Public Documents Depository College Library

CALIFORNIA HIGHWAYS and PUBLIC WORKS

December
1929

DECEMBER IN CALIFORNIA – A STATE HIGHWAY
SCENE IN LOS ANGELES COUNTY

Official Journal of the Department of Public Works
State of California

Table of Contents

Public Work in California is Increasing Factor in Employment

THE FOLLOWING preview of contemplated expenditures for 1930, together with a statement of work available for winter months, was presented at the November meeting of the Governor's Council by B. B. Meek, director of the Department of Public Works:

Total expenditures in California on state and county roads, not including city streets, are estimated at $88,030,000 for the year 1930. This sum includes state highway expenditures estimated at $38,030,000 and expenditures on county roads estimated at $50,000,000

A total of $10,000,000 in state highway contracts will be offered to bidders during the first six months of 1930. For the second six months, the contracts offered will total $7,800,000.

Expenditures to complete projects either under way or now being advertised will total $14,590,000.

Maintenance expenditures for 1930 on state highways will amount to $5,640,000 which will be almost equally divided between half year periods.

Figures are not available by which county expenditures can be pro rated as to the particular period in 1930 when they will be expended.

Expenditures upon state buildings during 1930 will total $4,726,000, of which one-half will be ready for award during the first six months of the year. At the present time, projects are under way and in process of completion calling for a total expenditure of $2,214,000.

One hundred irrigation districts in California will expend approximately $10,000,000 during 1930. On flood control a total of $1,385,400 will be expended during the same period. Of this sum the state and local units will contribute $385,400 and the U. S. government $1,000,000. Expenditures on the investigation into the water resources of California, the most complete and far reaching study of its kind yet made in the United States, will total $400,000.

When President Hoover issued his call for an expansion of public works throughout the nation to relieve unemployment and to stimulate business, Governor Young was able to answer for California that the President's request had been anticipated in this state, and that the policies he advocated were already in force.

With only 25 per cent of the time period of the present biennium past, 40 per cent of the highway projects programmed for this biennium are either under contract or advertised for bids. In other words, highway work is being given to the state at a time when public work is most needed.

The Division of Architecture has made a similar record. In the first 25 per cent period of the biennium, it has in the field under construction, or ready for the field, 38 per cent of its total program.

WINTER WORK

As winter approaches and seasonal unemployment increases, the importance of public work in providing employment is emphasized.

The extent to which public work is a factor in the labor situation is evidenced by a few figures.

Careful study of highway projects has enabled this work to be spread over a greater per cent of the year than has been the custom in the past. The extent of this work is evidenced by the contracts placed under contract and the contracts pending and projects advertised for the period from October 30 to November 21, 1929. These figures are:

Work placed under contract	$1,322,600
Contracts pending and advertised	1,764,600
	$3,097,200

To this must be added approximately $570,000 spent during the same period in the maintenance of state highways. Approximately 50 per cent of this amount goes to labor.

This work has a value even beyond the figures indicated by reason of its widespread distribution over California, and the extent to which local labor and local supplies enter into highway work.

With every highway contract awarded a letter to the contractor has been enclosed, asking him to employ local labor and to purchase supplies locally as far as it is possible so

to do. There has been a most gratifying response to these letters. Contractors engaged in highway work are cooperating wholeheartedly in the work of relieving unemployment in the localities in which they are working.

PLANNING PROGRAM HELPFUL

Governor Young's long time planning program for state building contsruction is resulting in a very important and helpful effect on the present serious unemployment situation. The value of building construction work provided for by the 1929 legislature which is now under way in the field is nearly double what it was at the corresponding time following the sessions of 1925 and 1927, and over six times what it was following the session of 1923.

The figure for 1929 is $2,256,147 and covers 87 different projects; that for 1927 was $1,193,843 covering 47 projects; for 1925, $1,190,856 covering 46 projects; for 1923, $334,168 covering 25 projects. While relieving unemployment, the state is at the same time benefiting financially from the low bids now being obtained.

WATER RESOURCES GIVE WINTER WORK

While the work of the Division of Water Resources, as far as total expenditures, is not as impressive as that of the Division of Highways and the Division of Architecture, yet the work of this division is important from an unemployment point of view, inasmuch as the normal winter work is greater than that of summer. It is of further importance both in that it uses local labor very largely, and its operation extends over a wide area. Thus laborers employed by the division in July number 48 as against 115 in October.

The investigation into the water resources of California now under way is the most complete and far reaching study of this kind ever made in the United States. This study is reflected in the increased employment given to engineers. In July of this year the engineer's staff number 60, while in October this was increased to 117, the increase being due to the increased activity in the water resources investigation and the increased duties of dam inspection placed upon the division by the last legislature.

It seems that one of the employees of Henry Ford dreamed that Henry died. He dreamed that he saw the black casket being borne by six of Henry's oldest and most faithful employees. As the casket came by, Henry raised up, looked around, and offered the following suggestion:

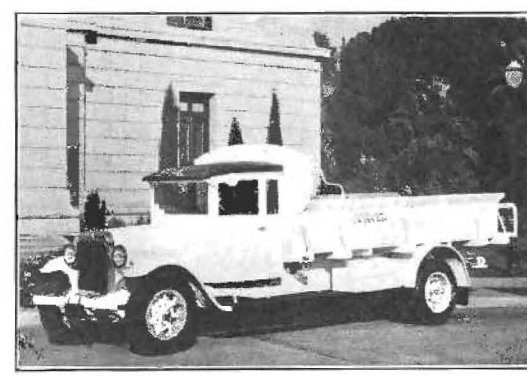
"If you would put rollers under this casket, you could lay off five men."—*Sour Owl.*

Equipment Made For State Use at Highway Shops

Road Oiler

Attached are two pictures of state equipment constructed at Headquarters Shop.

One is of a road oiler constructed for the Division of Highways and being used in District Four. The other is of a meat truck body



Meat Truck Body

constructed for the Napa State Farm. A letter from Mr. Owen Duffy, Superintendent of the Napa State Farm is attached.

The capacity of the oiler is 1200 gallons. The oil pump is driven by an independent engine instead of a take-off drive from the truck thereby permitting any speed of the pump desired, also, satisfactory pressure of oil regardless of the truck speed.

Another feature of this oiler is that the controls for the spray boot on the rear are arranged so that the operator is facing to the rear, thereby permitting him to see the road as it is oiled.

The meat truck body is constructed entirely of oak, finished in white lacquer and striped and lettered in gold. The inside of the body is natural wood. An offal box is placed on each side fastened to the step board.

NEVADA—It is reported that a road will be constructed between Las Vegas and Boulder Dam on the Colorado River. This highway will be about 35 miles in length and will cost approximately $600,000.

State Highway Patrol Organized; Districts Fixed; Personnel Selected

WITH DETAILS of organization of the new California Highway Patrol practically completed, California is now ready to take her place among the foremost states of the Union in traffic control.

The new law creating the patrol became effective August 14th. Shortly thereafter, Eugene W. Biscailuz, undersheriff of Los Angeles County, a man with a score of years experience in law enforcement work, was named superintendent.

Since his appointment Superintendent Biscailuz has devoted practically all of his time to working out the reorganization details, conferring frequently with B. B. Meek, Director of Public Works and Frank G. Snook, chief of the Division of Motor Vehicles. These officials have given him the utmost cooperation and have accepted his recommendations with almost no changes.

PRINCIPLES THAT GUIDE ORGANIZATION OF PATROL

Every effort is being made to weld the California Highway Patrol into a compact, energetic, highly trained and fast moving force of officers, each imbued with a sense of the responsibility of his job and with the necessity of maintaining the dignity and honor of the Patrol.

Although the organization will not be military in character, the strictest discipline will be maintained, and the personal conduct of the officers, on and off duty, will be scrutinized carefully.

THE ORGANIZATION

As projected at present, the patrol will consist of a force of approximately 350 men, including superintendent, assistant superintendent, bureau chiefs, district inspectors, captains and patrolmen, all engaged exclusively in enforcing the provisions of the California Vehicle Act.

Approximately one-third of this force will be engaged in night patrol work, in accordance with provisions of the new act.

Squads and their captains formerly operating as county units have been taken over intact and made a part of the patrol.

These men will be on probation for a period of one year. If their services are satisfactory, they will then become permanent members and will receive the protection of state civil service regulations.

Appointments to vacancies will be made only upon the submission of a list of candidates by the supervisors of the county in which the vacancy exists. The officers, however, will be responsible directly to the superintendent and his subordinate officials and will take orders from them only.

NIGHT PATROL FORCE

The night patrol force will be created in the same manner. The number of men needed in each county will be picked from lists furnished by the supervisors. They will be assigned to the captain in each county for duty day and night. It will be the responsibility of the captain to see that the work arranged is so that all members of his squad take turns at night patrol duty.

COORDINATING CONTROL

With the approval of Director Meek and Chief Snook, Biscailuz has taken the following steps toward the coordination of the work of the patrol:

1. Creation of five major bureaus, with headquarters in Sacramento, to be known as the Bureaus of Traffic, Schools and Education, Brakes and Lights, Commercial Vehicles and Weights and Statistics and Research.

2. Division of the state into eighteen traffic districts, composed of one or more counties, with convenient headquarters and an inspector in charge of each.

3. Adoption of a standard salary scale for all inspectors, captains and patrolmen.

4. Adoption of a definite, standardized set of rules and regulations for the conduct of the patrol and work of its members throughout the state.

Office details at headquarters will be under the immediate supervision of Roy Youngblood, former undersheriff of San Joaquin

County, who was appointed last month by Biscailuz as assistant superintendent of the patrol. Youngblood is an experienced peace officer and office executive.

TRAFFIC BUREAU

The Traffic Bureau will be headed by Otto Langer, whose work as captain of the traffic squad of San Diego County has earned him a nationwide reputation. Langer's work will

J. J. Borree

be largely supervisory and advisory. He will map out the beats of the officers in the various counties, find the danger spots, arrange for traffic detours in times of emergency similar to the recent "big game" at Palo Alto, and consult frequently with the inspectors in the various divisions relative to their problems.

EDUCATIONAL WORK

J. J. Borree, former adjutant general of California, heads the Bureau of Schools and Education. He is now proceeding with the task of organizing training schools for the officers throughout the state in accordance with section 30 of the act. In addition, he will be charged with the responsibility of supervising the junior traffic patrols at the schools and with the general education of the public to the needs of careful driving.

STATISTICS AND RESEARCH

Victor W. Killick, for the last four years statistician of the sheriff's office of Los Angeles County, will be chief of the Bureau of Statistics and Research. Killick is a veteran statistician of the Pacific coast and was founder of the Western Statistical Association, of which he was the first president. His bureau will be concerned largely with the collection and interpretation of statistics relative to the cause and cure of motor accidents. A record of such accidents is required by law.

LIGHTS AND BRAKES

The bureaus of Lights and Brakes and Commercial Vehicles and Weights are still in the process of organization. Their names are explanatory of the duties each will have.

An important function of the Bureau of Lights and Brakes will be to supervise the official brake and headlight testing stations throughout the state. There are more than 1500 headlight testing stations and arrangements are being completed to establish a number of brake testing stations as provided in the new law which sets up a definite standard for two- and four-wheel brakes.

DISTRICT ORGANIZATION

The districts, counties included in each, headquarters, and inspectors were announced as follows:

No. 1—Humboldt, Del Norte and Mendocino counties. Headquarters, Eureka. Inspector, M. F. Brown.

No. 2—Tehama, Shasta, Siskiyou and Trinity counties. Headquarters, Red Bluff. Inspector not yet named.

No. 3—Sierra, Plumas, Lassen, Modoc. Headquarters, Susanville. Inspector, R. L. Sheldon.

No. 4—Marin, Sonoma, Lake, Napa, Solano. Headquarters, San Rafael. Inspector, F. A. Leber.

No. 5—Glenn, Colusa, Yolo, Butte. Headquarters, Oroville. Inspector, J. W. Cooper.

No. 6—Nevada, Yuba, Sutter, Placer and El Dorado. Headquarters, Nevada City. Inspector, F. S. Quinn.

No. 7—Sacramento, San Joaquin, Amador, Calaveras, Alpine. Headquarters, Sacramento. Inspector, G. F. Moynahan.

No. 8—Contra Costa and Alameda. Headquarters, Oakland. Inspector, E. A. Steinmeyer.

No. 9—San Francisco. Headquarters, San Francisco. Inspector, C. D. Reade.

No. 10—San Mateo, Santa Clara. Headquarters, San Jose. Inspector not yet announced.

No. 11—Stanislaus, Merced, Madera, Mariposa and Tuolumne. Headquarters, Merced or Modesto. Inspector, F. J. Duncan.

No. 12—Santa Cruz, San Benito and Monterey. Headquarters, Salinas. Inspector, H. Livingston.

No. 13—Fresno, Kings and Tulare. Headquarters, Fresno. Inspector, J. A. Morrison.

No. 14—San Luis Obispo, Santa Barbara and Ventura. Headquarters, Santa Barbara. Inspector K. C. Murphy.

No. 15—Kern, Mono and Inyo. Headquarters, Bakersfield. Inspector, W. E. Snell.

No. 16—Los Angeles. Headquarters, Los Angeles. Inspector, E. L. Bruck.

(Continued on page 29.)

Interrelation of Airway and Highway Transportation

By C. H. PURCELL, State Highway Engineer.*

AIRWAY transportation in the United States is a development which has occurred since the war. At first the only airway lines were mail lines operated by the federal government. Some attempts were made by private agencies to establish air routes but they failed for two reasons: the uneconomy of available aircraft and the lack of popular air consciousness.

In order that all of us may be more familiar with the subject I will briefly note some facts regarding the present status of airway transportation and the conditions which are responsible for this development.

In 1925 national legislation was effected authorizing the Postmaster General to advertise for bids on contract airmail routes wherever he deemed advisable. As a result, con- air mail service came into operation during 1926 on a network of air lines and by the latter part of 1927 the Post Office Department had relinquished its main line operation to private contractors.

Prior to this time and for a short time there after the government had operated a few trunk air mail routes.

This act terminated direct governmental participation in the operation of commercial air lines and paved the way for inauguration of transcontinental air express and passenger service.

Commencement of commercial airplane transportation in the United States may properly be considered as dating from the spring of 1926, when the first of the contract air mail routes began operations. Subsequently, air mail contracts have been awarded and operations started on more than a score of routes ranging from short-line feeders to coast-to-coast service, including a route from Miami, Florida, to the Panama Canal Zone, and routes into Canada and Mexico. That some of these contracts have proven profitable, thus placing airplane transportation in the United States on a sound basis economically, and therefore at an advantage over the subsidized lines of other nations, is indicative of the value that American business places on time and the premium it is willing to pay for rapid transit. Up to the commencement of contract air mail service in this country the capacity of airplane transportation to earn its way had not been demonstrated. None of the nearly 400 attempts to establish commercial air lines in various parts of the world had revenues from transportation business sufficient to meet operation costs.

The American contract air mail lines were soon to change this. Several of them became definitely profitable after a pioneering period much shorter than is usually required to establish new concerns in older and proven fields of business.

Another important piece of legislation was the Air Commerce Act of 1926 which placed upon the Department of Commerce responsibility for developing and maintaining airways, inspecting and licensing aircraft and pilots, and promoting aids to aerial navigation, including radio communication systems.

Airplane passenger service offering daily accommodations on fixed schedule the year around was unknown in the United States until operators of air mail contract routes began to develop passenger traffic as a source of additional revenue. The first effort in this direction was made in connection with the air mail operation between Los Angeles and Salt Lake City in May, 1926, when this line was opened to passenger service. Subsequently, popular interest in commercial travel resulted in the development of extensive de luxe passenger service.

Passage of the transcontinental line from government operation to private hands also paved the way for nation-wide air express service. At the inception of contract air mail service many of the operators offered a field-to-field package delivery which was not a very satisfactory accommodation and attracted only limited use. The possibilities of such a service had, however, been long under consideration by the express companies, whose officials, in the late summer of 1927, negotiated air express contracts with four of the principal air mail carriers. Early in 1928 this air express service was extended to most of the other air mail lines.

* This paper was read by Mr. Purcell at the annual meeting of the American Association of State Highway Officials held in San Antonio, Texas, November 11th to 14th.

The principal services performed by airway transportation are mail, passenger, and express.

In industry, finance, law, agriculture, merchandising—wherever time is an element of any transaction—air mail may be turned to advantage. The air mail service of the United States now extends to practically every major city of the nation and correspondence destined for points 600 miles or more distant from post office of origination will be advanced several hours in delivery by air mail. The air mail line between Pacific coast points and New York City is only one-third of the time required for rail mail. With completion of airway lighting, making night flying possible, there will be but one business day lost between Atlantic and Pacific coast points.

An interesting study deals with the concentration of population necessary to support an air mail operation. Circumstances of location and accessibility through surface transportation agencies will, by influencing the comparative value of airway transportation, affect the air mail volume to be developed in any territory. Generally speaking, excepting where peculiar local conditions intensify the time-saving value, it appears that the air mail volume to be anticipated from any area of less than 300,000 population is insufficient to warrant flying daily both ways over a 200-mile airway. As airplane operation costs are lowered and the time between the airport and the delivery to the post office is reduced the benefits of air mail may be extended to smaller cities and communities nearer to each other.

At the present time, and until the traveling public becomes better acquainted with airway travel, airway passengers are recruited from three classes: Vacationists who want the experience of flight or desire a quick trip to a weekend resort; business men and women who can turn speed to profitable account; and individuals facing personal emergencies which demand their immediate presence at distant points.

As to the first group the question of speed is of small consequence excepting as it extends the range within which a limited vacation period may be spent or permits of more playtime by cutting down the time spent in travel. For instance, under presently available accommodations, a New Yorker desirous of visiting the Pacific coast and having but one week of vacation would find himself in this situation: By rail his entire vacation would be consumed in travel on the fastest trains and he would have to make closest connections in order to complete the journey on time. By airplane only 60 hours would be spent in travel, leaving four and one-half days for recreation. In other words, the airplane has in point of time brought transcontinental travel within range of a vast group of workers who have a minimum of leisure from the necessity of employment.

At one of the recent football games on the Pacific coast a number of enthusiastic fans came to the game a distance of 400 miles by airplane while others used the airplane to come 35 miles from a nearby city in order to avoid the usual highway traffic congestion. More than 80 airplanes were parked near the stadium.

It is from the second and third groups, however, that under present costs air travel volume can best be developed on a sound basis. From the standpoint of business, in the main, it is conservation of business time that counts. That is, to offer an advantage the airplane schedule must be such as will make available to the user a greater portion of the business day. An airplane schedule which does not offer such saving over available surface transportation systems has little to attract the patronage of business. For instance, business will not pay a higher rate to travel by airplane between two points if its purpose can be equally well or better served by using the cheaper agencies of surface transportation. With present available equipment travel between two cities twenty-four hours apart by rail can, by airplane, be accomplished in from six to eight hours. Daylight flying, of course, would so cut into the business day as to make this of small value excepting in emergencies; or in cases where such flight would permit making a night connection with other form of transportation, to final destination with consequent saving of an entire business day.

Night passenger service on the air mail lines has been fairly well patronized but widespread development of this must wait improved equipment and refined practice.

Passenger airplane service appealing to business for its patronage must be guided by two restrictions on operation. If it is to serve merely the speeding up of long haul travel it should aim at covering by flight a distance traversed by rail in approximately eighteen to twenty-four hours at least. That is, from six to eight hours of flying time are required to give any decided general advantage. If the service, however, is between two major cities, the expenditure of so much daylight time in the air plus the ground time between business districts and airports would consume the entire business day and destroy any general advantage. Three hours of flying plus one hour of ground travel appears to be the

(Continued on page 31.)

New Road Reveals New Standards

By C. H. WHITMORE, District Engineer.

THE Division of Highways has completed the paving of 8.7 miles of state highway on the Pacific Highway north of Sacramento.

The portion of the highway is more particularly described as being located between Ben Ali and Sylvan School. This is a very important state highway route, being a portion of both the Pacific and Victory highways. Travel to and from eastern points over the transcontinental roads are routed over this section of highway, also travel to and from northern points via Roseville and Marysville.

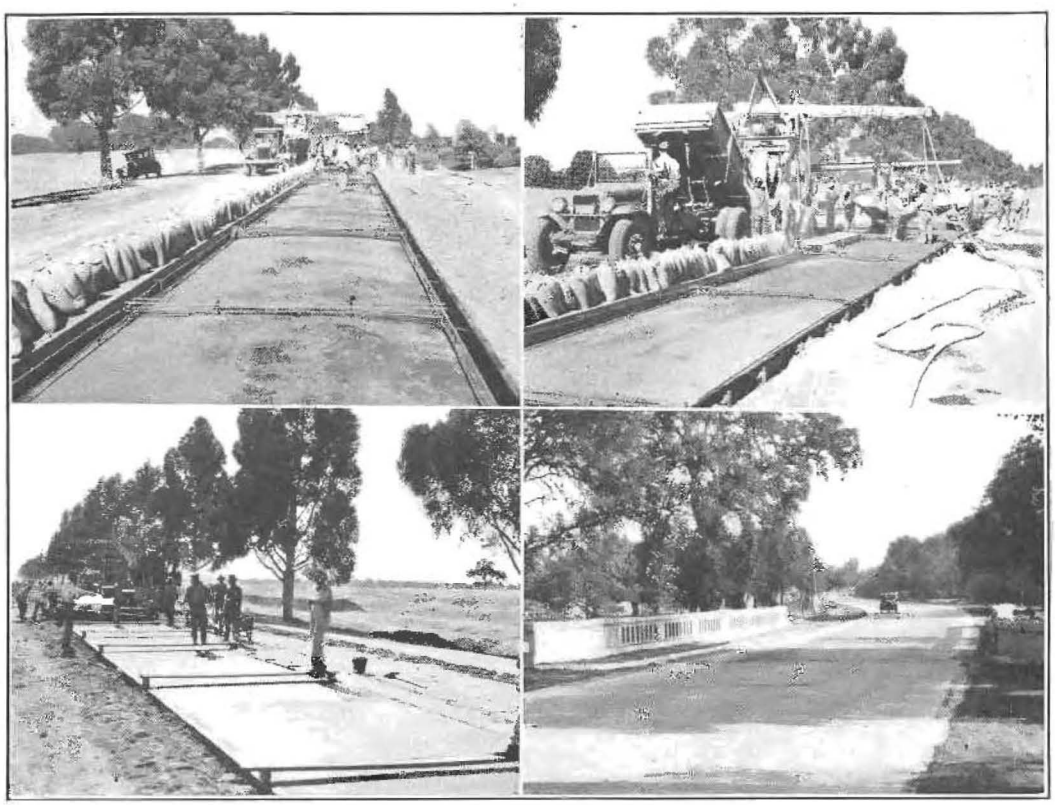
The road prior to reconstruction consisted of an 18-foot bituminous macadam on a 60-foot right of way, and was constructed by Sacramento County, and, since the creation of the state highway system, has been maintained by the state.

Additional ground area was obtained before construction and, at the present time, the state has a right of way 100 feet wide throughout the length of the improvement.

The alignment of the improvement followed closely the former alignment with adjustments where necessary to eliminate the short radius curves. A new grade of more uniform character was laid throughout the entire distance.

The work consisted of constructing a graded roadbed 46 feet wide on the southerly 3.7 miles and 36 feet wide on the remaining 5.0 miles. The paving on the southerly one-half mile consisted of widening the existing asphaltic concrete to uniform 30-foot width. On the next 3.2 miles Portland cement concrete pavement 30 feet wide was constructed in three standard 10-foot strips 6 inches to 9 inches thick and on the remaining 5.0 miles

(Continued on page 25.)



The new highway north of Sacramento. The views show the highway in process of construction, in ten-foot strips, with the lower right-hand picture showing a completed section of the road as it crosses a widened bridge.

A Typical Case of Highway Development

By E. J. Bassett, District Office Engineer.

BEFORE the advent of the Highway Commission into road affairs, in 1910, with its program for improved highways, the country roads throughout the state were totally inadequate to handle the rapidly increasing flood of automotive traffic. The valley roads and even those near populous centers were poor enough for this new type

E. J. Bassett

of traffic, but the roads in mountainous districts were a hazard pure and simple to the motorist, and the automobiles of those days, inferior as they were to our present models, were frequently incapable of traveling through the mountains even in the dry season.

Improvement came slowly, due largely to the vastness of the highway system, and while it kept abreast of the rapid strides made by the automotive industry for several years, financial stringencies caused a loss of headway and an increasing divergence between the lines of highway progress and of vehicular improvement. The gas tax, however, has now provided ample funds, and the highways of California are forging ahead and more than keeping pace with requirements. How long this condition will continue is problematical, and can not be accurately forecast, in view of the ever increasing speed limits and greater demands for safety and comfort, in addition to the enormous increase in the volume of traffic.

In looking back over the results of the past nineteen years, it is of great interest to observe the changes which have been wrought and the effect of those changes in our mode of life, on the progress and development in territories adjacent to highways, on transportation and accessibility to hitherto difficult locations, and particularly the economies which have been brought about in decreased operating costs and time saved. One noteworthy illustration of highway development is apparent on that portion of the Pacific Highway between Redding and Dunsmuir, in northern California, a portion of the highway which passes through ten miles of foothill country and fifty miles of scenically beautiful mountainous country, in which the highway has been improved from as villainous a piece of early day construction as one could find anywhere, to a modern high speed road.

At the time the state's highway program was first started in this vicinity, the old county road, oftentimes called the "Oregon trail," was the only means of highway transportation between the two towns. "Oregon trail" was a proper cognomen for this road, built in the days when time was not the essence of travel, but rather when costs of construction and upkeep were all important factors. Improved but slightly by the county, at the time of the first rising wave of automobile traffic it can best be characterized as rough, dusty, crooked, narrow and steep. There are other appropriate adjectives, but they are unprintable. Surfacing and the elimination of other undesirable features were prohibitive as well as impracticable on such inferior construction, as mountain roads are an expensive variety, and few of our mountain counties are financially able to get far in such construction. Traffic was slight on this section at the time, the automobile traffic at its peak in summer rarely exceeding fifty cars per day. The distance between the two points was sixty-nine miles, and the average travel time was eight hours. These eight hours were hours of bumps and dust, and the miles were many where first and second gears were indispensable, while the destination was a goal reached by the traveler with the full realiza-

tion of having been somewhere. Only the hardiest drivers would consider attempting the trip except in cases of necessity, so the vacation places and resorts in the Sacramento Canyon were accessible to the public only by train. During the winter the more northerly portions of this section were entirely blocked for several months with snow.

In 1914 the state started active construction, and after several years of delays and difficulties, completed grading of the entire section in 1919. This was followed immediately with surfacing and experimentation with dust palliatives, and produced a road suitable to the demands placed upon it, and in standard of construction far superior to the road it replaced. Suffice to say that during the earlier stages of the construction the users of the road were enthusiastic and thoroughly appreciative of the benefits derived in ease and rapidity of communication.

Comparison of this construction with the old road is, of course, difficult, as the original road was of haphazard development, while the new highway was built on a location chosen only after months of consideration and study, and was consistent with standards of construction then existing. The distance was decreased to sixty-four miles, and the average driving time to three hours, both factors of great value to motorists. The traveled roadway was surfaced with a crushed rock, both manufactured and natural products being used, and had a usable width of sixteen feet throughout, amply safe for a two-way road at moderate speeds. The improvement in alignment and grade over the old county road were incomparable, and even the wheezy and overladen wrecks so common on the roads in those days were able to navigate without assistance or delay. In 1924 the removal of snow during the winter months was provided, adding materially to the commercial use of the road during this period, although the tourist travel comprised a fair percentage, even in the winter season.

Traffic built up rapidly during the eight-year construction period, increasing ever more rapidly as the difficult sections of the old road were eliminated, until in 1922 the peak of the summer traffic averaged around eight hundred cars per day.

Completion had hardly been accomplished when developments in the character of the traffic, increased speeds, greater demands for safety and comfort, and embarrassing comparisons with road improvements in neighboring states brought forth a babel of comment and criticism which could not be ignored. The development of heavy passenger bus traffic, increasing truck traffic demanding fast service, and automotive improvements in the speed capacities of cars, coupled with the demand for a road on which this added speed

(Continued on page 33.)

The views in the accompanying column show the growth of the state highway in the Sacramento River Canyon; upper view shows the old county road. Beneath it is a picture of the first state highway constructed in the canyon. The two lower views show sections of the highway built to present standards.

The Relation Between Contractors and the Division of Architecture

By C. Pierson, Specification Writer, Division of Architecture.

THE PURPOSE of this article is to dwell on the relation between contractors and the Division of Architecture with regard to state buildings.

The question often arises, "Who built the building?" The answer is seldom correct and varies as frequently as it is asked, depending

C. Pierson

wholly upon the viewpoint of the individual questioned. More often than otherwise, were the question to be asked of the contractor, the answer would be, "Yes, I built the building." This same answer might emanate from the owner, the architect, the engineer, the designer, the superintendent, and all and sundry having aught to do with its construction. Nevertheless, and without attempting to combat anybody's preconceived ideas on the subject, the statement is made that the contractor plays a most important part in the construction of a building. It is he who must organize the force, provide the materials and equipment, lay out the plan of procedure, and take full responsibility for the faithful execution of plans and specifications.

There was a current impression at one time that public work was a thing to be avoided by contractors; that contractors, who once undertook a public work contract on competitive bidding, would probably lose money, or at least fail to make a profit. The demand for plans for most projects was not great and those contractors who succeeded in obtaining contracts seldom came back to figure other public work. Suffice it to say that no such condition exists at the present time, for we find the same contractors competing time after time together with more and more new contractors, and it not infrequently happens that the same contractor is successful on a number of separate projects.

The relations between the Division of Architecture and contractors who have undertaken to perform public work under the direction of the Division have, as a whole, been very satisfactory and a credit to the state and contractors alike. So satisfactory has been the relation that the state has profited to a large extent by reason of low bids on its building program over a period of several years.

PLANS ARE COMPLETE

In analyzing the situation, several outstanding reasons may be pointed out as at least tending toward making this condition possible. First, and we might say foremost, when a job is advertised for bids, the set of plans which goes into the hands of contractors is as complete as it is possible to make. An earnest and conscientious effort is made to show every item in detail and to leave as little as possible to guesswork on the part of the contractor. Numerous full size details accompany each set, and clear, concise scale details are shown for parts that may not be full sized. Generally, there are both scale and full size details for all particular work. With such a set of details before him, the contractor knows in advance what is expected and can figure his cost without fear of having a more elaborate detail forced on him later.

SPECIFICATIONS GIVE DETAIL

Specifications accompany all plans and are intended to explain in detail the kinds of materials required, methods of construction, types of finishes, and many other details and items that can not usually be shown on plans.

Specifications are drawn with care and with an effort made to explain fully what is required. To a large extent, "cover all" and ambiguous clauses, aimed to force the contractor to perform unforeseen work which might be required but which is neither shown nor specified, have been eliminated.

Clear, concise specifications written in understandable English unquestionably tend to reduce the cost of construction. Lengthy and wordy specifications are often not read completely, and ambiguous specifications tend to increase costs simply by reason of the law of self-protection.

The above statements are not made to give the impression that our plans and specifications are always faultless. Errors creep in occasionally in spite of our best efforts, but

A view in the drafting room of the State Architect's office

on the average the state's plans are as complete and more so than most.

HOW CHANGES ARE CARED FOR

When changes are made, requiring extra work, the extra work is paid for. Changes in plans and specifications are necessary at times after a contract has been let due to developed conditions, no matter how carefully they have been drawn. Such changes are cared for by change order; and when extra work of this nature is given to a contractor, he is allowed his cost, plus a reasonable amount for overhead and profit.

ASSISTANCE IN FIELD

In the field and in the office, every possible assistance is rendered the contractor and the results of such cooperation have been very gratifying. As a general result, there has been a growing demand for state plans, and the interest displayed when work is advertised for bids warrants the belief that contractors are losing their antipathy toward figuring public work. There has always been a certain demand from big centers but of late requests are coming from the more remote quarters. With such widespread interest, the competition has been increased and closer estimates have resulted.

With such keen competition, the assumption might readily be made that some contractors are performing work at a loss. Were it not for the fact that the same contractors compete time and again, this might be considered a fair assumption, but it is hard to conceive of a contractor standing a loss more than once; therefore, it is to be concluded that state contracts are remunerative in spite of competition and low prices.

CONTRACTORS PROVE RESPONSIBILITY

Out of hundreds of contracts let by the Division of Architecture, only a fraction of one per cent of the contractors have failed to live up to the terms of their agreements in one way or another. This speaks exceedingly well of the contracting fraternity as a whole.

It has always been the policy of the Division to look into a contractor's financial condition and experience before awarding a contract to him. Up until August 14, 1929, it was necessary to delay awarding of contracts until the contractor's experience and financial condition could be checked up. This information was not always forthcoming or easily obtainable, and often ten days or two weeks time would elapse between the opening of bids and the awarding of contracts solely for lack of this information.

Under a law passed by the legislature of 1929 and approved by Governor Young, the Department of Public Works is authorized to require contractors to prequalify before plans and specifications for duly advertised public work can be issued to them. This is known as the "Prequalification Law," chapter 644, 1929. Under its terms, contractors who have previously filed answers to a questionnaire, satisfactory to the Department of Public Works, will receive plans and specifications upon request, but others who have not filed their answers, and who request plans, will be delayed in the receipt of same until they comply with the requirements of this law.

Accordingly, a questionnaire was prepared and forwarded to all contractors upon their request, and these are now being received, checked, and filed. The questionnaire covers the experience and financial condition of the individual, copartnership, or corporation, as the case might be, and must be sworn to and audited by a public accountant. By having this information on file at the time bids are received, awards can be made without delay.

(Continued on page 28.)

Scenic Highways and Billboards

By FRANK H. MCKEE, Director of Highways, California State Chamber of Commerce.

THE HIGHWAYS of California have presented many and varied problems. Some of these have been engineering in character and many other economic. The California State Chamber of Commerce with the interests of the state in mind has, through its highway committees, given of its time and best thought in an effort to cooperate with the properly constituted authorities in effecting a solution to these problems, particularly where the economic factor of highway development was at stake.

Our highway system must expand to reach into sections not now served with proper transportation facilities and due consideration must also be given to making more accessible to both resident and visitor various scenic regions of the state. However, the question before us now is not that of planning future projection of the highway system but rather an economic question pertinent to it. Change a dirt road to a highway and business, as exemplified by garages, auto camps, soft drink stands, eating houses, and advertising signs immediately follows. These are business enterprises with an increasing amount of investment involved and in many cases these little groupings have formed the nucleus around which communities have grown. In certain instances, these are unsightly and some people have expressed the opinion that they should not be allowed to exist.

This feeling has prompted a study by the Highway Committee of the California State Chamber of Commerce in an effort to arrive at a commonsense and practical plan for meeting the situation.

COMMERCIAL HIGHWAYS

Let us first get the true picture of our highways. Their essential purpose is to speed up travel between cities. By far the greater number of those using the highways are on business errands—salesmen, merchants, buses, trucks—all welcome the well paved highway as a time saver. To them, it is only an extended city street and the time is not far in the future when, with our rapid population growth, our main highways will be successions of small towns with the highway itself serving as their main street. To take care of the needs of this traffic, business enterprises have sprung up and their continued existence bespeaks their popularity. They serve an evident need; they are part of our business structure, and must be recognized as an economic factor in community growth. It is a well known practice in subdividing property adjacent to the highways to set aside the frontage for business purposes. Many, in fact practically all, of these highway enterprises have erected signs describing the character of their business. Some of these signs are on their own premises, others on property facing the highway but some distance from their particular location. These signs are essential for attracting trade; without them the location and character of the establishment would be lost and trade suffer accordingly. Commercial highways with their attendant business enterprises are recognized as being part and parcel of our business life.

SCENIC HIGHWAYS

However, the picture changes when we leave the commercial section of these highways and come to points of natural scenic beauty. The greatest value of a scenic spot is its natural beauty; to mar it in any way would be an economic mistake. These sections should be kept free from objectionable shacks and buildings, commercial enterprises and advertising signs. There is such a unanimity of opinion on this point, and as it has received some publicity and public discussion, ways and means of putting a practical plan into operation for the preservation of these spots was started.

LEGAL ASPECTS

The first thought was to look to legislative measures for the proper enforcement of a plan that might be evolved. Realizing that certain legal rights were involved, a letter was written the office of the Attorney General of California asking specifically as to the rights of regulation "of cheap and disreputable vending stands and certain obnoxious sign boards which mar the natural beauty of scenic highways." An extract from the written opinion of Attorney General U. S. Webb, which was sent in reply to our communication, follows:

> Where public morals, health, safety, peace, etc., are involved in the exercise of its police power, government may go far in regulatory and even prohibitory measures. But when neither of these elements are present, government can do little in

the restriction of personal liberty or in the regulation of the use of private property.

PROPERTY OWNER KEY TO SOLUTION

This opinion from the Attorney General pointed out very definitely that the owner of the property abutting on the highway controls the situation as far as the elimination of unsightly structures and advertising signs is concerned regardless of the scenic values of the location. Further investigation revealed the fact that there are laws now on the statute books "prohibiting the placing or maintaining of signs, mechanical devices, transparancies, pictures or advertisements on or upon property of the State of California, or on or upon property of any city, city and county, or county in the State of California, and prohibiting the placing or maintaing of any signs, mechanical devices, transparancies, pictures or advertisements upon property of any person or private corporation *without consent in writing therefor having been first obtained.*" It is evident that further legislation is unnecessary as the whole matter comes back to the fundamental invested rights of property.

REPORT OF STUDY COMMITTEE

With these facts before us a study committee was appointed with instructions to go into the matter in detail. The primary feature of their recommendations is the urging of various chambers of commerce to determine what sections in their neighborhood are generally recognized natural scenic beauty spots and then to secure the cooperation of the property owners in their preservation.

RESULTS

The various regional committees, in cooperation with local organizations, determined on certain definite areas, almost without exception on the State Highway System (this in order to pursue a concentrated program rather than one widely spread), and immediately commenced to circulate pledge agreements which bind the owners of land fronting on these highways to allow no signs on their respective properties. This agreement is in the form of a legal document and may be filed with the county recorder.

Realizing the tremendous benefit which would immediately accrue to the properties on scenic highways, the following have already agreed to participate in this program: Southern Pacific Company, San Joaquin Light and Power Company, Pacific Gas and Electric Company, Red River Lumber Company, Southern California Edison Company, Yosemite Portland Cement Company, Little River Redwood Company, the National Forests and National Parks Service, Harry Chandler, William Randolph Hearst, Spring Valley Water Company, the Charles Nelson Company, Hammond Lumber Company, Harrison Investment Company and the Great Western Power Company.

As evidence that this campaign is actually effecting sign removal, the following quotation was taken from a letter from one of those already signing the petition:

> We have already written letters to some parties who had signs along the highway on our property in the Lagoon area, but for which we never have made any charge. We also are sending one of our men along the highway through our property, and are removing from all the trees and landscape any signs or cards that have been placed there.

In addition, the campaign has stimulated activity on the part of county authorities in that they are causing to be removed signs which have been placed illegally on county rights of way. An energetic supervisor in a San Joaquin Valley county had his road foreman gather in three truckloads of signs from within his own supervisorial district.

WANTS SPECIAL ROAD FOR RECKLESS DRIVERS

Every time we pick up our Monday paper we are reminded of news from the front during the late war. In big headlines the dead and wounded are told of as a result of the Sunday auto accidents, and the stories are sometimes more sanguinary than the war reports, which, added to the killings and maimings during the week, make a record unparalleled in peace-time pleasures. It does not seem to make any difference how carefully one drives, there is always a number of wild drivers who know no rules and who spread death and destruction along their trail. In view of this condition, we would respectfully suggest to the highway commissions that they maintain two lines of traffic—an elevated one for careful drivers and a lower one for the wild birds, lined on each side with deep ditches so that when they go off the trail it will be a "finish job" so far as they are concerned, and any killings they inflict on others on that trail would not be a loss, the dead being of the same irresponsible stripe as the killers.—Beach, N. D., *Advance*.

QUEBEC—New roads constructed in Quebec during the year 1927-28 covered 878 miles, and in the last five years 4000 miles of high type pavement has been built. There are 10,531 miles of permanently improved roads in the province and 10,000 miles under government maintenance.

A couple of cute young ladies who were visiting a western city decided that they would go horseback riding, we are told, and the head groom asked one of them whether she would prefer the flat English saddle or the western saddle with a horn.

"The flat saddle," said the young thing, "because we aren't going to ride in any traffic and won't need a horn."

The San Gabriel Dam Report

ON NOVEMBER 26TH Edward Hyatt, State Engineer, disapproved the application of the Los Angeles County Flood Control District for authority to construct the so-called San Gabriel Dam in Los Angeles County, on the grounds that the dam, if built as proposed, would be unsafe and a serious menace to life and property in the populous San Gabriel Valley below. The dam as planned by the county was to have been a curved gravity concrete structure, nearly 500 feet high, with a storage capacity of 240,000 acre-feet and located at what is known as "The Forks" site just below the junction of the East and West Forks of the San Gabriel River.

The application of the county was filed on October 26 last in accordance with the new law governing the supervision of dams which took effect in August. The State Engineer's investigations of the plans and the site for the proposed dam were carried on through the medium of a consulting board consisting of three geologists and three engineers, the personnel being as follows:

Charles P. Berkey, Consulting Geologist; Professor of Geology, Columbia University, New York.

G. A. Elliott, Chief Engineer and General Manager Spring Valley Water Co., San Francisco, California.

M. C. Hinderlider, State Engineer of Colorado, Denver, Colorado.

George Louderback, Consulting Geologist; Professor of Geology, University of California, Berkeley, California.

J. L. Savage, Chief Designing Engineer, United States Bureau of Reclamation.

Ira A. Williams, Consulting Geologist, Portland, Oregon.

All members of the consulting board are eminent and experienced in their profession, and no one of them has heretofore been connected with any of the projects of the Los Angeles County Flood Control District.

The board made a joint report to the State Engineer and it was the unanimous conclusion of the six members that a dam as proposed in the application could not be safely built on the foundation existing at "The Forks" site and in line with this conclusion the State Engineer disapproved the application.

Disapproval by the state is without prejudice to the right of the county to file any new application for a dam at this or any other site that the county may wish to submit. It means simply that the state finds that a 500-foot concrete dam, if built on the foundations at this location, would not be safe and this particular application is disapproved.

In its report the board stated that it was its conclusion that a dam of flexible type, such as an earth and rock fill structure of conservative proportions, could be safely built at "The Forks" site. Material storage capacity at this site could be obtained by such a dam. The state is without authority to require any given type or size of dam, but is limited to passing upon applications presented, and it is, therefore, in the discretion of the county as whether or not to file a new application and if so to submit plans best suited to its needs. In such case the state would then independently review such new application and plans from the safety standpoint.

TEXT OF REPORT

The text of the report of the committee follows:

November 21, 1929.

Mr. Edward Hyatt,
California State Engineer,
Sacramento, California.

Dear Sir:

The undersigned, constituting a geological and engineering consulting board, appointed by yourself, to advise on the safety of the proposed San Gabriel Dam in Los Angeles County, respectfully submits the following report.

The plans for the dam are outlined in Application No. D-175, filed in your office October 26, 1929. The filing was made by the Los Angeles County Flood Control District in accordance with the law for the approval of said plans.

The site chosen for this dam is at The Forks, at the junction of the east and west branches of the San Gabriel River, approximately thirty miles northeast of Los Angeles. The plans under consideration provide for a curved gravity concrete dam approximately 500 feet high above foundation, which is about 135 feet higher than any existing dam. The proposed San Gabriel dam would impound 240,000 acre feet of water at maximum filling, and would exceed by nearly 100 feet the height of the Owyhee dam, the highest of this type attempted to date, now under construction in Oregon by the U. S. Bureau of Reclamation.

Failure of such a dam on the San Gabriel River would endanger life and property in a very large downstream lowland area. The essence of the present study is to consider the safety of the proposed dam.

The purpose of this report is to advise the State Engineer, on whom rests the responsibility of approval or disapproval of the application. The conclusion is based on the coordinated studies of engineering and geologic data as developed by personal inspection of the site and consideration of all other available information.

The natural conditions in the San Gabriel mountains are much more complex than is usually appreciated. Although certain general geologic features prevail, each dam site is a problem in itself, and demands special study and handling.

ROCK FORMATIONS

The rocks of this site and vicinity, are ancient crystalline types, including granitic and dioritic gneiss and occasional schists, all cut by variety of igneous intrusions, including granite, aplite, diorite, diabase, basalt and porphyrites. The result is a crystalline complex, whose detailed history is long and involved, but whose character and quality would be eminently satisfactory for any engineering structure if the rocks had not undergone deformation and decay.

PHYSICAL CONDITION OF THE ROCKS

Deformation.

The rock complex is cut through in every direction by faults and slips and crush-zones, that have separated the mass into blocks of varied size and shape, most of which are comparatively small and roughly wedge-shaped or lenticular. No portion of this site or immediately adjacent ground is free from this condition. In addition, each individual block formed by these fault movements is internally broken, and more or less fractured and jointed, in such manner that most of the material separates readily into small pieces, and there are no extensive bodies of solid rock.

The original structural make-up of the rock formation, with its many different types of varying individual resistance to crushing, has favored the development of internal differential movement, and this has resulted in the meshed and jammed appearance that characterizes the rocks of this site. The rock was not originally weak, but was unevenly resistant, and the forces producing movement have been powerful enough to overcome the resistance of the whole mass.

It is generally conceded that the San Gabriel mountain mass has been thrust up, and that in addition to very large movements on the faults along the boundaries of the mountain block, there are a few zones of major movement cutting through it. One of these zones takes a general east-west course, and has determined the alignment of the east and west branches of San Gabriel River. Another such zone apparently runs nearly north and south, and has been followed by the river in its course below The Forks. The Forks is thus in the junction area of the two fault zones. The unusually numerous fractures at this locality seem to be consistent with this large structural relation.

Disintegration and Decay.

In addition to the faulted and crushed condition of the rock, much of it, especially that on the upper slopes of the canyon sides and along the principal movement planes and crush zones, is extensively disintegrated and decayed. The crushed and pulverized rock along the fault-breaks is often transformed into clay gouge. Some of it is so soft that when moist, it can be molded with the hand.

The surface materials are weathered into soil. By the same process some of the unbroken material beneath is altered or rotted to such condition that it can be broken easily with the fingers. Along the more fractured zones decay extends as deep as explorations have gone. This altered condition, together with the excessively broken character of the ground, and the smoothed and lubricated movement planes, are controlling factors with respect to any very large engineering structure.

Extent of Weakened Condition.

Observation shows that the crush zones and movement planes and slips occur in all portions of the site, as well beyond the cite proper in every direction. Drilling data prove that the same kinds of weaknesses, especially the slips and broken rock and gouge, extend also beneath the site to as deep as explorations have gone.

Landslides are common on the canyon slopes. These doubtless represent the slumping of individual blocks, or groups of blocks, separated from each other by slip planes, when they are weakened by progressive undercutting of a stream, lubrication due to access of water and downward extent of weathering. Relatively recent slides have occurred at the site and at several places in the vicinity.

Where the rock is harder or more uniform than the average, the individual fault blocks are larger, the internal slips and crushes are less numerous, and the accompanying decay correspondingly less extensive. This is the reason for the less broken appearance of the east abutment than that of the west abutment, although there are no different kinds of effects or any other principles represented.

Even the floor of the canyon is not free from this condition. A badly broken zone lies beneath the east third of the canyon bottom, where the bedrock channel is deepest. At this level the east portion of the rock floor of the canyon appears to be less substantial than the west, whereas higher in the canyon sides the west wall is more broken than the east.

Because of the existence of the same conditions beyond the site, together with the less favorable topography both up and downstream, it is not possible to find materially better conditions at any other location in the immediate vicinity of The Forks.

West Abutment.

The character of the rock in the west wall of the canyon, where the proposed dam would rest upon and against it, is displayed in the abutment excavation. It is here shown to be broken through by an intricate system of fault planes with dips ranging from essentially vertical through intermediate angles to flat-lying, and with strikes to nearly all points of the compass. Some of the fault lines may be traced across the excavation in a north-south direction, and they thus parallel the canyon, while others appear to be correspondingly extensive in transverse directions.

Intersection of the fault planes and joints with which the rock is traversed has separated or split the mass of the abutment rock into blocks of all sizes. Evidence of movement between contiguous blocks is the presence of a film or band of clay gouge, which when wet is smooth and slippery clay, and when dry, crumbly and gritty. There is often also a variable thickness of fault-breccia or shattered rock.

The fault planes are lines or surfaces of relatively ready percolation of water, by which alteration and softening of the adjacent rock has resulted. The inner parts of the larger blocks are usually comparatively hard and fresh rock; those of the smaller ones crumbly or in varying states of disintegration.

In excavation, separation takes place most readily along the slip surfaces between blocks. Where these are steep and approach parallelism with the canyon

(Continued on page 33.)

Clippings, Letters and Comment

Dealing With State Highways

Eureka Appreciative of Highway Work.

The following letter is self-explanatory:

EUREKA CHAMBER OF COMMERCE
Eureka, California, November 20, 1929.

California State Highway Commission,
Sacramento, Cal.

Gentlemen:

The board of directors of the Eureka Chamber of Commerce wishes to convey to you its sincere appreciation for the splendid work done by your body in construction work on the Redwood Highway and laterals these past few years, and especially during 1928 and 1929. We all realize the great benefit this has been to the State of California at large in giving the people access to one of California's most scenic attractions, and you may rest assured that this work on your part is greatly appreciated by this section of California.

Sincerely yours,
EUREKA CHAMBER OF COMMERCE,
President (Signed) Irwin T. Quinn.

* * * * *

"Marvelous Marin" Pulls Down Own Billboards.

This from the San Francisco *Chronicle* of November 26th:

By the time Saturday night rolls around, Marin County will be rid of all billboards advertising the county's charm. A dozen or more were pulled down yesterday and Harry G. Ridgway, president of Marvelous Marin, Inc., personally supervised their demolition.

In eliminating its own billboards, the county is taking a step long contemplated in the north bay region as a result of the program formulated by the Redwood Empire Association's highway beautification committee.

"As Marvelous Marin is affiliated with this association," said Ridgway yesterday, "we believe it would be inconsistent for us to maintain billboards in view of the stand that organization has taken. I realize that the billboard had its definite place in modern advertising and I can see no objection to well designed, well kept billboards when they are so placed they do not detract from the scenery or block the vision of motorists using the highways."

Commends Traffic Control at "Big Game."

Commenting on the manner in which traffic was handled at the California-Stanford football game, the San Francisco *Examiner* editorializes under the heading "Big Game Triumph Proves It Can Be Done," in part as follows:

The handling of the "Big Game" traffic by the state and peninsula motor police set up a target of perfection at which citizens and officers should begin shooting at once.

That immense torrent of steel and humanity flowed peacefully and uninterruptedly to and from the game. It flowed between the banks set by law in far more orderly fashion than do lesser streams of traffic on ordinary days.

The great problem of handling an emergency was met precisely because there WAS an emergency.

The experience with the tangled traffic of the Stanford-University of Southern California game a few weeks before had taught both citizens and authorities the need for law and order.

The motor police of the state and peninsula had thoroughly studied their "Big Game" strategy in advance, so that when the time came they were engineers guiding tons of traffic with their brains, not strongarm men shouting vainly at a brimming river pouring over all its levees.

The next great problem is how to profit fully by this triumph of modern transportation engineering.

* * * * *

Editor "Astray" on State Highways.

R. C. Harbison, editor of the San Bernardino *Sun*, in his column "The Editor Astray," has the following to say:

This California highway system—how it grows on one as he speeds over hundreds of miles of the pavement. Yet it is far from completed, as the report of the State Highway Department shows, and millions are being spent annually to extend and improve it. Special mention should be made of the efficient way in which the improvements are now made. There are few detours. The speedometer shows something over 400 miles from San Bernardino, past many construction gangs, yet only twice have we been off the pave-

ment, once for perhaps two miles past new construction, and once for a few hundred feet where an underpass is being built to avoid a grade crossing over the Southern Pacific.

* * * * *

Napa State Farm Expresses Appreciation.

The following letter is self-explanatory:

State of California
DEPARTMENT OF FINANCE

Yountville, November 4, 1929.

State Highway Commission,
Sacramento, California.

Gentlemen:

I wish to thank you and the members of your department for the splendid workmanship depicted in the body you recently built for the new Napa State Farm truck. It is most satisfactory and has received high praise from everyone who has seen it, in fact, I think it is the best and most carefully built truck body I have ever seen.

I thank you again in behalf of the Napa State Farm for the interest you have taken in this matter.

Very truly yours,

(Signed) OWEN DUFFY,
Superintendent Napa State Farm.

* * * * *

Yosemite Valley Road Bans Billboards.

This Associated Press dispatch was widely published both in California and elsewhere:

YOSEMITE, Nov. 13.—Ninety per cent of the billboards along the all-year highway, into the Yosemite Valley will be removed when their present leases expire, it was announced today by C. G. Thomson, recently appointed Mariposa County chairman of the State Chamber of Commerce campaign to clean up the scenic highways leading to national parks. Thomson said this assurance had been given him by land owners.

* * * * *

W. C. T. U. Praises Highway Patrol.

Papers using the Capitol News Bureau service, published the following article:

SACRAMENTO, Oct. 25.—Their white ribbons may be somewhat dusty, but California highway officers and the W. C. T. U. are one in spirit of temperance and law enforcement, documentary evidence disclosed today.

Congratulatory messages from the temperance organization because of the salutary conduct of patrolmen in session at San Diego, October 15, 16 and 17, simultaneously with W. C. T. U. convention reached Snook today via Captain Otto Langer, newly appointed chief inspector of the California highway patrol, and the news was promptly related to Assemblyman T. M. Wright of San Jose, author of the Wright act and chief of legislative dry contingents.

Kind Words Come From Australia.

The following letter from Australia is self-explanatory:

Department of Geology
THE UNIVERSITY OF SYDNEY

New South Wales, Australia,
15th October, 1929.

The Director,
California Highways and Public Works,
P. O. Box 1103,
Sacramento, Cal.

Dear Sir:

A friend recently lent me two copies of your official journal, Vol. 5, Nos. 2-3, Feb.-Mar. 1928 and Vol. 5, No. 4, April, 1928. These were the first copies of your splendid publication that I had seen, and I found therein matter of considerable interest and value. As lecturer in Economic Geology, including Engineering Geology for students of Civil Engineering in this University, I was keenly interested in the account of the "Six Legged Tetrahedron" and in the full report on the St. Francis Dam failure, as well as in other articles.

Might I be permitted to offer congratulations upon the excellent nature of your publication.

Thanking you in anticipation,

Yours faithfully,

(Signed) L. LAWRY WATERHOUSE,
Lecturer in Economic Geology.

* * * * *

Carrying Message For California.

It will be of interest to know that the message of California is sent through CALIFORNIA HIGHWAYS AND PUBLIC WORKS to the following places and countries out of the United States:

Capetown, Johannesburg, Pretoria, South Africa; Buenos Aires, La Plata, Argentina; Santiago, Valparaiso, Chile; Rio Grande, Brazil; Sydney, South Brisbane, Melbourne, Rockhampton, Australia; Canton, China; London, Yorkshire, Lincoln, England; Paris, France; Monforte, Italy; Cairo, Egypt; Yokohama, Tokyo, Kanagawaken, Japan; Mosco, Baku, Russia; Stockholm, Sweden; Tauranga, Auckland, Wellington, New Zealand; Ancon, Pedro Miguel, Canal Zone; Mexico City, Tijuana, Lower California, Mexico; Honolulu, Hawaii; Camaguey, Cuba; San Juan, Porto Rico; Juneau, Alaska; Vancouver, Victoria, Montreal, Canada; Rotterdam, Netherlands.

* * * * *

Steel Highways From Coast to Coast Forecast.

Highways made of one single strip of steel welded together and extending from coast to coast are predicted by Bennett Chappel, vice president of the American Rolling Mill Company, who recently addressed the annual convention of the International Acetylene Association.

Laboratory-ing California's Highways

By T. E. STANTON, Mem. A.S.C.E., Materials and Research Engineer*

THE SPECTACULAR side of road building, the side which appeals to the public fancy, lies in the operation of power shovels and dirt moving equipment, pavement mixers, and large trucks loaded with materials of construction that travel at high speed over roads already built en route to new work at some distant point.

T. E. STANTON

In due course the grading is completed and the new grade is surfaced according to the number and weight of vehicles the road is expected to carry.

The public takes it as a matter of course that whatever the nature of the pavement it should stand up without serious deterioration and always present a smooth, hard surface free from ruts, bumps, and chuckholes. It is the duty of the highway engineer to see that the public is not disappointed in this respect. To do this, however, he must be sure that the materials and methods used in the construction measure up to certain qualifications which have been determined by observation and research as requisite to insure success.

He has learned that if the foundation soil is of such a nature that it will swell when saturated with water and correspondingly shrink when dried out, it will tend to break up and disintegrate an otherwise economically designed and properly constructed pavement surface.

Having corrected foundation deficiencies by the addition of crushed rock, gravel, or sand there are many pitfalls which must be avoided during the construction of the pavement, such as the quality of the materials (rock, sand, cement, asphalt, steel, etc.) entering into its construction, as well as the manner and proportions in which these materials are put together.

Therefore, so that he may be warned in advance relative to the nature of the foundation soil, and the quality of construction materials to be used, the testing department is expected to keep the construction engineer out of trouble, and when trouble does occur, regardless of the knowledge and best efforts of testing and construction engineers, the research engineer steps in to find out what caused the trouble and devise ways of avoiding the same trouble in the future.

State highway departments in states with limited funds for road building are compelled to call upon commercial testing laboratories for assistance.

States with extensive construction programs usually have their own materials and research department.

California has always maintained its own department.

As the volume and variety of work has increased it has been necessary to gradually increase the facilities of the department until it is second to none in the country.

Probably no state in the Union has such a variety of pavement types under construction and maintenance as California. The size of the state and the wide range of climatic and physical characteristics makes this a logical development.

The wide variety of pavement types makes necessary the employment of laboratory experts in each type.

In addition to the physical testing laboratory, the department has a large and fully equipped chemical laboratory which handles chemical tests and analyses for other state departments, as well as the State Highway Department. The State Purchasing Agent depends on the chemistry laboratory for advice as to quality of much of the materials and supplies purchased for state institutions.

OUTLINE OF WORK

It is the duty of the department to investigate the soil from which the fills and subgrade are to be constructed. Moisture absorption, swell and shrinkage characteristics are studied in the laboratory. After a fill is constructed, if immediate hard surfacing is proposed, borings are made in the fills and tests made to

*This is the first of a series of two articles, dealing with the work of the Materials and Research Department of the Division of Highways. The second article, which will appear in the January issue of CALIFORNIA HIGHWAYS AND PUBLIC WORKS, will deal with some of the particular problems of highway construction upon which research is now being made.

ascertain if full settlement or compaction has been secured. If there is still danger of settlement, the pavement surface is omitted. Assuming that full compaction of the grade has taken place, the subgrade soil is then tested for shrinkage.

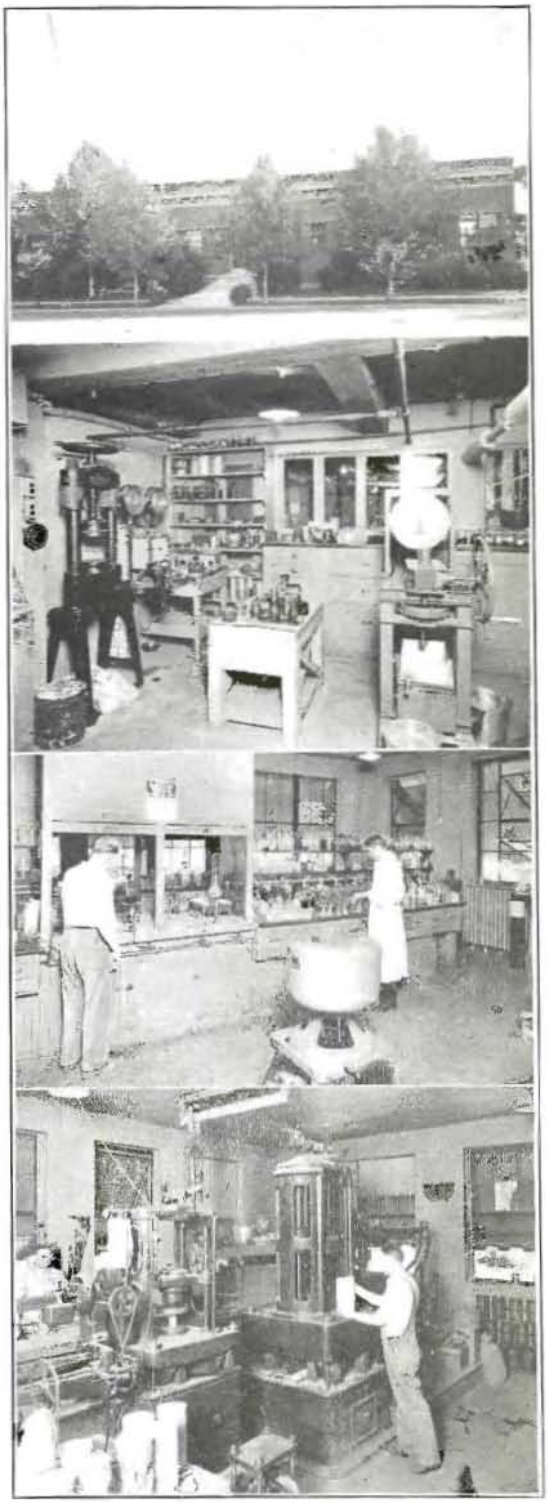
If the subgrade is of clay or adobe which has a high shrinkage value, as determined by laboratory tests, it is first treated or mixed with crushed rock or gravel and opened to traffic until thoroughly compacted. Frequently this subgrade material is mixed with road oil as a dust palliative. If, on account of the volume of traffic or other conditions, it is deemed necessary to pave immediately, the subgrade is first covered with a layer of rock or gravel. Failure to adopt this precaution in the past has frequently been the occasion of an early failure of the pavement surface.

When, for financial reasons or otherwise, an untreated waterbound base of crushed rock or gravel is to be constructed, the material proposed to be used for the purpose is tested at the laboratory to ascertain its resistance to wear. Determination by approved laboratory methods is also made of its binding value. If deficient in binding value, suitable binder material must be provided. Laboratory tests are made on the binding value of different fillers proposed for use, including tests to insure that the filler is of such a nature that it will not swell and mud up under traffic when wet.

If the surface is to be oiled, the materials engineer must ascertain the proper grade of asphaltic oil which should be used for the work proposed. When the oil is received it must be tested to insure that it has not been injured in the process of manufacture. Advice is furnished relative to the proper amount of oil for the aggregate which the contractor proposes to use. During the process of construction, samples of the completed work are forwarded to the laboratory for analysis and separation into component parts to ascertain if they are actually being put together in the proportions and manner which will insure the best results.

In asphaltic concrete pavement construction laboratory tests are not only made of the quality of the materials used in the work but also tests of the completed work to determine composition and stability of the compressed pavement mixture.

In Portland cement concrete work tests are made of the cement, as well as of the rock and sand. The cement is tested and the approved tested cement kept in sealed bins and released for construction projects on authorization from the laboratory.



Upper view shows testing laboratory in Sacramento. The three lower views show scenes where analysis and tests of highway materials are being made.

Grading, specific gravity, soundness, and void determinations are made of the rock and sand used in asphalt and Portland cement concrete construction, and advice furnished to the construction engineers relative to the proper proportioning of the materials which will give the best results. The work is frequently inspected in the field by representatives of the laboratory.

Concrete field cylinders and cores from the finished pavement are tested for strength on the crushing machines at the laboratory. Concrete beams are cast and broken in the field during the construction to ascertain when the new pavement is of sufficient strength to be opened to traffic.

Soil and aggregate is tested for detrimental alkalis and sand for organic matter.

Chemical analysis is made of water proposed for use in constructing concrete, as well as of the water used for domestic consumption in survey, maintenance, and construction camps.

Metal culvert material is inspected and tested chemically.

Steel reinforcing, structural steel and castings of iron and bronze are inspected at the mill and in the field and are tested physically and chemically in the laboratory.

Timber is inspected at the mill and in the field and when necessary is tested physically at the laboratory.

Paint is sampled and afterwards analyzed at the laboratory.

Expansion joint material is tested.

Everything else being equal, the volume of routine testing performed at the laboratory increases in direct proportion as the volume of construction increases.

There has been an increase in the demand on the testing laboratory following a better understanding of the part which thorough and rigid inspection and control of construction materials and methods bears to the quality of the completed work. The cost of laboratory control is cheap insurance.

As evidence of the rapid increase in volume of this type of work, we can refer to the records of the Division of Highways which show that during the fourteen years from the beginning of the state highway program in 1912 to 1926 an average of 3500 tests per year were made.

During the subsequent two-year period from July, 1926, to July, 1928, there were 26,519 tests performed, or 13,260 tests per year. From July, 1928, to July, 1929, the number increased to over 18,000 for the year. During the first four months of the current fiscal year, from July to October, inclusive, over 10,000 routine tests were made, and, in addition, approximately 20,000 salinity analyses of water for the Division of Water Resources.

To handle this large volume of routine work a thoroughly systemized organization is necessary.

To avoid confusion there must be a positive method of handling and recording samples when received and reporting tests when completed.

The variety of materials tested and the different tests and analyses to which most of the material must be subjected requires the use of carefully worked out printed cards and other forms.

ORGANIZATION

The organization is divided into five departments for routine tests with department heads in charge.

Work is distributed as follows:

1. Aggregate and Soils Department.

Field investigations and sampling of rock, sand and gravel deposits.
Inspection of rock plants.
Screen, sieve and wash analyses, rock and sand.
Void determination, rock and sand.
Specific gravity determination, rock and sand.
Soundness determination (L. A. Rattler) rock and sand.
Organic matter determination.
Alkali determination.
Silt determination.
Binder value determination (filler for waterbound base and surface).
Soils (shrinkage and moisture equivalent).
Compaction (roadway fills).
Screen analysis of fillers.
Miscellaneous tests and analyses.

2. Asphalt Department.

Sampling asphaltic cement, oils, asphaltic concrete, and oil mixtures.
Determination of proper grading of aggregate and percentages of asphaltic cement and oils for asphalt concrete base and surface mixtures, asphalt macadam and asphaltic oil mixes.
Determination of percentage of bitumen in field samples.
Determination of solubility of asphalt.
Determination of loss at 325°, penetration and viscosity of asphalt.
Determination of specific gravity of mixtures, asphalt, oils, etc.
Determination of flash and fire points.
Determination of stability of asphalt mixtures by Hubbard and Skidmore methods.
Determination of water in oil and aggregates.
Design of asphalt concrete mixtures.
Field inspection and advice on going contracts.
Miscellaneous tests and analyses.

3. Chemistry Department.

(Conducts chemical tests and analyses for all state departments.)
Analyses of paints, oils, varnish, shellac, etc.
Analyses of cement.
Analyses of corrugated metal pipe, reinforcing and structural steel, metal lath, etc.
Analyses of lubricating and fuel oils.
Analyses of asphaltic cements and emulsions.
Analyses of glue, coal, etc.
Analyses of prepared roofing paper.
Analyses of belting.
Analyses of water for domestic and construction use
Miscellaneous, including soap, waxes, calcium chloride, earth, clay, fillers, etc.

4. Concrete Department.

Cement sampling and testing, including making neat cement pats, setting time, boiling tests, and briquettes for tension tests.
Portland cement concrete, including making, curing, capping and breaking field and laboratory concrete test cylinders and beams.
Slump and flow table tests.
Sand mortar tests to determine sand strength.
Design of concrete mixtures for pavement and bridge construction.
Field inspection and advice on concrete construction.
Miscellaneous.

5. Steel, Castings, Timber, and Expansion Joint Department.

Mill inspection and sampling of reinforcing, structural, and culvert steel, cast iron, and bronze.
Laboratory physical tests of:
Phosphor bronze
Cast steel and iron
Reinforcing steel
Structural steel
Culvert steel
Asphalt dipping of metal culverts
Expansion joint material.
Mill inspection of timber, including redwood, Douglas fir, pine—treated and untreated.
Miscellaneous.
(This department has field and mill inspectors in the Los Angeles and San Francisco Bay districts.)

MODERN LABORATORY

In order to properly house and centralize the testing and research work, the Division of Highways has erected and equipped a modern laboratory building.

This structure is a one story and basement Class A building of brick, approximately 33 feet in width and 105 feet in length.

The center of the main floor is occupied by stenographic, clerical, and materials and research engineer's offices.

The chemical testing department occupies the west end and the physical testing the east end.

In the basement is located the asphalt department and the moist room of the concrete department. Back of the main building are additional sheet metal buildings which house the steel testing and overflow from the aggregate and concrete testing departments, as well as providing space for general storage purposes. There is a paved yard large enough to include storage bins for the various grades of aggregate used in the special tests.

The laboratory is well equipped with all necessary equipment and instruments for making tests.

SCHOOL FOR CONSTRUCTION ENGINEERS

In order that the field men in charge of engineering supervision on construction projects may have a thorough appreciation and understanding of laboratory control and tests of construction materials, arrangements have been made to have resident and assistant resident engineers spend two weeks at the laboratory in Sacramento where they are given instruction in laboratory and field control, sampling, and testing of materials.

Assignments for this purpose are made to the laboratory as these men can be spared from the field by district engineers.

It is proposed to combine a moving picture lecture course with the laboratory course. Motion pictures are being taken of good and poor construction methods. Similar pictures, preliminary to the laboratory work, will serve to illustrate methods of making tests.

The same pictures can be shown at the district offices to those who do not have an opportunity to attend the laboratory course at Sacramento.

Laboratory instruction should result in a better understanding of the value of laboratory control and an increase in quality of the finished construction work.

Upon completion of the laboratory course the construction engineer should be able to pass the following examination:

(1) Aggregates and Soils.

Describe methods used at laboratory or in field to determine:
(a) Screen or sieve and wash analysis, rock and sand.
(b) Void determination, rock and sand.
(c) Specific gravity determination, rock and sand.
(d) Soundness determination, rock and sand.
(e) Organic matter determination, rock and sand.
(f) Alkali determination, rock and sand.
(g) Silt determination, rock and sand.
(h) Binder value determination. Filler material for waterbound base and surface.
(i) Shrinkage and moisture equivalent determination of soils.
(j) Compaction determination of roadway fills.
(k) Effect of percentage of moisture on compaction of roadway fills.
(l) Equipment used and its operation.
State size of samples required for making above tests.
Describe method of sampling to secure representative sample.
Describe sample cards and laboratory report forms and procedure.

(2) Portland Cement and Concrete.

Describe:
(a) Method, number and size of cement samples from bins and cars.
(b) Method of making neat cement pats, setting time, and boiling tests.
(c) Method of making cement briquettes and determining strength.
(d) Method of making and curing field and laboratory concrete test cylinders.
(e) Method of capping, preparing and breaking test cylinders and cores.
(f) Method of making slump and flow table tests.
(g) Method of proportioning concrete and determining yield.
(h) Method of casting specimens and of making flexural tests.
(i) Water cement ratio and fineness modulus.
(j) What effect has excess water on strength of concrete and why?
(k) Describe method of making sand mortar tests.
(l) What proportions of cement and sand are used in sand mortar tests and why?
(m) Equipment used and its operation.

(3) Asphalt.

Describe:
(a) Size of samples and methods of sampling asphaltic cements, oils, asphaltic concrete, and oil mixtures, etc.
(b) Proper grading of aggregate and percentages of asphaltic cement and oils for asphaltic concrete, base and surface mixtures, asphalt macadam, and asphaltic oil mixes.

(Continued on page 31.)

Mammoth Pool Reservoir Site Survey Completed

Reclamation

Flood Control

Review of November Activities

In the

Division of Water Resources

EDWARD HYATT, Chief of Division

Water Rights

Water Resources

Investigation

Irrigation

WATER RESOURCES

San Joaquin Valley Investigation. The survey of the Mammoth Pool Reservoir Site was completed on November 18th. The area covered in this survey was 10,000 acres of very rugged mountainous country. The survey extended from the mouth of Big Creek, elevation 2150 feet, up the main channel of the San Joaquin River, twenty miles, to elevation 3600 feet. Mapping of this survey is one-half completed. Surveys on the Kings River, Kern River Exchange Canal, has been continued throughout the month. Thirty-eight miles have been completed to the Kaweah River. In this survey all railroads, streams, county roads, and state highways are located. Surveys on the lower San Joaquin River have been continued. These include obtaining all changes in alignment and additional artificial works such as dredge cuts, levees, etc., that have been constructed since the survey of the U. S. engineers was made. To date six miles of stream channel have been surveyed, thirty-eight miles of levee traversed, thirty-five miles inspected, and five new cutoffs located. About 15 per cent of the work outlined has been completed. This work has been carried forward from the Mossdale Bridge to the mouth of the Tuolumne River. Topography has been taken by field party, transferred from the Mammoth Pool Survey from the San Joaquin River toward the Kings River for a distance of about nine miles. This will be utilized in making a paper location in the office and then a final location in the field for an exchange canal between these two streams. Observations on the ground water conditions in Kern County area have been made for the year 1929 and forwarded to this office.

Intensive office studies are in progress and partially completed to determine the maximum possible utilization of all local water supplies on the areas susceptible of economic irrigation as determined by the land classification for the purpose of determining in what areas shortages exist and the importations required of foreign water to supplement the local supplies.

Sacramento Valley Investigation. Water supply studies. Sacramento River at Red Bluff and Bieber, and Upper Feather River have been continued throughout the month. Additional studies of yield have been made for the Iron Canyon Reservoir on Sacramento River and Indian Valley Reservoir on Feather River. Preliminary cost estimates have been completed on seven reservoirs on the Upper Feather River.

Classification of lands and crop survey has been continued. Up to date 2,500,000 acres have been covered.

Santa Ana Investigation. Agreement was reached with the representatives of the Tri Counties Association on Santa Ana River to conduct investigations of methods of conservation with particular reference to spreading on the cone of Santa Ana River and various creeks from San Gabriel Mountains to Cucamonga Basin. This is in addition to the cooperative work in Santa Ana Basin being carried on by the various branches of the federal government and this office. The matter involved is general plan for construction of works which will enable quantities of water to be diverted from Santa Ana River and spread on the cone where it will sink underground. The aim of the investigation will be to reach a plan whereby quantities of water unprecedented in spreading practice heretofore can be diverted. This involves serious questions of design and control of the stream after it has been diverted.

Salinity Investigations. Work in connectin with the salinity investigations has consisted merely of the maintaining of 76 regular salinity observation stations and the compilation of records and data obtained in surveys. Up to date 20,000 salinity samples have been taken and analyzed.

DAMS

As noted in our last report, the activities of this subdivision have been directed first to the prosecution of current work and second to the development of personnel and methods to adequately handle the duties imposed upon the department by the new law covering the supervision of dams, which became effective in August last.

During the present month applications have been received for two new dams, namely, the Sunset Canyon Dam of the Los Angeles County Flood Control District, and the Crouch Dam located in San Diego County. Sixteen applications have been received requesting approval of existing dams, and two applications for repairs or alterations of dams already built. During the present month $738.85 has been collected in fees by the department.

Regular inspections have been made of the important dams now under construction or being repaired. These are the San Gabriel Dam of the Los Angeles County Flood Control District, Juncal Dam of the Montecito County Water District, Santa Barbara County, Shaver Lake Dam of the Southern California Edison Company, Fresno County, Calaveras Dam of the city of Stockton, Calaveras County, Felt Lake Dam, Stanford University, San Mateo County, Chenery Dam, California Water Service Corporation, Contra Costa County and Lake Almanor Dam of the Great Western Power Company, Plumas County. In addition to the regular inspections and investigations of dams under construction, studies and analyses of the plans of the following dams have been made: San Gabriel, Juncal, Calaveras, Shaver Lake and Hansen.

In our last report we reviewed conditions existing at the San Gabriel Dam and noted that the Los Angeles County Flood Control District on October 26th, filed formal application accompanied by a filing fee of $14,875.23, requesting approval of the San Gabriel Dam as originally planned. The division will now take jurisdiction and make an investigation of the plans, specifications and foundations.

The report on the San Gabriel Dam investigation will be found on page fourteen of this issue.

IRRIGATION, WATER STORAGE DISTRICTS AND BOND COMMISSION

During the month financial and economic investigations were made of the Naglee-Burk, Palmdale and Little Rock Creek Irrigation Districts.

Petition for the organization of a new district to be known as the Dixon Irrigation District, located in Solano County, was approved by the County Board of Supervisors and filed with the State Engineer for investigation and report of feasibility.

The California Bond Certification Commission held a meeting on November 8, 1929, at which there was a hearing in the matter of the issuance of bonds by the Imperial Irrigation District for the development of their proposed power project.

The California Bond Certification Commission approved an expenditure of $14,805, by the El Dorado Irrigation District from its construction fund and construction work necessary in the development of the project.

RECLAMATION AND FLOOD CONTROL

Maintenance of Sacramento and San Joaquin Drainage District. The Sacramento by-pass has been cleared of timber growth by A. Mitchell, under contract at a cost of $875. Routine maintenance work on the project in Sutter County has been carried on, including maintenance clearing in the by-pass channels. A total of about twenty-five men is engaged in this work.

Cooperative bank protection work on the Sacramento River and its tributaries within the Sacramento flood control project is now considered a part of project maintenance, and the money for the state's portion of the cost is obtained from the flood control maintenance fund. Most of the items under this work have been previously reported under "Emergency flood control and rectification of river channels." The projects now under way or under consideration are as follows:

Reclamation Districts No. 535 and No. 673	$1,800
Robinson Bend on the Feather River	8,000
Sacramento River at Isleton in cooperation with the Division of Highways	14,000
Andrus Island in cooperation with Reclamation District No. 556—cost not yet determined.	
Reclamation District No. 730	16,000
Reclamation District No. 900	2,100
Randall Island in cooperation with Reclamation Districts No. 551 and No. 755	525

NOTE.—The above amounts include the total cost, of which the state contribution is one-third.

Emergency Flood Control and Rectification of River Channels. Arrangements have been made for protection at the head of Tyler Island, in cooperation with Tyler Island Farms and Libby, McNeill & Libby, at a total cost of $3,060, the work to be done under contract by Leonard Isham of Rio Vista.

Sacramento Flood Control Project. Good progress is being made in the work of by-pass clearing with the money provided from the "Joint navigation and flood control project fund."

In the upper Sutter by-pass and Butte Slough by-pass our own crew of eighty-two men is working under the direction of the maintenance foreman on by-pass clearing construction. These are all local men and no camp is maintained. The employment of these men relieves a serious unemployment situation in that vicinity, and the work is much appreciated. Many of the farmers on account of the hard season found it necessary to obtain outside work. An unusually high class of labor is being obtained.

In the lower Sutter basin, a crew of sixty-three men is camped on our floating river equipment, and is clearing timber adjacent to the river in Sacramento Slough. We have recently established a new camp for clearing operations at the east levee of Reclamation District No. 1500, opposite Lee Station, to accommodate approximately sixty men. This camp will be in full operation within a day or two.

Contract has been awarded to August Dententer of Marysville for clearing work in the channels of the state cut-offs at the junction of the Feather and Yuba rivers near Marysville. This work is approximately 70 per cent complete.

The work under the contract with P. D. Maritsas in the channel of the American River is progressing satisfactorily. He has at this date removed approximately 1100 piles and various other obstructions, consisting mostly of old bridge piers.

Russian River Jetty. On November 17th, the large quarry blast was shot, which broke down approximately 20,000 tons of rock. The shot was very successful, and the material was well broken up and well placed for handling. Approximately fifteen tons of powder were used. The balance of the work this season will consist of transporting this rock from the quarry and depositing it along the jetty. At the present time a crew of nineteen men is employed.

Pajaro River Flood Control. The work of clearing the channel of the Pajaro River is approximately 70 per cent complete and will probably be finished by the twenty-seventh of November. The work is being done by our own force under charge of Mr. Kelley, the river foreman. A total of $4,000 will be spent on this work.

Mokelumne River Improvement. On November 12 the work of clearing the channel of the Mokelumne River was commenced, in charge of our foreman, Mr. D. W. Roberts. This work is being carried on a day's labor basis, in collaboration with San Joaquin County. Our foreman has complete charge of the work, and one-half of the crew of fifty men is carried on the state pay roll and one-half on the San Joaquin County pay roll. Other expenses and purchases are being divided as nearly as possible on an equal basis. This work is done under authorization of Chapter 447, Statues of 1929, and a total of $10,000 is available, equally divided between the county and the state. The work being done consists of clearing timber and brush from certain portions of the overflow channel, and removing snags and other obstructions from the channel proper. The work is progressing upstream from the lowest point, and at present has been confined to the south bank on account of the unusual flow of water in the river.

Flood Measurements and Gages. A small crew has been engaged in putting the automatic and staff gages maintained by this office in proper condition for the winter operation, and arrangements are being made to take the necessary flood measurements should this be required.

WATER RIGHTS

Applications. During the month of October, 22 applications to appropriate water were received; 18 applications were rejected; 17 applications were approved; no permits were revoked; and 1 license was issued.

Other Activities. All other activities in connection with water rights, such as adjudication work, water master service, snow surveys, and the investigations in Southern California and in the coastal basins are going forward in the routine way. Progress is being made but there are no particular items to remark upon, except the conclusion of the Stanislaus River Adjudication Proceedings which is covered in the succeeding paragraph.

Stanislaus River Adjudication Proceedings. On November 14th, the superior court signed findings of fact and conclusions of law and entered a judgment and decree in the Stanislaus River Adjudication. This brings to a close proceedings which were initiated in 1916. This was the first adjudication attempted under the Water Commission Act and during its course many delays have been occasioned by attacks upon the constitutionality and various other features of the act. However, the act was upheld against all attacks and the conclusion of the proceedings was completed on the above date practically 13 years after they were initiated.

The adjudication covers 58 water rights scattered through five counties, Alpine, Calaveras, Tuolumne, Stanislaus and San Joaquin. Twenty-eight hundred and fifty cubic feet per second of direct diversion were decreed and approximately 128,300 acre-feet per annum of storage. The rights decreed provide for the irrigation of over 150,000 acres of land for development of over 50,000 horsepower of hydro-electric energy. The most important claimants whose rights were decreed were the Oakdale Irrigation District, South San Joaquin Irrigation District, Pacific Gas and Electric Company (Stanislaus power development) and the Utica Mining Company.

The findings of the decree are virtually the same as the final Order of Determination made by the Division of Water Rights and thus the decree is the same as the Order of Determination which was entered in 1923.

REGISTRATION FIGURES TELL STORY

The United States leads all other countries in motor vehicle registration, with 24,493,124 units. The entire foreign registration is only 7,285,000. The United States has 3,005,614 miles of roads—its nearest rival is France, with 440,085 miles. Argentina is the leading customer for American-built cars; Mexico has the most automobiles per mile of road with 37; Russia, with .06 has the fewest cars per mile of roads; the United States has the fewest persons per car, with 4.9; China has 17,000 persons for every motor vehicle there.

MOTOR VEHICLE DIVISION REPORTS

FRANK G. SNOOK, Chief

CAMPAIGN AGAINST FAULTY HEADLIGHTS

On October 15th the California Committee on Public Safety and various other organizations, cooperated with the superintendent of the California Highway Patrol in launching an educational campaign against faulty headlights. This campaign of education and warning was carried on for fifteen days. At its conclusion the highway officers, with the cooperation of the city police departments, started rigid enforcement at night throughout the state. The California highway patrolmen issued 12,730 citations to motorists up to November 11th, and we are still actively engaged in carrying out this work. Thousands of citations which have not been reported to the division as yet have been issued by police departments cooperating with the patrol.

EQUIPMENT OF HIGHWAY PATROL

On August 14th the division had 25 automobiles which had been purchased out of surplus budget allowance of the 30th fiscal year. All of these cars have been painted the distinctive color "white," and are now being operated upon the highways throughout the state by various inspectors and captains. Specifications have now been prepared for automotive equipment to completely equip the highway patrol.

HANDLING TRAFFIC AT THE "BIG GAME"

The expeditious manner in which traffic was handled at Saturday's "big game" reflects the value of the newly organized highway patrol.

A special meeting was held at the Cardinal Hotel at Palo Alto on November 8th, at which were present Mayor of Palo Alto, Mr. Albert R. Masters, general manager, Stanford Athletics, the Comptroller of Stanford University, chiefs of police of the various municipalities surrounding the peninsula district, traffic and operating officials of the Southern Pacific Company, the Chief Engineer of the California Automobile Association, a National Automobile Club representative, Superintendent Biscailuz, and other members of the California Highway Patrol, for the purpose of expediting the movement of traffic for the Stanford-California football game and the Stanford-Army game.

Superintendent Biscailuz offered the services of the California Highway Patrol to work in cooperation with the chief of police and traffic forces of the peninsula municipalities, and this offer was accepted wholeheartedly. Maps were furnished to Otto Langer, inspector at large in charge of the Bureau of Traffic, who instructed and placed the 60 men assigned to this work to their respective duties. These men were on

the ground Friday, November 22d, at noon. Stanford University made arrangements to furnish sleeping quarters for all men in one of their dormitories. Elaborate preparations were made, with the cooperation of the other interested officials, to bring about a satisfactory and efficient handling of a very difficult traffic situation occasioned by the lack of more than one major outlet from the stadium to San Francisco.

No traffic officers of the California Highway Patrol were allowed to be in attendance at the game, having been assigned to duty from 8 a.m., November 23d, until the whole situation had been cleared. The press was very helpful in advising the public how best to cooperate with the officers in charge.

INSTRUCT AUTOISTS IN MOTOR VEHICLE ACT

The synopsis of the Motor Vehicle Act has been published, in accordance with a statute passed at the last legislature. This act directed that the synopsis should be given with each original motor vehicle registration. The publication of this synopsis of motor vehicle laws is a part of the state-wide campaign for greater safety in the use of highways.

Governor Young contributed the following statement to the publication:

The highways of California have become the best in the world. Our job now is to make them the SAFEST.

Prevention of motor accidents, and the reduction of resulting deaths and injuries, is a duty incumbent not only on public officials, but on all citizens of the state.

The overwhelming majority of our motorists are careful and law abiding. With these the officers of our Highway Patrol must ever be friends and allies, all striving ceaselessly together to increase public safety.

The menace in highway travel lies with a small motoring minority. In this group are found the reckless and the criminally careless, the drunken and the grossly incompetent. These must be made either to reform or be forever eliminated from our highways.

I appeal to the individual motorist to recognize and ever remember the great outstanding fact that safety laws, even with the most rigid enforcement, will not keep accidents at an irreducible minimum, unless supplemented by safe practices on the part of individual drivers and individual pedestrians.

The goal of an irreducible minimum in accidents is a very proper standard for our California highways. The public should insist on a measure of safety that refuses to excuse any accident that is humanly preventable.

The lives of our people are too valuable to the state, and too precious to themselves and their families to be sacrificed through inattention and negligence.

Many conductors are not sold on the idea of publicity for the construction industry. They ask us what good it will do. Well; we are told that there are twenty-eight mountains in Colorado that are higher than Pike's Peak. We can't name any of them. And neither can you. But we all have heard of Pike's Peak because it has had so much publicity. So business is good in Pike's Peak and the twenty-eight higher peaks just stand there, and, we imagine complain that business is poor, wonder why people flock to Pike's Peak and refuse to believe in publicity—*Construction Advisor.*

NOVEMBER REPORT OF DIVISION OF ARCHITECTURE

GEORGE B. MACDOUGALL, Chief

Contracts of a total value of $366,149 were awarded during November. Projects on which bids are in but upon which awards had not been made (Nov. 21st) totaled $329,894. Projects out for bids showed a total of $31,900.

The list of projects upon which awards were made in November included the restoration of the stockade at Fort Ross; gate lodge at Tahoe Public Camp Grounds; painting work at the state nursery at Swingle; general work, heating and plumbing work; electrical work in reconstruction of ward buildings at the Mendocino State Hospital; addition to the Public Works Building; general work, heating, ventilating, plumbing and electrical work for the library and science building of the San Diego Teachers College.

Bids are now in for the general and complete mechanical work for the two barracks buildings of the Veteran's Home.

NEW ROAD REVEALS NEW STANDARDS

(Continued from page 7.)

Portland cement concrete pavement 20 feet wide was constructed in two standard 10-foot strips 6 inches to 9 inches thick.

Proposals were received on May 22, 1929, the contract being awarded to Frederickson & Watson and Frederickson Bros. of Oakland on a bid of $323,686.40.

The construction was standard throughout, the aggregates being proportioned at a central proportioning plant located near the center of the work, and hauled in batches to the mixer on the grade, where the cement was added and final mixing performed.

On this job a record average daily run of Portland cement concrete for the state highway work was obtained, being 360.4 cubic yards of concrete per day. The maximum daily run was 407.9 cubic yards.

The final cost of this improvement, including state furnished materials, supplemental work, etc., will be approximately $360,000, or about $41,000 per mile.

The contractor employed from fifty to one hundred men per month on this work during its construction.

The pavement was opened for through travel Saturday, November 16th.

Mr. C. A. Potter is resident engineer in charge of the work for the state.

November Highway Awards Described

Twenty-one state highway contracts were awarded by B. B. Meek, director of the Department of Public Works, in the thirty-day period between November 4 and December 4, 1929. The total of contractors' bids on these contracts was $1,504,950. This work is widely distributed over California. The improvements that will be secured by these contracts may be summarized as follows:

FOOTHILL BOULEVARD—The Johnson Construction Company of Los Angeles was awarded a contract to widen a bridge across San Gabriel River on the Foothill Boulevard near Azusa in Los Angeles County. This contract is a part of the general program of bridge-widening now in progress over California. The existing bridge is 21 feet wide. This is to be increased to a clear roadway width of 42 feet. A five-foot sidewalk is to be constructed on the south side of the bridge. The project will relieve the "bottle neck" at this point, resulting from the recent widening of the adjoining pavement to 40 feet. It lies on the main road between Los Angeles and San Bernardino. The contract price was $88,054.95.

COAST HIGHWAY—By a contract awarded to Gutleben Brothers of Oakland, a fine new bridge will replace the present old, narrow and dilapidated structure over San Luis Rey River near Oceanside in San Diego County. The new bridge will have three 265-foot steel deck truss spans and two 60-foot steel stringer spans on concrete piers and abutments. The bridge will have clear roadway width of 40 feet and a 5-foot sidewalk on each side. The approaches are to be graded and paved with Portland cement concrete and bituminous macadam. The contract price was $281,542.

A contract for cleaning and painting the bridge across the Santa Ana River south of Huntington Beach in Orange County was awarded to the L. A. Sandblasting Co. for $2,350.

A highway widening contract in Los Angeles and Ventura counties was awarded to the Southwest Paving Company of Los Angeles for $51,361. This contract lies between Calabasas and Conejo Summit. The project is about 19.6 miles in length. The road will be widened with oil-treated rock borders 2 and 3 feet wide, according to the width of the present pavement. This project is a part of the heavily traveled Ventura Boulevard between Los Angeles and Ventura.

Another Ventura Boulevard project was awarded to Griffith Company of Los Angeles. This project lies between Conejo Creek and Camarillo, a distance of about 2.3 miles. It will be graded and paved with asphalt concrete. The roadbed is to be constructed to a width of 40 feet with 20 feet of surfacing. The contract price is $38,288.50.

A third Coast Highway project, this one in Orange County, was awarded to the Macco Construction Company, Inc., of Clearwater, California. This project lies between Sunset Beach and Newport Beach, a distance of 6.4 miles. It will be graded and paved with Portland cement concrete. The roadbed is to be from 90 to 100 feet wide and the present pavement is to be widened to 30 feet. The wide roadbed will provide much needed parking space. The contract price is $201,545.15.

A contract for another widening job on the Coast Highway was awarded to the Cornwall Construction Company of Santa Barbara. This project is situated in Santa Barbara County between Eagle Creek and El Capitan Creek, a distance of 5.5 miles. The road will be widened with oil-treated crusher-run base. Contract price is $17,483.70.

LOS ANGELES TO BISHOP HIGHWAY—A contract for grading and surfacing with oil-treated crushed gravel or stone, 21.3 miles of this road was awarded to the Allied Contractors, Inc., of Omaha, Neb. This project is situated in Inyo County between Coso Junction and Olancha. The roadbed is to be 36 feet wide and the oil surfacing 20 feet wide. The project forms a part of the road from Mojave to Bishop. Adjoining this project on the north is a similar project recently completed. This work includes a general flattening out of the present undulating grades following closely the desert surface. The contract price was $239,792.50.

PACIFIC HIGHWAY—Grier & Taylor of Oakland were awarded a contract for surfacing 26 miles of the Pacific Highway in Shasta County between Bayha and La Moine. The surfacing is to consist of untreated crushed gravel on the existing roadbed and stockpiling screenings for a future armor coat. The project lies north of Redding in the Sacramento River canyon. The contract price is $59,941.50.

ALTURAS LATERAL—R. B. McKenzie of Red Bluff was awarded a contract to build six timber bridges on the Alturas lateral in Shasta County at points approximating from 40 to 60 miles east of Redding. The length of the bridges vary from one to seven 19-foot spans on frame bents with concrete pedestals. The contract price was $18,653.

CUYAMA LATERAL—The Los Angeles Decomposed Granite Company was awarded a contract to surface 12.2 miles of the Cuyama lateral with oil-treated crushed gravel 20 feet wide. This project lies in Kern County between Pentland and the San Emigdio Road. The Cuyama lateral is a secondary highway from the San Joaquin Valley south of Bakersfield to the coast at Santa Maria. It carries a very considerable trucking traffic to the west side oil fields. The contract price was $50,379.40.

CHOLAME LATERAL—A contract for grading a roadbed 36 feet wide and placing a bituminous macadam pavement 20 feet wide on 2 miles of the Cholame lateral was awarded to the Hartman Construction Company of Bakersfield. This section lies east of Lost Hills in Kern County. It is a portion of the Cholame Pass Road and the new section eliminates two dangerous right-angle turns. The contract price was $41,993.40.

REDWOOD HIGHWAY—The Engelhart Paving Company of Eureka was awarded a contract for surfacing 7.3 miles of highway in Humboldt County between Dean Creek and Fish Creek. The surfacing is to be 18 feet wide and screenings are to be stockpiled for future bituminous surface treatment. The project is located about 50 miles south of Eureka along the banks of the Eel River. The contract price is $27,050.

A similar project in Mendocino County covering a distance of 8.7 miles was awarded to Hemstreet & Bell of Marysville for $37,330.

Siemer & Kendall and J. F. Main of San Anselmo were awarded a contract for an overhead crossing over the Northwestern Pacific tracks near Greenbrae in Marin County. The crossing will consist of one 38-foot and two 21-foot reinforced concrete girder spans on concrete piers and abutments. The structure will provide a clear roadway width of 44 feet. This overhead structure is located on new alignment of the Redwood Highway between San Rafael and Sausalito. The railroad will bear one-half of the total cost. The contract awarded by the Division of Highways was for $17,190.

A second overhead crossing over the tracks of the same railroad, this one at California Park, in Marin County, was provided for in a contract awarded to Frederickson & Watson and Frederickson Bros. Construction Company of Oakland. This structure will consist of one 150-foot steel truss span on concrete piers, one 41-foot and one 28-foot steel beam spans on structural steel bents and 686 feet of timber trestle on pile and frame bents. A clear roadway of 44 feet 6 inches is provided. This structure is also on relocation between San Rafael and Sausalito. This relocation shortens the distance between these two points 4 miles. The question of the extent of participation of the Northwestern Pacific Railroad Company in the cost of this structure is now before the California Railroad Commission for determination. The contract price was $121,683.

The Butte Construction Company of San Francisco was awarded a contract for constructing a bridge across Corte Madera Creek at Greenbrae in Marin County. The bridge will consist of a bascule span over a clear channel of 40 feet, and approximately 355 feet of timber trestle approaches on pile bents. The contract price was $157,339.50.

MOTHER LODE HIGHWAY—The second oldest bridge in the state, a suspension structure across the North Fork of the American River, 2.5 miles east of Auburn. The new bridge will be a suspension span 322 feet in length with a clear roadway of 12 feet. The selection of this type of bridge was governed by the fact that the permanent location of this river crossing is dependent upon the building of a dam below the sight, so that the loss will be held to a minimum when the permanent structure is erected. The old bridge was built in the early 60's and is in a very poor condition. This contract was awarded to Smith Brothers of Eureka for $25,225.

CAJON PASS LATERAL—A contract for a reinforced concrete bridge near Cajon Station in San Bernardino County was awarded to Pittman & Hippenstiel of Riverside. The bridge will consist of three 20-foot spans on concrete piers and abutments with wing walls. It will have a clear roadway width of 34 feet. Approaches are to be graded to a width of 36 feet. Contract price was $13,087.57.

SAN DIEGO-EL CENTRO HIGHWAY — De Waard & Son of San Diego were awarded the contract to construct a subway under the San Diego and Arizona Railroad near Coyote Wells in Imperial County. The subway is to be of steel beam, timber deck on concrete abutments. This subway is on the new alignment, constructed after the old road was washed out in 1926. The contract price was $14,659.

There are poor people in the Tennessee mountains who live in such dilapidated shacks that every time it rains, they have to go out and get in the sedan.—*Kay Features.*

ACCEPTANCES OF HIGHWAY CONTRACTS

DEL NORTE COUNTY—Holderner Construction Co. of Sacramento for constructing various types of oil surfacing between Smith River and the Oregon line, Redwood Highway, 35.2 miles. Approximate cost $186,000.

DEL NORTE COUNTY—Holderner Construction Co. of Sacramento for crushing and stockpiling rock between Crescent City and the Oregon line, Redwood Highway. Approximate cost $15,100.

DEL NORTE COUNTY—J. E. Johnston of Stockton for constructing graded roadbed and placing untreated crushed stone surfacing from Klamath River and Wilson Creek, Redwood Highway, distance 7.2 miles. Approximate cost $242,000.

EL DORADO COUNTY—Contract of Lord & Bishop of Oroville for constructing a bridge across Tallac Creek about 8 miles north of Meyers on the Placerville-Tahoe Road. Approximate cost $9,600.

EL DORADO COUNTY—L. W. Hesse of Merced for constructing a graded roadbed between May's Station and the Nevada state line, Placerville-Tahoe route, 5.1 miles. Approximate cost $40,700.

HUMBOLDT COUNTY—Kern & Kibbie of Portland for furnishing and placing untreated crushed gravel or stone surfacing and stockpiling broken stone and screenings for bituminous macadam between Little River and Trinidad, Redwood Highway, 4.3 miles. Approximate cost of $28,600.

HUMBOLDT COUNTY—Ellison & Smith of Fort Bragg for constructing graded roadbed and placing crusher-run base between Mad River and Mill Creek, Redwood Highway, 0.9 of a mile. Approximate cost $37,900.

HUMBOLDT COUNTY—Butte Construction Co. of San Francisco for constructing a bridge and timber approaches about 4 miles north of Arcata, Redwood Highway. Approximate cost $78,000.

HUMBOLDT COUNTY—Englehart Paving Const. Co. of Eureka for placing untreated crushed rock surfacing and stockpiling bituminous macadam rock between Big Lagoon and Orick, Redwood Highway, distance of 3.3 miles. Approximate cost of $33,500.

HUMBOLDT COUNTY—E. C. Coats of Sacramento for constructing graded roadbed between Loleta and Beatrice, Redwood Highway, 3.7 miles. Approximate cost of $113,900.

LAKE COUNTY—Hemstreet & Bell of Marysville for placing oil-treated crushed rock surfacing between High Valley Creek and Abbott Mine, on the Ukiah-Tahoe route, 15.6 miles. Approximate cost of $111,200.

LASSEN COUNTY—F. H. Nielson, contractor for constructing timber bridge and cattle passes near Doyle on the Red Bluff-Susanville lateral. Approximate cost $34,000.

LASSEN COUNTY—C. C. Gildersleeve of Felton for constructing an undergrade crossing under tracks of Western Pacific Railroad near Doyle on the Red Bluff-Susanville lateral. Approximate cost $21,100.

LASSEN COUNTY—Meyer Rosenberg of San Francisco for constructing graded roadbed between Doyle and Long Valley Creek on the Red Bluff-Susanville lateral, distance 5.5 miles. Approximate cost $51,500.

LOS ANGELES COUNTY—Gibbons & Reed, Burbank, for surfacing certain crescent shaped areas with bituminous macadam between 0.8 of a mile north of Sandbergs and 2½ miles north of Sandbergs, main Valley route, at an approximate cost of $13,900.

LOS ANGELES COUNTY—Griffith Company of Los Angeles for constructing a graded roadbed and laying an asphaltic concrete pavement between Glendora and Claremont on the San Fernando-San Bernardino Road, 515 miles. Approximtae cost $333,500.

LOS ANGELES COUNTY—Gibbons & Reed of Burbank for constructing certain segments of bituminous macadam pavement between 1½ miles north of Kelly's and ½ mile north of Sandberg's, Valley route, 6.1 miles. Approximate cost $117,300.

MARIN COUNTY—Granfield, Farrar & Carlin of San Francisco for constructing graded roadbed and placing bituminous macadam surfacing at Alto, Tiburon-Alto route, about 0.6 of a mile in length. Approximate cost $26,100.

MONO COUNTY—D. C. Follis of Compton for grading at Hilton Creek, on Sausug-Owens Valley-Bridgeport Road, 1.6 miles. Approximate cost $17,200.

MONO COUNTY—Montfort & Armstrong of Sacramento for constructing a graded roadbed and placing untreated crushed rock surfacing between McGee Creek and Convict Creek, Tioga Pass route, distance 3 miles. Approximate cost $26,400.

ORANGE COUNTY—Steele Finley of Santa Ana for constructing a graded roadbed and placing Portland cement concrete pavement at Irvine, Coast route, 0.7 of a mile. Approximate cost $70,700.

PLACER COUNTY—Tieslau Bros. of Berkeley for constructing graded roadbed surfaced with oil-treated crushed rock at Magra, Auburn-Truckee highway, 1½ miles. Approximate cost $23,600.

PLUMAS COUNTY—Charles Harlowe, Jr., of Oakland for constructing graded roadbed and surfacing with crushed gravel or stone between westerly boundary and 2½ miles southwest of Chester on the Red Bluff-Susanville lateral, 6.2 miles. Approximate cost of $111,600.

SACRAMENTO COUNTY—George J. Ulrich Construction Co. of Modesto for building bridge across Arcade Creek about 11 miles east of Sacramento on the Auburn-Truckee road. Approximate cost $13,100.

SAN BENITO COUNTY—W. A. Dontanville of Salinas for surfacing portion of state highway from 7 miles north of Salinas to and including the town of San Juan, 2.4 miles. Approximate cost $11,000.

SAN BERNARDINO COUNTY—George Herz & Co. of San Bernardino for constructing graded roadbed and placing Portland cement concrete pavement between San Bernardino and Santa River bridge on the San Bernardino to El Centro route, distance 1.7 miles. Approximate cost $67,400.

SAN LUIS OBISPO COUNTY—M. J. Bevanda of Stockton for constructing timber bridge with graded and surfaced approaches across Yerba Buena Creek north of Santa Margarita on the main Coast Route (bridge and 0.2 of mile approaches). Approximate cost $9,900.

SAN LUIS OBISPO—M. J. Bevanda of Stockton for constructing graded roadbed and placing Portland cement concrete pavement between Cuesta and 1½ miles south of Santa Margarita, Coast route, for a distance of 1.9 miles. Approximate cost $104,500.

SANTA CLARA COUNTY—Tieslau Brothers of Berkeley for crushing and stockpiling coarse and fine screenings in stockpiles between La Honda Road and Saratoga Gap, San Francisco-San Jose route. Approximate cost $12,200.

SAN MATEO, SANTA CLARA AND SANTA CRUZ COUNTIES—Twohy Bros. and J. F. Shea Co. of San Francisco for constructing graded roadbed and placing untreated crushed rock surfacing between La Honda Road and Saratoga Gap, Skyline Boulevard, 13.8 miles. Approximate cost $712,400.

SISKIYOU COUNTY—M. B. McGowan of San Francisco for constructing a reinforced concrete bridge across Shasta River, Pacific Highway, 5 miles north of Yreka. Approximate cost $29,600.

SOLANO COUNTY—Frederickson & Watson Const. Co. of Oakland for constructing a graded roadbed and placing bituminous macadam surfacing between westerly boundary and 1½ miles west of Cordelia in the Jamison Canyon, 2.2 miles. Approximate cost $113,200.

TUOLUMNE COUNTY—Lilly, Willard & Biasotti of Stockton for constructing graded roadbed and placing oil-treated crushed rock surfacing between Sonora and Sullivan Creek, Mother Lode Highway, 1.6 miles. Approximate cost $45,700.

RELATION BETWEEN CONTRACTORS AND DIVISION OF ARCHITECTURE

(Continued from page 11.)

The passage of this legislation will work to the advantage of the contractor as well as to the state, in that the contractor will know that he is competing only against prequalified substantial contractors.

To date, the response to the questionnaire has been very gratifying, and the forms are being rapidly returned. In time, it is hoped to have a complete file of information on all contractors.

Under the terms of the Contractor's License Act, another bill that received legislative and executive approval, a contractor is defined as one who furnishes and installs labor and material for another, the cost of which exceeds the sum of two hundred dollars. Therefore, the Division of Architecture must obtain information on many kinds of contractors. Practically all of the work handled by the Division is by contract, and separate contracts for most every kind of building construction are entered into in the course of a year. General contracts, or contracts for a whole structure, of course, predominate, but minor contracts for such items as sidewalks, linoleum, window shades, water wells and what not, all come in due course, and contractors for all such miscellaneous items must also be both prequalified and licensed.

The licensing of contractors is not a function of the Department of Public Works but comes under the Department of Professional and Vocational Standards, a newly created Department, authorized by the legislature of 1929.

STATE HIGHWAY PATROL ORGANIZED

(Continued from page 4.)

No. 17 San Bernardino and Riverside. Headquarters, San Bernardino. Inspector Lyle J. Sanard.

No. 18—Orange, San Diego and Imperial. Headquarters, San Diego. Inspector, F. Vallejo.

CAPTAINS PROMOTED

The reorganization will promote the following captains to the rank of district inspector: F. J. Duncan, Merced County; Henry Livingston, Monterey County; K. C. Murphy, Ventura County, and W. E. Snell, Kern County.

W. P. Greer, inspector in the Fresno district, has been assigned to duties as inspector at Sacramento. Paul Maxim, inspector in Colusa County, has been reassigned as captain in Colusa County. Inspector A. J. Ford of San Francisco has been transferred to Sacramento headquarters.

PATROL ASSIGNMENTS

The following have been assigned to patrol duty without decrease in their present rate of pay:

H. E. Blackwell, district inspector at Fresno; E. J. Bradley, inspector at Long Beach; A. B. Crane, inspector at Los Angeles; Dave Curson, inspector in Colusa County; Mervin Holden, district inspector in Santa Barbara County, R. H. Emmett, inspector in Los Angeles, G. W. Griffin, inspector at Salinas and F. J. Bly, inspector at Red Bluff.

SALARY AND EQUIPMENT

All salaries of the officers are now being paid directly by the state instead of from motor vehicle registration funds apportioned to the various counties.

Automobiles of a modest but serviceable type have been purchased for officers engaged in night patrol duty. Equipment will be furnished by the state.

Payment of all salaries by the state has numerous advantages. Under the old plan, counties with a small registration of vehicles could not afford to employ traffic officers, in spite of the fact that traffic was heavy in many such counties in the summer. Under the new plan the state will be able to send men to these counties when they are needed to handle traffic.

Indeed, the new plan is very elastic, permitting the transfer of men from one location to another as the needs of the time may demand.

The new schedule of salaries was worked out as a means of creating a standard wage scale for all members of the patrol. Hitherto it was left to each county to fix the salaries, and the range was from $150 to $500 a month.

The new scale will wipe out the dissatisfaction that existed over these inequalities. It is based on the scale adopted by San Francisco and Los Angeles.

The scale of monthly salaries is as follows:

District inspectors, $255 to $285; captains, $225 to $250; patrolmen, $175 to $225.

OBJECTIVES OF ORGANIZATION

Every effort is being put forth to weld the new organization into a compact, energetic, highly-trained and fast-moving force of officers, each imbued with a sense of the responsibility of his job and with the necessity of maintaining the dignity and honor of the patrol.

Although the organization will not be military in character, the strictest discipline will be maintained, and the personal conduct of the officers, on and off duty, will be scrutinized carefully.

Strict obedience to the orders of superiors will be demanded at all times. Insubordination of any kind will be cause for dismissal from the patrol.

Uniformity of dress and neatness in appearance will be expected of every patrol member. This is being accomplished by the adoption of standard specifications for uniforms, in which every detail down to a buttonhole is described.

Officers are expected to maintain a dignified demeanor at all times while on duty. To this end smoking while on duty is prohibited. Nothing looks worse than to see a man in uniform trying to direct traffic with a cigarette or cigar in his mouth.

Uniforms must be kept neat, pressed and clean. Coats, if worn, must be kept buttoned.

Some of these regulations may seem arbitrary, but they go far toward impressing the public with the dignity and authority of the patrol and they impress the officer with a sense of discipline.

Plans are developing to require every officer to carry a first aid kit and to acquaint himself with first aid methods. This may enable the officer not only to save his own life upon occasion, but the lives of others involved in mishaps along the highways.

It is felt that the division of the state into traffic districts will assist in the task of welding the patrol into a compact body. The arrangement will bring the patrolmen into closer contact with their superior officers and bridge the gap between the motorcycle man and the central office.

INTERRELATION OF AIRWAY AND HIGHWAY TRANSPORTATION

(Continued from page 6.)

maximum that can be taken out of a business day. Such an arrangement leaves the air traveler four business hours, or half a day, in return for the extra charge made for airplane passage. It is therefore essential that facilities in such cases provide for night flying so that not more than one-half of the business day will be consumed in the air.

The personal emergency group, of course, have no uniform necessity. From the records of one leading operator it appears that more of this group charter special planes than travel on regularly scheduled operations.

Close observation of recent airplane development leads to the conclusion that the airplane may do on the long haul what the automobile has accomplished within the short haul range. Previously to the advent of the motor vehicle cities as we know them today were economically impossible. The speed and mobility of the automobile has extended metropolitan influences over a much broader range. The result has been that socially and economically city and county have merged. They retain separate identities only in political form and the present tendency is to eliminate the duplication of administrative effort by combining city and county governments.

It is entirely possible that the airplane, coming into general use, will extend this community interest over areas composed of whole states or parts of several states. Airplane passenger travel may bring points two hundred miles distant as close to city hall as are the present outskirts of any large city, provided airport facilities and highways to the business center are adequate. Similarly, by annihilating distance, airplane carriers may draw the great cities of the nation together.

Express is the third class of commodity opened to American airway transportation. While the volume of this type of service has not yet reached large proportions, it may eventually become a very important function of air transportation.

Starting in 1926, the development of airplane transportation has been very rapid, until in 1929 there are approximately 30,000 miles of airways of which 11,000 miles are lighted for night flying.

There are established at this time in the United States in excess of 425 municipal airports, 415 privately owned airports and 700 auxiliary airports. At the present time there are about 500 planes carrying mail in the United States. Forty-six air transport companies are flying 85,000 miles per day, about one-third of this mileage being flown during the night. Approximately 500,000 pounds of mail per month are being carried. Figures on passenger and express transportation for the entire country are not available. However, figures on the business of two of the largest airports on the Pacific coast—the Grand Central Terminal at Los Angeles and the Oakland Terminal at Oakland—may be indicative. At the present time the volume of traffic per month at the Oakland Terminal is approximately 13,300 pasengers and 1500 packages of express; at the Grand Central Terminal the monthly traffic is about 5100 passengers and 500 packages of express.

I have very briefly sketched the present scope of airway transportation. In all classes of such transportation the time between start and end of journey, including the item consumed in traveling between the airports and city, is the prime factor.

Were the established airway routes superimposed on a highway map of the United States it would be seen that the airways very closely follow the routes of the main highways. This is only natural when it is considered that, in overcoming topographical barriers, it is as economical for an airplane to seek the low summit in crossing a mountain range as it is for an automobile; that air transportation business lies between centers of population as does highway transportation; that emergency landing fields must be near a highway in order to function to the best advantage; that highways properly marked may serve as navigation aids to the airplane navigator.

Airways are composed of terminal landing fields or airports, intermediate or emergency landing fields to be used by planes desiring to land before they have reached their terminal designation and other navigation facilities, such as lighting, marking, radio communication and meteorological service. Under the present plan the federal government has undertaken the primary care of the emergency landing fields, beacons and meteorological service, leaving the matter of terminal airports to the local authorities and private corporations.

The principal types of transportation to date have been waterway, railway, highway, and airway. With respect to the manner in which they were and are being developed, they fall into two classes. Waterway and railway were developed by private corporations at their own expense, with some federal assistance in the case of the railways and canals. These two classes provide at their own expense all of their facilities such as boats, docks, trains, stations, roadbeds, etc. The highways and airways are of a different class. The public furnishes all the facilities except the vehicle in the case of the highway, and the airship and some of the airport terminals in the case of the airway. It appears, therefore, that development of airway transportation is a public matter and requires public or governmental direction and assistance similar to that extended to highway transportation.

To call attention to some specific air transportation problems relating to highways: In order for an airway transportation route to be justified the total elapsed time for transporting a commodity from a point from which the commodity could be shipped by other means to the ultimate destination must be shorter or else there must be a financial saving. At the present time there is no financial saving, therefore there must be a time saving. An airplane travels twice or two and a half times as fast as any other form of transportation, but there is from thirty minutes to one hour consumed between the airports and the ultimate destination. The saving in time may be accomplished by locating the airport as closely as possible to the center of population, by constructing highways between the airports and the centers of population so designed as to reduce the time of reaching the center of population to a minimum, or a combination of both. There is also the opportunity of bringing adjacent communities tributary to an airport terminal by laying out arterial highways leading between them and the airport, thereby enabling them to have the advantage of faster transportation, and permitting the larger communities to be distributing points for airway commerce.

The constructing of the airports presents problems very closely related to highway construction, involving as it does location of the port, grading of the site

and surfacing of the ground from which the ships take off and on which they alight. The location of the port involves many problems common to highway location adjacent to large centers of population, such as property values, elimination of traffic congestion, etc.

With the development of vacation travel by airway, particularly the weekend travel to mountain lakes and isolated resorts, the future weekend congestion on recreational highways leading to resorts may be relieved, although there will be the necessity of providing suitable landing fields adjacent to such resorts. Such a development might result in postponing or even eliminating the necessity for constructing high type recreational roads leading to such resorts. Transportation of materials and supplies into these regions could be handled by means of a very low type of road.

With all the publicity and propaganda that has been put out favoring aviation, and the efforts of this country to make the people air-minded and to develop aviation, to date there has not been any extensive volume of private flying. At a recent meeting in Los Angeles of the State Chamber of Commerce, it was very clearly brought out by one of the speakers that airplanes are being rapidly manufactured but that the problem of their use has not been a swered, and the factories are facing a serious overproduction.

Should private flying become popular and a machine of the flivver type with folding wings which could be run into one's garage be developed, small landing fields would be developed and these planes would have no effect on highway traffic other than to relieve congestion to a slight extent.

Illustrating the need for emergency landing fields for planes, there have been several instances in California where aviators were forced to land on the highway, one of these resulting in a wreck involving an automobile and a plane.

As indicating the trend of increase in flying compared with motoring, it is only necessary to compare the stage of improvement of the airplane at the close of the war and the number of private individuals using planes eleven years after the war with the progress and the increase in the volume of motoring during the same period.

The volume of traffic developed to date by airway transportation is not sufficient to make a very satisfactory determination of its effect on congestion of the highways leading to and from airports. There is nothing to indicate at this time that air transportation will not be a high-class transportation, supplemental to and with practically no effect upon the volume of highway transportation.

LABORATORY-ING CALIFORNIA'S HIGHWAYS

(Continued from page 21.)

(c) Determination of percentage of bitumen in sample.
(d) Determination of solubility of asphalt. State purpose.
(e) Determination of loss at 325°. What value, why made?
(f) Determination of penetration. Give weight, time, and temperature.
(g) Determination of percentage of A. C. in asphaltic oils.
(h) Determination of proper per cent of A. C. and oil from screen analysis.
(i) Determination of oil stain test.
(j) Determination of specific gravity of compressed samples.
(k) Determination of specific gravity A. C. and oils.
(l) Determination of flash and fire points.
(m) Determination of stability by Hubbard and Skidmore methods.
(n) Determination of water in oil.
(o) Describe equipment used and its operation.

(4) Steel—Castings—Timber—Expansion Joints.

Describe tests made and methods of sampling and testing:
(a) Phosphor bronze
(b) Cast steel
(c) Reinforcing steel
(d) Structural steel
(e) Culvert steel
(f) Asphalt dipping metal culverts
(g) Drain tile
(h) Timber (redwood, Douglas fir, pine—creosoted)
(i) Expansion joint material
(j) Equipment used and its operation.

How can inspected steel be identified in the field?
What is meant by yield or elastic limit of steel? Ultimate strength?
If a reinforcing bar fails on the bend test, what does it indicate?

(5) Chemical.

Describe:
(a) Analyses made of concrete mixing water and state why made.
(b) What constituents of highly mineralized water are likely to prove detrimental when used for mixing concrete?
(c) Method of analyzing water for domestic use. What care should be taken in sampling, and what quantity for analysis?
(d) Method of sampling metal culverts and size of samples.
(e) Method of analyzing steel, bronze, culvert material.
(f) How is soil sampled for alkali analysis and how is analysis made?
(g) What are the alkalis?
(h) How should paint be sampled when in (1) five gallon packages; (2) barrels?
(i) Describe method of analyzing paints.
(j) What chemical analyses are made of asphaltic (1) cements, (2) emulsions, (3) cutbacks?

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.

B. B. MEEK.....Director
GEORGE C. MANSFIELD.....Editor

Address communications to California Highways and Public Works, P. O. Box 1193, Sacramento, California.

Vol. 7 DECEMBER, 1929 Nov. 12

VIRGINIA—A booklet with the title, "Roads Are White Pages of History," designed as a key to inscriptions on Virginia highway historical markers, is being distributed by the State Commission on Conservation and Development, Richmond, of which William E. Carson is chairman and Elmer O. Fippin is executive secretary and treasurer.

The man who deals in sunshine
Is the man who gets the crowds.
He does a lot more business
Than the one who peddles clouds.
—*Schenectady Rotary Bulletin.*

No mere man can ever understand why a woman will pay five dollars for a pair of stockings that give the impression that she isn't wearing stockings.—Arkansas *Gazette.*

A TYPICAL CASE OF HIGHWAY DEVELOPMENT

(Continued from page 9.)

could be safely utilized, and a determined demand for the alleviation of the dust menace were all prominent features. The comparatively heavy traffic, however, did not tax the capacity of the road so much as the narrow roadway and the continuous heavy traffic taxed the ability of motorists to stay on the road and safely make the speed desired. Suppression of the dust menace became a problem for discussion and experiment; the maintenance of the graveled surface became a burdensome expense under the fast traffic; and as the density and speed of traffic increased, accidents increased in a growing ratio. In fact, the road was rapidly outgrown, and in 1923 the decision was reached to reconstruct the fifty-mile section from the entrance to the mountains, ten miles north of Redding, to Dunsmuir.

One of the lessons learned was that motorists do not appreciate the difference between valley and mountain construction, but demand a high speed road in all sections, particularly on main routes. As the new construction was through that portion of the canyon route where the heavier grades and sharper curves were located, and where traffic was slowed up to the greatest extent, it was, of course, desirable to eliminate as much of the heavy curvature as possible.

It was planned to build the new highway years into the future, ahead of existing demands sufficiently to insure permanence. Initial plans drawn up were for alignment surpassing in excellence any previous mountain construction on this route. The width was planned for an ultimate twenty-four-foot roadway to be rock surfaced at the time of reconstruction and paved at a later date, when traffic increases demanded it.

The new location was carefully studied with relation to the new requirements, keeping in mind the use of the original work to as great an extent as practicable. It was found possible to use the old road extensively, but at several locations it was found economical or desirable to discard portions and place the alignment on an entirely new location.

These major changes were all quite radical departures from the old line, and effected very desirable improvements. Of eleven changes, seven resulted in material decreases in mileage, while all of them resulted in betterments in alignment and grade. On six of the changes the construction of new bridges was involved, aggregating a third of a million dollars in cost, whereby circuitous routes down into low crossings of canyons were eliminated, and most of the saving in distance was accomplished. These decreases in mileage, added to the minor savings in distance accumulating through the entire work, aggregate a total decrease of 5 miles over the first construction, and approximately 10 miles over the original county road. Curvature was reduced to a minimum radius of 300 feet, and in the later projects, where the contour of the country lent itself more readily to longer radii, to an even higher standard.

Grades are such that the modern automobile may maintain a speed of forty miles per hour throughout. The reduction in the rate of grade is not so material as the decrease in adverse grade. The cutting down of summits and the bridging of deep canyons provided the greater part of the reduction, while the elimination of numerous small dips and rolls contributed to it.

The driving time between the two cities has been still further cut, so that now an average driver, attending strictly to the business of getting over the road, may make the trip in one and one-half hours. Improved alignment, a dustless surface and comfortable width take away the worry and fear which many motorists experience in the mountains, and the smooth surface provides an exhilaration and relaxation in place of former uneasiness, mental and physical.

The dust menace, one of the most disagreeable features of our early roads, was a detriment to traffic, and increased speeds and volume of traffic made the problem of its elimination both difficult and necessary. Persistent effort has had its reward, and present day roads of high type are as free from dust as a city street.

The reconstruction has a present width of twenty-six feet, upon which has been placed a twenty-foot course of crushed stone varying in thickness from six to eight inches. This crushed stone surface has been oil treated with heavy asphaltic oil, and the dust menace entirely eliminated. While this surface is adequate for present needs, it is, of course, a state of the ultimate improvement, as future increases in the volume of traffic and the greater economy in maintenance will bring about the construction of concrete pavement or other hard surface in time.

For the present legal speed of forty miles per hour, the reconstruction is amply safe, but probable future removal of the speed limit will doubtless bring with it a demand for further improvements in alignment, for the motorist of today demands a road equal to the speed capacity of his car. The past decade has seen an increase through this section from a summer peak of eight hundred cars to one of eighteen hundred daily, and traffic counts have indicated a yearly rate of increase which will double the volume of today in a period of ten years. The character of the traffic has shown a decided trend from light cars to a conspicuous percentage of heavy fast passenger buses and commercial trucks, adding to the burden of maintenance.

The first construction required eight years for its accomplishment, and was outgrown within ten years of its inception. Calculations of the earnings of this construction in operating costs and time saved show that the money was well spent and that the investment may be charged off as returned to the public with interest.

The reconstruction has required five years for completion, and at the present is capable of handling several times the traffic which passes over it. Savings have been effected which are not common knowledge to the public, but which justify the expenditure for the work.

The five-mile decrease in distance alone, with an average daily traffic of one thousand cars, coupled with the saving due to the elimination of maintenance, gives a comfortable total of $93,000 yearly, which will pay over one-half of the interest on the investment. The values of the smoother dustless surface, the lesser grade, and straighter alignment are all factors which tend to reduce operation costs, but which are difficult to evaluate. However, assuming that these refinements save in mechanical operation the inconsiderable sum of one cent per mile, the saving in one year will total $219,000. The value of the saving effected in time is remarkable, but must be partially based on assumptions. The saving of one and one-half hours in driving time and the average daily traffic of one thousand cars are definitely known. It may be reasonably assumed: first, that the average earning power of an individual is $5 per day, which would mean in this case a saving of $0.94 to each person passing over the road; second, that each machine,

(Continued on page 34.)

THE SAN GABRIEL DAM REPORT

(Continued from page 15.)

side, conditions are favorable to slumping of masses, such as the body of broken rock included in the recent "slide" at the northerly side of the west abutment excavation.

The test shafts, tunnels and borings so far made give little hope that the conditions described above will materially improve with continued excavation. These explorations indicate that no suitable foundation rock for a high masonry dam is available under portions of the west abutment to distances of at least 190 feet horizontally and 150 feet vertically beyond the present excavation lines.

East Abutment.

At the present time, the face of the east abutment excavation has the appearance of being less broken and more substantial than the west side. In excavating into this wall the rock has separated, leaving a face determined by a set of well-defined smoothed surfaces, nearly parallel to the natural slope at this side.

This coincidence of position of a plane of separation with the average slope of the canyon side is to an extent deceptive, for it gives less favorable opportunity to see the actual physical condition of the abutment rock than at the west side. In the top portions of the excavation, however, the same intricate combination of faulting and crushing appears as in the west side. There is reason therefore to anticipate that greater depth of excavation may show a similar degree of instability at other levels in this abutment.

While the present excavations and exploration tunnels in the east abutment give promise of more satisfactory foundations than are available in the west abutment, neither the tunnels nor the borings on this side extend far enough to definitely settle this point. Furthermore, even the best rears of rock in this abutment are sufficiently intersected by planes of weakness and joints, some of which contain soft material, to throw doubt on its suitability for a dam of the height proposed.

Canyon Bottom.

The bedrock in the floor of the canyon, as shown by the drill cores, and by the shafts now being put down, is of the same types of rocks as the canyon walls. In portions of many of the drill holes only a small percentage of core, or even no core, was recovered on account of the poor condition of the rock, and both fault-breccia and clay gouge are found in some of the cores.

The inference to be drawn from all available data that the foundation rock in the canyon bottom is more or less broken and is traversed by fault lines to an extent comparable to what is seen in the canyon sidewalls and abutment excavations. There is good reason to believe that strongly developed lines of break run lengthwise as well as across the canyon floor. Weathering and oxidization are not so general at this lower level, although these effects in certain places reach as deep as explorations have gone.

FOUNDATION STRESSES

The curvature of the proposed dam is slight, and no portion of the waterload has been assumed to be carried by arch action. The dam has therefore been designed as a gravity section, making proper allowances for the curvature in plan. The maximum compression in the concrete as calculated for a dam 492.5 feet high is 41.7 tons per square foot. This maximum compression occurs at or near the downstream toe of the dam with the reservoir full. With the reservoir empty a maximum compression of 31.2 tons per square foot is found to occur at or near the upstream heel of the dam. A compressive stress of 40 tons per square foot is generally accepted as safe practice for structures of this type, and with slight modification of the section, the stresses could in this case be reduced to 40 tons per square foot.

The calculated stresses are based upon the assumption that the resistance of the foundation rock is uniform at all points, and that every square foot of the foundation rock carries its proportion of the load. If substantial areas of the foundation rock are weakened by fault zones or other defects, such areas are rendered ineffective in supporting the structure and the more unyielding areas of the foundation rock will receive more than their proportion of the load. This result is due to the rigid nature of a concrete gravity dam, which will not yield sufficiently without rupture to impose its load upon the weakened and more yielding areas of the rock foundation. Where such conditions exist, the stresses in the concrete will be very materially increased, and might result in the failure of the dam.

The fundamental requirement for a high concrete gravity dam is that it be built on firm sound rock, of uniform compressibility. This condition does not exist at the San Gabriel site.

CONCLUSION

It is the unanimous opinion of this board that the foundation conditions are such that the dam proposed in Application No. D-175 can not be constructed without creating a menace to life and property.

SUPPLEMENTARY SUGGESTION

Site Suitable for Elastic Type of Dam.

While the primary purpose of this report as covered in the preceding pages is to advise on the safety of San Gabriel Dam, as proposed in the plans submitted by the Los Angeles County Flood Control District, the board, in its investigations, has come to the conclusion that the foundations and other conditions are suitable for a properly built flexible type dam of conservative proportions. Such a type would not only conform to foundation conditions, but would also provide a structure which can best withstand earthquake shock or earth movement.

The board is of the opinion that a combination earth and rock fill dam, placed by the hydraulic method with concrete core wall, can be safely constructed at the site under consideration. The location of the reservoir site above a thickly settled and highly improved valley necessitates unusual precautions in the design of the dam, such as limited height, adequate cut-off, large freeboard, flat slopes, and an ample downstream toe blanket. It calls for a spillway of generous capacity, designed for maximum flood occurrence. Unless conditions as now disclosed are found to be materially different upon further exploration, the board believes a safe dam of this general type can be constructed at this site. Such a dam should be of sufficient width up and down stream to provide a percolation distance (length of water travel) along the base of the dam, equal to at least eight times the maximum depth of water against the dam. In addition to these conservative proportions, the dam should be provided with a reinforced concrete core wall, extending a proper distance into the bedrock at all points, in order to increase percolation resistance. Sluiced material should also extend to bedrock in an open cut on the two sides of the core wall, the material immediately upstream from the concrete wall constituting

the impervious core, the material immediately below the core wall to consist of sand only. Such construction would prevent the travel of water in dangerous amounts either around or under the dam, and would provide a safe structure even though the concrete core wall were breached. The surface of the abutments above the crest of the dam should be brought to slopes that will prevent slides. Materials excavated to date from the abutments can be utilized in the earth and rock fill type of dam suggested above.

Respectfully submitted.

CHARLES P. BERKEY,
Consulting Geologist; Professor of Geology, Columbia University, New York.

G. A. ELLIOTT,
Chief Engineer and General Manager, Spring Valley Water Co., San Francisco, Cal.

M. C. HINDERLIDER,
State Engineer of Colorado, Denver, Colo.

GEORGE D. LOUDERBACK,
Consulting Geologist; Professor of Geology, University of California, Berkeley, Cal.

J. L. SAVAGE,
Chief Designing Engineer, United States Bureau of Reclamation.

IRA A. WILLIAMS,
Consulting Geologist, Portland, Oregon.

NEBRASKA—It is estimated that it will require 28,000 freight cars in Nebraska to move the material necessary in the season's road construction program.

NEW YORK—This state had 2,115,178 motor vehicles, about 7 per cent of all the cars in the world, in 1928. There were 1,836,968 operators and 757,118 chauffeurs licensed. Owners of automobiles paid $34,884,546.50 in fees to the state during the year.

COLORADO—Motorists along the main traveled highways will soon be able to locate historic and scenic attractions by signs. The Colorado State Highway Department and the Motor Club of Colorado assisted by counties and civic and commercial organizations will furnish the signs and see to their placement.

"Can we play at keeping store in here, mamma?"

"Yes, but I have a headache, so if you do you must be very, very quiet."

"Oh, all right, mamma, we'll pretend we don't advertise."

Isn't it strange that princes and kings and clowns that caper in sawdust rings,
And common people like you and me, are builders of eternity?
To each is given a bag of tools, a shapeless mass and a book of rules,
And each must make, ere life has flown,
A stumbling block or a stepping stone.

—*Author Unknown*

A TYPICAL CASE OF HIGHWAY DEVELOPMENT

(Continued from page 32.)

including passenger buses and trucks, averages three occupants; and third, that one individual out of every five is engaged in productive business, the other four being occupied with affairs of no value to anyone. On these assumptions, the saving approximates $206,000 yearly. These figures seem incredible at first thought, but there is little doubt that the saving in time and in operating costs on our improved highways is well nigh incalculable.

For the present, we have a highway which fulfills all of our needs and gives promise of handling future needs unless unprecedented demands are placed upon it. It is a typical case of the improvement accomplished all over the state during the past nineteen years, which in this instance has changed a mountain trail to a modern high class road; has cut the time of communication between the two cities at the extremes from a day's trip to a couple of hours; has changed a trip requiring physical endurance and stamina to one of relaxation and pleasure; has made a section of mountains and summer playgrounds easily accessible to the people of the state; has reduced the cost of operation manyfold; and which has served to stimulate the growth of the entire section.

In order to show a comparison of the various factors of interest in this development, the following table has been compiled:

	Original county road	First highway construction	Present construction
Date discontinued	1922	1929	In use
Minimum curvature	25-ft. Rad	50-ft. Rad	300-ft. Rad
Minimum width	10 ft.	16 ft.	26 ft.
Road surface	Earth	Gravel	Oil surface
Distance	69 miles	64 miles	59 miles
Average time	8 hours	3 hours	1½ hours
Average speed	8 m.p.h.	20 m.p.h.	40 m.p.h.
Av. summer traffic	50	800	1800

"That is a skyscraper," announced the guide.
Old Lady: "Oh, my! I'd love to see it work."

"Pappa vat is science?"

"My, how could you be so stupid! Science is dose tings vat say 'No smoking.'"

"Feed a cold and starve a fever," say the doctors. What we would like to know is why every girl we take out has a cold instead of a fever.—*London Opinion.*

Hal—"Women's clothes weren't much of a problem in the Garden of Eden."

Doc—"No, all you had to do was love 'em and leaf 'em!"

"'You's a liah.'
"'Say dat again, and I'll bust yore jaw.'
"'Consider it said again.'
"'Consider yore jaw busted.'"

Gwen—"So, when you went driving with Reggie you had to walk home? I didn't think that of Reggie."

Jen—"Oh, Reggie walked with me. The roadster really did run out of gas."—*The Garageman.*

State Highway Progress Reports

ALPINE COUNTY

The highway between Markleeville and Woodfords is being widened and surfaced. The Camino Construction Company is doing the widening. State forces are doing the surfacing.

AMADOR COUNTY

J. P. Holland's contract for grading 2.7 miles between Dry Town and Amador City, a portion of the Mother Lode Highway in Amador County, is complete. A contract has been awarded to Hemstreet & Bell for rock surfacing this job. This work is under way.

The Mother Lode Highway between Plymouth and Cosumnes River has been reconstructed practically throughout. J. P. Holland has completed the contract on the final portion.

CALAVERAS COUNTY

The grading job between Mokelumne Hill and San Andreas has just been completed by the Gabler Construction Company. This contract is on the Mother Lode Highway and eliminates the worst section of the road between the above towns. Bids were opened September 30th for surfacing this stretch with gravel. The Adams Co. were low bidders on this job.

COLUSA COUNTY

J. E. Johnston has a contract for placing bituminous macadam surfacing on existing pavement and constructing rock borders on each side of the existing pavement between Genevra (Berlin) and a point 2.6 miles northerly. Work will not be started until spring.

C. R. Merrill of Willows was awarded a contract for widening the roadbed between Colusa and Meridian. The work consists of widening the present narrow roadbed to a uniform width of 26 feet throughout. Work is under way and it is hoped to have it completed before winter rains set in. The financing of the project is from the State Highway Maintenance Fund.

DEL NORTE COUNTY

The Holdener Construction Company have completed their contract for oil surfacing 35 miles of the Redwood Highway from the new Hiouchi Bridge over Smith River to the Oregon line, and have also completed their contract for producing and stockpiling crushed rock for light bituminous surface work over the 22 miles of the Roosevelt Highway in Del Norte County between Crescent City and the Oregon line.

The bituminous surface was placed by state forces and was completed about the middle of October.

The Holdener Construction Company also have a contract for stockpiling crushed rock screenings over the 35 miles of the Redwood Highway between the Hiouchi Bridge over Smith River and the Oregon line. The work is well under way and is approximately 25 per cent complete.

The Webber Construction Company have completed their contract for constructing a concrete girder bridge over Hardscrabble Creek, approximately 6.7 miles east of the Hiouchi Bridge over Smith River.

J. C. Compton of McMinnville, Oregon, has completed the placing of bituminous macadam surfacing over 4 miles of the Redwood Highway, a point 5 miles east of Crescent City and the new Hiouchi Bridge over Smith River.

Drainage work over the same 4 miles is being accomplished by Smith Bros. who have the contract for placing perforated metal pipe underdrains. The work is approximately 25 per cent complete.

J. E. Johnston has just recently completed his two contracts in Del Norte County for grading and surfacing approximately 10½ miles of the Redwood Highway between the southerly Del Norte County line and Wilson Creek.

The Webber Construction Company have completed their contract for reinforcing 2 miles of the highway with crushed rock surfacing between the head of Richardson Creek and Klamath River.

EL DORADO COUNTY

Grading of 5.1 miles of the Lincoln Highway along the south shore of Lake Tahoe (May's Station to the Nevada state line) has been completed. The road, as constructed, is 36 feet wide with no sharp curves nor steep grades.

From Folsom to Placerville, construction of oil treated rock borders is nearing completion. The improvement is designed to correct the present narrow pavement and extremely sharp curves by placing 3-foot oil mixed rock borders which will provide a paved 18-foot traveled way, and will render this portion more capable of traffic demands to which this route is subject. Further improvement is being made by superelevating curves with oil treated material and constructing additional width on the inside of curves to flatten alignment where possible. This contract was awarded to W. H. Larson and is financed from the State Highway Maintenance Fund. All work will be completed by December 1.

Between Riverton and Kyburz, on Route 11, the grading of 5.75 miles is in progress. As a forest highway, this is a cooperative project to which $140,000 was subscribed as the state's share. This contract was awarded to G. E. Finnell and is under the supervision of federal engineers.

Between one mile north of Eagle Falls and three miles south of Meeks Bay, state forces are improving drainage conditions and placing disintegrated granite surfacing. The work is well under way and will be completed soon.

Hemstreet & Bell are working on a contract for surfacing with untreated crushed gravel that portion of the Mother Lode highway between Logtown and about 4 miles southerly. The work is being financed from the State Highway Maintenance Fund.

Nate Lovelace is working on his contract for grading between Bay View Rest and Eagle Falls. Progress is slow. If weather permits, the contractor will carry on his work through the winter.

HUMBOLDT COUNTY

The Webber Construction Company have the contract for producing and stockpiling bituminous macadam rock along the Redwood Highway for a 20-foot by 2-inch bituminous macadam between a point one mile south of Orick and the northerly Humboldt County line. It is intended that this rock shall be stockpiled during the winter in order that the Heafey-Moore Company, who have the contract for placing the bituminous macadam, may proceed with their contract as soon as weather permits next summer.

The Engelhart Paving and Construction Company have completed their contract for placing additional surfacing and stockpiling rock for bituminous macadam pavement on approximately 3.3 miles of the Redwood Highway between Big Lagoon and Orick. It is expected to let the contract for the placing of the macadam as soon as weather conditions permit next spring.

Kern & Kibbe have completed their contract for placing additional crushed rock surfacing of 4.3 miles of the Redwood Highway from Trinidad southerly to Little River and for stockpiling rock for bituminous macadam pavement over the same distance.

Heafey-Moore Company who have the contract for placing a 2-inch by 20-foot bituminous macadam pavement for the 10.7 miles between Mill Creek and Trinidad have completed that portion between Mill Creek and Little River, a distance of 6.4 miles.

The reconstruction of the highway between Mad River and Mill Creek, 0.9 mile, by Ellison & Smith, contractors, has been completed and the road is open to traffic.

Contractors Kennedy & Bayles have completed the grading and about 95 per cent of the surfacing for their contract of constructing the Redwood Highway between Arcata and Mad River.

The Butte Construction Company have completed the contract for the construction of the new bridge over Mad River and the new bridge and highway at this point are now in use by the traveling public.

It is expected that the construction of the overhead crossing of the highway over the Northwestern Pacific Railroad and the Arcata and Mad River Railroad, approximately one mile north of Arcata, will be completed during December, and that the new road between Arcata and Mad River will be open to traffic before the first of the year.

The grading of the new highway between Loleta and a point approximately 7½ miles south of Eureka, a distance of 7.3 miles has been completed by E. C. Coats of Sacramento. It is expected that a contract for surfacing this road will be let as early next spring as weather will permit.

E. C. Coats has also been awarded the contract for grading and surfacing a 28-foot standard roadway on that portion of the Redwood Highway between Fish Creek Grove and Stephens Grove, a distance of 3.2 miles.

The contractor is clearing, placing culverts and completing all excavation possible before heavy winter rains stop his operations.

The work is approximately 5 per cent complete.

Bids were received on November 13 for the grading of a 28-foot standard roadway and surfacing with 8 inches by 20 feet of crushed rock surfacing, that portion of the Redwood Highway from Garberville, 1.2 miles northerly to Bluff Creek.

H. H. Boomer was the low bidder and it is expected that work will start on this section within the next month.

The Engelhart Paving and Construction Company were awarded the contract for producing and placing 4 inches of additional crushed rock surfacing over the highway between Dean Creek and Fish Creek, a distance of 7.3 miles. The contractor has not yet started the placing of the material.

INYO COUNTY

From the southerly boundary of Inyo County to Little Lake, a distance of approximately 9.8 miles, Fred W. Nighbert is the contractor and February 10, 1930, should see the completion of this project within the allotted time limit. B. M. Gallagher is resident engineer.

From Little Lake to Coso Junction, a distance of approximately 3.7 miles, Fred W. Nighbert was also the successful bidder on the project adjoining his present contract. This project will be completed early in April, 1930, B. M. Gallagher being resident engineer.

From Coso Junction to Olancha, a distance of approximately 21.3 miles, the contract was recently awarded to the Allied Contractors, with the date of completion being set late in September, 1930. It is planned that S. C. Risley will be resident engineer on this project, and will likely be under way at an early date.

Standard culvert headwall posts are being placed throughout District IX, under the supervision of Frank Hagen.

It is planned to place Niterday signs on the paved portions of District IX, and it is expected that the Automobile Club of Southern California will start placing these at once.

Work will start in a few days widening the road north of Independence, and the work will be done by day labor forces, under the direction of Paul Peak, foreman.

Work has just been completed south of Lone Pine for the oiling of 10 miles of shoulders, under the direction of Carl Cleland, foreman.

KERN COUNTY

Plans have been completed for the continuation of the grading of a standard 36-foot roadbed and placing thereon 20 feet of oil-treated surfacing, from the end of the present improvement at Cinco to 7 miles north of Ricardo, a distance of approximately 16 miles. This project will likely be advertised soon, and will close the gap between Mojave and Sherwin Hill Summit, which is approximately 20 miles north of Bishop, which will mean, when completed, a continuous pavement of nearly 200 miles.

From 7 miles north of Ricardo to Coso Junction, there are at this time, five contracts under way, all of which provide for the construction of a standard 36-foot graded roadbed and the placing of an oil-treated

surface 20 feet wide. The first of these contracts, extending to Freeman, a distance of approximately 10.2 miles, is under contract to G. W. Ellis Company, and will be completed early in February, 1930, and is under the direction of V. E. Pearson, resident engineer.

From Freeman to the northerly boundary of Kern County, a distance of approximately 13.9 miles, Bartlett & Mathews, Black & Hagey, are the contractors. While the completion date has been set for February, 1930, it is believed that a 60 day extension of time will be necessary to complete this project, which is under the direction of V. E. Pearson, resident engineer.

Work is progressing rapidly for the placing of oil road mix shoulders between the city limits of Mojave and Cinco, a distance of 18 miles. This work is under the direction of Carl Cleland.

The work of placing surfacing and oil mixing certain portions of the road between Mojave and Kramer is under way and will be completed in the next few days. This work is under the direction of Ed Monroe and Carl Cleland.

LAKE COUNTY

The grading of the Ukiah-Tahoe road between Clear Lake Oaks and Sweet Hollow Summit has been completed by convict labor forces. From the summit to Abbott Mine the 20-foot graded roadbed is being widened to 24 feet.

Hemstreet & Bell have completed a contract for placing 20-foot crushed rock and oil-mix surface from High Valley Creek to Abbott Mine, about 15.6 miles.

Construction of a graded road, surfaced with crushed gravel or stone is under way between Lucerne and Clear Lake Oaks. The work is being performed under contract by von der Hellen, Pierson and Logan. This project will probably be complete by the first of the year. The completion, however, is contingent on weather conditions.

LOS ANGELES COUNTY

The contract for a line change immediately north of the Newhall tunnel has been awarded to McCray Co. Construction is started on this work. It is expected that this contract will be completed about next June.

Work on paving crescent shaped areas on the Ridge Route with bituminous macadam has been completed by Gibbons & Reed, contractors. These areas were left unpaved when alignment on this route was straightened by the state day labor forces. Emulsified asphalt was used in this work.

The work of grading the Newhall alternate line between Tunnel Station and the Santa Clara River is rapidly nearing completion. LaTourneau & Lindberg are the contractors. It consists of grading a 46-foot roadbed, 8.6 miles long, and eliminates from this route the Newhall tunnel and several dangerous curves in the vicinity of Newhall and Saugus. It is expected this work will be completed about December 1st.

Immediately after the completion of this grading work, a contract is to be let for paving with Portland cement concrete, 30 feet wide.

The first contract on the La Canada-Mt. Wilson Highway for grading 2.6 miles of 40-foot roadbed was awarded to H. W. Rohl Company on August 14th. Good progress is now being made.

MENDOCINO COUNTY

State forces are widening and straightening the roadway between the sidehill viaduct about 4 miles north of Lane's Redwood Flat and Red Mountain Creek. The road is being graded to a 24-foot standard width and surfacing with 8 inches of crushed rock surfacing.

Contractors Hemstreet & Bell have been awarded the contract for placing 4 inches of crushed rock surfacing on portions of the Redwood Highway between a point 2 miles south of Arnold and the Sherwood-Laytonville Road. The placing of the surfacing has not yet started.

MONO COUNTY

In the vicinity of Hilton Creek, D. C. Follis has recently completed 1.60 miles of state highway, which has been graded to a standard 24-foot roadway.

Between McGee Creek and Convict Creek, approximately 3 miles of standard 24-foot grade has been constructed, and a 20-foot crushed rock surface placed thereon by Montfort & Armstrong. W. Mathews was resident engineer on both these projects.

Between Mattly Ranch and Leevining, C. S. Miles is the contractor for the construction of 2.20 miles of grading a standard 24-foot roadway, to be followed with a 20-foot oil-treated surface. The mixing on this project is practically completed. A crusher-run base is approximately 95 per cent complete. The Armour top surface will very likely not be placed this year, owing to the inclement weather conditions which now prevail in this area. S. C. Risley is resident engineer on this project.

Surveys have been completed between Bridgeport and near Coleville by locating engineer, W. S. Dilliver. Plans will be prepared on the latter section in 1930.

Work is ready to start on the removal of blind and sharp curves on Sherwin Hill. These curves after widening will make the road much safer and high speed.

MONTEREY COUNTY

On the Coast Highway between Chualar and Salinas rapid progress is being made on the reconstruction work. The roadbed is being widened to 36 feet and a 20-foot asphaltic concrete second story pavement is being placed. The Peninsula Paving Company is the contractor. Within the limits of this project at Spence there is a change of line and an underpass of the Southern Pacific tracks. The underpass and approach is under supervision of the Bridge Department, and Triberti-Massaro are the contractors.

A change of line is being made at San Ardo to accommodate a new bridge across the Salinas River. The bridge, under the supervision of the Bridge Department, is being constructed by Ben C. Gerwick, contractor. The change of line and approaches to the bridge, 1.5 miles in length, involve grading a 36-foot roadbed and placing a 20-foot Portland cement concrete pavement. Frederickson & Watson Construction Company and Frederickson Brothers are the contractors.

Plans are complete for a change of line at the Bradley crossing of the Salinas River on the Coast Highway. The Bridge Department are preparing plans for the structure.

On that portion, San Simeon-Carmel Highway, being constructed by convict labor, a new bridge over the Little Sur River has been completed by Lord and Bishop, contractors.

On the San Simeon-Carmel Highway a timber bridge of ten 19-foot spans is being constructed across Villa Creek. H. C. Whitty of Sanger is contractor. This is on the portion of this road being constructed by convict labor from the camp located at Salmon Creek.

On the San Simeon-Carmel Highway construction work is in progress with convict labor. Two camps are maintained. At Little Sur a crew of 95 men and two power shovels are working and between Villa Creek and Alder Creek about the same number of men with three power shovels are working. About 7.3 miles of graded roadway has been completed. Surveys for the location of the road are in progress between the two camps.

NEVADA COUNTY

The Callahan Construction Company are working on their contract for grading and surfacing between Indian Springs and Soda Springs near the summit of the Colfax-Truckee Road. Travel is maintained through the construction with little inconvenience. On account of the many difficulties encountered on this work, the progress has been slow and it is doubtful whether this work will be completed this year.

C. B. Adams was awarded the contract for grading and surfacing 11.7 miles between Nevada City and Washington Road, and this work is well under way. This section, consistent with the rest of the Ukiah-Tahoe Highway, will consist of a 24 foot roadbed. An oil mixed crushed rock surface, 20 feet wide, is to be placed by the terms of the contract. The grading is practically complete and about 4 miles of untreated surfacing has been placed. On account of weather conditions, it will be impossible to oil treat the surfacing until warmer weather. Accordingly, this work will not be complete until some time in June.

NEVADA AND PLACER COUNTIES

Improvement is under way between Roseville and one-half mile north of Andrea Subway. The work is being done by J. E. Johnston. Bituminous macadam surfacing has been placed on the existing pavement and constructing rock borders is under way.

Between Airport and Indian Springs on Route 37, 9.3 miles of grading is in progress. This project covers the construction of a 28-foot roadbed and was awarded to T. E. Connolly. Construction will continue into next year.

ORANGE COUNTY

The contract for a line change 0.7 of a mile in length between Serra and San Juan Capistrano was awarded to Matich Bros. on August 12th. This work consists of constructing a 40-foot graded roadbed with Portland cement concrete pavement, 20 feet by 7 inches. Work is about one-half complete.

A contract for a line change to connect up the overhead crossing of the Atchison, Topeka and Santa Fe Railway at Irvine has just been completed. It consisted of grading 0.7 mile and paving with Portland cement concrete, 30 feet wide. Steele Finley was the contractor.

A contract for paving one-half width between Santa Ana and Anaheim was awarded on June 11th to Griffith Company. This section is 4.9 miles long. The paving work is being done in cooperation with Orange County, the state paying for a strip of pavement 28 feet by 7 inches, and the county paying for a like amount. The state's portion of this highway is completed and work has been started on the county's portion.

SACRAMENTO COUNTY

Larsen Brothers contract for grading and surfacing between Arno and McConnell on the highway between Sacramento and Stockton is well under way. This job will eliminate the dilapidated narrow trestles and road here.

SAN BENITO COUNTY

Surveys and the preparation of plans are in progress for bettering the alignment at several places, widening the roadbed and resurfacing the road between a point 3½ miles north of Hollister and the Pacheo Pass Road, a distance of five miles.

SAN DIEGO COUNTY

Work is in progress by the R. E. Hazard Contracting Co. of San Diego on constructing oil rock borders on portions of the Coast Route between the city limits of San Diego and Oceanside. It is expected that this work will be finished shortly after the first of the year.

A contract for grading the Rose Canyon Road between Balboa Avenue and Torrey Pines Road was awarded on August 13th to the R. E. Hazard Contracting Company. This section is 5.4 miles long and is to be a 46-foot graded roadbed. About one and one-quarter miles have been graded to date.

The contract for grading a roadbed 36 feet wide and placing of Portland cement concrete pavement 20 feet by 7 inches is in progress between Pine Valley and Kitchen Creek on the San Diego-El Centro Highway. It is expected that this section will be completed by the end of the year.

A contract for 4.5 miles of 38-foot graded roadbed between La Posta Creek and Miller Creek on the San Diego-El Centro Highway was awarded on May 27th to the Nevada Contracting Company. Grading is completed for a distance of about two and three-quarters miles.

A contract for grading 3.9 miles of 36-foot roadbed from Kitchen Creek to La Posta and paving with 20-foot by 7 inches Portland cement concrete was awarded on June 25th to Basich Bros. About two miles of rough grading is completed, and grading is now in progress on about one mile. This section is on the San Diego-El Centro Highway.

SAN JOAQUIN COUNTY

We have two contracts under way in San Joaquin County. The one between Mossdale and Banta, C. W. Wood, contractor, for grading and cement concrete

paving 3.1 miles, is progressing satisfactorily. This is on the highway between Stockton and Tracy, the main road to Oakland. The other is for grading and surfacing two line changes on the Hogan Road between Stockton and Manteca—the main highway between Stockton and Los Angeles. Lilly, Willard & Biasotti are the contractors. The work is well under way.

SAN LUIS OBISPO COUNTY

Work has been completed on grading and paving with 20-foot Portland cement concrete pavement between Cuesta and one and one-half miles south of Santa Margarita, a distance of 1.9 miles. This project greatly improved the alignment on the north side of Cuesta Grade. M. J. Bevanda was the contractor.

A line change 0.2 mile in length, including a 38-foot timber bridge has just been completed at the north edge of Santa Margarita, which eliminates a bad curve at that point. M. J. Bevanda was the contractor.

Work has been completed on resurfacing with bituminous macadam, the Cholame lateral from the Estrella River to the Sacramento Ranch, a distance of about six miles. A. Teichert & Son were contractors.

On the Coast Highway between Atascadero and Paso Robles, a distance of 9.6 miles, the road is being reconstructed with a 36-foot roadbed and a 20-foot asphaltic concrete pavement. In the vicinity of Graves Creek and Paso Robles Creek, is a major line change. The existing structure over Paso Robles Creek will be used, and a new structure has been constructed across Graves Creek under supervision of the Bridge Department. William Lane was contractor on the bridge and Steele Finley is contractor for the grading and paving.

In the town of Atascadero a local improvement district has awarded the contract to M. J. Bevanda for street improvements which include completing the street work full width through the town. This work is progressing.

Plans are nearly complete for the reconstruction of the Coast Highway from the Santa Maria River to Berros Hill, a distance of 7.2 miles.

Surveys have been completed for the reconstruction of the Coast Highway from San Luis Obispo to Cuesta Grade.

SANTA BARBARA COUNTY

On the Coast Highway near the Ventura County Line, a new bridge over the Southern Pacific track has been completed by Paul M. White, contractor. This structure is located on a major change of line 2 miles in length. This work, which is complete, involved grading a 46 foot roadbed and a Portland cement concrete pavement 30 feet in width. McCray Company of Los Angeles was the contractor.

Bids are being received on placing 4"x3'0" shoulders consisting of an oiled surface on crusher run base on the Coast Highway, west of Santa Barbara, between Eagle Creek and El Capitan Creek, 5.5 miles in length.

Plans have been completed for the reconstruction of the Coast Highway through Gaviota Canyon from Las Cruces to one mile north of Gaviota, 2.8 miles.

Plans are being prepared for the reconstruction of the Coast Highway from Wigmore to Zaca, a distance of 4 miles.

Surveys are complete and plans are being prepared for the reconstruction of a portion of the Cuyama lateral from the third crossing of the Cuyama River to the Kern County line, a distance of 38.2 miles. A portion of this project is in San Luis Obispo County.

SOLANO COUNTY

A serious traffic hazard is now removed by the completion of the grading and surfacing with bituminous macadam of the highway through Jamison Canyon between Napa County and Cordelia. This job also involved the moving of several miles of pipe lines which supplies the city of Vallejo.

TUOLUMNE COUNTY

A grading job 1.6 miles long on the Mother Lode Highway, now completed, gives a much improved entrance to Sonora, "Queen of the Southern Mines." This road connects the old road with the Columbia-Sonora Road already paved with asphalt concrete several years ago. Noble Brothers are the contractors. A contract for surfacing this job will be advertised in the near future.

Another job in the same vicinity is now completed. This is the Lilly, Willard & Biasotti contract for grading and surfacing with oil rock pre-mix of 1.6 miles on the Sonora-Mono Road just east of Sonora.

YOLO COUNTY

Plans and estimate have been made and the state is preparing to proceed with the improvement of Mullen crossing of the Southern Pacific Railroad, south of Woodland. The work to be done consists of grading and paving with Portland cement concrete pavement on line change to eliminate the present jagged and rough crossing. The grading has been completed and agreement for paving is being prepared. Neon tube railroad crossing signs will be installed over the road on each side of the crossing.

The state highway between Bretona and Dunnigan will be improved next season under contract by J. E. Johnston. The work will consist of placing bituminous surface on existing pavement and constructing rock borders.

YUBA COUNTY

The state highway between Dry Creek and Morrison's crossing is being improved by placing bituminous macadam surfacing on the existing pavement, rock borders are to be constructed on each side of the pavement. The work is being done under contract by J. E. Johnston.

Says Abie: "Cohen, I've been to the bank to borrow some money, and they say all I need is that you should sign to this note your name. Then I can have all the money I need. Ain't that fine?"

"Abie," says Cohen reproachfully, "you and I have been friends for many years, and yet you go to the bank when you need money. Abie, you just go again to the bank and say that they should sign the note, and then Cohen will lend you the money!"

Record of Bids and Awards

HIGHWAY BID OPENINGS FROM OCTOBER 30 TO NOVEMBER 27

HUMBOLDT COUNTY—Between Dean Creek and Fish Creek, about 7.3 miles in length to be surfaced with untreated crushed gravel or stone. Dist. I, Rt. 1, Sec. B. Hemstreet & Bell, Marysville, $33,120; E. C. Coats, Sacramento, $31,568. Contract awarded to Englehart Paving Const. Co., Eureka, $27,050.

HUMBOLDT COUNTY—Between Garberville and Bluff Creek, about 1.2 miles to be graded and surfaced with untreated crushed gravel or stone. Dist. I, Rt. 1, Sec. B. Contoules Const. Co., San Francisco, $92,746; W. H. Hauser, Oakland, $107,271; D. McDonald, Sacramento, $94,897; Tieslau Bros., Berkeley, $88,178; Mathew Const. Co., Sacramento, $131,192; Kennedy-Bayles Const. Co., Oakland, $111,704; J. E. Johnston, $96,840; E. C. Coats, Sacramento, $130,737; Young Bros., Berkeley, $96,522; C. R. Johnson, Portland, $94,070. Contract awarded to H. H. Boomer, San Francisco, $74,997.25.

IMPERIAL COUNTY—Undergrade crossing under San Diego and Arizona R. R. near Coyote Wells, consisting of one single track timber deck with steel beams about 32 feet long on concrete abutments with wing walls and 0.19 of a mile graded roadway. Dist. VIII, Rt. 12, Sec. A. Geo. Herz Co., San Bernardino, $19,899; V. R. Dennis Const. Co., San Diego, $19,991; Gist & Bell, Arcadia, $24,060; B. B. Boyd, San Diego, $17,421; Monarch-Breen, San Diego, $22,466; Lynch-Cannon Eng. Co., Los Angeles, $17,810; R. E. Hazard Const. Co., San Diego, $22,565. Contract awarded to De Waard & Son, San Diego, $14,569.

INYO COUNTY—Between Coso Junction and Olancha, 21.3 miles to be graded and surfaced with oil treated crushed gravel or stone. Dist. IX, Rt. 23, Secs. H and I. Isbell Const. Co., Fresno, $282,543; G. W. Ellis, Los Angeles, $240,255; Hemstreet & Bell, Marysville, $272,376; V. R. Dennis Const. Co., San Diego, $26,083. Contract awarded to Allied Contractors, Inc., Omaha, Neb., $239,792.50.

KERN COUNTY—Between Pentland and San Emigdio Road, 12.2 miles to be surfaced with oil treated crushed gravel or stone. Dist. VI, Rt. 57, Secs. B-C. Hartman Const. Co., Bakersfield, $59,607; Hemstreet & Bell, Marysville, $63,137; V. R. Dennis Const. Co., $72,372; Tieslau Bros., Berkeley, $57,774. Contract awarded to L. A. Decomposed Granite Co., Los Angeles, $50,379.40.

KERN COUNTY—Between 5 and 7 miles east of Lost Hills, 2 miles of grading and surfacing with bituminous macadam. Dist. PI, Rt. 33, Sec. C. M. J. Bevanda, Stockton, $47,073; Grier and Taylor, Oakland, $54,689; Tieslau Bros., Berkeley, $55,925; Pacific Pavement Co., San Francisco, $48,615; J. F. Shephardson, Bakersfield, $43,846; A. Teichert & Son, Sacramento, $47,641. Contract awarded to Hartman Const. Co., Bakersfield, $41,993.40.

LOS ANGELES COUNTY—Widening of bridge across San Gabriel River, on Foothill Boulevard, near Azusa, by constructing eleven 54-foot and one 31-foot reinforced concrete girder spans and twenty-one 18-foot timber trestle spans. Dist. VII, Rt. 9, Sec. G. S. M. Kerns, Long Beach, $96,906; De Waard & Son, San Diego, $94,462; Carpenter Bros., Inc., Beverly Hills, $89,718; Whipple Engineering Co., Monrovia, $94,320; Oberg Bros., Los Angeles, $91,721. Contract awarded to Johnson Const. Co., Los Angeles, $88,-054.95.

LOS ANGELES AND VENTURA COUNTIES—Between Calabasas and Conejo Summit, 19.6 miles to be widened with oil-treated rock borders. Dist. VII, Rt. 2, Secs. C, A and P. Gibbons & Reed Co., Burbank, $62,146. Contract awarded to Southwest Paving Co., Los Angeles, $51,361.

MARIN COUNTY—Overhead crossing over the N. W. P. R. R. near Greenbrae, consisting of one 28-foot and two 21-foot reinforced concrete girder spans on concrete piers and abutments with wing walls. Dist. IV, Rt. 1, Sec. C. C. C. Gildersleeve, Felton, $17,500; MacDonald & Kahn, Inc., San Francisco, $22,265; J. F. Barrett and H. H. Hilp, San Francisco, $19,656; McDonald & Maggiora, Sausalito, $24,001; M. B. McGowan, San Francisco, $17,973; A. T. Howe, Santa Rosa, $17,635; Frederickson and Watson Const. Co., $19,701. Contract awarded to Siemer & Kendall, and F. J. Main, San Anselmo, $17,190.

MARIN COUNTY—Overhead crossing at California Park over the N. W. P. R. R. One 150-foot steel truss span on concrete piers, and one 41-foot and one 28-foot steel beam spans with 686 feet of timber trestle. Dist. IV, Rt. 1, Sec. C. C. J. Nystedt, Sacramento, $129,800; W. L. Proctor, Santa Rosa, $126,-190; Pan Pacific Piling and Const. Co., Los Angeles, $145,209; MacDonald & Kahn, Inc., San Francisco, $134,716; Rocca & Caletti, San Rafael, $128,518; Lord & Bishop, Oroville, $123,808; M. B. McGowan, San Francisco, $126,156; Healey-Tibbetts Const. Co., San Francisco, $126,780; Butte Const. Co., San Francisco, $125,109. Contract awarded to Frederickson & Watson Const. Co., and Frederickson Brothers of Oakland, $121,633.

MARIN COUNTY—Bridge across Corte Madera Creek at Greenbrae on the Redwood Highway, consisting of a bascule span over a clear channel of 40 feet and approximately 855 feet of timber trestle approaches on pile bents. Dist. IV, Rt. 1, Sec. C. M. B. McGowan, San Francisco, $188,202; Pan Pacific Piling & Const. Co., Los Angeles, $179,061; Frederickson & Watson Const. Co., Oakland, $171,-855; Rocca & Caletti, San Rafael, $167,958; Lord & Bishop, Oroville, $168,838; C. J. Nystedt, Sacramento, $166,554; Fred J. Maurer & Son, Inc., Eureka, $176,-123; Healey-Tibbitts Const. Co., San Francisco, $176,-735; The Duncanson-Harrelson Co., San Francisco, $166,806. Contract awarded to Butte Construction Company of San Francisco, $157,339.50.

MENDOCINO COUNTY—Between 2 miles south of Arnold and the Sherwood-Laytonville Road, 8.7 miles to be surfaced with untreated crushed gravel or stone. Dist. I, Rt. 1, Secs. F and G. Tieslau Bros., Berkeley, $37,575; McDonald & Failing, Tres Pinos, $40,227. Contract awarded to Hemstreet & Bell, Marysville, $37,330.

ORANGE COUNTY—Between Sunset Beach and Newport Beach, 6.4 miles to be graded or paved with Portland cement concrete. Dist. VII, Rt. 60, Sec. A. Matich Bros., Elsinore, $203,100; Jahn & Bressi Const. Co., Los Angeles, $203,004; C. G. Willis & Son, Inc., Los Angeles, $208,988; Griffith Co., Los Angeles, $208,214; Sander Pearson, Santa Monica, $224,713. Contract awarded to Macco Const. Co., Inc., $201,545.14.

ORANGE COUNTY—Cleaning and painting bridge across Santa Ana River, south of Huntington Beach. Dist. VII, Rt. 60, Sec. A. Industrial Maintenance Engineering Co., Los Angeles, $2,600. Con-

tract awarded to L. A. Sandblasting Co., Los Angeles, $2,350.

PLACER AND EL DORADO COUNTIES—Bridge across the north fork of the American River, 2½ miles east of Auburn, consisting of 322-foot suspension span with timber trusses and timber deck. Dist. III, Rt. 65, Sec. A. F. H. Nielson, Orland, $30,248; E. B. Skeels, Roseville, $26,317; Lord & Bishop, Oroville, $25,640; Mathews Construction Co., Sacramento, $26,995; Butte Construction Co., $26,225; M. B. McGowan, San Francisco, $29,930. Contract awarded to Smith Bros. Co., Eureka, $25,245.

SAN BERNARDINO COUNTY—Reinforced concrete bridge near Cajon Station, three 20-foot spans on concrete piers and abutments with wing walls and 0.16 of a mile roadway grading. Dist. VIII, Rt. 31, Sec. B. Oberg Bros., Los Angeles, $14,458; A. R. & Co., Rodenhamer, Hemet, $17,496; Martin Green, San Bernardino, $15,018; George Herz & Co., San Bernardino, $16,989; Gist & Bell, Arcadia, $14,316; Franklin B. Gridley, Pasadena, $18,279; Whipple Engineering Co., Monrovia; $14,710. Contract awarded to Pittman & Hippenstiel, Riverside, $13,087.57.

SAN DIEGO COUNTY—Bridge across San Luis Rey River, near Oceanside, consisting of three 265-foot steel deck truss spans and two 60-foot stringer spans on concrete piers and abutments and grading and paving approaches with Portland cement concrete and bituminous macadam. Dist. VII, Rt. 2, Sec. C. Pan Pacific Piling and Construction Co., Los Angeles, $287,912; Carpenter Bros., Inc., Beverly Hills, $295,240; Sharp & Fellows Contracting Co., Los Angeles, $311,218; Butte Construction Company, San Francisco, $334,159; Chas. and F. W. Steffgen, San Diego, $305,062; Edwards, Wildey & Dixon, Los Angeles, $334,498; S. M. Kerns, Long Beach, $325,965; Lynch-Cannon Engr. Co., Los Angeles, $291,359. Contract awarded to Gutleben Brothers, Oakland, $281,542.

SANTA BARBARA—Between Eagle Creek and El Capitan Creek, about 5.5 miles to be widened with oil-treated crusher-run base. Dist. V, Rt. 2, Sec. G. Hunter & Richardson, Santa Barbara, $21,562. Contract awarded to Cornwall Construction Co., Santa Barbara, $17,483.70.

SHASTA COUNTY—Between Bayha and La Moine, 26 miles to be surfaced with untreated crushed gravel or stone. Dist. II, Rt. 3, Secs. B and C. Tieslau Bros., Berkeley, $66,886. Contract awarded to Grier & Taylor, Oakland, $59,941.50.

SHASTA COUNTY—Six timber bridges on Redding-Alturas lateral at points between 40 and 60 miles east of Redding, bridges varying from one to seven 19-foot spans on frame bents with concrete pedestals. Dist. II, Rt. 28, Secs. C and D. F. H. Nielson, Orland, $24,464; O. N. Pierce, Portland, Ore., $19,831; A. Young, $33,270. Contract awarded to R. B. McKenzie, Red Bluff, $18,653.

VENTURA COUNTY—Between Conejo Creek and Camarillo, 2.3 miles to be graded and paved with asphalt concrete. Dist. VII, Rt. 2, Sec. B. Osborn Co., Pasadena, $45,526; Cornwall Construction Co., Santa Barbara, $38,288; Southwest Paving Co., Los Angeles, $43,249. Contract awarded to Griffith Company, Los Angeles, $38,288.50.

NEW MEXICO—Bidding anew for greater touring business to the southwest, the highway department has recently published 50,000 copies of a highway map of the southwestern states. The map is being distributed free on request to touring bureaus and individuals all over the United States.

AWARD OF CONTRACTS DIVISION OF ARCHITECTURE NOVEMBER 12 TO NOVEMBER 29

STATE NURSERY near Swingle Station, Sacramento-Davis route; for painting work. Contract awarded to Zeb Knott of Richmond; price $924.

WARD BUILDINGS, reconstruction of, Mendocino State Hospital, Talmage, for general work. Contract awarded to Sorensen and Haggmark of San Francisco; price $98,900.

For heating and plumbing work on above building, contract awarded to Pemberton Heating & Ventilating Co. of Los Angeles; price $16,200.

For electrical work, same buildings, contract awarded to Eddy Electric Co., Stockton; price $2,390.

ADDITIONS TO PUBLIC WORKS BUILDING, Sacramento, for general work; contract awarded to Geo. D. Hudnutt, Inc., Sacramento; price $12,061.

For complete mechanical work to above building; contract awarded to Latourrette-Fical Company of Sacramento; price $1,853.

SAN DIEGO STATE TEACHERS COLLEGE, Library and Science Building, for general work; contract awarded to Pettifer Hunt Company of San Diego; price, $182,930.

For heating, ventilating and plumbing work, same building; contract awarded to Pemberton Heating and Ventilating Co. of Los Angeles; price, $33,500.

For electrical work, same building, contract awarded to the American Electrical Construction Company of Los Angeles; price, $13,498.

TWO BARRACKS BUILDINGS, Veterans' Home, Napa County, for general work; contract awarded to J. F. Shepherd of Stockton; price $272,036.

For complete mechanical work on the same building, contract awarded to Latourrette-Fical Company of Sacramento; price $55,570.

WATER PERMITS AND APPLICATIONS

Permits to Appropriate Water, Issued by the Department of Public Works, Division of Water Resources, During the Month of November, 1929.

LOS ANGELES COUNTY—Permit 3356, Application 6325. Issued to Farmers and Merchants National Bank of Los Angeles, Cal., November 1, 1929, for 0.12 cubit foot per second from Unnamed Spring in Section 21, Township 7 North, Range 15 West, S.B.M. for irrigation and domestic purposes on 10 acres.

EL DORADO COUNTY—Permit 3357, Application 6031. Issued to Augusta H. Lemmon, Palo Alto, Cal., November 2, 1929, for 200 gallons per day from Lemmon Spring in Section 11, Township 12 North, Range 17 East, M.D.M. for domestic purposes. Estimated cost $100.

RIVERSIDE COUNTY—Permit 3358, Application 4751. Issued to Palm Valley Water Company, Palm Springs, Cal., Novemer 2, 1929, for 900 acre-feet per annum from Chino Creek in Section 7, Township 4 South, Range 4 East, S.B.M. for domestic purposes. Estimated cost $2,500.

EL DORADO COUNTY—Permit 3359, Application 6092. Issued to Ruth C. Mermod, Fallen Leaf,

Cal., November 2, 1929, for 200 gallons per day from Unnamed Spring in Section 15, Township 12 North, Range 17 East, M.D.M. for domestic purposes. Estimated cost $50.

EL DORADO COUNTY—Permit 3360, Application 6093. Issued to O. L. Sponsler, Palo Alto, Cal., November 2, 1929, for 200 gallons per day from Unnamed Spring in Section 15, Township 12 North, Range 17 East, M.D.M. for domestic purposes. Estimated cost $50.

TRINITY COUNTY—Permit 3361, Application 6211. Issued to Gus A. Tinsley, Salyer, Cal., November 4, 1929, for 6 cubic feet per second from Corona Creek in Section 17, Township 6 North, Range 6 East, H.B., for mining purposes. Estimated cost $3,000.

EL DORADO COUNTY—Permit 3362, Application 6384. Issued to Tandy & Theis, Richmond, Cal., November 4, 1929, for 2 cubic feet per second from Cosumnes River in Section 22, Township 8 North, Range 10 East, M.D.M., for mining purposes. Estimated cost $250.

SAN BERNARDINO COUNTY—Permit 3363, Application 6293. Issued to R. H. Seals, Lucerne, Cal., November 5, 1929, for 0.5 cubic foot per second from Unnamed Spring in Section 15, Township 3 North, Range 1 West, S.B.M. for irrigation and domestic purposes on 40 acres. Estimated cost $500.

AMADOR COUNTY—Permit 3364, Application 6377. Issued to Brooke Realty Company, Sacramento, Cal., November 5, 1929, for 0.046 cubic foot per second from Slate Creek in Section 15, Township 8 North, Range 11 East, M.D.M., for domestic purposes. Estimated cost $700.

SAN JOAQUIN COUNTY—Permit 3365, Application 6386. Issued to T. Brandt Cross, et al., Stockton, Cal., November 6, 1929, for 4.55 cubic feet per second from San Joaquin River in Section 9, Township 1 South, Range 6 East, M.D.M., for irrigation purposes on 362.9 acres. Estimated cost $5,000.

EL DORADO COUNTY—Permit 3366, Application 6414. Issued to Raymond A. Young, Sacramento, Cal., November 6, 1929, for 200 gallons per day from Unnamed Spring in Section 5, Township 11 North, Range 17 East, M.D.M., for use for domestic purposes. Estimated cost $25.

SAN BERNARDINO COUNTY—Permit 3367, Application 6013. Issued to Oscar W. Peterson, Helendale, Cal., November 7, 1929, for 0.02 cubic foot per second from Quail Spring, in Section 10, Township 7 North, Range 3 West, S.B.M., for irrigation and domestic purposes on one acre. Estimated cost $7.00.

EL DORADO COUNTY—Permit 3368, Application 6339. Issued to John U. Morrison, Fairplay, Cal., November 8, 1929, for 2 cubic feet per second from Cedar Creek in Section 3, Township 8 North, Range 12 East, M.D.M., for power purposes. Estimated cost $500.

EL DORADO COUNTY—Permit 3369, Application 6275. Issued to Chas. P. and Myra J. Eells, Georgetown, Cal., November 8, 1929, for 0.05 cubic foot per second from Herrick Creek in Section 33, Township 12 North, Range 11 East, M.D.M. for irrigation and domestic purposes on 8 acres. Estimated cost $200.

HUMBOLDT COUNTY—Permit 3370, Application 6309. Issued to J. F. Brown, Trinidad, Cal., November 9, 1929, for 0.1 cubic foot per second from an Unnamed Creek in Section 35, Township 9 North, Range 1 West, H.M., for irrigation and domestic purposes on 6 acres.

EL DORADO COUNTY—Permit 3371, Application 6404. Issued to George Cunningham, Lotus, Cal., November 9, 1929, for 2.5 cubic feet per second from South Fork American River in Section 18, Township 11 North, Range 10 East, M.D.M. for mining purposes. Estimated cost $1,200.

RIVERSIDE COUNTY—Permit 3372, Application 6422. Issued to F. Wm. Seggie, Riverside, Cal., November 12, 1929, for 0.007 cubic foot per second from Mountain Lion Spring in Section 36, Township 3 South, Range 2 West, S.B.M. for domestic and irrigation purposes on 4 acres. Estimated cost $400.

EL DORADO COUNTY—Permit 3373, Application 6334. Issued to U. S. Eldorado National Forest, Placerville, Cal., November 13, 1929, for 1000 gallons per day from unnamed stream in Section 21, Township 13 North, Range 17 East, M.D.M., for domestic purposes. Estimated cost $400.

CONTRA COSTA COUNTY—Permit 3374, Application 6213. Issued to E. H. Stephenson, Oakland, Cal., November 13, 1929, for 0.1 cubic foot per second from Walnut Creek in Section 26, Township 1 North, Range 2 West, M.D.M., for irrigation purposes.

EL DORADO COUNTY—Permit 3375, Application 6403. Issued to Lora J. Knight, Santa Barbara, Cal., November 14, 1929, for 1 cubic foot per second from Unnamed Spring in Section 21, Township 13 North, Range 17 East, M.D.M., for irrigation and domestic purposes on 80 acres. Estimated cost $2,000.

VENTURA COUNTY—Permit 3376, Application 5881. Issued to John H. Dunshee, Ventura, Cal., November 14, 1929, for 0.075 cubic foot per second from Santa Ana Creek in Section 24, Township 4 North, Range 24 West, S.B.M., for irrigation and domestic purposes on 6 acres. Estimated cost $750.

LOS ANGELES COUNTY—Permit 3377, Application 4223. Issued to Glendora Consolidated Mutual Irrigation Co., Glendora, Cal., November 22, 1929, for 40 cubic feet per second from Big Dalton and Little Dalton canyons in Sections 21 and 20, Township 1 North, Range 9 West, S.B.M., for domestic and irrigation purposes on 2463.95 acres. Estimated cost $4,000.

LOS ANGELES COUNTY—Permit 3378, Application 5203. Issued to Glendora Consolidated Irrigation Co., Glendora, Cal., November 22, 1929, for 28.5 cubic feet per second from Big Dalton and Little Dalton canyons in Sections 20 and 21, Township 1 North, Range 9 West, S.B.M., for domestic and irrigation purposes on 2463.95 acres. Estimated cost $11,500.

SAN BERNARDINO COUNTY—Permit 3379, Application 5917. Issued to John C. Baldridge, Lucerne Valley, Cal., November 23, 1929, for 0.125 cubic foot per second from Bluebird Spring in Section 25, Township 5 North, Range 2 West, S.B.M., for use for irrigation and domestic purposes on 40 acres. Estimated cost $2,000.

SIERRA COUNTY—Permit 3380, Application 6411. Issued to Standard Mining Co., Downieville, Cal., November 23, 1929, for 2.5 cubic feet per second from Sailor Ravine in Section 22, Township 20 North, Range 10 East, M.D.M., for power purposes. Estimated cost $2,000.

TRINITY COUNTY—Permit 3381, Application 6273. Issued to J. J. Irving, Salyer, Cal., November 27, 1929, for 0.12 cubic foot per second from Swanson Creek in Section 29, Township 6 North, Range 6 East, H.M., for irrigation and domestic purposes on 10 acres. Estimated cost $150.

TRINITY COUNTY—Permit 3382, Application 6274. Issued to J. J. Irving, Salyer, Cal., November 27, 1929, for 3 cubic feet per second from Pony Bar

Creek in Section 28, Township 6 North, Range 6 East, H.M., for mining purposes. Estimated cost $50.

RIVERSIDE COUNTY—Permit 3383, Application 6023. Issued to U. S. San Bernardino National Forest, San Bernardino, Cal., November 29, 1929, for 0.006 cubic foot per second from Marion Creek in Section 6, Township 5 South, Range 3 East, S.B.M., for domestic purposes.

PLUMAS COUNTY—Permit 3384, Application 6186. Issued to Mrs. W. H. Day, Oroville, Cal., November 29, 1929, for 0.2 cubic foot per second from Jackass Creek in Section 16, Township 24 North, Range 6 East, M.D.M., for domestic and irrigation purposes on 15 acres. Estimated cost $750.

SISKIYOU COUNTY—Permit 3385, Application 6372. Issued to John S. Werts, Forks of Salmon, Cal., November 30, 1929, for 0.025 cubic foot per second from Another Creek, in Section 9, Township 10 North, Range 7 East, H.M., for irrigation and domestic purposes on 10 acres. Estimated cost $175.

Applications for Permit to Appropriate Water Filed With the State Department of Public Works, Division of Water Resources, During the Month of November, 1929.

NEVADA COUNTY—Application 6471. Charles H. Munro, Hobart Building, San Francisco, Cal., for 232.5 cubic feet per second from Middle Fork Yuba River, Bloody Run Creek and 6 unnamed tributaries, tributary to Middle Fork Yuba River. To be diverted in Section 13, Townshpi 18 North, Range 9 East, M.D.M., for mining. Estimated cost $1,540,000.

MONO COUNTY—Application 6472. Gilbert E. Humphrey, c/o W. T. Selleck, 213 S. Verdugo Road, Glendale, Cal., for 25,000 acre-feet per annum from (1) Adobe Creek, (2) River Springs, and (3) a series of wells tributary to Hammil Valley. To be diverted in Sections 20, 24, 11, 12, 13 and 14, Township 1 North, Range 30 East, M.D.M., Sections 19, 29, 30, 32, Township 1 North, Range 31 East, M.D.M., and Sections 5, 8, 17, 20, 29 and 32, Township 1 South, Range 31 East, M.D.M., for power purposes.

MONO COUNTY—Application 6473. Gilbert E. Humphrey, c/o W. T. Selleck, 213 S. Verdugo Road, Glendale, Cal., for 25,000 acre-feet per annum from (1) Adobe Creek, (2) River Springs, and (3) a series of wells tributary to Hammil Valley. To be diverted in Sections 20, 24, 11, 12, 13 and 14, Township 1 North, Range 30 East, M.D.M., Sections 19, 29, 30, 32, Township 1 North, Range 31 East, M.D.M., and Sections 5, 8, 17, 20, 29 and 32, Township 1 South, Range 31 East, M.D.M., for domestic and irrigation purposes.

SANTA CLARA COUNTY—Application 6474. Montezuma Mountain School for Boys, c/o C. M. Burleson, 444 61st Street, Oakland, Cal., for 1 cubic foot per second from Bear Creek tributary to Los Gatos Creek. To be diverted in Section 32, Township 8 South, Range 1 West, M.D.M., for irrigation purposes.

SAN BERNARDINO COUNTY—Application 6475. Aman Moore, c/o Cement Engr. Company, C. C. Chapman Building, Los Angeles, Cal., for one cubic foot per second from Unnamed Spring tributary to Cajon Valley. To be diverted in Section 2, Township 3 North, Range 7 West, S.B.M., for industrial purposes.

SAN BERNARDINO COUNTY—Application 6476. Aman Moore, c/o Cement Engineering Co., C. C. Chapman Building, Los Angeles, Cal., for one cubic foot per second from Unnamed Spring tributary to Cajon Valley. To be diverted in Section 1, Township 3 North, Range 7 West, S.B.M., for industrial purposes.

INYO COUNTY—Application 6477. The Ballarat Mining Corporation, Ballarat P. O. Box 246, Trona, Cal., for one cubic foot per second from The Cliff Springs, tributary to Panamint Valley Sinks. To be diverted in Section 16, Township 21 South, Range 45 East, M.D.M., for mining, milling and domestic purposes.

INYO COUNTY—Application 6478. The Ballarat Mining Corporation, P. O. Box 246, Trona, Cal., for 0.03 cubic foot per second from Post Office Spring (Paint Mine) tributary to Panamint Valley Sinks. To be diverted in Section 12, Township 22 South, Range 44 East, M.D.M., for mining and domestic purposes.

MERCED COUNTY—Application 6479. C. L. Schmidt, c/o C. R. Perrier, Attorney, for 0.6 cubic foot per second from Dry Creek tributary to Merced River. To be diverted in Section 13, Township 5 South, Range 12 East, M.D.M., for irrigation purposes. Estimated cost $500.

SAN BERNARDINO COUNTY—Application 6480. Aman Moore, 328 C. C. Chapman Building, Los Angeles, Cal., for 0.5 cubic foot per second from Unnamed Spring tributary to Cajon Valley. To be diverted in Section 12, Township 3 North, Range 7 West, S. B. M., for industrial purposes.

SAN BERNARDINO COUNTY—Application 6481. Aman Moore, 328 C. C. Chapman Building, Los Angeles, Cal., for 0.5 cubic foot per second from Unnamed Spring tributary to Cajon Valley. To be diverted in Section 12, Township 3 North, Range 7 West, S.B.M., for industrial purposes.

SAN BERNARDINO COUNTY—Application 6482. Aman Moore, 328 C. C. Chapman Building, Los Angeles, Cal., for 0.5 cubic foot per second from Unnamed Spring tributary to Cajon Valley. To be diverted in Section 13, Township 3 North, Range 7 West, S.B.M., for industrial purposes.

EL DORADO COUNTY—Application 6483. Franklin H. Cookinham and A. J. Minaker, 870 Market street, San Francisco, Cal., for 0.12 cubic foot per second from Unnamed Creek tributary to Cosumnes River. To be diverted in Section 16, Township 9 North, Range 10 East, M.D.M., for mining purposes. Estimated cost $500.

NEVADA COUNTY—Application 6484. Siberia Mine, c/o E. B. Frost, Agent, Nevada City, Cal., for one cubic foot per second from Grizzly Creek tributary to Middle Fork Yuba River. To be diverted in Section 26, Township 18 North, Range 8 East, M.D.M., for mining purposes. Estimated cost $2,500.

YOLO COUNTY—Application 6485. Constant Angle Arch Dam Co., c/o Don McKinney, Hobart Building, San Francisco, Cal., for 200,000 acre-feet per annum from Cache Creek tributary to Sacramento River. To be diverted in Section 5, Township 10 North, Range 2 West, M.D.M., for industrial and domestic purposes. Estimated cost $12,000,000.

SUTTER COUNTY—Application 6486. Scott F. Ennis and Edward S. Brown, Box 304, Sacramento, Cal., for 60 cubic feet per second from Sacramento River tributary to Suisun Bay. To be diverted in Section 15, Township 14 North, Range 1 East, M.D.M., for irrigation purposes. Estimated cost $41,000.

RIVERSIDE COUNTY—Application 6487. Idyllwild, Inc., Idyllwild, Cal., for 0.25 cubic foot per second from Marion Creek tributary to Strawberry

Creek. To be diverted in Section 6, Township 5 South, Range 3 East, S.B.M., for domestic purposes. Estimated cost $2,300.

SAN MATEO COUNTY—Application 6488. C. S. Crary, c/o A. E. Chandler, 723 Balboa Building, Second and Market streets, San Francisco, Cal., for 0.1564 cubic foot per second from La Honda Creek tributary to San Gregorio Creek. To be diverted in Section 26, Township 6 South, Range 4 West, M.D.M., for domestic purposes. Estimated cost $25,000.

SUTTER COUNTY—Application 6489. M. J. Newkom and H. E. Newkom, c/o Inman & West, Lawyers, McLean Building, Sacramento, Cal., for 11.14 cubic feet per second from Feather River tributary to Sacramento River. To be diverted in Section 35, Township 15 North, Range 3 East, M.D.M., for irrigation purposes. Estimated cost $4,357.

SUTTER COUNTY—Application 6490. California F. Hale Estate, c/o Inman & West, Attorneys, McLean Building, Sacramento, Cal., for 11.14 cubic feet per second from Feather River tributary to Sacramento River. To be diverted in Section 3, Township 15 North, Range 3 East, M.D.M., for irrigation purposes. Estimated cost $4,200.

TRINITY COUNTY—Application 6491. George E. Waggoner and Robert L. Little, 621 Manchester Drive, Inglewood, Cal., for 75 cubic feet per second from Stewart Fork and Deer Creek tributary to Trinity River. To be diverted in Section 3, Township 36 North, Range 10 West, M.D.M., for power purposes.

TRINITY COUNTY—Application 6492. George E. Waggoner and Robert L. Little, 621 Manchester Drive, Inglewood, Cal., for 100 cubic feet per second from Stewarts Fork and Deer Creek tributary to Trinity River. To be diverted in Sections 19 and 20, Township 36 North, Range 9 West, M.D.M., for power purposes.

TRINITY COUNTY—Application 6493. George E. Waggoner and Robert L. Little, 621 Manchester Drive, Inglewood, Cal., for 225 cubic feet per second from Stewarts Fork, Deer Creek, Owens Creek and Val Marte Creek, tributary to Trinity River. To be diverted in Section 6, Township 35 North, Range 9 West, M.D.M., Section 31, Township 36 North, Range 9 West, M.D.M., and Sections 13 and 25, Township 35 North, Range 10 West, M.D.M., for power purposes.

SISKIYOU COUNTY—Application 6494. Consolidated Copper Co., c/o J. F. Reddy, Liberty Bldg., Medford, Oregon, for 25 cubic feet per second from Elliott Creek tributary to Applegate Creek. To be diverted in Section 22, Township 48 North, Range 11 West, M.D.M., for power purposes.

SISKIYOU COUNTY—Application 6495. Consolidated Copper Co., c/o J. F. Reddy, Liberty Building, Medford, Ore., for 25 cubic feet per second from Middle Fork Applegate River tributary to Applegate River. To be diverted in Section 30, Township 48 North, Range 11 West, M.D.M., for power purposes.

HUMBOLDT COUNTY—Application 6496. Mr. Walter C. Hoffman, Star Route, Arcata, Humboldt County, Cal., for 0.03 cubic foot per second from Underwood Creek. To be diverted in Section 30, Township 7 North, Range 1 East, H.M., for irrigation and domestic purposes. Estimated cost $100.

SAN MATEO COUNTY—Application 6497. Bernard Ford, Hillsborough, San Mateo County, Cal., for 0.175 cubic foot per second from El Corte de Madera Creek and its tributaries, tributary to San Gregorio Creek. To be diverted in Sections 5 and 6, Township 7 South, Range 4 West, M.D.M., for irrigation and domestic purposes.

SAN MATEO COUNTY—Application 6498. Bernard Ford, Hillsborough, Cal., for 0.08 cubic foot per second from El Corte de Madera Creek tributary to San Gregorio Creek. To be diverted in Section 6, Township 7 South, Range 4 West, M.D.M., for recreational purposes.

PLACER AND NEVADA COUNTIES—Application 6499. Bear River Water and Power Co., c/o J. L. Rollins, Colfax, Cal., for 111,020 acre-feet per annum from Bear River and tributaries, tributary to Feather River. To be diverted in Section 27, Township 15 North, Range 9 East, M.D.M., or Section 22, Township 15 North, Range 9 East, M.D.M., for power purposes. Estimated cost $2,500,000.

RIVERSIDE COUNTY—Application 6500. United States National Bank, c/o Farrand and Slosson, Attorneys, 1028 Pacific Southwest Building, Los Angeles, Cal., for 5 cubic feet per second from Little Morongo Creek (surface and underground) tributary to Whitewater River. To be diverted in Section 24, Township 1 South, Range 4 East, S.B.M., for irrigation purposes. Estimated cost $50,000.

RIVERSIDE COUNTY—Application 6501. United States National Bank, c/o Farrand and Slosson, Attorneys, 1028 Pacific Southwest Building, Los Angeles, Cal., for 8 cubic feet per second from Big Morongo Creek (surface and underground) tributary to Whitewater River. To be diverted in Section 3, Township 2 South, Range 4 East, S.B.M. for irrigation. Estimated cost $20,000.

MADERA COUNTY—Application 6502. F. P. Burris and Associates, c/o J. W. Beebe, Redwood City, Cal., for 3 cubic feet per second from North Fork San Joaquin River tributary to San Joaquin River. To be diverted in Section 16, Township 3 South, Range 25 East, M.D.M., for power purposes. Estimated cost $750.

PENNSYLVANIA—Traffic studies show that 43.8 per cent of vehicles on state highways go 50 miles or farther per trip.

MICHIGAN—Detroit is investing $9,000,000 in street improvements this year. This figure includes $3,000,000 for widening and resurfacing. Over 100 miles of new street surfacing will be laid down.

OHIO—The National Road east of Springfield is being widened, a 12-mile section having been let for $445,000. This is the beginning of a program of widening this busy artery for its entire distance across the state.

MINNESOTA—Grading of 28.3 miles of highway on T. H. No. 35 between Hassman and Hill City is under way. Five jobs in progress make a total of 56.9 miles of grading. With work put under contract last spring, this will make a total of 276 miles built on permanent location this last summer.

"Whyfo' you all name yo' latest baby 'lectricity?'

"Well, Sam, it's this way—my wife's name is Dinah, and my name is Mose, and if dynamos don't make 'lectricity I'd like to know why not."

The Treasury Department received the following letter:

"I have received your application, but as I already belong to several good orders I do not care to join your income tax at this time."—*Exchange.*

STATE OF CALIFORNIA

Department of Public Works

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

C. C. YOUNG.....Governor

B. B. MEEK.....Director

CORNING DE SAULES.....Deputy Director

DIVISION OF HIGHWAYS

CALIFORNIA HIGHWAY COMMISSION

RALPH W. BULL, Chairman, Eureka
J. P. RAUMGARTNER, Commissioner, Santa Ana
M. B. HARRIS, Commissioner, Patterson Bldg., Fresno
JOSEPH M. SCHENCK, Commissioner, c/o United Artists Studio, Santa Monica Blvd., Los Angeles
FRED S. MOODY, Commissioner, 640 Kohl Bldg., San Francisco
C. H. PURCELL, State Highway Engineer, Sacramento
GEORGE C. MANSFIELD, Secretary
HARRY A. ENCELL, Attorney, San Francisco

HEADQUARTERS STAFF, SACRAMENTO

G. T. McCOY, Administrative Assistant
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
CHAS. E. ANDREW, Bridge Engineer
R. H. STALNAKER, Equipment Engineer
E. R. HIGGINS, Chief Accountant

DISTRICT ENGINEERS

F. W. HASELWOOD, District I, Eureka
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
E. Q. SULLIVAN, District VIII, San Bernardino
F. G. SOMNER, District IX, Bishop
R. E. PIERCE, District X, Sacramento
General Headquarters, Public Works Building, Eleventh and P Streets, Sacramento, California

DIVISION OF WATER RESOURCES

EDWARD HYATT, State Engineer, Chief of Division
J. J. HALEY, Jr., Administrative Assistant
HAROLD CONKLING, Deputy in Charge Water Rights
A. D. EDMONSTON, Deputy in Charge Water Resources Investigation
R. L. JONES, Deputy in Charge Flood Control and Reclamation
GEORGE W. HAWLEY, Deputy in Charge of Dams
SPENCER BURROUGHS, Attorney
EVERETT N. BRYAN, Hydraulic Engineer, Water Rights
A. N. BURCH, Irrigation Investigations
H. M. STAFFORD, Sacramento-San Joaquin Water Supervisor
GORDON ZANDER, Adjudication, Water Distribution
KATHERINE A. FEENY, Chief Clerk
MABEL PERRYMAN, Secretary
S. T. HARDING, Irrigation and Special Investigations

DIVISION OF ARCHITECTURE

GEO. B. McDOUGALL, Chief, Division of Architecture
P. T. POAGE, Assistant Architect
W. K. DANIELS, Deputy Chief of Division

HEADQUARTERS

H. W. DeHAVEN, Chief Architectural Draftsman
C. H. KROMER, Structural Engineer
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 MOTOR VEHICLES

FRANK G. SNOOK, Chief
EUGENE BISCAILUZ, Chief of California Highway Patrol

DIVISION OF CONTRACTS AND RIGHTS OF WAY

C. C. CARLETON, Chief

DIVISION OF PORTS

Port of Eureka—F. B. Barnum, Supervisor
Port of San Jose—Not appointed
Port of San Diego—Edgar A. Luce

STATE HIGHWAYS IN CALIFORNIA SHOWING THE PRIMARY AND SECONDARY ROAD SYSTEMS AND THE DIVISION OF THE STATE UNDER THE BREED BILL.

CALIFORNIA STATE PRINTING OFFICE
SACRAMENTO, 1929

72594 12-29 6600