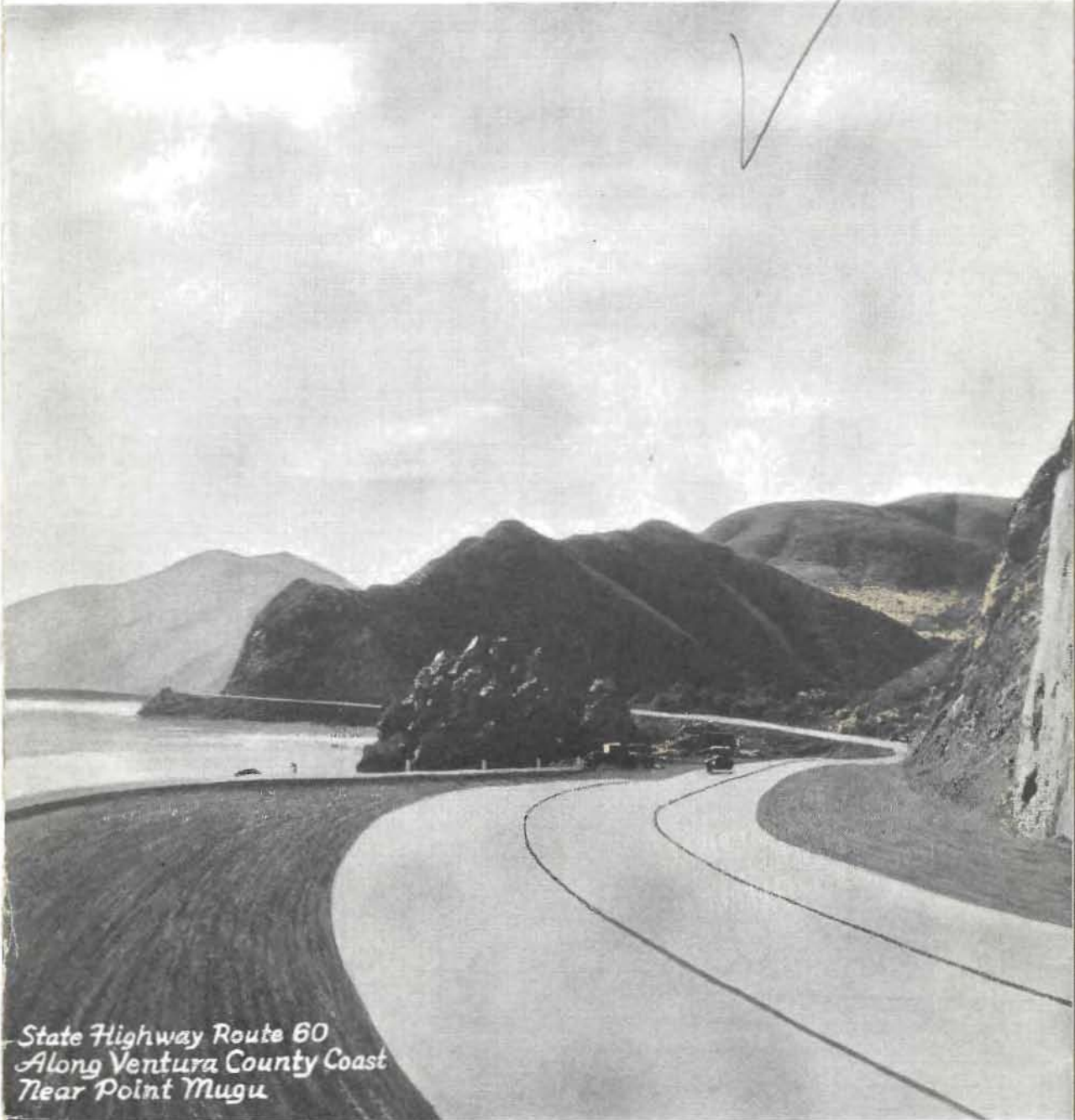


CALIFORNIA

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HIGHWAYS AND PUBLIC WORKS



*State Highway Route 60
Along Ventura County Coast
Near Point Mugu*

Official Journal of the Department of Public Works
JULY 1934

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Governor Merriam Announces

Highway Funds Will Provide

4,510,100 Man-Days Work

During This Fiscal Year

By **FRANK F. MERRIAM**, Governor of California

IN THE expenditure of public funds under present economic conditions, first consideration must be given to the relief of the unemployment situation as the foundation stone of any program for the revival of prosperity in California.

Employment for men out of work who are willing and anxious to work for wages that will provide a decent living for themselves and their families has been recognized by President Roosevelt as the basic principle of his national recovery policy and with his views in this respect, as I have repeatedly said, I am in full accord.

During the past four years it has been the experience of the Federal government and of our own State government that no kind of relief employment gives more satisfactory results than highway work, both from the standpoint of value received and the wide spread of pay roll moneys to workers and dependents in every part of the State.

It has been established through careful statistical studies of research experts confirmed by Federal and State checks of contract work that 90 per cent of the highway dollar ultimately goes into the pockets of labor.

It therefore gives me great joy to be able to announce that within the present fiscal

year, which began July 1 and will end June 30, 1935, the Division of Highways of the Department of Public Works will expend some \$18,200,000 of Federal and State funds for construction and \$6,972,600 for maintenance work on our highways, thereby providing approximately 4,510,100 man-days

work to citizens of California for the support of their families and dependents, with the resultant spread of benefits to the business communities in which they live.

This cheering announcement is made possible through the recent appropriation by Congress of \$200,000,000 for emergency construction of public highways and other related projects throughout the Nation, of which California's apportionment is \$7,932,206. The other State funds going to make up the \$18,200,000 total for this fiscal year include the unexpended balance of the current

biennial highway budget.

While this \$7,932,206 Federal grant is an outright gift to the State, the uses to which it may be put are controlled by the act itself as well as by certain provisions of the Industrial Recovery Act.

Under these provisions 50 per cent of the grant must be used on Federal-aid high-



FRANK F. MERRIAM

Angeles Crest Highway Will Open Vast Recreational Mountain Area in Fall

By S. V. CORTELYOU, District Engineer, District VII

THE FOURTH grading contract on the new Angeles Crest Highway, in the mountains north of Pasadena, has been in progress since early last October and is now entering its final stages of construction. It will in all probability be completed and opened to traffic the latter part of next September.

This contract is particularly important since it is the connecting link which will complete this highway to a point where it will open up and render safely accessible to public traffic a vast area of recreational territory in the high mountains of the Angeles National Forest, including Mt. Wilson.

This highway, commenced in 1929, has been built one contract at a time as money from the State gasoline tax has been made available. Ever since the first grading contract was completed in 1930, the road has "dead-ended" at the upper end of each succeeding contract.

Completion of the present contract will provide the necessary outlet so that all of the section constructed under previous contracts, as well as the one now in progress, can be utilized to the fullest extent by motorists seeking the scenic and recreational advantages of the higher mountains.

OPENS MOUNTAIN AREA

In order to obtain a thorough understanding of how the completion of a comparatively short section of highway will open up such a large area it is necessary to take into consideration the character of the country and the present means of access.

The Angeles National Forest, through which this highway will run, is an immense area of rough mountainous country lying northerly of Pasadena, Monrovia, Azusa and Glendora, a large portion of which is 4000 feet or more in altitude.

This area is potentially the largest recreational area of mountainous territory accessible from Los Angeles

From Altadena there has, for a long time, been a narrow toll road to Mt. Wilson, one of the higher mountains in this area, on which is located the famous Mt. Wilson Observatory.

This is a one-way control road, very narrow and with extremely sharp curves and steep grades.

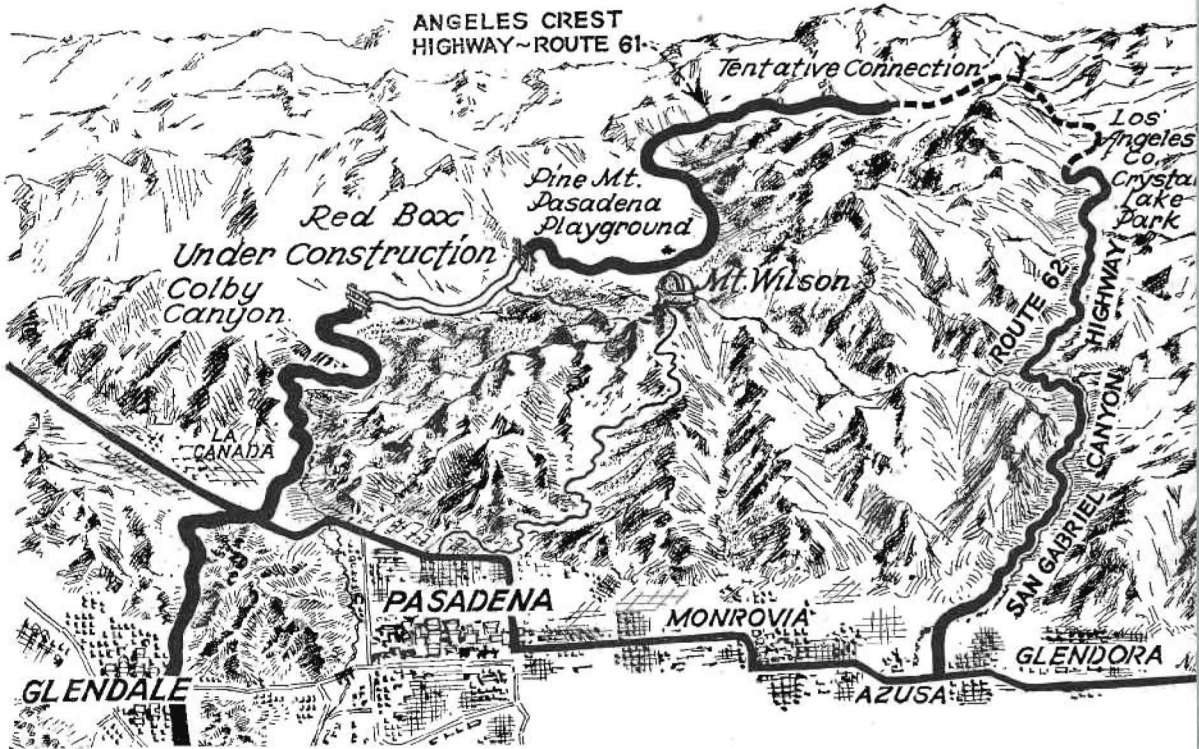
From Mt. Wilson a narrow road has been constructed by Los Angeles County and the U. S. Forest Service via Red Box, Barley Flat and Chilao Flat to Buckhorn Flat, a distance of about 26 miles. This road passes through the city of Pasadena playground and extends into the heart of the Angeles National Forest. Owing to the fact that the only present means of access to the road through this scenic country is over the steep, narrow toll road from Altadena to Mt. Wilson, comparatively few people use it.

CONNECTS WITH EXISTING ROAD

The new Angeles Crest Highway, following easy grades and good alignment from La Canada along the precipitous mountains toward Red Box (which is at the divide between the Arroyo Seco and the San Gabriel), has already been completed for 11½ miles to Colby Canyon. The present contract includes the 3.96 mile section from Colby Canyon to Red Box, and, in connecting with the present Forest Service road at this point, will render this large area of back country, now traversed by the Forest Service road, readily accessible to automobile traffic from Los Angeles and surrounding country.

This highway is one section of a general plan for a 65-mile drive known as Angeles Crest Highway. When completed, it will leave Foothill Boulevard at La Canada, following the new Angeles Crest Highway to Red Box thence following the U. S. Forest Service road northeasterly through the city of Pasadena playground, Barley Flat, Chilao Flat and Buckhorn Flat, connecting with the San Gabriel Canyon Highway on the northeasterly slope of Mt. Islip near the Los Angeles County playground at Crystal Lake; thence down this San Gabriel Canyon Highway to again connect with the Foothill Boulevard at Azusa.

Of this proposed highway circuit the only portion which will not be completed when the present contract is finished will be from Buckhorn Flat to the San Gabriel Canyon road.



BEAUTIFUL VISTAS of high mountain scenery and a great expanse of virgin National Forest back of Mt. Wilson will be made accessible to the Los Angeles metropolitan area in September by completion of the last link of the Angeles Crest Highway shown above. The 65-mile loop tour that will be made available by the proposed connection with San Gabriel Canyon highway is shown in the pictorial map by artist Newton Pratt.

Santa Barbara Through Truck Artery Involves 4 Bridges and Channel Change

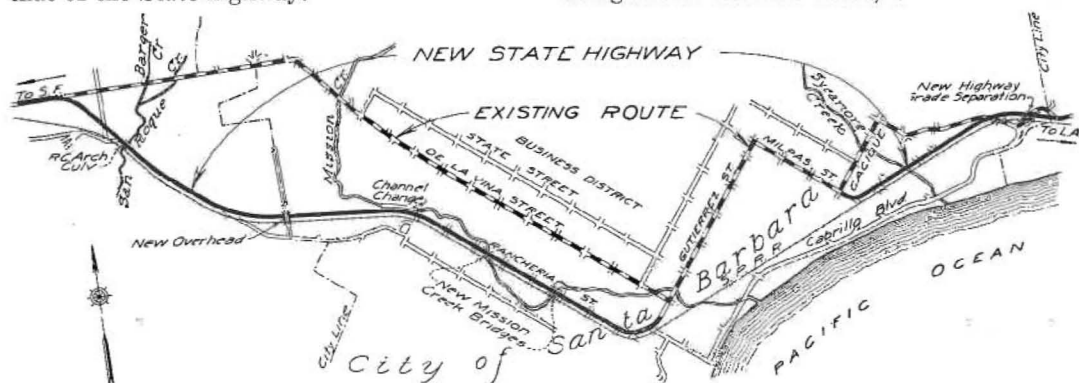
By L. H. GIBSON, District Engineer, District V

CONSTRUCTION is progressing rapidly on the new "Santa Barbara Through Traffic Boulevard," and it is anticipated that this welcome addition to the State highway system will be formally opened some time about November, 1934.

This major development will afford an entirely new, modern and adequate highway through the city and will replace, except for a short stretch, the present inadequate State route, as well as the present U. S. highway route, which differs in routing somewhat from that of the State highway.

projecting a modern highway development through the community. This study, needless to say, was not an easy one, as many factors were present, such as the utilization, as far as practical, of existing improvements, the appraisal of real estate and property that would be affected, and the drainage conditions encountered.

Finally, a route, closely paralleling the Southern Pacific railroad was adopted, which involves a total construction of 5.9 miles of highway, together with two steel and timber bridges over Mission Creek, a reinforced con-



SKETCH MAP of new through traffic boulevard by-passing congested business district of Santa Barbara.

The motorist, when entering Santa Barbara from the south along the present highway, is first confronted by a narrow underpass under the Southern Pacific tracks, where the grade is steep and the alignment on a 350-foot radius curve. A short distance farther on, the traveler again crosses under the railroad, under almost equally dangerous conditions; and thence proceeds along various city streets around no less than five right-angle turns, and then follows northerly along de la Vina Street, Hollister Avenue and out of the city on the north. De la Vina Street is very narrow and its congested condition has always been an annoyance to the traveler.

MANY FACTORS INVOLVED

All of these dangerous and inadequate conditions for the handling of the volume of traffic using "El Camino Real" prompted a joint study by city and State engineers for

crete overhead structure over the present highway, and a similar type structure to carry a county highway over the new road.

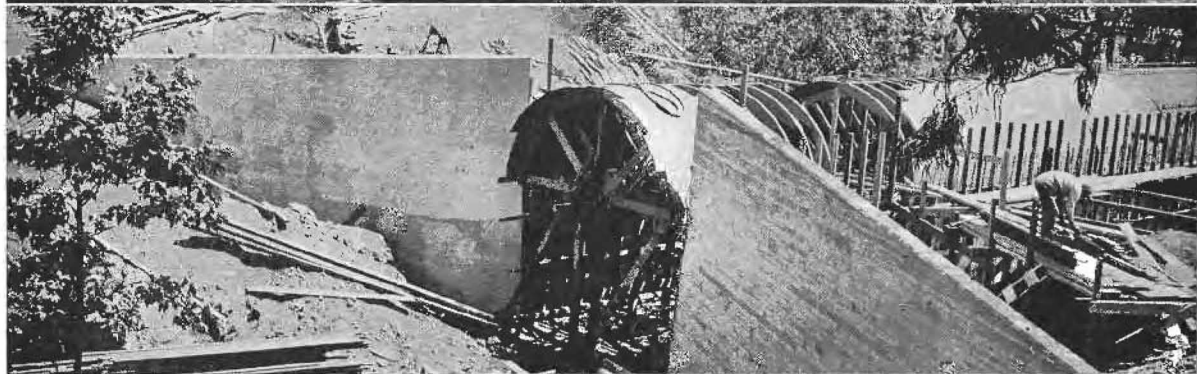
The new alignment has a graded roadbed width of 46 and 56 feet along the new alignment, and 76 feet in width where contiguous with existing city streets with surfacing 30 feet wide throughout, and all structures are being built to accommodate future widening.

The surfacing section is somewhat modified from general practice and consists of a 30-foot unreinforced Class "C" Portland cement concrete base topped with $2\frac{1}{2}$ inches of asphalt concrete. The asphalt concrete specifications have been drawn up stipulating the use of Carpinteria asphalt sand, which is a local product.

CREEK CHANNEL CHANGES

Another construction feature of the work is the changing of the channel of Mission Creek over a length of 1100 feet. This work

(Continued in page 22)



BUILDING TRUCK BY-PASS through the busy city of Santa Barbara. 1—Clearing operations for traffic separation structure. Note dangerous approach of old road to the underpass under railroad. 2—Grading operations near southerly city limits. 3—Constructing a reinforced concrete arch culvert at San Rocque Creek. 4—Paving side slopes of new channel for Mission Creek. It will have a 20-foot bottom and 9-foot depth.

New Deal in Slope Treatment Aims to Prevent Erosion and Beautify Roadsides

By E. S. WHITAKER, Assistant State Arboriculturist

THAT phrase, "A New Deal," has become overworked and perhaps a bit trite in these last few months of this waning age of the depression, but it is so descriptive and fits so well with the outcome of the "slope question" that it is used once again in the hope that those interested in the subject of slopes will realize just how much of a change has taken place.

By slopes we mean, of course, those indefinite, unstable, leaning pieces of handworked soil that are inadvertently left after the construction of a highway, towering over, or gaping away from, the traveler—a bald-faced dénouement.

At first, the practice consisted mainly of taking away from a certain area as much dirt as was desired, then giving the part that remained a lick and a prayer. If it stayed where it was, all well and finished. If not, it was moved out of the gutter line over the bank, thus causing another slope, perhaps a bit more hidden from the view of the passerby because of its position below the edge of the road, but every bit as bare and defiant as its foster parent had been.

SANDPAPERING EVOLVED

This type of construction is still carried out. But the people who think things out got together and decided that all that extra moving of dirt was not only unnecessary, but quite expensive. Better a small extra cost at first to keep the giant in hand than a continual tonsorial charge to keep him neat. So the idea of slope sandpapering was evolved with great success, in some places.

In those places, where the wind didn't blow too hard, or the rain didn't pour down with too much force, or the snow didn't lie with soaking effect upon their surfaces, or where their component parts did not contain too much blue clay, shale, sand, or loose gravel; in other words, where the ideal setup was encountered, the sandpapered slope assumed all the aspects of a pig in clover, and everything was fine.

But, let just one of these insidious malefactors creep into the scene, and, over a period of years or in one night, according to the temperament of the intruder, the beautiful

straight edge and smooth-shaven surface of the slope degenerates and grovels in the gutter line.

NEW IDEAS DEVELOPED

With all these incongruous pieces of an unsolved puzzle laid out over the landscape tourists and natural beauty lovers have objected to the inharmonious, raggedly straight top line and seared and seamed faces confronting them at every turn. Engineers and maintenance men assumed poses that would have done justice to a Rodin and "out of the black that was 50 below" crept an idea. Scorned and ridiculed as a weakling, hooted and jostled at first, the idea persisted and grew. It developed into twins, in fact, triplets. These ideas have now become nearly full-fledged. They have been afforded tentative recognition and experimental attempts are being made that will, in a course of a few years, prove their success or failure.

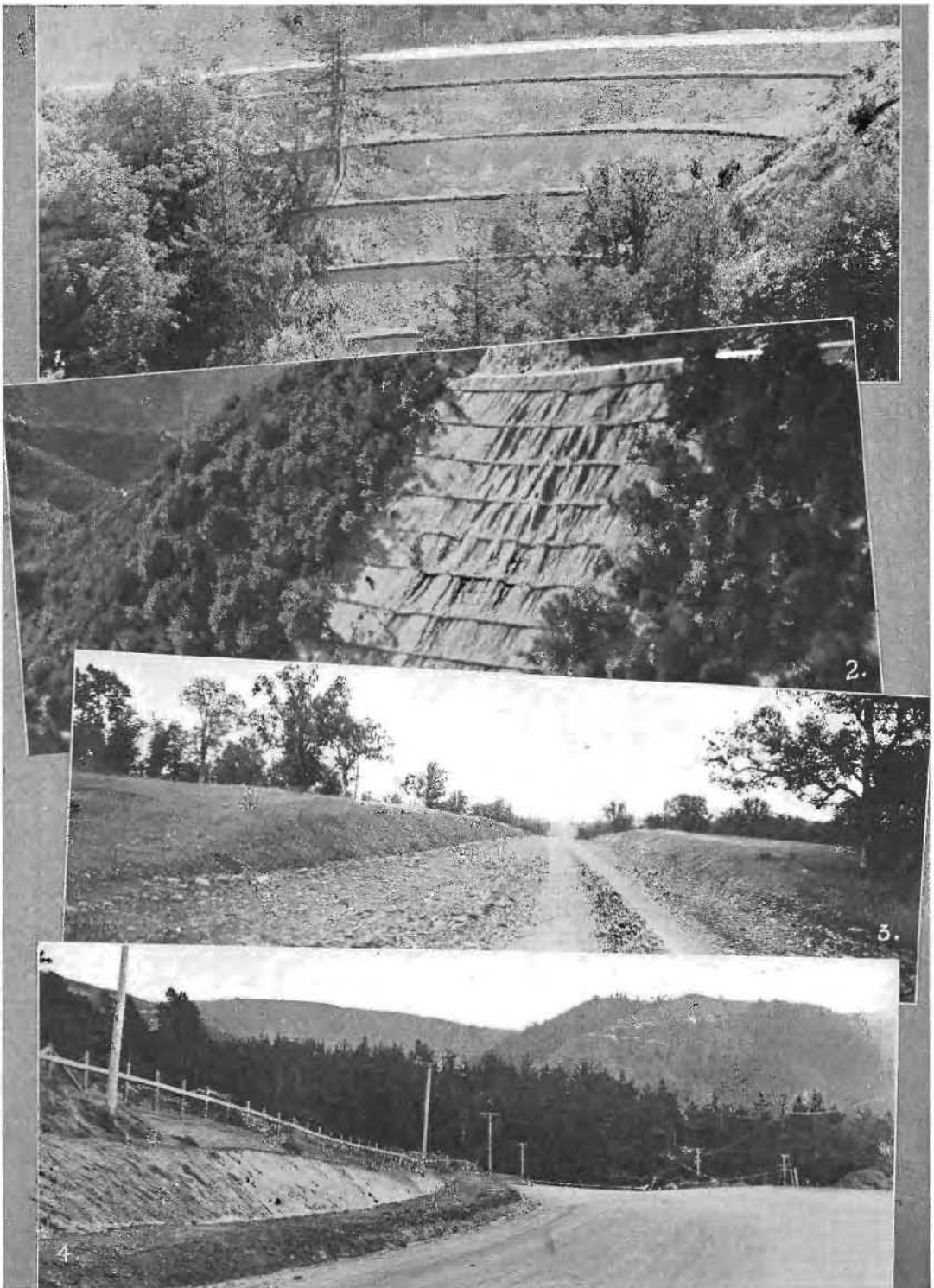
The strongest one of these ideas—in fact it has really passed the fledgling stage and is making progress in its own right—is called "slope top rounding," which consists of the rounding off the tops of cut slopes and thereby: (a) getting rid of that extra overhanging weight; (b) blending the slope more naturally into the surroundings; (c) making easier the natural dissemination of seeds from growth along the top of the slope; and (d) affording a smoother run-off of water.

RELIEF LABOR UTILIZED

This work is being carried out on construction jobs and by maintenance forces. It has proved itself at least more pleasing to the eye, even if it does not ultimately stop the face falling of the slope. Wherever slopes are rounded, the scars of construction are far less noticeable. Relief labor has been utilized in this work by maintenance forces, and the effect, as far as "looks" goes, is all that can be desired.

On construction jobs, the slope tops are rounded and, in many cases, by the time the job is finished, the tops of the slopes are covered with grass and small seedling plants.

The twin of this trio of ideas is still in the



SLOPE PROTECTION, shown in picture No. 1, consists of pipe and wire fences, 39 feet apart backed by rocks and brush and held by 8-foot posts driven $5\frac{1}{2}$ feet in ground. No 2 shows brush behind stake fences preventing erosion in Waterman Canyon, San Bernardino County. No. 3—Slope rounding on the Red Bluff-Susanville highway done in course of construction. No. 4—Slopes benched for planting.

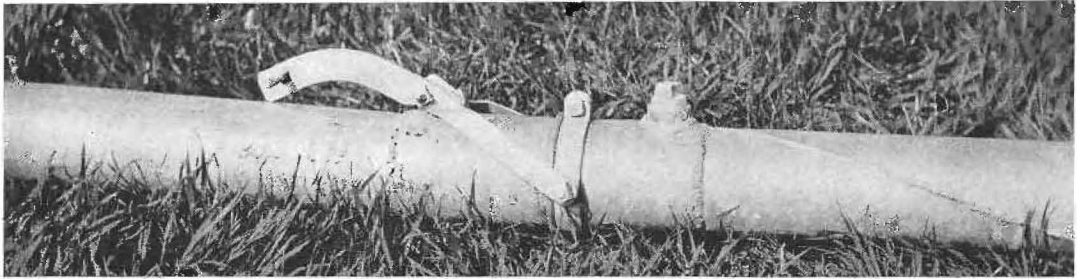
Welded Air Pipe of Light Weight and Large Diameter Adds Drilling Efficiency

AN IMPROVED type of air transmission pipe line has recently been developed by the Construction Department in conjunction with the Equipment Department, designed to increase the efficiency of drilling operations and to facilitate handling of heavy pipe lines on hillsides.

At the various labor camps and on other major day labor projects where excavation often consists of almost 100 per cent solid rock, the problem of securing adequate and effective air pressures at the point of drilling becomes of paramount importance. Several

deliver about 215 cubic feet per minute at 90 pounds pressure. A 360 cubic foot machine will deliver about 250 cubic feet, and a 310 two-stage, or one with a supercharger, will deliver the same. Altitude decreases this volume about $1\frac{1}{2}$ per cent for each 1000 feet.

Portable compressors of 450 cubic feet displacement are now available; also, where there is a large amount of drilling to be done, it is not unusual to use two 310 cubic foot compressors hooked up in tandem and regulated by one unloader; therefore the need of the larger size pipe line becomes apparent.



QUICK COUPLING device on light, welded air pipe shown in closed position.

camps operate six or more portable compressors, entailing the use of several thousand feet of pipe lines.

The transmission of compressed air through long pipe lines causes considerable drop in pressure due to frictional loss, especially if the pipe is of small diameter. For instance, a compressor with 400 cubic feet per minute capacity and a pressure of 110 pounds at the receiver, using three rock drills and the usual air hose connections on a 2 inch 3000-foot wrought iron pipe, gives a working pressure of about 61 pounds at the drills.

DRILLING SPEED INCREASED

This results in a very low drilling speed, a pressure of 85 pounds being most efficient. If this pipe size is increased to $2\frac{1}{2}$ inches, drill pressure would rise to 92 pounds; 3-inch pipe would give 102 pounds and 4-inch pipe, 108 pounds.

The average 310 cubic feet displacement portable compressor has a volumetric efficiency of about 70 per cent, which means it will

ADVANTAGES OF LARGER PIPE

Another particular advantage of larger diameter pipe line is that it can be manifolded, and other smaller lines taken from it to suit the convenience of the job; it also acts as a storage tank or air reservoir, and permits much steadier working of the drills due to the volume of air it contains.

While it is very important to have adequate pipe line facilities for any volume of air, it is equally important that the proper number of drills be used for the available air volume. The average compressor can handle two heavy drills in fairly hard rock, when used in unison, and give better results than three drills.

Wrought iron screwed pipe is somewhat expensive to handle in mountainous regions, and the threads are easily damaged, resulting in air leaks. At the Kings River convict camp in Fresno County, experiments were made early in 1933 in the use of a 4-inch spiral welded galvanized air pipe, of light weight, with quick detachable couplings,



SPEEDY DRILLING is obtained on heavy rock work by the use of this light, large diameter, welded air pipe equipped with quick coupling device.

which has proven quite satisfactory for air compressor work.

CARRIED BY ONE MAN

This pipe is made up in 20-foot lengths, equipped with Venturi couplings and locking devices, with necessary elbows or other fittings, and 1-inch or 2-inch taps for making smaller pipe connections. This 20-foot length of 4-inch portable pipe is readily carried by one man, and can be adjusted to horizontal or vertical curves on irregular topography. Other camps are also using this type of air line, about 7200 lineal feet having been purchased to date.

The following figures showing the theoretical loss in pounds pressure by friction, per 1000 feet of pipe length, may be of interest in drilling operations:

Pipe size, inches	Weight per ft., pounds	Air delivered cu. ft./min.	Pressure loss due to friction, pounds
2	3.65	250	6.72
2	----	350	13.41
3	7.57	250	.77
3	----	350	1.54
3	----	450	2.57
4	10.79	250	.17
4	----	400	.45
4	----	500	.68

QUICK COUPLING FACTOR

It will be noted that the weight of a 20-foot length of 2-inch pipe such as is in common use is 73 pounds, of a 3-inch pipe is 151

pounds and of a 4-inch wrought iron pipe is 216 pounds.

The weight of the new type 4-inch pipe is about 75 pounds per 20-foot length, including couplers. The light weight spiral weld pipe has a safe working pressure of 250 pounds per square inch and the rapidity with which it can be coupled up is a valuable factor. Airtightness is maintained by the use of rubber gaskets of simple design.

After an experience of about a year and a half we feel justified in saying that we would not undertake any extensive drilling operations without using the large diameter light weight pipe.

YERBA BUENA PIERCED JULY 23

Notified by Chief Engineer C. H. Purcell that the first Yerba Buena Island pioneer tunnel will be driven through by July 23, State Director of Public Works Earl Lee Kelly has invited fellow members of the California Toll Bridge Authority, including Governor Frank F. Merriam, to walk through this bore and inspect the progress made by the San Francisco-Oakland Bay Bridge on the first anniversary of its construction.

The tunnel will be wide enough for a one-track mine railway and approximately 20 feet high. The completed tunnel will be 78 feet wide and 58 feet high.

Bump—Has your wife learned to drive the car yet?
Bumper—Yes, in an advisory capacity.

One-third Loss If Gas Tax Diverted

(Continued from page 1)

ways, not less than 25 per cent on secondary or feeder roads, and the remainder on State highway projects within municipalities.

Another significant provision, that evidences the Federal government's disapproval of gasoline tax diversions, specifies that the State shall be deprived of one-third of the \$7,932,206 if gasoline tax revenues are used for any other purpose than highway work.

WORKING ON PROGRAM

The engineers of the Division of Highways are now concentrating on a study of eligible projects for the expenditure of these funds, making an analysis of the needs of the State highway system and the estimated costs of such improvements. Their recommendations are being considered in the preparation of a program for putting this money to work as speedily as possible.

The engineers estimate that approximately \$7,200,000 of the \$18,200,000 will go to job site labor, that is to men employed directly in construction work on the highways and will thus provide 1,440,000 man-days' work. Another \$9,076,000 will go to workers "behind the lines" in related industries—the ratio is two men for every one on the job. This, it is estimated, will give approximately 1,815,000 man-days' labor for workers on the pay rolls of companies manufacturing or producing highway building materials and supplies; trucks, graders, tractors and other equipment; transportation and many minor industries.

In addition to the amounts given above for construction purposes maintenance work for the fiscal year is estimated at about \$6,972,600 which will provide an additional 1,255,100 man-days' work making a total for the fiscal year of approximately 4,510,100 man-days' of employment.

Illustrative of how State highway work has provided a very much needed backlog of employment all over the State during the past year, Director Earl Lee Kelly of the Department of Public Works informs me that during the period from August 25, 1933, to June 15th of this year, construction work put under way has totaled 2363 miles of highway

ADEQUATE HIGHWAYS CONSIDERED DOMINANT FACTOR IN MODERN LIFE

Highway transportation is a dominant factor in modern life in rural sections, as well as population centers, of the United States. Adequate highways are needed every day for economic, educational, religious and social reasons. The motor vehicle supplies a flexible unit of transportation with a radius of operation limited only by inadequate highways.

The comprehensive planning of such systems, adequate to meet future traffic needs, is the most important problem confronting the highway business not only in the various regions and States but in the United States as a whole. It is important because it is fundamental.

The engineering supervision of construction, maintenance and other phases may be perfect, but unless the administrators have the foresight to make studies and investigations with a view toward planning the highway systems of the future, they will have failed to administer the highway work on a sound engineering, business basis.—Regional Plan of the Philadelphia Tri-State District, 1932.

improvements, exclusive of traffic striping, and 92 bridges and grade separations.

This vast amount of work has been done at an expenditure of \$23,940,000 and has provided approximately 4,788,000 man-days' labor.

Contractors reported 4400 men employed at job site on State highway work on June 1st. This means that approximately 13,200 men were getting wages through contract work alone on that date. The regular forces of the Department of Public Works engaged on highway work number approximately 4,000. Relief quota crews made up of unemployed men doing hand labor maintenance work at \$4 a day and getting a minimum of four days' work a week number approximately 3000. Add to these groups 8000 men employed on the San Francisco-Oakland Bay Bridge, 110 staff and field men in the Division of Architecture, approximately the same number in the Division of Water Resources, and we have a total of 28,400 men now gainfully employed directly or indirectly on Public Works.

Slope Top Rounding Part of the New Deal By Arboriculturists

(Continued from page 6)

experimental stage although quite extensively so. It has a twofold purpose and seems well on the way toward being able to fulfill all promises in both cases.

"The preparation of fill slopes to prevent excessive erosion and to obscure the scars of construction" is the title of the twin. This work is being carried out by maintenance forces and has its greatest trial ground on the large fill slopes of the Crest Drive, that beautiful road from San Bernardino to Lake Arrowhead and Big Bear Lake.

FILLS BEING PLANTED

These fills, in some cases, have run several hundred feet down the mountain side and can be seen from nearly any part of the valley below. To prevent erosion and to cover these bare areas as soon as possible, they have been cross-hatched with brush filled ditches or with grain hay. It is surprising how much wash a small clump of grass roots may prevent.

In some cases, cuttings of trees and seedling trees have been planted on the fill. Seeds of native plants have been gathered and scattered on the slopes, anything that might grow, so as to get the surface covered with a mat of roots. Hidden and held in place by native growth, these scars will soon be only a memory. A worthwhile use of relief labor, because a dollar spent now will undoubtedly save manyfold in the future.

And now comes the runt of these three ideas—the one which has been tried with much misgiving and occasional dire results, and has had to be habied along nearly as much as its antonym, the sandpapered slope. This idea deals wholly with the beautification of roadsides, although some common sense logic enters into the case.

BENCHING AND PLANTING

Why—say we—sandpaper a slope, using extra time and money in that hand labor operation, when in a relatively short time the slope will look as ragged as though never touched? Why not leave it rough, and in places pocket and bench the larger slopes so that shrubs may be planted to assist by their root growth in holding the slope to a semblance of stability and to screen and partly obscure its baldness?

This has been done in many experiments in a small way, and, in one case, extensively.

\$20,944,729 in Major Highway Contracts Let in Ten Months

MAJOR contracts for construction let by the California Division of Highways between August 25, 1933, and June 15, 1934, totaled \$20,944,729. As of June 15 the division was advertising work estimated at \$1,500,000, the major item of which was the M Street bridge in Sacramento, to cost approximately \$900,000. The total of all work, including day labor and minor lettings, for the ten-month period was \$22,848,634.

During the period from August 25 to June 15 construction was undertaken on principal routes by contract to the amount of \$11,965,263 outside incorporated areas, and \$5,620,213 within incorporated cities. Construction by contract on miscellaneous routes totaled \$2,979,030 and on feeder roads, \$380,223.

COAST ROUTE CONTRACTS

The largest allocation on a single route was on the Coast Highway between San Francisco, Los Angeles and San Diego. Contracts amounting to \$2,393,087 were let on this route, exclusive of work through municipalities.

Work on the Pacific Highway from San Francisco to the Oregon line was contracted to the amount of \$1,116,297, the total including \$407,703 for grading of the new American Canyon link between Carquinez Bridge and Cordelia.

REDWOOD HIGHWAY WORK

On the Redwood Highway work had been completed by June 15, or was in progress, amounting to \$2,074,548, including the re-routing in Del Norte County costing \$713,634 and realignment in Humboldt County near Garberville costing \$375,493.

Carmel-San Simeon route contracts amounted to \$1,090,138.

The Valley Route between Los Angeles and Sacramento received \$598,437 exclusive of several contracts in municipalities on the route.

On the contract through Carmel Highlands where so much natural beauty was defaced, this method was resorted to so that restoration would be more rapid. We hope it works. We hope all three of them work, because they mean more beautiful highways, a greater attraction to tourists.

First Cajon-Lancaster Highway Link Broken Through Summit of Ridge

THE FIRST unit of the important new Cajon-Lancaster highway, connecting the San Bernardino area and the eastern part of southern California with Owens Valley and San Joaquin Valley, is rapidly approaching completion. The construction of the new route, 14.5 miles in length, which extends from the junction of the Cajon Pass and Wrightwood Roads through Cajon Valley, has reached the cliff at the head of Cajon Canyon and contractors have broken through the summit of the ridge.

The present unit is under contract for \$145,000. With \$240,000 provided in the budget it is expected that the contract for the second link will be advertised for bids within a few weeks and that the whole project will be completed for next winter's travel.

This new route provides a direct connection for movement of winter vegetables from Imperial Valley and citrus fruits from the San Bernardino-Riverside area to the San Francisco Bay region. People from the central and northern part of the State will be able to come over this route to a direct connection with the southern transcontinental highways and desert winter resorts.

SAVES 15.5 MILES

The new highway results in a saving of 15½ miles in distance over the existing route and the new route is on easy grades and direct alignment. It follows beautiful Cajon Valley and crosses the summit at the end of Cajon Canyon through a single large cut made by tearing down a great cliff.

When completed the cut will be 125 feet deep, one-third again as high as San Bernardino's tallest structure, and five feet above any Los Angeles building, with the exception of the City Hall. To dig this cut roadbuilding equipment had to be moved up the mountain over a tortuous old government road. Scrapers were used for the first thirty or forty feet of the cut leveling operations before safety would permit the sending of shovels and trucks up the steep hillside.

Material taken from the cut is spread down the valley for about a mile of distance to build up fills through a number of the cross canyons and make a gradual, easy grade for the motoring public up out of the valley.

PICTURESQUE SEISMIC ROCKS

Cajon Valley was formed in bygone ages by the San Andreas fault. The scenery is spectacular. Large sandstone blocks are upended. Some of these sandstone blocks rise over 200 feet above the valley. They have a peculiar rounded appearance, very unusual in California scenery.

Vegetation in Cajon Valley is of unusual interest, as it is typical of California as well as of the Mojave Desert. This vegetation partakes of a transition from the valley to the desert and examples of Joshua trees, yuccas, pinyon pines, and junipers grow to luxuriant size.

SCENIC PANORAMA DISCLOSED

Travelers from the north will cross the desert and get the first glimpse of southern California between the walls of the great cut at the head of Cajon Valley. The view from this cut is truly magnificent. Mount San Jacinto and San Bernardino rise up in the distance, with Cajon Valley and the foothills in the foreground.

The U. S. Bureau of Public Roads has just completed a survey from this new route to connect to Los Angeles County Park at Big Pines. This survey discloses that an easy connection can be made which will permit of the approach to the Los Angeles County Park on a high gear road on good alignment.

FIRST STEREOPHOTOGRAMMETRY QUADRANGLE SHEET AVAILABLE

Advance sheets of Lakeport Quadrangle prepared by the U. S. Geological Survey in cooperation with the State of California are now available.

This is the first sheet of its kind produced in California from aerial photographs reproduced by stereophotogrammetry. The scale is 1:48,000, but it will finally be published on a scale of 1:62,500. The contour interval is 50 feet.

It will probably be found necessary to add some details by ground survey methods.



BIZARRE DESERT SCENERY is encountered along the Lancaster-Cajon cutoff now approaching completion. It traverses an interesting part of the great Mojave Desert in San Bernardino and Los Angeles counties. In Cajon Valley it passes a weird mass of sandstone blocks piled up by volcanic action ages ago and through a forest of Joshua trees and Yuccas. Great cuts were made through the hills, one of them 125 feet deep, that provided material for fills on a mile highway construction.

How State is Enforcing Law to Insure Safe Construction of School Buildings

By C. H. KROMER, Principal Structural Engineer

THE Safety of Design and Construction of Public School Buildings Act, with the administration of which the Division of Architecture was charged by legislative enactment, has been in active enforcement for over a year, having been made an emergency measure to take effect immediately upon signature by the Governor on April 10, 1933.

In anticipation of the passage of this measure, a tentative organization plan was worked



C. H. KROMER

out ready to be immediately initiated and rules and regulations together with necessary forms were written and placed in the hands of the State Printer ready for printing by the time that the bill was signed and became law or within a period of about two weeks, at a time when the personnel of the division had shrunk to skeleton proportions.

Starting with an initial group of only three men, the personnel employed in the administration of the act has grown rapidly until at the present time the personnel of the Division of Architecture actively engaged numbers 75. In addition, 61 inspectors are employed directly by the various school districts to serve as inspectors of construction under the direction of the architect or structural engineer connected with the project and under the general supervision of the Division of Architecture.

ONE THOUSAND APPLICATIONS FILED

Over 333 applications have already been made for approval of plans and specifications and over 1000 applications filed for examination of existing school plants. The magnitude of the work involved can better be realized when it is pointed out that the public school buildings in California coming

under the act are valued at from \$400,000,000 to \$500,000,000. The total value of new building projects as well as reconstruction work proposed for southern California is estimated to exceed \$50,000,000. This is entirely independent of work contemplated north of the Tehachapi or for our larger cities such as San Francisco, Oakland and Bakersfield.

The technical work required in the reconstruction and strengthening of buildings in both northern and southern California is so involved that the State as well as those engaged in private practice is required to give from two to three times as much service as would be necessary were the expenditure for entirely new construction.

The State thoroughly appreciates what this all means in connection with school housing and in providing work for the construction industries and consequently is making strenuous efforts to meet the situation.

HOW STATE FUNCTIONS

Examinations are under way or have been completed for approximately 430 school plants and all plans for construction of school buildings except for four recently filed have either been approved or are in the process of being checked.

The functions of the Division of Architecture with regard to the act are divided into two specific activities. The first has to do with the approval of plans and specifications and the supervision of new work. The primary purpose in giving such approval is to make sure that school buildings hereafter constructed will be safe for both teachers and pupils and that such buildings are honestly built both as regards materials and workmanship.

Incidentally, the State Department of Public Works rather than the school department becomes responsible for the safety of the buildings thus constructed.

Particular emphasis has been placed on the matter of inspection. Not only must this inspection be continuous and verified report made by the inspector that work and materials

(Continued on next page)

School Board Responsibilities Defined

(Continued from preceding page)

are in accordance with approved plans and specifications, but the architect or structural engineer in charge of the work must make a similar verified statement of his own personal knowledge. Any false statement or violation of the act constitutes a felony.

CALIFORNIA LAW FIRST

As far as we know, California is the first State to enact such a requirement in connection with public school buildings to insure honesty and competency in both design and construction.

It should be pointed out at this point that buildings designed or reconstructed in accordance with Appendix "A" of the Division of Architecture are in general subject to materially lower earthquake insurance rates than would be the case for similar buildings designed without any regard to bracing or earthquake resistance. This reduction in rates, depending upon the probable resistance of the structure, is relatively large. The variance is as great as fifteen cents for an adequately designed building to \$3.50 for hazardous construction.

Our attention has recently been called to a building the cost of which, designed to resist earthquake, was actually less than if no provision had been made for earthquake forces, due to the reduction in insurance rates. An article "Earthquake Design for an Eight-Story Apartment House," by Harold B. Hammill, Structural Engineer, in an issue of *Engineering News Record* dated November 16, 1933, gives an illustration where the additional cost for earthquake resistive construction was only 1.9 per cent.

The Board of Fire Underwriters is doing everything possible to encourage safe construction, and is giving consideration through reduced rates to additional bracing, even though not great in amount.

EXAMINATION OF BUILDINGS

The other function in connection with the administration of the act has to do with examination of existing school buildings and since some misunderstanding appears to have arisen in the public mind in regard to these matters, certain pertinent facts are here being pointed out:

1. Examinations and reports with reference to existing school buildings are made by the Division of Architecture only upon specific request of school officials or upon request of parents of pupils enrolled. Whether or not such examination is to be requested is entirely optional with the districts concerned.

The State Department of Public Works merely acts as agent of the school district. Such reports as are made are informative only and the district need do nothing further in the matter unless it so desires.

The State has always had physical surveys made of its own institutional structures whenever any question arose as to their safety. Certain of such buildings examined have either had to be demolished or reconstructed when not found to be safe. The school building construction act merely makes it possible for the

school districts to avail themselves of the same service the State has had in the past.

SCHOOL BOARD RESPONSIBILITY

According to our understanding there is nothing in this act which places any additional responsibility on any school board other than that embodied in the existing statutes established prior to the enactment of this act. It does, however, provide the school board with a means of meeting its responsibility and even being relieved of it.

School boards throughout the State have been caused considerable concern by an opinion rendered by the Attorney General to Mr. Vierling Kersey, Superintendent of Public Instruction, under date of November 22, 1933. In this opinion, the question of liability or responsibility seems to hang on whether the district itself or its employees have been negligent in not taking proper precautions to provide safe buildings. The matter is covered in detail in the opinion just referred to.

The school building act merely focuses attention on the matter of possible danger that might occur in the event of an earthquake and provides a method whereby school boards may have authoritative information regarding the structural condition of their buildings.

Except for the fact that a warning has been sounded and possible danger to life and property recognized, it does not appear that it is any more necessary for school districts to go to the expense of making alterations or reconstructing their buildings than has heretofore been necessary nor is it any more necessary to close school buildings.

RESPONSIBILITY NOT INCREASED

All that has been done is to attract attention and to emphasize responsibility of school boards but the responsibility itself has not been increased.

2. Approval will be given to submitted plans and specifications for strengthening or reconstructing a portion of a school building even though the remainder of the building is not found to be safe. However, approval will be given on the basis that the use of the building as a whole for school purposes will be entirely upon responsibility of the school authorities and without the approval of the Division of Architecture except for the portion covered by the submitted plans and specifications until such later time as the remainder of the building may be completed in accordance with the provisions of the act.

If, however, on examination, the remaining portion of the building is found to be safe then a certificate will be issued stating that the building is safe and meets the requirements of Chapter 59, Statutes of 1933.

FIRE HAZARD PROVISIONS

3. The act is not retroactive and accordingly the division is confining itself with reference to fire hazard to calling attention of the particular school authority to the lack, if any, of reasonable fire safety as interpreted by the division, and the school authorities may or may not, as they see fit, make corrections involved

(Continued on page 26)

Governor Merriam's Shovel Starts Alameda-Contra Costa Tunnel Work

SEVEN thousand Alameda and Contra Costa County residents gathered in a natural amphitheater in the Claremont District at Broadway and Chabot Road, Oakland, on June 17, and saw the formal starting of the long-awaited \$3,752,000 Broadway low level tunnel which will replace the present tunnel road between Contra Costa and Alameda counties.

Three shovels full of earth lifted by officials started the job. The officials were Governor Frank F. Merriam, State Director of Public Works Earl Lee Kelly and Supervisor Thomas E. Caldecott of Alameda County, president of Joint Highway District No. 13, comprising the two counties.

But more than Alameda and Contra Costa counties will be aided by this double-bore tunnel through the Berkeley hills.

By this tunnel the residents of Contra Costa County will be enabled to live in this beautiful section and work in San Francisco, because the tunnel will make it possible to drive to San Francisco in less than an hour from Walnut Creek.

The gasoline tax which makes this possible (in this instance with PWA Federal aid) was the theme of the leading speakers at the ceremonies managed by the Berkeley and Oakland Junior Chambers of Commerce.

These ceremonies began at a luncheon in the Claremont Hotel and continued through the afternoon with aerial mapping, daylight fireworks, a cross country race over the route of the tunnel and highway project, band music, speeches by those responsible for the project, and a moment of silence as an im-

pressive bugle call of taps sounded in memory of the late Governor James Rolph, Jr.

STAND AGAINST DIVERSION

Friends of the California highways who thanked the gas tax fund for making possible California's leadership in highway construction and maintenance, and who obligated themselves to use the gas tax fund exclusively for highways, were notably Governor Frank F. Merriam, Director of Public Works Kelly and Senator Arthur H. Breed.

GOVERNOR MERRIAM SAYS:

"The gas tax has supplanted the bond issue method and is a pay-as-you-go plan immeasurably superior to bonding as a means of highway financing.

"The people of California in a recent election by an overwhelming majority, expressed their belief that gasoline taxes should be used exclusively for highway construction and maintenance.

"I am unalterably opposed to the diversion of gasoline taxes from the purpose for which they are collected."

"Because of the late bond issue method of financing highways, we are still paying for highways long since worn out," Governor Merriam declared.

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GOVERNOR IMPRESSED CROWD

With the State financing becoming increasingly difficult and with an ever present number of budgeteers always recommending to the Governor and to the legislators that financial problems be solved by dipping into the gas tax fund, Governor Merriam's unequivocal statement produced a profound

(Continued on page 22)



STARTING WORK ON A GREAT PROJECT, Governor Merriam and Director Earl Lee Kelly participated on June 17 in ground breaking ceremonies at Oakland for the Broadway low level tunnel to connect Alameda and Contra Costa counties. In the upper picture Governor Merriam is seen turning the first shovelful of earth assisted by Director Kelly; Supervisor T. E. Caldecott, chairman of Joint Highway District No. 13; Dudley W. Frost (kneeling), chairman of Oakland and Berkeley Junior Chamber of Commerce Committee, and a group of young women representing participating communities. A beautiful eucalyptus grove at Broadway and Chabot Road, Oakland, was the scene of the formal exercises, which included speechmaking, music of massed bands, pageantry and fireworks.

CALIFORNIA HIGHWAYS AND PUBLIC WORKS

Official journal of the Division of Highways of the Department of Public Works, State of California; published for the information of the members of the department and the citizens of California.

Editors of newspapers and others are privileged to use matter contained herein. Cuts will be gladly loaned upon request.

EARL LEE KELLY.....Director
JOHN W. HOWE.....Editor

Address communications to California Highways and Public Works, P. O. Box 1499, Sacramento, California.

Vol. 182 JULY, 1934 No. 7

Gasoline Tax Funds

Never in recent years has a legislative session approached without designs on the part of some group for the diversion of gasoline tax funds to other purposes than that for which the tax is levied. Protests on the part of automobile owners against such action thus far has defeated these various moves.

Now there is a proposal for the use of \$30,000,000 highway funds for the relief of the unemployed, with the first result that the State's road program would be disrupted, with many thousands of other families thrown upon the various counties for charity support.

Public sentiment upholds the policy that work is better than a dole. If there must be a dole it should not come at the expense of constructive plans which give direct employment to many men and which stimulate a demand for labor in related industries.

Washington is considering new and heavy appropriations for relief. This would seem to be the place to turn when county and State resources for this purpose are exhausted.

To divert gasoline taxes would stop highway construction and hamper maintenance at a time when the State has taken over thousands of miles of secondary roads, thus relieving county taxation. It would force an increase in the gasoline tax rate even to carry on the absolute minimum of road work; and the gasoline tax already is out of proportion, being endured only because of the splendid highways which it provides for the use of Californians and their tourist guests.—*Long Beach Press-Telegram.*

LOS ANGELES ARRANGING TO REVISE MAJOR TRAFFIC PLAN

Announcement that the Los Angeles Traffic Association proposes to revise, extend and modernize the major traffic plan, which in its original form is well on the way to completion, is a progressive step. Traffic is a growing problem and there will always be a necessity of planning for it. Before the major traffic plan, street improvement in this city was of the haphazard variety. For some years it has been better planned and coordinated, and more of the same sort of thing is obviously desirable.—*Los Angeles Times.*

PROPERTY OWNERS ADOPT SET-BACK LINE FOR SIGNS

The Los Angeles County Regional Planning Commission, by detailed zoning, has safeguarded two outstanding projects during the year. They are the Fifth Avenue and Holt Avenue highways entering Pomona. The Holt Avenue development is a link of the Garvey-Ramona Boulevard project extending into Los Angeles. With the consent of property owners, billboards and commercial structures have been barred for 1000 feet back of the property line for a distance of 13 miles along these highways.—*Los Angeles Examiner.*

Seven Bridges Being Built on Route 56

Bridge building crews are being kept very busy these days along the San Simeon-Carmel coast on State Route 56 erecting a number of timber bridges. Three structures have just been completed and seven more are under way.

Across Anderson Creek, 45 miles south of Monterey; across Buck Creek, 47 miles south of Monterey, and across Lime Creek, 49 miles south of Monterey, timber bridges with 24-foot roadways have been completed.

Under construction are similar bridges across Hot Springs Creek, 48 miles south of Monterey; across Dolan Creek, 50 miles south of Monterey; across Prewitt Creek, Wild Cattle Creek, Mill Creek and Kirk Creek, all located between 32 and 36 miles north of San Simeon, and across Willow Creek, 32 miles north of San Simeon.

"Can I borrow a cigarette, old man?"

"Well, you ought to be able to—you've had enough practice."



ANOTHER BARRIER FALLS as the winsome granddaughters of State Senator Frank L. Gordon clip the silk ribbon officially opening the newly improved unit of the Napa-Monticello Highway to traffic. Left to right, Mrs. Ernest C. Crowley, wife of Assemblyman Crowley of Suisun; Napa County Farm Adviser H. J. Baade; Mildred Gordon and Charlotte Gordon; Mrs. Frank L. Gordon and Captain J. B. Critchley, California Highway Patrol, Napa.

Auto Caravan Tour Celebrates Opening of New Highway Unit

CELEBRATING the first unit of improvement to the Napa-Monticello Highway, a large caravan was mobilized by the Napa Chamber of Commerce and Napa County Farm Bureau to drive over the new highway on June 19th.

This highway, which was improved and surfaced jointly by the State and the Napa County Board of Supervisors, traverses a series of very scenic canyons and valleys, including the Berryessa, Wooden, Capell and Gordon valleys.

The improvement considerably lessens the driving time and adds tremendously to the pleasure of driving between Napa, Monticello and intermediate points.

PROVIDES IMPORTANT CONNECTION

This sector connects with the highway from Monticello to Winters, thus providing a direct route between the Sacramento Valley, Napa County and the Redwood Empire.

The caravan was mobilized by the Napa Chamber of Commerce, of which C. C. Money is president and Charles Grady secretary. Various arrangements were handled by Her-

man C. Baade, county farm adviser for Napa County, who acted as grand marshal of the caravan.

Arrangements in and about Monticello were in charge of W. D. McKenzie, prominent Monticello citizen.

At a luncheon in the Peacock Hotel in Monticello the speakers included: Assemblyman Ernest C. Crowley, Charles Grady, City Attorney Lochman of Napa, Sheriff John P. Steekter of Napa, District Attorney Wallace Rutherford, the General Manager of the Redwood Empire Association and others.

LAW AFTER SLOW ROAD HOG

People who clog the highways by slow driving are the objects of a campaign inaugurated by the California Highway Patrol to promote safety and courtesy on the highways of the State.

E. Raymond Cato, Chief of the California Highway Patrol, has issued orders to executives and officers of the patrol to watch for violations of the California Vehicle Act covering this point, following numerous reports of accidents caused by slow-moving pleasure and commercial vehicles refusing to let faster cars pass.

"I understand your wife wanted a closed car but that you wanted an open one."

"Yes, but the incident is closed now."

Blink—My laundry sends back my shirts with different buttons sewed on them.

Blank—You don't know when you're well off. My laundry sends back my buttons with different shirts sewed on them.

New Los Gatos-Santa Cruz Link Eliminates 130 Curves, Saves 2 Miles

By COL. JNO. H. SKEGGS, District Engineer

STATE Highway Route No. 5 has one of its termini in Santa Cruz, an important coast city of California with a population of 14,395. This highway is the main thoroughfare between beautiful Santa Cruz City and County and the populous interior valley and bay cities.

The section of Route 5 between Los Gatos and Santa Cruz is distinctively a mountain road. The highway leads to Los Gatos over long tangents through vast orchards, and in departing from the town plunges at once into the canyon of Los Gatos Creek, and winds its way upward for 10 miles to a pass over the ridge of the Santa Cruz Mountain chain. Thence it descends for 15 miles of devious courses to Santa Cruz through forest covered hills, little friendly valleys dotted with homes, and patches of orchard—every turn in the road a new masterpiece of scenery. And from the vantage points over the summits, breath-taking panoramas of mountains and valleys and the broad sweep of the sea.

TRAFFIC HAS INCREASED

This mountain road section was constructed during the years 1915 to 1919. For the funds and standards available in those days, it was a good job but the rapid growth of traffic burden long since passed the point where the present road could be considered adequate to demands upon it.

The traffic count has steadily mounted, being well sustained, even during these depression years, and often reaches peaks in excess of 12,000 cars per day.

The problem of reconstructing this highway has been approached in the light of modern scientific road building, with full knowledge of traffic requirements, economies of design, and the relation of original cost to cumulative costs and savings depending on the design.

Ultimately all of the 25-mile section between Los Gatos and Santa Cruz will have come under the reconstruction plan already well formulated, and in considerable measure brought to realization. The section from Ocean Street in Santa Cruz for a distance of two miles toward Los Gatos has been completed; and an 8-mile stretch of the most dangerous and difficult part of the old road

comprising the section between Inspiration Point summit and Scott's Valley has been replaced by 6.67 miles of new road, which has been graded and is now being surfaced. This particular section strikingly illustrates the evolution of the modern highway.

130 CURVES ELIMINATED

From a point nearly one mile east of the well named "Inspiration Point" the old road winds and loops about to find support as best it can, following the broken terrain and creek canyon leading into Scott's Valley. Original construction was under a principal control of low first cost, which effectually prohibited any large inclusions of an ultimate location.

The road was built from 21 to 24 feet wide, and paved to a width of 15 feet with Portland cement concrete, all at a cost of about \$16,500 per mile.

On the new location starting from the same point east of "Inspiration Point" the reconstructed road strikes boldly out through the mountains with huge cuts and fills. By way of easy gradients and but few curves, the new road again converges with the old in Scott's Valley.

The cost of the new construction is approximately \$92,000 per mile as against the \$16,500 per mile for the old road. But between the termini there has been a saving of more than two miles in distance to be traveled, the number of curves has been reduced by 130, and 6101 degrees of curvature eliminated and the minimum radius of curve made 500 feet long as against 80 feet on the old road. The width of new road is a minimum of 46 feet through the mountainous section and 36 feet in the valley, or about 100 per cent greater than that of the old.

In relation to the present traffic, savings in operating costs alone derived from reduced travel distance, represent a profit of about 25 per cent as the yearly dividend on the money invested in the improvement.

INVESTMENT JUSTIFIED

If only a fourth of the motorists using this highway are concerned with distance saved the investment would still be justified on the mileage saving basis.

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OVER THE MOUNTAINS between Los Gatos and Santa Cruz a fine new highway link is approaching completion, replacing a narrow old road of poor alignment. Parts of the new Scotts Valley-Inspiration Point link that cuts out 130 curves on State Route No. 5 are shown above. No. 1—Old and new road entering north city limits of Santa Cruz. No. 2—A view of the new road at Inspiration Point, showing a bit of the old route winding down around a cliff at the left. Nos. 3 and 4—Two of the deep cuts through the hills.

\$3,752,000 Broadway Low Level Tunnel Job Started Work June 17

(Continued from page 16)

impression upon the assembled thousands in the Berkeley hills witnessing the start of a project made possible by the gas tax fund.

Senator Breed, veteran friend of California highways, retiring from the Senate, spoke in similar vein, as did State Director of Public Works Kelly.

Other speakers were E. N. Ament, Mayor of Berkeley; W. J. McCracken, Mayor of Oakland; Hollis R. Thompson, City Manager of Berkeley; W. J. Buchanan, Chairman, Board of Supervisors, Contra Costa County; W. J. Hamilton, Chairman, Board of Supervisors, Alameda County; John B. Lewis, Collector of Internal Revenue; State Senator Will R. Sharkey, Contra Costa County; Redmond C. Staats, Past President and Thos. E. Caldecott, President, Board of Directors, Joint Highway District No. 13.

DREAM COME TRUE

Long the dream of residents of the great Eastshore Empire, the Broadway low level tunnel became a reality. Its inception in 1926 brought about by public demand, due to the inadequacy of the existing tunnel and its connecting traffic lanes, marked a historical date in the life of both Contra Costa and Alameda counties. These two counties were joined by the city of Oakland in a study which resulted in the formation of the 13th Joint Highway District. Assistance was given these bodies by the State Highway Commission.

Some idea of the amount of traffic that used the present antiquated tunnel in 1930 may be gained from the traffic count, which showed 30,000 vehicles per week. Engineers place the probable traffic by 1940, at which time the new Broadway low level tunnel will be in full operation, at 77,000 vehicles weekly.

Without the aid of the United States government and the State of California it would indeed have been difficult for the counties of Alameda and Contra Costa to construct this necessary traffic artery. PWA grant from the Federal government amounts to \$1,095,000, while the State of California granted \$700,000. The balance of the money was raised successfully by bond issue.

A NOTE OF APPRECIATION

T. H. Dennis, Maintenance Engineer,
California Highway Commission,
Sacramento, California.

Dear Mr. Dennis:

As a community organization, and in behalf of every resident, we thank you for the white line recently painted along the center of our highway from Dolans Corner to the head of Bolinas Lagoon.

Because of the many blind curves this is an important safety feature but to those who drive this road on foggy nights, when it is not possible to see either edge of the road, this white stripe is literally a "life line."

We also express our appreciation of the care given this road since it was taken into the Secondary Highway System. Prompt removal of rock and dirt slides after rains, frequent repairing of such holes as came in the surfacing, and the general attention to drainage and maintenance have given us a new conception of the service given by the State Department of Highways.

It is a pleasant contrast to the road we traveled for many years.

Very truly yours,

**PROGRESSIVE CLUB OF STINSON
BEACH.**

(Signed) W. B. Marble, President.

COST \$3,752,000

The project will consist of two parallel tunnels having a total length of 3168 feet each. A 22-foot roadway with a 3-foot pedestrian sidewalk through each bore will provide maximum safety and will allow for fast traffic movement.

Both tunnels are to be concrete lined, and mechanically ventilated by a system with a capacity of 1,500,000 cubic feet of fresh air per minute. Complete electric illumination and safety control devices are provided.

The cost of the entire project will be approximately \$3,752,000. For a period of 18 to 24 months an average of 900 men will be employed. One hundred twenty thousand barrels of concrete will be used. Over 1000 tons of structural and reinforcing steel will be required. Seven hundred thousand square feet of pavement will be laid. The whole project will require excavation and grading of one million cubic yards of earth.

Mr. Spendix: "Any installments due today?"

Mrs. Spendix: "No, dear, I think not."

Mr. Spendix: "Any payments due on the house, the radio, the furniture, the rugs or the books?"

Mrs. Spendix: "No."

Mr. Spendix: "Then I have ten dollars we don't need. What do you say we buy a new car?"



A newly issued report on the irrigation districts shows that major reservoirs were only half filled in 1933, compared with a storage amounting to two-thirds their capacity in 1932, and total water diversions were 522,000 acre-feet less than in the preceding year. The work of the Sacramento-San Joaquin water supervisor has been resumed through subscription of funds by water users. The flow of the Sacramento River did not drop to anticipated levels during the month and salinity encroachment in the Delta was delayed owing to cool weather and showers in the mountains. Other activities of the division are given in the monthly report as follows:

IRRIGATION DISTRICTS

At an election on June 19th, \$2,000,000 in bonds were voted by the Santa Clara Valley Water Conservation District, Santa Clara County. The bonds are to support a Federal loan which will be used for the construction of storage and other water conservation works planned by the district.

Bulletin 21-E, a report by the State Engineer on California irrigation districts for 1923, has been released. This is the sixth of a series of publications issued by the State since 1928 dealing with the history and activities of districts formed under the California Irrigation District Act. This bulletin supplements the previous publications by bringing the statistical data on the irrigation districts up to January 1, 1934, and briefly recording such other information as was obtained of district activities in 1933. One additional district was formed during the year and two districts dissolved. There are 92 districts containing a total of 3,384,000 acres maintaining organizations and listed as active.

Bulletin 21-E contains tabulations for 1933 on the water supply, crops, assessments and collections of the active districts as well as bond information on those having outstanding bonds.

There are 24 major reservoirs in use with a total capacity of 1,525,000 acre-feet. Water stored in 1933 amounted to 737,000 acre-feet, or less than one-half the capacity of the reservoirs, whereas in 1932 storage amounted to two-thirds of such capacity. Total water diversions reported are 6,900,000 acre-feet or 522,000 acre-feet less than in 1932.

The districts operated 302 irrigation and 251 drainage wells, and for all pumping operations reported an installation of 38,549 horsepower. To supplement the water furnished by the districts landowners in the district were reported as operating 11,647 private irrigation wells. There was a decrease of approximately 297,000 acres irrigated in irrigation districts as compared to the previous year.

DISTRICTS SECURITIES COMMISSION

The commission issued orders to the following districts:

La Mesa, Lemon Grove and Spring Valley Irrigation District—Approval for certification of \$490,000 in principal amount of second division, second issue, of bonds; also \$1,348,000 in principal amount of refunding bonds.

Imperial Irrigation District—Approval of warrant payment plan to be used in connection with the refunding plan previously approved.

Citrus Heights Irrigation District—Consent to expenditure from general fund, pursuant to section 11 of the Securities Commission Act.

FLOOD CONTROL AND RECLAMATION

Sacramento Flood Control Project—Bank Protection.

Work on the State-Federal cooperative program for permanent bank protection has been continued by the U. S. Engineer office at Sacramento. A large order for Folsom cobbles has been placed for bank protection in Reclamation District No. 1500 in Sutter County, District No. 108 in Colusa County and District No. 2047 in Colusa County.

Sacramento Flood Control Project.

Applications are being prepared by this office for the Reclamation Board covering possible SERA projects in the American River overflow channel, the Sacramento By-pass and the Feather River overflow area in Yuba County.

Mokelumne River.

This office has under preparation an application for a SERA project for clearing the Mokelumne River By-pass between Reclamation District No. 1002 and the McCormack-Williamson tract.

Russian River Jetty.

Application is being made for a SERA project to continue work on the Russian River jetty.

(Continued on page 28)

Bay Bridge Six Months Ahead of Schedule Says First Annual Report

A YEAR has elapsed since ground was broken for the San Francisco-Oakland Bay Bridge on Yerba Buena Island, July 9, and in the first annual report on the bridge State Director of Public Works Earl Lee Kelly and Chief Engineer C. H. Purcell had the pleasure of reporting to Governor Frank F. Merriam that the bridge was six months ahead of schedule.

If this lead is maintained, Director Kelly informed Governor Merriam, the San Francisco-Oakland Bay Bridge will be opened to traffic by July, 1936.

The first anniversary of the bridge sees the completion of the first steel tower of the suspension sector and the beginning of erection of the second tower.

WEST BAY PIERS COMPLETE

During the year the contractors on the bridge have earned \$11,500,000, or 31 per cent of the total amount of the major contracts.

At the end of the first year of the bridge all the piers of the West Bay crossing are either complete or nearing completion and, of the 22 major East Bay piers, only two are yet to be started.

Of the 51 piers beneath the entire bridge, 16 are complete, 18 are in construction, and the remaining 17 are small subpiers involving no unusual problems or quantities.

The San Francisco cable anchorage on Rincon Hill is now in its secondary stage of construction, containing more than 30,000 cubic yards of concrete, or half its final cubature. No more concrete will be added to this monument at the west end of the bridge until the cables have been spun and tied to the giant steel eyebars projecting from this monolith, some time in 1935.

ANCHORAGES WELL ADVANCED

Work is now starting on the viaduct to carry the bridge west of the anchorage over Rincon Hill.

Piers to carry the bridge east of the anchorage on the San Francisco side are in construction.

On Yerba Buena Island the cable anchorage is well under way and the concrete center anchorage, midway between San Francisco and Yerba Buena Island, has its substructure in the final stage.

The two huge tunnels, large enough to drive a truck in (but not turn around), into which the two cables will be anchored to steel gril-lages and concreted, are complete and ready for setting the steel to which the cables will be anchored.

OPENING TUNNEL BORES

The huge vehicular tunnel that will carry two decks of traffic through the sandrock island is well under way with two headings due to go through by July 23, when Governor Merriam and the California Toll Bridge Authority will be escorted through by Director of Public Works Kelly and Chief Engineer Purcell.

The piers supporting the bridge viaduct on the east side of Yerba Buena Island are all practically complete, as is the huge anchor pier on Army Point for the west end of the anchor arm for the 1400-foot cantilever span.

OVER 7000 EMPLOYED

Inasmuch as the East Bay piers are in an advanced stage, erection of the steel superstructure at the east end of the bridge is expected to be started next month.

The sand fill, which is being pumped into place alongside the Key Route Mole, is well ahead of schedule and should be completed this year.

Employment on the bridge has now reached a total of 7238 men of which 4015 are employed fabricating materials, and the balance by the contractors on location.

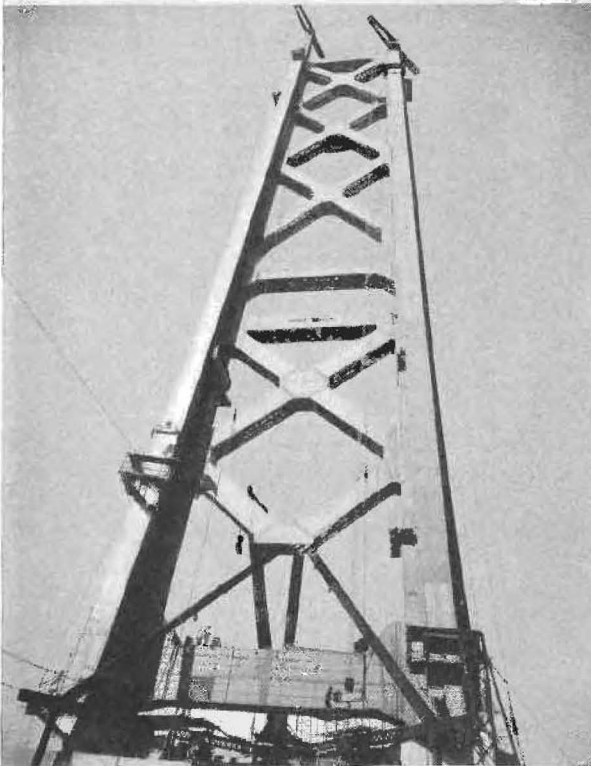
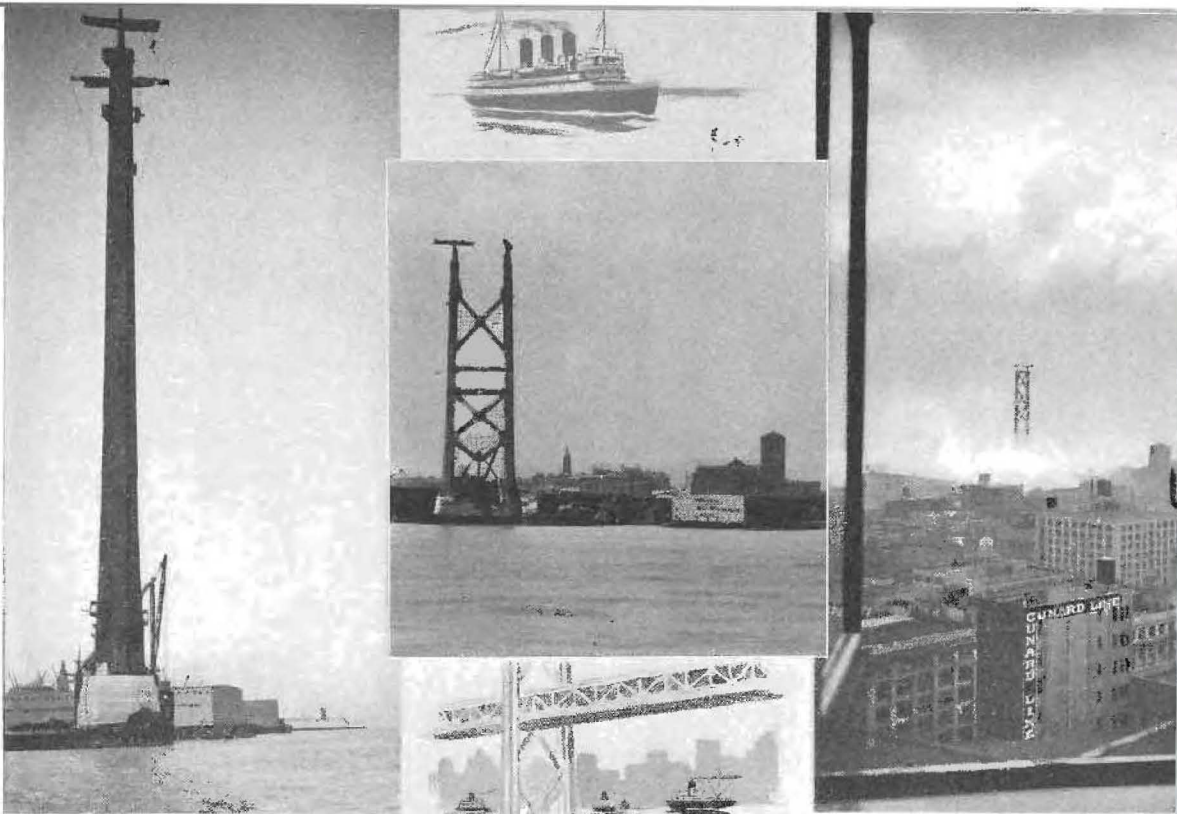
SURFACING COALINGA LATERAL

On the Coalinga lateral, between Mustang Ridge and Priest Valley, a distance of about 3.3 miles, the road is being constructed with a 24-foot graded road-bed and a 20-foot selected material surface. This project is financed under the National Industrial Recovery Act.

Gladys—What is your favorite sport?

Young Doctor—Sleighting.

Gladys—No, I mean apart from business.



RISING SKYWARD above the city's shoreline, Tower W-2 of the San Francisco-Oakland Bay Bridge presents fascinating studies of majestic beauty and strength to the camera. A side view shows the slender, graceful silhouette tapering from the base to its top 474.35 feet above the water. A worm's eye view presents a vaulting pyramid of steel lattice work. Seen through a second story office window it dominates all the bay front structures, its top almost lost in the cloud vapors. A close-up reveals the massive size of the great steel girders.

Expert Engineers Pass on School Plans

(Continued from page 15)

in providing such reasonable fire safety. However, where such reasonable fire safety is not provided, a school authority is advised that use of the school building for school purposes as far as fire hazard exists will be entirely upon its own responsibility.

4. Where a building belonging to a school district is to be used for housing school buses or such mechanical equipment then such building is not affected by the act provided that a proper resolution is passed by the school board to the effect that no pupils or teachers, as such, will be permitted to use or enter said building at any time.

ENFORCEMENT NOT ARBITRARY

5. The Division of Architecture has further taken the viewpoint that repairs such as painting, reshingling and miscellaneous upkeep do not come under the provisions of the act.

The rules and regulations set up in connection with the act are not being arbitrarily enforced but the way is left open for the designer to exercise his ingenuity subject to the primary consideration of safety of construction. What we are fundamentally concerned with is not a set of rules but rather safeguarding life and property.

The problem has been most difficult in connection with reconstruction work. What we have been primarily concerned with is not whether the minimum requirements prescribed for new construction have been exceeded but rather is the condition which exists such as to create a hazard to the occupants of the building.

The Division of Architecture is being just as liberal as possible consistent with safety in enforcing requirements for reconstruction or alterations of existing buildings.

BUILDING USE PRIOR TO COMPLETION

6. The school board may, if it so desires, submit plans and reconstruction or changes for the entire building or any portion thereof. Approval of this proposed reconstruction or change will be based upon whether or not the building as reconstructed will be hazardous, rather than whether it fully complies with Appendix "A" of the Division of Architecture. The division has, in certain instances, given approval where individual members have been overstressed as much as 50 per cent or more of the values laid down in Appendix "A," provided that an undue hazard is not created thereby.

It will, of course, be necessary that the submitted plans provide such safety as will give assurance that undue hazard does not exist. The school board may, on the other hand, do only such portion of the work, as set forth in the approved plans and specifications, as it may desire or as its financial limitations may permit. Construction may therefore proceed to any point short of full compliance with plans and specifications without doing all the work involved therein, and later, if it so desires, the school board may intermittently or continuously complete the work until full compliance is had.

Upon final completion, but not before, the Division of Architecture will issue a certificate of completion. The question of how far work shall proceed is thus

left entirely optional with the school board, since it may discontinue work at any time and proceed to use the building upon its own responsibility.

ADDITIONAL EXEMPTIONS PERMITTED

7. In accordance with a ruling of the Attorney General, permission is being granted to include a number of identical temporary buildings under one application, and minimum fee, provided that the cost of the group does not exceed \$10,000.

Whether or not an existing building is to be strengthened is entirely optional with the school board. If any work is done exceeding \$1,000 in cost, approval must be had of the State.

It is not necessary to secure approval for repair work such as painting, plastering, and general maintenance of the building. Approval applies only to new work, or to alterations, additions or reconstruction.

Approval for demolition work has been waived. This exemption can not, of course, include those conditions where reconstruction is involved.

PERSONNEL COMPETENCY DEMANDED

Realizing the extreme importance of the work involved the personnel employed has been selected entirely on the basis of fitness as determined by combined written and oral examinations. All persons engaged in this work are civil service employees employed solely on the basis of their individual qualifications and are retained by the State only so long as they are found to be efficient and competent.

The science of design with reference to adequately and economically providing for seismic forces is relatively new and consequently the State's personnel as well as those persons engaged in private practice have had to become trained in this work. Fortunately the State had a small group of structural engineers who had for several years been thus designing State buildings. These were reemployed upon passage of the safety of school construction act and augmented by a number of especially well qualified structural engineers in private practice.

This group served as a nucleus around which the organization was built and served not only to check such plans as were submitted but, in addition, in the work of examination of existing buildings it gave such advice and assistance upon submission of the preliminary scheme of design of plans and specifications as lies within the province of the Department of Public Works.

The ingenuity of both the structural engineer and architect is being taxed to the utmost to provide designs for this reconstruction work that are at all reasonable, economical and feasible. The problems involved are troublesome and solution is not always entirely satisfactory. However much has been accomplished since the act has gone into effect and designs are rapidly being simplified and standardized.

The public can have every assurance that new school buildings as well as those being reconstructed will be safe against earthquakes of rather severe intensity such as have been experienced from major earthquake shocks in the past on the Pacific Coast.

Projects Advanced to Bids in June

Fourteen contracts were advertised by the Division of Highways in June for improvements in nine counties. The projects on which bids were asked included the grading, paving or surfacing of 5.8 miles of highway, the construction of four bridges and two maintenance station buildings and the oiling of 68.2 miles of road oiling on various routes. The estimated total cost of the work was \$554,200.

DETAILED LIST OF PROJECTS

County	Location	Type	Miles
San Francisco	Between Division & Army Sts. on Potrero Ave. in San Francisco	Pavement	1.4
San Francisco	Between 5th & 10th Sts. on Harrison St. in San Francisco	Pavement	0.8
Humboldt	Broadway Avenue in Eureka	Bit. Tr. Cr. Rk. Surf.	1.5
Kings	23 & 25 Mi. S. of Fresno on Lemoore-Fresno Road	Bridges	(2)
Los Angeles	Across San Gabriel River & Coyote Crk. on Firestone Blvd.	Bridges	(2)
San Bernardino	In Redlands	Storm Drain	----
Napa	Napa to Greenwood Corner	Bit. Tr. Cr. Rk. Surf.	0.6
Orange	Approaches to Santa Ana Riv. Br. at Buaro Road	Graded Roadbed	1.5
Los Angeles	Los Angeles County Park	Maint. Sta. Bldgs.	----
Santa Cruz	Saratoga Gap	Maint. Sta. Bldg.	----
San Bernardino	Mt. Vernon Ave. Viaduct	Painting steel Struc.	----
Los Angeles	Various Routes	Oiling	23.3
San Bernardino	Various Routes	Oiling	28.5
Madera	2.9 Mi. E. of Madera to County Road to Bates	Oiling	16.4

SUMMARY

Type	Miles	Amount
Pavement -----	2.2	\$259,000
Bituminous Treated Crushed Rock Surface -----	2.1	65,500
Graded Roadbed -----	1.5	10,000
Bridges -----	(4)	102,400
Oiling -----	68.2	37,800
Miscellaneous Projects -----	---	79,500
Totals -----	74.0	\$554,200

Water Resources for July

(Continued from page 23)

WATER RIGHTS

Supervision of Appropriation of Water.

Thirty-eight applications to appropriate water were received during May, six were denied and 20 were approved. During the month two permits were revoked and 16 passed to license.

Among the applications filed were five by the Department of Finance under the provisions of Chapter 286, Statutes of 1927, in furtherance of the State Water Plan and involving the waters of the American River.

SACRAMENTO-SAN JOAQUIN WATER SUPERVISOR

In response to the appeal to the water users by the Permanent Committee of the Sacramento-San Joaquin River Problems Conference for funds for reestablishment and maintenance of water supervision during the current season, about \$5,500 of the \$12,500 sought has been paid or pledged. Provision has been made for matching the funds subscribed by the water users with a State Emergency Fund allotment, making about \$11,000 available for carrying on the work. Although this may not be sufficient to complete, in addition to the water supervision, the compilation and publication of the Water Supervisor's Report of all data, as in the past, it is sufficient to assure the maintenance of the much needed water supervision throughout the irrigation season. At the request of the Permanent Committee, therefore, the Division of Water Resources has definitely reestablished the work and it is now well under way.

Due presumably to the cool weather and showers in the mountains which have prevailed during the past month, the stream flow has not dropped to the levels anticipated for this date. On June 15th the flow of the Sacramento River at Sacramento was about 3000 second-feet, compared to a flow of about 1200 second-feet on the same date in 1931. The flow of the San Joaquin River near Vernalis is practically the same as in 1931, or about 400 second-feet.

This condition of the stream flow is reflected in the following comparison of the salinity at upper bay and delta stations on June 14, 1934, and 1931:

Comparison of Salinity on June 14, 1934 and 1931

Salinity in parts of Chlorine per 100,000

Station	1934	1931
Point Orient.....	1680	1680
Bullshead Point.....	1040	1280
Bay Point.....	740	920
Collinsville.....	190	580
Antioch.....	130	340
Rio Vista.....	4	34
Central Landing.....	7	8

The above indicates that at present the salinity encroachment is from twenty to twenty-five days later than in 1931, and gives rise to the hope that the maximum salinity at the various stations may be consider-

ably delayed and sustained for a much shorter period than in 1931, although the degree of the maximum may closely approach that of 1931 at the lower Delta stations.

DAMS

The application for construction of the Big Canyon Creek Dam, located on Big Canyon Creek in El Dorado County was approved on June 6th. The dam is to be an earthfill 45 feet in height with a storage capacity of 300 acre-feet. The water will be used for mining purposes.

Work on the construction of San Gabriel No. 1 dam is proceeding as is the work of producing settlement in the San Gabriel No. 2 dam by the use of water.

WATER RESOURCES

At the present time the application for the approval of the Central Valley Water Project and for a grant and loan for its construction is before the Public Works Administration in Washington. The application has been reviewed and reported upon by the United States Army engineers and the Federal Power Commission. Application has also been made to the Federal Power Commission for license by that commission for the three dams at Kennett, Keswick and Friant. The Secretary of Agriculture, through the United States Department of Agriculture, has made a study and report of the needs in the San Joaquin Valley of additional water for irrigation and agricultural development. With the report of the Secretary of Agriculture the Federal agencies interested will have reviewed the application for the approval of the Central Valley Project.

WHAT'S THE USE OF RED LIGHTS ILLUMINATED SIGNS N'EVERYTHING?

Four empty whiskey bottles, a man and a woman and a large sedan, Wednesday evening, in Wheatland, successively and successfully passed two "detour ahead" signs, four red lights, one illuminated arrow and a 6-foot barricade 40 feet wide, continued north into the new highway construction until they struck the 4-foot fill made of good red soil and sleeked down by the heavy rains. Then, like the "Strawberry Roan," that car just seemed to "quit livin' down there on the ground." It turned three somersaults, swapped ends and rolled over in the mud.

Officers visiting the scene found the car registered in the name of a resident of Oroville. Outside of some smashed glass the car was not badly damaged. The four whiskey bottles were intact and may be used again.—*Wheatland Herald.*

Angeles Crest Highway Will Open Recreational Mountain Area in Fall

(Continued from page 2)

Although at present there are no definite plans for this section, it will in all probability be constructed within the next few years.

GIVES ACCESS TO MT. WILSON

In the meantime, the U. S. Forest Service has awarded a contract for widening the road from Mt. Wilson to Red Box to a 20-foot roadbed width. This section is five miles in length. When this widening contract is completed, and the State contract between Colby Canyon and Red Box is finished, automobile traffic will have ready access to Mt. Wilson.

Construction on the new Angeles Crest Highway was commenced in 1929 and has been completed for the first 11½ miles in three contracts. Easy grades and high standards of alignment for this type of road have been used on all three of the completed contracts as well as the one now in progress.

A 26-foot wide roadbed has been constructed, with standard superelevation on all of the curves so this entire road can safely be driven at a fair rate of speed.

From La Canada the new highway climbs steadily along the precipitous sides of the



GRADING OPERATIONS call for 914,000 cubic yards of roadway excavation, 5,000,000 yards overhaul.

Arroyo Seco to the divide between the Arroyo Seco and Big Tujunga watersheds.

BEAUTIFUL SCENIC PANORAMA

As the ascent is made, a beautiful vista is unfolded. From certain prominent points a view can be had of Los Angeles, Pasadena, Glendale and many other cities and small towns in the flatter country below. On exceptionally clear days the ocean and Catalina Island can also be seen.

Care was used in planning the construction of this road to avoid making high cut or fill slopes which could be seen from the valley. The beauty of the mountain slopes in the vicinity of Los Angeles (particularly north of Hollywood and Beverly Hills) has been destroyed in many cases by the construction of subdivision streets and roads making unsightly gashes in the forest cover. To avoid these long fill slopes at exposed places, the excess material was hauled farther into the mountains and deposited out of view to make parking places and picnic grounds.

PARKING AREAS PROVIDED

Wherever possible, in the construction of this highway, the scenic points have been graded so as to form areas where cars can park overlooking the valley below.

The new section of the highway now under construction from the end of the completed portion of Colby Canyon to Red Box, is being built to the same standards as the portions already

(Continued on page 31)



WIDENING OPERATIONS call for heavy work on mountain spurs encroaching on the alignment.

Highway Bids and Awards

FOR JUNE

COLUSA COUNTY—Between Maxwell and Delevan, about 5.5 miles to be graded and paved with asphaltic concrete. District III, Route 7, Section C. Chas. L. Harney, San Francisco, \$186,719; Peninsula Paving Company, San Francisco, \$158,962. Contract awarded to Hanrahan Company, San Francisco, \$146,974.

IMPERIAL COUNTY—Oiling, Bonds Corner to Niland. District XI, Route 187-201, Sections A, B, C, E-C. Consumers Oil Co., Los Angeles, \$9,319; Gilmore Oil Co., Los Angeles, \$9,156; Paulsen & March, Inc., Los Angeles, \$8,883; Lambs Transfer, Long Beach, \$9,645. Contract awarded to Square Oil Co., Los Angeles, \$8,338.

KERN COUNTY—Between Rio Bravo and $\frac{1}{2}$ mile So. of Shafter and between Old Quarry and westerly boundary of Sequoia Natl. Park, about 28.7 miles to be treated with cut-back asphalt road oil and fuel oil. District VI, Routes 139 and 142, Sections B, C & D. E. A. Forde, San Anselmo, \$29,275; John Jurkovich, Fresno, \$2,880. Contract awarded to Granite Construction Co., Ltd., Watsonville, \$26,654.

LOS ANGELES COUNTY—Between westerly city limits and Wilmington Blvd. 2.0 miles to be graded and paved with asphaltic concrete or Portland cement concrete and asphaltic concrete. District VII, Route 60, Section L.A. United Concrete Pipe Co., Los Angeles, \$163,736; Griffith Company, Los Angeles, \$160,280; Sharp & Fellows Cont. Co., Los Angeles, \$167,268; Sander Pearson & Mundo Eng. Co., Los Angeles, \$199,177; Oswald Bros., Los Angeles, \$153,632; Sully Miller Contracting Co., Long Beach, \$167,983. Contract awarded to Basich Bros., Torrance, \$150,290.

LOS ANGELES COUNTY—Various locations, 41.1 miles, heavy fuel oil treated shoulders and roadbed and bituminous treated shoulders. District VII, Routes 4 and 186, Sections F, G, H, I, J, D & C. Kovacevich & Price, Inc., Southgate, \$42,040; Dimmitt & Taylor, Los Angeles, \$40,480; P. J. Akmadzich, Los Angeles; Geo. Herz & Co., San Bernardino, \$41,222. Contract awarded to Match Bros., Elsinore, \$38,163.

LOS ANGELES COUNTY—Various roads within Norwalk State Hospital grounds to be treated with heavy fuel oil and surfaced with bituminous treated crushed gravel or stone. W. P. Powell, Los Angeles, \$6,762; H. E. Cox & Son, Pasadena, \$8,954; Silveria & Robbins, Ventura, \$7,208; Griffith Co., Los Angeles, \$7,328; Oswald Bros., Los Angeles, \$7,077. Contract awarded to Kovacevich & Price, Inc., Southgate, \$6,739.

LOS ANGELES AND ORANGE COUNTIES—Various locations, 34.6 miles, roadbed and shoulders, heavy fuel oil treated and shoulders bituminous seal coat treated. District VII, Routes 2, 15, 26, 62, 177, Sections F, B, B, C, B, A. Kovacevich & Price, Inc., Southgate, \$30,288; P. J. Akmadzich, Los Angeles, \$31,250. Contract awarded to Dimmitt & Taylor, Los Angeles, \$29,695.

MODOC COUNTY—Between 14 miles east of Alturas and east limits of Cedarville. Oiling. District II, Route 28, Section C. Tieslau Brothers, Inc., Berkeley, \$3,751. Contract awarded to C. F. Fredericksen & Sons, Lower Lake, \$3,605.

MONO COUNTY—Between Rte. 23 near Carrington's to Rte. 23 near Rush Creek via Carson's and from Rte. 23 near Hot Creek to Mammoth Ranger Station. About 19.7 miles to be treated with fuel oil. District IX, Routes 111, 112, Sections A, A. Contract awarded to Paulsen & March, Inc., Los Angeles, \$6,277.

MONTEREY COUNTY—Between Mustang Ridge and Priest Valley, about 3.3 miles to be graded and portions surfaced with selected material. District V, Route 10, Section C. Young & Son Company, Ltd., Berkeley, \$138,575; Granfield, Farrar & Carlin, San Francisco, \$121,763; Union Paving Co., San Francisco, \$124,990; Dimmitt and Taylor, Los Angeles, \$148,989; Mittry Brothers Constr. Co., Los Angeles, \$135,600; Sharp & Fellows Contracting Co., Los Angeles, \$137,229. Contract awarded to Peninsula Paving Company, San Francisco, \$108,513.

NEVADA COUNTY—Between $\frac{1}{2}$ miles E. of Hinton and Floriston, about 3.5 miles to be surfaced with

bituminous surfacing. District III, Route 38, Section E. E. A. Forde, San Anselmo, \$16,956; Granite Const. Co., Ltd., Watsonville, \$18,865. Contract awarded to L. G. Kipp, Sacramento, \$15,768.

RIVERSIDE COUNTY—Between Temecula River Bridge and San Diego County line near Aguanga and between Hemet and Sage, oiling roadbed. District VIII, Routes 78, 194, Sections A, B. Lamb's Transfer Co., Long Beach, \$5,971; Square Oil Co., Los Angeles, \$6,354; Gilmore Oil Co., Los Angeles, \$6,525; Paulsen & March, Inc., Los Angeles, \$6,909. Contract awarded to Morgan Brothers, Huntington Park, \$5,757.

RIVERSIDE COUNTY—In city of Elsinore 1.9 miles of oiling shoulders. District VIII, Route 77-78, Section Esn. George Herz & Co., San Francisco, \$2,516. Contract awarded to Match Bros., Elsinore, \$2,189.

RIVERSIDE COUNTY—In city of Perris, about 1.7 miles of oiling shoulders. District VIII, Route 64-78, Section Per. George Herz & Co., San Bernardino, \$2,243. Contract awarded to Match Bros., Elsinore, \$1,968.

RIVERSIDE AND SAN BERNARDINO COUNTIES—Between Forest Boundary and Keen Camp and between Doble Corner and 5 miles North of Adelanto, about 22.7 miles to be treated with fuel oil. District VIII, Routes 64, 145, Sections M, A. Dimmitt & Taylor, Los Angeles, \$14,152; Sunset Decomposed Granite Co., Hollywood, \$12,336; Gogo and Rados, Los Angeles, \$16,964; Geo. Gardner & Sons, Redlands, \$12,603. Contract awarded to George Herz & Co., San Bernardino, \$11,920.

SAN BENITO COUNTY—Between Tres Pinos and Pinnacles, a distance of 11.7 miles, oil treatment to be applied to existing roadbed. District V, Route 119, Sections C, D, E. L. A. Brisco, Arroyo Grande, \$10,243; Granite Constr. Co., Ltd., Watsonville, \$7,861. Contract awarded to Walter B. Roselip, San Luis Obispo, \$6,836.

SAN DIEGO COUNTY—Between Escondido and Lako Hodges Dam, 5.6 miles to be graded. District XI, Route, Lake Hodges Road. Daley Corporation, San Diego, \$113,532; Bodenhamer Constr. Co., Oakland, \$110,370; Sander Pearson & Mundo Engr. Corp., Los Angeles, \$148,094; V. R. Dennis Constr. Co., San Diego, \$219,436; Dimmitt & Taylor, Los Angeles, \$121,249; Sharp & Fellows Constr. Co., Los Angeles, \$128,195. Contract awarded to R. E. Campbell, Los Angeles, \$105,296.

SAN DIEGO COUNTY—Between El Cajon and 1 mile east, about 1 mile to be graded and paved with asphaltic concrete. District XI, Route 12, Sections B, C. Griffith Co., Los Angeles, \$23,024; Daley Corp., San Diego, \$27,186. Contract awarded to V. R. Dennis Constr. Co., San Diego, \$22,136.

SAN LUIS OBISPO COUNTY—Routes 33, 125, 58; 41.7 miles oil treatment to be applied to existing roadbed. District V, Routes 33, 125, 58, Sections E; A, B; A, B. Granite Constr. Co., Ltd., Watsonville, \$10,936; Oilfields Trucking Co., Bakersfield, \$13,217. Contract awarded to Walter B. Roselip, San Luis Obispo, \$7,562.

SAN LUIS OBISPO AND MONTEREY COUNTIES—A total distance of 54.3 miles oil treatment to be applied to shoulders and roadbed. District V, Routes 56, 33, 147. Granite Constr. Co., Ltd., Watsonville, \$13,552. Contract awarded to L. A. Brisco, Arroyo Grande, \$12,943.

SANTA BARBARA COUNTY—Reinforce concrete slab bridge over existing highway near east limits of city of Santa Barbara, 1—55' span, 2—35' spans and 2—11' end cantilevers. District V, Route 2, Section S.B. Oscar Oberg, Los Angeles, \$33,117; Theo. A. Beyer Corp., Los Angeles, \$33,245; M. B. McGowan, Inc., San Francisco, \$31,909; Herbert M. Baruch, Corp., Ltd., Los Angeles, \$37,681; Lynch Cannon Engr. Co., Los Angeles, \$33,843; Lindgren & Swinerton, Inc., San Francisco, \$31,489; D. J. Reed & J. Maiser, Los Angeles, \$36,809. Contract awarded to L. C. Siedel, Oakland, \$29,597.

(Continued on page 32)

1,500,000 Cubic Yards Excavation on Link of Mountain Highway

(Continued from page 20)

Aside from any economic consideration the new road makes possible an easy strain-free trip through this delightful mountain scenery. The location is a radical departure from the old road. It provides a larger scope of scenic advantages and meets all the requirements of high standards in design.

Structurally, the work is excellent in conception and in craftsmanship. Only a few years ago the plan as executed would have seemed too bold, even fantastic—at least involving too much heavy work and expense.

LARGE EXCAVATION JOB

This job involved earth excavation approximating 200,000 cubic yards per mile. Most of the cutting was in sandstone of medium hardness, with a few cuts in shale. Design was predicated on encountering comparatively few locations where clay strata would involve heavy slide risks, and the preliminary conclusions were supported by the realities of construction. Many of the cuts and fills range between 50 and 80 feet in depth and the cut slopes stand at $\frac{3}{4}$:1 in the heaviest excavations.

While the project as a whole was conceived and executed under the guidance of economic and engineering controls, esthetic considerations were factors of weight in all the planning. The motorist will find that this splendid stretch of road is itself artistic in its graceful sweep of line, its nice balances in section and general fitness to the topography.

IN THREE CONTRACTS

Reconstruction of this important section of Route 5 through the Santa Cruz Mountains was done in two grading contracts, and one surfacing contract. The major project extended from Inspiration Point six miles toward the city of Santa Cruz and involved earth excavation in excess of one and one-quarter million cubic yards at a total cost to the State of \$313,591. The work was commenced in October 1932 and completed in October 1933.

A second contract involving more than one-quarter million cubic yards excavation extended the construction seven-tenths mile towards Los Gatos. The cost to the State for

Angeles Crest Work Has Averaged 125 Jobs for Five Years

(Continued from page 29)

completed. Parking areas are being graded on scenic points as was done on previous contracts.

The width of the roadbed will be 30 and 40 feet. This 3.96 mile length will cost approximately \$300,000. The contract allotment provides for 914,000 cubic yards of roadway excavation and 5,000,000 station yards of overhaul. Two power shovels have been employed part of the time, and three the rest of the time since early last October.

The time limit on this contract was set at September 26th and, from present indications, will be completed by that time.

RELIEVED UNEMPLOYMENT

A light type oil surfacing will be mixed in place on the roadbed and parking areas as was done on previous sections.

Practically all of this Angeles Crest Highway has been constructed during depression times and the employment which it has afforded has meant a great deal to men who have been employed in its construction. An average of about 125 men has been employed on the various contracts during the last five years. Since most of these men had dependents, it is safe to say that two or three times this number of people were benefited either directly or indirectly by the employment furnished by this project.

This project is of great importance to southern California, particularly to the metropolitan area around Los Angeles. Its completion will render the roads which have been already built in Angeles National Forest readily accessible to automobile traffic from Los Angeles and neighboring cities.

These Forest Service roads (lower standard roads) in turn extend into a vast hitherto inaccessible area in the high mountains which will be ideal for recreational purposes, both from the standpoint of altitude and scenery and from the standpoint of accessibility.

this second unit was \$83,080 and the work was completed in May, 1934.

The third contract for surfacing the two grading jobs has been awarded. The work consists of placing crusher run base and bituminous macadam at a cost to the State of \$191,228. This work is now under way and will be soon completed.

Channel Change and 4 Bridges on Project in Santa Barbara

(Continued from page 4)

consists of constructing a new channel with a 20-foot bottom about 9 feet high and lining with mesh reinforced concrete 8 inches thick on the base and 6 inches on the walls.

The four bridges mentioned above are being constructed under separate contract and under the bridge department supervision. The first of these structures is a reinforced concrete slab bridge over the present highway at the southerly city limits. This structure will provide a clear roadway width of 44 feet with two 4-foot sidewalks.

TWO BRIDGES OVER CREEK

The two bridges being built across Mission Creek provide a clear roadway width of 60 feet with two 4-foot sidewalks.

At the northerly edge of the city, where the new road parallels the railroad, it has been necessary to construct a reinforced concrete girder type overhead structure to carry a well traveled county road, this structure directly connecting to an existing timber bridge over the Southern Pacific railroad.

At the northerly end of the work, where a connection is again made with the present State highway on Hollister Avenue, additional right of way has been acquired to permit the future construction of a braided traffic intersection to effectively handle the ever increasing volume of traffic in this vicinity.

RELIEVES CONGESTED TRAFFIC

The roadway work is progressing under two contracts and the structures under three contracts, all work being under the provisions of the National Industrial Recovery Act, stipulating a maximum employment of Santa Barbara County workmen, and providing for a 30-hour working week.

The entire improvement on this Santa Barbara through truck boulevard aggregates a total contract price of over \$500,000, and when opened, which is expected will be about November 1st, will provide an adequate by-pass of the business section of Santa Barbara and allow through traffic of the Coast Highway to proceed through the city with the minimum of inconvenience and delay. It will also be of a decided benefit to the city itself, as it will relieve, to a great extent, the congested traffic conditions along de la Vina and other narrow streets within the community.

In Memoriam

CHARLES H. GREENWALD, maintenance foreman of District VII, died on June 16th following an abdominal operation at a hospital in Santa Ana, Orange County, at the age of forty-seven.

He was born in 1887 at Fort Scott, Kansas. He entered the service of the State Division of Highways as a laborer March 17, 1924, and served in that capacity until July 19, 1927. He was promoted to the positions of leading-man and maintenance foreman and served in the latter capacity continuously until his death. He was a very reliable and conscientious employee and his passing is deeply regretted by all his associates.

Mr. Greenwald had his home at Seal Beach and leaves a widow and three children. One of his sisters is the wife of Maintenance Foreman C. J. Ward, at Azusa, California.

COAST HIGHWAY IMPROVEMENTS

On the Coast Highway between King City and two miles south of Greenfield, a distance of 8.9 miles, the road has been graded to a 36-foot roadbed with a 20-foot bituminous surface treatment. This project was financed under the National Industrial Recovery Act.

Between King City and San Ardo, a distance of 15 miles, fuel oil has been applied as a dust palliative to the shoulders on each side of the existing pavement.

Highway Bids and Awards

(Continued from page 30)

SHASTA COUNTY—Bridge across Sacramento River at Redding. Construction of 6-108' pl. girder spans and 2-73' 6" end spans on concrete piers. District II, Route 3, Section B. M. B. McGowan, Inc., San Francisco, \$171,532; Lindgren and Swinerton, Inc., San Francisco, \$178,621; Gist & Bell, Los Angeles, \$199,560; Rocca & Caletti & J. P. Brennan, San Rafael, \$170,980; Ward Engineering Company, San Francisco, \$202,925. Contract awarded to J. F. Knapp, Oakland, \$168,847.

TEHAMA COUNTY—Treating with heavy fuel oil between Rte. 3 and 1½ miles east of Dales. District II, Route 29, Section A. Helwig Constr. Co., Sebastopol, \$4,975; E. A. Forde, San Anselmo, \$5,301; E. F. Hilliard, Sacramento, \$5,324. Contract awarded to A. Teichert & Son, Inc., Sacramento, \$4,766.

VENTURA COUNTY—Between Ojai and westerly boundary, about 42.1 miles in length, to be treated with heavy fuel oil as a dust palliative. District VII, Route 133, Sections B, C, D, E. Gilmore Oil Co., Los Angeles, \$8,851; Oilfields Trucking Co., Bakersfield, \$9,116; L. A. Brisco, Arroyo Grande, \$9,487; Paulsen & March, Inc., Los Angeles, \$9,752; Western Motor Transfer, Inc., Santa Barbara, \$10,229. Contract awarded to Consumers Oil Co., Los Angeles, \$8,489.

YOLO COUNTY—Between 2.3 miles E. of Woodland and 0.8 miles W. of Elkhorn Ferry, 319 miles to be surfaced with pl. rt gravel base. District III, Route 50, Section E. Albert G. Ralsch, San Francisco, \$17,955; Poulos & McEwen, Sacramento, \$11,910; Tieslau Bros., Inc., Berkeley, \$14,920; A. Teichert & Son, Inc., Sacramento, \$18,475; J. R. Reeves, Sacramento, \$14,582; Hemstreet & Bell, Marysville, \$14,370; Sunset Decomposed Granite Co., Hollywood, \$14,905; Peninsula Paving Co., San Francisco, \$16,975; Lloyd G. Kipp, Sacramento, \$14,450; George J. Fraites, Oakland, \$14,236. Contract awarded to Garcia Construction Co., Irvington, \$10,325.

STATE OF CALIFORNIA
Department of Public Works

Headquarters: Public Works Building, Eleventh and P Sts., Sacramento

FRANK F. MERRIAM.....Governor

EARL LEE KELLY.....Director

DIVISION OF HIGHWAYS

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C. H. PURCELL, State Highway Engineer, Sacramento
JOHN W. HOWE, Secretary

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J. G. STANDLEY, Principal Assistant Engineer
R. H. WILSON, Office Engineer
T. E. STANTON, Materials and Research Engineer
FRED J. GRUMM, Engineer of Surveys and Plans
C. S. POPE, Construction Engineer
T. H. DENNIS, Maintenance Engineer
F. W. PANHORST (Acting), Bridge Engineer
L. V. CAMPBELL, Engineer of City and Cooperative Projects
R. H. STALNAKER, Equipment Engineer
E. R. HIGGINS, Comptroller

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F. W. HASELWOOD, District II, Redding
CHARLES H. WHITMORE, District III, Marysville
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S. V. CORTELYOU, District VII, Los Angeles
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E. E. WALLACE, District XI, San Diego
General Headquarters, Public Works Building,
Eleventh and P Streets, Sacramento, California

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GORDAN ZANDER, Adjudication, Water Distribution

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C. H. KROMER, Principal Structural Engineer
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J. W. DUTTON, Principal Engineer, General Construction
W. H. ROCKINGHAM, Principal Mechanical and Electrical Engineer

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HUGH K. McKEVITT, Attorney, San Francisco
FRANK P. DURKEE, General Right of Way Agent
C. R. MONTGOMERY, General Right of Way Agent

DIVISION OF PORTS

Port of Eureka—William Clark, Sr., Surveyor
Port of San Jose—Not appointed

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

MAP SHOWING STATE HIGHWAY SYSTEM

1933

LEGEND

Primary Roads —————
Secondary Roads - - - - -

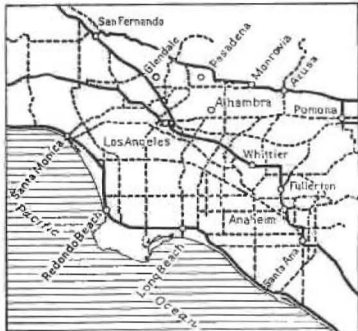


SAN FRANCISCO AND VICINITY



See Detail Map

See Detail Map



LOS ANGELES AND VICINITY