

CALIFORNIA HIGHWAYS and PUBLIC WORKS



*Conquering Snow on
Our Mountain Roads*

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520 Miles New Road Work and 30 Bridges } For 1932

Highway Division Program Includes All Phases of Construction in Every Part of the State

By COLONEL WALTER E. GARRISON, Director of Public Works

THE PLANS for highway construction as formulated by the Division of Highways for 1932 will advance the improvement of State roads in all sections of California. This year will see a substantial addition to the improved mileage. Communities in every part of our large Pacific commonwealth will be brought closer together and the State as a whole welded into a more compact unit.

It is the State highway system which makes possible this ready communication, both social and commercial, between North and South, Sierra and Seaboard, Desert and Metropolis. To this end the Division of Highways with its orderly ten-year program, is steadily bringing toward fulfillment a comprehensive system of thoroughfares designed to meet the needs of the various parts of the State and to provide the entire motoring public with adequate lanes of travel—highways adequate not only in length and number, but also adequate in width, thickness, alignment and grade, to bear safely the load of modern and future traffic.

COVERS WHOLE FIELD

Improvements to the State highways during the year just begun will include all phases of road work: construction on new or revised alignment; reconstruction of existing roads to modern standards of engineering requirements and constant maintenance of the entire system.

The construction of highways will include work on both primary and secondary routes, advancing improvements into new territories on routes now partially constructed and commencing work on other roads which were added to the State system by the last Legislature.

The reconstruction program involves the widening, straightening, surfacing and paving of existing State roads, that they may carry their traffic loads safely and swiftly.

The maintenance program is insurance that the people's investment in highways will be

preserved and this work is carried on constantly, keeping the highways in repair and preserving the capital investment made in every county of the State.

MILEAGE INVOLVED

Construction and reconstruction programs to be commenced in 1932, as set up in the Governor's budget, or provided for by the California Highway Commission during 1931, are estimated to approximate \$23,000,000. This work will include the placing of some 410 miles of the various types of paving and 60 miles of bituminous treated and untreated crushed rock surfacing, the construction of about 50 miles of graded and drained roadbed and the construction of 30 bridges and grade separations.

The amount allocated for maintenance during the year throughout the entire State will be approximately \$6,000,000.

To provide a picture of more definite outline for the coming year, brief descriptions of some of the larger projects which will be put under way during 1932 are given herewith.

OUTSTANDING PROJECTS

In southern California the outstanding projects will include the following:

On the important transeontinental highway which enters California at Yuma the last gap in the modern pavement will be closed with the placing of nine miles of asphalt concrete over the existing bituminous treated crushed rock surfacing, between the Sand Hills and five miles west of Yuma in Imperial County. The proposed work will connect the recently completed pavements between Yuma and Araz and from Holtville to Sand Hills.

This construction will give a modern 20-foot pavement over this entry into California from the Colorado River to El Centro.

On the portion of this interstate route between El Centro and San Diego a wide pavement built to high standards is rapidly nearing completion. On December 30th last

(Continued on page 12)

State Snow Fighters Win Victory on Far-Flung Sierra Battle Line

By A. L. BANKS, Assistant Deputy Director of Public Works

MEN of the highway division are on a far-flung battle line this winter. The Storm King and the Snow Queen began an offensive a few days before Christmas. The maintenance men accepted the challenge. With small arms, with great tanks and much grit, they went into action. The left of the battle line rested by the swirling freshets along the coast; the right was near the snow draped peaks of the Sierras; the center held the line of communications in the valley.

Hard fighting highway men plowed through the best the storm had to give. They opened the Victory highway. They will keep it open, save for brief intervals after new storms. Traffic will roll on rubber over dry pavement across the Sierras.

With more than 200 inches of snow at high points around Soda Springs and an equal depth spread over the upper sections of the Donner Pass road, the fight was made and won over three weeks ago. There have been some brief intermissions caused by storms and slides but for more than three-quarters of the time there has been dry pavement.

Superintendent Weeks and Assistant Bohman and their sturdy buck privates, acting under the orders of T. H. Dennis, Maintenance Engineer of the Division of Highways, cut the enemy's line wide open. They took back the people's property. The manner in which the big rotary plow mowed the snow banks and tossed the "beautiful" far out of the way was a sight to behold. The spectacle was worth a day's travel. The snow was thrown overbank with a force that suggested an old hydraulic mining hose in action.

The machine was shut down only for fuel and oil. Twenty-four hours every day, in sunshine and in blizzard, it dug, plowed and excavated. When a crew's time was up there was another on hand to take the work over. In the inky dark, working its own lights,

the rotary machine crawled through drifts.

The awesome silence of the mountain nights, was broken by the roar of its engines and the clanking of its mechanism. To the watcher it became a wonder how the drivers could "pick the road." In places there was nothing to mark the way but the clearing through the trees. But they knew how. They did it. There was no fumble. The machine was put right where it was needed, and then it dug and dug—leaving great lines of snow on both sides and a hard pavement between the white embankments.



A. L. BANKS

On the Red Bluff-Susanville lateral the same fight was made and won. The grades there are less exposed to drifts, and the highway, as a rule, makes machine operation easier. But it required quick work, hard work, day and night work, just the same. Here, as elsewhere, the Sierras had not received such a snow in twenty years.

In reality it was the first time since the State threw its modern highway through the big hills that the question of the open road was forced squarely up to the highway department.

It declared for the open road. Superintendent Gribble has been able to keep cars rolling via Susanville, and his heaviest tool was a shovel of the tractor type.

It has been a remarkable achievement to open these roads, particularly the Donner Pass road. To see business and pleasure traffic rolling through tunnels of snow makes a picture beyond the register of a camera.

The men are continually on the alert for slides, storms and obstructions. The roads are patrolled and the machinery is moved rapidly to points where it is needed. Control stations require cars to wear chains, and drivers are advised as to the conditions to be encountered.

Any Californian going into the mountains and seeing what has and is being done, is made to feel proud of maintenance division.

(Continued on page 4)



"SO HIGH!"—
The men are thus illustrating the height of a big drift on Donner Pass some three miles west of Soda Springs before the big snow plows finished clearing the road.

Through the night while the Storm King howls in fiendish glee as he hurls icy blasts piling great drifts across their paths the highway crews work doggedly on keeping the plows going 24 hours a day, stopping only for fuel and oil.



Black and White—a broad ribbon of clean black road threading its way for miles between high white walls over snow clad mountains—that's the Auburn-Truckee road shown here a few miles east of Applegate.

Far-flung frontiers like the Red Bluff-Susanville lateral are valorously defended against the onslaughts of the snow storms by maintenance crews who keep a fine two-way lane continuously open for traffic.



Victory Rests With State Snow Crews on Sierra Highways

(Continued from page 2)

T. H. Dennis, State Maintenance Engineer, is in line for ski jumping. Early this month a new storm closed the road below Soda Springs. Mr. Dennis took F. E. Burnside with him to the end of the trail. From there he sent his machine back. The two men donned snow shoes and hoofed it three miles over a tough country and into Soda Springs.

Traffic to and from California can now pass over its highways. The Sierras and snow no longer bar the automobile on the Victory highway. True, it will be an all winter campaign to hold the line, but Mr. Dennis' men are on the job. Both business and romance have a share of interest in the achievement. But to the maintenance men it is only another tough job accomplished, another day's work well done.

SNOW REMOVAL WORK JUSTIFIED BY RESULTS

Mr. C. H. Purcell,
California State Highway Engineer,
Public Works Building,
Sacramento, California.

Dear Mr. Purcell:

We want to compliment you and your organization for the splendid snow removal work which you have been and are now doing in keeping the highways of California open.

This has been an exceptionally bad season and there have been but very few intermittent times during which any of the main highways have been closed. The amount of travel using these thoroughfares and the hundreds of inquiries which we are receiving indicates there is no doubt of the justification of your efforts. I am sure the motoring public appreciates your work.

A continuance of the building of highways on proper alignment and the further development of snow removal equipment, coupled with an increased demand on the part of the motoring public, all indicate that within the very near future there will be no trouble in keeping all our interstate routes open at all times, regardless of the quantity of snow.

Respectfully yours,

C. C. COTTRELL,
Manager, Highways Bureau,
California State Automobile Association.

"Have you ever driven a car?" the lady applicant for a license was asked.

"One hundred and twenty thousand miles," put in her husband, "and never had her hand on the wheel."

Feather River Span Vaults Over Gorge, Stream and Railroad

By WALTER A. DOUGLASS, Assistant Bridge
Construction Engineer

WHEN the Legislature enacted the law extending the primary road system of the State to reach all county seats, a very considerable but interesting task was imposed on the Division of Highways. For the past three and one-half years the completion of these roads has been an important objective of the Division.

One of the most spectacular and costly pieces of construction in this group of new highways is that section of State Route No. 21, extending from Oroville to Quincy, the county seat of Plumas County. For the greater part of this stretch the new highway follows closely to a water grade along the Feather River Canyon and from one to three hundred feet above the normal water level. The obvious difficulties and cost of construction are further increased by the necessity of an occasional crossing.

DIFFICULT TASK

Near the railroad station at Pulga, about thirty miles above Oroville, the second crossing is being constructed—a steel arch bridge joining the rock cliffs of the canyon sides. All loose material was removed and footings and anchors set well into the solid rock of the precipitous cliffs for the concrete abutments which provide the main supports for the bridge. The steel arch which spans over both the river and a railroad bridge is 350 feet long. Shorter steel spans on either end bring the total length of the bridge to 680 feet.

While the length even for the clear span of 350 feet is not particularly notable, some of the hazards and difficulties of construction may be readily imagined when it is realized that surveyors descended the face of the cliffs on ropes to set stakes for the abutments. The deck of the highway bridge is some 200 feet above the river and 170 feet above the tracks of the Western Pacific Railroad, which crosses the river in the opposite direction at the same point.

Steel members for the structure were transported and placed in position by means of a wire rope high-line over the bridge. Construction of the center span began at the cast-steel shoes on either abutment and was carried out to a meeting at the crown pin of the arch.

STOPPED BY WEATHER

The ordinary difficulties of this type of construction were very considerably magnified by the high velocity winds characteristic of the Feather River Canyon.

Due to the snow—much in evidence in the accompanying photograph—and general unfavorable weather, the contractor discontinued operations when the steel erection was completed late in December and will return in March or April to place the concrete deck and steel railing and apply the aluminum paint to the steel.

When completed, this bridge will have cost approximately \$170,000. It will form a link in a new highway making easily accessible one of the most beautiful and enjoyable vacation lands in a State widely celebrated for such natural advantages.



A DIZZY LEAP will be made by the State highway up the Feather River Canyon when it crosses the gorge over this bridge now under construction at Pulga. The top picture shows the graceful arch springing from one precipitious canyon wall to the other high above the rushing stream and a railroad bridge crossing in the opposite direction. The steel arch spanning both river and railroad is 350 feet long, while the total length of the bridge is 680 feet. The highway will thus be carried over at a height of 200 feet above the river and 170 feet above the railroad bridge. The lower picture shows the bridge in its present state of construction and gives a close-up of the anchorage in one side of the sheer canyon gorge.

Transbay Bridge Tunnel Unit to be World's Largest Cross-Section Bore

By C. H. PURCELL, Chief Engineer of San Francisco-Oakland Bridge.

WORK ON the design of the San Francisco-Oakland Bay Bridge is rapidly progressing. During the past month two contracts were awarded for essential drillings to determine the strength of foundations for the tunnel link and pier anchorages of the bridge and for the San Francisco approaches.

Work to determine the foundation strength for the San Francisco approach is now under way. Forty holes will be sunk to a depth of 25 feet into bedrock or 100 feet below the earth's surface. Borings are being made in the district from the Embarcadero to and including Sixth Street on Mission, Minna, Howard, Folsom, Harrison, and Bryant streets.

Crews are now engaged in taking sample borings for the tunnel foundations on Yerba Buena Island. A tunnel through this island is estimated to cost, according to present plan, approximately \$1,000,000.

It will be a two-deck structure approximately 500 feet in length, 70 feet wide, and 50 feet high. Six lines for fast motor traffic will utilize the upper deck. Three lines of roadway will be provided for trucks and slow moving vehicles, and two inter-urban tracks on the lower deck. Foundation borings for the tunnel will cost \$7,275 and for the San Francisco Approach drillings, \$18,500.

Presents New Problems

The problems encountered by engineers engaged in the development of a project of such magnitude are many and often difficult to efficiently and economically solve.

The San Francisco-Oakland Bay Bridge presents many problems not ordinarily encountered in large bridge projects; in fact, a considerable number which have never before presented themselves. This project is unprecedented in at least two general phases.

No other bridge has spanned so wide an expanse of major navigable water. It is nearly 9000 feet from the bulkhead line in San Francisco to the shore of Yerba Buena Island, and the depth to rock foundations over this wide channel varies from 100 to 230 feet below water.

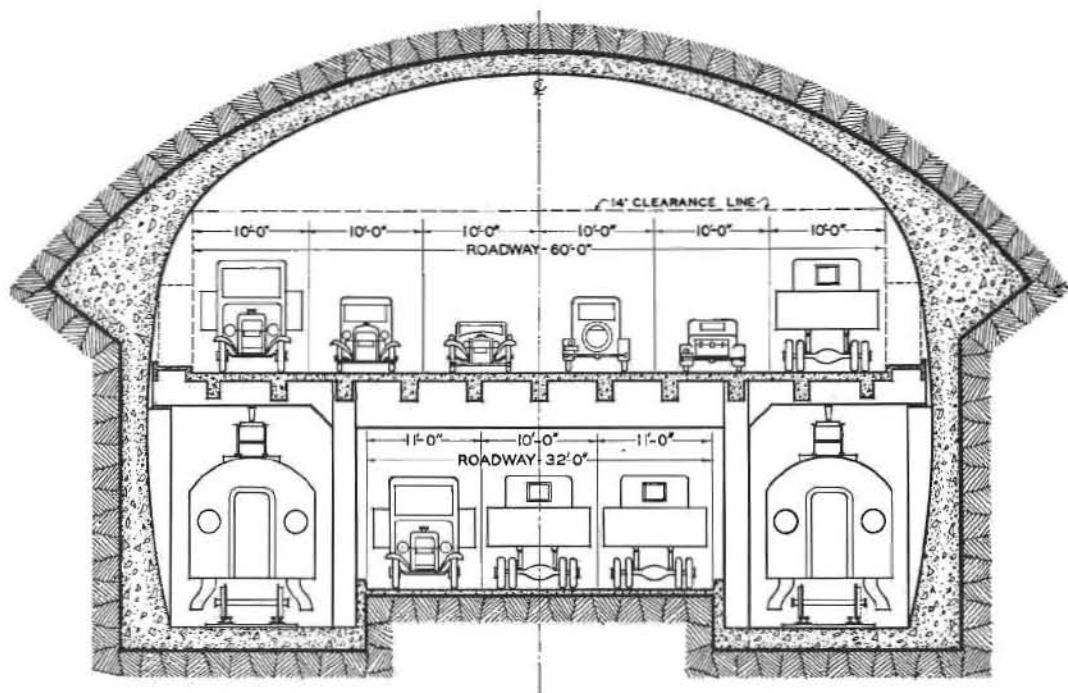


C. H. PURCELL

In all other major bridge projects comparable to this one the physical and geographical conditions have been much more definite. In such structures as the Fort Lee Bridge over the Hudson River, or the Golden Gate Bridge, nature herself and the requirements of navigation have decided what type of structure and span length are required. The designing engineers have only had to determine whether or not such a span length was possible and, having done so, make the proper design therefor.

Complicated Situation

In the case of the San Francisco-Oakland Bay Bridge, the conditions are entirely different. The Army engineers have determined the navigation clearances necessary, but nature has not been so definite, the result being that there are at least three or four span layouts which will comply with the navigation requirements. It devolves upon the engineer to select



ANOTHER WORLD WONDER will be this tunnel unit of the San Francisco-Oakland Bay Bridge project through Yerba Buena Island. The tunnel will be a two-deck structure 500 feet long with a cross-section approximately 70 feet wide and 50 feet high. On the upper deck will be carried six lanes of fast automobile traffic, including both passenger cars and light trucks. Two interurban railway tracks will occupy the outside lanes of the lower deck and three lanes of heavy motor traffic will be accommodated in the central roadway.

from this number the structure which will most efficiently and economically meet traffic needs, and which will be financially feasible.

In order to make such a determination, designs must be developed for various modifications of each of the three or four types, instead of only one. The cost of each must be accurately determined and the traffic capacity and general structural desirability closely and carefully studied.

In the channel east of Yerba Buena Island the engineering problems are of an entirely different character, but no less complicated. In the west channel the very character of the structure involving as it does the extremely heavy pier concentrations under long spans, makes it mandatory to sink piers to solid rock.

In the east channel the superstructure problem is much more definite than in the west channel, but the foundation problem is far more indefinite. The lighter spans with much lighter pier concentrations, coupled with the much greater depth to rock, immediately raise the question of whether or not foundations should go to rock, or be sustained by piles or cylinders deeply embedded in the overlaying stiff clay strata.

Piers on Piles

As a point of general information, the rock depths east of the island vary from zero at the island to 500 feet near the Oakland shore. Fortunately the sustaining power of the overlaying material at a given depth increases due to higher sand content as we advance from the island toward Oakland.

Obviously it is not feasible to sink a pier to 500 feet below water, as it occurs over the easterly mile of the bridge structure; and these piers which are under short spans will be sustained on piles. Our chief concern is with the easterly pier under the 1400-foot span adjacent to the island, where rock is found at 300 feet below water, and at the piers under the 500-foot spans just to the east of the 1400-foot span, where rock is from 300 to 350 feet below water.

In each of these cases very diligent search of the strata overlaying rock is being made in an attempt to find strata of sufficient bearing power to sustain piers short of rock. Casings are being sunk through this material and samples of the materials are being taken at 10-foot intervals of undisturbed material. These sam-

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Beach Sand Successfully Used in Big Asphalt Surfacing Job on Coast

By F. W. HASELWOOD, District Engineer

THE old adage "circumstances alter cases" applies as potently as ever whether the question is whose cow was in his neighbor's cornfield or that of improving a road in the absence of construction materials that meet the usual requirements.

The quality of highway surfaces has been markedly improved in recent years by refinement in the specifications for material and the methods of combining them and placing them on the road. The proper selection, combination and placing of materials constitute a case of judicious and skillful application of the principles developed by experience and uniformly result in a durable and satisfactory road.

But suppose one or more adverse circumstances inject themselves into the picture. Will they alter the case? For instance, suppose that within practical limits of transportation from a road on which surface renewals are imperative there exists no mineral aggregate that complies with the requirements of the standard specifications or that is approved by the testing laboratory. Such a circumstance will have to alter the case or there will be no resurfacing.

GOOD BUT PARKED

On a recent project in Humboldt County near Big Lagoon where resurface was absolutely necessary, the only rock of satisfactory quality within hauling range was on a State park and could not be used. Laboratory tests were made of every other source of rock with the hope of devising some means of using a soft aggregate with some grade of asphalt. There existed a large deposit of conglomerate which was made up of soft rock that broke up readily in handling, disintegrated quickly when placed on the road and contained a large proportion of clay.

ON THE BEACH

The other available aggregates were beach sand from $\frac{1}{4}$ " down and a finer yellow sand available in cuts along the road. Except for the soundness of the beach sand, these aggregates did not meet any of the requirements of the specifications for aggregate for

road base or surface whether treated with asphalt or not.

A limited fund was available for the resurface and had to be stretched over a length of 8.4 miles. Both base and surface renewals were necessary. Base reinforcement was made with the conglomerate and the beach sand. This work was done by day labor. The conglomerate developed too much clay fines by the time it was spread but the addition of beach sand ranging up to $\frac{1}{4}$ " so changed the characteristics of the aggregate that a compact and well bound base was developed by thorough processing, watering and rolling.

The amount of clay in the conglomerate varied from none to nearly one hundred per cent, therefore the amount of sand applied varied accordingly and was determined by the foreman in charge. If he had too little sand his roller would likely get stuck in the mud. If he had too much the base would not bind. With one minor exception the empirical field combination of the two materials was so perfect as not to require retreatment.

HEAT DOES TRICK

So much for the base which gave every promise of stability if protected against wear and weather. But what about the top? The only aggregates available that were sound enough to be used with asphalt were the beach sand and the yellow roadside sand. The beach sand is round and polished. The laboratory had difficulty in getting cut back asphalt of any grade to adhere to the smooth surfaces. No combination of the two sands would result in a grading even approximating that required by the specifications.

Field tests were made to ascertain the behavior of different combinations of the two sands and asphalt under traffic. First, cut back 94+ road oil was used. The mixture was spread over the full width of the road to a depth of two inches and for a distance of about thirty feet. It did not roll or displace under traffic but on the other hand it did not harden and the asphalt did not adhere well to the beach sand.

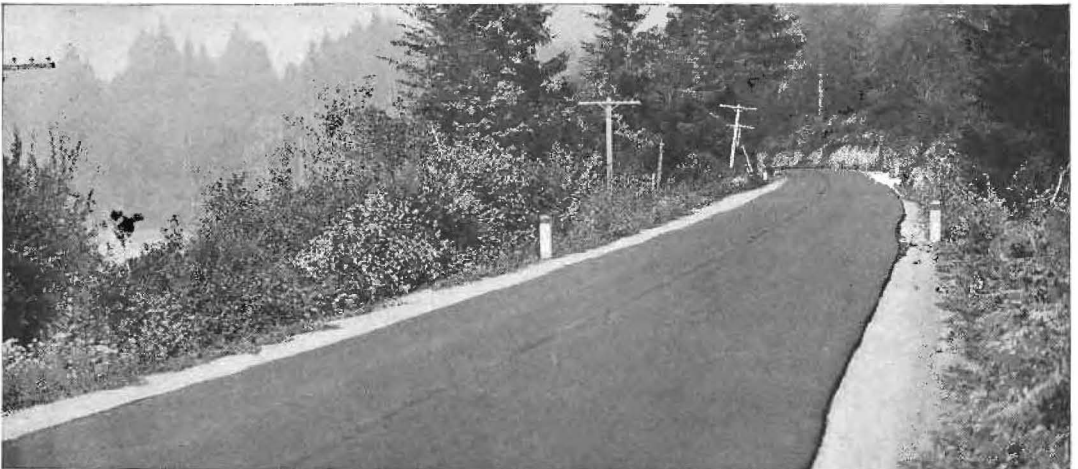
The trouble appeared to be in the presence of the coal oil with which the asphalt was cut



BEACH GOLD MINE this proved to be for the highway builders in Humboldt County. With no supply of aggregate available they tried beach sand for asphalt paving and it worked.



QUICK ACTION was obtained with the new mixture. A few rakers were used but the roller was able to follow close to the spreader instead of three to five hours behind as with regular mixes.



PRETTY AS A PICTURE and fine as a road is the completed surface. Shoulders yet to be placed but edges don't break under traffic or roller even though headers were not used.

Right of Way Men Discuss Problems in First Annual Session

PROBLEMS and procedure relative to acquisition of right of way, were given two days of intensive study when district right of way agents met at headquarters in Sacramento on January 18th and 19th. The conference was the first ever held by the right of way organization and is indicative of the growing importance of the Right of Way Division.

Standardization of forms and procedure, as far as this may be desirable or possible, was one of the purposes of the discussions. The district right of way agents were asked to submit to headquarters a copy of all forms in use in the several districts and to make suggestions for a more efficient handling of right of way purchases.

TOPICS DISCUSSED

Among the matters discussed were conveyancing; deed forms; descriptions; recording; rights of way over public lands; contact with title companies; condemnation practice and procedure; interchange of service between districts; abandonment and relinquishment of right of way; right of way schedules; value of cost summaries; right of way allotments; Railroad Commission procedure; rights of way over school lands; procedure in acquiring right of way from estates; and numerous legal matters relative to right of way work.

Cooperation of the right of way agents in condemnation trials was discussed by George C. Hadley and Jack Howard, of the office of Hugh K. McKeivitt, Attorney for the California Highway Commission.

At the conclusion of the meeting, the visiting district right of way agents adopted a resolution declaring they had gained great benefit from the discussions and thanking Col. Walter E. Garrison, Director of Public Works; James I. Herz, Deputy Director; C. H. Purcell, State Highway Engineer and C. C. Carleton, Chief of the Division of Contracts and Rights of Way, for authorizing the conference.

CHIEF CARLETON PRESIDED

C. C. Carleton, Chief of the Right of Way Division, presided. The following were the right of way agents in attendance: Frank B. Durkee and C. R. Montgomery, General Right of Way Agents, Sacramento; Phillip C. Eastman, Eureka; Leland L. Rose, Redding; Herman D. Jerrett, Sacramento; C. A. Marsh, San Francisco; E. W. Carson, San Luis Obispo; Henry A. Sellers, Fresno; Adolph N. Sutro, Los Angeles; J. E. Woodson, Bishop; George W. Pulich, Sacramento, District Right of Way Agents; Charles L. Flack, Assistant Right of Way Agent, San Bernardino, represented J. A. Gregory, the District Agent, who was prevented from being present by illness.

The following Assistant Right of Way Agents from the Sacramento Districts also attended: Stanley P. Cooley, B. J. Perry, Louis E. Davis, Louis J. Malatesta, Joseph T. Hinch, Charles T. Smith and Jay J. Herz, Assistant Right of Way Agent, from San Francisco, was present.

Jack: "Why did you quit calling on Eleanor?"

Fred: "Too many traffic signals."

Jack: "Huh?"

Fred: "Her father caught me kissing her and yelled 'stop' and then yelled 'go,' and her mother hung up a 'no parking sign.'"

Preliminary Work on East Bay Highway and Tunnel Begun

WORK of clearing the right of way for the East Bay Broadway highway and tunnel project has begun and this modern motor route linking Alameda and Contra Costa counties will soon be under actual construction.

The plans for this project in which the State is cooperating with Joint Highway District No. 13 call for a new, wide highway to replace the winding and narrow tunnel road which connects with the present obsolete tunnel. The new road will lead to a new tunnel, designed to meet modern traffic requirements, passing under the hills lying on the boundary line of the two counties.

PROVIDES NEW TUNNEL

By act of the last Legislature the road from the easterly portal of the tunnel to Walnut Creek was brought into the State highway system and will be improved to take care of the increased traffic. The original estimated cost of the tunnel and connecting highways was \$1,849,000.

Under present plans the project in Alameda County will start at upper Broadway and Shafter avenue, the roadway curving upward at a 5 per cent grade of varying widths, although the right of way is always more than one hundred feet wide.

The new tunnel will start approximately 1100 feet west of the present tunnel portal and will continue to a point near what is known as the Fish Ranch and Lafayette roads.

TWO BORES PLANNED

Plans worked out by George A. Posey, Alameda County engineer, and practically decided upon, consider a design for the tunnel with two one-way bores, connected at intervals to aid ventilation. Each side of the tunnel would have a 21-foot roadway, with one lane for slow traffic and the other for fast traffic, and a pedestrian sidewalk.

The tunnel will be some 3000 feet long and about 300 feet lower than the present one. The cost of the tunnel alone is estimated at \$2,500,000. Connecting highway construction in Alameda County is estimated at \$985,000, while the cost of rerouting and reconstructing the existing tunnel road as far as Walnut Creek will be in excess of \$1,000,000.

CARRY TIRE CHAINS

Winter sports may now be enjoyed in a number of conveniently located places in the higher altitudes of northern, central and southern California. Roads to most of the popular areas for snow diversions are in good condition, although motorists should take the precaution of carrying tire chains for use on icy or wet surfaces.

"Did the signs of the big sale at Wisenheimer's attract much attention?"

"Did they!" Seven women drivers had accidents while driving past!"—*Motor Land*.

First Motorist: Are the rural people in Bloofus County courteous?

Second Motorist: Heavens, yes! Every time they misdirect you they say "You're welcome."

GRAND CANYON OF THE SIERRA

By KET in Oakland Tribune



20-Mile Meca-Blythe Improvement

(Continued from page 1)

bids were opened for the placing of 14.6 miles of Portland cement concrete pavement between Tecate Divide in San Diego County and Mountain Springs grade in Imperial County, and within the coming month a contract will be awarded for placing a 20-foot asphalt concrete pavement from three miles west of Coyote Wells to Dixieland, a distance of 14.7 miles.

TWENTY-FOOT PAVEMENT

With the completion of this work and projects now in the course of construction, a smooth pavement, built to modern standards, will extend from Viejas Creek in San Diego County to El Centro, leaving only a few miles of the 15-foot pavement to be widened.

In Riverside County, on the El Centro-San Bernardino route through Coachella Valley, the connecting link between the heart of the fertile Imperial Valley with metropolitan Los Angeles, 14.3 miles of reconstruction will place a modern 20-foot Portland cement concrete pavement between the Imperial County line and Avenue 62. This improvement will complete the modern pavement on this route from El Centro to San Bernardino, with the exception of some 15 miles of 16-foot paving between White Water and Banning.

The 14-mile improvement to be undertaken this year will rectify alignment, eliminate the dips and raise the grade, making ample provision for proper drainage. This stretch of highway will connect at its southerly end with the new asphalt pavement recently placed between the Salton Sea and the Imperial-Riverside County line.

Further improvement to another of the interstate routes will be noted by the start of construction early this spring on nearly 20 miles of the Mecca-Blythe lateral which connects the gateway into southern California at the Ehrenberg Bridge with the San Bernardino-El Centro trunk highway at Coachella in Riverside County. Nearly 50 miles of this route have been completed to modern standards of desert highway construction from Blythe to 9.5 miles west of Desert Center and the proposed work will carry this improvement to Shavers Summit.

The new alignment will skirt along the southerly edge of the Chuckawalla Valley between the proposed Hayfield Reservoir of the Colorado River Aqueduct and the Chuckawalla Mountains.

PAVING TWO SECONDARIES

Two important improvements in Los Angeles County will be made on two of the secondary routes which were added to the State highway system by the last Legislature. The one, on the road between Pomona and Los Angeles, will comprise placing Portland cement concrete pavement on essential sections. The Division of Highways will supplement the general improvement which the county had started when the route became a part of the State system. It is estimated that 11 miles of this route will be paved this year. The other project involves similar paving on about six miles of the Pomona-Fullerton lateral between Brea Canyon and Pomona.

An important improvement in San Bernardino County will be the grading and surfacing with bituminous treated crushed rock the five miles from San Bernardino through Waterman Canyon

on the highway leading to Big Bear Lake in the San Bernardino Mountains. This highway is one of the most popular recreational roads in southern California, leading as it does to the many resorts at Lake Arrowhead and Big Bear.

The State, in cooperation with the United States Bureau of Public Roads, has constructed this mountain highway to modern standards from Camp Waterman to Big Bear Lake and the proposed improvement will modernize that portion of the road through the canyon.

Grading on the entire length of the Ridge Route alternate is now well advanced and during the coming year it is planned to award additional minor contracts. The new routing follows the canyon to the west of the existing tortuous climb over the Ridge Route and will not only facilitate travel on this important road by presenting modern alignment and grade but will likewise shorten the distance by nearly ten miles.

NEXT STEP PROVIDED

The reconstruction of the present State highway from Gorman to the Kern County line will carry the improvement of this highway some three miles northward and will be the next step in modernizing the grade and alignment of this route. Funds for this project were provided at the meeting of the Commission on January 8th.

An important project to begin in 1932 will be the construction of a bridge across the Kern River on the new alignment of the highway at Bakersfield. The new structure will be about one-half mile long and will obviate the use of the present concrete arch with its narrow roadway, which spans the river on the existing alignment.

Further improvement to the Coast highway which skirts the Pacific from Oxnard in Ventura County to Serra in Orange County includes the reconstruction and paving of the six miles from Laguna Beach to Dana Point, as well as the paving from Newport Beach to Corona del Mar. This route, passing through the beach cities and seaside resorts of southern California, carries the heaviest traffic of any route on the State system and its improvement to super-highway proportions is being pushed forward as rapidly as funds will permit.

In the northern portion of California many important projects will be undertaken this year and a few of the larger ones are included in the following:

ELIMINATES CURVES

On the Redding-Alturas lateral two proposed major projects involve the grading and surfacing of 18.5 miles between Canyon Creek, east of Burney, and Fall River Mills. This construction will involve a relocation of this part of this lateral and will eliminate the existing tortuous road which winds through the lava country over many small summits. This improvement will connect at Fall River Mills with some 66 miles of recently improved highway and will eliminate one of the worst portions between Redding and Alturas.

The work proposed for 1932 also includes the construction of bridges across Pit River, Hat Creek and Fall River west of Fall River Mills.

Pushing Work on Coast Super-Highway

(Continued from preceding page)

In Butte County further work is proposed this year on the construction of the new and scenic Feather River Highway connecting Oroville and Quincy with an all-year road which will follow along the precipitous walls of Feather River Canyon. The new alignment of this route holds to as low elevations as possible, reaching a summit of 2300 feet, while the old road connecting these two county seats rises to 6000 feet and is snow blocked from five to six months a year. The improvement proposed for this year will involve heavy grading and rock excavation over the eight miles from Pulga to the Plumas County line.

The substructure for the steel bridge which, with its 350-foot steel arch, will cross the Feather River at Pulga, has been completed and work on the steel superstructure is progressing.

IN REDWOOD EMPIRE

A much-needed improvement to the Redwood Highway will be started this spring with the awarding of a contract for grading 14 miles of a 37-foot roadbed between Cloverdale and Hopland. The new road will be built on an entirely new alignment following the Russian River and eliminating the eight miles of maximum grade and sharp curvature now made by the existing road over the hills between Cloverdale and Hopland. This new routing, aside from being a great improvement in grade and line, will present to the tourists traveling north a view of the scenic wooded country along the Russian River Canyon.

The highway will cross to the east bank of the Russian River at Preston about two miles north of Cloverdale and follow close to the river until it crosses again just south of Hopland. Passing through numerous groves of pine, fir, oak and cottonwood, the road gives many pleasing vistas along the river as well as excellent views of the rugged rock promontories which break into the west bank. Squaw Rock, a promontory some 700 feet in height, is the largest of these cliffs.

Several minor bridges, over creeks which enter into the river at various points, will be included in this contract. Two major structures crossing the Russian River and two grade separations with the Northwestern Pacific Railway will be constructed under separate contracts.

IMPORTANT LINK

In the San Francisco Bay area an important improvement will be the placing of 9.6 miles of Portland cement concrete pavement between San Pablo Creek, just north of Richmond, and the Carquinez Bridge. This pavement will be placed north and south of the recent construction through the towns of Hercules and Pinole and will involve some relocation of the present alignment and improvement in grade.

The construction of the Bay Shore Highway will be carried forward in Santa Clara County. It is being planned to continue the work on the six miles from Oregon avenue in Palo Alto to Alviso road this year. This 40-foot concrete pavement is rapidly approaching San Jose and its completion will give the Peninsula a modern super-highway from San Francisco to San Jose.

On the State highway between Merced and the Yosemite National Park, in Mariposa County, 7.6 miles of road on new location is to be graded during the coming year. This improvement will carry the work which is now under way between Orange Hill School and Pain Flat into Mariposa. This relocation lies to the north of the existing road and will be built to standards consistent with modern highway construction so necessary for the safety and convenience of the thousands of tourists who yearly enter the Yosemite by this route. The new alignment will lead directly into Mariposa by the same entrance as the existing highway.

ALONG RUGGED COAST

A structure of major proportions will be built across Rocky Creek on the Carmel-San Simeon highway in Monterey County. This bridge will be located about 17 miles south of Carmel at the southerly end of a grading contract which is now under way between Rocky Creek and San Remo Divide. It is also about one-half mile north of Bixby Creek where a large concrete arch is now being constructed. The proposed Rocky Creek bridge will be a reinforced concrete arch.

This structure will be another unit in the construction of this scenic highway which clings to the rugged coast of Monterey and San Luis Obispo counties.

Not the least important work in the program of the Division are the cooperative projects. Funds provided by the budget and by vote of the California Highway Commission amount to approximately \$2,750,000. The purpose of this cooperative set-up is to enable the Division of Highways to assist in the improvement of State highway routes within the limits of incorporated municipalities. By this cooperation, continuity of the standard of State highway improvement in the locality is attained, the full cost of which the abutting property could not bear.

COOPERATIVE BASIS

The customary basis of cooperation between the State and the municipality consists in the State grading, draining and paving to the same standard as the State highway leading to the cooperative project, and the local community paying for the remainder of paving and grading, placing curbs and sidewalks, and providing the right of way. The basis of cooperation is an individual problem for each project and an equitable distribution of cost is determined by conference with the local authorities.

Several such cooperative projects have been completed in 1931, or are under way at the present time in various communities and many more are contemplated for 1932.

The subject of State cooperation in improving a natural course of routing of a State highway within municipalities is one of paramount importance, and the applications to the State far exceed the amount of money available for this purpose. As these projects are handled on a cooperative basis and as State funds are limited, the policy has been adopted of giving prior consideration to those cities which show the greatest cooperation in advancing their portion of the obligation, such

(Continued on page 43)

California State Highway Organization Passes Its Twentieth Anniversary

Looking backward twenty years, the writer of the following article, C. C. Carleton recalls the organization of the first California State Highway Commission to which he was appointed the first attorney. The original bond issue gave that Commission the then fabulous sum of \$18,000,000 to build a State highway system. In this article Mr. Carleton draws some interesting comparisons and contrasts between the past and the present.

By C. C. CARLETON, Chief, Division of Contracts and Rights of Way

THE second day of this year marked the twentieth anniversary of the reporting for duty of the first seven division engineers of the California Highway Commission on January 2, 1912.

The first three State Highway Commissioners, their secretary, the State Highway Engineer and the writer, as attorney of the Commission, had been previously appointed in 1911, but the actual commencement of field operations did not begin until the division engineers entered upon their several assignments in seven different portions of the State.

Burton A. Towne of Lodi, as Chairman, Charles D. Blaney of Saratoga and N. D. Darlington of Los Angeles, as members, composed the pioneering California Highway Commission.

FIAD "FABULOUS" FUND

To them was entrusted the expenditure of \$18,000,000, the proceeds of the first State highway bond issue, then considered a rather fabulous sum of money for public highway purposes.

In 1931, two decades later, it is interesting to note that Governor James Rolph, Jr., went back to the progressive little city of Lodi to appoint another administrative head of the State highway activities, namely, Colonel Walter E. Garrison, now Director of Public Works.

The original State Highway Commissioners were appointed from three widely separated sections of the State, in order that they might be as representative as possible of the several portions of California.

SAME POLICY CONTINUES

Today that same policy is pursued. Although having State-wide powers and duties it is but natural that the individual Commissioners should be somewhat better informed of the

needs of their respective communities and any action taken by the board becomes the resultant of the combined special knowledge and local experience of the Commissioners.

The present California Highway Commission is composed of five members instead of three.

Chairman Earl Lee Kelly resides at Redding, Commissioner Harry A. Hopkins at Taft, Commissioner Timothy A. Reardon at San Francisco, Commissioner Frank A. Tetley at Riverside and Commissioner Philip A. Stanton at Anaheim.

Two of the original staff of the California Highway Commission first reported at the temporary office of the Commission then located in two committee rooms on the fourth floor of the State Capitol Building, at Sacramento.

TWENTY YEARS GROWTH

Now, twenty years later, approximately 14,000 employees are on the roster of the Division of Highways and extensive headquarters and district offices, equipment shops and maintenance yards are maintained at many points, all teeming with activity in handling the State highway system of California representing an expenditure of over two hundred millions of dollars, or more than ten times the outlay originally contemplated when the \$18,000,000 bond issue was voted in the fond hope that it would complete a State highway system.

On August 7, 1912, the first shovel of earth on Contract Number One under the first State highway bond measure was moved by Chairman Towne in San Mateo County between South San Francisco and Burlingame on the coast highway leading from San Francisco to Los Angeles.

Since that historic occasion thousands of miles of ribbon in the form of modern highways have been unreeled to the immeasurable advancement of the material prosperity of this



FIRST STATE HIGHWAY work began August 7, 1912, at a point on the coast highway in San Mateo County between San Francisco and Burlingame when Burton A. Towne, then chairman of the Highway Commission, turned the first shovelful of earth as shown in the above picture taken from the book "California Highways" written and published in 1920 by Ben Blow, now field secretary of the National Automobile Club. Chairman Towne thus started work on Contract No. 1, the first contract awarded by the first California State Highway Commission. The lower picture shows the road as it looks today.

commonwealth, as well as abundantly contributing to the comfort, convenience and enjoyment of its citizenry and its multitudes of visitors.

ENTERING THIRD DECADE

It is fitting that we should thus take stock of these accomplishments at the commencement of this new year, as we are entering upon the third decade of systematic State highway activity.

It would require a publication larger than this to carry the honor roll of those who have contributed to the signal success of the State highway work of California.

Every public spirited citizen and organization has sacrificed time and means to promote some phase of the development.

Loyal and zealous staffs of officers and employees have carried on the work itself without stint of service or stain of scandal.

Numerous Highway Improvements Under Way in Four Southern Counties

By S. V. CORTELYOU, District Engineer

SEVERAL highway construction projects of major importance are either under way or will be shortly let to contract in Los Angeles and neighboring counties.

LOS ANGELES COUNTY—One of the largest projects and one of greatest general interest is the Ridge Route Alternate which will supplant the present Ridge Road that has been in use since 1916. This new project, 26.85 miles in length, will be a modern high-speed highway. It will extend in nearly a direct line from Castaic School at the southerly end of the present Ridge Road to Gorman.

The grading work on this project has been let in three contracts. Grading work on the first of these contracts, from Castaic School to Canton Creek, a distance of 7.1 miles, has been completed. The second contract, extending from Canton Creek to Piru Creek, a distance of 7.32 miles, is under construction and work is in progress on the third contract, 12.50 miles in length.

WORKING TWO SHIFTS

Seven power shovels, each working two shifts per day, and a fleet of trucks are moving the huge amount of earth and rock which will form the new roadbed on which the future paving will be laid. From present indications grading operations will be completed early next fall in readiness for the pavement to be placed.

Another project of major importance to the residents of Los Angeles and vicinity will be the improvement of the portion of the Roosevelt Highway between the city of Santa Monica and Beverly boulevard, a distance of 2.4 miles. This project will shortly be let to contract with the view to completing it before the heavy traffic of the summer months. The new pavement will be 40 feet wide with oiled earth shoulders 20 feet wide on each side. During the summer this is the most heavily traveled highway in the State on account of the heavy beach traffic.

COUNTY COOPERATING

Another link in the Roosevelt Highway is now under construction between Washington Boulevard at Venice and El Segundo. This project is 5.9 miles in length and is to be paved with Portland cement concrete 40 feet wide. The county of Los Angeles is cooperating on this project to the extent of paying one-quarter of the cost of grading and paving.

A contract will be let in the near future for a grade separation on this project. The Roosevelt Highway will pass under the Pacific Electric Railway and Culver Boulevard. It is planned that this latter contract will be completed by the time the present grading and paving contract is finished so that the full length of highway from Washington Boulevard to El Segundo can be opened to traffic at the same time.

Another important traffic artery to be improved in the immediate vicinity of Los Angeles is Ventura Boulevard from Sepulveda Boulevard to Calabasas, a length of 10 miles, all located within the city limits of Los Angeles. A 10-foot strip of Portland cement

concrete will be added to the present 20-foot pavement except on short portions where grade and alignment changes are necessary to make this highway conform to modern standards. On these latter portions a new pavement 30 feet wide will be laid.

IMPROVING CITY LINK

The improvement of the State Highway connection through the city of Glendora along Alost Avenue, a distance of 1.5 miles, will shortly be let to contract. This improvement will consist of a 40-foot asphaltic concrete pavement with 8-foot oil macadam borders. Los Angeles County is cooperating on this project, paying for one-quarter of the grading and paving.

In the Arroyo Seco above Pasadena a project is in course of construction which will eventually open up one of the largest recreational areas within the reach of Los Angeles. 4.09 miles of this road have been graded under two previous contracts. The first of these contracts, 2.65 miles in length, starting at Haskell Avenue, La Canada, was completed in July, 1930. The second contract, 1.44 miles in length, was completed in August, 1931. A third contract, 5.02 miles in length, extending to Colby Canyon, is now in progress.

The country traversed is extremely rough and scenic. Parking areas are being graded on certain points which will afford panoramic views of Los Angeles, Pasadena and neighboring towns as well as the ocean. This highway will ultimately connect with the highway to be constructed up the San Gabriel Canyon from Azusa to Crystal Lake and Pine Flats.

SIX NEW PROJECTS

ORANGE COUNTY—The pavement from the city limits of Fullerton to the Los Angeles-Orange County line is being widened to 30 feet; both Portland cement concrete and asphaltic concrete are being used on different portions. The length of this section is 4.25 miles.

A contract will shortly be let for paving a length of 1.93 miles in the city of Fullerton from the Pacific Electric Railway arch to the north city limits. This pavement will be 56 feet wide, with curbs, and will join the section now under construction at the northern city limits. Orange County is cooperating on this project.

A contract is under way on the Coast Highway from San Mateo Creek near the San Diego-Orange County line to Doheny Park (Serra), a distance of 5.86 miles. The present 20-foot pavement is being widened to 30 feet (40 feet where adjacent to the Santa Fe Railway.) The new pavement is to be partly of Portland cement concrete and partly of asphaltic concrete.

WIDENING COAST ROUTE

An improvement which will relieve the congestion of traffic on the Coast Highway between Corona Del Mar and Laguna Beach, a distance of 5.54 miles, has recently been let to contract. The roadway on this section will be widened to a width

(Continued on page 44)

Transbay Tunnel Unit to Break Size Record for Bore

(Continued from page 7)

ples are being submitted to every known soil test to determine their bearing power and specific characteristics.

Test Loading

Single piles and pile clusters are being driven and loaded with test loads in excess of those which would be imposed by the bridge. These tests of necessity are slow and require considerable time to complete, yet they are absolutely necessary before the most economical design of the piers can be made. Many thousands of dollars can be saved in cost by such a study and the resulting economic design.

On the island, a tunnel of unprecedented cross-sectional dimensions is to be constructed to rock which is badly faulted and broken. A contract has been let for diamond drill boring to thoroughly survey the character of this rock.

In the cities of San Francisco and Oakland the question of proper and adequate approach and traffic distribution structures is very complicated and involved. These structures and their proper layouts involve many questions of property damage and benefit. They must be so constructed as to adequately collect and distribute traffic and, at the same time, cause as little property damage as possible.

Traffic Question

The carrying capacity of any bridge depends largely upon the proper collection and distribution of traffic. The question of adapting existing traffic facilities such as streets and electric lines to the new traffic conditions which will be created by the bridge is important and far reaching. All interests involved must be consulted and the plan worked out which will satisfy the greatest number at an economic cost.

These considerations, with many others not mentioned, require a great deal of time and study. The necessary decisions as to just what to design is much more difficult than the actual design after such a decision is reached. In this respect the San Francisco-Oakland Bay Bridge is outstanding, and may truthfully be said to be unprecedented in many respects.

Final borings will not be completed before the first of March and until some time after

EXTOLS EFFICIENCY OF ROAD CREWS IN STORM

Colonel Walter Garrison,
Dept. of Highways,
Sacramento, Calif.

My Dear Colonel:

Mrs. Tuller and I have recently returned from a rather extended automobile trip covering the roads over the Ridge Route through the San Joaquin Valley, Yosemite, Oakland and back by the Coast Route. We were driving during the recent storm and right afterwards. The difficulties that the Maintenance Department had to meet were obviously very great. They were meeting them with a degree of efficiency that was most gratifying. As a matter of fact, the work that was being done all along the highway would have been a great credit to the best organized private institution. After seeing the inefficiency of most public organizations, I can not refrain from writing you this letter to express my appreciation and tender my congratulations to you on the splendid manner in which your organization is functioning.

Sincerely yours,

(Signed) WALTER K. TULLER.

JUST PREPAREDNESS

The fair motorist was hitting it up along the open highway when ahead she spied three repairmen climbing telephone poles.

"Aren't they silly!" she said to her companion; "they must think I've never driven a car before."—*Motor Land.*

Photographer (taking pictures of father and college-boy son): Perhaps it would make a better picture, my boy, if you were to stand with your hand on your father's shoulder.

Father: The picture would be more natural if he stood with his hand in my pocket.—*Photographic Digest.*

the completion of borings no final determinations can be made. Practically every possible superstructure layout which is feasible has been drawn up and is being considered and studied as far as it is possible prior to final completion of foundation borings. These, with data on borings to date, will be presented to the Consulting Board of Engineers at their next meeting, and no doubt final decisions as to many features of the project will be made at that time.

The engineers in charge of this work feel that satisfactory progress is being made, and are anxious and willing to have any interested person or representative call at 500 Sansome street for any information which may be available in regard to this project.



This is the sixth of a series of articles on the State's water problem. The first dealt with Governor Rolph's call for a united effort to reach a solution. The second, third and fourth articles described, respectively, the situation in the Sacramento Valley, Sacramento-San Joaquin Delta, San Joaquin Valley and Los Angeles regions. This article is the second installment of a paper covering the financial aspects of the immediate initial and complete initial developments of the State's plan for the Sacramento-San Joaquin Valley project. The estimated costs of the project were presented last week and this installment deals with anticipated revenues and possible methods of financing.

By A. D. EDMONSTON, Deputy State Engineer

THE direct revenues which could be anticipated from the operation of the Great Central Valley project to meet the gross annual costs discussed in the December issue of this magazine are from two sources, as follows:

1. Sale of electric energy.
2. Sale of water.

About 1,600,000,000 kilowatt hours of electric energy could be produced annually on the average at the power plants of the Kennett and Friant units. The value at the power plant of this large block is estimated at from 2.65 to 2.42 mills per kilowatt hour for that part generated at the Kennett unit depending on the method of operation and 3.50 mills for that generated at the Friant dam.

These values are based on the lowest of several estimates of the cost of producing an equivalent amount of electric energy of the same characteristics with a steam-electric plant located in the area of consumption, taking into account the cost of transmission and transmission losses from point of generation to load centers.

ESTIMATED REVENUES

Under the immediate initial development, the revenue from the sale of electric energy

is estimated at \$4,585,000 and under the complete initial development, \$3,906,000.

The lesser estimated revenue under the latter plan of development is due to the reasons that a lesser amount of power would be produced and that it would have less desirable characteristics for absorption into the power market. The foregoing sums of revenue from sale of electric energy are the total amounts which would be realized when the energy is fully utilized and sold at the unit prices stated.

It is assumed in the financial analyses that arrangements could be made with producing and marketing agencies to plan their development so that the entire power output of the project could be absorbed into the power market at the time of the completion on the Kennett unit.

The project would be operated to serve many beneficial purposes, namely:

1. Improvement of navigation on Sacramento and San Joaquin rivers.
2. Improvement of water supply of lands under irrigation along Sacramento River.
3. Protection of Sacramento-San Joaquin Delta from invasion of salty water and thereby furnish an ample and suitable water supply to irrigated lands in the delta.

Four Methods of Financing Project

(Continued from preceding page)

4. A dependable and suitable water supply to the industrial and agricultural areas along south shore of Suisun Bay.

5. A supplemental water supply to developed areas with deficient supply in upper San Joaquin Valley.

Flood waters would be stored in Kennett reservoir during months of plenteous run-off and later released at the dam into the Sacramento River during periods of low run-off to meet fully the foregoing requirements on the Sacramento River, in the Sacramento-San Joaquin delta and in the Suisun Bay industrial and agricultural areas. Such operation also would permit the diversion of water from the San Joaquin River at Friant into upper San Joaquin Valley.

OBTAINED FROM SURPLUS

Under the immediate initial development, the water diverted would be that obtainable from the existing surplus in that stream and from the "grass land" water rights on San Joaquin River, which would be purchased. With the complete initial development, waters in addition to those mentioned could be so diverted by the installation of the San Joaquin River pumping system.

In the operation of Kennett reservoir, about 345,000 acre-feet seasonally, on the average would be released from storage specifically to meet the navigation requirements on Sacramento River. Because of the improvement of navigation on this stream, a direct contribution of \$6,000,000 to the project would be expected from the Federal Government. This sum has been deducted from the capital cost in the financial analysis.

In order to control salinity in the Sacramento-San Joaquin delta and to furnish a full and dependable supply to the lands under irrigation along the Sacramento River and in the Sacramento-San Joaquin delta, an average amount of about 420,000 acre-feet seasonally would have to be released from stored water to satisfy these requirements.

AVERAGE COST

The amount of revenue which could be obtained for stored water applied to such uses is problematical. However, the estimated average cost of such stored water with Kennett reservoir operated entirely for irrigation purposes and with allowances for power credit, is \$1.00 per acre-foot. Due to the uncertainty of the amounts of direct revenue which might be obtained from these sources, no sum therefrom has been included in the financial set-ups which follow.

About 43,500 acre-feet annually could be diverted from the delta by the Contra Costa County conduit. It is estimated that a revenue of \$300,000 per year could be obtained from the sale of this water. In the upper San Joaquin Valley, under the immediate initial development, about 600,000 acre-feet would be made available to the developed lands with deficient water supply. Based on a price of \$3.00 per acre-foot main canal side, the estimated revenue would be \$1,800,000 annually. Under the complete initial development, 1,720,000 acre-feet would be available. The estimated revenue if all the water were sold at \$3.00 per acre-foot at canal side would be \$5,160,000.

The revenues from sales of electric energy and water under both immediate and complete initial development, under the foregoing assumptions are:

Item	Estimated Revenues	
	Immediate Initial Development	Complete Initial Development
Electric Energy Sales---	\$4,585,000	\$3,906,000
Water Sales-----	2,100,000	5,460,000
Total -----	\$6,685,000	\$9,366,000

METHODS OF FINANCING

Some of several possible methods of financing the project are:

1 FEDERAL FINANCING. Under this method either funds would be advanced by the Federal Government to the State for construction of the project or the Federal Government would appropriate the necessary sums and itself construct the project. The State would guarantee the repayment of principal and interest and assume control and supervision of operation after completion of the project. The repayment of capital and payment of interest to Federal Government could be further secured by impounding of contractual revenues from sales of electric energy and water. An interest rate of $3\frac{1}{2}$ per cent per annum and a repayment period of 50 years are assumed in the analysis.

2 STATE BOND ISSUE. With this method, the State would issue bonds in the necessary amounts to construct the project and would meet the net annual costs, after deductions for revenues, either from the general fund of the State or by levying of assessments in proportion to benefits received. The interest rate would be about $4\frac{1}{2}$ per cent per annum and the period of amortization from 40 to 70 years.

DISTRICT BOND ISSUE

3 DISTRICT FINANCING. Under this method, a district would be formed to include all the areas benefited. Bonds would be issued, which would be secured by the taxable property within the district. The interest rate would probably be from 5 to 6 per cent per annum and the period of amortization of bonds, 40 years.

4 STATE WATER CONSERVATION FUND. By this method, a revolving fund would be created for the purpose of constructing water conservation projects of State-wide interest. The fund would be established either through a direct appropriation or by levying a tax on a commodity or commodities for a definite period of time. The project would be constructed with funds so obtained and the entire cost would be paid back into the revolving fund over a 40-year or some other adopted period, without interest. In the analysis, it is assumed that the annual payments would be equal over a period of 40 years.

INDIRECT BENEFITS

In a project of state-wide concern, there are benefits which may be classified as indirect which are of such moment that either the state as a whole or certain regions might contribute financially to the project

Whole Area Would Share In Benefits

(Continued from preceding page)

because of such indirect benefits. These indirect benefits should be considered in the analysis of economic soundness of the project.

In the development of the highway systems of this and other states through bond issues, gas taxes, and Federal aid the State, Federal government, public and private agency and individual receive no direct return from such expenditures but do receive indirect benefits by reduction of cost of operation of motor vehicles over the improved highways. If these indirect benefits were evaluated, undoubtedly they would far overbalance the costs of the improvements. The costs of such improvements, however, are not directly repaid.

If the state water plan were consummated and in operation, many agencies and localities would be indirectly benefited and perhaps should pay to the projects either in accord with their ability to pay, in proportion to the benefits received or in accord with a combination of the two criteria.

METHODS TABULATED

The following table sets forth for the four methods of financing, the capital and gross annual costs, the anticipated direct revenues per year and the net annual costs. The figures for the estimated revenues do not include any sums which might be obtained from the areas benefited in the Sacramento Valley and in Sacramento-San Joaquin delta or any amounts for the indirect benefits which would accrue to other interests and localities.

Method of Financing	Interest Rate in per cent	Period of Amortization in years	Immediate Initial Development			Complete Initial Development				
			Capital Cost	Gross Annual Cost	Revenues	Net Annual Cost	Capital Cost	Gross Annual Cost	Revenues	Net Annual Cost
1	3½	50 (1)	\$126,600,000	\$7,165,000	\$6,685,000	\$480,000	\$145,300,000	\$9,544,000	\$9,366,000	\$178,000
2	4½	40 (2)	129,500,000	8,982,000	6,685,000	2,297,000	148,500,000	11,660,000	9,366,000	2,294,000
		70 (2)	129,500,000	7,975,000	6,685,000	1,290,000	148,500,000	10,505,000	9,366,000	1,139,000
3	5	40 (2)	131,000,000	9,737,000	6,685,000	3,052,000	150,200,000	12,543,000	9,366,000	3,177,000
		6	133,900,000	11,284,000	6,685,000	4,599,000	153,500,000	14,345,000	9,366,000	4,979,000
4	0	40 (3)	116,200,000	4,537,000	6,685,000	*2,148,000	133,700,000	6,443,000	9,366,000	*2,923,000

* Profit.

(1) 3½ per cent sinking fund.

(2) 4 per cent sinking fund.

(3) Straight line amortization.

A study of the data in the foregoing table reveals that the project is not capable of being financed from the direct revenues assumed obtainable from the sales of electric energy and water, except under method 4. With this method no interest would be charged the project but principal would be repaid over a period of 40 years. It should be noted, however, that under method 4, the period of construction would be determined by the sums available annually for that purpose. If these sums were relatively small as compared to the

total cost of the project, the construction period necessarily would be long.

It is apparent, therefore, that unless money is obtained at a very low rate of interest, revenues from other sources must be obtained if the project is to be financed.

VALUES ENHANCED

There would be many beneficiaries, if the proposed Great Central Valley project were developed. Municipalities, public utilities, transportation companies, banks and other financial houses and others would be indirectly benefited. The lands under irrigation along the Sacramento River, the Sacramento-San Joaquin delta and the lands within Sacramento Flood Control project would receive substantial benefits. Business in municipalities in both the San Joaquin and Sacramento valleys and in the metropolitan centers of San Francisco and Los Angeles would be enhanced by the solution of the water problems through instrumentality of the project.

These indirect benefits were given careful consideration in the deliberations of the California Joint Federal-State Water Resources Commission. In its report of 1930, the Commission states in reference to the Great Central Valley project, "In the way of what might be termed direct benefits, that is, benefits directly to the land receiving the water, the cost will exceed any increment of value it will bring. When, however, the

indirect benefits are taken into consideration, the values that will accrue to the whole area affected, to the cities and towns it contains and which are dependent upon its prosperity, to its merchants, bankers and business men in general, to its transportation and other public utility companies, to all who are immediately affected by its general prosperity or decadence, your Commission feels it is fully justified in recommending the project as one that is economically sound. This it does."

AUTO ACCIDENTS INCREASING

According to statistics lately released, the automobile accident death toll in the United States for the first eight months of last year is placed at more than 21,000, against a corresponding number of deaths during the same period for 1930 of slightly over 20,000. These figures indicate that there were five more fatali-

ties every day of the first eight months of 1931 than for the first eight months of 1930, and show an increase of 5.6 per cent.

Honey: That boy you were riding with has trouble with his vision.

Girl: Yeah, he sees parking spots before his eyes.—*State Lion.*

Vital Statistics on Dam Construction

Applications for approval of dams built prior to August 14, 1929, filed with the State Department of Public Works, Division of Water Resources, during the month of December, 1931.

TRINITY COUNTY—Little Boulder Lake Dam No. 213. Buckeye Placer Mines, Inc., Carrville, owner; earth and rock walls, 8½ feet above streambed with a storage capacity of 32 acre-feet, situated on Little Boulder Creek tributary to Coffe Creek and Trinity River in Sec. 21, T. 37 N., R. 8 W., M. D. B. and M., for storage purposes, for mining use.

SAN DIEGO COUNTY—Lindo Lake Dam No. 839. County of San Diego, San Diego, owner; earth, with a storage capacity of 200 acre-feet, located in Sec. 19, T. 15 S., R. 1 E., S. B. B. and M., for storage purposes, for recreation use.

Applications for approval of plans and specifications for construction or enlargement of dams filed with the State Department of Public Works, Division of Water Resources, during the month of December, 1931.

LOS ANGELES COUNTY—Upper Holywood Dam No. 6-29. City of Los Angeles, Los Angeles, owner; earth, 73 feet above streambed with a storage capacity of 192.6 acre-feet, located in Sec. 34, T. 1 N., R. 14 W., S. B. B. and M., for storage purposes, for domestic use. (Amending application filed December 13, 1929.) Estimated cost \$163,500; fee paid \$1,317.50.

SAN BERNARDINO COUNTY—Greenspot Dam No. 809. Western Fruit Growers, Inc., Los Angeles, owner; earth, 30 feet above streambed with a storage capacity of 17 acre-feet, tributary to Santa Ana River in Sec. 8, T. 1 S., R. 2 W., S. B. B. and M., for storage purposes, for irrigation use. Estimated cost \$3,000; fees paid \$30.

PLUMAS COUNTY—Walker Dam No. 271. Walker Mining Company, Walkermine, owner; earth, 30 feet above streambed with a storage capacity of 25 acre-feet, situated on Little Grizzly Creek tributary to Indian Creek in Sec. 7, T. 24 N., R. 12 E., M. D. B. and M., for storage purposes, for mining debris use. (Amending application filed October 15, 1929.) Total estimated cost \$14,637.29; total filing fee \$146.37.

Applications for approval of plans and specifications for repair or alteration of dams filed with the State Department of Public Works, Division of Water Resources, during the month of December, 1931.

ALPINE COUNTY—East Lost Lake Dam No. 512. R. W. Bassman et al., Fredricksburg, owner; earth, situated on Faith Valley Creek tributary to West Carson River in Sec. 1, T. 9 N., R. 18 E., M. D. B. and M.

ALPINE COUNTY—West Lost Lake Dam No. 512-2. R. W. Bassman et al., Fredricksburg, owner; earth, situated on Faith Valley Creek tributary to West Carson River in Sec. 12, T. 9 N., R. 18 E., M. D. B. and M.

LASSEN COUNTY—Goodrich Dam No. 237-2. Red River Lumber Company, Westwood, owner; earth, 6 feet above streambed with a storage capacity of 60 acre-feet, situated on Hamilton Franch tributary to Leather River in Sec. 35, T. 29 N., R. 9 E., M. D. B. and M. (Removal.)

SAN DIEGO COUNTY—Lindo Lake Dam No. 839. County of San Diego, San Diego, owner; earth, tributary to Quail Canyon in Sec. 19, T. 15 S., R. 1 E., S. B. B. and M., for storage purposes, for recreation use.

SAN MATEO COUNTY—Dianda Dam No. 615. Henry Lime and Cement Company, San Francisco, owner; earth and concrete, situated on Denniston Creek, located in Rancho Corral de Tierra Mares.

TUOLUMNE COUNTY—Stanislaus Forebay Dam No. 97-53. Pacific Gas and Electric Company, San Francisco, owner; earth, located in Sec. 5, T. 3 N., R. 15 E., M. D. B. and M.

EL DORADO COUNTY—Webber Creek Arch Dam No. 53. El Dorado Irrigation District, Placerville, owner; arch, situated on Webber Creek tributary to American River in Sec. 18, T. 10 N., R. 12 E., M. D. B. and M.

SIERRA COUNTY—Lower Spencer Lake Dam No. 298. Andrew Bachels, Four Hills, owner; rock, situated on Middle Fork tributary to North Yuba River.

SAN MATEO COUNTY—Cowell Reservoir No. 615-2. Moss Beach Produce Company, Moss Beach, owner; earth, located in Rancho Corral de Tierra.

TRINITY RIVER—Little Boulder Creek Dam No. 213. Buckeye Placer Mines, Inc., Carrville, owner; earth between rock walls, situated on Little Boulder Creek tributary to Coffe and Trinity Rivers in Sec. 21, T. 37 N., R. 8 W., M. D. B. and M.

SAN MATEO COUNTY—Millbrae No. 2 Dam No. 618-2. Mills Estate, Inc., San Francisco, owner; earth, situated on a creek, located in Buri Buri Rancho.

CONTRA COSTA COUNTY—Lafayette Dam No. 31-2. East Bay Municipal Utility District, Oakland, owner; earth, tributary to Lafayette Creek, located in Sec. 26, T. 1 N., R. 3 W., M. D. B. and M.

FRESNO COUNTY—Sequoia Lake Dam No. 693. Y. M. C. A.—Sequoia Lake Conference, Fresno, owner; rock, situated on Mill Flat Creek tributary to Kings River in Sec. 1, T. 14 S., R. 27 E., M. D. B. and M.

LASSEN COUNTY—Coon Dam No. 249. W. W. Long, Susanville, owner; earth, situated on Coon Creek tributary to Horse Lake in Sec. 22, T. 33 N., R. 13 E., M. D. B. and M.

LASSEN COUNTY—Branham Flat Dam No. 249-3. W. W. Long, Susanville, owner; earth, situated on Branham Creek tributary to Horse Lake in Sec. 19, T. 33 N., R. 13 E., M. D. B. and M.

PLANS APPROVED

Plans and specifications for the construction or enlargement of dams approved by the State Department of Public Works, Division of Water Resources, during the month of December, 1931.

SAN DIEGO COUNTY—El Capitan Dam No. 8-7. City of San Diego, San Diego, owner; hydraulic and rock fill, 137 feet above streambed with a storage capacity of 118,000 acre-feet, situated on San Diego River in Sec. 7, T. 15 S., R. 2 E., S. B. B. and M., for storage purposes, for municipal use.

Plans for the repair or alteration of dams approved by the State Department of Public Works, Division of Water Resources, during the month of December, 1931.

LAKE COUNTY—Detert Lake Dam No. 392. Richard Detert, San Francisco, owner; earth, situated on Bucksnot Creek tributary to Putah Creek in Sec. 9, T. 10 N., R. 6 W., M. D. B. and M.

RIVERSIDE COUNTY—Mockingbird Dam No. 814. Gage Canal Company, Riverside, owner; earth, situated on Mockingbird Canyon in Sec. 20, T. 3 S., R. 5 W., S. B. B. and M.

FRESNO COUNTY—Sequoia Lake Dam No. 693. Young Mens Christian Association, Fresno, owner; rock, situated on Mill Flat Creek tributary to Kings River in Sec. 1, T. 14 S., R. 27 E., M. D. B. and M.

EL DORADO COUNTY—Webber Creek Dam No. 53. El Dorado Irrigation District, Placerville, owner; arch, situated on Webber Creek tributary to American River in Sec. 18, T. 10 N., R. 12 E., M. D. B. and M.

RIVERSIDE COUNTY—El Caso Dam No. 822. G. O. Trauzettel, Redlands, owner; earth, situated on San Timoteo Creek tributary to Santa Ana River in Sec. 20, T. 2 S., R. 2 W., S. B. B. and M.

SAN MATEO COUNTY—Filoli Dam No. 617. Filoli Inc., San Mateo, owner; earth, situated on Branch of Laguna Creek tributary to San Mateo Creek in Sec. 30, T. 5 S., R. 4 W., M. D. B. and M.

TRINITY COUNTY—Little Boulder Lake Dam No. 213. Buckeye Placer Mines, Inc., Carrville, owner; earth fill, rock walls, situated on Little Boulder Creek tributary to Coffe Creek and Trinity River in Sec. 21, T. 37 N., R. 8 W., M. D. B. and M.

ALPINE COUNTY—East Lost Lake Dam No. 512. R. W. Bassman et al., Gardnerville, owner; earth, situated on Faith Valley Creek tributary to West Carson River in Sec. 1, T. 9 N., R. 18 E., M. D. B. and M.

Building Safety Into Super-Highway By Double Bridge Grade Separation

By CHARLES WEST JONES, Engineer Bridge Department

ALTHOUGH Aristotle failed to write upon the subject, you may believe it or not, vehicles which strike trains stop and sometimes they do not choose to run again.

The Railroad Commission of the State of California reports that each year in California over 1000 persons are injured or killed by steam and interurban railroads. This number does not include street car casualties within cities.

It is gratifying to note, however, that the number of casualties has been decreasing. The enactment of laws relative to stopping at crossings, the installation of warning signs, gates and wigwags and the schooling of children and adults in safety principles have probably all had good effect. Much has also been done in the matter of eliminating interference and hazard at railroad grade crossings by means of grade separation.

The grade separation method of securing safety is ideal but expensive. According to the Railroad Commission there are 12,300 crossings over main and branch railroads in the entire State. Only 550 crossings or 4½ per cent have been separated. This small percentage, however, has cost \$20,000,000.

STATE HAS PROGRAM

On the state highway system alone, which is used largely by through fast traffic the separation problem is of considerable magnitude. The State, year by year, is proceeding as best it can with an orderly program of separation giving first consideration to crossings which are most dangerous.

In determining which crossings are most dangerous the main criteria are volume and speed of train and vehicular traffic and degree of visibility.

To bring out some of the problems and principles of grade separation and structure work as applied to state highway construction an example will be given.

In connection with the building of a new super-highway along the coast in Los Angeles County between Santa Monica and Seal Beach to serve as a connecting link in the Roosevelt State Highway and relieve the dangerous,

time consuming and costly traffic congestion which prevails in this highly developed beach area, the State is engaged in building a number of grade separation structures and interesting bridges.

THREE PROJECTS COMPLETED

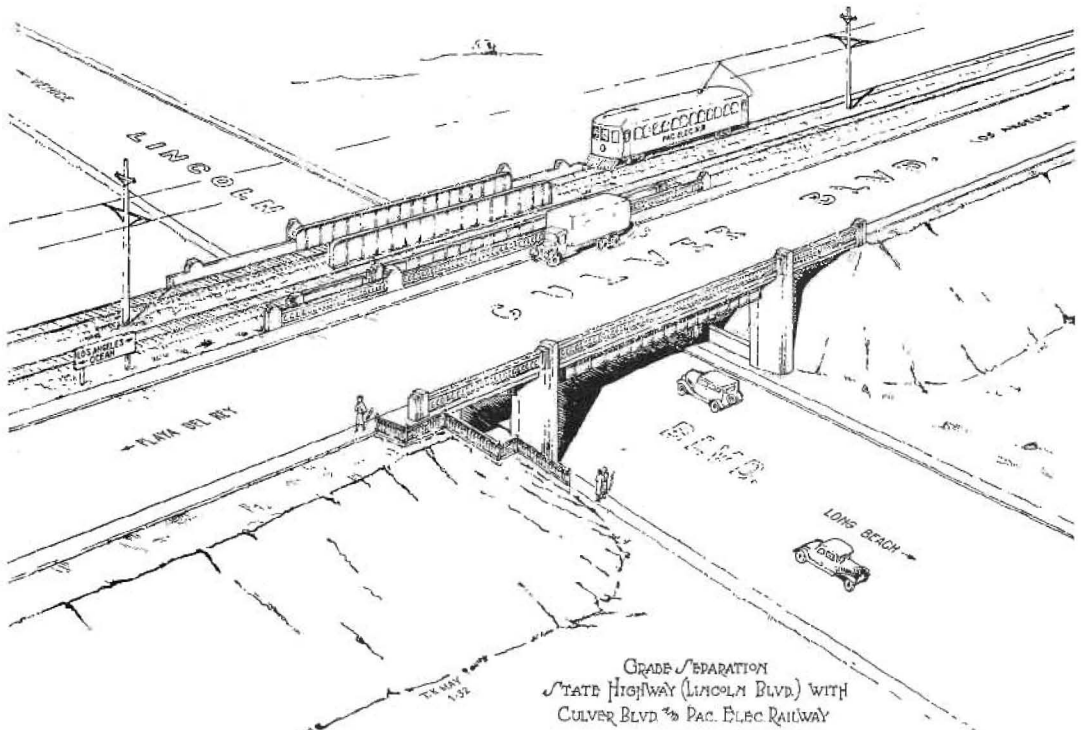
An imposing structure has been thrown across San Gabriel River, on new alignment which eliminates from the State highway a dangerous railroad crossing at Seal Beach. Further north, on this new road a new bridge, containing a removable span, conforming with War Department requirements, crosses Alamitos Bay. Still further north, in Manhattan Beach, where the new super-highway follows El Camino Real, the former dirt road is now a wide boulevard and a new grade separation has been built by the State over the Santa Fe tracks.

The next step in this program of structure building on this important connecting link of State highway will be the construction of a grade separation structure where the new super-highway will cut across the fast interurban del Rey-Redondo line of the Pacific Electric Railway and also cut across Culver Boulevard, a county road which is parallel and adjacent to the railway tracks. It will be located about one mile from the ocean, in the low tidal flat where Ballona Creek empties into the ocean a short distance south of Santa Monica, Ocean Park and Venice and immediately north of Playa del Rey hills and Loyola University.

MANY GOOD REASONS

Is there any good reason why the State should choose to build a grade separation at this point? There are a number of good reasons. While traffic on many State highways averages one, two, three and four thousand vehicles per day, traffic counts which have been taken on this coast highway near Santa Monica to the north, have in many cases exceeded twenty thousand vehicles per day, and in one case, on a holiday, a traffic count of fifty three thousand, three hundred and three vehicles for the day was recorded.

It is believed conservative to estimate that over 5,000,000 vehicles on the State highway



THEY SHALL NOT CRASH at the intersection of Roosevelt super-highway link and the Culver Boulevard just south of Venice in Los Angeles County, for an important grade separation will be effected by the imposing bridge structure shown above. In addition to carrying the State highway over the county road, the structure will provide two tracks for high-speed trains of the Pacific Electric Railway that serves this crowded beach area. It is estimated that 5,000,000 vehicles and 18,250 trains will pass through this intersection in a year.

will pass through this separation structure every year. During the same period of time approximately 18,250 trains will pass. On Culver Boulevard there will be a million or more vehicles, but there will be no boulevard stop, no congestion, no hazard and no delay, for Culver Boulevard as well as the railway tracks will be elevated and cross over and above the State highway.

EXPENSE IS SHARED

This construction which will cost approximately \$120,000 and which will be paid for jointly by the State, Los Angeles County and by the Pacific Electric Railway will render forever safe a portion of this road which we believe is destined to carry the heaviest traffic volume of all State highways in California. The structure will not only pay for itself many times over in time saving but it will also prevent many accidents.

Compared with many other grade separations which have been built and some that have been urged, the public will receive for its money a relatively large benefit per dollar expended. These arguments together with the

fact that the Railroad Commission has opposed the construction of a crossing at grade, answer the question why the State should choose to build a crossing at this particular locality.

The type of grade separation structure which should be built at any given locality is chiefly an engineering matter. Although we are enjoined by a certain good book to follow the wise policy of building on rock, the engineer must build structures where they are needed irrespective of fixed physical conditions.

ON MUD FLAT

In the case of the Culver Boulevard separation, the problem is to build a durable, attractive, adequate structure which will properly handle present and future flow of highway and railroad traffic, the structure to rest on a mud flat with water near the surface and build it in such a way as not to interrupt train traffic, keeping in mind always that the desired result is to be secured with a minimum expenditure of funds. In order to determine the underlying formation which must support the tremendous load of the structure

(Continued on page 35)

Relocating Grapevine Grade Unit of Ridge Route Cuts Out 95 Curves

By E. E. WALLACE, District Engineer

FOLLOWING the relocation of the portion of the Ridge Route located in District VII, Los Angeles County, the remaining portion of this important State highway is soon to be radically changed and improved.

The Ridge Route or Tejon Pass Route, as it was originally called, has always been the most direct route from Los Angeles to Bakersfield and the San Joaquin Valley. Authentic references are available of early travelers from southern California reaching the Great Central Valley by this route as early as 1854, but it was many years before a so-called road meandered over San Fernando Pass, through the Castaic Ranch and down Grapevine Canyon to the valley floor.

LOGICAL ROUTE

The part of the road within Kern County, from the Los Angeles county line, northeasterly for a distance of 11.6 miles comprising the Grapevine Grade was graded and paved during the period from September, 1919, to May, 1921. A 6 per cent maximum grade was adopted at that time, but with the limited funds available and the consequent necessity of avoiding heavy excavation and long hauls, it was necessary to depart from the old road at various places and to introduce considerable curvature, using a greatly improved grade at the expense of alignment and sight distance.

TRAFFIC INCREASED

Because of the advantage in distance and the better surface, the Ridge Route soon carried practically all through travel. The normal traffic increase and the development of long haul truck transportation between the San Joaquin Valley and Los Angeles, made the limitations of sharp curvature and short sight distance objectionable. Partial daylighting of the worst curves improved conditions somewhat but it remained a perilous undertaking for fast traffic to attempt passing the many slow-moving trucks and trailers that use this route.

To provide an adequate highway for present day traffic, a complete relocation of the Grapevine became a real necessity. The new route

follows a comparatively level course on the opposite side of Grapevine Creek from the present series of loops and hairpin turns leading down to the Bakersfield straightaway.

MINIMUM STANDARDS

The results of this relocation have been very gratifying and indicate that a high standard is obtainable at reasonable expense. The minimum standards adopted are:

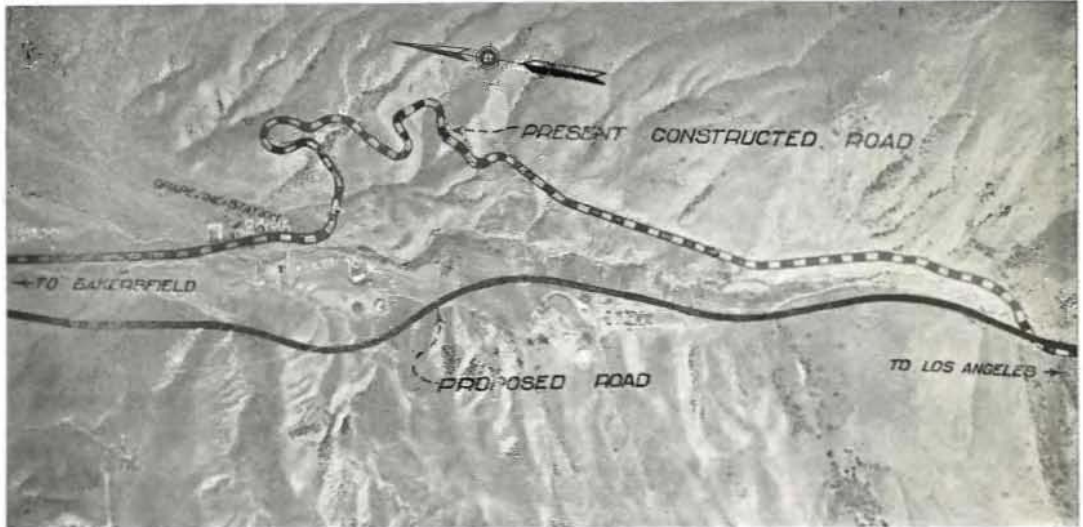
Six per cent maximum grade, 1000 feet minimum radius curves and a 36-foot graded roadbed with right of way sufficient for an ultimate 56-foot roadbed. A 20-foot, two-lane pavement will be built for the present, but the capacity of this two-lane pavement will be much greater than the present pavement due to the high standard of alignment.

The danger of travel over this grade will be considerably reduced, as well as the time of travel, after construction along the new location has been completed.

In line with the progressive improvement of this route, the California Highway Commission appropriated sufficient funds for improving three miles of the Grapevine Grade. This money is now available and the work of grading and paving from Grapevine Station to three miles south will be advertised and placed under way early this spring. This project will correct the worst section of the grade and will eliminate the notorious "Loop" and "Death Curve."

A comparison of curvature and grade on the existing road with those on the proposed relocation of the entire Grapevine Grade follows:

	Present route	Relocation
Length	11.6 Mi.	10.3 Mi.
Number of Curves.....	115	22
of 80-100 Radius.....	6	
100-200 Radius.....	16	
200-300 Radius.....	28	
300-500 Radius.....	29	
500-1000 Radius.....	34	
over 1000.....	2	
Total No. Curves.....	115	22
Total Central Angles.....	4246°	513°
Max. Grade.....	6%	6%
Adverse Grade.....	0.4 Mi.	0 Mi.
Adverse Rise.....	25 Ft.	0 Ft.
Max. Elev.....	3826 Ft.	3808 Ft.
Min. Elev.....	1495 Ft.	1495 Ft.



UP IN THE AIR, the 115 curves and loops of the Grapevine Grade give it the appearance of a big snake doing some fancy contortions with its midships section where the loops occur.



"DEATH CURVE," they call this danger point on the Grapevine. It will be eliminated.



A HOLD-UP like this is a frequent experience for traffic behind a truck and trailer.



CUTTING CURVES out by the dozen from this Ridge Route unit the relocation of the Grapevine as shown by the diagram will also shorten the distance between Bakersfield and Los Angeles.

Major Highway Program for 1932

The program of the Division of Highways for this year as announced by Colonel Walter E. Garrison, Director of the Department of Public Works contemplates improvements in every county of the State, as set up in the budget passed by the last Legislature. Some of the major projects of this program that will be placed under way by April 1 and some that will be advertised between that date and the end of the year are shown in the following table:

Work to be placed under way by April 1, 1932

SOUTHERN COUNTIES

County	Location	Type	Miles
Imperial	Coyote Wells to Dixieland	Gr. and A. C. Pave.	14.7
San Luis Obispo	Cambria to San Simeon	Gr. and Surf.	8.6
Tulare	Lemon Cove to Three Rivers	Gr. and Surf.	10.6
Kern	Plaza Garage to Goshen and Plaza Garage to 0.3 of a mile westerly	Gr. and Pave.	5.8
Los Angeles	Las Flores Canyon to Santa Ynez Canyon	Gr. and Pave.	7.4
Orange	Dana Point to Laguna Beach	Gr. and Pave.	5.6
Orange	Newport to Corona Del Mar	Gr. and Pave.	3.7
San Diego	El Cajon to Las Coches Cr., portions	Gr. and Pave.	3.5
Los Angeles	Tujunga to La Canada	Gr. and Bridges	5.0
Los Angeles	Canton Creek to Piru Creek	Bridges	—
San Bernardino	Baker east 10 miles	Gr. and Surf.	10.0
Riverside	Mecca-Blythe Road, portions	Gr. and Surf.	16.0
Riverside	6 mi. N. Imperial Co. line to Av. 62	Gr. and Pave.	8.3
Riverside	Imperial Co. line to 6 mi. N.	Gr. and Pave.	6.0
Los Angeles	Sepulveda Blvd. to Calabasas	Pave.	10.5

NORTHERN COUNTIES

County	Location	Type	Miles
Mendocino-Sonoma	Cloverdale to Hopland	Grade and Surf.	13.9
Shasta	Hat Cr. Summit to Fall River Mills	Grade and Surf.	8.9
Calaveras	Near Angels Camp	Grade and Surf.	1.6
Santa Clara	Ware Ave. to Stephens Cr. Road	Grade and Pave.	3.4
Santa Clara	Stephens Creek Bridge	Bridge	—
Lake-Colusa	Abbot Mine to 5 Mi. W. of Williams	Surface	19.1
Monterey	Rocky Creek	Bridge	—
Nevada	Nevada City to Washington Road	Surface	11.8
Solano	City of Vallejo	Grade and Surface	0.3
Alpine	Near Lake Alpine	Grade and Surface	5.0
Solano	Cordelia to Fairfield	Grade and Pave.	5.7
Siskiyou	At Beaver Creek	Grade and Surface	0.5
Sacramento	Cosumnes River to McConnell	Grade and Pave.	1.5
Humboldt	East Branch Eel River Bridge	Grade and Surface	0.5

Some Projects for Last Six Months

Work to be advertised April 1, 1932, to December 31, 1932

SOUTHERN COUNTIES

County	Location	Type	Miles
Kern	Kern River	Bridge	—
Kern	Bakersfield to Beardsley Canal	Pave.	2.9
Orange	In Fullerton	Pave.	1.9
Los Angeles	Santa Ynez Canyon to Santa Monica	Pave.	2.6
Los Angeles	Pomona to Los Angeles	Pave.	11.1
Los Angeles	Pomona to Brea Canyon	Pave.	6.0
Los Angeles	Through El Segundo	Pave.	2.0
Los Angeles	Pasadena to Monrovia	Pave.	3.6
Los Angeles	Jefferson Street to El Segundo	Structure	—
Ventura	Ventura Northerly	Pave. and Bridge	1.0
San Bernardino	End of Pave. to Camp Waterman	Grade and Surf.	5.0
Riverside	Blythe to Colorado River	Grade and Surf.	4.1
Imperial	Sand Hills to 5 mi. W. of Yuma	Pave.	9.0
Mono	Bridgeport to Sonora Junction	Oil Rock Surf.	15.0
San Luis Obispo	Between Cambria and San Simeon	Bridges	—
Orange	Anaheim Bay	Bridge	—
Los Angeles	In Montebello	Pave.	1.5
Los Angeles	Topango Canyon to Las Flores Canyon	Pave.	3.2

NORTHERN COUNTIES

County	Location	Type	Miles
Butte	Pulga to county line	Grade and Surf.	8.0
Santa Clara	Oregon Ave. to Alviso Road	Grade and Bit. Mac.	6.2
Santa Clara	Madrone Crossing	Grade separation	—
Alameda	Dublin to Hayward	Pave.	9.5
Santa Clara } Santa Cruz }	Saratoga Gap to Black Road	Grade and Surf.	4.0
Contra Costa	San Pablo Cr. to Carquinez Br.	Pave.	9.6
Santa Cruz	Inspiration Point to Vine Hill Road	Grade and Surf.	6.5
Monterey	At Soledad	Grade separation and Ap.	1.2
Monterey	San Remo Divide to Carmel River	Grade and Surf.	3.4
Fresno	Fresno to Fancher Creek	Pave.	3.1
Sacramento	Sacramento to McConnell	Grade widening	11.0
San Joaquin	Nile Garden	Grade separation	—
San Joaquin	Paradise Cut	Bridge	—
Stanislaus	Stanislaus River	Bridge and Ap.	—
Tuolumne	Sonora to $\frac{1}{2}$ mi. east	Grade and Surf.	—
Amador	Drytown to Martell	Bit. Surf.	7.2

Now Licensed Structural Engineers

AMONG the forty-one registered Civil Engineers out of more than 5000 in the State who have thus far been passed by the Board of Registration as qualified to use the title Structural Engineer, are two members of the Architectural Division of the Department of Public Works in the office of



C. H. KROMER

State Architect George B. McDougall at Sacramento.

They are Clarence H. Kromer, in charge of the Structural Section of the Division of Architecture, and D. C. Willett, Assistant in Charge. They are the only two men from the northern part of the State, exclusive of the San Francisco Bay district, who have thus far been so officially designated.

As evidence that the public is becoming more and more conscious of the responsibility placed in the hands of the men who design its more important buildings, there has been a growing demand that the law give more positive protection by stating that certain men are qualified and competent. The public rightly expects that these men shall be of assured competence

since it is life as well as property that must be guarded.

The State of California has long required that the architect be registered and a similar requirement was made of the civil engineer by legislative enactment in 1929—nearly five thousand engineers having been registered since this law was put into effect. However, since the safety of our building structures rests primarily with the structural engineer, greater protection is afforded the public by specifically designating those engineers who are known to be capable of assuming this responsibility.



D. C. WILLETT

With this in mind, the 1931 Legislature passed Assembly Bill No. 615 requiring that no person shall use the title "structural engineer" unless he be a registered civil engineer and unless he has been found qualified as a structural engineer by the Board of Registration for Civil Engineers. This bill was approved and signed by Governor Rolph thereby making California one of the pioneer states in assuring the public of safe buildings.

Good Roads Aid Gain In Park Attendance

Visitors in California's four national parks this year showed an increase of more than 50,000 over 1930, it is indicated in reports from Horace M. Albright, director of the National Park Service, reaching the Automobile Club of Southern California. A gain was registered over last year in each of these parks, and it is noted that more than 90 per cent of the travel to these outdoor recreation centers was in motor vehicles, made possible by improved highways.

There were 714,256 visitors in the four parks, an increase of over seven per cent.

Highway Courtesy a Factor in Safety

Highway courtesy, such as granting the right of way, signalling for turns and stops, having lights in proper adjustment, and remaining a safe distance behind the car ahead, will go far toward reducing the toll of deaths and injuries, according to a statement by the California Committee on Public Safety, which cites an analysis of driving faults which contributed to automobile accidents in support of the statement.

More than 30 per cent of those involved in accidents in 1930 did not have the right of way.

Unorthodox Mixture Makes Good Roads

(Continued from page 8)

back. So we left out the coal oil and heated both the sand and the road oil. And believe it or not asphalt stuck to the heated sand as if it belonged there. This mixture hardened at night, was fairly firm on a cloudy day but on a sunny day was nearly as soft as when first placed.

These combinations with road oil were obviously unsatisfactory but two months later when removed for the resurface they had not corrugated or displaced under traffic although they were still soft on sunny days.

COMBINATIONS TRIED

Endeavoring to obtain the best grading possible from the material, the beach sand was split into two sizes, $\frac{1}{4}$ to $\frac{1}{8}$ and $\frac{1}{8}$ to 0 and combined in various proportions with the yellow roadside sand.

The latter contained some fines passing a 200-mesh but the larger portion passed a 20 and was retained on a 40-mesh sieve. But little of the beach sand passed a 40-mesh sieve.

Various combinations of these three grades of sand were tried in the field experiments. Strangely enough every combination seemed to indicate by the surface area method that about 3.3 per cent of asphalt was required. The field tests indicated that the most stable mixture was obtained by the use of 50 per cent of the aggregate from $\frac{1}{4}$ " to $\frac{1}{8}$ " and about 25 per cent each of the two grades of sand. Increase in the amount of sand resulted in a mushy mixture and decrease in a porous mixture.

AVERAGE COMPARISONS

The average grading and asphaltic content of this combination compared with the specified grading for Type C asphalt concrete is as follows:

Sieve sizes	Per cent passing	
200	2.3	10% - 20%
100	4.5	
80	7.3	35% - 55%
40	19.4	60% - 70%
20	31.6	
10	44.3	70% - 90%
3	95.2	90% - 100%
$\frac{1}{2}$	99.3	100%
	3.5	9% - 15%

Obviously with round aggregate having such polished surfaces stability must be furnished by the asphalt for there is no mechanical locking of the aggregate. Since use of

aggregate from the beach required that the material be dried the same plant was necessary as for asphaltic concrete. It was therefore just as economical to use D grade asphalt and as this promised the greatest stability it was specified.

A condition contributing to the success of this type of construction is prevailing low temperatures in the area where it was used. Atmospheric temperatures above 70 degrees are rare and in July and August there is either high or low fog with little sunshine. Allowing for pavement temperatures 50 per cent in increase of atmospheric temperatures where the road is in sunshine for a major portion of the day, the pavement temperature would rarely if ever exceed 110 degrees.

TWO-INCH LAYERS

The average thickness of the asphalt treated surface is four inches. It was put down in two layers each thoroughly rolled. Experience indicated that satisfactory compaction was not obtained if the layers were much in excess of two inches in thickness.

Mineral aggregate was heated to about 35 degrees in the dryer and the mixture was spread on the road at a temperature of about 280 degrees. The hot material was spread and leveled by use of a combined spreader box, strike-off and leveling blades developed in this district and used by the contractors on other asphaltic jobs. No headers were used and no trouble was experienced in maintaining the edges of the surface.

A few rakers were necessary but blading was impracticable. The roller was able to work close to the spreader whereas with cut back mixes the roller has had to be kept from three to five hours behind the spreading.

The surface was made nonskid by application of the coarser aggregate, coated with asphalt as is customary.

The length of the job was 8.4 miles and the asphalt treated surface was twenty feet by four inches. Including the construction of shoulders two feet by four inches of selected material but exclusive of base reinforcement the improvement cost \$8,252 per mile.

At this writing there is every reason to believe that a satisfactory, safe and durable surface has been obtained at a low cost.

Highway Bids and Awards for December

HUMDOLDT COUNTY—Dyerville Bridge approaches, about 0.9 mile to be graded and surfaced with untreated crushed gravel or stone. Dist. I, Rt. 1, Secs. C. D. E, C. Coats, Sacramento, \$39,507; Baker and Taylor, Chester, \$47,645; Poulos and McEwen, Sacramento, \$53,685; Hemstreet & Bell, Marysville, \$33,041; Hein Bros.—Basalt Rock Co., Petaluma, \$40,186; Larsen Bros., Galt, \$34,997; Milton A. Purdy, San Francisco, \$40,867; Redwood Construction Co., Ltd., Eureka, \$38,863; Chas. N. Chittenden, Napa, \$47,842; Peter McHugh, San Francisco, \$47,829; Tieslau Bros., Berkeley, \$36,817. Contract awarded to Young & Son Co., Ltd., Berkeley, \$30,584.

LASSEN COUNTY—Between Willards and Susanville, about 5.2 miles to be graded and surfaced with crusher run base and bituminous treated crushed gravel or stone surface (plant mix). Dist. II, Rt. 29, Sec. B, Isbell Construction Co., Carson City, Nevada, \$266,295; A. Teichert & Son, Inc., Sacramento, \$249,335; Skeels & Graham, Roseville, \$245,677; Larsen Bros., Galt, \$244,731; Young and Son Co., Ltd., Berkeley, \$269,596; Hemstreet & Bell, Marysville, \$232,056; Dunn & Baker, Klamath Falls, Oregon, \$319,177; Peter McHugh, San Francisco, \$228,333; Contoules Construction Co., San Francisco, \$226,587; Force Construction Co., Piedmont, \$269,210; Southern California Roads Co., Los Angeles, \$245,347; Morrison-Knudsen Co., Boise, Idaho, \$243,182. Contract awarded to California Construction Co., San Francisco, \$217,927.

MADERA COUNTY—At Madera, about 0.5 mile to be graded and paved with Portland cement concrete. Dist. VI, Rt. 4, Sec. D, M. B. McGowan, Inc., San Francisco, \$33,759; Hartman Construction Co., Bakersfield, \$39,608; L. C. Clark and C. E. Doughty, Visalia, \$33,960; W. A. Dantanville, Salinas, \$32,600; D. McDonald, Sacramento, \$35,792. Contract awarded to Valley Paving and Construction Co., Fresno, \$31,554.

MENDOCINO COUNTY—Two reinforced concrete bridges, one across Big Dann Creek and one across Cedar Creek. Dist. I, Rt. 1, Sec. J, Barrett & Hill, San Francisco, \$236,122; Smith Bros. Co., Eureka, \$228,985; Lindgren & Swinerton, Inc., San Francisco, \$259,925; Mercer-Fraser Co., Eureka, \$246,380; Porter Bros., San Francisco, \$299,830; Rocca & Caletti, San Rafael, \$22,165; Peter McHugh, San Francisco, \$212,915. Contract awarded to Gutleben Bros., Oakland, \$208,248.

ORANGE COUNTY—Between Corona Del Mar and Laguna Beach, about 5.5 miles to be graded and paved with Portland cement concrete. Dist. VII, Rt. 60, Sec. B, Basich Bros., Torrance, \$407,470; Kovacevich & Price, Inc., South Gate, \$429,738; Gibbons and Reed Co., Burbank, \$497,294; Macco Construction Co., Clearwater, \$434,683; Peninsula Paving Co., San Francisco, \$466,450; Sander Pearson and Dimmitt & Taylor, Santa Monica, \$496,825; Griffith Company, Los Angeles, \$424,209; Daley Corporation, San Diego, \$444,051. Contract awarded to Jahn & Bressi Construction Co., Inc., Los Angeles, \$366,823.

SAN JOAQUIN COUNTY—Between 4.5 miles east of Lodi and 1.8 miles east of Clements, 8.4 miles grading and paving with asphalt concrete. Dist. X, Rt. 24, Secs. B & A, D. McDonald, Sacramento, \$137,922; Valley Paving & Construction Co., Fresno, \$149,972; Clark & Henery, San Francisco, \$159,048; Heafey-Moore, Oakland, \$169,645; C. W. Wood, Stockton, \$172,270; Larsen Bros., Galt, \$157,892; Hemstreet & Bell, Marysville, \$158,234; A. Teichert & Son, Sacramento, \$161,837; Fred W. Nighbert, Bakersfield, \$184,782. Contract awarded to Hanrahan Co., San Francisco, \$126,596.

SAN LUIS OBISPO COUNTY—Reinforced concrete girder bridges across Los Berros Creek and Arroyo Grande Creek. Dist. V, Rt. 2, Sec. F, Merritt-Chapman & Scott Corporation, San Pedro, \$43,747; M. B. McGowan, Inc., San Francisco, \$44,578; Theo. M. Maine, San Luis Obispo, \$42,390; Barrett & Hill, San Francisco, \$47,546; Fredrickson & Watson Construction Co., and Fredrickson Bros., Oakland, \$42,506; Gist & Bell, Arcadia, \$46,575; B. A. Howkins & Co., San Francisco, \$49,170; Neves and Harp, Santa Clara, \$44,855. Contract awarded to Bodenhamer Construction Co., Oakland, \$41,774.

SAN MATEO COUNTY—Widening reinforced concrete slab bridge across Baden Creek near Baden. Dist. IV, Rt. 2, Sec. A, M. B. McGowan, San Francisco, \$5,640; Clinton-Stephenson Construction Co., Ltd., San Francisco, \$5,869; Vogt & Davidson, Ltd., San Francisco, \$6,153; A. W. Kitchen, San Francisco, \$5,523; Healy-Tibbitts Construction Co., San Francisco, \$5,730; John P. Lawlor, San Francisco, \$4,985. Contract awarded to W. L. Proctor, Santa Rosa, \$4,588.

SANTA BARBARA COUNTY—Two miles north of Solomon Summit to 1½ miles south of Santa Maria, about 6 miles to be graded and paved with Portland cement concrete. Dist. V, Rt. 2, Sec. L, Meyer Rosenberg, San Francisco, \$231,002; Peninsula Paving Co., San Francisco, \$201,439; M. J. Bevaanda, Stockton, \$197,437; McCray Co., Los Angeles, \$207,794; Macco Construction Co., Clearwater, \$213,584; Basich Bros. Construction Co., Los Angeles, \$209,570; Granite Construction Co., Ltd., Watsonville, \$197,894; C. W. Wood, Stockton, \$199,900; Jahn & Bressi Construction Co., Inc., Los Angeles, \$213,426. Contract awarded to Fredrickson & Watson Construction Co., and Fredrickson Bros., Oakland, \$188,811.

SHASTA COUNTY—Between Montgomery Creek and Burney, stockpiling crushed gravel or stone. Dist. II, Rt. 28, Sec. C, Hemstreet & Bell, Marysville, \$7,709. Contract awarded to James W. Bettram, Weott, \$6,709.

SISKIYOU COUNTY—Bridge across Cottonwood Creek about 21 miles north of Yreka, three 40-foot spans on concrete bents. Dist. II, Rt. 2, Section C, Rolla Arbuckle, Anderson, \$17,622; Robert Heaney, Hayward, \$18,120; Kuckenberg-Wittman Co., Inc., Portland, Oregon, \$18,330; M. B. McGowan, San Francisco, \$16,929; J. W. Hoopes, Sacramento, \$17,237; Dunn & Baker, Klamath Falls, Oregon, \$18,890; John Berlinger, Orland, \$21,450. Contract awarded to J. W. Halterman, Willows, \$16,372.

SISKIYOU COUNTY—Constructing Mt. Shasta Maintenance Station Buildings. Dist. II, Rt. 3, Sec. A, R. B. McKenzie, Red Bluff, \$7,400; L. Consentino, Dunsmuir, \$6,880; T. B. Goodwin, San Francisco, \$8,159; John W. Anderson, Mt. Shasta City, \$6,330; Oliver S. Almie, San Francisco, \$8,578; Theodor Johanns, San Francisco, \$7,610. Contract awarded to M. G. Still, Mt. Shasta City, \$5,750.

TRINITY COUNTY—Reinforced concrete bridge across Canyon Creek, 11 miles west of Weaverville, consisting of 5 40-foot spans. Dist. II, Rt. 20, Sec. F, Rolla Arbuckle, Anderson, \$22,509; Fred J. Maurer & Son, Eureka, \$24,432; Clinton-Stephenson Const. Co., San Francisco, \$23,263; R. B. McKenzie, Red Bluff, \$23,854; Nelson Bros., Escalon, \$26,229; F. H. Nellson, Orland, \$29,117. Contract awarded to John Berlinger, Orland, \$19,269.

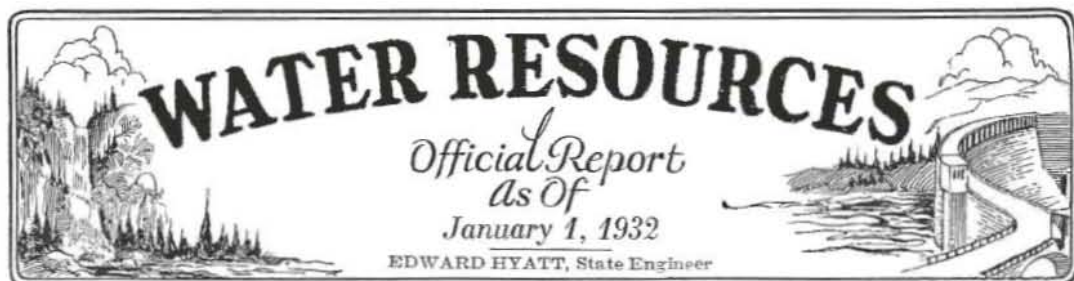
Bevans Now Chief of Registration Bureau

Appointment of Russell Bevans, former chief inspector of the California Highway Patrol, as Registrar of the Division of Registration of the Department of Motor Vehicles, has been announced by Governor James Rolph, Jr.

Bevans had been acting registrar since last August. His appointment became final when Governor Rolph approved plans for reorganization of the department presented by Director Daniel J. O'Brien.

Prior to entering state service Bevans was a member of the San Francisco Police Department and was assigned to the mayor's office for three years.

Canada's roads have been built to a high standard and are equal to any in America.



An interesting fact concerning the maintenance work on the Sacramento Flood control project disclosed in the monthly report of State Engineer Hyatt is that seven hundred men days labor at \$4 per day are required in clearing the Knights Landing Ridge Cut flowage area. The men are hired by the Yolo County supervisors and given ten days work each. An investigation of the underground basins or reservoirs in the South Coastal area, which the report says number twenty-nine in that section of southern California is being continued in connection with the collection of data concerning changes in the water plane. The report gives details of dam applications, and investigations in other areas of the State including reservoir sites on Piru Creek in Ventura County as follows:

IRRIGATION DISTRICTS

At the meeting of the California Districts Securities Commission on November 27, during the forenoon session, matters regarding the finances of Anderson-Cottonwood irrigation district were discussed by the Commission with various representatives of the district. During the afternoon session, similar matters were discussed with representatives of El Camino irrigation district.

A meeting of California Districts Securities Commission was held on December 11, 1931.

Visits for the purpose of considering matters in their interest were made to the following districts: Ramona, Lakeside, La Mesa, Lemon Grove and Spring Valley, and San Ysidro irrigation districts in San Diego County; Newport Heights and Newport Mesa irrigation districts in Orange County; Beaumont irrigation district in Riverside County; South Montebello, La Canada and Palmdale irrigation districts in Los Angeles County; Alpaugh irrigation district in Tulare County; Corcoran irrigation district in Kings County; and Oroville-Wyandotte irrigation district in Butte County.

DAMS

To date 788 applications have been received for approval of dams built prior to August 14, 1929; 88 applications for construction or enlargement, and 219 for repairs or alterations.

Applications Received for Approval of Plans for Construction of Dams.

Dam	Owner	County
Upper Hollywood El Capitan	City of Los Angeles City of San Diego	Los Angeles San Diego

Application received from the city of Los Angeles for construction of the Upper Hollywood dam, amending their application filed December 19, 1929, provides for an earthfill dam to store 193 acre-feet, 72 feet high.

The application for approval of plans of El Capitan dam states that the structure will be a combined hydraulic and rock fill dam 197 feet in height, to store 118,000 acre-feet at a cost of over three million dollars.

Applications Received for Approval of Plans for Repairs or Alterations.

Seventeen such applications were received during this period.

Plans Approved for Construction of Dams.

Dam	Owner	County
Looseley Pool El Capitan	T. H. Vestal, et al. City of San Diego	Lassen San Diego

Plans Approved for Repairs or Alterations.

Dam	Owner	County
Detert Lake Mocking Bird Sequoia Lake Webber Arch El Casco Filoli	Detert Estate Gage Canal Company Y. M. C. A. of Fresno El Dorado Irrigation District G. O. Trauzettel Filoli Inc.	Lake Riverside Fresno El Dorado Riverside San Mateo

FLOOD CONTROL AND RECLAMATION

Maintenance of Sacramento Flood Control Project.

Maintenance clearing in the Sutter, Tisdale and Butte-Slough By-passes has been continued with three crews of twenty men each. These men are working on a five day limit, new crews being furnished by the registry office at Yuba City. This work will be continued approximately one month longer, or until heavy rains necessitate discontinuance.

Routine maintenance operations have been continued on all parts of the project. Good progress is being made in the lay-out and construction of a maintenance headquarters near Sutter City. The grading, concrete foundations and floors for the warehouse and shed have been completed. This work is being done with our own equipment and regular crew.

The clearing of the flowage area in the Knights Landing Ridge Cut, which was included as an item to be maintained by this Department by the last Legislature, commenced and will be completed early in January. About seven hundred men days labor are

Building Jetty With Five-Ton Rocks

(Continued from preceding page)

required. The men are hired through the Yolo County Board of Supervisors and work for ten days each at \$4 per day.

A herd of about 800 goats is pasturing on cut-over land in the lower Sutter By-Pass on a 200 acre tract. The goats are clearing this area in a very satisfactory manner. It is hoped that by next season herds totaling 3000 will be pastured on by-pass lands as an aid to keeping down the growth of timber.

Sacramento Flood Control Project.

The work of clearing the timber and brush opposite the openings in the Southern Pacific embankment in the Yolo By-pass west of Sacramento has been completed.

Clearing in Lower Sutter By-Pass under the contract with A. F. Johnston is approximately sixty per cent complete. Goats are also keeping this area clean of new growth.

Emergency Flood Protection and Rectification of Rivers.

Clearing of the channel of the Santa Ynez River, in cooperation with the county of Santa Barbara, commenced on December 6 and will be completed by January 1. A total of \$4,700 will be expended under the direction of Foreman James P. Kelley.

The work of continuing the river rectification on the San Jacinto River has continued under J. W. Sallee. This will be completed within ten days at a cost of about \$4,400.

Mokelumne River.

Clearing in the Mokelumne River channel in collaboration with San Joaquin County, under Chapter 447, Statutes of 1929, was completed on December 3. The total amount expended to date, including county funds, is approximately \$24,000.

Pajaro River.

Clearing of the channel of the Pajaro River, under Chapter 524, Statutes of 1929, was completed on November 23. This work was done in cooperation with the counties of Santa Cruz and Monterey.

Russian River Jetty.

Rock has been deposited in the jetty during the entire period along the new steel trestle at the outer end. The new equipment permits the handling of rocks weighing up to twelve tons. Most of the rock being placed, however, is of five-ton size or less, the larger rock being used for protective purposes. A crew of twelve men is engaged in this work.

WATER RIGHTS

Applications to Appropriate.

During the month of November, 20 applications to appropriate water were received, 17 were denied and 10 were approved. In the same period 12 permits and 2 licenses were revoked.

Prior to December 15 some 1250 annual progress reports had been received from permittees and licensees. These reports are in process of examination and based upon the information contained therein extensions are being granted, or the projects are listed for field inspection next year wherever appropriate.

ADJUDICATIONS

Whitewater River (San Bernardino and Riverside counties). Case pending in the Superior Court of Riverside County awaiting developments in regard to the proposed All American Canal from Colorado River.

North Cow Creek (Sasta County). Case pending in Superior Court of Shasta County awaiting entry of the court's decree.

Oak Run Creek (Shasta County). Case pending in the Superior Court of Shasta County awaiting the entry of a decree in the North Cow Creek case.

Clover Creek (Shasta County). The Clover Creek case has been set for hearing January 18, 1932, in the Superior Court of Shasta County.

Mill Creek (Modoc County). Following filing of the Division's report as referee, on November 17, 1931, the court fixed December 7, 1931, as time for filing exceptions, and December 15, 1931, as date for hearing exceptions to report of referee and proposed decree.

Deep Creek (Modoc County). The Division's report covering the distribution of the waters of Deep Creek, in accordance with the trial schedule of allotments adopted for the 1931 season, has been completed for circulation among interested parties.

Franklin Creek (Modoc County). The Division's report on the distribution of the water of Franklin Creek for the 1931 season is about fifty per cent complete.

New Pine Creek (Modoc County). The report of the water supply and use of water on New Pine Creek, covering the field investigation conducted on that stream during the 1931 season, is being prepared.

Eagle Creek (Modoc County). The report on the water supply and use of water on Eagle Creek was completed on December 12, and is in the hands of the State Printing Office.

Pit River (Modoc and Lassen counties). The report on the supervision of diversion from Pit River in Hot Springs Valley is sixty-five per cent complete.

SACRAMENTO-SAN JOAQUIN WATER SUPERVISOR

During the past month work under this project has been confined almost entirely to office compilations and computations required in the preparation of the 1931 annual report presenting the results of all measurements of diversions, stream flow, return flow, use of water, salinity, etc.

The special field investigation to determine the extent of damage in the delta due to the 1931 water shortage and salinity, is still in progress.

State Water Plan Map Distributed

(Continued from preceding page)

Although there have been some storms during the past month, there has been very little increase in the river flow at Sacramento which has remained at about 7000 second-feet throughout the month. This flow has been sufficient to gradually push the salinity out of the Sacramento Delta but the recession in the San Joaquin Delta has been extremely slow and almost imperceptible in some locations where "pocketing" exists. The recession permitted the discontinuance of the following stations during the month: Camp 33 Staten, Camp 7 Staten, Camp 25 Staten, Eagle Tree, Williams Bridge, Junction Point, Liberty Ferry, Isleton Bridge, Three-Mile Slough Bridge and Garwood Bridge. Sampling is still being maintained at 38 channel stations and six regular drainage stations. The accompanying table gives a comparison between the salinity at the middle of November and December of this year, and at the middle of December, 1924.

SALINITY—SACRAMENTO-SAN JOAQUIN DELTA

Station	Parts of Chlorine per 100,000		
	11/14/31	12/14/31	12/14/24
O. and A. Ferry-----	815	---	91
Collinsville -----	525	245	17
Emmaton -----	253	164*	6
Antioch -----	535	250	28
Webb Pump-----	185	91	34
Central Landing-----	73	34*	11
Middle River P. O.-----	198	100	21
Rindge Pump-----	84	56*	14

* December 10th.

CALIFORNIA COOPERATIVE SNOW SURVEYS

All field work in making arrangements for the coming season's snow surveys was completed last month and the work under this project during December has been in the office bringing up the long-time stream flow estimates, computing natural flow for the 1930-31 season and otherwise bringing all compilations up to date. The first surveys of the 1932 season will be made in the latter part of January when the "key" stations will be covered. The first bulletin of snow survey and precipitation data will be issued early in February.

WATER RESOURCES

South Coastal Basin.—This investigation has made marked progress during the year. The principal points on which it was concentrated were: First, data concerning changes in water plane gathered by the various interests in South Coastal Basin and by the Division of Water Resources in the past in order to make available in one central office this great mass of important information. The second line of work in the ratio of expenditures for the past year has been an investigation of the geology of the underground

basins of which there are approximately 29 in this section of southern California, each one of which may be considered an underground reservoir somewhat separated from the remainder although no surface signs may indicate such delimitation. This work will not be completed for some time yet. A third line of effort has been in the investigation of quality of water including local underground water, stream flows from the mountains, sewage water which may be used for irrigation and imported waters. This also goes into the matter of present and possible future salt water intrusion from the ocean and salt water intrusion into the pumping strata from oil wells not properly cased off from the salt water strata.

Mojave River Investigation.—During the year practically all the work on this investigation has been done by two branches of the Federal Government forces, the Geological Survey and the Department of Agriculture. The work has consisted of measuring stream flows and determining transpiration and evaporation losses caused by certain conditions of vegetation and ground water in parts of the Mojave River basin. The run-off for the year was very small.

Ventura County Investigation.—The appropriation of the State was increased from \$15,000 to \$25,000 for the biennium and this additional sum is being matched by the county. The usual work of stream measurements, percolation measurements and measurements of changes in water plane has been done throughout the year. The rainfall and run-off was small as it has been during the entire period of the investigation.

Additional hydrographic work consisting of investigation into the quality of underground water and of possible penetration of salt water from the ocean was started.

The increased appropriations by the State and the county were made primarily for investigation of geology of dam sites in the various streams of the county and for drilling of such sites. To date a geological examination has been made of all the dam sites and in the case of four of them has been checked by other geologists. The principal interest has lain in the reservoir sites on Piru Creek where there occurs a conflict between location for the State highway and use for reservoir purposes as to certain of the sites. To date three of these sites have been drilled with Diamond or Calyx drills.

Santa Ana Investigation—Construction Work.—General plans for work on Cucamonga Cone have been approved by the State Engineer as have detailed plans. This work is a part of that provided for under Chapter 640 of the Statutes of 1931, appropriating \$400,000 for the biennium to be made available when matched by local appropriations of local interest in San Bernardino County for construction of spreading and flood control works on the cones of the various streams of that county tributary to the Santa Ana River.

Pit River Investigation Modoc and Lassen Counties.—Work on the report covering the three years investigation on the Pit River, October 1, 1928, to October 1, 1931, has been continued through-

(Continued on page 37)

Governor Rolph Takes Shovel in Hand To Start Four Public Buildings

IN THE past month Governor James Rolph, Jr., has participated in dedicatory and ground-breaking ceremonies at building projects of the Division of Architecture, Department of Public Works, in four counties.

These events took the Governor to widely separated parts of the State from Chico, Butte County, in the north, to Patton, San Bernardino County, in the south.

Governor Rolph began this series of functions by turning the first official shovelful of earth at the ground breaking for a large addition to the State Printing Plant in Sacramento on December 21st. The new Printing Plant Annex will be a three-story structure of steel and concrete.

HOSPITAL FOR VETERANS

At Yountville in Napa County on January 21st the Governor broke ground for a new hospital unit for the State Veterans' Home. The unit includes a group of four-story buildings consisting of an administration building, containing operating, laboratory and X-ray rooms; a ward building providing three 28-bed wards in addition to several smaller wards, baths and solarium; a service building containing large dining room, kitchen and cold storage plant.

The ceremonies on this occasion were most impressive and colorful. A military escort met the Governor on his arrival at the reservation gate at 3 p.m. Drawn up in review formation were massed colors with armed guards, the home band and post contingents of the G. A. R., Indian War Veterans, Spanish War Veterans, American Legion, Foreign War Veterans, Disabled Veterans of the World War and United Veterans of the Republic. The column filed in behind the Governor's automobile and escorted him to the site of the new hospital on Radio Hill for an impressive program arranged by Colonel Nelson M. Holdernan, Commandant of Veterans' Home.

President Bruno A. Forsterer of the Board of Directors addressed the assemblage and presented Governor Rolph, whose address was followed by the ground-breaking ceremony.

NEW AUDITORIUM

A similar occasion took the Governor to Chico on January 22d for the ground-breaking and dedicatory ceremonies at the State Teachers College. The program included the dedication of a new concrete and steel auditorium and additions. The auditorium has a seating capacity of 1500 persons and is equipped with a large pipe organ, stage and dressing rooms, rest rooms, choral room and offices.

The ground-breaking ceremony took place at the site for a new Library Building. This structure will be of brick and concrete, two stories high and 135 x 165 feet in North Italian style of architecture. In addition to a large main reading room, reference room and stack room, it will provide rest rooms and offices.

DOUBLE CEREMONY

The next of these events in the Governor's itinerary required him to visit San Bernardino on January 25th where he officiated at the dedication of additions to the Patton State Hospital. The program included dedication of a new infirmary building of reinforced concrete having two large dormitories, dining room, kitchen and single rooms. The building is in the Spanish type of architecture and is most thoroughly equipped.

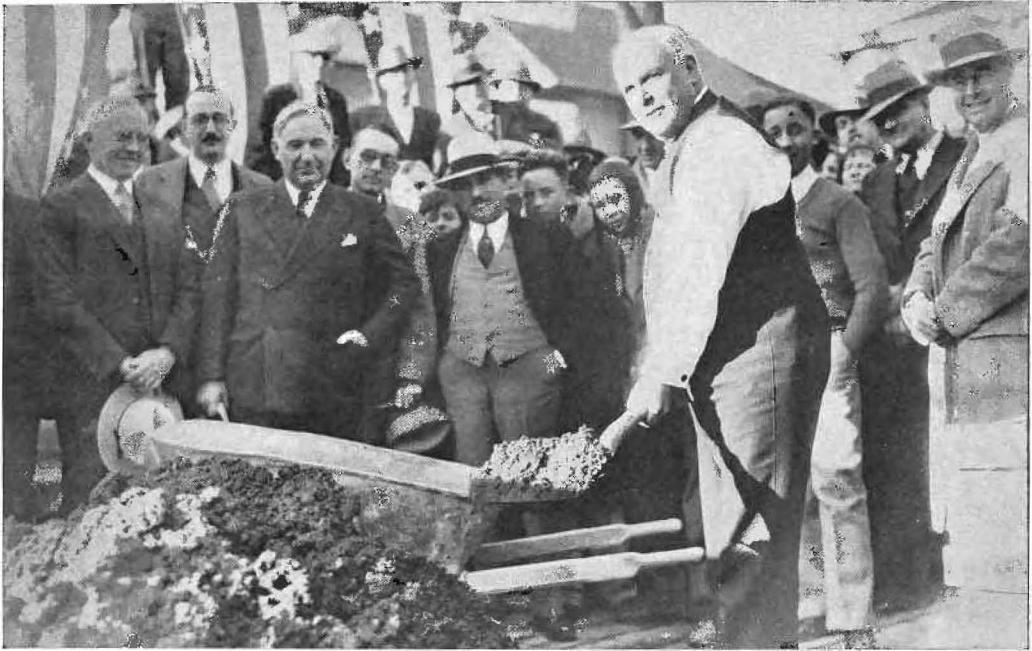
The program at Patton also included the dedication ceremonies for a group of fourteen employees' cottages each 49 x 26 feet of frame and stucco construction with two rooms, bath and porch.

The San Jose State Teachers College will claim Governor Rolph's presence on February 4th to dedicate its new Gymnasium Building and break ground for construction of a Natural Science Building.

DEDICATING GYMNASIUM

An appropriate program has been arranged by Dr. T. W. MacQuarrie, president of the college, and John Horning, president of the student body.

The gymnasium is a large concrete building 120 x 254 feet and is splendidly equipped with apparatus and facilities. The main gymnasium room has a seating capacity of from



WIELDS A WICKED SHOVEL.—Governor Rolph is becoming an expert in dirt digging through officiating at ground-breaking ceremonies. During the past month he participated in four such events in various parts of the State where the Architectural Division of the Department of Public Works has building projects under way. The above picture shows the Governor turning up the earth for an annex to the State Printing Plant at Sacramento. The bareheaded man in the center of the group is Director of Public Works Colonel Walter E. Garrison. Deputy Director James I. Herz is on the right and on the left is Superintendent J. M. Welsh of the Printing Plant.

2300 to 3000 persons and is surrounded by a large balcony. This building also contains a 25x75-foot swimming pool, dressing rooms for men and women, showers, boxing and wrestling rooms. After the dedication exercises at the gymnasium the audience will move out of the building to the site for the new science building where Governor Rolph will perform the ground-breaking ceremony.

The Natural Science Building will be of concrete construction and will be built in an "L" shape 200 x 75 feet by 103 x 73 and will be in the Italian style. It will contain lecture, physical, chemical, botanical and zoological rooms in addition to preparation rooms and offices.

USING CARS AND ROADS

Gasoline shipments for automobile use increased to 1,340,000 carloads during 1931, as compared with 1,330,000 carloads in 1930, according to figures reported to the California State Automobile Association. The increase is evidence that motorists continued using their cars in spite of general conditions. The freight revenue from these shipments was approximately \$220,000,000.

BUILDING SAFETY INTO SUPER-HIGHWAY BY DOUBLE BRIDGE GRADE SEPARATION

(Continued from page 23)

and of the approach fills, borings over fifty feet in depth were made into the mud bottom.

Suffice it to say, that an economical engineering solution to the problem has been found. The super-highway will not be depressed but will have a high and dry level grade and the tracks and Culver Boulevard will be elevated. Traffic will rely on other by-pass roads in proceeding from one boulevard to the other.

Stairways and sidewalks will be provided for pedestrians and those desiring to make use of train service. In addition to a sixty foot clear vehicular roadway width, which is the width used on all structures mentioned above, there will be additional width to take care of sidewalk construction.

The building of this structure which will eliminate interference and hazard will mean much to the people of the State who travel this super-highway.

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.

COLONEL WALTER E. GARRISON.....Director
JOHN W. HOWE.....Editor

Address communications to California Highways and Public Works, P. O. Box 1163, Sacramento, California.

Vol. 10 JANUARY, 1932 No. 1

"Splendid Piece of Work," Says Editor

The splendid road which the State Department of Public Works is building up the Yuba from Indian Valley will, when completed, be a tribute to Governor Rolph's administration. Although the work seems to be progressing slowly, owing to the large amount of rock encountered, when completed a beautiful, broad boulevard will be the result, one of the most scenic drives in this part of the State.

The way the kinks are being taken out of that crooked road is a thing to be marveled at by the layman, and the width is already a joy to one traveling over the completed portion. Everything else being equal, Superintendent Irish is to be congratulated on building a splendid highway.

The news published last week to the effect that the Rolph administration will continue this important work is most gratifying to the people of Sierra County. For such a highway to lead into Downieville from the west would be something of which our people could be justly proud.—*Downieville Messenger*.

LOOK WHAT'S COMING!

Regardless of the improvements made since the automobile was first introduced, the end is not yet, according to a statement reaching the Automobile Club of Southern California from a leading automobile engineer.

What the builders are figuring on is indicated in this forecast, which says:

"Within ten years we'll have automobiles safely traveling 100 miles an hour, weighing less than 1000 pounds, costing less than \$1,000, and covering 80 miles on a gallon of gas."

A sum of approximately \$2,250,000,000 was expended for the construction and maintenance of streets and highways in the United States during 1931, providing direct or indirect employment to more than one million persons.

Keeping Mountain Pass Open Called An Epochal Feat

LAST Saturday and Sunday it was our great pleasure to ride over the highway between Colfax and Truckee, and it is seldom that an opportunity to view such stupendous grandeur has been afforded us. Living as we have done for the past twenty years, in a country either adjacent to or right in the snow region of California, we feel we speak with some degree of knowledge of the subject. When we say that the California Department of Public Works, and their employees, have accomplished a feat of mammoth proportions we are indeed putting it mildly.

Never have we witnessed a sight more beautiful. As one approaches the summit of the Sierra Nevada Mountains, between banks of snow from four to fifteen feet in depth through which a double lane has been cut, leaving perpendicular banks of downy white on either side, it is with a feeling of awe and a somewhat indefinite understanding of the magnitude of the accomplishment. Then dropping over the summit looking down on Donner Lake, frozen over with a thin coating of ice, lying as it does at the base of precipitous mountains, a beautiful jewel in nature's diademed crown, the stupendous grandeur more forcibly awakens the insignificance of man. Yet beside this same feeling of insignificance is one of accomplishment because, for the first time in history, man has conquered the elements, on the highways of this mountain pass.

This year with such a tremendous task, aggravated by the extremely heavy fall of snow, it is truly an accomplishment worthy of recording. It is one of the greatest single feats in the history of modern man, in his struggle to conquer the elements.

Yes, the conquering of the Summit Highway, will mean much to the future economic life of central California. But aside from the great benefit that will accrue economically there is moral lesson, worthy of the closest attention and consideration. It is this that time, patience and perseverance will accomplish all things.—*Auburn Journal-Republican*.

During the calendar year of 1931, 1,588,428 persons camped or picnicked at the 1252 public camps maintained in the national forests of the State. It is estimated that at least as many more visited the resorts, private camps, and summer homes located within the forests.

Slight Increase in Sacramento Flow

(Continued from page 33)

out the present month and is approximately fifty per cent complete.

Napa Valley Investigation.—This investigation has continued throughout the month in a routine manner having as its object a determination of the waste from Napa River, the relative contributions of Napa River proper, Conn Creek and Rector Creek, the percolation losses and accretions in the lower reaches of these streams and the behavior of ground water in this area.

STATE WATER PLAN

A meeting of the California Water Resources Commission was scheduled to be held during the early part of December, but due to the untimely death of Commissioner W. B. Mathews, postponement was taken out of respect to the memory of this able, energetic commissioner and valued citizen of California.

On December 10 and 11 the Honorary Advisory Committee of Engineers met in the State Building, Civic Center, San Francisco, for discussions in connection with their review of engineering data bearing on all projects proposed under the State Water Plan.

In response to numerous inquiries from the public for information relating to the State Water Plan, a map of California, four by six feet in size, was

prepared by the Division. This map delineates the Major Units of the State Plan for Development of Water Resources of California. Distribution of the map has been made for the purpose of portraying the proposed projects for use at public gatherings and for the use of organizations that have undertaken analytical study of the State Water Plan as a whole.

Advance mimeographed copies of the following reports have been prepared and submitted to our consultants and the Honorary Committee of Engineers appointed by the Governor.

Bulletin 26, "Sacramento River Basin."

Bulletin 27, "Variation and Control of Salinity in Sacramento-San Joaquin Delta and Upper San Francisco Bay."

Bulletin 29, "San Joaquin River Basin."

The text of Bulletin 28, "Economic Aspects of a Salt Water Barrier Below the Confluence of the Sacramento and San Joaquin Rivers," has been submitted to the State Printer for publication and distribution at an early date. Thus the completion of the series of reports on the water resources investigation, authorized under Chapter 832, Statutes of 1929, is rapidly drawing to conclusion.

Studies are being continued by the California Water Resources Commission and the Joint Legislative Water Committee on a tentative draft of a proposed constitutional amendment under which, it is hoped, the State Plan may proceed to realization.

Highway Men Elected By State Employees

Paul O. Harding, who has been elected president of the California State Employees Association for the year 1932 is an Associate Highway Engineer in District IV of the Division of Highways, San Francisco. He was an active member of the State Employees Retirement Campaign Committee which supervised the campaign for the Retirement Act, and during 1931 was also a member of the Civil Service and Legislative Committees of the State Association, as well as president of the District IV chapter located in San Francisco.

C. E. O'Connell, who has been chosen as treasurer, is the chief clerk for District VIII of the Division of Highways located at San Bernardino. During 1931 he was president of the San Bernardino chapter, a position to which he has been reelected for 1932. During 1931 he was also chairman of the Auditing Committee of the State Association.

Gordon Zander, Supervising Engineer for the Division of Water Resources, Sacramento,

was selected as chairman of the Civil Service Committee for 1932. Mr. Zander has been active in employee association matters in the Sacramento chapter, of which he is a member.

COMMON COUNCIL SENDS RESOLUTION OF THANKS

BE IT RESOLVED by the Common Council of the city of San Diego, as follows:

That an expression of appreciation of this body be and it is hereby extended to the Hon. Edward Hyatt, State Engineer, for his courtesy in advancing action on the plans for the dam which the city of San Diego contemplates erecting at El Capitan Dam Site, and

The City Clerk is hereby directed to transmit a copy of this resolution to Mr. Hyatt.

I HEREBY CERTIFY the above to be a full, true, and correct copy of Resolution No. 57671 of the Common Council of the city of San Diego, as adopted by the said Council December 14, 1931.

(Signed) ALLEN H. WRIGHT,
City Clerk.

CLARK M. FOOTE, JR.
Deputy.

Highway Builders Tamed the Desert in Giving Imperial Valley Roads

There's romance everywhere if you look for it—even in road building. Down in the Imperial Valley there was plenty of it, sometimes tinged with tragedy for the pioneer highway workers battling with the drifting sands and fierce heat of the desert to build roads over which citizens of the State and visiting tourists could travel quickly and safely.

Some interesting features of this part of the valley's history are touched on in the following article describing some improvements effected by the Department of Public Works since the first of the year.

By I. A. (TOMMY) THOMAS, Maintenance Superintendent, District VIII, Division of Highways

THIRTY years ago Imperial Valley was the most forbidding place in the United States, known as the graveyard of adventure, where none could survive the stretches of desert. Then, water was brought into the valley from the Colorado River, and within six years the same valley was, by vote of the people, created into a county. This was less than twenty-five years ago. Of course, there was not a single State road in the whole Imperial County in 1907. It took a week to drive to Los Angeles, and the smoothest, speediest conveyance was the train out of Imperial Junction on the main line of the Southern Pacific Railroad.

Today, the network of State highways permits the autoist to reach San Diego, Los Angeles and San Francisco, through Yuma, without leaving paved highways.

The first piece of concrete roadway was laid in 1915. It was four inches thick and sixteen feet wide, starting at Meyers Creek, thence to Coyote Wells, Dixieland and finally reached El Centro. Before this road was constructed, it took all of twelve hours to reach San Diego from El Centro. It was an occasion for first page news if any one negotiated the distance in less time than that. In fact, at the creek, it was necessary for the occupants of six machines to get into a huddle in order to push the cars through the sands. It was too bad for the autoist who rode "lone wolf." He was doomed to remain there in the sands until relief came.

Now, after the completion of the twenty-foot wide pavement, the motorist drives through scenic beauty, across the path where Kearny marched his small cavalry army, through the grizzled rocks that have been smoothed by the blasts of sand blown against them for ages, through natural sulphur springs in the Jacumbas, up to the Pines, then to the frontiers of the shed used by San Diego for its present water supply, and into the vale where the climate is the most equable in the world. The trip from El Centro, the county seat of Imperial County, to San Diego can now be made comfortably in three hours.

REAL ROAD ROMANCE

Some day the gripping romance of the building of the State Highway System, which connects Los Angeles with the heart of Imperial County, will be written. It will be written by the young engineers starting now with the Highway Department of Public Works. They will be able to trace the paths of the first pavement placed across the section from Oasis, at the boundary line between Riverside and Imperial counties, to Westmoreland, the

first cultivated place in Imperial County, approached on the highway known as U. S. 99.

The first road there seemed destined to last one day and be a one-way highway. Shifting sands would cover the paths, cut backs from the Salton Sea would crack up and move parts, leaving deep ruts. In the event of a rain—an unusual feature—the whole section would be impassable.



I. A. THOMAS

I. A. Thomas Tells About Road Work In Imperial Valley

(Continued from preceding page)

These young men now with the department will marvel at the hardiness displayed by E. Q. Sullivan, engineer, District VIII, who for two years studied the drifts of the sands, the wind directions, in what is now the cut through the Sand Hills, leading around Pilot Knob and into Yuma. Here was a true sentinel of the desert, and because of his observations, a real paved highway was built, where before there was a dangerous plank road, and before that no road at all.

The Division of Highways is now building a road through the Yuma Indian Reservation, avoiding many sharp curves and grades.

PAVEMENT WIDENED

To mention only a few of the sections where additions were started and completed this year, the following are typical examples of improvements. On the U. S. 80 highway (connecting San Diego with El Centro and thence to Yuma) a new asphalt pavement running 16.5 miles east from the San Diego-Imperial County line, and from that point extending 27 miles east a new twenty-foot asphalt pavement, was laid over the old concrete road. To correct a fault in the highway between El Centro and Holtville, a new twenty-foot cement pavement covering 6.5 miles was laid over the old oil road.

A departure from the old type road building was made, when the highway, leading from Holtville, to the Highline Canal of the irrigation system, was built three feet higher than the old roadbed, thus preventing cracking of the surface through overflows or seepage under the road. Engineers consider this one of the best constructed pieces of roadway in its class.

And, to make the work complete, and safe, the highway through the desert, from the Highline Canal, to the sand dunes, was widened from fifteen feet to a twenty-foot roadway. From the sand dunes into Yuma the new line change is being made as mentioned previously.

BELOW SEA LEVEL

No one can fail to feel awe while traveling over the U. S. 99, along the Salton Sea. This road in Imperial County is all below sea level. On the sides of the hills to the west of the highway, the former sea level markings are plainly visible. Nature plays pranks with the vision. An inland sea, wholly below sea level, stretches for thirty miles to the east of the highway and there are no seeming inlets or outlets. The Salton Sea was formed wholly from the overflow of the Colorado River in 1905-1906, and is constantly replenished from surplus irrigation water.

At the very spot of greatest depth of the Salton Sea was located a salt works owned by Liverpool people. That was in 1904-5. It was then called the Salton Sink and cattle brought through the San Geronio Pass grazed in the Sink. The first tracks laid by the Southern Pacific Company ran across the Sink between Flowing Wells and Thermal. Now all these are covered by the Salton Sea.

A bee can rise with three times its own weight, says an insectologist. Yes, and sit down with about 300 times its own weight.—*Thomaston Times*.

Palm Leaf Fossil Unearthed on Ridge



A PREHISTORIC RECORD was brought to light by excavators on the Ridge Route Alternate in Los Angeles County when they found the perfect print of a huge palm leaf in a blasted rock thirty feet below the canyon surface.

A discovery has been made while excavating on the new Ridge Route Alternate in Los Angeles County which gives some insight into plant and climatic conditions existing in prehistoric times in that section of California.

Near Bridge Canyon, 6½ miles north of Castaic School, the fossilized imprint of a palm leaf was found embedded in sandstone. The depth at which this fossil was found has been estimated at from 25 to 30 feet below the present ground surface.

Traces of the tip of the leaf and a portion of the stem had been obliterated, probably by blasting operations preceding the discovery of the imprint. The part found was approximately 3½ feet long and 1½ feet wide across the leaf and closely resembles the leaves of palm trees now growing in the vicinity of Los Angeles.

December Water Applications and Permits

Applications for permits to appropriate water filed with the Department of Public Works, Division of Water Resources, during the month of December, 1931.

YUBA COUNTY—Application 7130. Andrew J. Thickstun, Clipper Mills, for 50 c.f.s. from Slate Creek, tributary to N. Fork of Yuba River to be diverted in Section 10, T. 19 N., R. 8 E., M. D. B. and M., for mining purposes. Estimated cost \$5,000.

INYO COUNTY—Application 7131. Panyo Gold, Ltd., 427 S. McCadden Place, Los Angeles, for 1.0 c.f.s. from Jall Canyon Stream tributary to N. stream to be diverted in Section 14, T. 20 S., R. 44 E., M. D. B. and M., for mining, milling and domestic. Estimated cost \$575.

SAN MATEO COUNTY—Application 7132. State Subsidiary, Ltd., Trustee for Cuesta La Honda, Inc., 775 Market St., San Francisco, for 0.02 c.f.s. and 55 acre-feet per annum from Woodhams Creek tributary to La Honda & San Gregorio Creek, to be diverted in Section 13, T. 7 S., R. 4 W., M. D. B. and M., for domestic purposes. Estimated cost \$15,000.

TUOLUMNE COUNTY—Application 7133. Russell Grigsby, Hotel Terry, Stockton, for 200 acre-feet per annum from Eagle Creek tributary to Stanislaus River to be diverted in Section 8, T. 3 N., R. 16 E., M. D. B. and M., for recreational purposes. Estimated cost \$3,000.

FRESNO COUNTY—Application 7134. City of Fresno, care Claude L. Rowe, City Attorney, Fresno, for 200 c.f.s. from San Joaquin River tributary to Suisun Bay to be diverted in Section 5, T. 11 S., R. 21 E., M. D. B. and M., for municipal purposes. Estimated cost \$10,000,000.

FRESNO COUNTY—Application 7135. City of Fresno, care Claude L. Rowe, City Attorney, Fresno, for 40 c.f.s. from San Joaquin River tributary to Suisun Bay to be diverted in Section 5, T. 11 S., R. 21 E., M. D. B. and M., for irrigation purposes (11,488 acres). Estimated cost \$10,000,000.

LOS ANGELES COUNTY—Application 7136. G. H. Burkhardt, 2681 Longwood Ave., Los Angeles, for 350 acre-feet per annum from Middle Fork of Palmett Creek tributary to Big Rock Creek to be diverted in Section 23, T. 4 N., R. 10 W., S. B. B. and M., for irrigation and domestic purposes (150 acres).

HUMBOLDT COUNTY—Application 7137. Ed Pratt, Hoopa, for 1.0 c.f.s. from Red Cap Creek tributary to Mill Creek, thence Klamath River to be diverted in Section 14, T. 9 N., R. 5 E., H. B. and M., for mining purposes. Estimated cost \$15.

SIERRA COUNTY—Application 7138. The Judson Estate Co., a Corporation, care Geo. F. Taylor, Downieville, for (1) 25 c.f.s. (2) 25 c.f.s. total 50 c.f.s. from (1) Lovers Ravine (2) Bald Mountain Ravine tributary to Slate Creek and N. Fork Yuba River to be diverted in Section 33, T. 21 N., R. 9 E., M. D. B. and M., for mining purposes. Estimated cost \$15,000.

LOS ANGELES COUNTY—Application 7139. State of California, Department of Public Works, Division of Highways, care C. H. Purcell, State Highway Engineer, Public Works Building, Sacramento, for 0.05 c.f.s. from Unnamed Spring tributary to Piru Creek to be diverted in Section 30, T. 6 N., R. 17 W., S. B. B. and M., for industrial and domestic and incidental irrigation.

SANTA CLARA COUNTY—Application 7140. Santa Clara Valley Water Conservation District, care Fred H. Tibbetts, Alaska Commercial Building, San Francisco, for 40,000 acre-feet per annum from Coyote River tributary to San Francisco Bay to be diverted in Section 10, T. 9 S., R. 3 E., M. D. B. and M., for irrigation and domestic purposes (133,000 acres). Estimated cost \$1,000,000.

SANTA CLARA COUNTY—Application 7141. Santa Clara Valley Water Conservation District, care Fred H. Tibbetts, Alaska Commercial Building, San Francisco, for 2500 acre-feet per annum from Almaden Creek tributary to Alamilos and Guadalupe Creek to be diverted in Section 10, T. 9 S., R. 1 E., M. D. B.

and M., for irrigation and domestic (133,000 acres). Estimated cost \$135,000.

SANTA CLARA COUNTY—Application 7142. Santa Clara Valley Water Conservation District, care Fred H. Tibbetts, Alaska Commercial Building, San Francisco, for 3500 acre-feet per annum from Guadalupe Creek tributary to San Francisco Bay to be diverted in Section 19, T. 8 S., R. 1 E., M. D. B. and M., for irrigation and domestic purposes (133,000). Estimated cost \$377,170.

SANTA CLARA COUNTY—Application 7143. Santa Clara Valley Water Conservation District, care Fred H. Tibbetts, Alaska Commercial Building, San Francisco, for 4000 acre-feet per annum from Stevens Creek tributary to San Francisco Bay to be diverted in Section 27, T. 7 S., R. 2 W., M. D. B. and M., for irrigation and domestic purposes (133,000 acres). Estimated cost \$350,000.

LOS ANGELES COUNTY—Application 7144. Truman K. Temple, Box 4, Upland, for 5 c.f.s. from Mescal Creek to be diverted in Section 15, T. 4 N., R. 8 W., S. B. B. and M., for irrigation and domestic purposes (189 acres). Estimated cost \$1,700.

EL DORADO COUNTY—Application 7145. B. W. Stone, 161 E. His St., San Francisco, for 500 c.f.s. and 125,000 acre-feet per annum from (1) Rubicon River (2) Pilot Creek (3) Gerla Creek (4) Loon Lake (5) Buck Is. Lake (6) Rock Bound Lake (7) Little S. Fork Rubicon River tributary to American River Drainage Area to be diverted in Section 9, T. 13 N., R. 16 E., M. D. B. and M., Section 11, T. 12 N., R. 12 E., M. D. B. and M., Section 24, T. 13 N., R. 13 E., M. D. B. and M., Sections 11, 31 and 34, T. 14 N., R. 14 E., M. D. B. and M., Section 4, T. 13 N., R. 15 E., M. D. B. and M., and Section 2, T. 13 N., R. 14 E., M. D. B. and M., for municipal purposes.

TRINITY COUNTY—Application 7146. D. G. Turnbull, Weaverville, for 25 c.f.s. from NE. Fork of Van Ness Creek (Peeney Creek) tributary to Van Ness Creek, thence Trinity River to be diverted in Section 20, T. 25 N., R. 7 W., M. D. B. and M., for mining purposes. Estimated cost \$5,000.

LOS ANGELES COUNTY—Application 7147. Division of Highways, Department of Public Works, State of California, P. O. Box 1105, Sacramento, for 2600 gallons per day from Read Spring tributary to Piru Creek to be diverted in Section 4, T. 6 N., R. 18 W., S. B. B. and M., for industrial, domestic and incidental irrigation purposes. Estimated cost \$1,500.

LOS ANGELES COUNTY—Application 7148. Division of Highways, Department of Public Works, State of California, Box 1103, Sacramento, for 0.008 c.f.s. from Templeton Spring tributary to Piru Creek to be diverted in Section 12, T. 6 N., R. 18 W., S. B. B. and M., for industrial, domestic and incidental irrigation purposes. Estimated cost \$1,000.

AMADOR COUNTY—Application 7149. State of California, Department of Public Works, Division of Highways, care C. H. Purcell, State Highway Engineer, Public Works Building, Sacramento, for 0.016 c.f.s. from unnamed spring tributary to Bear River, thence N. Fork Mokelumne River to be diverted in Section 16, T. 9 N., R. 16 E., M. D. B. and M., for domestic purposes. Estimated cost \$750.

EL DORADO COUNTY—Application 7150. State of California, Department of Public Works, Division of Highways, care C. H. Purcell, State Highway Engineer, Public Works Building, Sacramento, for 0.007 c.f.s. from Tragedy Springs tributary to Bear River, thence N. Fork Mokelumne River to be diverted in Section 7, T. 9 N., R. 17 E., M. D. B. and M., for recreational purposes. Estimated cost \$450.

SAN LUIS OBISPO COUNTY—Application 7151. City of San Luis Obispo, care Atheam, Chandler and Farmer and Frank R. Devlin, 723 Balboa Building, San Francisco, for 4 c.f.s. from Lopez Creek tributary to Arroyo Grande Creek to be diverted in Section 9, T. 31 S., R. 14 E., M. D. B. and M., for municipal purposes.

SAN LUIS OBISPO COUNTY—Application 7152. City of San Luis Obispo, care Atheam, Chandler and Farmer and Frank R. Devlin, 723 Balboa Building, San Francisco, for 6098 acre-feet per annum from Lopez

Permits to Appropriate Water Issued

Continued from preceding page

Creek tributary to Arroyo Grande Creek to be diverted in Sections 21, 22, 26, 36, T. 30 S., R. 13 E., M. D. B. and M., and Section 31, T. 30 S., R. 14 E., M. D. B. and M., and Sections 6, 16 and 21, T. 31 S., R. 14 E., M. D. B. and M., for municipal purposes.

ALAMEDA COUNTY—Application 7153. Sisters of the Sacred Names of Jesus and Mary, a corp., care Hatfield Wood and Kilkenny, Chancery Building, San Francisco, for 0.50 c.f.s. and 80 acre-feet per annum from Laurel Creek and Agua Caliente Creek tributary to San Francisco to be diverted in Section 18, T. 5 S., R. 1 E., M. D. B. and M., for irrigation purposes (10 $\frac{1}{2}$ acres). Estimated cost \$2,500.

ALAMEDA COUNTY—Application 7154. Sisters of the Sacred Names of Jesus and Mary, a corp., care Hatfield Wood and Kilkenny, Chancery Building, San Francisco, for 24 c.f.s. from Laurel Spring and Sulphur Spring tributary to Arroyo Agua Caliente and San Francisco Bay to be diverted in Sections 8 and 18, T. 5 S., R. 1 E., M. D. B. and M., for domestic purposes. Estimated cost \$8,000.

TEHAMA COUNTY—Application 7155. W. W. Hoy, Agent for First National Bank, Trust Department, Santa Ana, for 15 acre-feet per annum from South Fork Battle Creek tributary to Battle Creek, thence Sacramento River to be diverted in Section 8, T. 29 N., R. 4 E., M. D. B. and M., for recreational purposes.

TEHAMA COUNTY—Application 7156. Lassen Volcanic National Park, Dept. of Interior, care L. W. Collins, Supt., Mineral, for 0.5 c.f.s. from unnamed spring tributary to Battle Creek, thence Sacramento River to be diverted in Section 25, T. 29 N., R. 3 E., M. D. B. and M., for domestic, industrial and fire protection purposes.

EL DORADO COUNTY—Application 7157. H. I. Fowlar, Georgetown, for 9 c.f.s. from Pilot Creek tributary to Rubicon River to be diverted in Section 4, T. 12 N., R. 12 E., M. D. B. and M., for mining and domestic purposes. Estimated cost \$5,000.

SANTA BARBARA COUNTY—Application 7158. Mrs. Stanley McCormick, Mr. Harold F. McCormick, Continental Illinois Bank & Trust Co., Chicago, Conservators for Mr. Stanley McCormick, care Salisbury, Bradshaw & Taylor, Petroleum Securities Building, Los Angeles, for 2.4 c.f.s. 100 acre-feet per annum, from Cold Spring Creek tributary to Pacific Ocean to be diverted in Section 7, T. 4 N., R. 26 W., S. B. B. and M., for irrigation and domestic purposes (85 acres). Estimated cost \$1,500.

SANTA BARBARA COUNTY—Application 7159. Mrs. Stanley McCormick, Mr. Harold F. McCormick, Continental Illinois Bank & Trust Co., Chicago, Conservators for Mr. Stanley McCormick, care Salisbury, Bradshaw & Taylor, Petroleum Securities Building, Los Angeles, for 0.8 c.f.s. 20 acre-feet per annum, from Hot Spring Creek tributary to Cold Spring Creek to be diverted in Section 7, T. 4 N., R. 26 W., S. B. B. and M., for irrigation and domestic purposes (85 acres). Estimated cost \$100.

SAN MATEO COUNTY—Application 7160. State Subsidiary, Ltd., Trustee for Cuesta La Honda, Inc., 775 Market St., San Francisco, for 0.40 c.f.s. from La Honda Creek tributary to San Gregorio Creek to be diverted in Section 14, T. 7 S., R. 4 W., M. D. B. and M., for recreational and domestic purposes. Estimated cost \$5,000.

MONO COUNTY—Application 7161. Herbert W. Ross, 713 Crescent Drive, Beverly Hills, for 200 gallons per day from small stream tributary to Twin Lakes thence Mammoth Creek, Hot Creek and Owens River to be diverted in Section 9, T. 4 S., R. 27 E., M. D. B. and M., for domestic purposes. Estimated cost \$39.

LOS ANGELES COUNTY—Application 7162. F. R. Fancher, 217 Emerald St., Redondo Beach, for 0.601 c.f.s. from 2 unnamed springs tributary to Big Santa Anita, thence San Gabriel River to be diverted in Section 3, T. 1 N., R. 11 W., S. B. B. and M., for domestic purposes. Estimated cost \$50.

SAN BERNARDINO COUNTY—Application 7163. Frank P. Meeker, Cucamonga, for 0.5 c.f.s. from Natural flow and waste water taken in road gutter tributary to Santa Ana River Watershed to be

diverted in Section 2, T. 1 S., R. 7 W., S. B. B. and M., for irrigation purposes (40 acres). Estimated cost \$500.

EL DORADO COUNTY—Application 7164. Vern W. Drake, Greenwood, for 1.0 c.f.s. from Jackass and Orillo Creek tributary to Greenwood Creek, thence S. Fork American River to be diverted in Section 7, T. 12 N., R. 10 E., M. D. B. and M., for mining purposes. Estimated cost \$25.

Permits to appropriate water issued by the Department of Public Works, Division of Water Resources, during the month of December, 1931.

EL DORADO COUNTY—Permit 3822, Application 6997. W. H. Welch (forward to Twin Bridges, care Spencers Store), Kyburz, December 1, 1931, for 4.0 c.f.s. from Pyramid Creek tributary to So. Fork American River in Section 8, T. 11 N., R. 17 E., M. D. B. and M., for use for power and domestic. Estimated cost \$100.

INYO COUNTY—Permit 3823, Application 7000. E. Hague and M. A. Streger, Box 444, Trona, December 8, 1931, for 0.025 c.f.s. from Redland Springs tributary to Great Panamint Desert in Section 18, T. 23 S., R. 45 E., M. D. B. and M., for use for mining and domestic. Estimated cost \$2,000.

HUMBOLDT COUNTY—Permit 3824, Application 7034. James L. Skiffington, Dyerville, Humboldt Co., December 8, 1931, for 7760 gallons per day from Little Creek tributary to Bull Creek, thence to So. Fk. Eel River and Eel River in Section 19, T. 1 S., R. 2 E., H. B. and M., for use for domestic and recreational.

TUOLUMNE COUNTY—Permit 3825, Application 7058. U. S. Stanislaus National Forest, Sonora, Tuolumne Co., December 8, 1931, for 0.1 c.f.s. from No. Fork Tuolumne River tributary to Tuolumne River in Section 22, T. 4 N., R. 18 E., M. D. B. and M., for use for domestic purposes. Estimated cost \$5,000.

HUMBOLDT COUNTY—Permit 3826, Application 7064. Humboldt Creamery Association, Fernbridge, Humboldt County, December 10, 1931, for 0.22 c.f.s. from Eel River tributary to Pacific Ocean in Section 29, T. 3 N., R. 1 W., H. B. and M., for use for irrigation of 1 acre and creamery purposes. Estimated cost \$500.

HUMBOLDT COUNTY—Permit 3827, Application 6325. Benbow Power Co., Benbow, Humboldt Co., December 12, 1931, for 320 c.f.s. from S. Fork of Eel River tributary to Eel River in Section 36, T. 4 S., R. 3 E., H. B. and M., for use for hydroelectric power. Estimated cost \$50,000.

KERN COUNTY—Permit 3828, Application 7015. County of Kern, Bakersfield, December 12, 1931, for 0.4 c.f.s. from two springs tributary to Cedar Creek drainage area; thence to Poso Creek in Section 29, T. 25 S., R. 32 E., M. D. B. and M., for use for domestic purposes.

SONOMA COUNTY—Permit 3829, Application 6944. Sonoma State Home, Eldridge, Sonoma Co., December 15, 1931, for 0.55 c.f.s. and 250 acre-feet from Sonoma Creek tributary to San Pablo Bay in Section 22, T. 6 N., R. 6 W., M. D. B. and M., for use for domestic purposes and irrigation 110 acres of general crops and 20 acres of lawn. Estimated cost \$7,500.

PLUMAS COUNTY—Permit 3830, Application 7082. F. Anderson, R. A. Snyder, Senate Hotel, San Francisco, and A. Mattson, Quincy, December 15, 1931, for 3.00 c.f.s. from South Fork of Poormans Creek, tributary to Poormans Creek, thence Hopkins and Nelson creeks and Middle Fork Feather River, in Section 3, T. 22 N., R. 10 E., M. D. B. and M. Estimated cost \$250.

SAN DIEGO COUNTY—Permit 3831, Application 7021. Karl Feller, Aiguanga, December 15, 1931, for 4550 gallons per day from unnamed spring in Section 12, T. 9 S., R. 1 E., S. B. B. and M., for use for irrigation and domestic purposes on 50 acres. Estimated cost \$250. Mining purposes.

LOS ANGELES COUNTY—Permit 3832, Application 7057. Joseph A. Pollia, Los Angeles, December 17, 1931, 135 c.f.s. from an underground spring in Section 1, T. 4 N., R. 11 W., S. B. B. and M., for use for irrigation and domestic on 20 acres. Estimated cost \$750.

Gleaned From the Mail Bag

Cleared Road Permitted Quick Run to Doctor With Injured Boy, Perhaps Saving a Life

From Mr. and Mrs. W. E. Viljoen, Emerald Bay.—Owing to the fine condition of the highway, we were enabled to rush a patient to the doctor in record time. The patient, a boy whose hand was severely cut at the wrist, was in a serious condition. Had we been snowed in, unable to get to medical attention, serious complications would have set in—infection and loss of blood. We wish to thank you for keeping the highway in such good condition and clear of snow. Perhaps a life has been saved.

* * * *

100 PER CENT COURTESY

From C. E. Cooper, Big Bear City.—Please permit me to compliment you on the way you have caused the "Rim o' the World Drive" to be open at this time of the year. Also, I wish to state that the courtesies shown the motorists are absolutely beyond improvement. I get this report from many, many motorists, as I am in a position to meet a great majority of the people that come into Bear Valley. This applies particularly to your Big Bear Mountain Division. Whoever the man is in charge, he should be complimented.

* * * *

RESCUED FROM RIVER

From Gertrude E. Pence, Catalina Island.—I wish to commend the services rendered to us by the highway men in the territory between Crescent City, California, and Grants Pass, Oregon. Our car was wrecked near Camp Idlewyld and your men were very kind in rendering assistance to us, such as salvaging our luggage from the car in the river and aiding me to climb the mountainside.

* * * *

GREAT ACHIEVEMENT

From Senator Bert A. Cassidy, Auburn.—I have just returned from a trip to Truckee over the highway, and want to congratulate you and your men under Mr. Weeks for what I consider accomplishing one of the greatest achievements of modern man in his battle with the elements. The highway is in perfect condition, and it is a truly remarkable feat which your organization has accomplished.

I have spent twenty years in the mountain section of California through which the highway runs, and therefore, I have some knowledge of the conditions under which these men labor.

They certainly deserve the unstinted praise of every loyal Californian who has the interest of his State at heart, and it certainly is a real pleasure to say a word of commendation for yourself and every member of your organization who has made this stupendous achievement possible.

Lassen County Chamber of Commerce Commends Work of Keeping Highway Open

From C. E. Lawson, Secretary, Lassen County Chamber of Commerce.—The directors of Lassen County Chamber of Commerce wish to take this opportunity to extend to you their appreciation for the continuous effort and able manner in which the snow removal crew has handled the situation this winter from Red Bluff to Susanville.

It has been fully demonstrated that the Susanville-Redbluff Highway can be kept open during the winter months. They recommend that heavier and better equipment be installed for another year.

* * * *

ROADS WERE FLOODED

From Archie Stevenot, Merced.—I want to congratulate your department, particularly Ed. Wallace, Division Engineer, on the splendid work of handling traffic and protecting highway all night through Merced both north and south to Yosemite Valley. The water receded around Merced with very little damage.

* * * *

SPLENDID SERVICE

From Henry L. Hinman, Chairman, Good Roads and Highway Committee, Oakland Chamber of Commerce.—The true worth and efficiency of a public service agency is proven under stress and to meet an emergency. We wish to take this opportunity of highly commending the California Highway Commission and your department for the splendid service performed in keeping open for travel the Victory Highway, in the vicinity of Auburn, during the recent storms and heavy snows.

Due to your fine efforts travel to and from Oakland and the East Bay was permitted to flow without interruption over this important artery, and the service certainly justified any expenditure that may have been necessary to keep the highway open.

* * * *

EFFORTS JUSTIFIED

From W. H. Imes, President, Victory Highway Association, Topeka, Kan.—The Victory Highway Association is very appreciative of the fine work of your Department in keeping the Victory Highway open during the recent and all but unprecedented snowfall in the Sierra Nevada Mountains. The travel over that route during the past month has amply justified your efforts.

This fine record can not help but result in encouraging eastern tourist travel to come to northern and central California at all seasons of the year. There has been a hesitancy about this in the past, due to the uncertainty of getting over the mountains during the winter season.

To keep all the gateways to California open the year around is a splendid piece of work.

Col. Skeggs Elected Potentate of Shrine

ANOTHER high honor has come to one of the Highway Division's district engineers. Colonel John H. Skeggs, in charge of District IV with headquarters in San Francisco was recently elected Illustrious Potentate of Islam Temple of the Mystic Shrine.



J. H. SKEGGS

Colonel Skeggs who now holds the chief office over San Francisco's 12,000 Shriners is a graduate engineer, a native of Alabama and a veteran of the World War.

He was born in Decatur, Alabama, and after attending public and preparatory schools entered the sophomore class of Alabama Polytechnic taking a civil engineering course. Graduating in 1901 he came to California and became a resident engineer for the Pacific Electric Railroad. He served as deputy surveyor for Los Angeles County and later as construction and maintenance engineer in the road department. In 1917 he became Senior Highway Engineer of the U. S. Bureau of Public Roads at Albuquerque, in charge of work in Arizona and New Mexico.

The World War found him in France as a Captain of Engineers of the U. S. Army. On his return to this country he became Assistant Division Engineer of District IV in 1919 and was made Division Engineer in 1921, since which time he has been continuously in charge of that district.

PUSHING WORK ON COAST SUPER-HIGHWAY

(Continued from page 13)

as acquiring additional right of way, if required, and in providing funds for curbs and sidewalks, if such improvement is desired, as well as the installation or renewal of sewer, water, or gas lines under municipal jurisdiction; also in many instances in paving additional width of right of way to make a paved full width street.

The cooperative program contemplated by the Division of Highways includes work in the following cities:

Alturas	Vallejo	Sonora
Susanville	Pasadena	Modesto
Crockett	Fullerton	Daly City
Kingsburg	San Bernardino	Fresno
Yuba City	Anaheim	Bakersfield
San Diego	Ventura	

"Official Car" Group Gets a Smile from Orange County Folk

A TRANSPORTATION ensemble that always attracts attention on the roads of Orange County and never fails to evoke a smile from the home town folks is Commissioner Philip A. Stanton, his ancient car, his still more ancient dog and his cigar.

The combination, always the same, has been a familiar sight for years.

An unsalaried California Highway Commissioner, of ample means, Mr. Stanton lives



Commissioner Stanton in His "Official Car"

in a fine mansion at Anaheim and the family car is a high-powered, high-priced sedan. Mrs. Stanton drives that and Mr. Stanton shares it, but when Commissioner Stanton goes about his official business, he uses his "own" car, a 1923 remote control model that he calls "the official highway car."

"Foxy," the dog, has been the Commissioner's companion for seventeen years, and requires frequent doses of digitalis to keep him alive. But old age does not weaken his efficiency as self-appointed official custodian of the car. The Commissioner recently left the vehicle by the roadside and walked some distance to inspect a new road alignment. He sent a big motorcycle officer to fetch the car to him. "Foxy" protested with such savage ferocity that the officer was unable to get in the car. A brother officer was called to assist him, but "Foxy" routed them both.

"We'd like to bring up your car, Mr. Commissioner" they told Mr. Stanton, "but the dog won't let us."

As for the cigar unit of the ensemble it is always present and is always a good one.

Coast Highway to Have 100-Foot Width In Congested Area

(Continued from page 16)

of 80 to 100 feet, and Portland cement concrete pavement from 30 to 40 feet wide will be laid. Orange County is cooperating on 0.66 miles of this project with the city of Laguna Beach.

A reinforced concrete bridge 525 feet long has recently been completed on the Roosevelt Highway across Santa Ana River between Newport Beach and Huntington Beach. The width of roadway is 42 feet and there is one 4-foot sidewalk.

A wooden trestle bridge 695 feet long with concrete deck and one removable steel span in the center has recently been completed on the Roosevelt Highway across the north arm of Newport Bay. The width of roadway is 40 feet with two 4-foot sidewalks. Hydraulic fill approaches to this bridge have just been completed.

PROTECTING CHILDREN

SAN DIEGO COUNTY—A small contract for widening and oiling shoulders, a distance of 0.25 mile, has just been completed in Encinitas. This work was done in order to make it safe for school children to go from Encinitas to the grammar school.

A contract for widening the fill across the tidelands between Carlsbad and Oceanside, a distance of 0.3 mile, has just been let. The width of roadway will be increased to 80 feet under this contract.

One of the few lengths of highway remaining to be reconstructed between San Diego and the Imperial County line has just been let to contract. This is the section between Tecate Divide and Mountain Springs Grade, a distance of 14.6 miles. The improvement consists of widening the present 15-foot pavement to a width of 20 feet except on certain portions where grade and alignment changes are necessary to make this highway conform to modern standards. On these latter portions a new 20-foot pavement will be laid.

GRADE SEPARATION

A line change at Jacumba, 1.09 miles in length, including a new bridge across Boundary Creek, and an undergrade railroad crossing, is now in progress. The improvement consists of a graded roadbed 36 to 80 feet wide, with a 20-foot Portland cement concrete pavement, and provides safe alignment across Boundary Creek and the San Diego and Arizona Railway.

Near Del Mar on the Coast Highway a new bridge is being constructed across the San Dieguito River. This is a reinforced concrete deck girder type 596 feet long with a 40-foot roadway and two 4-foot sidewalks. A line change which includes this bridge across the San Dieguito River is now under construction. It is 0.63 mile in length and consists of grading and paving a width of 30 feet with Portland cement concrete.

VENTURA COUNTY—A new bridge across the Santa Clara River near Montalvo is now in process of construction. It is a steel girder concrete deck type 1806 feet long with a 42-foot roadway and 5-foot 10-inch sidewalk.

Between Oxnard and El Rio on the Roosevelt Highway, the construction of an undergrade railroad crossing under the Southern Pacific is in progress.

SECRETARY OF STATE PRAISES AND THANKS

Mr. James I. Herz,
Chief Deputy,
Department of Public Works,
Sacramento, Calif.

My Dear Mr. Herz:

I wish to call your attention to a noteworthy incident which shows that in the employ of your Department you have one that I know of who deserves praise for his accommodating spirit and helpfulness.

Recently while traveling in the storm between Davis and Dixon, a tire "blew" out and our machine was forced from the road into the soft dirt and settled badly. We were in real distress. It seemed impossible to get the tire on and extricate the machine. Just as we were about to go for assistance, one of your employees C. R. Fissell, of 601 47th Street, Sacramento, driving one of the Department's trucks, stopped and came to our aid. In no time at all a new tire was on and he pulled the machine out of the mire and sent us on our way rejoicing.

We appreciated the accommodating, helpful, cheerful way in which he worked and I want you to know it and to thank him. It is such conduct that pleases, and too few of our public employees respond as he did.

Very sincerely yours,
FRANK C. JORDAN,
Secretary of State.

ARCHITECTURAL AWARDS

For Month of December

Chico State Teachers College, Chico—Library and Classroom Building; for general work to H. Mayson, Los Angeles, \$82,379; for complete plumbing and heating work to Woodland Plumbing and Hardware Company, Woodland, \$11,295; for electrical work to James B. Tufts, Chico, \$3,788.

Los Angeles State Building, Los Angeles—Contract for wrecking two buildings on site to Los Angeles Wrecking Company, Los Angeles, \$2,500.

Los Angeles State Building, Los Angeles—Contract for sectional partitions to Pacific Manufacturing Company, Santa Clara, \$27,861.

Division of Parks, McArthur—Caretaker's Cottage, contract to Oliver S. Almile, San Francisco, \$3,973.

State Narcotic Hospital, Spadra—Superintendent's Residence, Two Ward Buildings and Assistant Physician's Cottage; for general work to Willard Lutz, Los Angeles, \$31,600; for heating work to Walter H. Smith, Long Beach, \$3,995; for plumbing work to Thomas Haverly Company, Los Angeles, \$3,311; for electrical work to H. H. Walker, Inc., Los Angeles, \$1,874.

Veterans' Home, Yountville—Hospital Building; for general work to R. W. Littlefield, Oakland, \$407,245; for electrical work to W. B. Baker and Company, Inc., San Francisco, \$28,495; for plumbing work to Carpenter and Mendenhall, Sacramento, \$35,900; for refrigeration work to Carbondale Machine Company, Los Angeles, \$21,600; for heating and ventilating work to Alta Electric and Mechanical Company, San Francisco, \$34,596.

Divorced are Mr. and Mrs. Howell; he wiped the car with her best guest towel!—*The Pathfinder.*

STATE OF CALIFORNIA
Department of Public Works

HEADQUARTERS: PUBLIC WORKS BUILDING, ELEVENTH AND P STS., SACRAMENTO

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COLONEL WALTER E. GARRISON-----Director

JAMES I. HERZ-----Deputy Director

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TIMOTHY A. REARDON, San Francisco

PHILIP A. STANTON, Anaheim

FRANK A. TETLEY, Riverside

C. H. PURCELL, State Highway Engineer, Sacramento

JOHN W. HOWE, Secretary

HUGH K. McKEVITT, Attorney, San Francisco

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L. V. CAMPBELL, 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

R. H. STALNAKER, Equipment Engineer

E. R. HIGGINS, Comptroller

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H. S. COMLY, District II, Redding

CHARLES H. WHITMORE, District III, Sacramento

J. H. SKEGGS, District IV, San Francisco

L. H. GIBSON, District V, San Luis Obispo

E. E. WALLACE, District VI, Fresno

S. V. CORTELYOU, District VII, Los Angeles

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A. D. EDMONSTON, Deputy in Charge Water
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R. L. JONES, Deputy in Charge Flood Control and
Reclamation

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SPENCER BURROUGHS, Attorney

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Rights

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H. M. STAFFORD, Sacramento-San Joaquin Water
Supervisor

GORDON ZANDER, Adjudication, Water Distribution

KATHERINE A. FEBENY, Chief Clerk

MABEL PERRYMAN, Secretary

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CARLETON PIERSON, Specification Writer

C. O. PALM, Chief Clerk

C. E. BERG, Engineer, Estimates and Costs

J. W. DUTTON, General Superintendent Construction

W. H. ROCKINGHAM, Mechanical Engineer

C. A. HENDERLONG, Assistant Mechanical Engineer

W. M. CALLAHAN, Electrical Engineer

**DIVISION OF CONTRACTS AND
RIGHTS OF WAY**

C. C. CARLETON, Chief

FRANK B. 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

Port of San Diego—Edwin P. Sample

