 96 were replaced at least once and some of them as many as four times. **Photo No. 2b** shows the set up on a narrow bridge with low ineffective curbs. Forced by opposing traffic to stay in his narrow lane the truck is crowded against the rail and overhanging width causes the damage noted above. Often the front wheel hooks into the rail with resulting loss of control and the entire unit may crash through the rail. **Photo No. 2c** shows such an accident.

Various methods have been devised for alleviating the conditions above described. **Figure No. 2** shows details employed in removing the railing and placing new substantial curbs in their place. A new railing is then attached outside this curb. While the actual gain in roadway width in this particular case was only 10 inches, the additional gain in width between rails was two feet two inches. This was a very substantial gain for overhang, a lack of which has caused considerable dam-



age to bridge railings. Observations made on one structure before this was done, showed that all vehicles crowded into the opposing lane. After widening by method shown in **Figure 2,** it was found that traffic moved closer to the curbs and even rubbed them without hitting the rails. **Photos Nos. 3 and 3a** show a structure before and after the new curbs and rails were placed as detailed in **Figure No. 2.**



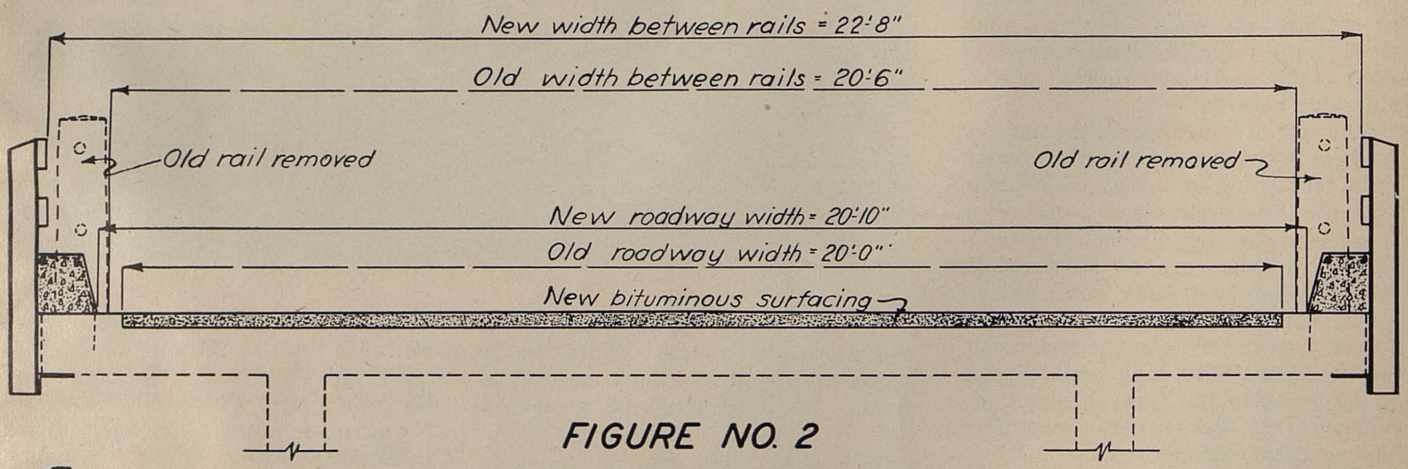


FIGURE NO. 2

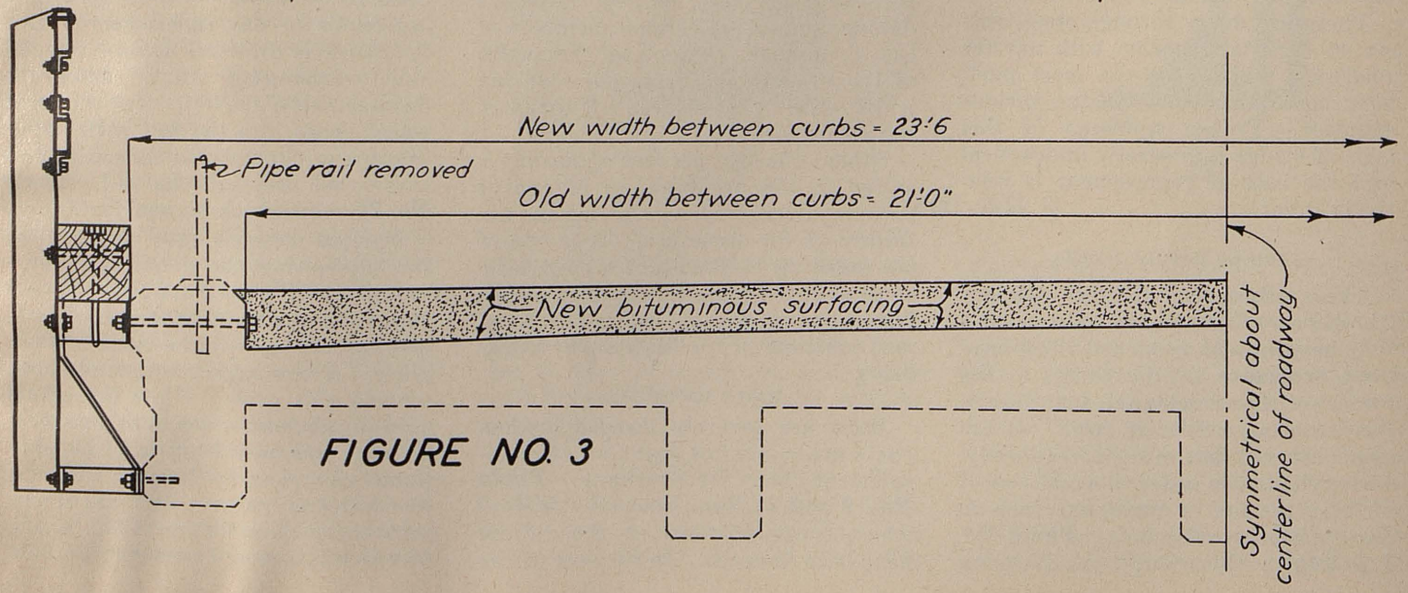
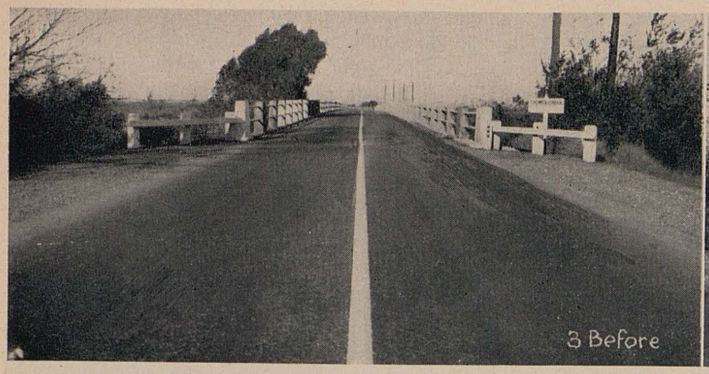
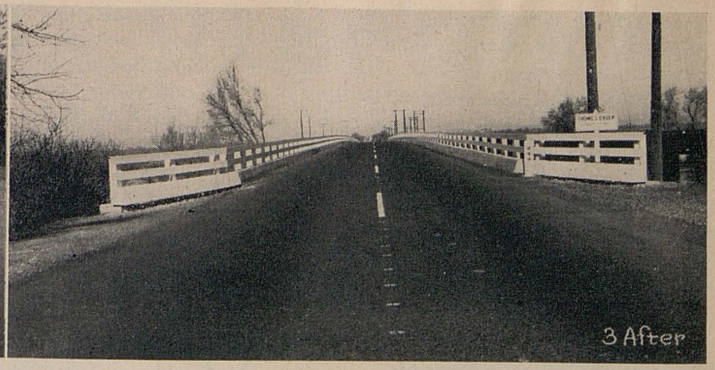


FIGURE NO. 3





SUCCESSFUL METHOD

Figure No. 3 shows a method which has been successfully adapted to a type of construction quite frequently found on many bridges. New curbs and rails, mounted on brackets, are bolted to the outside girders and the floor leveled up by placing additional wearing surface. This method can only be employed when the structure is strong enough to carry the additional load and it is permissible to raise the grade line as shown. **Photos No. 4 and 4a** show a completed job as detailed in **Figure 3.**

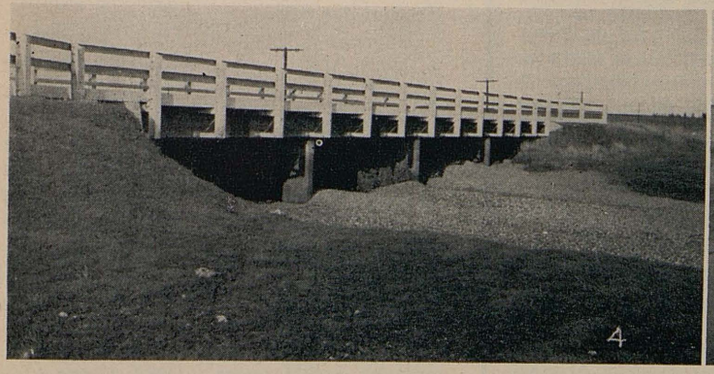
Figure 4 shows another method which has been used in several cases when nothing better was practicable. The old rails were removed to top of curbs and new ones bolted to the outside of the girders. While this method shows no gain in roadway width, there is considerable gain in overhang clearance between the front faces of the curbs and the railings. There is a feeling of more ample width which causes vehicles to stay close to the curbs. **Photos No. 5 and 5a** show before and after pictures of this type of widening.

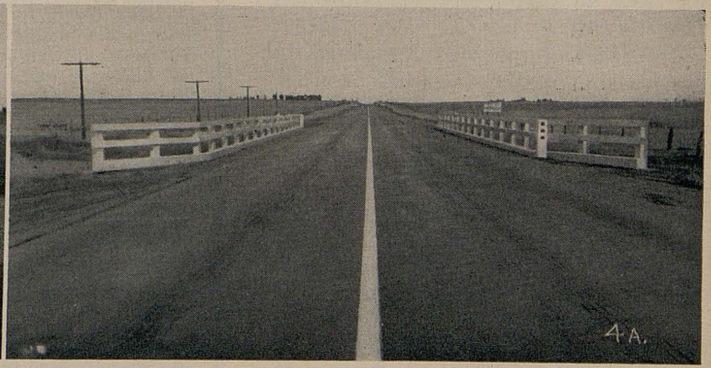
WINGWALLS COMMON PRACTICE

When a superstructure is in exceptionally poor condition and the design and condition of the substructure warrants its use for a new one, it is common practice to remove the floor, respace the stringers, or add new ones, and construct a new floor, curbs and rails. In this case the 45-degree wingwalls were substantial and could be encroached upon for support of new but longer outside lines of stringers to gain the extra width desired.

Most narrow bridges are, naturally, located on substandard, narrow roads and often have rather sharp curves at the bridge approaches. Narrow "through" structures on such set-ups should be protected from overhanging loads by wide and substantial curbs. It has been argued that wide curbs cut into an already narrow roadway but, paradoxically, such a reduction improves the "effective" roadway width, since with wide curbs, traffic feels safe in crowding over directly against them thus leaving much more room for opposing vehicles than otherwise would prevail. This contention has been proved in quite a few instances where this method has been adopted. Such curbs on narrow structures pay for themselves at all such locations.

Impaired vertical clearance on some of the "through" structures has been





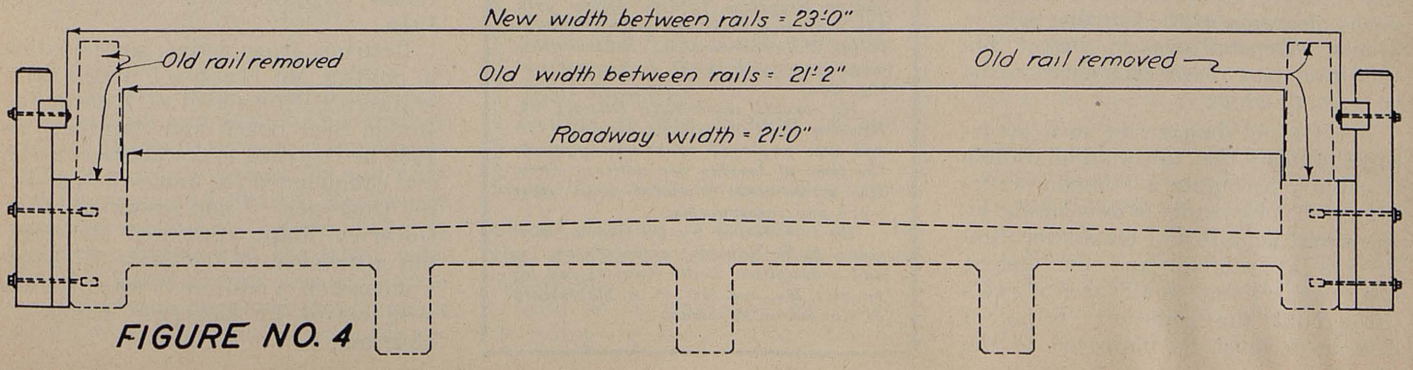


FIGURE NO. 4

a source of considerable hazard and expense. The bridge maintenance article appearing in the May-June issue of 1945 of CALIFORNIA HIGHWAYS AND PUBLIC WORKS on Repair of Steel Trusses, touched on this matter and showed what could be done to alleviate troubles of this nature.

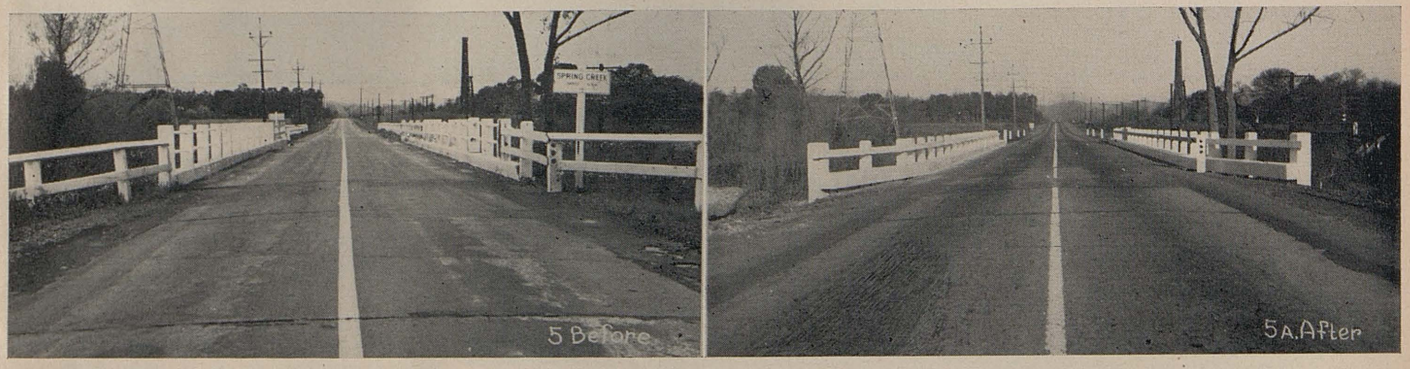
The State Motor Vehicle Code limits the legal height of vehicles to 13.5 feet. All "through" structures of recent construction have been designed for a vertical clearance of not less than 14 feet and on main highways 15 feet clearance is usually provided. However, there are 41 structures now on the State Highway System with a vertical clearance of less than 14 feet, the lowest of these being an underpass with clearance of only 9.9 feet. Nearly all of these impaired structures were built by agencies other than the State, previous to taking the road into the Highway System.

In a few important locations the clearance at underpasses has been improved by lowering the roadway grade. As previously described, quite a few "through" bridges having impaired clearance due to knee braces at the portals and intermediate frames, have been improved by removal of these braces. Strengthening of the structure by the addition of plates at critical section is necessary to retain the structural capacity. Much damage has occurred on structures having reduced clearance at the side due to knee braces. Expenditures to correct this condition have been considered to be well worth while.

Records of damage to such structures indicate that this kind of trouble is rapidly becoming a common occurrence. Truck traffic is developing by leaps and bounds and maximum legal heights of vehicles and over-height loads can be found on all types of roads throughout the country. Impaired clearances must be improved to the legal maximum, at least, if damage from this cause is to be avoided.

Some of the more common methods of widening to gain either additional roadway width or overhang clearance have been explained in this article. Generally, as explained at the beginning of this article, the most desirable way to attain this end is to either replace the superstructure with a new and wider one, or remove the curbs and rails, widen the roadway slab and place new curbs and rails. However, it is not always desirable or possible to do this.

Results to date clearly indicate that accidents have been reduced and maintenance costs materially decreased in cases where these types of improvements have been used.



In Memoriam

Leslie Taylor McNamara

District VI lost a trusted employee and a valued friend in the untimely passing of Lt. Col. Leslie Tay.or McNamara on August 27, 1945, at the age of 42 at Hammer Field Hospital, Fresno.

Col. McNamara was an Assistant Highway Engineer when he was granted military leave in 1941 from the Division of Highways. Previous to that year he was a member of the California National Guard for more than ten years and became a Captain with the 185th Infantry. He transferred to the Corps of Engineers after being assigned to duty in the Aleutian Islands and saw action on Attu and Kiska. He was last stationed on Amchitka from which island he was sent to Fitzsimmons Hospital in Denver for treatment of a chest ailment. An operation failed to arrest the disease and he was returned to his Fresno home in the latter part of August and subsequently taken to Hammer Field Hospital.

Born in Houghton, Michigan, he graduated from the Michigan School of Mines and Technology. He gained experience in mine surveying in Arizona, and in irrigation facility design with San Francisco firms and with the California Water Service Co. Several years were spent with the U. S. Engineers at Stockton.

He started work with District VI, Division of Highways, in March, 1929 and was employed continuously up to the time of leaving for military duty. His assignments included both office work and construction.

He is survived by his widow, Mrs. Grace F. McNamara; a son, Peter, 11, and a daughter, Leslie Ann, 3, and his parents, Mr. and Mrs. P. A. McNamara of Houghton, Michigan.

Former Highway Commissioner is Called by Death

From one end of California to the other, men and women in public and business life who knew Philip A. Stanton are mourning his death, which occurred at his home in Seal Beach on September 8th.

Born in Cleveland, Ohio, February 4, 1868, Mr. Stanton came west at the age of 18 years, arriving in Anaheim, Orange County, with a capital of $18. Mr. Stanton entered politics as an Assemblyman in 1903 and in 1909 was elected Speaker of the Assembly, a position he held for four successive terms. In 1910, the year Hiram Johnson was elected Governor, he was one of several unsuccessful Republican candidates for the gubernatorial office. He was California's Republican National Committeeman from 1912 to 1916.

Retiring from active participation in politics, Mr. Stanton founded three southern California cities, Huntington Beach, Seal Beach and Stanton. In 1930 he returned to the political arena and campaigned for James Rolph, Jr., for Governor. Upon assuming office, Governor Rolph appointed Mr. Stanton a member of the State Highway Commission, a position to which he was reappointed by Governor Frank F. Merriam.

CALIFORNIA MISSIONS

By KENNETH C. ADAMS, Editor

San Miguel Arcangel July 25, 1797

FATE elevated Mission San Miguel Arcangel to the heights of happiness and prosperity in the early decades of Franciscan administration and then flung it into depths of degradation and tragedy during the years of its decline under Mexican misrule in California and the turbulent period following American occupation. However, the spirit of its old padres never entirely deserted the Mission and the latter part of the nineteenth century saw its resurrection and later its gradual restoration to its present state.

Eleventh of the Franciscan stations on El Camino Real, south to north, San Miguel Arcangel, "The Mission on the Highway," was the sixteenth founded. Father Presidente of the Missions Fermin de Lasuen, who succeeded Father Junipero Serra, himself blessed the site and raised the cross for the mission on July 25, 1797, at a place on the Salinas River called by the Indians Vahca, by the Spaniards Las Pozas and known today as San Miguel, 12 miles north of Paso Robles in San Luis Obispo County.

Upon his arrival with Gaspar de Portola in San Diego in July, 1769, Fr. Serra had visioned a chain of missions stretching from there to San Francisco and each a day's journey apart, but 11 years after his death there existed in 1795, a gap between Mission San Luis Obispo and Mission San Antonio de Padua in what now is Monterey County. In the summer of that year, Governor Diego Borcia, desiring to close this gap, sent out an expedition to search for a new mission site, and with this party went Father Buenaventura Sitjar of Mission San Antonio.

NAME IS CHOSEN

Fr. Sitjar, after careful explorations, chose a spot near the hot springs of Paso Robles, used in that day by the Indians and now known far and wide for their medicinal virtues. Fr. Lasuen reported the findings of Fr. Sitjar to Governor Borcia and the latter petitioned Viceroy Branciforte in Mexico for permission to establish a mission on the site. The Viceroy gave his approval, saying: "I have resolved that the patron should be San Miguel, Arcangel."

And so it was that Fr. Lasuen, founding the mission two years after Fr. Sitjar's report, dedicated it in honor of "the most glorious Prince of the Celestial Militia, Archangel St. Michael."

The work of the padres at San Luis Obispo and San Antonio had become known to the Indians in the country between the two stations so that when Fr. Lasuen arrived to found San Miguel, the natives assembled at the site in great numbers. In musty but legible ancient records one may read in Fr. Lasuen's handwriting that "the many pagans who had flocked together and were present during the whole function offered 15 of their children, and with such ardent desires that they be made Christians, that I had to solemnly bless the Baptismal Font. Then in the same enramada (arbor) which had served that morning for the celebration of the holy Sacrifice of the Mass, I solemnly baptized Miguel Maria."

Miguel Maria was the first of 11 boys and three girls the good padre baptized that afternoon of July 25, 1797.

FRIENDLY INDIANS

The Fr. Presidente left Fr. Sitjar and Fr. Antonio de la Concepcion Horra at the new mission and the priests, with the aid of the friendly Indians, immediately set themselves to the task of constructing a church and dwellings for themselves and the neophytes.

Four weeks after the ceremony of dedication, Fr. Horra became violently insane and frightened the natives and guards alike by his mad behavior. Historians attribute the loss of his mental faculties to extreme summer heat. The poor friar was taken to Monterey, pronounced incurable and sent back to Mexico.

The annual report of December, 1798, states that the temporary church was replaced by a more permanent edifice at the end of 1797.

The building operations progressed steadily and in 1805 we find the padres adding 47 adobe huts to their community and turning out 10,000 tiles to roof the mission and other structures.

Fathers Sitjar and Horra were replaced by Father Juan Martin and Fr. Baltazar Carnicer and in a report dated December 31, 1804, Fr. Martin

Mission Meccas

California's famous old missions with their historical and romantic background annually attract thousands of visitors. Twenty-one Franciscan missions were founded by the Reverend Fray Junipero Serra and his colleagues, extending from San Diego to Sonoma. On his way north from San Diego, Father Serra and the mission padres who came after him followed a course which became known as El Camino Real, "The King's Highway." El Camino Real retains to this day its original name and is designated U. S. 101. Along this highway and short distances from it, the founding padres established their missions. U. S. 101, the old "King's Highway," now extends from the Mexican border into northern Washington.

Present day State highways lead to all the mission sites. Now that the war is ended, California looks forward to again welcoming tourists from all over the world. With the resumption of normal automobile travel, it is believed that the missions will be popular meccas for visitors to the Golden State.

Anticipating this traffic, the Division of Highways is publishing in California Highways and Public Works brief histories of the missions with directions on how to reach them over State highways. For the purpose of this series, the missions are taken up in the order of their locations from south to north, rather than in the sequence of their founding.

This is the seventh of the series.

Beautiful Mission San Miguel Arcangel as the tourist sees it today

states that the mission community numbered 466 male and 462 female Indians. During 1803-04 more than 440 natives of all ages had been baptized, and by the end of 1804 the baptisms totaled 1169.

PADRES POISONED

Fr. Martin and Fr. Carnicer had a terrifying experience in January, 1800, when an Indian who resented discipline, in some manner succeeded in poisoning both of them. Fr. Francisco Pujol, who came from Mission San Antonio to nurse them, also was given food that contained poison and succumbed, but his two patients recovered.

In 1806 a fire destroyed two rows of mission buildings containing 6,660 bushels of wheat and damaged the roof of the church considerably. It was decided to erect a new house of worship. Father Presidente Estevan Tapis, who had succeeded Fr. Lasuen, called upon the other California missions to contribute provisions, clothing, church goods, etc., to San Miguel and all responded generously. Building activities increased yearly and in 1816 stone foundations were laid for an imposing church.

The padres at San Miguel, in common with their brothers at the other missions, longed to establish a station in the wild country of the Tulares, to the east, inhabited by warring savages. So, in November, 1804, Fr. Martin, with only two soldiers, bravely set out inland. He had difficulty overcoming the fears of the natives, hundreds of whom fled upon his approach, but he finally won them over and returning, reported that he had found "4,000 Indians all of whom would be lost by dying away ignorant of their eternal destiny, because Satan, wars and diseases would leave no one to be converted." He urged that a mission be established for the Tulares. Opposed by the Mexican civil government, the Franciscans never saw their dream of missions in the interior realized.

SAVAGE TULARES WOOED

In October, 1814, 10 years later, Father Juan Cabot of San Miguel led another expedition into the Tulares, baptizing many aged natives. Old mission records reveal that Father Martin and Cabot reaped some rewards for there are frequent notations of the baptisms of members of the savage Tulares, who voluntarily followed the padres back to the mission.

The new stone church was completed in 1818 and in 1821 its interior was painted and frescoed by Esteban Munras, Spanish artist of Monterey, some of whose artistic work may be seen at San Miguel today.

Happy days at San Miguel approached an end with the arrival in California in 1825 of Governor Jose M. Echeandia, enemy of the missionaries, who laid the groundwork for the eventual seizure and destruction of the California missions by Mexican politicians. On January 6, 1831, Echeandia issued his decree secularizing the missions in spite of the fact that his appointed successor, General Manuel Victoria, even then was enroute to Monterey to take over his office. Echeandia lost no time. He appointed Jose Castro commissioner to go to San Miguel with Juana B. Alvarado, Jose Maria Villaviceno and Jose Avila and inform the Indians that they were "free."

On January 7th, Alvarado, as he later related, assembled the neophytes at San Miguel and instructed those who wished to remain with the padres to "stand to the left and those who wished freedom to stand to the right." Nearly all the Indians stood to the left, saying they desired to stay with their missionary guardian, and then the others joined them.

San Miguel was confiscated by decree of the civil government on August 9, 1834. A salaried administrator was placed in charge and the mission was declared a curacy of the second class by the territorial assembly. Father Juan Cabot, who had served at San Miguel for 21 years, and for 30 years with the California missions was penniless and asked Governor Figueroa for money to return to Spain. He was given $400. His brother, Fr. Pedro Cabot of Mission San Antonio, succeeded him. He refused the title of curate and would accept no compensation. On July 14, 1836, the mission was delivered to Ignacio Coronel, who had been appointed administrator. Father Juan Moreno remained at the mission until 1840. In 1838, he complained bitterly that there was no food or clothing for himself and his Indians.

An inventory taken in 1837 placed a valuation of $82,806 upon the mission and its property. To what sad estate the mission fell in a few years is indicated by a report on every mission in California which the Mexican Government required Father Perfecto Duran to draw up in 1844. **Reporting on San Miguel, under date of March 18, Fr. Duran wrote: "Mission San Miguel Arcangel is today without livestock, and the neophytes are demoralized and dispersed for want of a priest to care for them."**

Byron Dome Photo

Restored chapel of Mission San Miguel looking as it did in the days of the Founding Padres

On October 28, 1945, Governor Pio Pico forced his assembly to decree the sale of all missions and, as we have seen, proceeded to sell the Franciscan stations wholesale. San Miguel was the last one sold. It was disposed of by Pico to Petronillo Rios and William Reed on July 4, 1846, just three days before the American Flag was raised at Monterey and Pico fled the country.

September 2, 1859, President James Buchanan returned San Miguel to the Catholic Church, all of Pico's mission sales having been declared illegal by the United States District Court.

After taking over the mission, Reed and his family took up their residence there. One year later he and his wife, his three-year old son, his wife's brother, Jose Ramon, Josefa Olivera, a midwife, and her daughter aged 15, and nephew, aged four, an Indian servant and the latter's five year old nephew, and a negro cook, were brutally murdered in their quarters.

It seems that in December, 1848, a party of five men stopped at the mission and were entertained by Reed, who unwisely boasted of having considerable gold. Leaving their host, presumably to continue their journey south, the ruffians returned after dark, killed all the occupants of the mission and fled with Reed's gold and other valuables.

Soldiers from Santa Barbara overtook them near Ortega Rancho, killed one of them, forced another, Samuel Brenard, to jump into the sea, where he drowned, and took the surviving three back to Santa Barbara for trial. They were executed on December 28, 1848.

LAWLESS BANDS TAKE OVER

"The discovery of gold early in 1848," say Fr. Engelhardt, mission historian, "attracted all kinds of adventurers and fortune hunters to California. Being situated on the highway between Los Angeles and

The gardens of Mission San Miguel provide an added touch of beauty

San Francisco, the deserted mission buildings of San Miguel in consequence became the refuge of wanderers, gamblers, drunkards and outlaws. A saloon occupied one of the ancient reception rooms, whilst on the other side of the main entrance the apartment probably occupied by the resident missionary in the days of mission activity, served as a sample room and agency for a popular sewing machine. The church fortunately was respected and preserved from desecration at the hands of the lawless bands that infested the country."

These conditions prevailed until 1878, when Bishop Francis Mora appointed the Rev. Philip Farrely resident pastor of San Miguel and its dependencies, including Paso Robles. A new and happier era for San Miguel began. Fr. Farrely and his successors through the years patiently set to work to restore the old mission. The centennial of the founding of San Miguel was celebrated with a three day festival arranged by Fr. Henry S. O'Reilly, September 28, 29 and 30, 1897. And in 1901 the main building of the mission with its many apartments was renovated.

On November 13, 1912, marble slabs placed over the tombs of the Franciscan missionaries, Fr. Marcelino Cipros and Fr. Juan Martin, who lie beneath the church were unveiled and blessed at an impressive ceremony attended by many church dignitaries.

In 1928, Rt. Rev. John B. MacGinley, Bishop of the Diocese of Monterey-Fresno, offered San Miguel and Mission San Antonio to the Franciscan Provincial of Santa Barbara Province, his offer was accepted and in August of that year, two fathers and a lay brother took possession of San Miguel. Small donations from visitors and other contributions were used to improve the old mission and today it is one of California's cherished and revered spots of historic value.

Mission San Miguel is easily reached by motorists, being on the Coast Highway, U. S. 101, in the City of San Miguel. Motorists from the south, after leaving San Luis Obispo and the mission of that name there, proceed north through Santa Margarita, Atascadero, Templeton and Paso Robles direct to San Miguel. Those who take the inland route from Southern California will turn west from Bakersfield over the Cholame lateral to Paso Robles and go 12 miles north to Paso Robles.

Coming south from San Francisco, the way is over U. S. 101 direct to San Miguel or down the San Joaquin Valley to Hanford, thence southwest over the Yosemite-to-the-Sea Highway to Cholame, thence west to Paso Robles and north to San Miguel.

Nuestra Senora de la Soledad October 9, 1791

THIRTEENTH of the Franciscan stations established in California, Mission Nuestra Senora de la Soledad endured many trials and tribulations and came to an unusually sad end.

Its isolated location, lack of true missionary spirit on the part of its first resident padres and the dire privations its priests and Indian neophytes suffered under Mexican civil and military governments accounted for its rather tragic history.

Dedicated to Most Holy Mary, Our Lady of Solitude, the mission was given the name of Soledad, the origin of which is not definitely known. Fr. Engelhardt, mission historian, quotes Fr. Pedro Font, chaplain of Captain Juan B. Anza's expedition, which discovered the first overland route from Sonora, Mexico, to San Francisco, as offering the best explanation.

Anza stopped at Soledad on his journey and recording the visit in his Journal, Fr. Font, on March 9, 1776, wrote: "We stopped at a place called Soledad, and they told me that it was thus called because on the first expedition of Portola (September, 1769) they asked an Indian his name, who answered Soledad, at least it sounded that way to them."

MISSION FOUNDED

Fr. Fermin Francisco de Lasuen, who succeeded Fr. Serra as Presidente of the California Missions, himself founded Mission Soledad on Sunday, October 9, 1791. He was assisted by Fr. Buenaventura Sitjar of Mission San Antonio de Padua, and Fr. Diego Garcia.

Authorization to found Mission Soledad came to Fr. Lasuen from Viceroy Reville Gigedo of Mexico on August 2, 1790, on the same ship that brought to Monterey four Franciscan missionaries assigned to service in California. Church goods that were to have been shipped on the same vessel failed to arrive and in a circular issued July 22, 1791, Fr. Lasuen called upon the other missions to contribute what they could to Soledad. This they did gladly, whereupon Fr. Lasuen proceeded to Soledad and established the new mission.

"This place, then, is constituted a Mission dedicated in honor of the Most Sorrowful Mystery of the Solitude of Most Holy Mary, Our Lady," wrote Fr. Lasuen in recording the founding of the station. "In virtue of the faculty received from the Apostolic College of the Propagation of the Faith of San Fernando de Mexico, I named as its first missionaries the Rev. Fathers Preachers Apostolic, Fr. Diego Garcia of the Provincia de Los Angeles, and Fr. Mariano Rubi of the Provincia de Mallorca."

BAD CHOICE OF PADRES

After four months, Fr. Garcia was transferred to San Antonio and Fr. Bartolomi Gili was sent to Soledad.

The selection of Fr. Gili and Fr. Rubi to be the resident missionaries at Mission Soledad was unfortunate. Fr. Engelhardt, historian, has this to say about the two priests:

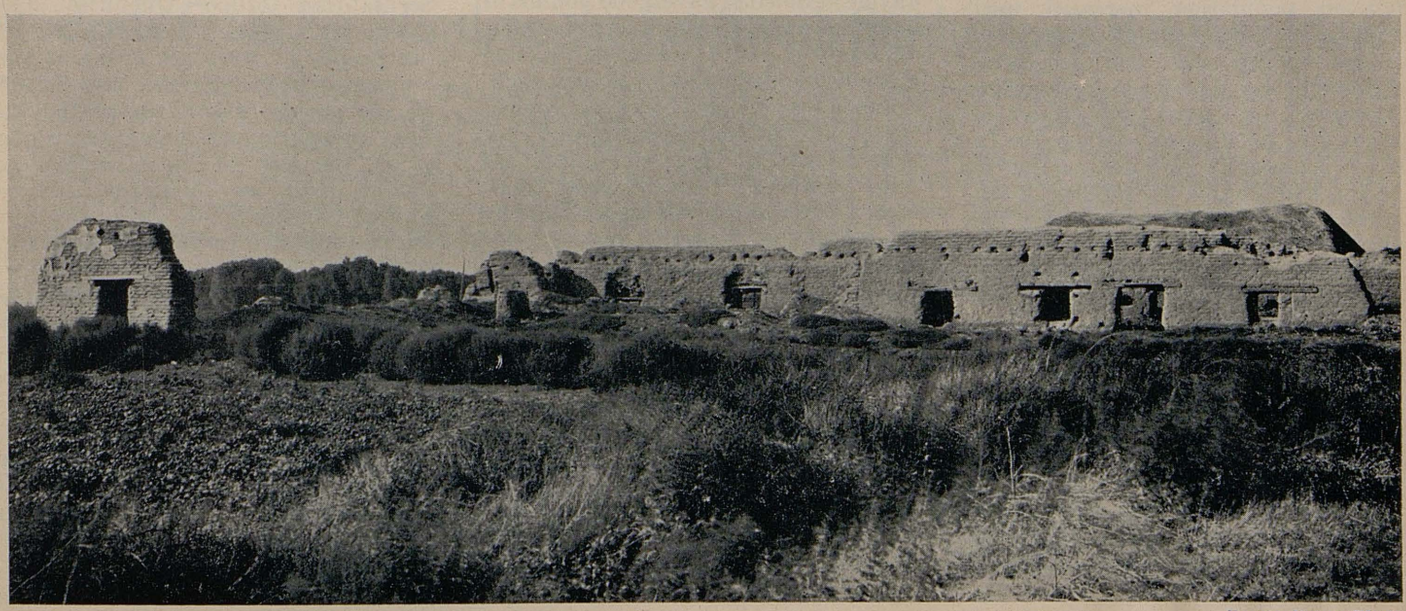
"Two friars were in charge who had made a bad record for themselves in Mexico, nor should they have been allowed to proceed to California, of all places where such characters could be least acceptable. Unfortunately for the good name of the Missionary College of San Fernando de Mexico, Viceroy Manuel Antonio de Flores, for reasons not divulged by him, held a protecting hand over them when they should have been expelled. * * * * He objected to the expulsion of the two men who wore the garb of Franciscans, but behaved like hoodlums while at the seminary of San Fernando."

Fr. Engelhardt treats of the subject of these two friars at some length because their conduct reflected upon the splendid records made by all the other Franciscan padres in California. He says, quoting Fr. Pangua, that the situation hastened the death of Fr. Guardian Palou, who "found nothing else to do than weep like a child, and from fear locked himself in his cell."

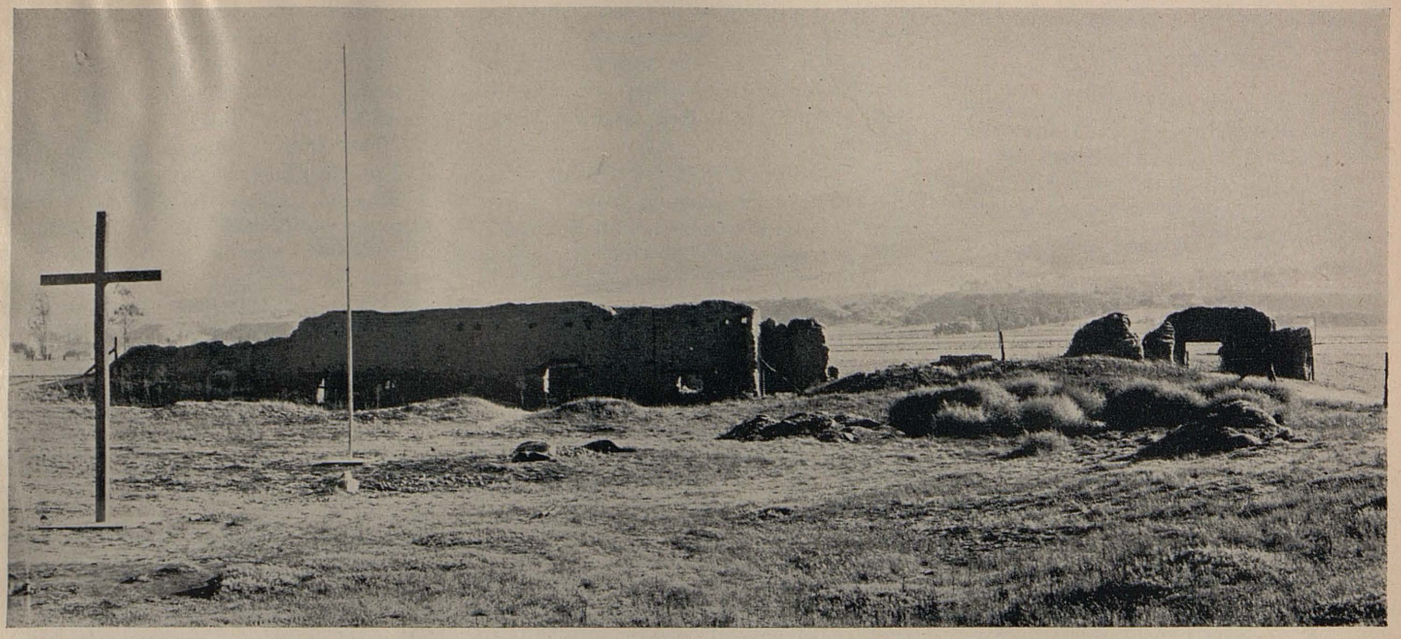
PLAGUE KILLS INDIANS

Fr. Engelhardt gives the two priests credit for behaving themselves at Soledad, but regrets that both lacked missionary spirit, complained of their surroundings and hardships and did not set a good example in faith and pati-

This photo taken fourteen years ago showed then the rapidly disappearing ruins of Mission Soledad



Byron Dome Photo



This is about all that remains of the once proud Mission Soledad

ence to the Indians. Nevertheless, they enrolled numerous converts during their year at the mission. Fr. Rubi was sent back to Mexico in January, 1793, and the following month Fr. Garcia was recalled from San Antonio Mission. A year later, Fr. Gili returned to Mexico.

On December 31, 1800, Soledad had 1,000 cattle, 3,000 sheep and 64 horses, and the Indian community consisted of 521 souls. In 1802, an epidemic, the nature of which is not known, caused the death of many Indians. Notwithstanding all the difficulties that beset Soledad, Fr. Engelhardt says that the mission population increased until 1805, when it reached the highest mark in its history with 688 neophytes. After that, he adds, for lack of savages to convert and owing to diseases communicated by Mexican soldiers, the Indians community dwindled so that by 1810 it had the smallest number of converts of all the missions except San Carlos.

GOVERNOR AIDS

Governor Jose Joaquin de Arrillaga, great friend of the Franciscans, while on a tour of inspection in 1814, was taken ill and hastened to Mission Soledad to be near Fr. Florencio Ibanez. There he died on July 24. He was given burial beneath the chapel, an appropriate resting place for the man whose term in office has been called by Fr. Engelhardt the "Golden Age of the Missions."

Following the revolt in Mexico against Spain the burden of feeding and clothing the soldiers of the California garrisons was placed upon the missions, the Mexican Government having stopped shipments of rations, clothing and pay to the military. Wherefore, Governor Jose de Arguello wrote to Fr. Vicente Francisco de Sarria, commissary prefect of the Franciscans, that the soldiers of the presidios of San Francisco and Monterey and their families were destitute, and asked for flour and blankets for them.

Fr. Sarria requested the missions to make contributions and Fr. Antonio Jayme at Soledad gave 5,000 pounds of flour and some clothing. A year later, January 5, 1816, Mission Soledad again was called upon for woolen cloth. So poor was it that Fr. Jayme replied that wool was scarce at Soledad, but that he would "beg some from the other missions." He managed, somehow, to forward 25 blankets, made by his Indians, to Monterey.

ELECTION HELD

The Mexican government demanded that its subjects in California swear allegiance to the new republic and on May 5, 1822, the padres at Soledad and their Indian wards held a meeting and took the oath of independence. They were authorized to elect a representative for the electoral convention at Monterey which would choose a delegate to the Mexican Congress. The record of the election at Mission Soledad, the first and last accorded the Indians, makes interesting reading. It follows:

"At the Mission of Our Lady of Soledad, this day, Sunday, November 19, 1826, the chief Alcade Geronimo, last night summoned the people to come to church. All being assembled, we attended our holy Mass and commended ourselves to the Blessed Virgin to give us a good heart that we may do what the commandante of the presidio has directed us to do. After hearing holy Mass, we went out of the church, and being together with the people, I named Senor Simon Cota, who can write, as my secretary, and I chose two Scrutators, Odilon Quepness and Felipe de Jesus. Then out of all the people 11 were set apart as the commandante prescribed, whereupon all the people retired except the 11. They talked among themselves whom of all the men of the mission they should send to Monterey. Three wanted Fernando, one was in favor of Isidro, two preferred Valentin, and four Juan de Dios. Then all 10 concluded that Juan de Dios was the man whom God desires to go to the commandante of Monterey, and hold himself subject to his orders. And this is to be known by all the people, and this paper we all that are here present will sign, affixing thereto a Cross because we cannot write; and Juan de Dios will carry it with him. Before me, Simon Cota, Secretary of the Junta."

Reports kept at Soledad by the resident padres were not as informative as

(Continued on page 26)

Students From Far North to the Far South Study Road Building Here

ONE day recently, the Materials and Research Department was host to foreign students from the far north to the far south in search of information regarding California Highway practices. The visitors were all traveling on independent assignments and just happened to visit the laboratory on the same day, their visit following by several weeks the visit of four Chinese students who recently spent three weeks with the Materials and Research Department.

The most recent visitors are shown with Thomas E. Stanton, Materials and Research Engineer, third from left, and are: Haraldur Asgeirsson of Rekjavik, Iceland, engaged in studies for the Iceland Government Ministry of Industries; Joaquin Rasgado of Brazil, employed at the laboratory in cooperation with a program carried on through the International Training Administration, Inc., a project of the Office of the Coordinator of Inter-American Affairs; Edmundo Sisto (Columbia University Scholarship), Montevideo, Uruguay. Sisto was formerly a District Engineer in the Department of Highways in Uruguay. He will return to his country as head of the Soils Laboratory; Oreste Moretto, extreme right, Buenos Aires, Argentina. University of Illinois Graduate Fellowship under the auspices of the Institute of International Education in the program of providing good will between the two countries, studying for a Ph.D. in Civil Engineering and in that connection touring the United States studying highways, structures, and soil mechanics. A member of the staff of the Argentine Department of Public Works.

The following Chinese Students recently spent several weeks in the Materials and Research Department. The first four were from China and the last, Clarence Seid, is an employee in the Design Department of the California Division of Highways: Shen Yu-ming, Peng Ping Chang, Chow Chi, Chen Cheng-Chuan, Clarence Seid.

Heavy Rainfall in Imperial County Closes Main Highways

By E. E. WALLACE, District Engineer

DURING the summer months the desert areas of southern California are subject to very heavy, and rather local rain storms, frequently reaching cloudburst proportions. On August 18, 1945, one of these heavy storms covered practically all of Imperial Valley, but reached its greatest intensity in the southwesterly portion.

On the Kane Springs road in the desert east of Julian, rainfall of five inches was recorded during two major downpours in less than an hour and one-half. Undoubtedly the rainfall was even heavier in other localities.

The combined run-off from the San Felipe and Carriso drainage areas caused flood conditions on San Felipe Creek.

U. S. Highway 80, between San Diego and El Centro was flooded to such a depth that all traffic was stopped west of Seeley.

State Route 111, along the north shore of the Salton Sea was also flooded to such an extent that it was impassable to traffic for 24 hours, consequently all routes from Imperial Valley to the north and west were completely closed. U. S. 80 was opened and restored to traffic on Sunday morning, August 19th, and the North Shore Road was opened to light traffic about noon on Sunday.

The San Felipe Bridge is a timber trestle structure, consisting of 26 spans totaling 496 feet in length. Seven of the spans near the center of the structure were destroyed. Because of the fact that other public utilities were also considerably damaged, it was not possible to secure either material or equipment in Imperial Valley with which to make repairs.

During the war emergency the State had stored for emergency use in the Los Angeles and San Bernardino areas a considerable quantity of bridge timbers and piling, and through the cooperation of maintenance engineers of Districts VII and VIII a sufficient quantity of bridge lumber was immediately routed to the bridge site. A pile driving crew and equipment were secured from the San Diego area, and work on repair of the bridge was started Sunday afternoon. Detour through the flooded river bed was not practicable, so repair crews worked continuously day and night, and the structure was completed and opened to traffic by the following Saturday.

Upper—View of San Felipe Bridge showing washed out section after flood subsided. Lower—View of washout from upstream side showing debris accumulated on pile bents

Maintenance crews from the El Centro, Blythe, and San Diego areas concentrated their efforts on the damaged portions of State highways on the other routes, all of which were cleaned of debris and opened to traffic as promptly as possible.

Many of the protective dikes and levees were destroyed during this storm, and will have to be rebuilt and additional bank protection installed. Considerable credit is due to the maintenance crews for the prompt and efficient handling of this emergency, especially so in view of the limited personnel, and other restrictions imposed by wartime conditions.

Many modern girls dress to kill—and cook the same way.

Channelization on Redwood Highway At Entrance to Hamilton Field

By B. VAN DALSEM, Assistant Highway Engineer

THE reputation of Hamilton Field as a major unit of the Air Transport Command, U. S. Army Air Forces, is well known to dignitaries and military personnel throughout the world. President Truman, Anthony Eden, Commissar Molotov and personages too numerous to mention, as well as thousands of injured servicemen and evacuated prisoners of the Pacific War, have passed through its terminal facilities, reputed to be the largest and most modern in existence.

Approximately 25 miles north of San Francisco, in Marin County, Hamilton Field is located a few hundred yards east of the Redwood Highway (U. S. 101) and access is gained by an entrance road which is flanked by two housing projects, Meadow Park on the north side and Meadow Park Annex on the south.

Except for a truck entrance one-quarter mile north, use of which is prohibited to passenger cars, all traffic entering or leaving Hamilton Field, as well as the two housing projects, must use this road. With the ever increasing activities on the field, this traffic, already heavy throughout the day and night, consisting of official military cars, ambulances and privately owned automobiles of servicemen and civilian employees, likewise increased, resulting in a severely congested traffic condition at the intersection of this road with the heavily traveled highway.

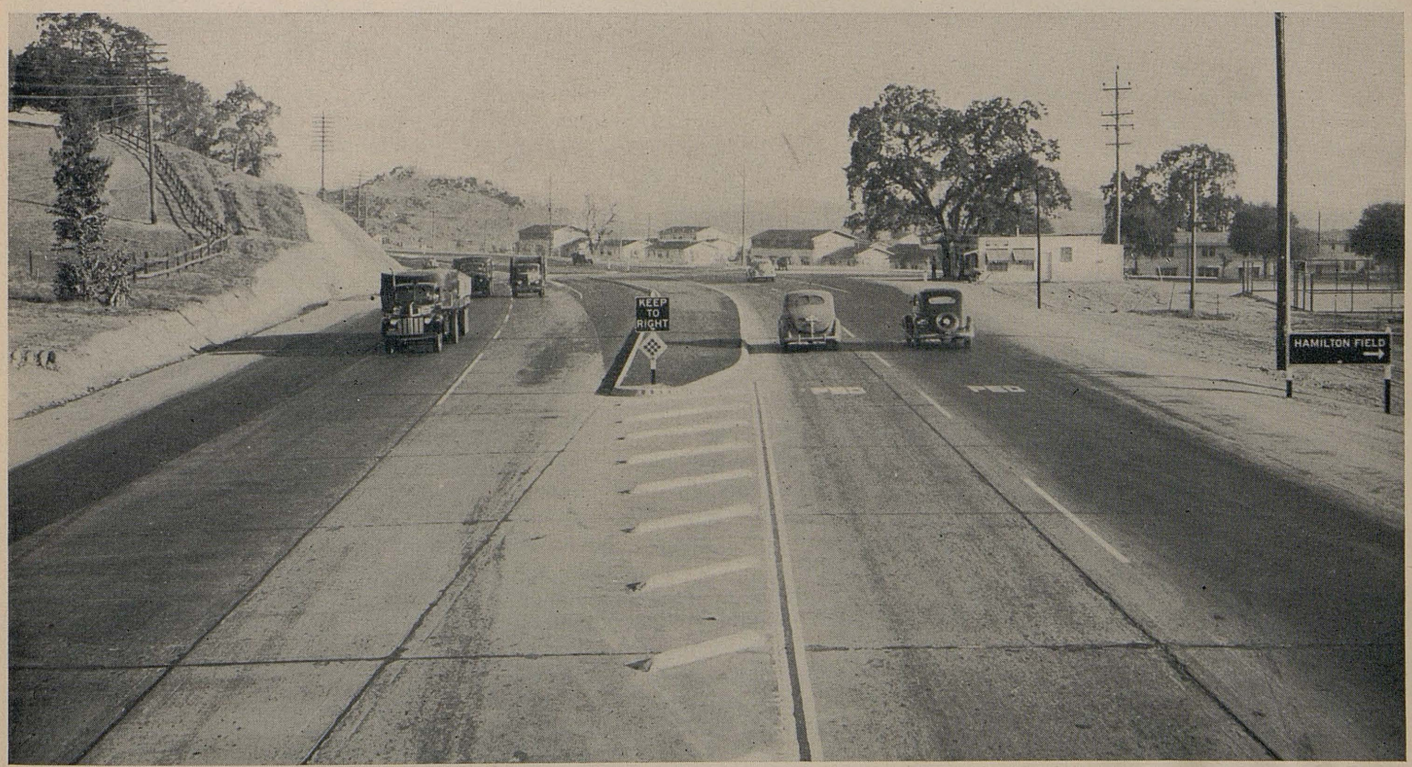
The Redwood Highway, at this intersection, consisted of a three-lane portland cement concrete pavement, 33 feet wide. The Hamilton Field road entered the highway at about the midpoint of a curve having a radius of 1500 feet. Servicemen, hopeful of obtaining transportation to San Francisco and points south, lined up along the west edge of the pavement, causing many kindhearted motorists to stop on the pavement and offer rides.

This pedestrian crossing of the heavily traveled Redwood Highway, occurring directly opposite the intersection and on the curve, created an additional and very dangerous hazard to traffic. Pacific Greyhound Lines maintain a depot on the east side of the highway but southbound buses were forced to make roadside stops to take on and let off passengers, further adding to the general confusion.

On May 7, 1945, Contract 4ATC4 for the construction of a channelized intersection to relieve this serious situation was awarded to A. G. Raisch Company, San Francisco.

The roadbed was graded and widened considerably on both sides of the existing pavement. Two portland

Looking north on U. S. 101 into channelized area at entrance to Hamilton Field



View of traffic channels on Highway U. S. 101 looking east at main entrance to Hamilton Field. Meadow Park Housing Project and Hamilton Field in the background

cement concrete pavement lanes, totaling 23 feet in width, were constructed west of the existing pavement on a long radius curve which permitted a space 27 feet wide between the closest edges of pavement directly opposite the Hamilton Field road, narrowing down to points of contact approximately 400 feet north and south. Appropriate transitions were constructed at each end of these lanes, permitting traffic to leave and return to the original lanes and also provide for future widening outside the limits of this improvement.

A short distance south of the intersection and west of the new pavement lanes, an additional 14-foot portland cement concrete lane with asphalt concrete approaches was constructed. This additional lane permits automobiles and buses to stop and pick up or discharge passengers on an elevated platform without interference to fast moving traffic.

The westerly 10-foot lane of the existing pavement was abandoned and two division islands of varying widths were constructed to serve as a physical barrier to opposing through traffic while also providing an area for accelerating and decelerating lanes as well as a haven of safety where cross traffic may stop before traversing the through traffic lanes. The elimination of this 10-foot lane left 23 feet of the existing pavement for use by northbound traffic.

ENTRANCE REALIGNED

The entrance road to Hamilton Field was realigned for a short distance to permit a right angle intersection with the highway. A division strip curb was constructed, as were two traffic islands to the north and south, to facilitate the distribution of traffic into the proper channels and lanes. Accelerating and decelerating lanes as well as wye connections were constructed of asphalt concrete. Directly north of the intersection another stopping lane and raised platform was constructed on the east side of the highway to handle pedestrian interchange to and from buses and passenger cars.

Asphalt concrete median bars and bituminous roll at both ends of the project and at the opening between the division strip islands add to the channelization pattern.

Asphalt concrete pavement (0.32-foot leveling course plus 0.10-foot type "B" surface) was laid on a six-inch crusher run base. Portland cement concrete pavement (9-inch by 7-inch by 9-inch section) was laid on selected material obtained from roadway excavation within the limits of the project. Eight-foot shoulders were provided throughout to which was applied a penetration treatment of Liquid Asphalt MC-1.

ILLUMINATING SYSTEM

The area of the islands and raised platforms is paved with Type "B" asphalt concrete surface. Light stand-

(Continued on page 32)

Division of Highways Puts New Ferry in Service at Cache Slough

By H. D. STOVER, Bridge Maintenance Engineer

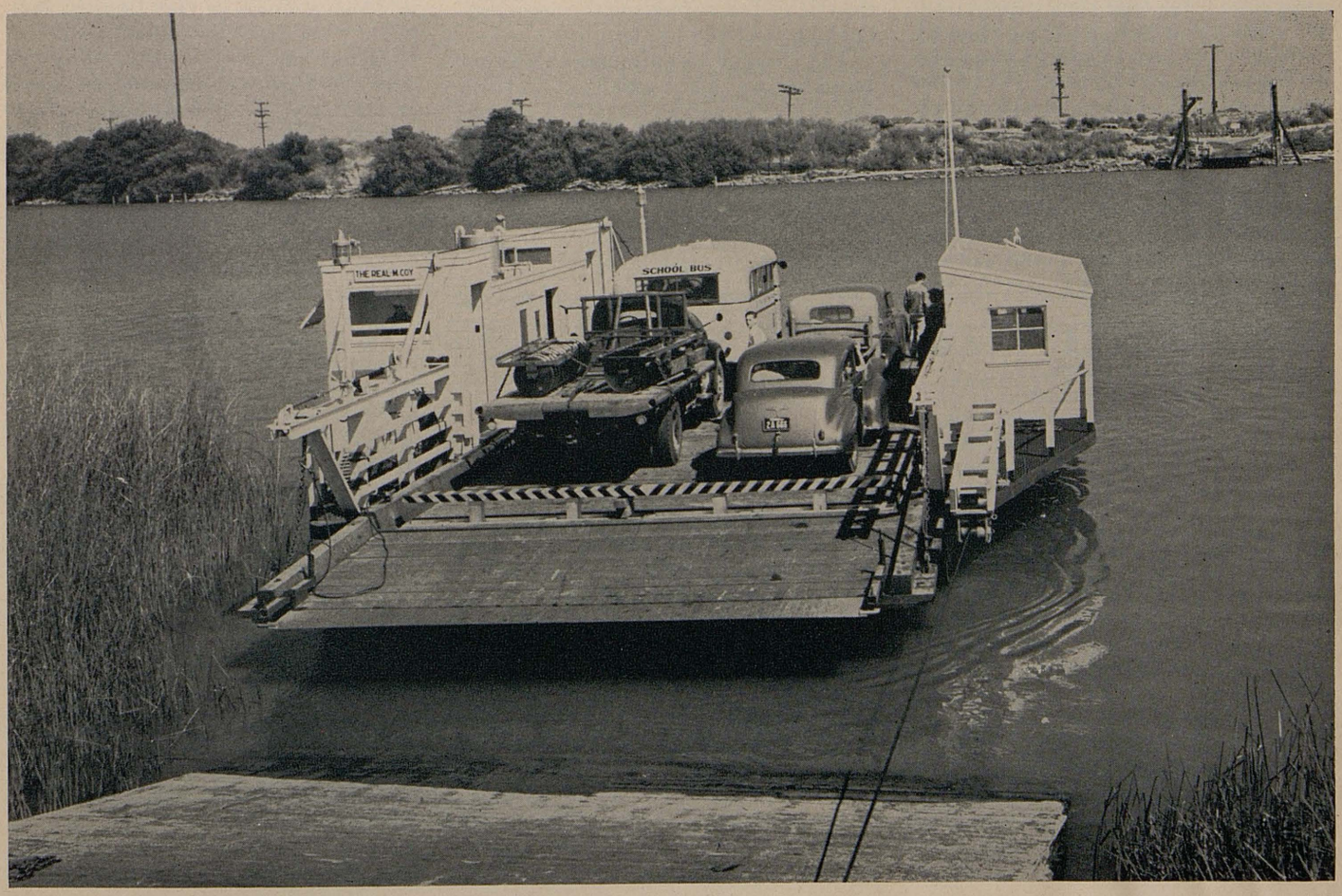
THE old ferry boat at Cache Slough, constructed by the State in 1934, being in constant need of repairs was replaced September 6, 1945, by a new one. This ferry carries traffic down State Highway Route 99-A, from the mainland near Rio Vista, Solano County, to Ryer Island.

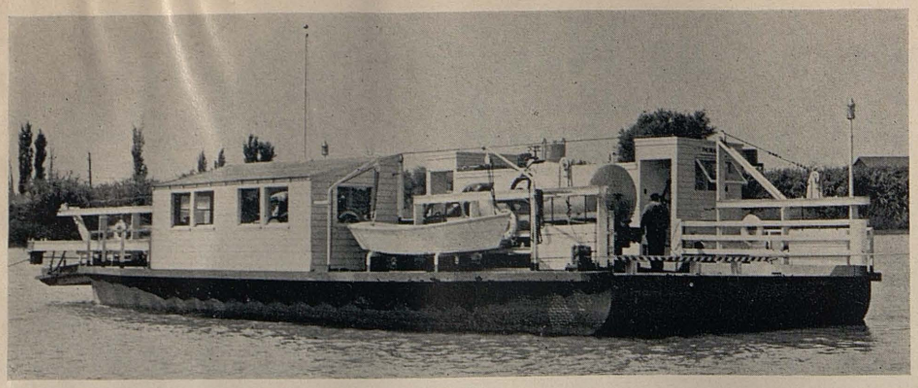
At present there are three ferries operated by the State on the Highway System. These ferries in the past have been of timber construction, but due to wartime restrictions on top grade lumber, it was not practical to construct from timber; therefore, we designed a steel hull for the new Cache Slough Ferry, which construction materials were available under maintenance priorities. This hull was built under contract by Stevens Bros. of Stockton and on completion was towed to a mooring near the Tower Bridge on the Sacramento River. At this location the Division of Highways Equipment Department installed machinery and other necessary features for the proper operation of the ferry. The ferry was christened "The Real McCoy" and towed to Ryer Island.

The new ferry has a substantially longer hull than the old one, having an overall length of 65 feet and a clear roadway width of 21 feet and provides more room for traffic.

One of the outstanding improvements to be found in the new construction was the positive barriers which have been built into the hull to prevent vehicles from over-running the ends of the ferry. Past experiences have indicated the need for more positive barriers at the boat ends, and the device constructed appears to have filled this need in a substantial manner. Normally, the barriers rest level with the floor, but upon operation of a control valve, the barrier is raised vertically by hydraulic pressure to a height of about two feet, providing safety for automobiles or traffic under any normal condition that might be encountered.

This photograph of the new Cache Slough Ferry shows the positive barriers built into the hull to prevent vehicles from over-running the ends of the boat





New ferry of Division of Highways in operation in midstream

Pilot houses have been provided at each end of the boat from which points movement of the ferry is controlled by the operator in either direction. These houses are so constructed to provide the operator with a clear view of the channel at all times, as well as to provide him with complete protection from the elements. The boat has been balanced by separating the machinery into two parts with the use of a transverse cross-shaft. The power supply installed on one side and the cable operating mechanism is placed on the other side of the boat thus eliminating the necessity of ballast on one side to provide even keel as was the case in the former design.

The articulated apron at one end of the boat has been extended and improved to provide better gradient and transition section for traffic entering and leaving the ferry. This is a decided improvement over the facilities previously in use and should reduce the difficulties formerly encountered by traffic going on and off at the landing.

Another decided improvement which makes for more positive operating control is the installation of an air brake working directly against the cable sheaves. This gives the operator an opportunity to retain complete control of his boat from the pilot house during landing operations. The fire control system, consisting of fire house, pumps and accessories which are connected to the boat's power supply, has been provided. An individually operating gas electric system supplying the necessary lighting facilities has been installed.

The Bridge Maintenance Section prepared the plans and specifications for the new carrier and the Bridge Construction Department supervised the inspection of the contract work.

With the various improvements over the old type of design, it is believed this boat will, in fact, be The Real McCoy. There is something in a name.

CALIFORNIA MISSIONS

(Continued from page 20)

those maintained at the other missions hence portions of its history are rather sketchy. In 1824, Fr. Uria reported that the church had been repaired and fortified. In 1826, he recorded the acquisition of a number of church goods. At the end of 1828, Fr. Pedro Cabot noted that tiles and bricks were being made for reconstructing existing buildings. He reported a smithy and carpenter shop in operation. Toward the end of that year, Fr. Prefect Sarria went to Soledad to reside and in December, 1832, recorded that "A provisional church building, sufficiently apt for divine worship, had been erected, because the church which existed before had collapsed in consequence of floods."

INDIANS DISAPPEAR

Only a few Indians remained at Soledad in this year. Alfred Robinson, noted traveler, visited the mission in 1830 and wrote: "It was near sundown when we arrived and dismounted at the door of La Soledad, the gloomiest, bleakest and most abject looking spot in California."

It was in this desolate place that Fr. Sarria, even though in high command of the Franciscan missions, decided to live and die that he might be near his Indian wards. The decree of Governor Figueroa confiscating all missions and dated November 4, 1834, joined Soledad and Mission San Antonio and made them a curacy of the second class. Fr. Sarria, ill nourished and worn out, died at Soledad on Sunday, May 24, 1835. He was buried at Mission San Antonio.

In August of that year, civil commissioners took an inventory at Soledad and placed a value of $47,297.12 upon the mission and property. In 1841, Mofras visited the mission and wrote: "Now not one Indian, nor one head of livestock is encountered. All has gone to ruin. The vineyards are abandoned, the gardens uncultivated, and the fruit trees in the orchards grow wild for want of pruning."

RUINS OF SOLEDAD

In June, 1846, Governor Pio Pico sold Soledad to Feliciano Soberanes for $800. Bancroft, the historian, says that a year before an inventory valued the mission and property at $2,494.

President James Buchanan returned Mission Soledad to the Catholic church in November, 1859.

In 1904, George Wharton James, on his tour of the California missions, wrote of Soledad:

"Over the entrance of the church—the ruins of which now bring sadness to the hearts of all who care—is a niche in which a statue of Our Lady of Solitude — La Soledad — used to stand. Methinks that if the ghost of things that were exist, surely a weeping ghost of the Lady of Solitude haunts these deserted and forlorn ruins. Weep! weep on! for the church of Our Lady of Solitude. It is entirely in ruins."

And some such sentiment must stir in the hearts of all who visit the ruins of La Soledad today.

* * *

The ruins of La Soledad are easily reached by the visitor to the California missions. They are located just south of Soledad in Monterey county on the Coast Highway, U. S. 101. Southern Pacific trains stop at Soledad. Motorists coming either from the north or south will use the Coast Highway.

From San Joaquin Valley points the route is from Hanford west through Lemoore and Coalinga to San Lucas over the Sierra to the Sea Highway, thence north on U. S. 101 through King City and Greenfield to Soledad. The mission visitor should take a side trip from Soledad to the famous Pinnacles National Monument, one of the most attractive scenic spots in the State.

Next—Mission San Juan Bautista and Mission San Carlos Borromeo.

Tragic End of Lt. Greenwood Is Confirmed

DISTRICT Highway Engineer Paul O. Harding, Stockton, has reported to the Division of Highways an official report of the death while a prisoner of war of the Japanese of Lt. George H. Greenwood, a former employee of the division.

Navy Department confirmation of Lt. Greenwood's death was forwarded to Harding by Captain Esther Greenwood, U. S. Marines, the widow, now stationed in Washington, D.C.

Lt. Greenwood left State service officially on June 4, 1941. He had, however, prior to this date, sailed from San Francisco under date of May 8, 1941, for Cavite to his assignment with the United States Navy as a Lieutenant, Junior Grade. He had before being captured, been promoted to the grade of Lieutenant, Senior Grade.

Lt. Greenwood, with the United States Army and military personnel, was captured on Corregidor on May 6, 1942. From information gathered, he was taken from Corregidor to Cabanatuan October, 1942. He was moved from Cabanatuan to Davao, Mindanao. In June, 1944, he was moved from Davao to Cabanatuan; in October, 1944, from Cabanatuan to Bilibid.

On December 13, 1944, he was loaded on to a prison ship for conveyance to the Japanese homeland. On December 15, en route, this ship was torpedoed by the United States Navy. Several lives were lost, others were able to make it to the land in the vicinity of Lingayan, at that time in enemy possession. These men were again loaded on a ship which set out for the homeland and this ship was also torpedoed by the United States forces.

Approximately 1,700 American personnel had been loaded on the first ship at Manila and the United States Government has received a list of names of those that had survived, amounting to some 400. Greenwood's name does not appear among the survivors.

The Chief of the Navy Personnel has informed Mrs. Greenwood that it is now known that Lt. Greenwood lost his life while in the service of his country.

Resumption of Snow Removal Is Announced

SNOW removal operations on mountain roads serving industrial and recreational traffic, abandoned during the war at the request of military authorities on all but essential routes, will be resumed by the Division of Highways this fall and winter, Governor Earl Warren has announced.

New snow removal equipment will shortly be available for use on Echo Summit, U. S. 50, replacing that which it was necessary to transfer to Donner Summit during the war emergency, the Governor said.

Clearing of snow from mountain highways during the winters since Pearl Harbor was greatly restricted not only because the Army and Navy desired important transcontinental routes such as U. S. 40 over Donner Summit be kept open for military reasons but also becausé deteriorated equipment which could not be replaced had to be conserved.

The Governor said that Director of Public Works C. H. Purcell had reported to him that a majority of the snow removal work can be handled by the present personnel of the Division of Highways and that it is desirable to resume snow clearance on these highways to the same extent to which it was performed prior to the war.

Among the routes on which snow removal services will be resumed, as announced by the Governor, are:

Kyburz to the Nevada State Line over Echo Summit, on State Route 11.

Meeks Bay to Tahoe City on Route 38.

Sierra City to Bassetts, on State Route 25.

Arnolds to Camp Connell, on State Route 24.

Long Barn to Pinecrest, on State Route 13.

Tahoe City to the Nevada State Line, on State Route 39.

Coarsegold to the Yosemite National Park boundary, on State Route 125.

Pinehurst to the General Grant Park boundary, on State Route 41.

Igo to South Fork, on State Route 190.

Bridgeport to the Nevada State Line, on State Route 96.

Sgt. Jantzen Wins Citation For Bravery

WHEN Sgt. Herman R. Jantzen, on military leave from District X, Division of Highways, Stockton, returns from the war to resume his State position, he will bring with him a fine commendation from his Commanding Officer, Lt. Col. Ewel J. Morris, Jr., 1st Field Artillery Observation Battalion, U. S. Army.

Sgt. Jantzen, prior to entering the military service, was an engineering employee in District X, with a civil service classification of Assistant Highway Engineer. He had been employed in District X since June 1, 1938. His assignments consisted of location surveys, planning and designing in the District Office and assistant construction engineer on construction.

Previous to his employment in District X, he was employed in District XI as a Senior Engineering Aid and with the State Compensation Insurance Fund as a Junior Safety Engineering Inspector. Sgt. Jantzen left the State service for his military assignment on March 12, 1943. He is 39 years of age and single.

The citation awarded Sgt. Jantzen reads as follows:

"You are commended for outstanding performance of duty to your country as Surveyor and Geodetic Computer with this organization. During your 28 months of service, 24 months overseas, and 19 months in combat, your duties have been performed with unselfish loyalty and devotion.

"You have willingly undergone the hardships of battle under the worst conditions of snow, ice, mud, rain, and intense heat, against a determined, efficient, and resourceful enemy. The bravery and skill with which you have fought him has brought him complete defeat.

"The contribution to the cause of freedom and security which you have made in the Sicilian, Naples-Foggia, Rome-Arno, Southern France, Rhineland, and Continental European Campaigns deserves the highest commendation."

Morgan Summit Junction, State Sign Route 36, to southerly boundary of Lassen National Park.

Shingletown to Lassen National Park, on State Route 20.

Descanso to Santa Ysabel, on State Route 78.

Recent Highway Repair in Yuba, Sutter Counties

By F. D. HILLEBRAND, Assistant Highway Engineer

RECENTLY completed repair construction at three locations in Yuba and Sutter counties has done much to provide a smoother and greatly reinforced pavement which during the war period had received much damage from increased heavy trucking and military traffic.

To motorists and truckers one of the worst stretches of State highway in Central California was perhaps in Yuba County on U. S. 99E between Morrison Crossing and Linda Corners, directly south of Marysville. Considerable roughness coupled with a crown as high as 9 inches, no superelevation at curves, and steep shoulders dropping abruptly from the pavement edge gave this section of road an unfavorable reputation with the traveling public.

Before the war emergency, this macadam surfacing had proved structurally adequate although considerable maintenance was necessary each year. Soon after the Nation entered the war, heavy trucking by contractors engaged in the construction of Camp Beale and the Marysville Army Airfield, and the military access roads to these areas, caused considerable deterioration to the surfacing on this highway. This heavy duty service, coupled with large convoys of all types of Army vehicles, including heavy tanks, using this roadway made resurfacing imperative this year.

HIGH CROWN ELIMINATED

The improvement just completed consisted of placing plant-mixed surfacing 20 feet wide and to an average thickness of 3 inches over the existing pavement, and constructing gravel shoulders four feet wide with variable slopes. The total length of the project was 7.34 miles.

To eliminate the excessive crown the surfacing was restricted to a minimum depth at the centerline of $1\frac{1}{2}$ inches with an increasing average depth at the pavement edge amounting to $4\frac{1}{2}$ inches.

Upper—Showing patched surfacing with low edges and shoulders. Center—Showing curve with no superelevation of old pavement. Lower—General view of old pavement, rough riding characteristics not being apparent in view

To provide some superelevation where none before existed on curves it was necessary at some locations to increase the thickness of the surfacing to 12 inches at the edges. For correction of the uneven and rough riding qualities of the existing pavement the new surfacing was placed in two courses. Where it was necessary to use additional material for building superelevations at curves the surfacing was placed in additional courses in order to obtain sufficient compaction.

The first course of the ½-inch maximum surfacing material was spread with a heavy, long wheel base motor grader equipped with mould board wings. By maintaining the grader blade at a constant height and carrying a full blade of material it was possible to float out most of the surface irregularities. Each course after being spread was thoroughly compacted with an 8-ton tandem roller and then allowed to cure under the action of traffic for at least 24 hours before the next course was placed.

TRAFFIC UNINTERRUPTED

A mechanical spreading and finishing machine was used for the last or surface course and brought the finished pavement to the required cross-section. Traffic at all times was permitted to pass through the work. During construction, activities were confined to one-half width of roadway and traffic regulated by flagmen and a pilot car.

The elimination of most of the excess crown and the addition of superelevation at curves has resulted in greatly improved riding qualities on this section.

Borders were not constructed until paving operations were finished. Prior construction of borders was not feasible as the thickness of the new surfacing was not uniform and a varying amount of imported borrow was required to bring the finished border to the grade of the new pavement.

Clean creek gravel with which a uniform amount of binder material was incorporated was used as border material. This imported borrow was placed in several courses by means of a spreader box and the material was watered and thoroughly compacted by rollers.

WORK ON TWO SECTIONS

The repair work in Sutter County was performed on two sections of highway. On U. S. 99E between the north city limits of Yuba City and Lomo, six areas aggregating a total length of 2.39 miles were repaired by placing over the old, badly broken concrete pavement, a blanket of plant-mixed

(Continued on next page)

Upper—Location same, showing new surfacing and completed borders. Center—Location same, showing superelevation in new surfacing. Lower—General view, same location, showing completed roadway

Highway Bids and Contract Awards

August 1945

COLUSA COUNTY—Between Williams and 2.8 miles easterly, about 2.8 miles to be repaired with plant-mixed surfacing. District III, Route 15, Section Wms, A. E. B. Bishop, Orland, $18,280; Lester L. Rice, Marysville, $20,495. Contract awarded to Harms Bros., Sacramento, $17,704.

KERN COUNTY—Between Lost Hills and Wasco, about 4.7 miles to be repaired with imported borrow base and road-mixed surfacing. District VI, Route 33, Section C. Chas. U. Heuser & R. A. Garnett, Glendale, $68,309; Charles J. Dorfman, Los Angeles, $69,242; Clements & Co., Hayward, $69,920; Basich Brothers Construction Co., Alhambra, $75,762; Volpa Brothers, Fresno, $78,052; Norman I. Fadel, North Hollywood, $78,061; Louis Biasotti & Son, Stockton, $83,446; Guerin Bros., Los Angeles, $88,007; M. J. Ruddy & Son, Modesto, $89,858. Contract awarded to Oilfields Trucking Co., Bakersfield, $66,408.

KERN COUNTY—Between Route 23 and 8 miles east of Inyokern, about 12.2 miles to be repaired by placing plant-mixed surfacing and applying seal coat thereto. District IX. Oswald Bros., Los Angeles, $84,900; Basich Brothers Construction Co., Alhambra, $86,741; The Tanner Construction Company, Phoenix, Arizona, $98,540; Southwest Paving Company, Roscoe, $104,587; J. E. Haddock, Ltd., Pasadena, $107,000; Oilfields Trucking Company, Bakersfield, $107,241; Charles J. Dorfman, Los Angeles, $112,985. Contract awarded to Lewis Construction Co., Los Angeles, $70,160.

LOS ANGELES COUNTY—In the City of Burbank, between Orange Grove Avenue and San Fernando Boulevard, about 0.6 mile, to be graded and surfaced with asphalt concrete on the existing surfacing and new crusher run base. District VII, Route 4, Griffith Co., Los Angeles, $36,992; Chas. T. Brown Co., San Fernando, $39,096; Oswald Bros., Los Angeles, $41,638; Schroeder & Co., Roscoe, $44,812. Contract awarded to Chas. J. Dorfman, Los Angeles, $34,369.

MENDOCINO COUNTY—At Blue Slide Gulch, about 13.1 miles north of Fort Bragg, a concrete bridge to be constructed about 0.19 mile to be graded, surfaced with imported base material and a seal coat applied. District I, Route 56, Section F. Fred J. Maurer & Son, Eureka, $69,996; Guerin Bros., South San Francisco, $74,559; Fredrickson & Watson Construction Co., Oakland, $83,457. Contract awarded to John Burman & Sons, Eureka, $66,699.

SAN DIEGO COUNTY—About 18 miles north of Oceanside, a reinforced concrete girder bridge to be constructed across San Mateo Creek. District XI, Route 2, Section D. J. E. Haddock, Ltd., Pasadena, $148,783; Matich Bros., Colton, $149,438; Guerin Bros., Los Angeles, $172,554; Carlo Bongiovanni, Hollywood, $176,796; Baruch Corp., Los Angeles, $191,920; Byerts & Dunn, Los Angeles, $192,216; The Contracting Engineers Co., Los Angeles, $193,618; Ralph A. Bell, Monrovia, $196,845; Guy F. Atkinson Co., Long Beach, $197,735; Fred D. Kyle, Pasadena, $205,224; M. H. Golden Construction Co., San Diego, $219,492; Dimmitt & Taylor, Los Angeles, $250,708. Contract awarded to Oberg Bros., Inglewood, $146,867.

SOLANO COUNTY—On Tennessee and Georgia Streets, between Vallejo and Route 7, about 0.9 mile to be resurfaced with asphalt concrete pavement on cement treated base. District X, Vallejo Bus Routes. C. M. Syar, Vallejo, $46,679. Contract awarded to Sheldon Oil Company, Suisun, $40,674.

TUOLUMNE COUNTY — Across Tuolumne River about 10 miles west of Groveland, repairing a bridge. District X, Route 40, Section B. Stockton Construction Co., Stockton, $3,435; C. C. Gildersleeve, Willows, $3,631. Contract awarded to James H. McFarland, San Francisco, $2,413.

YUBA COUNTY — Between Wheatland and Morrison Crossing, about 2.4 miles to be repaired with plant-mixed surfacing. District III, Route 3, Section A. Contract awarded to Lester L. Rice, Marysville, $12,175.

September 1945

ALAMEDA AND CONTRA COSTA COUNTIES—Between El Cerrito Hill Overhead and Route 14, about 1.4 miles to be resurfaced with asphalt concrete pavement. District IV, Route 69, Section Alb.,Rch.,E.Cr., Independent Construction Co., Ltd., Oakland, $36,792; Chas. L. Harney, San Francisco, $39,118; Lee J. Immel, Berkeley, $39,243. Contract awarded to Louis Biasotti & Son, Stockton, $36,589.

HUMBOLDT COUNTY — At Shively Bluffs, about 9 miles south of Scotia, a distance of about 0.2 mile, four permeable pile jetties to be constructed. District I, Route 1, Section D. Healy Tibbitts Construction Co., San Francisco, $56,975; Fred J. Maurer & Son, Eureka, $59,970; E. B. Bishop, Orland, $64,072; Case Construction Co., Alameda, $66,016. Contract awarded to Mercer, Fraser Company, Eureka, $40,751.

INYO COUNTY—Between Beatty Road and east boundary Death Valley National Monument, about 0.75 mile to be repaired with road-mixed surfacing on imported borrow. District IX, Route 127, Section K. Basich Brothers Construction Co., Alhambra, $13,813; Spencer Webb, Los Angeles, $13,897; Arthur A. Johnson, Laguna Beach, $18,263; Oilfields Trucking Co., Bakersfield, $18,917. Contract awarded to Vinnell Co., Alhambra, $12,761.

MENDOCINO COUNTY—At Alder Creek, about 7 miles north of Point Arena, about 1.2 miles to be graded, surfaced with gravel base, a seal coat applied to gravel base and a steel plate girder bridge to be constructed. District I, Route 56, Section B. Fredrickson Bros., Emeryville, $186,666; Fred J. Maurer & Son, Eureka, $204,130; Guy F. Atkinson Company, South San Francisco, $215,671; Fredrickson & Watson Construction Co., Oakland, $218,837; Dan Caputo & Edward Keeble, San Jose, $223,933; E. B. Bishop, Orland, $224,472; Louis Biasotti & Son, Stockton, $235,006; N. M. Ball Sons, Berkeley, $246,472. Contract awarded to Guerin Bros., South San Francisco, $182,963.

ORANGE COUNTY — About 2½ miles southerly of Tustin, two reinforced concrete box culverts to be constructed. District VII, Route 2, Section C. Paul E. Woof, Bakersfield, $18,847; Oberg & Cook, Los Angeles, $19,390; F. Fredenburg, Temple City, $21,997; Oberg Bros., Inglewood, $23,127; Tomei Construction Co., Van Nuys, $26,020; The Contracting Engineers Co., Los Angeles, $29,585. Contract awarded to Wm. E. Thomas Construction Co., Hayward, $16,757.

ORANGE AND SAN DIEGO COUNTIES —Between one mile north of Las Flores Creek and San Clemente, about 9.5 miles, existing highway to be widened and paved with portland cement concrete and portions of existing pavement to be resurfaced with asphalt concrete. District XI, Route 2, Section D,SCle. Matich Bros., Colton, $696,579; Basich Bros. Construction Co. & Basich Bros., Alhambra, $709,282; Griffith Co., Los Angeles, $722,453; Peter Kiewit Sons' Co., Los Angeles, $786,586; The Tanner Construction Co., Phoenix, $791,634; Oswald Bros., Los Angeles, $827,281; Ralph A. Bell, Monrovia, $836,489; Macco Construction Co., Clearwater, $889,810; J. E. Haddock, Ltd., Pasadena, $898,543. Contract awarded to N. M. Ball Sons, Los Angeles, $637,799.

SAN JOAQUIN COUNTY—Across Mokelumne River about one mile north of Clements, a bridge to be repaired. District X, Route 97, Section B. J. R. Reeves, Sacramento, $3,995; M. A. Jenkins, Sacramento, $4,580; Geo. Pollock Co., Sacramento, $4,695. Contract awarded to Lord & Bishop, Sacramento, $3,650.

SHASTA COUNTY—Between 1.6 miles west of Round Mountain and 0.3 mile west of Montgomery Creek, about 2.8 miles to be repaired with crusher run base and seal coat, District II, Route 28, Section B. E. B. Bishop, Orland, $64,880; J. Henry Harris, Berkeley, $66,069; A. R. McEwen, Sacramento, $66,210; Clements & Co., Hayward, $75,930. Contract awarded to Harms Bros., Sacramento, $46,622.

SISKIYOU COUNTY — Between Gazelle and Klamath River, about 1.9 miles to be repaired with gravel base and crusher run base and a seal coat applied thereto. District II, Route 3, Sections B,C. E. B. Bishop, Orland, $33,370; J. Henry Harris, Berkeley, $41,143. Contract awarded to Clements & Co., Hayward, $30,968.

Yuba and Sutter Counties Recent Highway Repair

(Continued from preceding page)

surfacing 21 feet wide and 2 inches thick. Two foot transverse tapers were constructed on each side of the central 21 feet decreasing in thickness from 2 inches to ½ inch. The surfacing was spread on the roadbed in two courses consisting of a leveling course and a surface course.

From Sutter Bypass north to Tudor Road on the highway between Yuba City and Knights Landing a similar section of repair work was done in Sutter County. The existing surface was constructed by Sutter County in 1930 and consisted of a 20-foot by 6-inch asphalt concrete pavement. Under heavy trucking of farm products this surfacing had deteriorated to a degree that made blanket resurfacing necessary.

The major items of this work were:

11,900	cubic yards Imported Borrow (gravel)
22,000	tons Plant-mixed Surfacing
800	M. gallons Water
34	tons Asphaltic Emulsion

The total cost of the work was approximately $105,000.

This reconstruction at the three locations was let under one contract to Lester L. Rice of Marysville. F. D. Hillebrand was the resident engineer for the State.

Governor Warren and Members of the State Park Commission pause while touring the Redwood Empire. Left to right: Isadore Dockweiler, Los Angeles; Joseph R. Knowland, chairman of Commission; the Governor, and Charles Kasch, Ukiah

Governor Earl Warren Wants Redwoods Preserved for Posterity

(Continued from page 2)

presided. Before returning to Eureka Inn the party made a tour of Fort Dick and Mill Creek via the Pebble Beach Drive, viewing the Peacock Hill highway alignment.

The Humboldt County Board of Trade was in charge of arrangements for the Governor's banquet in Eureka. Elmer P. McKenzie of the Redwood Empire Association acted as master of ceremonies. Fred Anderson, chairman of the board of supervisors, welcomed the Governor and the other visitors on behalf of the county and Mayor John Ryan of Eureka performed a similar service for the city.

In addition to Governor Warren and Mr. Purcell, Senator Irwin Quinn, H. L. Rick, Chairman of the State Fish and Game Commission, Mr. Knowland, and Charles Kasch of the Park Commission, George C. Hoberg, President of the Redwood Empire Association, and Richard Fleischer made brief talks.

Accompanying Mr. Purcell on the tour were the following members of the Highway Commission:

Homer P. Brown, Placerville; Chester H. Warlow, Fresno; Harrison R. Baker, Pasadena; James A. Guthrie, San Bernardino; Walter Sandelin, Ukiah, and C. Arnholt Smith, San Diego, and George N. Cook, secretary.

State Highway Engineer McCoy was accompanied by Colonel John H. Skeggs, District Highway Engineer at San Francisco, and District Highway Engineer A. M. Nash of Eureka.

With Chairman Knowland were Park Commissioners Isadore Dockweiler, Los Angeles, and Charles Kasch, Ukiah; A. E. Henning of Sacramento, Chief of the Division of Parks, and John H. Covington, Executive Secretary of the Commission. General Warren Hannum, Director of Natural Resources, and Colonel E. C. Kelton, Beach Erosion Engineer of the Park Commission, were members of Mr. Knowland's party.

The Golden Gate Bridge and Highway District was represented by Edward A. Kenney, San Francisco, and James E. Rickets, General Manager.

Arrangements for the tour were made by Mr. Hoberg, President, Valerie Kuhn, Manager, and Marsh Maslin, Publicity Director, of the Redwood Empire Association.

Two married men were discussing their joys and sorrows.

"My wife," said one, "is very poetic. She gets up at sunrise, wakens me and says ,'Lo, the morn' ".

"Huh," replied the other, "My wife wakens me and says 'Mow the lawn.' "

Highway Channelization at Entrance to Hamilton Field

(Continued from page 24)

ards were constructed and State forces will soon install an illumination system. Existing pipe culverts, long proven to be inadequate, were replaced with reinforced concrete pipe culverts and new drop inlets were installed to complete the drainage facilities.

Two huge meters, through which over a million gallons of water flow into Hamilton Field each day, were necessarily moved during construction operations. This work was done by forces and equipment of the Marin Municipal Water District under service agreement. Right-of-way acquisition required the moving of a service station and its adjoining buildings.

The final cost of the project is approximately $55,000 financed from Federal Access Road Funds. Work on Contract 4ATC4 began on May 15, 1945 and was completed September 6, 1945. William Russel was superintendent for A. G. Raisch Company. W. A. Rice was Resident Engineer for the Division of Highways.

HIGHWAYS OF CALIFORNIA

(Continued from page 9)

divided sections on the State highway system. On top of the mesa the old route was almost a tangent from its junction with the new Rose Canyon section to that of the new grade leading down to the ocean at Sorrento Creek. This portion of the old road was flanked on either side by a row of trees, an asset of considerable value to the appearance of the route. Widening the old 16-foot pavement to a desired minimum of 30 feet would have necessitated removal of one row of the trees. To avoid doing this, the old pavement was widened to 20 feet and a new two-lane strip placed parallel and outside the easterly row of trees. By using the old road for southbound traffic and the east for travel to the north an adequate and attractive divided highway was provided.

As a State highway, the Torrey Pines grade has passed into road history. El Camino Real still carries the traffic, but the brown-robed Franciscans, ox carts and wealthy owners of haciendas have given way to fast moving streams of cosmopolitan traffic in high-powered cars and dual-wheeled trucks. Progress in travel is evidenced in speed, ease, and comfort, while the charm of early California living slips away to appear only in printed books.

To be continued

In Memoriam

George Hamilton Greenwood

DISTRICT X of the State Division of Highways regrets to report the death of Lieutenant George H. Greenwood, U.S.N.R., while in the service of his country at the age of 37 years, 2 months and 13 days. The Federal Government has set the date of death at December 15, 1944.

Lt. Greenwood was a very valuable and efficient employee of the Division of Highways, having worked continuously in an engineering capacity since his employment, May 15, 1929, to the date of his leave of absence, June 4, 1941, to join the Naval forces. During his period of employment with the State, he worked at various engineering assignments from a position of Draftsman in the District Office and on location surveys, to Surveyor, Construction Assistant, and at the time of leaving the State service, was the District Traffic and Safety Engineer.

Lt. Greenwood's early schooling, grammar and high school, was in and about the Bay region, particularly in San Francisco. He graduated from the University of California with a B.S. degree in engineering in 1929 with high honors. He was a member of three engineering honor societies, Chi Epsilon, Tau Beta Pi and Sigma XI, and a member of the American Society of Civil Engineers. He was born on October 2, 1907, in San Francisco. He is survived by his wife, Captain Esther Trefts Greenwood, now assigned to the Women's Corps of United States Marines, with duties in Washington, D. C., his mother and father, Mr. and Mrs. Joseph Theodore Greenwood of San Francisco.

Many Miles of Our Highways Still in Mud, Says Engineer

AMERICA'S highways and byways are still far from "out of the mud" according to Charles M. Upham, engineer-director of the American Road Builders' Association.

"The public usually thinks of highways in terms of concrete, four-lane, limited access freeways and forgets the many thousands of miles of roads and streets that are unsurfaced. We have a big job ahead making these 'underprivileged' roads passable the year round," he said.

Insisting that mud and dust are still important highway problems especially in the rural areas, Mr. Upham announced that while 83 per cent of the 563,520 miles of state-controlled highways were surfaced, only 73 per cent of the 304,000 miles of municipal streets and alleys and 49 per cent of the 1,928,000 miles of county and local roads have all-weather treatment. By surfacing is meant construction of concrete, asphalt and tar coating, gravel or stabilized earth.

"The figures I quote are from 1940, the year before America entered the war and the last year of general construction. Since then road building has been at a standstill except for access roads to munition plants and military establishments," Mr. Upham said.

Studies by the Public Roads Administration of the various types of surfaces show that the average life of soil roads is from five to 14 years; gravel or stone six to 13 years; bituminous surface treated 11 to 21 years; mixed bituminous 14 to 22 years; bituminous concrete 13 to 20 years; portland cement concrete 17 to 24 years and brick or block 19 to 21 years. Naturally such factors as the kind and volume of traffic, action of the weather, types of materials used, design, quality of construction and others enter into the deterioration and retirement of a highway.

"These points must receive careful consideration by highway officials in preparing a postwar building program. With our roads in the worn condition that they are, and the proposed changes in motor vehicles promised soon, not only surfacing, but the proper surface and design to use becomes vitally important," Mr. Upham said.

State of California

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Department of Public Works

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