

CALIFORNIA

HIGHWAYS AND PUBLIC WORKS



D50 Illuminant, 2 degree observer

1 2 3 4 5 6 7 8 9 10 11 (A) 12 13 14 15

16 (M) 17 18 (B) 19 20 21 22 23 24 25 26 27 28 29 30

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Golden Thread

Colors by Munsell Color Services Lab

Don Williams

inches

centimeters

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a*	13.24	18.11	-4.34	-13.80	9.82	-33.43	34.26	11.81	48.55	-0.40	-0.60	-0.75	-1.06	-1.19	-1.07	0.16	-0.18	0.54	-0.05	-0.81	-0.23	20.98	-24.45	16.83	13.06	-39.91	52.00	3.45	50.93	-27.17	
b*	15.07	18.72	-22.29	22.89	-24.49	-0.35	59.08	-46.07	18.53	1.13	0.23	0.21	0.43	0.28	0.19	0.01	-0.04	0.80	0.73	0.19	0.49	-19.43	55.93	66.80	-49.49	80.77	50.01	81.29	-12.72	-23.46	
Density																															

JULY-AUGUST
1944

CALIFORNIA HIGHWAYS AND PUBLIC WORKS

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

[PRINTED
IN U.S.A.]

C. H. PURCELL, Director GEORGE T. McCOY, State Highway Engineer J. W. HOWE, Editor K. C. ADAMS, Associate Editor

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Vol. 22

JULY-AUGUST, 1944

Nos. 7, 8

Table of Contents



	Page
View of Mulholland Overhead Grade Separation on Hollywood Parkway, Los Angeles County	Cover Page
Postwar Building Program Appears Likely to be Financed before Actual Construction Begins	1
<i>By Anson Boyd, State Architect</i>	
Ramona and Santa Ana Parkways Proposed for Los Angeles Area	2, 17
<i>By S. V. Cortelyou, District Engineer</i>	
Picture of Tioga Pass Highway	3
Highway Commission on Tour in Redwood Empire Dedicates New Albion Bridge, Illustrated	4, 5, 20
Ribbon Cutting Dates Back Centuries	6
Erosion Prevention on Highway Cut Slopes in San Diego County, Illus- trated	7, 8, 19
<i>By H. F. Caton, Resident Engineer</i>	
Photograph of Ebbetts Pass Highway Cleared of Snow	9
Bridge Railing from Salvaged Railroad Rail, Illustrated	10
Mudjacking Experiments Develop Low Costs and Number of Improve- ments, Illustrated	11, 12
<i>By H. L. Cooper, District V Maintenance Engineer</i>	
Reconstruction of Highway Bridges Important Part of Postwar Program, Illustrated	13, 14
<i>By F. W. Panhorst, Bridge Engineer</i>	
Scene on Carson Pass Highway from Carson Spur to Twin Lakes	15
New Type of Highway Signs Required to Save War Material	16
<i>By Martin A. O'Brien, Maintenance Assistant</i>	
Highway Bids and Contract Awards for June and July, 1944	18
Gas Tax to Cities Not to Be Based on Snap Censuses	19
Gas Tax Revenues Show an Alarming Tendency Downward	20

Postwar Building Program Appears Likely to be Financed Before Actual Construction Begins

By ANSON BOYD, State Architect

THE postwar building construction program of the State of California will, in all likelihood, have money in the treasury to pay its costs, before actual construction begins. In adopting Governor Warren's program, the Legislature established a savings account for necessary construction work and as an employment reserve as follows:

Postwar Employment Fund (From 1943 Session, based on tax percentage)	\$62,000,000
General Fund Surplus (From 1944 Special Session)	50,000,000
Total	\$112,000,000

Distribution:

State Institutions	\$40,000,000
State Education (Colleges and Special Schools)	11,000,000
University of California (In- cluding contract plans)	25,600,000
State Office Buildings and Capitol	9,000,000
Correctional agencies	9,000,000
Veterans' Home	1,600,000
State Agricultural Society	1,600,000
Repairs to existing structures	4,000,000
Miscellaneous	1,000,000
Contract plans	3,250,000
Reserve	6,050,000

The farsighted program proposed early in the 1943 session of the Legislature by Governor Warren and generally based on survey material assembled on the Governor's instructions by the Director of Public Works, C. H. Purcell, is perhaps unique in the history of State financing in that:

- The funds accumulate from current revenues during its preparation and generally leave future revenues free to meet future problems and investments.
- Planning precedes actual appropriations—this is the reverse of past procedure and permits thorough understanding of the scope, implications and outlay of each project prior to commitment. If continued, this procedure may constitute the foundation for intelligent and businesslike long-term improvement

investments on the part of the State.

TWO GROUPS

The State building program divides into two groups according to jurisdiction, namely, the projects proposed for the University of California which are under the control of the Board of Regents and the remaining group of projects which are executed by the Department of Public Works, Division of Architecture, according to law.

According to priority of planning the entire program is divided into "parts" which have been cleared and approved in conformity with law in the order that surveys and evaluations have been made. Parts I and II are in progress or completed; Part III is in process of authorization and succeeding parts will follow as authorized. The total sum represented by Parts I, II, and III is \$33,248,900.

COOPERATIVE PROJECT

The entire planning program, in order to be effective, has been arranged as a joint coordinated and cooperative overall project with each of the principal agencies involved.

For purposes of illustration the State Department of Institutions operates nine sites for mental patients, three blind shops and one clinic. The resident population for the mental patients is 29,750 as of June 30, 1944, and a bed capacity of 5,154 less—this represents a drastic condition of present overcrowding. Each institution is generally similar to a city of equal population, having an administrative center, streets, bridges, water, telephone and electric systems, power house, sewage plant, laundry, warehouses, commissary, main food preparation buildings, shops, residential area, general psychiatric, medical and surgical hospital, auditorium, and usually a dairy herd serving two or more thousand people; swine, five to ten thousand laying hens and a general farm and orchards. Each of these

activities in a community is a specialized field of business in itself and must be so regarded in State affairs.

MANY TYPES OF BUILDINGS

The organization of the program requires about 110 different purpose types of buildings for institutions, colleges, schools and corrective institutions and to that extent profitable to the State standardized in plan units or form.

The order of their erection as well as that of the water, power, laundry, feeding and other parallel services must naturally be gauged to the projected demand. This projected demand has been established within reasonable working limits by "experience" charting methods together with the probable factors which will affect the various agencies.

Again using the Department of Institutions for illustration, and to an applicable degree, similar program planning will affect the correctional agencies, this broad condition exists—more than half of all community hospital beds, not including war casualties, are for the mentally ill. The dollar investment in a mental hospital bed is somewhat less than half that of a standard general hospital bed. The latter is occupied by about ten times as many patients in the same length of time in relation to its cost than a mental hospital bed. Therefore, and in part to counteract this disparity in use, large psychiatric acute treatment hospitals are being planned and a treatment study clinic proposed at Los Angeles in addition to that built in San Francisco for the purpose of accelerating cures and methods.

MASTER PLAN

Basically the master plan must provide the potential to reduce the fundamental risk to a mental patient wherein he differs from an ordinary illness—generally most physical ills are curable to the extent that the

(Continued on page 10)

Ramona and Santa Ana Parkways Proposed for Los Angeles Area

By S. V. CORTELYOU, District Engineer

RAMONA Parkway is one of the most important of the freeways proposed for construction in the Los Angeles metropolitan area as soon as finances and other conditions permit. It will be a modern freeway type traffic artery.

This parkway starts at the traffic interchange system at the easterly end of the Aliso Street grade separation in Los Angeles and extends easterly via Alhambra, El Monte, West Covina, to Pomona. The freeway passing under the Macy Street and other bridges in the City of Los Angeles will follow along the Covina line of the Pacific Electric Railway easterly through Alhambra to El Monte and thence easterly, generally along the existing alignment of State Highway Route 26.

Traffic from the proposed Ramona Parkway will enter the Civic Center and downtown area of Los Angeles by way of Aliso Street over the new Aliso Street viaduct. The viaduct and Aliso Street connection to the Civic Center are on State Highway Route 2, and known from Main Street easterly as

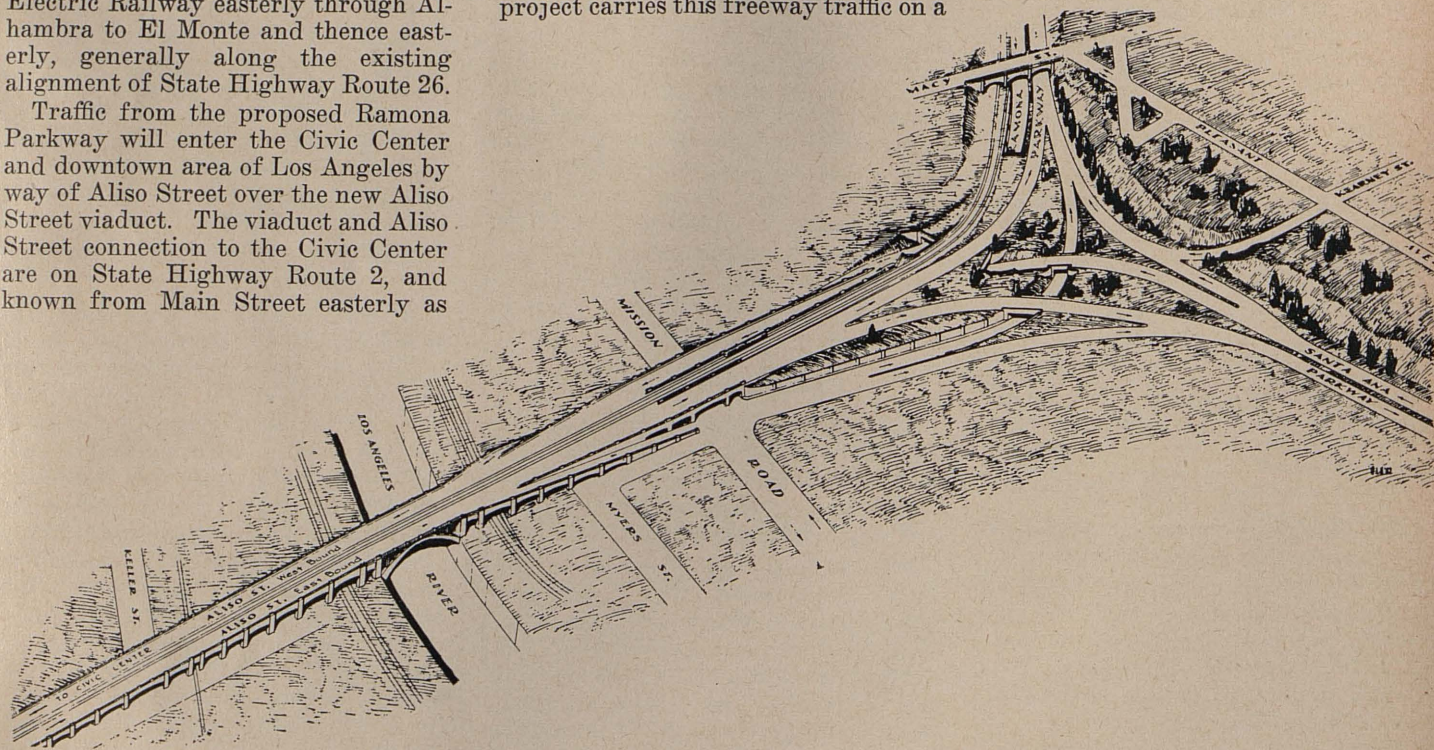
From the traffic interchange at the easterly end of the Aliso Street grade separation, the route of the Santa Ana Parkway turns southerly along the Boyle Heights bluff to a point south of Seventh Street, the freeway going over First Street and under Fourth Street, Sixth Street, Seventh Street and Boyle Avenue. It then turns southeasterly between Olympic Boulevard and Whittier Boulevard in the City of Los Angeles to Downey Road, about one mile east of the east city limits of Los Angeles, and continues southeasterly to Santa Ana.

The Aliso Street Grade Separation project carries this freeway traffic on a

continuation of the Santa Ana Parkway to Kearney Street and the necessary connections of Mission Road to both the Santa Ana Parkway and the Ramona Parkway will be completed at a later time, although temporary connections between Mission Road and the Ramona Parkway will be opened when the viaduct is put into use for vehicular travel on August 15, 1944.

COOPERATIVE PROJECT

The Aliso Street Grade Separation project, together with the traffic interchange at the easterly end thereof, has been handled under the direction of



This sketch of Aliso Street viaduct shows its connection with various important traffic arteries

the Santa Ana Parkway. Westerly of Main Street the extension of this parkway on State Highway Route 2, through the Civic Center to Hollywood is known as the Hollywood Parkway. Both of these parkways are freeways and are on the postwar program adopted by the California Highway Commission.

viaduct over the Los Angeles River, Mission Road and the major railroad lines on both banks of the Los Angeles River. The viaduct project starts at Vignes Street on the west and extends easterly to the Macy Street Bridge on the Ramona Parkway and to Kearney Street on the Santa Ana Parkway.

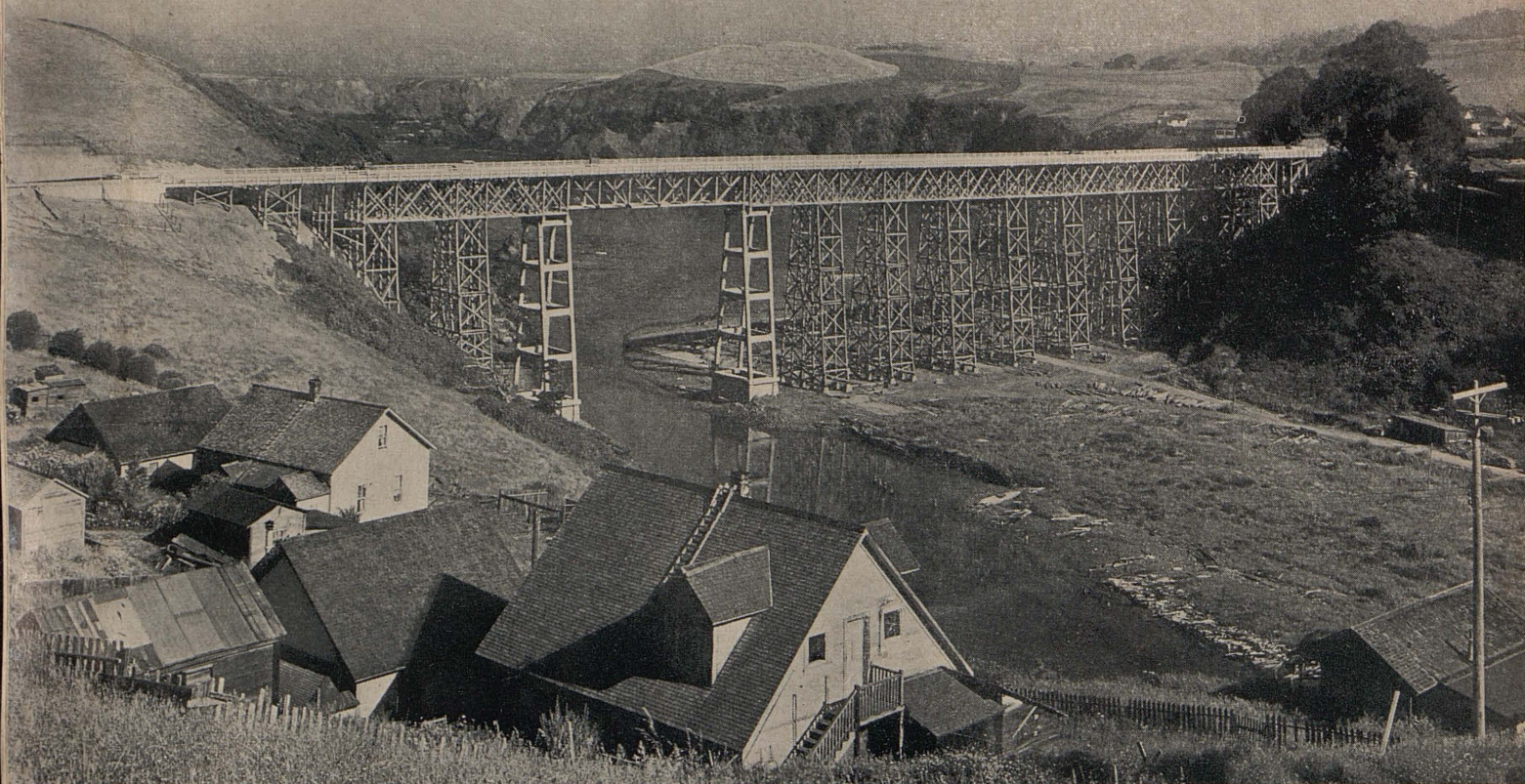
The interchange connection for the

the City Engineer of the City of Los Angeles. It is a cooperative project, much of which was done under a WPA project during the past three and one-half years and was jointly financed by the Pacific Electric Railway Company, the Santa Fe Railway Company, the Union Pacific Railroad Company, the Southern Pacific Railroad Company,

(Continued on page 17)



Four High Sierra mountain passes were cleared of snow during June and opened to traffic. This is section of Tioga Pass Highway between Ellery and Tioga Lake. Tioga Summit elevation, 9,941 feet



View of new \$350,000 Albion River bridge in Mendocino County. This is not the type of bridge the State would build under normal conditions but steel for reinforced concrete and structural steel could not be secured and much salvaged material had to be used

Highway Commission on Tour in Redwood Empire Dedicates New Albion Bridge

IN order to view at first hand proposed postwar highway projects in the Redwood Empire, the California State Highway Commission in mid-June made a three-day tour of inspection through Marin, Sonoma, Mendocino, Lake and Napa counties, stopping en route on Sunday, June 11th, to dedicate the new \$350,000 Albion River Bridge at Albion in Mendocino County.

The commissioners, who were accompanied by State Highway Engineer George T. McCoy and members of his engineering staff, following breakfast in San Francisco, Saturday, June 10th, as guests of the Golden Gate Bridge and Highway District, went first to Sausalito, where they viewed

the route of the projected Sausalito lateral. The group then proceeded to San Rafael for an inspection of the Linden Lane Underpass. At noon the State officials were luncheon guests of the Marin County Board of Supervisors, T. Fred Bagshaw, Chairman.

From San Rafael, the party traversed the Redwood Highway to the Sonoma County line and Black Point Cutoff, where it was joined by a delegation of Sonoma County officials. The commissioners were escorted to Sonoma, thence to Santa Rosa and from there to Sebastopol and Monte Rio via State Sign Route 12, returning in the afternoon to Sebastopol and traveling over the Gravenstein Highway to Cotati and thence to Petaluma.

Two contemplated projects were given attention in Petaluma, the proposed realignment of the Lakeville Highway and the proposed truck highway through the east side of the city, via Highway 104 to the Redwood Highway on the north.

The commissioners were guests at dinner at the New Hotel Petaluma sponsored by the Sonoma County Board of Supervisors where they were welcomed by George Kennedy, Chairman of the Sonoma County Board of Supervisors; Holly Vogensen, President of the Associated Chambers of Commerce; Mayor Jasper S. Woodson, and other civic leaders of Petaluma.

The highway desires of Sonoma County, including improvements on

U. S. 101 north through Cloverdale and a new highway to Bodega Bay to handle anticipated traffic expected there as a result of recent harbor improvements, were outlined by J. P. Kelly of Sebastopol.

Other speakers included Lyle Kirkpatrick, Chairman of the Lake County Board of Supervisors, and President of the Supervisors Unit of the Redwood Empire Association, who was in charge of the tour; Commissioner Harrison R. Baker of Pasadena, who said the commission is engaged in planning Governor Earl Warren's \$80,000,000 post-war highway construction program; Commissioner James Guthrie of San Bernardino, who estimated it will require between \$400,000,000 and \$500,000,000 to bring the California highway system up to desired standards, and Charles H. Purcell, Director of Public Works and Chairman of the Commission, who said that the commission's program will assure benefits to the entire State.

Following breakfast in Petaluma Sunday morning, the commissioners and party were escorted by the Sonoma

delegation to Cloverdale, where they were met by a welcoming party from Fort Bragg and escorted over the Cloverdale-to-the-Sea and Shoreline highways to Fort Bragg where they were tendered an abalone luncheon by the Mendocino County Board of Supervisors, Ed Haehl, Chairman, Sequoia Post No. 96, American Legion, and the Business Men's Club.

BRIDGE DEDICATED

Approximately 1,500 persons attended the dedicatory ceremonies at the Albion River Bridge, where Commission Chairman Purcell was the principal speaker. He was introduced by Commissioner Walter Sandelin of Ukiah, who summarized the rather unique history of the Albion span.

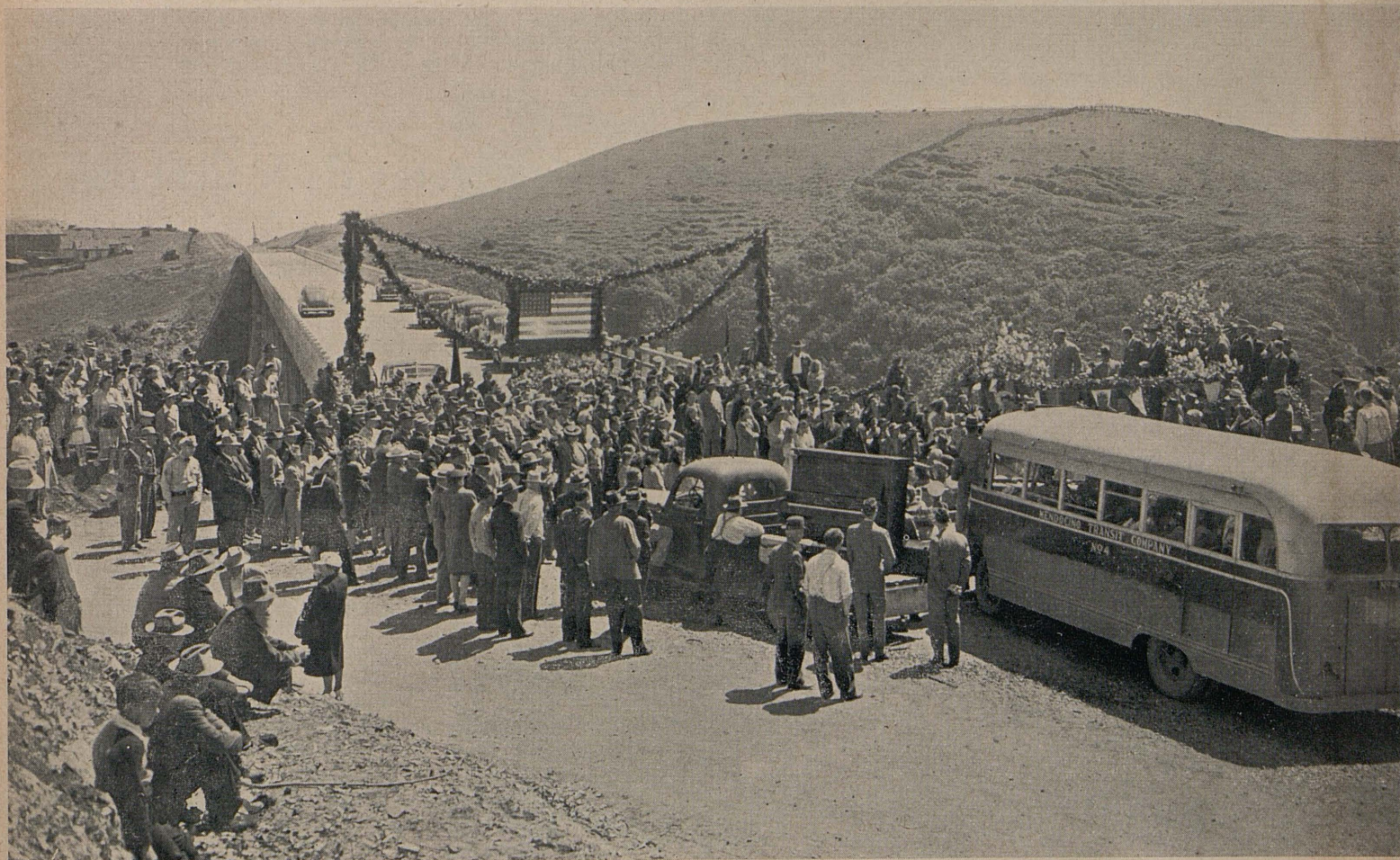
Participating in the dedication were Mrs. Marian A. Haarby, who has resided adjacent to the bridge since 1888, and her two sons, Martin and Albert. Mrs. Haarby, who is 87 years old, assisted in the ribbon cutting ceremonies. After the dedication exercises, the party motored along the Shoreline Highway to Rockport and Leggett Val-

ley and then traveled south on the Redwood Highway to Willits where dinner was served in the American Legion hall, with the Mendocino County Board of Supervisors and Mendocino County Chamber of Commerce and the Willits Chamber of Commerce acting as hosts.

TOUR LAKE AND NAPA

Following the dinner, the party went to Ukiah for an overnight stop at the Palace Hotel, departing early Monday morning for Lake County. A delegation of Lake County officials met the commissioners at the south end of Blue Lake and escorted them to Upper Lake, thence on State Route 29 to Lucerne Cutoff, Clear Lake Highlands, Lower Lake and thence over Route 29 to Hoberg's Resort, where the Lake County Board of Supervisors was host at luncheon.

Leaving Hoberg's, the group went via Cobb to Middletown and on to Napa County, where it was welcomed at Calistoga by a delegation of Napa officials headed by Supervisor Tom Maxwell. During the afternoon, the



Section of crowd which attended the dedication ceremonies at the new Albion River bridge, showing speakers' platform in right foreground



Pioneer of Mendocino County, Mrs. Marian A. Haarby, severs hempen cord, signaling opening to traffic of new Albion River bridge. Left to right, Highway Commissioners James Guthrie and Harrison R. Baker; Lyle Kirkpatrick, Chairman Lake County Board of Supervisors; Martin Haarby; C. H. Purcell, Director of Public Works and Chairman of the Highway Commission; Albert Haarby; Commissioners Homer P. Brown and Chester H. Warlow; State Highway Engineer George T. McCoy; Commissioner Walter Sandelin and Supervisor James Tocher of Lake County

commissioners visited St. Helena, the Beringer winery, Rutherford, and the Conn Canyon Dam project.

The tour concluded at Napa, where the commissioners and their party were guests of the Napa Board of Supervisors at dinner at the Napa Valley Inn. The highway officials left Napa Monday night for a commission meeting at Sacramento on Tuesday, June 13th.

Officials making the tour, which was arranged by Valerie Kuhn, Manager, and Ed Wilder, Publicity Director of the Redwood Empire Association, included C. H. Purcell, Chairman California Highway Commission and Director State Department of Public Works; Walter Sandelin of Ukiah, Highway Commissioner; Homer P. Brown of Diamond Springs, Highway Commissioner; Chester H. Warlow of Fresno, Highway Commissioner; Harrison R. Baker of Pasadena, Highway Commissioner; James Guthrie of San Bernardino, Highway Commissioner; G. T. McCoy, State Highway Engineer, State Department of Public Works; R. H. Wilson, Office Engineer, State Department of Public Works; F. W. Panhorst, Bridge Engineer,

(Continued on page 20)

Ribbon Cutting Dates Back Centuries

RIBBON cutting ceremonies attendant upon the dedication of new highways and bridges have been greatly curtailed since the war began due to travel restrictions and the lack of new highway construction except for military roads. Doubtless these time-honored rites will be resumed when peace comes and the Division of Highways and the counties and cities of the State launch their huge postwar building program.

The question as to the origin and historical significance of the custom of cutting the ribbon stretched across a highway during the dedicatory ceremonies is one that is frequently asked.

This practice originated in England hundreds of years ago, even before the Magna Carta. English feudal lords and dukes received their lands from their sovereign and the original ownership was carried on down through the centuries. Quite frequently villagers whose homes adjoined these estates used pathways through the estates to

go from one village to another or from one point to another and in time these pathways became accepted traveled routes although crossing privately-owned property.

Under old English law, if the free use of these pathways was not protested over a period of years, the pathways became legal public thoroughfares. In order to protect their property rights, the estate owners would each year or within a safe period of years, erect barriers or even stretch ribbons across the traveled pathways to indicate that they were not public lanes of travel. The villagers then would remove the barriers or cut the ribbon with the consent of the landowners and continue to use the pathways. On several of the larger estates for many years this practice of cutting the ribbon or removing the barrier became a ceremony participated in by the landowners and the villagers and in many cases developed into annual festivals.

(Continued on page 19)

Erosion Prevention on Highway Cut Slopes in San Diego County

By H. F. CATON, Resident Engineer

AS the standards of highway alignment and profile have increased, it has become necessary to disturb the natural drainage by reason of the need for deeper cuts and higher fills to obtain desired results. This has resulted in the need for more erosion protection by means of artificial structures, as well as promotion of erosion retarding growth. Results by the latter method have been given considerable study in the last few years, and have proved not only financially profitable, by decreasing maintenance costs, but are yielding high returns in the development of aesthetic values.

Military needs dictated the moving of a portion of State Highway 199 in San Diego County and also the San Diego and Arizona Eastern Railway from a location through Coronado Heights to a lower position paralleling the San Diego Bay, and through a cut, approximately a mile in length with a 50-foot face.

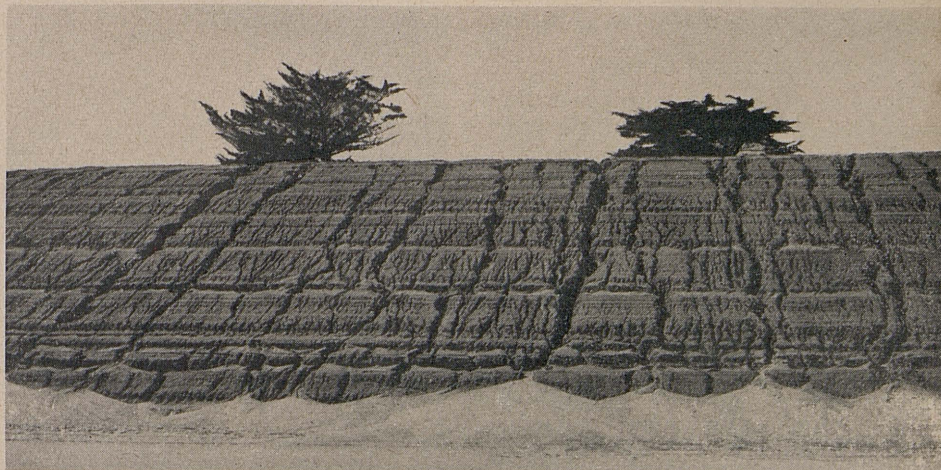
RAINS ERODED CUT SLOPES

It was originally planned to develop erosion controlling growth by disking the face of the cut and spreading over it, approximately three inches of top soil, which had been salvaged and stockpiled. However, before the seed could sprout and mature, heavy seasonal rains occurred, which eroded the slopes to the extent that repairs were imperative. It also became evident that any seasonal rains supplying sufficient moisture to germinate the seed would cause erosion before the rooting of the plants could progress to the erosion preventative stage.

It was therefore decided that the work should be done during the season of little or no rainfall, when artificial or controlled watering could be used, and also that rye and barley seed should be added to the soil to give a rapid and uniform growth.

STRAW MULCH USED

To form a proper seed bed, it was decided to mulch the area with approximately four to five tons of straw per acre. These planting plans were worked out in conjunction with Land-



Untreated 2:1 slope after rain, showing result of erosion



Disking 2:1 cut slope prior to spreading top soil. Grader below is cabled to tractor above



Spreading straw over top soiled slope to provide a mulch

scape Engineer Dana Bowers, from the Sacramento Headquarters Office.

Cuts were designed with a 2:1 slope which permitted the use of heavier equipment for a major part of the work. The surface was prepared for top soil by means of a 12-foot patrol and disk, operating horizontally on the cut face and held in position against side slipping by means of a tractor operating along the top of the slope.

SOIL DUMPED OVER TOPS

The top soil was dumped over the tops of the cuts and worked down over the face by means of the same patrol and tractor. The preparation of the cut face by this method was both rapid and nominal in cost.

The work, to this stage, was set up as a part of the contract agreement, and accomplished by the contractor under contract unit prices. The balance of the work, involving erosion protection, was paid for as extra work under a contract change order.

Baled straw was purchased on the local market, distributed in approximately the right proportion along the tops of the slope and spread over the areas to be mulched, at the approximate rate of four to five tons per acre. The spreading was done by hand labor, using conventional hay forks. The flat slopes permitted labor to work over the areas without inconvenience.

SEED SPREAD OVER STRAW

Barley seed at the approximate rate of 1 pound per 200 square feet, and rye seed at the approximate rate of 1 pound per 170 square feet, were then spread over the loose straw, using a small manually operated one-man centrifugal seed spreader. Because a more rapid and heavy growth was desired, the seed was spread considerably heavier than for ordinary commercial crops.

With the seed and straw in place, several methods were attempted to properly mix the mulching straw with the top soil. These methods included a disk harrow, several types of tampers, and a crawler type tractor with extra deep grousers. None of the methods proved satisfactory until a single section sheepsfoot tamper, with a high frame was used. This method obtained results far in excess of any anticipated.

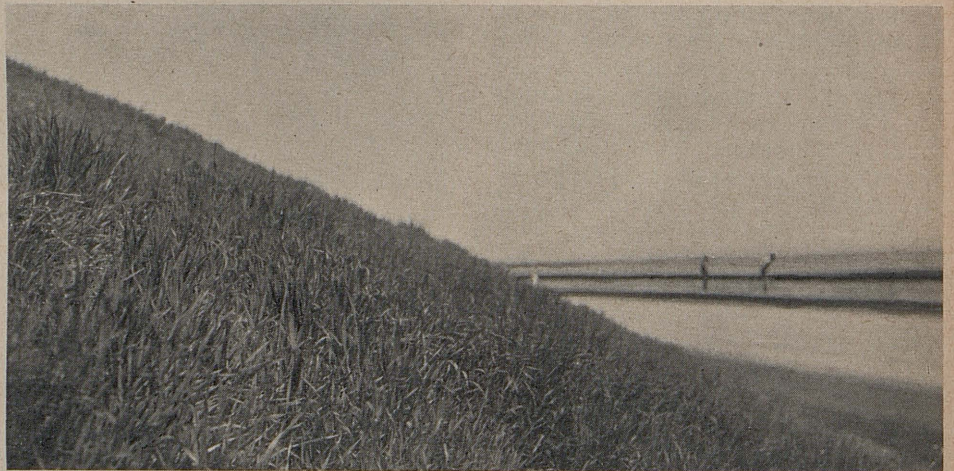
The sheepsfoot tamper was drawn back and forth on the face of the cut, parallel to the roadbed, by means of a tractor operated from the top of the fill, a patrol operated from the pave-



Punching in straw with sheepsfoot roller cabled between two tractors



Planting Ice Plant cuttings through straw along top and bottom of slope



Rye grass and barley crop growing through straw mulch

ment, and the roller operating between the two by means of a cable bridle.

STRAW TAMPED INTO SOIL

All areas were covered by the tamper from two to three times, which sufficed to drive the straw to a depth

of from three to six inches into the face of the cut. The above method of operating the sheepsfoot tamper horizontally on the face of the fill was possible because of the uniform height of the cut face and the fact that good operating surfaces for the tractor and

(Continued on page 19)



View of Ebbetts Pass Highway and Silver Mountain on east side of pass, the elevation of which is 8,800

Bridge Railing from Salvaged Railroad Rail

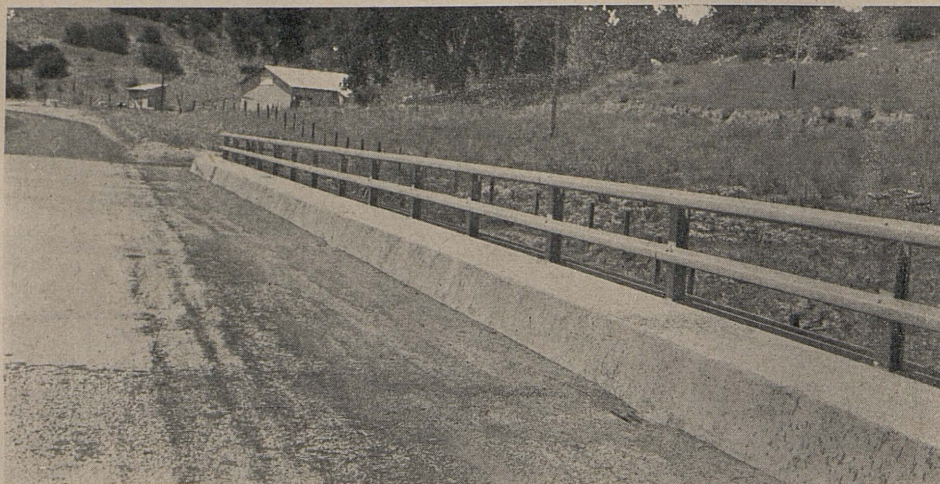
AT the start of the present war, the Bridge Department of the Division of Highways purchased a large stock of old railroad rail to be used primarily for reinforcing in concrete structures as a war-time emergency. Most of this railroad rail was of 45-pound section and 30-foot lengths.

A great number of uses has been made of this rail besides using it as reinforcing. In one case, it was placed as a deck on the stringers of an old steel bridge. The space or gap between rails was filled with concrete. In other

large number of years because it has been found to give excellent service. Timber of any kind has become so critical during the war that a substitute railing to be built of noncritical materials, was considered to replace the timber rail design.

It was decided to substitute the railroad rail for the timber in the standard bridge guard railing.

Plans for the Poso Creek Bridge were, therefore, prepared based on the use of scrap railroad rail as a substitute material for the timber railing. The structure has now been completed



Use of railroad rail railing on Poso Creek Bridge

instances, it has been used as cattle-guards and gratings.

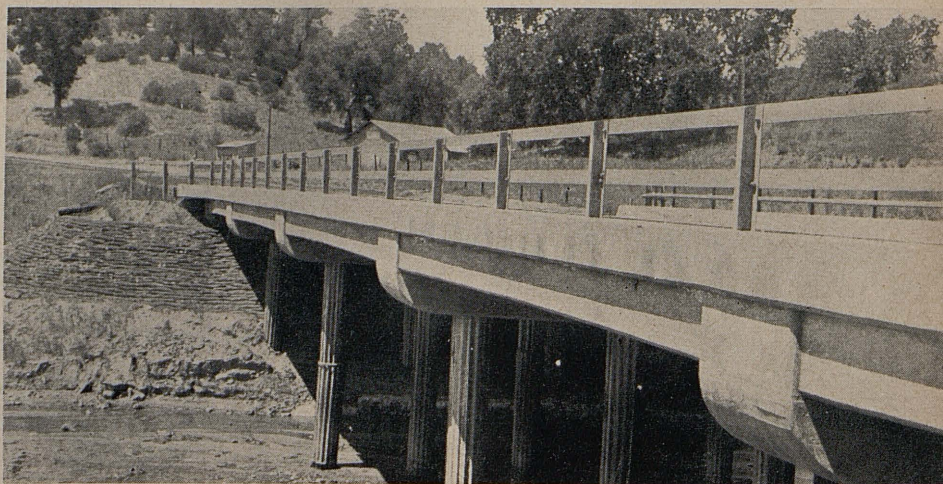
Its use as a bridge rail and wheel guard on the end of structures has helped in conserving materials now used in war construction. The appearance and practicability have more than proven its worth in all cases where it has been used.

A substitute, as a rule, is inferior to and less acceptable than the product for which it pinch-hits. However, this was not found to be true in the case of a substitute rail designed for the Poso Creek Bridge in Kern County between Woody and Isabella.

The old structure across Poso Creek was damaged beyond repair by flood waters, and it was necessary to prepare plans and build a new structure without the use of critical war materials. For a small structure located off of main arterial highways it is customary to use a standard redwood rail which has been developed and used for a

and the accompanying pictures show that the new railing is pleasant in appearance, safe and sturdy, which is all that can be asked of any guard rail.

The type of bridge is not one which



This is another view of Poso Creek Bridge railing

Postwar Building Program Appears to be Financed Before Construction Begins

(Continued from page 1)

patient can go home. Generally most mental illnesses must be cured within their early stages or else the patient will in all likelihood, be a permanent or intermittent charge on the State the rest of his life. Around these and similar necessities the services for the State's sites are allocated, grouped and arranged to grow in parallel. In bulk, they will furnish each community with which they relate a substantial pool of material and construction employment as well as the discharge of an established State responsibility.

the State would design and build under normal conditions but is typical of the bridges which were built with available materials, such as could be found and salvaged, and not at the expense of critical materials. The construction of the bridge could not wait on account of the necessity of transporting critical materials, such as lumber, over the highway. Reinforcing steel for concrete and structural steel could not be secured. An old abandoned railroad truss was revamped to fit in for the mainspan and old railroad rails were used for reinforcing steel in the towers.

Although the type of bridge was not that desired a good serviceable structure was built which will serve the highway for many years to come.

Mudjacking Experiments Develop Low Costs and Number of Improvements

By H. L. COOPER, District V Maintenance Engineer

AN extensive mudjacking program has, for the past two years, been under way in District V, in an effort to arrest the increasing number of step-offs in Portland cement concrete pavements at the joints and cracks, occasioned by pumping action following numerous repetitions of heavy wheel loads.

Some mudjacking was done during the 1943 season and the experience gained last year was of great value in planning our work for 1944. Work orders in the total amount of \$14,100 were authorized for this work at various locations from the Santa Clara County Line to the Ventura County Line on Route 2 (U. S. 101 Highway) on 12 different sections where the step-offs were noticeable, particular attention being paid to those sections where light bituminous blankets were to be placed this summer either by contract or by day labor.

Work was started February 1st of this year at the north end of the district with drilling and mudjacking crews.

The drilling crew equipment consisted of a 370-cubic foot I. R. air compressor, one 3-cubic yard Chevrolet dump truck, two 60-pound hammers and one Ford pickup.

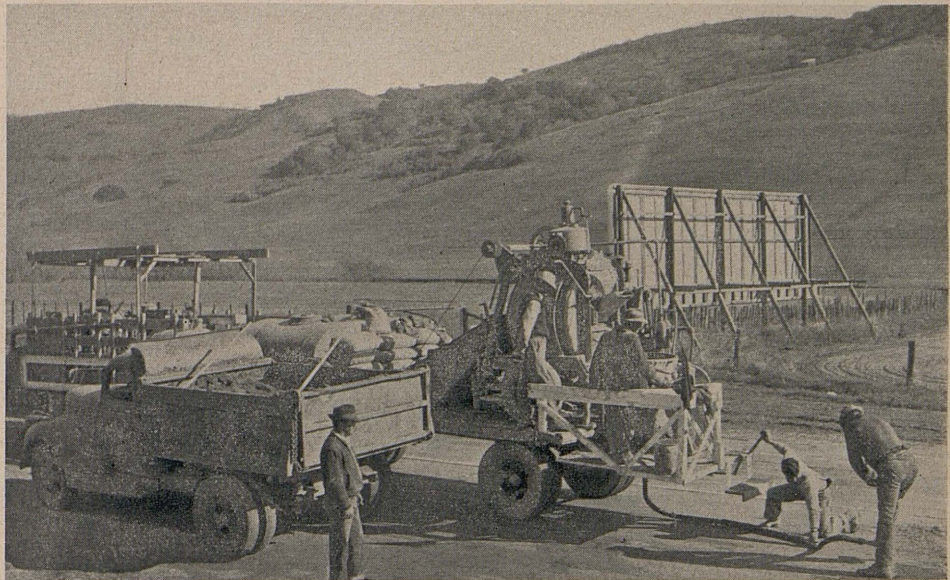
The mudjacking equipment consisted of Chevrolet utility paint truck with compressor, one 3-cubic yard dump truck for hauling mud, one 6-ton trailer, one 1-sack concrete mixer, one 7-cubic foot mud container and one Chevrolet express.

MATERIAL USED

The material used at the beginning of the work was selected roadside material with the following screen analysis:

Screen	Per Cent Passing	
16	100	With a moisture equivalent of 19.6 per cent and lineal shrinkage of 0.8 per cent
30	99	
50	76	
100	14	
200	6	
270	5	

The combined mud mixture consisted of: 1 cubic yard sand, 5 sacks



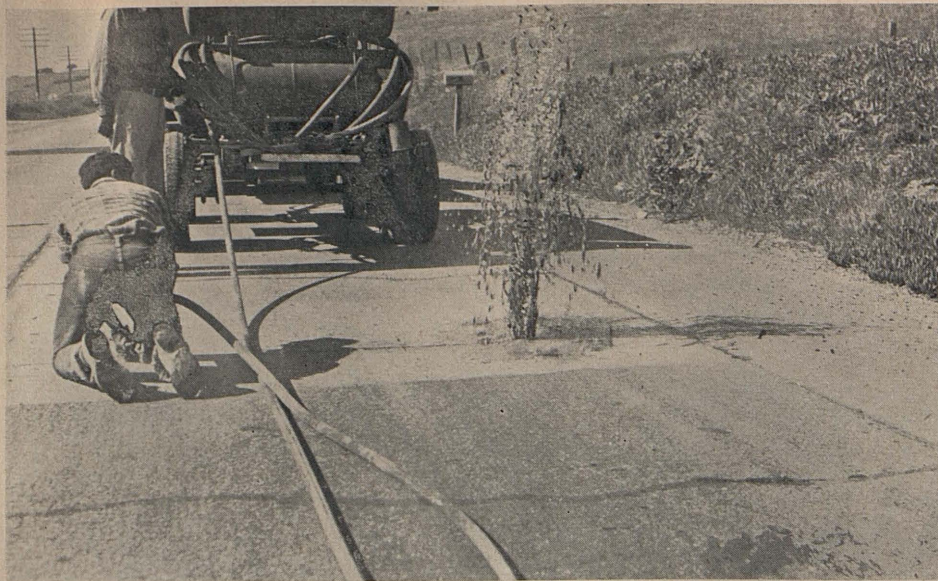
Upper—Mud jacking equipment in operation. Forcing cement treated loam under paving.
Lower—Drilling holes preparatory to mud jacking operations

cement, 100 pounds diatomaceous earth, 56 gallons water giving a combined weight of about 3,440 pounds. A total of 1,100 holes was filled with this material, but after the work progressed farther south, it was found that a better sand material could be purchased from a commercial plant at \$1.20 per cubic yard which gave better results in the combined mix. This

material had the following screen analysis:

Screen	Per Cent Passing
8	100
16	94
50	76
200	14-20

The combined mud mixture consisted of: 1 cubic yard sand, 5 sacks



This photograph shows water being forced from underneath pavement by air pressure

cement, 32 to 64 pounds diatomaceous earth, 92 to 116 gallons water and 50 to 100 pounds plaster of Paris, giving a combined weight of about 3,500 pounds.

TIME SAVED

Experimenting was done with this material to obtain a workable mix that would flow freely into the voids and have an initial set soon enough so that traffic passing over freshly filled areas would not force the mix out from under the pavement. The addition of the plaster of Paris set up the mix in 15 to 35 minutes, while before its addition, several hours to a day was required before a set was obtained.

It was found that in areas with small voids better results were obtained by increasing the diatomaceous earth content to 64 pounds per cubic yard and decreasing the plaster of Paris to 50 pounds which also increased the water content necessary to 116 gallons per cubic yard.

When large voids were encountered, 32 pounds diatomaceous earth and 100 pounds plaster of Paris were used which allowed traffic to move over these distressed areas in a very short time without any visible effect on mud content.

After moving to Santa Barbara County in the southern part of the district, the cost of trucking the entire amount of sand required from the commercial plant at Atascadero was so high that a commercial sand in Santa Barbara was mixed with the Atascadero sand on a 33½ to 50 per

cent basis which gave satisfactory results.

ADDITIONAL EQUIPMENT

The addition for this year's work of a 6-ton trailer, 16 x 7 feet in size, was an important factor in more efficient operation as all of the mudjacking equipment was placed on this trailer, which acted as one unit. Two 300-gallon water tanks were placed on the front of this trailer, and a one-sack concrete mixer on the rear. Suspended from the extreme rear and slightly lower than the mixer, the 7-cubic foot mud pot was placed. The material, after being mixed, was poured into this pot, first being strained through a screen to remove lumps and foreign material. This mud container was converted from a sand container from a bridge sand blasting outfit and only one change was necessary—a 2-inch A. C. F. lubricator valve was placed at the exhaust end and a 1-inch heavy duty rubber hose 10 feet long was attached to this valve. The nozzle on the end of the hose was a piece of rubber hose, 6 inches long, with an outside diameter slightly less than the diameter of the drilled holes. When the nozzle was placed in the hole the pressure would swell the hose to a tight fit, allowing no escape of pressure or mud. A pressure of 80 pounds per square inch was found to be the most satisfactory at the compressor.

COST OF WORK

A total of 13,839 2-inch holes was drilled in 33 working days or an aver-

age of 419 holes drilled per day at a cost of \$0.20 per hole. The average drilling cost per day was \$82.59.

Mudjacking these 13,839 holes required 50 working days or a total of 276 holes filled per day at a cost of \$0.82 per hole. The average filling cost per day was \$227.50. For the entire work the cost of drilling and filling was \$1.02 per hole.

About 3.74 cubic yards of material was used per day and an average of 0.37 cubic foot material was forced into each hole, although there was a variation of from 0.1 cubic foot to 7.0 cubic feet per hole.

For the first portion of the work, two holes were drilled in each expansion and dummy joint per panel with no attempt made to raise the depressed slabs to grade. As the work progressed it was decided to raise the depressed slabs and the locations of the holes were changed to 6 inches to 12 inches away from the joints, two holes per panel and drilled 4 inches below bottom of pavement.

It was found that a larger amount of mud could be forced into each hole and the low slabs raised to grade fairly easily. The reason for this is probably due to the fact that where the crack filling material had become broken or was missing in the immediate area of the hole, pressure was lost through this opening and it was then impossible to force very much mud under the slab. Also in many cases the panels have the low areas at the joints and as the slabs are resting on the subgrade there are no voids to fill at this point.

Redwood pegs 3 x 3 x 10 inches with a sharpened end were used to plug adjacent holes when pressure was desired to lift depressed slabs. An examination after two weeks showed that these raised slabs were still at grade.

A chart on cross-section paper was kept showing the location of all holes, by station and distance in from edge and distance from joint, in order to determine at a later date the efficiency of this mudjacking after plant-mix blankets have been placed.

This entire mudjacking program was under the immediate direction of Maintenance Foreman E. C. Van Schaick who deserves full credit for the results obtained and for the various detailed experiments carried on in an effort to obtain the most efficient results.

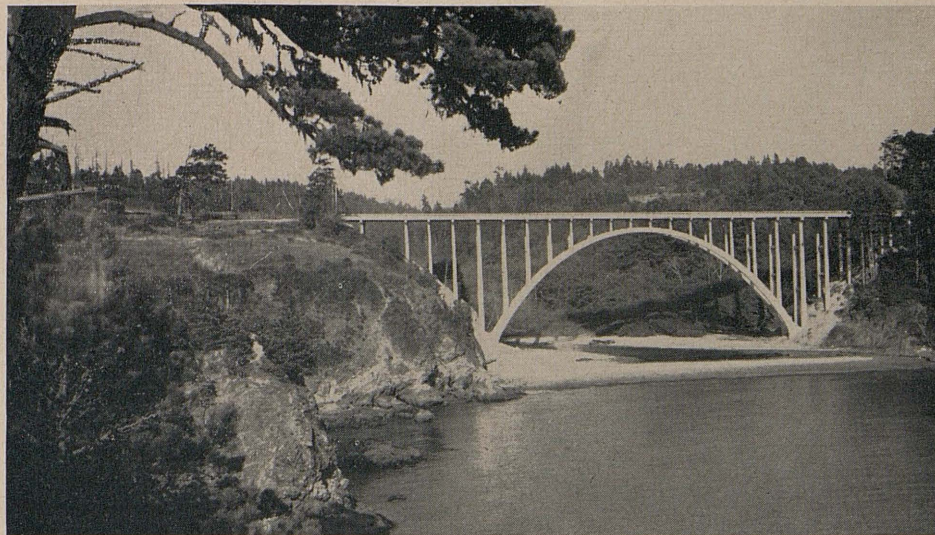
Reconstruction of Highway Bridges Important Part of Postwar Program

By F. W. PANHORST, Bridge Engineer

THE reconstruction of highway bridges must be given serious consideration in any program of justifiable postwar construction. The reconstruction of many bridges is necessary to keep from having transportation bottlenecks scattered throughout the State Highway System.

There are numerous planning organizations throughout the country making various postwar plans. Most of the projects are proposed for furnishing employment to assist in taking care of the anticipated unemployment condition after the war. Public works furnish ideal projects to relieve the unemployment, but the necessity and justification of the projects considered should be carefully weighed.

Where do highway bridges fit in this picture? There are all kinds of bridges on the State Highway System, varying from those ready to fall down to those that are recent and of modern design. No two are alike in all conditions and the importance of their replacement varies accordingly. However, to keep the wheels rolling after the so-called "construction vacation" during the war, it is absolutely necessary that a certain number of



Four types of bridges are dealt with in this article. This picture shows a modern bridge

these bridges be re-built and very desirable that many others also be constructed.

MODERN STANDARDS NEEDED

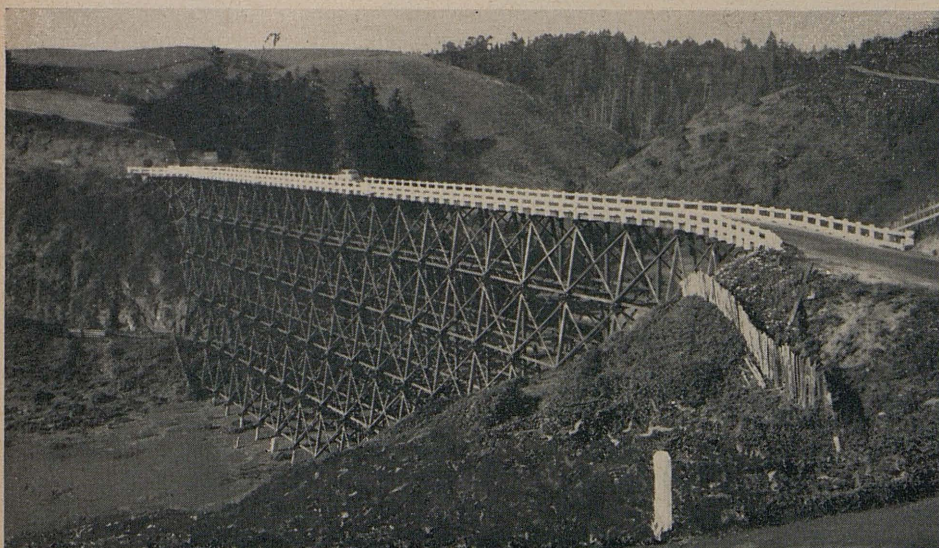
Many other bridges should be built to bring the Highway System up to modern standards of safety, width, etc. However, the so-called "bottleneck"

bridges are so numerous and so much money is required that we will be fortunate if sufficient funds can be secured to do the necessary work without attempting to do the merely desirable work.

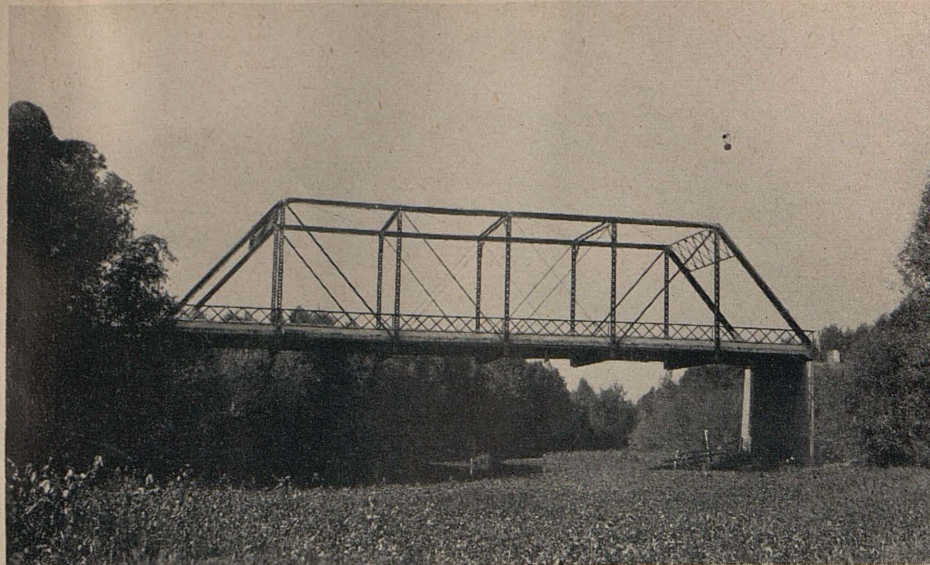
There are many stretches of highway now that legal size trucks cannot use on account of the below capacity bridges. Through the past few years, trucks and truck loads have increased in weight. These trucks are designed to carry the maximum legal load and if less load is carried, an uneconomical situation develops which increases the cost of transportation. The extra cost of transportation, which is caused by the necessary reduction in load on account of posted bridges, cannot be estimated but, undoubtedly, is far in excess of the money which would be required to remedy this undesirable and uneconomical situation.

DETERIORATION

Bridges deteriorate and wear out the same as people, buildings and other structures. Some people believe that concrete, steel and timber bridges and buildings are built to last forever, but nothing is completely enduring and even granite, the so-called "rock of ages"—decomposes in time. Highway



This is type of bridge on which loads are not now restricted, but must soon be because of continued deterioration



A bridge in good condition but unable to carry legal load because of light design

bridges, however, do not deteriorate from age so much as the pounding action of heavy trucks. During this war period there has been a large amount of heavy hauling, and bridges which have stood up for years have recently deteriorated rapidly due to the pounding action of the heavy and frequent passages of highway loads necessitated by the war effort.

Highway Facts published in 1939, in connection with the State-wide planning survey gave the result of a study which indicated that with all the construction under way at that time, the State was falling behind at the rate of 38 bridges every year. In other words, we were not making progress, not even holding our own, but actually falling behind and losing ground. Since the beginning of war, there has been no new construction except in rare emergency situations, which would indicate that a bad situation is getting worse.

POSTWAR BRIDGES IMPORTANT

From the foregoing, it can be seen that the construction of highway bridges should have an important place in any postwar construction plans, not only to furnish labor to take care of an unemployment period but to keep traffic moving and to secure more economical transportation. Postwar projects constructed throughout the State will use materials which must be hauled over the highways and over these bridges.

Most people take bridges for granted—a bridge is a bridge, some perhaps more attractive than others, but if it has a good deck and a good

looking rail it is a good bridge. Except in outstanding cases, even a trained bridge engineer cannot take one look at a bridge, and tell if the bridge can carry, with safety, the desired legal loads. There are no two bridges exactly alike, even if they may appear alike. They will have different carrying capacities and different lasting qualities.

During the war era, bridge repairs and replacements have been kept to an absolute minimum and done only as a dire emergency when necessary to keep traffic moving. Repairs had to be made which normally would not be considered economical since when repairs become excessive, it is more economical to reconstruct the bridge. However, with the shortage of sup-

plies and critical materials, it was impossible to reconstruct many bridges which should have been reconstructed and they were shored up and repaired temporarily by ingenious and sometimes Rube Goldberg methods with the hope of holding the bridges together until such time as they could be rebuilt in an orderly and economical manner.

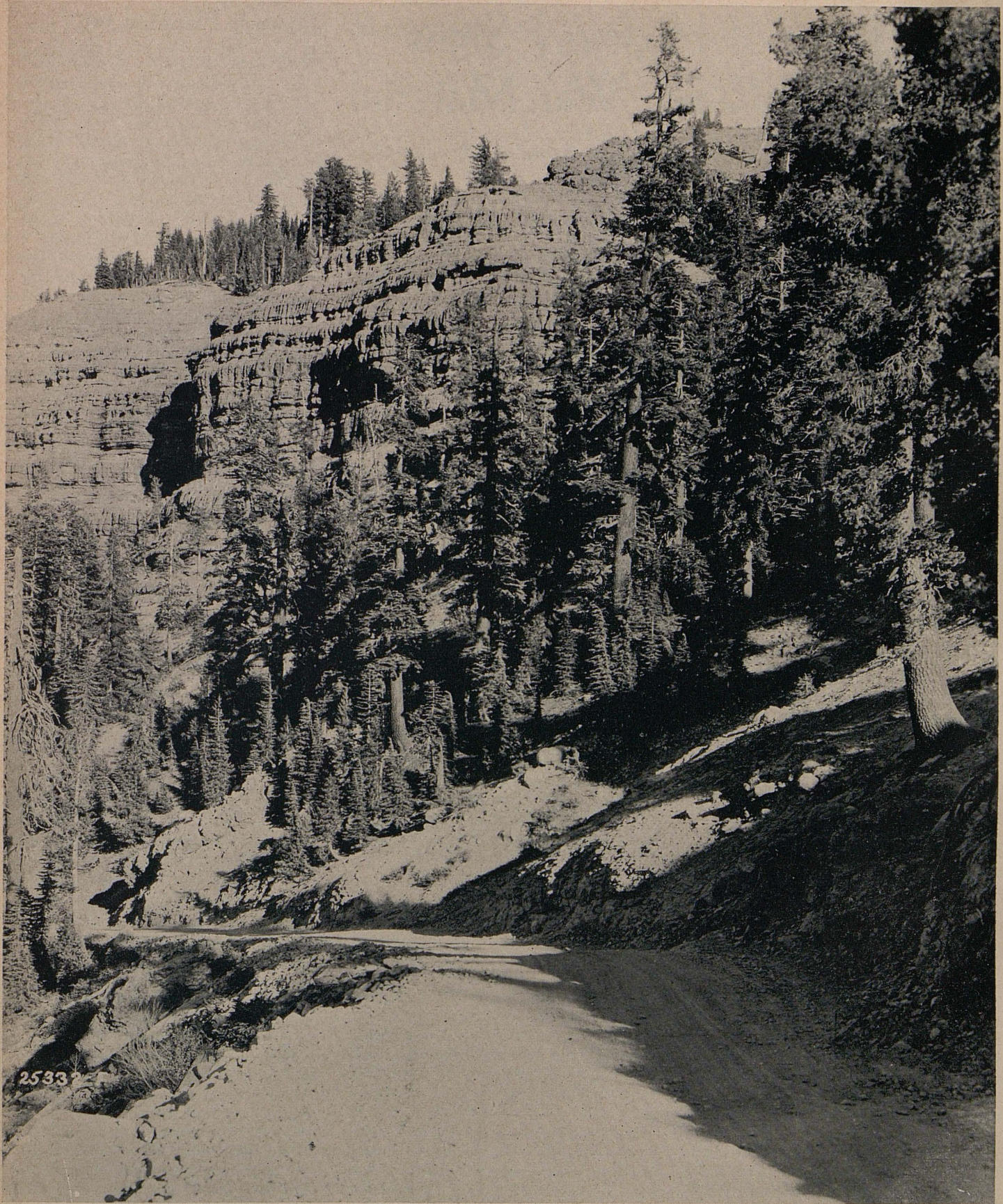
On any postwar program, the program of bridges should be based on a priority list, starting with the worst bridge from the standpoint of weakness and deterioration and working up the list as far as funds will permit. These bridges graduate in necessity from those which must be replaced or be barricaded up through the list of less important bridges to the bridges which should be replaced merely to bring them up to modern standards. To secure this result, all bridges are listed according to their priority of importance and a bridge reconstruction program outlined accordingly.

It is not easy or simple to figure the priority of a bridge since it includes many angles. It is not merely a question of the safe carrying capacity of a bridge or its posted limit. It includes the present carrying capacity of the bridge, its anticipated future life and carrying capacity, its location and the importance of the location, the type and frequency of loads, probable future highway improvements, the possibility of economical repairs or replacements, and many other conditions that must be considered and weighed. To arrive at the answer requires a combination of

(Continued on page 16)



A "must" bridge which is weak and structurally unsound



Scene on Carson Pass Highway from Carson Spur to Twin Lakes. Carson Pass Summit elevation, 8,650

New Type of Highway Signs Required to Save War Material

By MARTIN A. O'BRIEN, Maintenance Assistant

UPON our entry into the present World War, the Nation's supply of metals and other critical materials was required for military purposes. This restriction materially affected the road-signing activities of the Division of Highways.

In January of 1942, Thomas H. MacDonald, Commissioner of Public Roads Administration, requested the Division of Highways' cooperation in changing the specifications, to eliminate the use of metal, for highway signs. Shortly thereafter the War Production Board issued Limitation Order L-29, which made it mandatory to discontinue the use of metal for highway and other signs.

This division willingly cooperated with the request of Mr. MacDonald and the War Production Board's order and took immediate steps to determine the most suitable noncritical material that could be substituted for our porcelain enamel metal signs. We were aware that veneers and plywood sheets would make a satisfactory substitute for metal, but as they were also placed on the critical list, it was felt they should not be used for this purpose.

Numerous tests were made of various noncritical materials and, as a result, 3/16 inch tempered Masonite was selected. This material, while it has not proven a satisfactory substitute for metal signs, does work up easily and provides a good surface for baking enamel. It can be successfully drilled to hold reflector buttons and its selection made it possible to continue the use of reflectorized signs.

Since standard crystal reflector buttons also contained critical metals, they too were soon placed on the restricted list. The Signal Service Company of Elizabeth, New Jersey, then introduced a flat plastic reflector unit which is now substituted for reflectorized signs. These reflector units are of the rear-entry type, approximately the thickness of the sign face, and are held in place by a back plate made from Masonite.

The War Production Board's Limitation Order on metal signs made it necessary to revise the California

Vehicle Code, which required metal in the stop, railroad crossing and speed limit signs. This was done at the regular session of the Legislature, in January, 1943, when the Vehicle Code was amended to permit the use of other than steel in these signs. The change was made retroactive so that all signs made from noncritical materials and erected within the State, now comply with all legal requirements.

Signs made from Masonite naturally do not have the strength of those made from metal and are more susceptible to damage through vandalism and other causes. Experiments have been made to reinforce these signs by placing 1 by 4 inch or 1 by 6 inch wooden strips on the sign backs.

Where old metal signs are available, they also are being used as backs to strengthen new signs. This metal backing has proven very satisfactory.

From the standpoint of maintenance, Masonite signs have proven unsatisfactory. The material is very brittle, hence easily broken, and even in case of minor damage, an entirely new sign is usually necessary.

As a war economy measure the Department has discontinued the erection of signs of a purely informational character such as those showing names of streams, historical landmarks, elevations, summits or fish hatcheries.

Since January 1, 1943, up to the present time, we have spent \$28,355 for signs, or an annual expenditure of \$20,125. This compares with an annual average expenditure prior to Pearl Harbor of \$74,500 and a total expenditure for signs since 1925 of \$716,655.

While installation of new highway signs is being held to a minimum, every effort is being made to maintain those now in place.

Then there is the man who prided himself on never being wrong. Accused of being wrong in a statement, he summoned his dignity, rose and said, "I want it understood that I never was wrong but once in my life, and that was when I thought I was wrong and wasn't."

Postwar Planning for Reconstruction of Bridges

(Continued from page 14)

theory, science, experience and judgment.

Studies have been made by the Bridge Department of the Division of Highways. In order to decide upon a reasonable priority list, one group of engineers of the Bridge Department is employed continuously inspecting, posting, studying and classifying all bridges on the State Highway System. This crew consists of specialized engineers well trained and experienced in this type of work. Progressive or running records are kept of every bridge on the highway system.

There are approximately 4,300 bridges on the State Highway System that are regularly inspected. About 250 of them posted for less than legal load limit and another 750 carrying the legal limit with less than the normal safety factor.

FOUR CLASSIFICATIONS

Each bridge is really in a class of its own, on a graduated scale from worst to best, but in order to obtain an idea of the situation with regard to replacement, all the bridges may be roughly grouped in one of four classifications:

- (1) **First class, modern bridges**
- (2) **Bridges in good condition but of light design and unsafe for legal loads**
- (3) **Bridges now capable of carrying legal loads but replacement required in the near future due to deterioration**
- (4) **The "must" bridges of light design, weak, and structurally unsound.**

The first class needs little consideration and consists of the modern standard bridges which are of satisfactory width, clearance and can carry legal loads for a long time. Although about 75 per cent of the State Highway bridges are up to modern requirements as to structural strength, perhaps 25 per cent of these are too narrow for a modern highway or are on substandard alignment.

Some 40 or more bridges are in good condition and might last 10 to 20 years under existing conditions, but they are of such light design that they can not carry legal loads, and, therefore, should be replaced to keep from having bottlenecks on the high-

way. Unless conditions change, light loads can use these bridges with safety and maintenance costs will be reasonable for a few years at least. If sufficient funds could be secured these bridges should be replaced. We can not say we have an efficient highway as long as there are so many of these bridges forming weak links in otherwise first-class highways. These bridges may be likened to a lightweight fighter or wrestler—in good trim but too light.

In the third class are a considerable number of bridges which at the present time can carry legal loads but have deteriorated to the point where their economic life is practically over, maintenance costs are increasing rapidly and posting is imminent. These bridges may be compared to a heavy-weight wrestler or prize fighter who is winded or just about ready for forced retirement. Just a year or two separate bridges in Class 3 from some 40 or 50 bridges in Class 4 which might be called the "must" bridges. These are posted bridges structurally weak and in such a condition that further repairs are uneconomical. When your private car requires extensive and continuous repairs, and even then can not regain its former power or speed, it is replaced. The same is true with bridges, especially those in this class. The bridges in this class must be replaced, postwar or no postwar program if a definite and distinct loss to traffic and value of adjacent highways is to be prevented. It should be remembered that from 6 months to 2 years is likely to elapse between the budgeting of funds and completion of construction of a new bridge in normal times and the existing bridge may get much weaker in that time.

There is the usual obstacle in the way of correcting the undesirable situation outlined above—funds. How much money will be required? How much can be secured? The picture is changing constantly but a rough idea of the magnitude of the cost may be obtained. Considering Class 3 bridges to be those not posted but needing replacement within about 5 years time and all Class 4 bridges, the total cost of replacing these bridges alone being estimated at around \$14,000,000. This includes no bridges with narrow roadways, bad alignment or even posted if they can be made to serve at reasonable cost for the 5 years. It does not include the cost of highway reconstruction

Ramona and Santa Ana Parkways Proposed for Los Angeles Area

(Continued from page 2)

the City of Los Angeles, the County of Los Angeles, the Federal Government, and the State Division of Highways. The total cost of the viaduct project was about \$5,000,000.

The Pacific Electric railway tracks were placed and put into operation over this new viaduct between Vignes Street and the Pacific Electric's private right of way at Macy Street on July 21, 1943. The interchange connection between the Santa Ana Parkway and the Ramona Parkway at the easterly end of the bridge will be completed and the project opened to traffic on August 15, 1944.

OPERATION OF TRAFFIC

The operation of traffic at this connection can be more easily understood by examining the accompanying perspective sketch. It will be seen that Aliso Street, which connects with the Civic Center of Los Angeles, is carried on a viaduct over the Los Angeles River and the tracks of the Southern Pacific, Santa Fe and Union Pacific on each side of the river.

The viaduct also carries through traffic over Mission Road. A suitable ramp will permit local traffic to leave Aliso Street on the right and enter Mission Road and other streets in the vicinity. Another ramp will bear to the right for outbound traffic to enter the Santa Ana Parkway. Inbound traffic from Santa Ana Parkway will pass under the outbound Ramona Parkway Branch and connect with Aliso Street on an inbound ramp. Similarly, northbound Santa Ana Parkway traffic can turn eastward onto Ramona Parkway and both inbound and outbound Ramona Parkway traffic will have access to the Aliso

Street viaduct without having to cross traffic from any of the other connections.

CONVERSION OF BOULEVARD

The new Ramona Parkway between Aliso Street and the east boundary of Los Angeles City at Indiana Street is actually the conversion of a portion of the Ramona Boulevard improvement completed in 1935 into a modern freeway utilizing the old pavement as much as possible in the new improvement. Existing bridges at Macy, Lord, State, Cornwall, Pomeroy, Marango, Soto and Fickett streets over the present Ramona Boulevard pavement have been extended as necessary to permit this highway to be brought up to freeway standards.

The new Ramona Parkway consists of two 35-foot roadways with three lanes of traffic in each direction, separated by a raised curb dividing strip four feet wide. Suitable inlet and outlet ramps for traffic interchange are provided at Pomeroy Street and Fickett Street. The cost to the State for the construction and right of way between Macy Street and the east city limits of Los Angeles at Indiana Street, 1.95 miles, is approximately \$1,208,000. This includes the original cost of improving Ramona Boulevard as a highway and the cost of converting it to a freeway.

The above described work will provide a section of modern, safe freeway for the rapidly growing traffic in this portion of the metropolitan area for a distance of 2.5 miles, from Vignes Street to the east city limits of Los Angeles, which freeway facilities will be extended in both directions as funds become available.

that often is considered necessary in order to avoid building a new bridge off its final alignment. It does not include anything for emergency reconstruction as the result of fire, flood or abnormal traffic. To bring all bridges up to modern standards, taking into account all of the above factors, it has been estimated that around \$70,000,000 will be required.

In addition to all this, millions must be spent for bridges, grade separation projects, overheads, subways, and

other structures required by new highways which must be built to take care of even the past normal increases in traffic which should at least be equalled as soon as the country settles down to a peaceful existence once more.

Plans for a large number of bridges that must be built are under way and many plans have been completed. They are now filed ready to be advertised immediately when the proper time arrives.

Highway Bids and Contract Awards for June and July 1944

Bids and Awards for June 1944

BUTTE COUNTY—Between Nelson and 1½ miles north of Durham, about 7.7 miles to be repaired with plant-mixed surfacing on existing roadbed, with crusher run base on imported borrow, and seal coat to be applied to existing surfacing, new plant-mixed surfacing and new crusher run base. District III, Route 3, Section C. J. R. Reeves, Sacramento, \$96,212; M. J. B. Construction Co., Stockton, \$111,162. Contract awarded to Piazza & Huntley, San Jose, \$94,780.

BUTTE COUNTY—Between junction of Route 87 and Oroville Airport about 2.4 miles to be repaired with plant-mixed material. District III, Route 21, Section A. Contract awarded to Lester L. Rice, Marysville, \$10,691.

CONTRA COSTA COUNTY—Between Broadway Tunnel & Orinda Junction, about 1.8 miles to be repaired by placing asphalt concrete on the existing roadbed. District IV, Route 75, Section A. A. J. Raisch, San Jose, \$41,910; Gallagher & Burk, Oakland, \$40,070; Chas. L. Harney, San Francisco, \$43,270; Louis Biasotti & Son, Stockton, \$43,372; Lee J. Immel, Berkeley, \$43,660; Independent Construction Co., Ltd., Oakland, \$44,300. Contract awarded to Union Paving Co., San Francisco, \$34,827.

HUMBOLDT COUNTY—Between the junction with Route 85 and Blue Lake about 5.1 miles to be repaired with plant-mixed material and seal coat. District I, Route 20, Section A. Clements & Co., Hayward, \$49,405. Contract awarded to Mercer Fraser Company, Eureka, \$44,755.

HUMBOLDT COUNTY—Across Willow Creek and East Branch of Willow Creek between 32 and 36 miles east of Arcata, a reinforced concrete box culvert and a timber trestle bridge to be constructed. District I, Route 20, Section C. Wm. E. Thomas Concrete Construction, Petaluma, \$22,672; O'Connor Bros., Red Bluff, \$23,955; Mercer Fraser Company, Eureka, \$24,311. Contract awarded to Kiss Crane Co., San Pablo, \$17,710.

LASSEN, MODOC AND SISKIYOU COUNTIES—Between Constantia and Oregon State line, about 34.8 miles to be repaired by applying a seal coat. District II, Routes 29, 73, 210. A. A. Tieslau & Son, Berkeley, \$23,420. Contract awarded to Harms Bros., Sacramento, \$22,950.

LOS ANGELES COUNTY—In the city of El Segundo on Douglas St. between Imperial Highway and 1400 feet south, about 0.3 mile to be graded, paved with Portland cement concrete and surfaced with plant-mixed surfacing. District VII, Griffith Co., Los Angeles, \$29,262; Oswald Bros., Los Angeles, \$31,518; Dimmitt & Taylor, Los Angeles, \$32,602; Western Dredging and Construction Co., Los Angeles, \$36,723; Bonadimon McCain, Inc., Los Angeles, \$40,918. Contract awarded to Olympic Contracting Co., Los Angeles, \$28,977.

LOS ANGELES COUNTY—Between Monrovia and La Verne, portions only, about 2.6 miles to be repaired with plant-mixed material. District VII, Route 9. Griffith Co., Los Angeles, \$16,324; Vido Kovacevich, South Gate, \$17,315; W. E. Hall Co., Alhambra, \$17,677. Contract awarded to Pacific Rock & Gravel Co., Los Angeles, \$16,313.

LOS ANGELES COUNTY—On Figueroa St. between Anaheim St. & B St. and on C St., between Hawaiian Ave. and Figueroa St., about 0.7 mile to be graded and surfaced with plant-mixed surfacing and Portland cement concrete. District VII, Route 165 and C Street. Dimmitt & Taylor, Los Angeles, \$42,675. Contract awarded to Griffith Co., Los Angeles, \$36,433.

MADERA COUNTY—Between 7.8 and 11.9 miles north of Madera, about 4.1 miles to be repaired with plant-mixed surfacing. District VI, Route 4, Sections B, C. M. J.

Ruddy & Son, Modesto, \$28,480. Contract awarded to Stewart & Nuss, Inc., Fresno, \$17,855.

MARIN AND SONOMA COUNTIES—Between Ignacio and Sears Point, about 3.5 miles, a seal coat to be applied. District IV, Route 8, Sections A, A. A. Tieslau & Son, Berkeley, \$2,321; Lee J. Immel, Berkeley, \$3,235. Contract awarded to A. G. Raisch, San Francisco, \$2,242.

MARIN-SONOMA COUNTIES—Between Petaluma and San Rafael, portions about 2.4 miles in length, to be repaired with plant-mixed surfacing. District IV, Route 1, Sections C. A. Lee J. Immel, Berkeley, \$29,735; Louis Biasotti & Son, Stockton, \$31,129; E. A. Forde, San Anselmo, \$36,010; Chas. L. Harney, San Francisco, \$36,103. Contract awarded to A. G. Raisch, San Francisco, \$27,490.

MENDOCINO COUNTY—Between Navarro River and Caspar, about 3.9 miles to be repaired by furnishing and placing imported base material on portions of the project and applying seal coat to new base and existing surfacing. District I, Route 56, Sections D, E. Close Building Supply, Hayward, \$38,940; Elmer J. Warner & Ted Watkins, Stockton, \$39,135; A. A. Tieslau & Son, Berkeley, \$40,915. Contract awarded to A. Teichert & Co., Sacramento, \$35,541.

ORANGE COUNTY—Trabuco Road between Route 2 and Marine Base, and Central Avenue between Route 2 and Trabuco Road, about 4 miles to be graded and surfaced with plant-mixed surfacing on untreated rock base and plant-mixed surfacing to be placed on the existing surfacing. District VII, Arthur A. Johnson, Laguna Beach, \$82,652; Griffith Co., Los Angeles, \$82,821; Lewis Construction Co., Los Angeles, \$84,584; Sully Miller Contracting Co., Long Beach, \$86,088; J. E. Haddock Ltd., Pasadena, \$89,041; M. W. Stanfield Co., Los Angeles, \$89,816. Contract awarded to W. E. Hall Co., Alhambra, \$77,871.

ORANGE COUNTY—Between San Diego County line and Doheny Park, portions only, about 4.4 miles, to be repaired with plant-mixed material, imported borrow and bituminous surface treatment. District VII, Route 2. Arthur A. Johnson, Laguna Beach, \$66,325; W. E. Hall Co., Alhambra, \$69,878; Oswald Bros., Los Angeles, \$73,670; J. E. Haddock, Ltd., Pasadena, \$75,532; Griffith Co., Los Angeles, \$77,455; Pacific Rock & Gravel Co., Los Angeles, \$78,875. Contract awarded to Sully-Miller Contracting Co., Long Beach, \$66,155.

SACRAMENTO COUNTY—Between McConnell and Sacramento, portions only, about 8.3 miles to be repaired with plant-mixed material. District III, Route 4, Section B. McGillivray Construction Co., Sacramento, \$47,680; Louis Biasotti & Son, Stockton, \$57,480; Westbrook & Bing, Sacramento, \$60,100; M. J. B. Construction Co., Stockton, \$69,200. Contract awarded to A. Teichert & Co., Sacramento, \$47,520.

SAN BERNARDINO COUNTY—Plant-mixed surfacing and seal coat to be placed between Verdemon and Devore, about .5 mile, and between Sycamore Avenue and Cajon Creek, about .9 mile. District VIII, Routes 31,190, Sections A, B. Contract awarded to Geo. Herz & Co., San Bernardino, \$12,676.

SAN DIEGO COUNTY—Between Escondido and north county line, and between 6 miles east of Oceanside and Route 77, portions only, about 7.8 miles to be repaired with plant-mixed material. District XI, Routes 77 and 195, Sections CDE, A. Schroeder & Co., Inc., Roscoe, \$54,575. Contract awarded to Southwest Paving Co., Roscoe, \$50,045.

SONOMA AND MARIN COUNTIES—Between Petaluma and San Rafael, portions about 2.4 miles in length to be repaired with plant-mixed surfacing. District IV, Route 1, Sections C, A. Lee J. Immel, Berkeley, \$29,

735; Louis Biasotti & Son, Stockton, \$31,129; E. A. Forde, San Anselmo, \$36,010; Chas. L. Harney, San Francisco, \$36,103. Contract awarded to A. G. Raisch, San Francisco, \$27,490.

TULARE COUNTY—Between Goshen Underpass and 3 miles northerly, about 2.6 miles to be repaired with imported borrow, untreated rock base and plant-mixed material with seal coat. District VI, Route 4, Section F. Contract awarded to Brown, Doko & Baun, Pismo Beach, \$62,725.

VENTURA COUNTY—Between Oxnard and Camarillo, portions only, about 7.2 miles to be repaired with plant-mixed material and imported borrow. District VII, Route 153. Griffith Co., Los Angeles, \$71,441; Schroeder & Co., Inc., Roscoe, \$76,561; Dimmitt & Taylor, Los Angeles, \$83,780. Contract awarded to R. R. Hensler, Glendale, \$66,675.

YOLO, SACRAMENTO, EL DORADO, PLACER AND NEVADA COUNTIES—At various locations, about 56.7 miles to be repaired by applying a seal coat. District III. A. A. Tieslau & Son, Berkeley, \$40,460; W. C. Railing, Redwood City, \$48,853; Close Building Supply, Hayward, \$51,796. Contract awarded to J. P. Breen, Sacramento, \$35,412.

Bids and Awards for July 1944

ALAMEDA COUNTY—In the city of Oakland on Sequoyah Road, between Oak Knoll Blvd. and San Leandro Naval Hospital, about 0.9 mile, to be graded, paved with Portland cement concrete pavement and surfaced with plant-mixed surfacing on waterbound macadam base. District IV. Independent Construction Co. Ltd., Oakland, \$62,429; Fredrickson Bros., Emeryville, \$63,065; MacDonald & Kahn, Inc., San Francisco, \$65,245; Lee J. Immel, Berkeley, \$68,994. Contract awarded to Heafey-Moore Co., Oakland, \$59,476.

BUTTE COUNTY—Portions between Biggs Road and Oroville Wye, about 4.6 miles to be repaired with plant-mixed material. District III, Route 3, Section B. Westbrook & Bing, Sacramento, \$39,865; Lester L. Rice, Marysville, \$47,060. Contract awarded to Piazza & Huntley, San Jose, \$36,875.

CONTRA COSTA COUNTY—A drainage pipe and drainage improvements to be installed one mile east of Orinda Junction. District IV, Route 75, Section A. M. J. McGuire & M. Hester, Oakland, \$13,216; Peter Sorensen, Redwood City, \$13,976; Lee J. Immel, Berkeley, \$17,330; James H. McFarland, San Francisco, \$20,266. Contract awarded to A. A. Tieslau & Son, Berkeley, \$10,891.

CONTRA COSTA & ALAMEDA COUNTIES—Between Willow Pass and Dublin, portions about 8.2 miles to be repaired by surfacing with plant-mixed surfacing. District IV, Routes 75,107, Sections B.B. Union Paving Co., San Francisco, \$59,668; W. P. Railing, Redwood City, \$65,132; Chas. L. Harney, San Francisco, \$68,849; M. J. Ruddy & Son, Modesto, \$70,362; Lee J. Immel, Berkeley, \$73,723. Contract awarded to A. J. Raisch, San Jose, \$58,311.

LOS ANGELES AND ORANGE COUNTIES—Carson Street between Route 168 and Orange County line and Garden Grove Avenue between Route 170 and Santa Ana, about 9.6 miles to be repaired with plant-mixed material. District VII, Routes 178 and 179, Sections A.A. W. E. Hall Co., Alhambra, \$51,122; Griffith Co., Los Angeles, \$55,460; Oswald Bros., Los Angeles, \$59,484. Contract awarded to Sully-Miller Contracting Co., Long Beach, \$44,657.

MONTEREY COUNTY—Between San Ardo and King City, portions only, about 8.5 miles to be repaired by removing existing bituminous surfacing and placing it on shoulders, furnishing and placing imported borrow and crusher run base and applying

armour coat. District V, Route 2, Sections G.F. M. J. Ruddy & Son, Modesto, \$192,205; Frederickson Bros., Emeryville, \$228,549; Arthur A. Johnson, Laguna Beach, \$233,961. Contract awarded to Granite Construction Co., Watsonville, \$182,435.

NAPA COUNTY—Between Napa and Yountville, about 2.6 miles, to be repaired by surfacing with plant-mixed material. District IV, Route 49, Section B. A. G. Raisch Co., San Francisco, \$19,915; A. S. Jones, Napa, \$19,330; C. M. Syar, Vallejo, \$20,177; Lee J. Immel, Berkeley, \$20,537; W. C. Railing, Redwood City, \$21,010. Contract awarded to E. A. Forde, San Anselmo, \$18,881.

SACRAMENTO, PLACER, YOLO COUNTIES—Between Sylvan School and Roseville, between Hood and Sacramento, and between Kiesel and Sacramento, about 8.0 miles to be repaired with plant-mixed material. District III, Routes 3, 11, 50. A. Teichert & Co., Sacramento, \$31,551. Contract awarded to McGillivray Construction Co., Sacramento, \$27,388.

SAN BERNARDINO COUNTY—Between Cajon Summit and Victorville and between Daggett and Needles, 63.8 miles to be repaired by placing seal coat over the existing surfacing. District VIII, Routes 31, 58. Frontier Construction Co., Whittier, \$71,140; Vinnell Co., Alhambra, \$71,770; Geo. Herz & Co., San Bernardino, \$73,906. Contract awarded to R. R. Hensler, Glendale, \$57,175.

Ceremony of Ribbon Cutting Dates Back Several Centuries

(Continued from page 6)

California has a law based on the old English custom and law which provides that where a section of privately-owned land is used by the public for travel unrestricted for a period of five years, that section of property, whether it be a lane, short cut, or a pathway, becomes public property.

The significance of our highway ribbon ceremonies is that the State, having acquired new rights of way for a new highway, stretches a ribbon across the project when completed and ready for opening to traffic, then by the mere act of cutting the ribbon serves notice that henceforth this road is a free traveled highway.

The railroads, particularly, are careful on their extensive rights of way to maintain at all times NO TRESPASS signs in order that usage of any part of their right of way by the public over a period of five years or more will not endanger their ownership.

There have been occasions in California where ranch owners neglected to protect their property rights, permitting public usage of their lands, and lost that portion of them used by the public under the State law.

We understand that a fireman in a small town recently by accident drank some fire extinguishing fluid, and boy! was he put out!

Gas Tax to Cities Not to be Based On Snap Censuses

IN accordance with an opinion given to Director of Public Works C. H. Purcell by the Attorney General, apportionment to California cities of the $\frac{1}{4}$ -cent gas tax funds for the current fiscal year beginning July 1 by the Division of Highways will be based upon the decennial census of 1940 except as modified by some 30 special censuses which have been taken in compliance with the requirements of Chapter 581 of the Statutes of 1943 made by the U. S. Bureau of Census and which have been certified to the Department of Public Works.

Purcell said that the only course he can pursue is that dictated by the Attorney General, who holds that sample or spot check censuses are not the type of census contemplated by the Legislature of 1943 when it amended the law governing the distribution of $\frac{1}{4}$ -cent gas tax funds to municipalities for the duration of the war.

Thirty-odd California cities have had special censuses taken by Bureau of Census at the expense of each such city. Several sample population counts have been taken chiefly for the purpose of allocation of foodstuffs, needs for housing, schools, transportation, hospitalization, public utilities, day-care for workers' children and similar problems arising in congested areas.

Approximately 50 California cities have sought to obtain from the Bureau of Census on the basis of sample censuses, a certificate of determination of population for the purposes set forth in Chapter 581, Statutes of 1943. The Director of Census has refused to issue any type of certificate to 45 of these cities.

"Prior to June 21, 1944," the Attorney General rules, "according to reliable information in our possession, the Director of Census had never before issued even a qualified certificate of population determination on a basis of spot-check. Obviously, therefore, the Legislature could not have had such a procedure in mind when it enacted the legislation under consideration. We conclude that the only type of determination by the Bureau of Census which complies with Chapter 581 is the complete census involved in a special census taken by the bureau."

Erosion Prevention in San Diego County

(Continued from page 8)

patrol were available, both at the top and bottom of the cut.

Additional experimental work indicated that on cuts with an irregular top, where it would be impossible to tow the tamper horizontally, good results and progress could be obtained by operating the tamper up and down the face of the cut, with a cable operated from the hoist drum on the rear end of the tractor. The same results could no doubt be obtained by the use of a winch mounted on a truck.

WATER LINE INSTALLED

A 4-inch water line was installed along the top of the cut, and outlets were provided at intervals of 150 feet. Water was applied by hand from one-inch hoses. From two to three men, 8 hours per day, were required to keep the approximate one mile length of treated slope properly moist. A surface ditch was excavated approximately fifteen feet back from the top of the slope, parallel to the centerline, and at intervals of approximately 500-feet, redwood timber down drains were constructed, leading into existing drainage culverts.

Additional erosion protection, as well as fire control during the summer season when the natural growth would be somewhat of a fire hazard, was provided for by planting *Mesembryanthemum Edule* (Ice Plant) at the tops and lower parts of the slope. Four rows were planted at the top and four rows at the bottom. This planting was done by hand, and a considerable portion of the actual placing was done by women, who seemed to adapt themselves readily to this type of work.

GROWTH IN THREE WEEKS

The germination of the rye and barley seed started within approximately five days, watering was continued for approximately three weeks, at which time the growth averaged some 6 inches in height, and was very luxuriant, as illustrated in one of the accompanying photographs.

The cost of the completed erosion protection, including the purchase of materials, placing of straw, scattering of seed, planting and fertilizing of Ice Plant cuttings, construction of down drains, and watering, was approximately \$5,600. The area covered was approximately 28,000 square yards, or approximately \$0.20 per square yard.

Highway Commission on Tour in Redwood Empire Dedicates New Albion Bridge

(Continued from page 6)

State Department of Public Works; Colonel John H. Skeggs, District Engineer, District No. 4, Division of Highways, San Francisco; A. M. Nash, District Engineer, District No. 1, Division of Highways, Eureka; George N. Cook, Assistant Secretary, California Highway Commission; D. V. Nickerson, State Photographer, Sacramento.

The Albion Bridge was taken into the State Highway System by legislative act in August, 1933, after which time the State became directly interested in its condition, strength, carrying capacity, safety, etc.

The bridge consists of 10 timber spans of 18 feet, one span of 15 feet and three timber truss spans of 108 feet each, with an overall length of 521 feet. The roadway width was 16 feet with no wheel guards. The bridge was inspected in 1933 after being adopted by the State and the condition was found to be good but of light design, which necessitated posting for 11 tons and 15 miles per hour. As a safety measure, wheel guards were added, which reduced the roadway width to 14.6 feet. Later the bridge was redecked and widened to 16 feet 9 inches between wheel guards.

The bridge was inspected periodically as all other State bridges are and repaired from time to time. In the August, 1941, report, it is noted that many heavy loads used the bridge, greater than legal loads, while posted for limited loads, and it was noticed that there was a big sag in the trusses—a danger sign for timber trusses. In February, 1942, the overloads were continuing and repairs were made in an attempt to hold the bridge together.

Since the time was rapidly approaching when it would be necessary to close the bridge to truck traffic, governmental approval was requested to build a new bridge. On April 24, 1942, the Board of Review of the War Production Board considered the bridge "not sufficiently important." The State would not take "no" for an answer on account of the importance of the project and every effort was made to secure approval of the project. Letters of assistance were written by local lumber companies, supervisors, etc., and the new application made to the government June 5, 1942, was ap-

proved by the War Production Board for construction June 16, 1942.

The contract for a new bridge was advertised August 28, 1942, and the contract with Maurer and Son approved October 5, 1942, the time for completion being June 5, 1943—a little over a year ago. The contractor would have completed the bridge within the time limit except for the various delays encountered.

Priority ratings required for materials kept going up and up and construction was delayed at the beginning for lack of materials. A higher priority rating was requested with no results. After continual efforts through December, 1942, and January, 1943, a higher rating finally was granted in February, 1943, but at this time lumber could not be secured.

Then, to further complicate matters, the WPB put a "stop order" on the job March 31, 1943, and this was reaffirmed by the Facilities Review Committee April 27, 1943. All work was stopped on April 13, 1943, and protests sent to the WPB. Wires were sent to Congressman Lea, the Commissioner of Public Roads and the Works Progress Administration, with supporting wires from lumber companies, Redwood Empire Association, county supervisors and other local organizations.

In May, 1943, a very thorough investigation was made and the members of the old bridge were bored carefully to determine the extent of decay. It was found that the condition of the bridge was even worse than anticipated. Authority to resume new construction work was received June 16, 1943.

Revised application for materials was made June 16, 1943, but it was found impossible to secure redwood lumber. In order to keep the work going, a change to salt treated fir was approved by the Public Roads Administration June 21, 1943.

Work was resumed July 5, 1943, and a preference rating AA-4 received July 16, 1943. After many additional trials and tribulations caused by material, labor and equipment conditions work progressed to the point achieved when the bridge was ready to receive traffic.

Gas Tax Revenues Show an Alarming Tendency Downward

THE State Board of Equalization in June announced completion of California gasoline tax assessments for April amounting to \$4,025,417 in contrast to \$3,871,866 for the same month a year ago.

This is the smallest gain registered for any month of 1944 over the corresponding tax for 1943. George R. Reilly, member of the board, said that it is indicative of a **sharp downward trend in the tax yield.** Contrasting gasoline tax collections, he pointed out:

"April taxes on distribution of 134,180,555 gallons were only 153,551, or 3.97 per cent over those of a year ago. March taxes were correspondingly greater by 260,261, or 6.76 per cent, while those for February were 503,255, or 15.4 per cent higher. In January the gain was 636,051, or 19.26 per cent.

"If we compare collections for April of this year with those of 1942, the drop is even more marked. Two years ago April taxes were \$4,574,371. The full force of this comparison is realized when it is recalled that in 1941, the last year before rationing, the April collections were \$5,452,587."

Reilly expressed the belief that this trend is inevitable due to the increased tempo of the war with its attendant curtailment of gasoline supplies for local consumption. He warned that it would mean a definite lessening of funds for highway work and that the people of this State must be prepared for postponement of projects dependent on gasoline taxes for their support.

Gasoline rationing has reduced gasoline tax revenues by approximately \$50,000 a day. Gasoline tax assessments for May totaled \$4,154,032, a drop of \$49,664 under that of May, 1943, and \$1,469,741 under that of May, 1941, the last year before rationing.

The May tax revenues were based on a distribution of 138,467,748 gallons. This was 1,654,797 less than for May, 1943.

Teacher—Why, Junior, you say you wouldn't like to be President?

Junior—Not just now. If it's all the same to you, I'd rather wait until a couple more elections and things cool down a little.

State of California
EARL WARREN, Governor

Department of Public Works

Headquarters: Public Works Building, Twelfth and N Streets, Sacramento

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A. H. HENDERSON, Assistant Director

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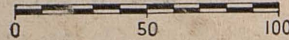
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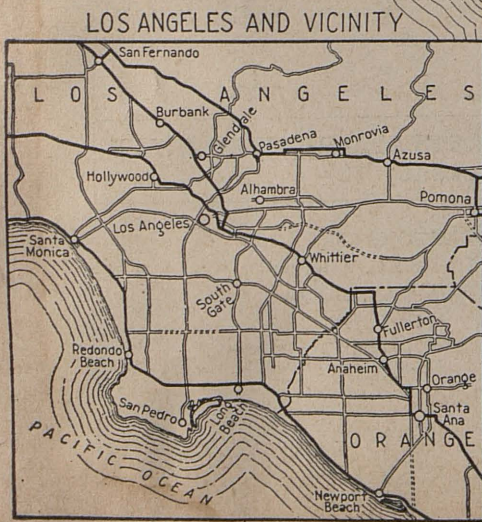
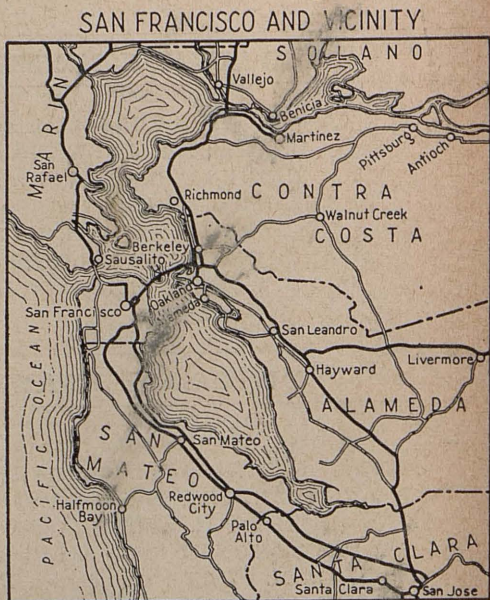
CALIFORNIA STATE HIGHWAY SYSTEM

SCALE IN MILES



~ LEGEND ~

- Primary Routes
- Secondary Routes
- Proposed Routes



D50 Illuminant, 2 degree observer

L*	38.12	65.43	49.87	44.26	55.56	70.82	63.51	39.92	52.24	97.06	11.61	12	13	14	15
a*	13.24	18.11	-4.34	-13.80	9.82	-33.43	34.26	11.81	-48.55	-0.40	-0.60	-0.73	-1.05	-1.19	-1.07
b*	15.07	18.73	-22.29	22.83	-24.49	-0.35	59.89	-48.07	18.51	1.13	0.23	0.21	0.43	0.28	0.19
Density										0.04	0.09	0.15	0.22	0.36	0.51

Golden Thread

Colors by Munsell Color Services Lab

Don Williams