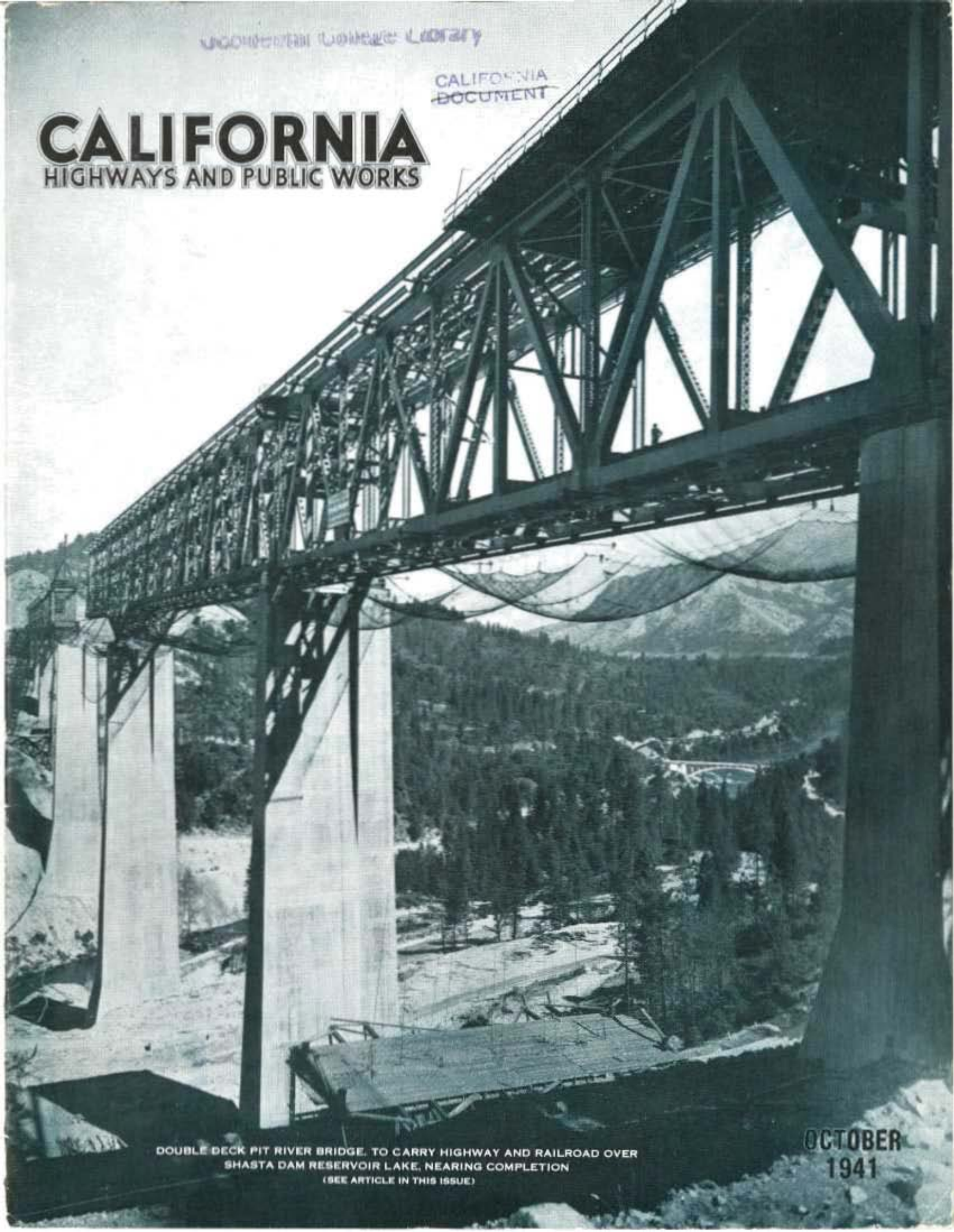


CALIFORNIA

HIGHWAYS AND PUBLIC WORKS



DOUBLE DECK PIT RIVER BRIDGE, TO CARRY HIGHWAY AND RAILROAD OVER
SHASTA DAM RESERVOIR LAKE, NEARING COMPLETION
(SEE ARTICLE IN THIS ISSUE)

OCTOBER
1941

CALIFORNIA HIGHWAYS AND PUBLIC WORKS

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

FRANK W. CLARK, Director C. H. PURCELL, State Highway Engineer J. W. HOWE, Editor K. C. ADAMS, Associate Editor

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Grading Completed on Relocation of U. S. 99 Shasta Dam Reservoir Unit of Central Valley Project

By M. FREDERICKSEN, Resident Engineer

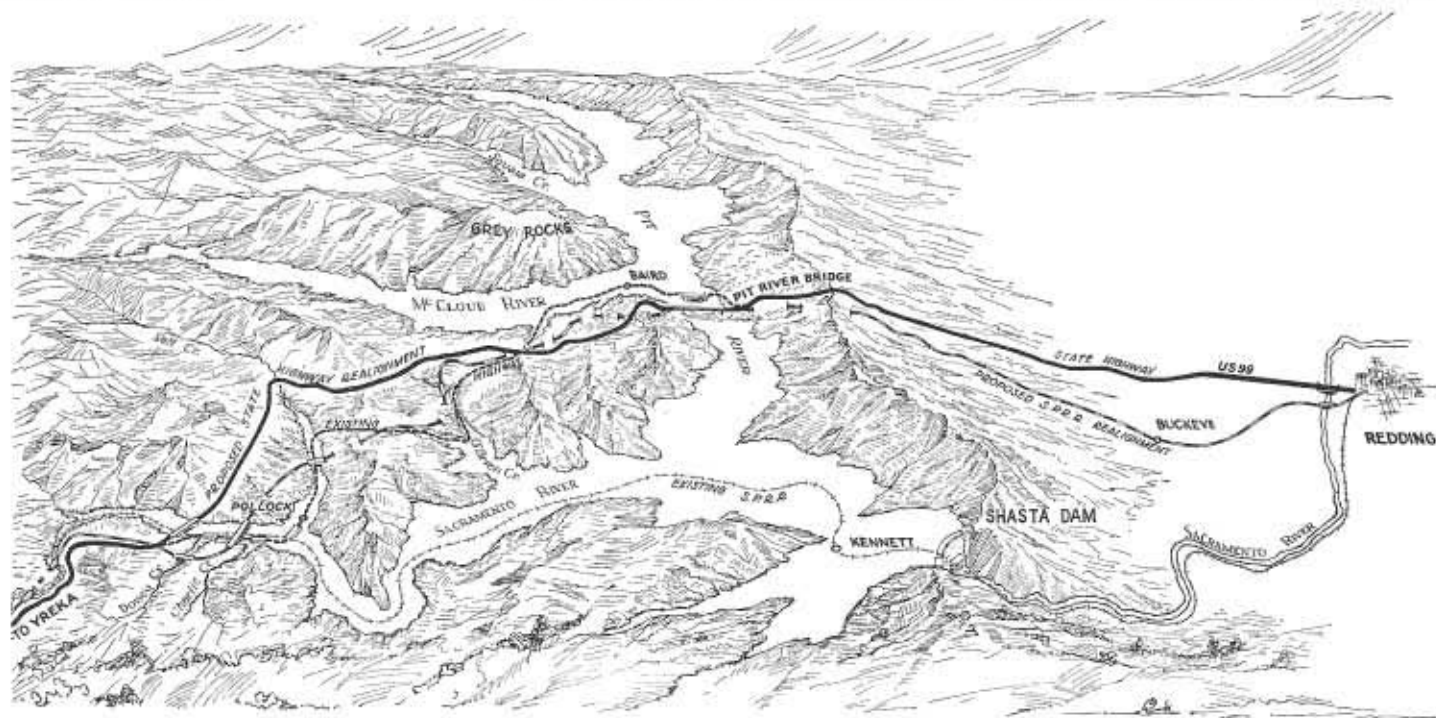
THE grading of the relocated Pacific Highway (U. S. 99) through a portion of the reservoir to be formed by the Shasta Dam unit of the Central Valley Project in Shasta County, has been completed. This work has been in progress since October, 1938, and will be entirely ready for public use during the summer of 1942.

struction is under the supervision of the United States Bureau of Reclamation, and title to it will be vested in the Federal Government, joint maintenance only being the responsibility of the State and the Southern Pacific Company. The existing highway bridge will be covered by 335 feet of water when the reservoir lake is formed.

In the 4-mile unit between Bass

roadbed grade. In the adjacent fill, just northerly from the above cut, the embankment toe is 285 feet below grade, a total elevation differential of 560 feet. The largest cut contained 193,000 cubic yards. A total of 1,376,000 cubic yards of material was excavated on this unit.

This contract also included the construction of a reinforced concrete viaduct along a steep hillside. This



Map showing relocation of State Highway (U. S. 99) from Redding north around and across Shasta Dam Reservoir

A section 3.5 miles in length is in use at present, but the remaining southerly 12-mile section is yet to be paved, and the completion of the Pit River Bridge accomplished before it can be turned over to traffic.

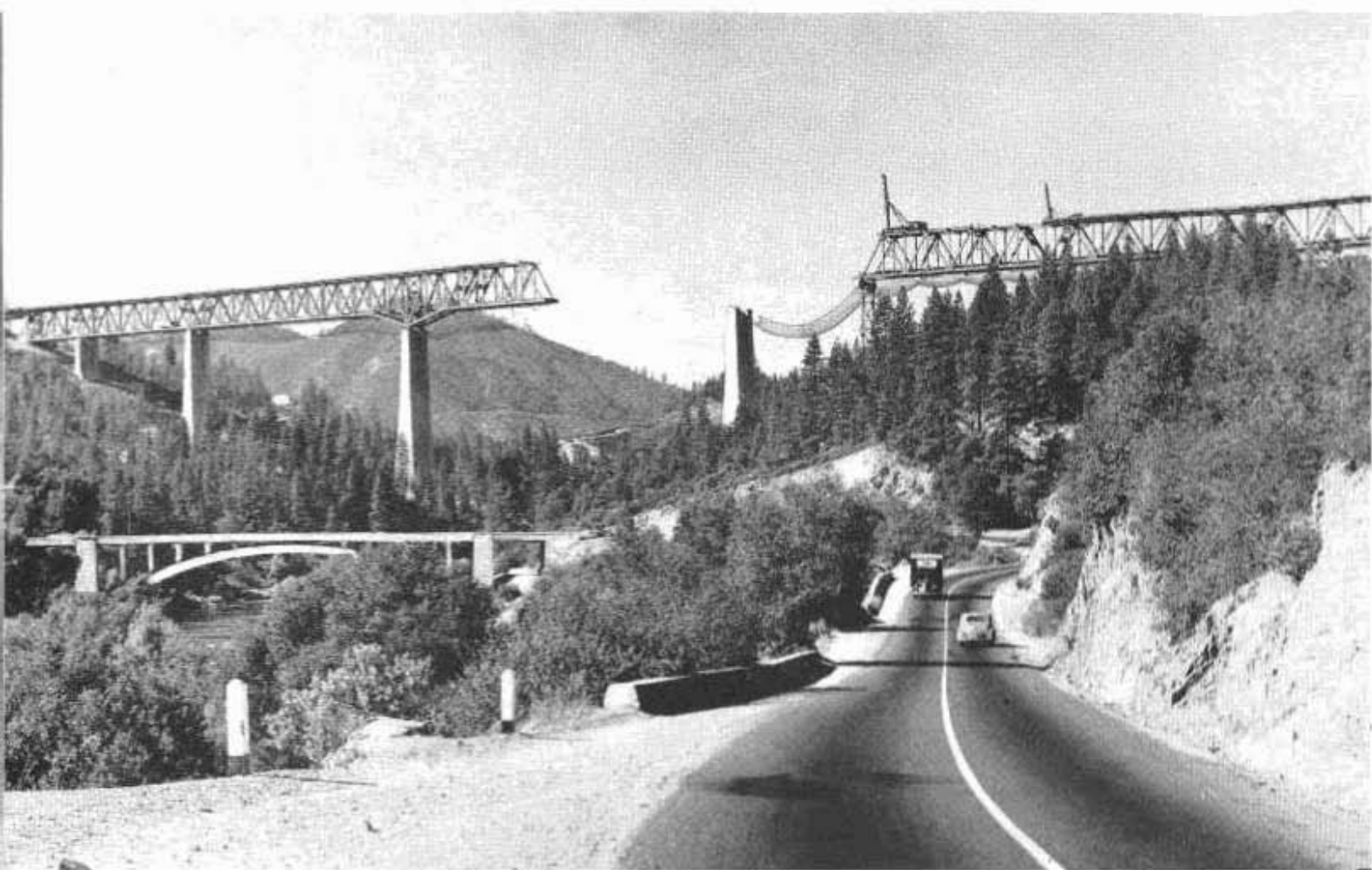
It is now estimated that the Pit River Bridge will be completed in the early part of 1942. This bridge, one of the largest of its kind, 3,467 feet in length, will carry both highway and railway traffic. The bridge con-

Hill and O'Brien Summit, composing one contract, some of the heaviest and most difficult grading work undertaken by the Division of Highways in Northern California, was encountered. The northerly one mile of this unit required excavating and moving approximately 683,200 cubic yards of material.

In one single cut in this section, the cut slope intersected the original ground surface 275 feet above the

bridge with an overall length of 395.5 feet, consists of one 23.5-foot and three 20-foot flat slab end spans; the main portion is of deck girder type of rigid frame design, composed of two 16-foot cantilever spans and five 56-foot spans, supported upon column bents. The deck width provides for three lanes of highway traffic.

The adjoining unit, and a separate contract, between O'Brien Summit and Antler, exclusive of the Antler



Pit River Bridge as seen today from U. S. 99 with the gap half closed between the great central piers and only another half span to be completed. In the foreground is the existing concrete bridge that will be submerged 335 feet under water

On the mountainside high above the present road has been built the approach to the top deck of the bridge that will carry the relocated highway. The railroad approach is made through a tunnel to the lower deck



Bridge, involved 8 miles of grading. Approximately 1,540,000 cubic yards of excavation were involved in this project.

In this unit there were installed 10,452 lineal feet of pipe underdrains and 11,140 lineal feet of pipe culverts. Heavy grading and the presence of many springs made an extensive program of subdrainage necessary. A winter of record rainfall probably developed the maximum of ground water ever to be expected and exposed the locations where seepage would develop trouble.

The culvert pipes ranged in diameter sizes from 18 inches to 105 inches. The reinforced concrete arch culvert installed in Salt Creek, 187 feet in length, with inside span width of 16 feet and a vertical clearance of 20 feet, is considered one of the largest of its type in service in the State Highway System.

General statistical cost data on the highway relocation work completed to date, exclusive of the Pit River Bridge, is as follows:

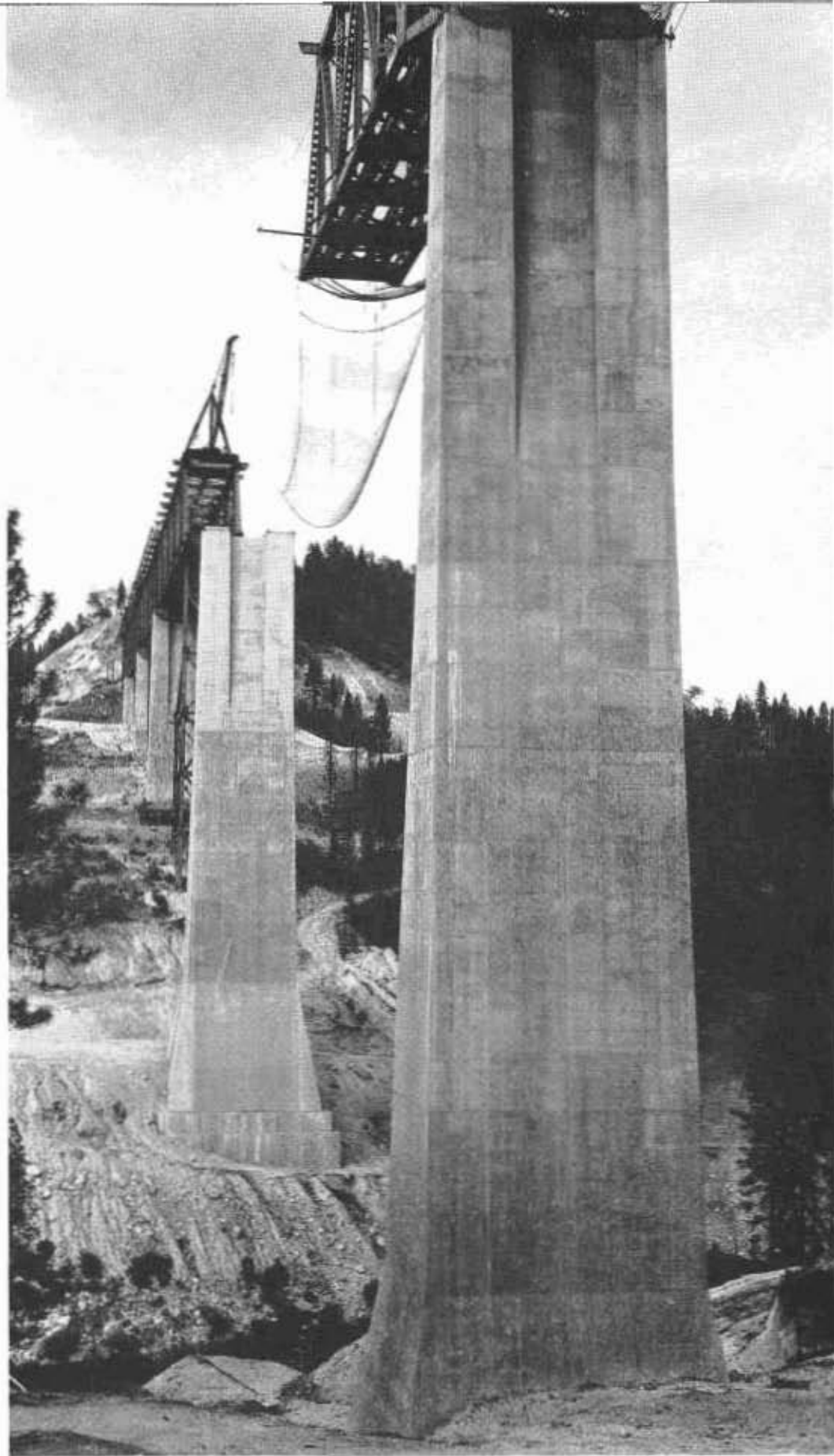
Antler to Crespos, 2.5 miles grading and surfacing, U. S. B. R. contract	\$157,500
Bass Hill to O'Brien Summit, 4 miles grading, including the reinforced concrete viaduct....	484,000
O'Brien Summit to Antler, 8 miles grading	453,000
Antler Bridge, 1330 feet in length	680,000
Total.....	\$1,774,500

The greater portion of the cost of the highway relocation will be borne by the United States Government. The State is contributing an amount determined from the value of the improved standards of design to which the road is being constructed. The improvement in design consists largely in greatly improved alignment and a wider roadbed. Incidental to the relocation there was a decrease in gradient and in adverse grade.

With the completion of the grading work, the State has called for bids on the surfacing.

Two of the grading contracts and the contract for construction of Antler bridge were awarded by Director Frank W. Clark of the Department of Public Works for the State Division of Highways.

The work of this relocation, under contract by the State, has been under the supervision of the writer as Resident Engineer.



The middle piers of Pit River Bridge shown in foreground are 360 feet high, as tall as a 28 story building



Procession of cars at dedication ceremonies of realigned Mustang Ridge unit on State Sign Route 198 in Monterey County

94 Mustang Grade Curves Abolished

By E. J. L. PETERSON, District Office Engineer

ANOTHER link of the Sierra-to-the-Sea Highway, State Sign Route 198, located in Monterey County between Peachtree Valley and Mustang Ridge, about 15 miles east of San Lucas, was recently completed and officially dedicated September 15th.

The improvement is an entirely new alignment which was adopted after considerable study and laboratory investigation. This route crosses a very unstable terrain which is due, primarily, to its being traversed by the San Andreas fault with minor branch faults and numerous old slides and potential slide and slip areas.

The new alignment replaces a section of practically unimproved side-hill contour, old-time wagon road, with many short sharp curves and grades up to 8.3%.

The benefits gained by this construction are clearly illustrated by

the following comparison of standards of the old and new highways and the map showing the location of the project:

	Old Highway	New Highway
Length	6.3 miles	4.6 miles
Number of curves....	123	29
Total curvature	7271°	1354°
Minimum radius ...	60'	300'
Maximum grade	8.3%	7.5%

It will be noted that there is a saving in distance of 1.7 miles and an elimination of 94 curves with a reduction of total curvature of 5,917 degrees, a saving of over 16 complete circles. The minimum radii of curves has been reduced from 60 feet to 300 feet.

The new road throughout this section consists of a 21 foot graded roadbed with imported borrow 0.75 foot thick over the full width of the roadbed with a bituminous surface treatment of 0.25 foot thick over the full width of the roadbed.

Where questionable foundations for embankments were encountered, trenches were excavated through the unstable material to drain and stabilize the foundations. The trenches were 10 feet in width at the bottom and varied from 5 to 30 feet in depth.

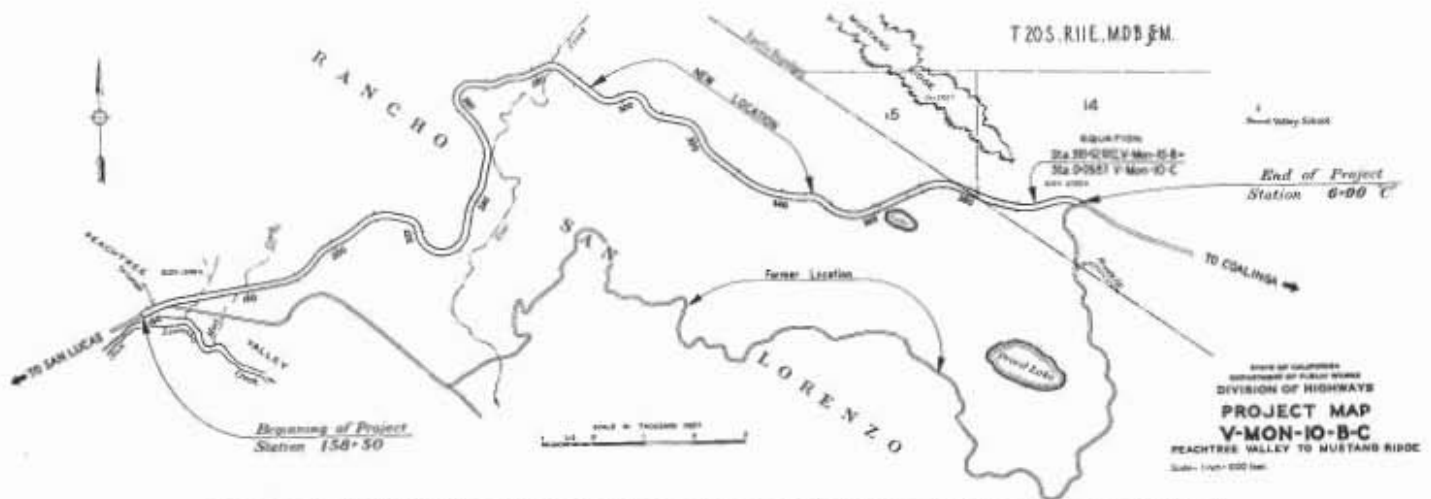
In order to take care of the seepage crushed rock was placed at the bottom of the trenches to a thickness of from 2½ to 5 feet with a mat of straw to prevent earth from sifting into the rock when placing the overlying embankment. Crushed rock was also spread on the trench side slopes where seepage was indicated.

The remainder of the trenches was then backfilled with earth. Where sufficient seepage was encountered to warrant their installation, 8 inch perforated metal pipes were placed in the bottom of the trenches.

Added protection against embankment failure was afforded by the construction of toe supports along the embankments of material exca-



Two views of improved sections of realigned Mustang Ridge route through mountains separating San Joaquin and Salinas Valleys where a narrow old road with 123 sharp curves in 6.3 miles has been replaced by a 21 foot highway with 23 easy curves



Sketch map of tortuous old Mustang Grade route of 123 curves compared with new highway

vated from the trenches and roadway.

Unstable cut slopes were benched to unload the slope or constructed on a flat 2:1 slope. As a result of these precautionary measures, only minor slides have occurred in this generally unstable material even though the precipitation during the past abnormal winter was more than twice the average rainfall.

The rock filling material placed in the fill treatment trenches and the imported borrow used for constructing the upper portion of the roadbed were produced from a local deposit

of chert adjacent to the roadway.

The work involved approximately 317,000 cubic yards of roadway excavation; 20,000 cubic yards of trench excavation for fill treatment; 5,000 cubic yards of rock filling material; 33,000 tons of imported borrow; 650 tons of liquid asphalt and 72,000 square yards of mixing and compacting surfacing.

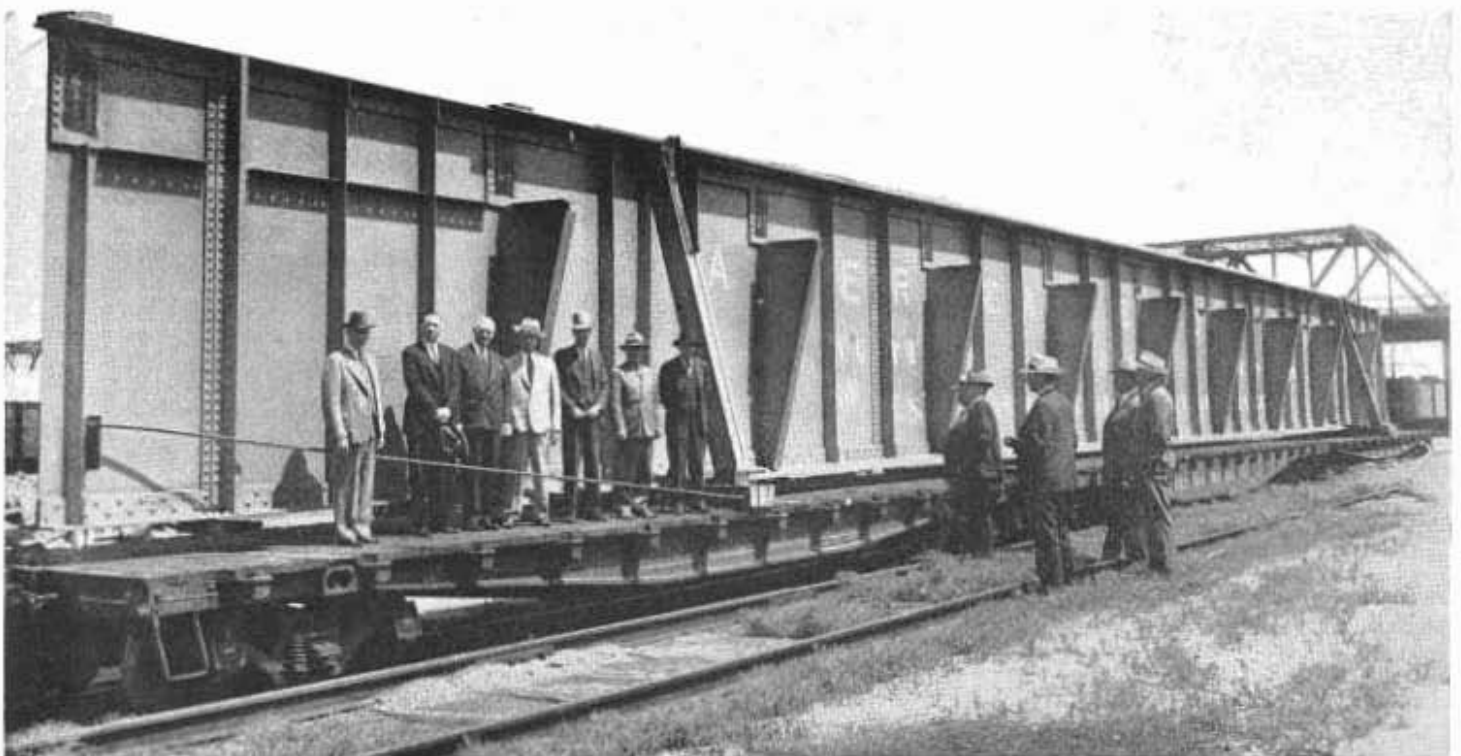
The contractor was Harms Brothers and the cost approximately \$175,000.

The dedication and formal opening ceremonies were held at a beautiful spot in Peachtree Valley. George Gould of Salinas, president

of the Sierra-to-the-Sea Highway Association, was master of ceremonies and the speakers included Leo J. Smith, special representative of Director of Public Works Frank W. Clark; J. W. Halleen, representing the State Chamber of Commerce; Fay McCollum and Floyd E. Howe, Coalinga Chamber of Commerce; Fred McCarger, Salinas Chamber; Craig Cunningham, Madera Chamber and W. C. Beasley, King City Chamber.

A telegram was received from Governor Culbert L. Olson, expressing his regrets at his inability to attend the ceremony.

(Continued on page 24)



Officials inspect huge girder of Pit River Bridge that required 3 freight cars to transport (see article on page 3)

New Laws Effective Jan. 1, 1942 Covering Gross Weights of Vehicles on Highways

By STEWART MITCHELL, Assistant Bridge Engineer

IN order to clarify the revised provisions covering the gross weight of vehicles in the California Motor Vehicle Code (AB 1268) the following discussions and examples of their application to existing vehicles have been prepared. The revisions recently made by the legislature which are to take effect January 1, 1942, were necessary because the present law does not properly regulate the weight of vehicles in conformity with the safe carrying capacities of standard highway bridges built in accordance with the so-called "H-15" design load which has been in general use all over the United States during the past 15 or 20 years.

Since it is obviously impractical to replace these bridges, it is necessary to limit the actual vehicle loads in a way that will not shorten their service life or increase the cost of maintenance unreasonably.

The allowable stress in the structural members of a highway bridge is a function of the weight and spacing of the axles. Some of the axle concentrations of certain types of vehicle are too great for safety while in the case of other vehicles it is safe to permit a slightly greater gross weight than is now allowed.

WEIGHT FORMULA ADOPTED

The method that has been adopted to regulate the gross weight of vehicles in accordance with axle loads and spacings has been given careful thought for a good many years. The particular type of formula C ($L+40$) that has been incorporated into the Vehicle Code was first included in a code of recommended practice for regulating the size and weight of motor vehicles adopted by the American Association of State Highway Officials in 1932. In 1937, the Western Association of State Highway Officials, comprising the representatives of the eleven Western States, adopted more definite rules specifying in detail the application of the form-

ula and setting exact values for the coefficient.

As the result of studies made by the Division of Highways subsequent to 1937, in which many of the Engineers of the trucking industry cooperated, slightly higher values for the coefficient than those adopted by the Western Association were decided upon as being reasonable under the conditions encountered in California. However, the engineers of the Division of Highways feel that the values so adopted permit the greatest loads that can be allowed without cutting down the safety factor to a degree beyond which it is not safe to go under conditions of continuous service.

APPLY TO NEW VEHICLES

It was generally agreed by those who had given the matter careful study that the permanent limitations imposed in Section (a) and (b) of the Code would be satisfactory provided they were applied to a new vehicle only. In the case of some vehicles already constructed in accordance with the old law which can not economically be modified so as to get the axle spacing required, a strict application of the 18-foot limit would reduce the gross weight out of proportion to actual increase in stress produced by the small decrease in axle spacing.

Exceptions were made (Sections (c) and (d)) to take care of such vehicles and a ten-year period allowed for the owner to get back his investment. Therefore these additional complications in the law are temporary and are required in order not to unnecessarily penalize those who have constructed and purchased their vehicles in good faith.

The previous weight restrictions of the California Vehicle Code placed an arbitrary weight limit on each type of vehicle or vehicle combination. In many respects the loads allowed on the various vehicle types did not conform to the stresses produced in high-

way structures. Even more detrimental to highway structures was the fact that the allowed load on any particular type remained unchanged regardless of the vehicle's length.

Short-coupled vehicle combinations induce high stresses in bridge structures, while if the same load is distributed over a longer wheel base the stresses are appreciably reduced. A logical weight restriction must base the allowed load on the length of wheel base over which this load is distributed.

WHEEL BASE PRIMARY FACTOR

The new law covering vehicle weights, which becomes effective on January 1, 1942, is based on this principle. The arbitrary weight limits for the various vehicle types are discontinued and the allowed load on all vehicles and vehicle combinations placed on as nearly equal footing as is practicable. The load to be allowed on any vehicle type will depend primarily on its wheel base, subject to the maximum allowed axle and wheel loads, and the weight concentrations which may be carried on any group of closely spaced axles.

The new law which is effective on all vehicles first registered after January 1, 1942, and on all vehicles regardless of their date of registration after January 1, 1952, may be stated briefly as follows:

GROSS WEIGHT LIMITS

Sec. 704: "The gross weight imposed upon the highway by the wheels of any one axle of a vehicle shall not exceed 18,000 lbs. and the gross weight upon any one wheel or wheels supporting one end of an axle and resting on the roadway shall not exceed 9,500 lbs."

Sec. 705 (a): "No vehicle, whether operated singly or in a combination of vehicles, and no combination of vehicles shall be operated whose gross weight, with load, exceeds that given

(Continued on page 17)

Two Units of Coast Road West of Santa Barbara Under Reconstruction

By LESTER H. GIBSON, District Engineer

WEST of the City of Santa Barbara the State Highway coast route leading northerly toward San Francisco follows the ocean shore for some 20 miles between Ellwood and Gaviota Canyon. Since the early days of road construction in California traffic heading northerly has used the road facilities along this route.

With the development of the present State Highway System this section was graded in 1914 and about 1919 a portland cement concrete pavement 15 feet wide and 4 inches thick was placed over most of the distance. To meet the needs of increased traffic flow the old pavement was later surfaced with an upper story of asphalt concrete and the pavement widened with portland cement concrete borders.

During recent years there has been much improvement of the coast route in Santa Barbara County. South of Santa Maria this main route between Los Angeles and San Francisco was constructed on modern alignment through Solomon Canyon, in 1931 and 1932.

In the City of Santa Barbara and

southerly through Montecito the highway has been constructed as a modern divided arterial.

Complete reconstruction has been accomplished through Gaviota Canyon 35 miles west of Santa Barbara and the Nojoqui Creek line change north of the canyon provided a marked improvement.

On the coastal section between Santa Barbara and Gaviota Canyon several of the poorer sections have been reconstructed and last year work was begun on two of the three remaining portions which were in need of improvement to meet modern traffic requirements.

On August 10, 1940, the Director of Public Works awarded a contract for the reconstruction of 3.4 miles of this route between Tecolote Creek and Las Varas Creek, approximately 12 miles west of Santa Barbara. On September 13, 1940, a separate contract was awarded for construction of a new reinforced concrete girder bridge across Dos Pueblos Creek within the limits of the road reconstruction contract.

Improvement to a second portion of

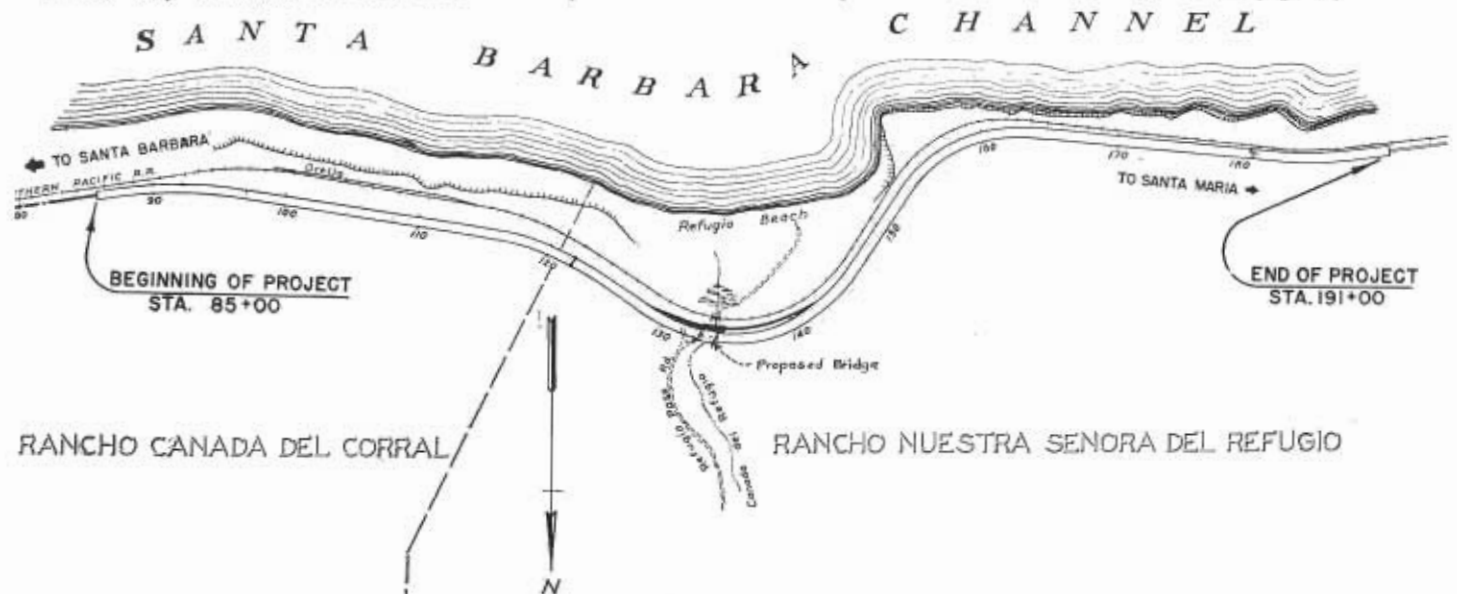
the route was begun with the award on October 4, 1940, of a contract for construction between Orella and one mile west of Canada del Refugio, a distance of two miles, some 20 miles west of Santa Barbara, including the construction of a new concrete girder bridge across the Canada del Refugio.

Traffic using the route has varied from an average of 2,000 cars per day in the winter months to 6,000 in the summer, with particularly heavy concentrations on Sundays and holidays, as recreationists sought the Santa Barbara beach areas. For this volume, the alignment, grade, and surface on both of these sections were considerably substandard.

At Dos Pueblos Creek, Eagle Creek, and Refugio Creek, the bridges provided narrow roadways only 21 feet in width and, in the case of all three bridges, curvature at each end presented hazardous conditions. At many locations on each section the grade line was such as to seriously restrict sight distance.

The designs for both new sections were made to eliminate these obsolete

(Continued on page 10)



Map showing section of Coast Highway under reconstruction west of Santa Barbara between Orella and Canada del Refugio



Views of reconstruction on Coast Highway west of Santa Barbara. Top and bottom scenes show Canada del Refugio bridge under construction. Here a 4-lane realignment on a fill eliminates a long dip and narrow old structure with restricted sight distance



A reinforced concrete box culvert carries Tecolote Creek under highway

features. The comparative tabulation between the old and new sections of highways clearly indicates the improvements effected by the reconstruction.

	Tecolote Creek to Las Varas Creek		Orella to One mile West Canada del Refugio	
	Old	New	Old	New
Total number of curves	8	4	10	4
Total curvature	146°	65°	210°	211°
Minimum Radius	358 ft.	5000 ft.	700 ft.	1000 ft.
Maximum Grade	6.5%	3.1%	6.8%	3.9%
Minimum vertical sight distance	320 ft.	1400 ft.	320 ft.	875 ft.
Minimum horizontal sight distance	240 ft.	900 ft.	360 ft.	475 ft.

In the design of the section between Tecolote Creek and Las Varas Creek the new standards of construction are those for a high type of two lane thoroughfare. On the Orella portion

of the route, however, the road at Canada del Refugio was so restricted between the location of the railroad on the ocean side and the rapidly rising hills on the north, that the cost of necessary heavy grading for construction to similar standards of curvature was such that it was found more expedient to somewhat reduce the standards of alignment and construct the road as a four-lane divided highway.

That soil conditions throughout both of these sections are poor has long been evidenced by the difficulty and high cost of shoulder maintenance on the old road. To overcome this handicap the new construction consists of placing a heavy blanket of satisfactory imported material on which is

placed a cement treated base six inches thick. The surfacing placed on top of this base consists of a bituminous plant-mixed crushed rock three inches in thickness. The shoulders, constructed of salvaged surfacing, are also surfaced with plant-mixed surfacing.

On the two lane sections, the roadway is graded 36 feet wide, the cement treated base is 24 feet wide and the surfacing is 22 feet wide. On the four lane portions the graded roadbed is 64 feet in width, the treated base 50 feet wide and the surfacing 50 feet.

Construction operations on the contract between Tecolote Creek and Las Varas Creek involved 360,000 cubic yards of excavation and the contract between Orella and Canada del Refugio necessitated 160,000 cubic yards of excavation.

The bridge across Dos Pueblos Creek was built under a separate contract and was completed on March 28, 1941. This reinforced concrete girder structure consists of one 60-foot and two 50-foot spans on concrete piers and abutments. The bridge provides a 27-foot clear roadway.

The old narrow bridge across Eagle Creek was replaced by a reinforced concrete arch culvert which was built under the road contract.

The new bridge across Refugio Creek is a reinforced concrete girder structure consisting of two 36-foot spans, two 40-foot spans and two 9-foot cantilevers, all on concrete bents with timber pile foundations. This bridge, which is located in the four-lane section of highway, provides a 56-foot roadway.

It is estimated that the road contract between Tecolote Creek and Las

(Continued on page 21)





Top—Rough graded section of realignment of Coast Highway west of Santa Barbara. Center—Cut slopes being rounded preparatory to application of top soil. Bottom—Top soil applied and left rough to permit natural vegetation to gain a foothold

Flood Damaged Highway in Temescal Canyon Rebuilt on New Alignment

By A. E. SMITH, Assistant Engineer

RECONSTRUCTION of a section of highway ravaged by the flood of March, 1938, is virtually complete on a portion of the "Inland Route" between Corona and Elsinore in Riverside County.

As a result of the abnormal rains in March, 1938, and the excessive runoff, in which much of Southern California suffered severe damage, Temescal Creek carried a huge volume of water.

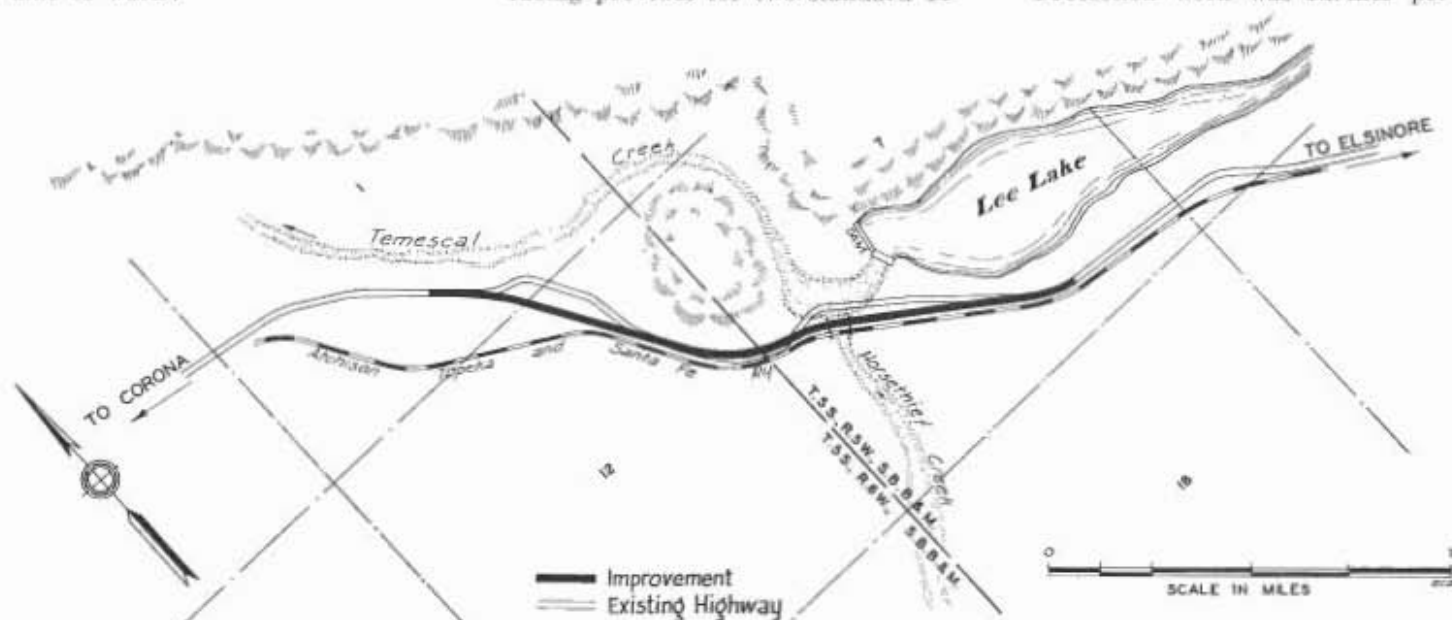
chosen southerly of the old road, hugging The Atchison, Topeka and Santa Fe Railway as closely as possible. This was to improve the alignment, and to place the highway farther from the reaches of Temescal Creek.

The job was 1.67 miles in length and consisted, in general, of constructing a graded roadbed 36 feet in width covered with a four-inch thickness of road-mix surface treatment. The surfacing provides for two standard 11-

Creek, tributary to Temescal Creek. The junction of the two streams is immediately below the bridge.

The bridge was built on steel pile bents and consisted of four interior spans of 22 feet, six inches each and two exterior spans of five feet each. The approach fills were protected by placing sacked concrete riprap under the bridge around the ends of these fills.

Protection work was further per-



Sketch of realignment in Temescal Canyon. Heavy black line shows location of new road compared with old

This creek was the source of water supply for Lee Lake located in the Temescal Canyon. As the spillway facilities of the lake were inadequate for so large a volume of water, during the flood stage the dam broke, causing a portion of the highway to be washed out.

Temporary detour roads were constructed of oil mix around the new wash area and traffic was permitted to travel uninterruptedly without inconvenience.

In the reconstruction of the permanent road, a new alignment was

foot lanes for traffic and a seven-foot shoulder on each side of the traveled way portion.

CONCRETE GIRDER BRIDGE

Selected material was placed 12 to 18 inches in thickness throughout the project, the top four inches being used as aggregate for road-mixing.

Berms at the top of fill slopes and gutter ditches adjacent to the cut slopes were also paved with the oiled surfacing material.

A reinforced concrete girder bridge was constructed across Horsethief

formed by placing broken concrete riprap along exposed embankment slopes. The broken concrete was obtained from adjacent sections of old concrete pavement damaged by the flood.

The remains of the old concrete bridge across Horsethief Creek were broken up and disposed of, as well as other portions of concrete that would present an unsightly appearance from the new road.

At locations where spring water was encountered a system of perforated metal pipe underdrains was

installed to prevent subgrade saturation. Approximately 1,350 lineal feet of underdrain pipe were used.

Other phases of the work consisted of placing corrugated metal pipe culvert cross-drains and a 10 by 6 by 94 foot reinforced concrete box culvert, encasing irrigation lines with concrete jackets to insure against damage by saturation to the highway; moving and resetting property fences and incidental work.

This was a Federal Aid Project. The work was done by State Highway contract. The firm of Oswald Bros. of Los Angeles was the contractor. The bridge construction was performed by Oberg Bros. under a subcontract. Mr. W. H. Crawford was the Resident Engineer.

Passenger Buses Serving Increased Needs of Defense

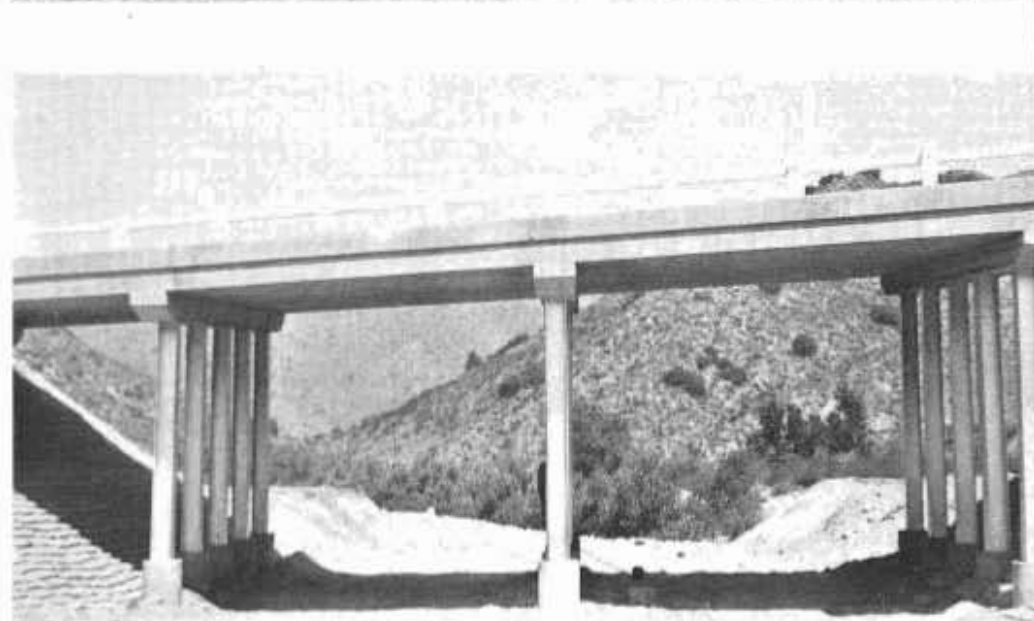
Reports from public passenger bus operators in many sections of the country indicate that this mode of transportation is providing greatly increased services in National defense.

One company serving a large military reservation reports a 255 per cent increase in passengers for the first five months of 1941 over the same period in 1940. The same line during May, 1941, carried increased business of 456 per cent over 1940.

In addition to serving Army, Navy and Marine reservations, buses are supplying transportation to airplane factories, steel mills, housing projects, arms factories, ship yards, shell loading depots, munitions plants and other defense activities.

There are 2,209,856 automobiles on 2,825,126 farms in the first twenty-four states tabulated in the 1940 farm census conducted by the Bureau of the Census, United States Department of Commerce. The percentage of farms having automobiles, not including trucks, in these 24 states is 74.2, although Iowa with 236,601 automobiles on 213,318 farms had 90.2 per cent.

At top—View showing how old highway was washed out by flood waters in 1938 due to failure of Lee Lake Spillway. Center—New highway. Bottom—New bridge replacing old bridge seen in foreground of top picture.





Newly completed divided highway south of Madera. Roadside trees of old road preserved as screen on division strip

New Divided Highway Units on U. S. 99

By R. E. PIERCE, District Engineer

PROGRESSIVE highway improvements made in the past three years are providing vastly increased capacity and safety for the heavy traffic using U. S. 99, State Route 4, in Stanislaus and Merced Counties.

This traffic, ranging from 7,000 to over 10,000 vehicles per day, with a large number of trucks, greatly exceeds the capacity of the existing 20-foot pavement.

At the same time, a serious flood hazard was eliminated in Merced and northern Madera counties.

The problem of relieving this condition is being solved by providing, in general, an additional 23-foot portland cement concrete pavement separated from the existing pavement by

a dividing strip, except through cities where widening and improving existing pavements has been accomplished.

Completed divided highway projects in the two counties are:

Completed	Description	Length of Project	Length of Divided Highway	Cost of Project
Jan., 1939	Modesto northerly to Salida.....	5.76 mi.	5.48 mi.	\$208,000
	(Landscaping)			11,000
June, 1939	Merced southerly	5.70 mi.	5.42 mi.	355,000
Oct., 1939	Merced northerly	1.74 mi.	1.43 mi.	177,400
Work Began Projects now under construction				
Feb., 1940	In Merced and Madera Counties.....	4.39 mi.	4.14 mi.	251,500
Oct., 1940	Hatch Crossing south, Modesto to Keyes....	5.51 mi.	4.64 mi.	230,900
	Totals	23.10 mi.	21.11 mi.	\$1,233,900

Mileages of different widths, etc., extending from 1.792 miles south of northerly boundary of Madera County to northerly boundary of Stanislaus County.

Mileage of two-lane State Highways	32.645
Mileage of three-lane State Highways S. Modesto.....	1.316
Mileage of four-lane divided State Highways	21.11
Mileage of city streets.....	8.104
Total Mileage	63.175

The incentive for the first project extending northerly from Modesto to Salida, a distance of 5.76 miles, initiated in May, 1938, and completed in 1939, was the necessity for better facilities for the more than 10,000 vehicles using this road daily. A por-

tion of this project included the widening of a short piece at the north end of 9th Street within the City of Modesto, and a short transition section at Salida, which leaves a net of 5.48 miles of divided highway.

This project provides for northbound traffic an additional two lanes of portland cement concrete pavement 23 feet in width, separated from the existing 20-foot pavement carrying southbound traffic by a strip averaging 29 feet in width. This permits the existing trees to remain in place, giving the added advantage of a protecting screen to opposing automobile headlights at night.

The approximate total cost of the project was \$208,000. In addition, an extensive landscaping project, including the planting of many trees and

shrubs was completed at a cost of approximately \$11,000.

FLOOD PROBLEM SOLVED

The next project to be constructed—started May, 1938, and completed June, 1939—was the divided highway south of Merced. This was initiated primarily to solve a flood problem which had caused great inconvenience and hazard to traffic on this section during periods of high water ever since it was built. Also the traffic of over 7,000 vehicles per day justified additional facilities.

This project, 5.70 miles in length, consists in the main of a 23-foot width, two-lane portland cement concrete pavement carrying the northbound traffic, with a separation of 21 feet from the old two-lane, 20-foot



Divided highway unit of U. S. 99 nearing completion south of Modesto with traffic using outside lanes



Divided highway under construction between Merced and Chowchilla on U. S. 99. The contract included construction of a bridge over Chowchilla River

pavement carrying the southbound traffic.

The elimination of the flood hazard was accomplished by building the new pavement upon an embankment high enough to clear any flood of record. The old road was also protected from floods by carrying cross levees from the new grade to the Southern Pacific Company embankment at the bridge ends.

The total length of divided highway amounts to 5.42 miles; 0.28 miles of the 5.70 total mileage being taken up in transitions at each end.

The completed work cost approximately \$355,000.

The next divided highway project, from Merced north to Black Rascal Creek, a distance of 1.74 miles, started in October, 1939, and completed in August, 1940, was proposed for the same reason as the previously described project, with the object of getting the new pavement above flood

waters, which frequently in the past entirely stopped traffic on the old road. Also, the 7,000 or more vehicles per day using the road justified additional facilities.

The work, in general, consisted of grading; portions to be paved with portland cement concrete; portions to be surfaced with plant-mixed surfacing on portland cement concrete base and untreated crushed gravel or stone surfacing as a base; borders and widening strips to be constructed adjacent to the new pavement consisting of plant-mixed surfacing on untreated crushed gravel or stone surfacing as a base; and reinforced concrete bridges to be constructed.

A portion of the project is on 16th Street, about 187 feet being within the city, and some 1,000 feet of widened section outside the city and south of Bear Creek. About 660 feet is used in merging into the present pavement at the north end of the

project, leaving 1.43 miles of divided highway.

FOUR BRIDGES BUILT

As stated, the new grade was elevated about 5 to 6 feet above the average ground level to clear the highest flood waters of record.

The new concrete pavement 23 feet in width, laid in two lanes, the outside being 11 feet wide, and the inside being 12 feet in width.

The project included four concrete bridges: Two over Bear Creek; one over Black Rascal Creek; and one for overflow between the two creeks.

The two bridges over Bear Creek are both skewed to the stream, and also are not parallel, as their location between the special widened dividing strip at the intersection with State Highway Route 123 to Snelling and 16th Street made it advisable to build the bridges not parallel but diverging

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New Laws Effective Jan. 1, 1942 Covering Gross Weights of Vehicles

(Continued from page 7)

by the formula $W=800$ multiplied by $(L+40)$. In said formula W equals the total gross weight, with load, in pounds; L equals the distance in feet between the first and last axles of the vehicle or combination of vehicles."

(b) "The total gross weight, with load, imposed upon the highway by any two or more consecutive axles of a vehicle, or of a combination of vehicles, where the distance between the first and last axles of said two or more axles is 18 feet or less, shall not exceed that given by the formula $W=700$ multiplied by $(L+40)$. In said formula W equals total gross weight with load, in pounds, imposed on the roadway by the group of axles under consideration; and L equals the distance in feet between the first and last axles of the group."

TEN YEAR EXCEPTIONS

Manufacturers are taking, or will take, the above restrictions into account in designing new equipment after January 1, 1942, and a detailed discussion of this phase of the law will not be included. The chief purpose here is to acquaint owners with the changed restrictions covering existing equipment. In order not to effect too severe hardship on the owners of present equipment, exceptions to Sec. 705 (a) and (b) are included in the law and apply for a ten-year period.

These exceptions, which apply until January 1, 1952, on all vehicles first registered prior to January 1, 1942, and on all combinations of vehicles when each vehicle of the combination was first registered prior to January 1, 1942, are:

Sec. 705 (e). (Exception to Sec. 705 (a)) says that if "vehicles or combinations thereof have a distance of not less than 25 feet or more than 45 feet between the first and last axles of the vehicle or combination, the formula applicable to such vehicle or combination shall be $W=850$ multiplied by $(L+40)$ but no such vehicle or combination of vehicles shall be operated whose gross weight with load exceeds 68,000 pounds."

Sec. 705 (d). (Exception to 705 (b)) says that if "vehicles or combinations have a group of two or more axles where the distance between the first and last axles of said two or

more axles is between 14 and 18 feet, both inclusive," the formula applicable shall be $W=800$ multiplied by $(L+40)$."

The general points to be kept in mind in computing the allowable load on existing vehicles or vehicle combinations after January 1, 1942, are as follows:

AXLE AND WHEEL LOADS

The maximum axle load under the new law is 18,000 pounds. This is an increase of 1,000 pounds over that allowed at present and this increase will prove advantageous particularly to two-axle vehicles. However, less leeway in lateral unbalancing of the load is allowed under the new law since the maximum wheel load is 9,500 pounds.

The formula covering two or more axles within a distance of 14 feet is $W=700(L+40)$. This formula must be applied to determine the allowable load on: (1) dual axles, (2) on single vehicles whose wheel base is less than 14 feet, and (3) on any group of two or more consecutive axles of a vehicle or combination where the distance between said axles is less than 14 feet.

The spacing of dual axles only varies within narrow limits, from the minimum legal spacing of 40 inches to a maximum of about 5 feet. The allowable gross load on duals as represented by these limits is between 30,330 pounds and 31,500 pounds.

TRAILER COMBINATIONS

Although applicable to single trucks and tractors with a wheel base of less than 14 feet, this formula will not usually control since practicable considerations governing the load on the steering axle generally set the gross load at a value less than allowed by the formula. This formula will limit the allowable load on full trailers with a wheel base of less than 14 feet; and, in the case of truck-trailer combinations, usually should be applied to determine the gross load on the group of axles comprising the front trailer axle and the rear axle or axles of the towing vehicle. In the case of short coupled semi-trailer combinations, the rear tractor axle, or axles, with one or more axles of the semi-trailers may be included in a distance of 14 feet, in

which case the formula $700(L+40)$ will usually limit the allowable load.

It may be easier for some persons to remember or apply the formula if the mathematical form is changed. For example, the formula $700(L+40)$ may be put in the form $28,000+700L$. In words this means that the allowable gross load may be found by adding to 28,000 lbs., 700 lbs. for each foot of distance. The maximum for a single axle is, of course, 18,000 lbs., and the formula applies only to two or more axles of a group with a minimum allowable spacing of 40 inches. The most common spacing for dual axles is 3' 9", in which case their permissible load is: 28,000 plus the product, 3.75 times 700, or 30,625 lbs. Of course, the same answer results if 700 is multiplied by 43.75.

GREATER THAN 14 FEET

The formula $W=800(L+40)$ must be applied to existing vehicles to determine the permissible load on the following: (1) any single vehicle whose wheel base exceeds 14 feet and is less than 25 feet, (2) any vehicle combination whose total wheel base is less than 25 feet or greater than 45 feet and (3) any group of three or more consecutive axles of a vehicle or vehicle combination where the distance between said axles is between 14 and 18 feet.

In (2) above where the total wheel base of the combination exceeds 45 feet the exception of Sec. 705 (e) does not apply, since a combination whose wheel base exceeds 45 feet is permitted a gross in excess of 68,000 lbs., in accordance with Sec. 705(a).

The reference in (3) above to 3 or more axles when the wording of Sec. 705 (b) is "two or more axles" requires explanation. Actually 2 axles require a distance of only 11.4 feet to enable them to carry the full legal maximum of 18,000 lbs. on each axle. Consequently, 3 axles or more must be contained within a distance of 14 to 18 feet before the formula becomes the limiting factor.

25 TO 45 FEET

Vehicles or combinations of vehicles whose total wheel base is between 25 and 45 feet are allowed a gross load

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Clearing and burning Echo Summit site, Sept. 5



General view of work operations on Sept. 15

Fast Work on Construction of the Echo Summit Snow Removal Station

By J. L. PIPER, District Maintenance Engineer

THE California Highway Commission, on August 29th voted funds to construct maintenance quarters and equipment buildings and to purchase snow removal equipment for use at Echo Summit of the Sierras to keep U. S. 50 open throughout the winter. Full cognizance was taken of the fact that winter was fast approaching and that the need for immediate action was necessary in order to carry out the decision of the Highway Commission.

On September 2d District representatives met with Federal Forest Service officials at Echo Summit and selected a site suitable for the location of the maintenance station buildings. The site obtained is located on the north side of the road about one-fourth mile east of the actual summit. The highway at this point was completed in July, 1940.

The buildings being constructed are surrounded by towering pine trees which screen the development

from roadway view. Looking eastward from the site and a thousand feet below is glimpsed the southern end of famous Lake Tahoe and Lake Valley.

FOREST OFFICIALS COOPERATE

The utmost cooperation of U. S. Forest Service officials was given in granting immediate permission to start construction operations on the ground.

On September 3d clearing opera-



Bunkhouse foundation forms in place, Sept. 18



General view, with truck shed forms in background, Sept. 19



Pouring concrete on bunkhouse foundations, Sept. 23



Finishing floor of truck shed on Sept. 26

tions were started. While the site is relatively level, it was necessary to remove a heavy stand of pine and fir timber.

The first construction materials were delivered to the job on September 5th. Cement was on the job site on September 8th and thereafter materials arrived daily. A crew of eight carpenters and 12 laborers started work on September 10th. On the fifth working day thereafter the first concrete was poured, the foundation of the truck shed being the first unit started.

For the first two weeks of work on the buildings, operations, while going full speed, were slightly handicapped by having to work around the tree falling, burning, and stumping crews.

FOUR BUILDINGS UNDER WAY

The maintenance station is to consist of four buildings—a bunkhouse, a truck shed, a boiler house, and a gasoline and oil storage house.

The bunkhouse is to be a two-

story frame building with redwood rustic siding capable of housing about 30 men at the peak period. The lower floor will have a kitchen, cook's quarters, dining room, foreman's office and radio room, drying room, wash room, and lobby. The upstairs will be divided into two dormitory rooms.

The truck shed is to be 40 feet deep by 107 feet long. At one end of the truck shed and completely walled off from the garage portion will be a well-stocked and equipped shop for the repair and service of equipment.

STEAM PLANT NECESSARY

The boiler house will contain the steam plant and the power generator. Electricity is not available at Echo Summit at this time and a temporary power plant is to be used until such time as electric lines are extended to the summit.

A standard 16 by 18 foot gasoline and oil house with an electric gaso-

line pump completes the buildings at this station. Underground storage for approximately 4,000 gallons of gasoline is being provided.

In accordance with a ruling of the Forest Service all buildings are being set back 200 feet from the center line of the highway except in the case of the gasoline and oil house. Permission was granted to place this building only 100 feet from the center line of the highway. There is a clear distance of 50 feet between all buildings for fire prevention.

DIGGING LARGE WELL

Other appurtenances at this station include a buried 8,000-gallon fuel oil tank, a 1,500-gallon metal septic tank, an elevated water reserve storage tank, and a lined well. This latter item is being dug by a local well-drilling contractor under an emergency contract. The feature of this well is to be its underground drifts running laterally at the foot of the opening to provide additional



Truck shed framing being erected, Sept. 30



Floor joists on bunkhouse foundation, Sept. 30

storage for emergency use. These laterals are to be two in number and each is to be six feet high, four feet wide, and five feet long. A pressure system is to be installed in a pit at the top of the well at about ground level.

About a foot of topsoil and pine needles has been cleared off the site, disclosing a good grade of granite for use as subgrade. Local granite, road-mixed with liquid asphalt SC-3 sufficient to provide a three-inch compacted thickness, has been stockpiled for use in surfacing the yard and driveways.

FORTY MEN AT WORK

As this magazine goes to press all of the concrete foundations, footings, and floor slabs have been poured, framing of the bunk house and truck shed is under way, the well is being dug, steam, sewer, and water lines are being laid, and the yard area is being graded. All clearing and stumping has been completed and the surfacing is ready to be placed.

On the last day of September more than 40 men were actively engaged in construction on the site. Materials were nearly all on the job but some few delays have been encountered in obtaining the necessary materials and supplies.

The original force of eight carpenters and 12 laborers was increased to 11 carpenters and 16 laborers on September 29th in order to proceed with actual fabrication of the various buildings with the utmost speed. The entire project with the exception of the well digging is being handled by the State on a day labor basis in order that the work could be started at the earliest possible moment.

All snow removal equipment has been ordered and a part of it is on hand at the present time. No delays on the balance of the equipment are anticipated.

Rushing Work on Highway Across Isthmus of Panama

Under the blazing tropical sun by day and under electric lights at night, 1,000 men are working on defense-spurred schedules to complete by next spring the first highway across the Isthmus of Panama at the Canal Zone.

The 50-mile highway will connect Colon on the Atlantic end of the Panama Canal with Panama on the Pacific end, and serve about 200,000 people in the Isthmian area. It will be the first transisthmian road since the days of the gold trail of the Seventeenth Century.

Traffic on State-Owned Toll Bridges Again Shows Increases in September

THROUGHOUT the month of September there was a continuation of the large volume of traffic which for some time has been characteristic of the State-owned toll bridges.

On the San Francisco-Oakland Bay Bridge, the daily average was 57,131 vehicles, representing an increase of 2 per cent over September, 1940.

Carquinez Bridge, with an average of 14,982 vehicles per day, showed a gain of 55 per cent over the same month of 1940. The heaviest single day's traffic occurred on September 1, when 24,697 vehicles crossed the

bridge, establishing a new high record.

Antioch Bridge broke all previous records with an average of 1,018 vehicles per day.

September 16th marked the first anniversary of the day on which the State of California acquired the Carquinez and Antioch bridges. The total traffic for the first 12 months under State operation was 4,106,689 vehicles on the Carquinez Bridge, and 244,041 on the Antioch Bridge.

The vehicular traffic for September on the San Francisco-Oakland Bay Bridge and the Carquinez and Antioch bridges is tabulated below:

	San Francisco- Oakland Bay Bridge	Carquinez Bridge	Antioch Bridge
Passenger autos and auto trailers	1,541,522	407,511	23,522
Motorcycles and tricars	5,254	1,524	66
Buses	43,950	6,033	189
Trucks and truck trailers	85,002	34,138	6,730
Others	38,214	242	45
Total vehicles	1,713,942	449,448	30,552

New Divided Highway Units on U. S. 99

(Continued from page 16)

from each other at the northerly end.

The westerly bridge over Bear Creek is 250 feet long with four center spans each 46 feet 8 inches long and two end spans of 31 feet 8 inches length, all supported on concrete piles.

The easterly bridge is 230 feet 7½ inches long, with four center spans each 43 feet long and two end spans of 29 feet 2½ inches length. Each structure has a 26-foot clear roadway with a 5-foot sidewalk on the outside. Concrete railing is used throughout.

The bridge over Black Rascal Creek is a skew concrete structure 94 feet in length and consists of four equal spans, all supported on concrete piles. It has a 27-foot roadway width.

The concrete bridge over the overflow is normal to the roadway 52 feet long with two equal spans on concrete piling. The roadway is 27 feet in width.

The approximate cost was \$177,400.

The next project in order is the divided highway now under construction, south of Modesto between Keyes and Hatch Crossing, which will doubtless be completed by the time this article goes to press.

This project, initiated primarily to afford better facilities for over 10,000 vehicles now using this road, begins at the southerly end of the three-lane pavement at Hatch Crossing about 1.5 miles south of the south city limits of Modesto and extends southerly 5.51 miles to Keyes.

It consists in the main of a 23-foot portland cement concrete roadway with a 31-foot separation between the old and new pavement, except through Ceres where the pavement averages 50 feet in width and consists of plant-mix surfacing over the old pavement and new concrete base.

The total length of divided highway excluding the widened portion through Ceres and the transitions at each end is 4.64 miles.

The allotment for this job is about \$231,000.

The final project was handled in three contracts, the first for grading begun in February, 1940, and com-

pleted in September, 1940, consisting in general of constructing a graded roadway; placing imported subgrade material and applying road-mix surface over the full width. A reinforced concrete slab bridge was constructed over South Dutchman Creek consisting of three 16-foot spans and two 6-foot cantilever spans supported on concrete pile bents.

The second contract was for constructing a bridge over Chowchilla River just south of the northerly boundary of Madera County. This bridge is of reinforced concrete 132 feet long with a clear roadbed of 27 feet resting on concrete piles.

Under the contract, now under way, approved August 23, 1941, the work to be done consists in general of constructing a portland cement concrete pavement upon the previously constructed grade finished under contract last year. This pavement will be 23 feet wide; crusher run base borders 2 feet wide and 6 inches thick are provided for each side and 2 inches of plant mix extending for the full 8 feet of shoulder on the outside and 5-foot shoulder on the inside.

The original grading proved its worth last winter by making it possible to keep traffic moving by diverting it onto the new grade when during a period of high water the old road was closed, while the new grade was above water.

This divided highway, in use in these two counties, has proved so beneficial in relieving the traffic congestion that it is hoped funds will be made available to not only complete the work in Stanislaus and Merced Counties, but also through San Joaquin County where traffic conditions are fully as bad.

Travelling salesmen drive their automobiles an average of 18,701 miles per year, according to a recent survey. It is estimated that physicians drive their cars 12,932 miles annually; attorneys, 12,898 miles; insurance and real estate salesmen, 12,618 miles; unclassified salesmen, 12,303 miles; workers, 7,657 miles; farmers, 5,750 miles; all persons employed in other occupations, 8,650 miles.

It was their first day in military camp, and the two colored recruits were sitting in the kitchen, more or less industriously removing the skins from potatoes.

"How come," demanded the first, "how come dat officer keeps callin' us K. P.—K. P.?"

"Hush yo' mouf, Ignorance," advised the second. "Dat am de abbreviation for Keep Peelin'—Keep Peelin'."



Old narrow bridge across Dos Pueblos Creek was replaced by modern structure

State Jails Boys Who Move Road Signs

The mutilation, destruction or removal of official State Highway Signs is a violation of law punishable by arrest, and imprisonment of the guilty person upon conviction in court.

The cost of material and maintenance of the signs of the State Highway System approximated \$160,000 last year.

A recent instance was the case of two boys who were returning from a holiday trip in the mountains and ran out of gas at a highway intersection. A third boy, the driver of the car, caught a ride to the nearest service station for gas, and while he was gone the other two removed and put in their car a reflectorized sign reading "DETOUR" and moved another sign reading "BRIDGE OUT 8 MILES AHEAD" to another location in the intersection where it gave a false message to traffic.

Later the boys again ran out of gas and abandoned the car for the balance of the night. The Police Department, found the "DETOUR" sign in the car, hunted up the boys and found out from them what had happened. The State highway district office was notified, the District Traffic Engineer made an investigation and signed a complaint.

The complaint was filed with a Justice of the Peace and a warrant for

the arrest of the boys was issued. The older boy was sentenced to 10 days in jail, but the sentence was suspended on the condition that he replace the signs in their original position (which had already been done by highway employees) and also repair all damaged signs between the intersecting routes, for a total distance of approximately 44 miles.

The younger boy whose case was referred to the Juvenile Court, was apparently only reprimanded by the judge.

Coast Road West of Santa Barbara Under Reconstruction

(Continued from page 19)

Varas Creek will cost approximately \$260,000. The Dos Pueblos Creek bridge cost was \$21,168.

The contract between Orella and one mile west of Canada del Refugio will cost about \$199,000, including the bridge across Refugio Creek. It is expected that all work on both contracts will be completed about the first week in November.

The firm of Basich Brothers of Torrance are the contractors on both of the road contracts and the Dos Pueblos Creek bridge was built by Carl Hallin. J. C. Adams has been Resident Engineer for the State on road construction and E. C. Bissell was Resident Engineer for the Bridge Department.

Three Way Channelization Project Completed on U. S. 99, Near Redding

By F. N. DRINKHALL, Resident Engineer

RECENT completion of a section of Route 3 through Redding, between the Southern Pacific Subway and Hill Street, on the Pacific Highway, U. S. 99, was of special interest as it was the first experience with channelization at an important intersection in that district.

This particular intersection will assume still greater importance at a future date when it will become a part of Route 20 between Redding and Lassen Volcanic National Park and connect with a proposed new bridge across the Sacramento River at the foot of Cypress Street.

The project, in general, converted the existing two-lane, paved road into a four-lane divided highway improving grade and line in the process. Driving lanes are portland cement concrete pavement 11 feet in width, with passing lanes of plant-mix surfacing 12 feet in width over six inches of crusher-run base.

Opposing lanes of traffic were divided by raised bars with double traffic stripes at the southerly end of the project and by irregular shaped division strip areas, partially bounded by concrete curbs through the more congested section.

3-WAY CHANNELIZATION

The most important intersection was given a three way channelization treatment, complete with acceleration and deceleration lanes, that has since proved adequate in controlling and directing traffic and reducing traffic hazards. Three flashing beacons, numerous ruby reflectors and painted recessed division strip curb faces were installed to further aid in safeguarding traffic.

Due to the close proximity of buildings and side streets, gravity and reinforced concrete walls were placed to obtain the required roadway width in cuts without running into exorbi-

tant right of way costs and other complications.

The project was started on August 12, 1940.

Due to the lateness of the season the contractor conducted his grading operations on a 24-hour basis; the first rains came the day he completed his grading, October 23d. During the latter part of November and first half of December one lane of portland cement concrete pavement and the lower course of crusher run base was placed and served to partially carry traffic through the winter months.

MOISTURE TESTS NECESSARY

Throughout the Winter and Spring progress had to contend with adverse weather conditions with intermittent dry spells that were seldom long enough to dry out the grade. This was a source of constant concern to the Resident Engineer, causing frequent discussion as to the permissible moisture condition of subgrade and crusher-run base to permit placement of plant-mix surfacing.

Local U. S. Weather Bureau predictions plus a maximum permissible moisture in the crusher-run base of 5 per cent and in shoulder material of 10 per cent, controlled placement of plant-mixed surface. These moisture percentages were the optimum moisture contents as shown by laboratory tests on the materials involved. Over eighty field moisture tests were taken and the results used to definitely settle the question of plant-mixed placement.

Items of interest in the construction methods employed were as follows: The special provisions called for automatic batching of concrete aggregates. The contractor erected an automatic concrete aggregate batching plant close to a commercial crushing plant, using an existing stockpile as the approach road to the hoppers.

Portland cement concrete pavement float finishing was done with a mechanical float which did an excellent job with an experienced operator in charge.

Plant-mixed surfacing placement and finishing was done with a bituminous paver.

BLENDER SCREEDS EXTENDED

In order to conceal the longitudinal joint line that is sometimes visible after laying two adjoining strips with these machines, extensions were placed on the blender screeds which increased the spread width to 14 feet. This placed the joint in the center of the highway and under the raised bars. It was found that by compacting a half foot width of the first laid strip at the same time as the adjoining strip, the longitudinal joint is almost entirely eliminated.

As frequently happens on construction jobs within city limits unexpected items ran high in cost. During grading operations an old sewer tunnel was uncovered, large enough to walk through. This had to be excavated and backfilled. A cut face slip out above one of the retaining walls necessitated installing perforated drains back of the wall and slope paving above the wall to retain the backfilled cut face on a 1-1 slope.

COSTLY RECORD RAINS

The long record high rainy season ran up the maintenance of traveled way costs, and increased the item of crusher-run base due to loss of fouled material that had to be replaced.

Excavation of unsuitable material, particularly at the south end of the project, was a costly item. Backfill had to be placed with selected rock and drains provided because of a high water table that turned the natural material into an unstable mass. Altogether the long list of

(Continued on page 24)



Views of channelization project recently completed on U. S. 99 near Redding that converted the existing 2-lane road into a 4-lane divided highway. At the 3-way intersection with Route 20 and the highway to Volcanic National Park, opposing traffic is separated by irregular shaped division strip areas partially bounded by concrete curbs.

Bids and Awards for the Month of September, 1941

FRESNO COUNTY—Widening a bridge across Herndon Canal 1.3 miles north of Fresno. District VI, Route 125, Section C. F. Fredenburg, South San Francisco, \$24,983. Contract awarded to Trewitt-Shields and Fisher, Fresno, \$19,342.

FRESNO COUNTY—Between 0.2 mile west of Parkfield Junction and 1.3 miles east of Parkfield Junction, about 1.2 miles to be graded. District VI, Route 10, Sections B.C. Rhoades Bros., Los Angeles, \$64,563; Claude C. Wood and W. C. Watson, Lodi, \$68,445; M. J. Ruddy, Modesto, \$78,246; Plombo Bros. Co., San Francisco, \$91,229; Stewart & Nuss, Inc., Fresno, \$132,648. Contract awarded to Harms Bros., Sacramento, \$62,193.

HUMBOLDT AND SISKIYOU COUNTIES—Two bridges across Eel River, one at Robinson Ferry and one at North Scotia to be removed and salvaged and a bridge across Salmon River at Somes Bar to be constructed with salvaged steel. District I, Routes 1 & 46, Sections E & A. A. Soda & Son, Oakland, \$83,604; Kiss Crane Service, Berkeley, \$86,690; Ralph A. Bell, Eureka, \$173,315; Harry J. Oser, San Francisco, \$193,854. Contract awarded to C. W. Caletti & Co., San Rafael, \$74,259.

KERN COUNTY—Across Boena Vista Slough about 9 miles northeast of McKittrick, a timber bridge to be constructed. District VI, Route 58, Section J. George von Kleinsmid, Bakersfield, \$25,780; Kiss Crane Service, Berkeley, \$27,928; F. Fredenburg, South San Francisco, \$29,981. Contract awarded to Rexroth and Rexroth, Bakersfield, \$22,997.

KERN COUNTY—Between Southern Pacific Railroad and Levee Canal, about 0.8 mile to be graded and a cement treated base to be constructed and surfaced with asphalt concrete, and a reinforced concrete culvert to be extended. District VI, Route 142, Section Bakersfield, A. Contract awarded to Griffith Co., Los Angeles, \$69,969.

LOS ANGELES COUNTY—Construct system of traffic signals on Redondo-Wilmington Blvd. between Pennsylvania and Walnut Avenues. District VII, Route 60, Section D. Econolite Corp., Los Angeles, \$11,500; Martin J. McCarthy, Los Angeles, \$12,543. Contract awarded to Newbery Electric Corp., Los Angeles, \$10,564.

MENDOCINO COUNTY—Between 6.1 miles and 5.3 miles south of Ukiah, about 0.2 mile to be graded and surfaced with plant mixed surfacing. District I, Route 1, Section B. Lee J. Immel, Berkeley, \$33,311; Macco Construction Co., Clearwater, \$48,095. Contract awarded to Harold Smith, St. Helena, \$26,426.

MENDOCINO COUNTY—Between Hopland and Crawford Ranch, about 6.3 miles to be graded. District I, Route 1, Section B. Claude C. Wood, W. C. Watson and L. D. Tonn, Lodi, \$390,725; N. M. Ball Sons, Berkeley, \$328,645; Parish Bros., Sacramento, \$333,731. Contract awarded to Macco Construction Co., Clearwater, \$251,217.

PLACER COUNTY—Between Roseville and 0.6 mile east, about 0.7 mile to be graded and surfaced with plant mixed surfacing. District III, Route 17, Section Roseville, A. Parish Bros., Sacramento, \$28,140; A. Teichert & Son, Inc., Sacramento, \$33,649. Contract awarded to Poulos & McEwen, Sacramento, \$26,728.

RIVERSIDE COUNTY—Between Orange County Line and Corona, a nonskid surface treatment. District VIII, Route 43, Section A. Contract awarded to Oswald Bros., Los Angeles, \$5,870.

An Appreciation

Beverly Hills, California

My dear Sirs:

This is just a note I wish to write in commendation of the men whom you have working for you. I noticed in the newspaper that printed an account of the accident occurring on the road between Igo's and Camp Angelus on August 25th that your men were not mentioned and being one who would like to see "credit given where it is due" I felt it my duty as a rather heavy taxpayer to tell you of their wonderful work. I know because I was the one that called for help for the injured people.

The ranger at Camp Angelus was not there so I went to the house of E. G. Boyd who works for you. He immediately got up at 1.30 in the morning and went with another woman friend and myself to investigate. He came back up the mountain and got Joe Holt (maintenance foreman) who came with first aid, stretchers, etc.—and maybe you think they didn't work. It took two hours for them to get the woman who was injured from the bottom of the canyon to the top. In the meantime, the CCC boys came and helped but I just can't imagine what would have happened to those injured people at the bottom of the canyon had it not been for Mr. Boyd and Mr. Holt.

I just want to say that I am happy there are such people and they gave their time and energy so very unselfishly.

Thank you for a grand highway maintenance organization.

Sincerely,

Mrs. Hartle Tallman.

SAN LUIS OBISPO COUNTY—At Cholame Creek about 22 miles east of Paso Robles, a reinforced concrete girder bridge to be constructed, and about 0.4 mile of roadway to be graded and surfaced with road-mixed surfacing on crusher run base. District V, Route 33, Section B. Trewitt-Shields and Fisher, Fresno, \$63,491. Contract awarded to Dan Caputo, San Jose, \$58,703.

VENTURA COUNTY—At Pole Creek, bridge to be raised and about 0.2 mile of grading and paving with asphalt concrete. District VII, Route 79, Section Fildmore, C. J. S. Metzger & Son, Los Angeles, \$14,002; A. S. Vinnell Co., Alhambra, \$16,569. Contract awarded to J. E. Haddock, Ltd., Pasadena, \$13,865.

YOLO COUNTY—Between Cache Creek Bridge and 0.4 mile north, about 0.4 mile to be graded and surfaced with plant mixed surfacing on gravel base. District III, Route 87, Section A. Hemstreet and Bell, Marysville, \$23,425; Parish Bros., Sacramento, \$23,801; Poulos & McEwen, Sacramento, \$26,218; A. Teichert & Son, Inc., Sacramento, \$26,219. Contract awarded to Louis Binsotti & Son, Stockton, \$22,791.45.

Channelization Project Completed at Redding

(Continued from page 22)

unexpected items accounted for approximately 7 per cent of the final cost of the project.

Original plans called for the dividing strip areas to be filled in to top of curbs. During the life of the contract it was decided to leave these areas low to permit a future filling in with loam as part of a proposed general landscaping project that will make this southern entrance to Redding ornamental, as well as useful.

Final total cost of the project, a Federal Aid job, amounted to \$120,082. Length 1.10 miles.

Fredericksen & Westbrook were the contractors, with Jerry Bing as their Superintendent for the greater part of the contract time. The writer was Resident Engineer for District II of the Division of Highways.

94 Grade Curves Abolished

(Continued from page 6)

Following the formal opening several hundred cars caravanned over the new grade into Warthan Canyon for a picnic and entertainment by the Mustang Mountain Rangers Quartet.

On this State Highway Sign Route 198 between Coalinga and San Lucas the Division of Highways has inaugurated 11 major construction projects during the past 20 years. Six of these projects were in Monterey County and five in Fresno County, and the total cost of these 11 improvements was about \$872,700.

Laws Effective Jan. 1, 1942 Covering Weights of Vehicles

(Continued from page 17)

as computed by the formula $W=850(L+40)$ but this gross must not exceed 68,000 lbs. $850(L+40)$ equals 68,000 lbs. when $L=40$ so all vehicle combinations whose wheel base is between 40 and 45 feet are permitted a gross of 68,000 lbs. provided of course permissible axle loads and concentrations within 14 or 18 feet are not exceeded.

In a following issue of this magazine there will be shown by illustrations how the law applies to various types of commercial vehicles using California highways.

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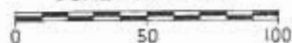
C. C. CARLETON, Chief
FRANK B. DURKEE, Attorney
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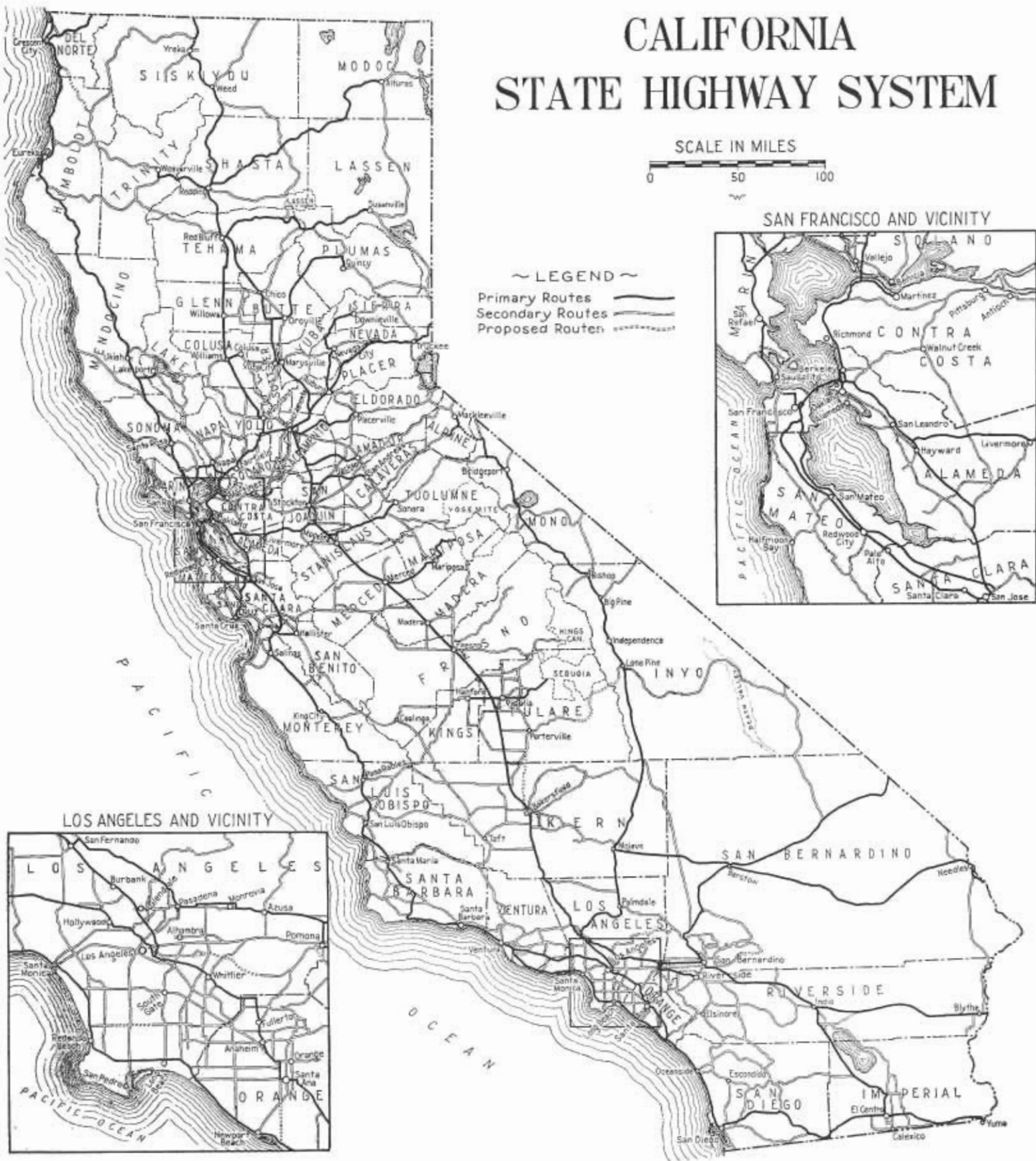
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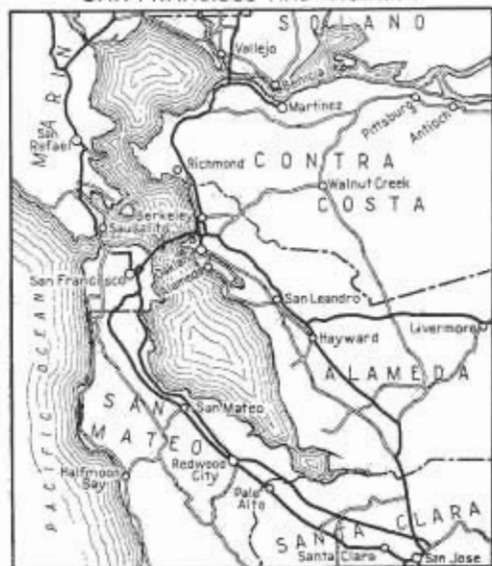
SCALE IN MILES



~ LEGEND ~
 Primary Routes ———
 Secondary Routes - - - -
 Proposed Routes - · - · - · -



SAN FRANCISCO AND VICINITY



LOS ANGELES AND VICINITY

