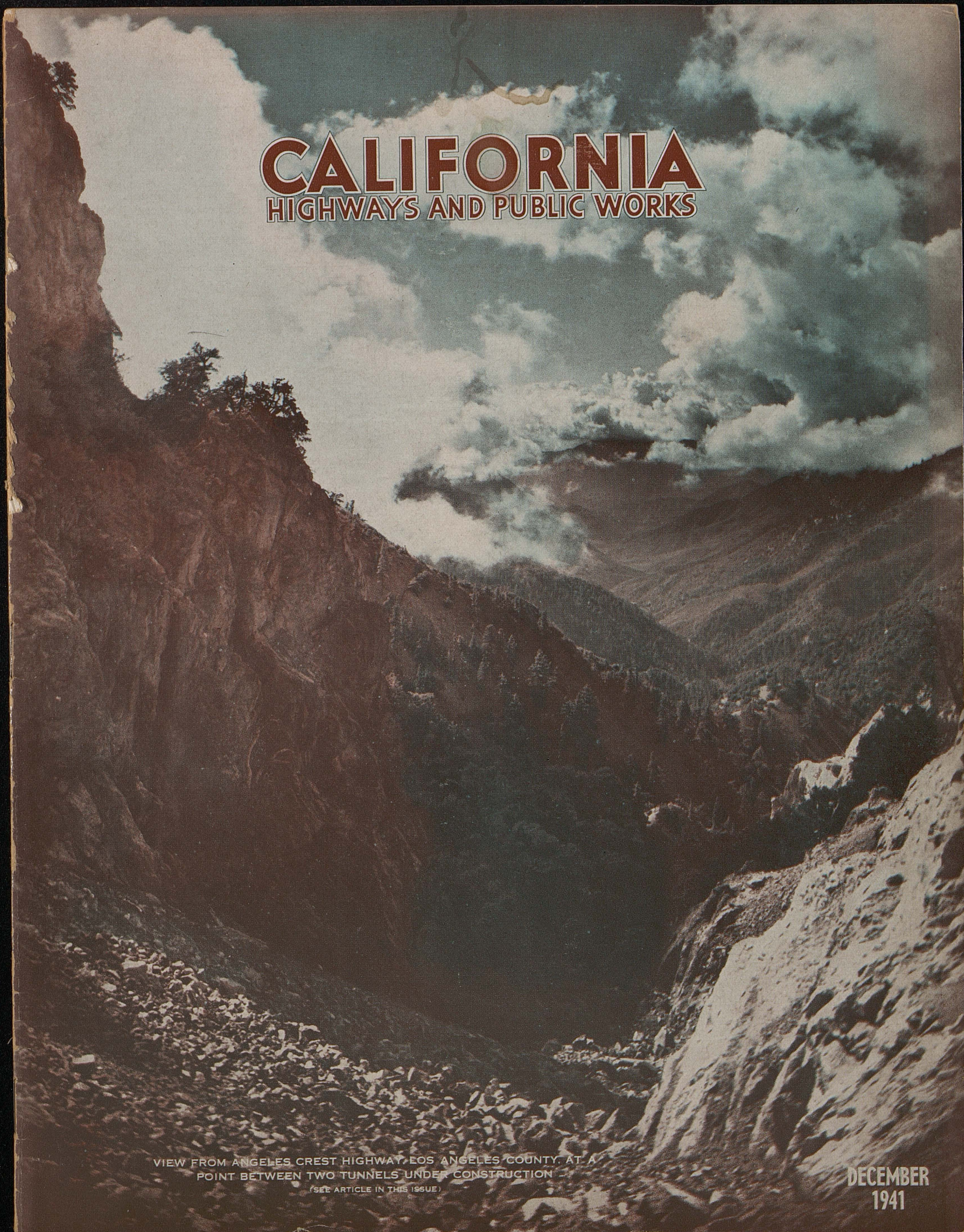


CALIFORNIA

HIGHWAYS AND PUBLIC WORKS



VIEW FROM ANGELES CREST HIGHWAY, LOS ANGELES COUNTY, AT A POINT BETWEEN TWO TUNNELS UNDER CONSTRUCTION

(SEE ARTICLE IN THIS ISSUE)

DECEMBER
1941

D50 Illuminant, 2 degree observer

inches

1	39.12	65.43	49.87	44.26	55.56	70.82	63.51	39.92	52.24	97.06	92.02	87.34	82.14	72.06	62.15
2	13.24	18.11	-4.34	-13.80	9.82	-33.43	34.26	11.81	48.55	-0.40	-0.50	-0.75	-1.05	-1.19	-1.07
3	15.07	18.72	22.29	22.85	-24.49	-0.35	59.80	46.07	18.51	1.13	0.23	0.21	0.43	0.29	0.19
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6															
7															
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11(A)															
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Density

Golden Thread

16(M)	48.25	38.62	28.88	18.19	8.29	3.44	31.41	72.46	72.85	23.37	54.91	53.06	82.74	52.28	52.07
17	-0.16	-0.18	0.66	0.75	0.19	0.48	-19.45	55.93	68.80	-49.49	30.77	30.01	81.29	-12.72	-29.46
18(B)															
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centimeters

Colors by Munsell Color Services Lab

Don Williams

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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Highway Budget for 1941-43 Biennium Revised to Meet Demands Imposed By National Defense Emergency

CONFRONTED by greatly changed conditions affecting highway construction occasioned by the National defense situation, such as increased costs of material and labor, priority restrictions and many other important factors, the California Highway Commission has been forced to revise the original budget for the current biennium submitted to Governor Olson in December, 1940, through Director of Public Works Frank W. Clark.

The principal factors in addition to increased costs that made budget revisions and adjustments obligatory included:

1—The compulsory application of budgeted Federal Aid and State highway funds to certain projects on the strategic highway system, as designated by the Federal Government.

2—The military access road program totaling \$40,000,000 to be built by the State with Federal Funds on locations designated by the Secretary of War and Secretary of the Navy.

3—Fewer bids (sometimes only one bid) for advertised projects at much greater costs than the engineering estimates.

4—Federal priority regulations rendering unavailable, or subject to indefinite delays, building materials essential to the economic progress and completion of projects.

5—A larger increase in gasoline tax revenues than was anticipated when the budget was compiled, making possible additional needed allocations.

TOTAL EXPENDITURE INCREASED

After long study and discussion of the effect of these factors on the existing budget set-up and with the controlling purpose to make as few changes as possible, Chairman Larry Barrett and Commissioners Hitchcock, Nielsen, Vaughn and Bozzani met at Sacramento November 10th and adopted a revised budget which deferred certain projects, reduced others and added some new ones

Washington Holds Up Highway Jobs Not on Defense Projects

PENDING further instructions from Washington, no highway projects in California involving expenditure of Federal funds other than those certified as defense roads may be advertised for bids by the Department of Public Works, according to a telegram received by Director of Public Works Frank W. Clark from the United States Public Roads Administration on December 3d.

The telegram read as follows: "Until further advice, please withhold approval of plans, specifications and estimates and consent to advertise for any pending projects regardless of funds involved except those certified as defense projects. Further advice will be sent to you soon. This will apply to any projects proposed for advertising this week."

The Division of Highways is awaiting a thorough interpretation of the telegram from the Public Roads Administration as this issue goes to press.

The instructions from Washington will affect the expenditure by the State of all regular Federal Aid moneys and feeder road and grade separation funds, according to Director Clark, who asked the Division of Highways to immediately prepare a list of all highway projects involved in the latest orders from Washington.

Several hundred thousand dollars of road projects already approved by the Highway Commission in various parts of the State probably will be affected.

while increasing the proposed total biennium expenditure from \$90,600,000 to \$93,810,000.

The revised budget total includes \$50,682,500 as compared with the original amount of \$48,615,000 for highway construction and contingency reserve, rights of way and engineering costs; \$18,875,000 for the cities' $\frac{1}{2}$ -cent share of the gas tax for streets and highways within municipalities compared with \$18,250,000 and \$24,252,500 for Administration, Maintenance of Highways and Bridges, Joint Highway Districts and Capital Investment including Shop Equipment and Maintenance Stations.

ADDITIONAL REVENUES AVAILABLE

The difference between the totals of the new and old budgets amounting to approximately \$3,210,000 is due to increases of revenues above amounts estimated when the old budget was compiled. The gas tax increase contributed \$2,500,000 of the difference, the balance representing motor vehicle fees.

In making a readjustment of funds to meet the new situation, the commission found it necessary to defer 34 projects in Northern California totaling \$1,693,300, and 33 in Southern California totaling \$1,281,260.

New projects numbering 34 and totaling \$1,328,482 are listed for the North while the South gets 25 new projects amounting to \$1,166,753.

As this magazine goes to press it is not known what portion California will receive of the \$220,000,000 appropriation recently made by Congress and signed by President Roosevelt for Access Roads, the Strategic Network, Flight Strips, and Plans and Surveys in connection with the National Defense System.

The bill provides for the following distribution of these funds throughout the Nation:

1—Access Roads, \$150,000,000, with no matching by State funds required.

2—Strategic Network, \$25,000,000 to be allocated in accordance with regular Federal Aid formula and matched by the State on a 75-25 basis and \$25,000,000 to be apportioned by President Roosevelt without regard to allocation and matched on a 75-25 basis.

3—Flight strips on strategic highways, \$10,000,000, no matching required.

4—Plans and Surveys, \$10,000,000, to be matched on a 50-50 basis.

The only amount California is assured of receiving out of the \$220,000,000 at this writing is \$1,000,000 from the No. 2 allocation for strategic highways in accordance with regular Federal Aid formula.

SPECIFIC ALLOCATIONS AWAITED

The Division of Highways will not know what further money will be available to the State under the Access Road Program until specific allocations are made by the President and Federal Works Administration. Expenditures of these funds must be made under rules and regulations to be promulgated through the Public Works Administration according to priorities made by the Secretary of War and Secretary of the Navy.

The Strategic Network in California comprises approximately 5,900 miles of highways. In the main, this mileage overlaps the Federal Aid System which consists of 6,787 miles out of the 14,000 miles of the State Highway System.

The Access Road Program in this State includes recommended projects amounting to \$40,000,000, but it is impossible to state at this time whether or not funds will be available for all of these projects. The great majority of these roads are located off the State Highway System and therefore State funds can not be expended for their construction. They are essentially roads to furnish access from main highways to military cantonments, camps, air fields, naval and marine bases and stations and to defense industrial areas.

ARMY AND NAVY SELECTIONS

The specific locations of these roads were selected as the result of numerous conferences with military officials held under the orders of the Army and Navy departments at various naval, marine and military establishments and attended by representatives of the Public Roads Administra-

Summary of Changes in Biennial Budget

It will be recalled by the reader that in the November issue of this magazine, Director of Public Works Frank W. Clark stated the demands imposed upon the State by the National Defense Program would require some revisions and postponement of projects in the Highway budget as prepared and submitted by the California Highway Commission to Governor Olson in December, 1940. Mr. Clark stated that the specific details of the changes would be published in this issue.

In brief, the changes are as follows:

The total biennium expenditure of \$90,600,000 as provided in the old budget has been increased to \$93,810,000. The revised budget provides \$50,682,500 for highway construction, engineering, etc., compared with \$48,615,000 in the old budget.

The difference in the total between the old and new budget of approximately \$3,210,000 is due to increases of revenue not anticipated when the budget was compiled.

The Highway Commission found it necessary to defer 34 projects in northern California totaling \$1,693,300 and 33 in southern California totaling \$1,281,260. New projects for northern California, numbering 34, total \$1,328,482, and 25 new projects for southern California are listed at \$1,166,753.

The proposed distribution of funds in the \$220,000,000 appropriation recently passed by Congress and signed by the President are described in this article.

tion, State Highway Departments, WPA and local city and county officials.

In the case of access roads to industrial sites, the designation is made through the Transportation Commissioner to alleviate traffic congestion where enormous defense industries are operating.

The Federal Aid Highway Act permits the use of Federal Aid Funds

and Federal Aid Feeder and Secondary road funds for surveys and plans for access roads. Up to the present time, the State has spent approximately \$1,200,000 of these Federal funds preparing for this \$40,000,000 Access Road Program and plans and specifications are now ready for such road projects amounting to \$12,000,000.

LOOKING TO FUTURE

The \$10,000,000 allocated for the construction of flight strips adjacent to highways is to provide emergency landing places for air craft throughout the United States. These strips will vary from 300 to 800 feet wide and 3,000 to 8,000 feet in length. The locations are to be selected by the Air Corps and no matching funds are required.

The \$10,000,000 for plans and surveys to be matched on a 50-50 basis is for work that will tie in with studies President Roosevelt has requested for carrying on Interregional Highway construction as a means for furnishing employment after the present emergency is over.

As to the priority regulations, materials used in highway construction come to the Division of Highways projects under an established priority basis.

A road leading to a cantonment takes the same preference rating as assigned to the cantonment. For example, McClellan Field carries a priority rating of A-1-e and the construction project of the viaduct in North Sacramento also carries a priority rating on materials of A-1-e.

ROAD AND BRIDGE PRIORITIES

Ordinary approach roads to Army camps have a priority rating of A-1-j; bridges on the Strategic Network are A-2; road work in connection with construction on any part of the Strategic Network carries an A-4.

Bridges on the Federal Aid System but not on the Strategic Network have a rating of A-3; and road construction projects on the Federal Aid Highway System but not on Strategic Network are A-7. Federal Aid Secondary projects are A-7 for bridges and A-10 for road construction. Maintenance operations also carry an A-10 rating.

A complete tabulation of the projects in the revised biennial budget detailing by counties the State highway route, location of the proposed improvement and cost of construction will be found on pages 18 to 27.



View of last stages of 30,000 cubic yard fill restoration at slipout on Los Gatos-Santa Cruz Highway.

Los Gatos-Santa Cruz Highway Slipouts Cost State \$64,000

By GEORGE F. HELLESOE, District Maintenance Engineer

ACCOMPANIED by a roaring sound that resembled the uncanny booming noise of a major earthquake, two large dirt and rock fills on the Los Gatos-Santa Cruz Highway slipped out late last winter.

Engineers of the Division of Highways viewing the damage foresaw a restoration task of monumental proportions. Their reconstruction work is just now nearing completion at a cost of \$64,000.

The two fills, 11 and 12 miles respectively north of Santa Cruz, in an earthquake fault area on State Highway No. 5, had successfully withstood the traffic loads imposed upon

them since 1933, but proved unstable after a sequence of several unusually wet seasons during which the yearly inflow of rainfall into the hills above the highway was more rapid than the drainage therefrom by surface seepage and percolation into subterranean channels.

Last winter the elevation of ground water had risen to such an extent that the normally wet, earthquake-shattered foundation soil was subjected to a considerable hydrostatic head, causing a high degree of saturation. With the surface soil of the foundation in this lubricated condition, the central portions of these two sidehill fills slipped out.

Slippage was along circular arcs through the uniform material of the fill and, in the lower portion of the embankment, along the steeply sloped and softer surface of the foundation. In plain view the slipouts formed rough segments of a circle at roadway grade, which shape continued on down, but with an increasing taper. The shape of the sliding masses thus resembled the lower portion of a diagonal slice of an egg or an ellipsoid.

Slippage progressed at a rather slow rate and although several days elapsed from commencement to completion of the sliding, the failures were nevertheless awe-inspiring due



Completed repair of slipout at junction of old and new highways 12 miles north of Santa Cruz. Dark pavement marks area of slipout.

to the crashing noise which could be heard for miles at times of appreciable movement. The earthquake sound of the slipping masses was, in the later stages, augmented by the falling of redwood trees as the plastic, sliding fill material made its way for over half a mile (on the north slipout) down the steep, heavily timbered canyon.

It was indeed fortunate that the slippage lines did not extend beyond the centerline of the four-lane main traffic artery. Should such have occurred, temporary closure would have been inevitable and during restoration, summer traffic, with Sunday counts of nearly 16,000 and daily counts of over 4,000, would have been subjected to the hazard of narrow and shorter radius detours.

PRELIMINARY WORK

Before restoration could commence, the lower areas of the embankments had to be stripped of remaining loose fill material. This was strictly a bulldozer job as the material had to be moved to the sides and down the canyons. The material was moved just far enough to get it out of the way of the new embankments as it was desired that as large an amount

as was reasonably possible be left at the toe of the embankment to serve as a buttress or counterweight.

The clearing of areas sufficiently large to commence filling operations would not have involved particularly large amounts of material. However, it was desired to expedite the installation of horizontal drains so such work would not delay or interrupt the placement of fills. This entailed stripping and depositing below the toe of embankment, not only a good share of the fractured portion of the remaining fill but also removal of all unsatisfactory foundation material.

An estimated amount of 20,000 cubic yards of preliminary stripping was done in the slipout located 11 miles north of Santa Cruz and approximately 12,000 cubic yards in the slipout 12 miles north. Over one-half of this item consisted of removing the softer top portions of the original foundations, it being considered essential that the new fills rest on as solid material as reasonably possible. Over a portion of the south slipout, it was necessary to excavate original ground to a depth of nearly 30 feet; but, in general, solid Monterey shales and sand-

stones were uncovered at depths of only a few feet.

SOIL TUBE BORINGS

As the stripping progressed, many one-inch soil tube borings were made to determine to what depths foundation stripping should be done. This enabled the work to be conducted more efficiently for the steep, slippery and constricted areas required that stripping progress from top to bottom or unnecessary access ramps along the sides of fills would have had to be constructed.

Although seepage was evident at many points over the slipout areas, it was not until stripping was well under way that free flow appeared. As the upper portions of the foundations were stripped of the compressed and somewhat impervious covering of fine material, flow estimated at 10,000 (south slipout) gallons per day commenced. Later, as stripping progressed downward and new outlets were opened, discharge from the upper springs subsided. Gradually, as the ground water gradient flattened, the total flow decreased but was appreciable throughout construction.

(Continued on page 6)



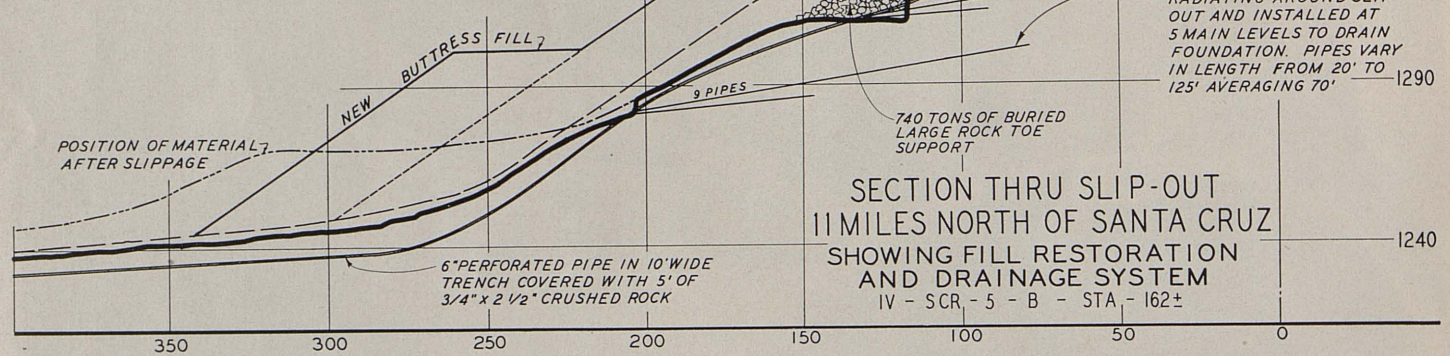
View of large slipout of fill. Installation of extensive drainage system under way. Inset shows outlets of 2-inch perforated pipe drains before covering with crushed rock.

(Continued from page 4)

With the foundations subjected to underground flow of this magnitude and the extensive, though inadequate, former underdrains destroyed, it was imperative that considerable drainage facilities be provided. This was of extreme importance, not only from a loss of investment standpoint, which would occur in case of a future slip-out, but from a traffic interruption standpoint as well. Failure of the fills being possible only by a reduction of the friction and cohesion factors of the soil composing them or their foundations, the proper measures would be to prevent such decrease in soil strength. Positive elimination of hydrostatic pressure in the area would prevent lubricating ground water from being forced into the interstices between the minute soil particles and the soil would maintain its strength.

HORIZONTAL DRAINS

To remove as much foundation ground water as possible, without



As used during the past two years to drain slide areas, a 4-inch to 5-inch diameter hole is drilled approximately horizontally into the face of the area to be drained. Holes over 150-feet long have been drilled but the practical limit in most soils is less. After drilling the hole, a perforated 2-inch diameter asphalt-dipped, standard steel pipe with closed end is pushed or jacked into the hole. The perforations are at 2 3/4-inch centers along the top and both sides and the pipe is made continuous by welding on additional lengths as the pipe is jacked into the hole.

MANY DRAINS INSTALLED

The machine consists of a simple light base with an air motor mounted at the rear end, which not only

resorting to pumping from numerous vertical wells, the evident solution was to drain the area back of the foundation surface with horizontal wells or drains. However, the comparatively fine nature of the foundation soil required that such drains be rather closely spaced to be effective. To install horizontal drains of types used in the past for water supply would have been too expensive to be feasible, and but for the comparatively recent development of a machine to bore long horizontal holes, some other solution would have had to have been resorted to.

This hydrauger machine was developed primarily for installing nominal sized utility pipes under pavements, but with minor changes, the Division of Highways has successfully used it at several locations throughout the State.

rotates the drilling rod but forces a stream of water through the 1 1/2-inch diameter hollow drill. Drill rods have threaded ends and are in 5-foot lengths. The augur at the head end consists of a hard steel cutting bit with outlet holes for the water which washes the loosened soil out through the bored hole. Holes must be drilled on an incline in order that the water carrying the soil may flow out of the hole. For any drainage work, an outward slope is, of course, also necessary to prevent the casing pipe from clogging with silt which flows in with the ground water.

On this project a total of 32 drains was installed on the north fill and 64 on the south fill. They were located at five main levels on both slipouts with a few installed along the sides at intermediate levels where it appeared that appreciable water

could be picked up. In the lower portions of the fills the pipes radiated from a working bench in the bottom of the trench. At higher levels, where the slipouts widened out, they were located at somewhat uniform intervals around the faces of the slipouts in a manner such that they would penetrate the entire steep foundation as uniformly as possible. Wherever seepage was still evident after install-

ing pipes adjacent, additional drains were installed in an endeavor to intercept the subterranean flow.

Pipe drains in the north fill varied in length from 17 feet to 125 feet and in the south fill from 17 feet to 141 feet, averaging 54 feet. In general, it was desired to install as long drains as possible and the shorter lengths actually installed were because either the hole caved before the casing could be installed or the hole could not be driven further. The former reason was most common, particularly in the south fill where 3,777 feet of hole was drilled and but 2,514 feet of casing installed. Approximately 2,000 lineal feet of pipe were installed on the north slipout.

The hydrauger was operated by two three-man crews on a double shift basis. Water was required in

an average amount of 2,000 gallons per shift and had to be hauled over steep grades for five miles, as was likewise required for the large amount necessary to compact the fills. It was stored in tanks at the top of the fills and carried to the hydrauger by gravity through a 1-inch pipe.

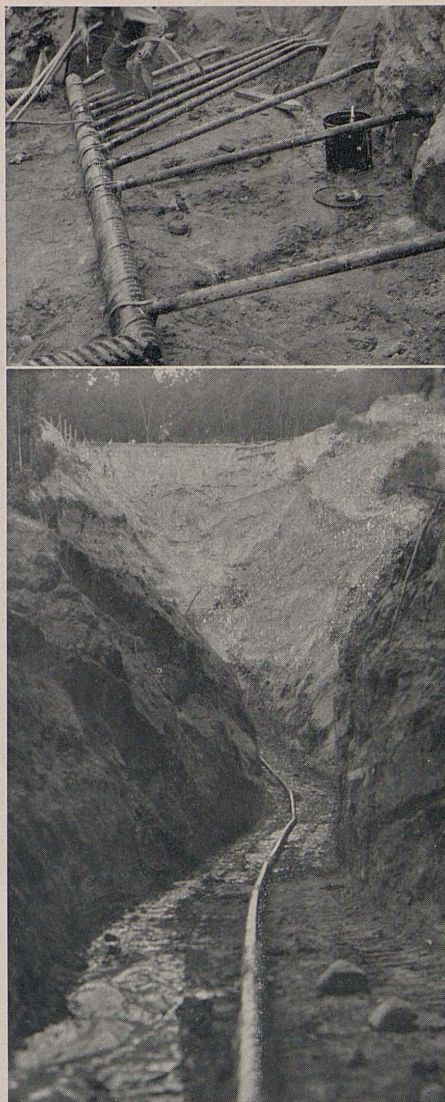
The gross cost per foot for pipe actually installed was approximately \$2.50 on the north slipout, which was completed first, and \$2.06 on the other. This cost included only the connections to the 6-inch perforated lateral drains which connected to the main drains.

Because of the shape of the slipouts, the logical scheme for carrying the water from the horizontal drains was by means of lateral connections to a main drain running down the approximate middle of each slipout. Six-inch diameter galvanized and asphalt-dipped, perforated metal pipes were used for these conduits. The main pipe was laid in the very bottom of a bulldozer width 10-foot trench with the perforations on top so that the water running through the pipe would not disperse itself into occasional drier areas en route, which might possibly happen should the perforations be in the bottom of the pipe.

TONS OF ROCK REQUIRED

To prevent the entry of fill material into the pipe, to provide an alternate outlet in case of pipe failure and to drain the foundation and fill along these main drains, the entire trench was filled to a depth of five feet with $\frac{3}{4}$ -inch to $2\frac{1}{2}$ -inch crushed rock. The upper ends of the main drains, and all laterals were covered with a windrow of crushed rock of equivalent cross-sectional area and the fills built around them.

The crushed rock covering of the main drain, as well as the lateral pipes, to which the horizontal drains were connected, was placed by means of a 10-inch diameter pipe chute. Hoppers were built at each slipout and the chute carried the rock to a point where a bulldozer could easily spread it over the main and lateral drains. For the north fill 2,500 tons of rock were required and 2,275 tons were used in the south fill, all at an average cost of \$1.65 per ton in place. Approximately 750 feet of 6-inch perforated pipe were installed in each slipout at an approximate cost of \$0.40 per foot.



Typical 2-inch drains connected with 6-inch collection pipe.

The total cost of all drainage features in both fills was \$18,650, of which \$10,200 was for 2-inch horizontal drains. For this expenditure the gratifying result has been the draining of approximately 14,000 and 3,000 gallons of water per day, respectively, from the south and north fill foundations.

In order that the efficiency of the drainage system may be constantly observed, several permanent wells were driven along the roadway at each fill. The ground water level can thus be determined and should an unusual rise occur, steps can be taken to correct the system.

As soon as the installation of horizontal drains had been completed in the lower portions of the north fill, the work of rebuilding the em-

bankment commenced. It was desired to use the most siliceous material available for these embankments and this entailed a 3-mile haul along the main highway. The material was easily obtained from a borrow pit off the highway and traffic was not interfered with except by the left turn movements of the nine to twelve 4-cubic yard trucks.

The material was dumped over the side of the slipouts, moved into position by the bulldozer and compacted with another which constantly pulled a heavy sheepsfoot roller, resulting in an average relative compaction of over 95 per cent. The fills were brought up in level 6-inch lifts and the outside edges were thoroughly compacted by regularly running the sheepsfoot roller over the slopes of the fills. As the fills progressed, the rock drains were carefully covered with fill material and the tractors were not driven over them until they had been covered with at least two feet of fill.

Particularly, in the south fill, large portions of the original fill along the sides of the slipouts had been fractured and this loosened material was moved out and reconsolidated in 6-inch layers as the fills progressed. An estimated amount of 20,000 and 12,000 cubic yards, respectively, in the south and north fills was thus recompacted.

In the south fill, 740 tons of rock, averaging one ton in weight, were placed on the foundation at a level above the toe of the fill. This large rock increases the shearing resistance against sliding.

As a further insurance against slippage, the new fills were increased in width by 40 feet for a height of approximately 50 feet. These buttresses or counterweights greatly increase the resistance against slides of the circular arc type.

The total quantity of new fill was approximately 55,000 cubic yards, with 30,000 cubic yards going in the south slipout. The total cost of all work, including drainage facilities, was \$64,000—of which \$36,000 was for work on the south fill. All work was by Division of Highways' forces.

A salesman called on a big business man near the close of a rush day. When he was admitted, the magnate said:

"You ought to feel honored, son. During the day I have refused to see eleven men."

"I know," replied the salesman. "I'm them."



Arrows point to 2 tunnels separated by only 87 feet of highway being bored through Mt. Williamson on Angeles Crest Highway.

Boring 2 Tunnels on Angeles Crest Highway

By G. A. TILTON, Jr., Assistant Construction Engineer

ENGINEERS of the Division of Highways are making steady progress in handling the toughest construction job thus far encountered on the Angeles Crest Highway, State Highway Route 61, in the Sierra Madre Mountains in Los Angeles County.

The project unit now engaging the attention of the engineers is a 3.7 mile section from Cedar Springs to West Islip Saddle, involving the boring of two tunnels, one 675 feet and one 474 feet in length, separated by 87 feet of roadway.

Construction crews, working day and night, are penetrating solid rock, drilling, blasting and mucking six-foot rounds simultaneously in each tunnel with accelerating speed.

On the section between Cedar

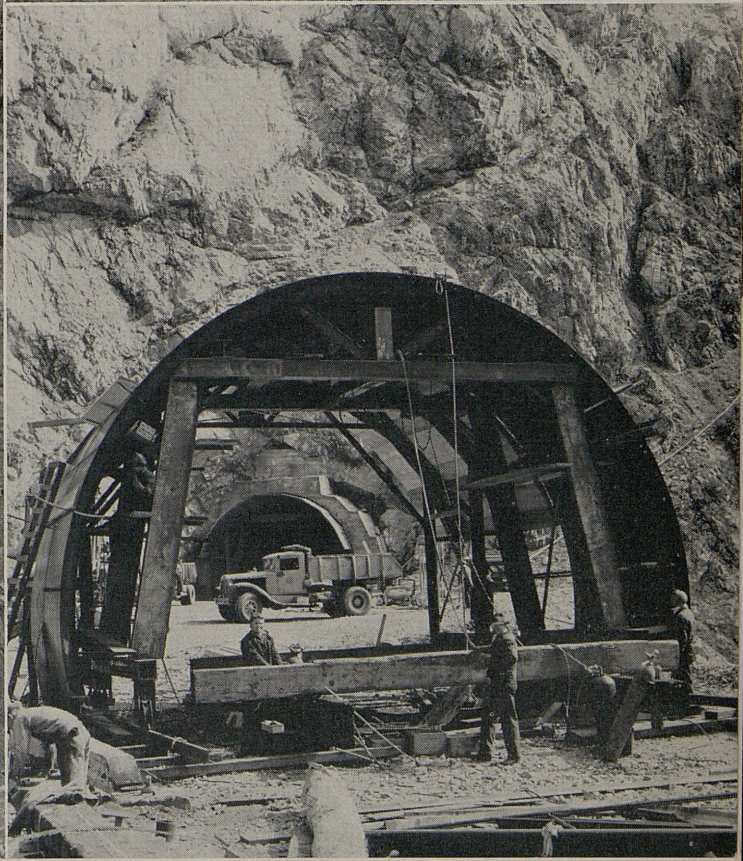
Springs and West Islip Saddle, there is very little soil and 80 per cent of the excavation must be blasted. Two inclined ridges projecting from the face of Mt. Williamson are so steep as to make tunnels necessary. Three of the four portal locations are on nearly perpendicular rock faces, 50 to 75 feet above the canyon floor, making it imperative to construct earth ramps before starting excavation.

FEDERAL-STATE PROJECT

Grading on the first two miles from the southwesterly end of the project to the tunnel is nearing completion. Work on the third mile can not be started until equipment can be moved through the tunnel. The cost of this 3.7 mile unit including tunnels will be in excess of \$700,000 and will require over two years to complete.

The Angeles Crest Highway, traversing scenic mountain areas, is being built jointly by the United States Bureau of Public Roads and the State of California. The new route begins at the Foothill Boulevard and La Canada, extends up the Arroyo Seco and passes through the Sierra Madre Mountains to an easterly terminus in Los Angeles County Park at Big Pines, a recreational district that is reached now only by way of Palmdale or San Bernardino. Passing Buckhorn Flats, the new highway will serve the Pasadena public camp grounds. The shortest present route from Los Angeles to Big Pines is 107 miles in length. The distance by the Angeles Crest Highway will be approximately 64 miles, a saving of 43 miles.

(Continued on page 16)



At left, portal of tunnel No. 2 through ridge of Mt. Williamson. This is a 14 x 14 foot pilot bore. At right, top, equipment mucking at main heading of tunnel No. 1, showing protective shell in use. Below, Construction yard between tunnels. Building concrete tunnel lining form. In the background may be seen the portal of tunnel No. 1.

Widening Sections of American Canyon Highway by Adding Two More Lanes

By R. E. PIERCE, District Engineer

SINCE the opening to traffic in November, 1936, of the so-called American Canyon Cut-off, extending from the Carquinez Bridge to Cordelia, there has existed a condition which has hampered the free flow of traffic, and which has been aggravated greatly by the continually increasing traffic. This traffic has practically doubled in four years, increasing from 4,996 vehicles per day in July, 1937, to 9,885 per day in July, 1941. Approximately 12 per cent of the traffic consists of trucks, stages, etc.

The condition that is hampering the free flow of traffic on the two-lane pavement and increasing the hazard is the reduced sight distance caused by vertical curves at the summits of two large cuts on both sides of a valley which is crossed by a large fill and a bridge. The grades on either side of the southerly summit are 6.22 per cent and 6.41 per cent, and there is a 6.10 per cent grade south of the northerly summit, and a 2.35 per cent grade north.

The principal cause of delay is due to the very slow speed of most of the trucks climbing these grades, the shortest of which is about one-half mile long, and the short sight distance which makes it hazardous to pass these slow vehicles.

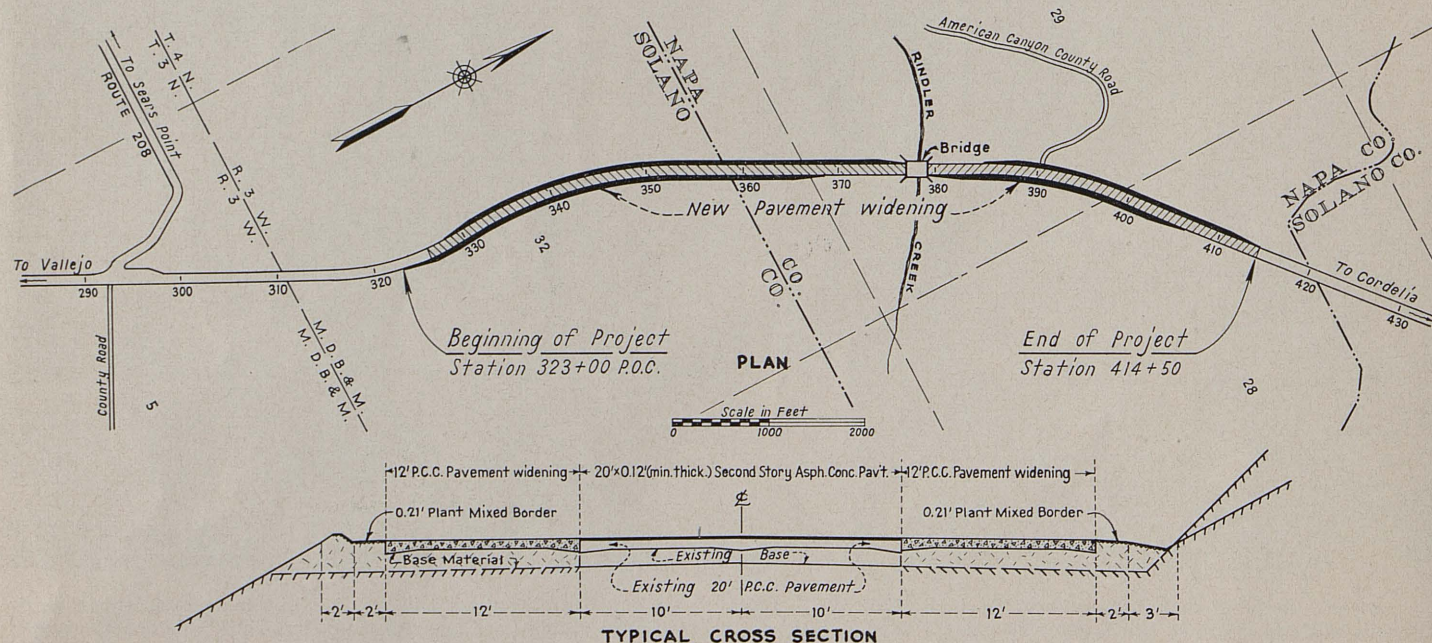
The project now under way, to eliminate most of the present difficulty, includes widening the existing pavement and adding two traffic lanes on either side of the two summits. This widening is carried for about one-half mile each side of the southerly summit, connected through a 1,400-foot vertical curve, and on the south side of the northerly summit and approximately 1,000 feet to the north of the northerly summit connected through a 1,100-foot vertical curve. There is also a horizontal curve to the south which shortens the sight distance in that direction.

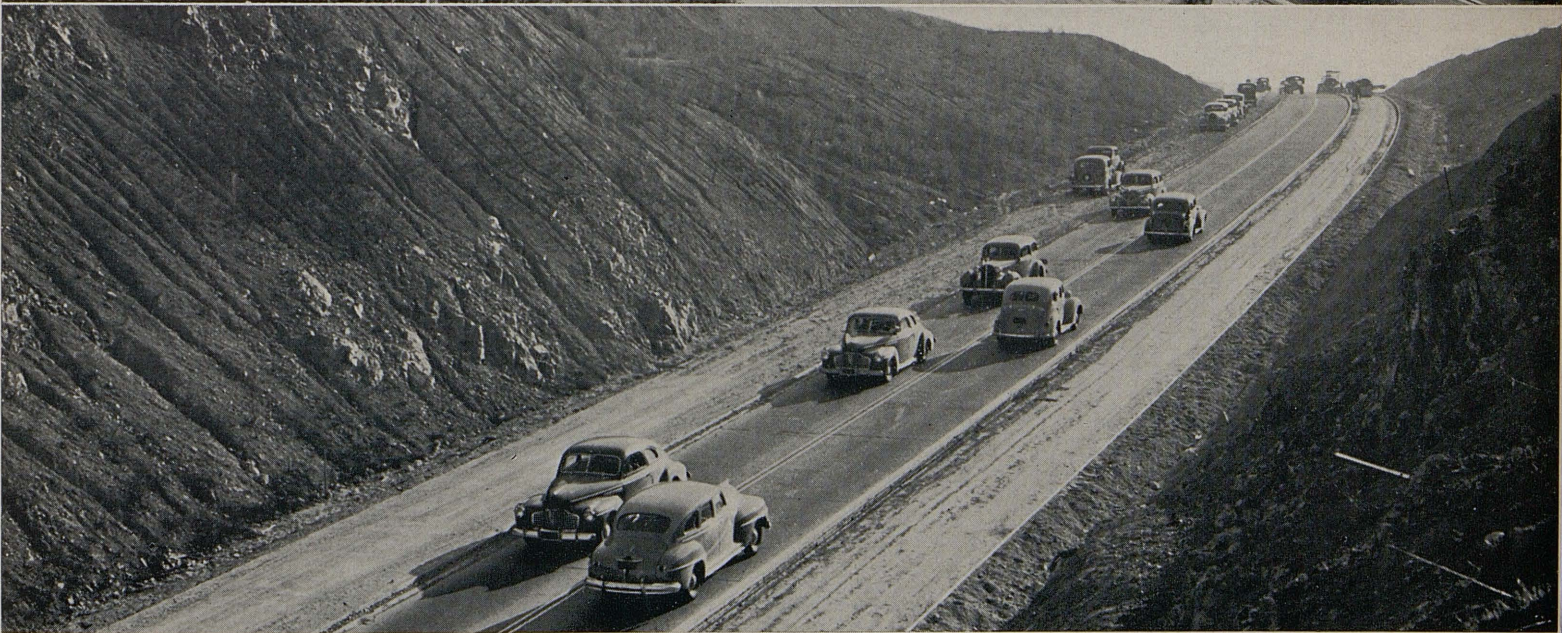
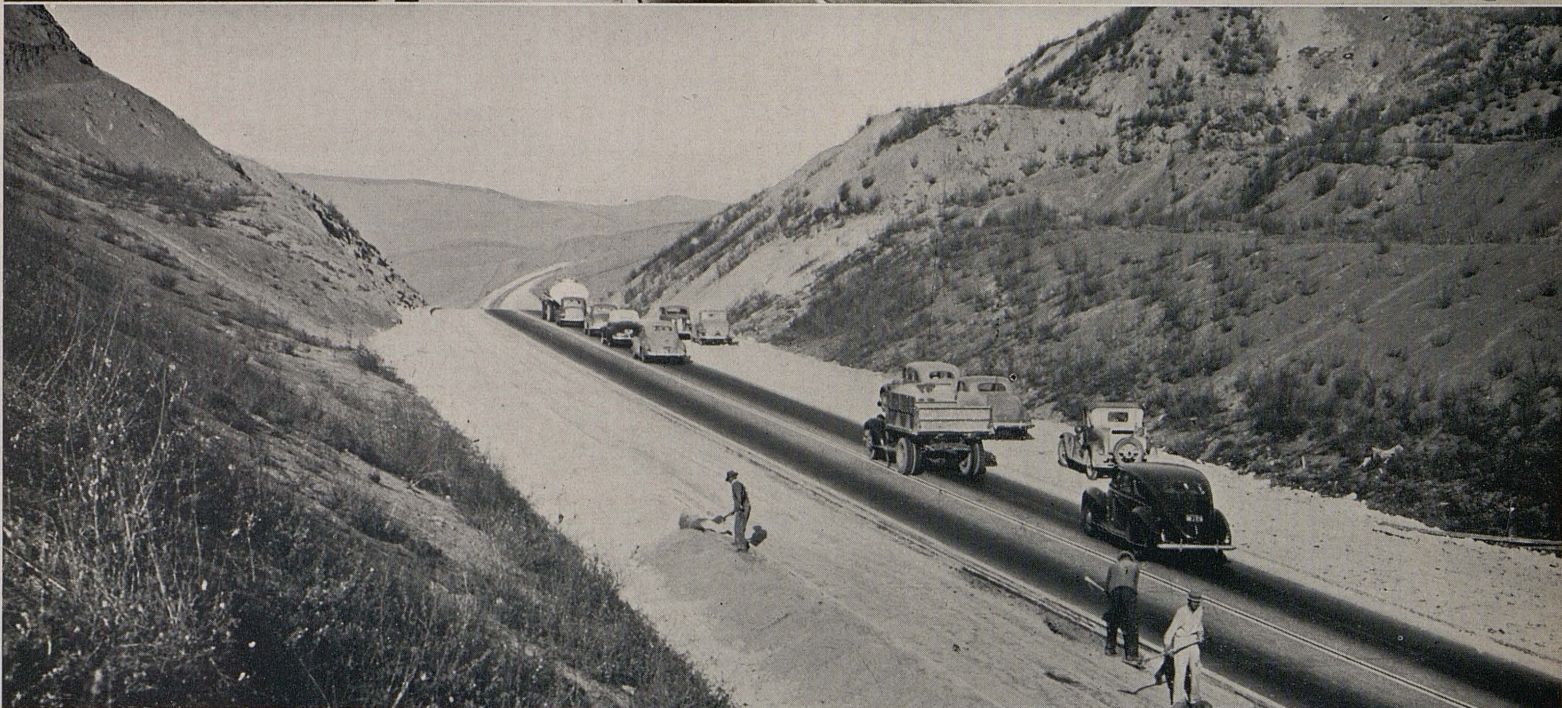
The widening is not continuous, but is stopped on either side of a timber bridge 236 feet long, at the bottom of the dip between the two summits.

The work to be done consists, in

general, of constructing a graded roadbed. This work was light as in the original grading contract large slides developed, the removal of which caused the cuts to be somewhat widened, while the material was wasted in the fills which were generally wide enough for the additional widening strip. Imported borrow was placed on this graded roadbed. Portland cement concrete pavement 12 feet in width and seven inches thick was placed on each side of the existing 20-foot portland cement concrete pavement, and left a minimum of one inch above the existing pavement to allow for asphalt concrete topping to be placed on the present pavement.

The transitions at each end of the widening strips consist of portland cement base varying from two to 12 feet wide and six inches thick to be covered with asphalt concrete a minimum of one and one-half inches thick. Borders are to be plant mixed surfacing two and one-half inches thick on crusher run base one-half a foot thick. (Continued on page 15)





Adding extra lanes to 2-lane sections of American Canyon Cut-off (U. S. 40) to eliminate congestion on vertical curves through cuts.



View of Pit River Bridge taken just as the central span was being placed connecting up the world's highest double deck structure.

Last Span of Pit River Bridge Erected

CLOSURE of steel on the central span of the great Pit River bridge, one of the major units of Central Valley Project construction, was completed on November 15th.

Steel riggers drove giant connecting pins into place, fastening the two huge cantilever arms of the bridge in the middle. The work of completing the joints on the central span of the structure, which is the highest double deck bridge in the world, was begun immediately by a crew of riveters.

Main line trains of the Southern Pacific will be routed for the first time over the new 30-mile relocation around the Shasta Reservoir probably some time in March of next year.

The State Division of Highways is rushing relocation of 15.5 miles of the Pacific Highway around Shasta Reservoir. The reconstruction of the highway is an important part of the

Central Valley Project. In order to make certain improvements in standards on the realigned highway, the State is contributing approximately 10 per cent of the grading and surfacing costs and 23.5 per cent of the cost of the bridge across the Sacramento River near Antler. The Federal Government through the Bureau of Reclamation is bearing the balance of the costs.

PRECAUTION AGAINST RAIN

Urgency of National defense will not permit of winter rains delaying completion of the bridge.

To insure that inclement weather will not hamper the final work of relocating the Southern Pacific's San Francisco-Portland main line and U. S. Highway 99 around the Shasta Reservoir, the United States Bureau of Reclamation and the contractors now engaged in concreting the highway deck on the Pit River span have

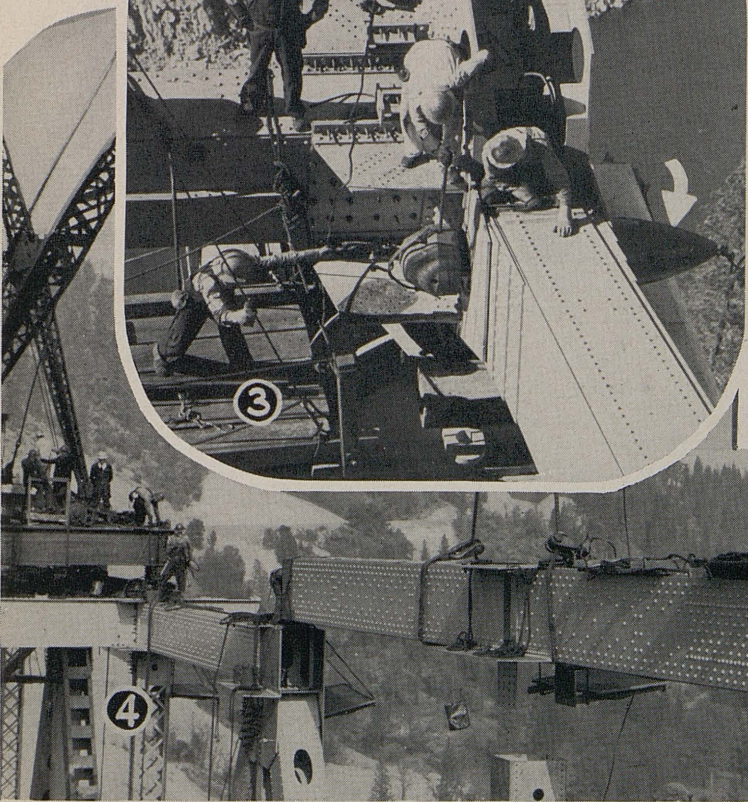
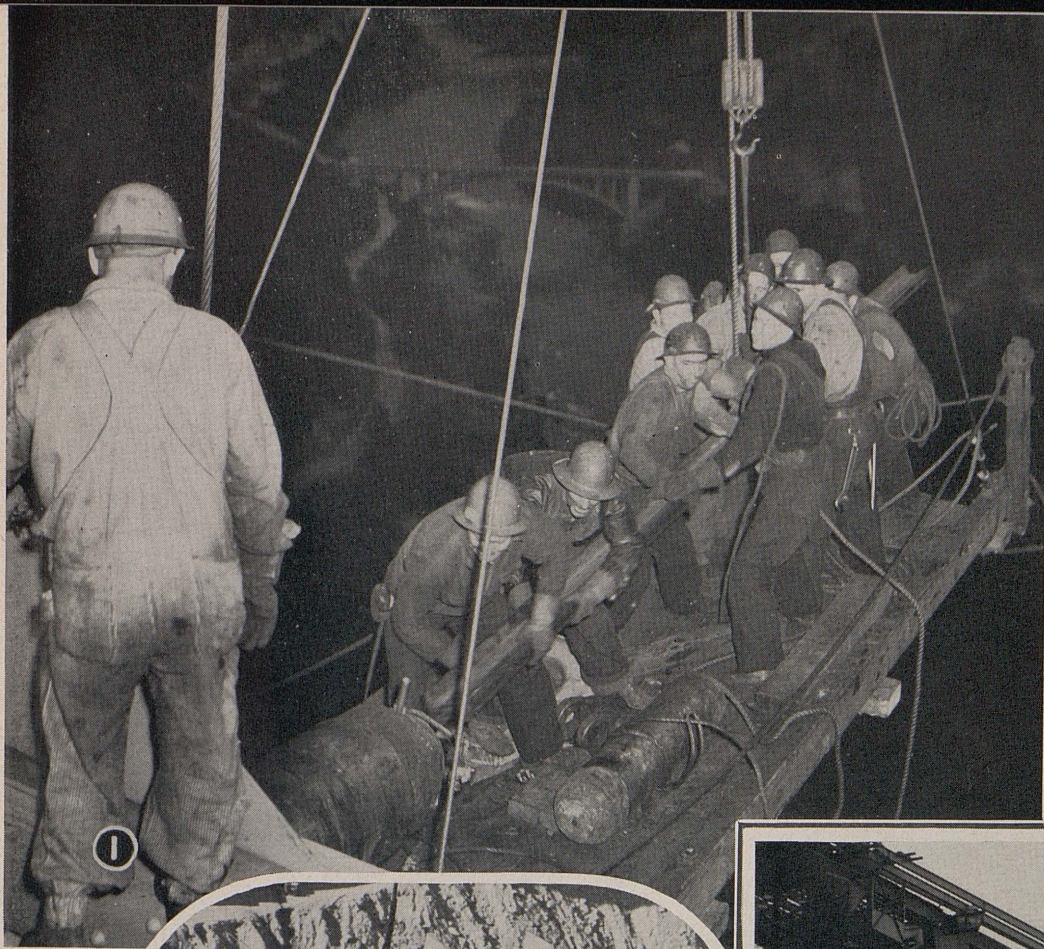
adopted a novel method of speeding progress of the work during the rainy season.

A giant tarpaulin, costing more than \$20,000 will be purchased jointly by the bureau and the contractors and will be suspended from the bridge superstructure over the highway deck so that surfacing of the roadway deck of the bridge can proceed in spite of rain. The tarpaulin will be 300 feet long and more than 50 feet wide. It will be moved from section to section as the concreting progresses.

Working from the southern end of the bridge, Couse and Saunders, contractors, already have laid a portion of the concrete surface on the highway deck.

Financed by the Bureau of Reclamation as part of the Central Valley Project, the Pit River bridge will carry two railroad tracks on the lower deck and a four-lane section of U. S.

(Continued on page 28)



Connecting the last span: (1)—Pit River Bridge workers suspended on platform 500 feet above river ramming home 5-ton riveting pin. (2)—View of pin coming through girder. (3)—Arrow shows pin in place. (4)—Lowering connecting girder into position. (5)—Last span connection complete.

Photos by U. S. Bureau of Reclamation and Sacramento Bee



Equipment tearing up old pavement and grading for south approach to new North Sacramento Viaduct structure.

North Sacramento Viaduct Progressing With Steel and Concrete Construction

PROGRESS on the construction of the North Sacramento Viaduct across the American River overflow area between Sacramento and North Sacramento has improved considerably during the past month after having been seriously delayed for about two months due to the contractor's inability to obtain reinforcing steel.

Completion of the "On Ramp" and the subsequent placing of it in operation as a detour have permitted the contractor to resume operations at the south end of the contract where the work on the approaches and 10 bents of the structure has been held up pending the opening of the detour.

The footings and portions of the columns for the remaining 27 bents have been poured and the forming of the girders and deck has been gotten under way at the north end of the structure.

The concrete in the columns has been brought to a point sufficiently high above the ground line to reduce to a minimum the damage that might be caused by drift and silt during the approaching high water season.

The fills at the north end of the project have been completed and surfacing courses are now in the process of being placed.

While it had been the contractor's intention to complete the viaduct structure about the first of the year, the delay in the receipt of reinforcing steel has rendered the task impossible of fulfillment at that time. Taking into consideration the delay anticipated because of the overflowing of the working area during the next few months, it would appear that completion of the structure can not be looked for before next June.

Earl W. Heple of San Jose is the contractor on the work and Charles

R. Poppe is resident engineer for the State.

FOR ALL-YEAR USE

The viaduct will make an all-year highway north on Route U. S. 99 and east on Route U. S. 40. The present road has been intermittently closed by high water during the winter for an average of eight days per season for the past five years. On these occasions traffic has had to be detoured over a narrow levee road, adding three miles and at least one-half hour to the trip between Sacramento and North Sacramento. During each high water period, maintenance crews have had to sandbag the highway and clean up mud and debris after the waters had subsided.

The viaduct starts about 300 feet north of the American River Bridge and rises on easy vertical curves at a maximum rate of 6.2 per cent to a

height of more than 50 feet above ground. It clears the Western Pacific Railroad trestles by 28 feet, thus providing for future raising of the tracks, which are now below the stream flood plane. Connections will be made to the end of the American River bridge and at the south limits of North Sacramento.

RAMP CONNECTIONS

An off-ramp connection will be made to the Garden Highway, passing under the structure so that cars will not have to cross opposing traffic.

The viaduct will be of reinforced concrete, with the exception of the steel railing and the expansion details. It will be 1,496 feet long, consisting of 36 spans each 41 feet in length with 10-foot cantilever spans at each end. The bridge deck will have an overall width of 65 feet, consisting of a 6½ inch slab supported on 11 shallow girders each one foot wide.

The bridge will provide four traffic lanes on two 25-foot roadways, separated by a four-foot dividing strip and in addition two sidewalks each four feet wide. The bridge deck will be lighted by 20 incandescent luminaires.

Gold Is Where You Find It Is Jury Decision

“Thar’s gold in thet old shaft.” On this contention, A. S. Macdonald and Milton A. Purdy, Plumas County miners, demanded \$800,000 from the Division of Highways for nine acres of land required for right of way purposes on the Feather River Highway and on which is an ancient mine shaft which has not been worked for years.

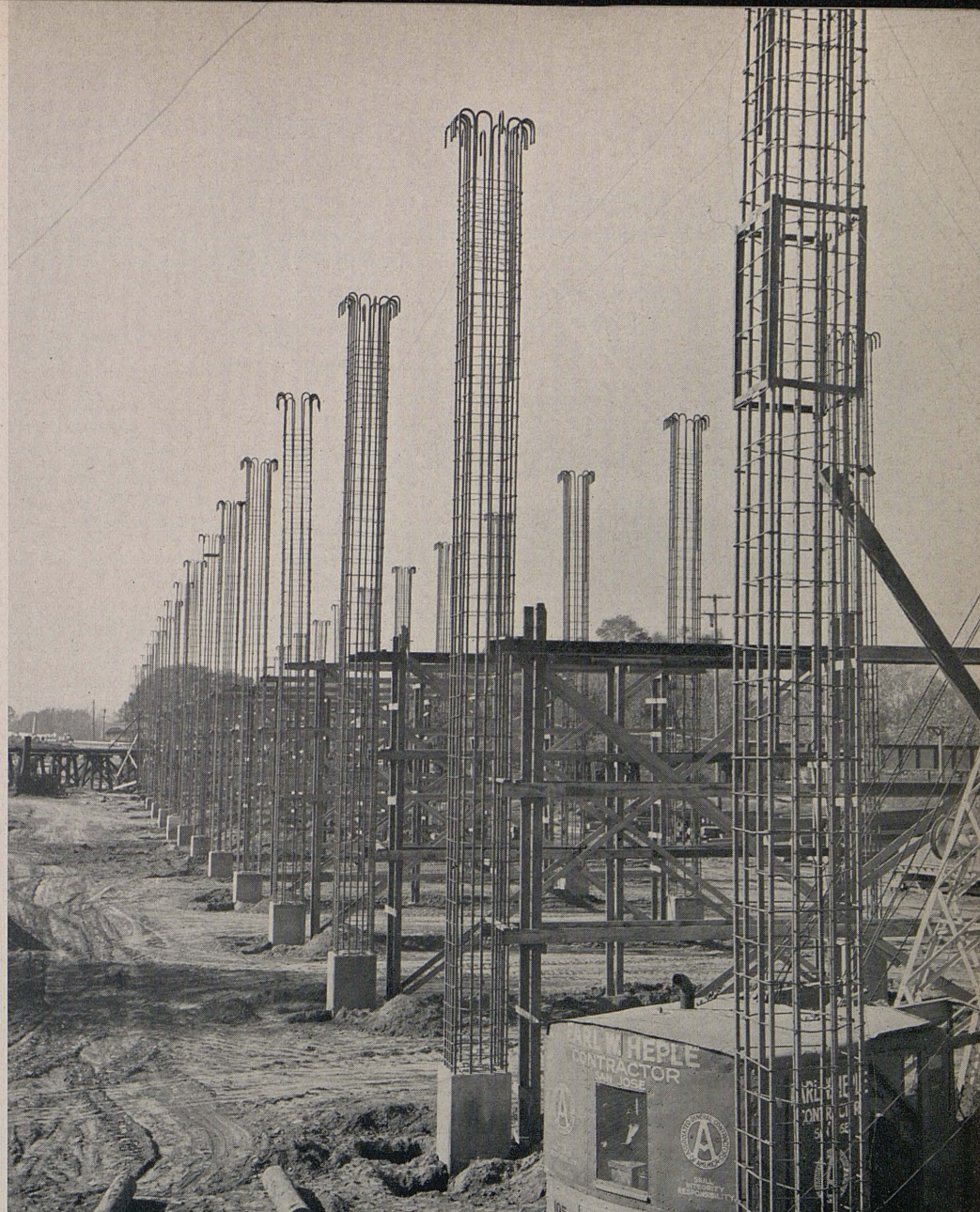
The State offered the owners \$1,241.85 for the property, which was refused, and the Division of Contracts and Rights of Way of the Department of Public Works was compelled to institute condemnation proceedings.

A Plumas County jury has just rendered a verdict awarding Macdonald and Purdy \$380.

The defendants contended that there is still a fortune in gold in the abandoned shaft and estimated at least \$800,000 could be taken out of it if it were reopened and worked.

Admitting that gold is where you find it, attorneys for the Division of Highways argued that the State of California can not pay for gold unless the gold can be seen.

On the witness stand, Purdy re-



Erected reinforcing steel columns mark route of viaduct across railroad trestle.

duced his valuation estimate to \$475,000, asking \$474,550 for damages and \$450 for the land. The jury awarded \$360 for land and \$20 for damages.

The property involved lies in Elizabethtown Ravine, between Keddie and Quincy, once the scene of extensive mining operations.

According to S. W. Elliott, Supervising Right of Way Agent of the Department of Public Works, the case was one of the most unusual ever encountered by the Division of Highways.

The jury rendered its verdict on November 27th, last.

Query—“My cutworms and beetles are better than ever before, but for some reason my potato bugs look undernourished.”

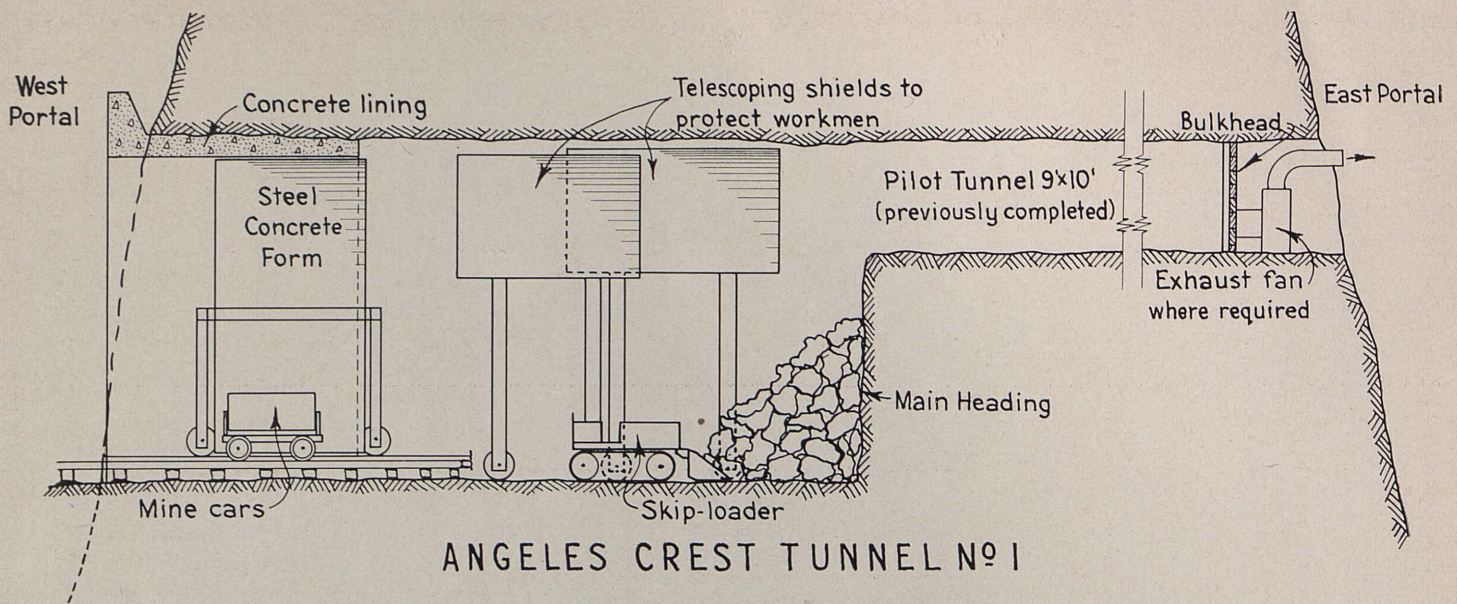
Widening Sections of American Canyon Highway

(Continued from page 10)

Providing that inclement weather does not interfere, this project should be completed and opened to traffic before Christmas, and should materially aid in the free flow of traffic over this U. S. 40, important cross-state road, extending from the San Francisco Bay area, through Sacramento and on across the continent.

The contract is being done by Heafy-Moore Company and Fredrickson & Watson Construction Company, of Oakland.

The total allotment is \$141,968. A. K. Nulty is the Resident Engineer in charge for the State.



Boring 2 Tunnels on Angeles Crest Highway

(Continued from page 8)

From West Islip Saddle, the new highway will run along the northerly side of Mt. Islip and North Baldy Peak at elevations of from 6,500 to 7,500 feet above sea level through heavily timbered country and on very steep slopes.

Due to the ruggedness of the terrain at slightly less than 7,000 feet elevation, construction roads necessary to by-pass the tunnel sites for roadway work ahead were considered to be impractical as well as disfiguring to the landscape. Facing a "bottle-neck," it became necessary to adopt tunnel construction procedure that would expedite progress and allow passing of heavy equipment and crews through the tunnels at the earliest possible moment.

To facilitate such procedure, beginning at the westerly portal of tunnel No. 1, a small pilot drift 9 feet wide by 10 feet high, was rapidly excavated at the crown of the tunnel—this size opening being sufficient to pass air equipment and crews ahead for work on tunnel No. 2.

PILOT DRIFTS USEFUL

Excavation was then immediately started on tunnel No. 2 with a 14 foot by 14 foot pilot drift at grade—this size being adequate for passing heavy grading equipment. Simultaneously with the start of construction of this pilot drift in tunnel No. 2, excavation

of the full face of tunnel No. 1 was undertaken and both operations are, at present, under way. Upon completion of these two operations, heavy grading equipment can readily be passed through the tunnels for roadway excavation ahead.

The pilot drifts as above planned, aside from facilitating construction procedure, serve as a part of the ventilating system and also provide exploratory information necessary for proper design of tunnel lining.

In construction of the pilot drifts, forced ventilation is provided through a 10-inch duct from a 15-inch blower capable of furnishing 5,400 cubic feet of air per minute at 1,485 R.P.M., powered by a 10 H.P. gasoline engine. Ventilation during excavation of the full section of tunnel No. 1 is, under present conditions, adequately furnished by natural draft through the pilot drift. This is to be augmented as work progresses with an exhaust blower in the pilot tunnel.

Two distinct types of rock are encountered: gneiss, a faulted metamorphic rock, and pink granite, a massive igneous rock, both of which have been found to be sufficiently stable to require timbering of pilot drifts only in faulted areas and at the portals. Excellent breakage is being obtained in both types of rock with approximately 3 lbs. of 50 to 60 per cent special tunnel powder per cubic yard.

Mucking of the pilot drifts is being satisfactorily handled with a mine car air loader. Mucking of the full section is under way with half cubic yard skip-loaders.

For protection against dropping spalls from the tunnel crown during drilling and mucking of the full tunnel section (35 feet wide by 22 feet 2 inches high), two telescoping steel and timber shields, 20 feet and 30 feet long, operating on rails, are moved into place over the workmen as excavation progresses.

With steel forms for reinforced concrete tunnel lining following the protection shields closely behind excavation operations, workmen are given a maximum of protection against falling rocks.

Tunnel lining, consisting of an 18-inch reinforced concrete ring, is being successfully placed with a one-half cubic yard pneumatic concrete placer operating at 110 pounds air pressure. Concrete work noted in the photographs at the westerly portal of tunnel No. 1 is a strengthening arch ring to reinforce the portal.

Coarse aggregate for concrete is produced on the job from tunnel muck and fine aggregate is obtained from a local deposit.

Field operations are in charge of Superintendent Ben H. Henry and Resident Engineer Jim Lackey under District Engineer S. V. Cortelyou.

In Memoriam

Myrtle V. Murray

THOUSANDS of men and women who have played a part in the public life of California during the past three decades were saddened by the death on November 29th of Miss Myrtle V. Murray, Administrative Assistant to Director Frank W. Clark of the Department of Public Works.

To the headquarters staff of the department in Sacramento and to many hundreds of employees throughout the State, the passing of Miss Murray is a distinct personal loss.

Entering State service as a girl in 1911, Miss Murray viewed the passing political parade in the Capital City of California for 31 years, the while taking an ever-increasing active role in varied governmental affairs.

She was the only woman ever to hold the office of Director of Public Works in this State. In recognition of many years of faithful public service, Governor James Rolph, Jr., on October 10, 1932, following the resignation of Col. Walter E. Garrison as Director, appointed her Public Works Director so that she might have the honors and emoluments of the office pending the assumption of the post by Earl Lee Kelly on October 14th.

Myrtle V. Murray was born in Dallas, Texas. She was one of three girls born to Dr. and Mrs. Carl L. Murray. The family moved to Los Angeles in the 90's. Following her graduation from the Los Angeles high school, Miss Murray became a resident of Chico, where her father had established himself in the practice of medicine and later became a widely known physician in northern California.

While still in her teens, Miss Murray came to Sacramento from Chico to accept a position as sec-

retary for the firm of Wood-Curtis Co., and served in that capacity until she was appointed in 1911 a stenographer in the old State Highways Division of those days. The staff then consisted of a chief engineer, an assistant and two stenographers. Miss Murray saw that little organization expand into

the present-day Department of Public Works employing some 6,000 persons.

Hiram W. Johnson was elected Governor of California in 1910 and a few months after he assumed office in January, 1911, Miss Murray was transferred by him to his office. In that year, Governor Johnson appointed Austin Bradstreet Fletcher to head the first State Highway Department and Miss Murray became his secretary.

In 1921, under Governor William D. Stephens, the Legislature created the present Department of Public Works and Mr. Fletcher became the first Director, retaining Miss Murray as his secretary. Miss Murray served in that capacity under eight Public Works directors. During the latter part of his term, Governor Stephens borrowed Miss Murray and she was a valued member of his office staff until B. B. Meek made her his secretary following his appointment

as Director of Public Works by Governor C. C. Young. Following the appointment of Mr. Kelly in 1932, she became Administrative Assistant of the department, being retained in that position by Director Clark.

Miss Murray's passing has left a void in the Department of Public Works which can not be filled.

Surviving Miss Murray are her two sisters, Mrs. Clara Blood and Mary Murray, to whom goes the sympathy of the entire personnel of the department.



MYRTLE VENELIA MURRAY

Detail Of Major Project Allocations In Revised Budget

Continuing the article on the budget from page two, the ensuing pages present tabulations showing the allocations State Highway System during the ninety-third and ninety-fourth fiscal years of the biennium that began July 1, 1941. The amount appears in parentheses for one of the counties, indicating that the two counties share the allocation which

County	Route	Location	Mileage	Proposed expenditure for construction, right of way, engineering and contingencies	County total
Alameda	5	Mayhew Creek		\$18,500	
Alameda	5	Castro Valley to Dublin (portions)	1 5 +	132,300	
Alameda	5	Livermore to Hayward	18 7	35,500	
Alameda	5	Hayward to Dublin (portions)	1 1	8,000	
Alameda	69	Ashby Avenue to Bay Bridge Distribution Structure	1 7	112,200	
Alameda	69	Oak Street to High Street	3 3	1,719,900	
Alameda-Contra Costa	69	Junction with Route 14 to Ashby Avenue (see Contra Costa County)	2 8	235,800	
Alameda	107	Alameda Creek		26,500	
Alameda	107	Arroyo de Laguna		29,100	
Alameda-San Francisco	68	San Francisco-Oakland Bay Bridge (see San Francisco)		(1,700,000)	\$2,317,800
Alpine	23	South of Markleeville		2,600	
Alpine	24	At Woody Gulch		16,000	
Alpine	24	Summit of Pacific Grade to Wolfe Creek Road (portions)		13,200	31,800
Amador	34	Pine Grove to Lower Volcano Road		33,100	
Amador	34	Antelope Springs to Cooks Station (portions)		19,800	
Amador-Calaveras	65	Across Mokelumne River (see Calaveras County)		6,600	59,500
Butte-Sutter	3	Loma to 0.2 mile north of Butte County Line (portions) (see Sutter County)		251,400	
Butte	3	Biggs Road to Tehama County Line (portions)	3 0	27,800	
Butte	21	Feather River to West Branch	10 4	158,800	
Butte	45	At Big Butte Creek Overflow		11,900	
Butte	47	Pine Creek Overflows		55,600	
Butte	87	At Grass Draw		7,500	
Butte	87	Oroville to junction Route 3 (portions)		62,200	575,200
Calaveras	24	County Line to Valley Springs (portions)	5 0	39,700	
Calaveras	24	Angels Camp to Murphy's (portions)	2 0	26,500	
Calaveras-Amador	65	Across Mokelumne River (see Amador County)		(6,600)	66,200
Colusa	7	In Arbuckle		1,453.50	1,453.50
Contra Costa-Alameda	69	Junction with Route 14 to Ashby Avenue (see Alameda County)	2 8	(235,800)	
Contra Costa	14	Richmond to Carquinez Bridge (portions)	3 5	345,500	
Contra Costa	14	Richmond to Martinez (portions)	17 6	29,600	
Contra Costa	75	Orinda Road to Walnut Creek (portions)		309,600	
Contra Costa	106	Franklin Canyon; Martinez to Route 14 (portions)		529,200	
Contra Costa	106	Hercules to Martinez (portions)		21,200	1,235,100
Del Norte	1	At Station 817		3,300	
Del Norte	1, 71	1 mile south of Crescent City to 1.5 miles north of Crescent City (portions)	0 3	31,900	
Del Norte	46	Klamath to Klamath Glenn (portions)		19,800	55,000
El Dorado	11	2¼ miles east of Clarksville to 1¼ miles west El Dorado (portions)		370,500	
El Dorado	23	At Branches of Big Meadow Creek		2,600	
El Dorado	23	Across Upper Truckee River		10,000	383,100
Fresno	4	Malaga to Cherry Avenue	4 0	370,500	
Fresno	10	Lone Pine Service Station to 1.3 miles east of Parkfield Junction	1 6	92,600	
Fresno, Kings	10	Coalinga to Armona (portions) (see Kings County)		19,800	
Fresno	41	White Deer Road to Forest Boundary	3 12	24,200	
Fresno	41	Fowler Switch Canal		13,200	
Fresno	41	Kings Slough and Overflows (12 openings)		136,300	
Fresno	76	Big Dry Creek		20,000	
Fresno	76	Humphreys Creek		1,300	
Fresno	76	Home Creek		19,800	
Fresno	76	Snowslide Creek		12,000	
Fresno	76	Corral Creek		23,800	
Fresno	76	Pitman Creek		8,000	
Fresno	76	Route 125 to Huntington Lake (portions)		26,500	
Fresno, Kings	125	Kettleman City to Fresno (portions) (see Kings County)		(13,200)	
Fresno-Madera	125	Fresno to 1.6 miles north San Joaquin River; Canal Bridge (see Madera County)	9 3	(317,500)	768,000

For Current Biennium As Adopted November 10, 1941

of highway funds as revised by the State Highway Commission for each proposed major project improvement of the The items of proposed expenditure are grouped by counties and in cases where the projects cross county lines is only included in the total column opposite the name of the other county.

County	Route	Location	Mileage	Proposed expenditure for construction, right of way, engineering and contingencies	County total
Glenn	7	North of Willows		\$26,500	
Glenn	45	Butte City Ferry		9,500	
Glenn	45	Willows to Glenn (portions)	3.0	26,500	\$62,500
Humboldt		At Bull Creek in Bull Creek State Park		7,900	
Humboldt	1	Jordan Creek to South Scotia Bridge	1.7	25,900	
Humboldt	1	Across Eureka Slough	0.6	406,700	
Humboldt	1	North Scotia Bridge to Rio Dell	1.4	128,300	
Humboldt	1	Weott to 0.6 mile north	0.6	76,000	
Humboldt	1	Sinclair's northerly (portions)	1.63	12,600	
Humboldt	1	Avenue of Giants (portions)	0.28	2,100	
Humboldt	1	South Scotia Branch to Scotia	3.16	66,800	
Humboldt	1	Loleta to Salmon Creek (portions)	5.90	29,100	
Humboldt	1	Big Lagoon northerly (portions)	2.00	13,200	
Humboldt	1	3.5 miles north of Garberville at Redway		92,600	
Humboldt	1	¼ mile north of Dyerville		92,600	
Humboldt	1	At South Fork Eel River Branch at Smith Point		23,600	
Humboldt	1	Metropolitan to Fortuna (portions)		9,900	
Humboldt	1	State Parks, various locations		6,600	
Humboldt	1	Richardson Grove (portions)		8,900	
Humboldt	1, 56	At Fernbridge Intersection and Rohnerville Curve	0.3	19,900	
Humboldt	20	Across Mad River	0.5	285,500	
Humboldt, Trinity	20	Willow Creek to Whites Bar (portions) (see Trinity County)		(271,200)	
Humboldt	20, 46	At Minor Creek, Glendale Creek and Starritt Mine Flume		5,000	1,313,200
Imperial	12	Mountain Springs to Dixieland (portions)		18,200	
Imperial	26	El Centro to Brawley and in Imperial	13.0	326,500	
Imperial	26	Trifolium Canal to 2 miles north Sandy Beach Road (portions)		390,000	
Imperial	26	Coral Wash to north County Line		91,000	
Imperial	26	Calexico to El Centro	10.0	58,500	
Imperial	27	Junction Route 12 and 26 via Adams Avenue and Fourth Street to Route 27; in El Centro, cooperative project		195,000	
Imperial	27	East Highline Canal to Yuma		32,500	
Imperial	187	Niland to north County Boundary (portions)		65,000	
Imperial	187	Bonds Corners to Holtville (portions)		10,000	
Imperial	187	Bonds Corners to Holtville (portions)		3,900	
Imperial	201	North of Calexico to east of Brawley (portions)		10,500	
Imperial	201	Brawley to Calipatria (portions)		13,000	
Imperial	202	East Highline Canal Line Changes	0.6	25,000	1,239,100
Inyo	23	Cottonwood Creek to Bartlett (portions)	2.5	84,500	
Inyo	23	At Railroad Crossing Station 528 to Station 533, Section H	0.1	2,750	
Inyo	23	South of Route 127 to Alabama Gate (portions)	1.5	9,700	
Inyo	23	Independence to Fish Springs School (portions)	6.0	19,500	
Inyo	23	Haiwee to Cottonwood Creek and Round Valley Road to Mono County Line (portions)	1.0	5,200	
Inyo	23	Drainage correction on Primary Routes		3,250	
Inyo	63	Near Deep Springs School	0.1	400	
Inyo, Mono	76	Laws Junction to Mono County Line (see Mono County)	4.6	73,600	
Inyo	76	Near Plant No. 3	0.05	3,600	
Inyo	127	Near Shoshone	0.1	1,300	
Inyo	127	In Death Valley National Monument		23,100	
Inyo		Various Drainage correction on Secondary Roads		600	227,500
Kern	4	Fort Tejon to 1.6 miles north of Grapevine Station; Grapevine Creek Bridge	6.2	540,000	
Kern	4	Southern Pacific Railroad Overpass to Famosa (portion); Lerdo Canal Bridges		494,000	
Kern	4	Famosa to Delano (portions)		52,000	
Kern	4	Safety Items on Primary Roads		3,250	
Kern	23	North Boundary Mojave to 6.5 miles north	6.5	140,700	
Kern	23	Cinco to Ricardo (portions)	1.3	4,000	
Kern	58	Mojave easterly (portions)	8.0	31,200	

DETAIL OF MAJOR PROJECT ALLOCATIONS IN REVISED BUDGET

County	Route	Location	Mileage	Proposed expenditure for construction, right of way, engineering and contingencies	County total
Kern	58	Marcel easterly; 5 unnamed creeks		\$475,000	
Kern	58	5.6, 5.7, 5.9 miles east of Buttonwillow, Equalizers		26,000	
Kern	58	Main Drainage Canal		13,000	
Kern	58	Buena Vista Slough		41,600	
Kern	58	McKittrick to Rosedale (portions)		19,500	
Kern-Tulare	129	Deepwell Ranch to 1/4 mile north of County Line (see Tulare County)	8.0	(221,000)	
Kern	138	McKittrick to Kings County Line (portions)		39,000	
Kern	142	Southern Pacific Railroad Tracks to Levee Canal	0.66	78,000	
Kern	142	Barren Creek Bridge		9,500	
Kern	142	Poso Creek Bridge		3,400	
Kern		Various Drainage correction on Secondary Roads		6,500	
Kern		Various Safety Items on Secondary Roads		3,250	\$1,979,900
Kings, Fresno	10	Coalinga to Armona (portions) (see Fresno County)		(19,800)	
Kings	125	5th Standard Parallel to Stratford; Kings River Bridge	4.7	270,000	
Kings	125	Prairie Draws		1,100	
Kings, Fresno	125	Kettleman City to Fresno (portions) (see Fresno County)		13,200	
Kings	134	Corcoran to Tulare County Line (portions)		6,600	
Kings	138	North and south of Junction of Route 125	10.0	59,500	350,400
Lake	15	Laurel Dell Lake to Tule Lake (portions)	1.75	14,000	
Lake, Mendocino	16	Lakeport to Route 1 (portions) (see Mendocino County)		264,600	
Lake	49	Middletown southerly (portions)	3.9	30,700	
Lake	49	Putah Creek to Lower Lake (portions)		95,300	
Lake	89	Lakeport easterly (portions)	0.8	6,400	
Lake	89	Intersection with Route 16 southerly (portions)	0.9	7,100	
Lake	89	At Kelsey Creek	0.3	7,900	
Lake	89	At Scott Creek	0.3	2,600	428,600
Lassen	21	At Long Valley Creek		5,300	
Lassen	28	Big Valley Mountain	2.5	12,000	
Lassen, Sierra	29	Constantia to Nevada State Line (portions) (see Sierra County)		79,400	
Lassen	73	Ravendale to Termo	5.0		
Lassen	73	Brockmans to Madeline (portions)	3.5	61,700	158,400
Lassen	73	Viewland to Secret Valley (portions)	10.0		
Los Angeles	4	Paradise Ranch to Piru Creek (portions)	3.55	81,250	
Los Angeles	4	Castaic to Alamos Creek (portions)	16.0	52,000	
Los Angeles	9	Glendora to San Bernardino County Line (portions)		16,000	
Los Angeles	9	At Rosemead, traffic signals		6,500	
Los Angeles	26	Right of Way, Ramona Freeway; Los Angeles to Pomona (portions)		300,000	
Los Angeles	26	Garey Avenue to Hamilton Boulevard in Pomona (cooperative project)	0.7	45,500	
Los Angeles	26	Valley Boulevard Intersection		3,250	
Los Angeles	26	Rosemead to Potrero Street (portions)		17,000	
Los Angeles	60	Walnut Canyon to Winter Canyon (portion)		627,000	
Los Angeles	60	South City Limits to 24th Street in Hermosa Beach	1.2	96,500	
Los Angeles	60	0.4 mile east of Sunset Boulevard		19,500	
Los Angeles	61	Angelus Crest Highway		624,000	
Los Angeles	156	0.5 mile south of Topanga Post Office		2,000	
Los Angeles	158	Sepulveda Boulevard; Centinella Avenue to Jefferson Boulevard	0.7	117,000	
Los Angeles	162	Pacific Electric Railroad Tracks at Hancock Avenue		4,300	
Los Angeles	162	Santa Monica Boulevard, Fairfax to Croft	0.7	58,500	
Los Angeles	164	La Tijera to Sepulveda	1.5	16,000	
Los Angeles	164	Hawthorne Ave., El Segundo to north City Limits		18,500	
Los Angeles	166	Santa Ana Freeway (portions)		585,000	
Los Angeles	168	Rosemead Boulevard, Route 60 to Center Street	3.4	982,000	
Los Angeles	168	Rosemead Boulevard, Las Tunas Boulevard to Longden Avenue	0.7	84,500	
Los Angeles	169	Bellflower Boulevard, Compton Boulevard to Lakewood Boulevard		18,200	
Los Angeles	169	Bellflower Boulevard, Artesia Street to 800 ft. south of South Street		50,500	
Los Angeles	170	Orange County Line to 1 mile north		1,700	
Los Angeles	173	Olympic Boulevard, Los Angeles City Limits to Lincoln Boulevard in Santa Monica	2.3	560,000	
Los Angeles	174	At Los Angeles River (cooperation with U.S.E.D.)		36,400	
Los Angeles	174	Lakewood Boulevard to Orange County Line (portions)	9.82	74,100	
Los Angeles	178	Carson Street east of Lakewood Boulevard		18,200	
Los Angeles	179	Route 60 to San Gabriel River	1.4	15,600	

ET FOR CONSTRUCTION OF HIGHWAYS IN THE CURRENT BIENNIUM

County	Route	Location	Mileage	Proposed expenditure for construction, right of way, engineering and contingencies	County total
COOPERATIVE PROJECTS IN LOS ANGELES:					
Los Angeles	2	Cahuenga Pass; 900 ft. north of Barham Boulevard to 1,000 ft. north of Lankershim Boulevard		*(486,000)	
Los Angeles	2	Parkway Route 2; from Los Angeles River at Aliso Street to Vermont Avenue		3,250,000	
Los Angeles	2	Aliso Street to Soto Street (portions)		511,200	
Los Angeles	4	Daley Street; Main Street to Pasadena Avenue		*(330,000)	
Los Angeles	4	San Fernando Road; Ensign Avenue to Burbank		*(35,600)	
Los Angeles	4	San Fernando Road; Bransford Avenue to Truesdale Avenue		*(47,200)	
Los Angeles	4	San Fernando Road; Delay Drive to Verdugo Road		*(62,000)	
Los Angeles	26	Ramona Freeway; Macy Street to Indiana Street	1.95	545,000	
Los Angeles	158	Sepulveda Boulevard, Sunset Avenue to south of Waterford and Ohio Avenue to Pico Place		*(241,000)	
Los Angeles	161	Colorado Street, Townsend Avenue to Eagle Rock Boulevard		*(92,800)	
Los Angeles	161	Moorpark Street Bridges and Approaches, Tujunga Wash		*(50,000)	
Los Angeles	163	Bicknell Street to Windward Avenue (portions) (State Highway Fund \$232,000; City of Los Angeles, 1/4 c \$117,590)		232,000	
Los Angeles	165	Figueroa Street, Neola to Buena Vista Terrace		*(117,590)	
Los Angeles	165-205	Arroyo Seco Parkway and Figueroa Street, Avenue 22 to Figueroa Terrace		*(112,500)	
Los Angeles	173	Olympic Boulevard, Berendo Street to Western Avenue		1,691,000	
Los Angeles	173	Olympic Boulevard, Hoover Street to Menlo Avenue		*(310,000)	
Los Angeles	173	Olympic Boulevard, Bundy Drive to Centinella Avenue		*(111,000)	
Los Angeles	173	Flower Street to west City Limits, traffic signals		88,000	
				*(28,000)	\$10,848,200
Madera, Merced	4	1/2 mile north of Ash Slough to 2.6 miles north of County Boundary (see Merced County)	1.8	(221,700)	
Madera	4	San Joaquin River to Madera	7.5	33,200	
Madera	32	Califa to Merced County Line (portions)		39,700	
Madera, Fresno	125	Fresno to 1.6 miles north of San Joaquin River Bridge; Canal Bridge (see Fresno County)	9.3	317,500	
Madera	126	Across City Canal		5,700	396,100
Marin	1	Ignacio to north County Boundary (portions) Navato Creek		396,900	
Marin-Sonoma	8	Ignacio to Shellville (portions) (see Sonoma County)		4,800	401,700
Mariposa	18	8.7 miles west of El Portal		1,000	
Mariposa	65	At Maxwell Creek		3,300	
Mariposa	65	At CCC Camp	0.5	9,300	13,600
Mendocino	1	At South Fork Eel River		19,800	
Mendocino	1	3/4 mile north of Red Mountain Creek to Piercy	3.9	333,400	
Mendocino	1	Hopland to Crawford Ranch; McNab Creek	6.7	487,000	
Mendocino	1	N. W.P.R.R. to Willits (portions)	0.9	104,500	
Mendocino	1	At Elk Creek		10,600	
Mendocino	1	0.5 mile south of Hopland		10,600	
Mendocino	1	At Ackerman Creek		2,600	
Mendocino	1	Ridgewood Hill (portions)	0.92	6,400	
Mendocino	1	Sherwood Road to Rattlesnake Summit (portions)	2.85	21,200	
Mendocino	1	Rosswarnes northerly (portions)	0.66	5,300	
Mendocino	15	Calpella to County Line (portions)	1.90	15,100	
Mendocino, Lake	16	Lakeport to Route 1 (portions) (see Lake County)		(264,600)	
Mendocino	48	Flynn Creek to Navarro	2.0	86,000	
Mendocino	48	Ward Creek—Mile 45.1		2,000	
Mendocino	48, 56	Fairbanks Hill and Gualala to Point Arena (portions)	5.0	29,600	
Mendocino	56	At Albion River	0.7	357,200	
Mendocino	56	Mile 2.5 northerly		700	
Mendocino	56	Salmon Creek Bridge northerly		5,300	
Mendocino	56	Mile 5.1 Dark Gulch		13,200	
Mendocino	56	Mile 6.6 south of Buckhorn Creek		9,400	1,519,900
Merced, Madera	4	1/4 mile north of Ash Slough to 2.6 mile north of County Boundary (see Madera County)	2.6	221,700	
Merced	32	West County Boundary to Foot of Grade and San Luis Creek Line Change	4±	311,000	
Merced	41	Dos Palos Wye to Dos Palos (portions)	4.0	26,500	

* City of Los Angeles 1/4 cent State Highway Funds; amounts not included in County total of State Highway Funds.

DETAIL OF MAJOR PROJECT ALLOCATIONS IN REVISED BUDGET FOR

County	Route	Location	Mileage	Proposed expenditure for construction, right of way, engineering and contingencies	County total	
Merced	32	Pacheco Pass to Junction Route 121 (portions)	1.5	\$86,000		
Merced	41	Centinella to Los Banos (portions)	10.8			
Merced, Stanislaus	41	Vernalis to Junction Route 32 (portions) (see Stanislaus County)	5.0			
Merced	121	Centinella to Junction Route 32	3.0			
Merced	122	West of Merced (portions)	4.0			
Merced	123	Junction Route 32 to Merced River (portions)	3.5	26,500	\$701,400	
Modoc	28	Pit River to Canby (portions)	6.0	6,700	181,600	
Modoc	28	Lakeview Junction to Toms Creek (portions)	8.2	15,300		
Modoc	28	Toms Creek to Cedarville (portions)	10.0	12,800		
Modoc	73	Likely northerly	1.0	14,200		
Modoc	73	At Toms Creek, Joseph Creek, Dry Gulch and New Pine Creek		38,000		
Modoc	73	Likely to Alturas (portions)	18.6	94,600		
Mono	13	Vicinity Mile 4.6, Section A		6,500		
Mono	23	Rock Creek to Casa Diablo (portions)	8.0	166,300	442,600	
Mono	23	1 mile north of Bridgeport to Dresslers Corner	1.2	27,300		
Mono	23	Vicinity Mile 12.55 and Mile 14.55, Section J	2.0	18,000		
Mono	23	Station 381, Section J	0.1	1,000		
Mono	23	Station 114 to 194, Section I	0.1	2,300		
Mono	23	Station 543 + 50 to Station 547 + 00, Section K	0.1	3,700		
Mono	23	Station 610, Section I		250		
Mono	23	In Leevining		900		
Mono	23	Vicinity Chris' Flat	0.1	4,500		
Mono	23	In Bridgeport		1,500		
Mono	23	Casa Diablo Hot Springs to Crestview (portions)	2.7	22,750		
Mono	23	Conway Summit to Bridgeport (portions)	6.0	20,500		
Mono	23	Crestview to June Lake Junction	9.7	34,300		
Mono	23	Near Point Ranch		700		
Mono	40	West Boundary to Route 23 (portions)		31,900		
Mono	40	Route 23 to Gas Pipe Springs (portions)	14.3	19,500		
Mono	76	Near Hammil Station	1.0	7,800		
Mono, Inyo	76	Laws Junction to Mono County Line (see Inyo County)	4.6	(73,600)		
Mono	95	Near Winemuller's, Mile 8.5, Section A	0.4	10,200		
Mono	95	Antelope Valley to State Line (portions)	2.0	5,500		
Mono	111	Grant Lake to Route 23	2.6	52,000		
Mono	111	Station 76 to Station 111 + 25, Section A	0.6	2,600		
Mono	111	Vicinity of Gull Lake		2,600		
Monterey	2	Salinas to Santa Rita	3.1	390,000	1,043,800	
Monterey	2	Salinas to 2 miles south of Salinas	1.8	264,600		
Monterey	2	King City to Soledad (portions)		29,000		
Monterey, San Benito	2	Santa Rita Mesa to Chittenden Road (portions) (see San Benito County)		(396,900)		
Monterey	2	Bradley to San Ardo (portions)		4,000		
Monterey	2	San Ardo to San Lucas (portions)		33,000		
Monterey	2	At Monterey Trestles	0.22	2,600		
Monterey	2	San Lucas to King City (portions)	3.5	66,200		
Monterey	2	King City to Greenfield (portions)	2.5	52,900		
Monterey	2	Greenfield to Camphora (portions)	1.0	18,800		
Monterey	2	San Ardo to King City (portions)		19,800		
Monterey	56	Seaside to Castroville		132,300		
Monterey	56	At Salmon Creek		15,900		
Monterey	56	Near Seaside		3,400		
Monterey	56	At Villa, Alder, Willow, Kirk and Lime Creeks and Hot Springs Canyon		3,400		
Monterey	117	Monterey to Salinas (portions)		2,100		
Monterey	118	Castroville to Salinas (portions)		5,800		
Napa, Solano	7	Junction of Route 208 to 2½ miles easterly (portion) (see Solano County)	2.5	188,700		229,100
Napa, Sonoma	8	Ignacio to Napa (portions) (see Sonoma County)		40,400		
Nevada	15	Bear Valley Grade (portions)		13,200		377,100
Nevada-Placer	17	Auburn to Rattlesnake Creek (portions) (see Placer County)		(82,300)		
Nevada	17	1.5 miles north Rattlesnake Creek to Grass Valley	4.2	284,400		
Nevada, Yuba	25	Nevada City to Sierra County Line (portions) (see Yuba County)		(132,300)		
Nevada	37	Donner Summit to Donner Lake	2.2	79,500		
Nevada, Sierra	38	1 mile north Farad to 0.7 mile south State Line (see Sierra County)	3.0	(211,700)		

ET FOR CONSTRUCTION OF HIGHWAYS IN THE CURRENT BIENNIUM

County	Route	Location	Mileage	Proposed expenditure for construction, right of way, engineering and contingencies	County total
Orange	2	At Doheny Park		\$1,400	
Orange	2	Right of Way; Santa Ana Freeway (portions)		260,000	
Orange	43	Santa Ana Canyon Road, Peralto to Olive Cutoff	4.5	247,100	
Orange	43	Santa Ana Canyon Road, Santiago Creek Bridge to north City Limits of Orange (cooperative project)	1.4	26,000	
Orange	170	Katella Avenue to Cerritos		1,400	
Orange	174	Los Angeles County Line to Anaheim	2.85	22,100	
Orange	174	Right of Way; Santa Ana Freeway (portions)		130,000	
Orange	175	Santa Ana River Bridge		30,696.50	
Orange	176	Route 62 to Route 2 (portions)		4,000.00	
Orange	182	Orange to Orange County Park (portions)		1,400	
Orange	184	Newport Boulevard to Santa Ana	1.3	15,000	
Orange	185	1.2 mile south of Route 2 to Route 2	1.2	4,750	\$743,846.50
Placer-Nevada	17	Auburn to Rattlesnake Creek (portions) (see Nevada County)		82,300	
Placer	3	Lincoln to Yuba County Line (portions)	2.0	18,500	
Placer	37	2d crossing Nevada County Line to 3d crossing Nevada County Line (portions) and Gold Run to Nevada County Line (portions)	3.0	34,400	
Placer	38	El Dorado County Line to Nevada County Line (portions)		14,200	149,400
Plumas	21	In Quincy	0.5	6,000	
Plumas	21	Spanish Creek to Quincy		6,600	
Plumas	21	North Fork to Keddie	21.0	202,800	
Plumas	21	Near Quincy		700	
Plumas	21	Beckwourth to Edes Ranch	9.3	62,700	
Plumas	21	Quincy to Western Pacific Subway	4.1	162,500	
Plumas	21	Feather River Inn to Beckwourth (portions)	16.0	6,600	
Plumas	21	Spring Garden to Feather River Inn (portions)	10.0	6,600	
Plumas	21	Spring Garden to Feather River Inn (portions)	12.0	13,200	
Plumas	21	Keddie to Spanish Creek	5.65	19,800	
Plumas	29	Lost Creek to Route 83	3.0	7,900	
Plumas	83	Greenville to Crescent Mills	4.1	25,500	
Plumas	83	Wolf Creek to Westwood Road	5.0	7,000	
Plumas	83	Crescent Mills to Greenville	4.0	5,400	533,300
Riverside	19	Mira Loma to 3 miles west of Riverside	5.6	488,000	
Riverside	64	Near Mile 10.5, Section M		2,500	
Riverside	64	State Line to 4 miles west of Blythe (portions)		65,000	
Riverside	64	Route 26 to State Line		325,000	
Riverside	64	Indio to junction Route 64-B (portions)		19,500	
Riverside	64	Perris easterly and Hemet easterly		8,000	
Riverside	64	All American Canal Station 428		26,000	
Riverside	77	Murrieta southerly (portions)		5,500	
Riverside, San Bernardino	77	Route 43 to 1 mile south of State Game Farm (see San Bernardino County)		65,000	
Riverside	78	Perris northerly		3,300	
Riverside	78	Elsinore northerly (portions)		1,000	
Riverside	146	Ripley to junction Route 64 (portions)		10,500	
Riverside	146	Route 64 to north County Line (portions)		13,000	
Riverside	187	Between Coachella and Mecca (portions)		500	
Riverside, San Bernardino	193	Corona to Route 19 (portions) (see San Bernardino County)	5±	(52,000)	
Riverside	194	San Jacinto northerly (portions)		1,800	
Sacramento	3	American River Bridge to North Sacramento	0.7	744,500	
Sacramento	4	Cosumnes River and Overflows		26,600	
Sacramento	4	San Joaquin County Line to Sacramento (portions)		18,500	
Sacramento	11	Sacramento River Bridge at Isleton and Steamboat Slough		34,400	824,000
San Benito, Monterey	2	Santa Rita Mesa to Chittenden Road (portions) (see Monterey County)		396,900	
San Benito	119	At Oat Creek and near Stump Creek		10,000	406,900
San Bernardino	9, 26, 190	One mile west of Etiwanda Avenue (Cooperative Drainage Improvement)		105,500	
San Bernardino	9	Cherry Avenue to San Bernardino (portion)		174,500	
San Bernardino	9	Foothill Boulevard at Station 247, Section A	0.1	3,000	
San Bernardino	26	Redlands to Calimesa (portions)		195,000	
San Bernardino	26	State Street to 0.4 mile south of City Reservoir in Redlands	1.7	253,600	
San Bernardino	26	Mission Storm Drain		13,000	

DETAIL OF MAJOR PROJECT ALLOCATIONS IN REVISED BUDGET

County	Route	Location	Mileage	Proposed expenditure for construction, right of way, engineering and contingencies	County total
San Bernardino	26	Intersections Monte Vista Avenue and Vernon Street		\$2,500	
San Bernardino	31	Cajon Pass at Blue Cut Slide, Mile 5.1, Section B		1,500	
San Bernardino	31	Cajon Pass near Keenbrook, Mile 4.0, Section B		1,000	
San Bernardino	31	Cajon Boulevard at Cable Creek Overflow, Mile 2.5, Section A		800	
San Bernardino	31	Drainage correction; Victorville to Barstow (portions)		2,500	
San Bernardino	43	Victorville to 1 mile east	1.0	116,000	
San Bernardino	43	Near Arrowbear Park		500	
San Bernardino	43	San Bernardino to Route 189 (portions)		9,000	
San Bernardino	43	Running Springs Park to Big Bear Dam (portions)		3,300	
San Bernardino	58	Needles southerly		26,000	
San Bernardino	59	Deer Lodge Park to Mojave Desert	5 ±	3,250	
San Bernardino	59	At Sheep Creek		650	
San Bernardino	59	Cedar Glen Road to Route 43 (portions)		650	
San Bernardino, Riverside	77	Route 43 to 1 mile south of State Game Farm (see Riverside County)		(65,000)	
San Bernardino	189	Squirrel Inn to Lake Arrowhead (portions)		6,500	
San Bernardino	189	Route 43 to Route 59 (portions)		1,300	
San Bernardino	190	Igo to Camp Angeles (portions)		13,000	
San Bernardino	190	San Bernardino to Forest Boundary (portions)		17,800	
San Bernardino	191	At north City Limits of San Bernardino		1,500	
San Bernardino	192	Route 77 to Ontario	5.85	39,000	
San Bernardino, Riverside	193	Corona to Route 19 (portions) (see Riverside County)	5 ±	52,000	
San Bernardino	207	Junction Route 43		650	\$1,044,000
San Diego	2	Torrey Pines Mesa to Del Mar Overhead	3.3	248,500	
San Diego	2	In San Diego; Market Street to Mission Bay (portions)		218,000	
San Diego	2	Wisconsin Street to 8th Street in Oceanside (cooperative project)	1.0	70,200	
San Diego	2	San Ysidro to National City (portions)		7,800	
San Diego	2	Oceanside to Las Flores (portions)		2,500	
San Diego	12	In San Diego, Barnett Avenue, Route 2 westerly		16,300	
San Diego	12	El Cajon to Casbere Ranch (portions)		13,000	
San Diego	12	Casbere Ranch to Tecate Divide (portions)		3,300	
San Diego	77	Ash Street, San Diego, to 1/2 mile north of City Limits (Cooperative Project)	7.2	585,300	
San Diego	77	Escondido to San Luis Rey River (portions)		624,300	
San Diego	77	Between Vista and Bonsall		11,700	
San Diego	77	At San Luis Rey River		22,100	
San Diego	77	Vista to north County Line (portions)		9,800	
San Diego	78	At Canada Verde		13,000	
San Diego	78	At Descanso Creek and Samagatuma Creek		13,000	
San Diego	78	At Coleman Creek		2,500	
San Diego	78	At Acorn Creek Bridge		9,750	
San Diego	78	At Matagual Valley Creek		23,400	
San Diego	78	Cuyamaca to Julian (portions)		10,400	
San Diego	195	At West and East Channels of Live Oak Creek		20,800	
San Diego	195	At Fry Creek		9,750	
San Diego	195	Pump House Line Change		16,900	
San Diego	195	Bonsall to Pala (portions)		1,300	
San Diego	195	Oceanside to Junction Route 77 (portions)		7,800	
San Diego	196	Carlsbad to Vista (portions)		3,300	
San Diego	198	San Vicente Line Change		97,500	
San Diego	198	At Sycamore Creek		12,500	
San Diego	198	At Wright Street Creek in El Cajon		26,000	
San Diego	198	Ramona to Santa Ysabel (portions)		6,500	
San Diego	198	El Cajon to San Vicente Creek (portions)		3,300	
San Diego	198	Scissors Crossing to east County Line (portions)		4,000	
San Diego		At Borego State Park		2,000	
San Diego		At Cuyamaca State Park		700	2,117,200
San Francisco, Alameda	68	Administration, maintenance, operation and insurance on San Francisco-Oakland Bay Bridge (see Alameda County)		1,700,000	1,700,000
San Joaquin	4	At Jahant Corner		3,300	
San Joaquin	53	Lodi Lake to Railroad Crossing	1.0	4,600	
San Joaquin	75	At Morman Slough and Lone Oak Creek		1,300	
San Joaquin	75	At Hunter Creek		1,600	
San Joaquin	75	At Old and Middle Rivers		26,500	
San Joaquin	97	At Calaveras River		1,300	38,600

FOR CONSTRUCTION OF HIGHWAYS IN THE CURRENT BIENNIUM

County	Route	Location	Mileage	Proposed expenditure for construction, right of way, engineering and contingencies	County total
San Luis Obispo	2	Line Change north of Motel	0.4	\$44,200	
San Luis Obispo	2	San Luis Obispo to Santa Margarita (portions)		7,300	
San Luis Obispo	33	At Santa Rosa Creek		11,700	
San Luis Obispo	33	Paso Robles to Kern County Line (portions)		41,400	
San Luis Obispo	56	Guadalupe to Oceano (portions)		6,200	
San Luis Obispo-Santa Barbara	57	Seven cattle passes (see Santa Barbara County)		23,500	
San Luis Obispo	57	Route 2 to Cuyama River (portions)		13,000	
San Luis Obispo	58	At Trout Creek		33,800	
San Luis Obispo	125	Salinas River Bridge		26,000	\$207,100
San Mateo	2	South County Boundary to Charter Street in Redwood City	3.22	946,000	
San Mateo-Santa Cruz	56	Santa Cruz to Tunitas (portions) (Cooperative Project with Joint Highway District 9) (see Santa Cruz County)		(158,800)	
San Mateo	68	Redwood City to San Mateo (portions)		8,600	
San Mateo	68	Peninsular Avenue, San Mateo, to South San Francisco Underpass	6.64	3,043,000	3,997,600
Santa Barbara	2	Hollister Wye to San Jose Creek	3.5	553,000	
Santa Barbara	2	Las Varas Creek to ½ mile east of El Capitan Creek	3.0	377,500	
Santa Barbara	2	Right of Way; Santa Barbara Freeway Park Place to west City Limits (Cooperative Project)		390,000	
Santa Barbara	2	Right of Way; West City Limits to Hollister Wye (Cooperative Project)	2.0	13,000	
Santa Barbara	2	Zaca to Los Alamos (portions)		3,000	
Santa Barbara	2	Alcatraz to Las Cruces (portions)		7,200	
Santa Barbara	2	Goleta to Stoney Creek (portions)		3,700	
Santa Barbara	2	Nojoqui Summit to Buellton		7,000	
Santa Barbara	56	Orcutt to Guadalupe (portions)		5,200	
Santa Barbara	56	Las Cruces to Lompoc (portions)		28,600	
Santa Barbara	57	At Wasioja Creek		9,100	
Santa Barbara-San Luis Obispo	57	Seven cattle passes (see San Luis Obispo County)		(23,500)	
Santa Barbara	57	At Cottonwood Creek		9,100	
Santa Barbara	57	At Cuyama River		7,800	
Santa Barbara	80	At San Jose Creek		2,000	
Santa Barbara	149	At Alamo Pintado		19,500	
Santa Barbara	149	Surf to Lompoc (portions)		14,300	
Santa Barbara	149	1.9 miles east of Lompoc		3,500	1,453,500
Santa Clara	2	Ford Road to San Jose	8.2	595,500	
Santa Clara	5	Bascom Avenue to Park Avenue (Cooperative Project)	1.2	209,000	
Santa Clara	32	San Felipe to Bells Station (portions)		13,300	817,800
Santa Cruz	32, 56	Watsonville to Rob Roy	7.74	563,600	
Santa Cruz	42	Sempervirens Creek		23,900	
Santa Cruz-San Mateo	56	Santa Cruz to Tunitas (portions) (Cooperative Project with Joint Highway District 9) (see San Mateo County)		158,800	746,300
Shasta	3	At Cottonwood Hill		4,200	
Shasta	3	Spring Creek to Redding Subway	7.0	421,400	
Shasta	3	Redding to 2½ miles north	2.5	107,200	
Shasta	3	La Moine to Siskiyou County Line (portions)	18.5	6,600	
Shasta	3	Redding Underpass to Hill Street		3,500	
Shasta	28	In Burney Valley (portions)		3,300	
Shasta	28	Redding to Diddy Hill (portions)		26,500	
Shasta	209	Summit City to Route 3	2.9	2,000	574,700
Sierra-Lassen	29	Constantia to Nevada State Line (portions) (see Lassen County)		(79,400)	
Sierra-Nevada	38	One mile north Farad to 0.7 mile south State Line (see Nevada County)	3.0	211,700	211,700
Siskiyou	3	North Approach in Dunsmuir, Cooperative Project		46,300	
Siskiyou	3	Siskiyou County Line to Dunsmuir	1.5	2,000	
Siskiyou	3	Gazelle to Yreka (portions)	17.0	10,000	
Siskiyou	46	Across Salmon River		49,000	
Siskiyou	46	At Irving, Stanshaw and Sandy Bar Creeks		38,800	
Siskiyou	46	Hamburg to Klamath River Bridge at Walker and at Walker Creek 8 miles west of Hamburg		99,000	
Siskiyou	72	Edgewood Road to Whitney Creek (portions)		112,500	
Siskiyou	72	Near Macdoel to Dorris (portions)	10.0	11,900	

DETAIL OF MAJOR PROJECT ALLOCATIONS IN REVISED BUDGET

County	Route	Location	Mileage	Proposed expenditure for construction, right of way, engineering and contingencies	County total
Siskiyou	72	Four miles north of Weed to Grass Lake (portions)	19.0	\$11,900	
Siskiyou	82	Fort Jones to Route 3 (portions)	16.0	6,600	
Siskiyou	82	Yreka to Montague (portions)	6.0	4,000	
Siskiyou	83	Route 3 to McCloud (portions)	9.0	4,000	\$396,000
Solano	7	North of Vacaville to 2 miles north of Power Station	6.0	487,000	
Solano-Yolo	7, 6	1.3 miles north of Dixon to Yolo Causeway (see Yolo County)		934,800	
Solano-Napa	7	Junction Route 208 to 2½ miles easterly (portions) (see Napa County)	2.5	(188,700)	
Solano	7	Fairfield to 1 mile north of Vacaville (portions)	5.1	33,100	
Solano	53	Suisun to Denverton (portions)	4.0	26,500	
Solano	90	Route 7 near Richfield Station northerly		211,700	
Solano	99	Minor Slough Bridge to Yolo County Line		12,000	
Solano	208	At Napa River		158,800	
Solano-Sonoma	208	Installment payment and interest Sears Point Toll Road (see Sonoma County)		36,400	1,900,300
Sonoma	1	Sebastopol Avenue to 9th Street in Santa Rosa		166,800	
Sonoma-Napa	8	Ignacio to Napa (portions) (see Napa County)		(40,400)	
Sonoma-Marin	8	Ignacio to Shellville (portions) (see Marin County)		(4,800)	
Sonoma	51	Beltane to Sonoma (portions)		21,000	
Sonoma	56	Timber Cove Tunnel		5,300	
Sonoma	104	Jenner to Guerneville (portions)		21,200	
Sonoma	208	Junction Route 8 to Solano County Line	2.2	21,200	
Sonoma-Solano	208	Installment payment and interest Sears Point Toll Road (see Solano County)		(36,400)	235,500
Stanislaus-Merced	41	Vernalis to Junction Route 32 (portions) (see Merced County)	5.0	(30,000)	
Stanislaus	109	Modesto to Junction Route 13	4.0	66,200	66,200
Sutter-Butte	3	Lomo to 0.2 mile north of Butte County Line (portions) (see Butte County)		(251,400)	
Sutter-Yuba	3	Feather River Bridge Foundations (see Yuba County)	1.9	416,700	
Sutter	15	Sacramento River Bridge at Meridian		46,400	
Sutter	15	Meridian Overhead		4,000	467,100
Tehama	3	1.5 mile south of Red Bluff		1,300	
Tehama	7	At Thomes Creek Bridge		14,600	
Tehama	7	South Boundary to Proberta	19.5	33,100	
Tehama	29	Paynes Creek to Lost Creek (portions)	3.0	7,900	56,900
Trinity	20	Weaverville to Whites Bar Creek (portions)		145,500	
Trinity	20	Prairie Creek to Valdor (portions)	15.0	21,500	
Trinity	20	Tom Long Gulch to East Boundary (portions)	10.7	6,600	
Trinity	20	Douglas City to Vitzhums (portions)	1.0	5,300	
Trinity	29	At Hayfork Creek		1,500	
Trinity-Humboldt	20	Willow Creek to Whites Bar (portions) (see Humboldt County)		271,200	
Trinity	35	Browns Creek		6,600	458,200

General items for northern counties which have been budgeted total \$778,700.

Amounts allocated in seven northern highway districts are as follows:

District I—For culverts and State park road improvements on secondary highways, \$11,800.

District II—For safety items, improving drainage and State park road improvements on secondary roads, \$10,500; and for safety items and drainage improvements on primary highways, \$11,900.

District III—Safety items on primary highways, \$5,300; and for safety items, guard rail installations and State park road improvements on secondary highways, \$12,200.

District IV—For drainage correction and intersection and safety items on primary highways, \$87,200; and for drainage correction, various safety items and State park road improvements on secondary highways, \$31,700.

District V—For safety items on primary roads, \$7,300; and for safety

items and State park road improvements on secondary roads, \$12,800.

District VI—For various safety items on primary highways \$6,600 and for drainage correction and safety items on secondary roads, \$13,200.

District X—For drainage correction and safety items on primary roads, \$9,300; and for safety items and drainage correction on secondary highways, \$9,600.

Other budget items for use in all northern highway districts as needed are \$41,000 for landscaping and road-

FOR CONSTRUCTION OF HIGHWAYS IN THE CURRENT BIENNIUM

County	Route	Location	Mileage	Proposed expenditure for construction, right of way, engineering and contingencies	County total
Tulare	4	Tulare to Kings River (portions)		\$52,000	
Tulare	4	Quail to Tipton Crossing	5.6	19,500	
Tulare	4-10	Safety Items		3,400	
Tulare	10	Right of Way; Route 4 to Mill Creek (cooperative project)	4.2	19,500	
Tulare-Kern	129	Deepwell Ranch to ¼ mile north of County Line (see Kern County)	8.0	221,000	
Tulare	129	Daley's Corner to Woodlake (portions); (Yokohl Creek Bridge)		65,000	
Tulare	132	Route 134 to Visalia (portions)	8.1	182,000	
Tulare		Various Drainage correction on Secondary Roads		6,500	
Tulare		Various Safety Items on Secondary Roads		3,500	\$572,400
Tuolumne	13	2½ miles north of Keystone to south of Jamestown	7.5	99,200	99,200
Ventura	2	At Seacliff Sea Wall	0.4	169,000	
Ventura	2	Junctions Route 60 and Route 9; and El Rio to Montalvo	1.7	98,000	
Ventura	2	Mandos Curve to Pitas Point	1.5	121,600	
Ventura	2	Drainage protection Montalvo to Ventura (portions)		26,000	
Ventura	2	On Meta Street in Ventura, cooperative drainage improvement		2,500	
Ventura	9	Route 2 to Los Angeles County Line (portions)		6,500	
Ventura	9	Saticoy to Santa Clara Avenue (portions)		18,200	
Ventura	9	From Route 2 to Saticoy		11,700	
Ventura	60	Point Mugu to Little Sycamore Creek		195,000	
Ventura	60	Fifth Street to 6th Street in Oxnard		41,500	
Ventura	79	Through Santa Paula (cooperative project)	2.4	40,300	
Ventura	79	Sespe River Bridge		2,000	
Ventura	79	Santa Clara River Protection		71,500	
Ventura	79	At Pole Creek in Fillmore (cooperative project)		17,000	
Ventura	79	At intersection with Route 2		6,500	
Ventura	138	At Jim Creek		6,500	
Ventura	138	Ventura Avenue in Ventura, cooperative drainage improvement		6,500	
Ventura	154	El Rio to Route 9 (portions)	3.6	6,700	
Ventura	155	Triumpho Creek Bridge		2,500	849,500
Yolo, Solano	6, 7	1.3 miles north of Dixon to Yolo Causeway (see Solano County)		(934,800)	
Yolo	6	2½ miles east of Yolo Causeway to Washington Subway	1.3	84,700	
Yolo	50	¾ mile south to ½ mile north of Rumsey	1.2	43,700	
Yolo	50	Woodland to Kiesel (portions)	4.5	33,100	
Yolo	50, 90	Portions in Vicinity of Madison		10,000	
Yolo	87	0.2 mile south to 0.5 mile north of Cache Creek	0.7	33,000	
Yolo	99	Solano County Line to Irrigation Canal (portions)		17,200	
Yolo	99	Irrigation Canal to Route 6 (portions)		26,500	248,200
Yuba-Sutter	3	Feather River Bridge Foundations (see Sutter County)		(416,700)	
Yuba-Nevada	25	Nevada City to Sierra County Line (portions) (see Nevada County)		132,300	132,300

side improvements on primary roads and \$32,000 for landscaping improvement on secondary highways. A total of \$476,300 was budgeted for use in all northern districts for emergency construction, repair or replacement of bridges failed and posted for less than legal loads on secondary highways.

General items for southern counties total \$413,600 as follows:

District V—Various safety items on primary roads, \$6,500; and for safety items and State park road im-

provements on secondary highways, \$13,400.

District VII—For safety items and small betterment projects on primary highways, \$32,500; and for small grading, surfacing and drainage projects, safety items and State park road improvements on secondary roads, \$48,900.

District IX—For safety items on primary roads, \$3,300; and for safety items on secondary roads, \$600.

District XI—For safety items on primary highways, \$9,800; and for

safety items on secondary roads, \$12,400.

Budget appropriations for landscaping and roadside improvement projects in all southern districts totaling \$75,500 for primary and \$28,600 for secondary highways were provided.

The Budget provides for \$182,100 for emergency construction, repair or replacement of bridges failed and posted for less than legal roads on secondary roads in all southern districts.

Bids and Awards for November, 1941

KERN-TULARE COUNTIES — Between Deepwell Ranch and $\frac{1}{4}$ mile north of Kern-Tulare County Line, about 8.0 miles, to be graded and penetration treatment applied. District VI, Route 129, Sections B.A. N. M. Ball Sons, Berkeley, \$135,632; Griffith Co., Los Angeles, \$137,312; A. Teichert & Son, Inc., Sacramento, \$138,083; M. J. Ruddy, Modesto, \$145,203; Macco Construction Co., Clearwater, \$145,376; Rexroth & Rexroth, Bakersfield, \$153,443; Rhoades Bros., Los Angeles, \$157,049; Claude C. Wood, Lodi, \$157,796; Harms Bros., Sacramento, \$162,465; Olaf Nelson Construction Co., Logan, Utah, \$159,355; Clyde W. Wood, Los Angeles, \$165,602; M. J. B. Construction Co., Stockton, \$167,167; Oberg Bros. & Nathan A. Moore, Los Angeles, \$172,292; T. M. Page, Glendale, \$177,111; A. S. Vinnell Co., Alhambra, \$182,730; Dimmitt and Taylor, Los Angeles, \$190,972. Contract awarded to Louis Biasotti & Son, Stockton, \$131,748.

LOS ANGELES COUNTY — Between Long Beach Traffic Circle and Carson Street, about 3.0 miles to be graded and paved with asphalt concrete on Portland cement concrete base. District VII, Route 168, Sections A, Long Beach. Oswald Bros., Los Angeles, \$265,061; Sully-Miller Contracting Co., Long Beach, \$274,081; Griffith Co., Los Angeles, \$276,989; Anso Construction Co., Inc., Long Beach, \$285,163. Contract awarded to J. E. Haddock, Ltd., Pasadena, \$259,824.

MONTEREY COUNTY — Between King City and Greenfield (portions) about 2.5 miles, plant mixed surfacing to be furnished and delivered to State spreader boxes on the road. District V, Route 2, Section E. Hayward Building Material Co., Hayward, \$17,050. Contract awarded to Walter J. Wilkinson & H. B. Scott, Watsonville, \$15,125.

SAN DIEGO COUNTY — In the City of San Diego, on Pacific Highway between Bean Street and Smith Street and on Barnett Avenue from Pacific Highway to $\frac{1}{4}$ mile westerly, a distance of about 1.6 miles, drainage system to be constructed. District XI, Routes 2, 12. R. E. Hazard & Sons, San Diego, \$44,604; V. R. Dennis Construction, San Diego, \$48,385. Contract awarded to Walter H. Barber, San Diego, \$44,291.

SAN FRANCISCO COUNTY — Existing drain from Mountain Lake to be extended approximately 2200 feet to a connection with an existing city storm drain. District IV, Route 56. Fay Improvement Co., San Francisco, \$5,431; E. J. Treacy, San Francisco, \$5,664; M. J. Lynch, San Francisco, \$6,165; Eaton & Smith, San Francisco, \$6,625; Chas. L. Harney, San Rafael, \$7,770; Edwin J. Tobin, Oakland, \$8,372; Lowrie Paving Co., Inc., San Francisco, \$9,345. Contract awarded to M. J. Mcquire & M. Hester, Oakland, \$4,638.

SAN MATEO COUNTY — Between Charter St. in Redwood City and San Francisco Creek Bridge, about 3.2 miles to be graded and paved with asphalt concrete. District IV, Route 2. Piazza and Huntley, San Jose, \$363,686; A. J. Raisch and Earl W. Heple, San Jose, \$364,488. Contract awarded to Union Paving Co., San Francisco, \$324,547.

SHASTA COUNTY — Between Sulphur Creek and Boulder Creek, about one mile to be graded. District II, Route 3, Section B. Harms Bros., Sacramento, \$30,400; A. Teichert & Son, Inc., Sacramento, \$33,760. Contract awarded to Poulos & McEwen, Sacramento, \$25,458.

Traffic Continues to Show Increases on Three State-owned Toll Bridges

NOVEMBER traffic on the three State-owned bridges maintained the high level recorded in recent months. The average daily traffic on all three bridges increased slightly over October traffic and substantially over November, 1940.

The San Francisco-Oakland Bay Bridge passed its fifth anniversary date on November 12th. In the five years since the opening of the structure 61,690,000 vehicles passed through the toll gates.

The daily average on the San Francisco-Oakland Bay Bridge during

November was 56,615 vehicles—151 vehicles over the October average and a gain of 26 per cent over the November, 1940 traffic.

Carquinez Bridge, with a daily average of 14,265 vehicles, showed a gain of 482 vehicles daily over October, and a 50 per cent increase over the November, 1940 figures.

Antioch Bridge, with a 920 daily average compared with 888 in October, gained 48 per cent over November, 1940 traffic.

Total vehicular travel on the three bridges is shown in the following tabulation:

	San Francisco-Oakland Bay Bridge	Carquinez Bridge	Antioch Bridge
Passenger autos and auto trailers	1,529,600	392,405	22,853
Motorcycles and tricars	3,421	841	25
Buses	44,301	5,993	204
Trucks and truck trailers	77,566	28,468	4,476
Others	43,555	245	29
Total vehicles	1,698,443	427,952	27,587

Last Span of Pit River Bridge Erected

(Continued from page 12)

99 on the upper deck across the deep Pit River Canyon, 14 miles north of Redding. The canyon will become an arm of Shasta Reservoir after the Shasta Dam across the Sacramento River about eight miles down stream from the bridge is completed.

Construction of the bridge piers was started in November, 1939, and the first steel was placed for the superstructure in December, 1940. Supported by towering concrete piers of record height, the heavy steel spans were erected from both sides of the canyon. The span will have an overall length of 3,588 feet, including short highway approach viaducts on either side. The highway girder spans on the north side connecting with a highway approach road are yet to be erected. Southern Pacific railway tracks are being laid on the lower deck of the bridge.

In addition to riveting, the work of installing handrails, ladders, loco-

motive blast plates, and utility lines still is under way on the main spans. The concrete floor of the highway deck has been poured on four spans at the south side. Painting of the bridge is under way but probably won't be completed until some time after it is in use.

AUXILIARY WORK RUSHED

Meantime, work is being rushed on auxiliary features of the 30-mile railroad relocation which is to replace the existing 37-mile canyon line, part of which will be flooded out by Shasta Dam. All the roadbed grading, all 12 tunnels, and seven other bridges are completed, with track laid on the entire line except the Pit Bridge and a few sidings.

Under six separate contracts, various buildings and facilities are being constructed to prepare the new line for railroad operation. These include stations, section houses, water tanks, electric systems, water-supply and sewerage systems at sidings located at Buckeye, Boomtown, O'Brien Creek and Lakehead. An oil storage tank and fuel-supply station are being built at Buckeye.

State of California
CULBERT L. OLSON, Governor

Department of Public Works

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FRANK W. CLARK, Director of Public Works

FRANZ R. SACHSE, Assistant Director

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